Scapes of Wellness:

Supported Living Housing For The Intellectually Disabled

Angeliki Sykiotis

Site Analysis & Design Booklet
June 2023

Cover Image: Photograph of physical model

Site Analysis & Design Booklet
Angeliki Sykiotis 5611075
June 2023

Faculty of Architecture, Delft University of Technology
MSc Architecture
Academic Year 2022-2023
Designing For Health & Care:
Towards a Healthy and Inclusive Living Environment -
Graduation Studio

Main Course Coordinator: Birgit Jurgenhake
Design Mentor: Elke Miedema
Research Mentor: Frederique van Andel
Building Mentor: Jos Lafeber

Dedicated to the memory of
my father

TU Delft
BK Bouwkunde

Contents

Chapter 1 | Site Analysis

Introduction

The chosen site for the intervention of the supported living housing for the intellectually disabled (ID) adults is located at the area of Lelystad, a relatively new city in the center of the Netherlands and capital of the province of Flevoland (figure 1). Being a city that was reclaimed from water, the location is characterized by a rich natural environment with a diverse body of flora and fauna. Considering that the growth of the population of Lelystad has not reached the expected numbers, the goal of the municipality is to redevelop areas of the city so that it becomes the capital of "new nature" and to utilize the abundance of green spaces to promote the city and attract new people (Lelystad Next Level, 2021). Within this framework, the urban planning firm Cittanova has proposed a master plan to develop the neighborhood of Warande, where the site is located, focusing on bringing together various target groups of residents and promoting healthy living (Cittanova, n.d.).

Site analysis aim

The aim of this site analysis is to demonstrate the urban history and the characteristics of the town of Lelystad and the specific site of the intervention. Additionally, an analysis of the existing "Where else, Lelystad" master plan by Cittanova is presented, highlighting its strengths and weaknesses, in order to propose an alternative solution associated to the theoretical research conducted and answering the question: why is this location suitable for designing an supported living housing environment that implements qualities of biophilic design?

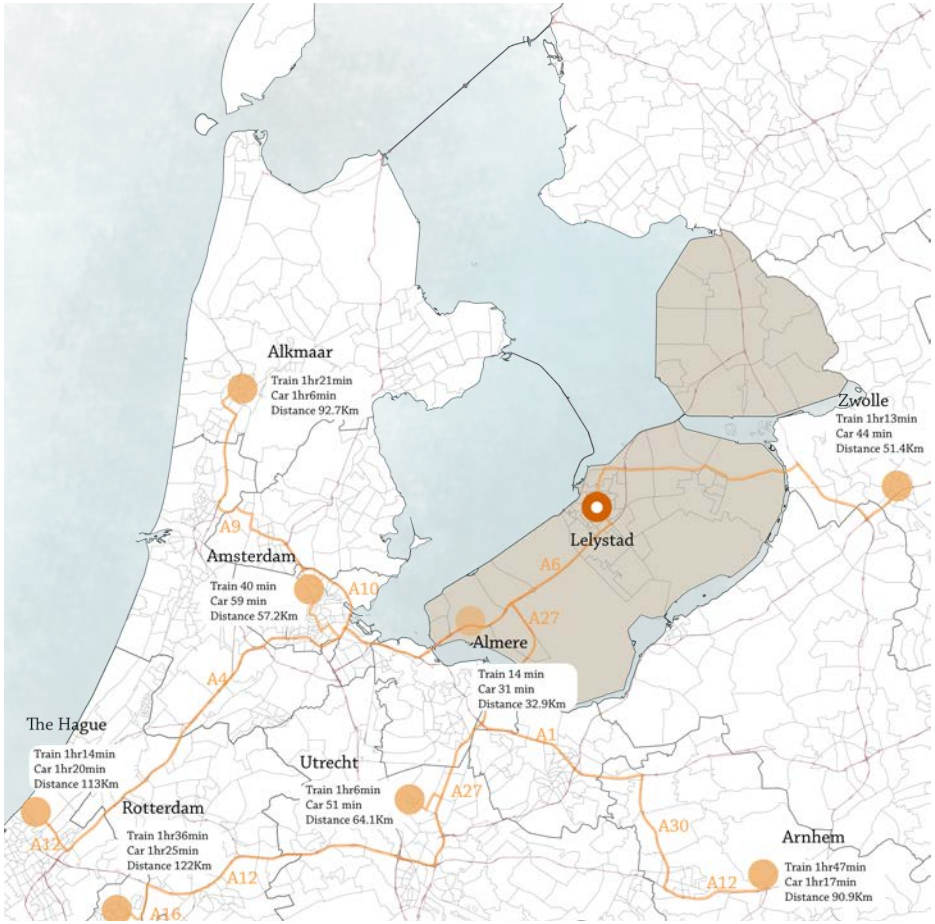


Figure 1. Map indicating the proximity of Lelystad to the surrounding big cities. Base map generated via Open Street Map. Drawing made in collaboration with Mihnea Cernăianu.

Figure 2. Map of Lelystad indicating the site location. Base map generated via Open Street Map.

Urban History

After World War II, the predicted population of the Netherlands was to reach 13.5 million by 1980 (Spoormans et al., 2019). In the meantime, three of the most populated cities, Amsterdam, Rotterdam and Den Haag, were expanding more rapidly than expected. Therefore, as Spoormans et al., (2019) mention, 'bundled de-concentration' was introduced, to combine the benefits of urban life with a quiet residential atmosphere and reduce the concentration in big metropolises. As a result, in 1972, the idea of Groeikern emerged: the creation of an urban node that could strongly grow to benefit a nearby large city, without affecting the development of the big city. The chosen locations aimed to function as semi-independent suburbs, that can include facilities, devices and services offering employment (Spoormans et al., 2019). One of these places, to be redeveloped as a new city [1], was Lelystad.

[1] New Towns are cities or towns that are designed from scratch and built in a short period of time. They are designed by professionals according to a Master Plan on a site where there was no city before (Spoormans et al., 2019).

The creation of Lelystad on reclaimed land started in 1950, with the construction of "Parcel P": an island that allowed the erection of dykes forming the central area of Lelystad, now called Lelystad Haven (Gemeente Lelystad, n.d.) (figures 3 & 4). The development of the rest of Lelystad resumed in 1965, and people started moving to the area by 1967. Yet, the development of the city was slow, due to the poor infrastructural connections with the mainland. Therefore, the idea of the polder to become the hinterland of Lelystad started to fade away (Gemeente Lelystad, n.d.). The Groeikern was successful, if we consider that in the period of 1972-1985 1.6 millions dwellings were built in the Netherlands. However, in 1983, the memorandum 'Outline for the Urban Areas" set the focus on developing donor cities that were closer to larger cities, thus Lelystad lost its Groeikern status (Spoormans et al., 2019).

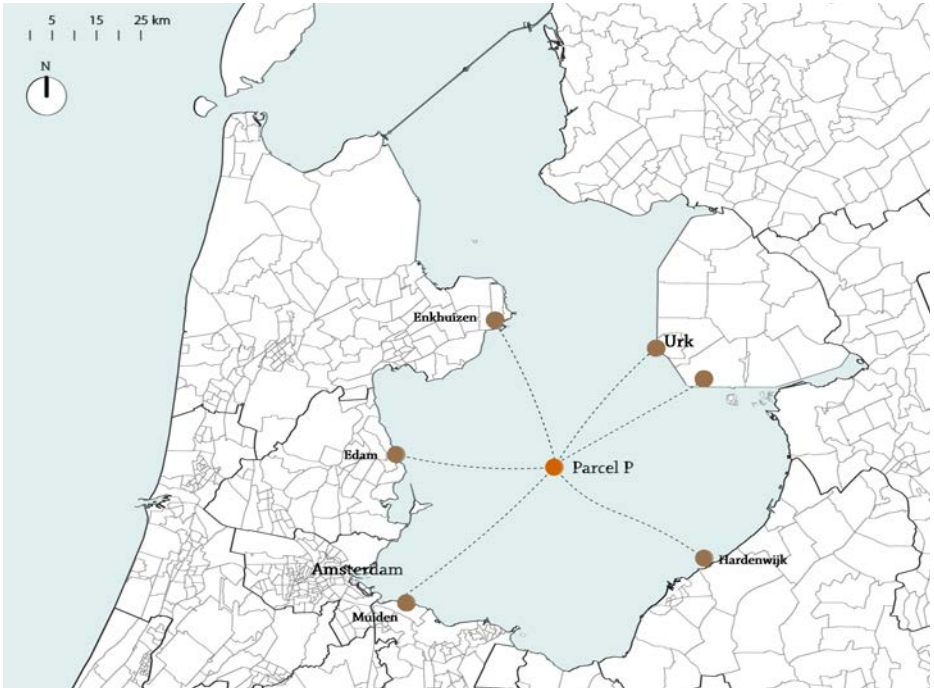


Figure 3. Determining the location of Parcel P. Base map generated via Open Street Map.

In the onset the 21st century, the development of Lelystad has not reached the expected level, even though the civil services and infrastructure constructed were to serve 100.000 people in the year 2000 (Gemeente Lelystad, n.d.). The population today has only reached 81,214 people (*Lelystad Municipality, Flevoland, Netherlands*, n.d.). The growth of the city has been on a halt, affecting the perception of the city to the whole Netherlands. For this reason, the municipality of the city is now initiating actions to change the image of Lelystad and set the focus on the strengths the location has to offer: nature (figure 5).

Figure 4. Photograph of Parcel P. (Werkeiland,2019,June1).

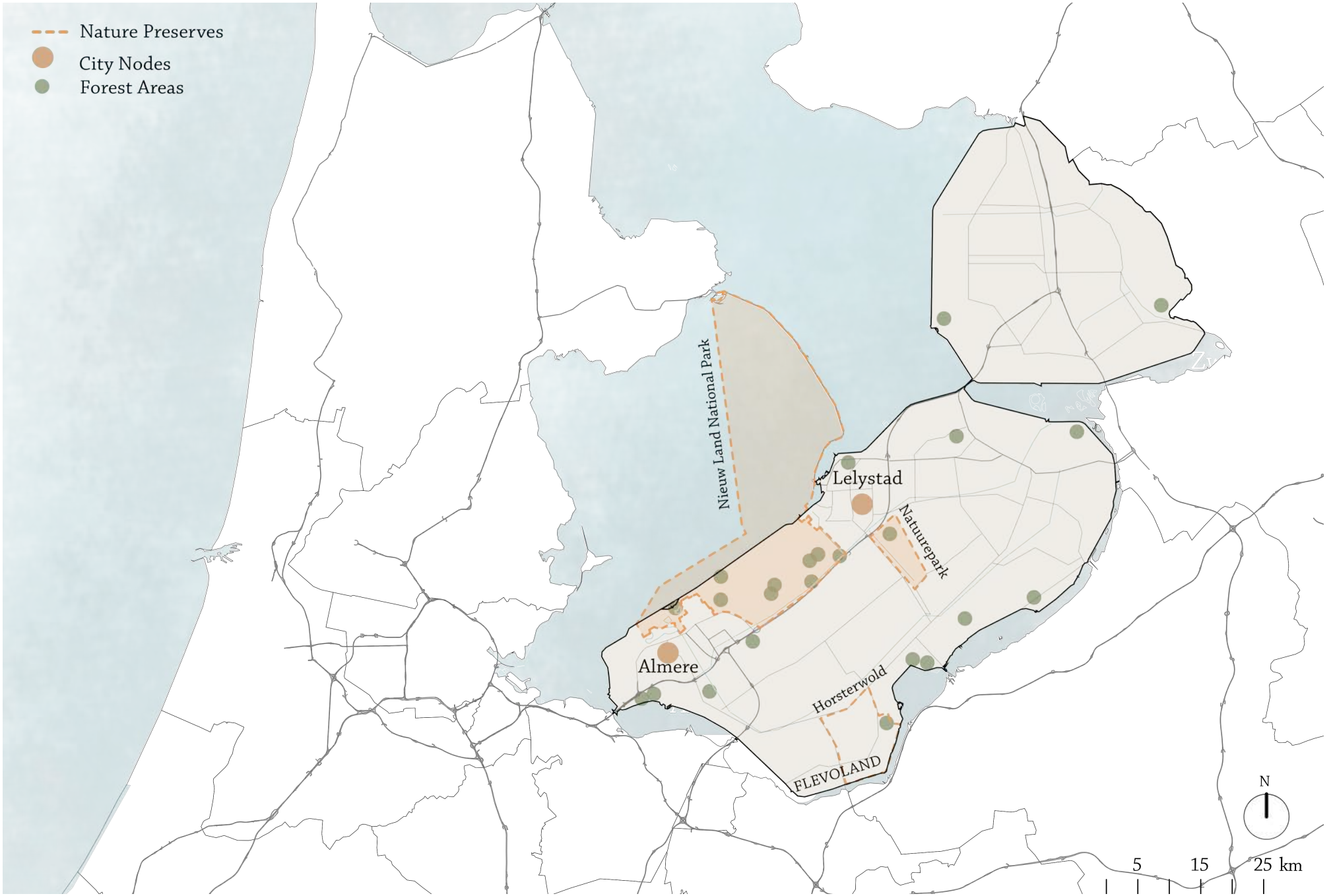


Figure 5. Map showing the forests and nature preserves surrounding Lelystad. Base map generated via Open Street Map.

Lelystad: Towards the Redevelopment of the Warande Neighborhood

Lelystad Next Level, is the new municipal city policy to reintroduce the town of Lelystad; the emphasis of this policy is put on the nature and water that surrounds the area, to promote Lelystad as the '*capital of new nature*' (Lelystad Next Level, 2021). Although the population growth from 1995 until now is rising in smaller numbers than expected (figure 6), according to the projections, by 2040 the goal is to turn Lelystad into an independent, socially resilient, sustainable, attractive and economically strong city of 100.000 inhabitants (Lelystad Next Level, 2021). In line with this wider ambition, comes the urban redevelopment plan by Cittanova, a small urban design firm, that has proposed a master plan for the neighborhood of Warande, where the site of my design is located, aiming to promote inclusive living, nature as well as climate adaptiveness and timber construction (Cittanova, n.d).

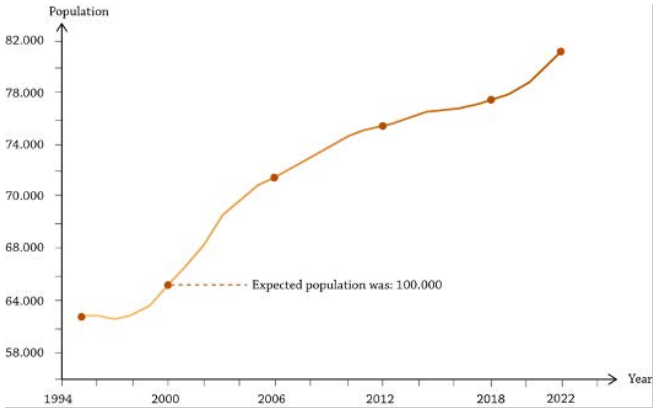


Figure 6. Population of Lelystad from 1995 through 2022. (AlleCijfers.nl, 2022,January).

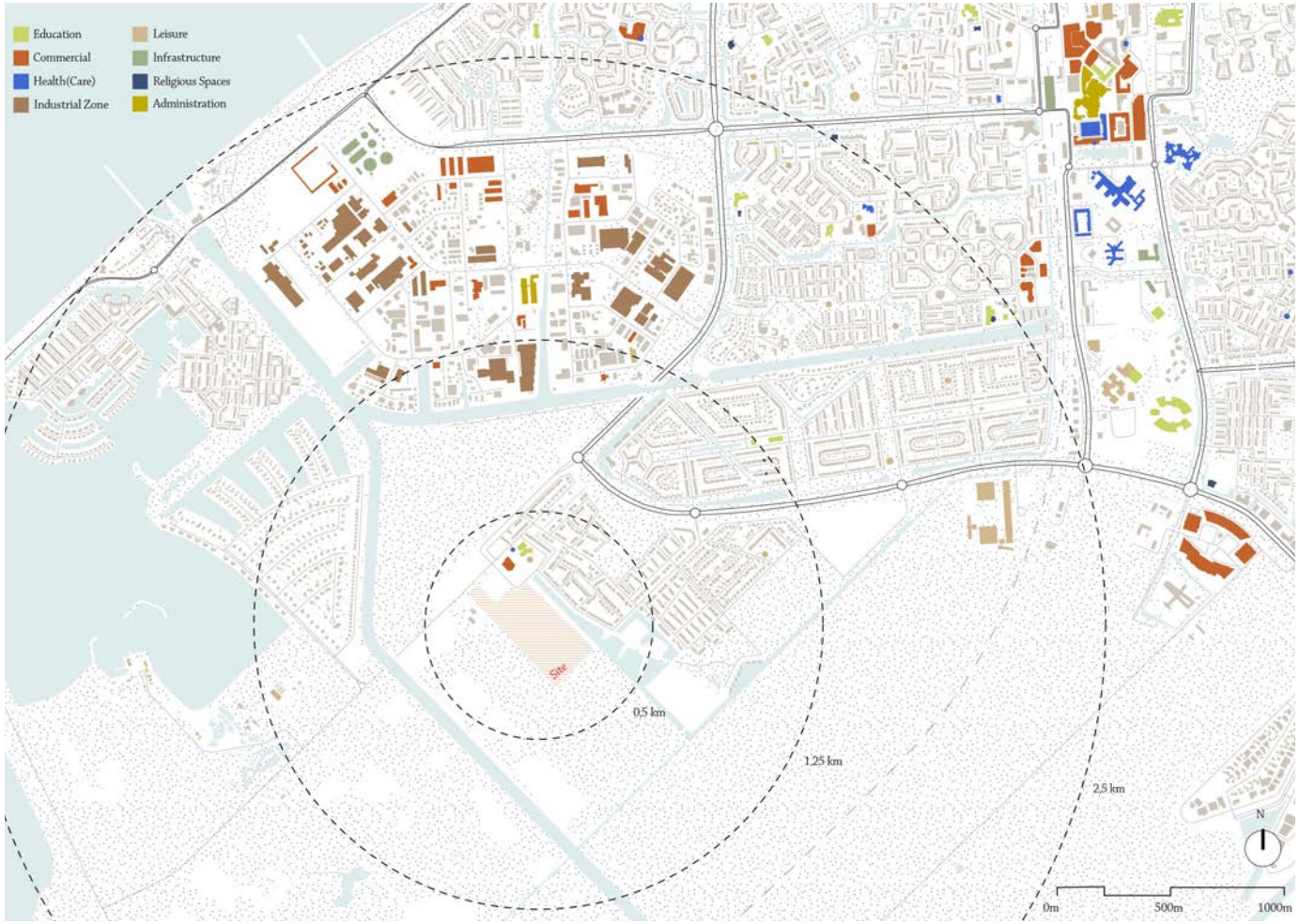


Figure 7.Map showing the surrounding functions at the city scale. Base map generated via Open Street Map. Drawing made in collaboration with Jil Weber.

