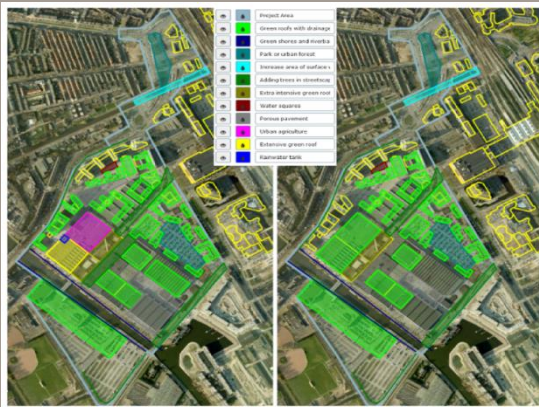


Tools for climate-adaptive and healthy urban design

Robbert Snep – Wageningen Environmental Research



Adaptation Support Tool

Dutch version of this tool (Toolbox Klimaatbestendige Stad) is available at:

<https://ruimtelijkeadaptatie.nl/hulpmiddelen/toolbox-ks/>



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Adaptation Planning Support Toolbox: Measurable performance information based tools for co-creation of resilient, ecosystem-based urban plans with urban designers, decision-makers and stakeholders

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Performance indicators

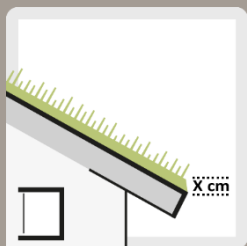
ABSTRACT

Currently, most tools, guidelines and benchmarks for urban adaptation raise awareness on climate change impacts, assess the city's vulnerability and/or address the need for adaptation on a policy-level. However, tools that have the ability to implement adaptation solutions in the actual urban planning and design practice seem to be missing. We developed and tested the Adaptation Planning Support Toolbox (APST) to fill this gap. This toolbox supports local policymakers, planners, designers and practitioners in defining the program of demands, in setting adaptation targets, in selecting from more than 60 blue, green and grey adaptation measures and with informed co-creation of conceptual adaptation plans. The APST provides quantitative, evidence-based performance information on (cost)effectiveness of adaptation measures regarding climate resilience and co-benefits. The APST can be used design workshops, to feed dialogues among stakeholders on where and how which ecosystem-based adaptation measures can be applied. Applications of the AST in various settings and context in cities on different continents have illustrated the added value of the toolbox in bringing policy and practice together with help of science. With more and more cities worldwide that will make the step from policymaking to actual adaptation-inclusive urban (re)development practice we foresee a growing demand for such tools.

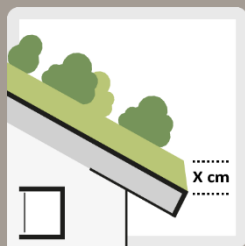
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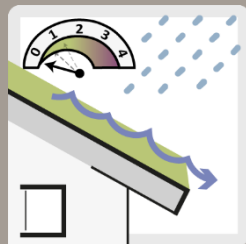
More than 60 nature-based solutions for climate change adaptation



