COURTYARDS FOR LIFE

REIMAGINING THE URBAN COURTYARD

MSc04 Urban Design
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Group 14
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AALBORG UNIVERSITET

THESIS TITLE PAGE

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ABSTRACT

Urban courtyards hold untapped potential to support the green transition when approached through the lenses of climate adaptation, biodiversity, and social sustainability. This thesis investigates how underutilized courtyards in dense city environments, specifically a pilot site in central Aalborg, can be transformed into multifunctional and resilient spaces, using urban design concepts. The project responds to growing challenges related to stormwater management, biodiversity loss and the lack of social challenge of urban life, in existing urban settings.

Grounded in a theoretical framework, such as the sponge city concept, biophilic urbanism, and Jan Gehl's theory of life between buildings, the project establishes three guiding design pillars: climate, nature, and social. These informed an integrated design process involving mappings, site-specific analysis, user studies, and iterative spatial testing.

The resulting proposal introduces a concept composed of three layers: edge, in-between, and core. This structure choreographs flows of people, water, and ecology, where nature-based solutions such as a retention pond, stormwater channels channels, and diverse planting strategies are combined with informal gathering zones, semi-public transitions and much more, ultimately creating a multifucntional space with synergies between functions. The outcome positions the courtyard as a infrastructure for climate adaptation, biodiversity support, and community well-being.

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02 EXPLORATION

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00
PROLOGUE

prologue

/ˈprəʊlɒg/

noun

1. a prefase or introduction to a literatury work
   “the prologue of the novel sets the stage for the epic journey that follows.”

MOTIVATION

"At times I look outside my apartment window, all I see is a barren courtyard, grey and lifeless. I often imagine a different scene, where nature reclaims the space"

(author's own reflections)

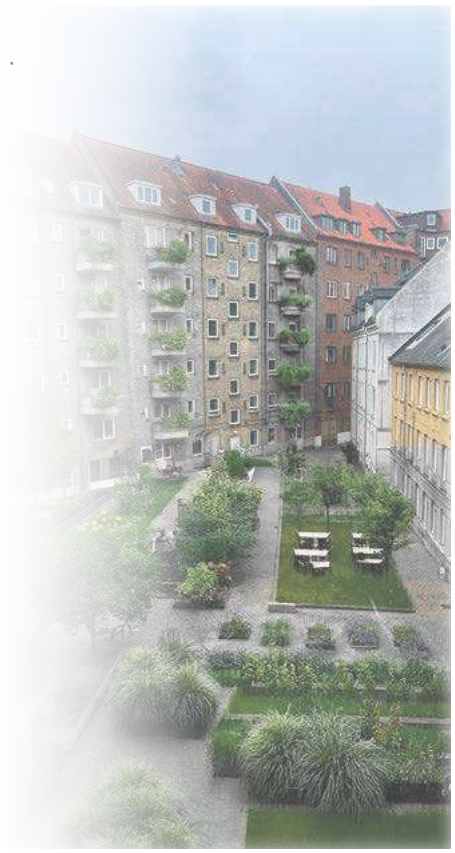
This **daydream** has become a driving force behind our master thesis project. After nearly five years in Aalborg, we have come to know this city very well - its streets, its people, and its **challenges**. It only feels right to conclude this academic journey by addressing a site that resonates with our own experience, in a city that has had a significant influence on our development as designers.

The **underutilized courtyards of Aalborg** present a perfect opportunity to confront a selection of urban design challenges, some familiar and others less so.

Over the years, we have been trained to work with robust urban forms, exploring how cities can become more resilient and sustainable. However, this project aims to push that knowledge further, challenging us to rethink the **overlooked spaces between buildings**, where the potential for transformation is often overshadowed by zoning regulations and planning conventions.

This master thesis aims to develop a design concept that not only transforms a specific, underutilized courtyard in Aalborg, but also serves as a pilot project: ***a scalable model for reimagining neglected urban courtyards in cities more broadly.***

Ill. 1. *Courtyard at Jernbanegade*

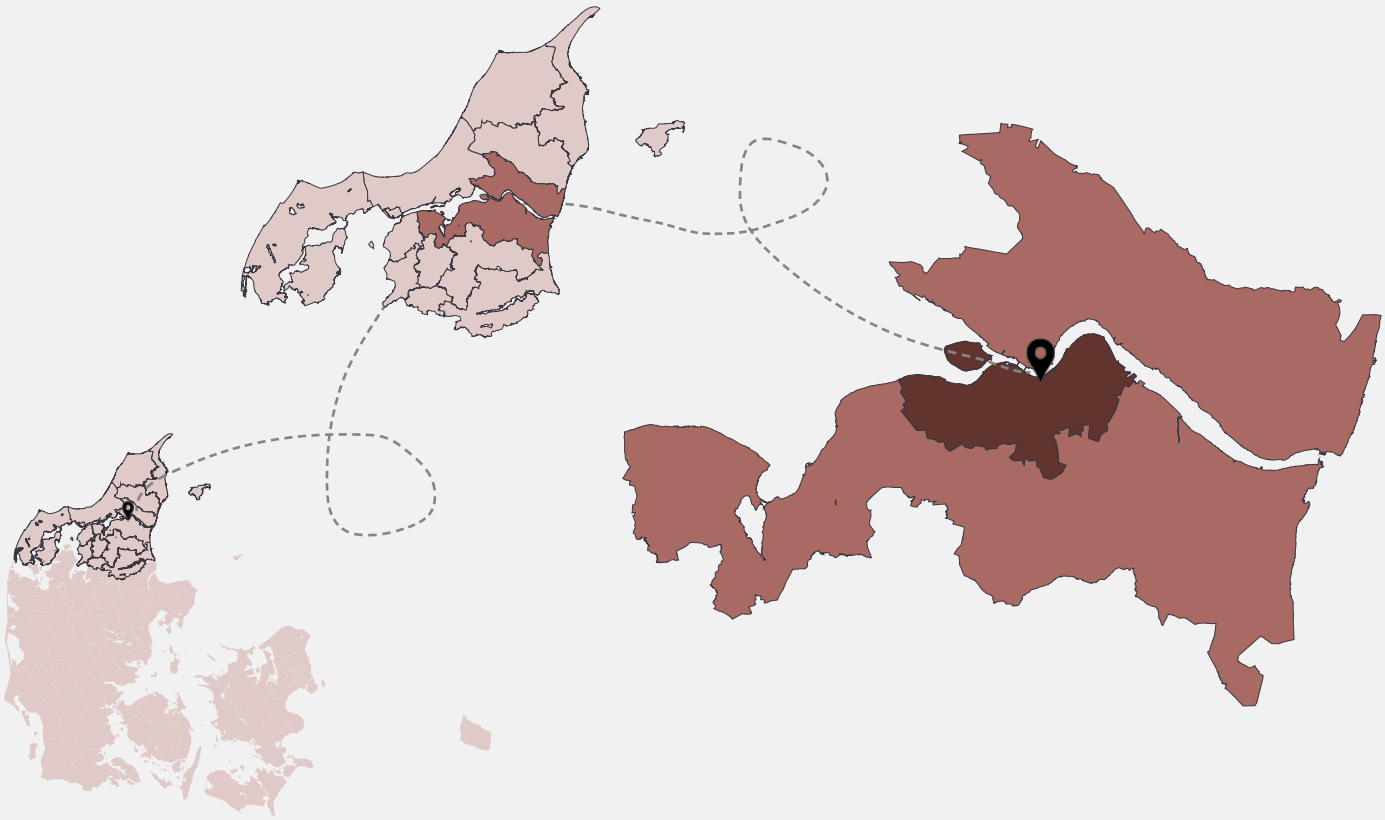


Ill. 2. *"Daydreaming"*

VISION

The vision is to create a flexible framework that responds to the challenges of **climate adaptation**, supports **nature integration and biodiversity**, and fosters **social sustainability**. By addressing these interconnected themes, the project aims to turn overlooked courtyards into vibrant, green, and socially engaging spaces that are resilient, ecologically diverse, and rooted in local communities.

Rooted in thorough site analysis, this approach bridges the gap between theoretical insights and imagined practical, context-based solutions. It aims to challenge conventional zoning practices and inspire cities to rethink their hidden potential by reclaiming these forgotten spaces. By doing so, we hope to set a new standard for how urban courtyards can contribute to more resilient, inclusive, and ecologically rich urban environments.



Ill. 3. *Project Location, Denmark-Nordjylland- Aalborg*

METHODOLOGY

Urban design as an academic field draws on a wide range of methodologies, reflecting its inherently interdisciplinary nature. Depending on the project's context and objectives, methods range from technical approaches rooted in engineering and hydrology to more human-centered strategies from architecture and the social sciences. This broad spectrum allows urban designers to address complex, layered challenges that span physical, ecological, and social dimensions. For this project, the methodology primarily aligns with design and architecture but also incorporates insights from related fields to ensure a comprehensive approach to courtyard transformation.

IDP

The structure of this master thesis follows the **Integrated Design Process (IDP)**, *a holistic approach that emphasizes a continuous, iterative workflow where analysis and design inform each other throughout the project* (Hansen and Knudstrup, 2005). According to Mary-Ann Knudstrup, IDP is defined as a method that integrates knowledge from engineering and architecture, allowing these disciplines to interact to address the **complex challenges of sustainable design**.

While the original IDP framework is grounded in the integration of architecture and engineering disciplines, this thesis builds on the growing recognition that complex urban challenges also require a systematic inclusion of social science perspectives. As our project demonstrates, issues such as community interaction, user behaviour, and social sustainability are not just by-products of physical design - they are fundamental design parameters in themselves.

In this regard, our approach aligns with what could be seen as an **expanded or adapted form of IDP** - one that not only bridges design and technical performance, but also embraces human and cultural dimensions as active and co-equal drivers in the design process. This multidimensional understanding of integration is especially relevant when working with semi-private spaces like courtyards, where spatial interventions must respond to layered social practices, lived experiences, and community dynamics.

It allows for the integration of multiple parameters - such as spatial quality, climate adaptation, biodiversity, and social use - into a cohesive design strategy, ensuring that sustainability is embedded in both physical form and lived experience from the earliest stages of the design process.

This approach is particularly suited for complex urban contexts, where numerous interdependent variables must be considered simultaneously. However, to better align the structure of this thesis with the unique context of the chosen site and the project's overarching vision, we have adapted the traditional IDP framework into a more tailored sequence, structured around our own defined chapters: **Foundation, Exploration, Insight, Transformation, and Reimagining.**

FOUNDATION

The Foundation chapter serves as the **theoretical framework** of the thesis, providing a comprehensive

overview of relevant **literature, theories**, and **perspectives** that frame the context and significance of the project. It establishes the critical background for addressing climate adaptation, nature integration, and social sustainability in dense urban environments. This chapter also introduces the **problem statement**, clearly defining the scope of the design challenge and the thematic focus of the project. By grounding the work in both theoretical perspectives and practical concerns, the Foundation chapter ensures a clear starting point for the subsequent analytical- and design phases.

EXPLORATION

The Exploration chapter is characterized by a **wide-angle approach,** focusing primarily on the broader urban context. It includes extensive **desktop analyses** that examine the spatial, social, and environmental conditions of Aalborg as a city. This chapter also integrates findings from the field study, the **Courtyard Walk**, which provided first-hand insights into the spatial qualities of the city's courtyard environments. This broader perspective allows for the identification of key challenges and opportunities, setting the stage for a more focused site-specific analysis in the following chapters.

INSIGHT

In contrast to the broader focus of *Exploration*, the Insight chapter zooms in on **the local scale**, concentrating on the specific courtyard selected as the case study. This phase involves a detailed, multi-method analysis, including in-depth **site observations, sketching, and spatial assessments**. Here, the project shifts from generalized observations to a precise understanding of the unique physical and social dynamics at play within the chosen site, laying the groundwork for informed design interventions.

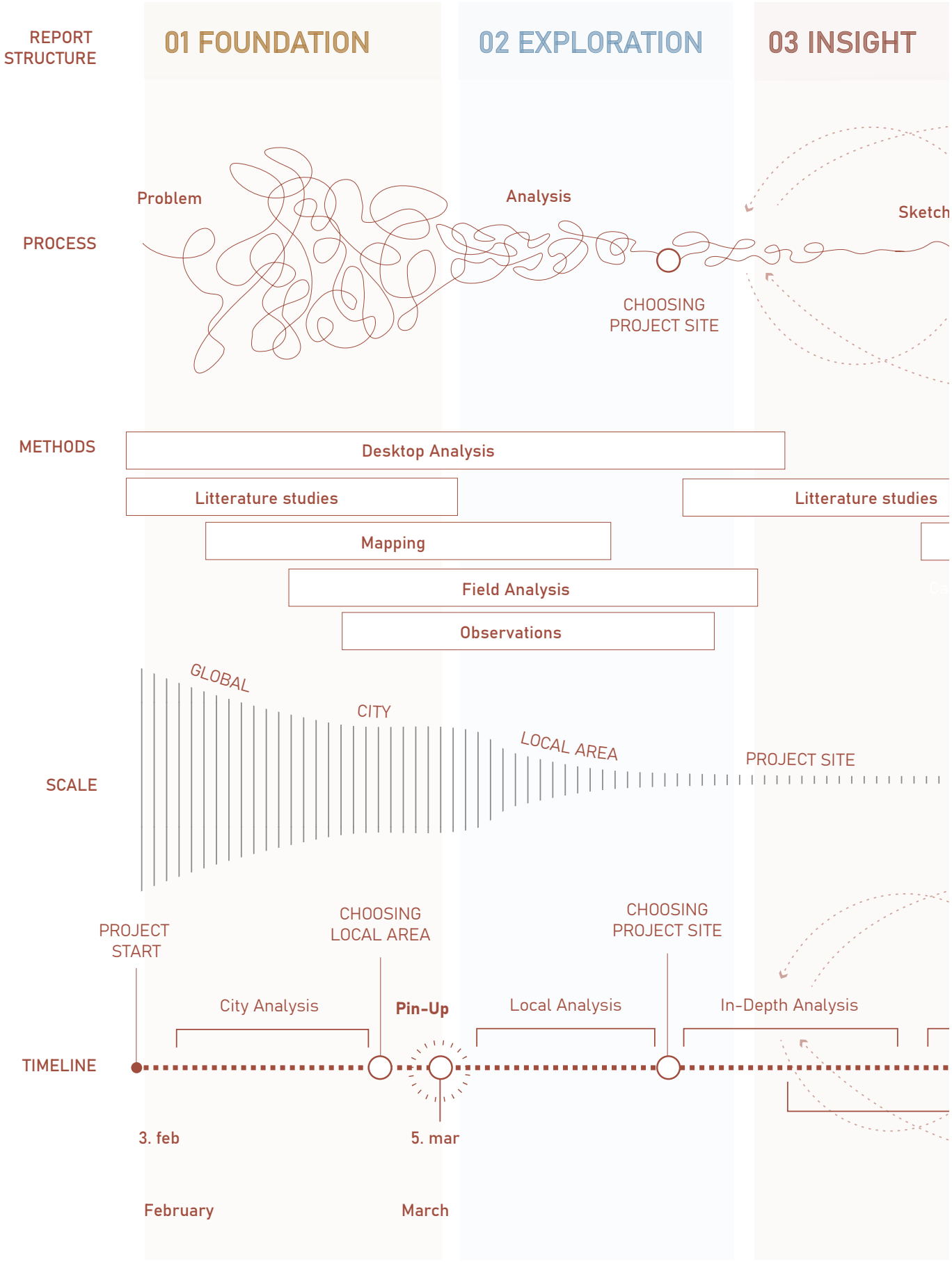
TRANSFORMATION

The Transformation chapter represents the creative core of the thesis, translating analytical insights into design iterations. This phase captures the iterative nature of **the design process**, moving from initial sketch concepts to a refined **design concept**, articulated through **design principles** and ultimately resulting in a **final design proposal**. It embodies the critical synthesis of analysis and creative exploration, emphasizing the role of design as both a problem-solving tool and a standard for **reimagining the urban environmen**t.

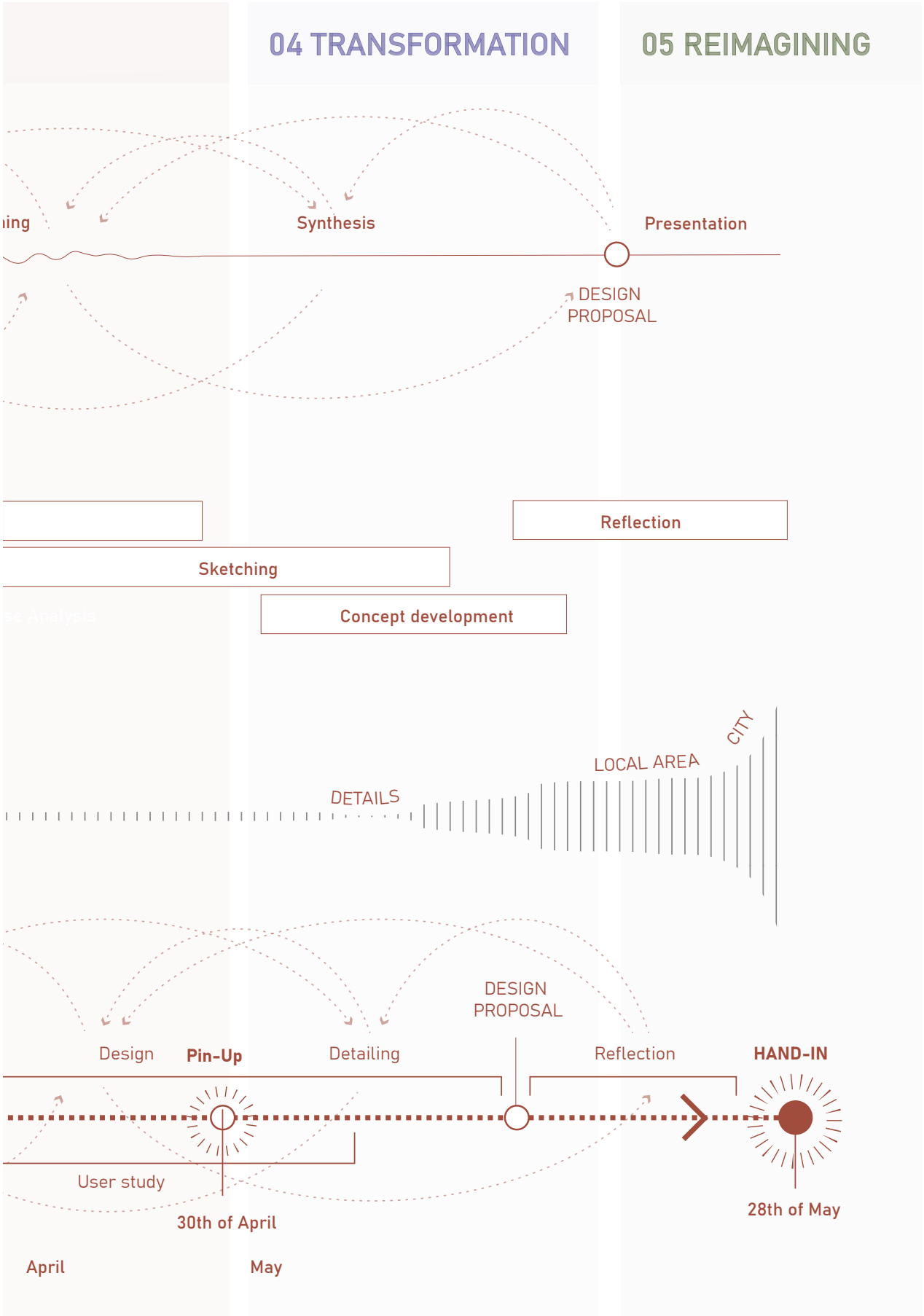
REIMAGINING

Finally, the Reimagining chapter aligns closely with the final stage of the IDP - The **presentation** of the final design is structured around a selected combination of **visualizations, diagrams, and narrative texts**, effectively communicating the concept's full potential. The chapter is followed by the thesis *epilogue*, which reflects on the overall processes, the project's broader implications, and potential pathways for future research and implementation. It aims to bridge the gap between concept and practical application, ensuring that the proposed interventions remain both visionary and grounded in the practical realities of the urban context.

TIMELINE



Ill. 4. *Methodology diagram*


04 TRANSFORMATION
05 REIMAGINING
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Presentation
DESIGN
PROPOSAL
Reflection
Sketching
Concept development
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LOCAL AREA
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DESIGN
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HAND-IN
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28th of May
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01
FOUNDATION

foundation

/faʊnˈdeɪʃn/

noun

1. an underlying **basis or principle**.
   “this idea is the foundation of all modern economics”

PROJECT RELEVANCE

Urban environments are subject to some of the most pressing global challenges of our time, regarding sustainability. As the impacts of climate change intensifies, biodiversity continues to decline, and social disconnection grows in densely populated areas. It becomes clear that cities must transform - not only in how they function, but in how they support life, both for humans, animals and nature.

In response to these intersecting crises, urban design and planning are undergoing a paradigm shift. Traditional approaches that treat climate adaptation, biodiversity protection, and social well-being as separate concerns are no longer sufficient. Instead, a more integrated perspective is needed - one that sees urban spaces as multifunctional landscapes capable of responding to environmental pressures while simultaneously enriching the everyday life of their residents.

A fundamental shift in planning methods is required - one that moves away from reactive "quick-fix" solutions towards site-specific analyses and holistic strategies that work with, rather than against the dynamics of nature (Isaksen, 2025). Equally important is the integration of climate adaptation into urban development, where flood mitigation measures can simultaneously form recreational environments and improve citizens' quality of life (Realdania, 2025). It is no longer sufficient to merely guard against water; adaptation efforts should also generate added value through urban spaces that combine technical solutions with social and ecological qualities. This thinking is reflected in Aalborg Municipality's Climate Plan (2022), which emphasizes nature-based solutions as a key strategy - linking water management with recreation, increased biodiversity, and social sustainability.

This project is situated within this broader context. By focusing on the transformation of inner courtyards in Aalborg's dense urban areas, it explores how such often overlooked spaces can contribute to a sustainable transformation. These courtyards, typically characterized by impermeable surfaces and limited ecological or social value, hold the potential to become vital assets in addressing challenges regarding climate adaptation, biodiversity, and social connection.

The following sections will examine each of these challenges further. Climate, biodiversity, and the social dimensions, together they form the foundation for, why this project is relevant at a local, reginal and national scale.

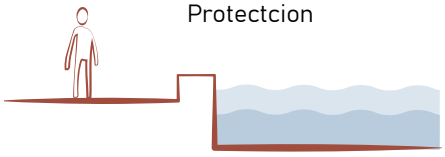
Ill. 5. *Project relevance*

THE CLIMATE CRISIS

Climate change will have significant and widespread effects on urban areas across Europe. There is a consensus that keeping global temperatures rise well below 2°C is crucial to prevent severe climate-induced disasters in the future. (Kabisch et al., 2017).

We are currently facing a global climate crisis that demands immediate action, if we are to reduce or slow down the damage humans are causing to the planet. Around the world, extreme weather events are becoming more frequent, with new records for drought, precipitation, and heat being set each year (Danmarks Meteorologiske Institut, 2021). Climate scientists are astonished by the significant impacts that are already happening from the relatively modest increase in the global temperatures (Klimarådet, 2024).

> *"Extreme weather events have increased in both frequency and intensity across Europe, with the past decade setting multiple records for heatwaves, droughts, and flooding"*
>
> *(Danmarks Meteorologiske Institut, 2021).*

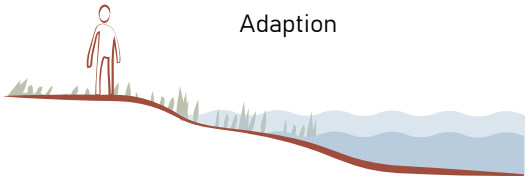


As a consequence of the climate crisis, the risk of flooding is becoming increasingly threatening. Many European cities are located on flood plains or along coastlines, and these areas will be particularly vulnerable to flooding. Additionally, rising sea levels in certain regions of Europe are expected to lead to more frequent basement flooding (Arnbjerg-Nielsen et al., 2013).

Even in our small country, Denmark, we are experiencing clear changes. Luckily, despite our size, Denmark has ambitious climate goals. The country aims to reduce greenhouse gas emissions by 70% in the years from 1990 to 2030, as outlined in the Climate Act 2021.

For many years, billions of Danish crones have been invested in keeping water away from our residential areas, particularly in the largest Danish cities. Dikes, dams, coastal protections, and extensive drainage systems have been constructed to protect our cities. However, millions of Danish crones are still spent each year fighting against the rising water levels. But what would happen if we started investing in **adaptation** instead of **protection**? The water is coming our way - Rising sea-level, extreme stormwater, storm surge, and the rising groundwater levels. It is time for our perspective on water to shift, focusing on welcoming water as part of our landscape rather than fighting against it. This idea is simplified in the diagram: Protection - Adaptation.

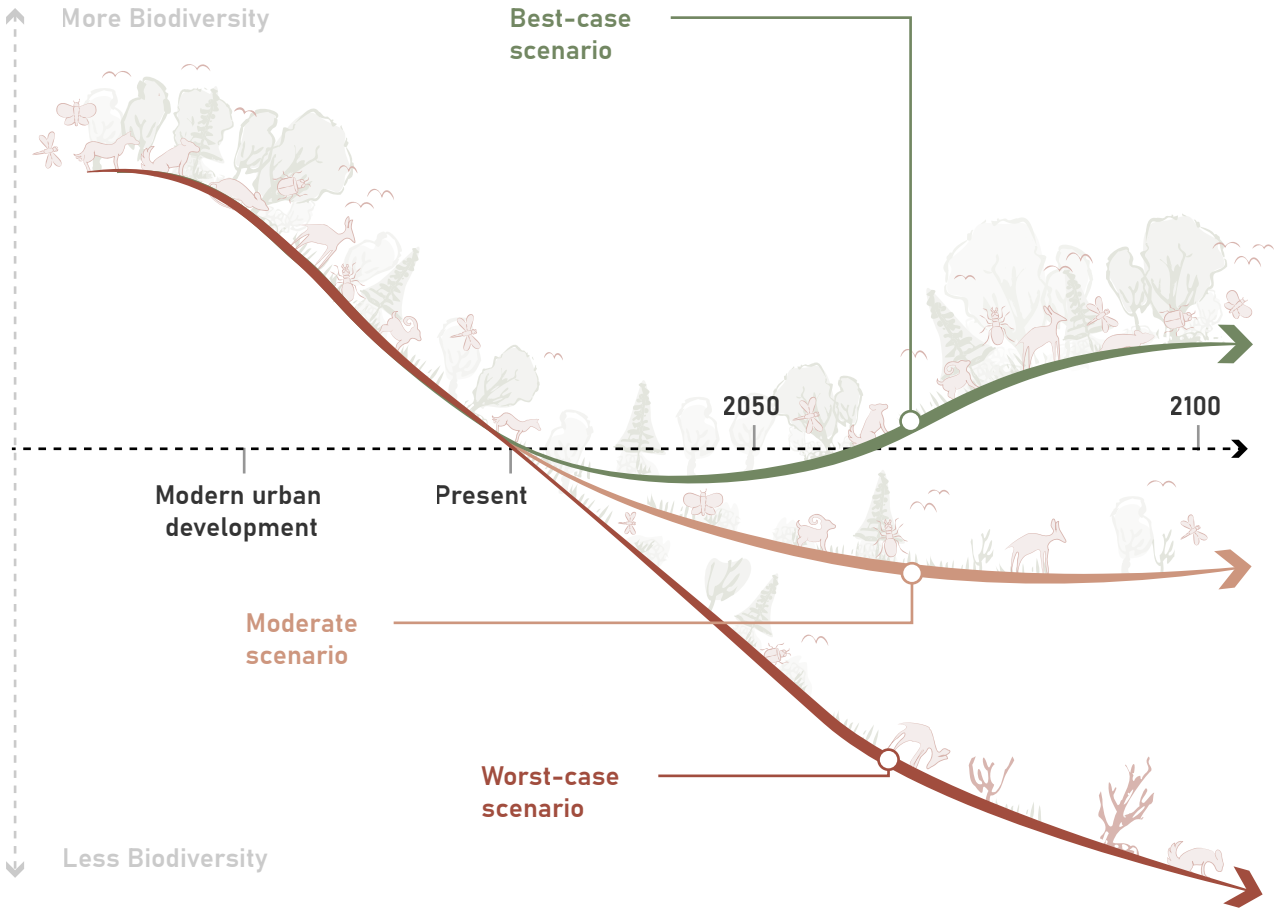
In this context, urban courtyards in dense city districts represent a significant opportunity for climate adaptation. Their location within impermeable urban



Ill. 6. *Protection - Adaptation*

fabrics makes them well-suited to function as local climate buffers, spaces where rainwater can be absorbed, stored, or delayed, for example through green infrastructures. By integrating solutions such as permeable surfaces or local retention systems, courtyards can help reduce flood risks and ease the pressure on the existing sewer infrastructure.

THE BIODIVERSITY CRISIS



Ill. 7. *The Biodiversity Crisis*

Biodiversity, *the variety of life*, is essential for maintaining healthy ecosystems and supporting human well-being. A biodiverse city ensures ecosystems stability and environmental qualities like clean air, water, and fertile soil, and is essential for ecological sustainability (Biodiversitetsrådet, 2023). Despite its importance and focus in the recent decade, biodiversity is still under pressure from urbanization, climate change, and habitat destruction:

> *"Despite decades of efforts to reverse the trend, biodiversity loss in Denmark has not been halted, and it remains under significant pressure"* *(Biodiversitetsrådet, 2023, p. 8).*

Urban design carries a responsibility to support biodiversity, so that the built environment can contribute to ecological sustainability rather than diminishing it. Integrating biodiversity initiatives into urban spaces is essential for maintaining, even improving the environment, and provide habitats for diverse species.

This is reflected in the diagram 'The Biodiversity Crisis', illustrating how mitigation of biodiversity in (urban) development, affects the biodiversity crisis. The diagram is inspired by the article *Bending the Curve of Biodiversity Loss* (Rounsevell et al., 2020), which illustrates the projected decline or potential recovery of biodiversity depending on whether action is taken now

SOCIAL CHALLENGE OF URBAN LIFE

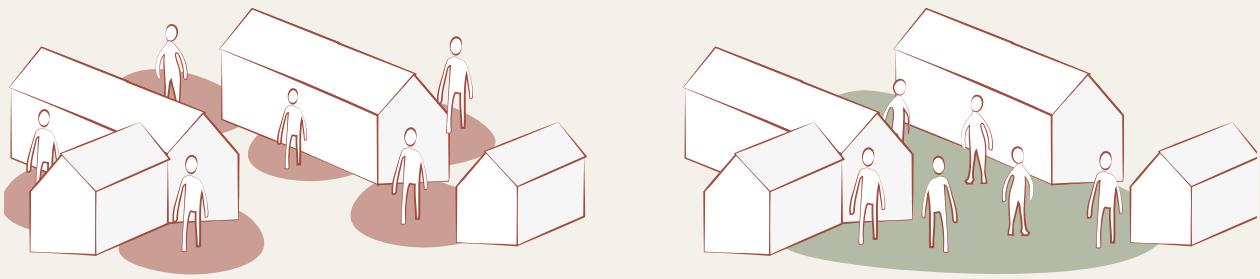
Despite increasing urban density and the presence of more people in shared physical environments, modern cities are facing social challenges. One such challenge is a growing sense of disconnection and loneliness, particularly among younger people. (Statens Institut for Folkesundhed, 2023). According to recent statistics, ***"12% of 16–29-year-olds feel lonely, while for the entire population it is 8%"*** (Ritzau, 2023). This indicates that the social perspective of urban life is under pressure, and this psychological state of feeling disconnected or lonely, is influenced, not just by social factors, but also by the environment we are living in.

A critic of the modern urban environment is addressed by Jan Gehl, through his extensive studies of **everyday life in cities**. In 1971, he published the book "*Livet mellem husene*" (in english: *"life between buildings"*), which concludes that modernist architecture and urban planning often lead to social fragmentation by deprioritizing the spaces between buildings, the very places where spontaneous encounters and community interactions may occur. Gehl argued that the physical environment significantly influences people's behavior in public space and that design has a direct impact on how, where, and whether people meet. (Gehl, 1971)

In the context of the biodiversity- and climate crisis, it becomes crucial to also address the social dimension of this transformation. If cities are to become more sustainable, they must not only mitigate climate change and support biodiversity, but also create environments where people can meet, feel connected to each other, and participate in everyday social life.

In this context, public and semi-public spaces gain increased importance as spaces for informal social life and everyday encounters. While this report does not seek to diagnose or solve the problem of loneliness as such, it acknowledges disconnection as a relevant condition in modern cities, affecting social sustainability and should be understood as part of the background for rethinking the use and potential of urban spaces.

Inner **courtyards** in dense city districts may play a role in addressing this challenge. As semi-public transitional spaces between private residents and the wider city, courtyards hold the potential to support everyday interaction and a shared social life, depending on how they are designed and perceived. These spaces are therefore relevant to investigate further in relation to the broader social dimension of sustainable urban transformation.



Social Fragmentation

Social Cohesion

Ill. 8. *Social structure*

TOWARDS SUSTAINABILITY

With the increasing impact of climate change, the biodiversity crisis, and social challenge, rethinking urban spaces and their approach to climate adaptation, water management, social sustainability, and biodiversity has become more urgent than ever. The green transition plays a central role in this shift, emphasizing the need for systemic changes in urban planning, construction, and resource management to create more sustainable and resilient cities (Sørensen et al., 2024).

The report *"Grøn Omstilling af det Byggede Miljø"* (Sørensen et al., 2024) outlines the key strategies for this "**green transition**". The report mentions that the green transition cannot be approached in seperate fields, but it requires collaboration across disciplines, sectors, and governance levels to create systemic change:

> *"The green transition cannot be solved in the individual areas where we each sit. There is a need for synergy, but also for an understanding of the challenges that exist across different areas."*
>
> *Sørensen et al. (2024, p.5)*

Historically, urban planning has been characterized by a desire to control and remove water through drainage systems, sewers, and channeling (Isaksen, 2025). However, this approach has proven insufficient in the face of rising sea levels, more frequent cloudbursts, and increasing groundwater levels. A fundamental shift in planning methods is required. This shift involves moving away from reactive, 'quick-fix' solutions and instead focusing on site-specific analyses and holistic strategies that work with, rather than against, natural processes. (Isaksen, 2025).

Equally important is the integration of climate adaptation into urban development, where flood mitigation measures can simultaneously create recreational environments, improve social engagement, and enhance biodiversity (Realdania, 2025). This aligns with the principles of the green transition, which stress that, sustainable urban transformation must be interdisciplinary, addressing environmental-, social-, and ecological challenges collectively rather than separated (Sørensen et al., 2024). Aalborg Municipality's Climate Plan (2022) follows this line of thinking, emphasizing nature-based solutions as a key strategy to link water management with recreation, increased biodiversity, and social sustainability (Aalborg Municipality, 2022a).

This approach is particularly relevant in the context of courtyards in dense urban areas. These spaces are often overlooked, covered with grey, impermeable surfaces, and lacking functional or recreational value. By converting them into green, permeable, and multifunctional spaces, it is possible not only to manage rainwater and reduce flood risks but also to strengthen biodiversity and create a space for social interaction. Aalborg Municipality's Planning Strategy (2023) emphasizes the need to connect green structures within the city, ensuring that sustainable interventions are not isolated but rather part of a larger network of resilient urban spaces.

Such a holistic approach paves the way for sustainable urban transformation, which raises the question presented in the following section:

*"How can urban design contribute to a **sustainable** transformation of courtyards in Aalborg?"*

DEFINING SUSTAINABILITY

The term **Sustainability** is widely used in urban design and has already appeared throughout the prior text, reflecting its significance in this field. To align the sustainability ambitions of this project, the term must not only be defined in a broader official context but also adapted to match the specific challenges and opportunities at hand, in our context.

Official definition

Sustainability is officially defined in the Brundtland Report (1987) as: ***"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs"*** (World Commission on Environment and Development, 1987, p. 43).

This definition points out the need for a long-term balance between environmental health, social well-being, and economic stability. It recognizes that human development must occur within the limits of natural resources while ensuring fairness and livability for future generations.

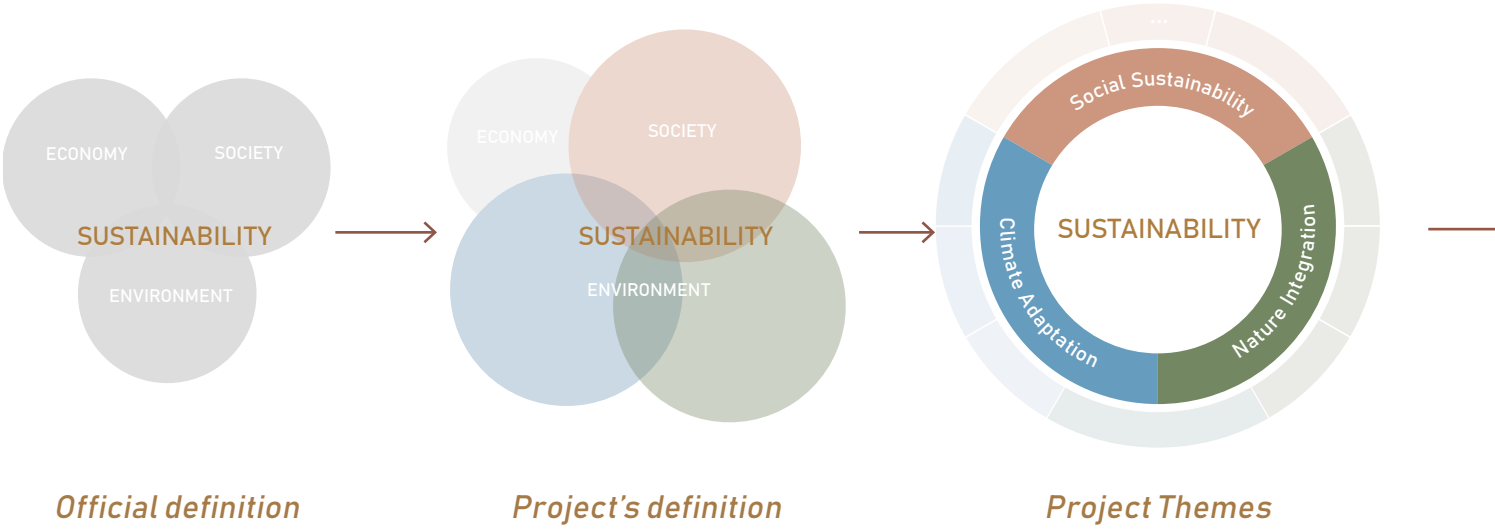
Project's definition

While the official definition provides a broad foundation, sustainability in this project is conceptualised with a twist, to align with the specific challenges and opportunities in our interest and context.

The diagram below shows how sustainability, the official concept of the three pillars: economy, society, and environment, is connected to the project's definition of sustainability.

We have expanded the environmental dimension by dividing it into two project themes: climate adaptation and nature integration, allowing for a more detailed exploration of both climate-related challenges and ecological aspects of the environment. The social dimension remains a central focus, addressed through its own project theme and analyzed in parallel with the two environmental themes.

The economic dimension, however, is placed in the background and will not serve as a primary theme. Nonetheless, it will be considered in the concluding reflection, as we acknowledge that economic factors are an inseparable part of urban development. Understanding its framework is essential to ensuring that the project remains realistic and implementable.



Ill. 9. *3 steps of Sustainability*

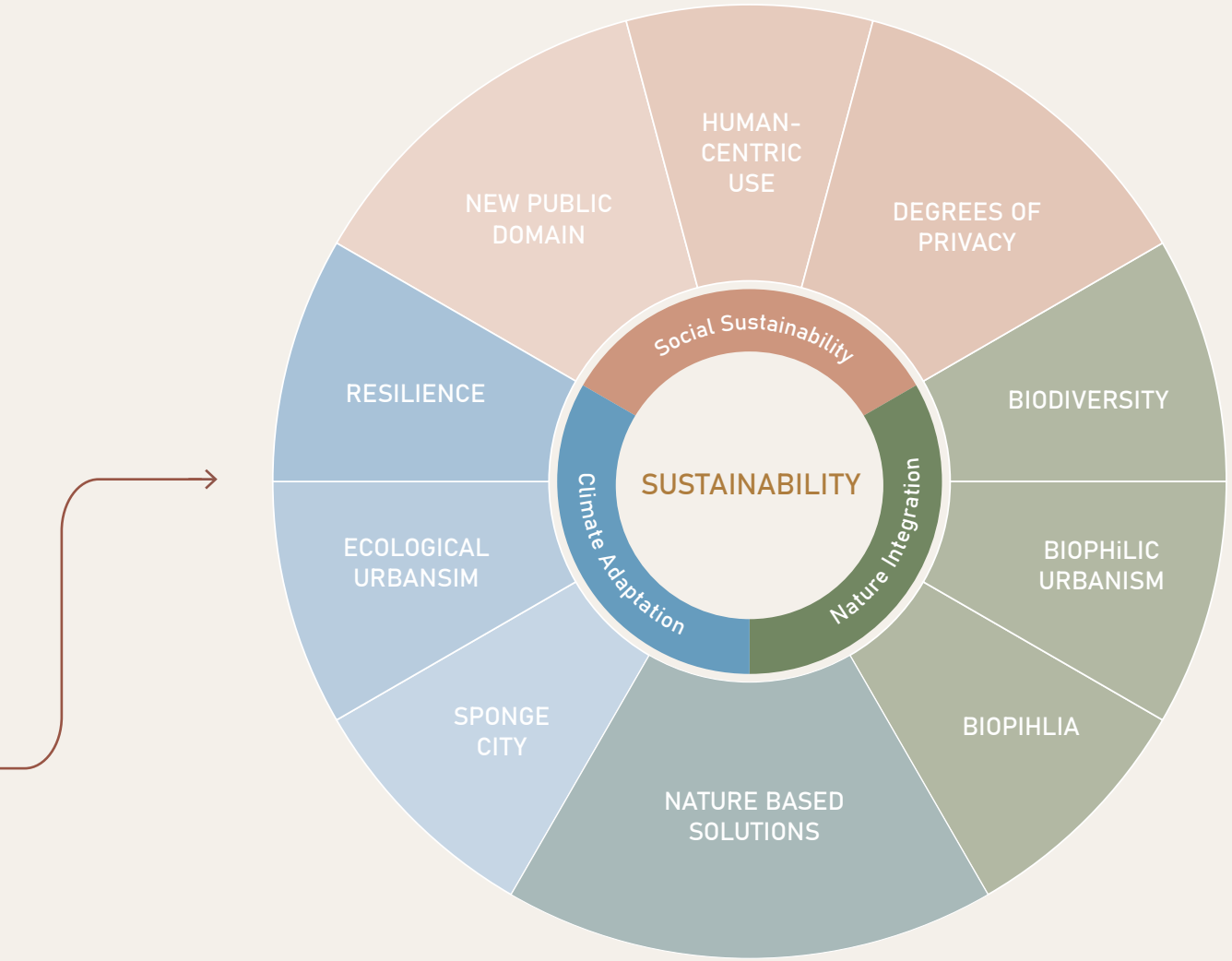
DEFINING THEMES

Project Themes

The project themes translate our modified sustainability concept, into more concrete urban design strategies, and integrating theories of the three themes: social sustainability, climate adaptation, and nature integration.

Each theme is further explored through sub-themes such as resilience, public space, biodiversity, and ecological urbanism, aiming to result in a holistic and interdisciplinary approach in studying each theme.

The following chapter **'Theoretical Foundations'**, will explore each theme in greater depth and discuss the chosen literature related to the selected themes.



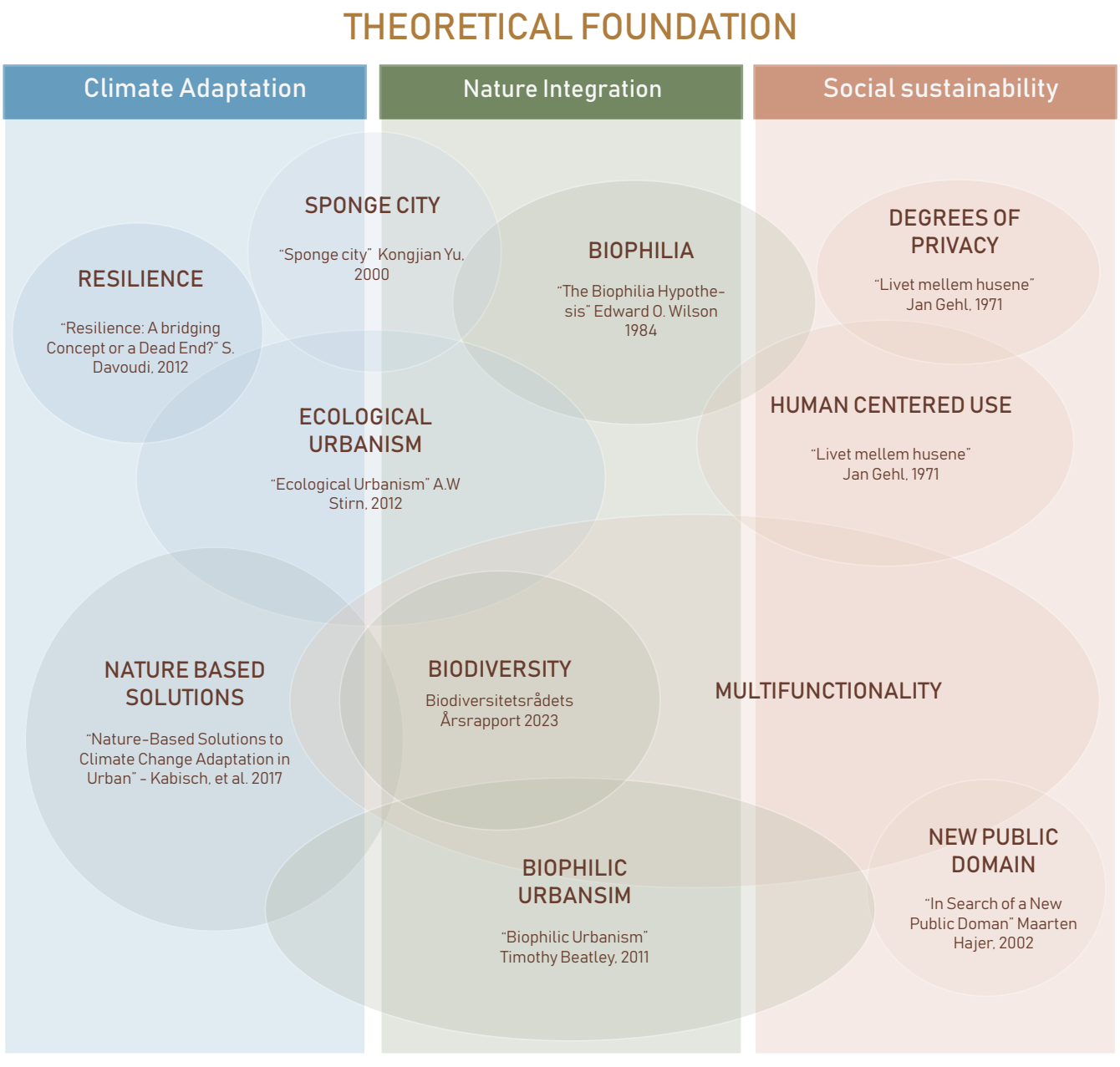
Ill. 10. *Wheel of themes*

THEORETICAL FOUNDATION

To ensure a well-informed design process and solid arguments throughout the project, a solid theoretical foundation is inevitable. It is structured around key themes and sub-themes, each intrinsically connected to sustainability.

