

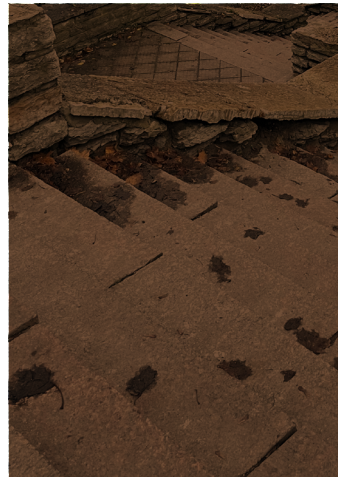


“Co-habitat: a nature-inclusive residential community in Tallinn.”

Liza Verdonk 5060796

Methods of Analysis and Imagination

Prof.dr.ir. Klaske Havik
Ir. Pierre Jennen



Msc Architecture,
Delft University of
Technology

GRADUATION REPORT LIZA VERDONK

TABLE OF CONTENTS

Foreword	3
1. Introduction	6
Problem Statement	7
Relevance	8
Objective and Motivation	10
Research / Design Questions	11
Scope	12
2. Approach	14
Methods	15
Theoretical Framework	17
3. Results	20
Co-habitat	21
Green network of Tallinn	22
Tallinn animals	23
Roost	24
House	27
Neighborhood	31
4. Conclusion	34
Conclusion	35
Implications	36
Reflection	37
5. References	38

Foreword

This graduation project develops a nature-inclusive communal residence, created within the studio 'Methods of Analysis and Imagination' at Delft University of Technology.

My motivation for choosing this theme stems from my affirmation for animals. I have always enjoyed walking in nature and observing other species. Last year, during a gap year, I worked at Dream Team Emergence Delft, a team that develops artworks to spark conversations about technology. Through one of their projects, I was introduced to the philosophical concept of the Anthropocene, which immediately sparked my interest. It opened my eyes to human dominance in the world and made me highly critical of anthropocentric attitude of traditional architecture is also. After that experience, I knew I wanted to design a project within this topic.

This process has made me realize how resilient nature is, it does not stop where the city begins. It also made me reflect on my own behavior and acknowledge that my thoughts can be just as anthropocentric as anyone else's. Fortunately, it also showed me that there are already many inspiring, animal-friendly initiatives out there, with hopefully many more to come.

I would like to thank Klaske and Pierre for tutoring me during my graduation. Our shared interest in this topic made collaborating both highly enjoyable and educational. I would also like to thank the residents of Warmoestuin and Aardehuis Olst for welcoming me and showing me around their community. Finally, of course, I want to thank my fellow students for creating such a supportive environment to study in.

Enjoy reading.

Liza Verdonk
Delft, June 2026

1. INTRODUCTION

Problem Statement

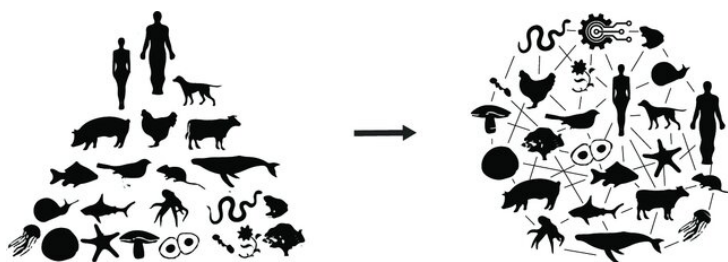
We currently live in the Anthropocene, an era characterized by the central position of the human. This human-centric concept implies that all other living (and non-living) elements are measured against our human needs. This perspective on life has led to many ecological imbalances, like habitat destruction and extinction (Albrecht, 2019).

In the Anthropocene, humans strive for control over nearly every aspect of the world. When nature does not align with our desires, we reshape it to fit human culture. Some examples of this cultural dominance over animals can be seen in wildlife management, zoos, and with keeping pets.

While hunting is an ancient practice, modern wildlife management was pioneered in 1922 by Aldo Leopold. Its primary aim was to minimize damage to crops and domestic animals (Chesemore, 2024). This practice highlights a hierarchy where certain species are deemed more valuable to humans than others, thereby justifying the control and manipulation of their populations.

Zoos started as menageries 2500 years ago to admire exotic animals, and later on evolved into an educational space for families and scientific purposes (Albrecht, 2022). However, their existence suggests that human entertainment and curiosity are more important than the freedom of these animals.

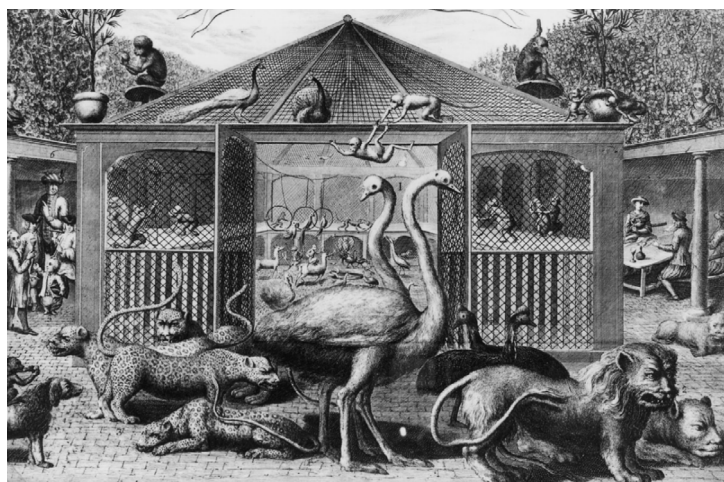
The domestication of pets began already 11,000 years ago. Initially, this was for practical reasons, but later pets came to be regarded as dear family members (Lear, 2012). They serve as a prime example of a deeply lovable relationship, yet one defined by the absolute dominance of the human.



The move from human-centred design to more-than-human-centred design (Rosén et al., adapted from Lehmann, 2019)



Vijf kinderen van Koning Charles I, Anthony Van Dyck 1637



De Menagerie van Blauw Jan, Christian Friedrich Fritsch 1751

This hierarchical mindset, where humans place themselves above the ecosystem, is directly seen in architecture. Currently, most buildings are designed exclusively for humans. The wall serves as a rigid boundary between nature (outside) and the human living space (inside). But, putting those two against each other is artificial. Humans and their creations are inherently part of nature. By clinging to this division, we neglect our role within the broader ecosystem.

This project demonstrates that humans do not stand above nature, but that they are part of it. In modern behaviour it seems like culture and nature are truly separated, but this is false.

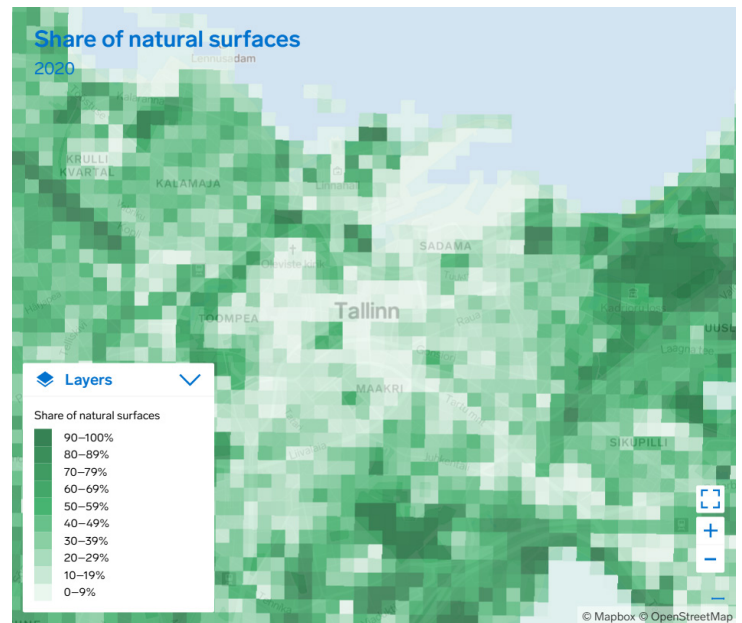
Through this nature-inclusive concept, the project illustrates how the two can be seamlessly intertwined, fostering a more integrated relationship with the world around us.

Relevance

The municipality of Tallinn prioritizes urban greening. Their aim is to maintain a natural surface cover of at least 65%. In 2020 the city exceeds this goal at 67% (Municipality of Tallinn, 2020), and with many development projects in the future, the current rate could drop below. Consequently, there is an urgent need to prioritize building in a nature-inclusive way. As such buildings remain rare globally, this project contributes to a broadening of the nature-inclusive architectural repertoire.

Besides making a project that contributes ecologically, it is also very beneficial to build nature-inclusive for humans. People in urban environments experience many impulses and often feel the need to escape to the wilderness. Research shows that direct contact with nature reduces stress and improves mental health (Bratman et al. 2015). Integrating these elements into residential architecture is therefore essential for creating a comfortable living environment.

By establishing a green neighborhood within the city, the quality of life of various species (including humans) will be greater. This is particularly relevant in the Estonian climate, where architecture can play a crucial role in facilitating habitats that protect and support local flora and fauna throughout the seasons.



Share of natural surfaces in Tallinn centre (Municipality of Tallinn, 2020)

Objective and Motivation

The objective of this project is to challenge the anthropocentric worldview where humans place themselves above nature. By showing a project where humans and other species are living more like in a symbiosis, it will show that a nature-inclusive project is not only possible, but also beneficial. It will put extra focus on interaction of humans and other species, to raise awareness about the big variety in our ecosystem, and to cultivate a sense of respect for them.

The incentive of doing a nature-inclusive lays within my own affinity with animals. While many others share that admiration as well, I am especially fascinated by how we humans want to be close to (certain) other animals, within many different relationships, but insisting that this interaction is strictly on our terms. Humans have become a controlling species, prioritizing dominance over connection.

Furthermore, there is a growing dissociation between people and their surroundings. With spending most of our hours listening to music with headphones or ticking on our phone, we get overwhelmed and seek for an escape out of the city to find peace. Why not bring this peace back and inside your own home?

Research / Design Questions

The problem statement, relevance, objective and motivation have led up to the following design question:

- How can a nature-inclusive communal residence in Tallinn be designed to challenge the anthropocentric attitude of modern urban development, while simultaneously amplifying the symbiotic and admiring relationship between humans and other species?