Extensive green roof



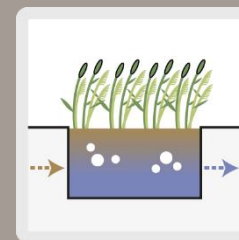
Intensive green roof



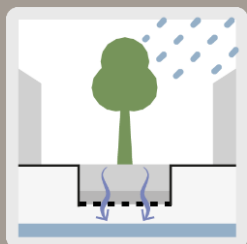
Green roof with delayed drainage



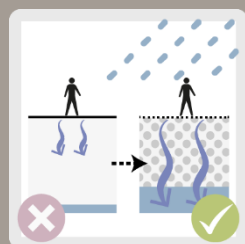
Green wall



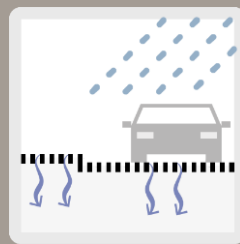
Constructed wetland



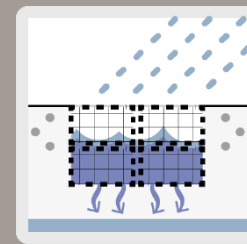
Bioretention pit for trees



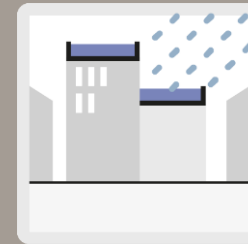
Enhancing soil infiltration



Porous pavement



Infiltration units



Water roof



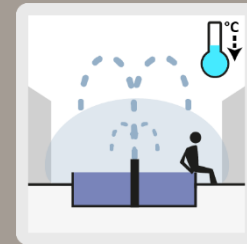
Subsoil water storage



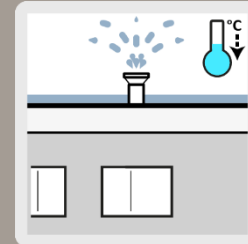
Rain barrel



Water square

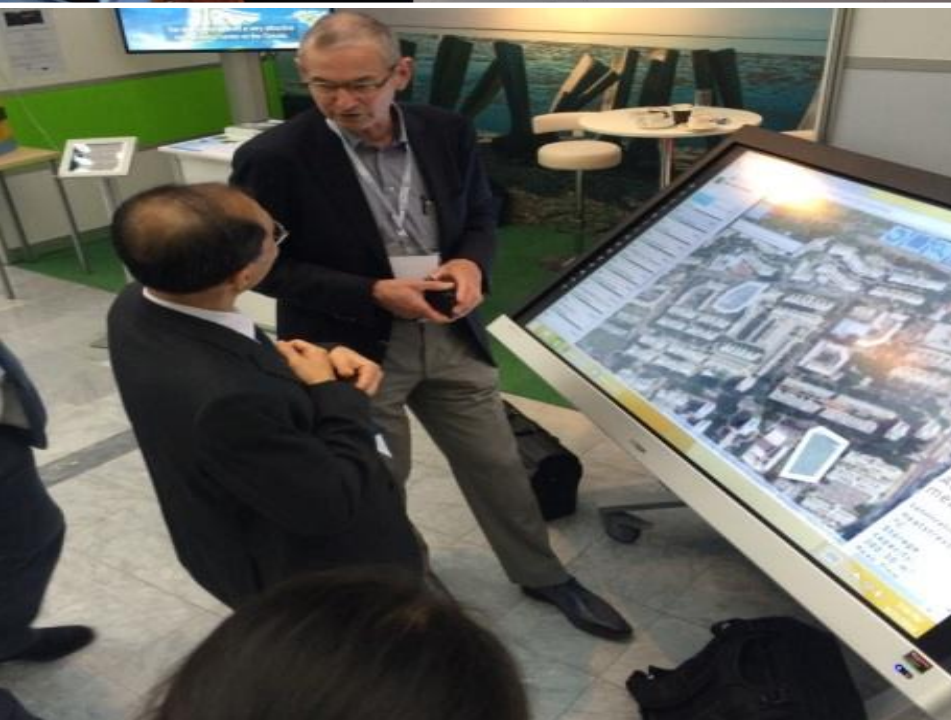


Fountain



Wetting pavement





Setup Measures Layers

Snapshots

Documentation New

Scenario

Which scenario to use for calculations:

measures_total_V3_meta-t

Area of interest (m2)

0-10000000

0

Please draw project area

Importance multi-functional landuse

0-1 :

0

Scale level under consideration

- ☐ City
- ☐ Neighbourhood
- ☐ Street
- ☐ Building

Area slope

- ☒ Sloping area
- ☐ Flat area on high ground
- ☐ Flat area on low ground

Soil type

- ☒ Sand
- ☐ Peat
- ☐ Clay
- ☐ Bed rock

Existing type of space

- ☐ Red space (buildings)



