

**SUSTAINABLE SELF LIVABLE NET**

Balancing sustainability and livability in dense urban environments through strategies for the mitigation of the UHI effect

Francisco Marín Nieto, 4516281, MSc Thesis, 29 June 2017  
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**PROBLEM STATEMENT**

Double dimension of the problem statement:

ABSTRACT DIMENSION → ABSTRACT DIMENSION

There is a gap in knowledge on the discrepancy between sustainability and livability.

To define a theoretical perspective capable of re-defining this discrepancy. To use existing body of knowledge (the Urban Heat Island effect) to represent this issue, and its possible solutions, in a tangible way.

CONCRETE DIMENSION → CONCRETE DIMENSION

In Málaga, this discrepancy can be aggravated by the particular conditions of its city form.

To explore possible spatial interventions that can bridge sustainability and livability in Málaga.

**RESEARCH QUESTION**

What spatial interventions can be applied in Málaga in order to mitigate the Urban Heat Island effect, as a way to overcome the discrepancy between sustainability and livability that characterizes dense urban environments?

**THEORETICAL FRAMEWORK**

-Sustainability and livability are two complementary dimensions of urban environments.

-The discrepancy between the two can be explained through the conflict between "the Net" and "the Self" ( , 1996)

-Temperature represents the essence of this dichotomy, and the Urban Heat Island Effect is the way it manifests in urban environments.

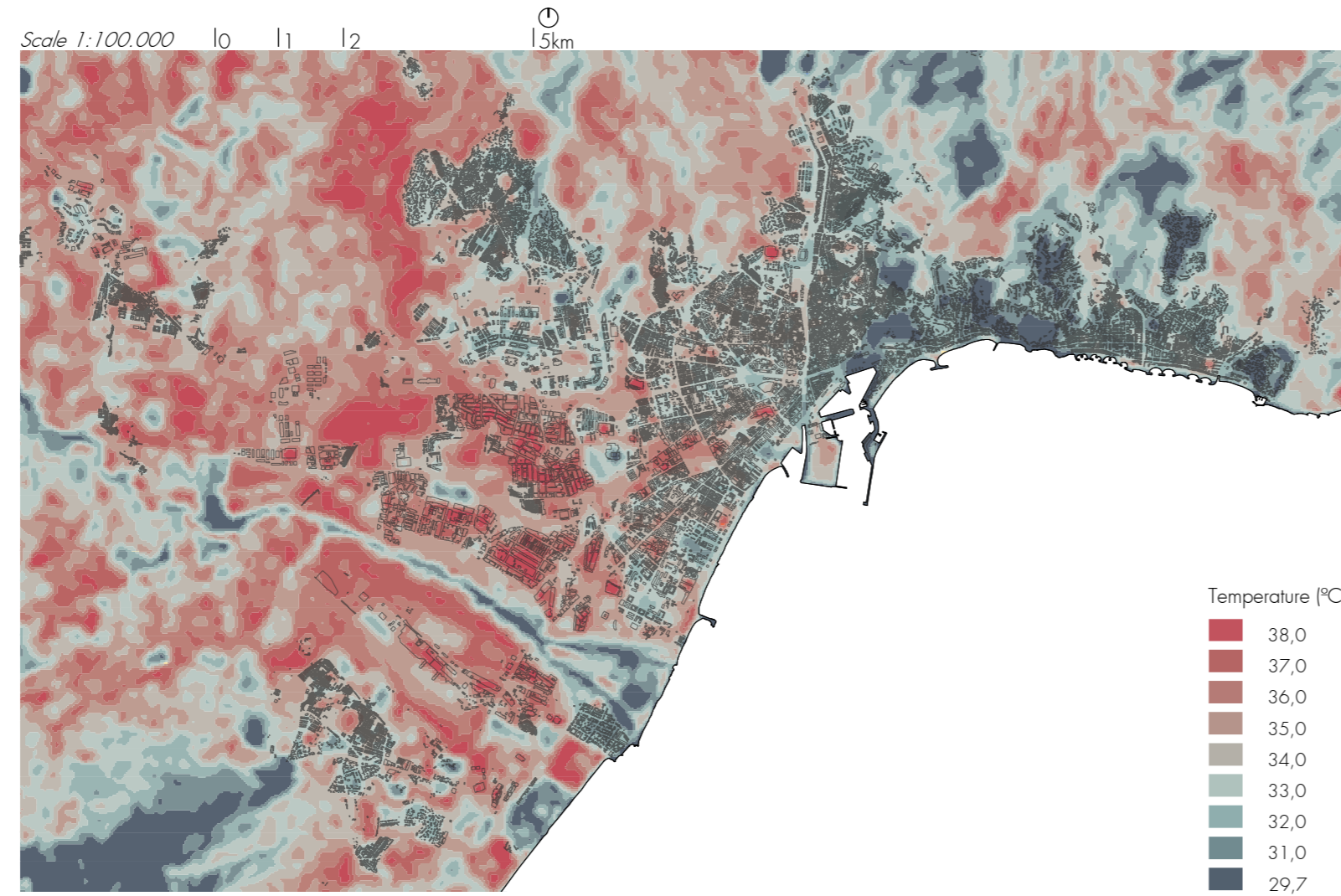
-Density can amplify the negative impact of the UHI effect and hinder the application of beneficial measures.