The theoretical position of each theme and sub-theme is explored in relation to one another. Some themes overlap, while others are inherently connected or embedded within each other, as visually represented in the diagram. This reflects the interdisciplinary nature of sustainability, where concepts such as climate adaptation, resilience, nature-based solutions, and social sustainability interact dynamically rather than existing as isolated fields.

With an overview of the theoretical landscape we are engaging with, this systematic approach allows for better understanding of how different themes complement or influence one another. In the following chapter where the themes are each unfolded.



Ill. 11. *Theoretical foundation*

CLIMATE ADAPTATION

This theoretical framework will present various perspectives and principles on climate adaptation and how we can transform our cities to manage and welcome the water as a friend rather than an enemy.

> *"Adaptation to climate change is defined as the adjustment in natural or human systems such as urban areas in response to actual or expected climatic stimuli or their effects. Climate change adaptation strategies should moderate harm or exploit beneficial opportunities of climate change."* *(Kabisch et al., 2017)*

There is no doubt that achieving the greatest possible impact in terms of climate adaptation of our cities, and in this case Aalborg, requires a holistic approach to the green transition (Sørensen, M. K., Hermansen, D. K., & Hald, S, 2024). In this context, it is important to emphasize that the design principles examined in this master thesis aim to create a foundation for how smaller transformation projects can have a significant impact on the holistic perspective, and not least, how the theory can inform design principles and for sustainable urban transformation accommodating the green transition.

Resilience

Resilience has become a central method in planning because, we live in a time characterized by increasing uncertainty and unpredictability in the form of climate change, economic crises, and disasters. This makes it necessary to develop systems that can handle the "shocks" and long pressures (Davoudi, 2012). Simin Davoudi identified three different types of resilience: Engineering-, ecological-, and evolutionary resilience:

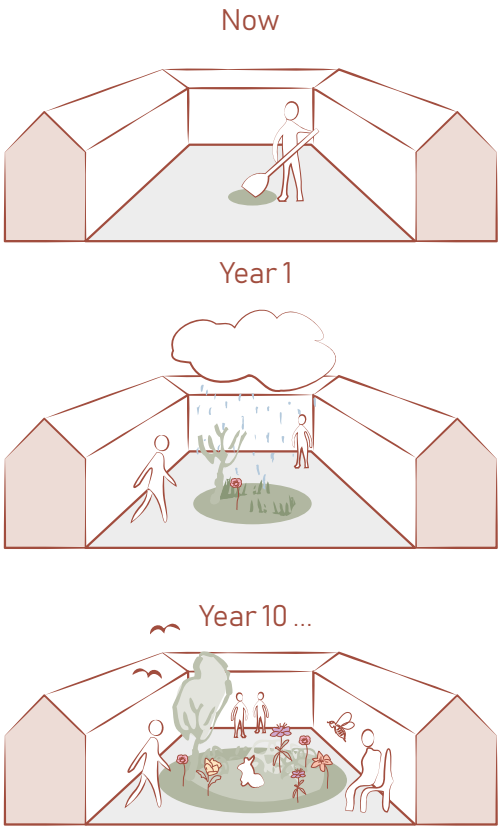
Engineering Resilience - The ability to return to an equilibrium state after a disturbance. This involves a quick "bounce back" to a previous state, for example, in the case of a natural disturbance, such as a cloudburst or storm surge.

Ecological Resilience - The ability to absorb the shocks and stay within a given defined boundary, but with the possibility to change in response to external pressures. *"..the ability to persist and the ability to adapt."*

Evolutionary Resilience - A more dynamic approach where systems do not necessarily return to a previous state but can transform into something new (Davoudi, 2012).

All three of the above are relevant, when we talk about urban resilience, but it is particularly relevant to look more closely at ecological and evolutionary resilience, as they identify that **urban climate adaptation** requires change and innovation – not just a return to previous states. This is very interesting if we had the opportunity to design out cities from a blank foundation. But - when working with an already existing dense city, with very restricted boundaries and in the context of the courtyards of Aalborg, we are interested in urban design that leans against the principles of engineering resilience, to ensure an ecological- and evolutionary resilience.

One of the key challenges when working with climate adaptation is the ability to balance the fast disaster response with the need for long-term structural changes. Therefore, resilience can act as a bridge to consider both instant risk-management and future-oriented adaptation strategies side-by-side. It shifts the focus from simply preventing damage to creating adaptive and flexible urban environments that can grow over time. By adopting an **evolutionary resilience** perspective, urban planners can create more dynamic, adaptive, and socially inclusive climate adaptation designs, ensuring that cities are not just



Ill. 12. *Diagram: Nature-Based Solustions*

protected from climate change but are also open to bloom and grow in an unpredictable future.

Nature Based Solutions

Nature-Based Solutions (NBS) are strategies that use natural processes to address societal challenges such as climate change and biodiversity loss. These solutions work with ecosystems rather than against them, offering a more sustainable alternative to traditional engineering methods. The concept was introduced in the late 2000s by organizations such as the World Bank and the International Union for Conservation of Nature (IUCN), and has since been widely adopted, particularly in European research and policy frameworks (Kabisch et al., 2017).

One of the core strengths is its **multi-functionality**. Nature-based solutions can improve biodiversity,

"The best time to plant a tree was 20 years ago. The second-best time is now."

(Kongjian Yu, 2012)

increase urban resilience, and provide economic and social benefits. By enhancing natural and semi-natural ecosystems' ability to purify water, regulate temperatures, and manage flooding, NBS can provide solutions to urban challenges, that are both long-term and economical sustainable.

In dense urban environments, courtyards present an ideal opportunity to implement NBS on a smaller, localized scale. These spaces, often underutilized, can be transformed into green oases that provide multiple benefits, from improving the microclimate to increase the urban biodiversity.

For instance, replacing impermeable surfaces with permeable paving, green roofs, and rain gardens can significantly reduce stormwater runoff, allowing rainwater to infiltrate naturally into the soil rather than overwhelming urban drainage systems. This helps avoid flooding risks while also refilling the groundwater reserves (Kabisch et al., 2017).

Green roofs and vertical gardens not only improve air quality and isolation but also contributes to urban cooling, reducing heat pressure in the dense built environment. By integrating these elements, urban courtyards can become key elements to point out, how NBS can enhance urban biodiversity while at the same time contributing to climate adaptation.

NBS contributes to **climate adaptation** by mitigating the impacts of extreme weather events. *For example*, urban forests and green spaces lower the city temperatures through evaporation and

shading, helping to reduce the urban heat island effect. Also, wetlands and vegetated water reservoirs absorb excess surface water, reducing flood risks in cities in case of cloudbursts (Kabisch et al., 2017). At the same time, these solutions can increase biodiversity by creating habitats for a wide range of species. Increasing the amount of urban green space enhances species richness, providing food, shelter, and migration corridors for insects, birds, and small mammals. Green corridors linking parks, courtyards, and street trees help mitigate habitat fragmentation, supporting resilient urban ecosystems that can better withstand environmental changes (Aalborg Kommune, 2021).

By aligning urban planning with ecological principles, NBS act as a link between climate resilience and biodiversity protection. They represent a shift from traditional urban development, simply controlling environmental processes through artificial means, and now highlighting the multiple benefits of restoring and integrating nature within cities.

Sponge city

As Kongjian Yu expressed it at an international TED Talk in 2023:

> *"The conventional solutions has been based on of protective strategy, and a continuous fight against the water. The future is now, and we have to use green based solutions."* *(Kongjian Yu, TED Talk, 2023).*

"

The climate change is happening, and it is happening now". The concept of **Sponge City** originated in China and was popularized by the Chinese architect and professor Kongjian Yu from Peking University. He introduced the concept in the early 2000s as a response to the increasing flooding problems in Chinese cities. The idea behind it is to make cities more absorbent and resilient to extreme rainfall by using green infrastructures such as permeable surfaces, rain gardens, green roofs, and urban wetlands to slow down and infiltrate rainwater (Yu, 2013).

A Sponge City relies on the integration of green spaces and the replacement of concrete with permeable surfaces that absorb rainwater during storms. These surfaces then release the water back into the atmosphere through evaporation, helping to cool the city down during hot weather. The technologies associated with Sponge City are designed to blend seamlessly with the natural urban environment, often going unnoticed.

> *"...normal people, i.e. not urban hydrology experts, don't necessarily realize that it's a Sponge City district. The interventions are always created in a multi-functional way."*
>
> (Hudson ,2023).

What differentiates the Sponge City concept from traditional drainage systems is its focus on natural processes and green infrastructure for managing rainwater, as opposed to quickly directing water away through pipes and channels.

Ill. 13. *Sponge City - Aalborg collage*

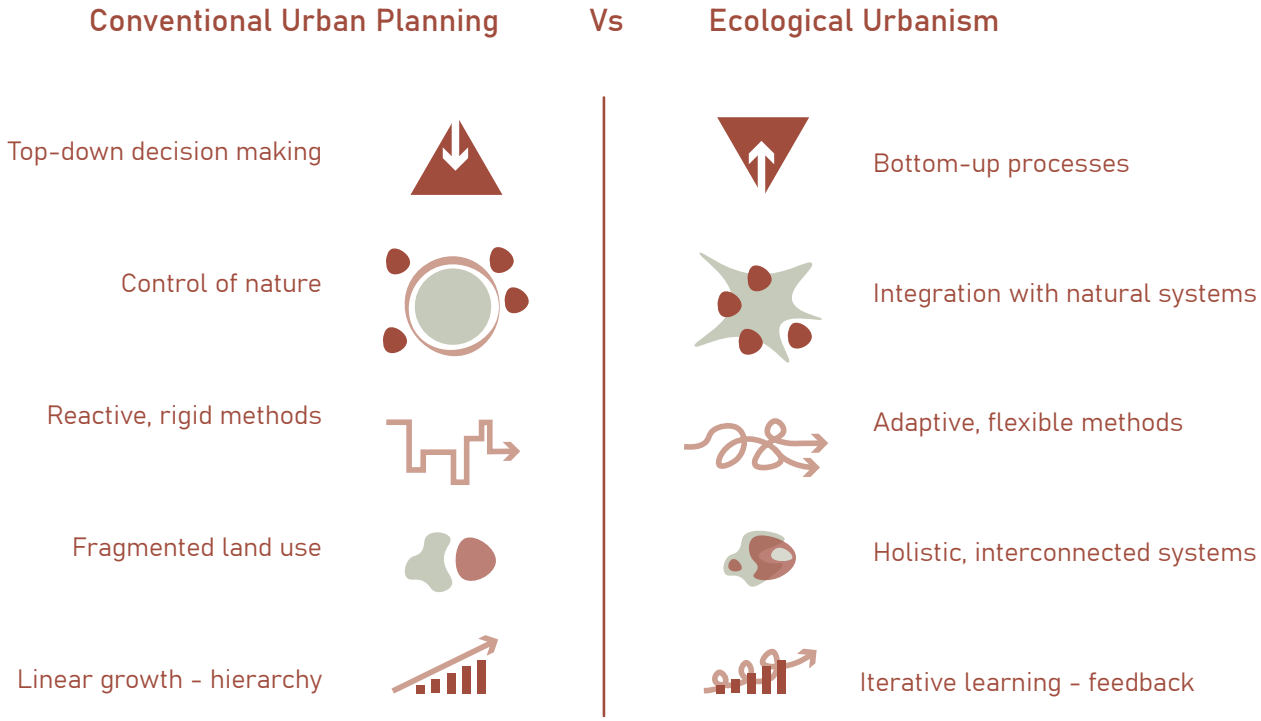
In traditional drainage systems, often based on grey infrastructure like sewer systems and drains, rainwater is rapidly directed to rivers or the sea, which can lead to flooding, pollution, and groundwater reduction. In contrast, the Sponge City works to **absorb, store, and treat** rainwater locally through permeable surfaces (such as green roofs, rain gardens, and permeable pavements), which not only reduce the risk of flooding but also promote the reuse of water for the benefit of both nature and society.

It's all about slowing down the velocity and flow of the water, with the sponge technique, inspired by traditional Chinese farming techniques, planning the nature to handle the water naturally, and give it value, for the people, climate and biodiversity (TEDx Talk, 2023).

Ecological Urbanism

Ecological Urbanism is a framework for designing resilient cities that integrates ecological principles with urban planning and design. This approach emphasizes the importance of looking at a city as a part of the natural world, recognizing it as habitat and ecosystem that is vibrant and connected (Spirn, 2012). Unlike conventional urban planning, which often relies on laws and functionalist principles of zoning, ecological urbanism highlights the benefits of restoring and integrating natural systems within urban environments (Steiner, 2011; Spirn, 2012).

A clear difference between **ecological urbanism and conventional urban planning** lies in the management of the environmental processes. Traditional methods focus on controlling and modifying nature through artificial resources, such as drainage systems and strict infrastructure, where ecological urbanism takes a **holistic approach**, considering cities as



Ill. 14. *Ecological Urbanism*

complex systems that work best, when in balance with the natural processes (Spirn, 2012). This is more sustainable for the urban environments and more adaptable to the changing conditions, due to climate change, extreme weather, and the shifting socio-economic demands (Steiner, 2011).

The contrast between conventional and adaptive methods in urban planning further highlights the flexibility of Ecological Urbanism. Traditional methods often use a **top-down** approach, where decisions are made centrally and results in large, hierarchical urban developments. While this can be effective for structuring growth and major infrastructure projects, it often lacks the flexibility needed to adapt to unexpected changes (Spirn, 2012). In contrast, adaptive methods integrate **bottom-up** approaches, that emphasize iterative learning and community engagement. This allows cities to evolve based on real-time feedback, developing more resilient and economically sustainable urban environments (Steiner, 2011; Spirn, 2012).

The difference between **top-down and bottom-up approaches** further illustrates the advantages of adaptive strategies in ecological urbanism (*as illustrated in the diagram: Ecological Urbanism*). Top-down planning involves centralized control and large-scale interventions, which can be useful for implementing policies but may overlook local ecological and social aspects (Steiner, 2011). Bottom-up approaches, on the other hand, involve local communities and stakeholders in the decision-making process, ensuring that solutions are context based and adaptable to future uncertainties (Spirn, 2012). By combining both approaches, adaptive methods allow urban planning to be effective and capable of evolve and improve over time (Steiner, 2011).

Finally, ecological urbanism represents a shift in urban development with the benefits of integrating natural systems within the cities. This framework supports a holistic, adaptive approach that focuses on sustainability, resilience, and the balance between human activities and natural processes.
While cities face increasing environmental and social challenges, ecological urbanism provides a way to more livable, adaptive, and ecologically responsible urban environments (Steiner, 2011; Spirn, 2012).

Sub-conclusion

Climate adaption of Aalborg's courtyards to climate change is not just about managing water, it is about transforming urban spaces into resilient, multifunctional environments. By integrating **nature-based solutions** and adopting principles from the **sponge city** approach, these spaces can absorb and manage water naturally, reducing flood risks, and on the same side enhancing biodiversity and ecological health. However, climate adaptation should not be seen isolated. The way we design our cities must also create stronger connections between people and nature to make sure that green spaces contribute not only to environmental resilience but also to social sustainability.

Moving on, a deeper focus on **nature integration and social sustainability** will be presented. By rethinking how we integrate green infrastructure into dense urban areas, courtyards can become vital spaces for both climate adaptation and community life. Climate adaptation is not just a necessity, it is an opportunity to create better, greener, and more inclusive cities in the future.

NATURE INTEGRATION

Stepping towards accommodating the biodiversity crisis and the green transition, as presented in the project relevance, ***"There is a need for synergy, but also for an understanding of the challenges that exist across different areas."*** (Sørensen et al., 2024, p. 5). To address different challenges, it is relevant to introduce the concepts of biophilia and biodiversity, as part of the theoretical foundation for nature integration in this project. There is significant overlap between the themes and theories, as illustrated prior in the 'Theoretical Foundation' diagram. Both Nature-Based Solutions and Sponge Cities integrate nature into urban environments, primarily for climate-related purposes. In contrast, this chapter explores nature's impact from a human-centered perspective

Briefly introducing: **Biophilia** - It refers to humans' innate connection to nature, and how it's a part of the **psychological** experience of well-being. The theory has its premise in the fact that we, as humans, have evolved a *"genetically hardwired connection to nature"* (Wilson, 1993, p. 41).

Biodiversity, on the other hand, focuses on the variety of life in an environment including plants, animals, insects and microorganisms and the entire **ecological system**. Though the premise of biodiversity is in conflict, as it *"is limited by the built environment, as nature's ability to unfold is reduced when land is used for cities, buildings, and infrastructure"* (Sørensen et al., 2024, p. 7).

These two theories are seen as distinct but also highly complementary. Their synergy lies in how biophilic design supports biodiversity by creating green spaces as a benefit to both human health and the flourishing of plants, animals, and ecosystems. Both aim for a more sustainable and nature-centric environment, including urban areas, but from different angles, one from an ecological perspective (biodiversity) and the other from the human experience (biophilia).

The upcoming sections will dive deeper into these two concepts separately and focus on how their frameworks can contribute to designing and transforming urban environments, in accommodation to the green transition, the biodiversity crisis and the biophilic experience of nature.

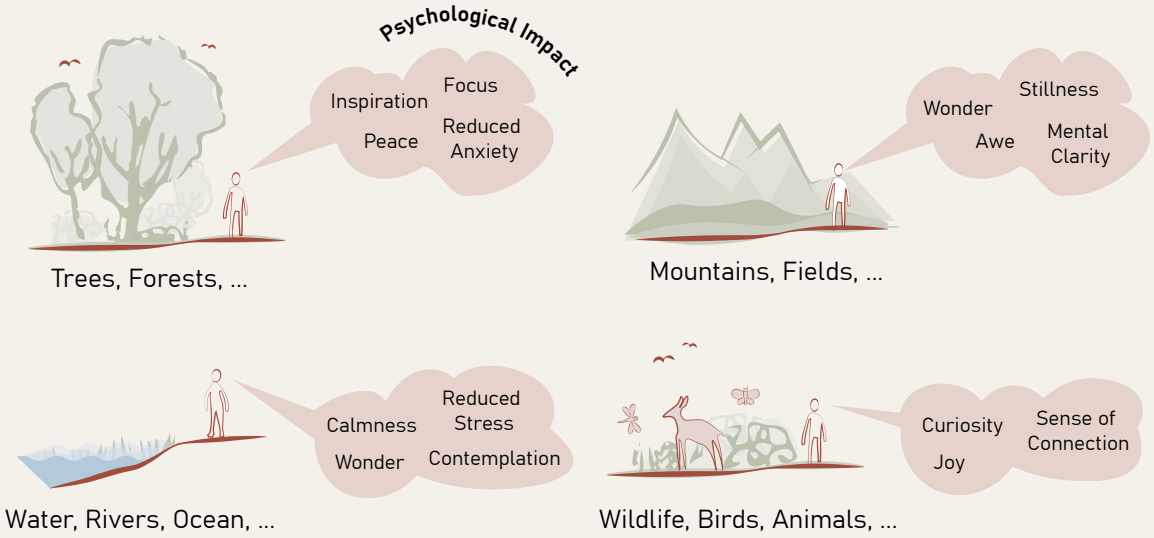
Biophilia

Biophilia, is a term that was first defined by psychoanalyst Erich Fromm in 1964 and later expanded by Edward O. Wilson in *The Biophilia Hypothesis* (1984), arguing that humans are biologically predisposed to seek connections with nature, and feel satisfaction in experiencing nature. According to Wilson;

> *"Humans have an innate, genetically hardwired connection to nature that is responsible for psychological and physiological responses to nature and the values and patterns of nature."*
>
> *(Wilson, 1993, p. 41).*

This connection is not a romantic idea but an essential biological and evolutionary need, influencing human preferences. The Biophilia Hypothesis presents a strong argument for biophilia being a real feeling, in comparing it to our evolutionary response to fear.

For instance, we instinctively fear snakes, large predators or even darkness, even though these fears seem irrational today. This reaction is hardwired from millions of years of evolution of the reptilian brainstem. If fear is so deeply rooted, *"why wouldn't these instincts feed positive feelings as well; Like feeling inspired, peaceful, safe or social cravings due to experiencing certain features of nature?"* (Wilson, 1993)



Ill. 15. *Biophilia*

Given that biophilia is an evolutionary preference shared across all humans, it is a widespread and universally appealing concept, making it a powerful tool in design to address human well-being and the psychological needs of individuals. The diagram shows biophilia, humans' connection with nature, in some exemplified situations.

The premise of biophilia conflicts with urban environments growing more complex, with more people living in cities than ever before. The challenge becomes how to design spaces that reconnect individuals with nature, especially as they often experience disconnection due to modern technology and urban life.

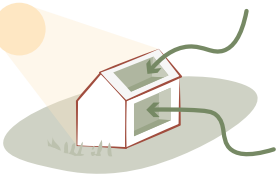
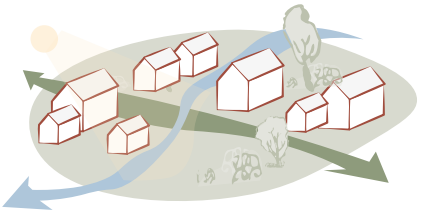
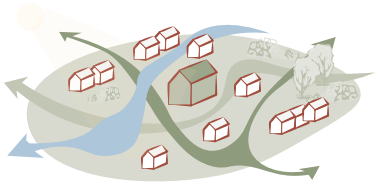
Reflecting on the importance of integrating natural elements in cities, it is accordance with 'green transition' stating that ***"The green transition of the built environment is a transformation that will have significant implications for many aspects within the built environment"*** (Sørensen et al., 2024, p. 5). This idea of a holistic effect is suggesting the green transition is not just environmental but should aim to offer something more: ***improving human well-being through biophilic urban design.***

Biophilic Urbanism

Biophilic urbanism, as defined by Timothy Beatley in 2010, builds upon the biophilia hypothesis and applies it to the urban scale. Beatley advocates for cities designed to offer their residents ***"a daily dose of nature"***, recognizing that a connection to nature is fundamental for human well-being. He emphasizes that *"In recognizing the innate need for a connection to nature, biophilic cities tie the argument for green cities and green urbanism more directly to human well-being than to energy or environmental conservation"* (Beatley, 2010, p. 45). This perspective differentiates biophilic urbanism from ecological urbanism, as it focuses more on enhancing the psychological and emotional experience of humans, rather than purely addressing ecological needs.

The success of biophilic design lies in its ability to connect people to nature in meaningful and accessible ways. This connection can be achieved through a variety of design elements. It may present itself as a physical connection such as green roofs, living walls, sky gardens, and courtyards, which integrate nature directly into the built environment.

Moreover, biophilic urbanism extends beyond the individual building level and incorporates nature throughout urban settings, creating interconnected green spaces across neighborhoods, streets, and entire regions. Beatley makes it clear that effective biophilic urbanism should be applied at all levels, from ***"small habitats for insects"*** to ***"nationwide policies"*** (Beatley, 2010, p. 45). This idea of biophilic interventions on a multi-scalar level is reflected in the following table, inspired from T. Beatley's '*Biophilic Cities*', with the addition of diagrams illustrating the impact on each scale.

Scale	***Biophilic Design Elements*** *(Beatley, 2010)*	
Building	Green rooftops Sky gardens and green atria Rooftop garden Green walls Daylit interior spaces	
Block	Green courtyard Clustered housing around green areas Native species yards and spaces	
Street	Green streets Sidewalk gardens Urban trees Low-impact development Vegetated swales and skinny streets Edible landscaping High degree of permeability	
Neighbourhood	Stream daylighting Stream restoration Urban forests Ecology parks Community gardens Neighbourhood parks and pocket parks Greening grey fields and brownfields	
Community	Urban creeks and riparian areas Urban ecological networks Green schools City tree canopy Community forest and community orchards Greening utility corridors	
Region	River systems and floodplains Riparian systems Regional greenspace systems Greening major transport corridors	

Ill. 16. *Diagram inspired by T. Beatley's "Biophilic Cities"*

Biodiversity

This chapter explores the theoretical frameworks surrounding biodiversity, its role in the broader green transition, and its integration into urban environments.

Natural ecosystems support climate adaptation by absorbing carbon, regulating temperatures, and managing water flows. In cities, the presence of diverse plant- and animal species contributes to urban cooling, air quality improvement, and psychological well-being for residents. But *"Urban expansion puts significant pressure on natural ecosystems, leading to biodiversity loss, which in turn reduces the ability for cities to adapt to climate change"* (Kabisch et al., 2017, p. 15).

The *'Biodiversitetsrådets Årsrapport 2023'* argues for a legal framework to **protect biodiversity**, emphasizing that *"a national biodiversity law should be implemented to ensure long-term commitments to reversing biodiversity loss"* (Biodiversitetsrådet, 2023, p. 5).

Biodiversity is a key component of the green transition, as it supports ecosystem-based approaches to urban resilience. The 'Nature-Based Solutions' framework proposes that ***"integrating biodiversity into urban planning can serve as a cost-effective and multifunctional approach to mitigating climate change impacts"*** (Kabisch et al., 2017, p. 29). Nature-based solutions synergize with biodiversity to provide climate adaptation benefits, for the environment and it's living creatures.

The article *'Det er uambitiøst ikke at inddrage byerne i biodiversitetsplaner'* highlights that urban biodiversity must be part of national biodiversity strategies, stating that:

> *"Urban green corridors and habitats can serve as essential links between fragmented ecosystems, enhancing biodiversity even in densely populated areas"*
>
> *(Hansen & Thielst, 2024).*

Water management solutions:

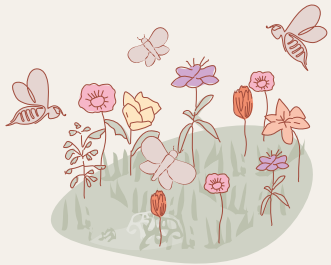
Sustainable drainage systems (SuDS) and wetland restoration to enhance aquatic biodiversity.

Green infrastructure:

Parks, green roofs, and urban forests that provide habitats for local flora and fauna.

Pollinator-friendly landscapes:

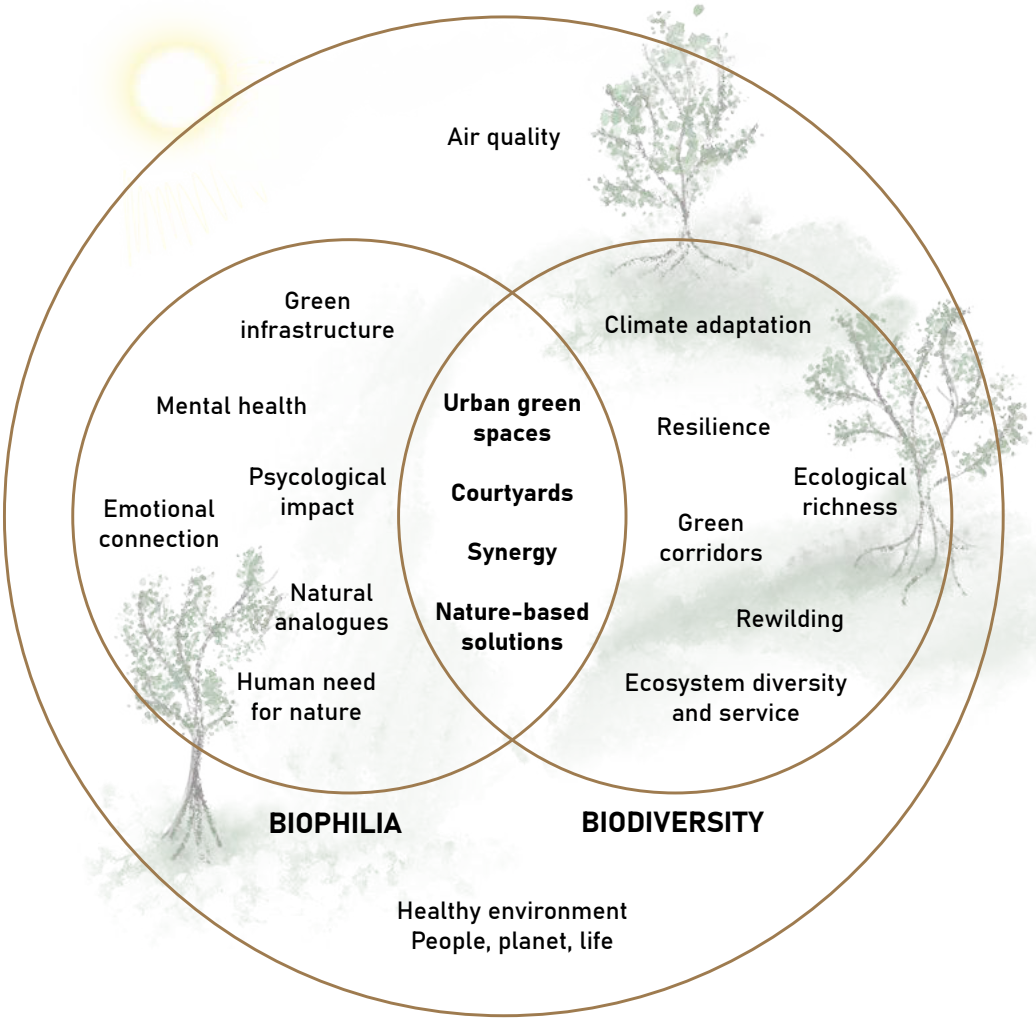
Flowering plant species that support bees, butterflies, and other pollinators essential for the health of ecosystems.



Ecological corridors:

Green pathways connecting fragmented habitats, allowing wildlife to move freely within urban areas.

Ill. 17. *Biodiversity*



Ill. 18. *Nature integration*

Urban biodiversity initiatives should be prioritized alongside rural conservation efforts to create a cohesive national strategy for biodiversity restoration.

These exemplified initiatives align with the recommendations of the *Biodiversitetsrådets Årsrapport 2023*, which calls for *"the creation of large, interconnected protected areas to representatively cover Denmark's biodiversity and restore ecological integrity"* (Biodiversitetsrådet, 2023p. 7).

Biodiversity is a foundational element of sustainable urban development and a crucial component of the green transition. As cities continue to expand, integrating biodiversity into urban design becomes increasingly necessary to enhance resilience against climate change while improving human well-being. The combination of legal frameworks, urban planning strategies, and public engagement will be vital in ensuring biodiversity conservation within urban environments. As mentioned in Nature-Based Solutions to Climate Change Adaptation,

> *"Cities must embrace biodiversity as a core element of their adaptation strategies, recognizing its role in shaping resilient, livable urban spaces"*
>
> *(Kabisch et al., 2017, p. 51)*

Sub-conclusion

Together, **biophilia and biodiversity** form an essential framework for understanding how nature can be integrated into urban environments. While biophilia emphasizes the human psychological and emotional need for nature, biodiversity focuses on ecological richness and resilience. Though their foundations differ, their aims are mutually reinforcing, creating synergetic effects that contribute to **healthier environments** for both the planet and its inhabitants.

In the context of the green transition and the global biodiversity crisis, integrating these concepts into urban design is no longer optional, it is necessary. The role of urban courtyards holds significant potential in this transformation. Their (semi)enclosed character offers an opportunity to bring nature closer to people's everyday lives while supporting local ecosystems.

When designing with biophilic principles and biodiversity goals in mind, courtyards can serve as **micro-habitats**, **climate buffers**, and **restorative green spaces** within dense urban environment. With biophilic urbanism and biodiversity-informed design and planning, implemented into structures like the urban courtyard, cities have the potential to transform into more sustainable, resilient environments that support life at all scales.

SOCIAL SUSTAINABILITY

This chapter aims to explore how public and semi-public spaces, particularly courtyards, can be designed to enhance **social interaction, inclusivity, and community resilience**. The discussion is especially relevant in the context of Aalborg, where densification and climate adaptation strategies are reshaping urban spaces.

Social sustainability plays an important role, when talking about sustainable urban transformation, ensuring that cities are not only environmentally resilient, but also inclusive, vibrant and socially cohesive. Social sustainability can be understood as:

> *"The ability of a city to support social equity, community cohesion, and quality of life, while ensuring long-term resilience to social challenges"* (Dempsey et al., 2011).

The previous chapters have focused on environmental and ecological sustainability, through climate adaptation, nature-based solutions, biodiversity etc. This chapter shifts its focus to the people and the social dimensions of the sustainability term, emphasizing how urban spaces can contribute to well-being, community engagement, and everyday social life.

To improve the connections between people in the city, it's fundamental to shape collective areas and strengthen the belonging in the urban environment, when looking at the design of **public- and semi-public spaces**. Urban courtyards, as semi-public spaces, holds a significant potential for strengthening social interaction, inclusivity and community resilience, when designed with these principles in mind. The unique position between public and private space makes them an important area, when considering how cities can provide valuable, accessible and adaptable courtyards for diverse social groups.

New public domain

Hajer and Reijndorp (2001) emphasize that contemporary urban environments require a rethinking of public space to accommodate the different needs of the citizens. Their concept 'New Public Domain' highlights how public spaces are no longer singular, universally accessible arenas but rather **fragmented, layered and balanced between accessibility, control and function** (Hajer et al., 2001). Hajer and Reijndorp also argues that traditional public spaces such as streets and squares are being integrated, and in some cases replaced, by new hybrid spaces that blur the line between public- and private domains (Hajer et al., 2001). These spaces, including urban courtyards,

Courtyard Design			
Spatial Quality	Low	Medium	High
Optional Activities	Low	Medium	High
Social Interaction	Very low	Low - medium	High

Ill. 19. *"Livability" inspired by Jan Gehl*

must be designed to promote inclusivity, and on the same hand acknowledging the different ways on which different people use and experience a space.

One of the central ideas in the 'New Public Domain' is that **access alone does not define a successful public space**. The key element for this to happen is meaningful interaction and engagement (Hajer et al., 2001) This is particularly relevant when working with urban courtyards, which often serve as local and closed meeting spaces, rather than a fully open public square. In this context the theory underlines the importance of defining "publicness", that describes to which degree a space invites social encounters, promote engagement between different people and allows **multifunctional** use of the space (Hajer et al., 2001).

Human-Centered Use

Jan Gehl explores the concept of the role of public spaces in the development of social interaction and activities in cities. He supports the argument for human-centered design, that prioritizes social interaction and well-being. Gehl identifies **three types** of outdoor activities that inform the design of socially sustainable spaces:

Necessary activities, which occur regardless of the environment (for example, when taking the trash out or commuting)
Optional activities, that depends on the quality space and flourish in well-designed environments; and
Social activities, which emerge naturally when optional activities thrive (Gehl, 2010).

In other words, the presence and success of optional activities are closely tied to the quality of the physical space. When a space is thoughtfully designed, these activities are more likely to take place and contribute to the overall livability of the area. As shown in the diagram: "*Livability," Inspired by Gehl*. Social activities naturally emerge when optional activities are encouraged, and people engage more with their environment. Integrating features that encourage both spontaneous and planned interactions, can improve the social cohesion and local community. (Gehl, 2010)

The connection between **social- and environmental sustainability** is fundamental in designing courtyards that offer multiple benefits. Nature-based solutions and Spong City principles can provide both ecological and social advantages. Green courtyards can improve social well-being by enhancing air quality, providing shade, creating comfortable environments, and helping build stronger social ties through shared care of public spaces (Kabisch et al., 2017). Furthermore, biodiversity and a green infrastructure, can enhance urban life by frequently allowing residents to experience and engage with nature more. This could strengthen the psychological well-being and encourage stronger social bonds.
Additionally, flexible and multifunctional design allows the courtyards to adapt to different uses and user groups, young families, seniors, single people, couples, etc., making them more inclusive and livable. (Hajer et al., 2001)

Degrees of Privacy

The spatial hierarchy between private, semi-private, semi-public, and public spaces plays a fundamental role in shaping social interaction, safety, and a sense of belonging within residential environments.

Private spaces, such as ones home and garden, serve as intimate zones of retreat, while **semi-private** and **semi-public** areas like shared courtyards or access paths create opportunities for casual encounters and social familiarity. **Public** areas, such as town squares, are accessible to all and support broader urban engagement. The transition between these spatial types is crucial.

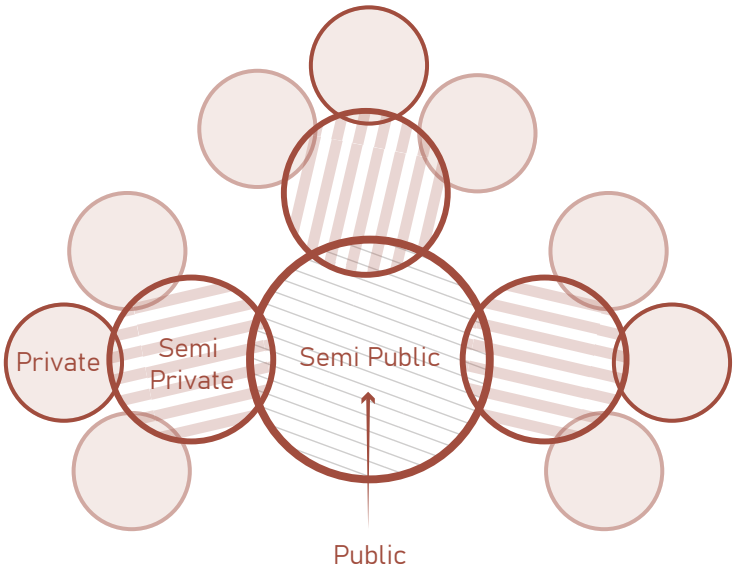
"The clear separation provides better overview, greater familiarity with the residents who belong there, and improved opportunities for group organization around solving common problems."

(Newman, 1972, cited in Gehl, 2003, p. 55)

This quote, along with the following diagram, emphasizes how such a hierarchical system create both community oversight and collective responsibility. When spatial design supports the ability to ***"move gradually from smaller groups and private spaces toward more public environments,"*** it enables a stronger sense of territoriality and social structure (Gehl, 2003, pp. 54–55). In sum, the implementation of a hierarchy between degrees of privacy, is not only about access or visibility but about facilitating belonging and mutual care in the built environment.

Sub-conclusion

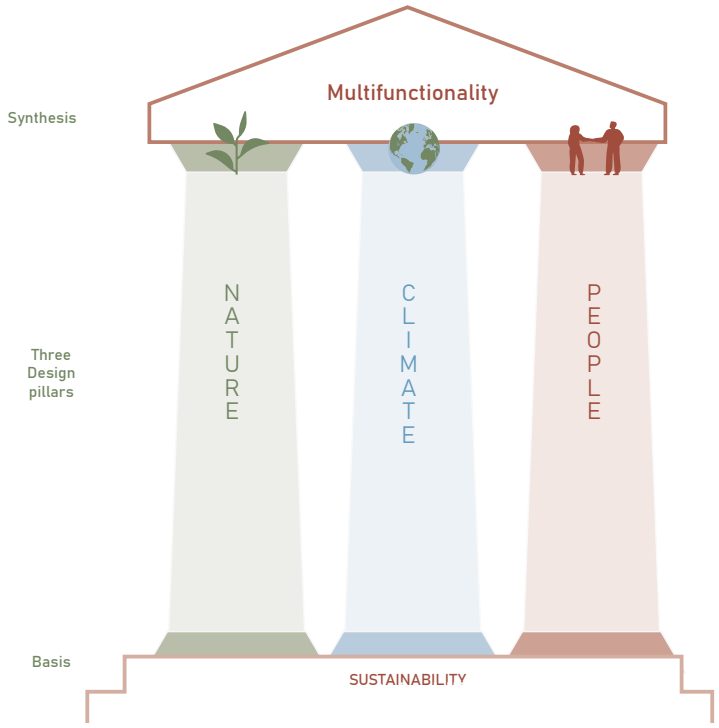
Courtyards can be designed to support both social and environmental sustainability, ensuring they remain **accessible, dynamic and socially connected**. The integration of public space theory, human-centered urbanism, together with prior climate and nature perspectives, provides a foundation for rethinking Aalborg's courtyards as multifunctional spaces.



Ill. 20. *"Degrees of Privacy" Inspired by Jan Gehl*

Ill. 21. *Livability collage*

FOR CLIMATE, NATURE AND PEOPLE



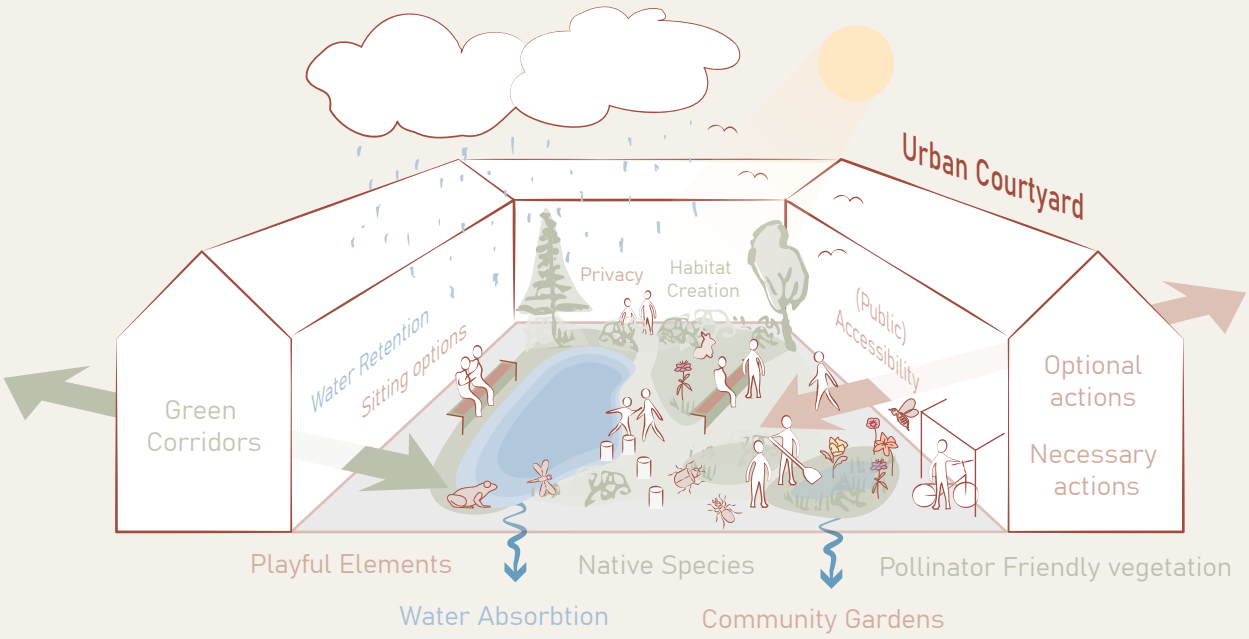
Ill. 22. *Towards multifunctionality*

To sum up the prior insights gained in developing the theoretical foundation, urban courtyards represent an overlooked but important role in the transformation towards more sustainable cities. Courtyards hold untapped potential to address the interconnected challenges of the **climate-, and biodiversity crisis**, together with the **social challenges of urban life**. Meaningful change doesn't come from addressing climate, nature, and social life as separate agendas, but from the synergies between them. When approached holistically, courtyards can become **climate buffers, ecological habitats**, and **social meeting places** all at once.

From a **climate adaptation** perspective, courtyards can evolve into active water storage buffers, supporting **water retention**, and **water absorption,** for delaying stormwater and minimising flooding. As argued by Isaksen (2025), the era of reactive quick-fix solutions must be replaced with holistic, nature-based approaches that work with the natural dynamics of nature.

In terms of **nature integration**, the courtyards should offer initiatives to reverse biodiversity decline by supporting **native species, pollinator-friendly vegetation,** and **habitat creation**. As argued by Kabisch et al. (2017), integrating biodiversity and nature in general into dense urban settings increases resilience, while benefiting public health and the human-nature connection central to biophilic urbanism as defined by Beatley (2010) and Wilson (1993). Connection to broader **green corridors,** courtyards can function as ecological stepping stones, as part of a more systemic approach to biodiversity recovery, also supported by the Biodiversitetsrådet (2023).

Courtyards can play a key role in creating **social sustainability** countering the feeling of social fragmentation in the urban fabric. As noted by Gehl (1971), *social life thrives in spaces designed for optional and social activity, not just necessary actions*, though these necessary actions should still be preserved. With elements such as **sitting options, playful features,**



Ill. 23. *Towards Multifunctional Urban Courtyards*

and **shared gardens/ urban farming**.
Courtyard's position between public and private realms creates opportunities for both **(public) accessibility** and **privacy**, reinforcing the concept of the new public domain described by Hajer and Reijndorp (2001).

The points made clear in this summary, is synthesised and put in context in the diagram: *Towards Multifunctional Urban Courtyards*.

What makes these themes truly impactful is not just their individual contributions - the magic lies in overlaps between them, where one intervention supports multiple outcomes, and creates synergy across the themes. For instance, water management not only helps reduce flood risk, but also enhances the self-sufficiency of vegetation and makes maintenance easier, thereby supporting long-term biodiversity.

Community gardens, an initiative to strengthen social cohesion, also foster a deeper human-nature connection and can double as pollinator-friendly landscapes. Likewise, a water retention element, initially designed for climate adaptation, can evolve into a habitat for small aquatic lifeforms or function as a playful feature that invites children to engage with water through play, fostering optional and social activity.

These examples illustrate how well-designed multifunctionality in courtyards can create **synergies** across **climate, nature,** and **social** dimensions, unlocking far greater value than when treated separately. Courtyards, if reimagined as multifunctional spaces, can reflect this idea, supporting each theme simultaneously and synergetically, and making the result greater than the sum of each part, as illustrated in below.

1 + 1 + 1 = > 3

Urban courtyards represent a unique but often overlooked opportunity to address multiple sustainability challenges within the dense fabric of our cities. These spaces hold the potential to become vital components in the transition toward greener, more resilient urban environments. By integrating climate adaptation, nature integration, and social sustainability, courtyards can serve as multifunctional spaces that strengthen both ecological health and community connections.

However, unlocking this potential requires a holistic design approach that moves beyond isolated interventions, instead embracing the synergies between these interconnected themes. This project aims to explore how these underutilized pockets of the city can be reimagined to deliver meaningful impact across multiple dimensions, treating courtyards not as leftover spaces, but as critical elements in a broader urban ecosystem.