Overview Detail Export

Target

Contribution

Climate

Storage cap.: 0.0%

Heat red.: 0.0%

Normative runoff: 0.0%

Drought red.: 0.0%

Groundwater recharge: 0.0%

Water quality

Nutrient red.: 0.0%

Abs. pollutants: 0.0%

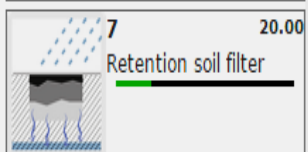
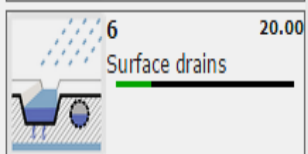
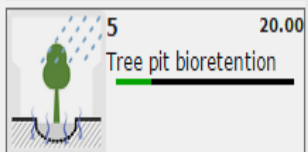
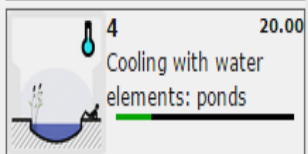
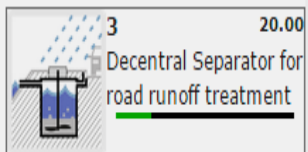
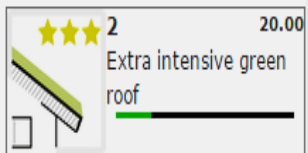
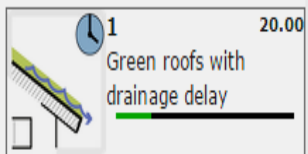
Pathogens red.: 0.0%

Active measures

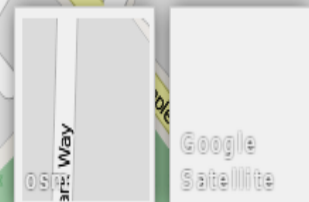


Setup Measures Layers

Snapshots



- Project Area
- Infiltration field
- Porous pavement
- Bioswales
- Disconnecting paved surfa



