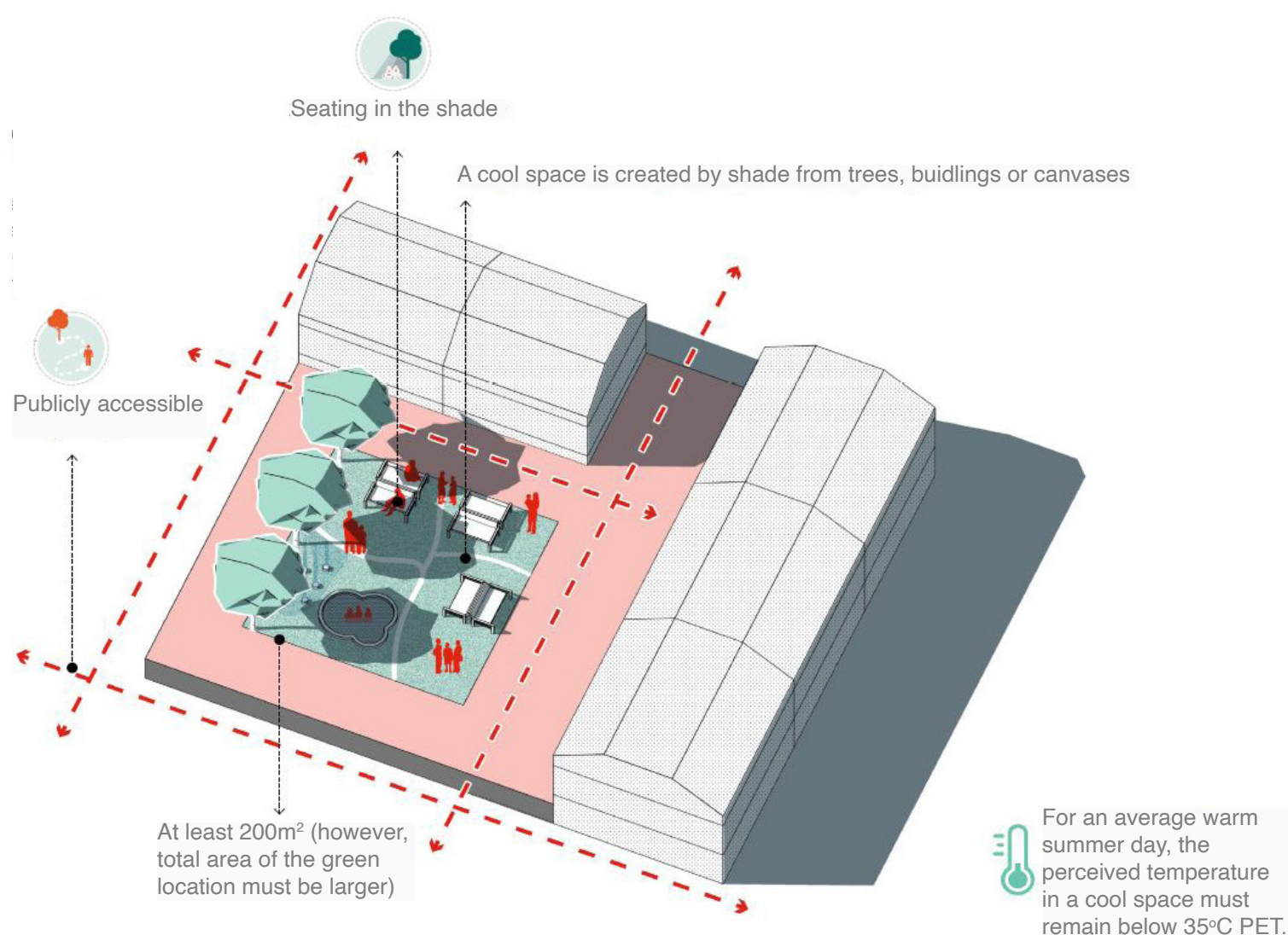


## A practical approach towards designing heat resilient cities

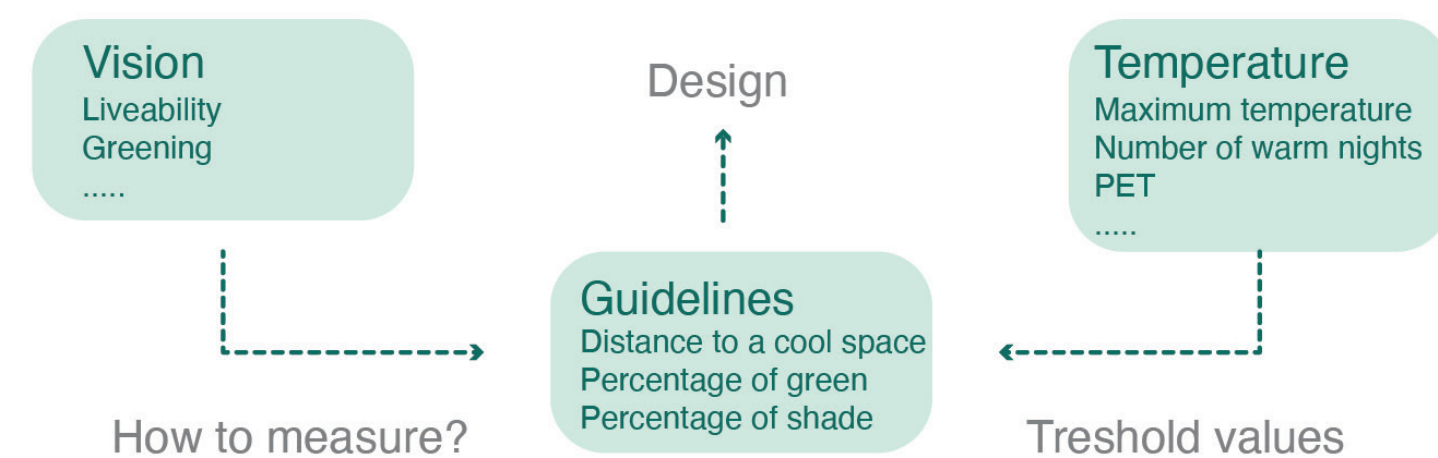


### Specifications of a cool space in urban tissues

## Design guidelines for heat resilient urban spaces

Since January 2020, heat stress is officially part of policy and design of public space in The Netherlands. Nevertheless, how to design in a heat resilient way is still open for interpretation. Municipalities are searching for design rules to make their cities heat resilient. Together with over 45 municipalities the AUAS developed and tested three design guidelines for heat resilient urban spaces. The first two guidelines focus on creating enough cool spaces with a comfortable temperature during the day. The third guideline aims at lowering the air temperature throughout the city.

The three design guidelines have been developed in such a way that it is relatively simple to check whether spatial plans meet the objectives for a heat-resilient outdoor space. Dutch municipalities, provinces, designers and developers already use and implement the guidelines in their regulation and everyday practice. In the report that describes the guidelines (Kluck et al. 2020) we explain how the guidelines can be applied.



### From vision and temperature values to guidelines

Literature:

Klucck, J., E.J. Klok, A. Solcárová, L. Kleerekooper, L.I. Wilschut, C.M.J. Jacobs en R. Loeve (2020a). De hittebestendige stad: hoe kijk je op de inrichting van de buitenruimte. Hogeschool van Amsterdam, Faculteit Techniek, Onderzoeksprogramma Urban Technology. Available at: [https://www.hva.nl/binaries/content/assets/subsites/kct-techniek/publicaties/klimaatbestendige-stad/hva-2020-hittebestendige-stad\\_online.pdf](https://www.hva.nl/binaries/content/assets/subsites/kct-techniek/publicaties/klimaatbestendige-stad/hva-2020-hittebestendige-stad_online.pdf)

