

SOFTENING THE HARDER GROUND

Researching the potential of new street profiles to include a 50% green surface

Ilse van den Brink



Our current mobility system

Based on movement by car

De auto is de baas in Amsterdam



Auto neemt bijna helft van ruimte Amsterdam in beslag

Een rijdende auto neemt meer plek in dan je waarschijnlijk denkt

The problem

Urbanisation and densification lead to a paved environment



The problem

Climate challenges



The problem

A need for green



What if?



What if?



What if?

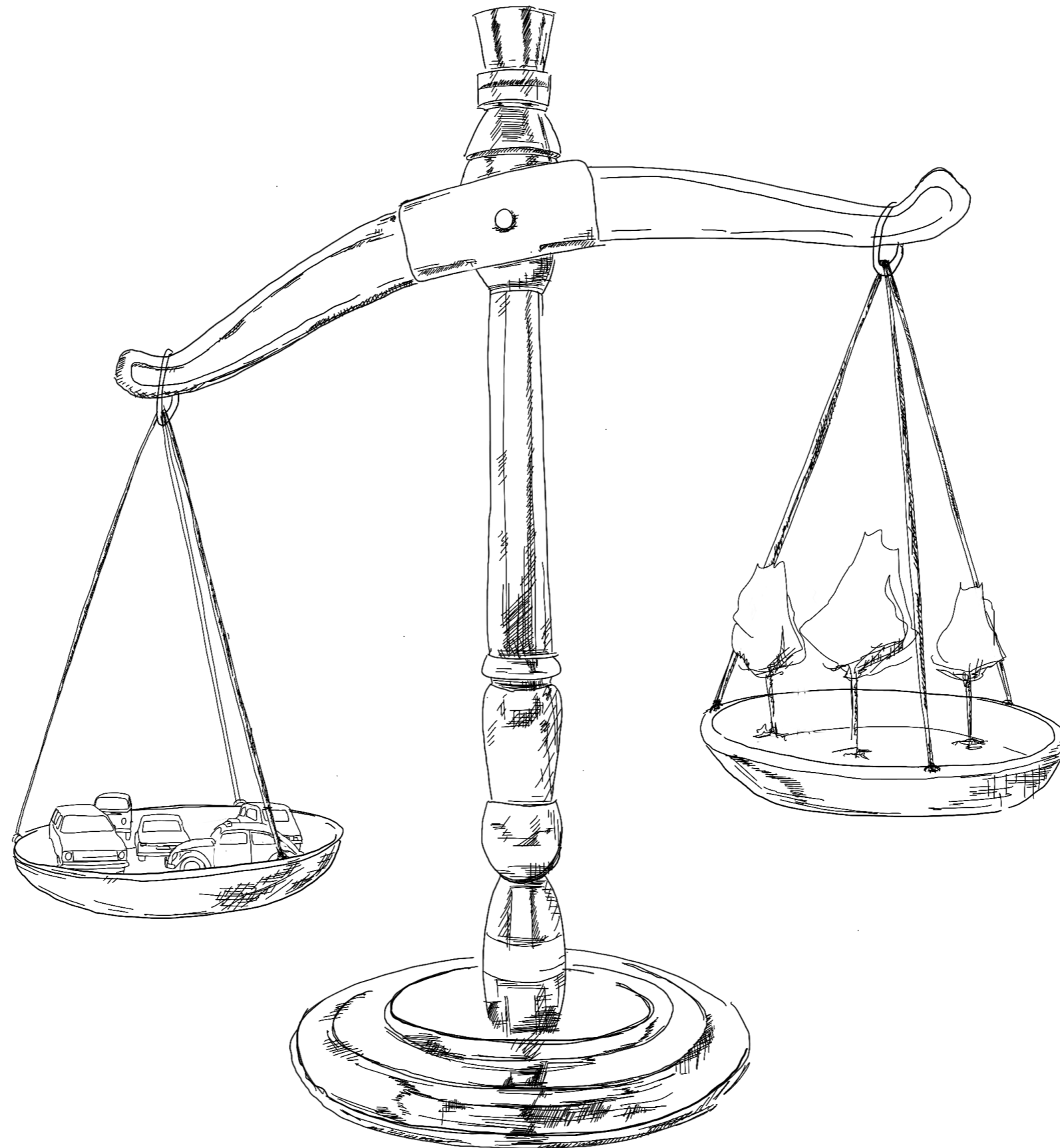


What if?



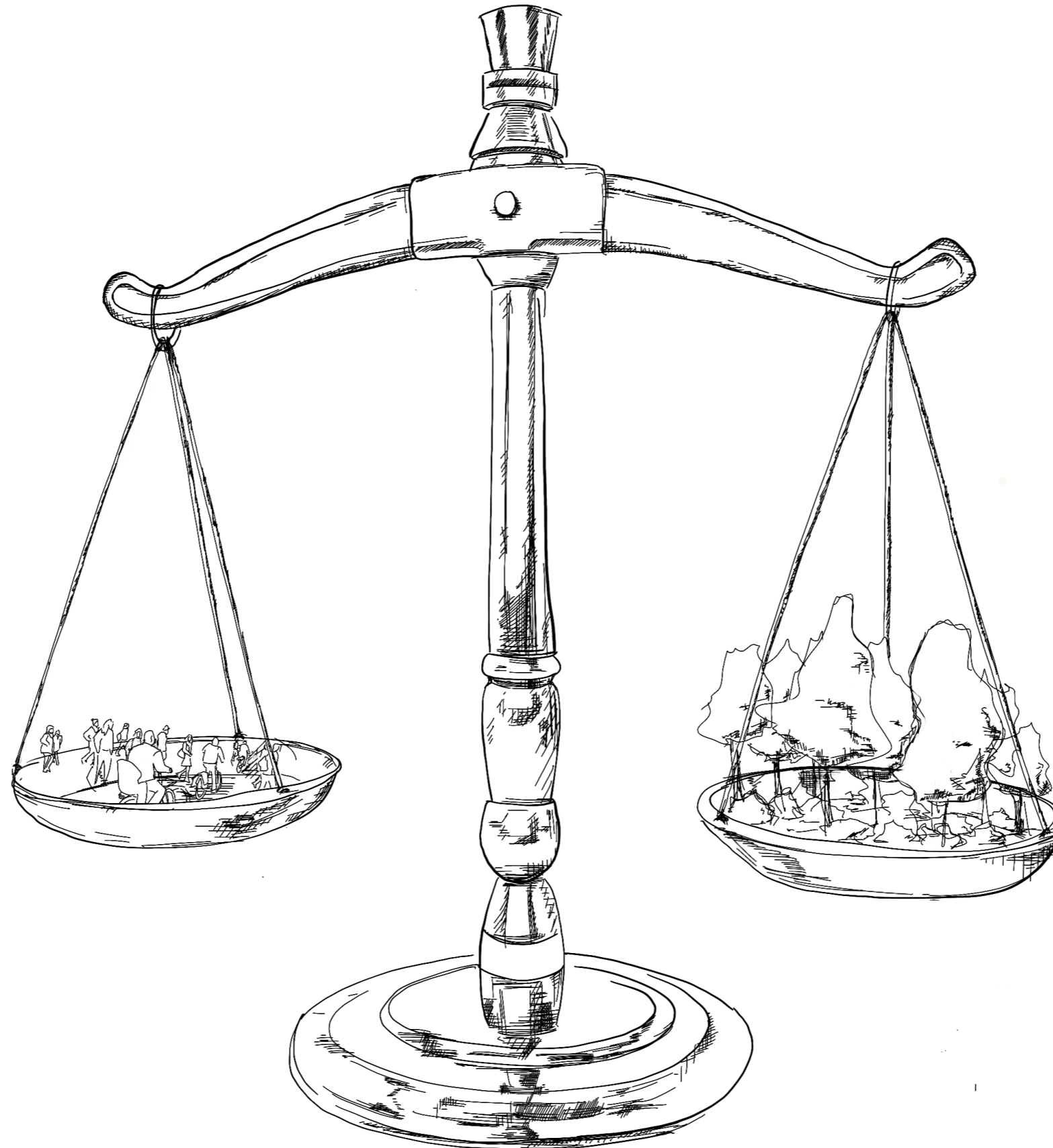
The problem

There is an imbalance in space demand, with on the one hand the car focused mobility system, taking away space from, on the other hand, the much needed green structures



The aim

Use the mobility transition to soft and shared modes of transportation to create green structures that cater to the urban ecological demand, and as a result create balance in the space demand in movement spaces.



The research question

The main question of the thesis

How can the mobility transition to soft and shared modes of transport be used to create green structures within movement spaces, that cater to the urban ecological demand?

Through the scales

Using three different scales to research and design on



Case study location

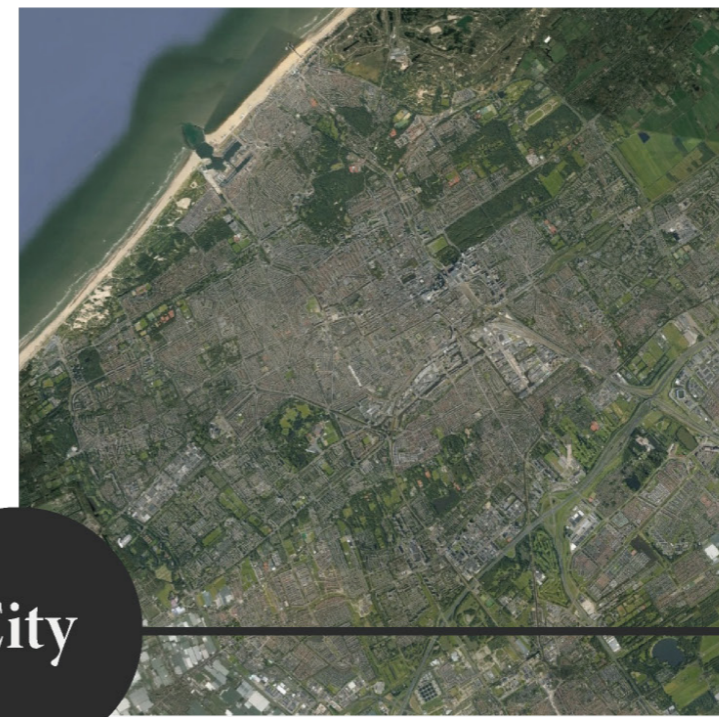
A focus on the region of Haaglanden and The Hague

Region of Haaglanden



Region

The Hague



City

The regional green structure

The National Nature Network (NNN)