**THE URBAN HEAT ISLAND EFFECT**

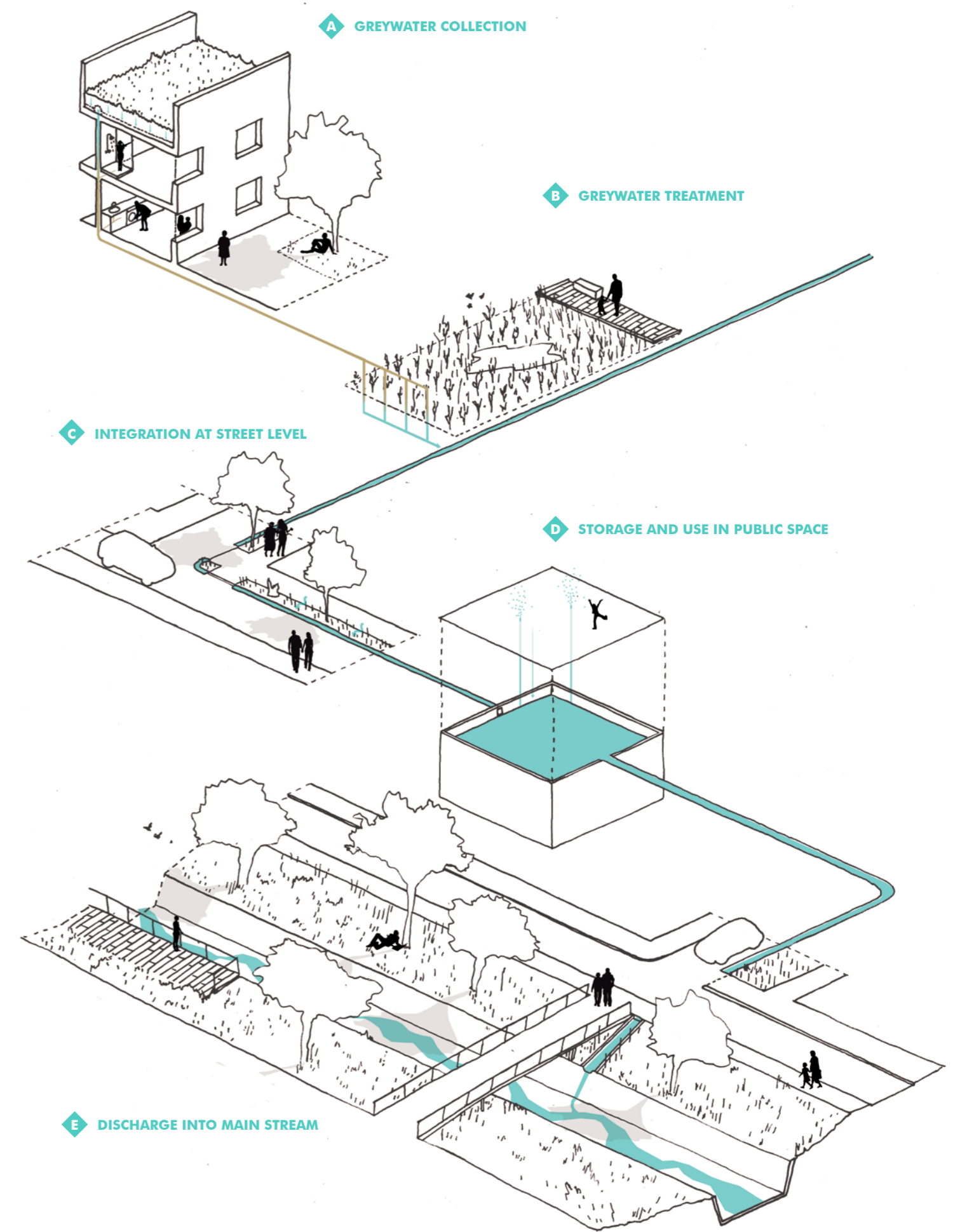
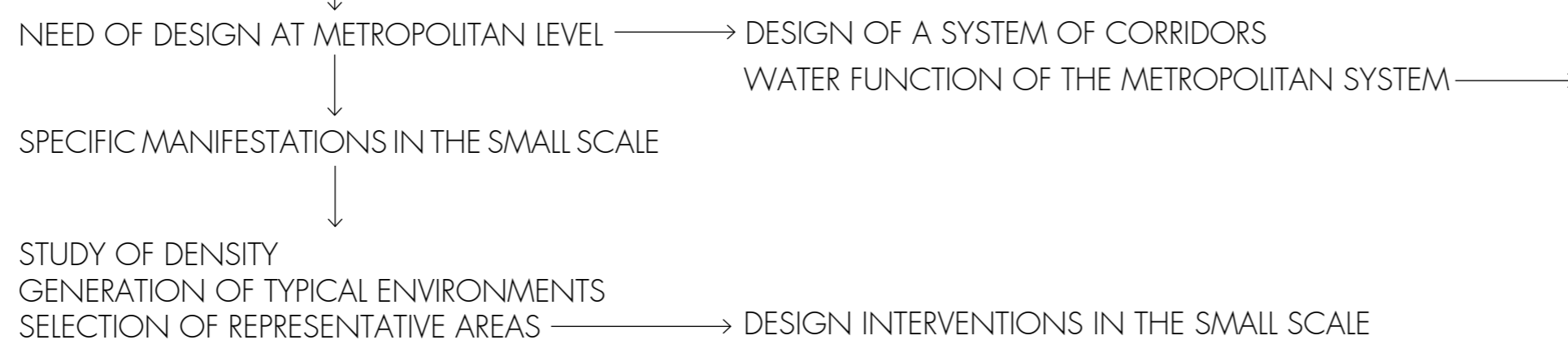
The UHI effect manifests differently across the city.

Its magnitude highly depends on structural factors, such as vegetation, altitude, vicinity to water or land use.

In the small scale, the presence of certain physical features (such as permeability, albedo, water, vegetation) also have a big impact in defining the manifestation of the UHI effect.