Moabit - Berlin



Overview Detail Export Target

Contribution

Climate

Storage cap.	92.5%
Heat red.	2.0%
Normative runoff	66.0%

Water quality

Nutrient red.	2.8%
Abs. pollutants	3.7%
Pathogens red.	3.1%

Potential

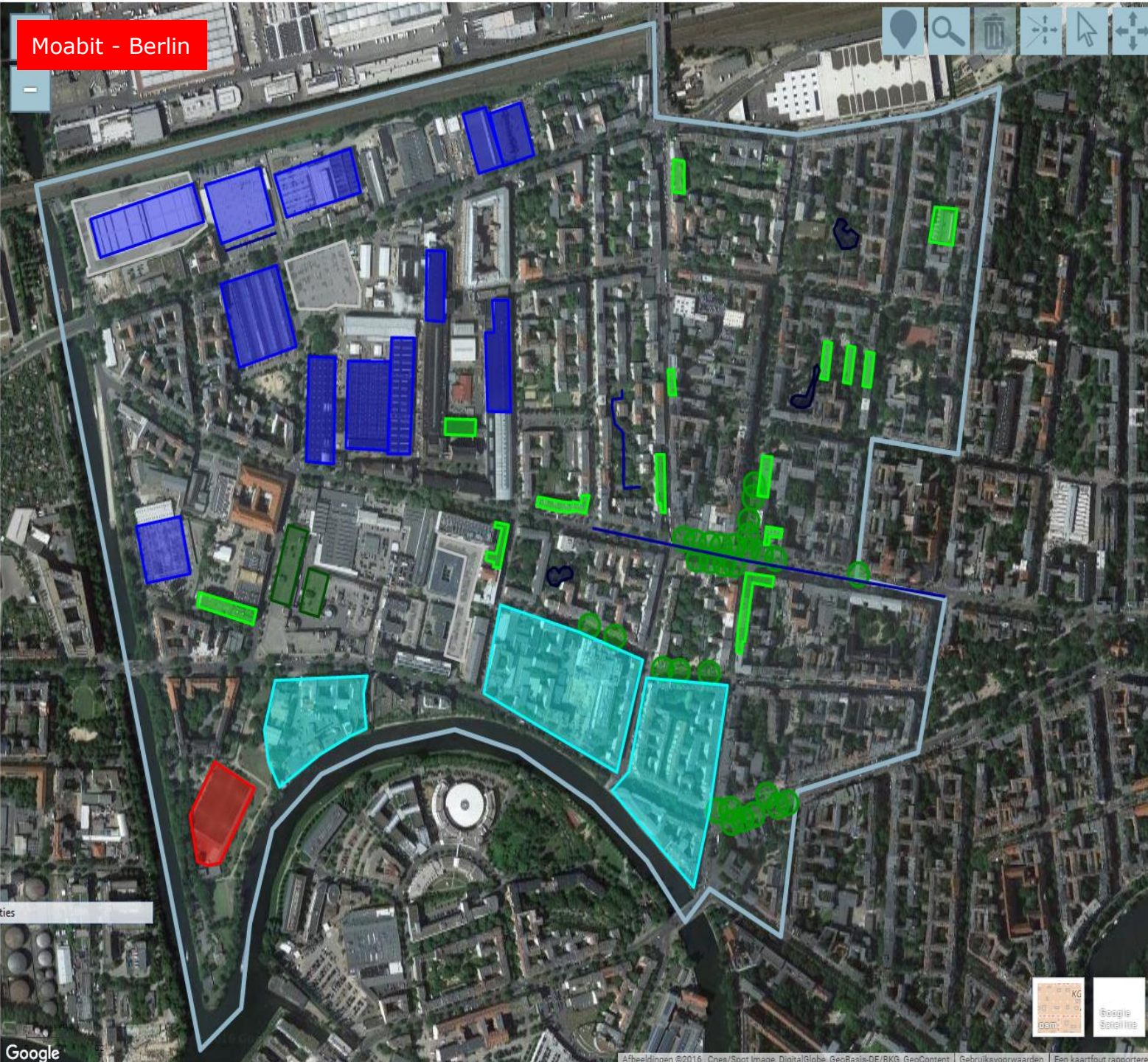
Perception pot	4.3%
Safety pot	2.9%
Soc cohesion pot	3.4%
Health pot	3.9%

Costs

Construction	€ 3685
Annual Maint.	€ 305

Active measures

☐		Project Area
☐		Wetting surfaces (of garder)
☐		Disconnecting paved surface
☐		Water squares
☐		Urban agriculture
☐		Green roofs with drainage c
☐		Porous pavement
☐		Bioswales / Infiltrating filter
☐		Tree pit bioretention
☐		Rainwater retention pond

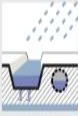
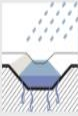
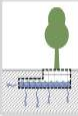


		Green roofs with
		Green shores and
		Park or urban for
		Increase area of
		Adding trees in st
		Extra intensive gi
		Water squares
		Porous pavement
		Urban agriculture
		Extensive green i
		Rainwater tank



Setup Measures Layers Cases

Search measure

	1	79.9
Cistern		
	2	76.4
Bioretention cell		
	3	69.9
Surface drain		
	4	69.0
Bioswale		
	5	68.6
Tree cells		
	6	64.4
Retention basin (wet pond)		
	7	64.1
Infiltration recreation field		
	8	63.8
Green open space		



Overview Detail Export Target

Contribution

Climate

Storage cap.	52.4%
Normative runoff	32.0%
Evapotranspiration	10.0%
Groundwater recharge	30.0%