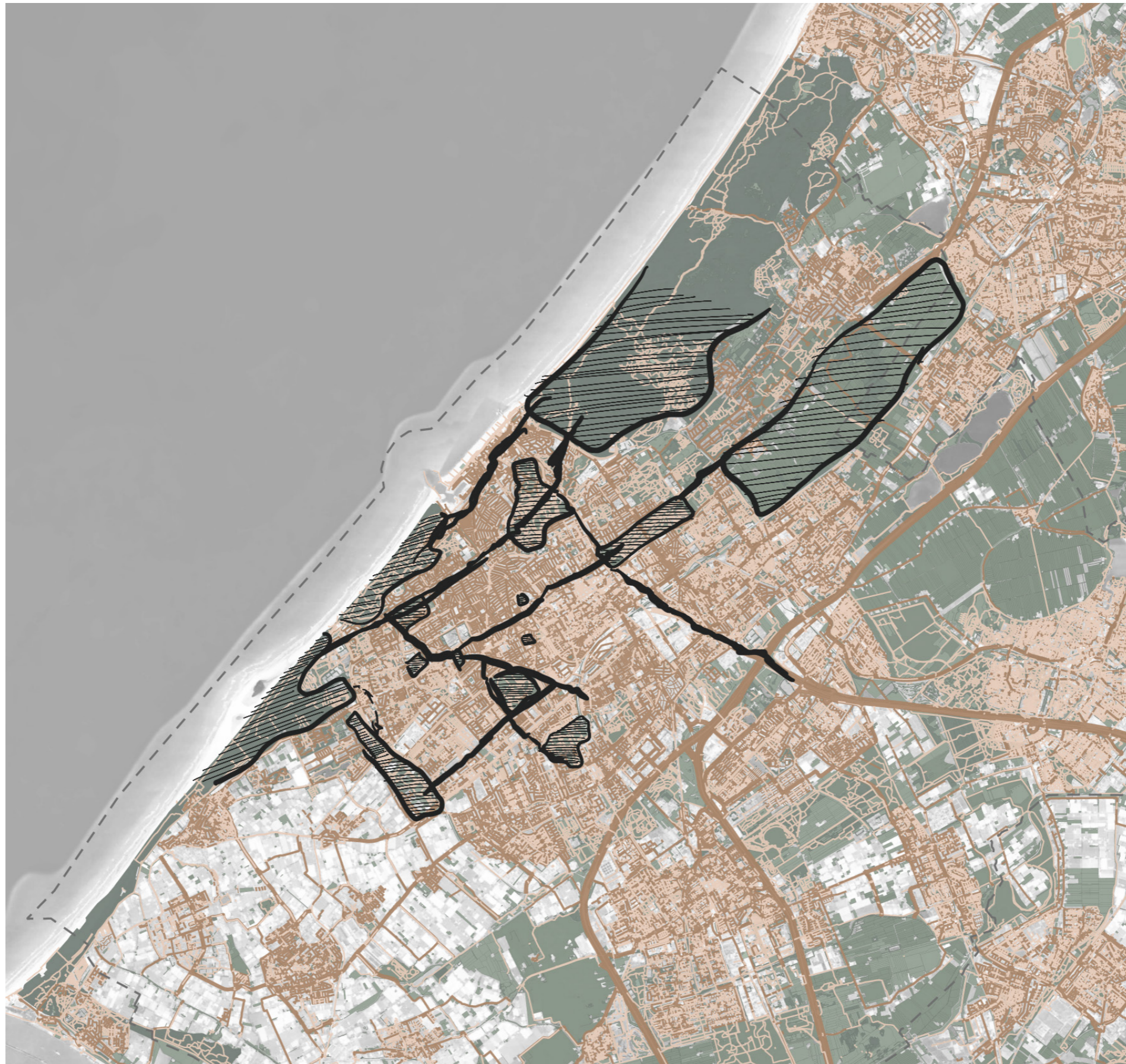
The regional green structure

Urban green network within the NNN



The regional green structure

The Patch-corridor matrix theory - by Formann



A new regional network

The vision for the region of Haaglanden

- Legend
- Regional arteries
 - Local arteries
 - Regional green structures



The focus arteries

Choosing two arteries as the design locations

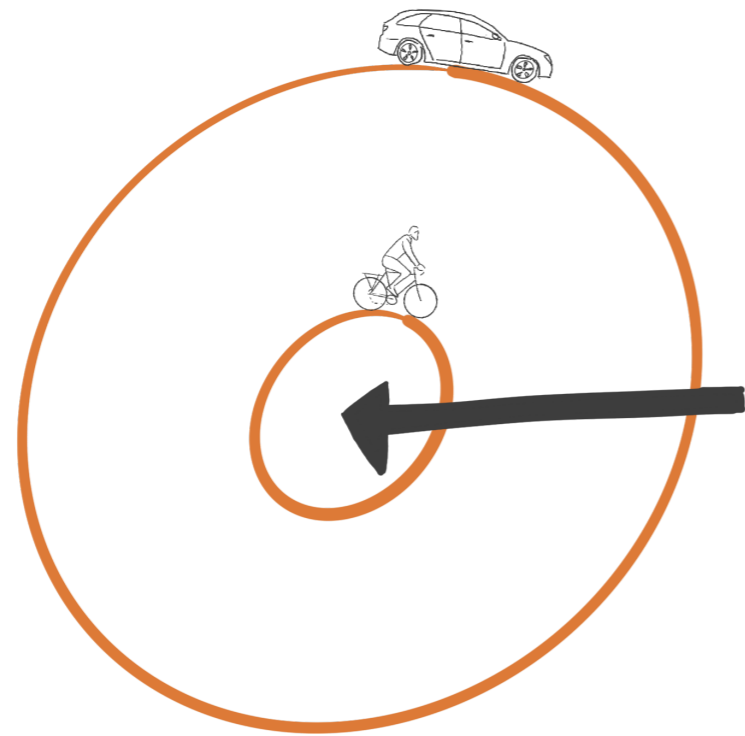
Scheveningen artery