Urban Analysis

Functions – City Scale

Focusing on the city scale in relationship to the site, the public functions, commercial, educational, leisure, and healthcare, are mainly distributed in the city center of Lelystad. North of the site, there is an industrial area. The immediate surrounding of the site, in a radius of 5km, is a residential area, yet there is small commercial center with a grocery store, a primary school as well as a dentist facility and general practitioner (figure7).

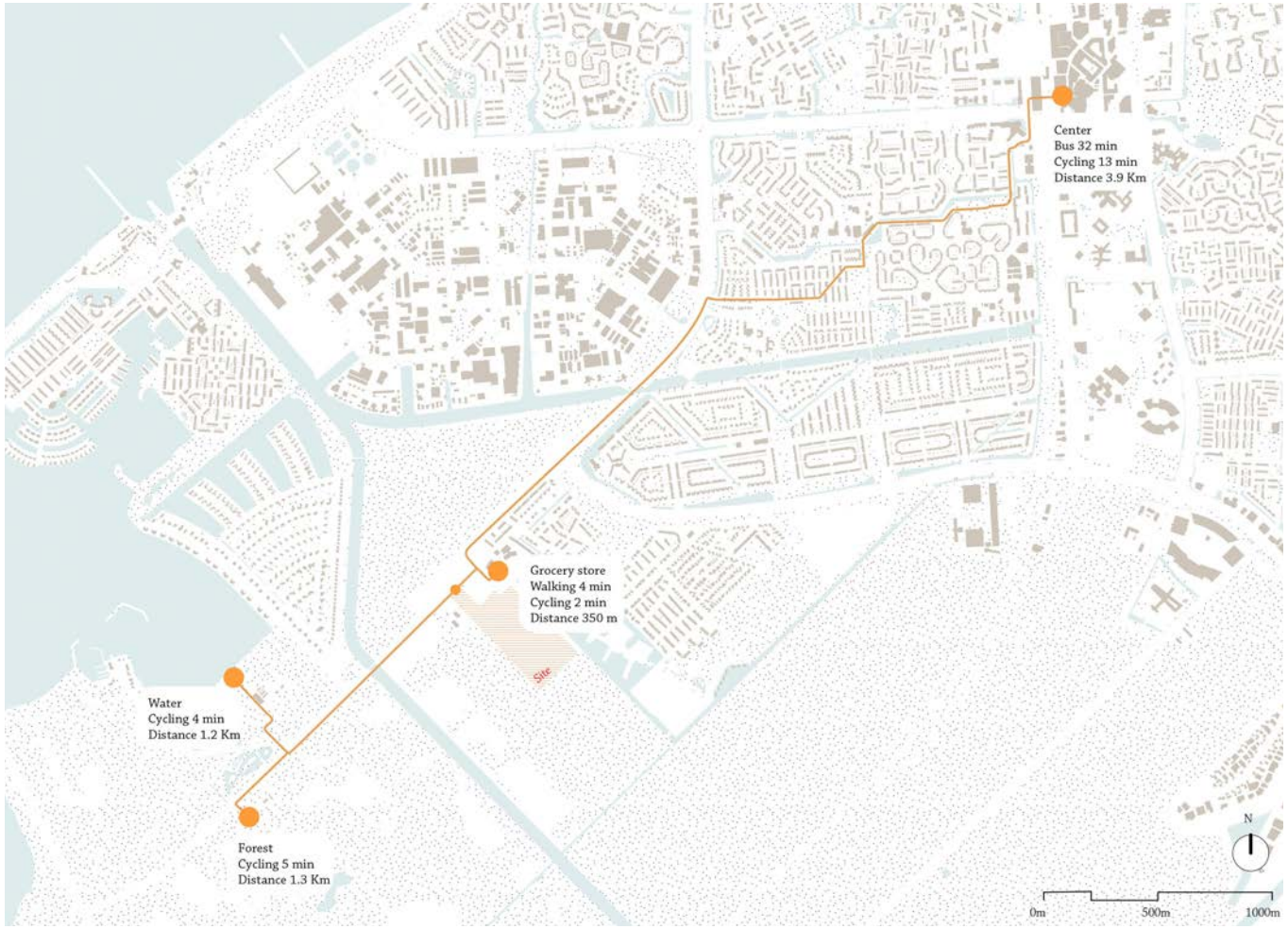


Figure 8. Map showing distances to key locations from site. Base map generated via Open Street Map. Drawing made in collaboration with Mihnea Cernăianu.

Transportation accessibility

The site, being 3.9 km away from the city center, is quite far from it. Nevertheless, the site is accessible by car, bike and walking routes - although it takes at least 40 minutes by walking, for someone to reach it from the center (figure 8). Overall, the transportation system of the area is friendly to residents (figure 9): there is a bus stop for bus number 8 directly in front of the site, that starts from the central station of the city (figure 10). Additionally, by 2025, a new train station located 5.5 km from the site, Lelystad Zuid will open. The forest is close, 5 min by bike and the grocery store is reachable within 4 min of walking. In sum, the transportation accessibility of the site is very convenient for ID people, who usually don't have cars.

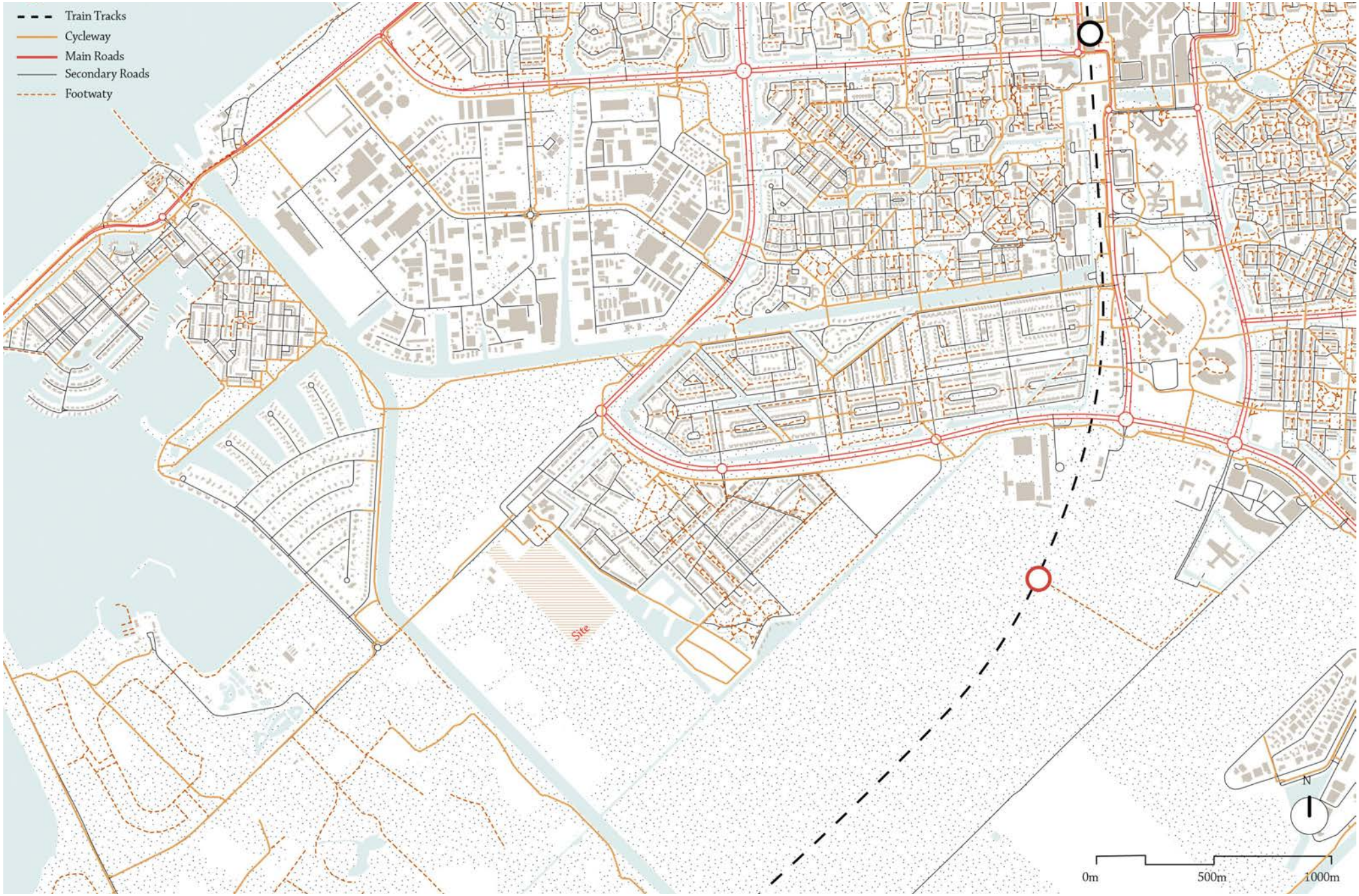


Figure 9. Map showing infrastructure. Base map generated via Open Street Map.

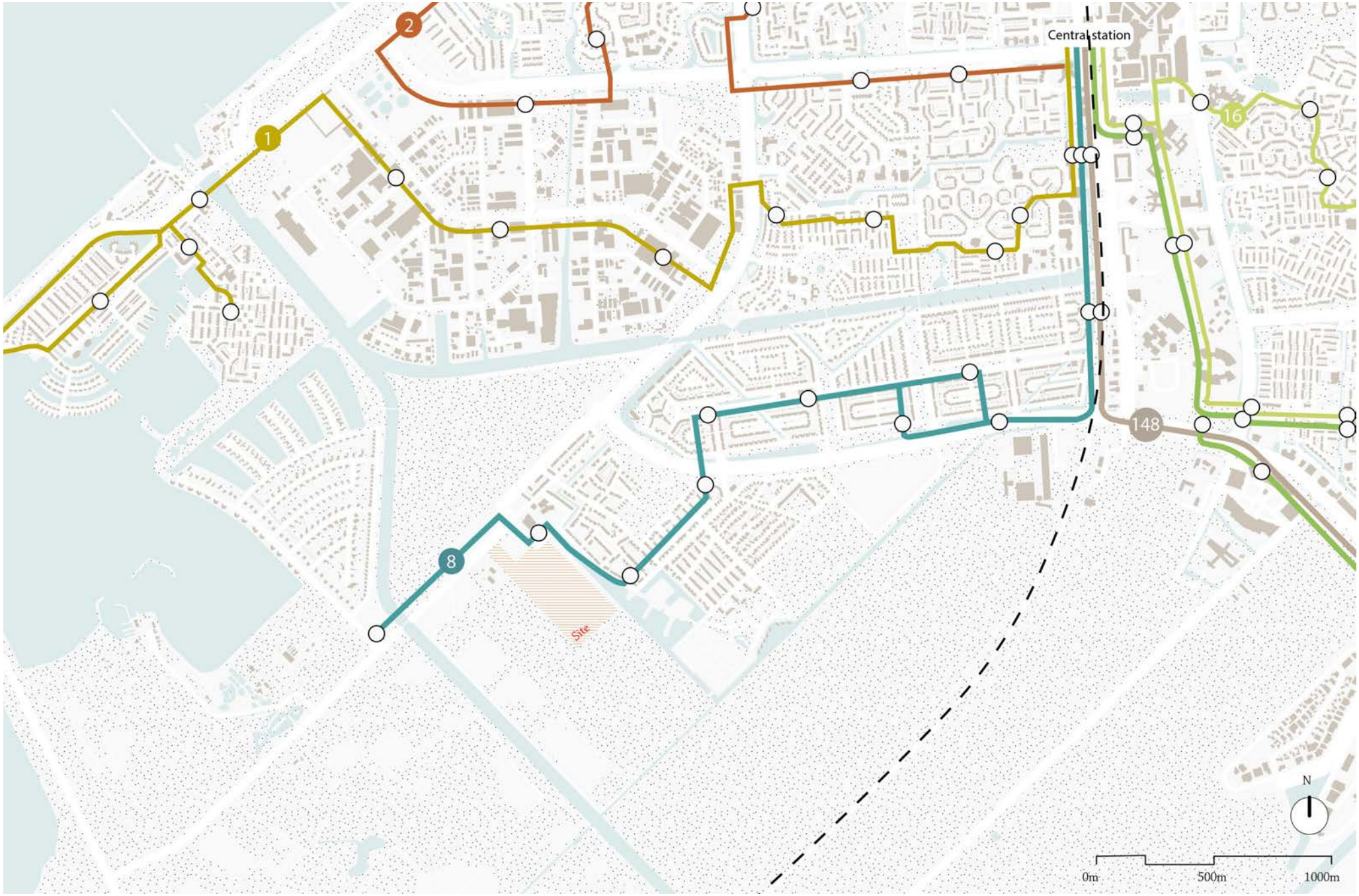
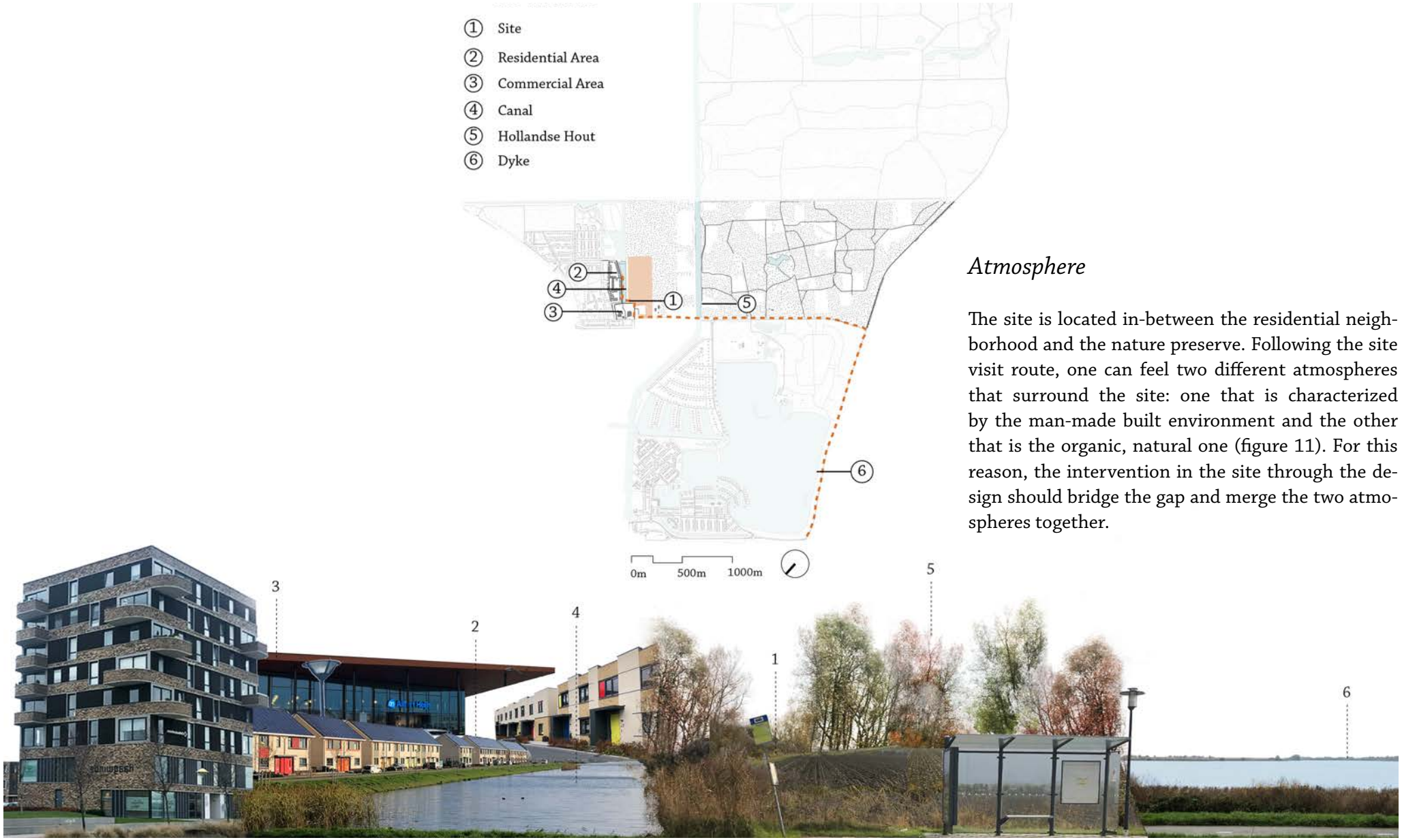


Figure 10. Map showing the bus routes. Base map generated via Open Street Map. Drawing made in collaboration with Mihnea Cernăianu.



