POSAD MAXWAN
strategy x design

Team: Laura Thomas, Gintare Norkunaite, Martina Germanà, Ganesh Babu
Client: Stimuleringsfonds, Gemeente Rotterdam

How to understand soil as an urban designer?

Who would like to design circular and regenerative public spaces from the perspective of vital soil with us?

To anchor our research within the practical constraints of the real world, we work on **Westblaak in Rotterdam.**

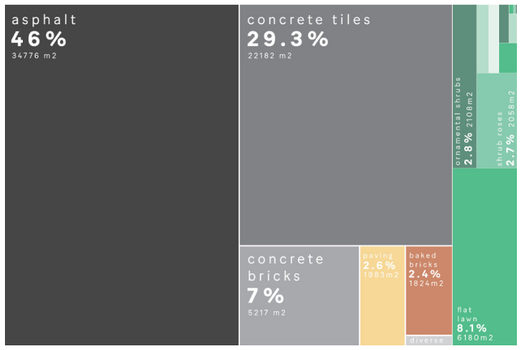
Cities like Rotterdam have ambitious targets for emission reduction and climate adaptation. These targets require significant transformation of existing infrastructure, which can result in contested space claims in the public and private realm, particularly in the underground. Designing for a vital soil is crucial to avoid unmitigated exploitation of this finite resource and ensure sustainable urban development.

01 Collecting ambitions

Collect ambitions for the site under study from different policy documents. There could be multiple competing policy ambitions, but it is important to list and consolidate them, so we don't start designing from scratch.

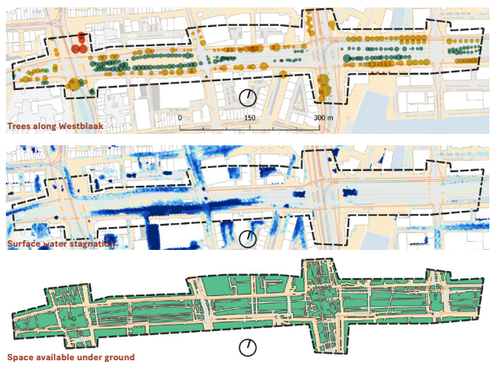
02 Surface conditions

Establish the baseline of existing surface conditions in the public space. This gives insight into the amount of space paved/unpaved and the different material usage on the surface.



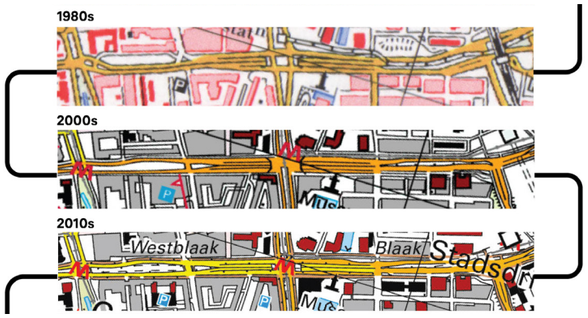
03 Spatial analysis

Analyse other factors both spatial and environmental, looking at the z axis as well, for example distribution and types of trees, flood risk, space available underground.



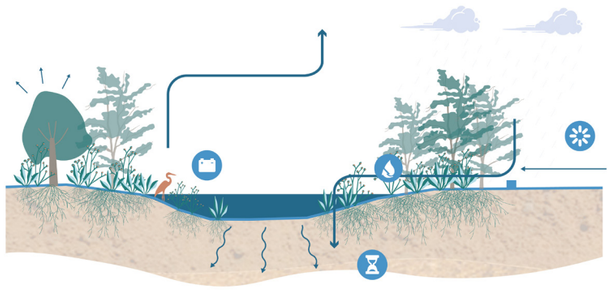
04 Reading through time

Time is a fundamental line of enquiry to understand soil as an urban designer. The city is in constant transformation and the soil has been subjected to different forces over time.



