



BRIDGING PAST AND FUTURE

Utilising cultural heritage values to increase resilience in Amsterdam's polder water system

PATTERNBOOK

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Utilising cultural heritage values to increase resilience in Amsterdam's polder water system

Delft University of Technology
Faculty of Architecture and the Built environment

Msc Architecture, Urbanism and Building sciences
Department of Urbanism
Graduation studio Design of the Urban Fabric
Pattern Book

Author:

Lieke van Lun
student number: 4844580

First mentor:

Claudiu Forgaci
Section of Urban Design

Second mentor:

Gerdy Verschuure–Stuip
Section of Landscape Architecture

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All images and figures are made by the author unless stated otherwise.

PROJECT ABSTRACT

This thesis explores the future of Amsterdam and the broader metropolitan region, all deeply influenced by a rich history of water management practices. Against this backdrop, the rising challenges of climate change are increasingly threatening the Dutch delta region. Recognising the historical significance and heritage associated with Amsterdam's water structures, this research aims to strengthen these assets to integrate a resilient water system with a strategy for sustainable heritage development in Amsterdam.

Qualitative and quantitative research have been combined to gain a better understanding of the water problems caused by climate change, enrich the understanding of contemporary cultural heritage values that are associated with the water system and look for spatial potential for urban transformation regarding water-related heritage. The integrated typology forms the basis for the design project, emphasising which design qualities can be improved in which places in the city.

In the design project, the maximisation method maximises the landscape and cultural resilience and by integrating these extremes it is intended to create the most sustainable urban plan. In parallel a pattern language will be developed that aims to generate design solutions that support the design qualities aimed for in this project.

The maximisation experiments and pattern language are combined into the integrated urban transformation plan and integrated implementation on the neighbourhood scale with two example neighbourhoods which show how different neighbourhood types can strengthen their water identity by integrating resilience water management with sustainable heritage development. Ultimately bridging past and future and creating a resilient urban environment.

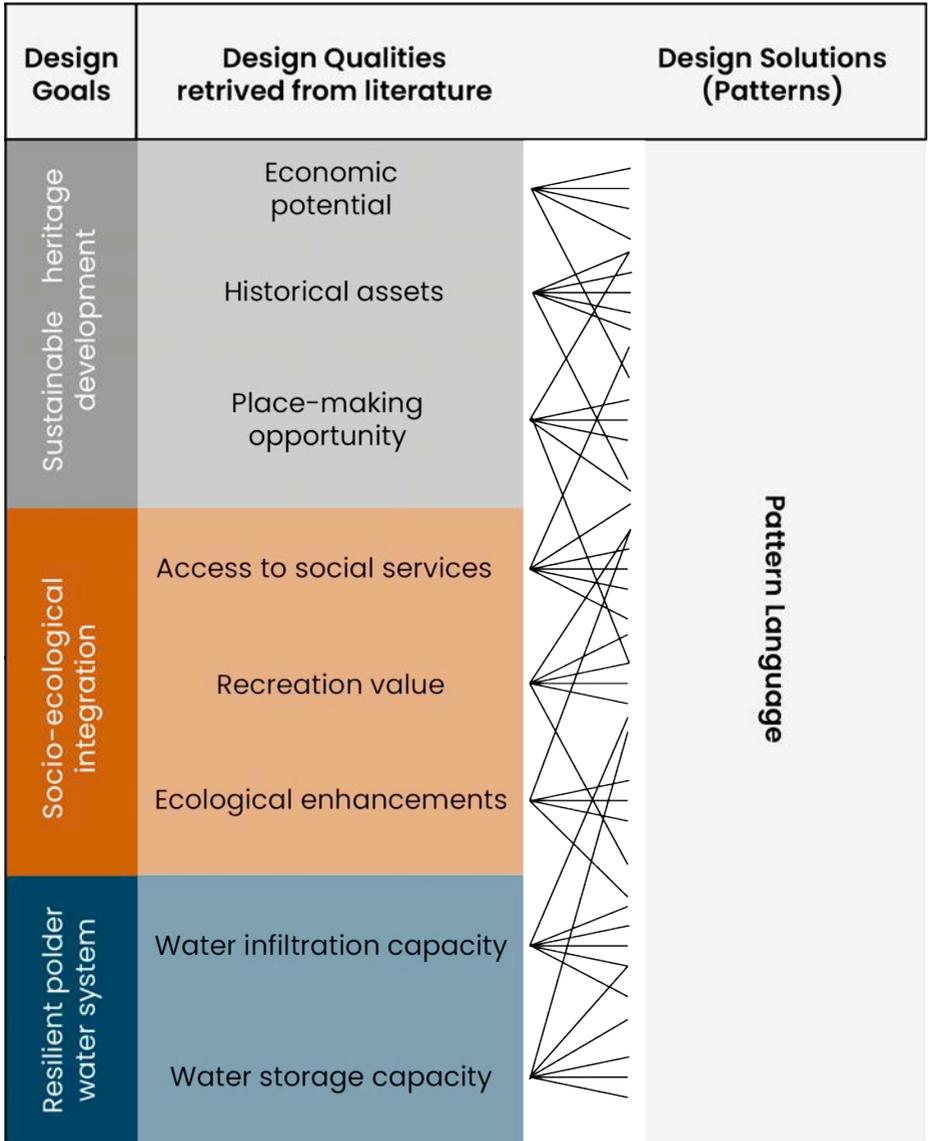
Keywords: Resilient water management, sustainable heritage development, socio-ecological integration, climate adaptation, integrated urban transformation

HOW TO USE THIS PATTERN BOOK

Based on the research and analysis in this project eight design qualities were formulated, they correspond to the three conceptual goals: Sustainable Heritage Development, Socio - Ecological Integration and Resilient Polder Water System. These eight design qualities are used as the starting point for the development of patterns (design solutions). A pattern can contribute to the improvement of one or multiple design qualities and therefore to one or multiple goals. The goal of this project is integrated urban transformation and therefore patterns that support different goals should be combined in an urban design. In the pattern network the connection between the patterns indicate the patterns that are compatible and thus allow for easy integration within one urban design.

In this project, the pattern language is used as a design tool. It is a systematic approach to generate and combine design solutions based on the design vision and design qualities. At the same time, the patterns allow for context-specific implementations, creating a framework for the integrated resilience of water and cultural heritage systems in different locations. This enables the transferability of knowledge and design solutions, which supports integrated urban transformation initiatives in other locations. The pattern book can be used by designers and decisionmakers, like municipalities.

In this pattern book all pattern are equal design solutions. However they may hold variations or different implications, if this is the case this is explained in the pattern. Patterns are often complementary and can coexist in one urban design. Every pattern card shows other pattern the decision solution relates to.



DESIGN OBJECTIVE

In the design project, the maximisation method will maximise the landscape and cultural resilience on a city scale and investigate conflicts and synergies for urban transformation in these systems. The maximisation method allows for the exploration of extreme scenarios and by integrating these extremes it is intended to create the most sustainable urban plan. In this case, the maximisation will be combined on a city and neighbourhood scale into the integrated urban transformation plan and integrated implementation on the neighbourhood scale.

In parallel a pattern language will be developed that aims to generate design solutions that support a resilient polder water system, sustainable heritage development and/or socio-ecological integration. The pattern language consists of design solutions (patterns) and their interrelations (the pattern language). The pattern language bridges scales as the individual patterns can be transferred to different locations, but also allows for context-specific design because of the many different possibilities to combine patterns. This makes the pattern language a welcoming tool in a multi-scalar integrated design project.

WHAT IS A PATTERN?

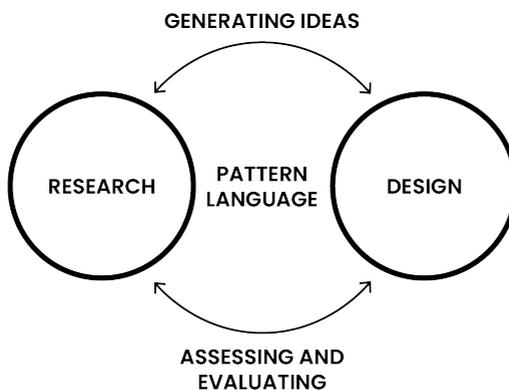
Christopher Alexander introduced patterns and pattern language in his books *A Pattern Language: Towns, Buildings, Construction* (1977) and *The Timeless Way of Building* (1979). According to Alexander a 'pattern' represents a solution to a design problem, that arises in a specific context. At the same time, a pattern is a generalised solution and be applied to different design problems (Alexander, 1977). Alexander's approach emphasizes the idea that certain problems in design recur across different contexts, and there are common-sense solutions that can be effective. A pattern is based on research sources like literature, interviews or (spatial) data and therefore it plays a crucial role in systematically connecting research and design. In this project, patterns are neighbourhood-scale solutions that increase social, ecological and historical values, based on the eight design qualities that ought to be increased.