This leads to the problem statement that drives this master thesis:

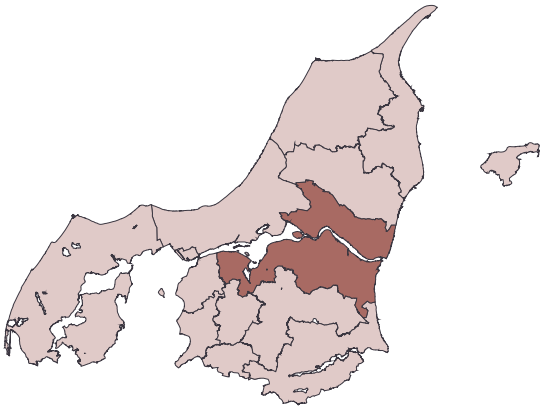
PROBLEM STATEMENT

*"How can urban design support the **sustainable transformation** of **Aalborg's** underutilized **courtyards** into multifunctional environments that integrate **nature, water management**, and **social interaction**, exemplified through a design proposal for a specific project site?"*

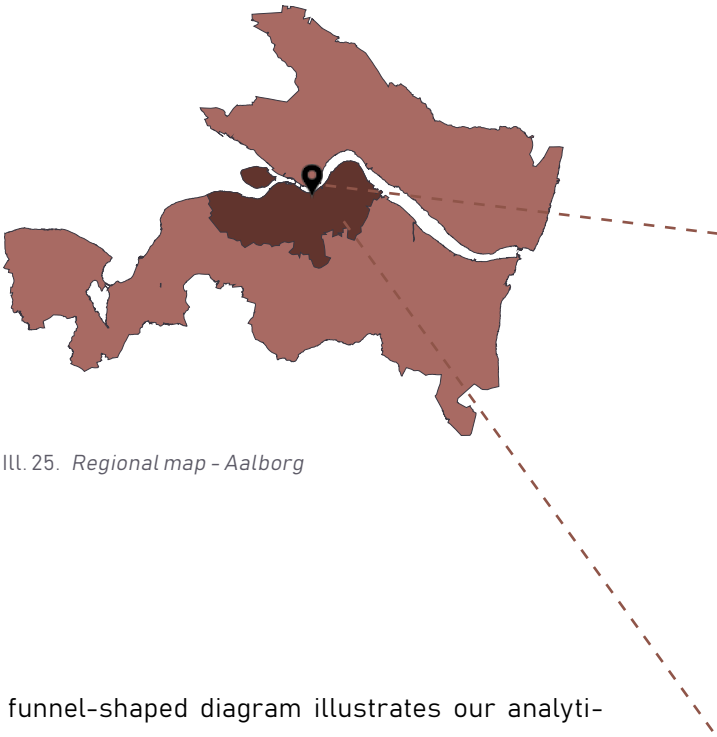
02
EXPLORATION

exploration
/ˌɛksplə'reɪʃn/

noun
1. the action of exploring an **unfamiliar** area.
"space exploration"



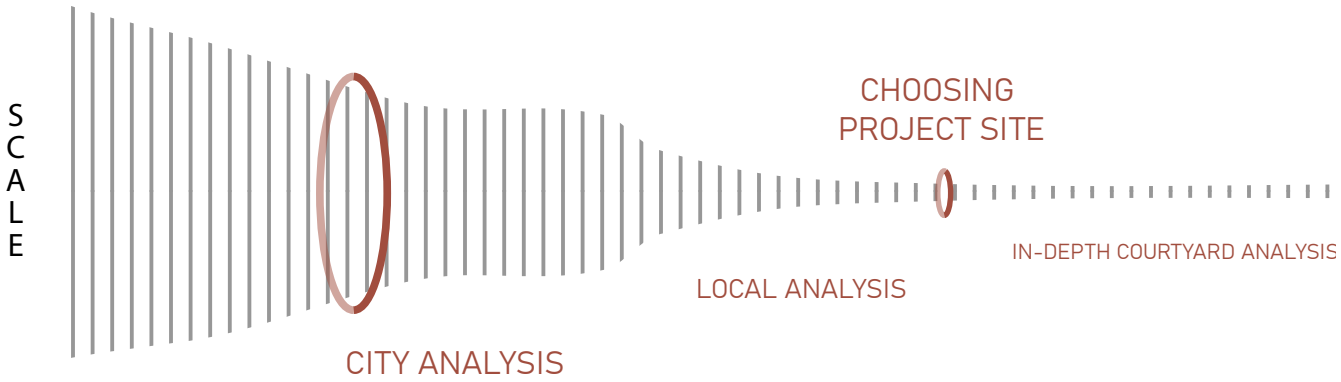
Ill. 26. *Nordjylland*



Ill. 25. *Regional map - Aalborg*

The city analysis provides a broad understanding of Aalborg's urban structure, with a particular focus on water-related challenges and spatial dynamics. This scale allows us to identify key patterns and risks while setting the framework for more detailed investigations.

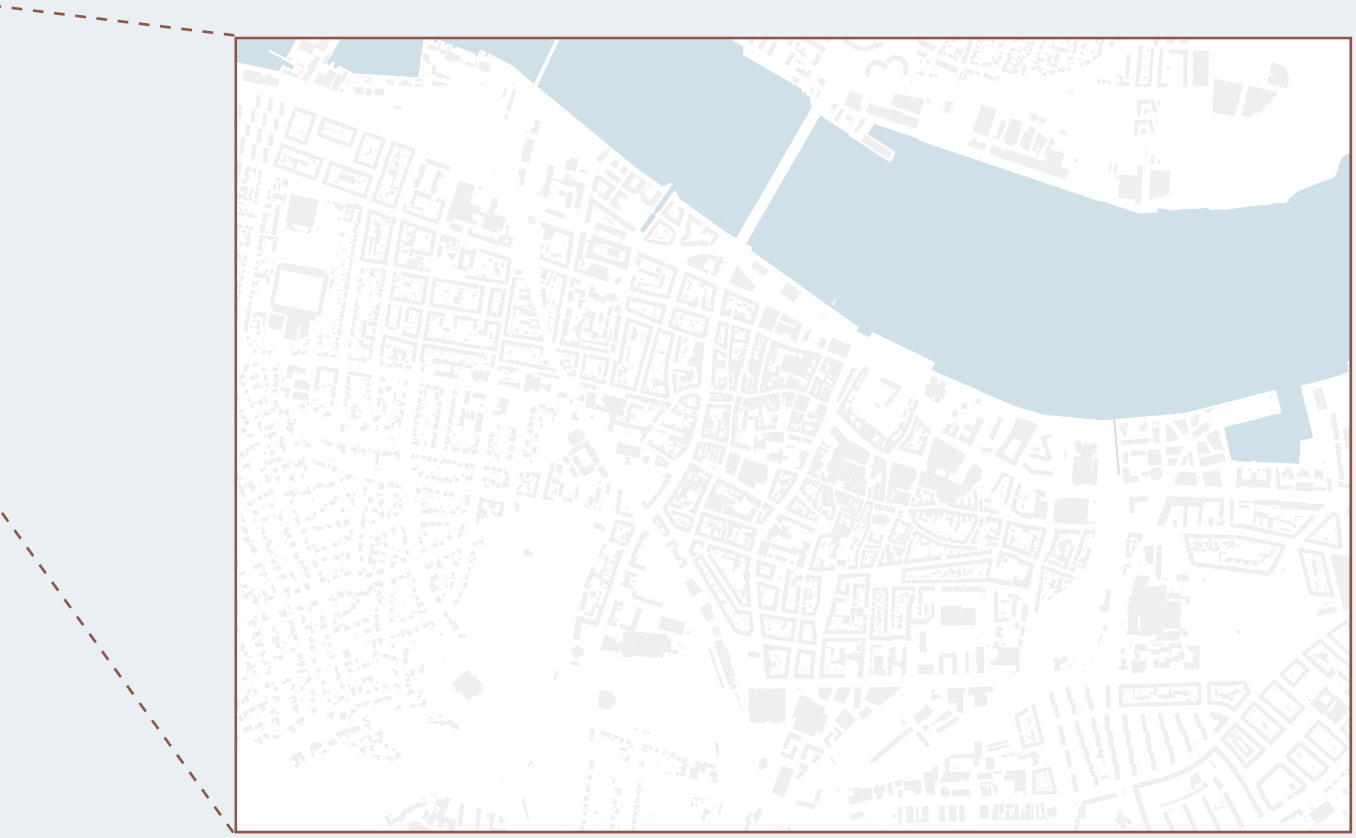
The funnel-shaped diagram illustrates our analytical approach - starting with a WIDE perspective and gradually narrowing the focus down. This method ensures a structured transition from large-scale urban dynamics to more design specific interventions.



Ill. 24. *Analysis Approach*

CITY ANALYSIS

TOWARDS CHOOSING LOCAL AREA



Ill. 27. *1: 20.000 - City Scale, area*

CITY DEVELOPMENT

This timeline illustrates the **evolution of Aalborg** from its prehistoric roots to its modern urban landscape and future ambitions. It traces the **city's transformation** from early settlements and agricultural hubs to a thriving industrial centre, and ultimately into a forward-looking knowledge and innovation hub.

Each phase highlights key historical milestones, economic shifts, and urban planning strategies that have shaped Aalborg's physical and social fabric over the centuries. This overview provides essential knowledge for understanding the city's past, present, and future, setting the stage for further analysis and design process.

As industrialisation accelerated and the city expanded beyond its medieval boundaries, a new urban morphology began to take shape. One of the most defining features of this transformation was the emergence of perimeter blocks.

How has Aalborg developed?

Hunter-gatherers settled in the area, especially along the Limfjord.

Early Stone Age
ca. **9000– 4000** BC

Introduction of agriculture led to forest clearing and **land cultivation.**

Late Stone Age
ca. **4000 - 1700** BC

Communities engaged in farming. Burial sites were built, many of which remain visible today.

Bronze Age
ca. **1700–500** BC

Increased land cultivation and cultural development.

Iron Age
ca. **500 BC - 800 AD**

Cultural and religious expansion still seen e.g. at Lindholm Høje, with well-preserved stone settings.

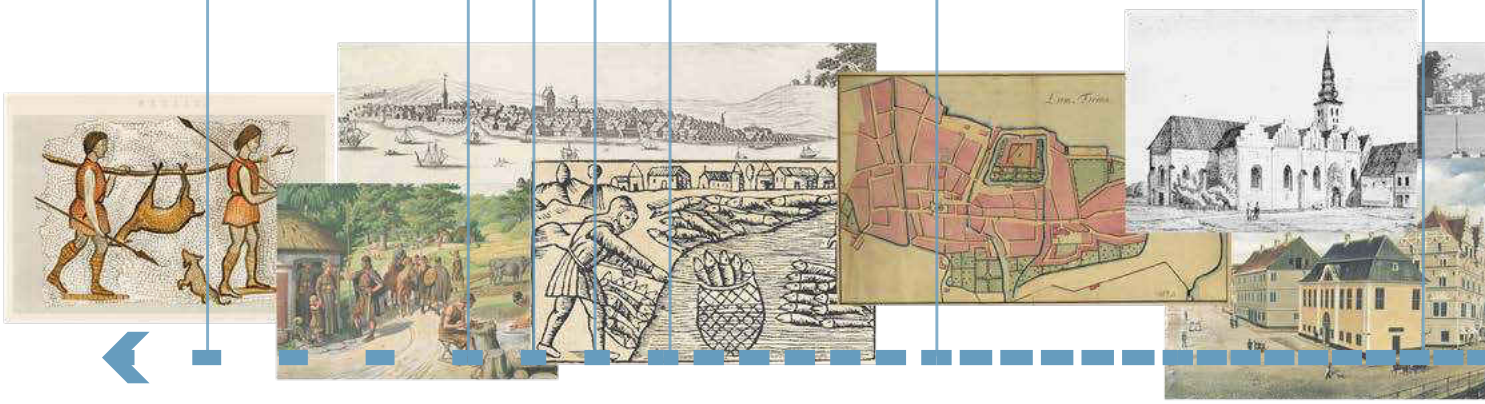
Viking Age
ca. **800 - 1050 AD**

in the Limfjord after the western outlet of the fjord closed around the year 1100. Herring fishing was a major driver of the town's economy.

Early Aalborg
1050 - 1536

Herring and grain trade made Aalborg the **second-largest city in Denmark by 1600,** but declining fishing, political shifts, and losing Norway in 1814 led to economic struggles. The 1825 reopening of Limfjord's outlet weakened its strategic role.

The Market Town
1536–1850



Past

9000 BC - 1050 AD
Prehistoric Aalborg

1050 - 1900
Early Development

Ill. 28. *City development timeline*

Perimeter blocks became a dominant urban form between **1870 and the 1920s**, especially in areas just outside the medieval core. The population grew rapidly – from around 14,000 in 1880 to over 31,000 in 1901 – and new neighbourhoods were developed to house the expanding working class. These blocks were typically 3–6 storeys, often built around small, shaded courtyards used for livestock, latrines, or workshops (Marling & Knudstrup, 1998).

The buildings were marked by red brick, ornamented facades, and styles like Historicism and National Romanticism. Though modest in comfort, these courtyard blocks shaped the foundational spatial logic of Aalborg's dense city structure – many of which remain today as key sites for urban renewal (Marling & Knudstrup, 1998).

fueled growth. **The railway (1869) and the Limfjord bridge (1865)** boosted trade, and by 1900, Aalborg had 30,000 residents and a booming industrial workforce.

Industrial Growth
1850–1900

Aalborg's port became Denmark's second-largest, and factories like Aalborg Portland and Dansk Eternit thrived. **By 1960, half the population worked in industry** , but decline began in the 1970s, marking a shift away from manufacturing.

The Industrial City
1900–1970

Aalborg University was founded, strengthening the city's education sector and contributing to more diverse business.

1974

Aalborg started shifting from an industrial city to a **knowledge and education** city, with early redevelopment of old industrial areas west of Limfjordsbroen.

1990s

The transformation gained momentum, with major urban development projects reshaping the city.

2000s

The Kultur bro was built, improving the connection between Aalborg and Nørresundby and supporting the city's **cultural development**.

2017

The Climate Plan set a goal to reduce Aalborg Municipality's greenhouse gas emissions by 70% by 2030, adopted by Aalborg City Council on August 15, 2022.

2022

Rich Nature in Aalborg Municipality – A **biodiversity strategy** was accepted by Aalborg City Council in April 2017.

2017

Sygehus Nord & Gåsepigen: **Relocation of Sygehus Nord** in 2026-2027, Aalborg Municipality plans to transform the area including a new pedestrian and cycling bridge.

2026

Mobility 2040: Aalborg City Council accepted an action plan focused on developing future mobility to support urban and business development.

2040

An initiative focusing on climate adaptation through the separation of wastewa – ter and **stormwater** sewage systems. With a goal of full implementation of separate sewage system in the entire municipality by 2100.

Towards 2100

1900-1970
The Industrial City

1970-...
Modern Development

Present

Future

BUILT STRUCTURES

How is Aalborg City structured?

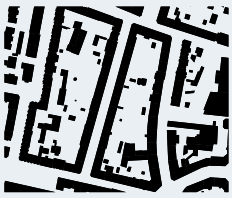
Looking at the built structures of Aalborg, *Nolli mapping* is applied, as a cartographic technique that represents the built environment by distinguishing between built and open spaces. This method uses a black on white approach where buildings are shown as solid black masses, while open spaces such as streets, plazas, and courtyards are white.

The mapping shows the density of the city center, with closely packed buildings and minimal gaps between structures. The narrow street network, typical of medieval urban development suggests a strong public-private spatial hierarchy, and together with the presence of perimeter blocks, where buildings enclose interior courtyards, the spatial hierachy, thus high density, is defined.

Moving outward from the center, the built fabric becomes more fragmented, with larger open spaces and fewer enclosed courtyard structures.
This transition marks the introduction of modernist planning principles, characterized by more detached buildings, open green spaces, and wider streets, creating a noticeable variety in spatial organization.
This spatial variety becomes more evident when examining the different building typologies, which are identified and categorized in the accompanying diagrams.

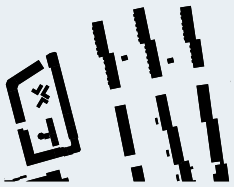
Ill. 29. *1 : 15:000 - Nolli map*

What- and where are the different typologies in Aalborg City?



1. Perimeter Block
Dominant in: The city center and older urban expansions (e.g., Øgade-kvarteret and Vestbyen)

2. Row Housing
Dominant in: Transitional areas between the inner city and suburban districts (e.g., Hasseris, Vejgaard, and some parts of Nørresundby)



3. Slab Blocks
Dominant in: Post-war housing and large residential areas (e.g., Aalborg Øst, parts of Nørresundby, and Hasserisgård)

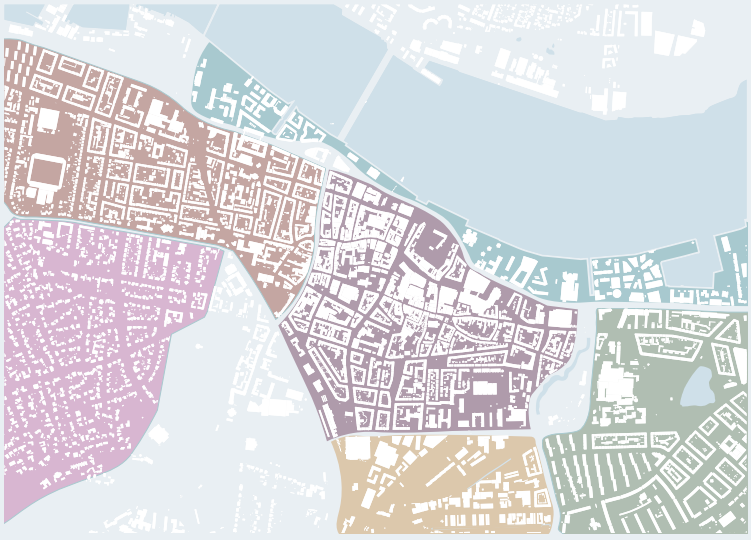
4. Point Houses
Dominant in: High-density residential areas and mixed-use developments (e.g., Østre Havn, Eternitten, and newly developed waterfront districts)

5. Detached Single- Family Homes
Dominant in: Suburban and peripheral districts (e.g., Hasseris, Gug, and Skalborg)

DISTRICTS

Where are the diffrent districts of Aalborg located?

Aalborg is a city characterized by various districts, each with distinct urban qualities shaped by its spatial, functional and historical character. These characteristics of each district is presented in the following list, defined by their urban fabric and spatial organization as observed shown on the mapping.



Ill. 30. *1: 30:000 - District map*

How are different districts of Aalborg characterised ?

Midtbyen
The core of Aalborg, a relatively dense and compact area with an irregular street network, reflecting its historical roots. This district is also the cultural center, featuring a mix of retail spaces, offices, and public squares. The well-integrated streets and squares promote pedestrian activity, and the prevalence of perimeter blocks adds to its urban character.

Havnefronten
Havnefronten is an example of Aalborg's urban transformation. Once functioning as an industrial harborfront, and now redeveloped into a modern, mixed-use area with new residential buildings, office spaces, cultural institutions and a series of landmark buildings. The open structure and accessibility to the water make it a key recreational public space.

Vestbyen
Vestbyen extends the dense urban grid of the city center but with slightly larger blocks and a more open structure. Primarily a residential area, it has a mix of housing types, from older apartment buildings to newer developments. Historically, Vestbyen was an industrial area with strong ties to Aalborg's shipbuilding and manufacturing industries, though today it is mainly a residential neighborhood with local shops and community spaces.

Hasseris
Hasseris stands out as more suburb. Its urban form is characterized by loosely packed streets and detached houses with large private gardens. The area is predominantly residential, and home to higher-income families, and offers a more secluded and greener environment compared to the denser districts closer to the city center. With access to suburban parks and green buffers, Hasseris provides a contrast to the more compact urban districts of Aalborg.

Godsbanearealet
Formerly a logistical and industrial zone, Godsbanearealet has been redeveloped into a mixed-use district with a focus on residential development. This transformation, similarly, to Havenfronten, reflects a broader trend in Aalborg, where former industrial areas are repurposed to accommodate the city's growth and shifting economy. A shift from its industrial past to a knowledge-based community.

Øgadekvarteret
Once the home to factory workers, Øgadekvarteret is now a residential neighborhood with a structured, grid-like street pattern. The area consists of mid-density housing, primarily apartment blocks, and benefits from proximity to green spaces such as Østre Anlæg and Karolinelund, which provide recreational opportunities. While mainly residential, the district also hosts schools, local businesses, and institutions that support everyday life.

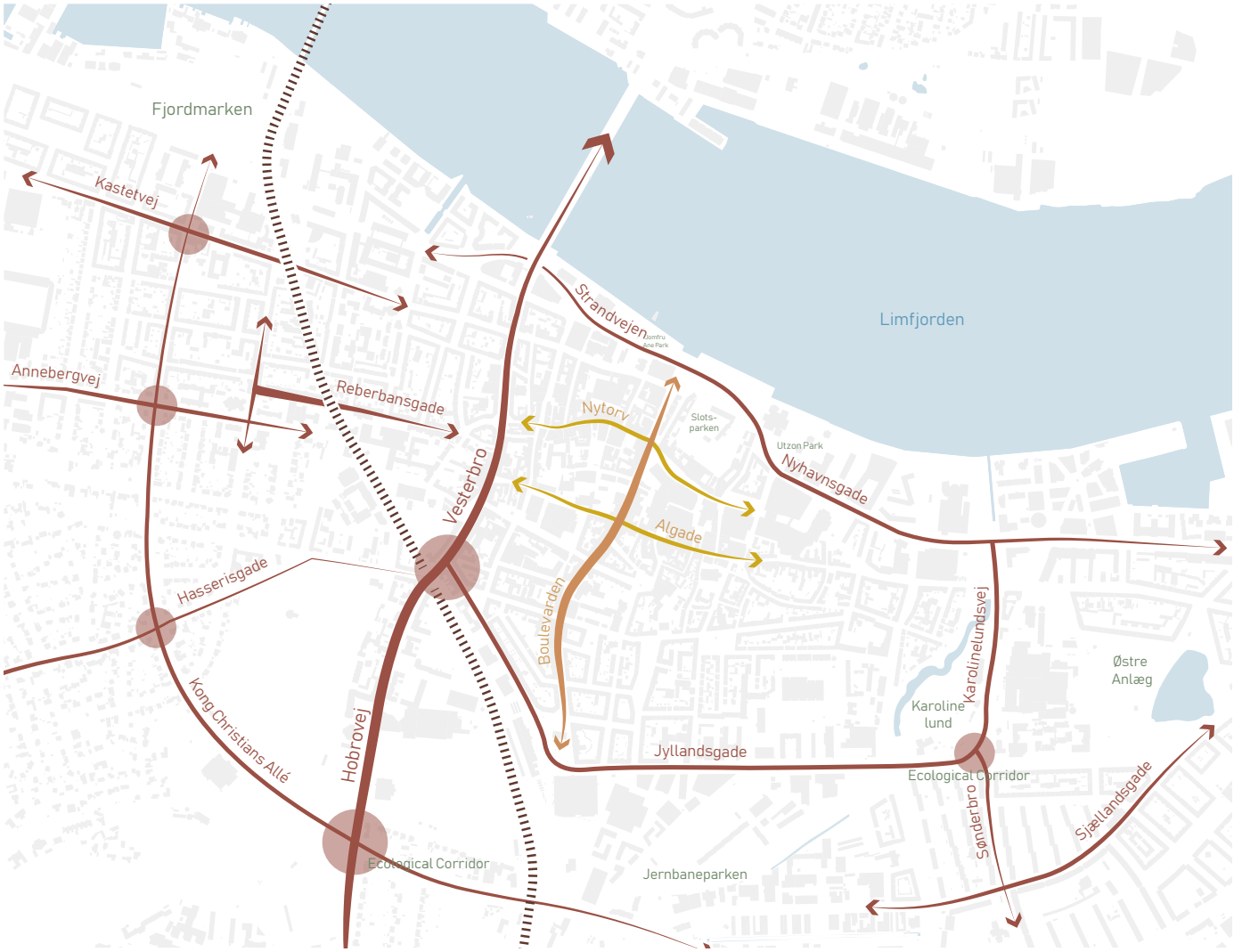
INFRASTRUTURE

How are people moving through Aalborg City?

The map reflects Aalborg's mobility infrastructure, with characteristic vehicular, pedestrian, and mixed-use mobility patterns. The dominance of car infrastructure is evident in the major roads such as Hobrovej, Vesterbro, Karolinelundsvej, and Nyhavnsgade, which serve as key arterial routes for traffic flow within and beyond the city center. These roads clash at intersections, like around Vesterbro, Sønderbro, and Karolinelundsvej, with high traffic volumes, noise, air pollution and potential traffic congestion. Additionally, the bridge crossing the Limfjord plays a crucial role in regional connection.

What modes of mobility is commonly used ?

The pedestrian network is concentrated around Boulevarden, Algade, and Nytorv, marking the city's primary commercial and social spaces. This pedestrian-oriented core suggests walkability as prioritized, supported by retail, cafés, and cultural activities that contribute to a dynamic street life. The pedestrian network appears concentrated towards the centre, with most walkable areas confined to the historic core while other parts remain dominated by vehicular infrastructure. Mixed-use streets as Boulevarden, for instance, facilitate both modes of mobility.



Ill. 31. *1:15:000 - Infrastructure*

GREEN- & BLUE STRUCTURES

How are natural structures integrated into Aalborg City?

The map shows the distribution of green- and blue structures in Aalborg, analyzing the presence of natural elements within the urban fabric. The most dominant blue element is Limfjorden, which acts as a major geographical and ecological feature, providing both a physical barrier and an important recreational and environmental resource. Given its proximity to the city center, the fjord influences urban climate, biodiversity, and recreational activities while also posing challenges related to flooding and water management.

Recently, Østerå was reopened after being covered for decades. This transformation aims to improve urban biodiversity, manage stormwater, and create a dynamic space for nature enthusiasts and the local community to engage with the natural environment (Aalborg Kommune, 2022c). The reopening of Østerå represents a significant step towards integrating blue-green infrastructure in Aalborg, enhancing both the ecological resilience and social value of the city center.

Green structures are scarcely distributed throughout the city, with forests, larger parks, and green spaces primarily located on the outer perimeter of the city core. Notable areas include Skovdalen, Kildeparken, Karolinelund, and Jernbaneparken, which serve as key recreational and ecological spaces.

Ill. 32. *1:15.000 - Green- and blue structures*

The presence of Slotsparken and Østre Anlæg indicates an effort to integrate greenery into the urban environment, though the distribution suggests that central areas might have fewer publicly accessible green spaces.

In the context of courtyard environments, the map suggests that while large public green spaces are present, smaller-scale green interventions within courtyards might be necessary to provide easy access to nature and enhance biodiversity. The spatial gaps between green areas could also indicate opportunities for improving connectivity through green corridors or micro-green spaces, helping to integrate green (and possibly blue) structure into the dense urban fabric.

What are the different types of green structures?

Large Public Parks

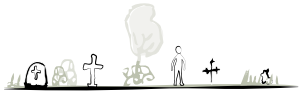
Fjordmarken, Karolinelund, Østre Anlæg, Kildeparken
These parks have large flat grass lawns, which can be habitat for native plant species, and bushes or large trees can provide homes for small animals, and act as corridors for birds and insects.

Public Forest

Skovdalen
Public forests, such as Skovdalen, are vital for biodiversity due to their natural complex ecosystems. Forests host a wide range of flora and fauna, with trees, shrubs, and undergrowth supporting many species of birds, mammals, insects, and fungi.

Smaller Community Parks

Jomfru Ane Park
Smaller pocket parks like Jomfru Ane Park, although limited in size, can still enhance urban biodiversity. Jomfru Ane Park are designed with a focus on native plants, creating microhabitats for pollinators like bees and butterflies. Urban pocket parks can also act as stepping stones for wildlife movement in the bigger perspective of the city. For small parks to work as stepping stones, they need to be somehow connected into a series.

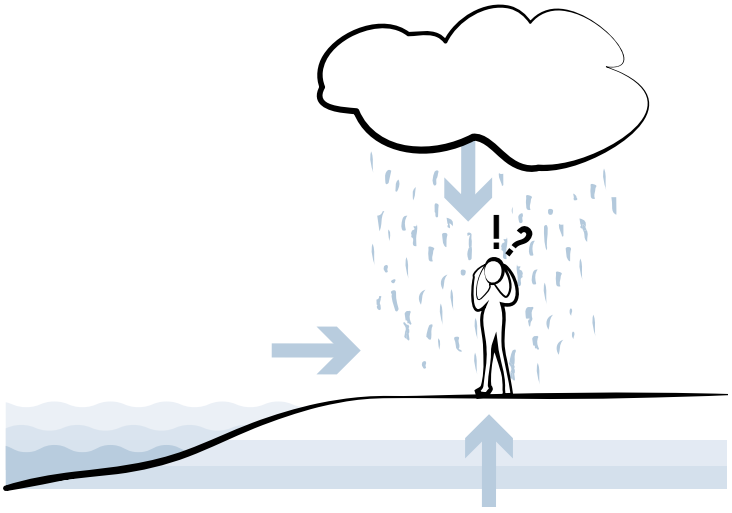


Cemetery

Almen Kirkegård
Though often overlooked as a biodiverse space, cemeteries like Almen Kirkegård can foster biodiversity by offering areas of calmness and minimal disturbance. It features a mix of big, old trees, grassy areas, and a variety of plant species. These spaces can act as refuge for birds, insects, and small mammals, while certain graveyard plants like wildflowers can provide additional food sources for pollinators like bees.

Ill. 33. *Different types of green structures*

HYDROLOGY



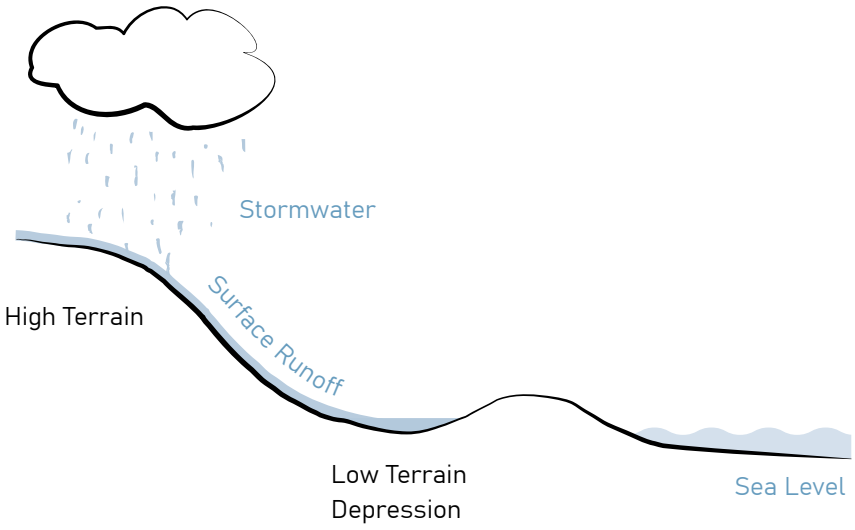
Ill. 34. *Hydrology I.*

How is Aalborg affected by water?

Climate change presents a global challenge, intensifying extreme weather events and increasing water-related risks. Rising sea levels, storm surges, and extreme rainfall events threaten urban environments, necessitating a proactive approach to design and planning.

Aalborg is particularly subject to these challenges, facing risks from stormwater, rising groundwater, and coastal flooding. The upcoming series of analyses will examine these threats using, among other methods, topographic and hydrological mapping techniques to identify critical flood-prone areas. This will provide an overview of where flooding is most likely and guide the selection of specific locations for a more detailed study.

Later in the project, these insights will support the redesign of a chosen courtyard to improve their ability to manage water effectively and reduced flooding risks.



Ill. 35. *Hydrology II.*

What shaped the terrain of Aalborg?

Aalborg's terrain was largely shaped by glacial movements during the last ice age. As glaciers advanced and retreated, they sculpted the landscape, creating the varied elevations we see today.

Looking at the map, Aalborg's terrain is characterized by a variation in elevations, with slopes towards the Limfjord. This can be influencing both for the built environment and water management strategies. In the southern parts of the city, such as Hasseris and the surrounding suburban areas, the terrain is more elevated, offering scenic viewpoints and natural drainage towards lower-lying districts . As one moves closer to the city centre and waterfront, the terrain flattens, making these areas more prone to water accumulation. Local depressions in the terrain are also mapped, as they are threatened by water accumulation.

As seen in the diagram the natural topography also affects stormwater management, as runoff from higher areas accumulates in the lower-lying city districts, increasing pressure on the urban drainage network.

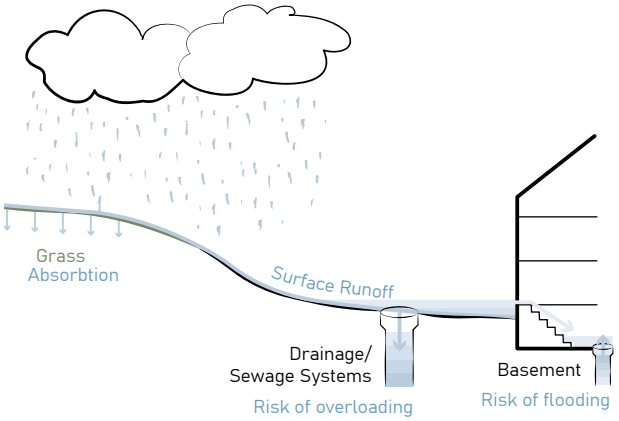
Ill. 36. *1:15:000 - Terrain*

STORMWATER

How is stormwater a threat?

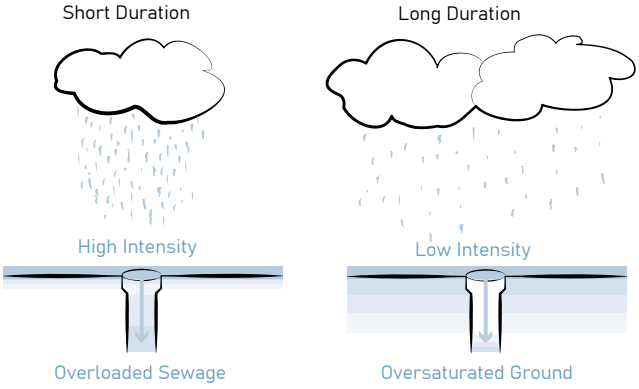
Aalborg experiences significant volumes of stormwater, with rainfall patterns varying between short, high-intensity storms and prolonged, low-intensity rainfall. These variations impact how water moves through the city, influencing flooding risks, drainage capacity, and urban resilience.

The diagram highlights another critical issue, related to stormwater: basement flooding. When drainage systems are overloaded, excess stormwater can back up through the sewage network, leading potential damage.



Ill. 37. *Basement flooding*

High-intensity, short-duration storms generate large amounts of water in a short period, overwhelming drainage systems and causing flash flooding, as illustrated in the diagram. This leads to surface runoff accumulating on streets and in low-lying courtyards. In contrast, long-duration, low-intensity rainfall gradually saturates the soil, reducing infiltration capacity and increasing the likelihood of groundwater rising, which can place additional stress on the drainage network.



Ill. 38. *Flash flood*

What happens in extreme stormwater events?

The mapping illustrates the extent of flooding during extreme rainfall events:

10-year event (50mm rain)
Flooding mainly affects streets, courtyards, and other localized areas with inadequate drainage.

50-year event (100 mm of rain)
These larger storm events cause more wide-spread flooding, affecting infrastructure and larger urban zones.

100-year event (140mm rain)
This level of rainfall results in extensive flooding across Aalborg, particularly in areas near the Limfjord and other low-lying districts.

Ill. 39. *1:15:000 - Stormwater*

SEA LEVEL

How is the rising sea level a threat?

As a coastal city situated along the Limfjord, Aalborg faces increasing risks from rising sea levels. The fjord, which lies at sea level, is particularly vulnerable to climate change-induced water level rise, potentially leading to coastal flooding and damage to infrastructures. The diagram illustrates how low-lying urban areas are at risk, emphasizing the need for adaptive planning to protect both residential and commercial districts from inundation.

Ill. 41. *Sea level rise*

How much will the sea level rise?

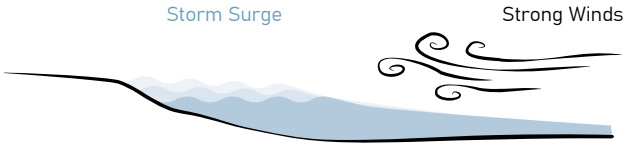
According to climate projections, sea levels are expected to rise significantly over the next century. Under the RCP 4.5 scenario, a moderate climate change projection, Aalborg could experience a **700 mm** sea level rise over the next 100 years.

This increase, combined with more frequent storm events, poses a major challenge for the city's waterfront developments and existing flood defences.

STORM SURGE

How is storm surge a threat?

Storm surges occur when strong winds push water into the Limfjord, leading to rapid rises in water levels, as depicted in the diagram. These surges intensify during extreme weather events, overwhelming drainage systems and causing severe flooding along the coastline. Due to Aalborg's topography and proximity to the fjord, storm surges increacese the risk of areas in Aalborg flooding, as seen in the mapping.



Ill. 42. *Storm surge*

Ill. 40. *1 : 10:000 - Sea level and Storm surge*

What happens in extreme storm surge events?

The mapping highlights the potential impact of extreme storm surge events in Aalborg:

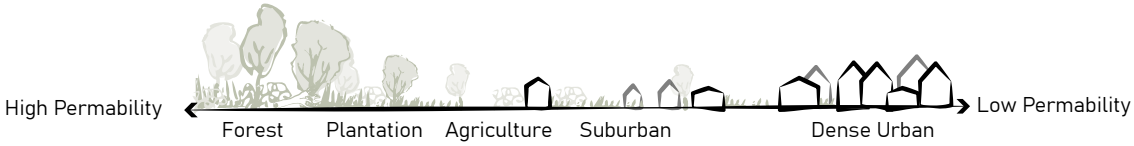
10-year event (1,200 mm storm surge)
Shown in dark blue, this level of flooding affects coastal streets, lower-lying districts, and infrastructure near the waterfront.

100-year event (2,030 mm storm surge)
This extreme event results in extensive flooding, reaching deeper into the urban fabric and threatening critical infrastructure, residential areas, and commercial zones.

SURFACE PERMABILITY

What makes a surface permable?

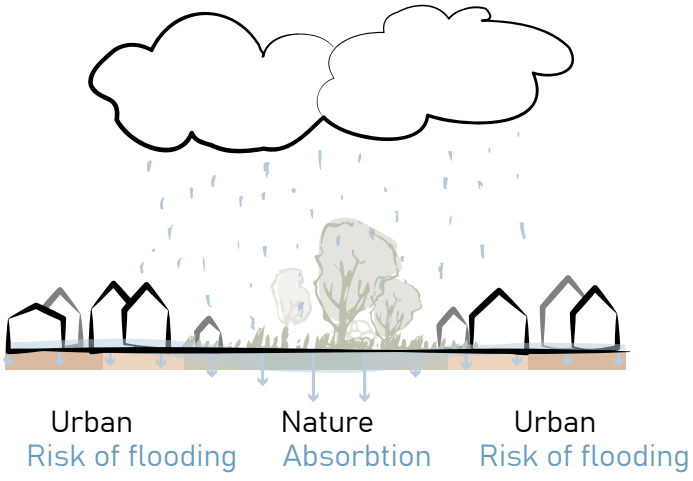
Surface permeability refers to how well the ground can absorb and allow water to infiltrate. The diagram illustrates a permeability scale, ranging from highly permeable natural environments, such as forests and heathlands, to low-permeability urban areas with dense built surfaces like asphalt and concrete. Natural surfaces, rich in vegetation and soil, absorb rainwater efficiently, while paved areas prevent infiltration, increasing runoff and flood risks.



Ill. 43. *High- and low permability*

How does surface permeability affect flooding risks?

Permeability plays a critical role in managing stormwater. As the diagram highlights, green areas with dense vegetation allow water to drain naturally, reducing surface runoff and reducing pressure on drainage systems. In contrast, urbanized environments with impervious surfaces struggle to absorb water, leading to increased runoff, water pooling, and potential flooding.

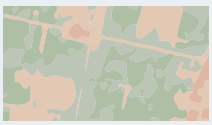


Ill. 44. *Natural absorbtion*

Where are the permable surfaces in Aalborg ?

The mapping provides a look at Aalborg's surface permeability, where:

Red areas indicate the least permeable surfaces, These locations are most at risk for urban flooding due to poor water absorption.



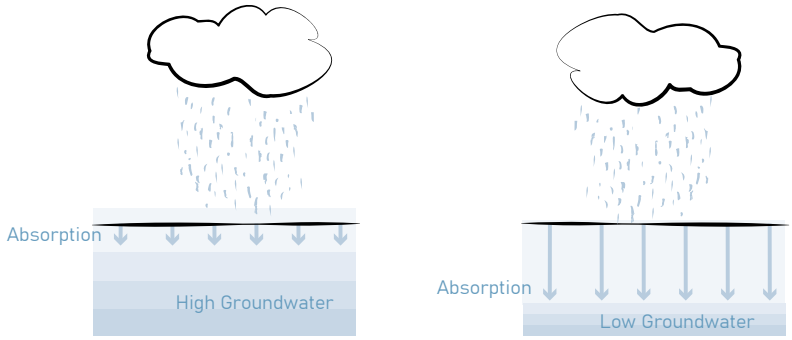
Green areas represent permeable land cover, including parks, forests, and other vegetated spaces that naturally absorb water and reduce runoff.

Ill. 45. *1 : 15:000 - Surface permability*

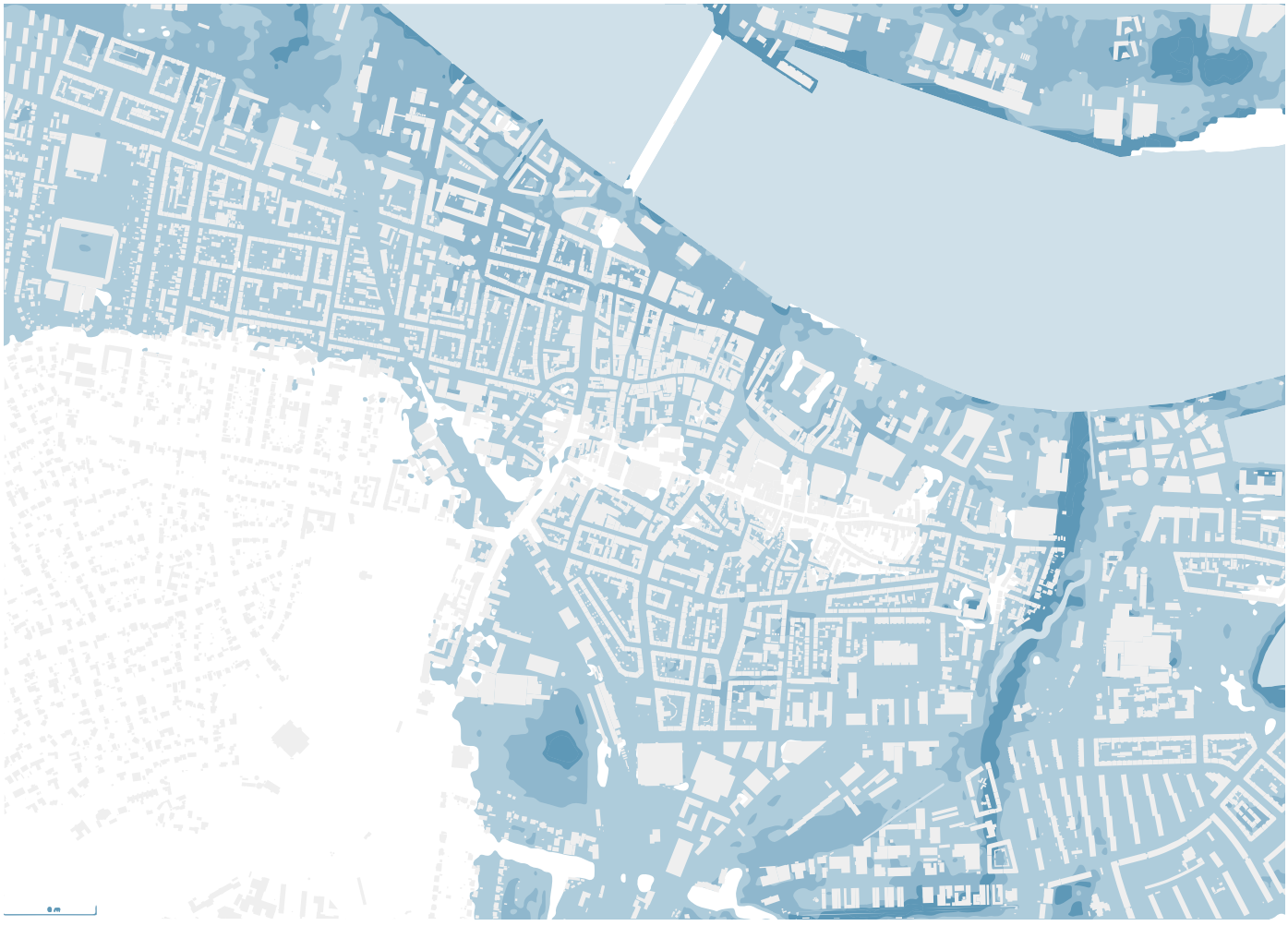
GROUNDWATER

Why is groundwater a threat?

High groundwater levels cause a challenge in Aalborg, particularly in areas where the water table is close to the surface. When groundwater levels are high, the soil's ability to absorb additional rainwater is greatly reduced, hindering natural drainage and increasing surface runoff. The diagram illustrates how saturated ground prevents infiltration, leading to water accumulation on the surface and an increased risk of urban flooding.



Ill. 47. *Groundwater*



Ill. 46. *1:15.000 - Groundwater*

Where is the groundwater level highest in Aalborg?

The mapping provides an overview of groundwater levels across Aalborg, highlighting the most vulnerable areas where the water table is closest to the surface Beyond flooding, high groundwater levels can also impact building foundations, basements, and underground infrastructure. With climate change and extreme weather events, groundwater levels are expected to rise, making urban water management an even greater challenge in the coming decades.

Groundwater table: < 0.5 m under ground
These areas face the highest risk, where groundwater is near or at the surface, significantly limiting drainage capacity. Flooding is highly likely, especially during heavy rainfall events.

0,5 m – 1 m under ground
Moderate-risk areas where infiltration is restricted. Prolonged wet periods can lead to standing water and an increased risk of basement flooding.

1 m – 2 m under ground
Groundwater is deeper below the surface, allowing for better drainage. However, in extreme weather conditions, rising groundwater levels can still contribute to localized flooding.

> 2 m under ground
This extreme event results in extensive flooding, reaching deeper into the urban fabric and threatening critical infrastructure, residential areas, and commercial zones.

LOCATIONS OF INTERST

Based on the city analysis, several locations in Aalborg have been identified as critical due to overlapping challenges, including flooding, poor surface permeability, and high groundwater levels. These factors contribute to increased water accumulation and flood risk, making these locations particularly relevant for the design team.

Given these identified challenges, further on-site investigations were conducted to observe, document, and analyze the specific conditions of each location.

These observations will be presented in the following sections, providing deeper insights into potential solutions and urban resilience strategies.

The selection of focus areas was not solely based on risk factors. Existing spatial qualities - such as the structure of courtyards, accessibility, and potential for green transformation - were also key criteria. The aim was to identify places where urgent challenges and clear design opportunities intersect, enabling meaningful interventions that integrate water management, nature, and strong social foundations.

1 Løkkegade
High flood risk due to stormwater accumulation, exacerbated by low terrain and impermeable surfaces.

2 Frederiks Torv
Vulnerable to both stormwater, flooding and groundwater rise, with limited drainage capacity.

3 Kennedy
A dense urban area with minimal green spaces, leading to poor water absorption, increased runoff, and flood risk.

4 Vesterbro
A critical infrastructure, experiencing frequent stormwater accumulation, with no nearby green areas to support drainage.