Atmosphere

The site is located in-between the residential neighborhood and the nature preserve. Following the site visit route, one can feel two different atmospheres that surround the site: one that is characterized by the man-made built environment and the other that is the organic, natural one (figure 11). For this reason, the intervention in the site through the design should bridge the gap and merge the two atmospheres together.

Figure 11. Collage showing the site atmosphere. Own drawing.

Figure 12. Map showing the surrounding functions at the site scale. Base map generated via Open Street Map.

The site

The area to be redeveloped, consisting of 97.000m^{2,} is located at the neighborhood of Warande. North of the site, there is a commercial center with a grocery store and a school and adjacent to the canal, overlooking the residential area. The southeast side of the lot is primarily barren with some wild trees. On the southwest there is a private farm and their cultivation land (figure 12).

Nature and Biodiversity

While commercial growth and residential reconstruction are important for the economy of the city, it is also important for a designer to take into account the possibilities the abundance of nature of the location has to offer to the physical and mental well-being of the residents.

The site is located in-between two forest preserves: the Hollandse Hout, that is part of the Niew Land National Park and the Nature Park (figure 13). Both of them offer trails for hiking, running and birdwatching; additionally, the first park offers paddle sports and water activities. The flora species are similar in both forest preserves (figure 14), including trees such as poplar, willows and alder, that grow fast and are able to hold great amounts of water (Wandelroute Hollandse Hout, 2023). What differs, however is the diversity of the fauna (figure 15). At the Hollandse Hout there is a great number of wild animals such as kestrels and grass snakes, birds (AllTrails,2022), as well as pine martes (Wandelroute Hollandse Hout, 2023). At the Nature Park, which takes part in nature conservation programs, there is a wider diversity of animals, even endangered species, such as otters, bison and przewalski horses (Natuurpark Lelystad, n.d.). This biodiversity of the region has the potential to become a magnet for more activities and social events that may promote social interaction and inclusion of vulnerable groups, such as ID people.

Figure 13. Map showing the proximity to the two natural parks. Base map generated via Open Street Map.

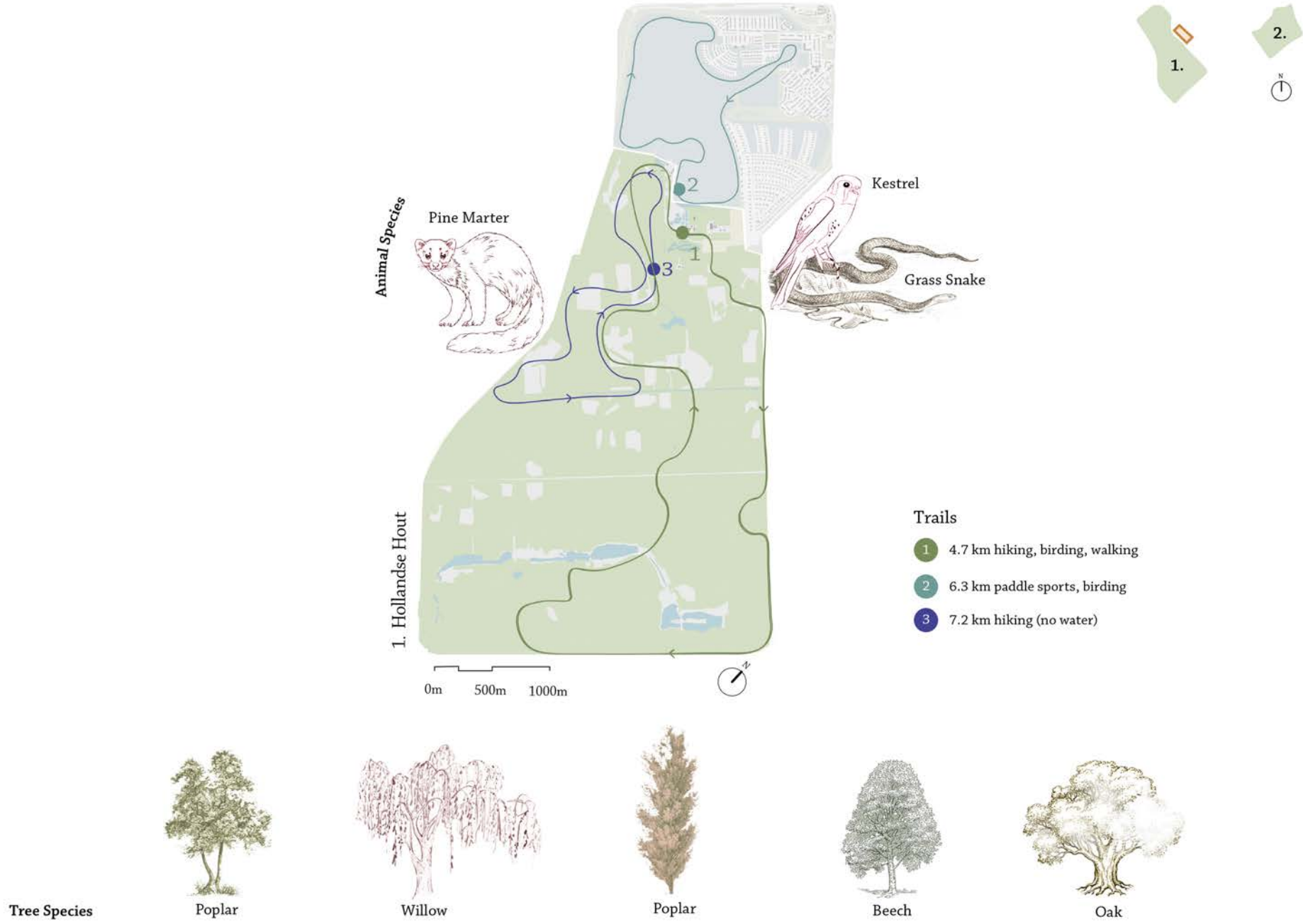


Figure 14. Hollandse Hout trail map and biodiversity. Base map generated via Open Street Map.

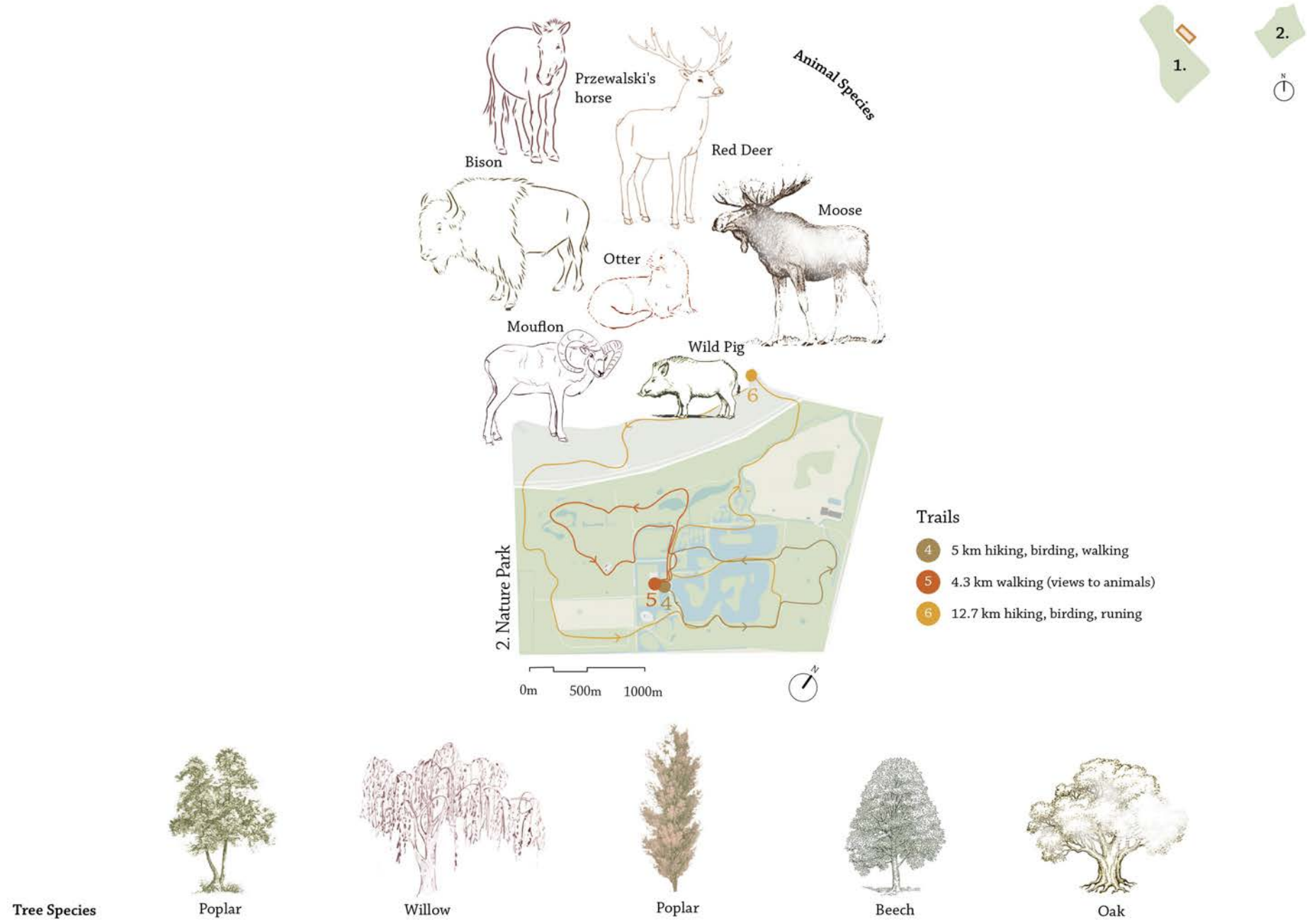


Figure 15. Nature Park trail map and biodiversity. Base map generated via Open Street Map.

Climate Analysis

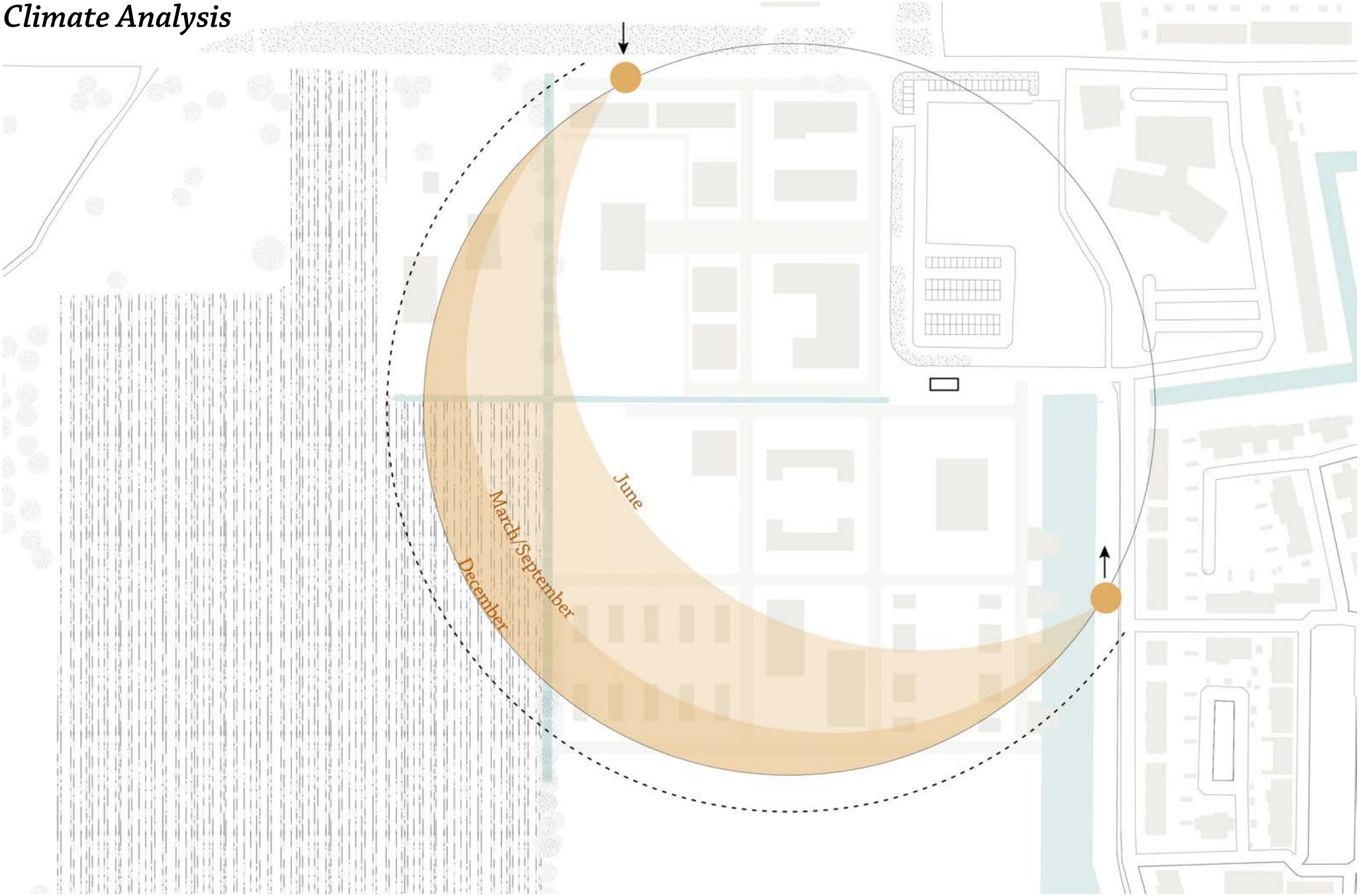


Figure 16. Sun Path. Base map generated via Open Street Map.

Daylight Through the Seasons

December 21st

9:00 am

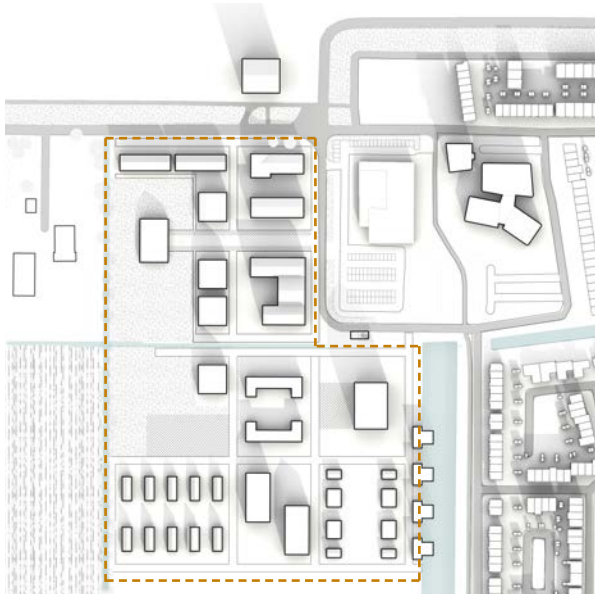
12:00 pm

15:00 pm

Figure 17. Daylight through the seasons. Base map generated via Open Street Map.

Daylight Through the Seasons

March 21st



9:00 am

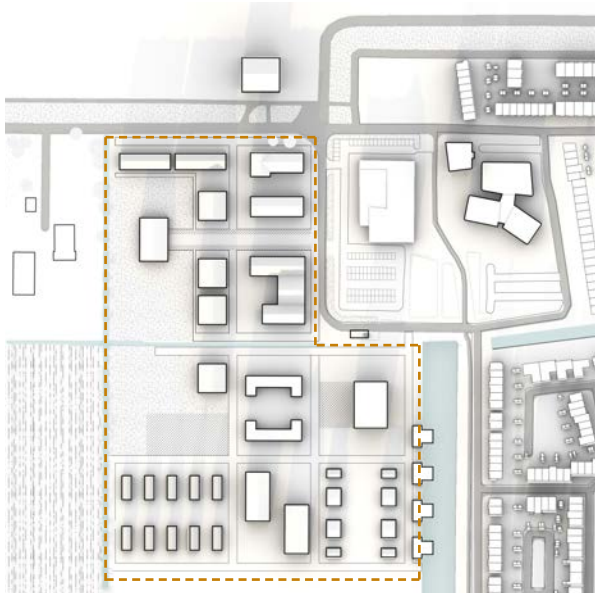
12:00 pm

15:00 pm

Figure 18. Daylight through the seasons. Base map generated via Open Street Map.

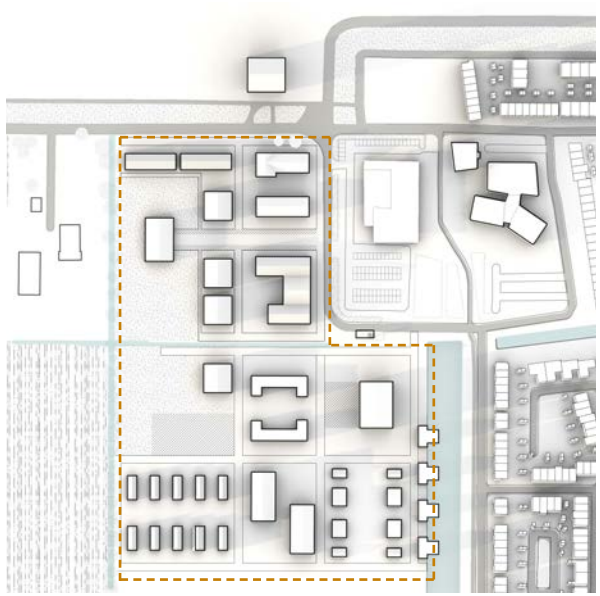
Daylight Through the Seasons

June 21st



9:00 am

12:00 pm



15:00 pm

Figure 19. Daylight through the seasons. Base map generated via Open Street Map.