THE PATTERN LANGUAGE

A pattern language shows the interrelations between individual patterns. Each pattern is a self-contained piece of advice, and the language provides a framework for assembling these patterns to create a coherent design. A pattern language is useful to simplify the complexity of integrated urban transformation. A pattern language promotes the replicability of the design solutions across different urban areas, while also being adaptable in a specific location context. The pattern language can have different roles (Cai, 2018):

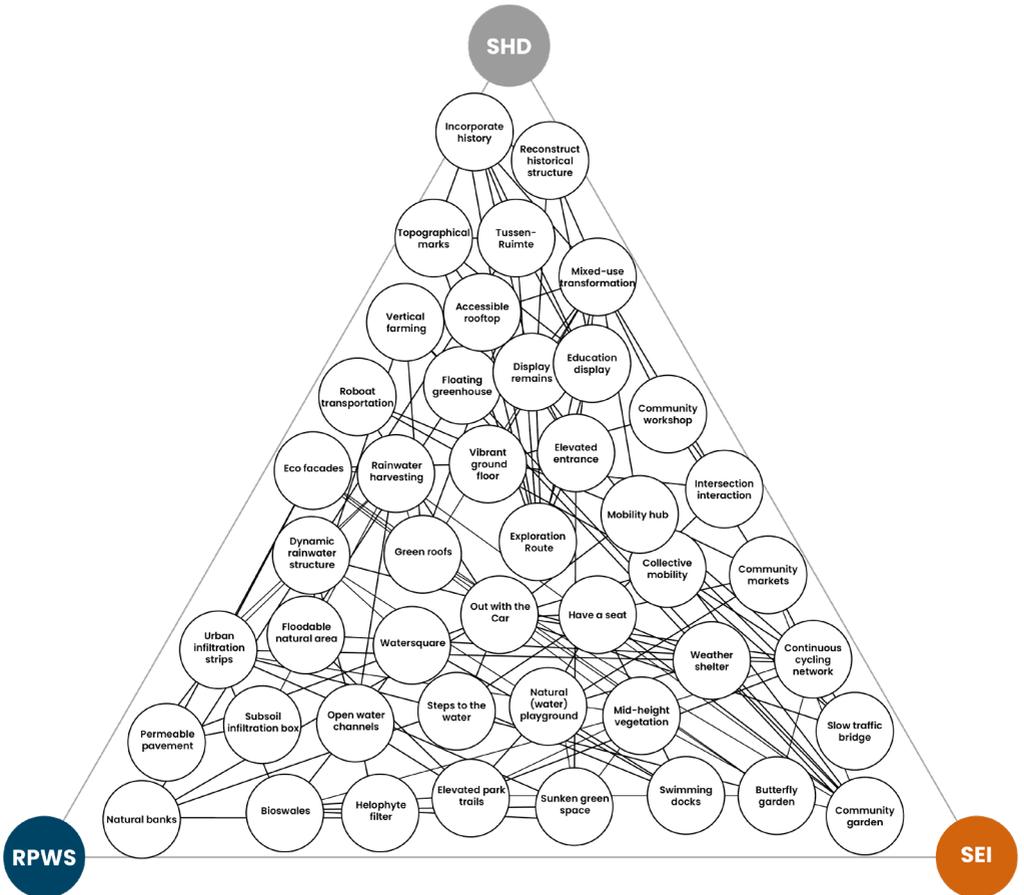
- It can be a learning tool to have a systematic approach to handling spatial and non-spatial data and organise this in an integrated way, using the same format.
- It can be used as a presentation and communication tool: Patterns visualise different types of information into straightforward solutions. This enables the communication between researchers, designers and stakeholders. In addition, a pattern language could be used in co-creation and co-design tools enhancing collaboration and bottom-up design solutions.
- It can be used as a design tool to structure and combine ideas and generate new ideas. It translates research outcomes into design vocabulary, explores design concepts and generates designs.
- Moreover, the pattern language can be used as an assessment tool to show to what extent the design solutions support the design qualities envisioned for this project.

Visual representation of the pattern language as design and research approach



THE PATTERN NETWORK

The pattern network shows how the patterns relate to the three design goals. In the pattern network the connection between the patterns indicate the patterns that are compatible and thus allow for easy integration within one urban design.



**SOLUTIONS FOR
ONE OR MULTIPLE
DESIGN QUALITIES**

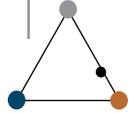
P#
TITLE

**POSITION IN THE
PATTERN NETWORK
BASED ON THE
PROJECT GOALS**

SUPPORTS QUALITIES



**PATTERN
NETWORK**



A HYPOTHESIS IS A STATEMENT THAT SHOWS WHY THIS PATTERN IS A DESIGN SOLUTION TO PROMOTE ONE OR MULTIPLE DESIGN GUIDELINES

**A SKETCH OR
SUPPORTIVE
IMAGE OF THE
SOLUTION**

RELATES TO

P # TITLE

**RELATION
TO OTHER
PATTERNS**

SOURCE

A SPECIFIC LINK OR REFERENCE TO THE DATA OR LITERATURE THAT SUPPORT THIS SOLUTIONS

THEORETICAL BACK-UP

Clarification of the design solution based on literature research or reference projects

PRACTICAL IMPLICATION

A suggestions for the scale and context this solutions fits in.
Possible the explanation of variations or different implementation possibilities.

Q1 BOOST ECONOMIC POTENTIAL

Q2 RENEW HISTORICAL ASSETS

Q3 CREATE PLACE-MAKING OPPORTUNITY

Q4 IMPROVE ACCESS TO SOCIAL SERVICES

Q5 STRENGTHEN RECREATIONAL OPPORTUNITIES

Q6 INCREASE ECOLOGICAL ENHANCEMENT

Q7 MAXIMISE WATER INFILTRATION CAPACITY

Q8 EXPAND WATER STORAGE CAPACITY

PATTERN OVERVIEW

Q1 BOOST ECONOMIC POTENTIAL

Ensuring long-term financial viability of the city by promoting sustainable economic activities by using heritage assets for sustainable tourism, cultural events, and local businesses.

Contains Design Solutions:

- P1 Community Market**
- P2 Roboat Transportation**
- P3 Exploration Route**
- P4 Vertical Farming**
- P5 Floating Greenhouse**
- P6 Intersection Interaction**
- P7 Mixed-Use Transformation**
- P9 Accessible Rooftop**
- P12 Incorporate History**
- P16 Vibrant Ground Floor**
- P21 Mobility Hub**

Q2 RENEW HISTORICAL ASSETS

Safeguard and promote Amsterdam's rich historical assets by integrating historical artifacts into sustainable development practices

Contains Design Solutions:

- P3 Exploration Route**
- P7 Mixed-Use Transformation**
- P8 Tussen - Ruimte**
- P9 Accessible Rooftop**
- P10 Elevated Entrance**
- P11 Topographical Marks**
- P12 Incorporate History**
- P13 Education Display**
- P14 Display remains**
- P15 Reconstruct historical structure**
- P16 Vibrant Ground Floor**

Q3 CREATE PLACE-MAKING OPPORTUNITY

Make use of historical and socially valued places as focal points for community engagement, creating vibrant and inclusive public spaces that celebrate Amsterdam's cultural identity.

Contains Design Solutions:

- P1 Community Market**
- P6 Intersection Interaction**
- P7 Mixed-Use Transformation**
- P9 Accessible Rooftop**
- P14 Display remains**
- P16 Vibrant Ground Floor**
- P17 Community Workshop**
- P19 Have a Seat**
- P26 Swimming Docks**
- P33 Community Garden**
- P24 Weather Shelter**

Q4 IMPROVE ACCESS TO SOCIAL SERVICES

Ensure equitable access to social services by strategically locating and combining amenities such as healthcare, education, and community centres to serve diverse neighbourhoods.

Contains Design Solutions:

- P6 Intersection Interaction**
- P7 Mixed-Use Transformation**
- P10 Elevated Entrance**
- P17 Community Workshop**
- P18 Out with the Car**
- P19 Have a Seat**
- P20 Collective Mobility**
- P21 Mobility Hub**
- P22 Continuous Cycling Network**
- P23 Slow Traffic Bridge**
- P27 Elevated Park Trails**

Q5 STRENGTHEN RECREATIONAL OPPORTUNITIES

Develop accessible and diverse recreational spaces that support the well-being of residents, strengthen a sense of community and promote an active lifestyle.

Contains Design Solutions:

P2	Roboat Transportation	P24	Weather Shelter
P3	Exploration Route	P25	Steps to the Water
P9	Accessible Rooftop	P26	Swimming Docks
P17	Community Workshop	P27	Elevated Park Trails
P18	Out with the Car	P28	Natural (water) Playground
P19	Have a Seat	P29	Dynamic (rain)water Structure
P22	Continious Cycling Network	P33	Community Garden
P23	Slow Traffic Bridge	P45	Watersquare

Q6 INCREASE ECOLOGICAL ENHANCEMENT

Integrate green infrastructure and biodiversity initiatives into urban planning, enhancing ecological resilience and promoting a healthier urban environment.

Contains Design Solutions:

P4	Vertical Farming	P35	Helophyte Filters
P5	Floating Greenhouse	P36	Eco Facades
P25	Steps to the Water	P37	Floodable Natural Area
P30	Green Roofs	P38	Urban Infiltration Strips
P31	Rainwater Harvesting	P40	Permeable Pavement
P32	Butterfly Garden	P42	Bioswales
P33	Community Garden	P43	Natural Banks
P34	Mid height vegetation		

Q7 MAXIMISE WATER INFILTRATION CAPACITY

Implement permeable urban surfaces and green technologies to enhance water infiltration, mitigating the impact of heavy rainfall and supporting sustainable water management.

Contains Design Solutions:

- P28 Natural (water) Playground
- P30 Green Roofs
- P31 Rainwater Harvesting
- P34 Mid height vegetation
- P35 Helophyte Filters
- P36 Eco Facades
- P38 Urban Infiltration Strips
- P39 Subsoil Infiltration Box
- P40 Permeable Pavement
- P41 Open Water Channel
- P42 Bioswales
- P43 Natural Banks

Q8 EXPAND WATER STORAGE CAPACITY

Design water-storage features that serve dual purposes, contributing to flood resilience and providing opportunities for aesthetic water features, enhancing the urban landscape and recreation possibilities

Contains Design Solutions:

- P10 Elevated Entrance
- P28 Natural (water) Playground
- P29 Dynamic (rain)water Structure
- P30 Green Roofs
- P37 Floodable Natural Area
- P38 Urban Infiltration Strips
- P41 Open Water Channel
- P42 Bioswales
- P43 Natural Banks
- P44 Sunken Green Space
- P45 Watersquare

P1

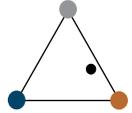
COMMUNITY MARKET

SUPPORTS QUALITIES

Q1

Q3

PATTERN
NETWORK



A COMMUNITY MARKET GENERATES LOCAL ECONOMIC ACTIVITY, COMMUNITY ENGAGEMENT AND DIVERS SHOPPING EXPERIENCES

RELATES TO

- P17 Community workshop
- P19 Have a seat
- P21 Mobility hub
- P22 Continuous cycling network
- P28 Natural (water) playground



SOURCE

Project for Public Spaces. (2008). *Why public markets?* Retrieved February 26, 2024, from <https://www.pps.org/article/why-public-markets#:~:text=Public%20markets%20can%20revitalize%20communities,and%20sociable%20public%20gathering%20places>.