Water quality

Nutrient red.	1.0%
Abs. pollutants	1.6%
Pathogens red.	1.6%

Costs

Construction	100.0%
Annual Maint.	100.0%

Active measures

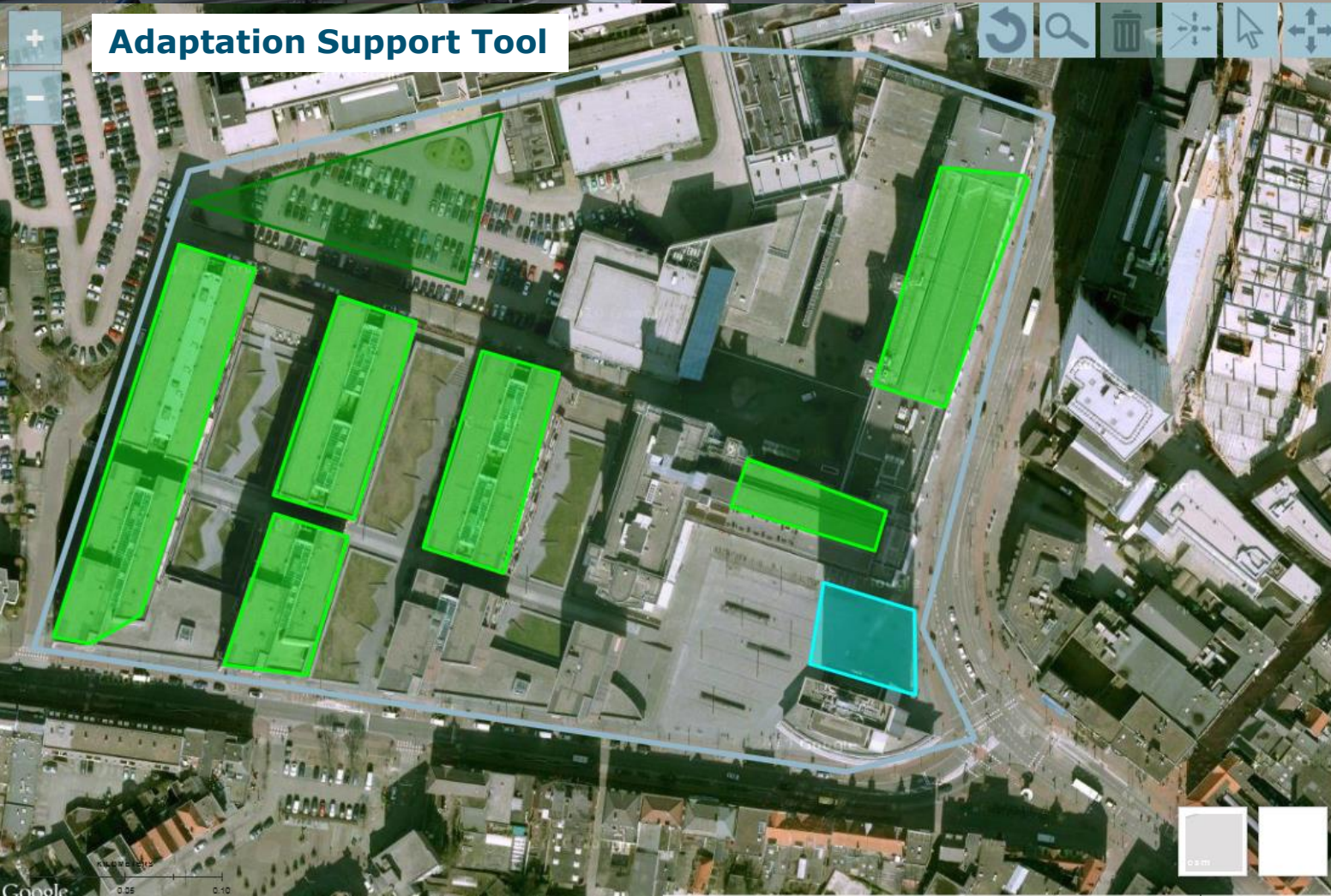
		Project Area
		Detention basin (dry)
		Urban agriculture
		Rainwater harvesting
		Adding trees in street
		Retention basin (wet)



Brainport Eindhoven (NL) – climateproofing Design Academy & Claus square



Adaptation Support Tool



Overview Detail Export

Contribution

Climate

Storage cap.:	6023 m ³
Heat red.:	-0.1 °C
Normative runoff:	8.5
Drought red.:	0.0
Groundwater recharge:	0.0