Klucck, J., Kleerekooper, L. Erwin, S. Liu, C. Solcárová, A. Klok, E.J. Loeve, R. Welter, N. Lopes, M. en Rajaei, S. (2020b). De hittebestendige stad: COOLKIT. Toolkit voor ontwerpers van de buitenruimte. Hogeschool van Amsterdam en KuiperCompagnons. Available at: <https://www.hva.nl/urban-technology/gedeelde-content/publicaties/publicaties-algemeen/de-hittebestendige-stad-coolkoolkit.html>

Steeneweld, G.J., Koopmans, S., Heusinkveld, B.G., Van Hove, L.W.A., Hottislag, A.A.M. (2011). Quantifying urban heat island effects and human comfort for cities of variable size and urban morphology in the Netherlands. J. Geophys. Res., 116, D20129

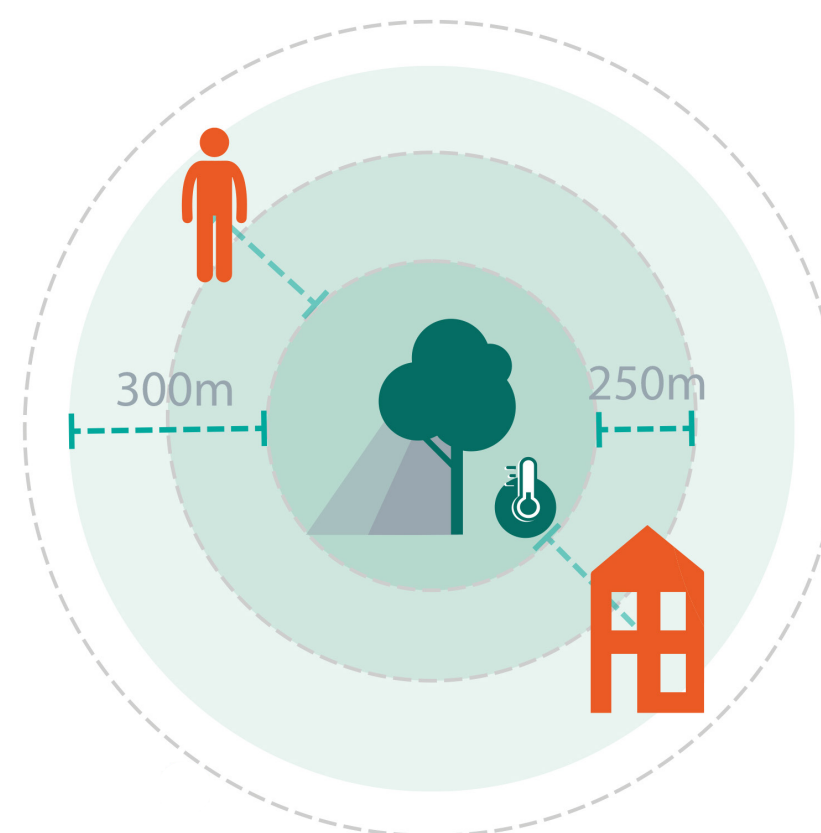
World Health Organization (2016). Urban green spaces and health: a review of evidence. World Health Organization: Copenhagen, Denmark.