5 Korgade
Prone to both stormwater and groundwater-related flooding, worsened by extensive impermeable surfaces.

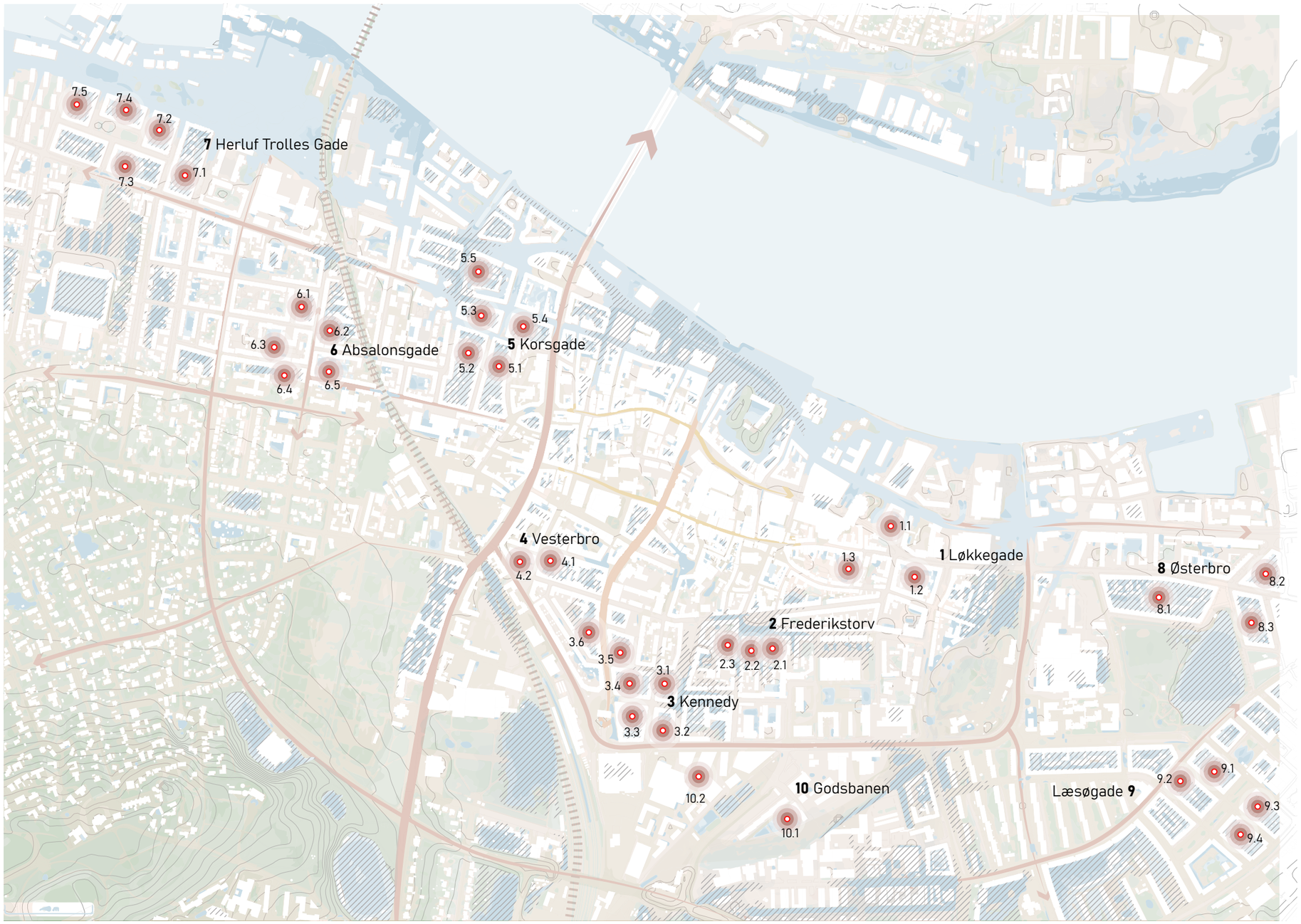
6 Absalonsgade
Features limited permeability and poor drainage, leading to frequent water pooling and runoff issues.

7 Herluf Trolles Gade
A flood-prone residential area where stormwater runoff and groundwater challenges intersect.

8 Østerbro
Particularly vulnerable to sea-level rise and storm surges, increasing the risk of coastal flooding.

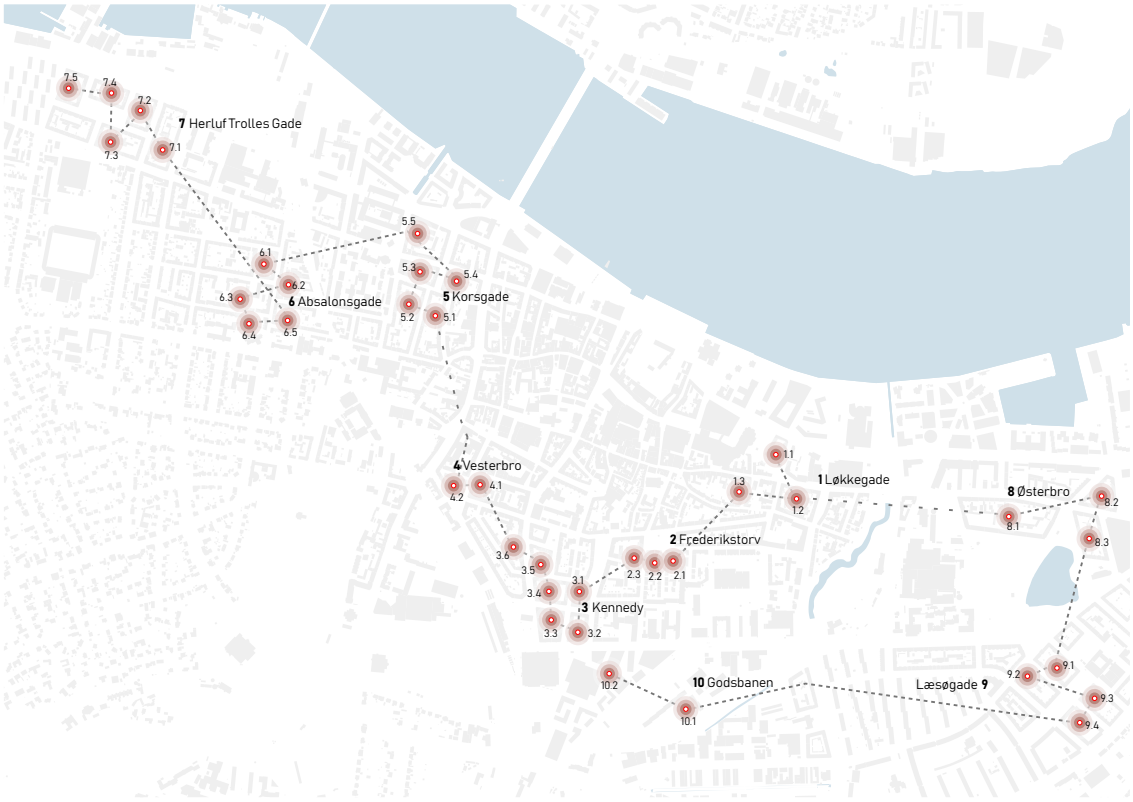
9 Læsøgade
A low-lying area affected by stormwater retention, poor infiltration, and inadequate drainage solutions

10 Godsbanearealet
A former industrial site undergoing redevelopment, facing significant water management challenges.



Ill. 48. *Locations of interest - 1:10:000*

COURTYARD WALK



Ill. 49. *Courtyard walk route map - 1: 20000*

With the **selected areas of interest**, we mark the transition from desktop analysis to field studies. The field studies were conducted over several days, considering the scale of the area. We approached the process analytically, with a particular focus on documenting the selected courtyards through the lens of our three main themes: **climate adaptation, nature integration and social sustainability**. These themes also shaped the way the data was processed and interpreted. The full data collection, including photographic documentation, can be found in *Appendix 1 – Courtyard Walk*. This section will solely focus on key observations and a reflection on how the field study contributes to the further development of this project.

Ill. 50. *Selected pictures from the courtyard walk*

What were we looking for?

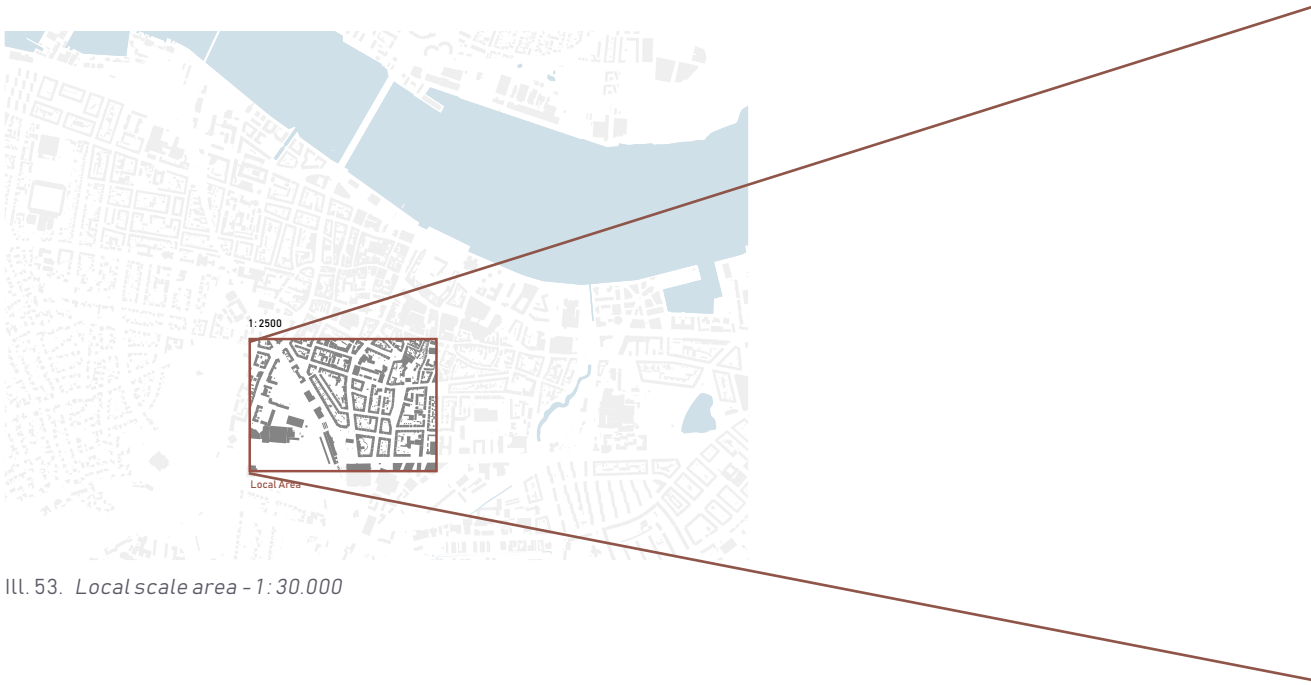
First and foremost, the purpose of the courtyard walk was to conduct a firsthand investigation of the selected courtyard environments, identify many of the issues we had found in our desk top research, and critically assess the connection with our phenomenological analysis approach. The courtyard walk consisted of a total of **38 courtyard investigations** spread over 10 areas as indicated on the route map. The courtyards varied greatly in terms of size, openness, accessibility, privacy, vegetation, paving, etc. Common to the many courtyards was that they were all connected to residential areas, both in the form of cooperative housing associations, owner-occupied apartments, back houses, dormitories, student housing, and elderly housing.

In addition to use the courtyard walk as an inspiration study, the purpose was also to identify which local area and specific courtyard we wanted to use as the case in the pilot project of sustainable urban transformation.

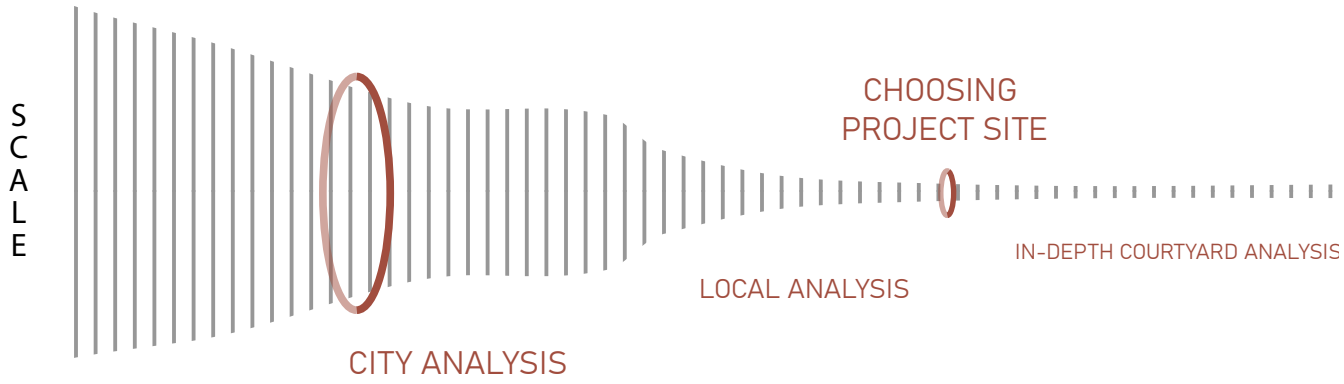
Ill. 51. *Photo registration from the courtyard walk*

CHOOSING LOCAL AREA

The choice to focus on the city center as the local area was driven by several key parameters. This part of the city faces significant hydrological challenges, including high exposure to flooding, impermeable surfaces, and a lack of accessible green spaces. These factors contribute to increased surface runoff and reduced biodiversity, highlighting the need for improved ecological connectivity. Additionally, the city center is a highly dynamic area, affecting not only the residents but also the thousands of people who move through it daily, making it a critical zone for impactful urban transformation.

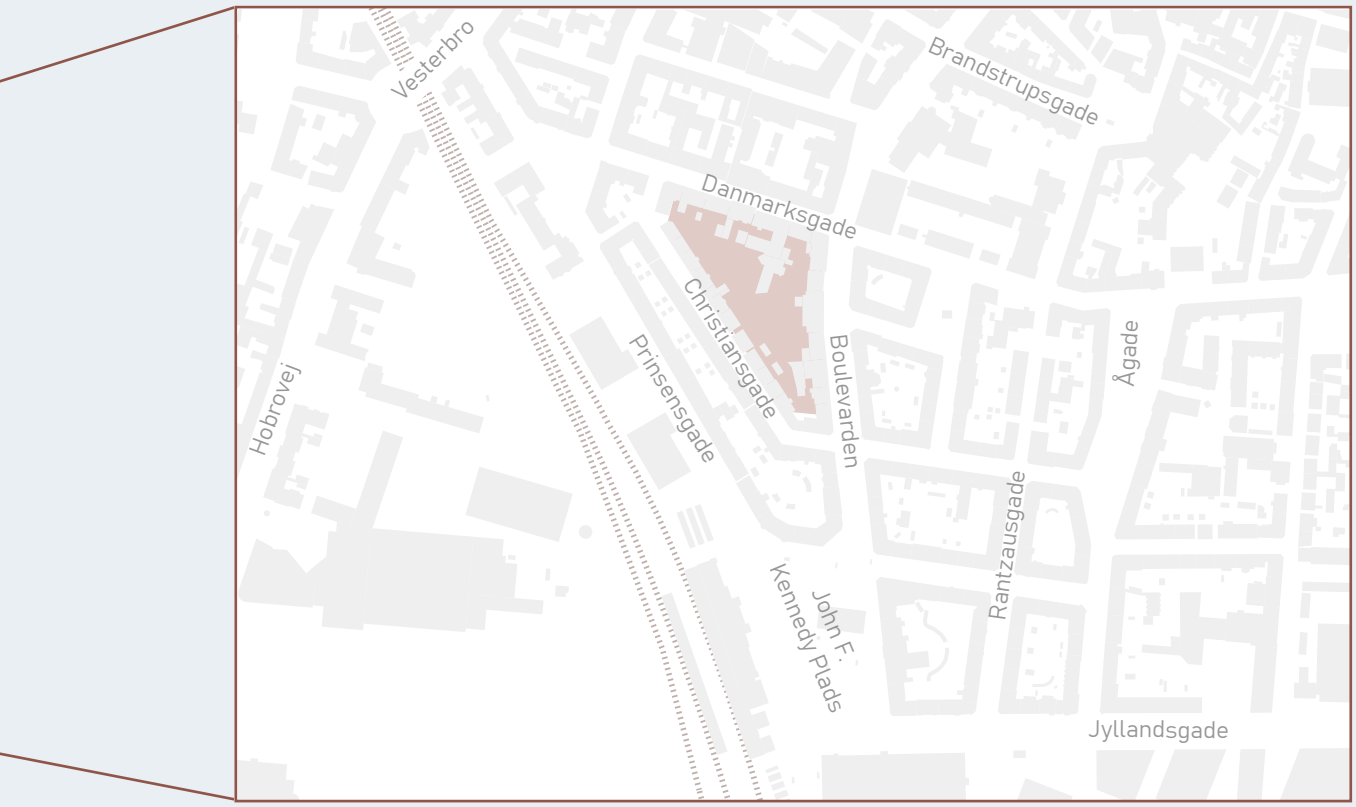


Ill. 53. *Local scale area - 1 : 30.000*



Ill. 52. *Analysis approach*

LOCAL ANALYSIS



Ill. 54. *Local scale area - 1: 5.000*

FUNCTIONS

Ill. 55. *Functions - 1:5.000*

The first step in the local area analysis focuses on understanding the overall function of the city at a local scale. The area around **Boulevarden, Danmarksgade, and Christiansgade** is characterized by a dense urban fabric, with a high concentration of residential and mixed-use buildings. These structures reflect the **typical urban morphology** found in many Danish city centres, where living, working, and recreational functions are closely integrated.

The area also contains distinct cultural elements, adding a social and public dimension to the otherwise residential landscape. Transport infrastructure, including railways and major roads, acts as both a connector and a divider, influencing the **movement and accessibility** within this part of Aalborg.

This dense, multifunctional environment makes the inner city an ideal testing ground for the proposed pilot project, as the challenges and opportunities present here are representative of those found in other **Danish urban contexts.**

DEMOGRAPHY

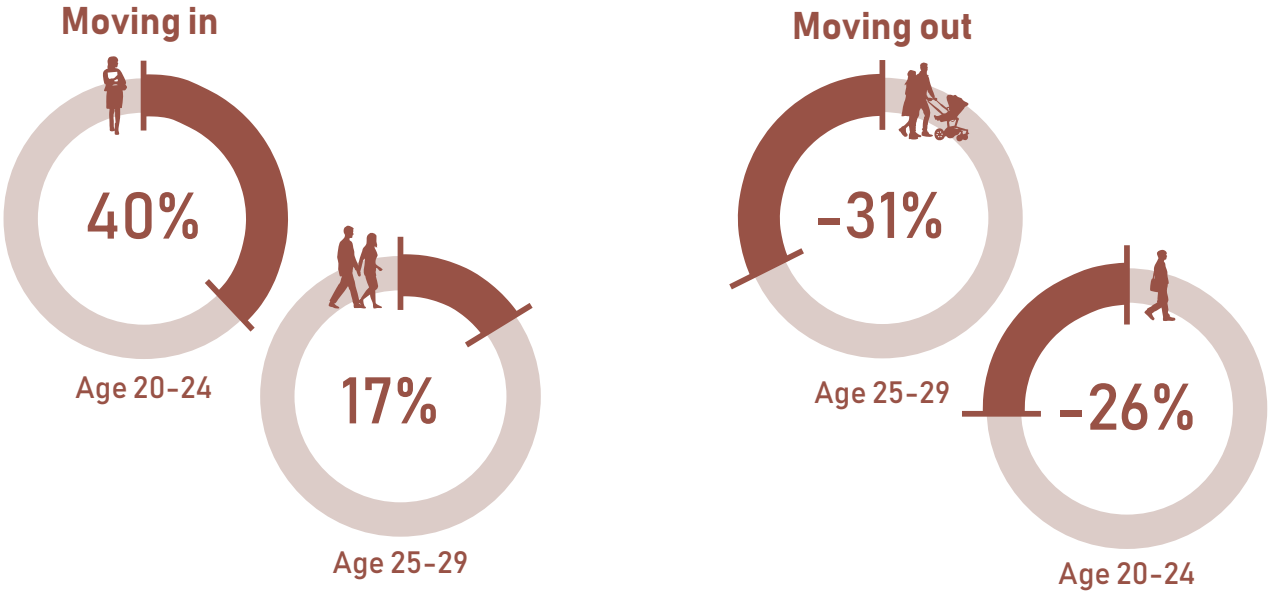
In recent years, Aalborg Municipality has experienced significant population growth and now has approximately 223,200 residents, making it Denmark's third-largest municipality by population (Colliers, 2024). This growth is largely driven by young newcomers - particularly students - who are attracted by the city's educational institutions and central location.

Aalborg's inner city stands out as the planning area with the highest rate of population inflow. The area is characterized by a high turnover of residents, which also results in a correspondingly high rate of population outflow. This pattern is clearly dominated by young adults aged 20–30, who often settle temporarily in the city center during their studies or at the beginning of their professional lives (Aalborg Kommune, 2024).

The central district contains many small apartments and a dense urban environment, which supports this mobile and temporary living pattern among young people. As such, the inner-city functions as an important transitional zone in the life cycle of residents - bridging the years of study and the shift to more permanent housing in other neighborhoods or municipalities.

These city-wide trends are also visible on a much smaller scale - within the courtyards of the inner city. In the area around **Boulevarden, Danmarksgade**, and **Christiansgade**, the high turnover of young residents creates a dynamic but often temporary community.
Many of the people living in these courtyards stay for only a short period of time, which means there is limited long-term engagement with the shared outdoor spaces. The courtyard becomes a reflection of the wider patterns in the city center: a place shaped by short stays, changing routines, and a constant flow of new people.

However, this circulation of residents does not have to be seen as a challenge. Instead, it can be embraced as a unique social and spatial potential. By designing courtyards that are open, welcoming, and flexible, we can create settings that encourage everyday interaction, even among temporary neighbors. Through simple, inclusive design strategies, these spaces can support a sense of belonging and community, regardless of how long people stay. The goal is not to change the flow itself, but to use it as a positive driver for creating vibrant, adaptable, and socially resilient urban living environments.



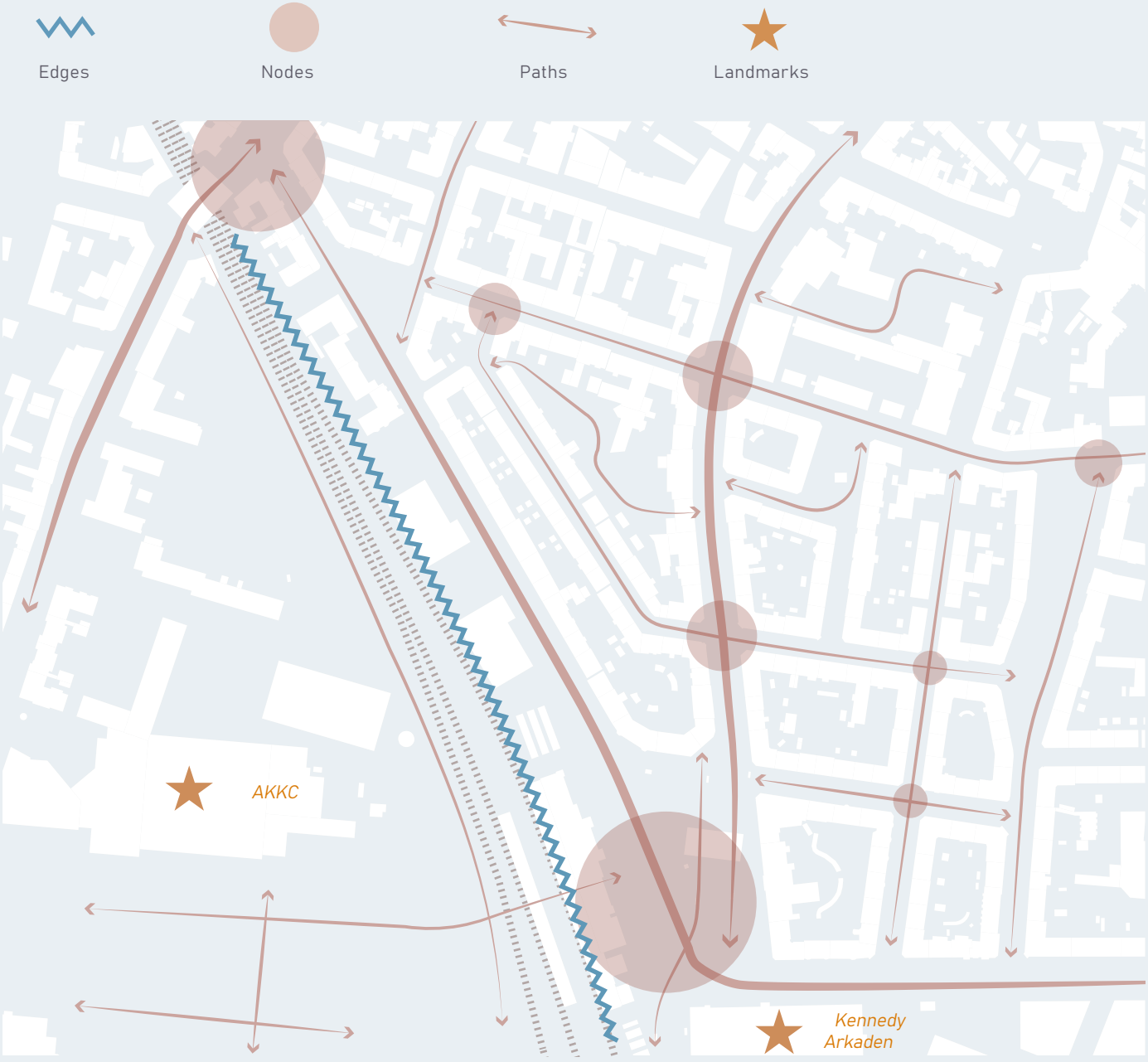
Ill. 56. *Moving patterns - Aalborg Midtby*

ELEMENTS OF THE AREA

The map illustrates spatial elements within the choosen area, as shaped by paths, edges, nodes, districts, and landmarks, as described by Kevin Lynch in *"The Image of the City"* (Lynch, 1960). These elements help define how people perceive and navigate the urban landscape.

The most prominent paths include primary streets acting as connectors within the urban fabric Edges, particularly the railway line, serve as both physical and psychological barriers, dividing neighborhoods and shaping movement patterns. Nodes highlight key intersections or focal points where urban activities converge. These nodes are critical in defining areas of social interaction .

Overall, the structural elements identified here provide valuable insights into the spatial organization of the area, as well as insights and opportunities for improving the urban quality in future design process.



Ill. 57. *Elements of the city - 1 : 2.500*

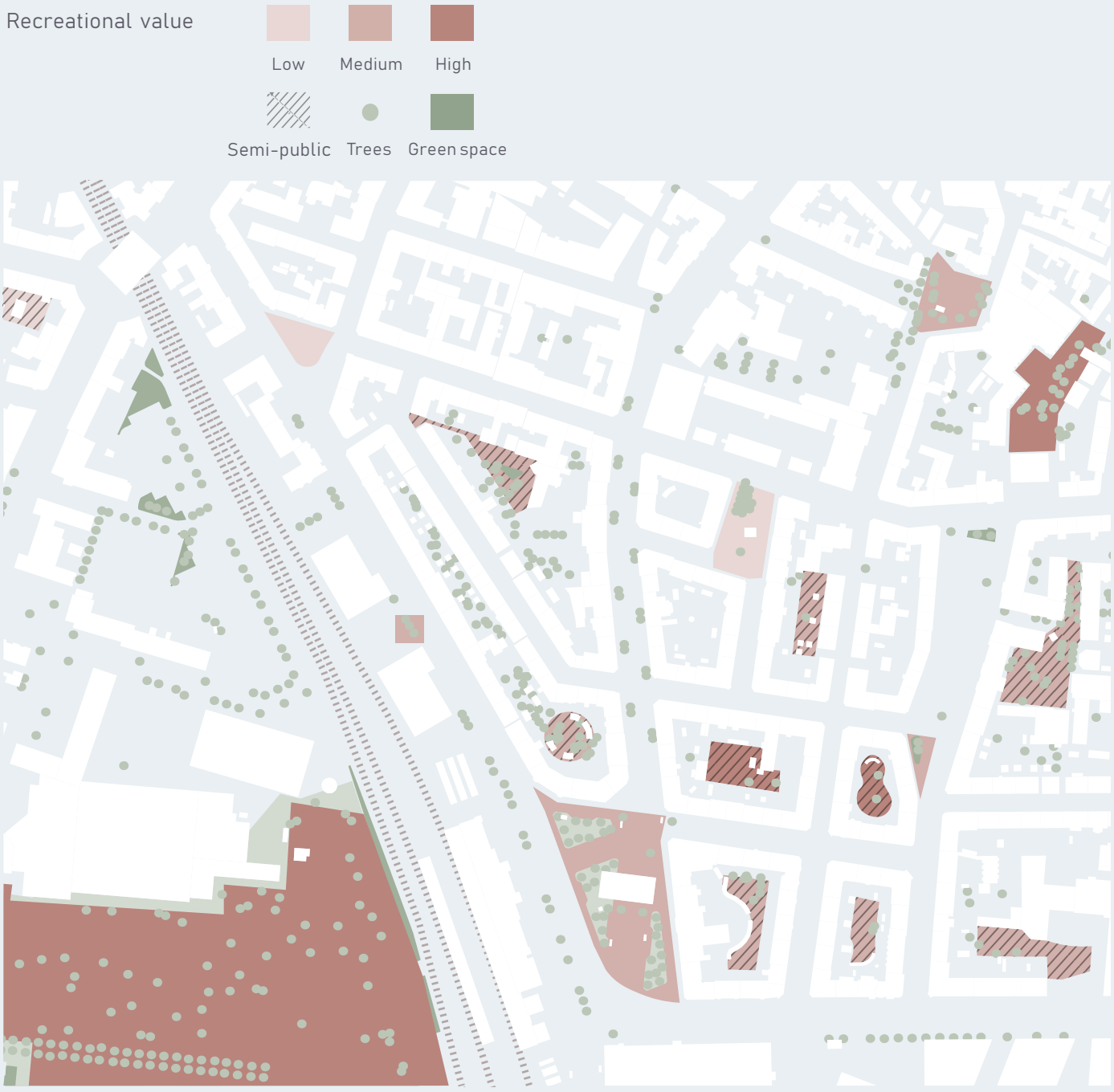
RECREATION

The map categorizes public outdoor spaces based on their recreational value and level of accessibility.

Higher recreational value areas are in this analysis characterized by their green cover, or openness, providing opportunities for social interaction, leisure, and biodiversity.

Medium and low-value recreational areas tend to be grey, empty and lacking support social activities.

The analysis hints to the idea that improving the recreational quality of semi-public spaces and lower valued recreational areas could improve overall livability, and to higher degree attract people to stay and socialise. Integrating these spaces with the broader urban network may also support social interaction, and give people the social connections their need in their daily day.



Ill. 58. *Places to meet - 1:2500*

EXPLORING THE LOCAL AREA

Ill. 59. *Registrations of local area*

This analysis explores the local area of Aalborg city center from an experiential perspective. The analysis was conducted through on-foot observations over several days and at various times of day. The focus was on capturing different types of experiences: the urban experience, sensory experience, water management, and the experience of nature.

THE URBAN EXPERIENCE involves how we experience space, based on architecture, atmosphere, and how people move through spaces, in traffic flow. Atmospheres ranging from busy and chaotic to quiet and peaceful, shaped by urban fabric and activities happening.

THE SENSORY EXPERIENCE includes sounds, scents, textures, tactility and visuals that define the environment. Traffic noise, natural sounds, plant aromas, urban smells, and contrasts between natural and built elements all contributing to the area's character.

WATER MANAGEMENT Explores visible systems like permeable pavements, rain gardens, and drainage channels. These elements affect both aesthetics and functionality, particularly in areas prone to flooding.

EXPERIENCE OF NATURE, looking at how greenery and elements of nature integrates with the urban environment.

These observations will guide potential solutions and resilience strategies for the area.

CHOOSING PROJECT SITE

As the project transitions from a broader urban perspective to a more focused **courtyard scale**, the selection of the specific site becomes a critical hinge point. This courtyard was not chosen subjectively, but rather through a layered selection process combining extensive desktop analysis with intense fieldwork.

A variety of parameters contributed to its relevance: limited- or non-existing water management infrastructure, a fragmented surface material composition, existing- but underutilized vegetation, and a spatial structure suggesting a bigger potential.
Its **mixed-use character**, with both residential and commercial functions, introduced a **complex dynamic** with regulatory constraints and unclear spatial definitions. Its central location, and functions contribute to a relatively high level of everyday activity, making it not only a complex courtyard but also an important infrastructure, and a chance to influence an everyday experience for its users and residents.

The courtyard's high user intensity, contrasted with its worn and undefined condition, revealed a hidden opportunity for transformation. Here, the need for a resilient, multifunctional, and inclusive transformation became evident - not as a singular solution, but exemplifying and reflecting the broader challenges and possibilities of sustainable urban transformation.

Ill. 60. *Choosing project site*

03
INSIGHT

insight

/ˈɪnsʌɪt/

noun

1. the capacity to gain an accurate and deep **understanding** of someone or something.

    “his mind soared to previously unattainable heights of insight”

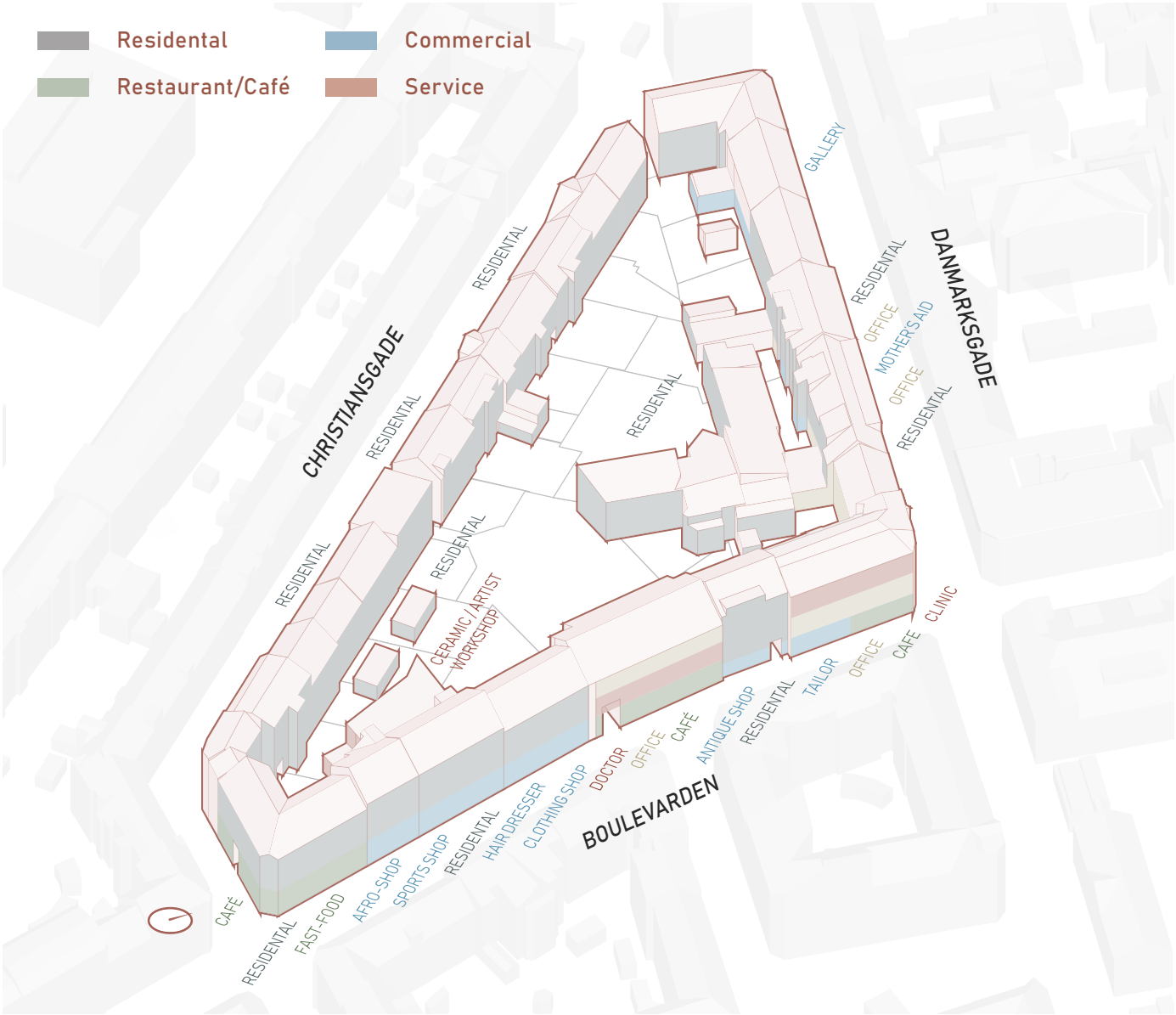
PRESENTING THE COURTYARD

The chapter insight - introduces the site as a spatial entity with latent potential and sets the stage for a comprehensive spatial analysis. The investigation will unfold through detailed mapping of physical structures, access points, and material conditions, followed by user studies that explore how the courtyard is currently used and perceived. This approach aims to uncover opportunities for a sustainable and socially engaging transformation of the courtyard.

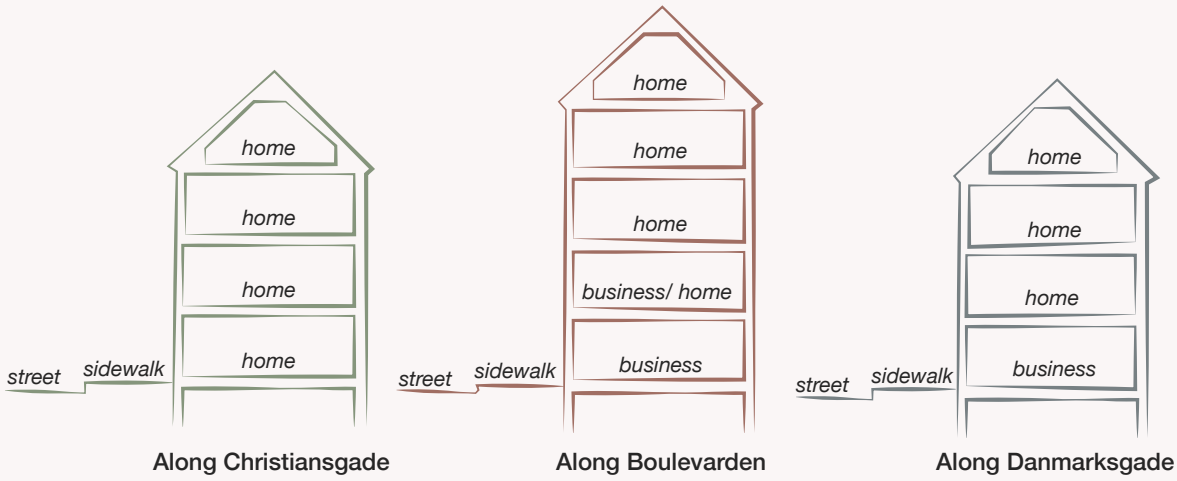
The chosen courtyard is centrally located in Aalborg, positioned along **Boulevarden** - one of the city's primary infrastructural arteries for both pedestrians and vehicles. Despite being frequently passed by, the courtyard remains **underutilized** and lacks a clearly defined function in the everyday life of the city.

Surrounded by shops, cafés, residential units, and a constant flow of passersby, the site holds significant **potential for transformation**, particularly through a sustainable and socially inclusive perspective .

The courtyard consists of a total of **27 properties,** with only one of them being fully privately owned – the



Ill. 61. *1:1000 Isometric courtyard map*



Ill. 62. *Conceptual sections of the three streets*

property that contains the centrally located parking area.

Structurally, the courtyard is framed by the surrounding city block, defined by the three streets: **Boulevarden, Danmarksgade and Christiansgade** *(see the "isometric courtyard map" and "the conceptual sections of the three streets")*

Boulevarden acts as a central spine in Aalborg city center, connecting the train station to the city's commercial and recreational zones, including restaurants, retail shops, the pedestrianized city center, and the waterfront along the Limfjord.

The ground floor along Boulevarden is dominated by commercial activity, while upper floors typically host residential units, ranging from the first or second floor up to the fourth.

Within the perimeter block that encloses the courtyard, several well-frequented restaurants, popular stores, and a hair salon can be found. Danmarksgade, functioning as a side street to Boulevarden, is also characterized by ground-floor commercial spaces. However, the pace of the street is slower, and many of its business premises currently stand vacant, suggesting a shift in its urban dynamic. Christiansgade, by contrast, is exclusively residential, with apartments of various sizes and ownership types, stretching from ground level to the top floor.

It is important to note that the courtyard is part of two different local plans, adding complexity to the official regulations and conditions governing its use and development.

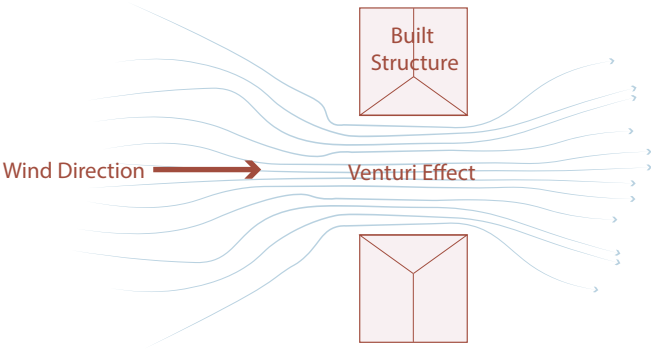
Given this surrounding structure, there is an expectation that the courtyard could function as a shared, flexible, and transitional space. It could accommodate both the dynamic activities tied to commercial life and the slower rhythms associated with residential living. These structural conditions shape the framework within which the courtyard can be activated, making it a potential node for multifunctional programming and new urban synergies.

Understanding these different surrounding functions is essential when analyzing the courtyard spatially and socially. Considering both aspects allows for a more nuanced and informed design proposal, ensuring that future interventions resonate with the existing urban life and enhance the potential of the courtyard as a shared, meaningful place.

MICROCLIMATE

WIND

The wind conditions in the courtyard are primarily determined by the surrounding built geometry. The tall perimeter block, rising over 15 meters, provides effective shelter from dominant westerly winds, reducing overall wind exposure. However, a narrow opening to the north introduces a distinct spatial phenomenon: **the Venturi effect** (*see Ill. 63*). As wind is funneled through this constricted passage, it accelerates, creating localized gusts within specific areas of the courtyard.



Ill. 63. *Venturi Effect*

These intensified currents, although limited in scale, can influence thermal comfort and should be carefully considered in the placement of vegetation, outdoor seating, and activity zones. The wind flow pattern (*Ill. 64*) reveals how the built environment not only moderates but also redirects air movement across the site - resulting in highly variable microclimatic conditions.

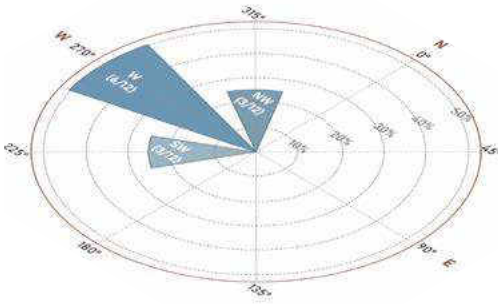
Ill. 64. *Conceptual wind diagram*

The wind rose (*ill. 65*) is constructed using wind data, representing average wind speed and direction patterns from Aalborg across all 12 months of 2024 (DMI, 2024a; DMI, 2024b).

While the site remains largely protected, several users have described sudden wind shifts when moving through the courtyard. One noted:

> *"On windy days, it's almost like the wind gets trapped and then suddenly released when you step around the corner."*

Such experiences highlight the importance of understanding not just the physical wind dynamics, but also how they are perceived and felt by people moving through the space.



Ill. 65. *Windrose - Aalborg 2024*

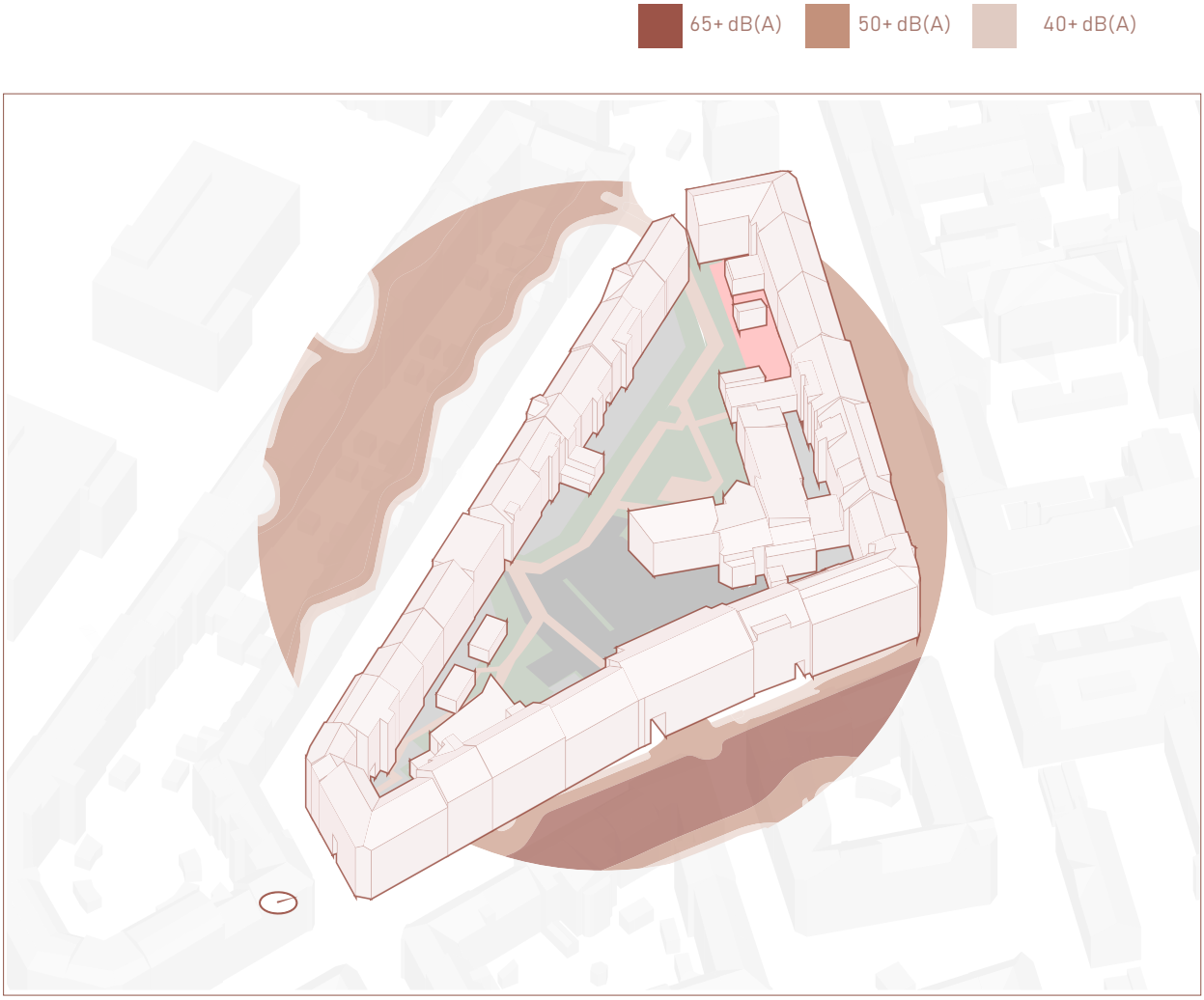
NOISE

Despite its central location, the courtyard presents a surprising **contrast in soundscape**. While heavy traffic, buses, and nightlife dominate **Boulevarden** and nearby streets, entering the courtyard feels like crossing a sensory threshold. The layered building facades act as acoustic buffers, muting the city's background noise.

Yet the courtyard is not fully insulated – its many passageways and semi-open gates allow sounds to leak in and out, creating a **dynamic and shifting acoustic experience** depending on time and position. During interviews, one user described:

"I live on Danmarksgade, and every day I walk my dog through this courtyard. It's like the noise of the city just switches off when you step inside."