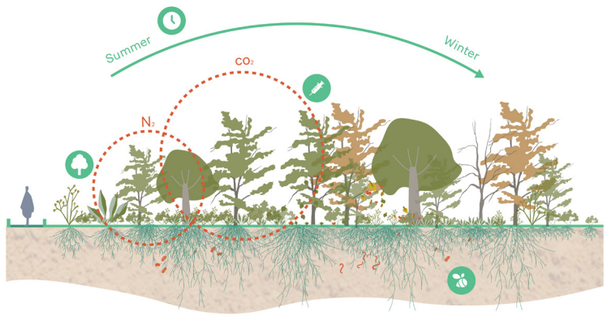
05 Water system

The flow of water through soil is crucial for various urban processes, including drinking water supply, sewage management, cooling, soil stability, and natural water cycles facilitated by trees. It is essential for sustainable urban design, it addresses climate challenges and improves soil health.



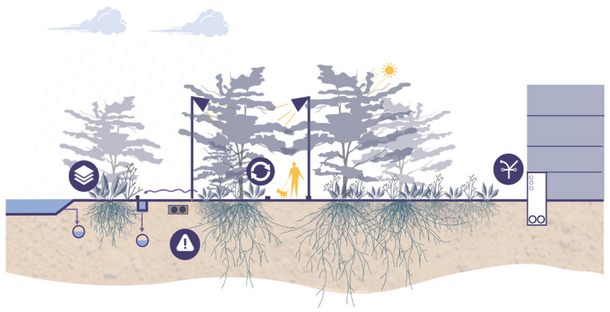
06 Soil system

The flow of soil, including movement, storage, and transformation of soil and organic materials, is vital for supporting healthy urban ecosystems and hinterlands. Urban areas often face challenges such as limited open topsoil, degradation due to maintenance work, and negative feedback loops from emissions.



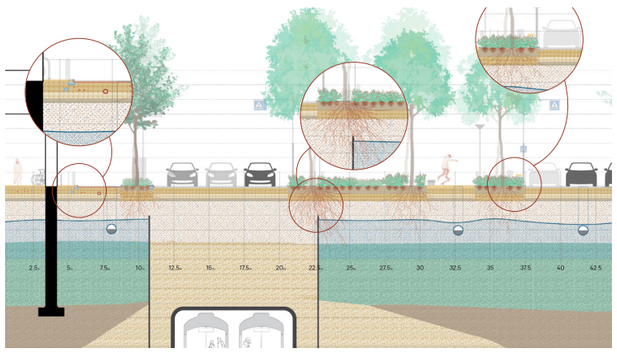
07 Infra System

The subsurface should be organized efficiently in order to leave the most amount of space for all the other spatial claims that need to land in it. It is important to organize infrastructure effectively, design it for multiple purposes, and minimize negative externalities.



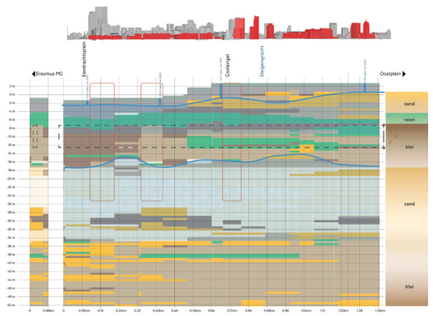
08 Shallow subsurface

The top soil is the most heavily contested space. It is where all infrastructure is located for easy access and it is also the place where most life is (variety of bacteria, fungi, nematodes). Therefore it is important to zoom into this layer to maximize its efficiency.



09 Deep subsurface

Diving deeper into the soil up to 50m below surface gives us new systemic insights into how soil and water systems function.



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Bouwen vanuit de Bodem - Maximizing Circularity

This scenario focuses on growing the ecosystem of Westblaak through time, preserving as much as possible of what is there.

The design allows vegetation to develop through successions with minimal interventions. In the first stage, part of the Westblaak is unpaved, nutrients are added to make the soil more fertile. Pioneer species are planted to prepare the soil for late succession trees. Based on the existing soil conditions at that time, public space designers decide which trees will be planted (and preserved!). In this way, Westblaak is an ever evolving public space. Obsolete infrastructure elements are brought to a new life: a car tunnel is used for water storage and becomes a metropolitan meeting place; removed sewage pipes are reused to connect patches of green underground.