Master Plan Analysis

Where Else, Lelystad by Cittanova

The following analysis of the urban redevelopment master plan by Cittanova (Cittanova, n.d) , aims to highlight its strengths and to point out what could be improved, based on the conducted research on supported living housing for adults with intellectual disabilities.

The basis of this master plan lies on the creation of a new neighborhood center, connecting the community center with the existing commercial district of the neighborhood and offering daily activities including urban farming, animal farming and an organic store. Additionally, new parking lots and spaces are allocated to serve the neighborhood (figure 20).

The buildings are divided in four zones with varying heights from 1 to 3 story height (figure 21). Exception are the two accent marks that will have 7 to 14 story height. The zones have different typologies of buildings varying from residential buildings to care homes for elderly.

In essence, this master plan aims to create an inclusive neighborhood where various target groups co-live together, sharing the community center and caring for each other. The intention of this master plan emphasizes 'togetherness', which is really important for the creation of a sense of community. However, what seems to be missing from this master plan is the human-scale. The circulation seems to be car-oriented with a focus to creating parking areas and the pedestrian scale is absent (figure 22).

Figure 20. Master plan important axis . Base map generated via Open Street Map.

Figure 21. Master plan zones diagram. Base map generated via Open Street Map.

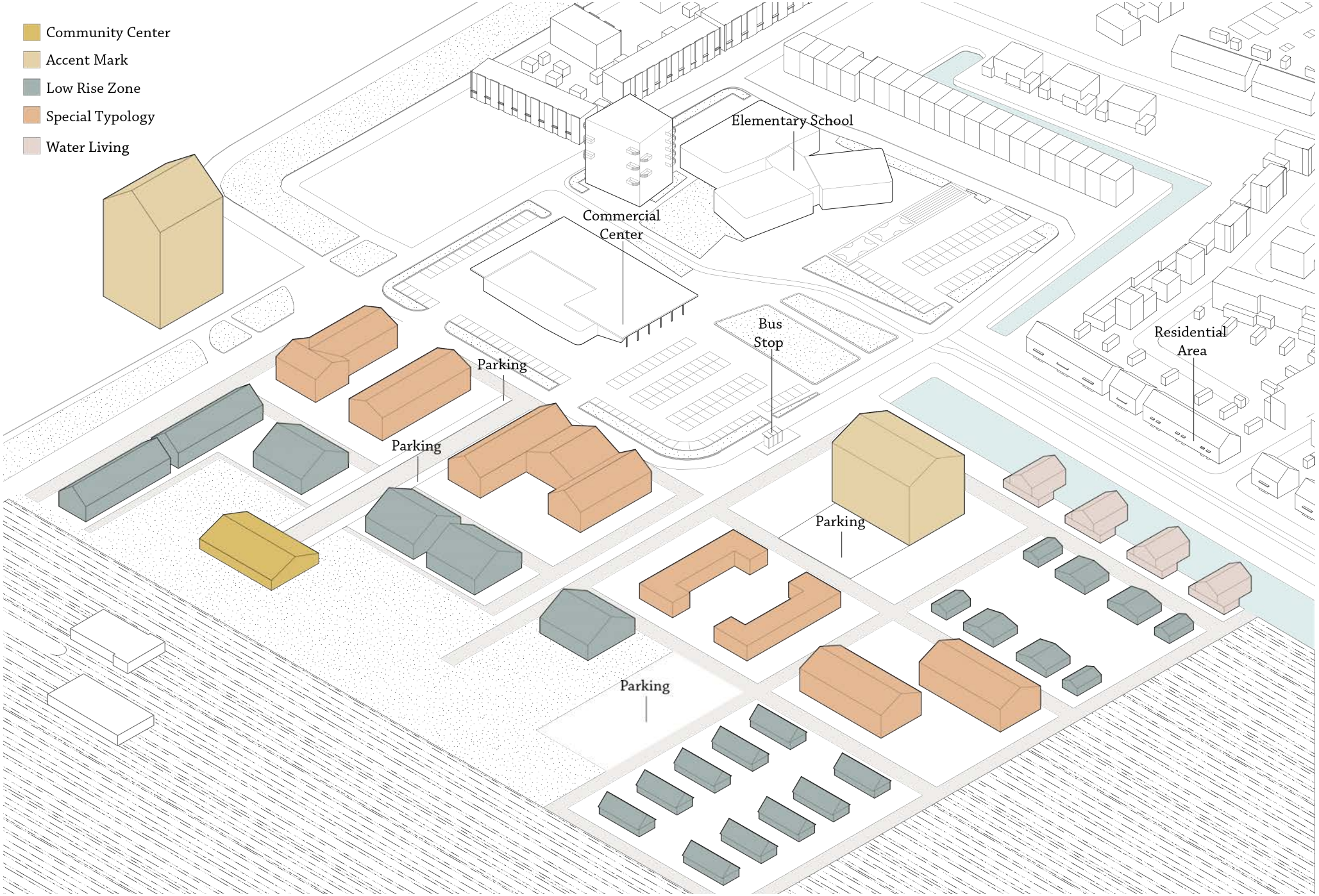


Figure 22. Axonometric view of the master plan and building typologies. Own drawing.

Analysis' Conclusions

The selection of the site for creating a supported living environment for adults with intellectual disabilities was made based on three main parameters.

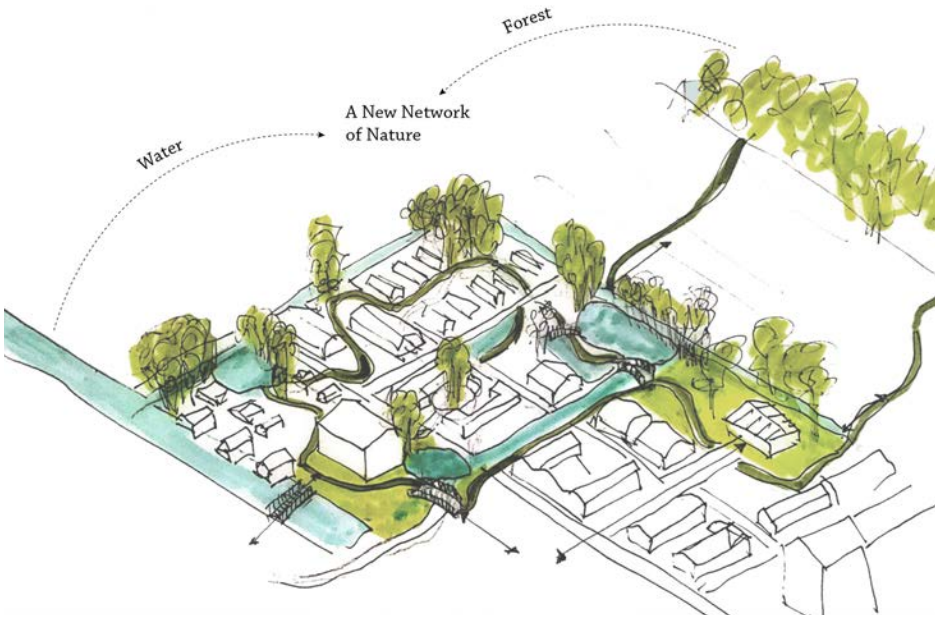
Firstly, the connection the city of Lelystad and the specific location have with nature and the ambition of the municipality to establish Lelystad as the *Capital of New Nature*; this allows for an opportunity to create genuine relationship between nature and the built environment, a core principle of biophilic design. The design intervention could serve as a greater example of how nature can be implemented in the development of the urban fabric: nature won't be associated only with recreational purposes, but it will be also implemented it in the design process to create a sense of identity, by applying the biophilic patterns in the various design scales: site, building and interior.

Secondly, the site is located at a small-scale residential neighborhood and a commercial district, that is accessible by bus, bike and car. This condition is ideal for ID people, as they can build a relationships with the local community and develop their social interaction.

Finally, the neighborhood itself is in need of development and additional public functions, therefore, a hybrid facility of supported living housing in combination with a wellness center could help towards creating an environment that caters for the social inclusion of everyone. The additional functions are centered on catering for the physical and mental well-being of the both the residents and the neighborhood as a whole.

Chapter 2 | New Master Plan

The first steps towards designing a supportive living housing facility for the intellectually disabled was to **reevaluate the possibilities of the existing master plan** and propose a new one that would implement the city's ambition to achieve a better connection with the abundant natural sceneries of the area (the Plan of New Nature – refer to pages 17 & 31-37).The existing master plan, even though it aims to create an inclusive neighborhood by implementing healthcare facilities and welcome a diverse body of residents, is undoubtedly car-centered and doesn't provide green spaces and a connection with the surrounding natural environment.

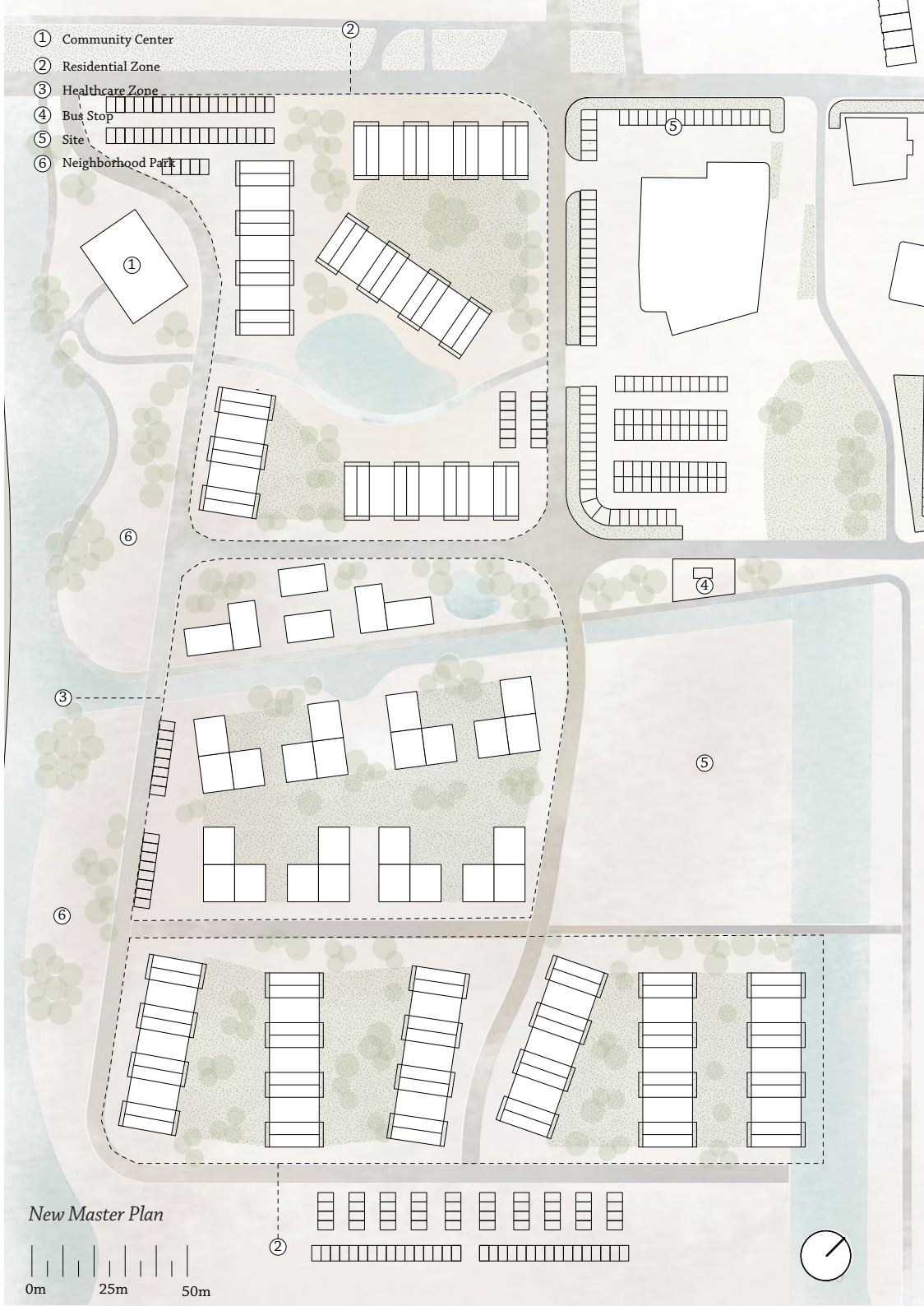


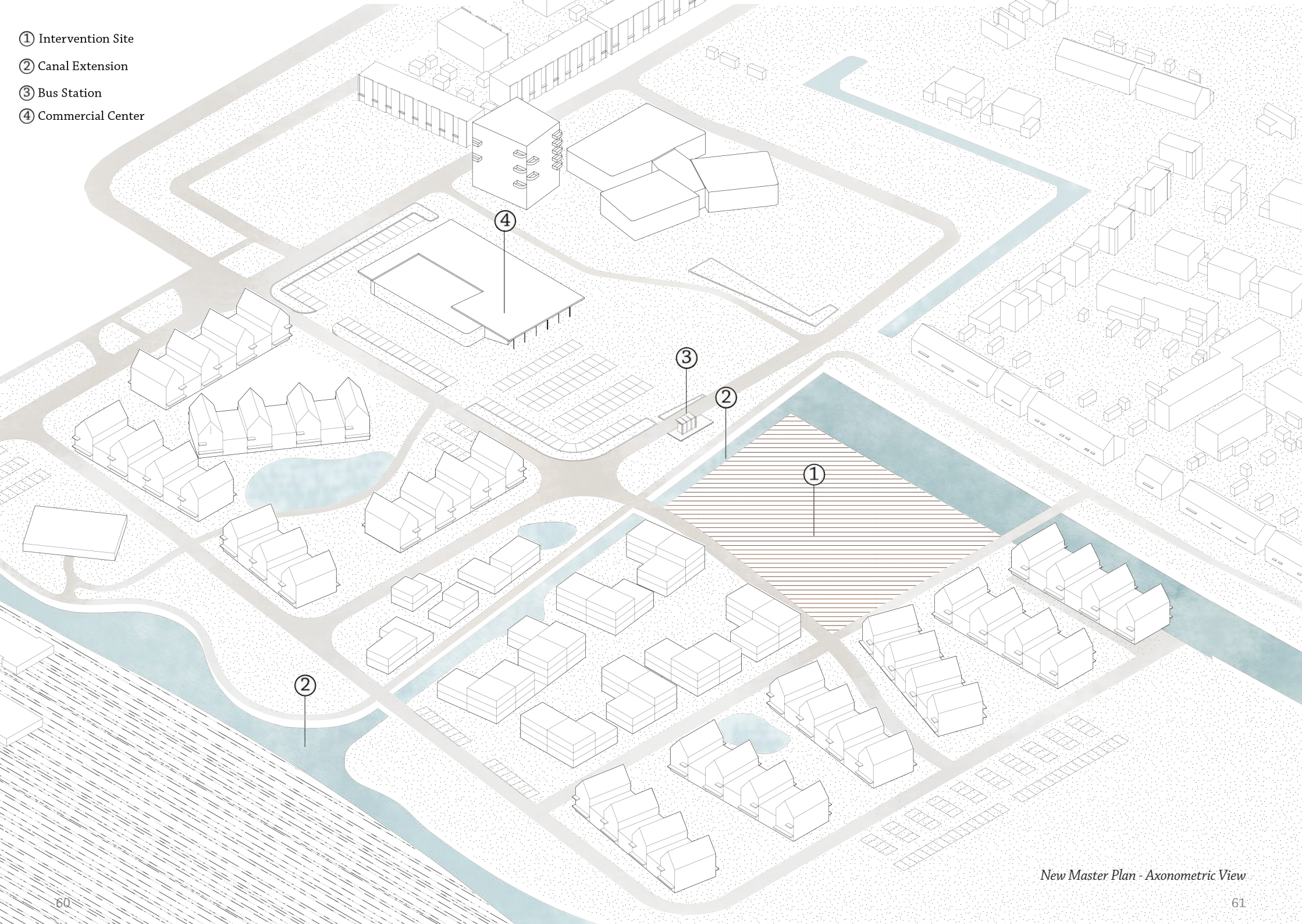
Master Plan Concept Sketch

New Master Plan Design Approach

As suggested by the research report, the implementation of biophilic design principles could support the well-being of humans and especially the target group of adults with intellectual disabilities.

Therefore, for this design project, a new proposal for the site area was developed aiming to integrate the existing canal by extending it within the site, creating a new waterway, as well as ponds that can bring the residents closer to nature. Moreover, new pedestrian paths were designed to bring the master plan closer to the human scale along with the integration of more green spaces that surround the residential parts. Lastly, the dwellings related to healthcare are placed at the 'heart' of the neighborhood, in proximity to public transportation.





New Master Plan - Axonometric View

Chapter 3 | Design Proposal

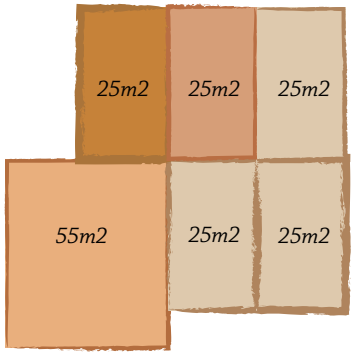
An Outline of the Design Proposal

Taking into consideration the rights and needs of adults with intellectual disabilities to independence, social inclusion and well-being, the question that stirred my research was how can biophilic design be implemented to improve their quality of life in supported living environments. Biophilic design focuses on the different ways one can experience nature - directly or indirectly.