Water quality

Nutrient red.:	-3.5 %
Abs. pollutants:	22.4 %
Pathogens red.:	22.4 %

Costs

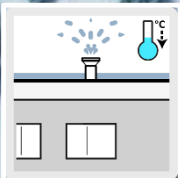
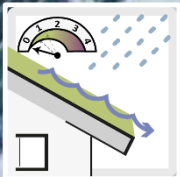
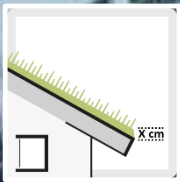
Construction:	k€ 2091
Annual Maint.:	k€ 98

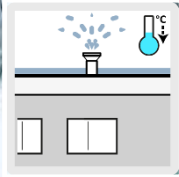
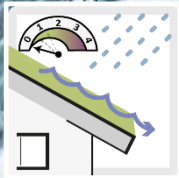
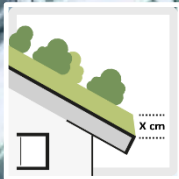
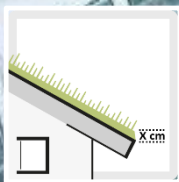
Active measures

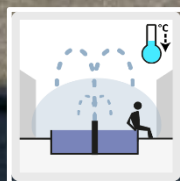
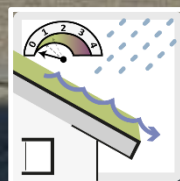
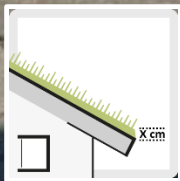
Private green garden



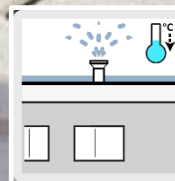
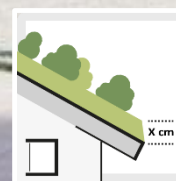
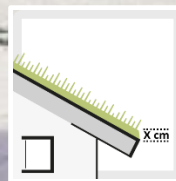
Storage cap.:	1281 m ³
Heat red.:	-0.0 °C
Normative runoff:	6.5
Drought red.:	0.0
Groundwater recharge:	0.0
Construction:	k€ 154
Annual Maint.:	k€ 2
Nutrient red.:	-0.6 %
Abs. pollutants:	4.1 %
Pathogens red.:	4.1 %
Stress red.:	***
Obesity red.:	***
Disease recovery:	***
Air Quality:	**
Social Cohesion:	***







Organizing micro-retention:
Building owners, municipality, citizens





Organizing micro-retention:
Building owners, municipality, citizens



Adaptation Support Tool

- Evidence-based (key figures based on >300 sc. pubs)
- Quantifiable aims and impacts (xx m³, etc.)
- Easy to integrate local maps / GIS
- Broad set of nature-based and regular engineering solutions (>60)
- From building up to city region level
- Applicable in urban development practice, both new and renovation
- Supports stakeholder involvement in workshops
- Valuable input for urban planners, designers and developers
- Applicable at MapTables (workshop) and computer (plan evaluation)
- Anno 2018 no comparable evidence-based tools available internationally



Ontwerptool Groene Gezonde Stad

<https://tools.wenr.wur.nl/groenegezondestad/>



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Ontwerptool Groene Gezonde Stad



Uw stad gezonder maken middels slimme keuzes voor groen!
Ontwerp uw eigen groene, gezonde straat, wijk of bedrijventerrein.

Waarom een tool?



Ontwerp en vergelijk groeninrichtingen

Kies waar u welk groen wilt inzetten.

De interactieve ontwerp-tool indiceert welk gezondheidseffect waar en voor welke doelgroep wordt bereikt in uw plangebied.

Ontwerp en Vergelijk

Waar is de tool voor bedoeld?

1. bewustwording gezond stadsontwerp > denk vanuit mensen, niet vanuit stenen
2. checklist inzet groen > benut alle baten van groen
3. condities effectiviteit groen > vragen die controleren of groen prestatie kan leveren
4. vergelijken scenario's groeninrichting > welk alternatief ontwerp is het beste?

Wat doet tool niet?

1. 100 verschillende groentypen doorrekenen op gezondheidsbaten (teveel detail)
2. Gezondheid kwantitatief uitdrukken (x dagen verzuim minder...) (onrealistisch)
3. Ruimtelijke berekeningen (kost teveel tijd)

Wizard - stap: Locatie

welke locatie?