With sub research questions:

- What specific ecological and spatial requirements are necessary to provide a high-quality habitat for humans, bats (northern, pipistrelles & parti-coloured bat), low-flying birds (e.g. house sparrow, great tit, starling), and various insects (such as butterflies and bees) within the context of Tallinn?

With sub design questions:

- How can the rigid division of the “wall” be softened to bridge the division between the natural exterior and the human interior?
- Which design strategies can facilitate meaningful connections between humans and other animals without causing mutual disruption or conflict?

Scope

5W's

The project scope is defined using the 5 W's. As the **Why** has been addressed in the previous sections, the remaining components are stated below:

Who?

The site will be designed for Tallinn city animals. This includes humans, bats (northern, pipistrelles & parti-coloured bat), low-flying birds (e.g. house sparrow, great tit, starling), and various insects (such as butterflies and bees).

What?

Inspired by eco-villages, a set of communal urban villa's will be designed. The primary focus is nature-inclusive design, providing habitat for all mentioned Tallinn city animals.

Where?

The site is an open plot at 'Suur Ameerika tn.', across from Tuvi Park (in the Uus Maailm sub-district). The open plot itself has the potential to become a biodiverse hub, and with the highly biodiverse Tuvi Park across the street, it is evident that a lot of animals live there. The plot can be connected with the green stroke along Kesklinn. This way, the habitat of the animals will be widely broadened.

When?

The near future. With this building, the aim is to question the regular way of building, which often fails to take other species into account. It also aims to raise awareness of how humans position themselves within the global ecosystem.

Challenges:

There are many challenges that will be faced during this project. A couple examples are:

- There is a tension in wanting to decenter humans while still facilitating human habitation (e.g., spatial atmosphere, logistical routing, and comfort). The challenge lies in minimizing human-centrism as much as possible, acknowledging that humans (culture) demand more architectural complexity than other species.
- A core aim is to soften the rigid boundary of the "wall" to reconnect humans with their environment. However, this raises the question of when this separation begins. How to "soften" this division without compromising fundamental needs?
- While humans admire nature, they often reject its "unpleasant" side. A challenge is how to handle potential conflicts between species. From a human perspective, this includes addressing practical concerns such as waste (feces), "unwanted" urban wildlife (e.g., seagulls or rats), and biological issues like mold.
- There are numerous elements that can be designed to accommodate various species. However, determining which specific elements to implement remains a challenge, as animal behavior is often more unpredictable to us than our own. For instance, while a constructed path effectively directs human movement, it may be completely ignored, or interpreted differently, by other species.



The site's location in Tallinn

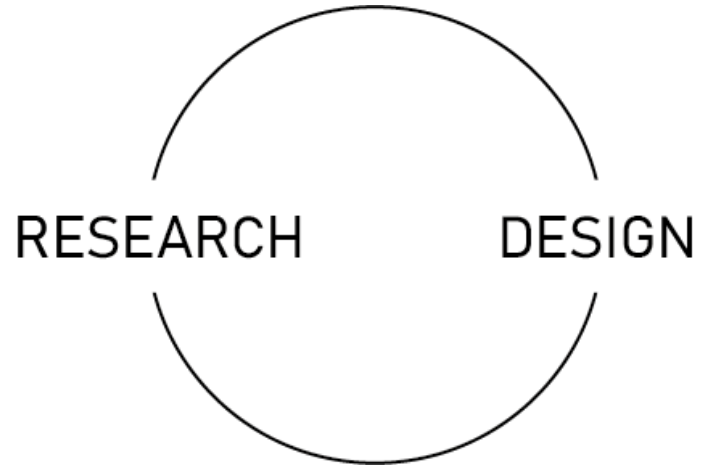
2. APPROACH

Methods

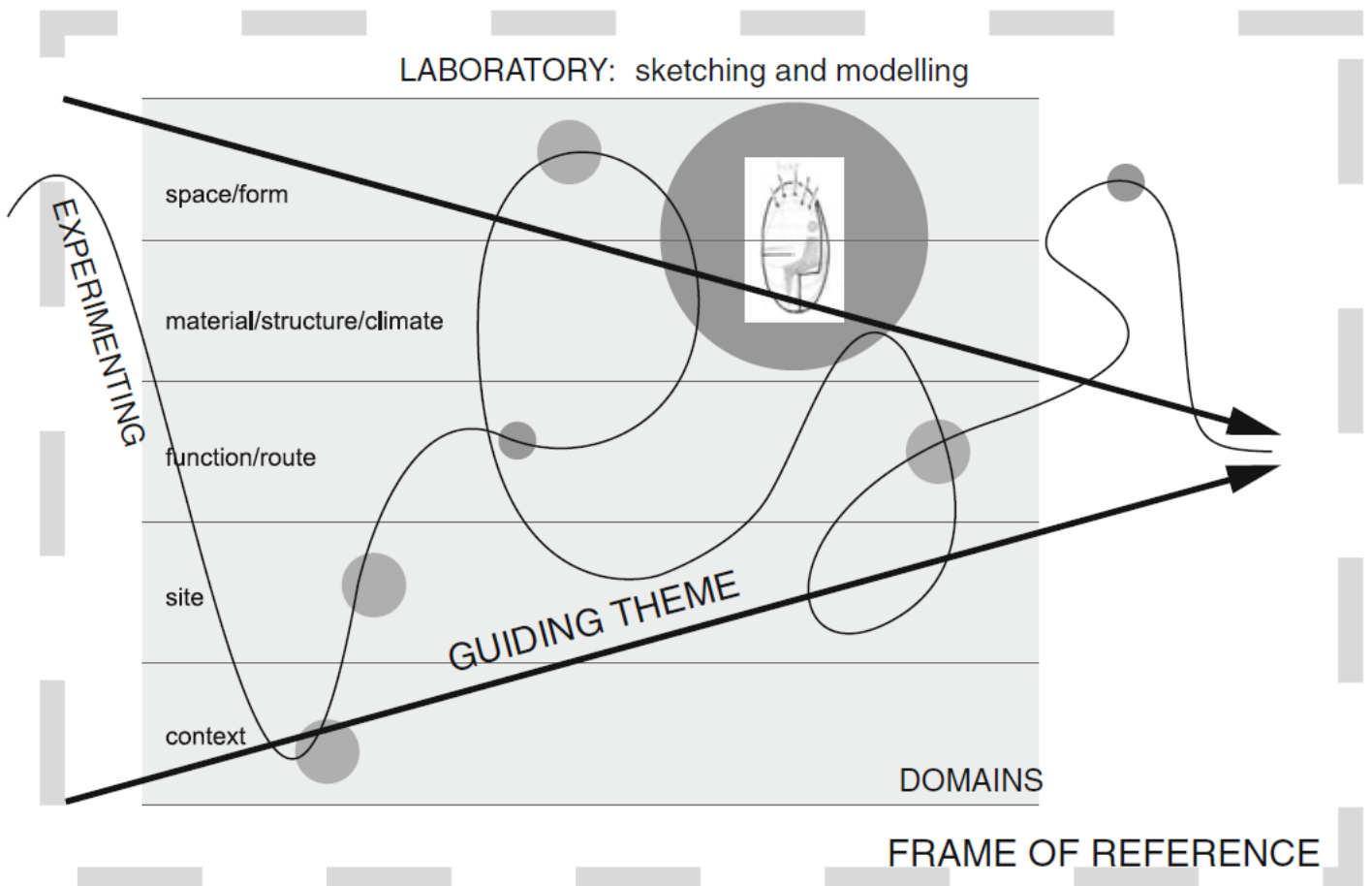
For the design strategy, the methodology will make up a mix of drawing, writing, and making. This approach is encouraged by the graduation studio Methods of Analysis and Imagination.

In the current curriculum, there is no longer a separate research phase; instead, research and design constantly complement each other. It works as a cycle: start by researching a topic, which leads to the first design experiments. These experiments then raise new questions that require more research, helping me to develop the design further, and so on.

I am deepening this strategy using the methods I learned during the MSc 2 Gezel Meester course. This course stated that a design process can be divided into five generic elements: Experimenting, a Guiding Theme, Domains, a Frame of Reference, and Laboratory. I have fully explored these elements and now consider them my essential tools for the design process.



Research and design is a circular process



The five generic elements in the design process: experimenting, guiding theme, domains, frame of reference and laboratory (van Dooren, 2013).

This circular approach, combined with the five design elements, resulted in the following process:

2.1 & 2.2: Fieldwork in Tallinn.

2.3: Urban analysis (focused on greenery) and research into nature-inclusive design.

2.4: Animal analysis.

2.5: A0: defining the site, purpose of the building, overall form, and materiality.

2.6: Continuing the animal analysis and exploring the first volumes.

2.7 & 2.8: Defining focus points and the program, and experimenting with case studies to define the scale of the garden.

2.9: Decision-making and developing volumes into floor plans and sections.

2.10: Finalizing the A1.

3.1: Research on collaborative housing. Focusing on eco-villages and other communal residences that have an affinity with ecology.

3.2: Further exploration on collaborative housing. A visit to Warmoestuin that focuses on collaborative gardening and start designing a communal residence.

3.3: Continue designing the residences, while also re researching biobased materials

3.4: Making a 1:50 model to test facade options into the residences. Combining last weeks' insights.

3.5: Writing a narrative to get a grip on the inhabitants. Exploring in an axonometric drawing where all species would habitate in the residence.

3.6: Design an elevation and section of a facade where all insights come together. Also making more versions of compositions of the site.

3.7: Meet with Jacques Vink, who is expertised in nature-inclusive architecture, to get feedback about how the project is developing so far.

3.8-3.10: Elaborate on the so far made drawings. Working towards A2, making fully developed drawings.

4.1 – 4.4:

- Elaborating on the design draft of A2
- Further develop the landscape design
- Finalize accurate details
- Continue on the floor plans
- Defining nature-inclusive design principles

4.5 – 4.8:

- Producing the products for the A3 presentation

4.9 – 4.10:

- Finalizing the presentation
- Develop drawings in to effective communicators
- Showcasing process through an exhibition and booklet

Although a graduation project is never truly “finished,” the end result will be a design focused on nature-inclusivity. To show an alternative of the regular way of building, where architecture becomes beneficial for various species.