Centres artery

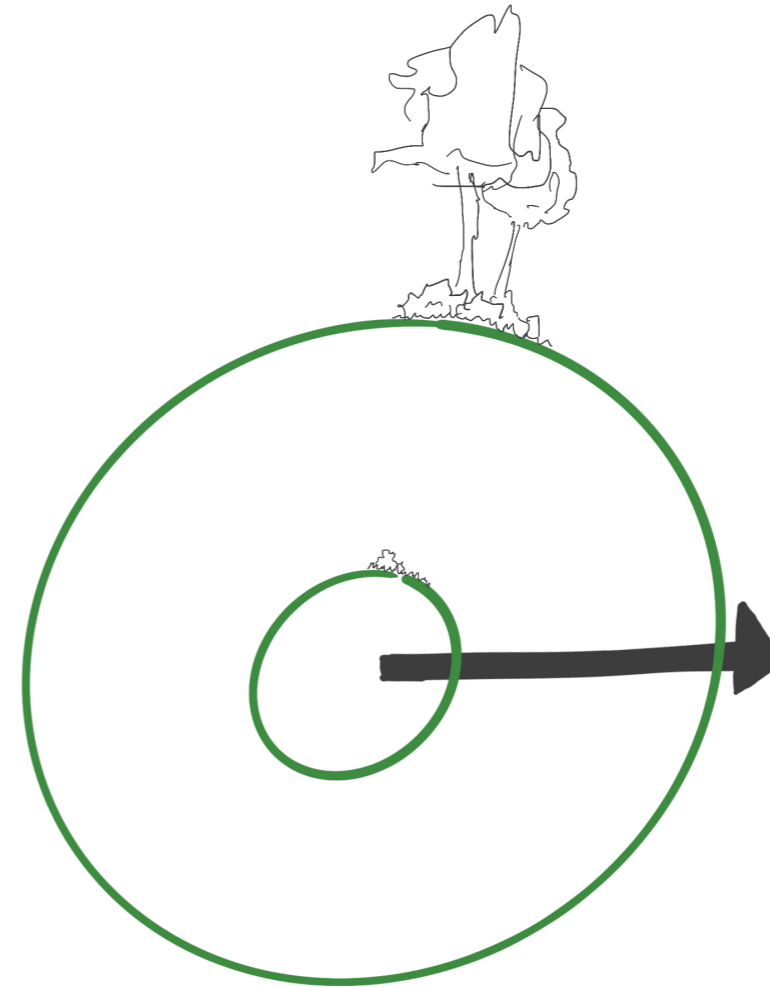


Changing street design

Using two steps

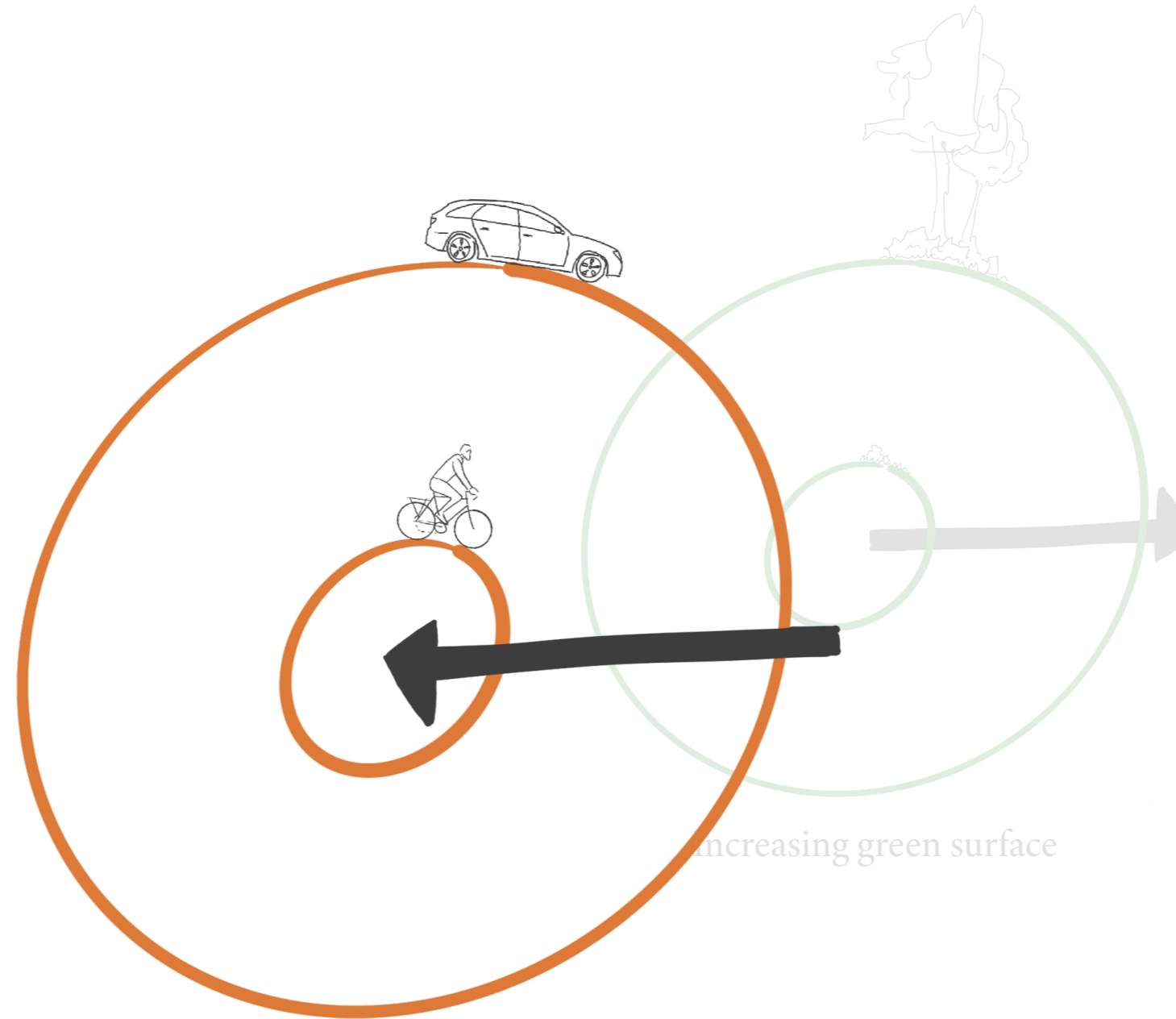


Reduction of mobility space



Increasing green surface

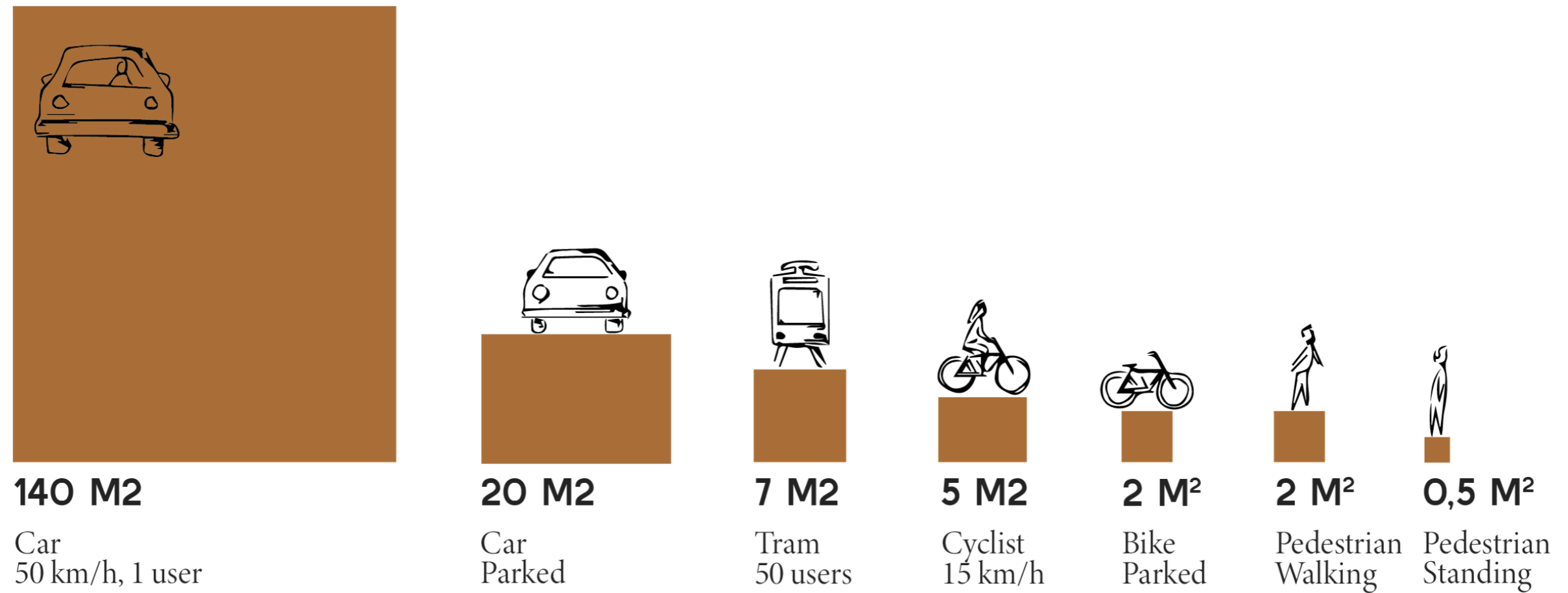
Changing street design



Reduction of mobility space

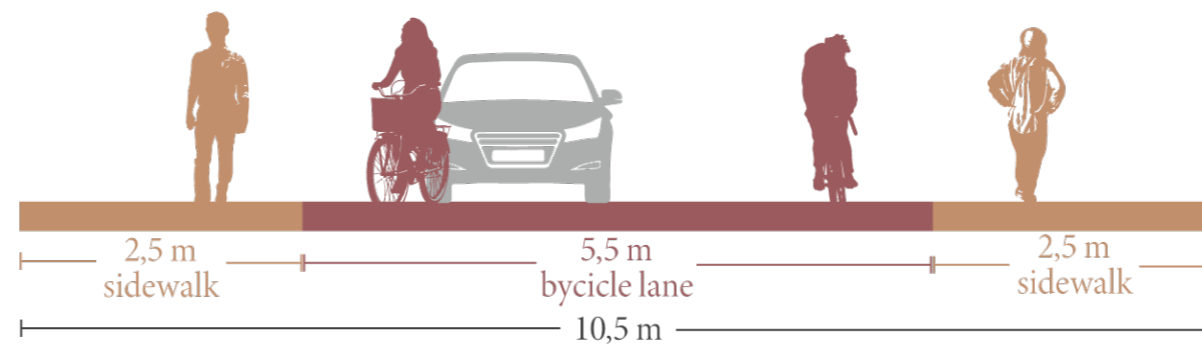
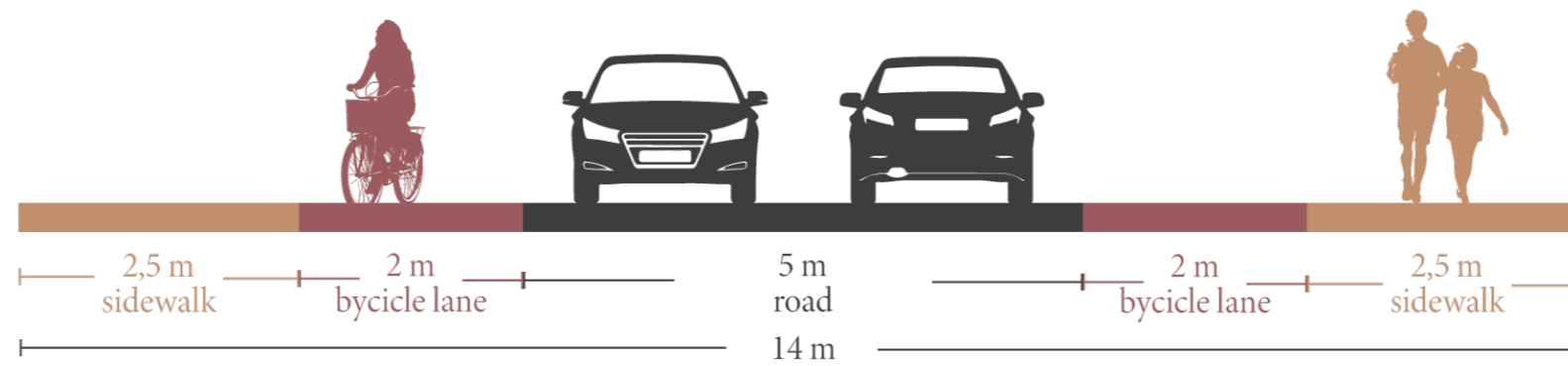
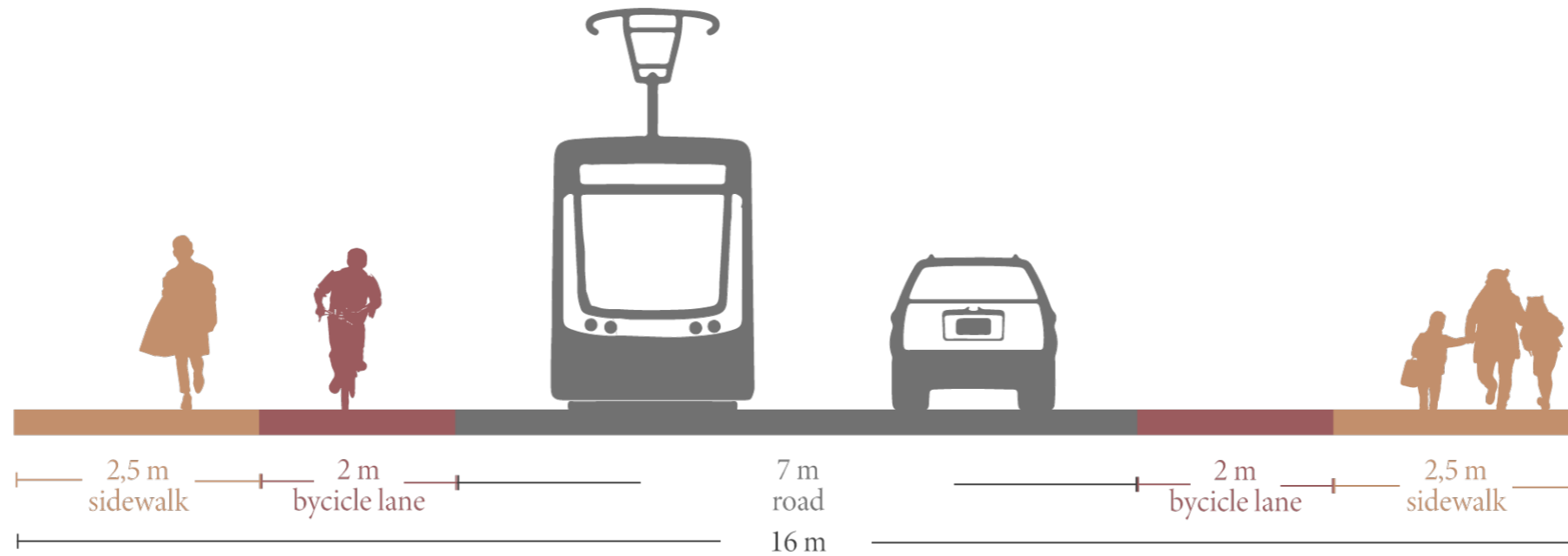
Reducing mobility space