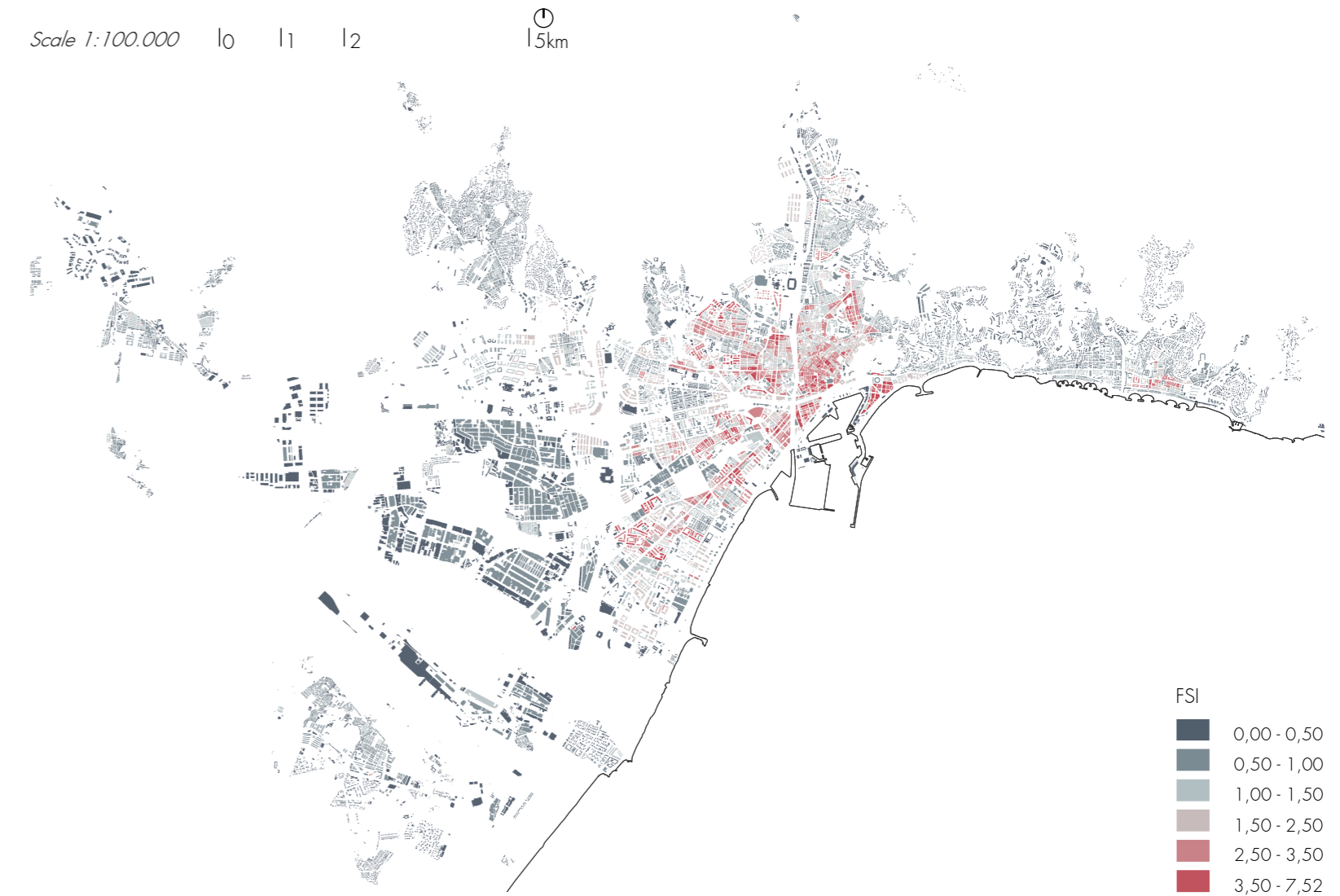
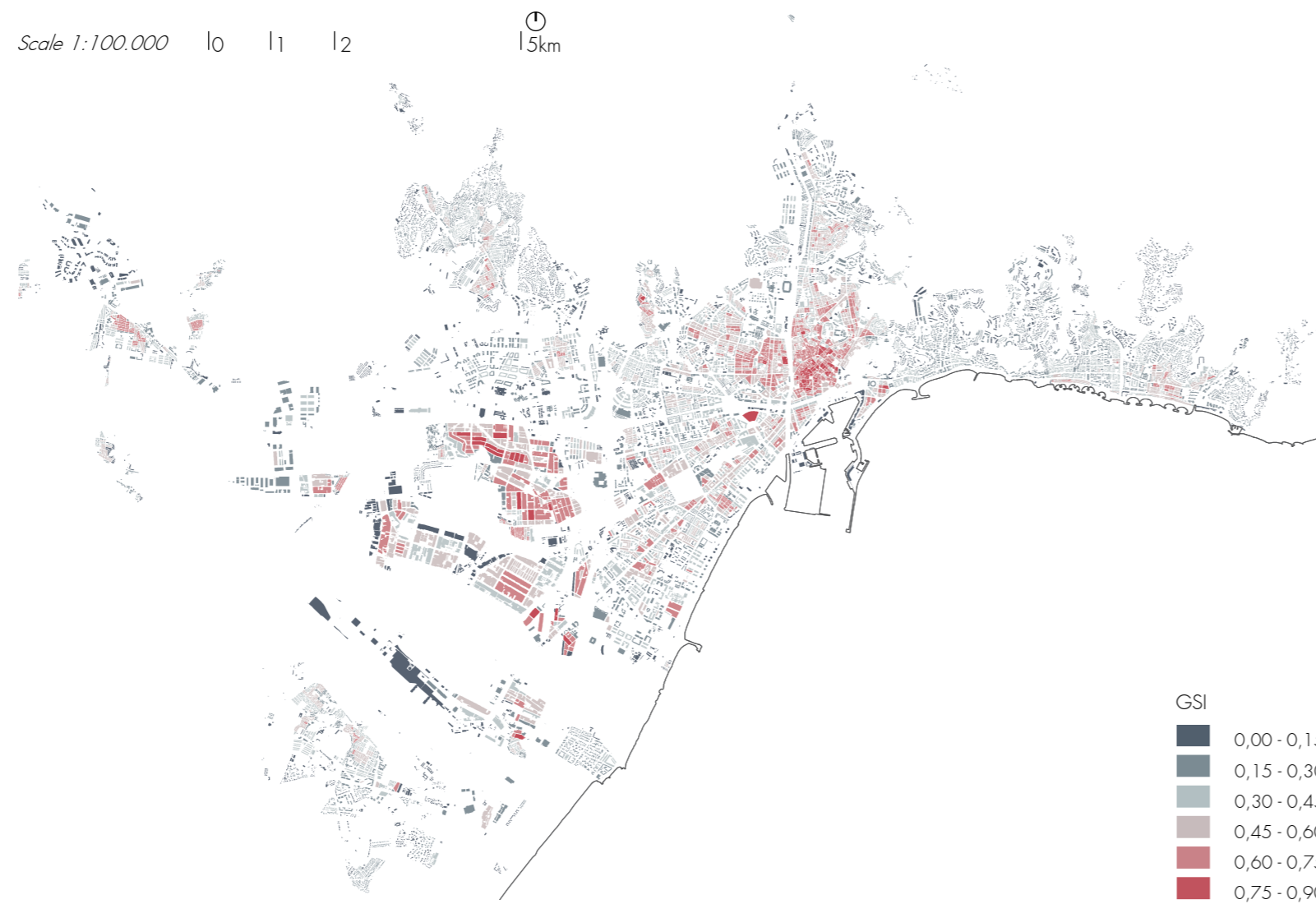
**INFLUENCE OF METROPOLITAN STRUCTURES IN LST**