Theoretical Framework

The project is supported by research and examples that provide a theoretical background:

Understanding the Anthropocene:

- Albrecht, G. A. (2019). *Earth emotions: New terminology for a new world*. Cornell University Press.
- Albrecht, H. (2022). *From Royal Prisons to Leaders in Conservation: A Brief History of Zoos. Ecology For The Masses*. <https://natureaccordingtosam.wordpress.com/2022/05/23/from-royal-prisons-to-leaders-in-conservation-a-brief-history-of-zoos/>
- Finney, A. (2022). This week PETA said architects could prevent billions of bird deaths. <https://www.dezeen.com/2022/08/27/this-week-peta-architects-bird-deaths/>
- Harari, Y. N. (2017). *Homo deus: A brief history of tomorrow*. Harper.
- Lear, J. (2012). *Our Furry Friends: the History of Animal Domestication* — *Journal of Young Investigators*. *Journal Of Young Investigators*. <https://www.jyi.org/2012-february/2017/9/17/our-furry-friends-the-history-of-animal-domestication>
- Poikolainen Rosén, Anton & Normark, Maria & Wiberg, Mikael. (2022). *Towards More-Than-Human-Centred Design: Learning from Gardening*. *International Journal of Design*. 16.

Tallinn's Vision for Green Transformation:

- Municipality of Tallinn (2020). *Green transformation. Tallinn 2035 Development Strategy*. Retrieved January 17, 2026, from <https://strategia.tallinn.ee/en/green-transformation/>

Spatial organizations for the site:

- Ching, F. D. K. (2014). *Architecture: Form, space, and order* (4th ed.). Wiley.

Managing the Design Process:

- Van Dooren, E., Boshuizen, E., Van Merriënboer, J., Asselbergs, T., & Van Dorst, M. (2013). Making explicit in design education: generic elements in the design process. *International Journal Of Technology And Design Education*, 24(1), 53–71. <https://doi.org/10.1007/s10798-013-9246-8>

Case studies:

- De Warren – Natrufield (2023), Kingo houses – Jørn Utzon (1958), Tinngården – Vandkunsten (1978), Elix – MIX architecten (2023), Georg-Hermann-Allee – Mueller Reimann (2019), Auenweide – einszueins architektur (2022), Hortus Ludi – Architectuur Maken (2023), Het Bosbad – GAAGA (2022), Common Woods – Space and Matter (2025), Walls of Public Life – Anomalia (2025), Warmoestuïn – Inbo (2012)

Biobased materials:

- <https://www.youtube.com/watch?v=ubq0pr4C8yQ>
- CrossBoundary (2025). *Mycelium advantage: mushroom-based insulation for Africa's construction boom*. <https://crossboundary.com/mycelium-advantage-mushroom-based-insulation-for-africas-construction-boom/>

Designing for Non-Human Species:

- Vink, J., Vollaard, P., & De Zwarte, N. (2021). *Building urban nature: Towards a nature-inclusive architecture*. Nai010 Publishers.

Articles on Nature-Inclusive Architecture:

- Gemeente Amsterdam. (2019). *Natuurinclusief bouwen en ontwerpen in twintig ideeën [Nature-inclusive building and design in twenty ideas]*. <https://openresearch.amsterdam/nl/page/47014/handboek-natuurinclusief-bouwen>
- Aghina, N., Roeke, T. & Sloots, I. (2021) *Handreiking natuurinclusief ontwikkelen [Manual for nature-inclusive development]*. Synchroon, Nest Natuurinclusief, & Vogelbescherming Nederland. <https://nestnatuurinclusief.nl/natuurinclusief-synchroon/>

Native Flora of Tallinn:

- Liiv, T. H. (2014). *Wildflowers of Estonia*. Trak Pen.

Psychological Benefits of Nature:

- Bratman, G. N., Hamilton, J. P., Hahn, I. C., Daily, G. C., & Gross, J. J. (2015). Nature experience reduces rumination and subgenual prefrontal cortex activation. *Proceedings of the National Academy of Sciences*, 112(28), 8567–8572. <https://doi.org/10.1073/pnas.1510390112>

The 'woonerf':

Van Gameren, D. & Mooij, H. (2017). DASH 03 Het woonerf leeft / DASH The Woonerf Today. - Nai010 Uitgevers / Publishers. <https://books.bk.tudelft.nl/press/catalog/book/9>

Eco houses:

Van Gameren, D. & Van Den Heuvel, D. Van Andel, F. (2017). DASH 07 - The Eco House: Typologies of Space, Production and Lifestyles - Nai010 Uitgevers / Publishers. <https://books.bk.tudelft.nl/press/catalog/book/4>

Communal housing:

Arroyo, I., Yahia, M.W. & Johansson, E. (2022). Collaborative Housing. A tool for social integration and increased sustainability. Lund University - Housing Development & Management.

Animal site analysis:

- <https://observation.org/locations/665396/species/>
- https://www.inaturalist.org/observations?place_id=99281&view=species

Animal studies:

- Municipality of Tallinn (2025). Study on mammal movement paths in Tallinn proposes solutions to improve habitat connectivity. <https://www.tallinn.ee/en/news/study-mammal-movement-paths-tallinn-proposes-solutions-improve-habitat-connectivity>

3. RESULTS

Co-Habitat

Co-habitat is a design for a nature-inclusive residential community. It serves as a critique of the Anthropocene, an era in which humans position themselves above the rest of the ecosystem. This design proposes a multispecies habitat that decentralizes the human through two primary strategies.

First, it offers an alternative to the individualistic lifestyle seen in many Western societies by fostering intergenerational households living together as a community. Compared to other species, humans dominate the planet significantly through the huge scale of their living environments. By embracing shared living, this ecological footprint is reduced.

Second, the project demonstrates how nature-inclusive design can be implemented. Through specific form and materialization, the facades, floors, and roofs (that are originally constructed for the human space and habitat), simultaneously serve as a habitat for other animals.

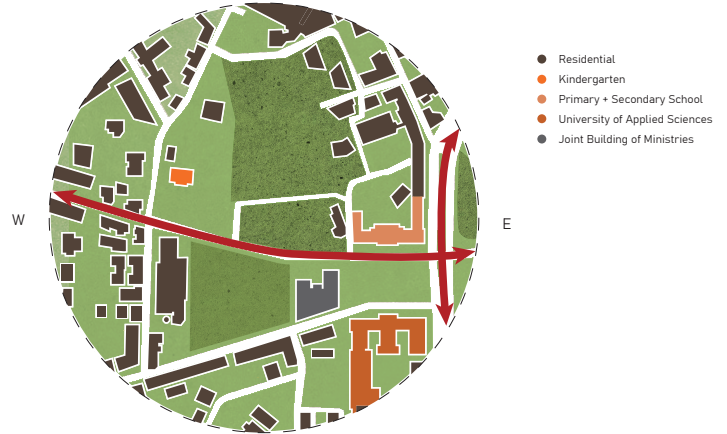
Within the field of social and nature-inclusive design, various architectural themes can address this problem statement. Cohabitat explores these concepts through the lens of porosity, a theme where a building becomes accessible to multiple species rather than for the individual human only. By softening the rigid boundaries between interior and exterior spaces, the project investigates porosity across three distinct scales: the roost, the house, and the neighborhood, situated within Tallinn, Estonia.

Green network of Tallinn

Many parks in Tallinn function as “green islands,” meaning they are disconnected from other green spaces in and around the city. This fragmentation hinders animal movement (Municipality of Tallinn, 2025). Furthermore, when designing for diverse species, it is crucial to target areas where these animals are already established; otherwise, there are not enough species that can be effectively accommodated (Vink et al., 2021).

Consequently, this project selects a site located close to a highly biodiverse area, offering opportunities to contribute to Tallinn’s broader ecological network. The chosen site is an open plot adjacent to Tuvi Park, which

currently functions as an isolated green island. By introducing a tree line, the site connects to Tehnika Street. This street, in turn, links to the Pollinator Highway, which extends toward the Stroomi Forest. It also links to the future Klindi Park, ultimately leading to Pirita. Through this spatial connection, the green infrastructure in this part of the city is strengthened.



The site's location in Tallinn



Tallinn's green network with the connection highlighted

Tallinn animals

Various species thrive in suburban environments. Tuvi Park is high in biodiversity, which means that many animals in the area can be accommodated within the design. After an analysis of the local fauna at Observation.org and Inaturalist.com, focusing on behavior and requirements, it became evident that several species actively utilize architectural elements. Consequently, the focus lies on bats (northern, pipistrelles & parti-coloured bat), low-flying birds (e.g. house sparrow, great tit, starling), and various insects.



Focus species

Animal:	Role in ecosystem:	Role in foodchain:	Habitat:	Enemies with:	Tolerates humans:	Food:	Seasonal behaviour:	Use in buildings now:	Possible architectural inventions:
Bats	Pest Controller	Secondary	Hollows, Caves	Owls, cats	Somewhat: uses building but dislikes light	Insects (night)	Hibernation: dec-mar Foraging in summer	Attics, cavities	Roosting spots
Bee	Pollinator	Primary	Ground, hollow stems	Wasp, Spider	Yes: uses gardens	Nectar	Workers die in autumn	Holes in mortar	(Natural) beehives
Blackbird	Seed disperser	Secondary	Low vegetation	Cats	Yes: uses gardens	Worms, snails, berries	Breeding: feb-jul forages intens in winter	-	Landscape
Butterfly	Pollinator	Primary	Flower rich	Birds, spiders	Yes: uses gardens	Nectar	Metamorphosis in winter, Active in summer	Green areas	Spot for metamorphosis
Earthworm	Soil improver	Detritivore	Soil	Blackbirds, moles, hedgehog	Somewhat: no Specific interaction	Dead organic matter	Deep in to ground during cold / dry periods	-	Landscape
Frog	Pest controller	Secondary	Ponds, moist garden	Cats	No: suffers from traffic	Insects, snails	Hibernation	-	Only if pond is made
Great tit	Pest controller	Secondary	Trees, shrubs	Cats	Yes: adapted	Insects, seeds	Foraging in winter, breeding in spring	Small openings facade	Nesting spots
Hedgehog	Soil scavenger	Secondary	Dense vegetation	Fox, owl	No: suffers from traffic, is shy	Worms, insects	Hibernation: nov-mar	Hibernates under sheds	Traffic protection
Herring gull	Scavenger	Tertiary	Open space	Birds of prey	Yes: adapted	Fish, human food	Not really	Nests on flat, concrete rooftops	High parapet
House sparrow	Seed disperser	Secondary	Dense shrubs	Cats	Yes: adapted	Seeds, insects	Shelter in winter, breeds in spring	Under roof tiles	Shelter spots
Human	Manager (end of the chain)	Tertiary	Built environment	Mice, mosquitos	Yes	highly diverse	Couch sessions in winter, Gardening in summer	Yes	Residential, educational, meditation*
Ladybird	Pest controller	Secondary	Leaves	Spiders, frogs, birds	Yes: uses gardens	Mites	Hibernation under barks, leaves	Window sills	Insecthotel on warm facade
Mole	Soil aerator	Secondary	Underground	Fox, owl	No: very shy	Earthworms, larvae	Always active	-	-
Snail	Decomposer	Primary	Moist spots	Blackbird, hedgehog, frog	Somewhat: no Specific interaction	Dead plant matter, leaves	Hibernation during frost	Damp, shaded areas	Landscape
Squirrel	Seed disperser	Primary	Trees	Cats	Yes: adapted	Nuts, seeds, eggs	Somewhat hibernation	Sometimes attics	Spot for winter storage
Swallow	Insect controller	Secondary	Very high structures	Birds of prey	Yes: uses human structures	Flying insects	Arrives in may, leaves in august to Africa	Gaps under eaves	Not in city centre