THEORETICAL BACK-UP

Public markets have the potential to bring life into communities by offering economic opportunities. It increases the access to local food, bridging the gap between urban and rural areas and provide safe and social spaces to gather. Successful markets generate activity that revitalises an entire area. A public market is located in a public space and is composed of independent owner-operated businesses

PRACTICAL IMPLICATION

There are different types of community markets. They can be open-air markets, covered markets, indoor market halls and market districts. The size and variety of these markets can vary. Community Markets can be weekly recurring food markets in neighbourhoods. Less reoccurring markets can be more focused on community-making and community-specific activities. Car accessibility is needed to supply the markets, while the market area itself should be a pedestrian area.

P2

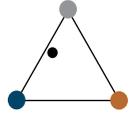
ROBOAT TRANSPORTATION

SUPPORTS QUALITIES

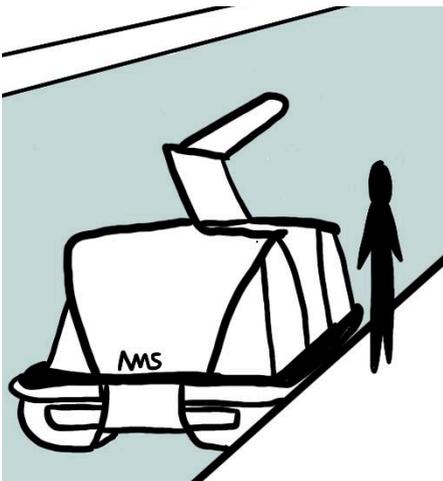
Q1

Q5

PATTERN NETWORK



ROBOATS ARE ELECTRIC POWERED AUTONOMOUS BOATS. IT CREATES DYNAMIC TRANSPORTATION OF GOODS AND PEOPLE, AND ENVIRONMENTAL CONSCIOUS EXPERIENCES ON THE CANALS



RELATES TO

P18 Out with the car

P20 Collective mobility

P21 Mobility hub

SOURCE

Amsterdam Institute for Advanced Metropolitan Solutions. (n.d.). Roboat. Retrieved February 26, 2024, from <https://www.ams-institute.org/urban-challenges/smart-urban-mobility/roboat/>

THEORETICAL BACK-UP

Roboats is a research project by the AMS Institute creating autonomous floating vessels that could be used for waste collection, the transportation of goods and eventually people. At the moment (2024) they are working on the full-scale prototype. When Roboat is developed into a commercial product, Amsterdam's canals could be once again used for transportation.

PRACTICAL IMPLICATION

The Roboat can majorly change urban transport. The first prototype focuses on the transport of goods and collection of waste from the city centre waters. With floating dumpsters, Roboats could allow for a sustainable type of waste collection and recycling. The future plan is to use Roboats as a waterbus or canal cruise for both residents and tourists.

P3

EXPLORATION ROUTE

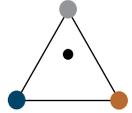
SUPPORTS QUALITIES

Q1

Q2

Q5

PATTERN NETWORK



(ONLINE) EXPLORATIVE ROUTES OR SCAVENGER HUNTS THROUGH THE CITY GUIDE THE USER THROUGH NATURAL OR HISTORICAL HIDDEN GEMS

RELATES TO

P8 Tussen - ruimte

P9 Accessible rooftop

P11 Topographical marks

P13 Education displays

P14 Display remains



SOURCE

Kiefer, P., Matyas, S., & Schlieder, C. (2006). *Learning about cultural heritage by playing geogames*. In *Lecture Notes in Computer Science* (pp. 217–228). https://doi.org/10.1007/11872320_26

P4

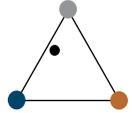
VERTICAL FARMING

SUPPORTS QUALITIES

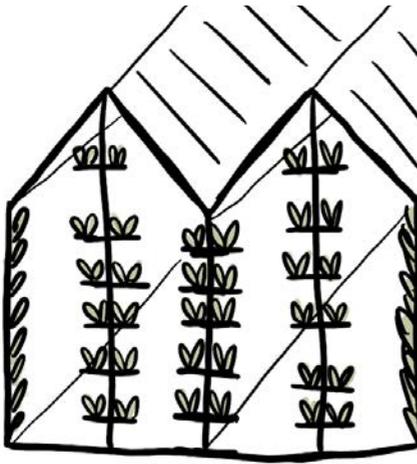
Q1

Q6

PATTERN
NETWORK



WITH THE DECREASE OF AGRICULTURAL LAND OUTSIDE OF THE CITY
MORE AGRICULTURAL PRACTICES SHOULD BE LOCATED INSIDE THE
URBAN FABRIC



RELATES TO

- P5 Floating greenhouse
- P30 Green roofs
- P33 Community garden
- P37 Floodable natural area

SOURCE

Ji, Y., Kusuma, P., & Marcelis, L. (2023). Vertical farming. *Current Biology*, 33(11), R471–R473. <https://doi.org/10.1016/j.cub.2023.02.010>

P5

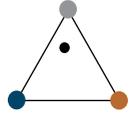
FLOATING GREENHOUSE

SUPPORTS QUALITIES

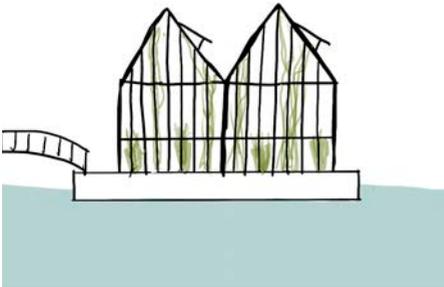
Q1

Q6

PATTERN NETWORK



A FLOATING GREENHOUSE CAN STILL PRODUCE FOOD WHILE USING THE SAME SPACE FOR WATER STORAGE



RELATES TO

P4

Vertical farming

P33

Community garden

P37

Floodable natural area

SOURCE

Steffen, A. D., & Steffen, A. D. (2023, July 28). *The Jellyfish Barge: a Self-Sustaining modular floating greenhouse*. Intelligent Living. <https://www.intelligentliving.co/the-jellyfish-barge-modular-floating-greenhouse/>

P6

INTERSECTION INTERACTION

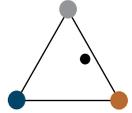
SUPPORTS QUALITIES

Q1

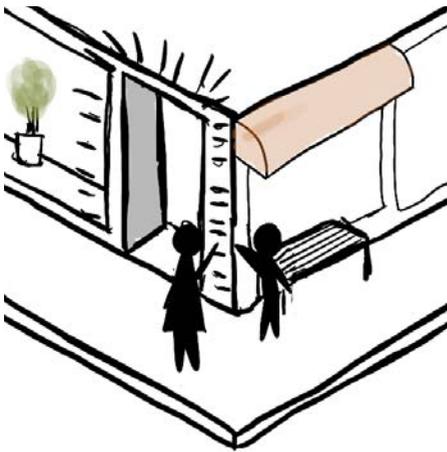
Q3

Q4

PATTERN NETWORK



STREET CORNERS ARE POINTS OF HUMAN COLLISION BY USING THE INTERSECTION AS PLACE TO MEET, GATHER AND INTERACT IT ENHANCES COMMUNITY COHESION



RELATES TO

- P7 Mixed use transformation
- P16 Vibrant ground floor
- P17 Community workshop
- P19 Have a seat

SOURCE

Hillier, B. (2001). *The social logic of space*.

P7

MIXED USE TRANSFORMATION

SUPPORTS QUALITIES

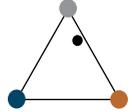
Q1

Q2

Q3

Q4

PATTERN NETWORK



MONUMENTAL BUILDINGS ARE OFTEN LARGE EXPENSIVE BUILDINGS AND REMAIN VACANT. DIVIDING THE BUILDING IN SMALLER FUNCTIONS CAN MAKE IT LIVELY AGAIN.



RELATES TO

- P6 Intersection interaction
- P9 Accessible rooftop
- P10 Elevated entrance
- P12 Incorporate history
- P14 Display remains
- P15 Reconstruct historical structure
- P16 Vibrant ground floor
- P17 Community workshop

SOURCE

Jacobs, J. (1992). *The death and life of great American cities*. Vintage.