**STUDY OF DENSITY**

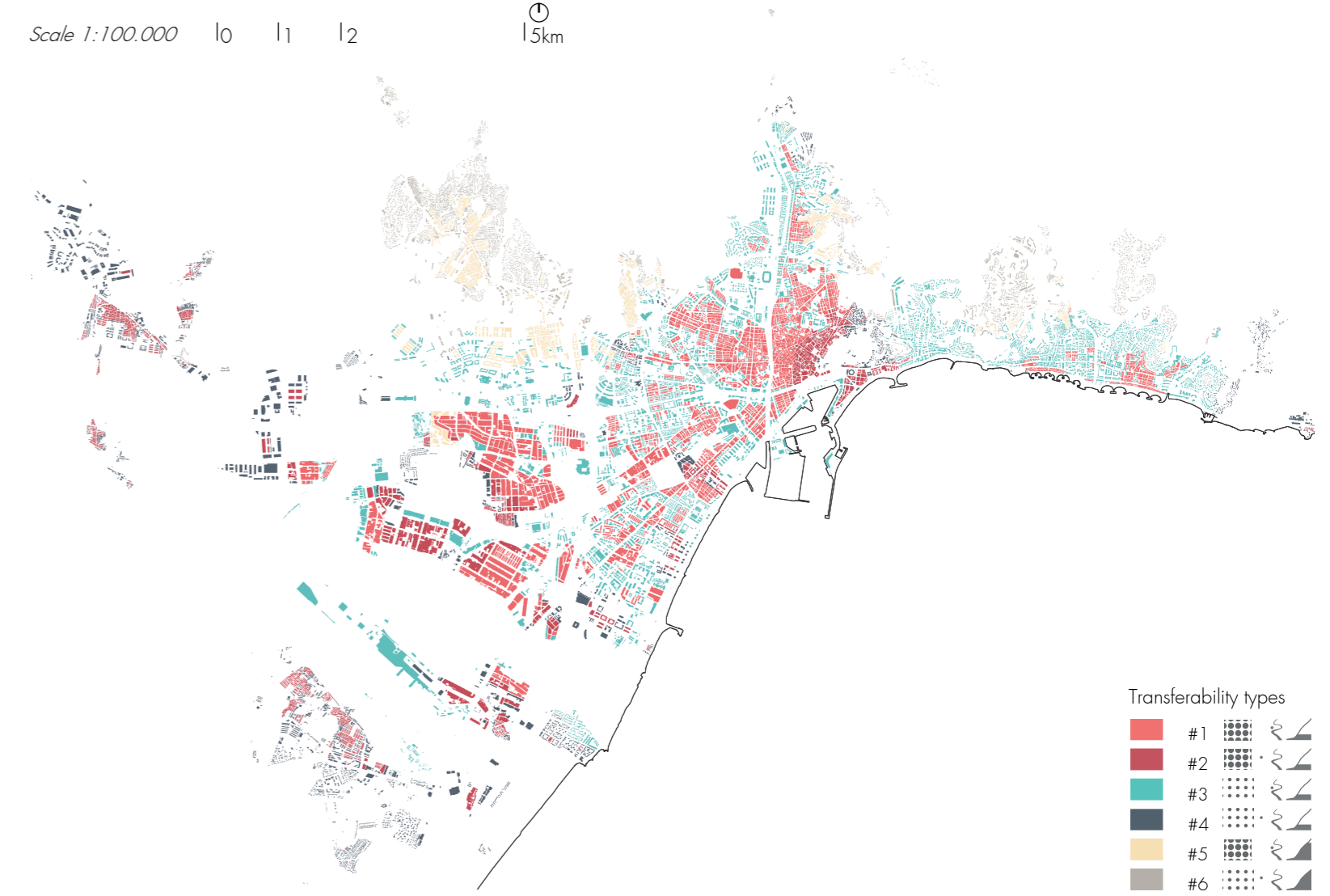
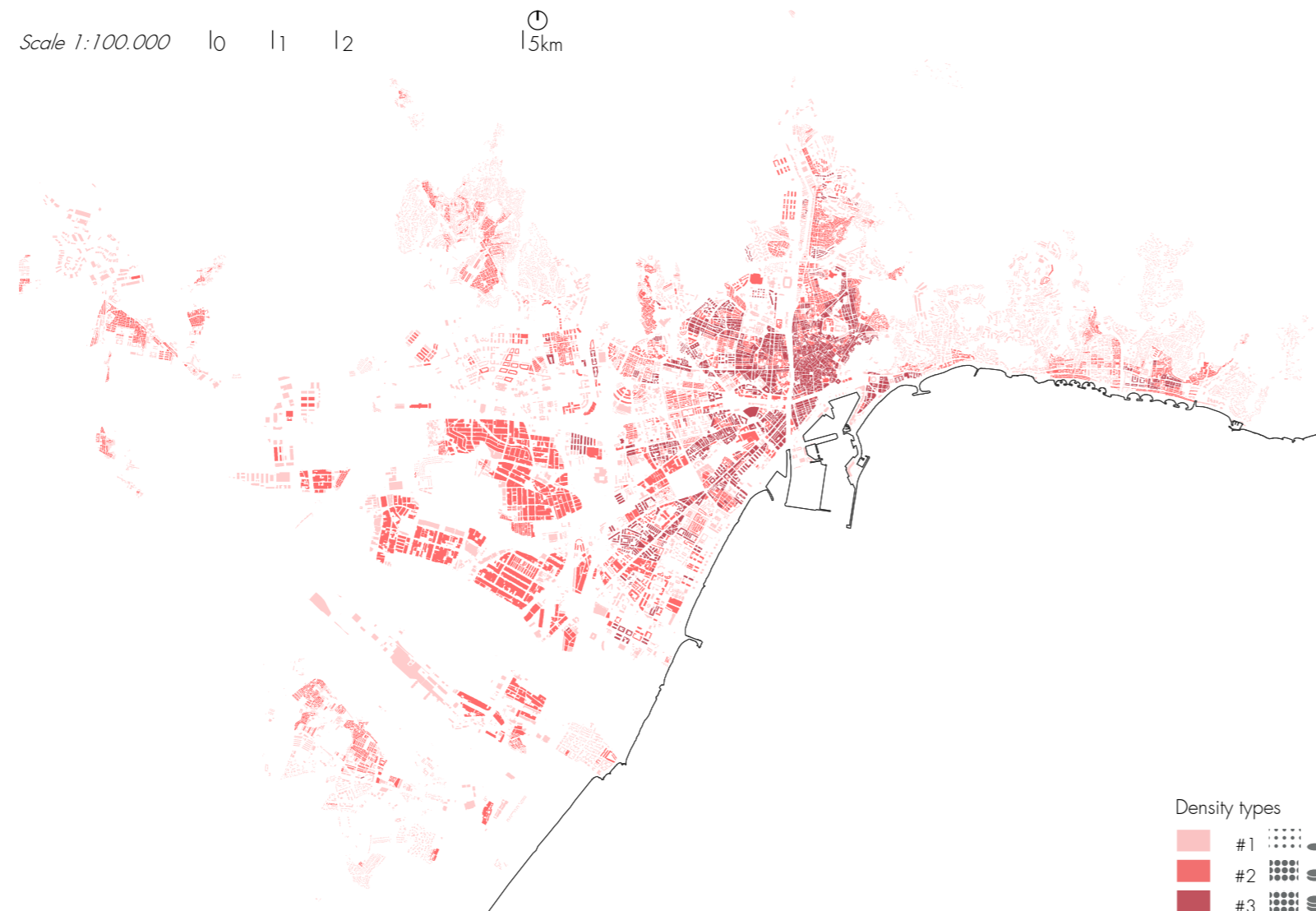
Density has a strong influence in the way the UHI manifests at a local scale, and on the possibilities and limitations of intervention.