Mobility space claim by different modes of transport

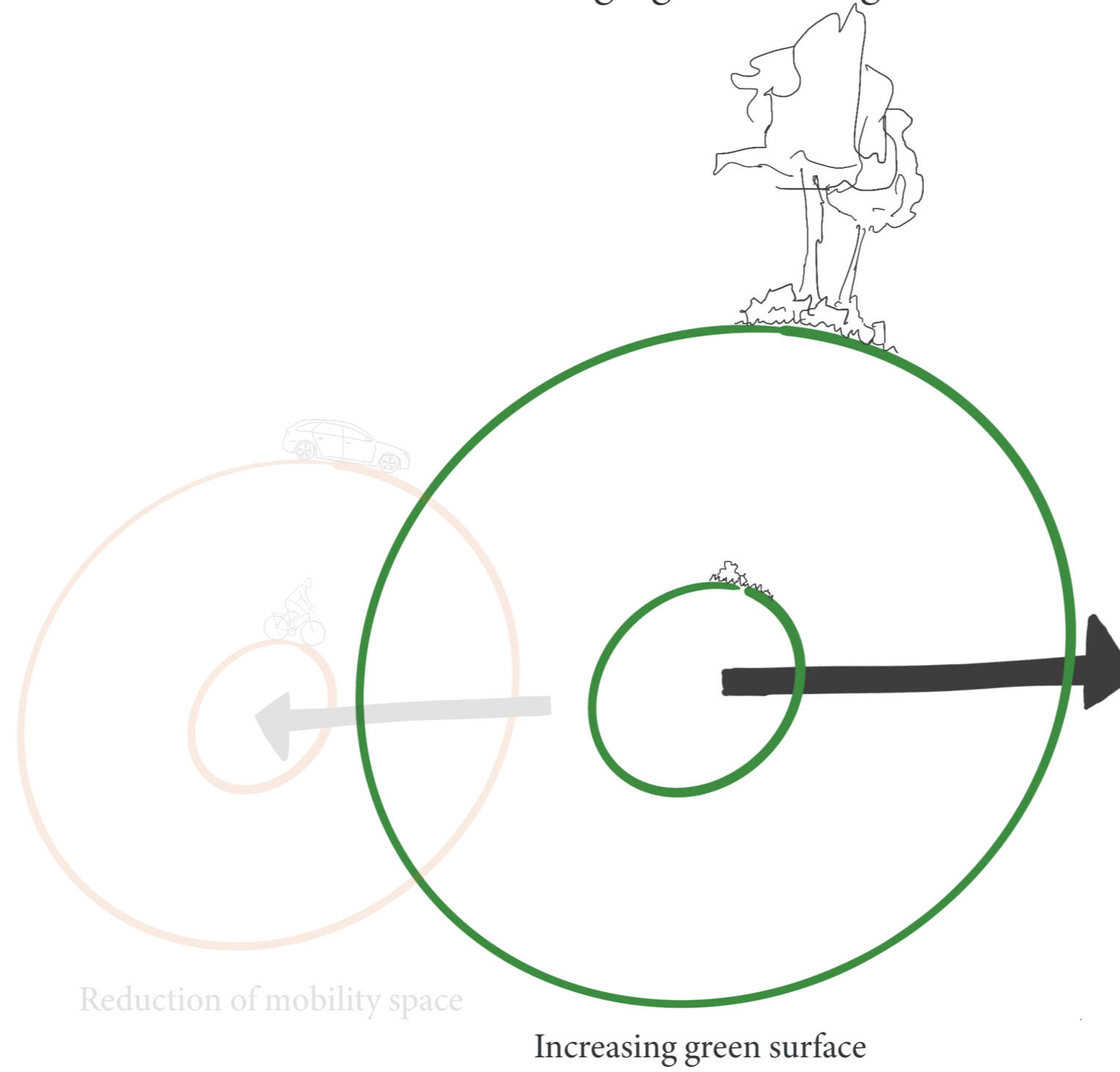


The mobility profiles

Minimizing mobility space for fast transport

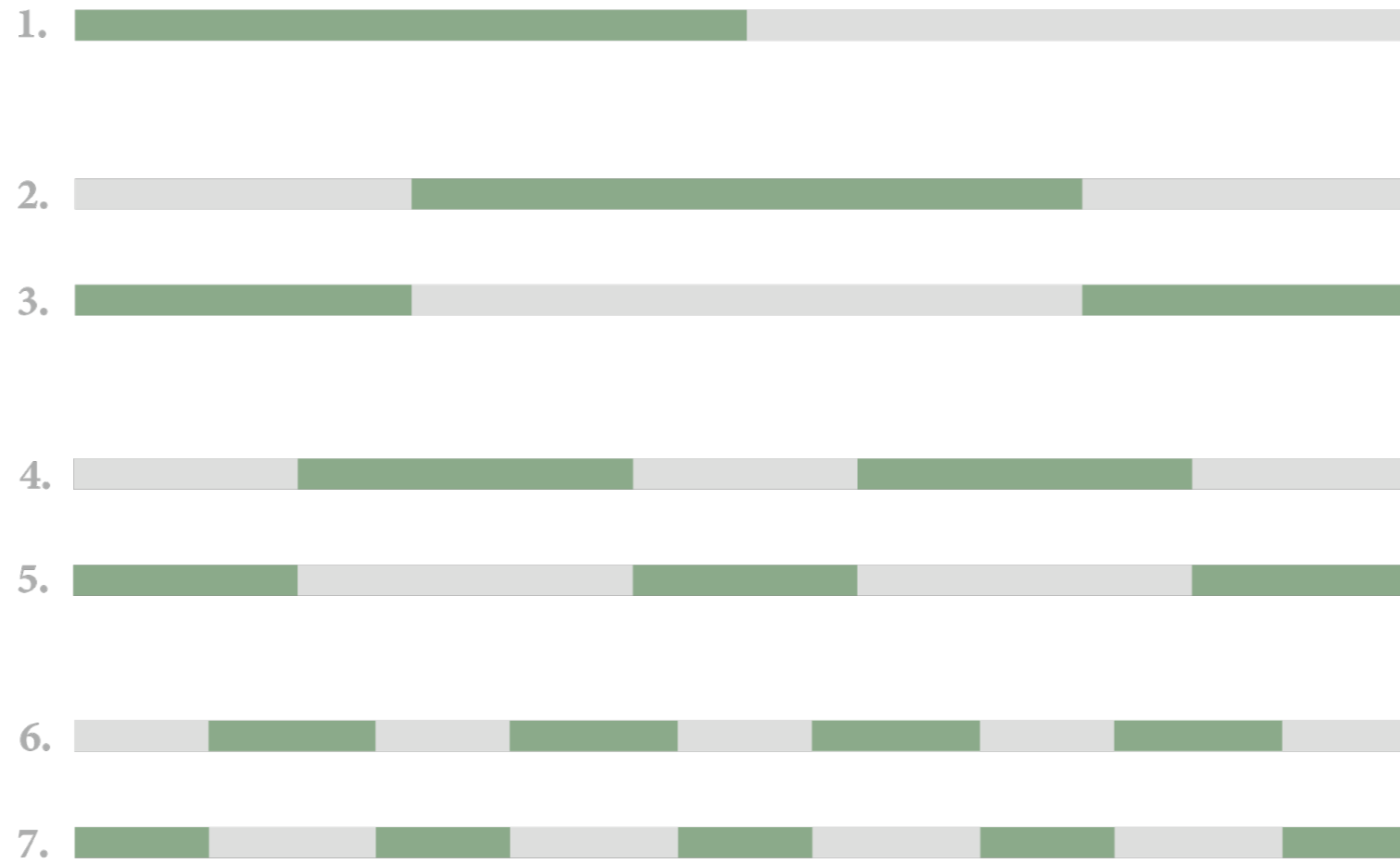


Changing street design



Adding green to the profile

Hard vs soft



Ecosystem Services

As an evaluation tool.

A definition

“Ecosystem services, refer to the goods (such as food) and services (such as water regulation) that are presented by the ecosystem functions and from which we, as the human population, can derive the benefits, both directly and indirectly.”

Constanza et al. (1997)

Infill of the green structure

The toolbox matrix

		SERVICES	ECOLOGY				CLIMATE			SOCIAL
			SE1	SE2	SE3	SE4	SC1	SC2	SC3	SS1
TOOLS			Pollination	Soil quality	Life cycle protection	Biodiversity	Purification of air, water and soil	Climate regulation	Water regulation	Disturbance regulation
VEGETATION										
Grass	TV1	●	●	●	●	●	●	●	●	
Bushes and shrubs	TV2	●	●	●	●	●	●	●	●	●
Flowerbeds	TV3	●	●	●	●	●	●	●	●	
Trees	TV4	●	●	●	●	●	●	●	●	●
Green tree surrounding	TV5	●	●	●	●	●	●	●	●	
Facade gardens	TV6	●	●	●	●	●	●	●	●	●
Floating green	TV7	●		●	●	●	●	●		
Hanging green	TV8	●		●	●	●	●	●		
WATER STRUCTURES										
Ditches	TW1		●	●	●	●	●	●	●	
Bioswales (Wadi)	TW2	●	●	●	●	●	●	●	●	
Urban water channels	TW3	●	●	●	●	●	●	●	●	
Natural banks	TW4	●	●	●	●	●	●	●	●	
Green in hard banks	TW5			●	●				●	
MATERIALS										
Porous pavement	TM1		●		●			●	●	
Lifted planters	TM2	●		●	●	●	●	●	●	
Dry stone walls	TM3	●		●	●	●	●	●		
Facilities for fauna	TM4			●	●					
Water infiltration boxes	TM5								●	
Rainwater storage	TM6								●	
Sprinkler systems	TM7							●		

The Green Street Toolbox

A pocketsize toolbook

- TV1** **SC3** Water regulation
- SE1** Pollination
- SE2** Soil quality
- SE3** Life cycle protection
- SE4** Biodiversity
- SC1** Purification of air, water and soil
- SC2** Climate regulation

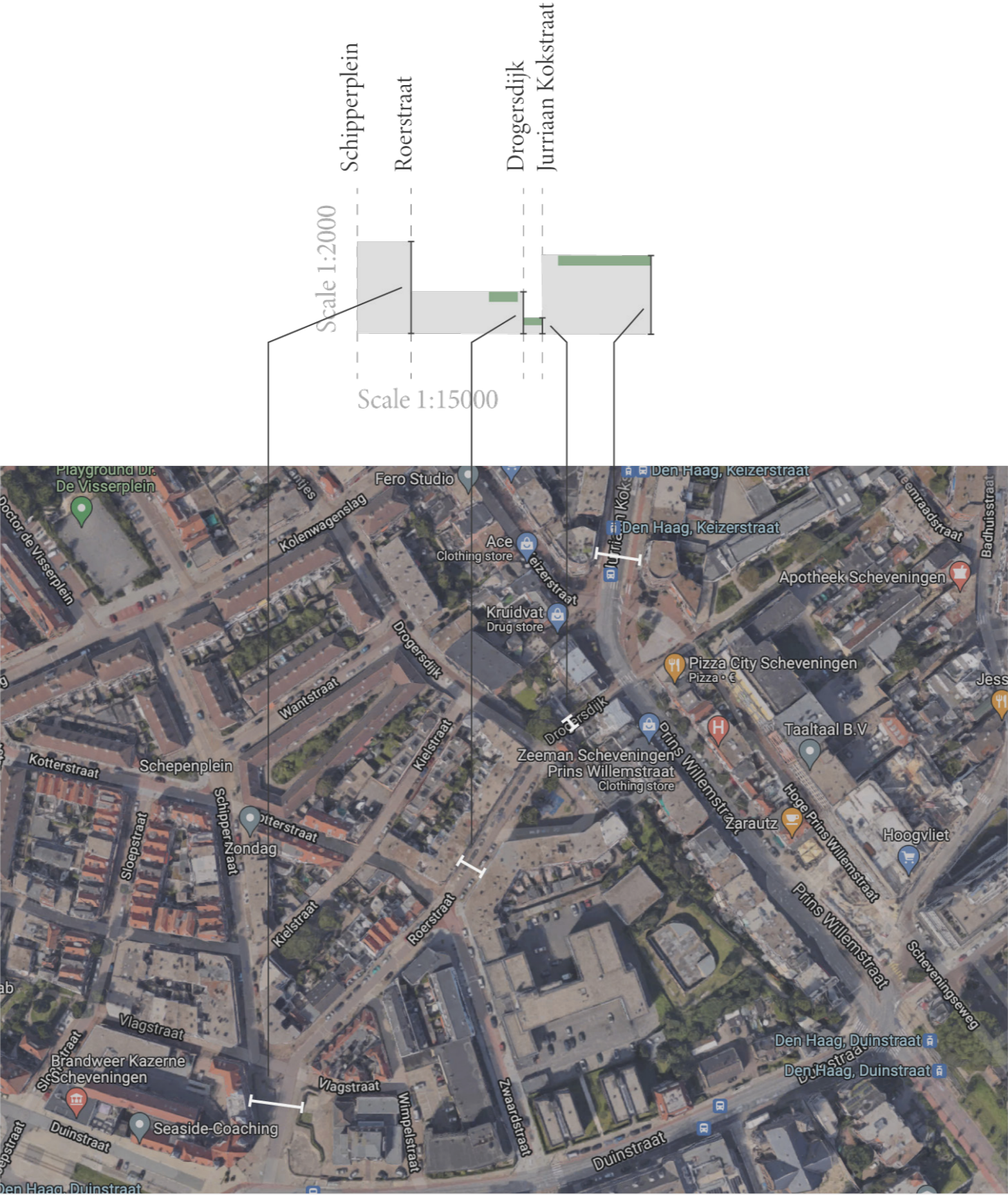
GRASSES

Grass fields or patches of grass can be applied in any situation where there is no excessive amount of movement. Grass surfaces let rainwater infiltrate the soil, and when designed with a slight slope it will also be able to hold water temporarily. As such grass field help with managing ground water and prevent drying out of the soil. When applying short grass to a surface, the field might also be used for social activities, such as picnics or playing sports, but these short grass fields don't have any benefit for the biodiversity of the area. To achieve that, a field with wild and taller grass is needed, which also stimulate root growth, resulting in better soil quality and water retention. Lastly, taller grass also emits more water evaporation, resulting in a slight cooling effect to the surrounding (Pötz, 2016).