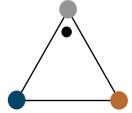
P8

TUSSEN - RUIMTE

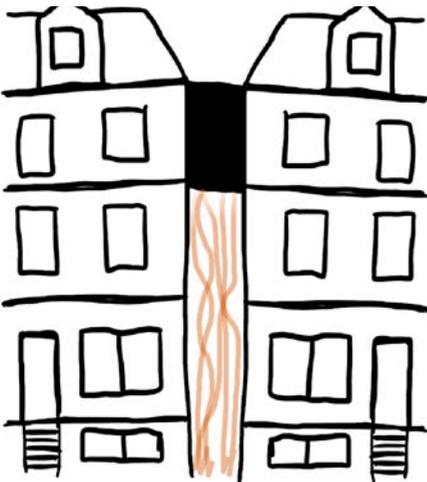
SUPPORTS QUALITIES

Q2

PATTERN
NETWORK



TUSSEN - RUIMTE IS AN EXCISTING PROJECT THAT USES THE SMALL ALLEYS IN THE AMSTERDAM CANAL RING FOR ART AND INTERACTIVE INSTALLATIONS



RELATES TO

- P3 Exploration route
- P11 Topographical marks
- P12 Incorporate history
- P13 Education displays
- P29 Dynamic rainwater structure

SOURCE

HOH Architecten. (2024, January 10). Tussen-ruimte. Retrieved March 5, 2024, from <https://www.hoh-architecten.com/project/tussenruimte/>

P9

ACCESSIBLE ROOFTOP

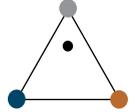
SUPPORTS QUALITIES

Q2

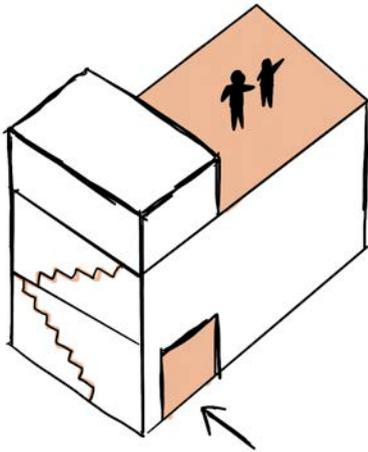
Q3

Q5

PATTERN NETWORK



OPENING UP THE ROOFTOPS FOR DIFFERENT FUNCTIONS WILL ALLOW FOR NEW FUNCTIONS IN THE DENSE URBAN FABRIC AND ALLOWS FOR NEW WAYS TO EXPERIENCE THE CITY



RELATES TO

P3 Exploration route

P7 Mixed use transformation

P10 Elevated entrance

P30 Green roofs

P33 Community garden

SOURCE

Maas, W., Mvrdv, & Van Manen, S. (2021). *Dakencatalogus, néerlandais ; Flamand.*

THEORETICAL BACK-UP

In most cities space is scarce, while there are hectares of rooftops available for new possibilities. The roofs can contribute to a healthy, inclusive and sustainable urban environment. It allows the user to see the city from a new perspective.

PRACTICAL IMPLICATION

Roughly there are two types of accessible rooftops to consider: Internal access or external access rooftops. Internally accessed rooftops often hold a function that relates to the building, if the building is private, the rooftop will have a private function like a community garden or (restaurant) terrace. External and sometimes internally accessed rooftops can hold public functions like sports fields and parks. It is important to note that rooftops are often also needed to generate solar energy.

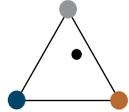
P10

ELEVATED ENTRANCE

SUPPORTS QUALITIES



PATTERN NETWORK



ELEVATED NETWORKS ALLOW FOR THE ACCESSIBILITY OF DIFFERENT FLOORS OF MIXED USE BUILDINGS AND ARE BACK-UP ROUTES IN CASE OF FLOODS

RELATES TO

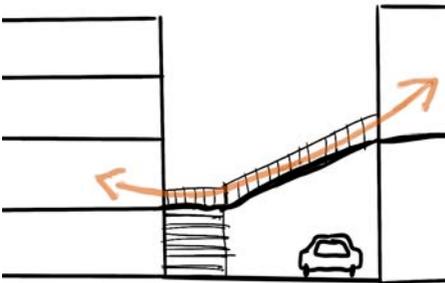
P7 Mixed use transformation

P9 Accessible rooftop

P14 Display remains

P36 Eco facades

P44 Sunken green space



SOURCE

HafenCity Hamburg GmbH. (n.d.). Infrastructure. HafenCity. Retrieved February 26, 2024, from <https://www.hafencity.com/en/urban-development/infrastructure>

THEORETICAL BACK-UP

Elevated entrance is a good measure in dense urban networks, where pedestrians need an easy lane to enter the different stories of a building. It can also be used in less dense environments as a backup route over green space or water channels that are used for water storage when there are high water quantities.

PRACTICAL IMPLICATION

An elevated network has different implications. It can be used as a bridge between building components to enhance the accessibility of the different floors. This can also be done from street level to open public access of the different floors. It can be used in new development to allow for accessibility in case of flooding, for example, this is done in the Hamburg Hafencity.

P12

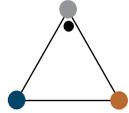
INCORPORATE HISTORY

SUPPORTS QUALITIES

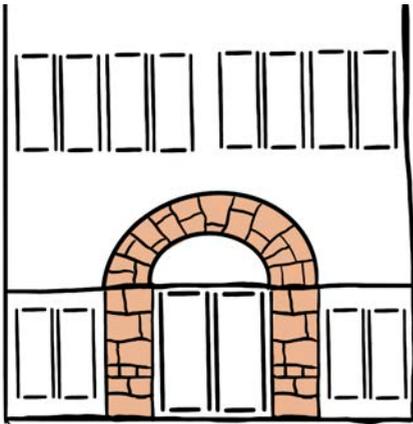
Q1

Q2

PATTERN
NETWORK



INCORPORATING HISTORICAL STRUCTURE IN NEW DEVELOPMENT WILL SHOW CASE THE TIME PARADIGM AND IDENTITY OF THE PLACE.



RELATES TO

- P3 Exploration route
- P7 Mixed use transformation
- P8 Tussen - ruimte
- P11 Topographical mark
- P13 Education displays
- P14 Display remains
- P15 Reconstruct historical structure

SOURCE

Colenbrander, B. (2005). *Limes atlas*. 010 Publishers.

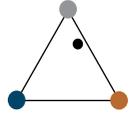
P13

EDUCATION DISPLAY

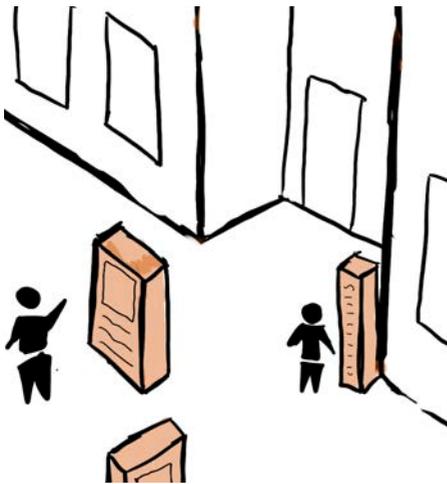
SUPPORTS QUALITIES

Q2

PATTERN
NETWORK



SIGNS OR MULTIMEDIA DISPLAYS EDUCATE PASSERSBY ABOUT THE HISTORY OF A PUBLIC SPACE.



RELATES TO

- P3 Exploration route
- P8 Tussen - ruimte
- P11 Topographical mark
- P12 Incorporate history
- P15 Reconstruct historical structure

SOURCE

Colenbrander, B. (2005). *Limes atlas*. 010 Publishers.

P14

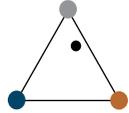
DISPLAY REMAINS

SUPPORTS QUALITIES

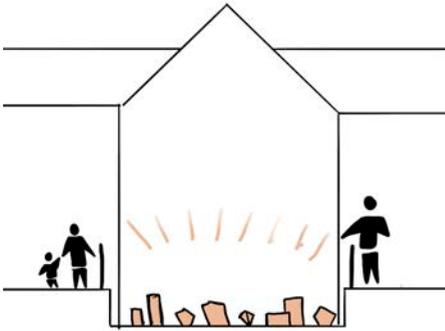
Q2

Q3

PATTERN
NETWORK



DISPLAYING HISTORICAL REMAINS SHOWS HISTORICAL STRUCTURE IN THEIR ORIGINAL PLACE, HIGHLIGHTING DIFFERENT STAGES IN URBAN DEVELOPMENT



RELATES TO

- P3 Exploration route
- P7 Mixed-use transformation
- P10 Elevated entrance
- P12 Incorporate history
- P15 Reconstruct historical structure
- P27 Elevated park trails

SOURCE

Colenbrander, B. (2005). *Limes atlas*. 010 Publishers.

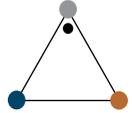
P15

RECONSTRUCT HISTORICAL STRUCTURE

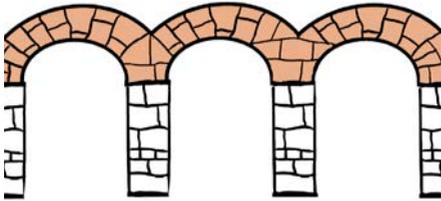
SUPPORTS QUALITIES

Q2

PATTERN
NETWORK



RECONSTRUCTING BROKEN DOWN HISTORICAL STRUCTURE SHOW
THE HISTORIC ACTIVITIES IN A PLACE



RELATES TO

- P7 Mixed-use transformation
- P11 Incorporate history
- P13 Education display
- P14 Display remains

SOURCE

Colenbrander, B. (2005). *Limes atlas*. 010 Publishers.

P16

VIBRANT GROUND FLOOR

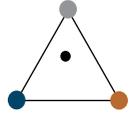
SUPPORTS QUALITIES

Q1

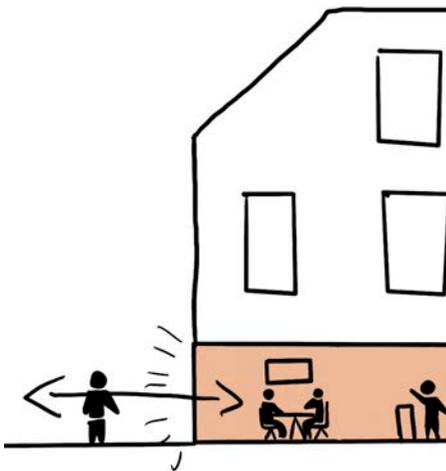
Q2

Q3

PATTERN NETWORK



THE GROUND FLOOR IS THE MOST VIBRANT PLACE IN A BUILDING AND CAN ACTIVATE THE STREET WITH DIFFERENT FUNCTIONS.



RELATES TO

P6

Intersection interaction

P7

Mixed use transformation

P17

Community workshop

P36

Eco facades

SOURCE

Sim, D. (2019). *Soft City: Building Density for Everyday Life*. Island Press.