Poster design: Lisanne Corpel

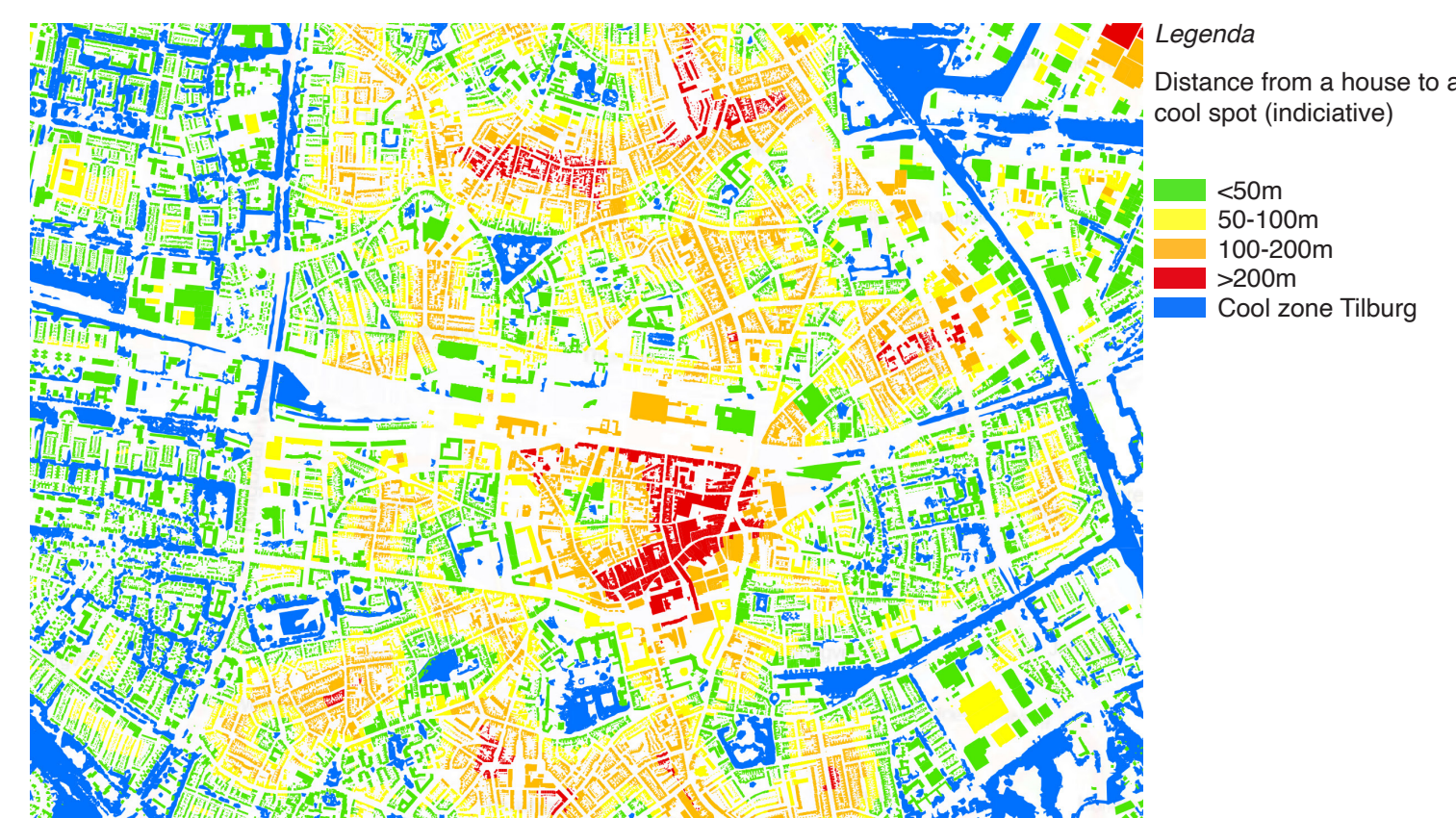
Contact: [l.kleerekoper@hva.nl](mailto:l.kleerekoper@hva.nl)

### Distance to a cool space

The first guideline, distance to a cool space, states that every home is within 300 meters of an attractive, cool place in the outdoor area. This guideline helps in the search for suitable strategic cool spaces that are within walking distance for residents of the neighbourhood. It is in line with the guidelines of the WHO (2016), recommending a maximum walking distance of 300 meters, which can be easily walked within five minutes, even for elderly. A location is considered suitable when it is sufficiently cool, has seating in the shade and is designed as an attractive place to stay.