This recurring perception reinforces the idea of the courtyard as a **micro-urban refuge** – a space where stillness and slowness are possible, even if only temporarily. Sound becomes part of the spatial identity: *it contributes to defining the boundary between public city life and intimate in-between space.*



Ill. 66. *1:750 Noise*

SHADOWS

SUMMER

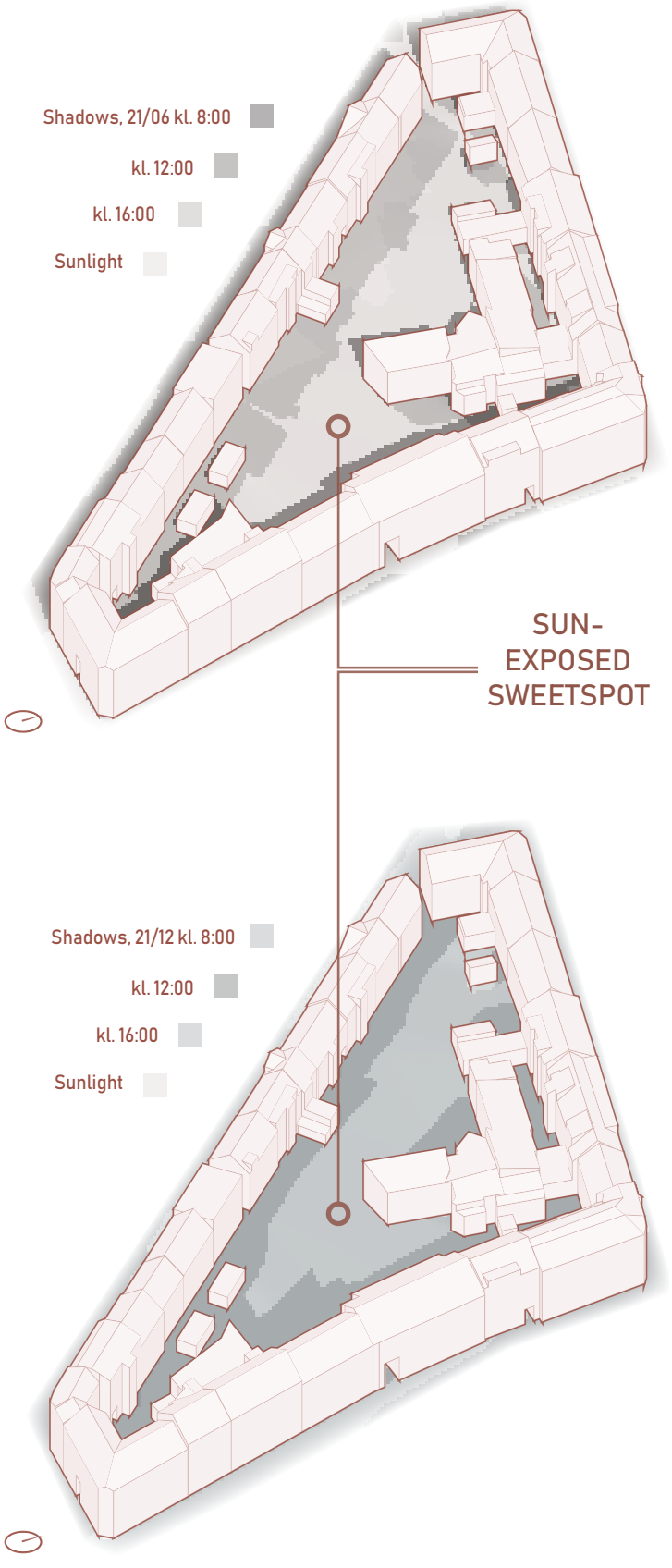
For most of the day, the courtyard receives direct sunlight, which supports outdoor stays and optional activities. Simply sitting and enjoying the sun becomes an activity, if the facilities are inviting. Around midday, the amount of shadow is minimal, creating favorable conditions for social life and recreation. However, on hot summer days, the lack of shading - combined with heat-absorbing surfaces such as asphalt - may contribute to urban heat island effects.

WINTER

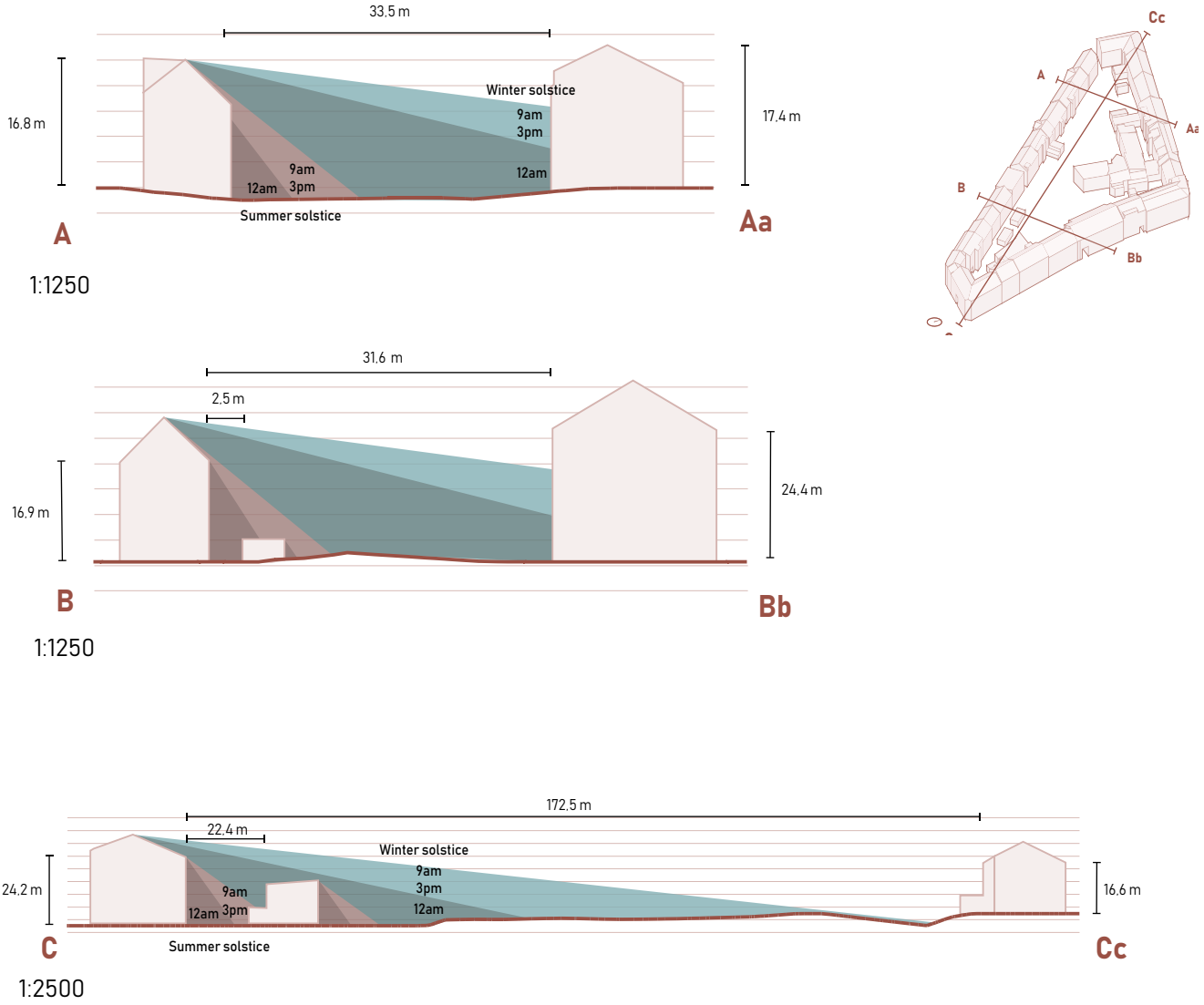
In winter, sunlight is significantly limited. The courtyard remains shaded during both morning and evening hours, creating a cold and dim atmosphere. However, around midday, selected areas still receive some direct sunlight, offering brief opportunities for outdoor stays. Despite this, the overall low sun exposure reduces the courtyard's appeal for social or optional use during the colder season.

SUN-EXPOSURE

A central sun-exposed sweetspot receives direct light year-round, making it one of the courtyard's most climatically attractive areas. Yet, this space is currently used for parking, leaving its potential for social or recreational use untapped. Strategic reprogramming could transform it into a key spatial asset (*see Ill. 67*).



Ill. 67. *Shadow analysis*



Ill. 68. *Shadow analysis - sections*

The sections highlight the courtyard's spatial enclosure and the significant impact this has on sunlight at summer- and winter solstice. Surrounded by buildings up to 24 meters high, the courtyard receives highly uneven sun exposure, particularly during the winter months when the sun angle is low (*See appendix 4 - shadows, for more information).*

In dense urban environments like this, the geometry of the built form becomes a decisive factor in determining where and when light reaches the ground.

While summer conditions provide opportunities for sunlit stays, the spatial depth and shading of the courtyard call for careful programming to ensure that sun-exposed zones are activated and accessible. Conversely, in winter, moments of direct sunlight are limited and highly valuable – not only for comfort, but also for supporting biodiversity and year-round usability.

ENTRIES & ACCESSIBILITY

The courtyard is accessed through multiple entries and narrow passageways, some of which feel more like shortcuts than formal entrances. These entry points vary in width, condition, and material expression, influencing how **accessible** and **welcoming** they feel.

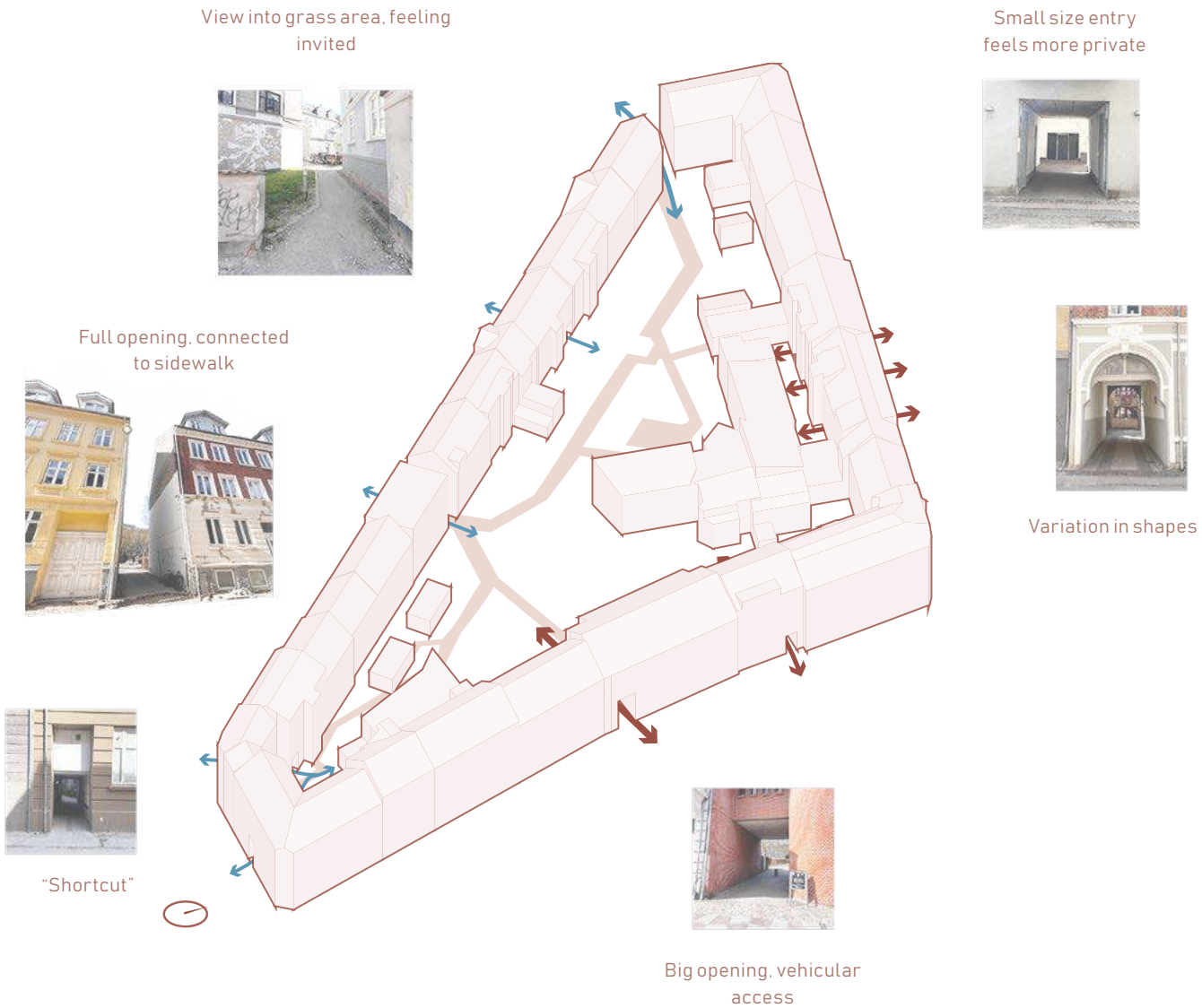
Some are restricted to pedestrians, while others accommodate vehicles. The entry points and overall accessibility affects the spatial logic of the courtyard and plays a key role in defining how the space is perceived and navigated.

All pictures presented in *Ill. 69.* are taken in the courtyard, representing a visual insight and reflecting tendencies experienced within the courtyard.

Public path

Vehicular entry

Pedestrian entry



Ill. 69. *Entries & Accessibility*

PRIVACY DEGREES & BOUNDARIES

Boundaries within the courtyard, such as **walls** and **hedges**, create varying levels of privacy. These elements can be green and transparent, or fully closed structures, and they function as indicators of ownership, access, and use.

Overall, the courtyard's sense of privacy is loosely defined, existing in a grey zone between **public and private**, where boundaries blur and functions overlap.

Even for functions that are priavte on paper, like parking and storage rooms, they are visually exposed from the public path, and therefore never feels completely private.

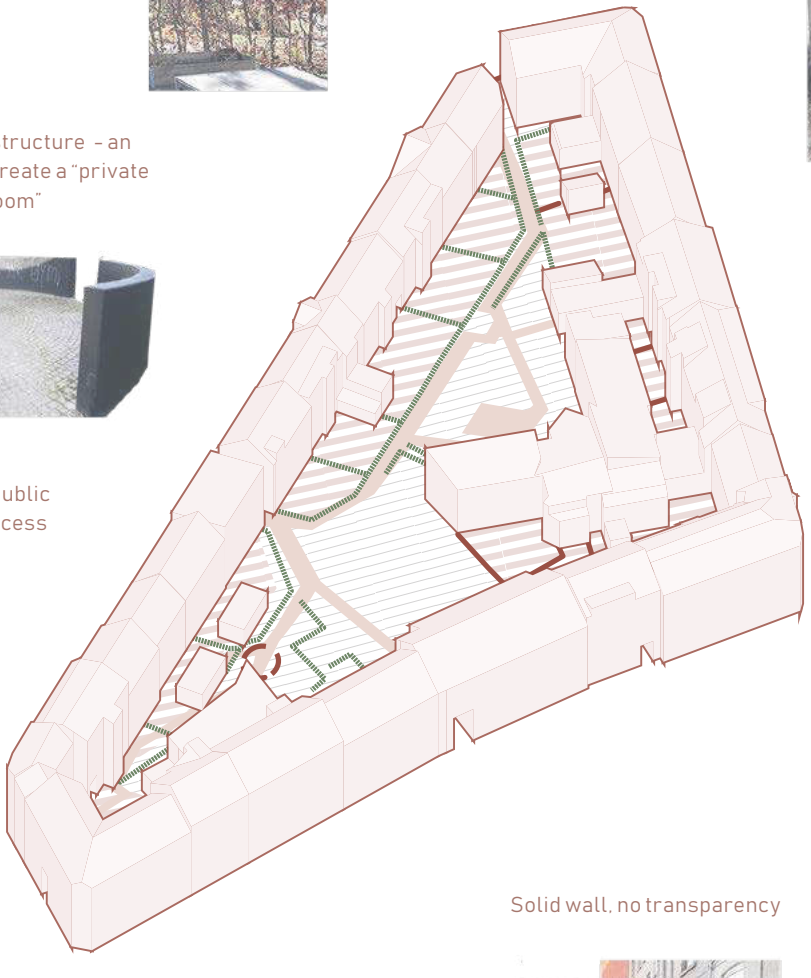
Public path
Hedge
Fence / Wall
Semi-Private
Semi-Public

Hedges too transparent to afford complete privacy

Low walls giving public view into grass area

Half-wall structure - an initiative to create a "private room"

Private parking



Preventing public vehicular access

Visually tranparency but not physically

Solid wall, no transparency

Ill. 70. *Privacy mapping*

SURFACES

The map highlights the different surface types within the courtyard, including **grass/soil, gravel paths, balconies, and paved areas**. Despite a relatively large amount of green spaces, these areas remain underutilized, lacking clear programming and ecological function. Previous analyses confirmed that the sunniest and most attractive section of the courtyard, receiving sunlight from morning to evening, is primarily dominated by paved surfaces. This area also serves as a key circulation hub, with the highest foot traffic, making it a prime location for potential social activation and biodiversity enhancement. However, the current layout limits its usability, creating an opportunity to reimagine the relationship between green and hard surfaces to better support both social and environmental goals.

PARKING

One of the key challenges in the design process is whether the **existing parking area** in the backyard should be preserved or reimagined. This parking lot is part of the only fully privately owned plot within the 27 parcels of the backyard, exclusively serving commercial purposes, including clinics, offices, and a restaurant on the ground floor. The plot is also subject to a specific declaration that aligns with Aalborg Municipality's central city parking norms, which require a certain number of parking spaces per square meters (Aalborg Kommune, 2022a).

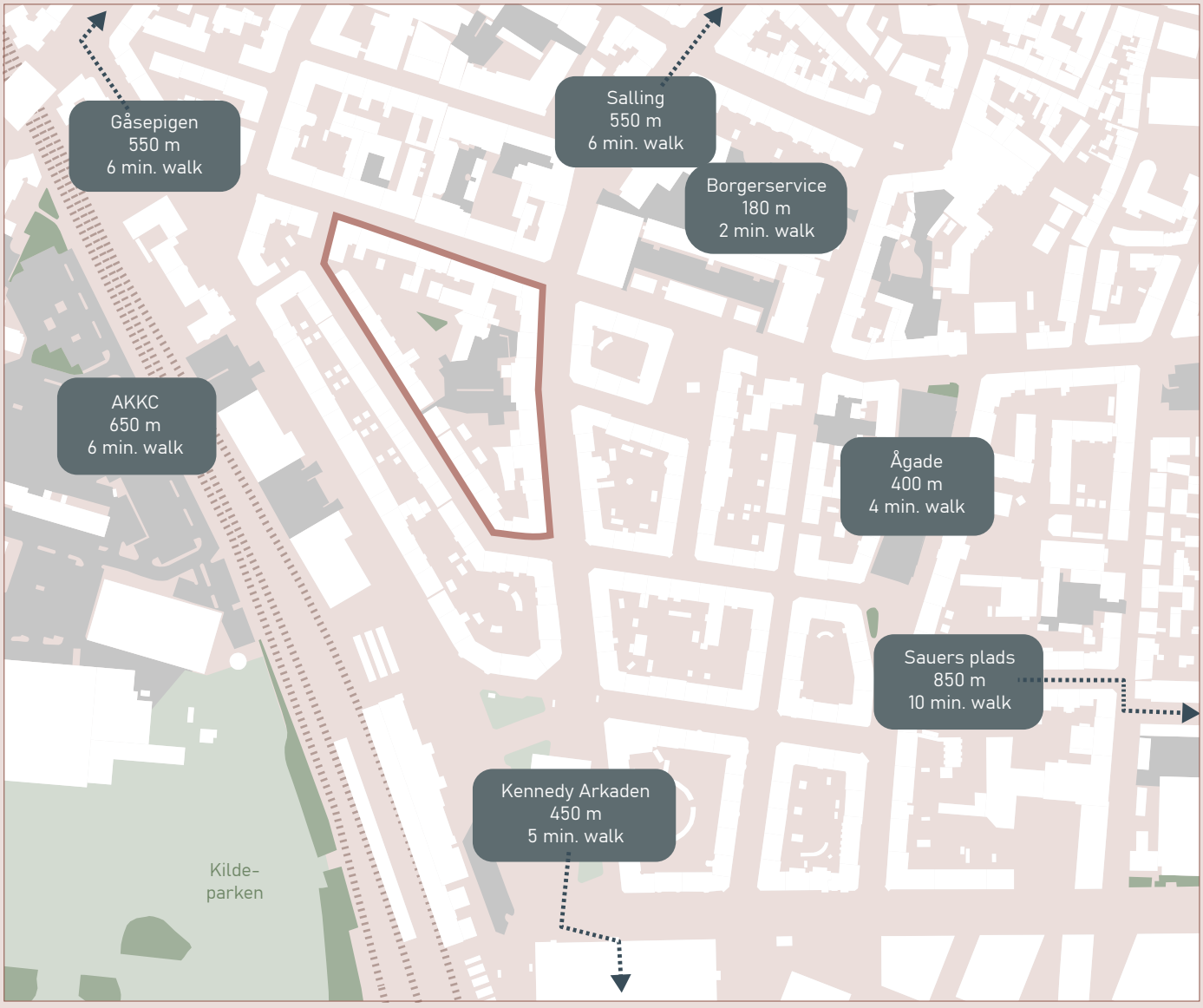
However, as the map illustrates, the site is already well connected to several public parking options within short walking distances, including ***Gåsepigen (550***

Ill. 71. *Surface map - 1:1500*

m), Kennedy Arkaden (450 m), and Sauers Plads (850 m). From a long-term urban planning perspective, this raises the question of whether it is sustainable to maintain backyard parking when the city aims to promote more pedestrian-friendly and climate-adaptive environments.

As professor of mobility and urban design Ole B. Jensen (2025) argues, *sustainability should not be understood as a purely technical challenge, but also as a cultural and spatial issue*. The persistence of car-dominated environments in cities is not just a matter of infrastructure, but of ingrained habits and institutional path dependencies. In this light, the courtyard's central parking lot represents more than a spatial barrier - it reflects a deeper resistance to change in how we imagine and use urban space (Jensen, 2025).

Retaining the parking lot supports the businesses on the plot by ensuring convenient access for employees and fulfilling current regulatory requirements. However, its removal would unlock valuable space for green infrastructure, social interaction, and biodiversity, thereby aligning the project with broader municipal ambitions to **reduce car dependency** and **enhance the green infrastructure.**



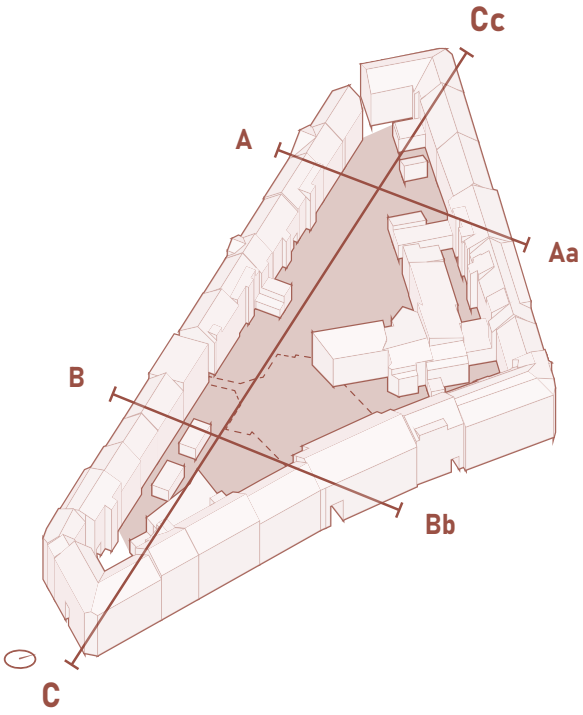
Ill. 72. *Parking map - 1:2500*

SPATIAL DIMENSIONS

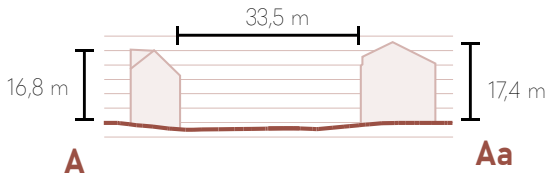
The courtyard spans a total area of **5,515 m²**, incorporating a mix of open space and built environments. The parking area occupies **774 m²**, *representing 14% of the total courtyard area*, and is primarily situated along the perimeter, reducing its visual impact within the central courtyard.

Section A-Aa reveals a compact internal courtyard relationship, stretching 33.5 meters in width and framed by buildings with varying heights from 16.8 meters to 17.4 meters, establishing a semi-enclosed spatial character. **Section B-Bb**, with a width of 31.6 meters, highlights a more open spatial configuration, with a significant drop in building height from 24.4 meters to 16.9 meters, creating a stepped profile that supports light penetration and visual connectivity.
Section C-Cc spans 172.5 meters, capturing the full extent of the courtyard's elongated form.

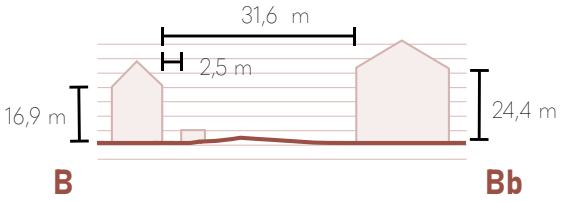
Together, these sections reveal the **varied spatial qualities** of the courtyard, reflecting the interplay of built form, open space, and topography, critical for understanding the site's hydrological and social dynamics.



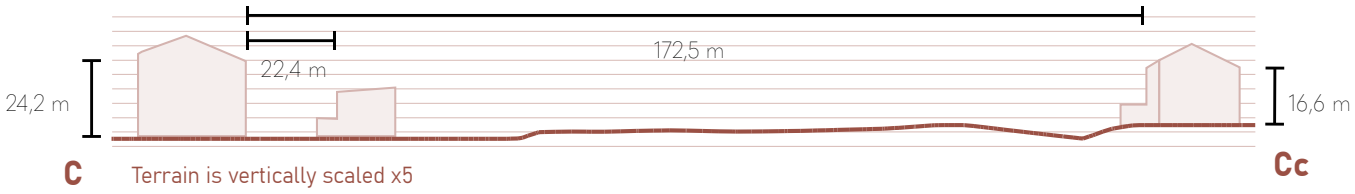
Ill. 76. *Sections map - Spacial dimensions*



Ill. 73. *Section A-Aa with measurement*



Ill. 74. *Section B-Bb with measurement*



Ill. 75. *Section C-Cc with measurement*

STORMWATER MANAGEMENT

There is a potential risk of flooding during heavy rainfall or cloudbursts as stated in earlier chapters. Although the courtyard is not located in a natural depression, surface water has difficulty infiltrating the ground due to the high degree of impermeable surfaces.

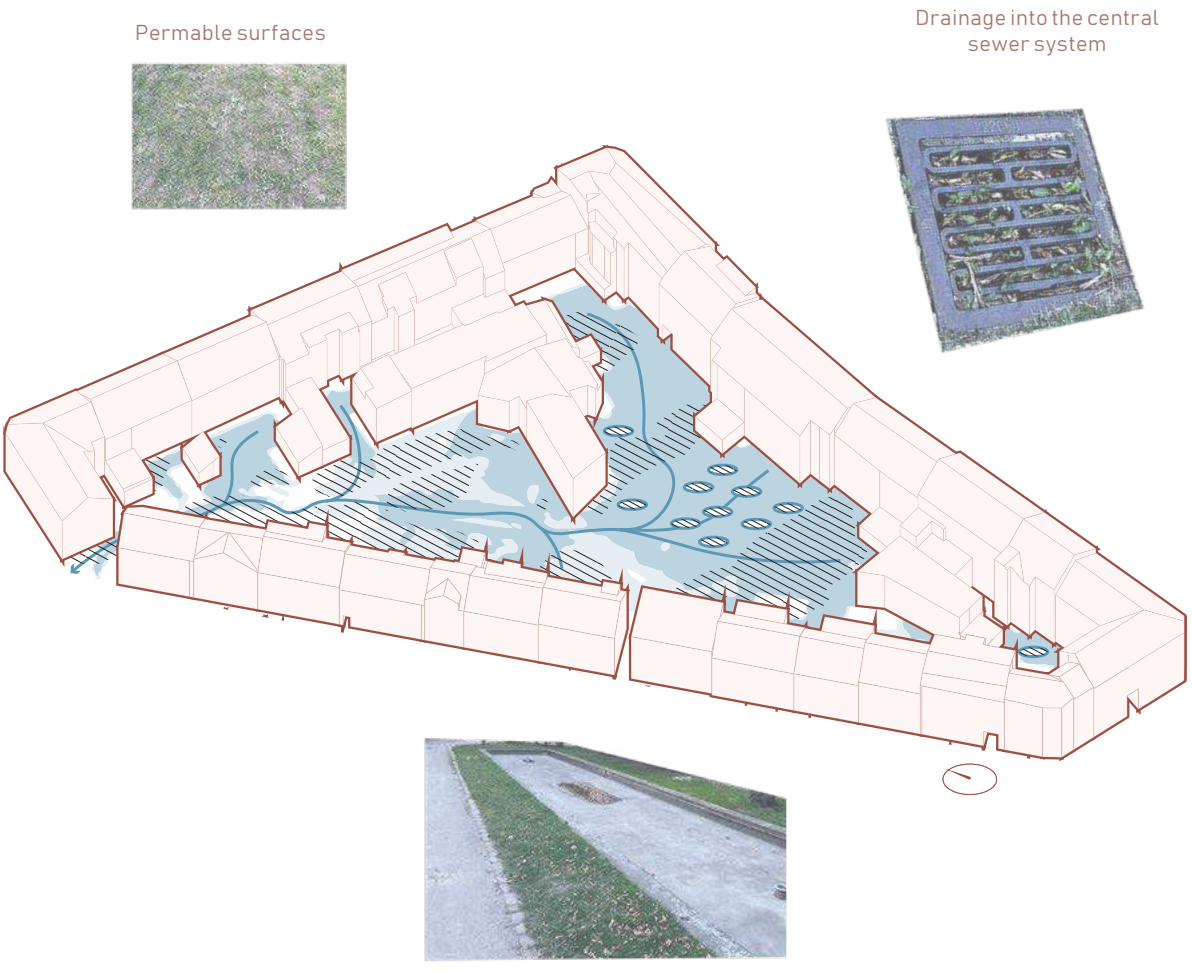
The map below (*ill. 77*) illustrates depressions in the landscape where surface water may accumulate. Drainage inlets connected to the sewer system are marked with blue circles. The risk of flooding during extreme weather events is closely linked to the site's topography. As shown in the diagram, local depressions around Boulevarden 34 are vulnerable to surface water accumulation in the absence of sufficient drainage infrastructure. The presence of a non-functional fountain *(out of use since 2021)* further illustrates the current lack of active water management solutions on site.

Drainage inlets

< 180 mm

Watershed > 65 mm rain

Permable Surface



Ill. 77. *Stormwater Management*

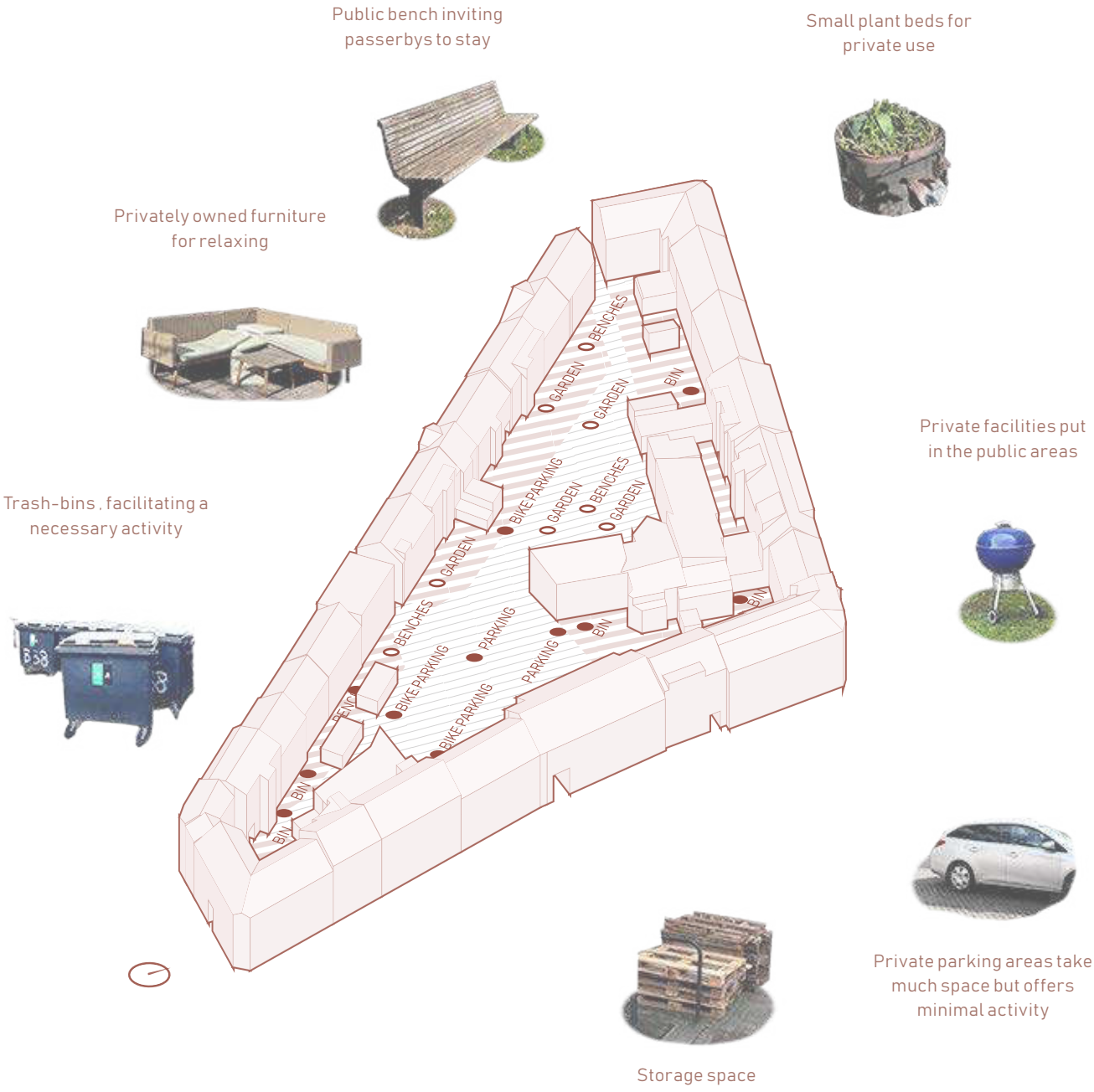
FACILITIES & ACTIVITIES

The courtyard has lots of facilities, yet they are spatially fragmented and mostly support **necessary activities,** as defined by Gehl (2011): *brief, trivial interactions* such as taking out the trash, parking a bicycle, a car, or accessing storage rooms.

Parking, waste stations, storage access, and parking (*both bikes and cars*) dominate the environment, while optional or social functions remain secondary. This distribution limits the community feeling, and contributes to a momentary, task-oriented atmosphere rather than facilitating collective use or everyday community life, through social and optinal activity.

Necessary activity

Optional activity



Ill. 78. *Facilities & Activities*

"It is not enough to count how many square metres of open space there are; it is essential to evaluate ***what actually happens*** *in these spaces...*

People come ***where people are****"*

Jan Gehl, Cities for People (2010), p. 127

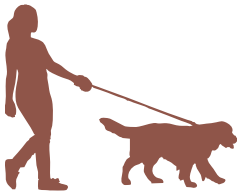
USER STUDY

In working with the courtyard on a spatial level, it has been equally important to investigate ***who are we designing for?*** - The people who interact with the courtyard environment on a daily basis. This courtyard, located in the heart of Aalborg, consists of 27 separate property units and serves a variety of users in diverse and sometimes conflicting ways.

To better understand these users, we developed a questionnaire aimed at capturing a wide range of perspectives, not only from the residents living adjacent to the courtyard but also from passersby, local workers, and business owners who engage with the space.

Posters with a QR code linking to the online survey were displayed throughout the courtyard, and we additionally approached individuals directly to encourage participation. However, the response rate was lower than expected, and the number of completed questionnaires was limited. While not without value, this lack of quantitative data led us to supplement the survey with qualitative methods, including informal interviews and on-site observations. *To see the full online survey, see Appendix 2 – User study.*

From the collected data, it became evident that the courtyard is primarily used for **short-term and functional purposes** - such as walking dogs, passing through, waste disposal, and bicycle parking. Social interactions are minimal, and residents consistently expressed that they rarely use the courtyard for recreational activities. One recurring sentiment was a strong sense of disconnection: ***"I have no idea who I share the courtyard with,"*** as a 27-year-old student noted.



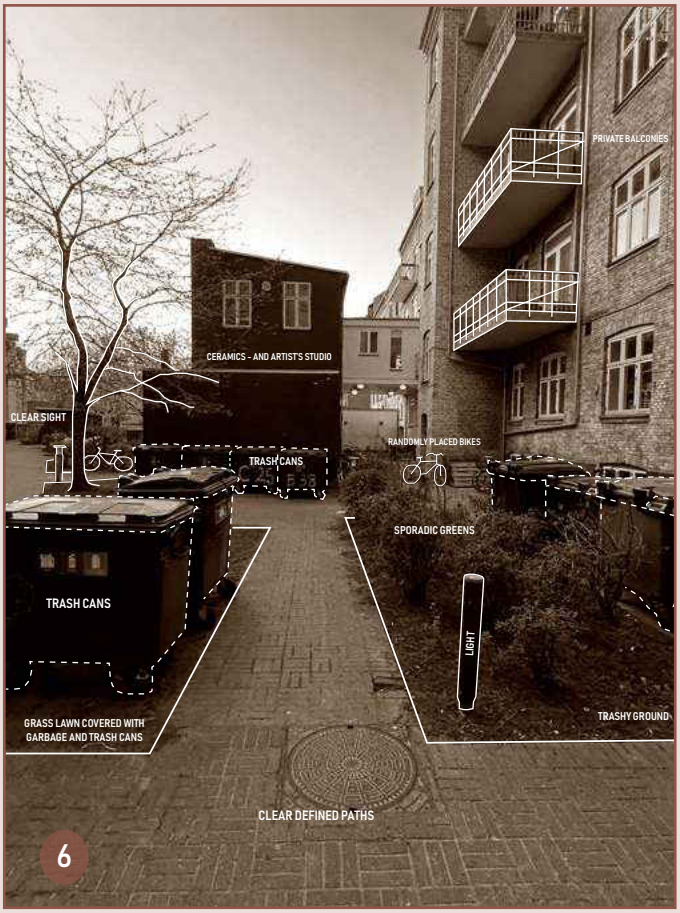
Despite the courtyard's central location and moments of calm - *"There's good sunlight here, and it's as if the noise of the city fades away when you step inside"* - the area suffers from several recurring issues. The waste management is poor: trash is often left behind, attracting rats and pests. The once functional fountain in the middle green area, was decommissioned due to persistent odour problems. Cleanliness and maintenance were rated negatively by most survey participants, and comments frequently pointed to a lack of user responsibility:

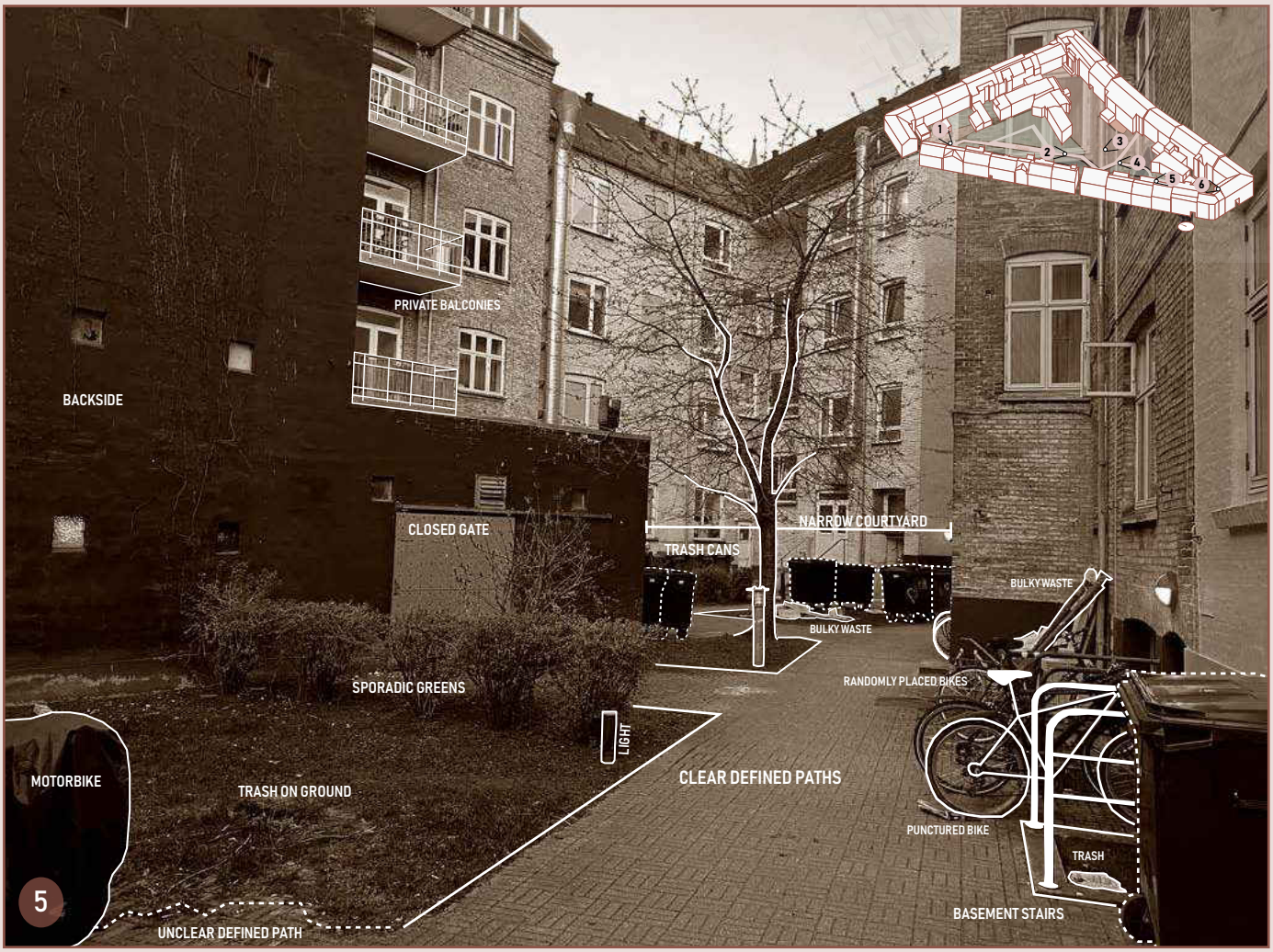
> *"It would be great if people just cleaned up after themselves."*

The courtyard's only shared space is the path that runs through it, along with a small green patch informally referred to as "the common garden." These areas, however, are not designed for social gatherings. Semi-private areas near the residential entrances are used almost exclusively for storage or utility purposes - bike racks, trash bins, sparse furniture, and sporadic patches of grass. There is little to no sense of visual privacy due to the open layout and low hedges that fail to define boundaries between shared and private zones.

Survey responses clearly indicated a desire for more greenery, seating, and communal facilities. One respondent wrote: *"A large lawn - not just for dogs, but also for lying in the sun or being with friends."* Another mentioned: ***"An outdoor covered terrace with space for friends and family would be amazing."***

Ill. 79. *Courtyard registrations*





Ill. 80. *Courtyard registrations*

Overall, features such as nature, weather protection, and a social layer were repeatedly mentioned as missing from the courtyard. This highlights a hidden potential: while the courtyard is not currently perceived as a recreational space, many users would welcome the opportunity to use it as such - if the conditions were better.

Interestingly, no clear dominant user group could be identified through the data. The courtyard is used by a range of people: residents, neighbours, employees, dog walkers, and people simply passing through. What unites them is that they use the space only briefly, often for necessary activities**.** When asked what could make them use the courtyard more often, common answers included "better seating," "green areas," "cleaner environment," and "a sense of community."

In summary, the courtyard is functional but not social. It serves multiple practical roles yet fails to provide an inclusive or attractive shared space. While ownership is fragmented and the layout restrictive, there is a notable demand for social infrastructure - whether one lives in the courtyard, works nearby, or simply passes through.

RETHINKING SHARED SPACE

The courtyard's challenges and potentials are clear. Despite its central location and occasional moments of calm, it lacks the social infrastructure needed to support a sense of community and everyday life beyond functional use.

The fragmented ownership and diverse user base present barriers, but they also reveal opportunities for creating a more inclusive and vibrant shared space. By addressing maintenance issues, enhancing greenery, and integrating flexible, communal areas, the courtyard can become a more inviting, multifunctional space that encourages longer stays and deeper social connections.

This transformation will require a careful balance of physical redesign and community engagement, ensuring that all user groups feel a shared sense of ownership and belonging.

PERSONAS

The personas illustrated here are based on observations and survey responses collected during the user study. By generalising typical behaviours, routines, and needs, the personas serve as a tool to humanise the analysis and better understand the courtyard's diverse user base.

A persona is a fictional, research-based character representing a type of user, constructed from real-world data such as interviews, observations, and surveys. In this project, personas were developed by identifying recurring patterns in how people move through, use, and relate to the courtyard space.

Rather than attempting to portray every individual precisely, this method provides relatable character types that help identify spatial challenges, user needs, and design opportunities. As Chapman & Milham (2006) argue:

> *"Well-developed personas support empathy and allow designers to focus on real users rather than abstract assumptions."*
>
> *(Chapman et al, 2006)*

The personas will be revisited later in the design process to guide reflection, evaluate proposals, and ensure that a broad range of users are considered in the transformation of the courtyard.

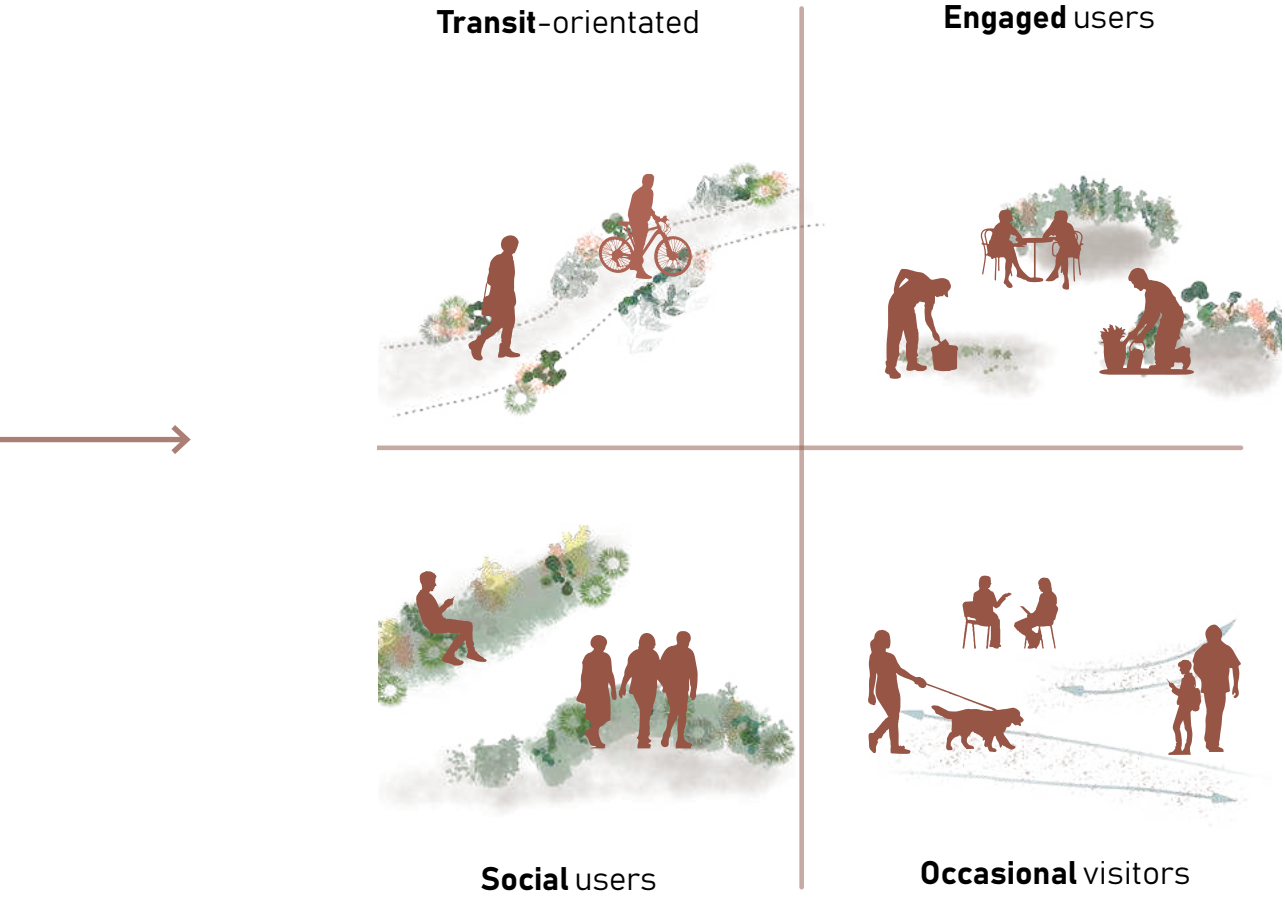
Ill. 81. *Personas*

The diagram illustrates how the identified courtyard personas can be grouped into four behavioural clusters based on their typical spatial engagement. These categories: **Transit-oriented, Engaged, Social, and Occasional users** capture essential differences in how people move through, interact with, or occupy the courtyard environment.