The study of physical density can be done through two main indicators (GSI and FSI) and is the base for the selection of areas of interest.



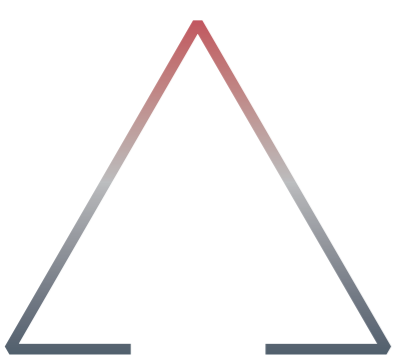
**GENERATION OF TYPOLOGIES**

The clustering of data facilitates the identification of areas with similar characteristics. As a tool, it can be used for choosing areas that are representative of different conditions (which is useful at the stage of analysis), or for identifying areas with common characteristics (which can determine prospective opportunities for the transferability of approaches or design principles).



**DENSITY TYPOLOGY**  
 The combination of GSI and FSI helps to identify areas with common morphological characteristics. It is the base for the selection of the five areas of interest.

**TRANSFERABILITY TYPOLOGY**  
 The combination of local and systemic parameters helps to understand the extent to which similar design strategies can be transferred to other areas of the city.



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### SELECTION OF REPRESENTATIVE AREAS



### DESIGN OF A METROPOLITAN SYSTEM



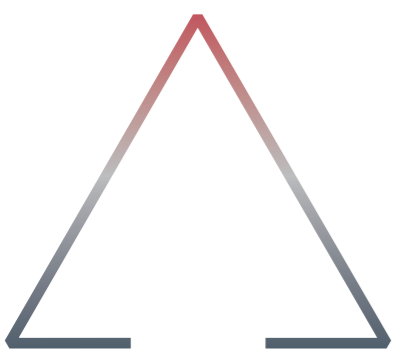
Elements of the metropolitan system

- Intervention site
- Facility
- Main corridor
- Secondary corridor
- Qualified route
- Potential for water treatment

Scale 1:15.000 10 10,1 10,2

10,5km





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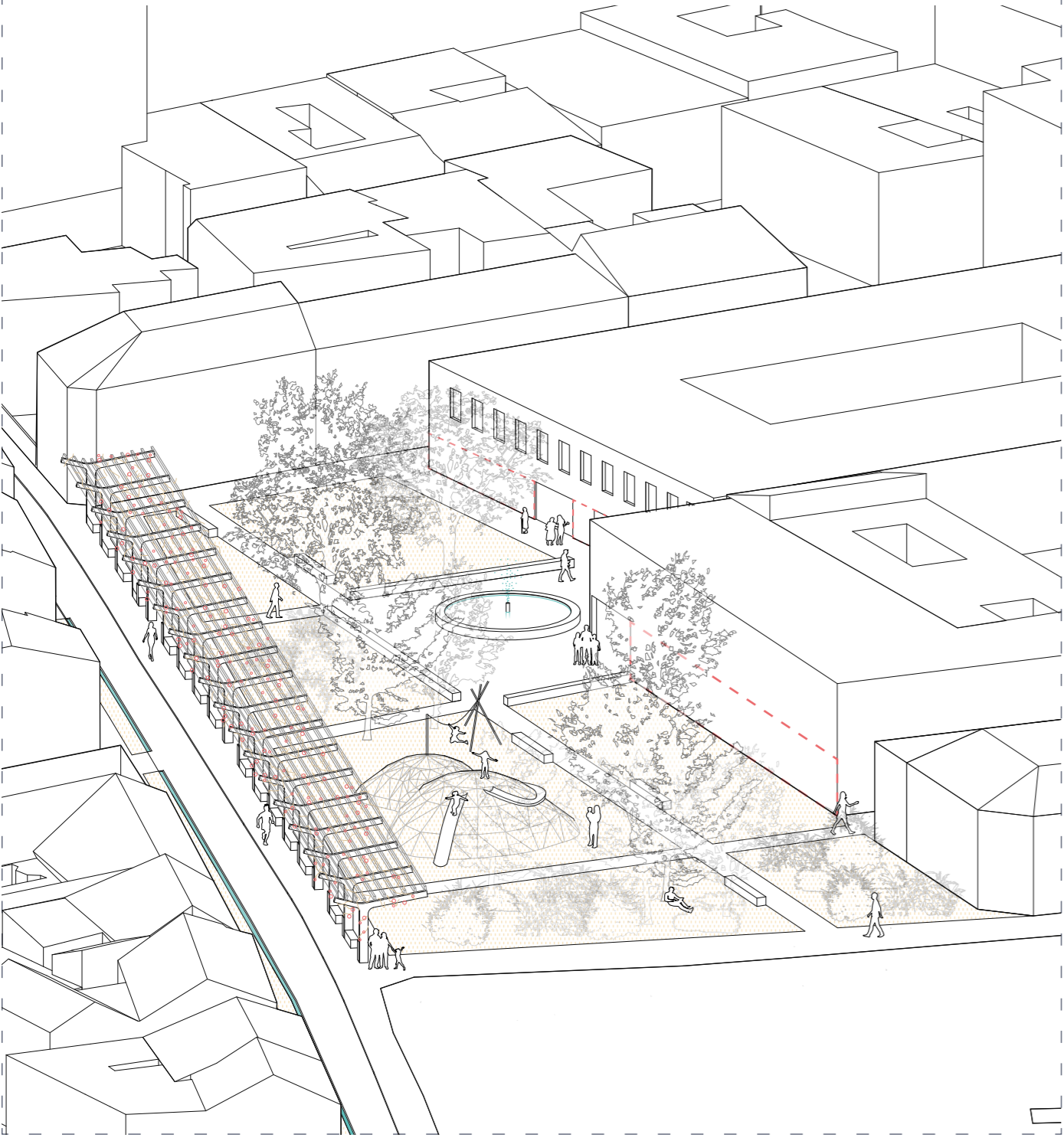
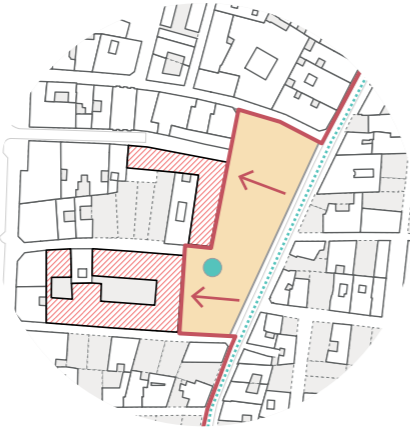
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## SYSTEM DEVELOPMENT IN THE SMALL SCALE