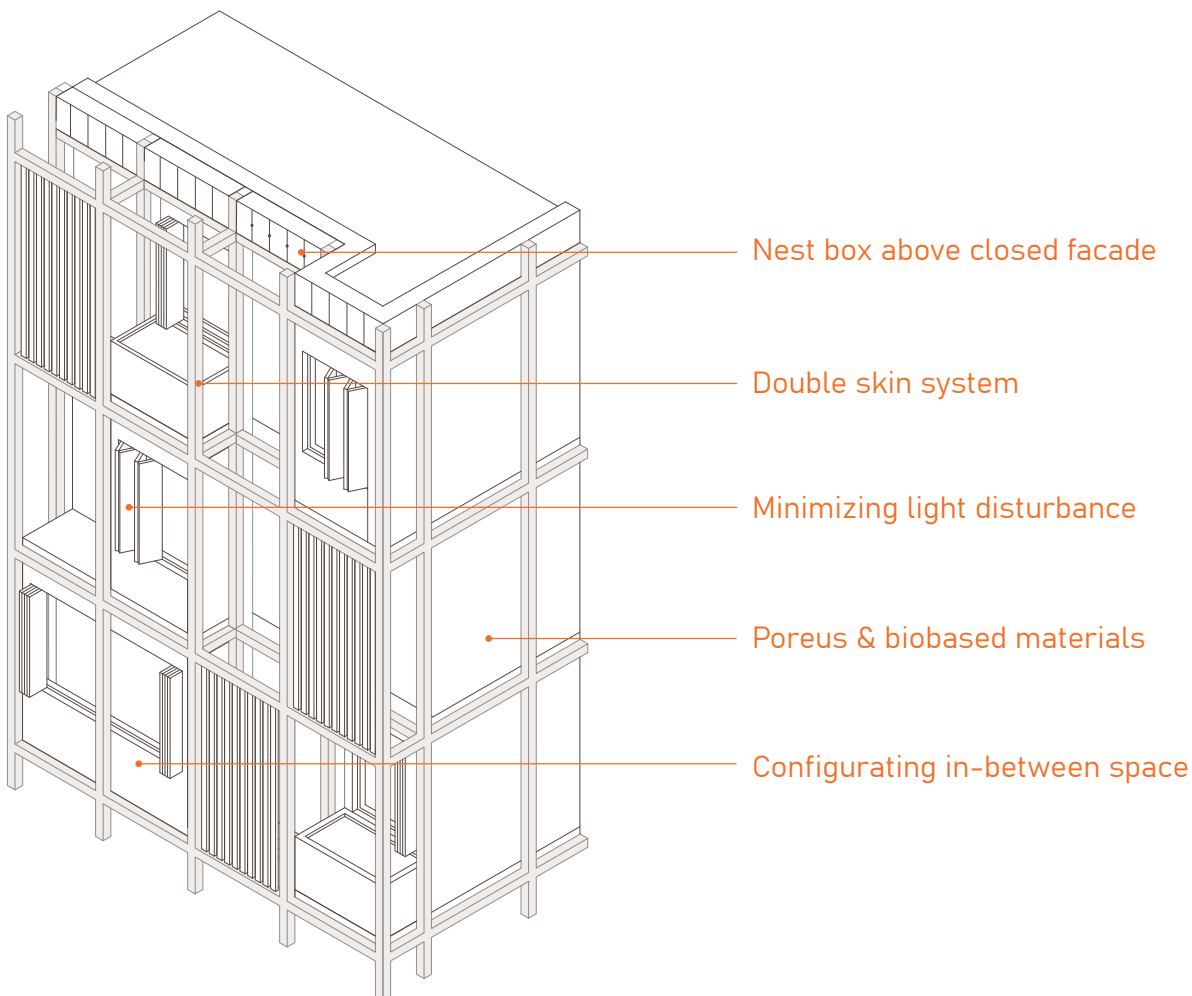
Animal analysis

Roost

By showing the building principle of the facade, some strategies occur that other designers could use while designing a nature-inclusive facade as well.

The building principle shows a couple rules:

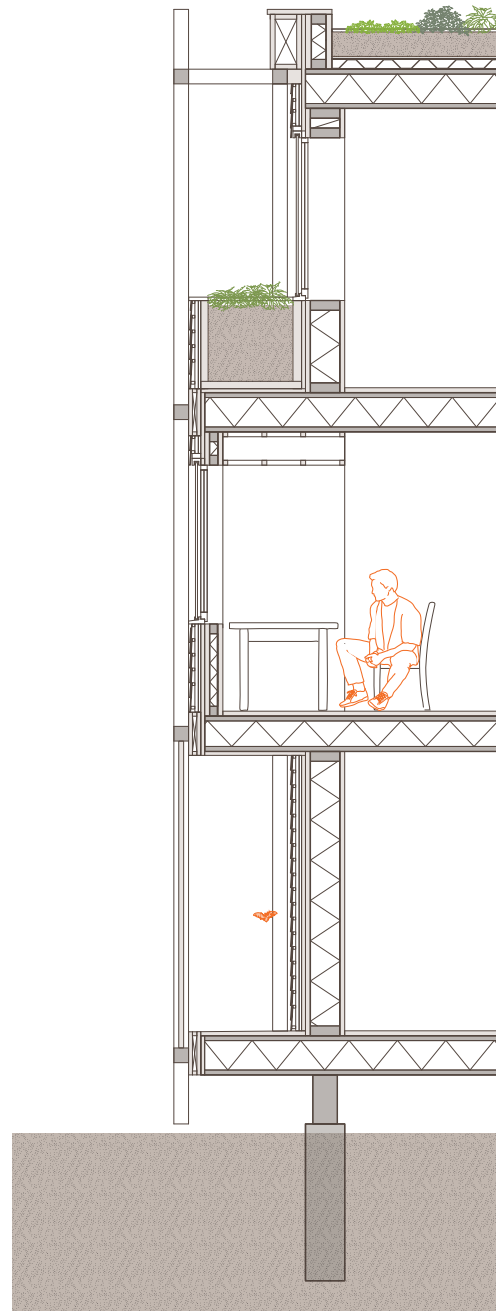
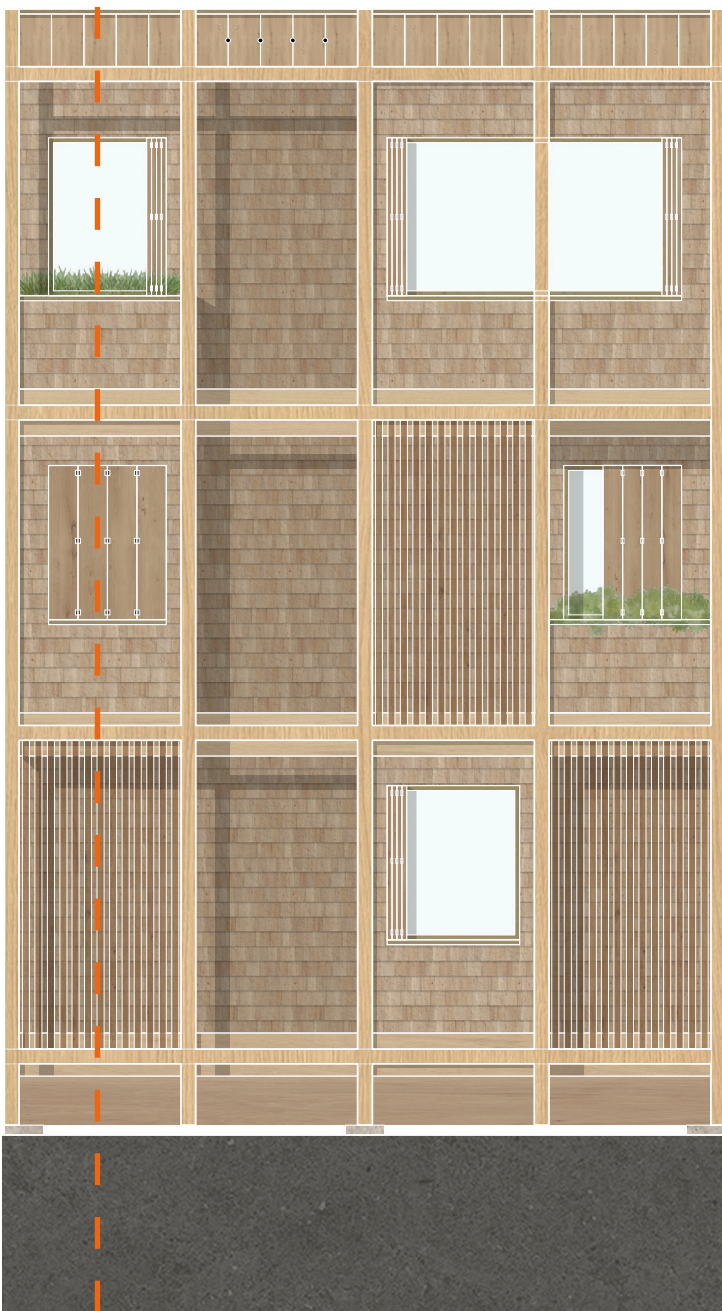
- A double-skin system
- Configuring the in-between space with a couple ingredients: a bay window, a green balcony, or a wall without openings.
- Attachments like wooden strips can be attached, for greenery to grow on.
- Nest boxes can only be put on the roof edge when there is no window beneath.
- Window shutters need to be used to minimize light disturbance.
- Materialisation focuses on porosity and biobased.