Transit-oriented users, such as the passerby or cyclist, primarily use the courtyard as a shortcut or transit route. Their needs revolve around *legibility, connectivity, and clear spatial flow*. In contrast, **engaged users** are more rooted in place. These include residents who garden, maintain, or regularly use the courtyard for everyday activities - requiring infrastructure that *supports care, comfort, and continuity*.

Social users are defined by their informal group presence, such as those meeting casually, hanging out, or spending time with others. Their interactions depend on *adaptable seating and inviting atmospheres that support community feeling*. Finally, **occasional visitors** include users who engage with the courtyard intermittently, such as workers on break, dog walkers, or parents with children. They value *ease of access, passive comfort, and safe, multifunctional environments*.

By visualising these overlapping behaviours, the diagram supports a more inclusive and responsive design approach - one that considers both permanent and temporary patterns of use, and the diverse rhythms of courtyard life.

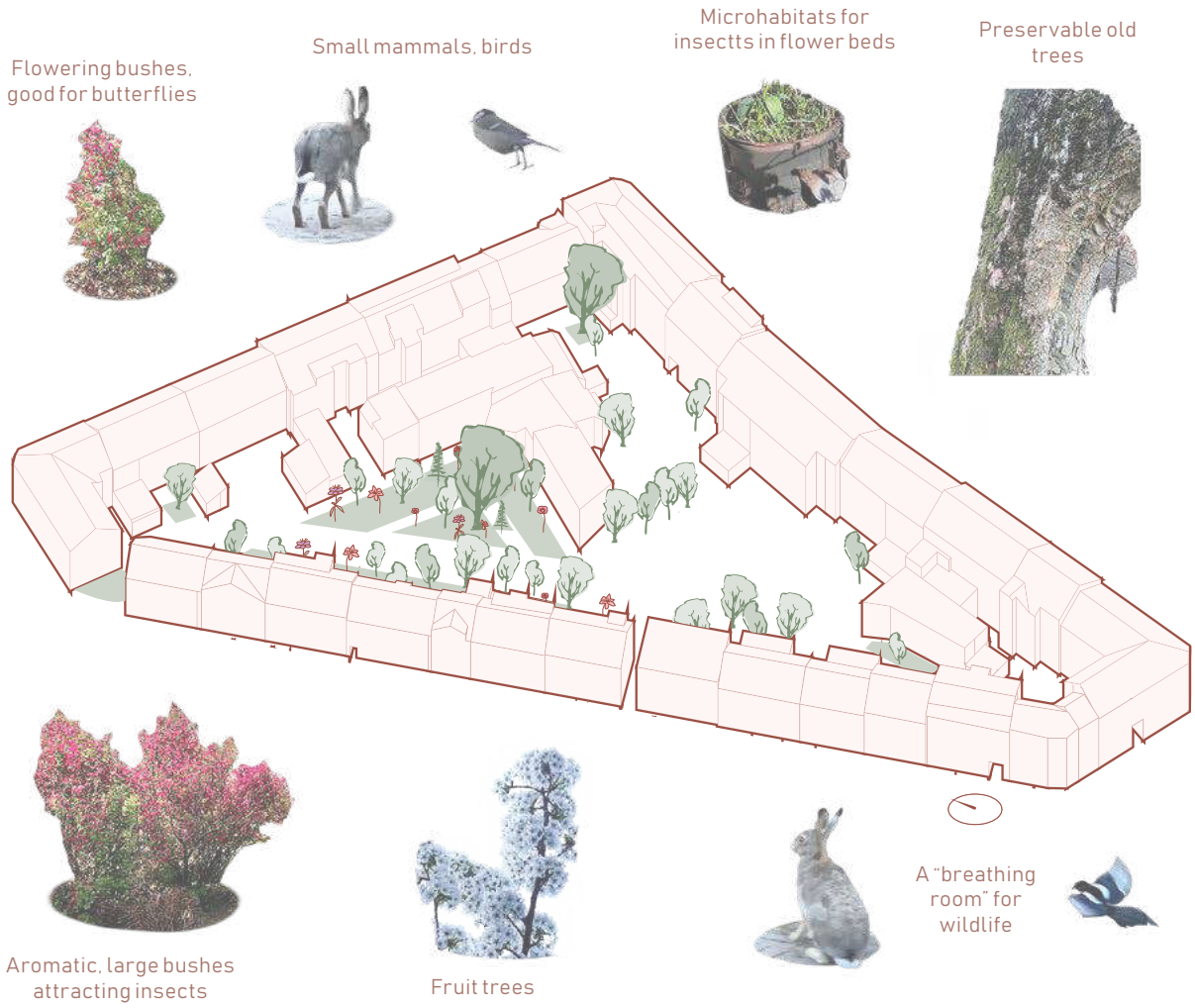


Ill. 82. *Persona engagement*

BIODIVERSITY

The courtyard holds the potential and responsibility for hosting biodiversity, even in dense city areas. In the courtyard a mix of vegetation types supports various species and ecological functions are present, as presented in the pictures and mapping below.

Flowering and aromatic bushes attract pollinators, while fruit trees provide food and shelter for birds and small mammals. Microhabitat cover offers refuge for insects, while a few large, tall, and old trees contribute to the vertical structure and provide nesting sites for birds. Together, these elements create small but meaningful habitats. The courtyard already contains a lot of mature trees and flowering shrubs. Preserving as much greenery as possible is essential, but it also makes sense to introduce and expand areas with new vegetation and species to enhance ecological value.



Ill. 83. *Biodiversity*

PLANT SPECIES

Maple (Acer platanoides)

Type: Tree / up to 20–30 m
Biodiversity properties: Habitat tree, nectar source for pollinators
Aromatic: No
Color:

Elm (Ulmus rubra)

Type: Tree / up to 20 m
Biodiversity properties: Host plant for butterflies, nesting habitat
Aromatic: No
Color:

Elderberry (Sambucus nigra)

Type: Shrub / up to 6 m
Biodiversity properties: Berries for birds, nectar for insects
Aromatic: Yes
Color:

Apple Tree (Malus pumila)

Type: Tree / up to 5–10 m
Biodiversity properties: Pollinator source, fruit for wildlife and people
Color:

Wild Cherry (Prunus avium)

Type: Tree / up to 15–20 m
Biodiversity properties: Flowers for pollinators, fruit for birds
Aromatic: No
Color:

Stinging Nettle (Urtica dioica)

Type: Herbaceous / up to 1.5 m
Biodiversity properties: Host plant for caterpillars
Aromatic: No
Color:

Silver Birch (Betula pendula)

Type: Tree / up to 25 m
Biodiversity properties: Supports fungi, insects, and birds
Aromatic: No
Color:

Flowering Currant (Ribes sanguineum)

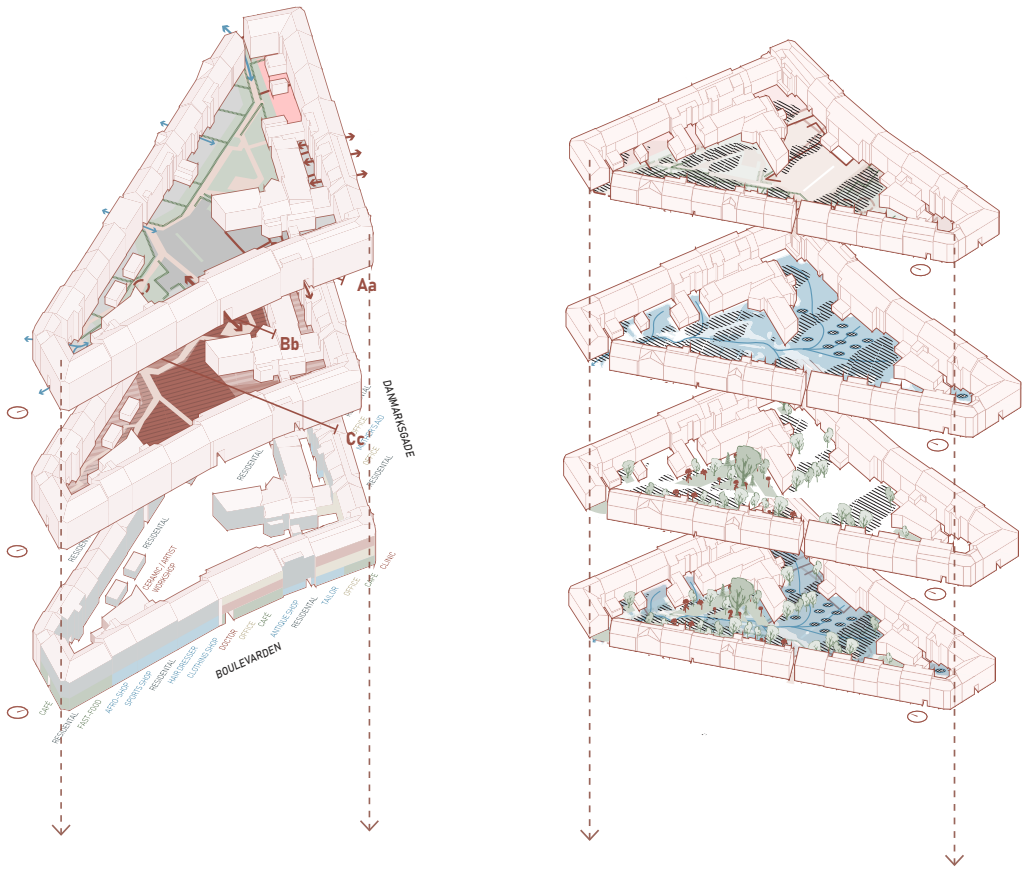
Type: Shrub / up to 3 m
Biodiversity properties: Attracts early pollinators, berries for birds
Aromatic: Yes (flowers)
Color:

Ill. 84. *Plant species*

The courtyard already hosts a surprisingly diverse range of plant species, even more than those mentioned. The diagram above highlights the most prominent and dominant types. Mature trees, flowering shrubs, and herbaceous plants contribute to the site's ecological value by supporting pollinators, birds, and small mammals. This existing biodiversity forms a strong ecological foundation.

Rather than introducing extensive new planting, the future transformation strategy could focus on **preserving** and **enhancing** what is already thriving. Supplementing the current species with carefully selected additions can strengthen microhabitats, increase resilience, and promote a more vibrant and layered green structure throughout the seasons.

KEY INSIGHTS



Ill. 85. *Insight Summary*

All previous mappings and observations are now brought together in a comprehensive overview, where physical conditions, user behaviour, ecological qualities, and spatial structures are layered and compared. By weighing the insights against one another, a set of key analytical points is distilled - highlighting both existing challenges and untapped potential within the courtyard.

Strong foundation for biodiversity

The courtyard already hosts mature trees, flowering bushes, and microhabitats that support biodiversity. These elements have high preservation value and offer a basis for enhancing ecological function - as seen in the previous **Biodiversity** section.

For place for utility, more than community

Despite its central location, the courtyard mainly supports necessary activities (*trash disposal, parking, bike storage*), with limited support for social or optional use. There are some seating options like benches, but a lack of gathering spots and community-focused features limits social engagement, as described in **Facilities & Activities** (*pp. 96*) and confirmed by user feedback in the **User Study** (*pp. 98–101*).

Insufficient water management

The courtyard includes large impermeable surfaces and a fountain that's not working. There are surface runoff and flooding risks during heavy rain, but the conditions offer a chance to

Ill. 86. *Insight Summary map - 1:1000*

implement sustainable stormwater strategies — as analyzed in **Stormwater Management** (*pp. 95*).

Blurred boundaries & privacy issues

Visual and physical boundaries between public and private zones are often transparent with hedges, half-walls, offering a visual transparency across boundaries. This creates a blurred sense of ownership and access, as mapped and discussed in **Privacy Degrees & Boundaries** (*pp. 91*).

Accessible and centrally positioned

The courtyard benefits from a central location in Aalborg and multiple entry points that connect it to surrounding streets and activities. This makes it frequently traversed by passers-by and positions it as a potential urban shortcut or shared public node - as illustrated in **Entries & Accessibility** (*pp. 90*) and described in the site overview (*pp. 86*).

Underused, but socially desired

Most users make use of the courtyard briefly and functionally, but both surveys and informal interviews reveal a consistent wish for better greenery, cleaner conditions, and more communal features — *see User Study (pp. 98-101).*

Challenging ownership structure

With 27 individual property units and a mix of uses (residential, commercial, and cultural), collaborative transformation is complex, but also opens the door for a shared vision of urban renewal - stated in the User Study (*p. 98*) and throughout the introductory site description (*pp. 84-85*)

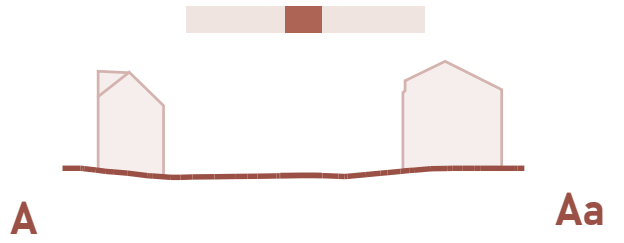
Unrealized spatial potential

Some areas, especially in the centre with natural sunlight and openness, have strong potential as social sweet spots, but are currently occupied by underused parking or passive green areas with low activity, as seen in the **Spatial Dimensions** (*pp. 94*) **Shadows** (*p. 88-89).*

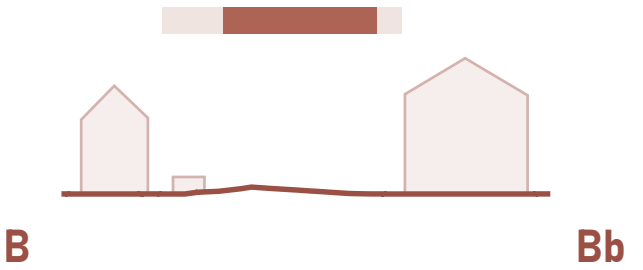
Identified spatial Zones

The edge zones, located along the building facades, are typically narrow, shaded, and used for functional purposes like storage or parking. These areas offer privacy but limited opportunity for social interaction.

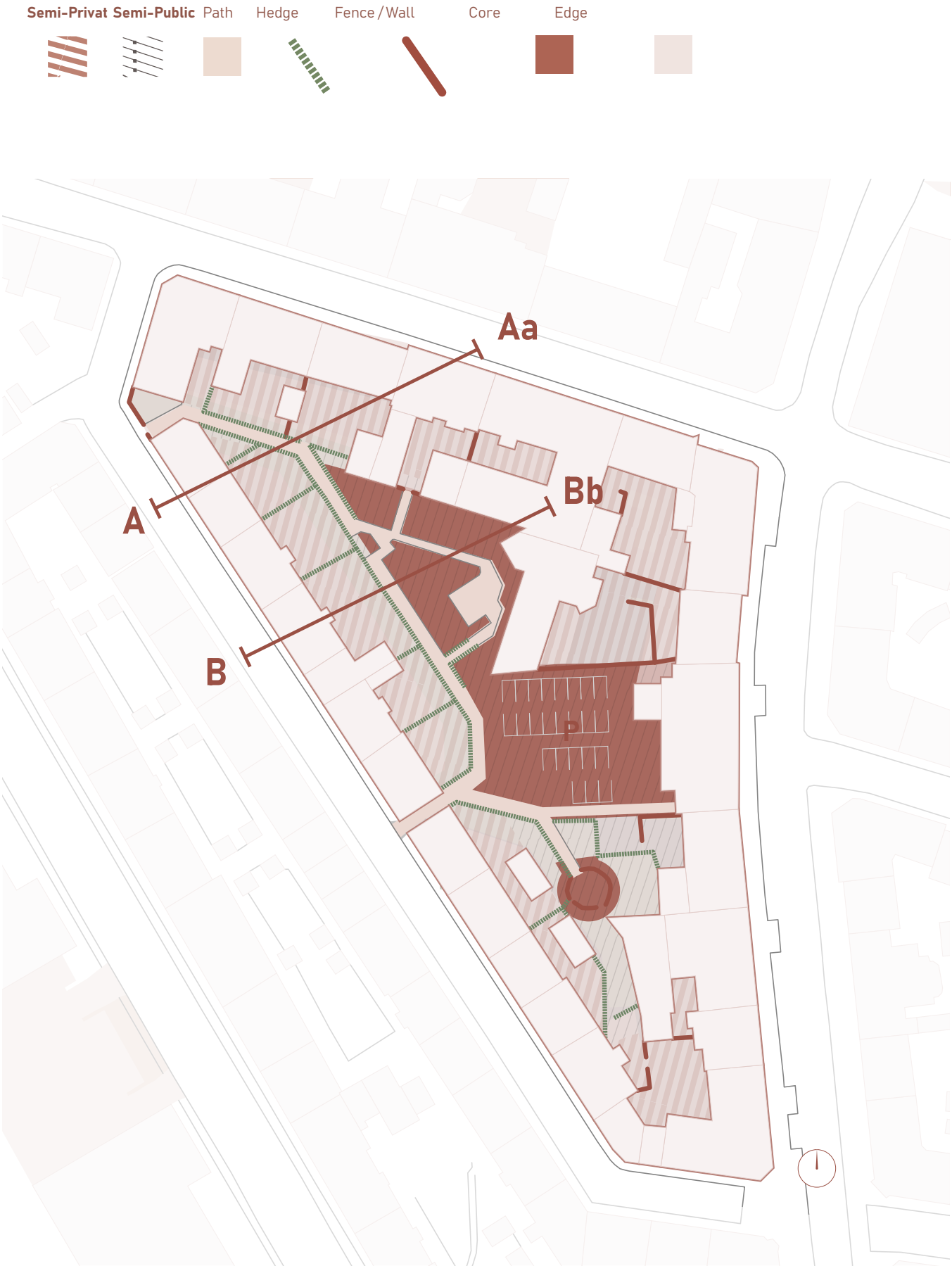
The core zone is more open, centrally located, and receives significantly more sunlight, making it ideal for shared, recreational, or green functions. Recognizing and structuring the courtyard into these zones forms a strategic foundation for future design interventions.



Ill. 88. *Zones in section A-Aa*



Ill. 87. *Zones in section B-Bb*

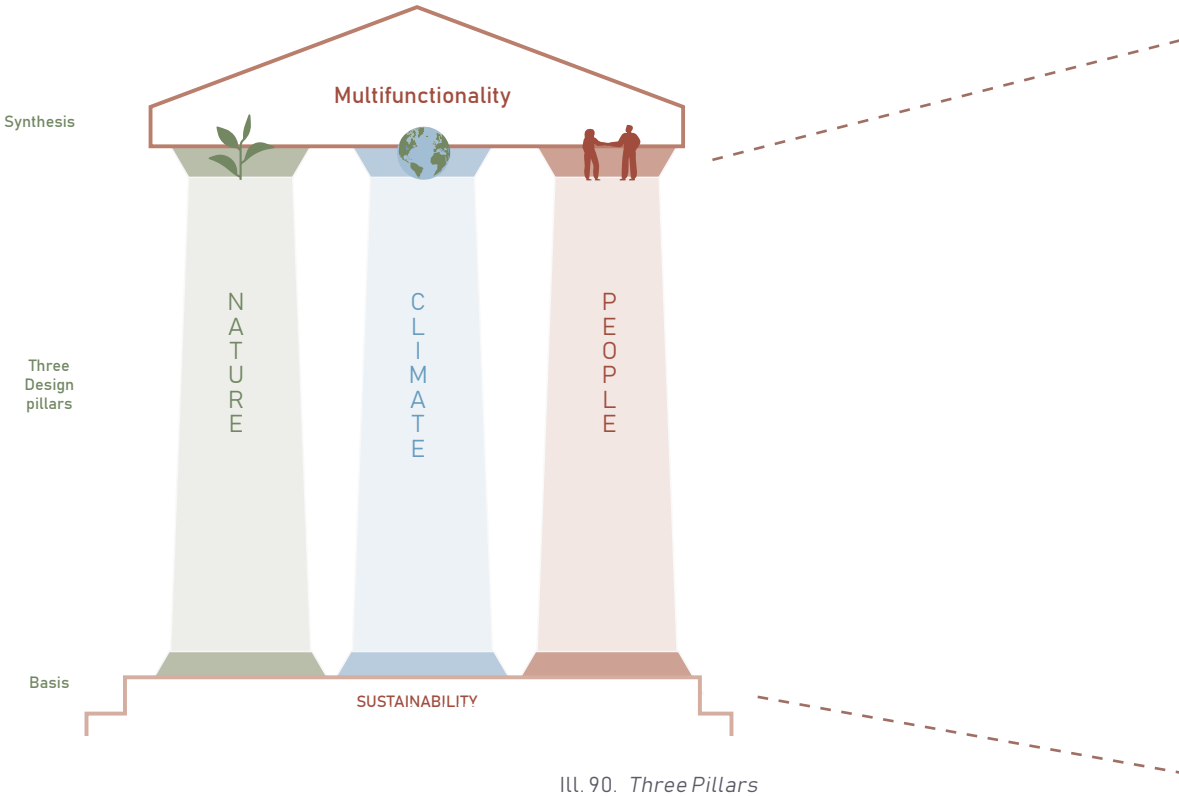


Ill. 89. *Zoning the courtyard - 1:1000*

FROM INSIGHT TO INTERVENTIONS

This chapter marks a transition from understanding the existing conditions to shaping a future vision for the courtyard. Drawing on the comprehensive insights developed through spatial mapping, user studies, and environmental analysis, concluded in the key-insight, the process now returns to the theoretical foundation set at the beginning of the thesis, framed around the three design pillars: Nature, Climate, and People. These pillars (*Ill. 90*) continue to serve as a conceptual backbone for the project and are now used to translate observations into action.

The goal is to create a new reality, build upon what already exists, preserving qualities worth keeping,



Ill. 90. *Three Pillars*

addressing critical challenges, and introducing interventions that **strengthen the courtyard's ecological, social, and climatic capacity**. The process involves translating site-specific issues and potentials into **design criteria** that are both context aware and intentional. These criteria act as a bridge between insight and tranformation (headline for the design-process), layered knowledge into clear principles that can guide decision-making throughout the next phases.

By returning to the original design framework and aligning it with lived realities on-site, the proposal becomes more than a conceptual exercise. It is anchored in context, responsive to user needs, and shaped by ecological responsibility, as stated early on in the project.

The design criterias (*ill. 91*) presented in the following page are therefore not random; they are carefully formulated tools, based on our defnintion of sustainability, a theoretical and thematic foundation, and contextual insights to steer the transformation toward a multifunctional and sustainable courtyard that supports both people, nature and climate.

DESIGN CRITERIAS

Multifunctional and sustainable courtyard that supports both nature, climate and people:

Everyday encounters with nature

- Design for ecological systems, over decorative greenery
- Preserve all existing trees and large bushes
- Design for visual, physical and sensory connec- tion
- Multiple scales, from micro-habi- tats to the broader ecological perspective

Climate adaption, where water shapes an experience

- Water should be managed locally on-site to reduce load on the central sewage
- Design for adapt- ability to everyday rainfall and extreme weather events
- Stormwater retention system as an integrated and multifunctional element
- Preserving high degree of permable planted areas

A framwork for social life

- Support commu- nity- building while allowing for unplanned, everyday interactions.
- Neseccary, social and optional activites should overlap
- Distinction and hierachy between , semi-private, semi-public and public
- Introducing (semi)public seating and recreational opportunities, all year around

SUSTAINABILITY

Ill. 91. *Design Criterias*

04
TRANSFORMATION

transformation

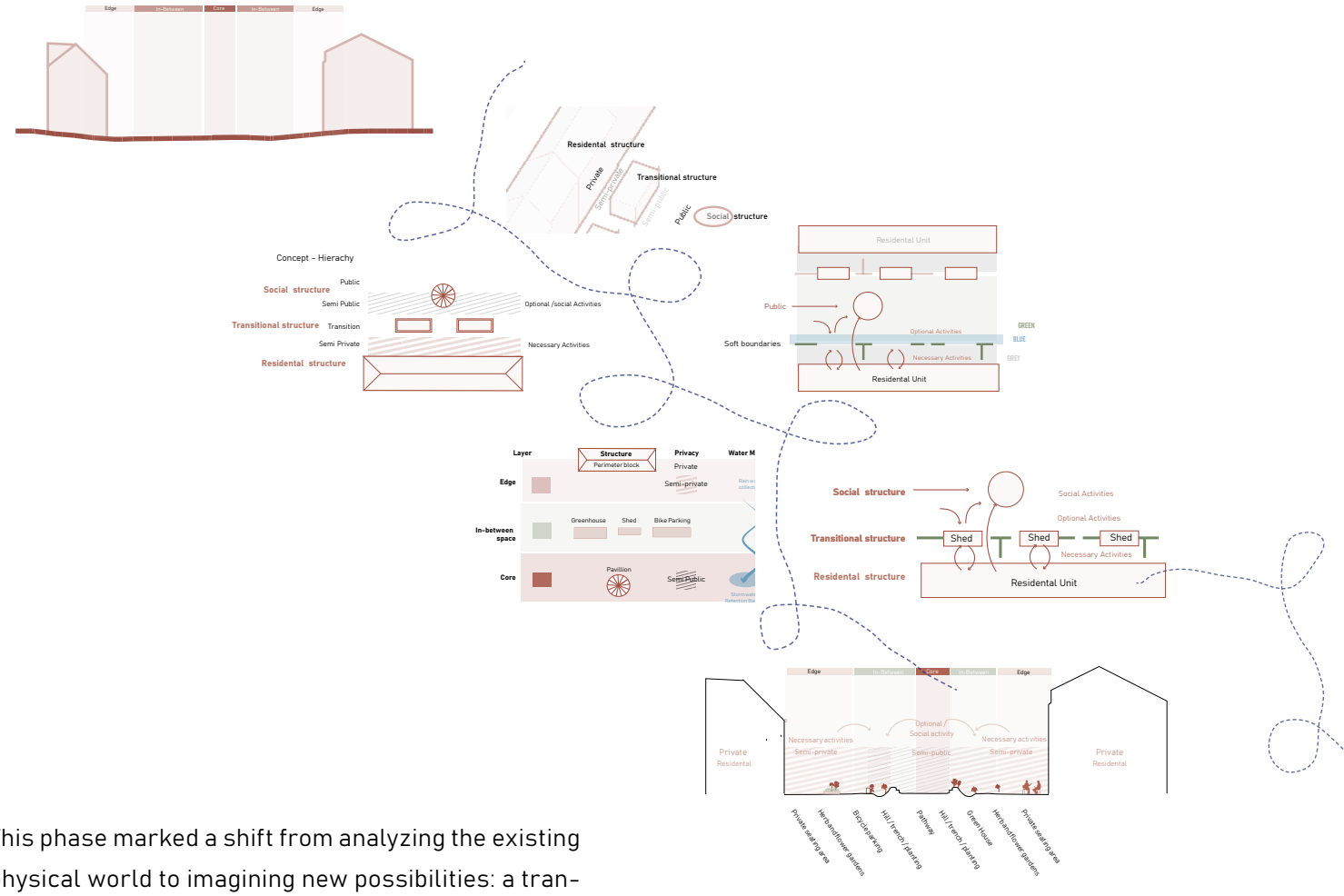
/ˌtransfəˈmeɪʃn,ˌtrɑːnsfəˈmeɪʃn/

noun

1. a marked change in form, **nature**, or appearance.

    "British society underwent a radical transformation"

CONCEPT DEVELOPMENT



Ill. 92. *Concept development iterations*

This phase marked a shift from analyzing the existing physical world to imagining new possibilities: a transition from reality to the realm of ideas. Building on the insights gathered through site analysis and theoretical grounding, the design process turned toward **exploring interventions**. At this stage, the aim was to align conceptual thinking with both lived experience and academic frameworks.

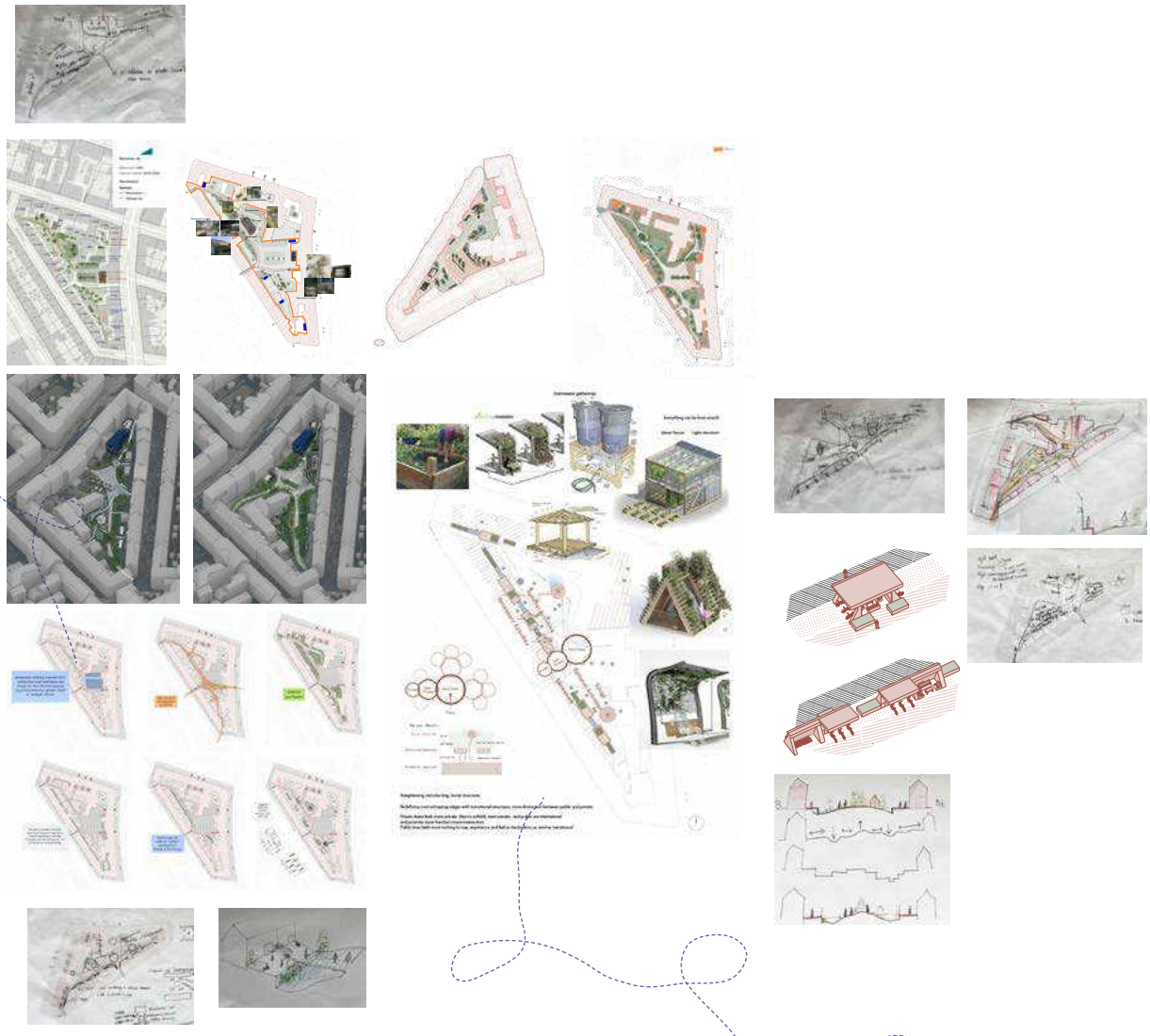
Design tools – both digital and analogue – were used to generate and test ideas. These tools allowed for the development of conceptual structures, diagrammatic relationships, and early spatial strategies. Working in layers over the existing site, the sketches began to articulate possible futures rooted in ecological, climatic, and social insight.

The excitement emerged when concept, theory, and context began to combine, when ideas became grounded in both spatial reality and theoretical understanding. This was where the designer's role came into focus: not simply interpreting the site, but actively reimagining it.

... SKETCHING

Sketching became a key instrument in translating *insight* into form. Here, concept development was explored across multiple formats, from analytical overlays and zoning diagrams to atmospheric visuals and structural typologies. Rather than resolving a final design, this phase also involved experimentation, iteration, and reflection.

The process was layered and non-linear, testing how different ideas performed when placed onto the spatial context of the courtyard. Programmes were considered, boundaries were questioned, and social flows were envisioned. The drawings on this spread reflects not just a design outcome, but a methodology, where intuitive exploration and theoretical intent were allowed to meet. Through this, the seeds of a transformative design proposal began to take shape.



Ill. 93. *Collage of sketching and concept development*

TRANSFORMATION CONCEPT

THE THREE LAYERS

Edge

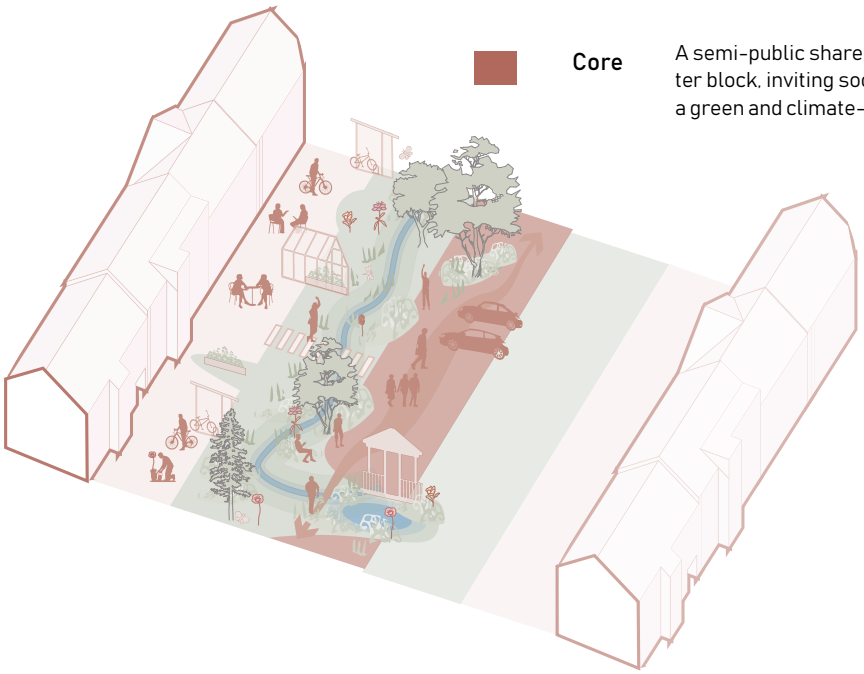
A semi-private extension of the home where residents engage in everyday routines—surrounded by edible, aromatic planting, bike storage, utility space and pollinator-friendly gardens, that collect rain and creates a sense of ownership

In-between Space

A green corridor that shapes space and guides flow, where people, water, and biodiversity move through a soft, but distinct line between private and public life.

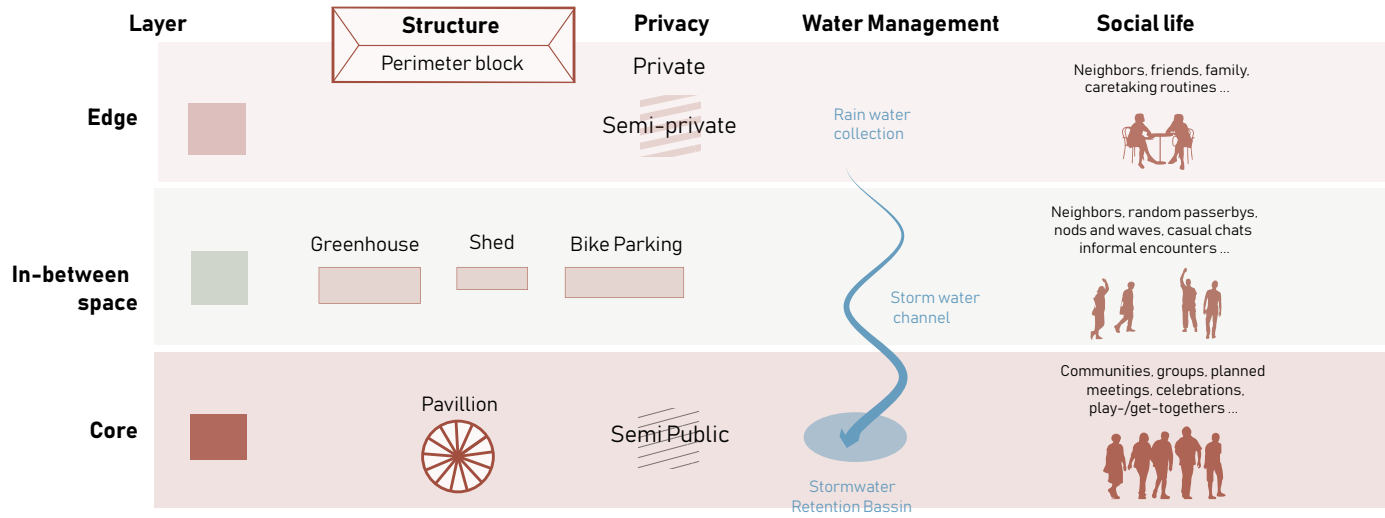
Core

A semi-public shared space at the heart of the perime - ter block, inviting social life, play, nature and water into a green and climate-resilient environment



Ill. 94. *Concept - the three layers*

PROGRAMME



Ill. 95. *Concept Programme*

The courtyard is reimagined through a conceptual framework of three spatial layers: **Edge, In-between,** and **Core.** The edge and core were both identified in the existing courtyard (*see Key Insghts pp. 106*), however these are reimagined. The In-Between layer is a new addition, and holds a key responsibility, as later explained.

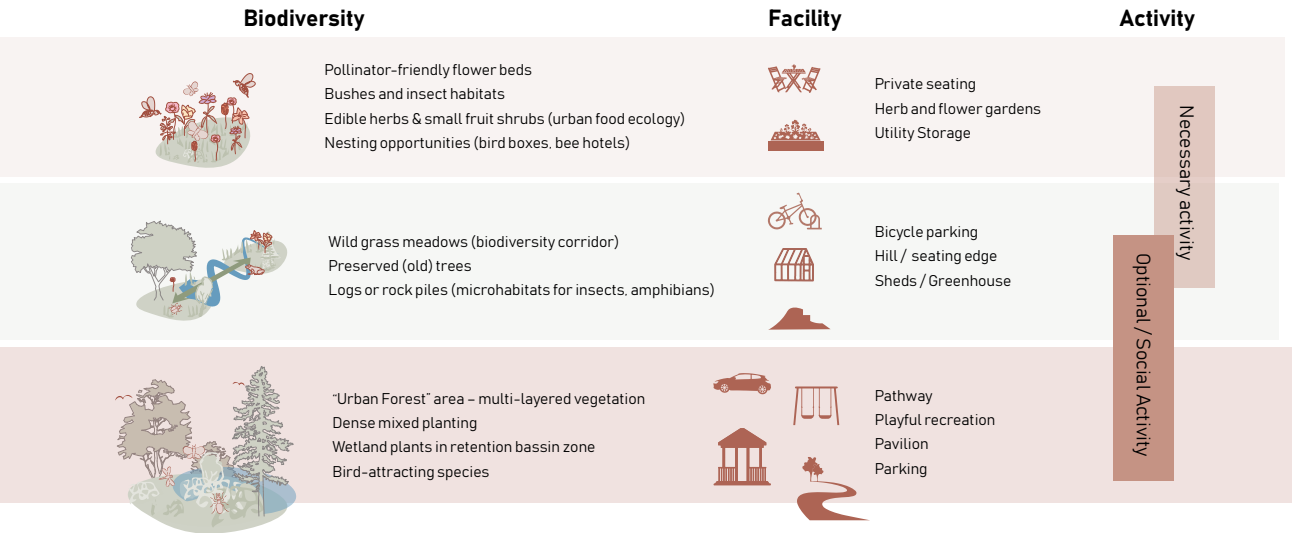
This concept of three zones is visualized in the diagram ***The Three Layers*** and further operationalized through the ***Programme***.

The **Edge** is the zone closest to the building façades, where spatial and social boundaries are most tightly defined. Here, private routines, such as bike parking, gardening, and access to storage, take place in a semi-private setting. As shown in the *insight summary mapping on page 107*, this edge condition already plays an active but fragmented role in residents' everyday lives. The design strengthens this zone by introducing new structures, like greenhouses and sheds, to help define and enclose the space. The framework encourages residents to socialize with their closest, perhaps bringing out table sets for morning coffee. At the same time, edible planting and pollinator-friendly gardens foster a sense of ownership.

The **Core** lies at the courtyard's sunlit center and holds the most spatial and climatic potential. Identified on *page 86*'s microclimatic- and activity analyses (*page 96*) as underused and dominated by parking, the core is reframed as a shared, semi-public landscape. It becomes the main site for communal functions: a pavilion, play areas, and a stormwater retention basin designed to support both recreation and resilience. This transformation turns a latent space into a vibrant social and ecological hub.

Between these, the **In-between** layer operates as a connective corridor, both spatially and programmatic. It guides water through the site by stormwater channels, connects habitats for pollinators, and creates informal spaces for movement and everyday encounters. **This zone mediates between public and private life**, and between hardscape and greenscape.

While these layers are diagrammatic presented as distinct, in practice they overlap and blur. Edges becomes social, cores may host private moments, and the use can shift throughout the day. The strength of the concept lies not in rigid separation, but in the ability to orchestrate spaces that respond to different and adaptive needs for the user, climate and nature. *This zoning becomes the foundation for both spatial organization and programmatic decisions in the design proposal.*



CONCEPT IN SECTION

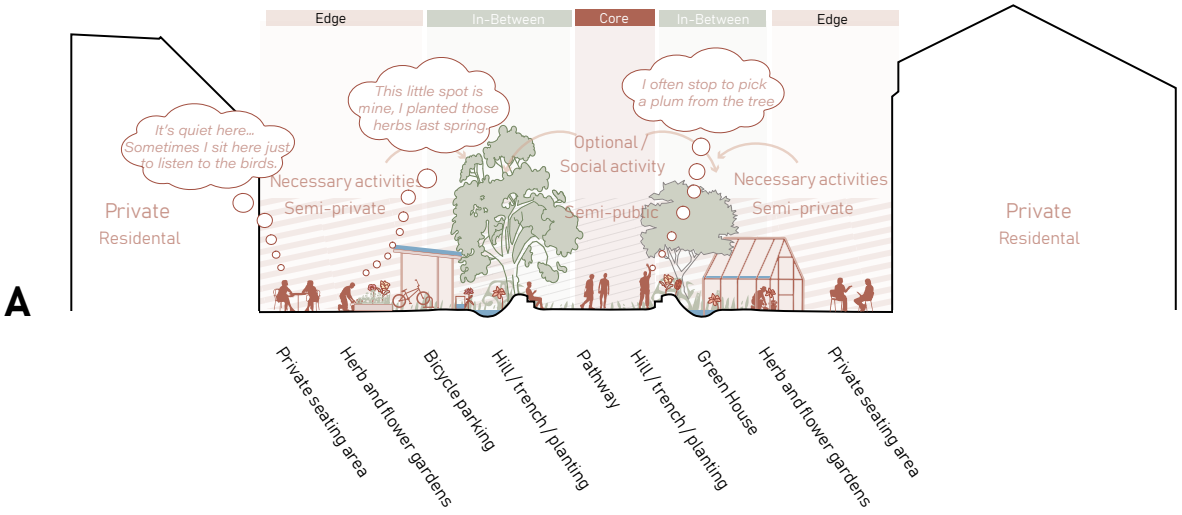
Ill. 96. *Section indications - 1:3000*

Sections offer a way to test how the conceptual zoning of **Edge, In-between, and Core** performs in real spatial conditions. Acting as a hybrid between the abstract and the physical, sectional drawings allow the design to be evaluated not just as a surface plan but as a lived environment. The three selected cuts (*see Ill. 96*) each capture a different condition within the courtyard:

Section A moves from the private edge toward the communal core, illustrating transitions in ground treatment, privacy, and planting.

Section B captures a fully opened green core, where social and ecological functions overlap.

Section C engages directly with the current parking zone, testing how this contested space could be transformed into a socially and climatic active core.

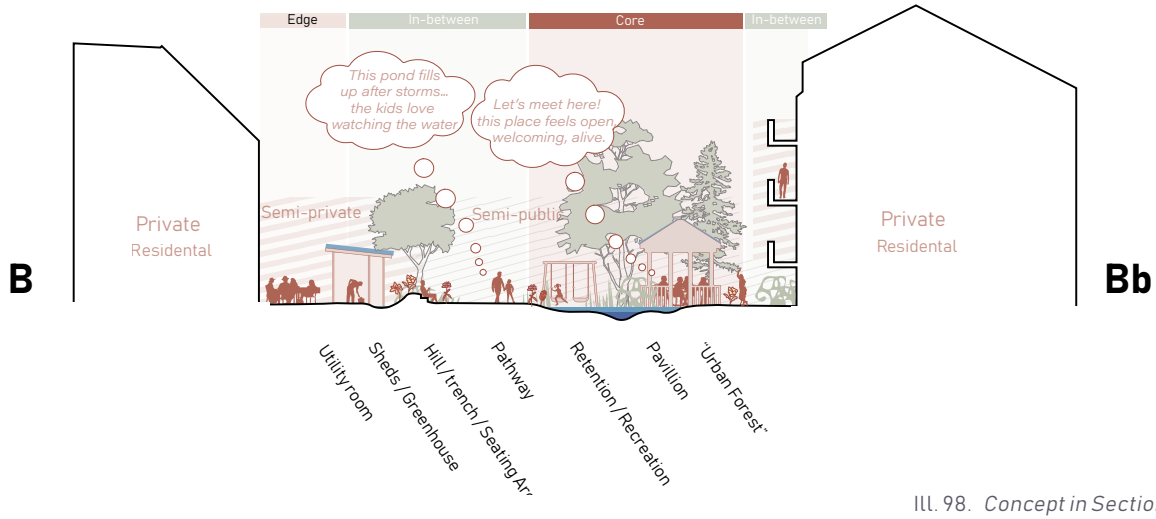


Ill. 97. *Concept in Section A-Aa*

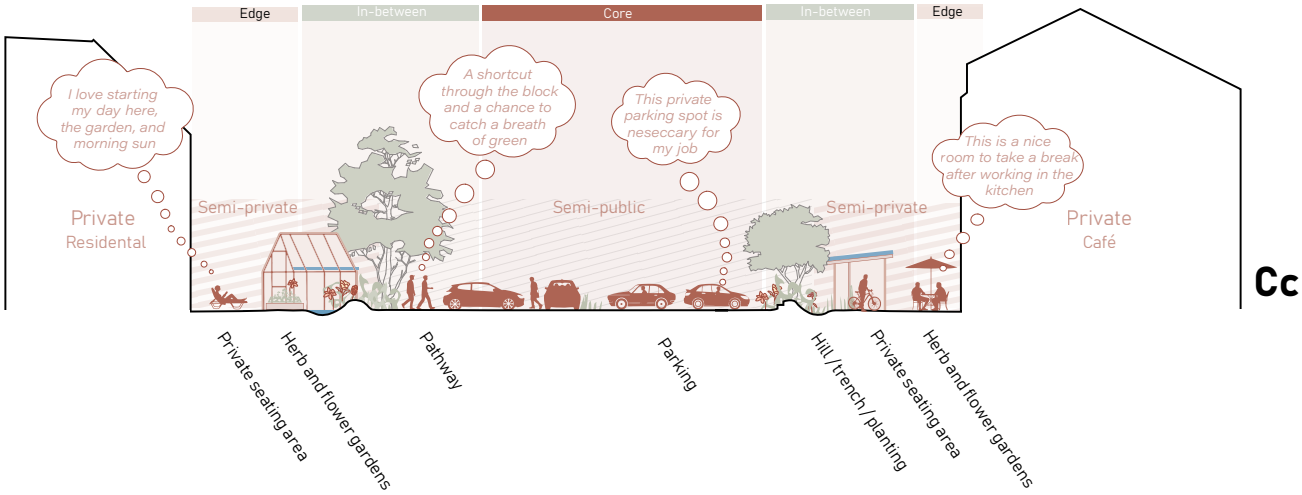
Each section (*Ill. 97–99*) includes narrative overlays in the form of thought bubbles. These help visualize the courtyard, not just as a system of zones, but as a human experience. one that invites reflection on comfort, activity, and perception from a resident's point of view. This method supports storytelling as a design tool, relating spatial interventions into new perspectives.