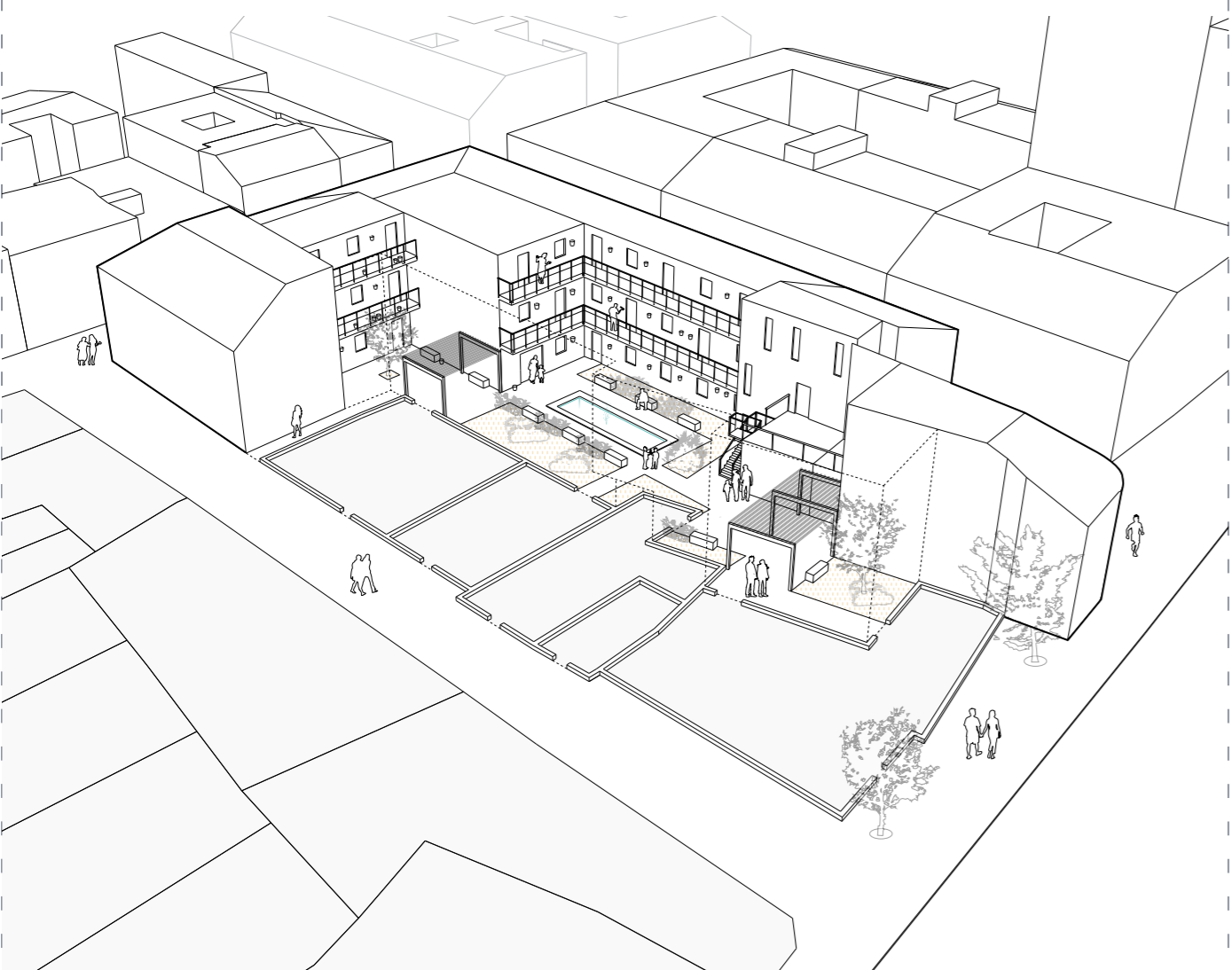
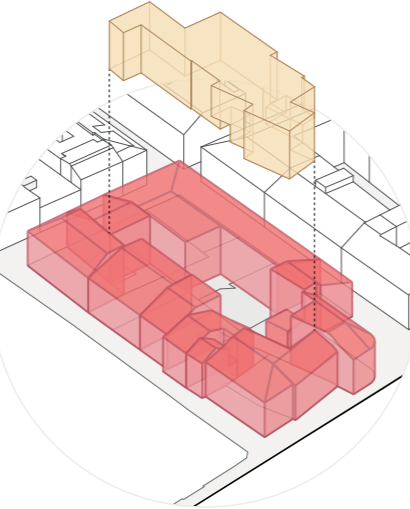
### 1 A SUMMER SQUARE

A group of unbuilt plots is incorporated into the public realm, and materialised in a way that it provides qualities that are currently absent in the area. It's relation to the water functions and to the public facilities situated on its borders determines the final design.