*Design principle - Distance to a cool space*



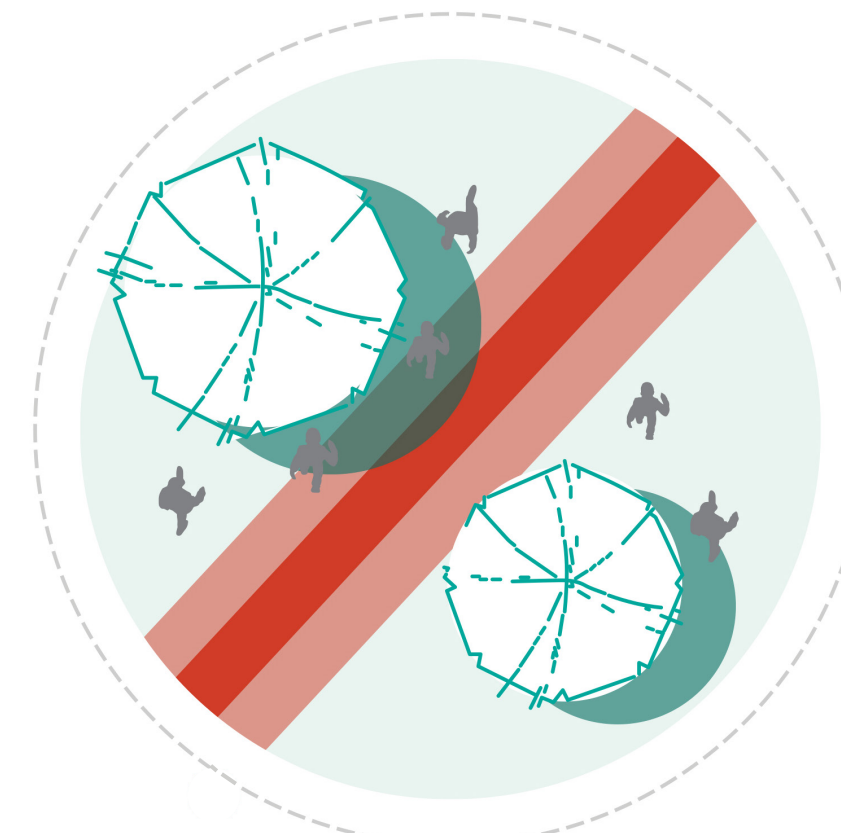
*Analysis - Map with distance to cool spaces in the city of Tilburg*