By working in section, the concept is no longer just diagrammatic, it becomes spatially grounded.

The sections examines, how **the three-layer concept** interacts with program, vegetation, and social use at eye level, setting the stage for more detailed design development.



Ill. 98. *Concept in Section B-Bb*



Ill. 99. *Concept in Section C-Cc*

REFLECTION

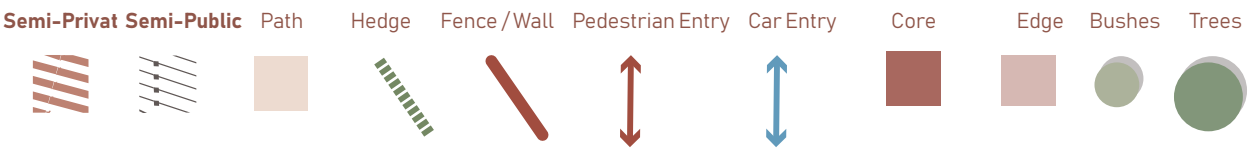
A key point of contention in the design process has been the treatment of the central parking area.

As visualized in the existing- and concept plans (*Ill. 100-101*) and Section C (*Ill. 99*), the space currently occupied by parking overlaps directly with the sunniest and most central zone of the courtyard, precisely where the proposed **Core** zone is intended to foster social life, greenery, and climate resilience. While earlier iterations sought to preserve the parking out of legal obligation and to avoid friction with local businesses, this increasingly stood in conflict with the broader concept and ambitions for the project. Through continued testing and reflection, it became clear that maintaining parking in this location would compromise the overall spatial quality and long-term potential of the courtyard.

> *"As designers, we carry responsibility not only to accommodate existing needs but to propose meaningful futures."*
>
> *(Authors own formulation)*

With this in mind, the project begins to challenge the static role of the parking lot, reframing it not as fixed infrastructure, but as a space open for transformation.

EXISTING PLAN



Ill. 100. *Existing Plan - 1:1500*

PRESERVING

The following elements are being preserved as part of the courtyard transformation. Preservation plays a vital role in sustainable urban redevelopment, as it avoids unnecessary interventions and respects existing qualities that align with the overall design concept.

TREES AND BUSHES

ENTRIES, PUBLIC ACCESSIBILITY

(PARKING)

→ TOWARDS A TRANSFORMATION PLAN

" THE THREE LAYERS "

Core In-Between Space Edge

Ill. 101. *Concept in Plan - 1:1500*

INTRODUCING

These mentioned initiatives are newly introduced into the masterplan and needs more iterations, as the presented plan is only conceptual, temporary and needs deeper degrees of exploration and detailing towards final soultion:

(NEW)

STORMWATER CHANNELS

PARKING SCENARIOS

SEATING EDGE

BIODIVERSITY STRATEGY

RETENTION POND / PLAY-GROUND

LIGHT STRUCTURES

PATH CONNECTIONS

PARKING SITUATION

The first design iteration explores how the parking area can evolve **from its current use into a more dynamic, multifunctional, and climate-adapted space**. The plan shown here illustrates a phased approach where essential access and some parking are initially retained, while simultaneously integrating tree planting, water management, and flexible spatial design.

This strategy aligns with broader **municipal ambitions**. Aalborg Municipality is actively working toward reducing inner-city car presence in favour of greenery and more people-prioritized environments (Aalborg Kommuneplan, 2021). The project builds on this direction, imagining the parking lot not as a barrier but as a catalyst for change.

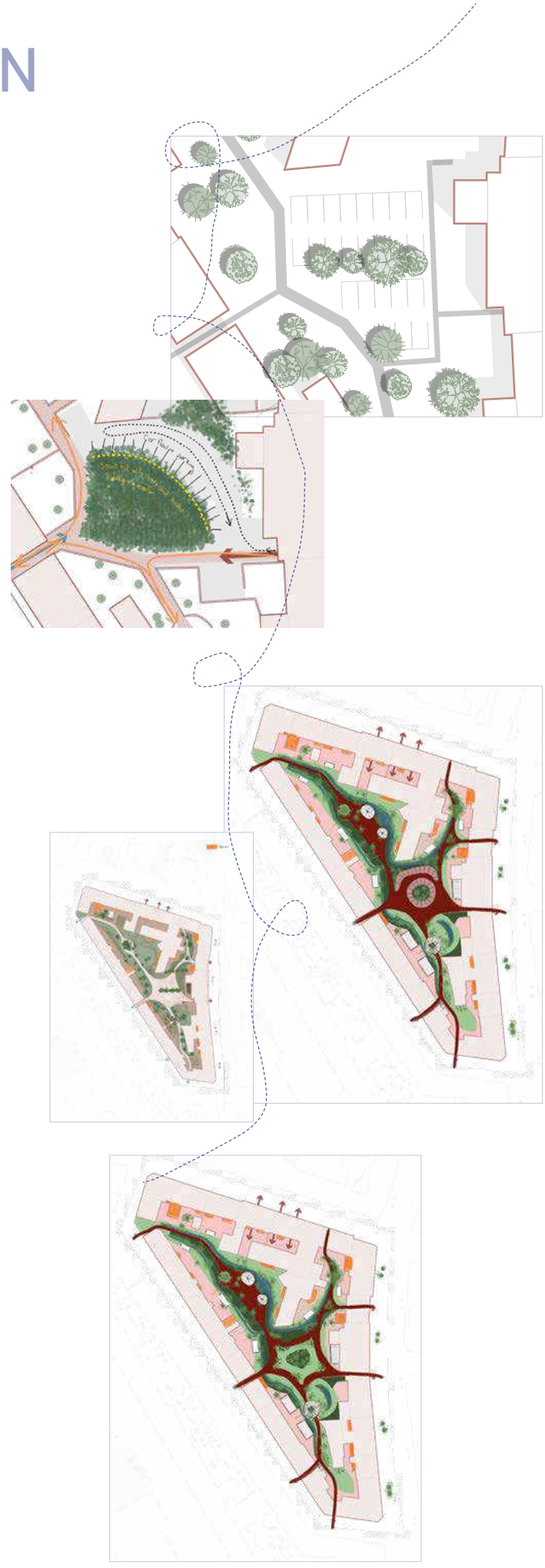
Future scenarios could include a **reduced parking demand**, changes in local regulations, or growing support for green mobility. Conditions that can unlock the full transformation of the site over time.

By positioning the parking area as a negotiable layer, this approach opens for long-term adaptability while staying true to the project's conceptual foundation. It becomes a testing ground for transition: from asphalt to shared space, **from car logic to courtyard life.**

The courtyard's current centre use, as a parking lot, raises critical questions about **spatial priorities** and future adaptability. In line with the municipal strategies to reduce car dominance in central areas, this project explores three possible scenarios (*see ill. 103*):

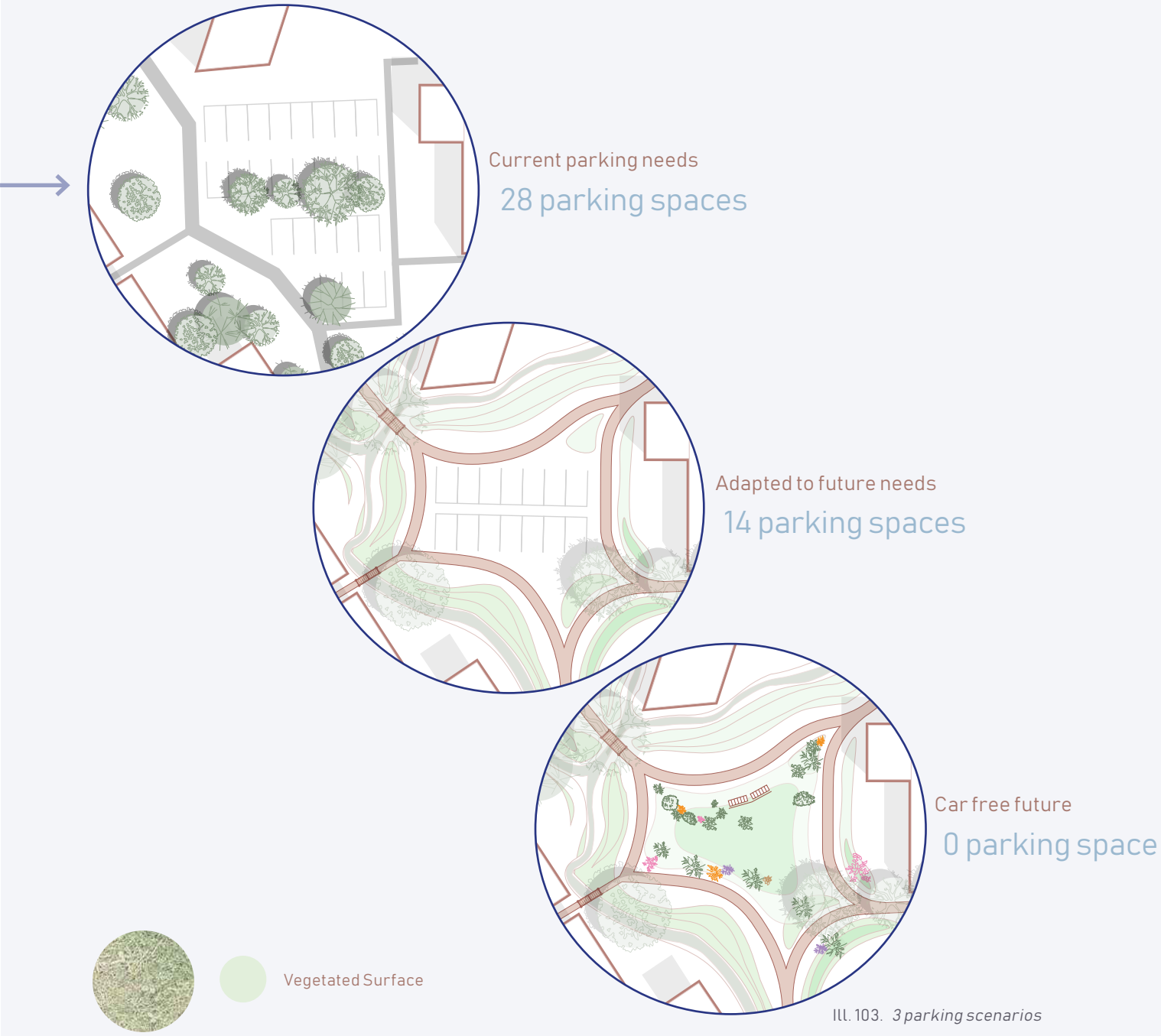
Status Quo – Retaining all 28 parking spaces, preserving current functions but limiting transformation potential and green integration.

Phased Reduction – Keeping 14 spaces during a transition period while freeing up space for planting,



Ill. 102. *Iterations in plan*

SCENARIOS



Ill. 103. *3 parking scenarios*

recreation, and stormwater management.

Car-Free Courtyard – Removing all parking, enabling full implementation of the design vision focused on biodiversity, community life, and climate adaptation.

These scenarios reflect both current legal requirements and long-term ambitions. By treating parking as a negotiable layer, the design opens for gradual change, balancing present needs with future potentials.

As Ole B. Jensen points out, transitions away from car-centric planning require more than technical solutions. They demand a rethinking of how mobility, space, and everyday life are culturally and spatially entangled (Jensen, 2025). This project supports that ambition by shifting focus from asphalt functionality to shared urban value.

RETENTION POND

Climate adaption, where water shapes an experience

Water should be managed locally on-site to reduce load on the central sewage

Design for adaptability to everyday rainfall and extreme weather events

Stormwater retention system as an integrated and multifunctional element

Preserving high degree of permable planted areas

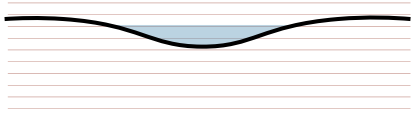
As part of the courtyard's climate adaptation strategy, a retention pond is proposed to manage local storm-water on site, reducing reliance on the existing sewer system. The design process involves understanding key factors such as surface runoff, infiltration capacity, and rainfall frequency.

By removing existing drainage inlets, the courtyard is reimagined as a self-regulating system where water is absorbed or temporarily stored in the landscape. The retention pond is dimensioned to handle runoff from a **2-year rain even**t and designed to hold up to **60 m³** of water.

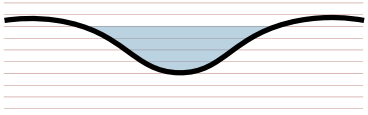
These calculations and technical assumptions - including catchment size, infiltration rates, and runoff reduction - are detailed in ***Appendix 3 – Retention Pond***, which provides the basis for the final design.

Ill. 104. *Natural permability*

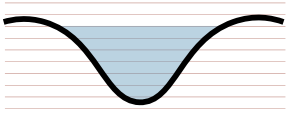
RETENTION POND DIMENSIONS



Shallow Pond – 0.3 m depth
Required surface area:
200 m²

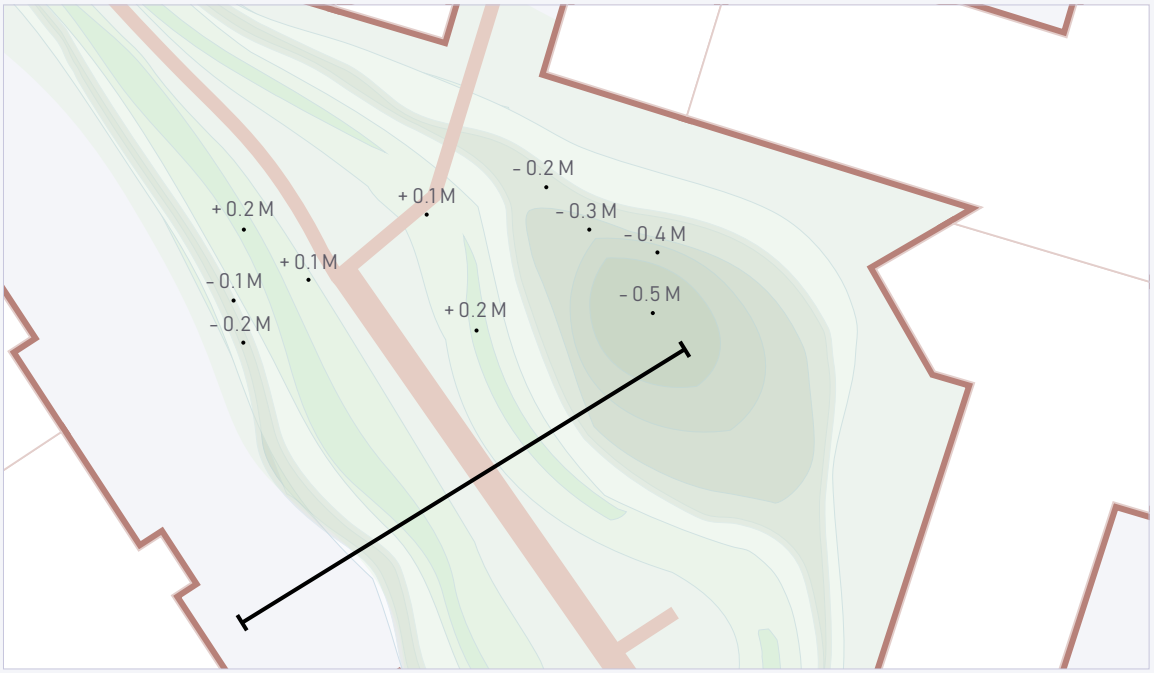


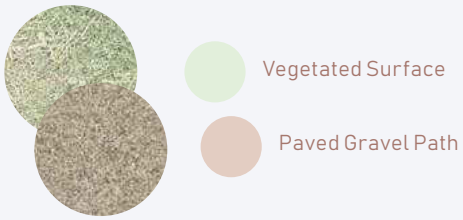
Medium Depth Pond – 0.5 m
Required surface area:
120 m²



Deep Pond – 1.0 m
Required surface area:
60 m²

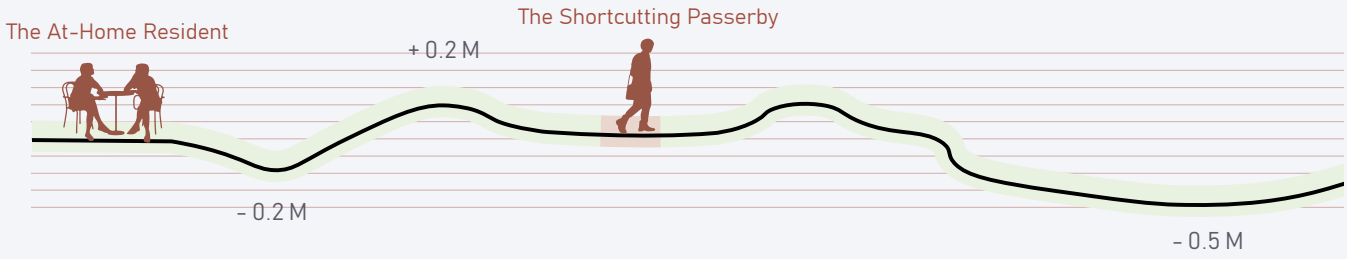
TERRAIN MODULATION





General Site Elevation: +8.7 M - +9.3 M

Ill. 105. *Terrain modulation - 1:250*



Ill. 106. *Section - Terrain modulation*

SCENARIOS

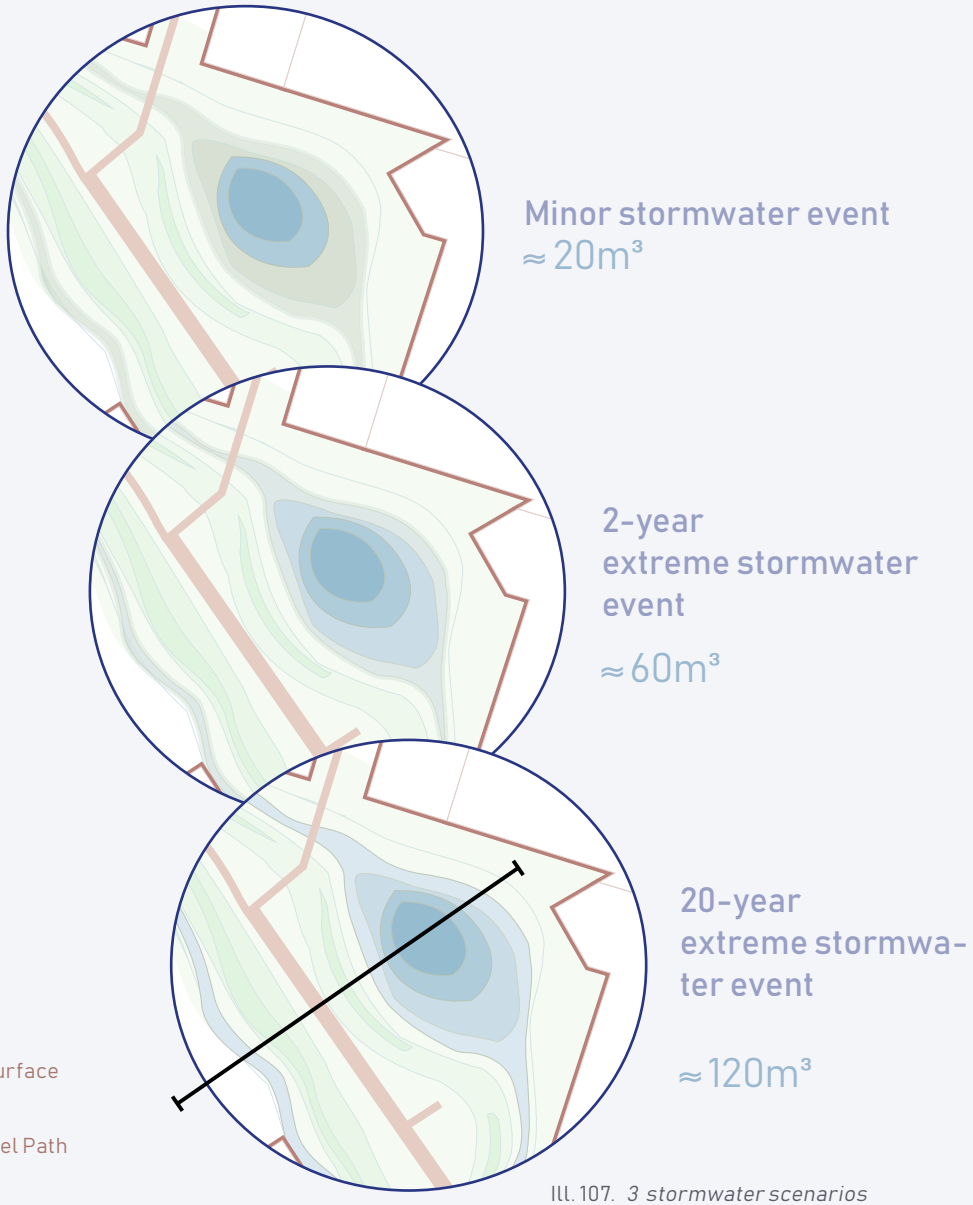
Climate adaption, where water shapes an experience

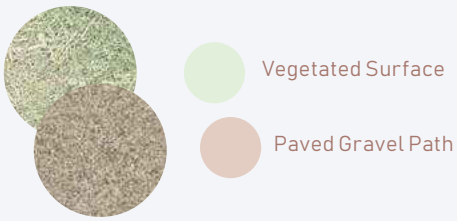
Water should be managed locally on-site to reduce load on the central sewage

Design for adapt-ability to everyday rainfall and extreme weather events

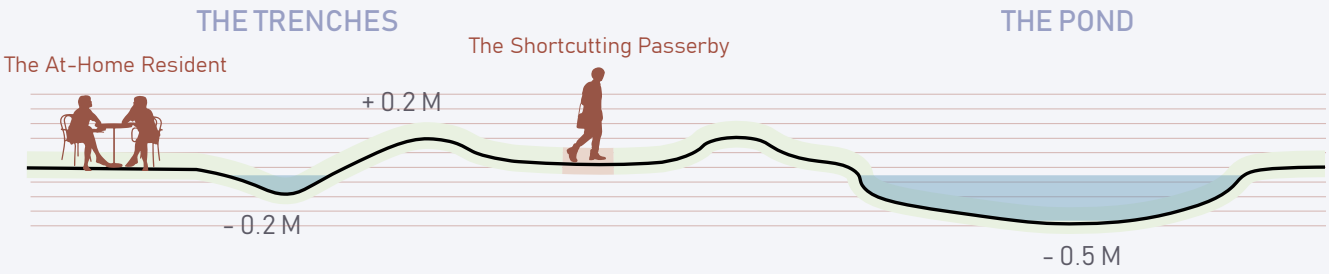
Stormwater retention system as an integrated and multifunctional element

Preserving high degree of permable planted areas



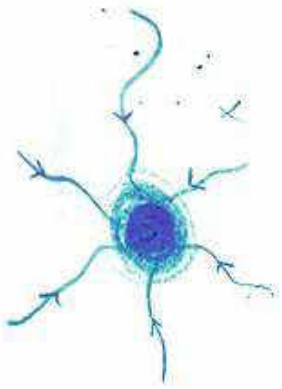


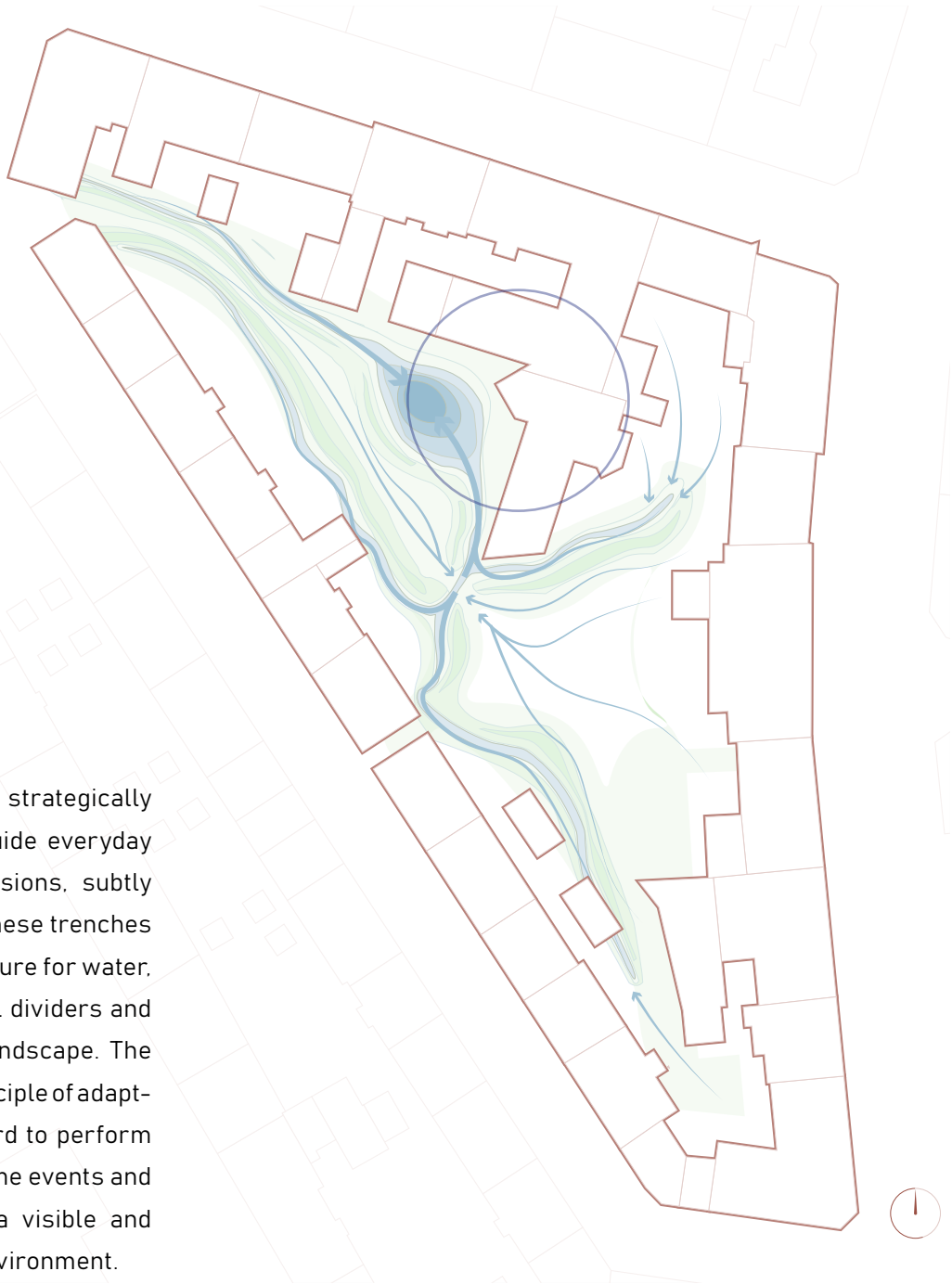
Ill. 107. *3 stormwater scenarios*



Ill. 108. *20-year extreme stormwater event*

STORMWATER CHANNELS / RETENTION BUFFER

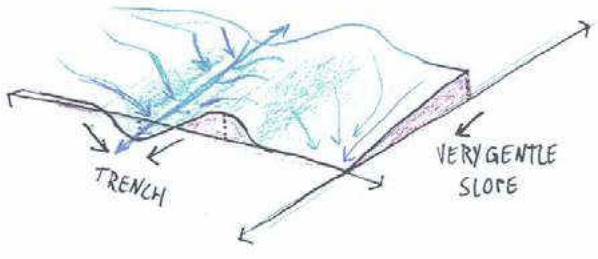




THE TRENCHES

Smaller channels are strategically placed across the site to guide everyday rain through gentle depressions, subtly marking flow and division. These trenches act as connective infrastructure for water, while also serving as spatial dividers and experiential edges in the landscape. The approach underlines the principle of adaptability, allowing the courtyard to perform during both minor and extreme events and introduces stormwater as a visible and shaping force in the urban environment.

Ill. 109. *Trench channels - 1:1000*



Ill. 110. *Terrain and pond sketch*

THE POND

A larger depression is introduced as a retention buffer, capable of holding up to 60 m³ in a 2-year rain event and 120 m³ in a 20-year event. However, this element serves more than just technical capacity: it is designed as a hybrid spatial feature , when its dry and usable for other functions in daily life, but adaptable during storm conditions.

THE PATH

Ill. 111. *Path map - 1:1200*

A framwork for social life

Support community- building while allowing for unplanned, everyday interactions.

Neseccary, social and optional activites should overlap

Distinction and hierachy between , semi-private, semi-public and public

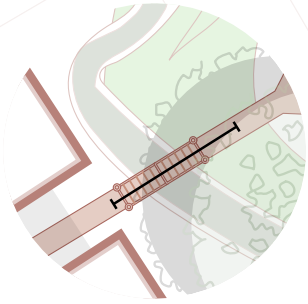
Introducing (semi)public seating and recreational opportunities, all year around

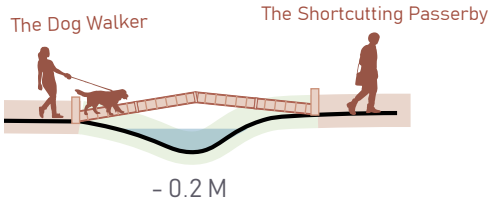
PATH CONCEPT

The path network is both a connective infrastructure and a spatial organiser. It links the different zones of the courtyard while guiding movement across and between them.

The main pathway functions as a subtle spine through the site, offering a clear route for circulation while connecting fragmented spaces into a more cohesive whole.

ELEVATED PATH



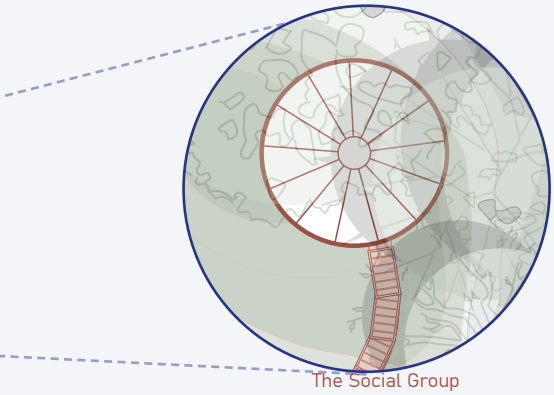


Where the path intersects with stormwater trenches, it transitions into an elevated walkway. These raised crossings are not only functional but also serve a symbolic role: They highlight transitions. Importantly, connectivity is not maximised everywhere, the deliberate absence of certain connections preserves spatial hierarchies, reinforces privacy gradients, and ensures that the flow of people respects the logic of use and ownership. The path thus becomes a tool for both movement and meaning.

BUILT STRUCTURES

PAVILLIONS

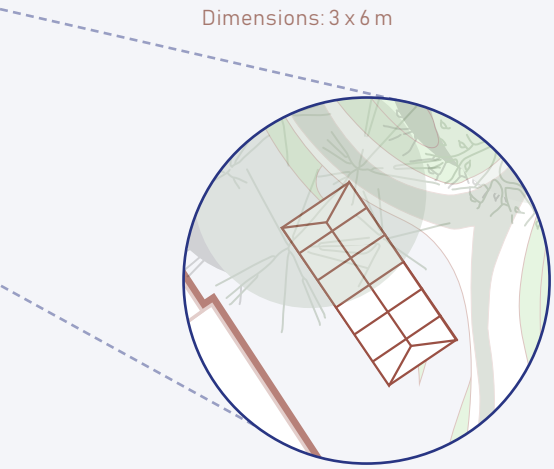
Diameter: 6 m



The Social Group

GREEN HOUSES

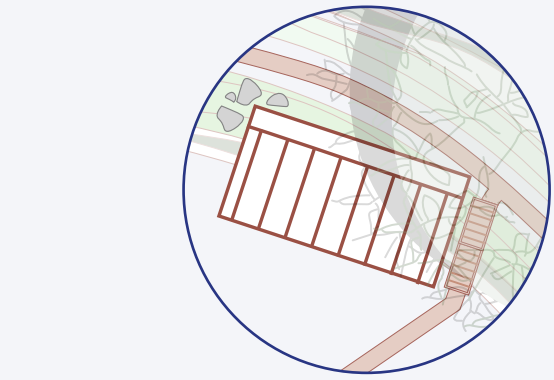
Dimensions: 3 x 6 m



The Engaged Resident

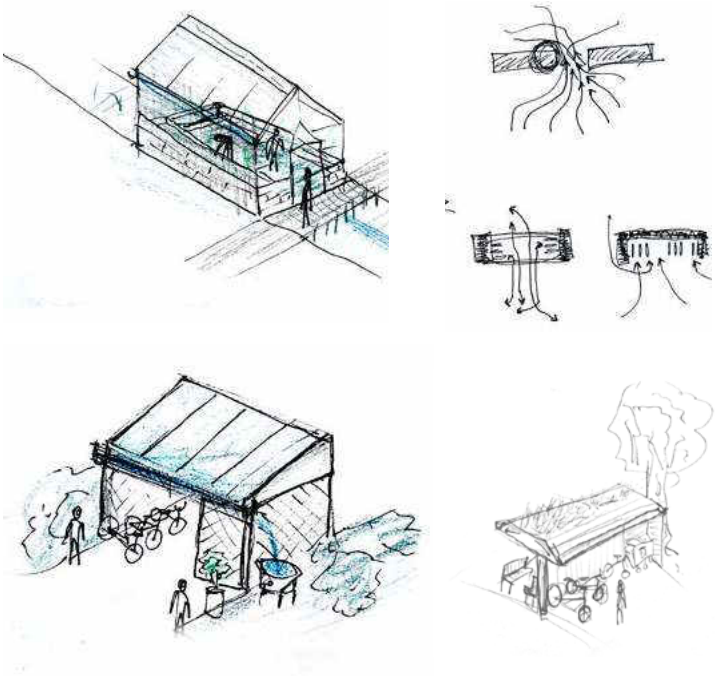
BIKE PARKING

Dimensions: 4 x 8 m



The Bike Owner

Built elements are introduced to support both social life and everyday functionality within the courtyard. The pavilion, located in the core zone, acts as a central, inclusive structure that facilitates communal activities, such as informal gatherings, celebrations, or seasonal events, for semi-public use. Its open design and accessible location provide a gathering point for shared use, reinforcing the courtyard as a social and multifunctional space



On the other hand, structures placed in the in-between zones: Greenhouses, and bike parking, are smaller in scale and serve more practical or semi-private purposes. While functional in nature they also shape spatial boundaries. Their positioning and orientation and more closed design subtly define transitions between public and private spheres, allowing gradients of access and ownership to emerge. These elements aim to enable everyday necessary activities to coexist with informal social interaction and environmental care.

NATURE INTEGRATION

STRATEGY

Everyday encounters with nature

Design for ecological systems, over decorative greenery

Preserve all existing trees and large bushes

Design for visual, physical and sensory connection

Multiple scales, from micro-habitats to the broader ecological perspective

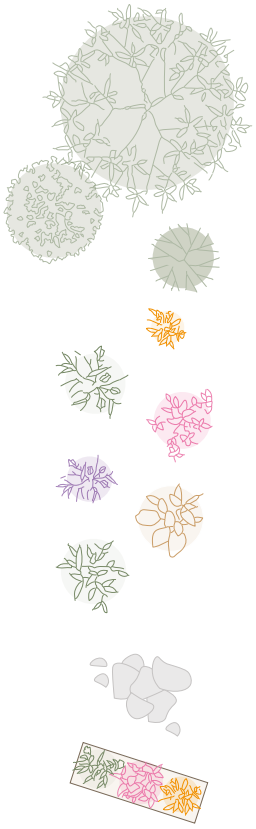
The planting strategy is guided by principles of **biodiversity, resilience, and layered ecological structure**. Rather than focusing on decorative greenery, the courtyard is reimagined as a living system, supporting *urban wildlife, seasonal change, and stronger connections between people and nature*.

A key part of the strategy is to preserve as much existing vegetation as possible, especially the mature trees and *large shrubs that already offer shade, structure, and habitat*. This nature-based strategy aligns with the overall transformation concept, where vegetation helps define the three spatial zones: Edge, In-Between, and Core, both ecologically and socially.

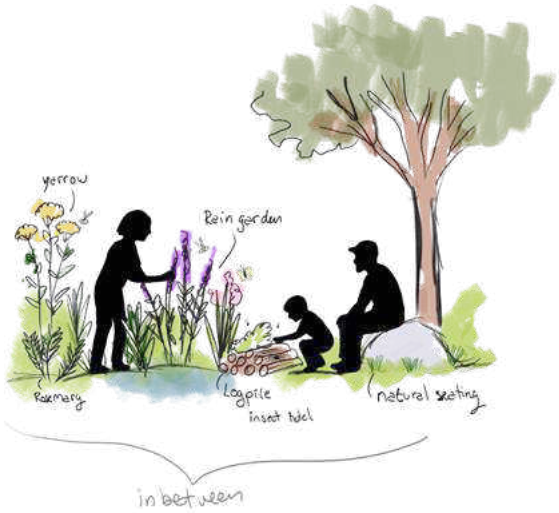
New species are introduced to increase diversity and create varied habitats across the courtyard. The planting is organised around **seven key categories**: p*ollinator magnets, ground covers, drought-tolerant and resilient species, shade-tolerant plants, early-season bloomers, edible or useful plants, and species with seasonal or visual interest*.

This layered approach includes low groundcovers, wildflower zones for pollinators, shrubs and fruit-bearing plants, and taller trees along selected edges. Together forming a kind of small urban forest. Natural elements like logs and stone piles are added to support microhabitats and biodiversity, making the courtyard a dynamic, multifunctional space for both humans and nature.

Ill. 112. *Sketches - Nature integration*



FUNCTION	SPECIES
TREES	
Pollinator Trees	Maple (Acer platanoides), Apple (Malus pumila), Wild Cherry (Prunus avium)
Habitat & Nesting Trees	Elm (Ulmus rubra), Silver Birch (Betula pendula)
Fruit-Bearing Trees	Apple (Malus pumila), Wild Cherry (Prunus avium)
PLANTING	
Pollinator Attractors	Purple Coneflower, Catmint, Lavender, Yarrow, Field Scabious
Ground Covers	Japanese Sedge, Emerald Gaiety, Tufted Sedge, Bigroot Geranium
Edible / Useful Plants	Raspberry, Thyme, Rosemary, Oregano, Catmint
Early Season Bloomers	Marsh Marigold, Alpine Currant, Cherry Laurel, Raspberry
Drought Tolerant & Resilient	Thyme, Lavender, Yarrow, Emerald Gaiety
Shade Tolerant	Male Fern, Alpine Currant, Japanese Sedge, Wolf's Bane
Ornamental Interest	Japanese Sedge, Purple Loosestrife, Wolf's Bane, Bigroot Geranium, Meadow Bistort
OTHER	
Natural Plant Debris	Dead wood, large cut branches
Stone Piles for Insects	Rocks and loose materials stacked intentionally
Microhabitats in Flower Beds	Bark mulch, cavity stones, and plant density variation



Ill. 113. *Sketches - Nature integration*

Ill. 114. *Ecological perspective*

Ill. 115. *Social perspective*

Ill. 116. *Spatial perspective*

ECOLOGICAL PERSPECTIVE

The planting strategy treats the courtyard as a living system. Mature trees and large bushes are preserved for their ecological value, forming the backbone of a layered planting structure. New vegetation adds diversity at multiple levels: groundcovers, shrubs, and canopy, to support pollinators, birds, and soil life. Features like log piles, rock clusters, wildflower zones, and wetland plants enhance microhabitats and support urban biodiversity.

SOCIAL PERSPECTIVE

Nature is designed to be experienced. Edible herbs, aromatic plants, and fruit-bearing species invite residents to touch, taste, and care for their surroundings. Seasonal planting ensures variation throughout the year, creating moments of interaction and awareness.

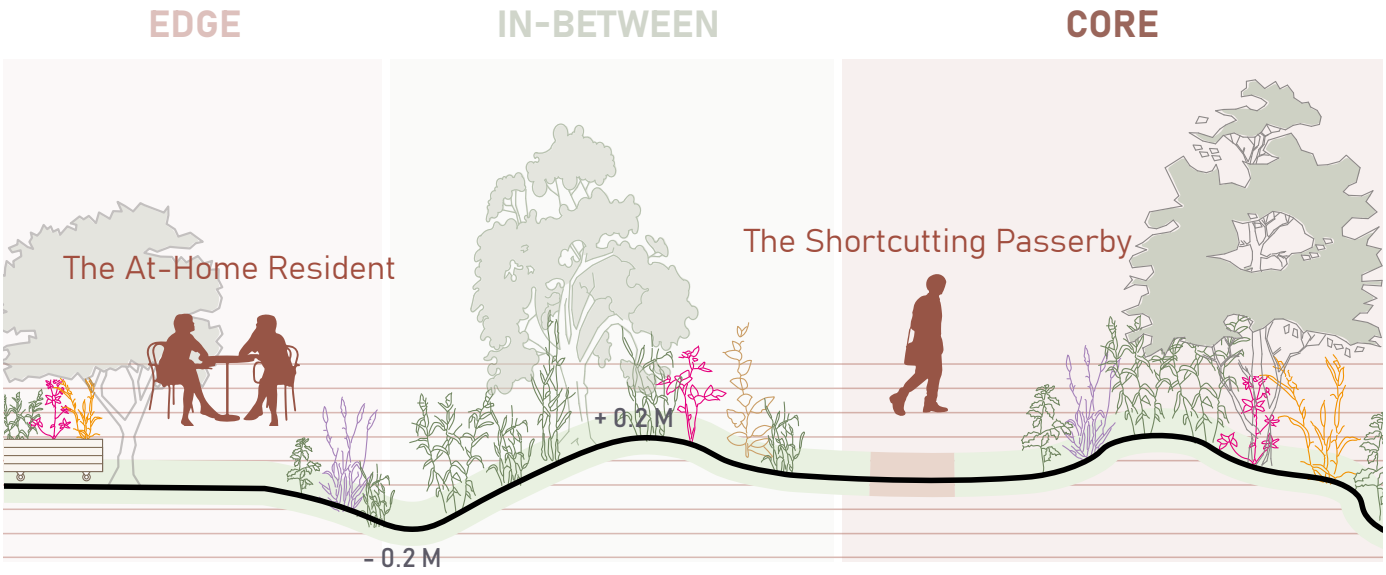
This hands-on relationship builds a shared sense of care and supports informal learning and community ties.

SPATIAL PERSPECTIVE

Vegetation is used strategically to define space and support function. Planting creates soft boundaries, guides movement, and signals transitions between public and private. Trees provide shade and anchor seating zones; swales and planted trenches manage water while shaping circulation. Nature becomes an active part of the courtyard's spatial structure.

By combining preservation, diversity, and engagement, the strategy transforms the courtyard into an adaptive, resilient, and meaningful urban ecosystem.

Nature here is not an afterthought, but a **primary design driver**, integrated across time, scale, and human interaction.



Ill. 118. *Nature integration concept section*

Ill. 117. *Strategy for nature integration - 1:250*

SEATING EDGE

A framwork for social life

Support community- building while allowing for unplanned, everyday interactions.

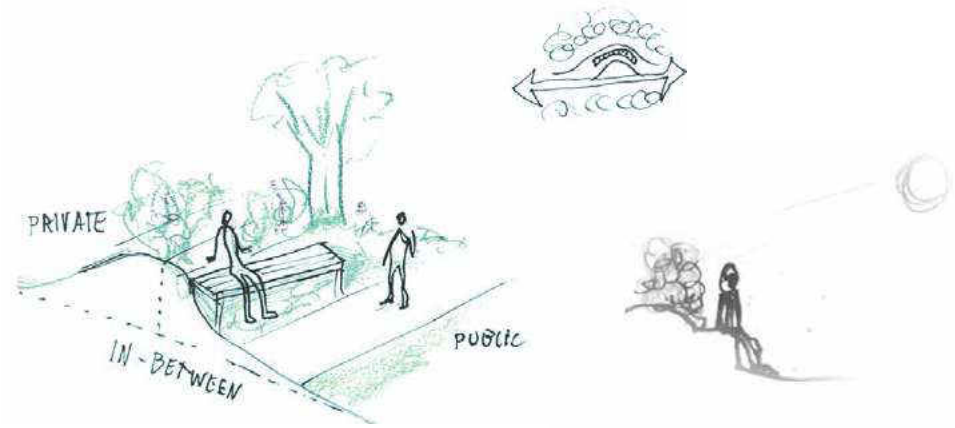
Neseccary, social and optional activites should overlap

Distinction and hierachy between , semi-private, semi-public and public

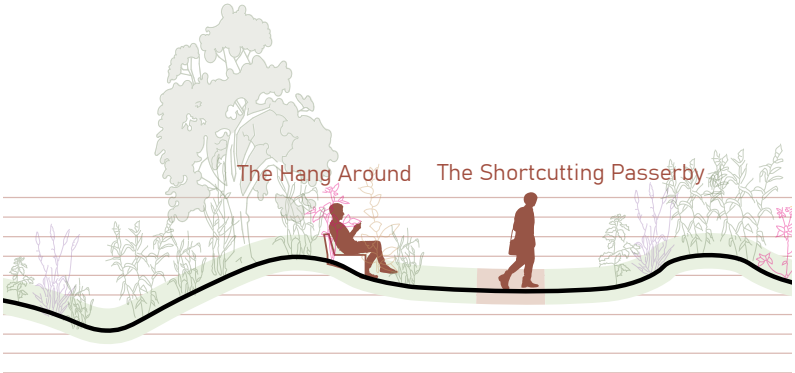
Introducing (semi)public seating and recreational opportunities, all year around

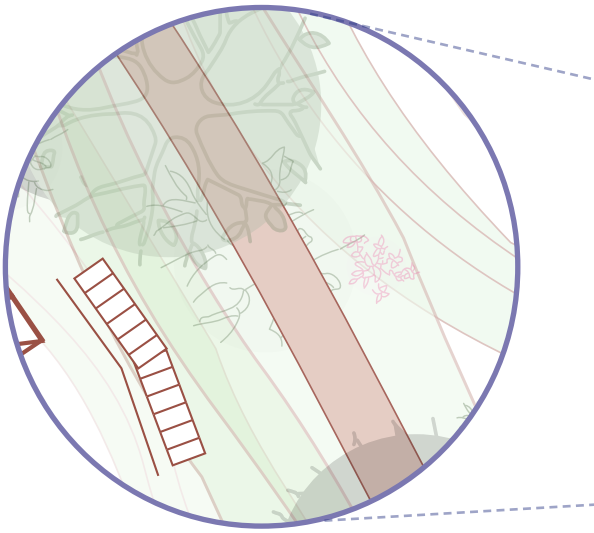
The seating edge is introduced as a multifunctional spatial element that merges topography, social function, and climate adaptation. Positioned along key transitions - such as between wet and dry zones, or between different user areas - it acts both as a physical border and as a place to pause, rest, and observe.