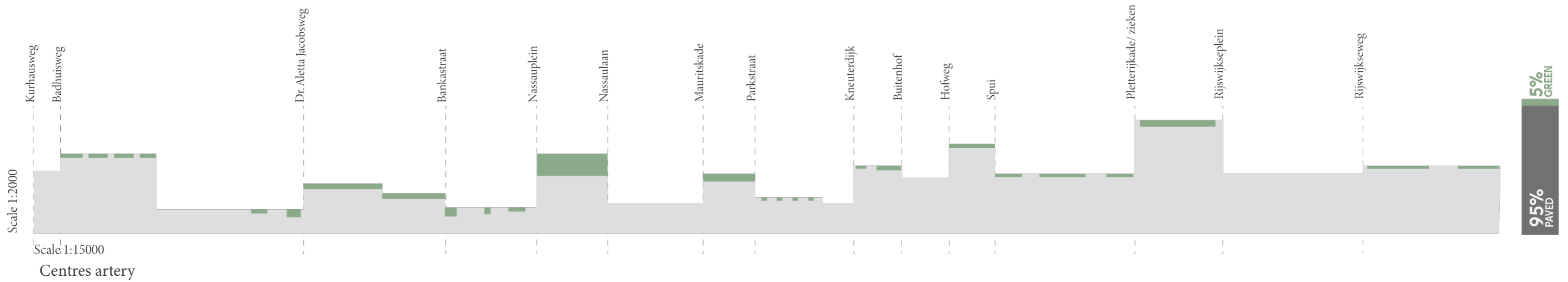
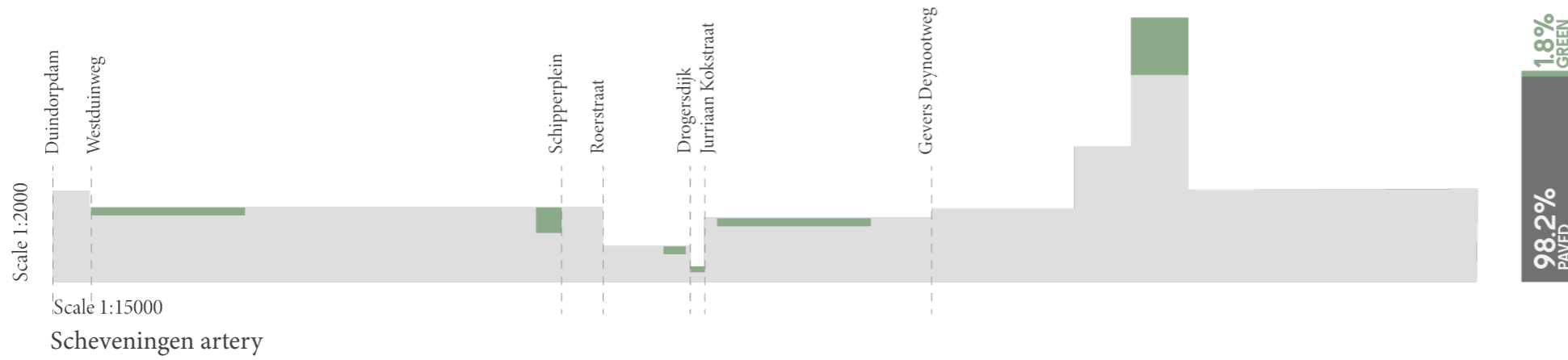
Artery widths

From map to diagram



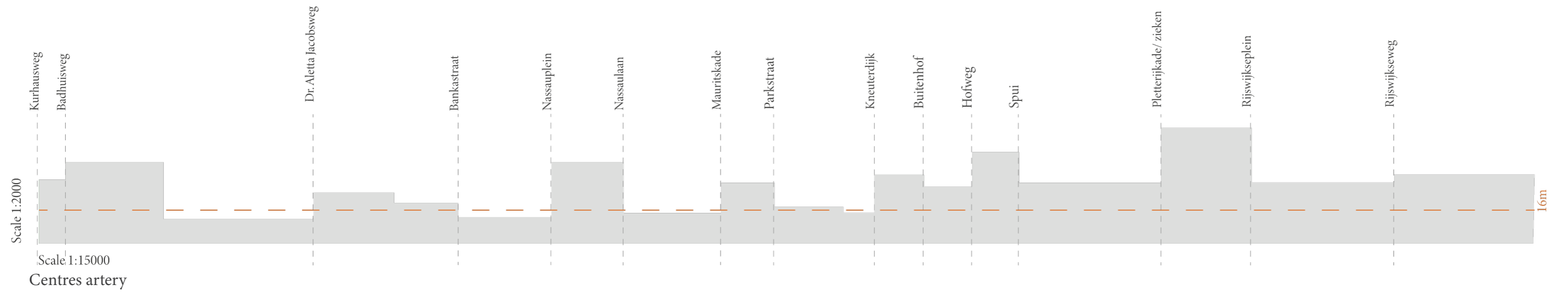
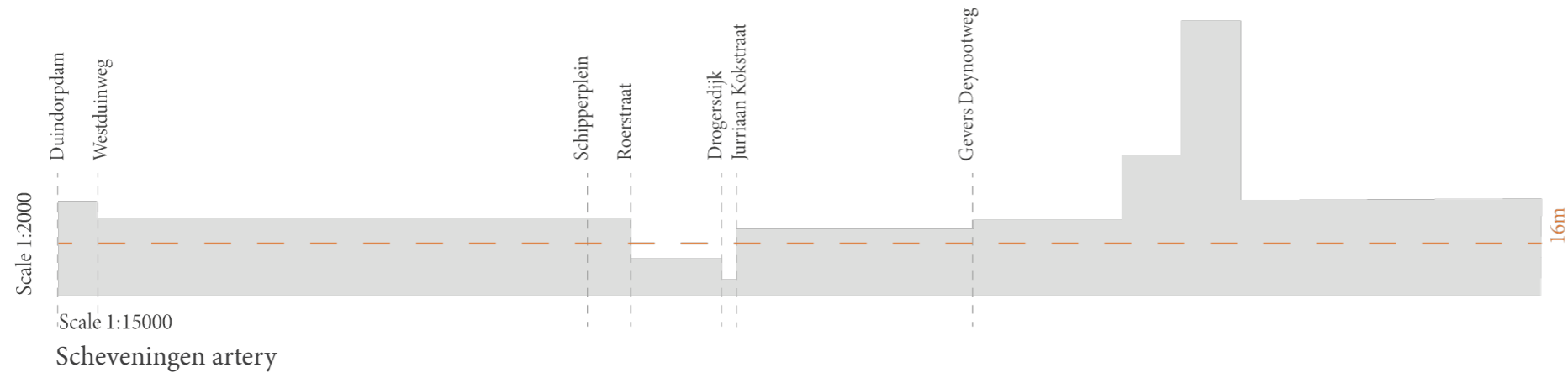
Artery widths

The current width and green percentages



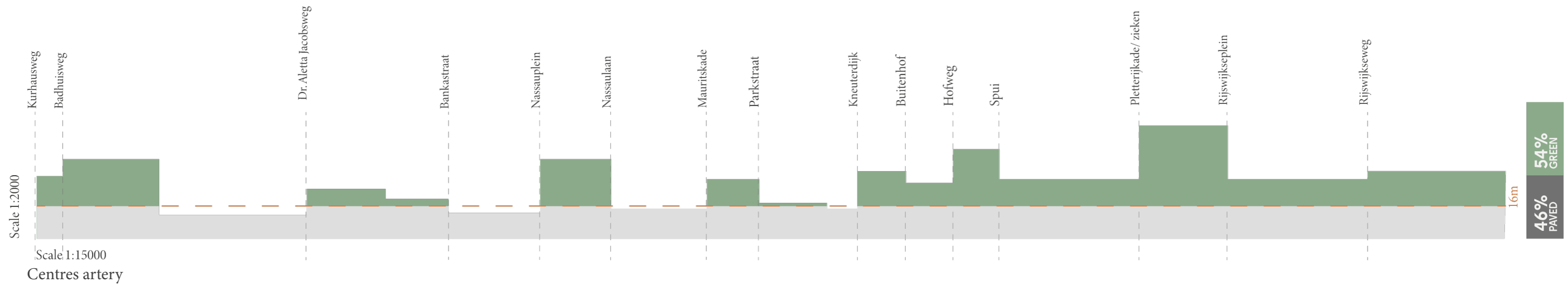
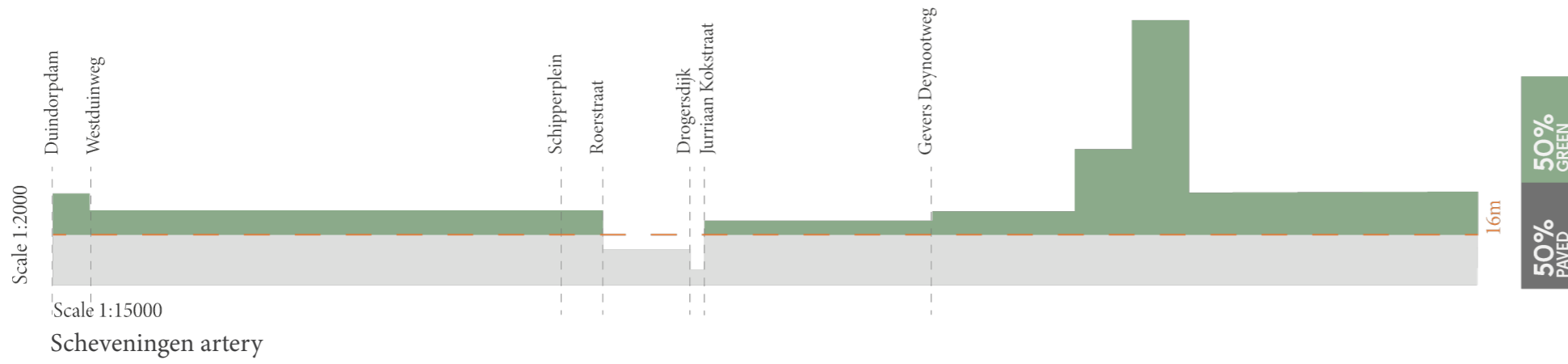
Artery widths