Facade building principle

The facade is a double-skin system where a timber frame is attached to the main structure. This staggered approach is inherently more nature-inclusive; by avoiding a flat surface and allowing elements to protrude, landing spots and resting places for birds are created.

The double facade acts as an in-between space, an architectural element where “inside” and “outside” merge. Here, the rigid boundary between human space (interior) and natural space (exterior) is softened. Combined with the grid, this space allows for various functions: green balconies, bay windows (for residents), or sheltered ledges (for other animals). The windows have shutters, to minimize light disturbance.



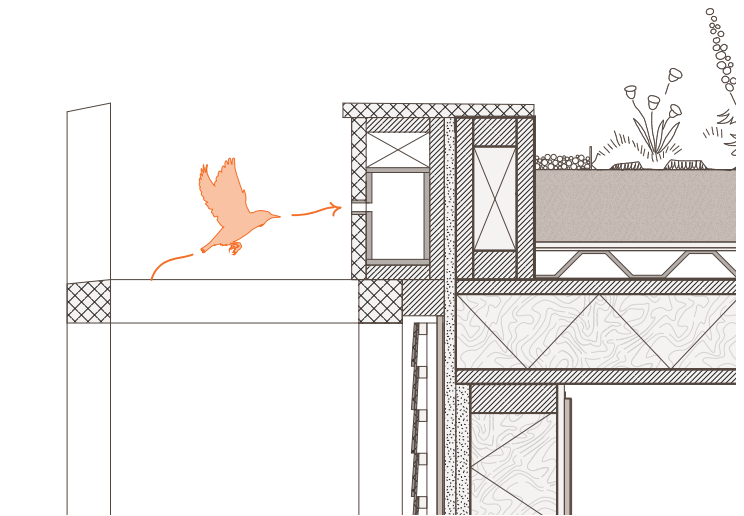
Fragment and section 1:20

The building is designed using bio-based materials wherever possible. The primary structure consists of a timber stud frame (HSB) with mycelium as insulation. A still experimental but useful biobased material which has good insulating qualities (CrossBoundary, 2025). The outer shell is composed of wooden shingles, which are highly resistant to the Estonian climate. Many bat species, like the northern bat, pipistrelles & parti-coloured bat, like to nest behind cavities. Therefore, the cavity is made wide enough for these species to nest. Furthermore, loam is applied against the fiber cement boards to provide more grip for bats, and as comfortable shelter for insects.

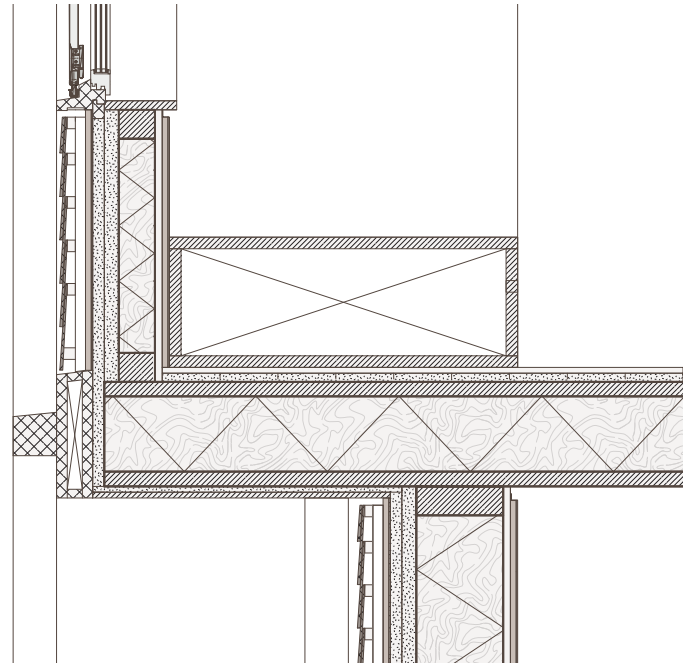
The roof gardens are designed as intensive green roofs, ideal for both human gardening and for insects to nest (Gemeente Amsterdam, 2019). In the roof edge at the openings are integrated for bird nesting boxes, but only on the north and east sides. Also, the boxes should only be added when there is no window beneath it (Aghina et al., 2021). Finally, the buildings are stilted. This further reduces the building's footprint and, by allowing air to circulate above the ground, ensures that soil life is minimally disturbed.



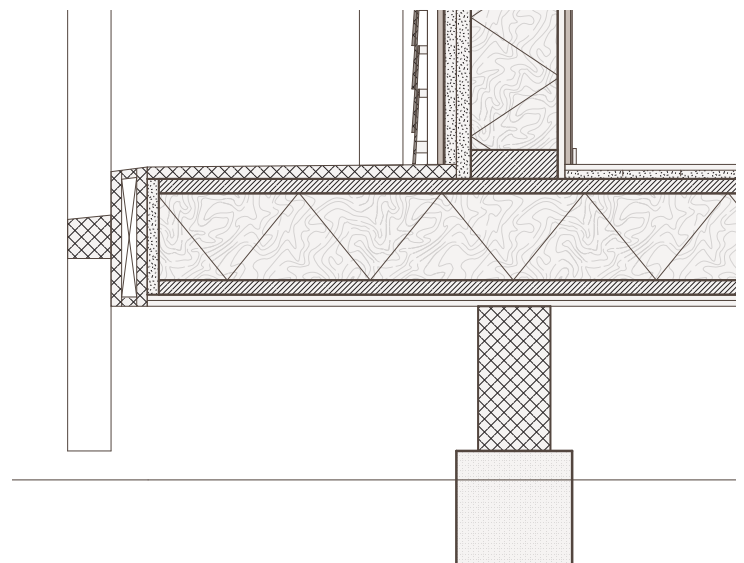
1:10 fragment model



Roof edge 1:5



Bay window 1:5

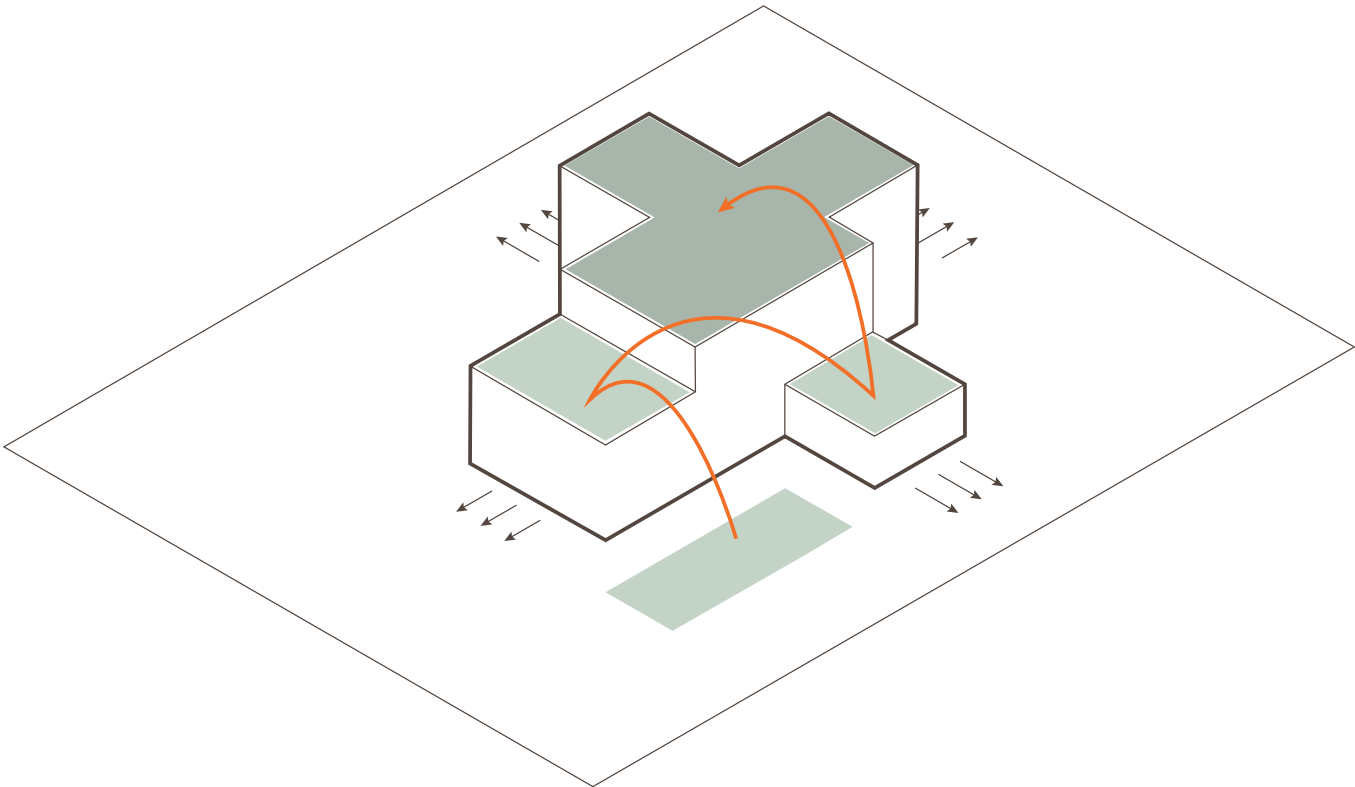


Foundation 1:5

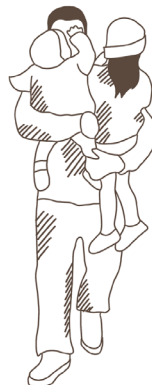
House

Also a building principle of the house is configured, with the following strategies:

- The building height is low to keep residents close to the ground and connected with nature.
- There are stepped roof gardens on the sun-facing sides.
- The buildings are plus-shaped, to have many contact moments between interior and exterior.