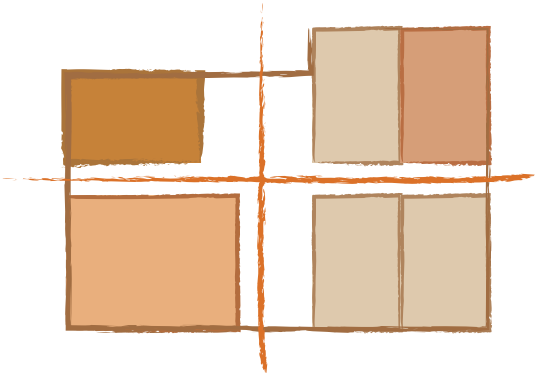
Therefore, the first ambition was the development of residential clusters that, based on the research conducted (literature review findings and empirical data from the fieldwork), would cover the needs of intellectually disabled adults living in supported living settings and provide a better quality of life for them.

Essentially, the program consists of three clusters of supported living houses for intellectually disabled individuals hosting 36 residents and their caretakers, as well as a wellness center (gymnasium, swimming pool, multipurpose facility and a café) shared with the community. The dwelling clusters are placed close to the canals and the wellness center towards the side of the street. This configuration allows for an 'in-between' central garden that acts as a boundary between the public and the private and becomes an opportunity for the creation of different types of gardens that stimulate the senses throughout the year.

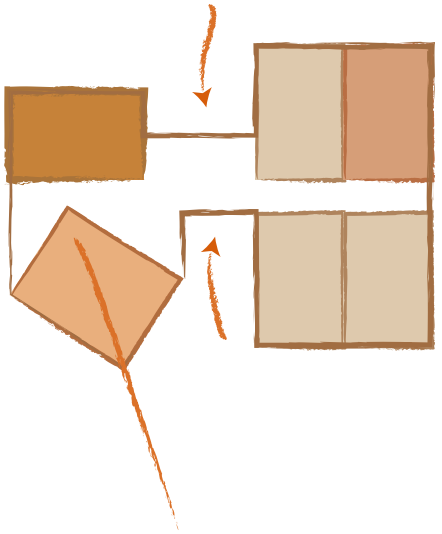
1.Determining Room Sizes



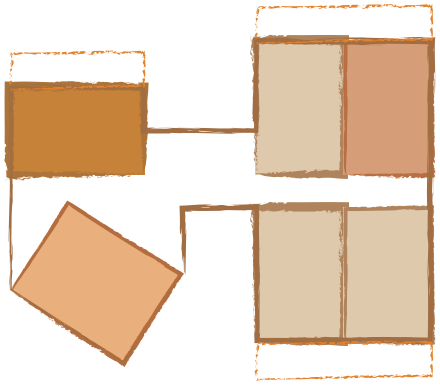
2.Spatial Organization



3. Creation of Common Spaces - Intimacy & Views



4. Private Outdoor Spaces

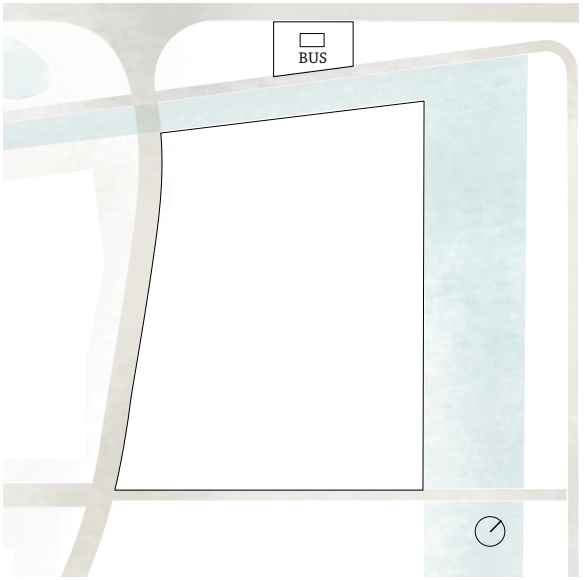


ID Bedroom with Private Bathroom

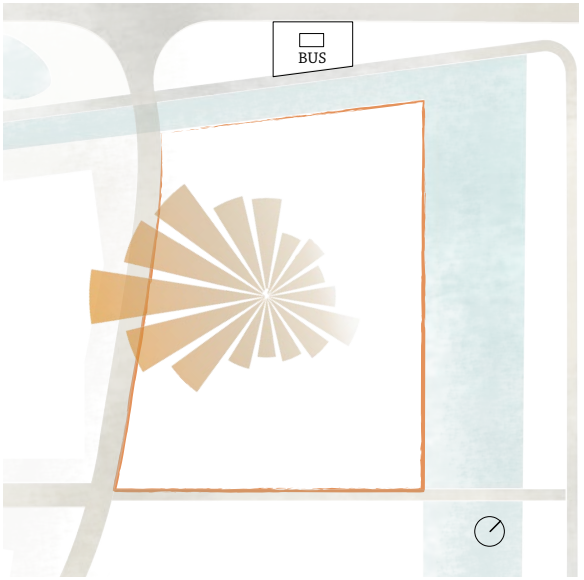
Caretaker Bedroom with Private Bathroom

Common Living Space

ID Bedroom with Caretaker

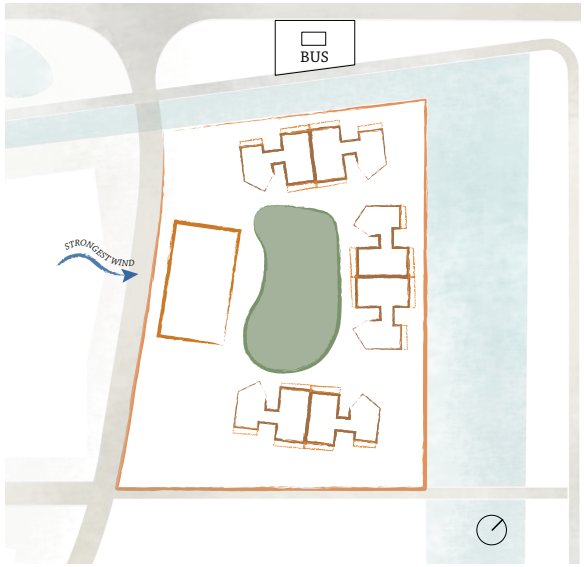


The Site

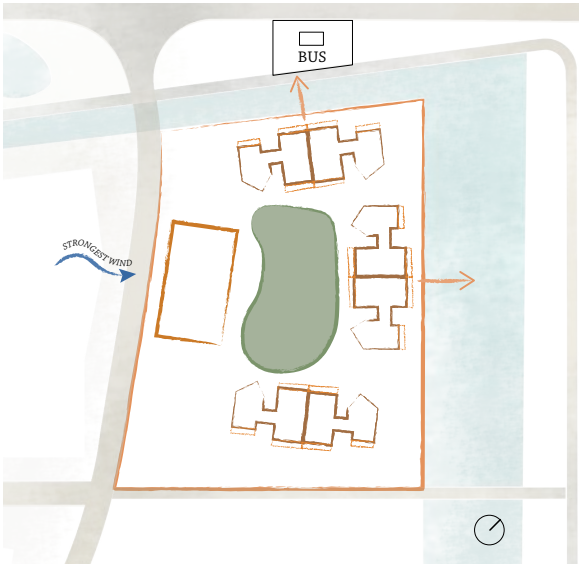


Taking into consideration the wind and sun.

Creating an axis that creates two zones.

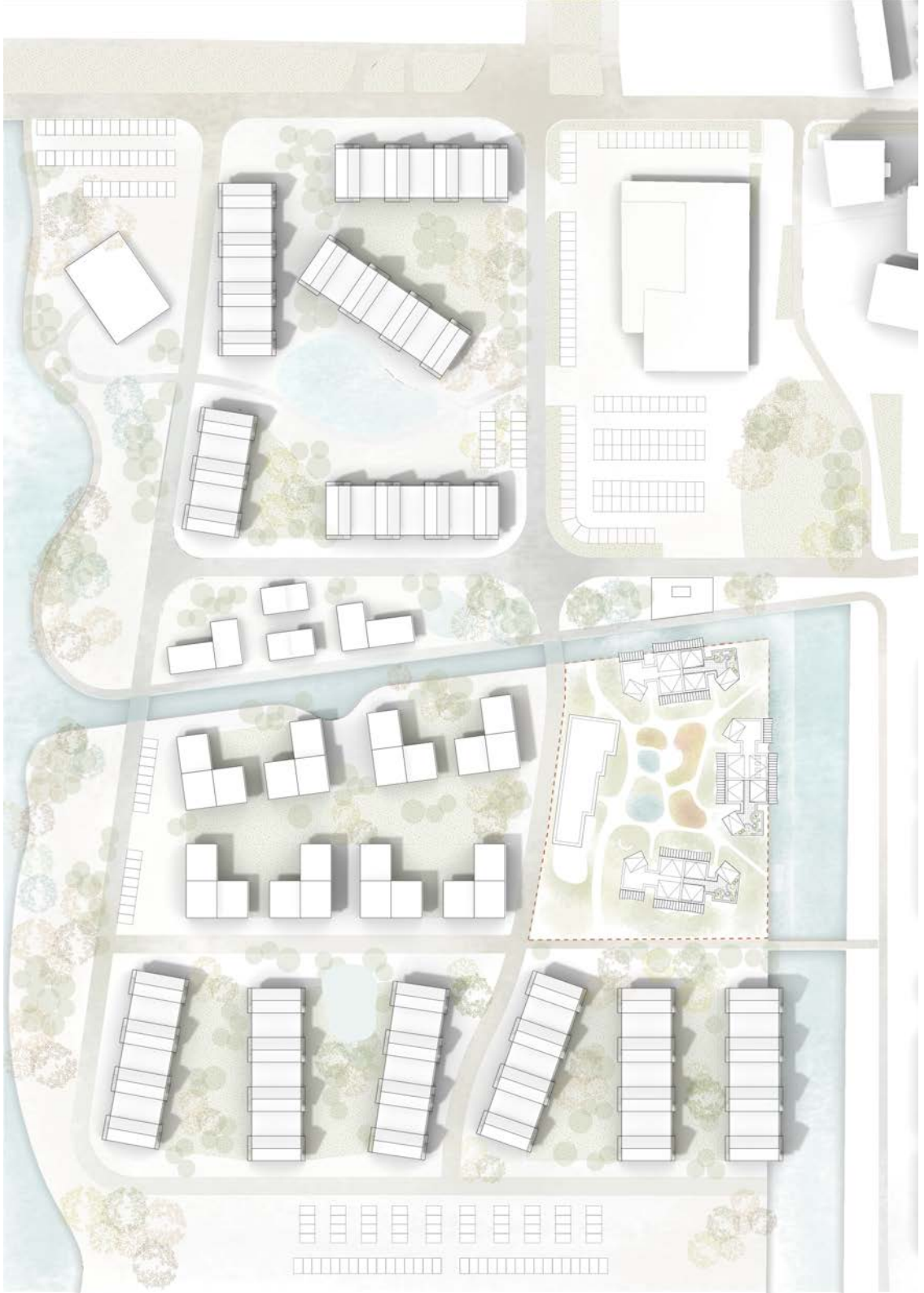


Placing the public functions to block the strongest wind.



Placing dwellings closer to the canal edge.

Final site plan idea.



Site Plan

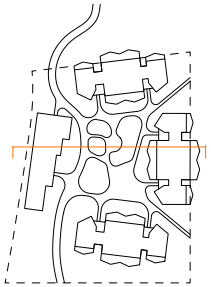

Water Platforms
Fitness Center
Swimming Center
Cafe' (Place to Work)
Art Therapy Center
2 Dwelling Clusters
(12 Residents)