quick win — large investment

responds to the principle:
- infiltrate
- buffer
- store
- treat

helps improve ...
- a climate **a**daptation
- b **b**iodiversity
- c **c**ircularity

quick win — large investment

responds to the principle:
- diversify
- work with time
- stimulate natural processes
- give space to nature

helps improve ...
- a climate **a**daptation
- b **b**iodiversity
- c **c**ircularity

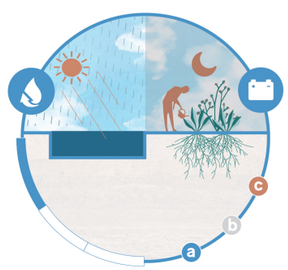
quick win — large investment

responds to the principle:
- work with what is there
- organize efficiently
- design for multi-purpose
- min. negative externalities

helps improve ...
- a climate **a**daptation
- b **b**iodiversity
- c **c**ircularity

w10

Use existing height differences to design water runoff: organise your water storage at the lowest point.

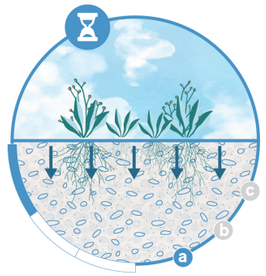


w11

Reuse (rain) water daily. Spray plants at night (at 2:00-3:00) using filtered water that was collected during the day.

w12

Reduce the amount of pavement (less than 50%) to improve water infiltration and to save on materials. Use permeable paving in parks and in squares.

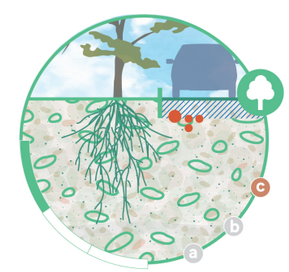


w13

Use the water infiltration and storage capacity of the top sand layer: sand can store 300 L per m³ sand (porosity of sand is 30%). Reduce paved surface so that water can infiltrate.

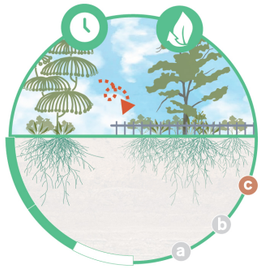
o23

Apply the bokashi technique under the right conditions. Bokashi is the Japanese word for "well-fermented organic material". The material makes the soil more fertile and does not change its composition.



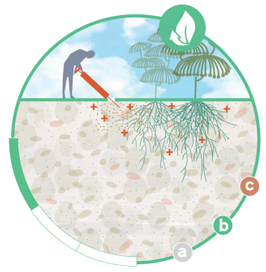
o26

Plant trees with deep roots next to a paved surface so that roots can grow healthily without destroying infrastructure and viceversa.



o27

Apply and reuse fast growing plants, e.g. wilgentenen can be used as quay walls or as tree protection. Fast growing plants are effective providers of natural services (storing carbon, making the soil more permeable, etc.).

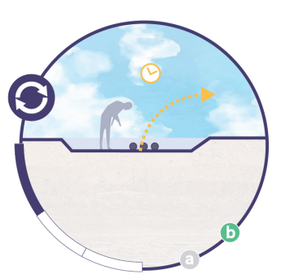


o28

Optimize conditions of existing soil (by adding nutrients, planting plants,...).

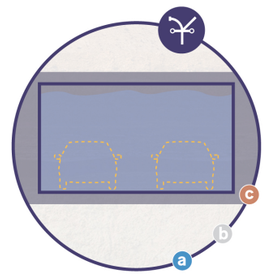
i16

Prevent conflicts between roots and underground infrastructure.



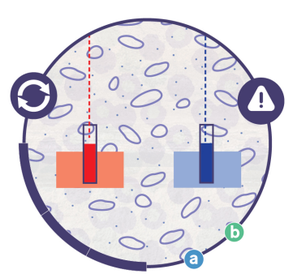
i17

When opening the soil, collect and re-use obsolete infrastructure (e.g. recycle obsolete copper cables, reuse old sewage pipes as root tunnels for tree roots to connect)



i18

Re-use basements or tunnels for underground water storage (e.g. decommissioned tunnel)



i19

Mind the conflicts between different ambitions that land in the deep subsurface (e.g. ATES vs. drinking water).