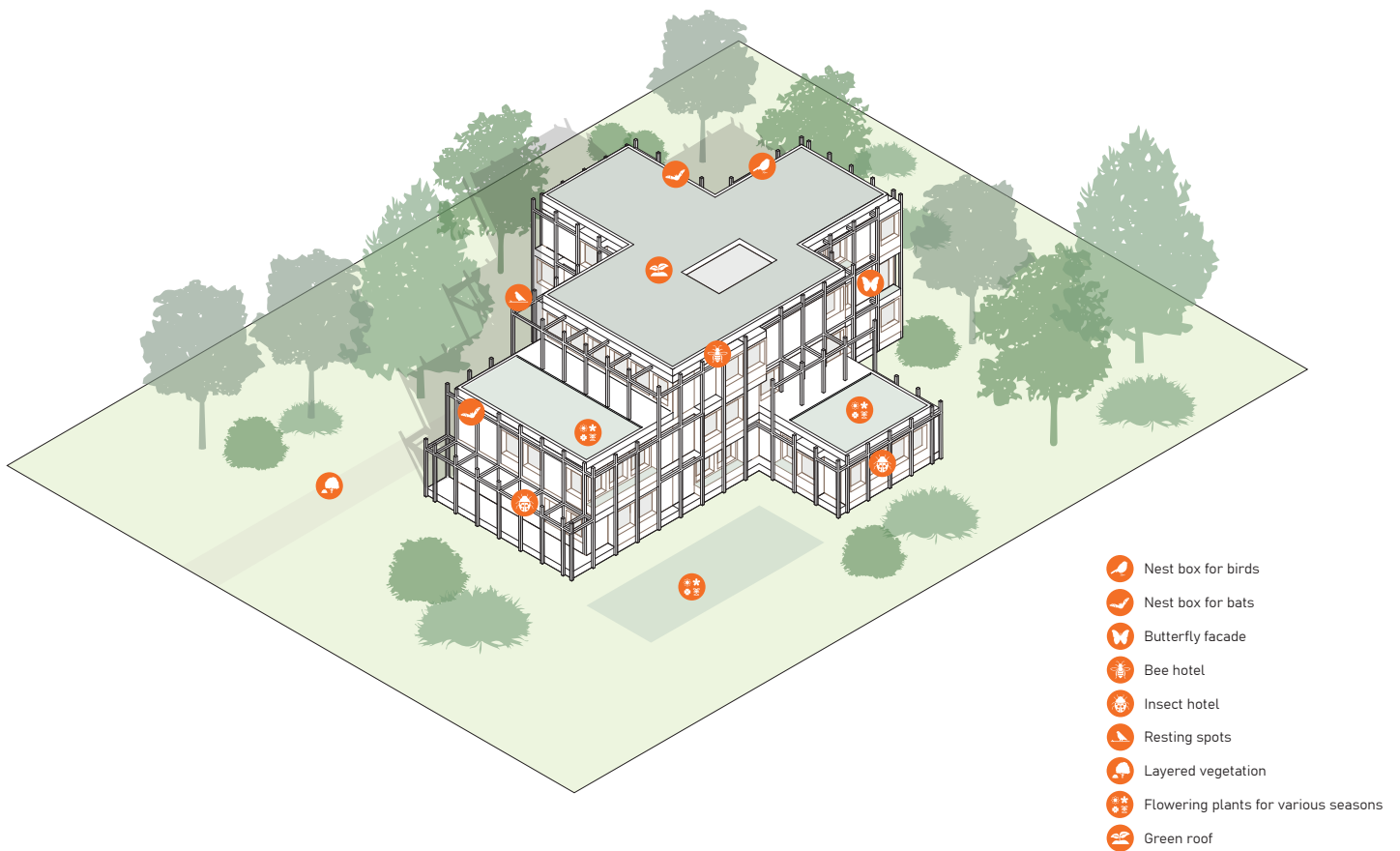
Buildings' building principle



Target groups: elderly, young couples, small families

The urban villa consists of a maximum of three stories, with each floor housing a community of multiple households. The villa features “stepped” roof gardens on the sun-facing side so animals can move easy and freely through the different floors (Vink et al., 2021). The villa’s cross-shaped footprint ensures numerous contact points between the interior and the outdoors.

Just like humans, other species have specific residential requirements. Insects prefer nesting in sunny spots; bats require both winter and summer roosts on opposing sides of the building; and birds need nest boxes facing north or east to avoid overheating and strong winds (Aghina et al., 2021).

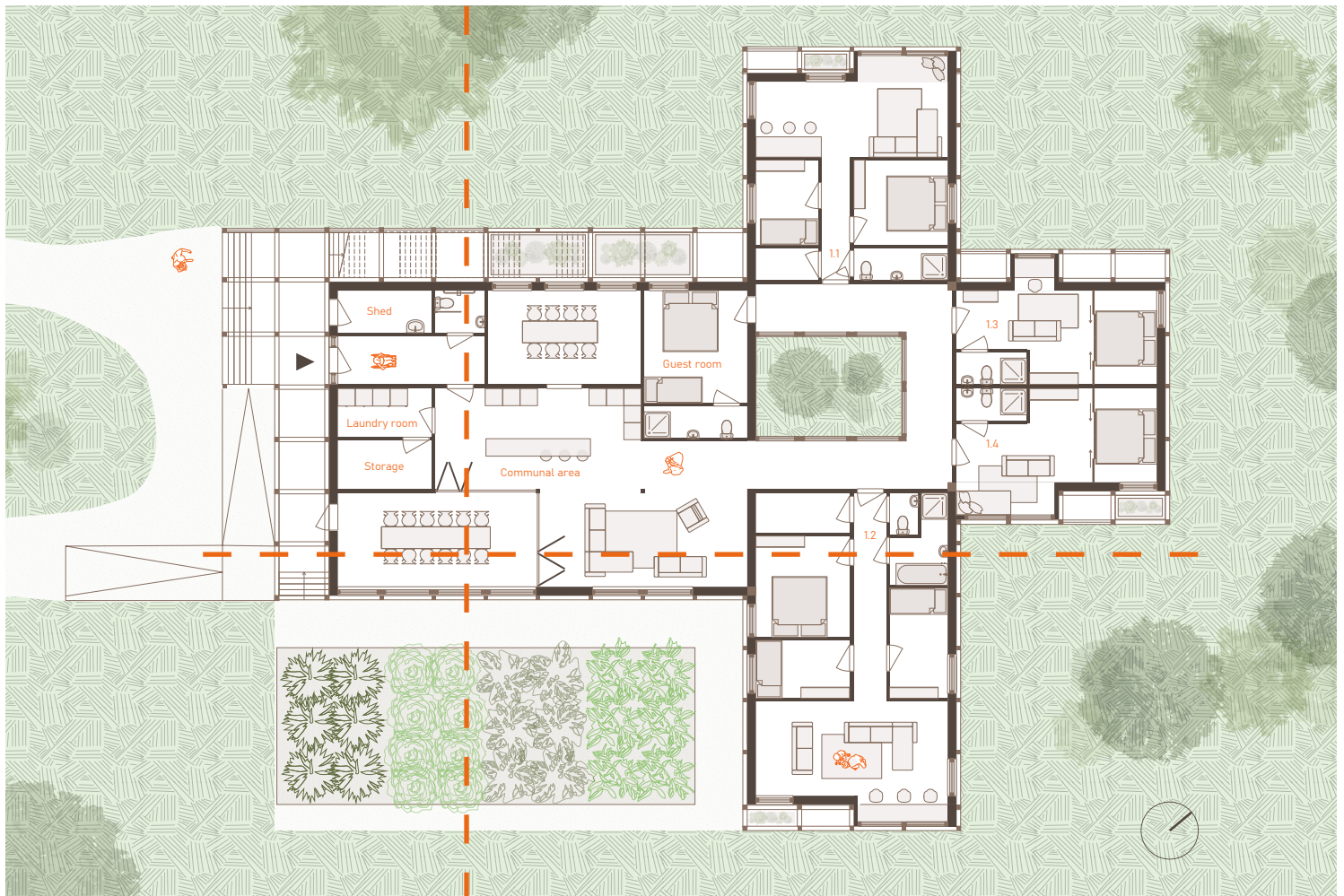


Each floor follows the same logic: one side is dedicated to the communal space, which is connected to the roof gardens, while the other sides contain the private quarters. An atrium creates a transition between the private and shared spaces. Routing towards the private residents goes through the communal space, to enhance social encounters (Arroyo et al., 2022).