Adding the mobility width



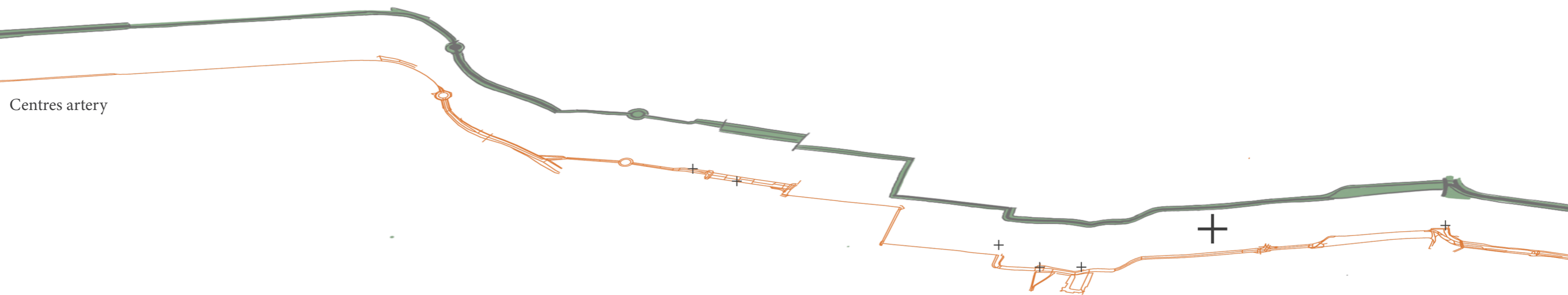
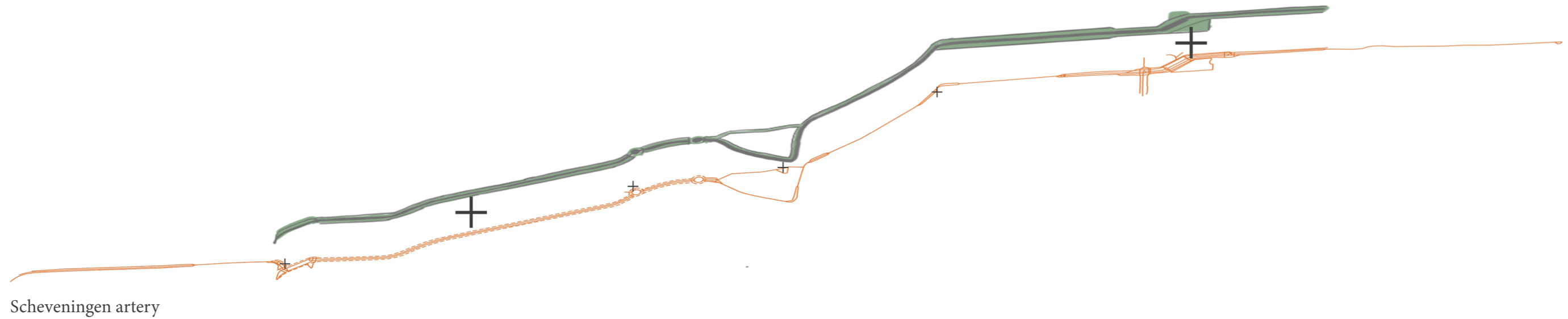
50% green

To a new percentage of green surface



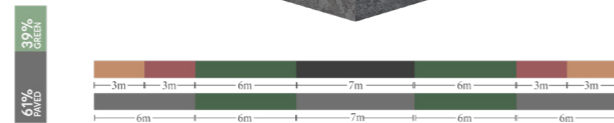
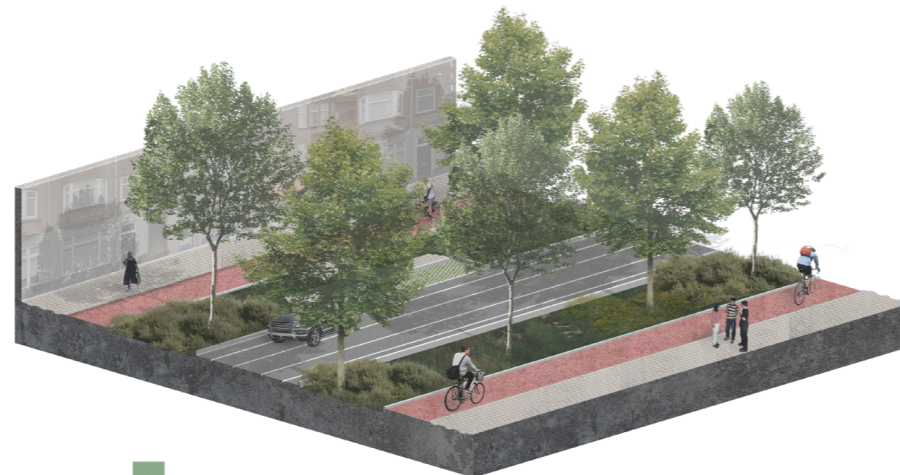
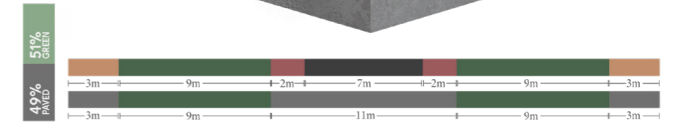
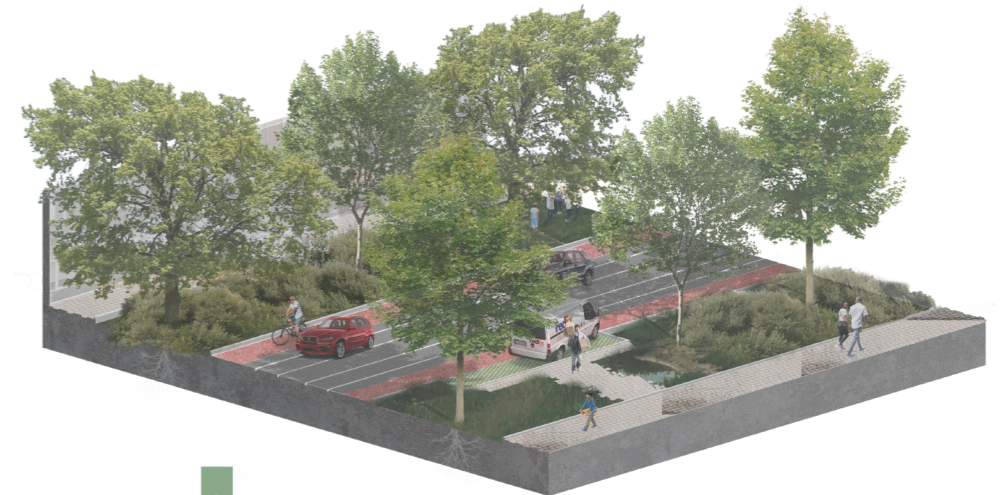
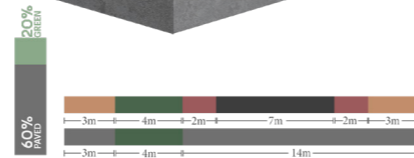
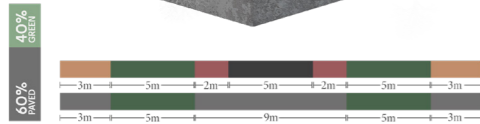
Artery design