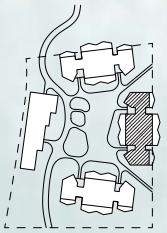
Site Plan

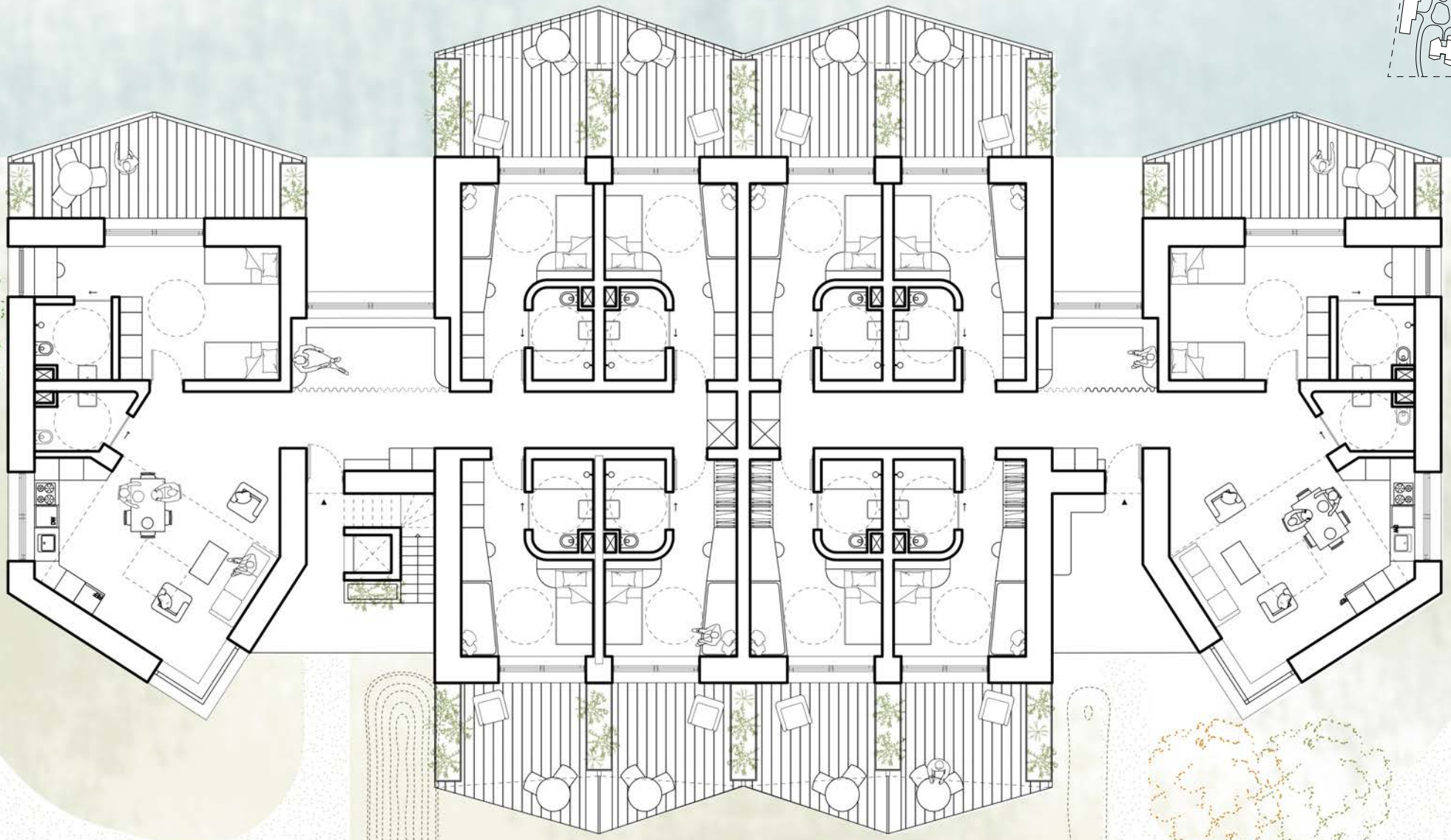
Ground Floor Plan

Perennial Garden Through the Seasons

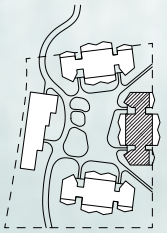
Urban Section Perspective

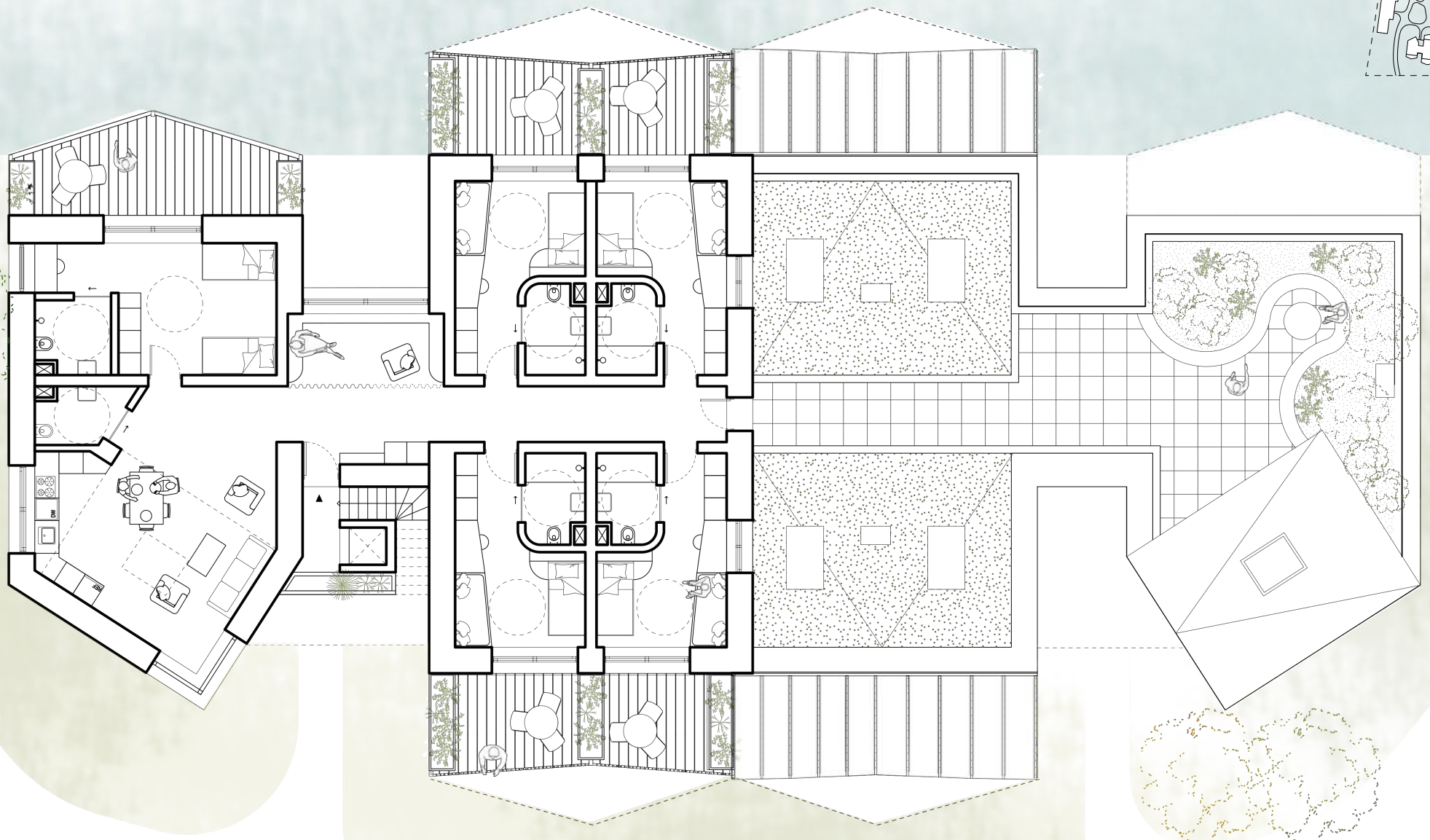




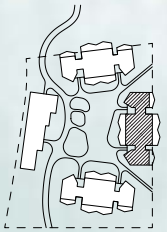


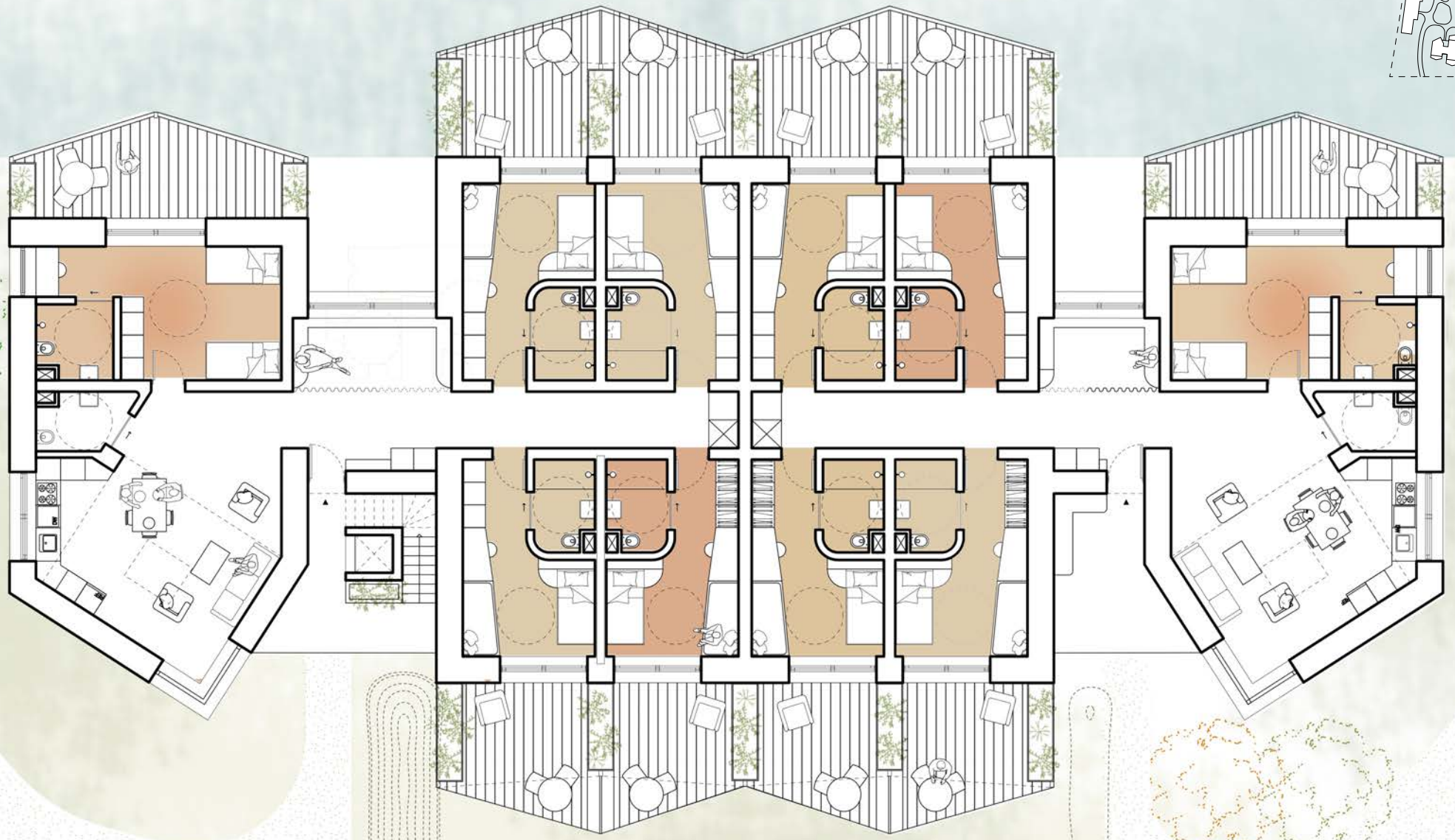
Ground Floor Plan





Second Floor Plan

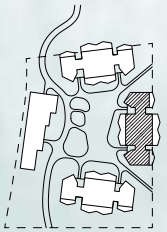


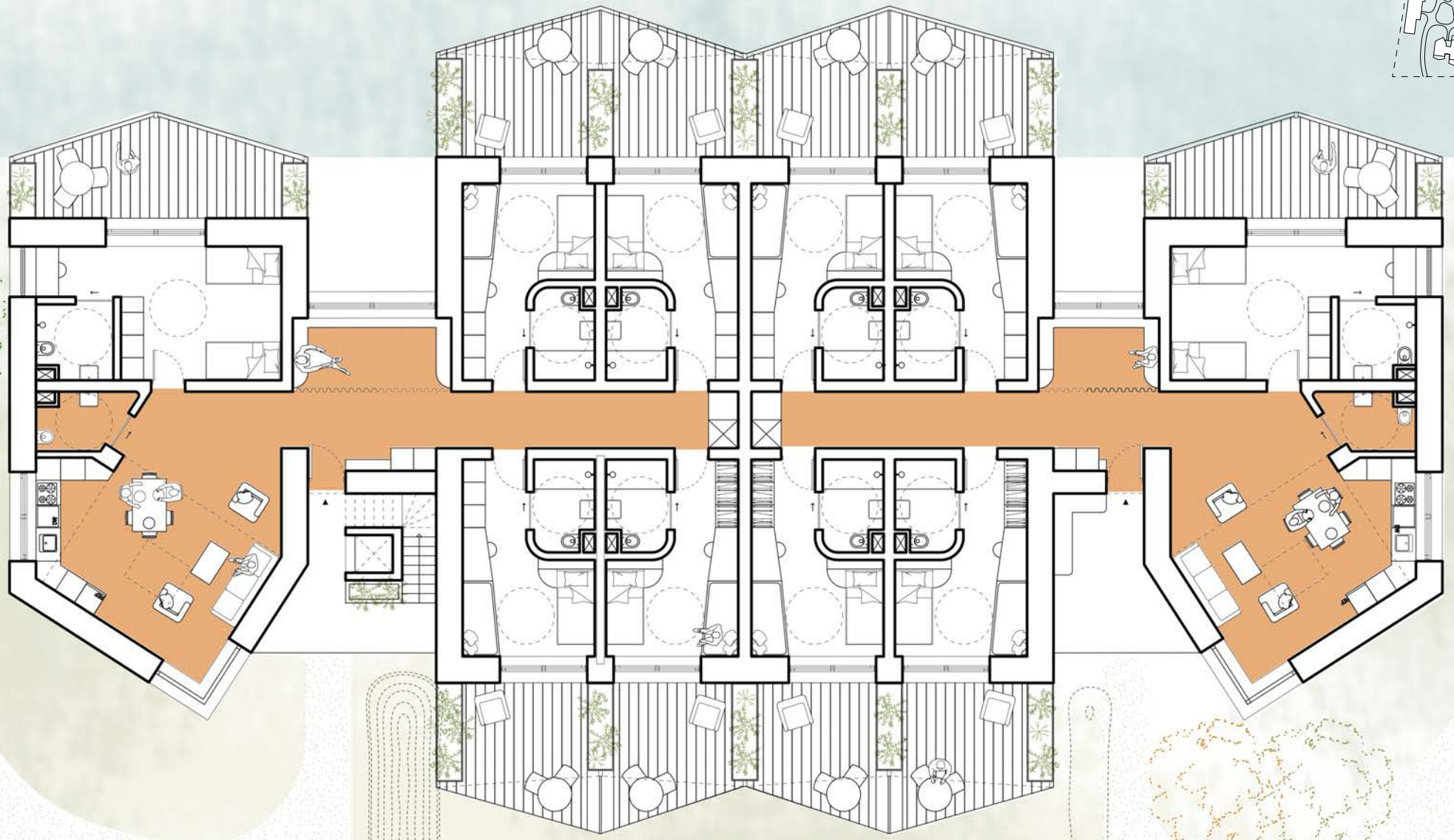


ID Bedroom

Caretaker

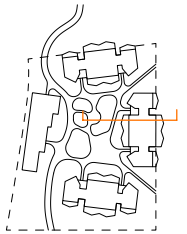
Residents Distribution Diagram





Common Space

Common Space Diagram

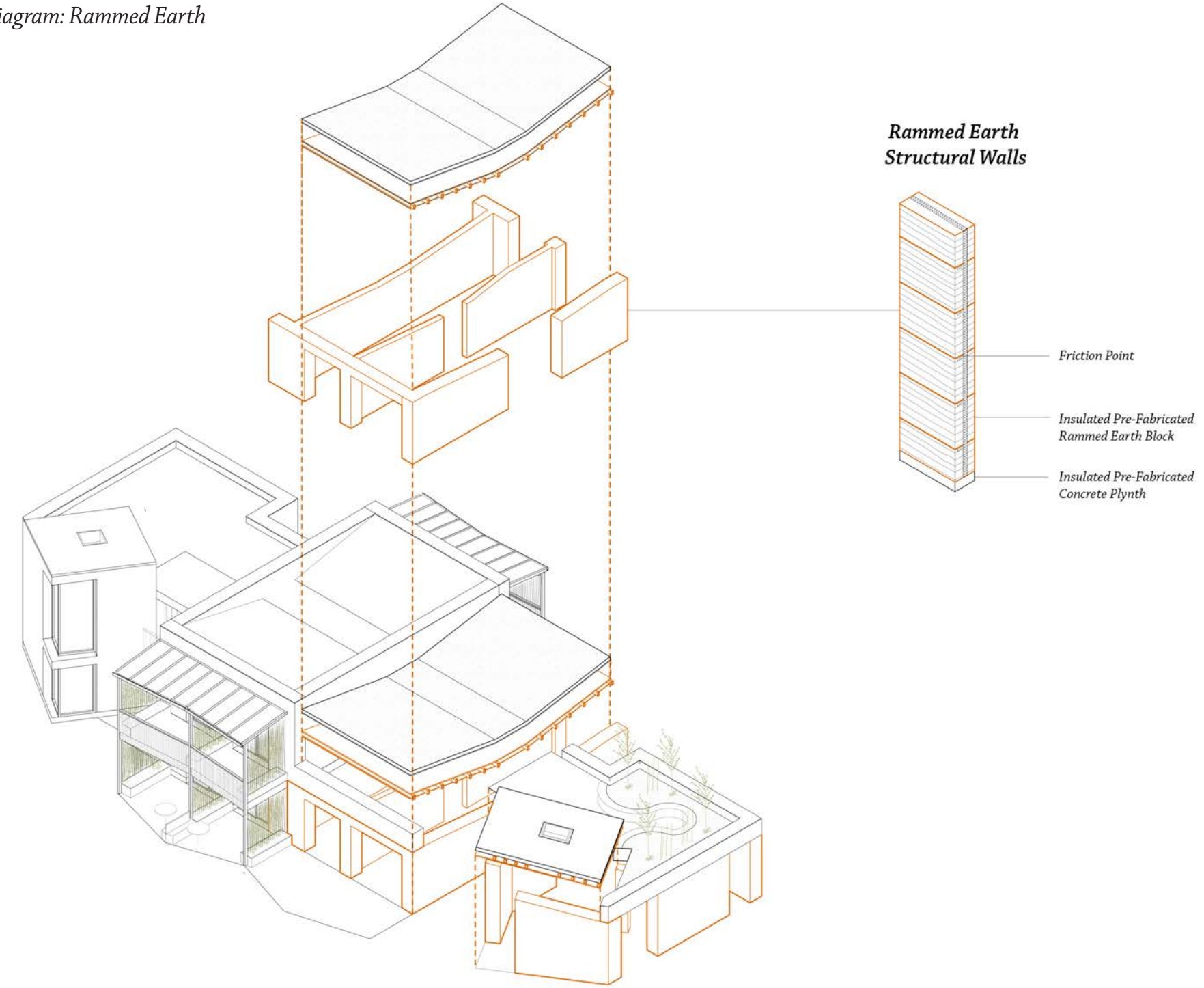


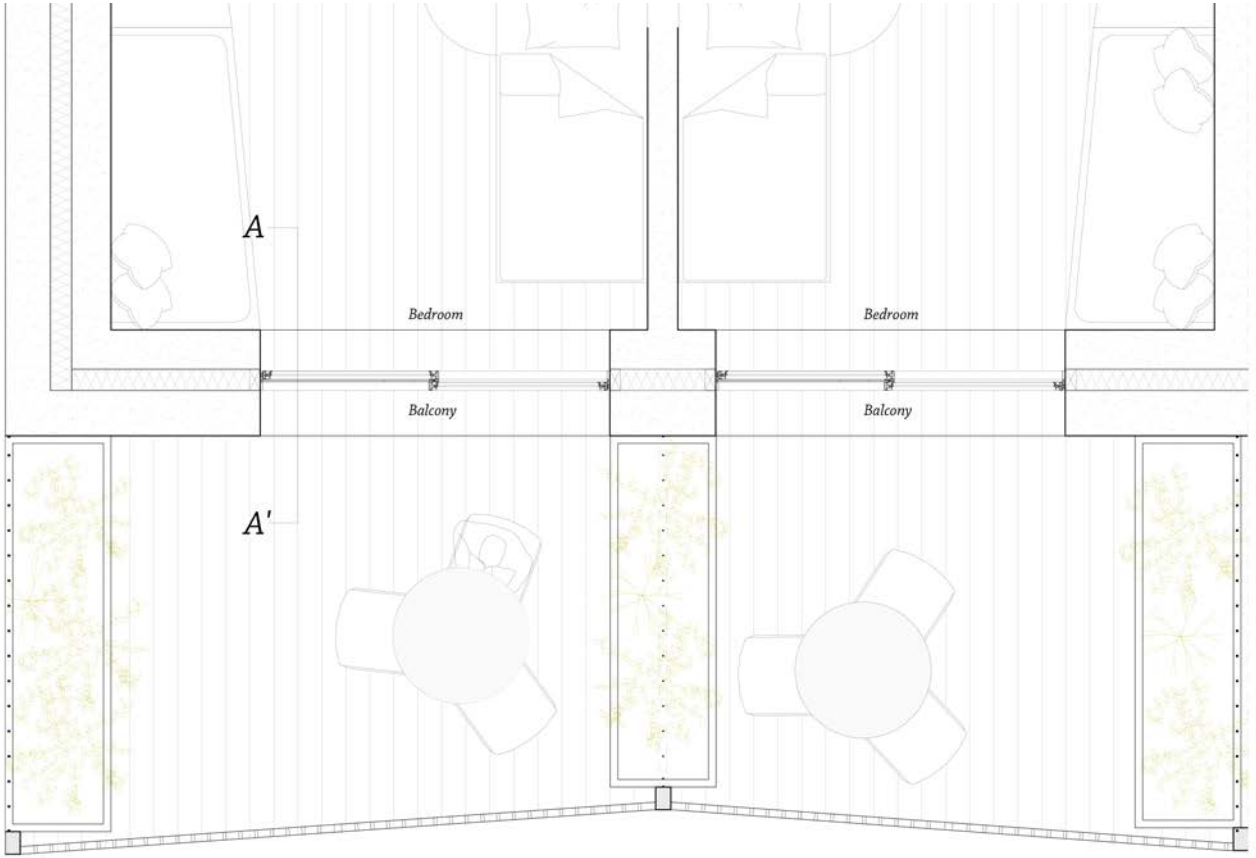
Section

Materials & Construction Details

The basic construction material chosen for this design is **rammed earth** because it is durable, non-toxic and sustainable: it is natural and can be constructed with the use of the soil excavated from the site (Birznieks, 2013). Some of its benefits include excellent insulation and soundproofing, which is valuable for the target group of intellectually disabled, high fireproof rating and a low carbon footprint (Kapfinger & Sauer, 2015). On the downside, cast in place rammed earth can be fairly labor and cost inefficient (Hill, 2022). For this reason, prefabricated insulated rammed earth blocks are suggested which, in addition, have the advantage of being able to expose the rammed earth on both facades. This material is closely connected to biophilia, and creates an atmosphere at the building interior scale that can make the residents feel closer to nature.