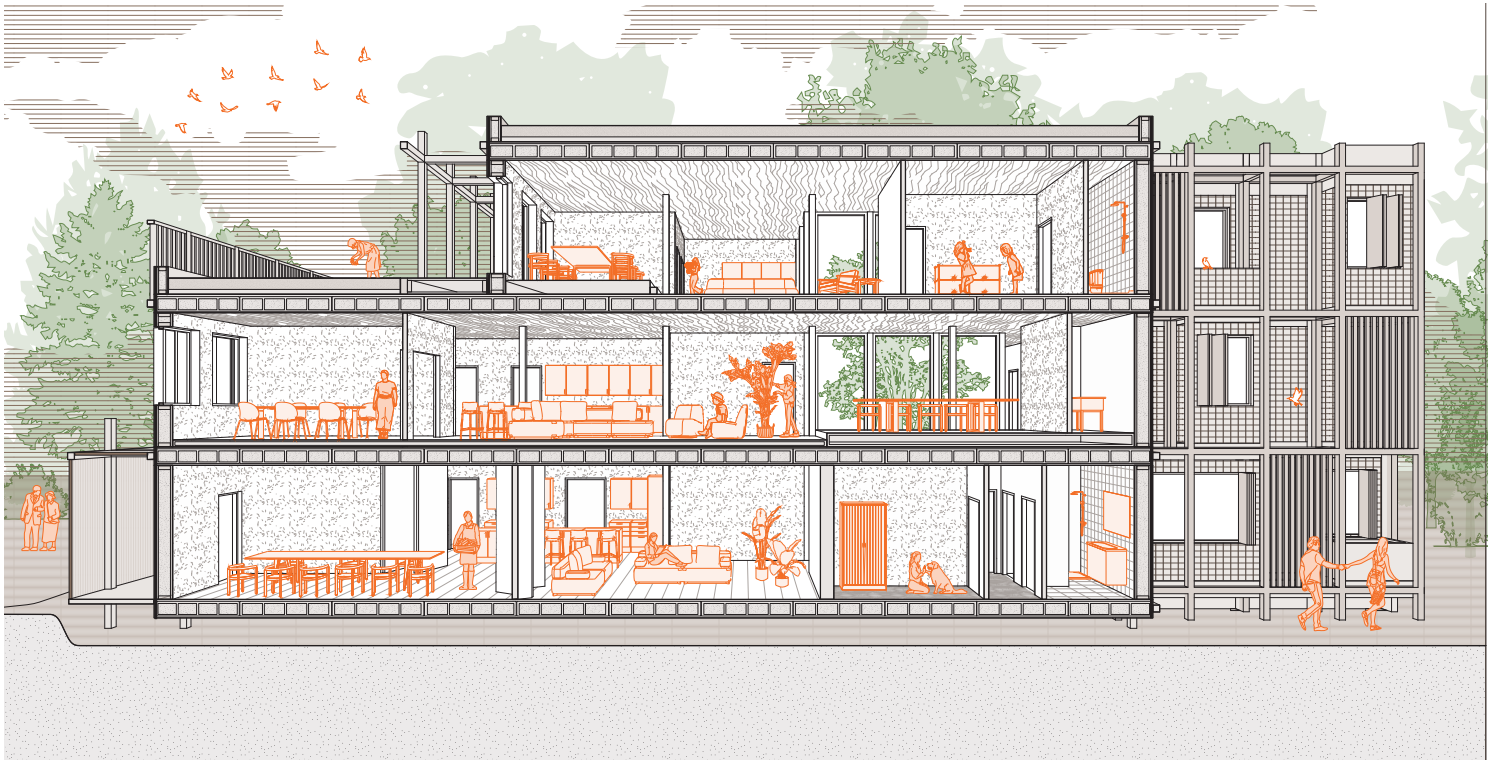
The residents of this community are individuals with an affinity for nature and/ or gardening. Part of their connection is to take care of the gardens together. To facilitate this, a shed is placed at every (roof) garden. Furthermore, the connection between residents is centered around the act of dining. Beyond its social aspect, the table represents the moment of consuming, which is a necessity shared by every living creature. Therefore, the table is the central element of the communal space.

The private quarters serve as rest spots. Kitchens and dining tables are intentionally absent to draw people out of their individual spaces and encourage connection in the communal area. The communal area is designed with an extra dining table and a big kitchen, to give the opportunity to invite acquaintances without interrupting your neighbours' peace.

While the quarters allow for rest and sleep, they are kept compact. Given the richness of the communal spaces, large private rooms are unnecessary. Through design interventions such as bay windows, the private residents maintain a sense of spaciousness.



Base floor



Perspective section showcasing the communities per floor

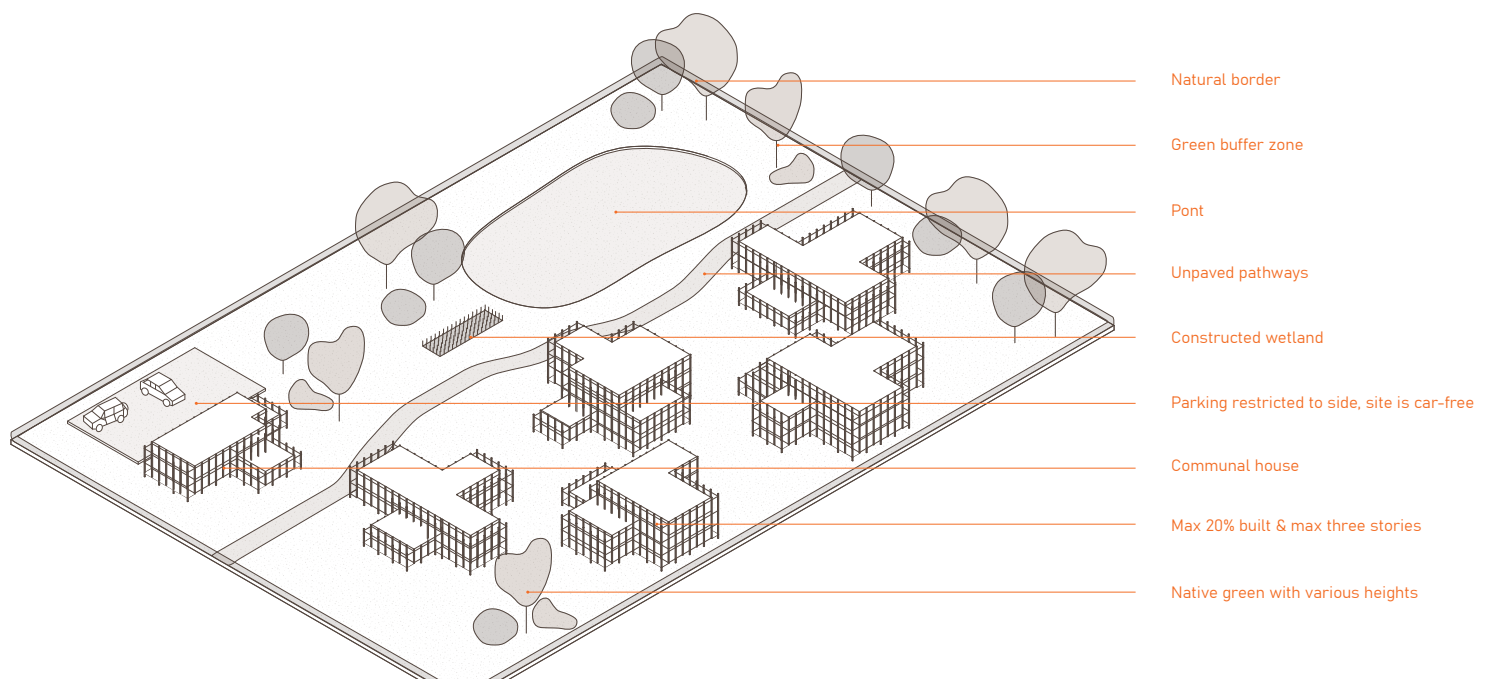


Cross-section showcasing the connection of dining and gardening

Neighbourhood

The building principle of the neighborhood is configured with the following strategies:

- Maximum footprint: A maximum of 20% of the site is built upon.
- Communal house: A shared community building is available for group use or private rental. This space includes:
 - Mail and parcel storage
 - Space for meetings, parties, and workshops
 - An extra kitchen and sanitary facilities
 - A sauna
 - A shed for large gardening tools
 - A bike shed
- Car-free zone: Parking is restricted to the side, making the rest of the site car-free.
- Paths: Walking paths are left unpaved.
- Natural borders: Boundaries are formed by natural elements like bushes and trees.
- Buffer zone: A green buffer is placed near the busy road to reduce noise and visual impact.
- Biodiversity: Vegetation consists of native greenery and of various heights (Aghina et al., 2021).
- Water feature: A pond is integrated into the landscape, because it serves as an important food source for bats (Aghina et al., 2021).



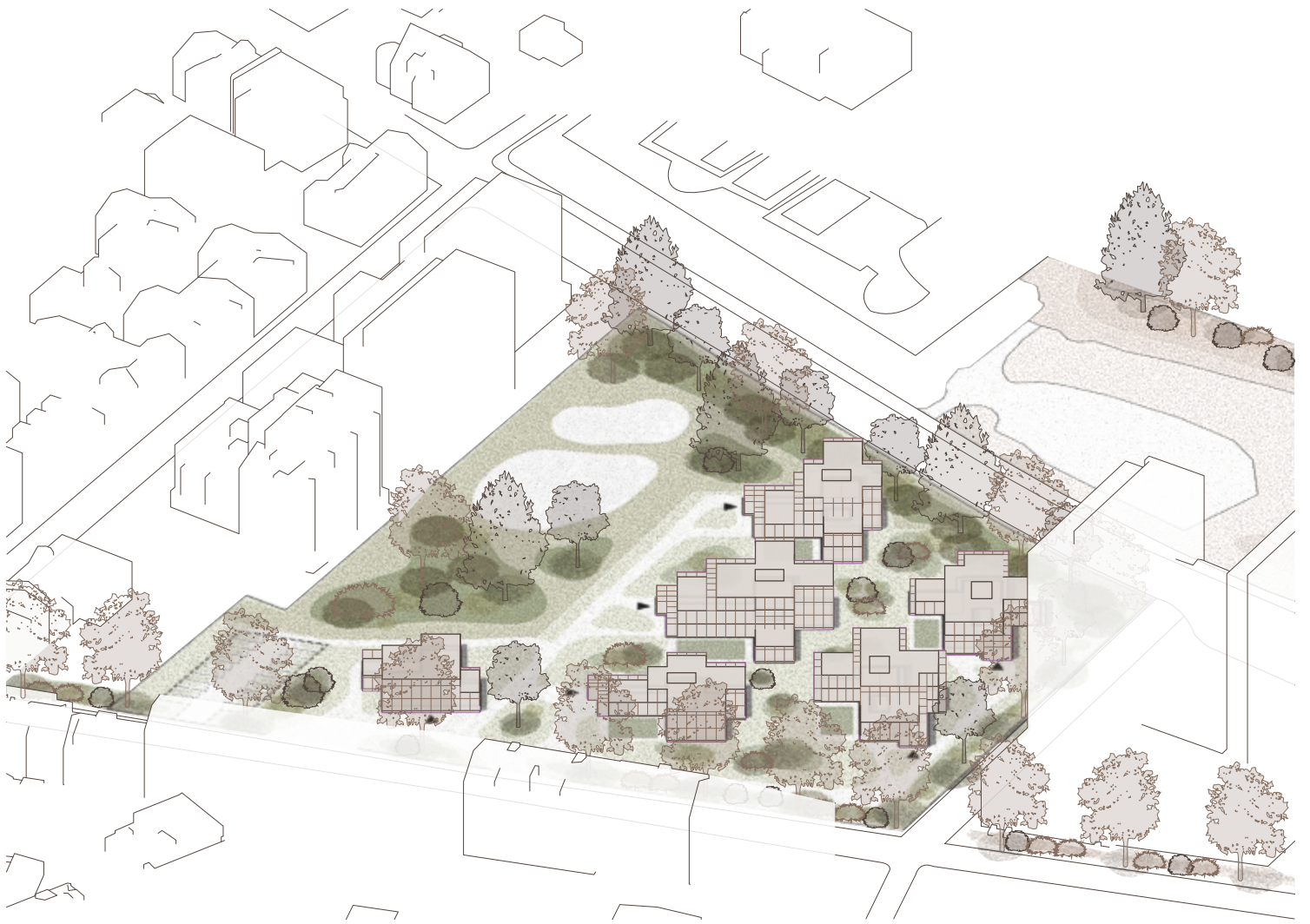
Site building principle

On the site, which currently possesses average biodiversity, a 'woonerf' featuring several urban villas is created. By maintaining a ratio of built-to-open space, where the maximum of built is 0.2, the courtyard is granted the necessary room to enhance its biodiversity. The layout features unpaved paths lined with urban villas and a multifunctional main house for meetings, activities and practical purposes. Since the 'woonerf' is car-free, this building also serves as a hub for mail and package deliveries.