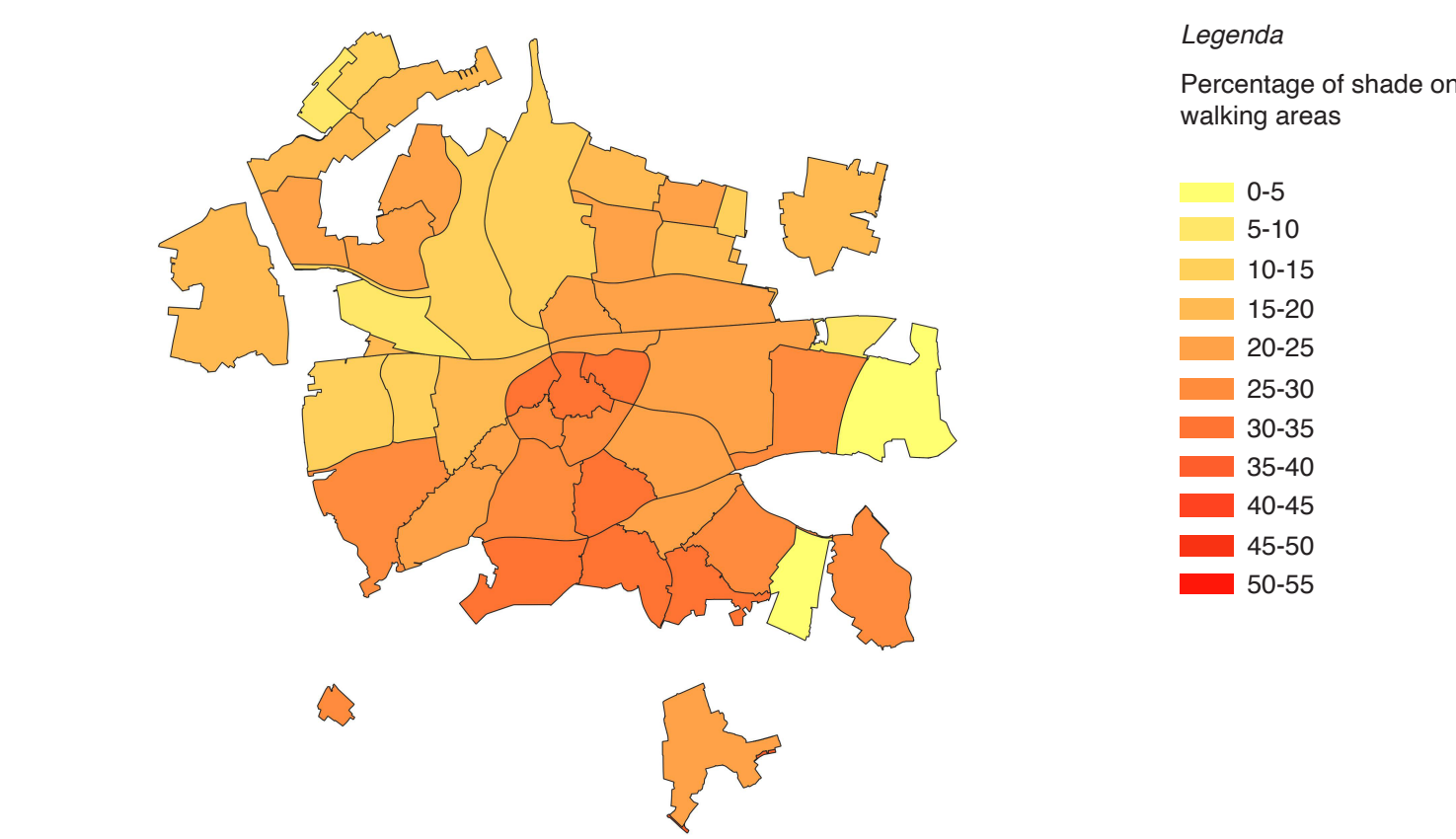
Reference - A cool space in Amsterdam with shade from trees

### Percentage of shade on walking areas

The second guideline, shade on walking areas, suggests a minimum of 40% shade on important walking routes at the hottest time of the day, to reduce the perceived temperature. This guideline focuses on important slow-traffic routes. By keeping these routes comfortable during hot days essential functions in the city remain accessible for everyone. It is important that the shadow is well distributed over the walking route as well as over neighbourhoods in order to provide sufficient comfort in the outdoor areas in each neighbourhood.