P17

COMMUNITY WORKSHOP

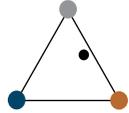
SUPPORTS QUALITIES

Q3

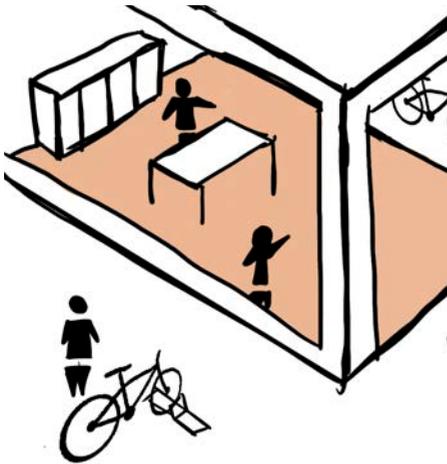
Q4

Q5

PATTERN NETWORK



NEIGHBOURHOOD WORKSHOPS CAN GENERATE SOCIAL AND ENVIRONMENTAL VALUE BY THE PROMOTING OF SHARING AND REPAIRING WITHIN THE COMMUNITY



RELATES TO

- P1 Community markets
- P6 Intersection interaction
- P7 Mixed use transformation
- P16 Vibrant ground floor

SOURCE

CoM. (n.d.). P.2 Shared Making Spaces & Technology. *Cities of Making*. Retrieved March 6, 2024, from <https://citiesofmaking.com/pattern/p2/>

P18

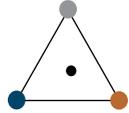
OUT WITH THE CAR

SUPPORTS QUALITIES

Q4

Q5

PATTERN NETWORK



LIMITING CAR ROADS AND CAR PARKING ALONG WATERWAYS WILL STRENGTHEN THE ACCESSIBILITY OF THE URBAN WATERFRONT AND ITS AESTHETIC VALUE



RELATES TO

P2 Roboat transportation

P19 Have a seat

P20 Collective mobility

P21 Mobility hub

P25 Steps to the water

P40 Permeable pavement

SOURCE

- Based on the survey in this project

- Studio Lucy & Claire. (2024, January 26). Amsterdam Autoluw Magazine / editie 5. Gemeente Amsterdam: Magazine Autoluw. <https://amsterdam-autoluw-magazine.readz.com/editie-5>

P19

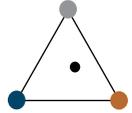
HAVE A SEAT

SUPPORTS QUALITIES

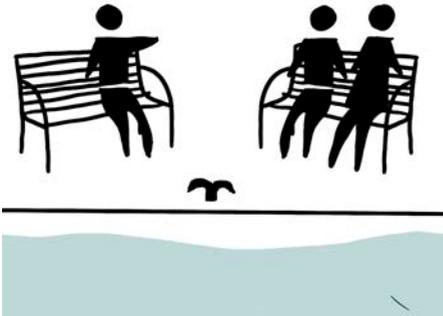
Q3

Q5

PATTERN NETWORK



PLACES TO SIT IN PUBLIC SPACE ALLOW FOR RELAXATION AND ACTIVATES PUBLIC SPACE, IMPROVING THE SAFETY AND SOCIAL COHESION



RELATES TO

- P1 Community markets
- P6 Intersection interaction
- P18 Out with the car
- P24 Weather shelter
- P25 Steps to the water
- P26 Swimming docks
- P28 Natural (water) playground
- P33 Community gardens

SOURCE

- Based on the survey in this project
- Mumcu, S., & Yilmaz, S. (2016). Seating Furniture in Open Spaces and Their Contribution to the Social Life. In *Environmental Sustainability and Landscape Management* (pp. 169–187). ST. KLIMENT OHRIDSKI UNIVERSITY PRESS. https://www.researchgate.net/publication/309285059_Seating_Furniture_in_Open_Spaces_and_Their_Contribution_to_the_Social_Life

THEORETICAL BACK-UP

From the survey it became clear that inhabitants of Amsterdam miss adequate places to sit along the urban waterfront. They ask for an increase in spaces to sit and relax in the city, especially in the historical city centre. The existence of stationary activities creates the vitality of public space. Because seating allows for a longer duration of your stay in public space. In places with a lot of seating possibilities, more social activities take place.

PRACTICAL IMPLICATION

Increasing the possibilities to sit and relax does not uniformly mean placing benches. The variety of seating possibilities increases the success rate. This includes benches, picnic tables, grass that allows for occupation and plant borders. Moreover, seating is important to include in other patterns like a playground and community gardens.

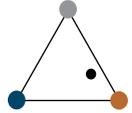
P20

COLLECTIVE MOBILITY

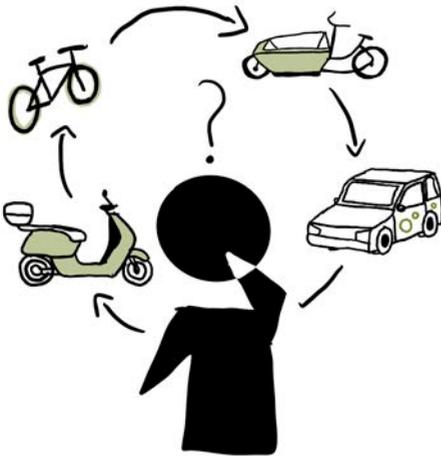
SUPPORTS QUALITIES

Q4

PATTERN
NETWORK



ELECTRIC COLLECTIVE MOBILITY INCREASES ACCESSIBILITY OF SOCIO-CULTURAL FACILITIES AND PROMOTES SUSTAINABLE MODES OF TRANSPORT



RELATES TO

- P2 Roboat transportation
- P18 Out with the car
- P21 Mobility hub
- P22 Continuous cycling network

SOURCE

Amsterdam. (2024, March 6). Deelvervoer. Amsterdam.nl. <https://www.amsterdam.nl/deelvervoer/>

P21

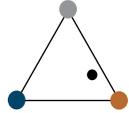
MOBILITY HUB

SUPPORTS QUALITIES

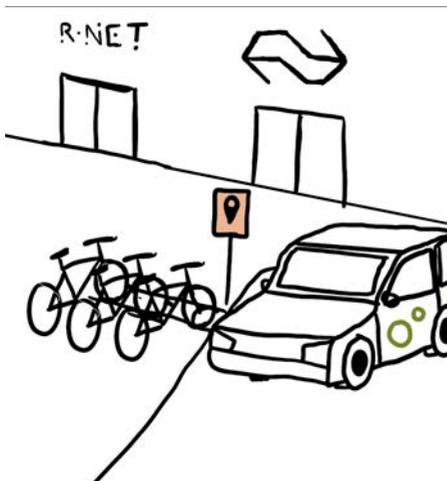
Q1

Q4

PATTERN NETWORK



MOBILITY HUBS ENSURE FAST AND EFFICIENT TRANSFERS BETWEEN DIFFERENT MODES OF SUSTAINABLE TRANSPORT



RELATES TO

- P1 Community markets
- P2 Roboat transportation
- P7 Mixed use transformation
- P18 Out with the car
- P20 Collective mobility
- P22 Continious cycling network

SOURCE

Amsterdam. (2024, March 6). Deelvervoer. Amsterdam.nl. <https://www.amsterdam.nl/deelvervoer/>

P22

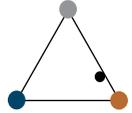
CONTINUOUS CYCLING NETWORK

SUPPORTS QUALITIES

Q4

Q5

PATTERN
NETWORK



A CONTINUOUS CYCLING NETWORK INCREASES THE ACCESSIBILITY OF SOCIO-CULTURAL FACILITIES AND PROMOTES SUSTAINABLE MODES OF TRANSPORT



RELATES TO

- P18 Out with the car
- P20 Collective mobility
- P21 Mobility hub
- P23 Slow traffic bridge
- P34 Mid-height vegetation
- P37 Floodable natural area
- P38 Urban infiltration strips

SOURCE

Based on the survey in this project

P23

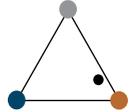
SLOW TRAFFIC BRIDGE

SUPPORTS QUALITIES

Q4

Q5

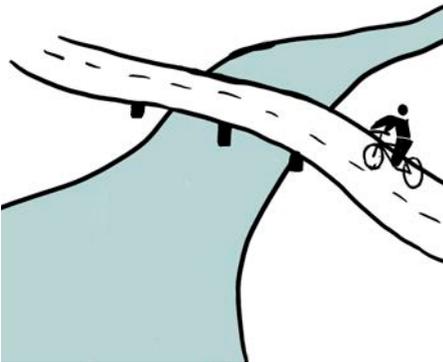
PATTERN NETWORK



A SLOW TRAFFIC BRIDGE INCREASES THE ACCESSIBILITY OF SOCIO-CULTURAL FACILITIES AND PROMOTES SUSTAINABLE MODES OF TRANSPORT

RELATES TO

- P18 Out with the car
- P20 Collective mobility
- P21 Mobility hub
- P22 Continuous cycling network



SOURCE

Amsterdam. (2024b, March 15). De Oostbrug. Amsterdam.nl. <https://www.amsterdam.nl/verkeer-vervoer/sprong-ij-snel-makkelijk-veilig-overkant/oostbrug/>

P24

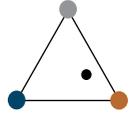
WEATHER SHELTER

SUPPORTS QUALITIES

Q3

Q5

PATTERN NETWORK



WEATHER SHELTERS IN PUBLIC SPACE MAKE THE PUBLIC SPACE USE-FULL WHEN IT RAINS AND PROVIDE SHADE WHEN IT IS SUNNY



RELATES TO

P19 Have a seat

P26 Swimming docks

P28 Natural (water) playground

P33 Community garden

P29 Dynamic rainwater structure

SOURCE

Rain Friendly Principles | Life between umbrellas. (n.d.). *Life Between Umbrellas*. <https://www.lifebetweenumbrellas.ca/rain-friendly-principles>

P25

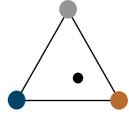
STEPS TO THE WATER

SUPPORTS QUALITIES

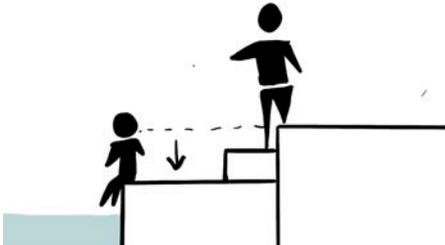
Q5

Q6

PATTERN
NETWORK



STEPS TO THE WATER INCREASE THE INTERACTIVE POSSIBILITIES OF THE URBAN WATER, INCREASING ITS RECREATION POTENTIAL AND AESTHETIC IMPORTANCE.