Designing a linear system



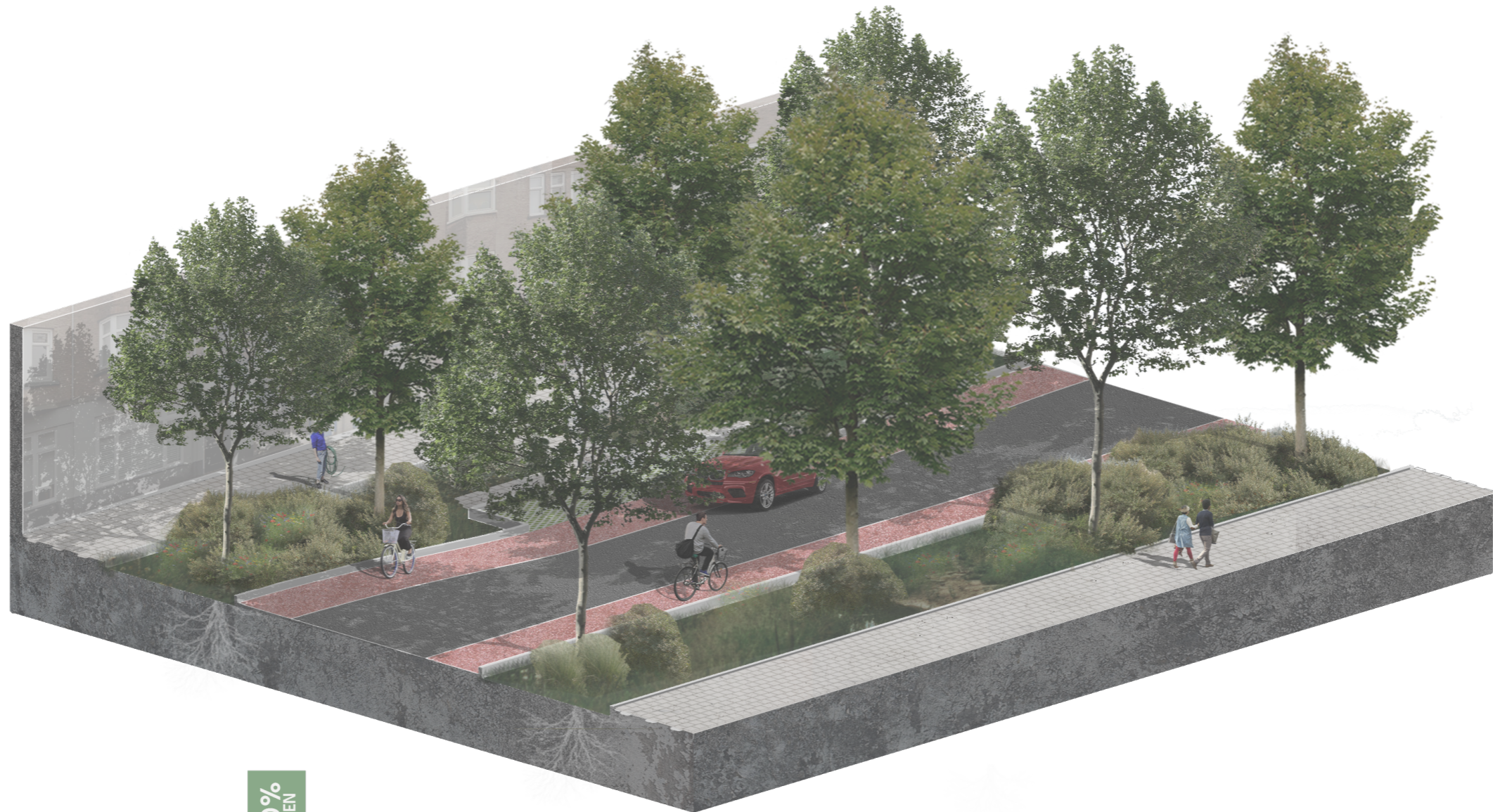
New street profiles

Adding green to the standard green profiles



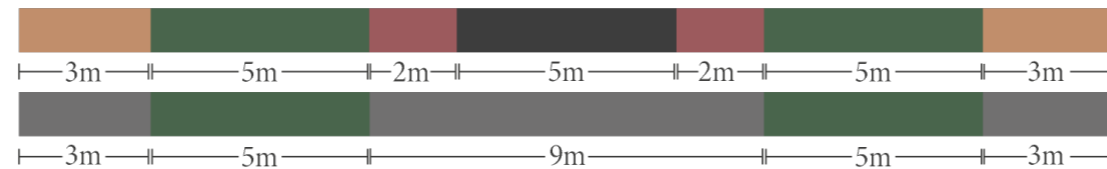
New street typologies

Taking a closer look



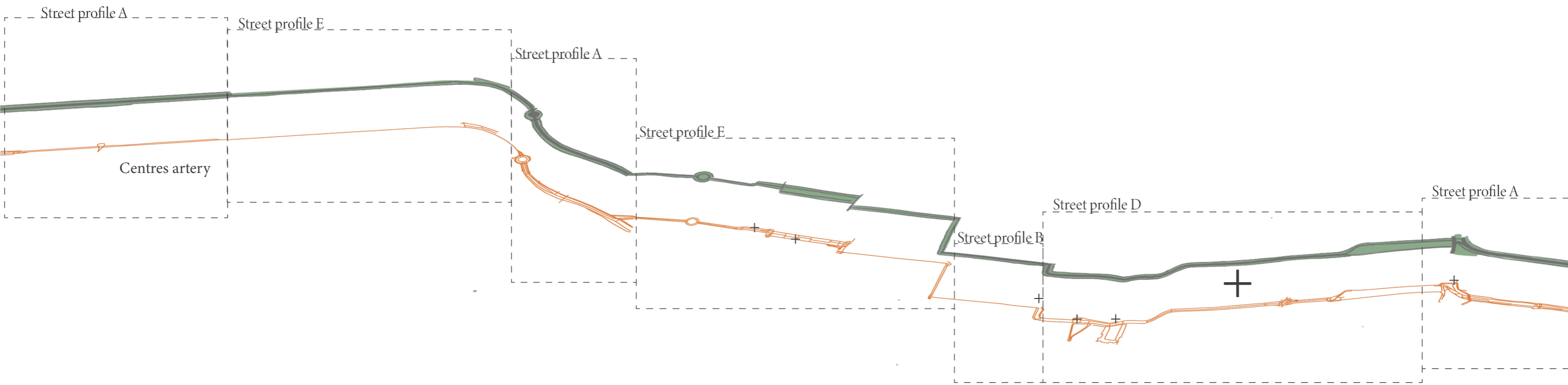
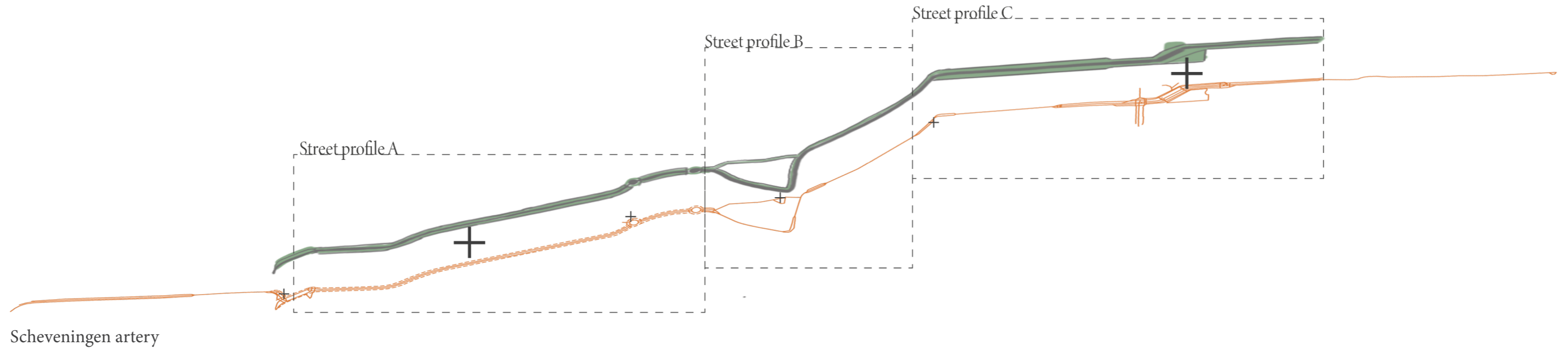
40%
GREEN

60%
PAVED



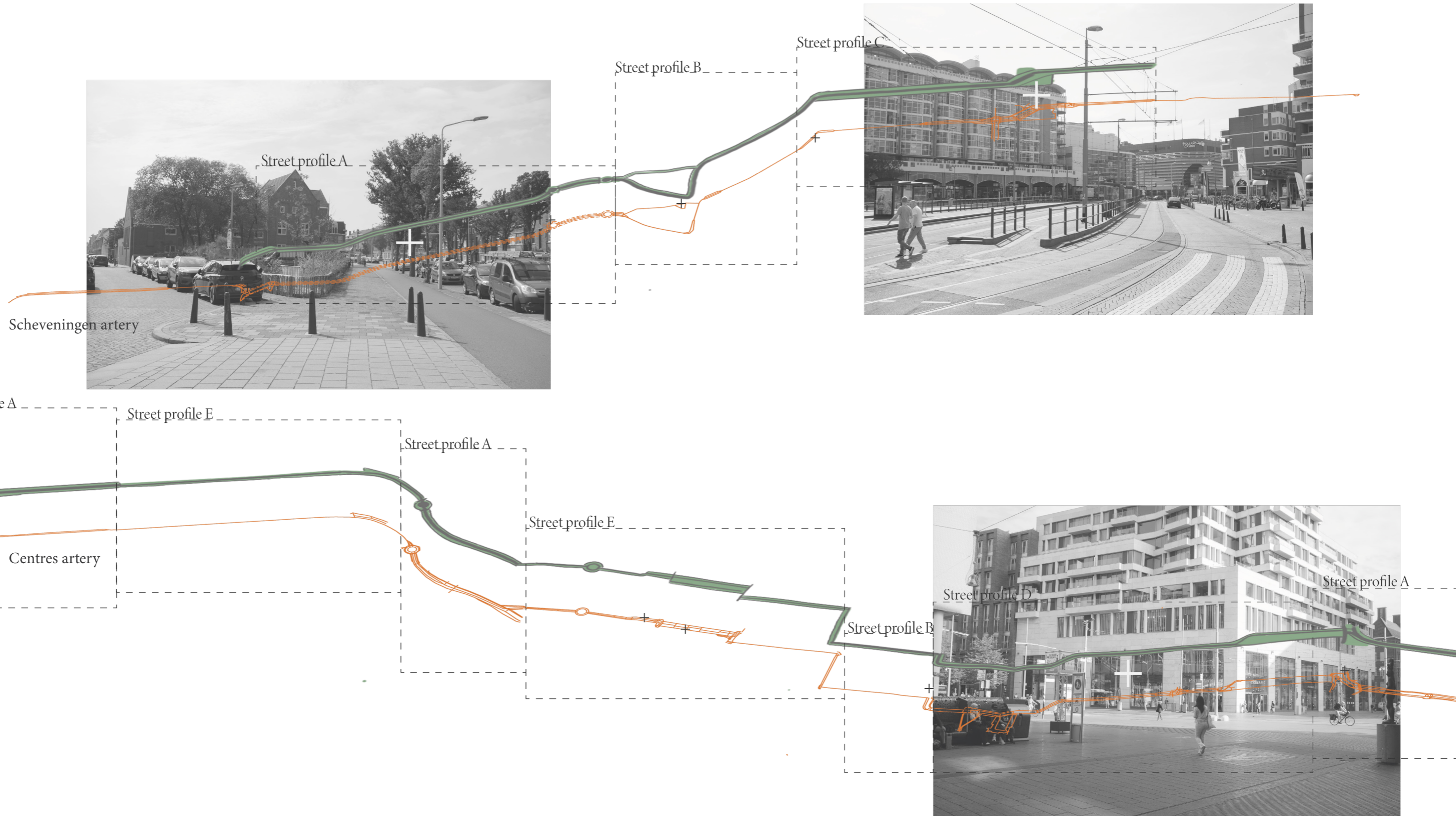
Implementation of the profiles

Applying the profiles along the artery to create linear green structures



Designing the exceptions

Three design locations are chosen along the two corridors



The school area
Creating places to stay

TV4-SC2
Trees

TM1-SC2
Porous pavement

The school area

Creating places to stay

		SERVICES				ECOLOGY			CLIMATE			SOCIAL
		SE1	SE2	SE3	SE4	SC1	SC2	SC3	SS1			
		Polination	Soil quality	Life cycle protection	Biodiversity	Purification of air, water and soil	Climate regulation	Water regulation	Disturbance regulation			
TOOLS												
VEGETATION												
Grass	TV1	●	●	●	●	●	●	●	●	●	●	
Bushes and shrubs	TV2	●	●	●	●	●	●	●	●	●		
Flowerbeds	TV3	●	●	●	●	●	●	●	●	●		
Trees	TV4	●	●	●	●	●	●	●	●	●		
Green tree surrounding	TV5	●	●	●	●	●	●	●	●	●		
Facade gardens	TV6	●	●	●	●	●	●	●	●	●		
Floating green	TV7	●		●	●	●	●					
Hanging green	TV8	●		●	●	●	●					
WATER STRUCTURES												
Ditches	TW1		●	●	●	●	●	●	●	●		
Bioswales (Wadi)	TW2	●	●	●	●	●	●	●	●	●		
Urban water channels	TW3	●	●	●	●	●	●	●	●	●		
Natural banks	TW4	●	●	●	●	●	●	●	●	●		
Green in hard banks	TW5			●	●			●				
MATERIALS												
Porous pavement	TM1		●		●			●	●	●		
Lifted planters	TM2	●		●	●	●	●	●	●	●		
Dry stone walls	TM3	●		●	●	●	●	●				
Facilities for fauna	TM4			●	●							
Water infiltration boxes	TM5							●				
Rainwater storage	TM6							●				
Sprinkler systems	TM7						●					

The school area

Creating places to stay



The school area

Visualising the future



The Kurhaus stop
From hard to soft nodes

TV4-SC2
Trees

TV2-SC3
Bushes and shrubs

TV2-SC4
Bushes and shrubs



The Kurhaus stop

From hard to soft nodes

		SERVICES	ECOLOGY				CLIMATE			SOCIAL
			SE1	SE2	SE3	SE4	SC1	SC2	SC3	SS1
TOOLS			Pollination	Soil quality	Life cycle protection	Biodiversity	Purification of air, water and soil	Climate regulation	Water regulation	Disturbance regulation
VEGETATION										
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Bushes and shrubs	TV2		●	●	●	●	●	●	●	●
Flowerbeds	TV3		●	●	●	●	●	●	●	
Trees	TV4		●	●	●	●	●	●	●	●
Green tree surrounding	TV5		●	●	●	●	●	●	●	
Facade gardens	TV6		●	●	●	●	●	●	●	●
Floating green	TV7		●		●	●	●	●		
Hanging green	TV8		●		●	●	●	●		
WATER STRUCTURES										
Ditches	TW1			●	●	●	●	●	●	
Bioswales (Wadi)	TW2		●	●	●	●	●	●	●	
Urban water channels	TW3		●	●	●	●	●	●	●	
Natural banks	TW4		●	●	●	●	●	●	●	
Green in hard banks	TW5				●	●			●	
MATERIALS										
Porous pavement	TM1			●		●		●	●	
Lifted planters	TM2		●		●	●	●	●	●	
Dry stone walls	TM3		●		●	●	●	●		
Facilities for fauna	TM4				●	●				
Water infiltration boxes	TM5							●		
Rainwater storage	TM6							●		
Sprinkler systems	TM7							●		