*Design principle - Percentage of shade on walking areas*



*Analysis - Map of Breda with percentage of shade on walkways per neighbourhood*



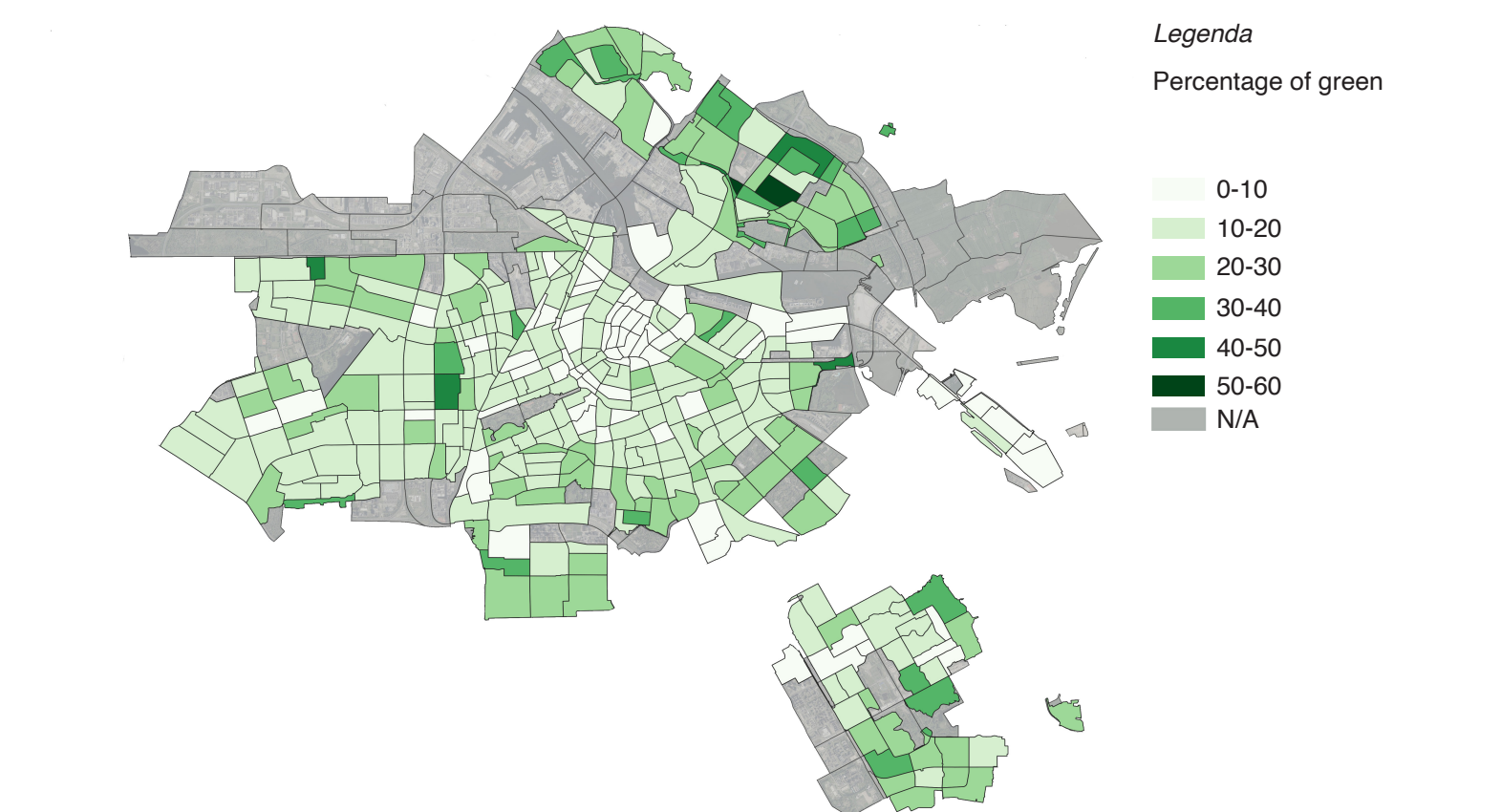
*Reference - An innercity pedestrian zone shaded by canvas sheets*

### Percentage of green

The third guideline, percentage of green, ensures that there is sufficient vegetation coverage in each neighbourhood. Greenery cools the air: an increase in vegetation cover by 10 percentage points lowers the air temperature by approximately 0.5°C (Steeneveld et al., 2011). The guideline expresses the required amount of green space in a lower limit and a target value, differentiated per neighbourhood type. Values for this guideline have been chosen on the basis of an analysis of the current green in all neighbourhoods of four Dutch cities. For example, historical city centers have 16% of green on average, which is defined as the lower limit. Examples show a potential of 32% of green (average + standard deviation), which is defined as the target value.



*Design principle - Percentage of green*



*Analysis - Percentage of green per neighbourhood in the city of Amsterdam*



Reference - Transformation of a residential street into a green lane, meeting the target value