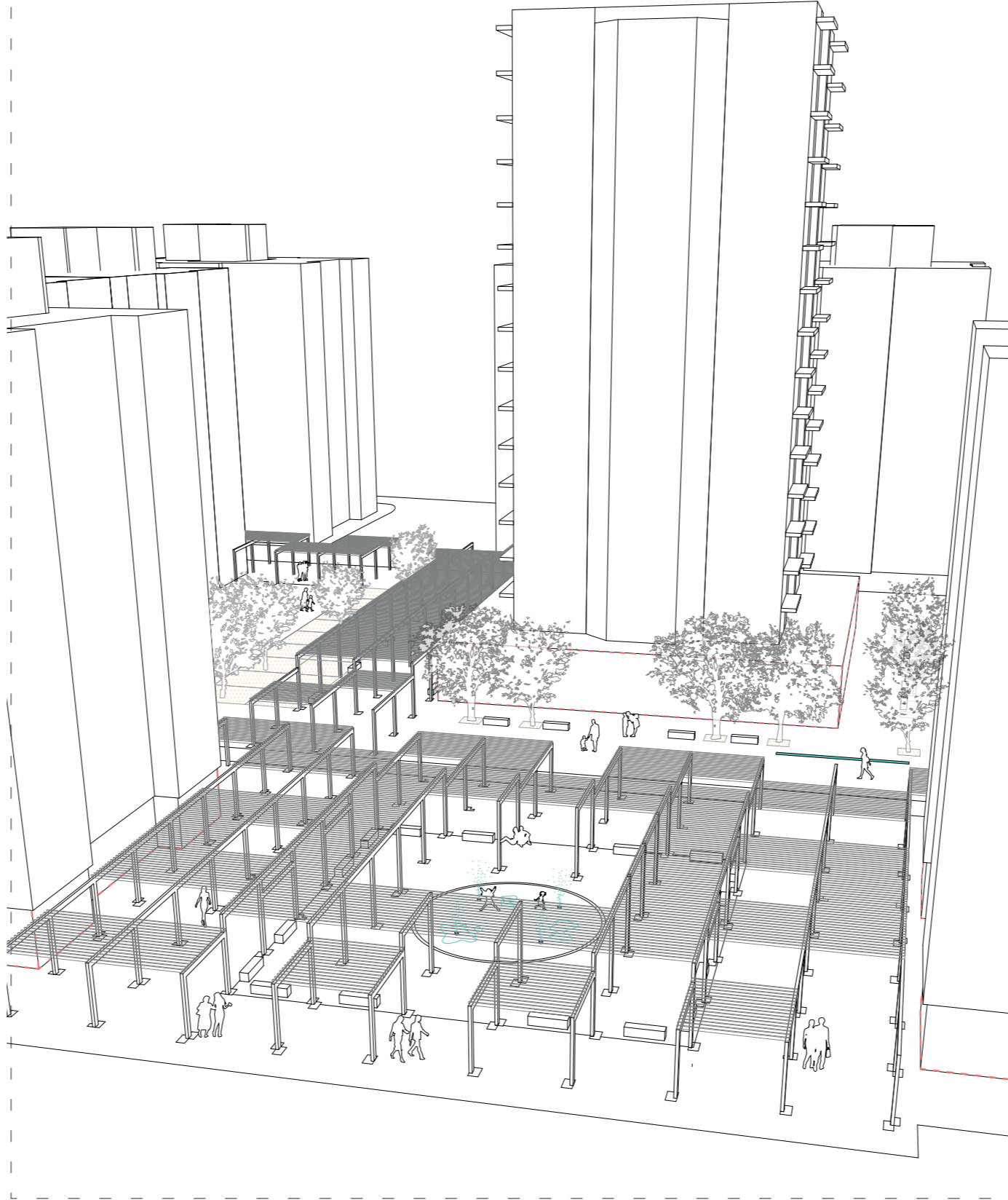
### 2 A NEW CORRALÓN

The "corralón" is the traditional building type of La Trinidad, in which a common courtyard has a strong social function. By means of additional regulation, the goal is to shape the future transformation of the neighbourhood's blocks into a similar model, in which newly created courtyards can have a strong cooling and social function.



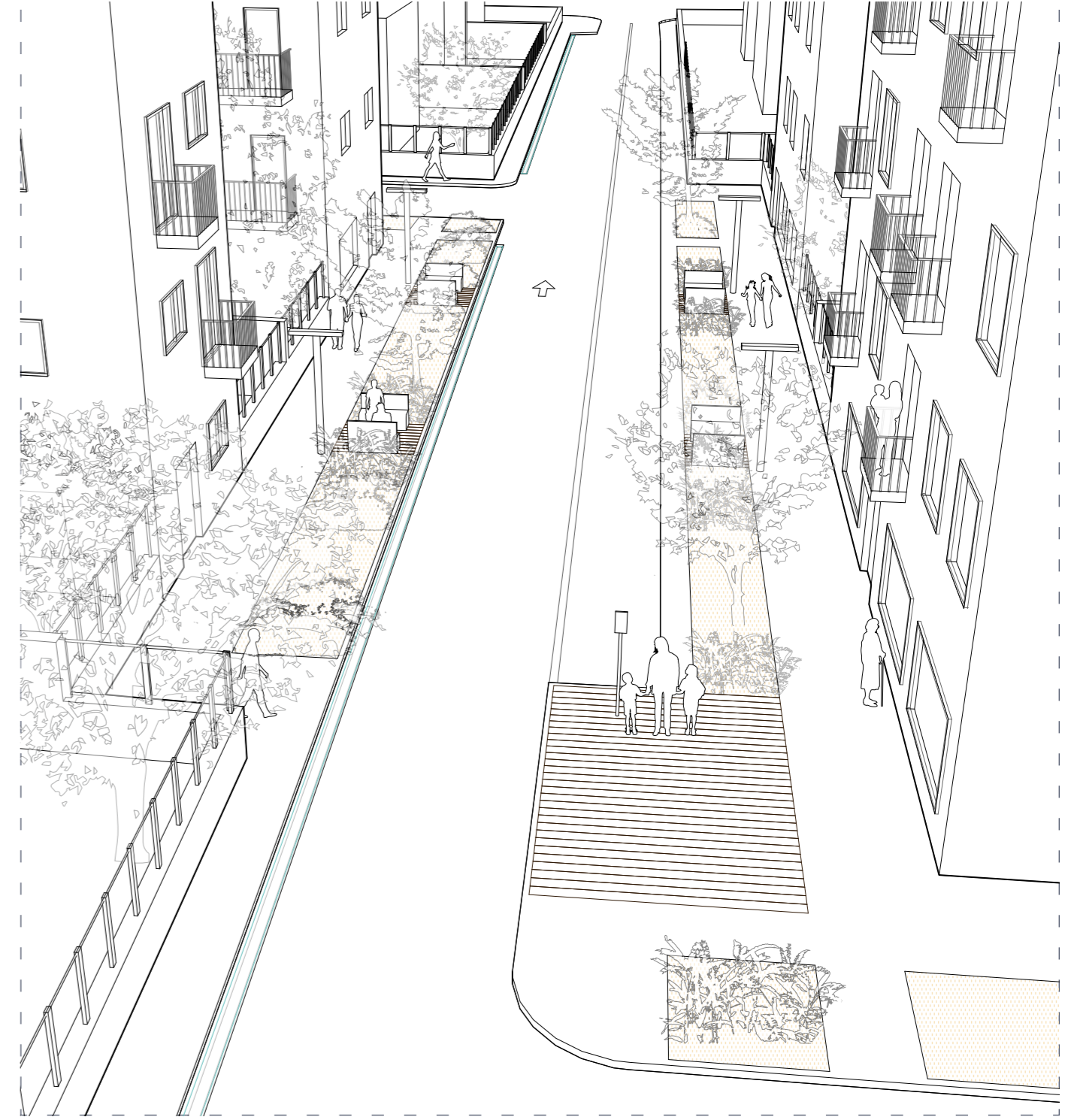
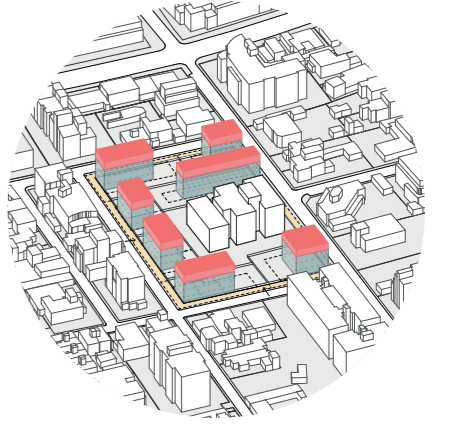
### 3 A SEQUENCE OF SPACES