Plangebied: 

[Volgende >](#)

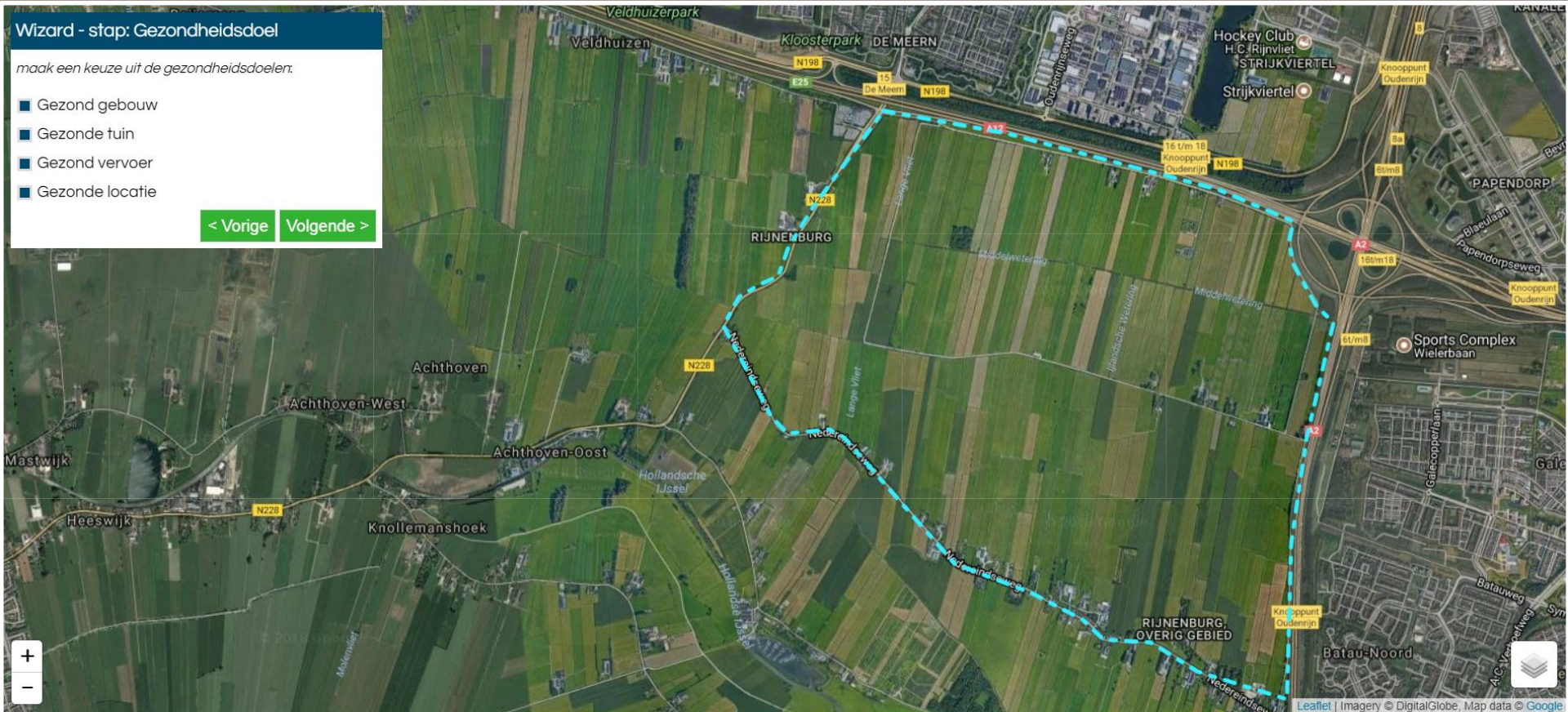


Wizard - stap: Gezondheidsdoel

maak een keuze uit de gezondheidsdoelert.