Structure Diagram: Rammed Earth



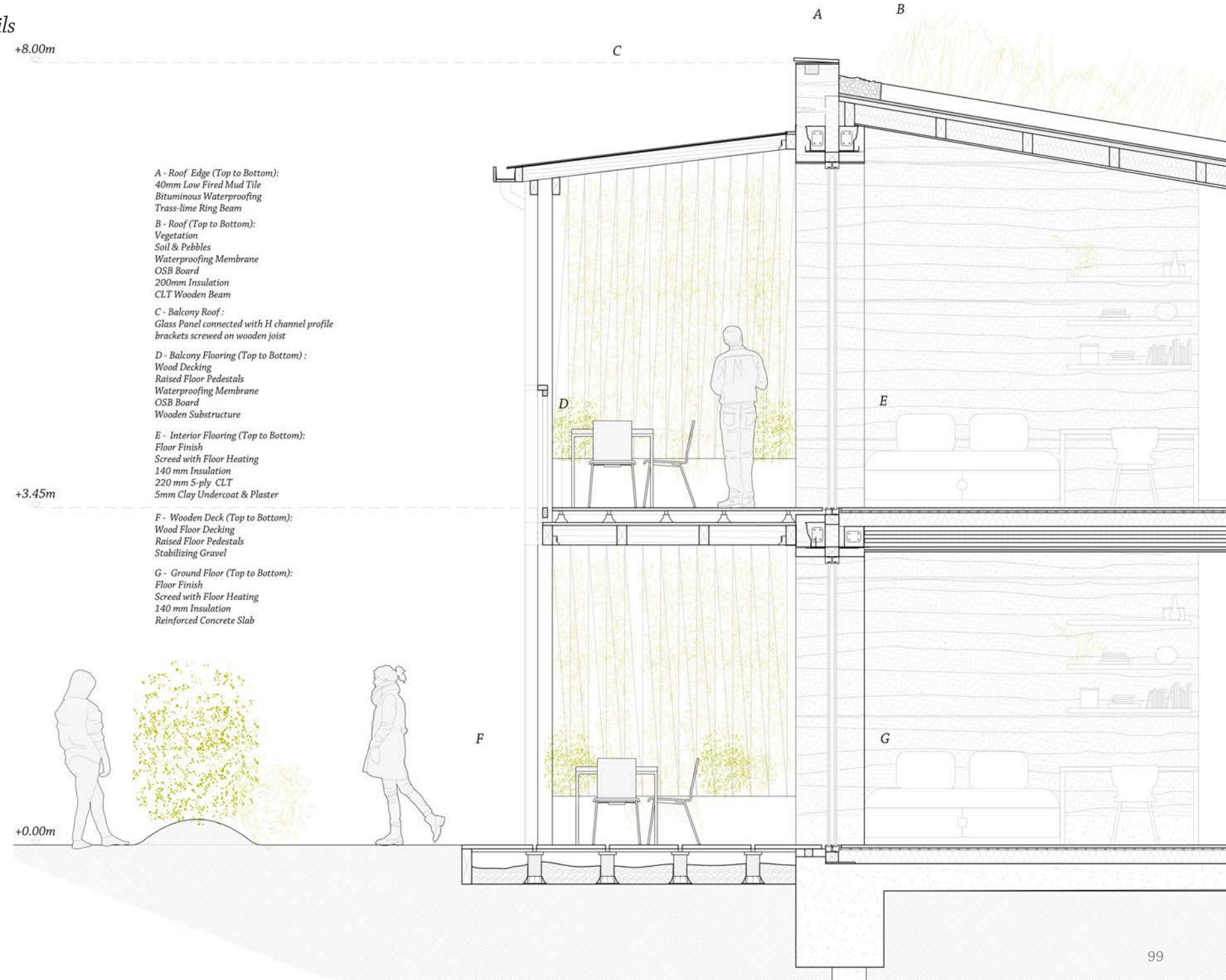


Façade Fragment - Plan

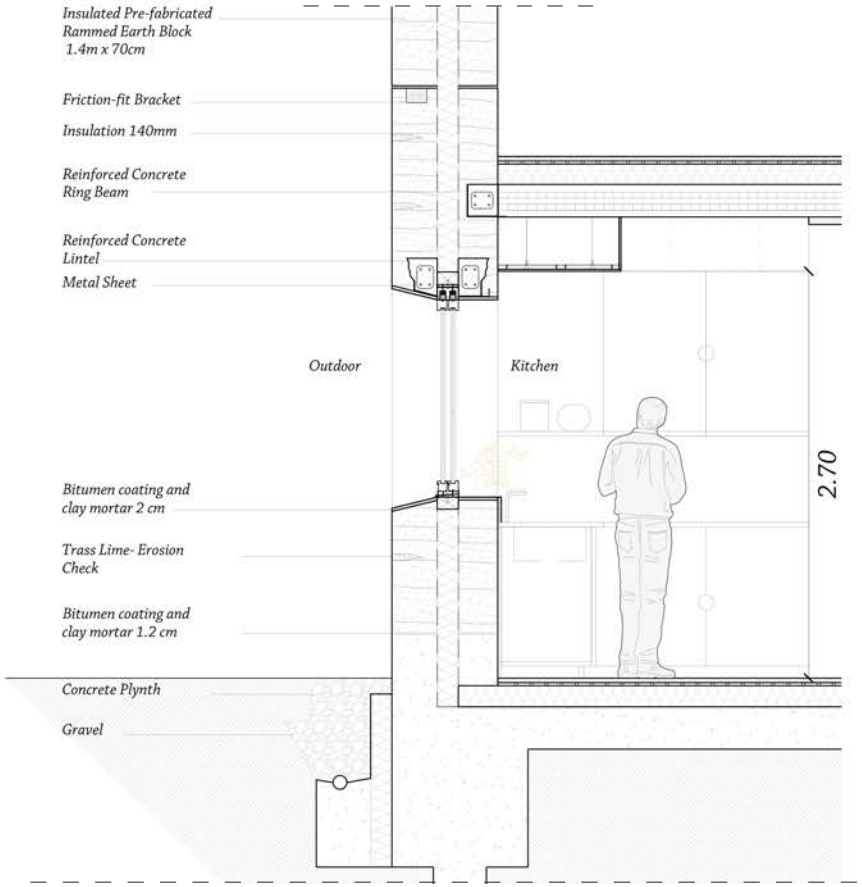
Construction Details

Façade Fragment - Plan

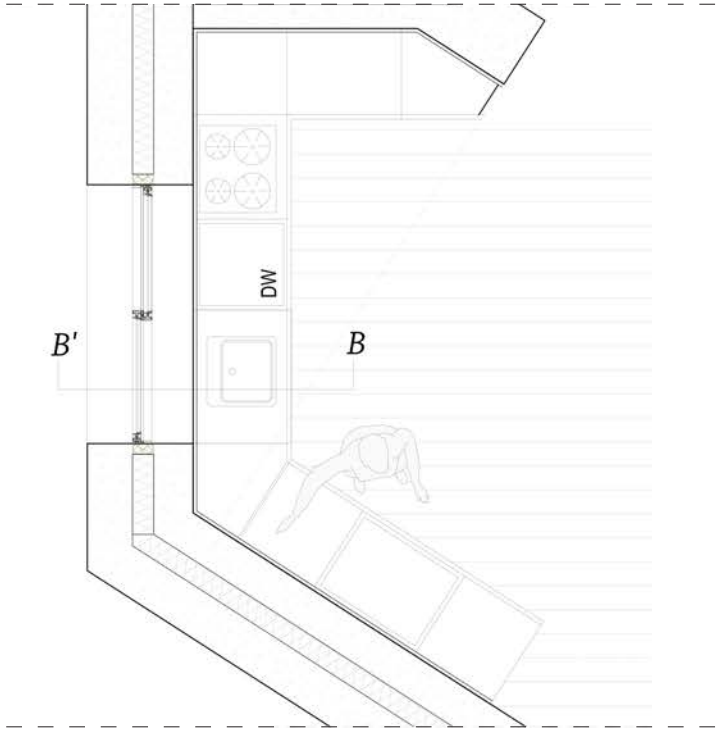
Construction Details



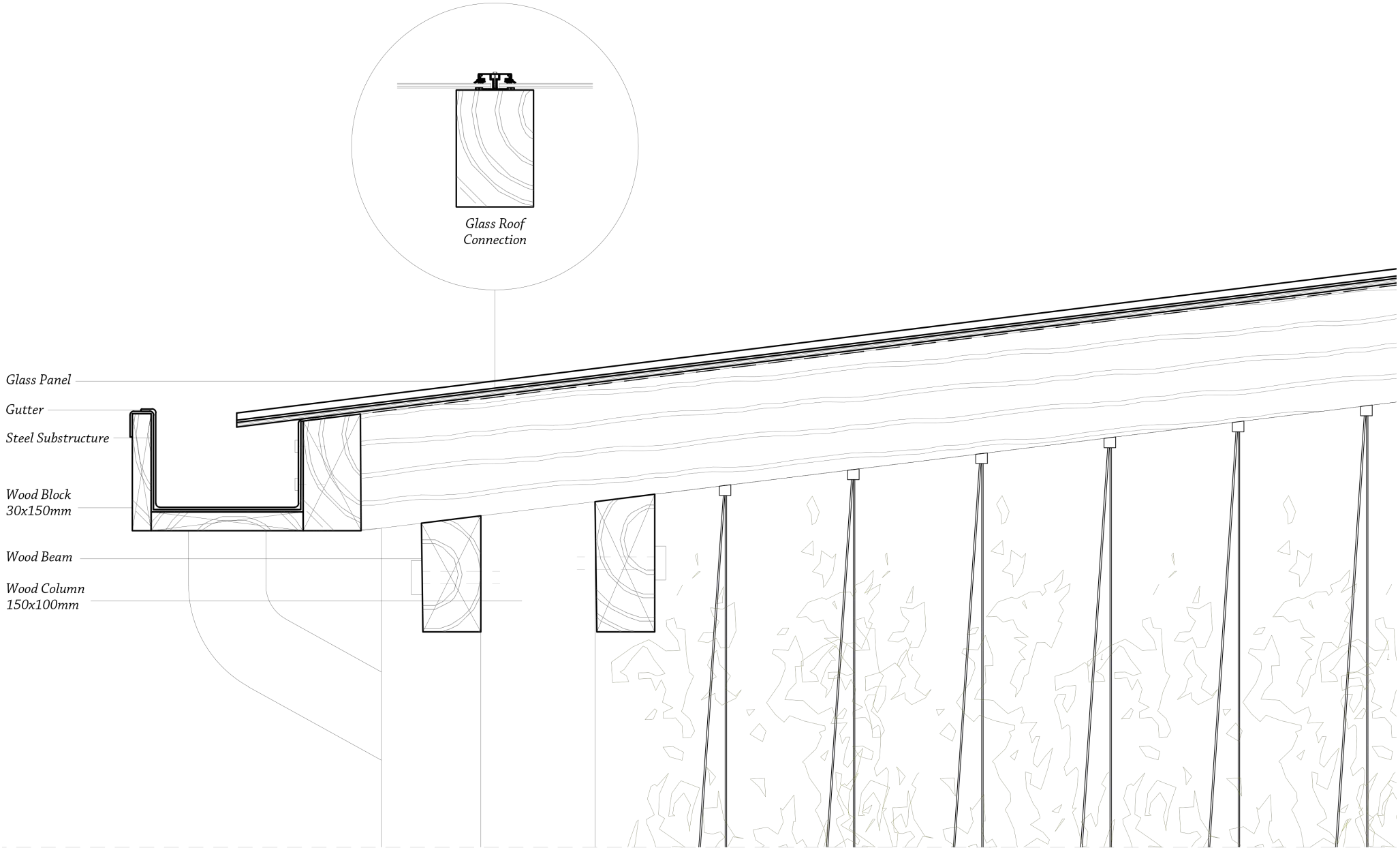
Façade Fragment - Plan



Typical Wall Section

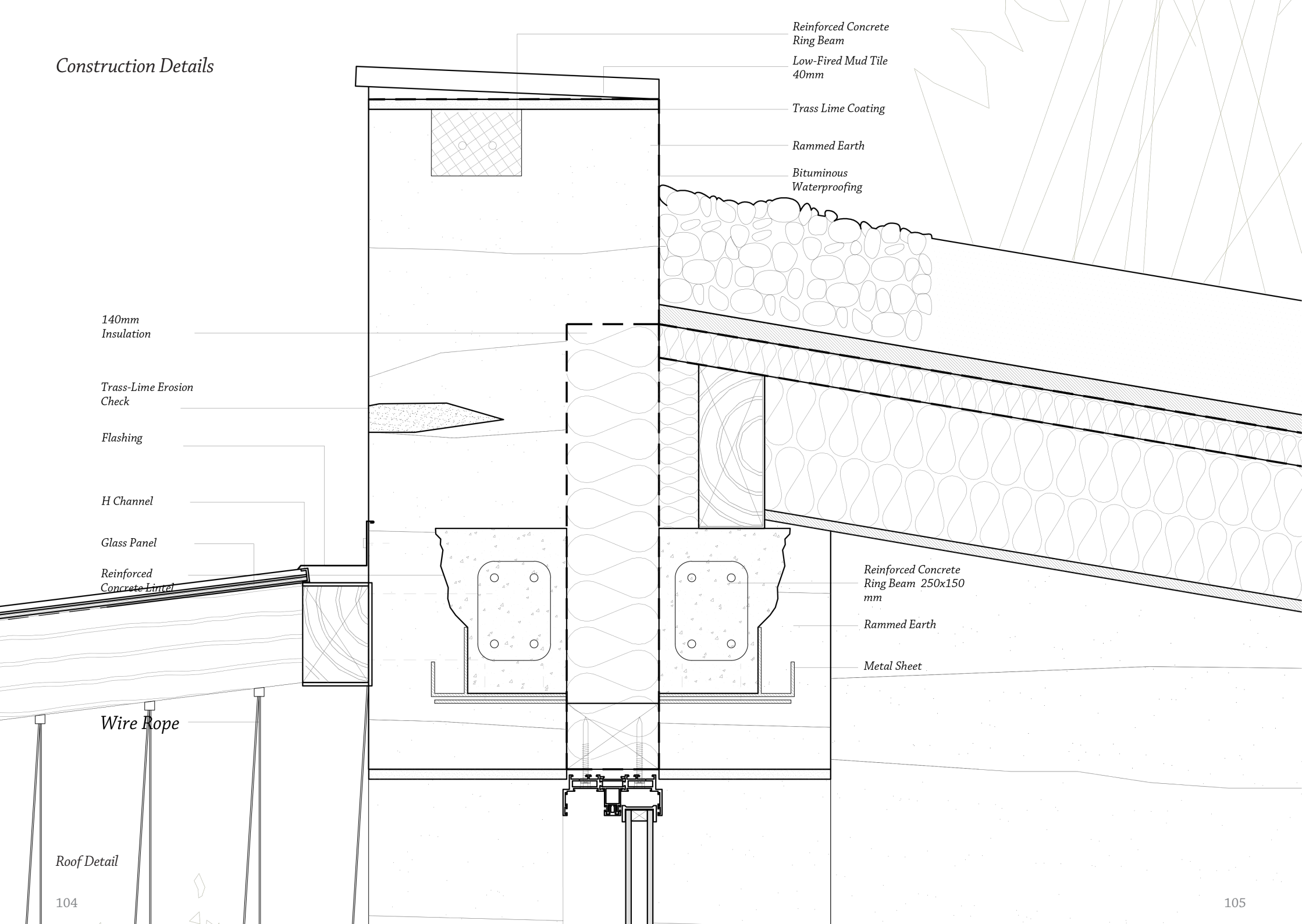


Typical Wall Plan

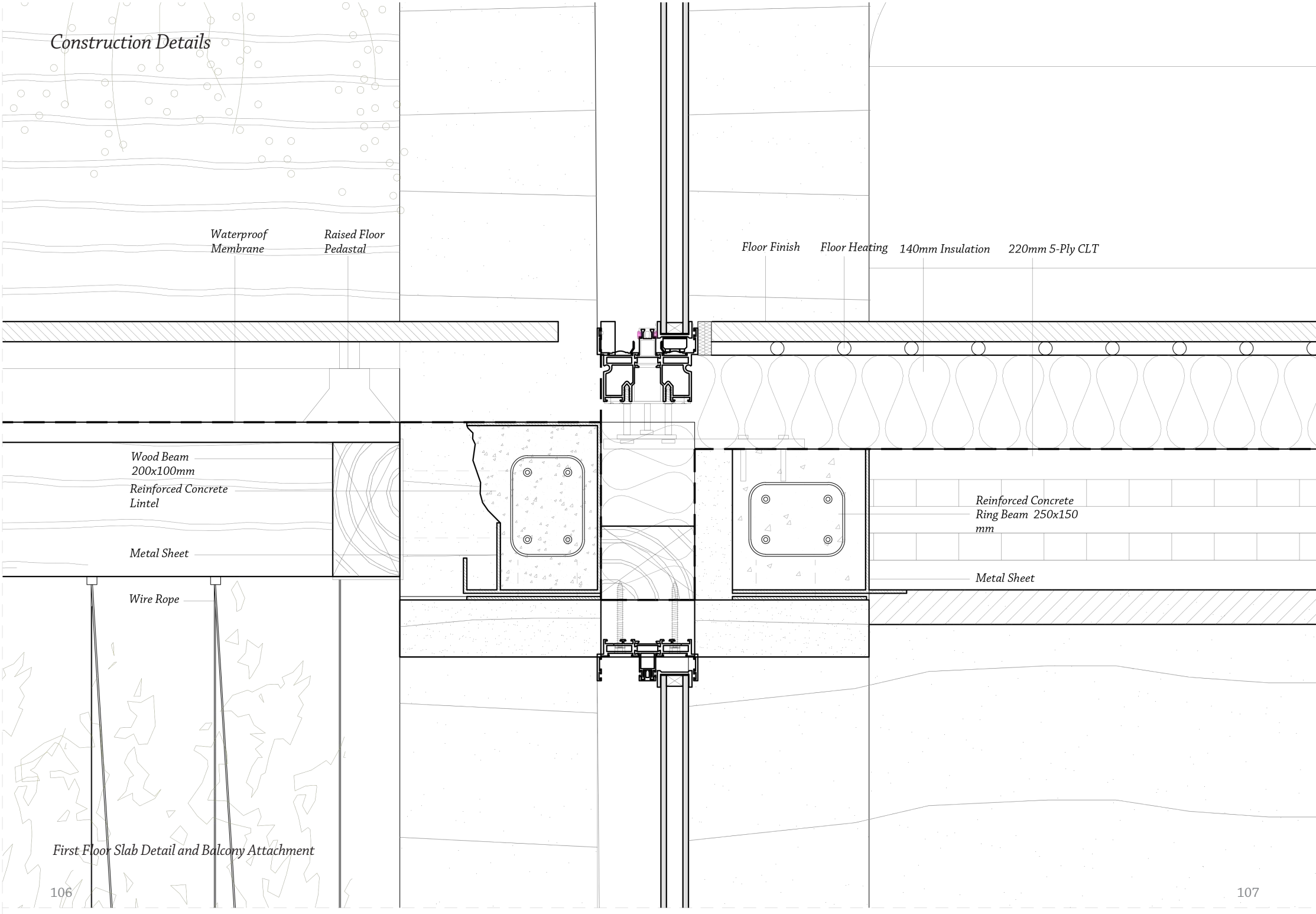


Balcony Roof Detail

Construction Details

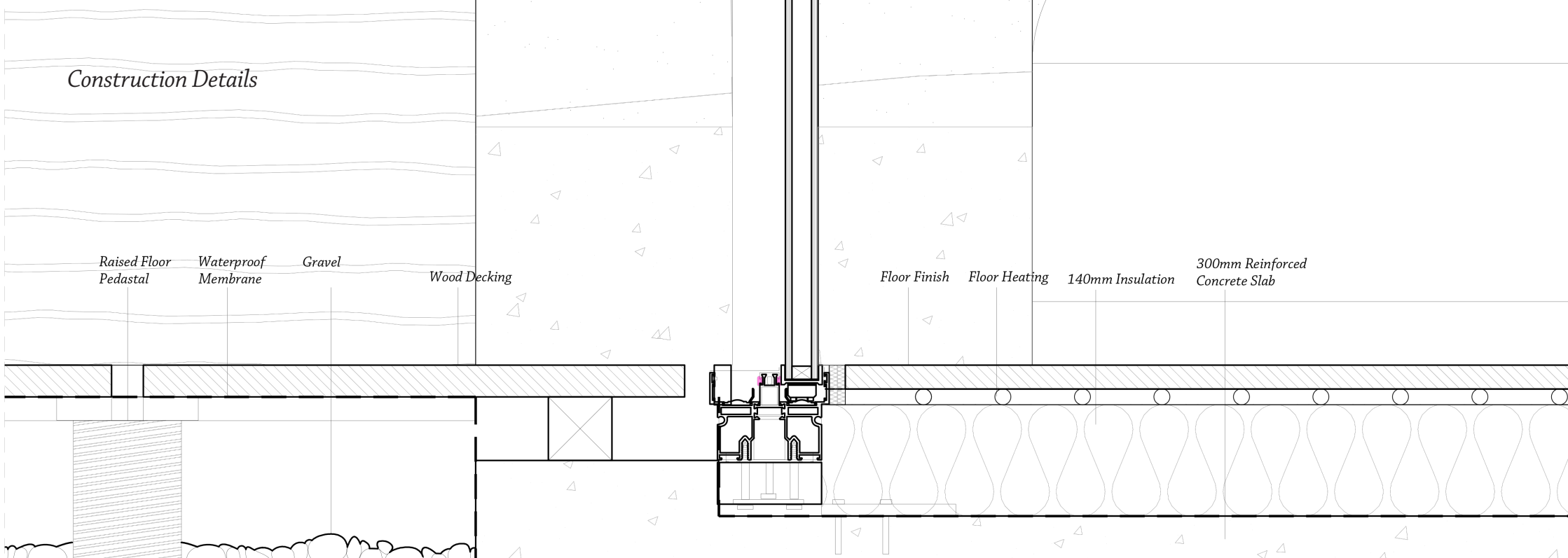


Roof Detail



First Floor Slab Detail and Balcony Attachment

Construction Details



Ground Floor Slab Detail

Railing Connection Detail

Climate Diagram

Heating

1. **PVT Panels** are located on the roof to generate heat and electricity

2. **Hydro-power heat pump** works with the temperature difference of the water and transforms the energy into heating

3. **Floor heating** is installed in the houses

Ventilation

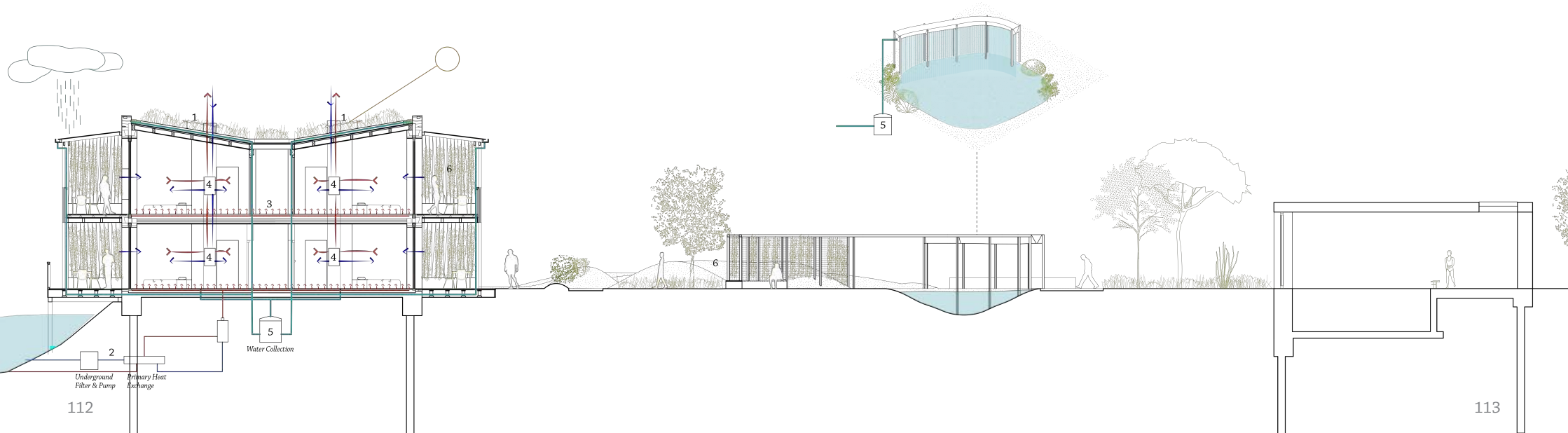
4. The rooms can be well-aired through the windows in the summer. In the winter a heat exchange system controlls the air quality transforming cold to warm air extracting it outside through the shafts.

Water Collection

5. The green roofs as well as the balcony roofs incorporate a gutter system that collects water underground. The water supply is for household purposes as well as for the operation of the water curtain at the public garden.

Greenery & Biodiversity

6. The greenery on the balconies, rooftop and central garden, along with the canals and the designed ponds help the creation of an environment that encourages biodiversity and provides shading.



Perspective Views: A Journey through the Daily Life of Residents

Getting Ready - 9:00 a.m.

Socializing in the Common Space- 9:30 a.m.

Walking to Work - 10:45 a.m.

Working at the Cafe' - 11a.m.

Swimming - 15:00 p.m.

Socializing at the Gardens - 16:30 p.m.

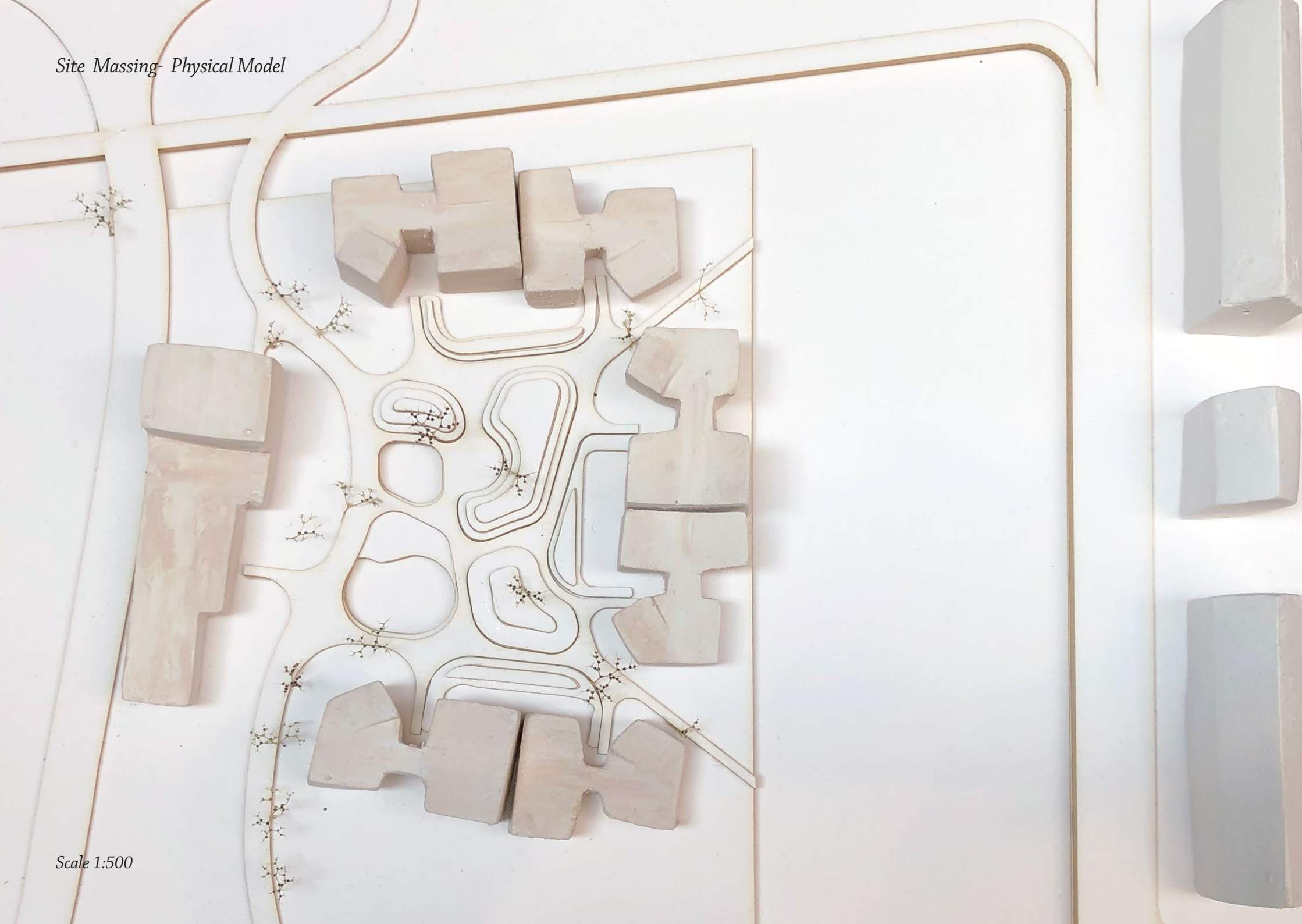
Resting at the Indoor Nook - 18:00 p.m.

Enjoying the Views from the Balcony - 19:30 p.m.

Relaxing BeforeSleeping - 21:00 p.m.

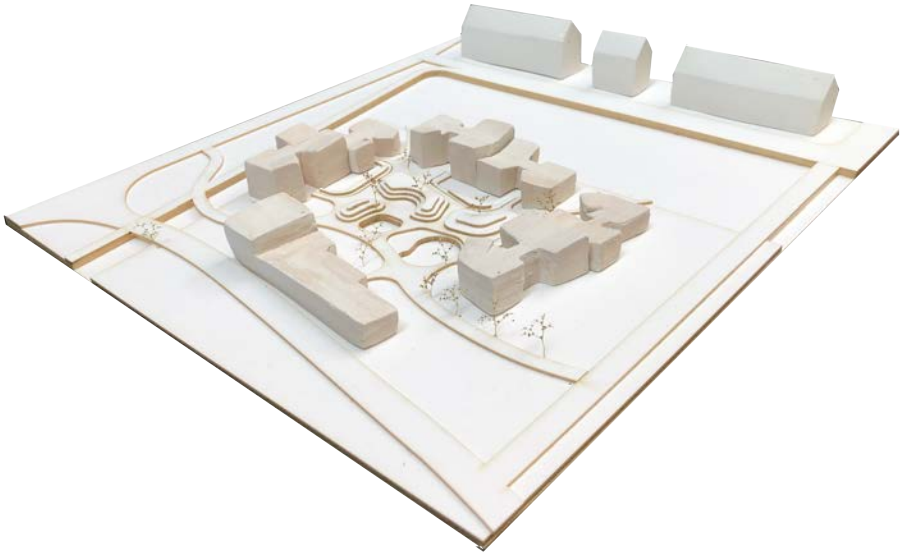
Physical Models |
Photographs

Site Massing- Physical Model



Scale 1:500

Site Massing- Physical Model



Scale 1:500

Scale 1:500

Cluster & Garden - Physical Model

Scale 1:100

Physical Model

Scale 1:100

Physical Model

Scale 1:100