RELATES TO

P18 Out with the car

P19 Have a seat

P26 Swimming docks

P43 Natural banks

SOURCE

Grafia, C. (2023, December 19). Sjøfronten i Molde. Christie Opsahl. <https://www.christie.no/sjofronten-i-molde/>

P26

SWIMMING DOCKS

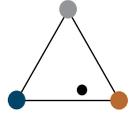
SUPPORTS QUALITIES

Q3

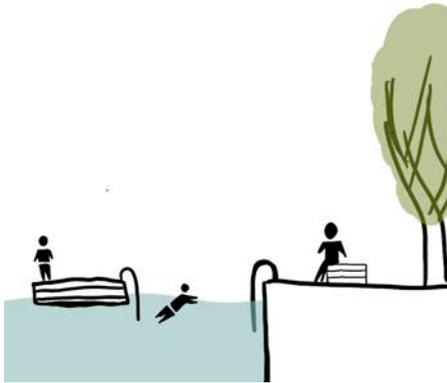
Q4

Q5

PATTERN NETWORK



OPPORTUNITIES TO ENTER OR SWIM IN THE SURFACE WATER IN THE CITY GROWS THE APPRECIATION OF WATER IN THE LIVING ENVIRONMENT.



RELATES TO

P19 Have a seat

P24 Weather shelter

P25 Steps to the water

P28 Natural (water) playground

P43 Natural banks

P45 Watersquare

SOURCE

- Based on the survey in this project

- De Jong, A., Van Der Meulen, S., Melman, R., & Vaarten, A. (2022). Zwemmen in niet-aangewezen zwemwater. In *Deltares* (No. 11206881-005-BGS-0001).

P27

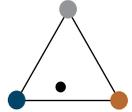
ELEVATED PARK TRAILS

SUPPORTS QUALITIES

Q4

Q5

PATTERN NETWORK



ELEVATED PARK TRAILS ALLOW FOR DYNAMIC RECREATION SPACE WHICH ARE ALSO ACCESSIBLE WHILE THE PARK IS FUNCTIONING AS WATER STORAGE BUFFER



RELATES TO

- P14 Display remains
- P28 Natural (water) playground
- P32 Butterfly garden
- P34 Mid-height vegetation
- P37 Floodable natural area
- P38 Urban water channels
- P42 Bioswales
- P44 Sunken green space

SOURCE

Marker Wadden. (2022, March 17). Vista. https://vista.nl/en/mies_portfolio/marker-wadden/

P28

NATURAL (WATER) PLAYGROUND

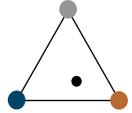
SUPPORTS QUALITIES

Q5

Q7

Q8

PATTERN NETWORK



A WATER PLAYGROUND MAKES WATER AN ELEMENT FOR PEOPLE TO HAVE FUN IN THE CITY, IT CONNECTS RECREATIONAL ACTIVITIES WITH WATER STORAGE

RELATES TO

- P1 Community market
- P19 Have a seat
- P26 Swimming docks
- P27 Elevated park trails
- P29 Dynamic rainwater structure
- P44 Sunken green space



SOURCE

Circular water play for a sustainable municipality - Watergames & More. (2020, September 1). Watergames & More. <https://tinyurl.com/mvrus58c>

THEORETICAL BACK-UP

A water playground like, swimming docks, is a possibility to enjoy water structures in the city. The water playground is safe and accessible for children, while the swimming dock is not. It can have many different forms and sizes. A water playground is different from a water square because a water square only stores water, while a water playground is designed with fountains and noozles to encourage play.

PRACTICAL IMPLICATION

The water playground should be enclosed with trees or green hills to separate it from roads, by that it is safe for children to play in. Around the water playground there is need for benches and seats for parents. That helps them taking care for their playing children. A changing room and public toilet is a necessity.

P29

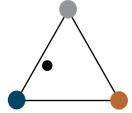
DYNAMIC (RAIN)WATER STRUCTURE

SUPPORTS QUALITIES

Q5

Q8

PATTERN
NETWORK



ATTRACTIVE STRUCTURES THAT SHOW THE QUANTITY OF WATER IN CASE OF RAINFALL MAKE RAINFALL AN INTERESTING INSTEAD OF NEGATIVE EVENT. THIS CAN ALSO BE A CONTINUOUS FOUNTAIN.

RELATES TO

P8 Tussen - ruimte

P28 Natural (water) playground

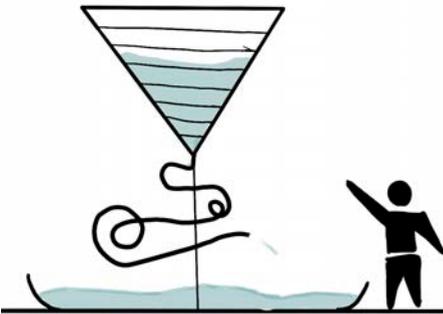
P31 Rainwater harvesting

P38 Urban infiltration strips

P41 Open water channel

P43 Natural banks

P45 Watersquare



SOURCE

Regnlekplatsen, *The Rain Playground* « Landezine International Landscape Award LILA. (n.d.). <https://landezine-award.com/regnlekplatsen-the-rain-playground/>

THEORETICAL BACK-UP

What if rain is not only a negative part of your day, but can also be educational, interesting or fun. This idea came to me, with the help of my peers. The idea is that art structures can be an educational tool to look at rainfall events in a different way. This can be combined with playfull activities for childern, like building dams. It encourages people to stop on their commute and take a closer look at the rain.

PRACTICAL IMPLICATION

This pattern can be anything from a giant funnel collecting water to an irrigation system for plants in your garden or water and sand boxes in schools that allow the children to play outside while it rains.

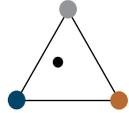
P30

GREEN ROOFS

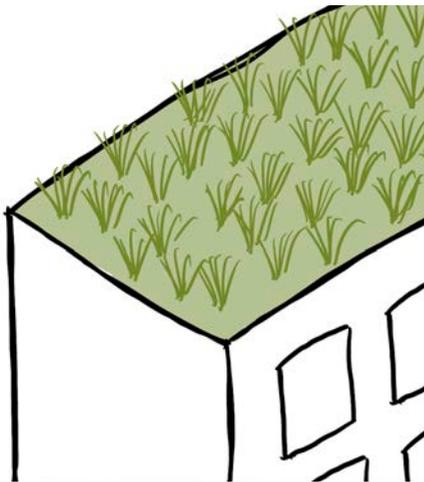
SUPPORTS QUALITIES

Q6

PATTERN
NETWORK



GREEN ROOFS RETAIN RAINWATER AND LIMIT HEAT STRESS IN THE URBAN ENVIRONMENT, WHILE INCREASING THE ECOLOGICAL ENHANCEMENT



RELATES TO

- P7 Mixed use transformation
- P31 Rainwater harvesting
- P32 Butterfly garden
- P33 Community garden
- P36 Eco facades

SOURCE

Braaksmā, E. (2022, June 22). RESILIO slimme blauw-groene daken. RESILIO. <https://resilio.amsterdam/slimme-blauw-groene-daken/>

P31

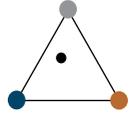
RAINWATER HARVESTING

SUPPORTS QUALITIES

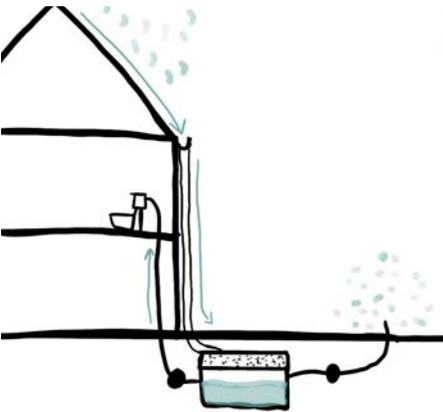
Q6

Q7

PATTERN
NETWORK



RAINWATER THAT IS STORED ON A BUILDING OR BLOCK SCALE AND USED FOR HOUSEHOLD ACTIVITIES DOES NOT DRAIN TO THE POLDER WATER SYSTEM.