- ☒ Gezond gebouw
- ☐ Gezonde tuin
- ☐ Gezond vervoer
- ☐ Gezonde locatie

< VorigeVolgende >



Wizard - stap: Objecten

gebouw:

weg/route:

- A: Rijnstate
- B: Wonderwoods
- C: Rijnenburg
- D: Bateau
- E: Knollemans
- F: Utrechtlaan
- G: fietspad

< Vorige Volgende >



Maatregelen

Gebouw

✓

groen dak

?

✓

groene gevel

?

Perceel

+

Maatregel: groen dak

×

Op welk dak?

↗

A Rijnstate

▼

naam:

Daktuin Rijnstate

✎

Welk deel van het dak?

35

%

>

Wordt er gewerkt met koelend substraat (Smart Roof of 50+cm substraat)?

(maak een keuze)

▼

ja

nee

Resultaten

Gezond gebouw

Rijnstate

Wonderwoods

Rijner

Recreatie en sport - stationair

Rustgevend uitzicht

Verkoeling binnen 's-nachts

Verkoeling binnen overdag

Verzamelplekken

Gezonde tuin

Rijnstate

Wonderwoods

Rijner

Recreatie en sport - stationair

Rustgevende verblijfsplek

Verkoeling buiten - stationair

Verzamelplekken

Gezond vervoer

Utrechtlaan

fietspad

Actief transport - fietsen

Recreatie en sport - routegebonden

Rustgevende route

Verkoeling buiten - routegebonden

Gezonde locatie

Plangebied

Actief transport - wandelen

Ontmoet 'en route'

Maatregelen

—





Gezond gebouw

Recreatie en sport - stationair

Rustgevend uitzicht 12.5 25 12.5

Verkoeling binnen 's-nachts 24.75 4.375

Verkoeling binnen overdag 24.75 4.375

Verzamelplekken 50

Geen
bijdrage
groen aan
gezondheid

Gebouw Wonderwoods profiteert meer van haar groengevel dan de omliggende gebouwen.

Gezonde tuin

Recreatie en sport - stationair 100

Rustgevende verblijfsplek 100

Verkoeling buiten - stationair 26

Verzamelplekken 100

Geen bijdrage groen aan
gezondheid

12.5

6

6

Alleen Rijnstate biedt de mogelijkheid tot ontmoeting in het groen op haar dak.

De tuin bij gebouw Rijnstate (links) biedt veel meer voor gezondheid dan de tuin bij gebouw Knollemans (rechts).

Gezond vervoer

Actief transport - fietsen

Recreatie en sport - routegebonden

Rustgevende route

Verkoeling buiten - routegebonden

Utrechtlaan fietspad

3.75 20

3.75 20

0.9375 40

10 30

Het losliggend fietspad (rechts) verleidt mensen eerder tot gezond bewegen dan het fietspad langs de Utrechtlaan (links)

Gezonde locatie

Actief transport - wandelen

Ontmoet 'en route'

Recreatie en sport - stationair

Rustgevende route

Rustgevende verblijfsplek

Verkoeling buiten - routegebonden

Verzamelplekken

Plangebied

Geen bijdrage groen aan
gezondheid

30

30

100

21.875

50

Het centrale parkje is vooral rustgevend, en kan nog beter worden ingericht voor koeling, recreatie etc.

Score 100 betekent dat groen maximaal is ingezet om het betreffende gezondheidsdoel te bereiken

Ontwerptool Groene, Gezonde Stad

Samengevat

1. Deze tool agendeert meerwaarde effectief groen in stadsontwerp > niet alleen beeldkwaliteit, omvang en prijs, maar ook prestatie van groen!
2. De tool is een stap om wetenschap naar praktijk te vertalen, geen uitontwikkeld ontwerpinstrument.
3. Huidige versie wordt dit jaar verder aangescherpt, daarna online beschikbaar.
4. Meer informatie: Robbert.Snep@wur.nl, 0317-486006

Dank aan collega's Sjerp de Vries en Inge la Rivière en partners in het TKI-Topsector project!



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100years
1918 — 2018



DE
GROENE
STAD



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