Designing for animal-inclusive environments inherently necessitates a human-inclusive approach. Therefore, the site layout and the ground floors of the buildings are designed with full accessibility, particularly for individuals with limited mobility.



Neighbourhood drawing



Neighbourhood visualisation

4. CONCLUSION

Conclusion

This project shows the design of a nature-inclusive communal residence in Tallinn, Estonia. It explored how to integrate the architectural theme of porosity across three scales: the roost, the house, and the neighborhood. Porosity in the façade (roost) is achieved by creating a double facade with intermediate spaces that soften the rigid boundary between inside and outside. Porosity in the building (house) is visible in its shape, which provides comfortable access for various species while stimulating shared living. Finally, porosity on the site (neighborhood) is seen in the arrangement of several small-scale buildings, leaving more space for nature to grow so that the natural environment becomes more dominant than human structures.

This result addresses the primary research question:

How can a nature-inclusive communal residence in Tallinn be designed to challenge the anthropocentric attitude of modern urban development, while simultaneously amplifying the symbiotic and admiring relationship between humans and other species?

An evaluation of the research question and the resulting design reveals several notable insights.

The most important goal of this project was to challenge the anthropocentric (human-centered) attitude of modern urban development. This is visible in all designed scales, where spaces are deliberately not designed just for human dominance. Instead, decisions regarding shape and materials were consistently made from a nature-inclusive perspective.

The second part of the research question, amplifying the symbiotic and admiring relationship between humans and other species, took a secondary role in the final design. This relationship is mainly visible in the bay windows of the façade and the plus-like shape of the building. These choices allow for a lot of contact between the inside and outside, meaning residents can experience and admire nature even from within their homes. Additionally, gardening

is designed as a central activity, encouraging residents to spend time outside. Prioritizing a proper habitat for multiple species over human visibility was a conscious choice, mostly visible in the detailing and the scale of the façade. By focusing on this, the design shows that human dominance can be reduced.

The project also showed that cohabitation between humans and other species already exists today. Other species are everywhere, and many of them use our buildings. However, this usually happens in parallel and goes unnoticed. In this design, cohabitation with multiple species is explicitly amplified and brought to light.

Throughout the process, the specific context of the location was slightly lost. The design became more of a general principle on how to design within this subject. The context of Tallinn is still visible in the choice of materials, which need to be strong enough for extreme weather conditions, and in the selection of local species. However, the direct surrounding context of the site was released. The project became its own mini-village within the Tõnismäe area, meaning it could have been situated anywhere in Tallinn. The project mostly focused on fundamental ideas for nature-inclusive design, resulting in strategies and rules that can help other designers working in this field.

Implications

Reflecting on this project and its significance for the architectural profession brings forward several important insights.

Firstly, the complex façade and shape of the building require a large amount of materials. This relates to the exhibition 'Carbon Confessions', where MVRDV showed their 'failed' sustainable projects because the complex designs required so much material that the emissions no longer added up. Their conclusion was that the most sustainable option is often not to build at all. A similar conclusion could apply to this design. The relief needed for a nature-inclusive façade could have been designed much more simply. Some decisions regarding the building's shape were made to enhance human admiration of animals. Simplifying the façade would diminish this experience. Throughout the process, it raised the question of whether that would be negative, since that part of the design remains human-centered.

Secondly, it is difficult to determine if the project is fully successful because non-human stakeholders do not speak our language. Therefore, the only way to verify if the design works is through long-term observation to see if animals actually use the buildings. Furthermore, due to limited time, the research on animals was done quickly, leaving some uncertainty about whether the focus species were fully considered.

Thirdly, the design decisions, especially concerning shape and materials, would make these dwellings very expensive in reality. Since these are intended as social residences where less fortunate people can live, it might not be realistic to build them in this form. The combination of nature-inclusive buildings and communal living might currently be too experimental or idealistic.

Fourthly, this way of communal living requires a significant shift in mindset. It remains a question how quickly this lifestyle would be accepted, especially by the population of Tallinn, where individual housing has only recently become widely possible. Human acceptance of nature-inclusive design can also be difficult.

Lastly, discussions about this topic with others often brought up practical concerns, such as bird droppings or pests like mice. This shows that humans have become so separated from nature that they have become afraid of it. Additionally, the conservative construction industry makes it difficult to introduce sustainable ideas. Even building with wood is still a challenge, let alone designing habitats for species other than humans.

Recommendations for the Architectural Field would be:

- Collaborate with experts: When designing for this topic, work together with an ecologist who can analyze the location and determine which animals can be accommodated.
- Test sustainability: When aiming to design sustainably, test the design decisions early on to ensure that the design is truly sustainable.

Reflection

Doing this graduation project was super interesting. Not only did I grow as a designer within this field, but my personal admiration for nature in daily life also grew significantly.

I started this project being highly critical of the anthropocentric worldview that we as humans all share. But ironically, the process made me realize how much I am having the exact same thoughts, even while trying to design against it. For example, I chose this topic because of my love for animals. I wanted to make a building that attracts animals so that I could admire them. Their actual wishes regarding habitat and how close they want to come to humans were less important than my wishes for living with them were. Fortunately, the project grew into something where it is not just about bringing humans and other species together, but where humans truly take a less dominant role in architecture. I feel that my own development within this topic is very valuable. It made me much more aware of my daily surroundings, and I now notice how much animals already make use of our buildings. We are not always aware of it, but there is so much life around us, and giving attention to it creates a much greater appreciation.

For the design process, I used many different methods. In the research phase, I did site visits to experience what it is like to live in a green community. I read articles about nature-inclusive design and communal housing, and I looked at various case studies focused on similar topics.

During the design phase, I constantly kept the five generic elements of Elise van Dooren in mind. Taking her course 'Van Gezel tot Meester' taught me how to make a design within a short timeframe. I focused on using different media: from making physical models and drawings to writing a poem and creating a narrative illustration. Working hands-on helped me the most, as designing in 3D makes the project much more understandable. Writing was also a helpful tool that I did not use before, because it connects you deeply to the story of the design. On the other hand, I sometimes overlooked certain standard drawings. I did not always think ahead about the

standard drawings needed for a final presentation, so I could have used e.g. full façades and cross-sections more often as active design tools.

Before I started graduation, I was quite nervous that it would only take three quarters. It felt like a difficult and rushed task at the beginning. It surprised me how doable it actually was. By keeping in mind that a design is never truly finished, the pressure on the end result was lowered, and I am satisfied with where I stand now. I do think the research phase fell a bit behind because of the shorter timeline, which made me doubt whether the academic level of the design was high enough. It became clear that graduation was mostly a design-led assignment.

Lastly, it helped me a lot that I chose a subject that interests me so much outside of architecture. It kept the graduation process very fun, and my motivation stayed high until the end. I truly enjoyed my graduation.

5. REFERENCES

1. Aghina, N., Roeke, T. & Sloots, I. (2021) Handreiking natuurinclusief ontwikkelen [Manual for nature-inclusive development]. Synchroon, Nest Natuurinclusief, & Vogelbescherming Nederland. <https://nestnatuurinclusief.nl/natuurinclusief-synchroon/>
2. Arroyo, I., Yahia, M.W. & Johansson, E. (2022). Collaborative Housing. A tool for social integration and increased sustainability. Lund University - Housing Development & Management.
Bratman, G. N., Hamilton, J. P., Hahn, I. C., Daily, G. C., & Gross, J. J. (2015). Nature experience reduces rumination and subgenual prefrontal cortex activation. *Proceedings of the National Academy of Sciences*, 112(28), 8567–8572. <https://doi.org/10.1073/pnas.1510390112>
3. Ching, F. D. K. (2014). *Architecture: Form, space, and order* (4th ed.). Wiley.
4. CrossBoundary (2025). Mycelium advantage: mushroom-based insulation for Africa's construction boom. <https://crossboundary.com/mycelium-advantage-mushroom-based-insulation-for-africas-construction-boom/>
5. Gemeente Amsterdam. (2019). *Natuurinclusief bouwen en ontwerpen in twintig ideeën* [Nature-inclusive building and design in twenty ideas]. <https://openresearch.amsterdam.nl/page/47014/handboek-natuurinclusief-bouwen>
6. Municipality of Tallinn (2020). *Green transformation. Tallinn 2035 Development Strategy*. Retrieved January 17, 2026, from <https://strategia.tallinn.ee/en/green-transformation/>
7. Municipality of Tallinn (2025). *Study on mammal movement paths in Tallinn proposes solutions to improve habitat connectivity*. <https://www.tallinn.ee/en/news/study-mammal-movement-paths-tallinn-proposes-solutions-improve-habitat-connectivity>

8. Van Dooren, E., Boshuizen, E., Van Merriënboer, J., Asselbergs, T., & Van Dorst, M. (2013). Making explicit in design education: generic elements in the design process. *International Journal Of Technology And Design Education*, 24(1), 53–71. <https://doi.org/10.1007/s10798-013-9246-8>

9. Vink, J., Vollaard, P., & De Zwarte, N. (2021). *Building urban nature: Towards a nature-inclusive architecture*. Nai010 Publishers.