The Kurhaus stop

From hard to soft nodes



The Kurhaus stop

Visualising the future



The Spui area

A design for softer shopping streets

TV4-SC2
Trees

The Spui area

A design for softer shopping streets

		ECOLOGY				CLIMATE			SOCIAL
SERVICES	TOOLS	SE1	SE2	SE3	SE4	SC1	SC2	SC3	SS1
		Pollination	Soil quality	Life cycle protection	Biodiversity	Purification of air, water and soil	Climate regulation	Water regulation	Disturbance regulation
VEGETATION									
Grass	TV1	●	●	●	●	●	●	●	
Bushes and shrubs	TV2	●	●	●	●	●	●	●	●
Flowerbeds	TV3	●	●	●	●	●	●	●	
Trees	TV4	●	●	●	●	●	●	●	●
Green tree surrounding	TV5	●	●	●	●	●	●	●	
Facade gardens	TV6	●	●	●	●	●	●	●	●
Floating green	TV7	●		●	●	●	●		
Hanging green	TV8	●		●	●	●	●		
WATER STRUCTURES									
Ditches	TW1		●	●	●	●	●	●	
Bioswales (Wadi)	TW2	●	●	●	●	●	●	●	
Urban water channels	TW3	●	●	●	●	●	●	●	
Natural banks	TW4	●	●	●	●	●	●	●	
Green in hard banks	TW5			●	●			●	
MATERIALS									
Porous pavement	TM1		●		●		●	●	
Lifted planters	TM2	●		●	●	●	●	●	
Dry stone walls	TM3	●		●	●	●	●		
Facilities for fauna	TM4			●	●				
Water infiltration boxes	TM5							●	
Rainwater storage	TM6							●	
Sprinkler systems	TM7						●		

The Spui area

A design for softer shopping streets



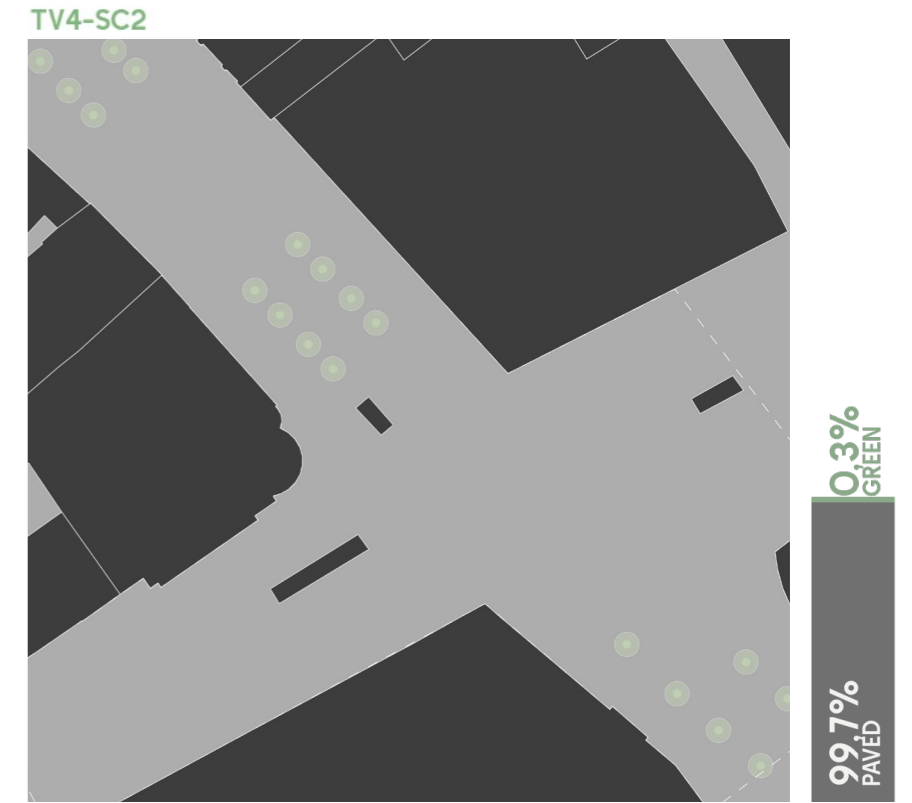
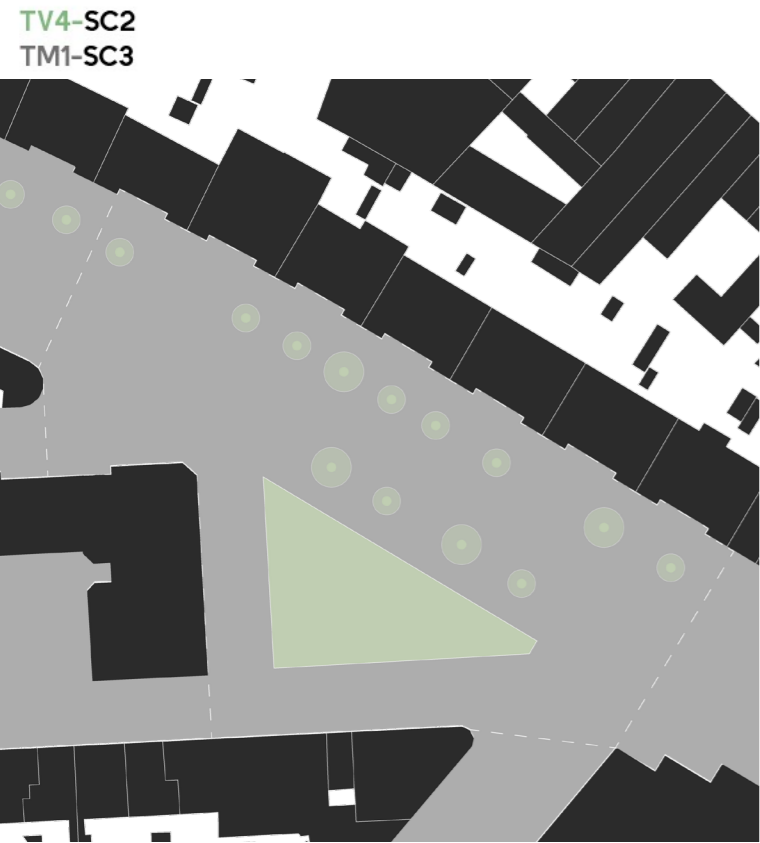
The Spui area

Visualising the future



Evaluating the design

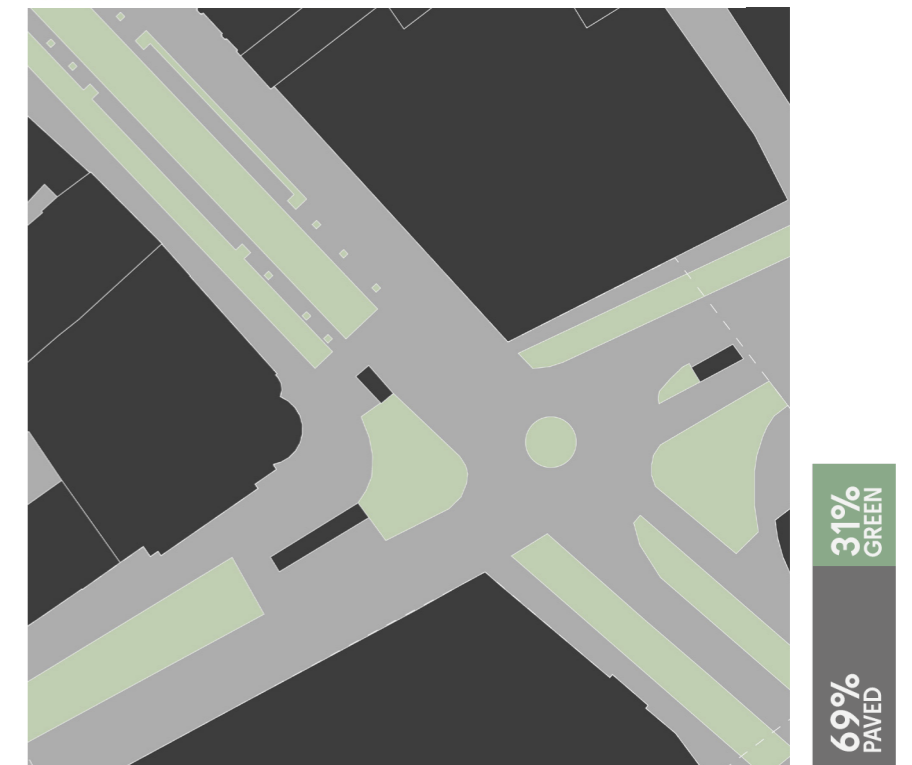
ESS and green surface in the three design locations



- TV1-SE2
- TV1-SE4
- TV1-SC2
- TV2-SE2
- TV2-SE3
- TV2-SE4
- TV2-SC1
- TV2-SC2
- TV4-SE2
- TV4-SE3
- TV4-SE4
- TV4-SC1
- TV4-SC2
- TW1-SC3
- TW1-SE2
- TM1-SC3

- TV1-SE2
- TV1-SE4
- TV1-SC2
- TV2-SE2
- TV2-SE3
- TV2-SE4
- TV2-SC1
- TV2-SC2
- TV3-SE1
- TV3-SE2
- TV3-SE3
- TV3-SE4
- TV3-SC1
- TV4-SE2
- TV4-SE3
- TV4-SE4
- TV4-SC1
- TV4-SC2
- TM1-SC3

- TV1-SE2
- TV1-SE4
- TV1-SC2
- TV3-SE1
- TV3-SE2
- TV3-SE3
- TV3-SE4
- TV3-SC1
- TV3-SC2
- TV3-SC3
- TV3-SC4
- TV5-SE2
- TV5-SE3
- TW1-SC3
- TW1-SE2
- TW3-SC3
- TW3-SE4
- TM1-SC3



Evaluating the design

Back to the artery



Conclusion

Repeating the research question

How can the mobility transition to soft and shared modes of transport be used to create green structures within movement spaces, that cater to the urban ecological demand?

Conclusion

Answering the research question

Use the mobility network to enhance the green network

Conclusion

Answering the research question

Use the mobility network to enhance the regional green network
By making regional and local arteries that create connections
between the current green patches

Conclusion

Answering the research question

Use the mobility network to enhance the regional green network
By making regional and local arteries that create connections
between the current green patches

Using linear green structures in the arteries by reducing car space

Conclusion

Answering the research question

Use the mobility network to enhance the regional green network

By making regional and local arteries that create connections
between the current green patches

Using linear green structures in the arteries by reducing car space

The leftover space can be used to for the demand of ecological,
social and climate functions

Conclusion

Answering the research question

Use the mobility network to enhance the regional green network

By making regional and local arteries that create connections
between the current green patches

Using linear green structures in the arteries by reducing car space

The leftover space can be used to for the demand of ecological,
social and climate functions

Which can be achieved using the tools from the toolbox and
linking them to the needed services.

Conclusion

The result

Lets all make use of the new profiles and toolbox to realize

50% green surface streets

LET'S SOFTEN THE
HARDER GROUND!
THANK YOU