Scale 1:100

Physical Model - Details

Scale 1:100

Scale 1:100

Reference List

AlleCijfers.nl. (2022, January). *Statistieken gemeente Lelystad*. Retrieved from https://allecijfers.nl/gemeente/lelystad/?fbclid=IwAR13Zvlgj_pT1U4cd0J-DwsAvVpcM18o4bnjE0V0YR-pkbACzEbSwBTEan5Q.

AllTrails. (2022, January). *Map of birding trails near Lelystad, Flevoland*. Retrieved from https://www.alltrails.com/explore/netherlands/flevoland/le-lystad?b_tl_lat=52.52045597511193&b_tl_lng=5.3398733400654805&b_br_lat=52.46017430113815&b_br_lng=5.521731284318463&mo-bileMap=true.

Birznieks, L. (2013). *Designing and building with compressed earth*. Master's Thesis, TU Delft.

Cittanova. (n.d.). *Waaranders, Lelystad*. Retrieved from https://cittanova.nl/waarand-ers/.

Gemeente Lelystad. (n.d.). *Geschiedenis*. Retrieved from https://www.lelystad.nl/4/Lelystad/TokomstHistorie-Geschiedenis.html.

Hill, V. (2022). *Rammed Earth Wall & House: Construction, Cost, Pros & Cons*. https://amazingarchitecture.com/articles/rammed-earth-wall-house-construction-cost-pros-cons

Kapfinger, O. & Sauer, M. (eds.) (2015). *Martin Rauch: Refined earth construction & design with rammed earth*. Munich: Detail - Institut für internationale Architektur-Dokumentation GmbH & Co.

Lelystad Municipality, Flevoland, Netherlands. (n.d.). *City population*. Retrieved from https://www.citypopulation.de/en/netherlands/admin/flevoland/0995__le-lystad/.

Lelystad Next Level. (2021). *Werkdocument uitvoeringsprogramma Lelystad Next Level 2021-2022*. Retrieved from https://www.lelystad.nl/Documenten/Beleid__skaders/Uitvoeringsprogramma%20Lelystad%20Next%20Level%202021-__2022.pdf.

Natuurpark Lelystad. (n.d.). *Over het gebied*. Retrieved from https://flevo-landschap.nl/gebieden/gebied-detailpagina/23/natuurpark lelystad?gclid=Cj0KC-QiAvqGcBhCJARIsAFQ5ke7KUcrjsTZlGve536EIQ9ZdAiT9tlVkxTB4sB7y-OLljPCWlRmglk-AaAn5IEALw_wcB.

Spoormans, L., Navas Carrillo, D., Zijlstra, H., & Pérez Cano, M. T. (2019). Planning history of a Dutch new town: Analysing Lelystad through its residential neighbourhoods. *Urban Planning, 4 (3), 102-116*.

Wandelroute Hollandse Hout. (2023, January 2). *Visit Lelystad. Retrieved from* https://visitlelystad.nl/route/wandelroute-hollandse-hout/.

Werkeiland. (2019, June 1). *Wijkraad Lelystad-haven*. https://www.wijkradenlelystad.nl/lelystad-haven/werkeiland-lelystad-haven/.