RELATES TO

- P29 Dynamic rainwater structure
- P30 Green roofs
- P33 Community garden
- P36 Eco facades
- P38 Urban infiltration strips
- P39 Subsoil infiltration box
- P41 Open water channel

SOURCE

Vartan, S. (2022, November 8). A Beginner's guide to rainwater harvesting. Treehugger. <https://www.treehugger.com/beginners-guide-to-rainwater-harvesting-5089884>

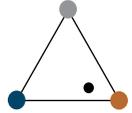
P32

BUTTERFLY GARDEN

SUPPORTS QUALITIES

Q6

PATTERN
NETWORK



A BUTTERFLY GARDEN CAN BE A SMALL SCALE PATCH WITH DIFFERENT FLOWERS TO INCREASE BIODIVERSITY IN PUBLIC SPACE

RELATES TO

- P27 Elevated park trails
- P30 Green roofs
- P33 Community garden
- P34 Mid-height vegetation
- P36 Eco facades
- P38 Urban infiltration strips



SOURCE

Caballero, P. (2022, December 26). Butterfly Garden in Papalotla / Taller Capital. ArchDaily. <https://www.archdaily.com/991735/butterfly-garden-in-papalotla-taller-capital>

P33

COMMUNITY GARDEN

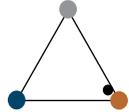
SUPPORTS QUALITIES

Q3

Q5

Q6

PATTERN NETWORK



A COMMUNITY GARDEN INCREASES BIODIVERSITY AND PROMOTES SUSTAINABLE FOOD SOURCING AND RECREATIONAL POTENTIAL



RELATES TO

P1 Community market

P9 Accessible rooftop

P19 Have a seat

P24 Weather shelter

P30 Green roofs

P31 Rainwater harvesting

P32 Butterfly garden

SOURCE

Binns, S. (2021, January 5). *The economic and social benefits of Urban agriculture – A conversation for six*. A Conversation for Six. <https://conversationforsix.com/conversations/benefits-urban-farming>

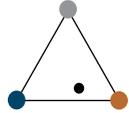
P34

MID-HEIGHT VEGETATION

SUPPORTS QUALITIES

Q6

PATTERN
NETWORK



MID-HEIGHT VEGETATION PROVIDES SHELTER FOR ANIMALS AND SUPPORTS BIODIVERSITY. MOREOVER, IT SUPPORTS AESTHETIC VALUES IN PARKS AND STREETS.



RELATES TO

- P 27 Elevated park trails
- P32 Butterfly garden
- P36 Eco facades
- P38 Urban infiltration strips
- P42 Bioswales
- P44 Sunken green space

IN THE INTEREST OF PUBLIC SAFETY IT SHOULD NOT BE TOO HIGH OR TOO DENSE IN PUBLIC SPACES

SOURCE

Murphy, S. (2024). Vegetation structure. *Recreating the Country*. <https://www.recreatingthecountry.com.au/structure.html#:~:text=These%20structural%20layers%20also%20provide,layers%20%3D%20more%20diversity%20of%20wildlife>.

P35

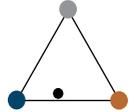
HELOPHYTE FILTERS

SUPPORTS QUALITIES

Q6

Q7

PATTERN NETWORK



HELOPHYTE FILTERS ARE PURIFICATION PLANTS THAT CAN FILTER WASTEWATER AND ORGANIC SUBSTANCES

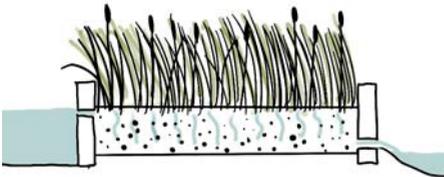
RELATES TO

P41 Open water channel

P42 Bioswales

P43 Natural banks

P44 Sunken green space



SOURCE

offgridcentrum.nl. (2021, April 23). Wat is een helofytenfilter? - offgridcentrum.nl. <https://www.offgridcentrum.nl/kennisbank/watervoorziening/wat-is-een-helofytenfilter/>

P36

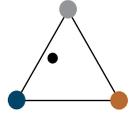
ECO FACADES

SUPPORTS QUALITIES

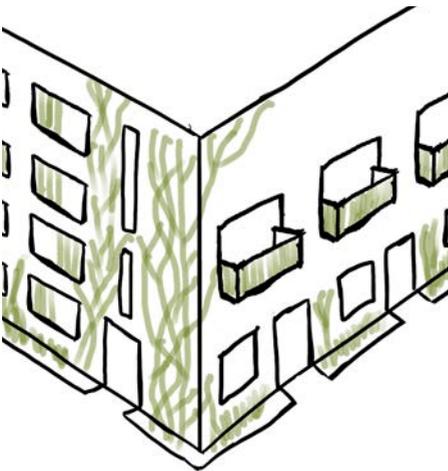
Q6

Q7

PATTERN
NETWORK



ECO FACADES IMPROVE THE URBAN CLIMATE AND BIODIVERSITY IN CITIES. IT INTEGRATES ECOLOGY WITHIN THE BUILD ENVIRONMENT.



RELATES TO

- P16 Vibrant ground floor
- P30 Green roofs
- P32 Butterfly garden
- P34 Mid-height vegetation
- P38 Urban infiltration strips
- P40 Permeable pavement

SOURCE

Atelier Groenblauw. *Planting facade gardens | Urban green-blue grids.* (n.d.). <https://www.urbangreenbluegrids.com/measures/planting-facade-gardens/>

THEORETICAL BACK-UP

Removing a strip of pavement along buildings helps the infiltration of rainwater from the facade into the ground. Climbing plants increase the biodiversity in streets and neighbourhoods. The climbing plants also reduce the heat inside buildings which improves the urban climate.

PRACTICAL IMPLICATION

Eco facades can be used in both existing and new buildings. There are many different implications. Removing a strip of pavement, helps best with water infiltration. But plants can also hang in pots or structures on the facade.

P37

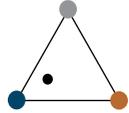
FLOODABLE NATURAL AREA

SUPPORTS QUALITIES

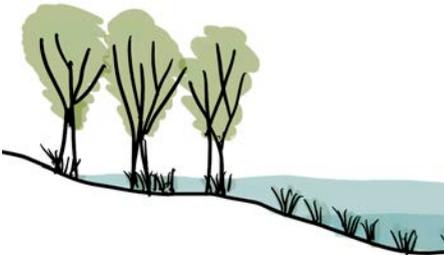
Q6

Q8

PATTERN NETWORK



NATURAL OVERFLOW AREAS ARE BUFFERS IN CASE OF BIG FLOOD EVENTS. THEY ARE ECOSYSTEMS OF GREAT IMPORTANCE FOR MANY SPECIES AND BIRDS AND PROVIDE RECREATIONAL SPACE FOR THE CITIZENS



RELATES TO

- P4 Vertical farming
- P5 Floating greenhouse
- P22 Continuous cycling network
- P27 Elevated park trails

SOURCE

Atelier Groenblauw. Urban wetlands | Urban green-blue grids. (n.d.). <https://www.urbangreenbluegrids.com/measures/urban-wetlands/>

THEORETICAL BACK-UP

Urban wetlands or floodable forests manage precipitation runoff. Instead of the traditional approach involving rapid drainage through ditches and pipes, floodable natural areas are designed to absorb and gradually release the excess water. Additionally, wetlands naturally remove biological pollutants, thanks to the presence of various plant species. Floodable natural areas are also well appreciated recreation areas.

PRACTICAL IMPLICATION

Floodable Natural Areas are most likely floodable wetlands or floodable forests. Urban wetlands are capable of purifying urban water in a efficient and affordable way. An urban wetland or floodable forest should be the size of about 5% of the surface from which the water runs off. The effluent from wetlands can be used for sprinkler systems.

P38

URBAN INFILTRATION STRIPS

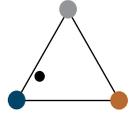
SUPPORTS QUALITIES

Q6

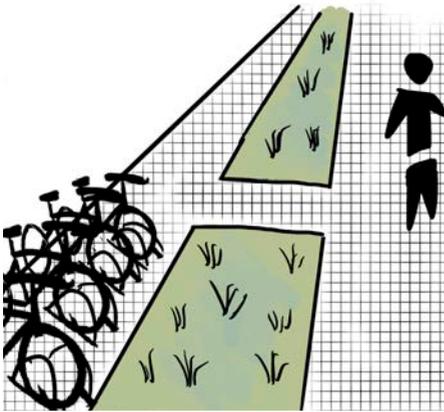
Q7

Q8

PATTERN NETWORK



STRIPS OF GRASS OR PERMEABLE MATERIAL CAN BE SMALL SCALE SOLUTIONS TO INCREASE THE WATER INFILTRATION CAPACITY



RELATES TO

- P29 Dynamic (rain)water structure
- P32 Butterfly garden
- P34 Mid-height vegetation
- P36 Eco facades
- P40 Permeable pavement
- P41 Rainwater harvesting
- P42 Bioswales
- P44 Sunken green space

SOURCE

Atelier Groenblauw. (n.d.-a). *Urban infiltration strips*. *Urban Green-blue Grids for Resilient Cities*. Retrieved March 6, 2024, from <https://urbangreenbluegrids.com/measures/urban-infiltration-strips/>

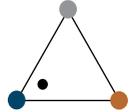
P39

SUBSOIL INFILTRATION BOX

SUPPORTS QUALITIES

Q7

PATTERN NETWORK

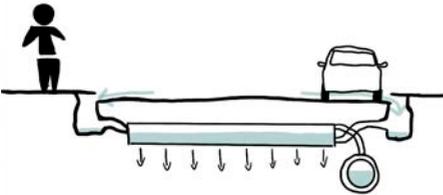


SUBSOIL BOXES CAN DRAIN AND STORE RAINWATER WITHOUT PERMEABLE PAVEMENT. IT CAN BE DONE UNDER ROADS, SPORTFIELDS AND PARKING GARAGES.

RELATES TO

P40 Permeable pavement

P41 Rainwater harvesting



SOURCE

AtelierGroenblauw. (n.d.-b). *Infiltration boxes and infiltration drains/wells. Urban Green Blue Grids for Resilient Cities.* Retrieved March 5, 2024, from <https://urbangreenbluegrids.com/measures/infiltration-boxes-and-infiltration-drainswells/>

P40

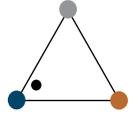
PERMEABLE PAVEMENT

SUPPORTS QUALITIES

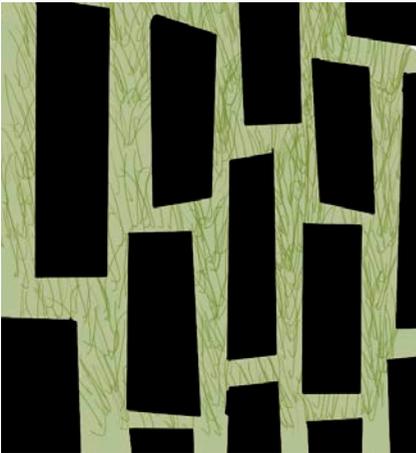
Q6

Q7

PATTERN NETWORK



PERMEABLE PAVEMENT INCREASES THE INFILTRATION CAPACITY OF (SEMI) PAVED STREETS



RELATES TO

- P18 Out with the car
- P36 Eco facades
- P38 Urban infiltration strips
- P39 Subsoil infiltration box

SOURCE

Atelier Groenblauw. (n.d.). *Water-permeable pavements | Urban Green-blue Grids*. Retrieved February 27, 2024, from <https://urbangreenbluegrids.com/measures/porous-paving-materials/>

THEORETICAL BACK-UP

Permeable pavements are porous or allow to have voids between the material. They allow rainwater to pass through and drain into the soil. Materials like open-joint bricks create voids for water infiltration. Pavers with open structures, like grass-concrete or open-cell blocks, allow plant growth and rainwater infiltration. Runoff from heavy showers still needs to be channeled away via sewerage pipes or surface water.