A series of public spaces are demarcated and qualified using a continuous physical element. They are incorporated into a bigger system of public spaces, and are designed so that they can offer different functions and atmospheres.



### 5 AN OPEN FRONT YARD

In an area of expected densification, but with strong inherited aesthetic values, new regulations are designed to allow the incorporation of certain qualities to the public realm. In particular, the traditional front gardens, which define the area's appearance, are made accessible in order to define a new street profile.



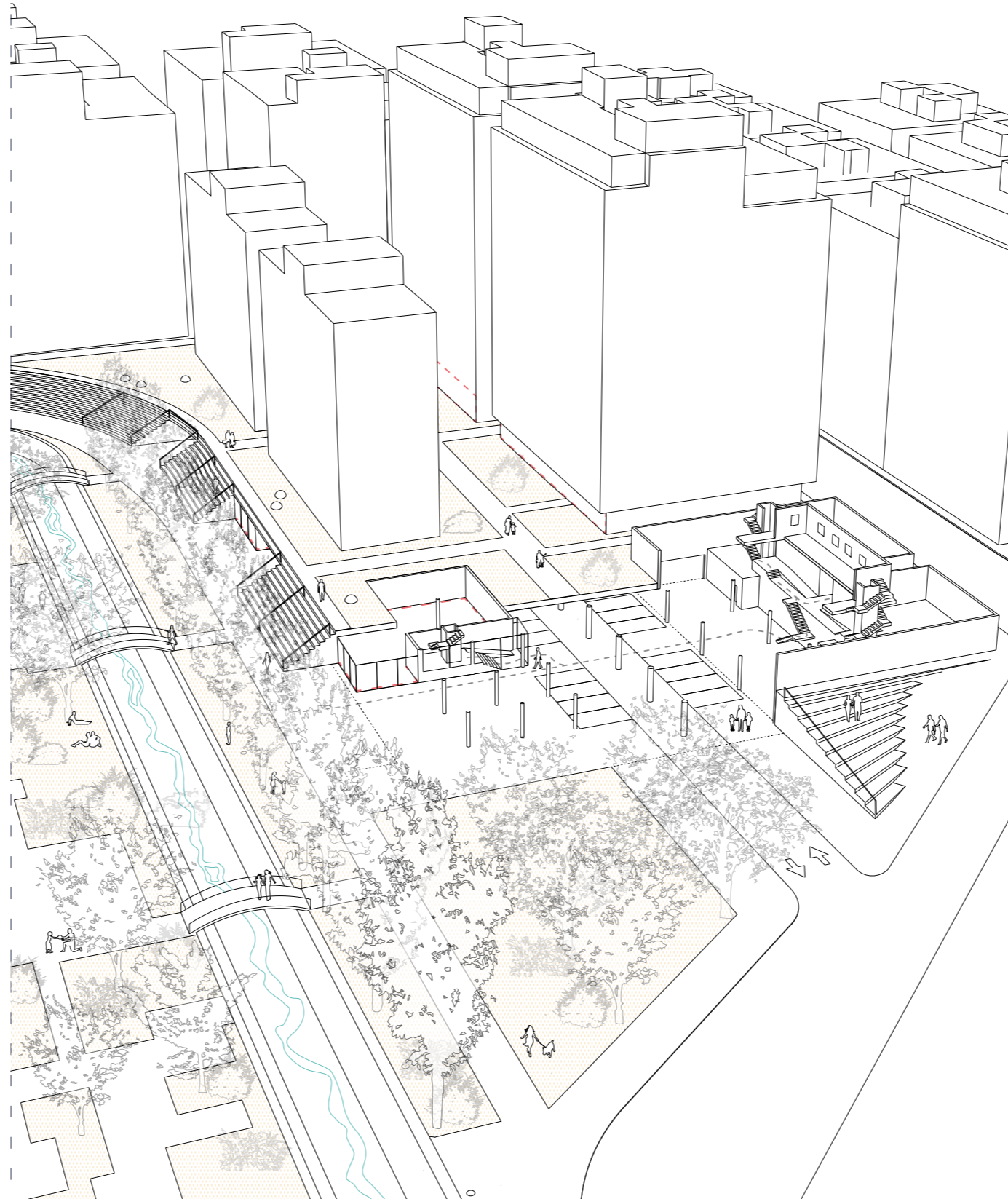
### 6 A FOREST IN BETWEEN

In the area of urban expansion of the city, the dimensions and treatment of public space result in an inhospitable landscape. The application of a structural vision allows the incorporation of a vast amount of vegetation which, together with other functions and qualities, defines a new urban forest.



### 4 A PARK ON THE ROOF

The continuity of the existing park towards the interior of the corridor is solved by adding a new roof on part of the existing open space, which currently has only parking functions. In this way, the positive qualities and cooling effect of the park can be infiltrated into the neighbourhood's dense fabric, while the parking spaces are maintained. New possibilities for the integration of activities, as well as the facilitation of wind flows, are additional benefits.



### 7 A NEW CITY IN THE MAKING

A critical and explorative approach to the current models of urban expansion, at block level. Two different operations (densification and the superposition of a new layer of public connections) transforms the existing block and results in a richer urban experience.