PRACTICAL IMPLICATION

Porous and open-joint bricks can be used in lightly trafficked roads and car parks. Permeable materials such as grass-concrete pavers and open pavement patterns are less stable and cannot bear heavy loads. They are only suitable for lightly used car parks and driveways. Gravel and shell pavements are even less robust and are therefore most appropriate for footpaths and bicycle paths, or on private terrains.

P41

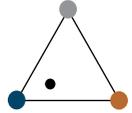
OPEN WATER CHANNEL

SUPPORTS QUALITIES

Q7

Q8

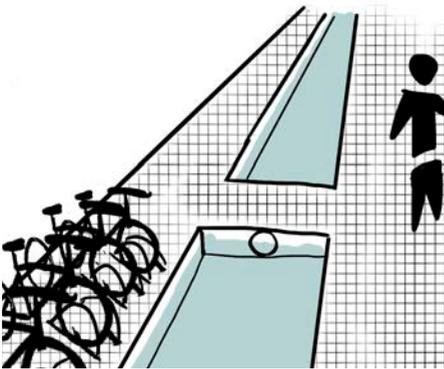
PATTERN
NETWORK



RAINWATER CHANNELS IN STREETS ASSURE A WELL-FUNCTIONING DRAINAGE SYSTEM FOR RAINWATER AND PREVENT THE FLOODING OF STREETS. IT ALSO ADDS TO THE AESTHETIC AND ECOLOGICAL VALUE IN STREETS.

RELATES TO

- P27 Elevated park yrails
- P29 Dynamic (rain)water structure
- P35 Helophyte filter
- P41 Rainwater harvesting
- P42 Bioswales
- P45 Watersquare



SOURCE

Atelier Groenblauw. *Urban water channels | Urban green-blue grids*. (n.d.). <https://www.urbangreenbluegrids.com/measures/open-water-channels/>

THEORETICAL BACK-UP

Rainwater channels secure that rainwater is drained from the street surface and not causes flooding of streets. This implication is especially useful in streets with limited infiltration possibilities. Moreover open water channels should be as much as possible used to replace diikers, increasing the surface water surface and circulation in the polder water system.

PRACTICAL IMPLICATION

They can be designed as gutters from impermeable materials that drain the water elsewhere, or they can be designed as ditches with permeable pavement. As ditches they can also be small bioswales. An open water body does take up a lot of space in a street, which can not be used for human users.

P42

BIOSWALES

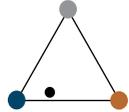
SUPPORTS QUALITIES

Q6

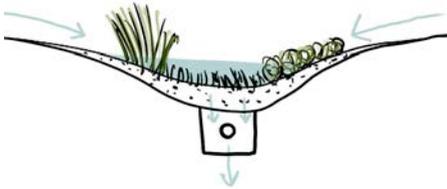
Q7

Q8

PATTERN NETWORK



A BIOSWALE IS A DITCH WITH VEGETATION AND A POROUS BOTTOM. IT INFILTRATES, STORES AND DRAINES THE WATER, WHILE ALSO DECONTAMINATING IT.



RELATES TO

P27 Elevated park trails

P34 Mid-height vegetation

P35 Helophyte filter

P38 Urban infiltration strips

P41 Open water channels

P44 Sunken green space

SOURCE

AtelierGroenblauw. (n.d.). BioSwales. *Urban Green-Blue Grids for Resilient Cities*. Retrieved March 5, 2024, from <https://urbangreenbluegrids.com/measures/bioswales/>

P43

NATURAL BANKS

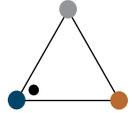
SUPPORTS QUALITIES

Q6

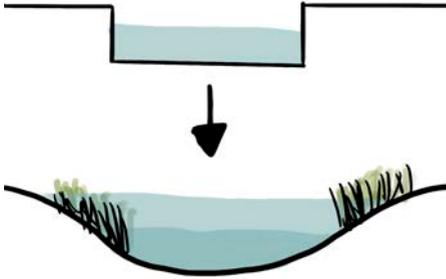
Q7

Q8

PATTERN
NETWORK



NATURAL BANKS WITH VEGETATION IMPROVE THE WATER STORAGE AND WATER INFILTRATION CAPACITY IN CANALS AND RIVERS, MOOREOVER IT INCREASES THE ECOLOGICAL ENHANCEMENT OF THE WATER NETWORK



RELATES TO

P18 Out with the car

P25 Steps to the water

P26 Swimming docks

P 29 Dynamic (rain)water structure

P35 Helophyte filter

SOURCE

Sollie, S., Brouwer, E., & De Kwaadsteniet, P. (2011). *Handreiking natuurvriendelijke oevers: een standplaatsbenadering: Het toepassen van standplaatsen bij planvorming en ontwerp van natuurvriendelijke oevers.*

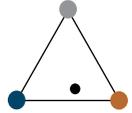
P44

SUNKEN GREEN SPACE

SUPPORTS QUALITIES

Q8

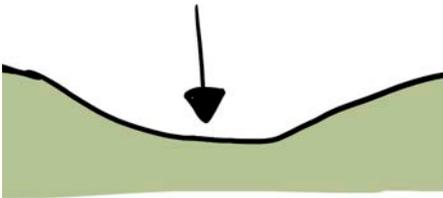
PATTERN NETWORK



HIGH QUANTITIES OF STORMWATER ARE GATHERED IN AN OPEN GREEN SPACE, THIS AVOIDS STREET FLOODING AND MINIMISES THE PRESSURE ON THE DRAINAGE SYSTEM

RELATES TO

- P10 Elevated entrance
- P28 Natural (water) playground
- P34 Mid-height vegetation
- P35 Helophyte filter
- P38 Urban infiltration strips
- P42 Bioswales
- P45 Watersquare



SOURCE

Climate-smart city needs more green spaces. (n.d.). WUR. <https://www.wur.nl/en/article/climate-smart-city-needs-more-green-spaces.htm>

THEORETICAL BACK-UP

Rainwater flows to the lowest level of the park or green space. A sunken area can therefore take up more rainwater avoiding street flooding. Open soil makes sure the water can infiltrate. When dry this green area can be a recreational space. It is public space people can enjoy in different ways regarding the water quantity.

PRACTICAL IMPLICATION

The water system should be designed so the drainage of rainwater flows from the street towards a green space where the water can be stored and infiltrates into the ground. This is easiest if the sunken green space has the lowest elevation compared to the surrounding groundlevel. But a higher elevation than the surrounding groundwater levels! The sunken green space can have different scale. It can be a small corner of the street or a park area.

P45

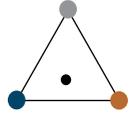
WATERSQUARE

SUPPORTS QUALITIES

Q5

Q8

PATTERN NETWORK



A WATER SQUARE HAS A RECREATION FUNCTION IN DRY CONDITIONS AND SERVES AS A STORMWATER RETENTION ZONES DURING HEAVY RAINFALL

RELATES TO

P25 Steps to the water

P26 Swimming docks

P29 Dynamic (rain)water structure

P41 Open Water channels

P44 Sunken green space



SOURCE

Atelier Groenblauw. (n.d.-a). *Water squares | Urban Green-blue Grids*. Retrieved February 27, 2024, from <https://urbangreenbluegrids.com/measures/water-squares/>

THEORETICAL BACK-UP

Water squares are particularly useful in inner-city areas with little room for water buffers and where high groundwater levels make infiltration impossible. The squares feature lower-lying areas that can be submerged in the case of heavy rainfall. The run-off from the surrounding district is connected to the square by open drains or rainwater drainage systems.

PRACTICAL IMPLICATION

The design of the watersquare is context specific, it is important that there is sufficient drainage from the surrounding area to the watersquare. The lowest parts of the square will be full of water most often. The parts that become submerged need cleaning after every rainfall event. To prevent the square from flooding with groundwater, the material of the square needs to be waterproofed. Maintenance is important to take into account for the long time viability.

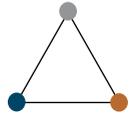


TITLE:

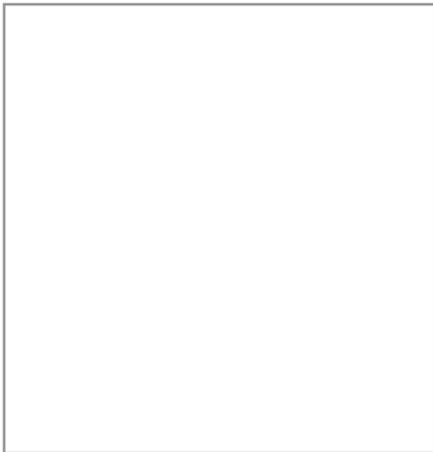
SUPPORTS QUALITIES



**PATTERN
NETWORK**



HYPOTHESIS:



RELATES TO













SOURCE

**THE WILDCARD MAY BE USED TO ADD
NEW PATTERNS TO THE PATTERN SET**

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