By shaping the terrain into subtle ridges or berms, the edge doubles as a soft barrier guiding surface water, while also providing informal seating integrated into the landscape. This layered functionality reflects the project's broader design philosophy, where technical performance and human experience are not separated, but interwoven. The edge frames views, defines zones, and supports daily use - not as an isolated object, but as part of the courtyard's continuous and adaptive groundscape.



Ill. 119. *Seating edge sketches*





Ill. 120. *Seating edge concept section*

NATURE PLAYGROUND

Climate adaption, where water shapes an experience

Water should be managed locally on-site to reduce load on the central sewage

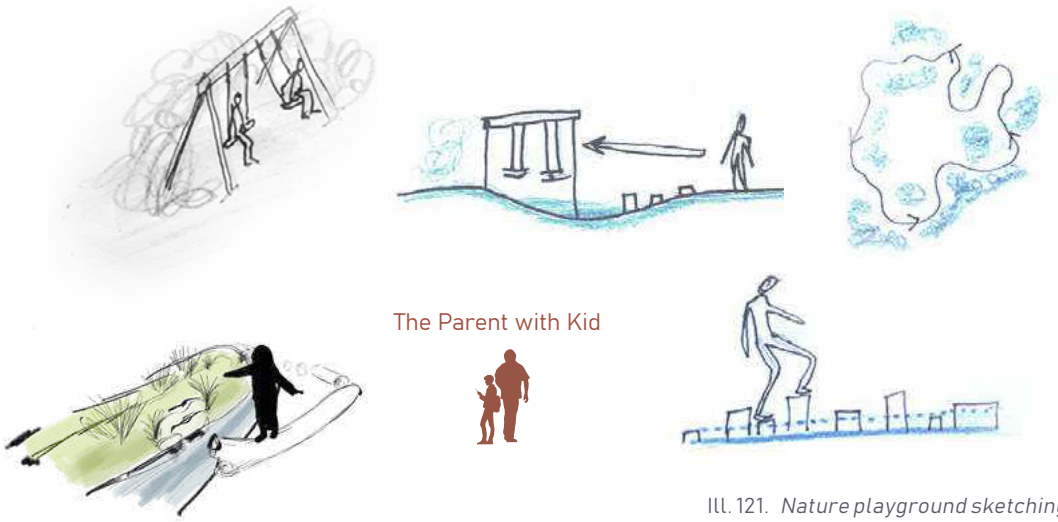
Design for adaptability to everyday rainfall and extreme weather events

Stormwater retention system as an integrated and multifunctional element

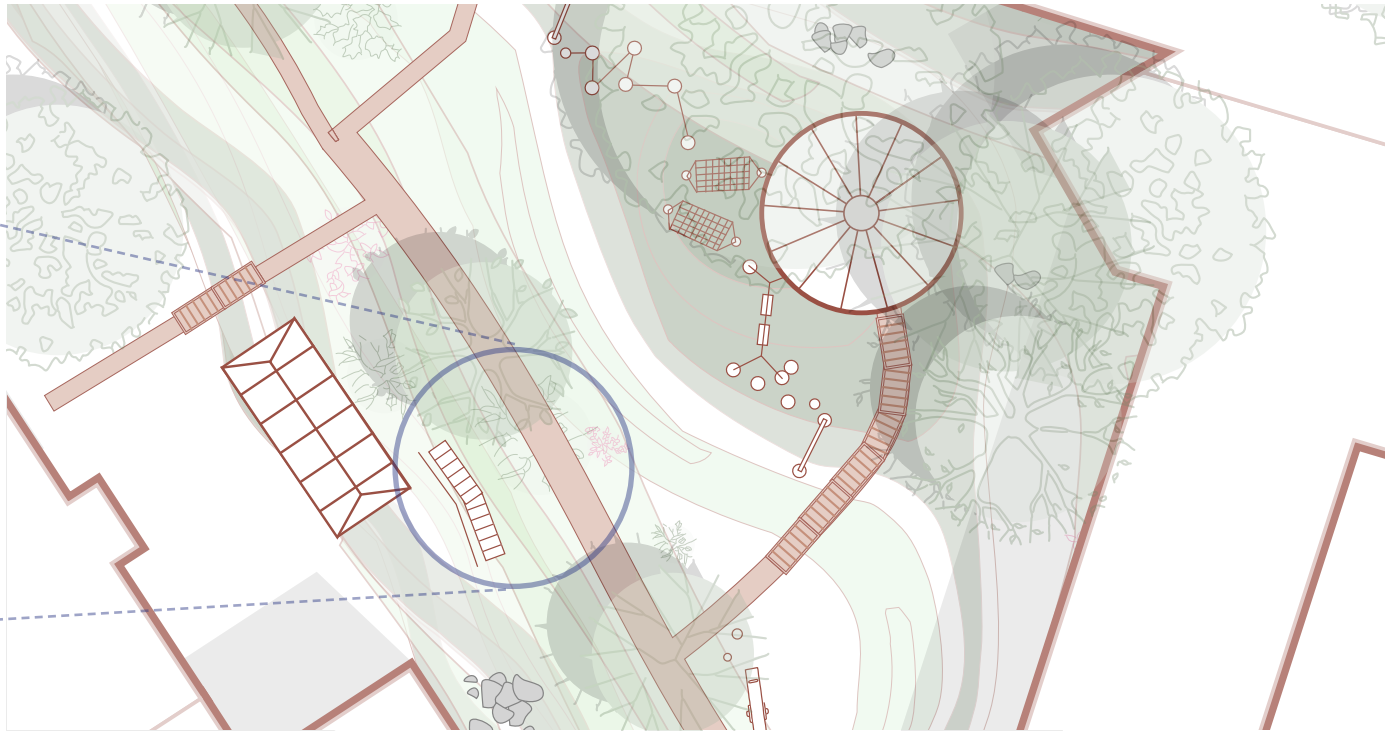
Preserving high degree of permable planted areas

As part of the transformation, the courtyard includes a nature-based play area designed to stimulate children's sensory and physical development while supporting biodiversity. The playground merges natural materials and topographic features such as gentle mounds, logs, and shallow depressions with interactive elements like balancing beams, water play, and loose parts.

Rather than a fixed set of play equipment, the design invites open-ended exploration and seasonal change. Children can interact with vegetation, insects, and water , developing a sense of place and responsibility toward the urban ecosystem. The playground is strategically located in the core zone, allowing for passive supervision and integration with other shared functions.



Ill. 121. *Nature playground sketching*



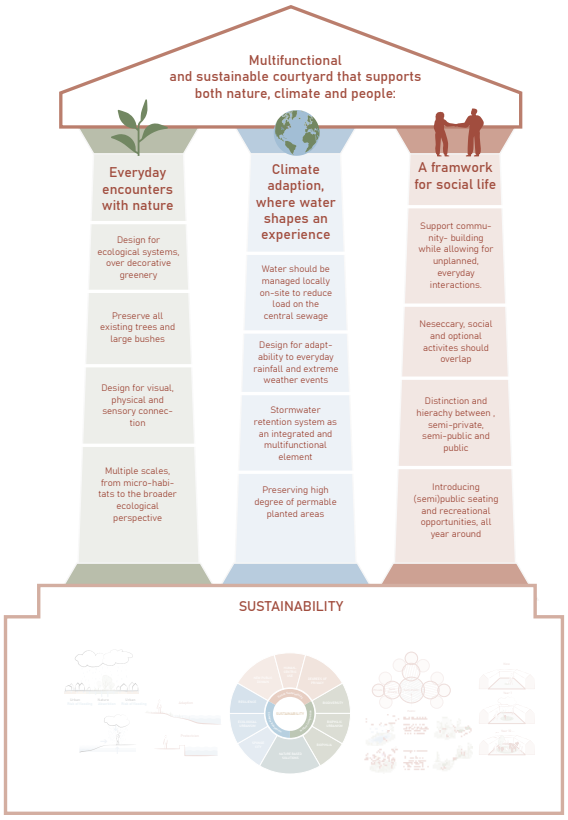
Ill. 122. *Seating and nature playground - 1:250*

NEW DESIGN PROPOSAL

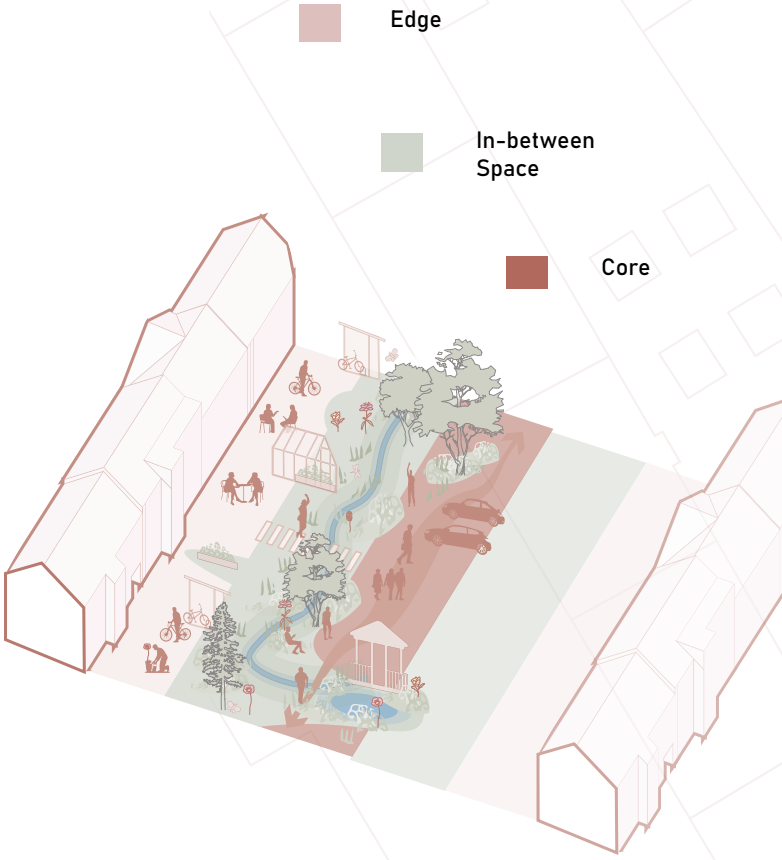
The final design proposal transforms the courtyard from a fragmented, underutilized space into a **multi-functional, inclusive, and climate-resilient environment**. It is structured around three spatial layers: **Edge, In-Between, and Core**, each with distinct functions but fluid transitions.

The proposal preserves all mature trees and existing vegetation of ecological value. It introduces new elements such as a stormwater retention area, a shared pavilion, soft topography, biodiversity planting, and informal play zones. Small structures like sheds and greenhouses support everyday use, while planted corridors guide water, people, and pollinators through the space.

At its core, the design embraces flexibility and seasonality. It responds to shifting needs; social, ecological, and climatic, making the courtyard **a model for adaptive urban transformation** rooted in care, co-existence, and long-term sustainability.



Ill. 123. *Design criterias*



Ill. 124. *Design concept*

Ill. 125. *New design proposal - 1:500*

05
REIMAGINING

reimagining the urban courtyard

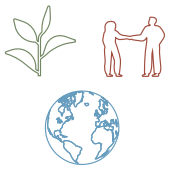
/ˌriːɪˈmædʒɪnɪŋ ðiˈɜːrbənˈkɔːrtjɑːrd/

noun

1. a design-led transformation of inner-city courtyard spaces to promote sustainability, biodiversity, and climate resilience through nature-based interventions.

    “Reimagining the urban courtyard has allowed cities to turn overlooked backyards into shared green assets that support both people and ecosystems.”

COURTYARDS FOR LIFE



Ill. 126. *Diffrent lifeforms*

This chapter introduces the **final design proposal** and masterplan - a culmination of the analytical, strategic, and iterative processes that have shaped the transformation of this inner-city courtyard.

With a focus on climate adaptation, biodiversity, and social sustainability, the proposal **reimagines the courtyard** as a resilient, inclusive, and multifunctional urban space.

The design seeks to unlock the latent spatial potential of the site by replacing impermeable surfaces with planted zones, creating microclimates, integrating rainwater strategies, and supporting everyday social life. By gently reshaping the terrain, integrating diverse vegetation layers, and carefully balancing the private and public, the space is transformed into a living courtyard that supports both ecological function and human connection.

This masterplan represents not only a spatial solution, but also a replicable model for how neglected courtyards across the city can become key drivers in the urban green transition.

MASTER PLAN
1 : 500

1. Residental block
2. Mixed-Use block
3. Preserved Trees
4. Preserved Hedge
5. Retention Pond
6. Nature Playground
7. Public Paved Path
8. Elevated Wooden Path
9. Greenhouse
10. Pavillion
11. Bike Parking
12. Flower Bed
13. Elevated Terrain
14. Seating Edge
15. Wild Planting
16. Grass Area

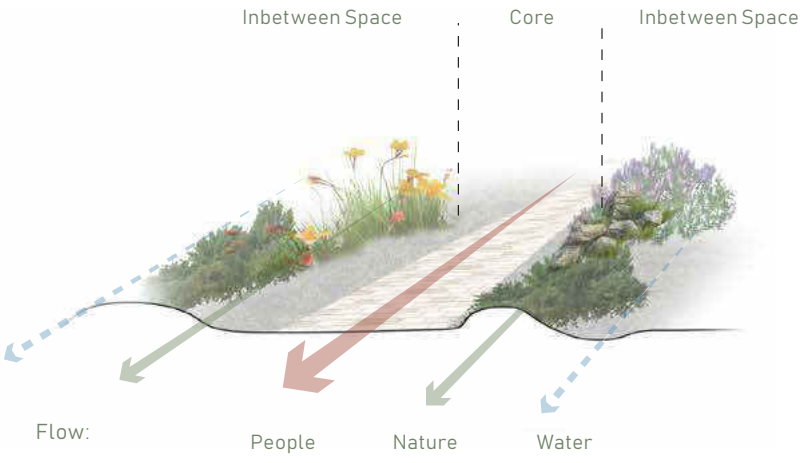
Ill. 127. *Masterplan 1:500*


1

Ill. 129. *1:200 Zoomed-in plan view*

A PUBLIC PATH, FRAMED BY IN-BETWEEN SPACE

This part of the courtyard highlights the role of in-between spaces as soft transitions that connect movement, nature, and sensory experience. The path has planting along its length, guiding visitors while partially blocking views across into the edge zone. Seating edges, terrain elevations and visual openness help create a welcoming atmosphere thus a clear flow to follow. The flow of people, nature and water merge in the in-between space, as illustrated in Ill. 128.



Ill. 130. *Flows in path and in-between*

Ill. 128. *Visualisation 1 - The path*

A SEMI-PUBLIC CORE, FOR PEOPLE, NATURE AND CLIMATE

Pavilion as gathering point

Inclusive design for all ages

Informal seating and stay spaces

Playfull design

Clear paths encouraging walk-ability and passive surveillance

Native and adaptive planting

Flowering cycles supporting biodiversity year-round

Vertical layering: ground cover, shrubs, and trees

Informal nature, soft edges and untamed patches

Integrated microhabitats

Sunken play area doubles as stormwater retention zone

Permeable surface

Drought-tolerant planting strategy

Minimal maintenance

Minimal Resource use

Ill. 131. *1:200 Zoomed-in plan view*

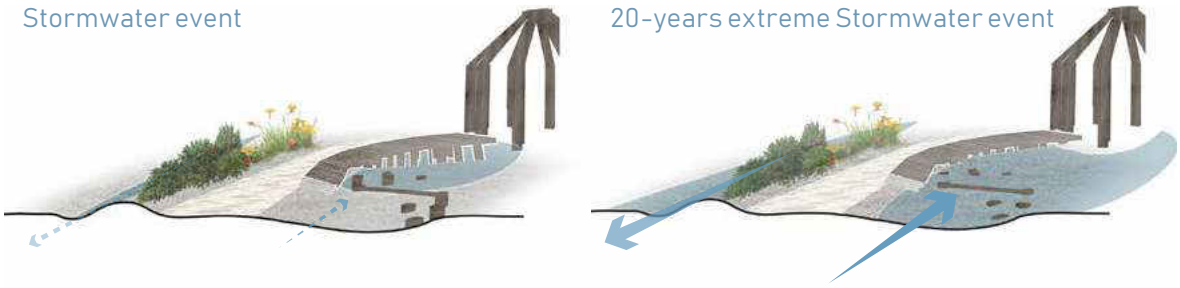
This part of the courtyard reflects the core layer, where everyday life unfolds in shared public mulitfunctional space. A sunken play area supports physical play, with native vegetation forming soft barriers. The wooden pavilion creates a social anchor, supporting seasonal and community-based use. Elevated paths provide playful use while being the access point into the pavillion and preserving the planted surface below. As listed above the multifunctionality an properties of this space are considered according to our three design pillars

Ill. 132. *Visualisation 2 - Pavillion*

DESIGNED FOR SEASONS AND STORMS

This space can adapt to extreme weather. It is designed to embrace water, not resist it. The integrated retention pond, rain channels, and vegetated sunken area form a multifunctional system that collects, delays, and infiltrates stormwater onsite. In ordinary rain events, water gently flows through channels *(as seen in Ill. 134)* and into the pond *(as seen in Ill. 135)*.

During heavy cloudbursts or 20-year storm events, the system shifts to temporarily flooding designated zones while keeping key paths elevated and accessible. The wooden walkway rises above the water level, ensuring safe passage during extreme rainfall. Climate resilience is not hidden but made visible and experiential.



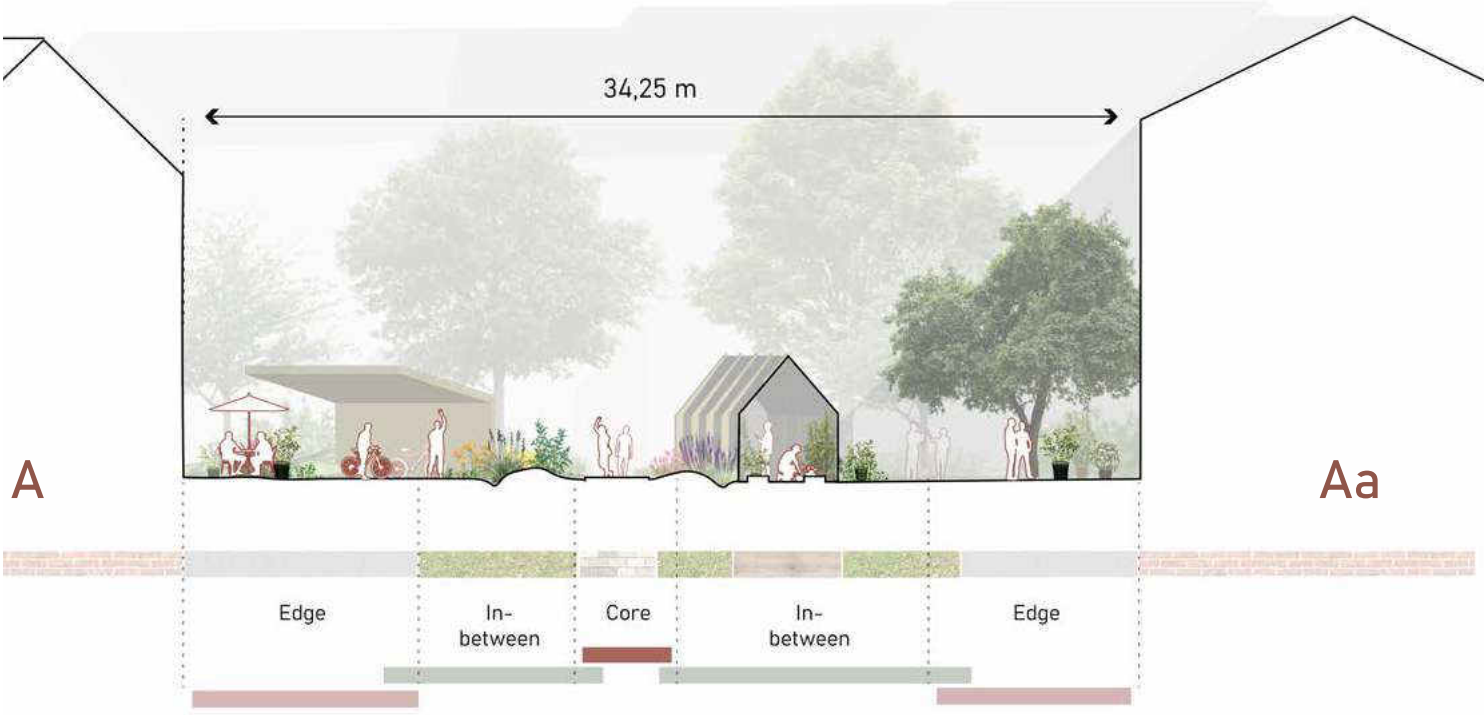
Ill. 133. *Stormwater Scenarios*

Ill. 135. *Visualisation 4 - edge zone in stormwater*

Ill. 134. *Visualisation 3 - pavillion in stormwater*

SECTIONS OF DAILY LIFE

These sectional views unfolds everyday life across the proposed courtyard's layered structure , from its edges, through in-between zones, and into the central shared core. Each zone invites different degrees of uses, activities, varying levels of engagement, and spaces to pass through, connect, or retreat. Both for the public city and the private homes, value and livability increase, according to the courtyards ability to host daily life. The courtyard becomes more than a backdrop, it is a framework for lived experience.



Ill. 136. *1:250 Section A-Aa*

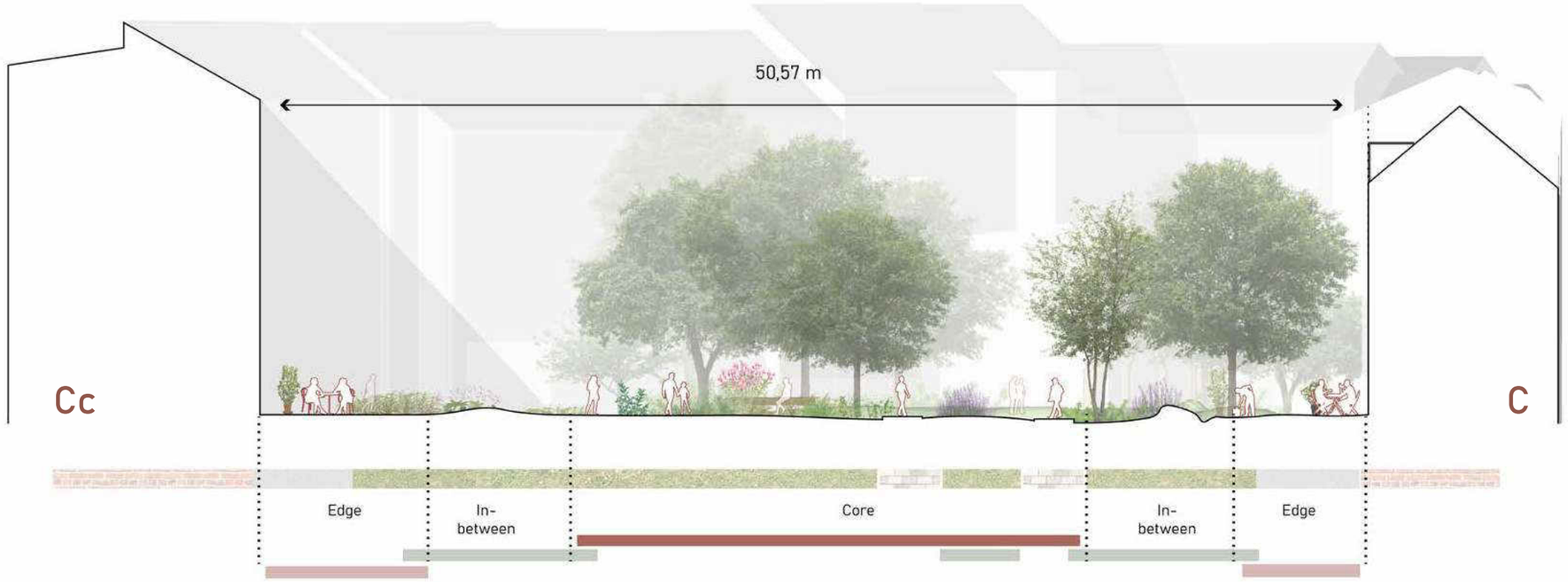
Ill. 137. *Section A-Aa zoom-in + thought bubbles*

Ill. 137 presents a narrative zoom-in of Section A–Aa, where imagined situations are used to illustrate the human experience of the courtyard. These fictional reflections help demonstrate how the spatial design supports modes of use, from momentary passage to long-term care, and how the courtyard becomes a meaningful setting for daily life.

Ill. 138. *1:250 Section B-bb*

Ill. 141. *Section C-Cc zoom-in + thought bubbles*

These zoom-ins reveal how users relate to different courtyard zones and uncover informal patterns and everyday routines tied to the shared space. They demonstrate how the design supports small-scale social life and fosters connections among both visitors and residents.

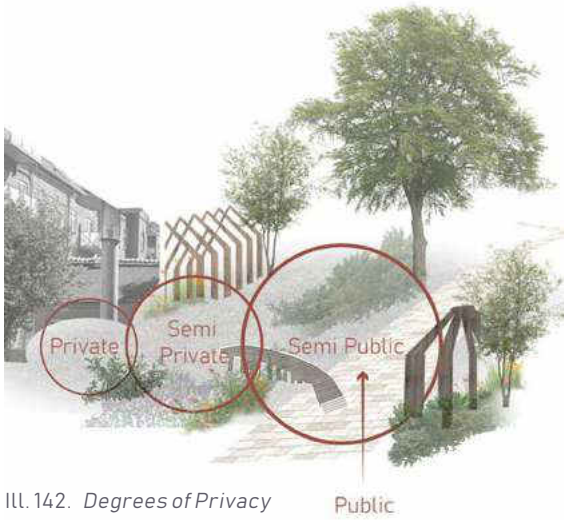


Ill. 139. *1:250 Section C-Cc*

Ill. 140. *Section C-Cc zoom-in + thought bubbles*


3

A SOFT BUT DEFINED HIERARCHY IN PRIVACY DEGREES



Ill. 142. *Degrees of Privacy*

The edge layer aims to create a sense of belonging by inviting residents into a semi-private environment, as an extension of their private home with the characteristics of a garden. The spatial design follows a gradient of privacy (Ill. 142), transitioning from semi-public pathways to semi-private spaces for gardening, dining, and quiet retreat. The elevated wooden path marks the shift between public and private, as both its material and width differ from the public paved path.

In the residential edge zones, a rich variety of planting and opportunities for everyday interaction with vegetation, such as watering herbs or harvesting vegetables, create a closer connection to nature and place. Here, biophilia becomes part of daily life: nature is not just seen, but felt and practiced through human-scale rituals of care. Planting strategies are further detailed on the following pages.

Ill. 144. *1:125 Zoomed-in viewplan*

Ill. 143. *Visualisation 5 - edge zone*

A LAYERED BIODIVERSITY APPROACH

The proposed biodiversity strategy for the courtyard consists of a system where we imagine specific (smaller) plant species planted in addtion to the (larger) preserved trees.

New plants are distributed according to each of our zones, from the concept. *For an overview of categories and zone placements, see Appendix 5 – Plant Diagram.*

DROUGHT TOLERANT & RESILIENT
Hardy, low-maintenance plants suited for dry or tough conditions

SHADE TOLERANT
Plants that thrive in partial or full shade

EDIBLE OR USEFUL PLANTS
Species that offer fruit or herbs for human use or urban foraging

ORNAMENTAL / SEASONAL INTEREST
Plants offering color, texture, or form beyond just flowers

GROUND COVERS
Low-growing or spreading plants that visually define or soften edges

POLLINATOR ATTRACTORS
Plants highly attractive to bees, butterflies, and hoverflies

CORE

*Planting in the **Core** aims to create a , sensory experience through a mix of sun-loving and shade-tolerant species that reflect the courtyard's space.* Pollinator-friendly species such as purple coneflower, catmint, lavender, yarrow, and oregano ensure long-lasting blooms and dynamic seasonal color. Shade-adapted plants like male fern and alpine currant bring structure and variation to cooler areas. Edible and aromatic species like rosemary and thyme support everyday use and urban biodiversity. Plants have been selected based on their roles as **pollinator attractors, early bloomers, edible plants, or providers of seasonal interest and shade tolerance.**

IN-BETWEEN

*The **In-between** zone functions as both a planted buffer and a water-responsive landscape element, emphasizing biodiversity, seasonal dynamics, and moisture adaptation.* Moisture-tolerant species thrive in sunken rain zones while supporting pollinators. Structured perennials like woodland sage, bigroot geranium, and field scabious bring height, floristic variation, and habitat value. Groundcovers like Japanese sedge help unify shaded areas. Plants in this zone span categories such as **drought and water resilience, ground covers, pollinator value, and seasonal bloom.**

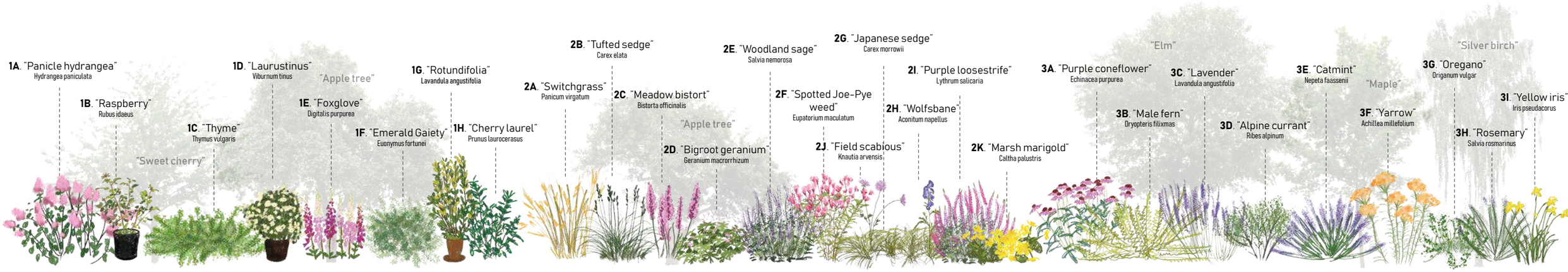
EDGE

*The **Edge** zone mediates between shared and semi-private space, using plants to create privacy, enclosure, and flexibility.* Dense or evergreen species like cherry laurel, laurustinus, and panicle hydrangea offer visual screening and atmospheric greenery. Moveable, user-friendly species like raspberry, thyme, foxglove, and Emerald Gaiety invite interaction and personal adaptation through the seasons. The planting strategy in this zone supports **edible use, resilience to both shade and drought, and pollinator activity.** Its flexible character allows for seasonal adjustments and spatial rearrangement while preserving ecological function.

EDGE

IN-BETWEEN

CORE



1A. Panicle hydrangea: Sun to partial shade - well-drained soil - attracts bees and hoverflies - blooms from July to September.

1B. Raspberry: Prefers full sun and fertile, well-drained soil, attracts spring pollinators, and fruits in summer or autumn depending on the variety.

1C. Thyme: Requires full sun and dry, well-drained soil, loved by bees, and blooms from May to July.

1D. Laurustinus: Sun to partial shade - moist soil - important nectar for early pollinators - blooms from November to March.

1E. Foxglove: Partial shade - moist, well-drained soil - attracts bumblebees - blooms from June to July.

1F. Emerald Gaiety: Grows in sun to partial shade and tolerates various soils, primarily ornamental with minimal pollinator value, and may flower subtly in late spring.

1G. Rotundifolia: Sun-tolerant - bee-friendly - bloom times varying by type.

1H. Cherry laurel: Sun to deep shade - moist, adaptable soil - spring flowers - attract bees - blooms in April–May.

2A. Switchgrass: Full sun - insect habitat - flowers with airy seed heads from August to October.

2B. Tufted sedge: Moist to wet soil - sun to part shade - structure and habitat - flowering in late spring.

2C. Meadow bistort: Sun to partial shade - attracts bees and hoverflies - blooms from May to July.

2D. Bigroot geranium: Sun to full shade - dry to moderately moist soil - attracts bees - blooms in May–June.

2E. Woodland sage: Full sun and well-drained soil - highly attractive to bees and butterflies - blooming continuously from June to September.

2F. Spotted Joe-Pye weed: Moist soil and sun to part shade - highly valued by butterflies and bees - blooms July–September.

2G. Japanese sedge: Full shade and moist, well-drained soil - excellent evergreen groundcover.

2H. Wolfsbane: Moist, rich soil - part shade - attracts bumblebees in late season, - blooms August–October.

2I. Purple loosestrife: Moist to wet soil and full sun - very attractive to bees and butterflies - blooming July–September.

2J. Field scabious: Full sun and well-drained soil - excellent for bees and butterflies - blooms from June to September with lilac pincushion flowers.

2K. Marsh marigold: Wet soil and sun to part shade - supports early-season pollinators - blooms March–May.

3A. Purple coneflower: Full sun and well-drained soil - highly attractive to bees and butterflies - blooms July–September.

3B. Male fern: Thrives in shade and moist soil

3C. Lavender: Full sun and dry, well-drained soil - very attractive to bees - blooms June–August

3D. Alpine currant: Shade and average soil - attracts some early-season pollinators - blooms April–May

3E. Catmint: Sunny, well-drained spots - extremely bee-friendly - blooms May–September

3F. Yarrow: Drought-tolerant and sun-loving - attracts bees and butterflies - blooms June–August

3G. Oregano: Full sun and dry, calcareous soil - loved by bees - blooms July–September

3H. Rosemary: Full sun and dry, well-drained soil - attracts bees - blooms April–June (can rebloom in autumn)

3I. Yellow iris: Wet or waterlogged soils - sun to part shade - attracts bees and hoverflies - blooms May–June

Ill. 145. *Layered biodiversity*

TRANSFORMATION IN COMPARISON

THE EXISTING COURTYARD

Despite its central location and mature trees, it remains underused primarily serving as parking space and passage. Its spatial potential is limited by impermeable surfaces, minimal social programming, and unclear boundaries between public and private use.

Preserved features form a key foundation for a sustainable transformation, reducing intervention needs while supporting overall biodiversity.

Ill. 146. *1:1000 Existing Courtyard*

THE TRANSFORMED COURTYARD

The transformed courtyard reclaims space for people, nature, and climate. Structured by three spatial layers: **Edge, In-between, and Core**, the design introduces biodiversity zones, stormwater management, spatial hierarchy and shared functions that support daily life.

The courtyard itself is a living system with ecological, social, and urban value for its users to thrive. This layered approach not only improves this local courtyard, but it shows a model for future-oriented courtyard design.

Ill. 147. *1:1000 Transformed Courtyard*

CITY-SCALE RELEVANCE

This transformation project is not only about local improvement, but aims to be a piece in a much larger puzzle, a test case with city-wide relevance that contributes to Aalborg's broader urban transition. It invites a look back at the city scale to reflect on how small, well-placed interventions can influence both a bigger persepctive. As shown in the adjacent map (Ill. 137), the site is embedded in a broader context of ecological corridors and pedestrian mobility routes. This was first explored in the earlier site analysis (see page xx). Its transformation supports both biodiversity and movement creating value far beyond its boundaries.

The courtyard serves as a natural shortcut in the city's pedestrian grid. A public pedestrian route that connects neighborhoods, invites informal encounter, and defines transitions between private and public. Arrows on the map visualize this embedded pedestrian movement, and the shortcut through our site, as a critical path.

The transformation also strengthens biodiversity at the city scale. The preserved trees and added plantings link to existing green areas, enhancing urban habitat continuity. The green lines on the map mark these ecological flows. This courtyard doesn't operate in isolation — it becomes part of a layered urban ecosystem, supporting pollinators, microclimate regulation, and a richer biodiversity network
city-wide

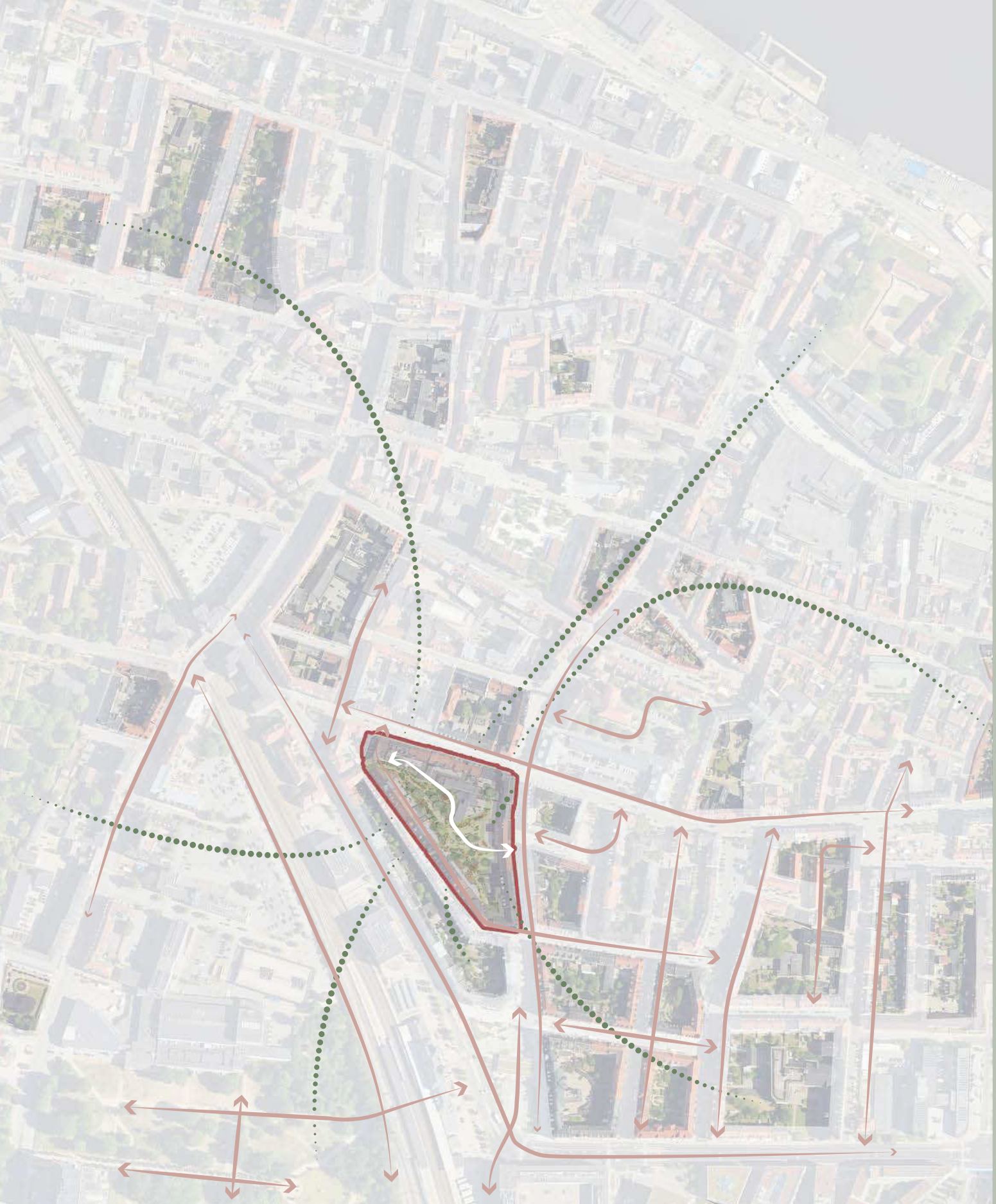
Many nearby courtyards share similar spatial typologies, often underutilized, paved, and hidden. These represent untapped potential for multifunctional transformation, likewise this project's desgin proposal. If approached with the same principles of zoning, ecological layering, and human-scale programming. This projects aim is both specific and symbolic. It shows how a single courtyard can serve climate, people, and nature, and how spatial design can link local interventions to systemic change.

ECONOMY THROUGH ECOLOGY

Managing stormwater on the surface is generally no more expensive than replacing or upgrading underground sewage pipes. Cities like Copenhagen have recognized this and increasingly prioritize local water handling as a way to generate added value in urban spaces.

This approach was central to the award-winning Klimakvarteret project in Østerbro, where surface-based stormwater management was used not just to reduce flood risk, but to improve public space, increase biodiversity, and strengthen community identity (City of Copenhagen, 2014).

In this project, the same logic applies. Local water management is not only cost-efficient — it also contributes to livability, ecology, and social quality. When climate adaptation improves everyday life while remaining economically feasible, it becomes not just a technical solution, but a compelling urban investment.



Ill. 148. *1:5000 Situation Plan with connections*

06
EPILOGUE

epilogue
/ˈɛpɪlɒg/

noun
1. a section or speech at the end of a book or play that serves as a comment on or a conclusion to what has happened.

> *"the meaning of the book's title is revealed in the epilogue"*

CONCLUSION

This thesis set out to investigate how urban design can facilitate the sustainable transformation of Aalborg's underutilized courtyards. The project reveals that these often-overlooked spaces can become essential urban settings for integrating nature, climate-adaption, and social encounters, into daily lives, if approached through context-sensitive design and with new spatial concepts, which this project aimed to develop. Grounded in a specification of the sustainability term, and a broader theoretical foundation, for example including the "sponge city" approach, "biophilic urbanism", and Jan Gehl's "life between buildings," the project introduced three guiding design pillars: climate, nature, and social. Based on these, a wide-scope analysis of Aalborg led to the selection of one courtyard in the city centre as a transformation site.

By engaging deeply with this site, the project illustrates how multifunctionality, as a product on our three design pillars, can be achieved in spatially complex environments. The design process combined mapping, site-based analysis, user studies, and iterative testing to develop a concept that is both contextually grounded and transferable.

This resulted in a spatial framework based on three layers: edge, in-between, and core. This structure brings life back into the courtyard by activating the in-between layer, a mediator between public and private, meanwhile allowing flow of nature and water. With the concept applied to our project site, the result is a layered courtyard where ecological, climatic social functions overlap, and where different degrees of privacy are carefully choreographed through spatial design. Ultimately, the project offers not just a new design for a single courtyard, but a replicable approach for urban development in similar courtyards, as identified throughout the entire city. It also demonstrates how smaller urban spaces can serve as catalysts for sustainable change, embracing the coexistence of people, nature, and climate infrastructure. In doing so, it reimagines the overlooked courtyard as a potential urban resource, that is adaptive, social-, and ecologically alive.

This is how we envision courtyards for life.

REFLECTION

This thesis concludes a design-led exploration into how urban courtyards, often overlooked or underutilized, can become catalysts for sustainable transformation. By centering the project on a specific courtyard in Aalborg, the ambition was not only to redesign a site, but to develop a **pilot project** - a concept capable of inspiring broader urban change through local, context-sensitive interventions.

PROCESS

Throughout the process, the Integrated Design Process (IDP) served as a critical framework. Its phased and iterative structure allowed for continuous movement between analysis, ideation, and testing - enabling insights from user studies, spatial mapping, and theoretical perspectives to inform each design iteration. Traditionally, IDP has focused on facilitating collaboration between **architectural and engineering disciplines**, emphasizing energy performance, material choices, and technical integration. However, this thesis reveals the necessity of extending that collaboration to include **social sciences** and **human-centered knowledge**. Urban design operates within deeply layered social realities, where space is shaped as much by use, perception, and behavior as by form and function.

> *"First life, then spaces, then buildings – the other way around never works."*
>
> *(Jan Gehl, 2010, Cities for people)*

This quote by Jan Gehl serves as a reminder that design must emerge from a dialogue with the communities it serves. In this light, a refined IDP, as discussed by Hansen & Knudstrup (2005), could evolve into a more holistic process - embedding co-creation, social sustainability, and cultural responsibility as core pillars in sustainable urban transformation.

CULTURAL SHIFTS

A central reflection concerns the tension between **existing conditions and envisioned futures**. The project had to engage with municipal regulations, private land ownership, and legal parking requirements. These constraints were not treated as obstacles, but as design parameters to work within and challenge. The final proposal, particularly the treatment of the courtyard's parking zone, demonstrates how **urban design can propose not only spatial alternatives but cultural shifts** - reframing asphalt as a temporary layer rather than fixed infrastructure.

THEORY

The role of theory was not limited to be a background justification; it actively shaped the design. Concepts such as the **New Public Domain** (Hajer & Reijndorp, 2001), **Biophilic Urbanism** (Beatley, 2010), and **Sponge City** principles informed decisions on spatial zoning, planting strategies, and water management. The "**Edge, In-between and Core**" framework synthesized these ideas into a spatial language that could navigate the complexities of privacy, biodiversity, and climate adaptation at the same time.

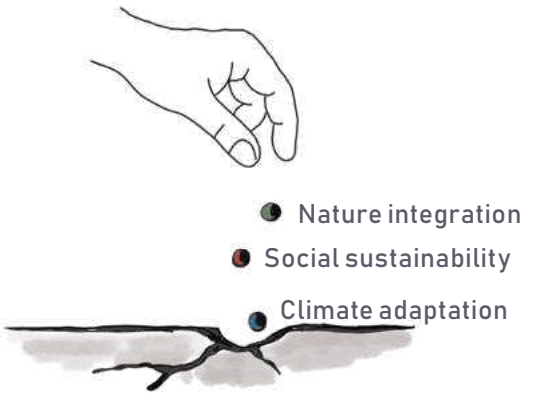
BEYOND

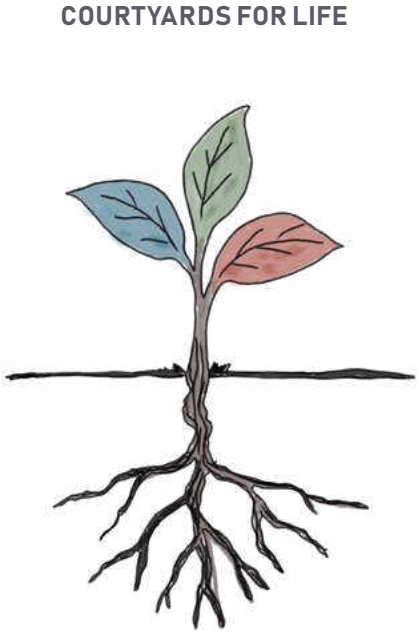
Looking back, the greatest strength of the project lies in its **strategic simplicity**: a clearly structured concept that can adapt to different contexts without losing depth. This does not suggest a one-size-fits-all solution, but a flexible toolset for transformation. The courtyard may be specific, but the questions it raises - about *how we share space, live with nature, and plan for uncertainty - are universal*.

In this way, the pilot project plants more than trees and vegetation; it plants the seed for a paradigm shift in how we approach underutilized urban spaces. As cities continue to densify and climate challenges intensify, such spaces can no longer be treated as marginal - they must be reimagined as essential. The project has demonstrated that even spatially fragmented and socially complex environments hold potential for transformation when addressed with a clear, scalable, and context-sensitive framework.

This reflection is not merely theoretical. The final pages of this thesis revisit the courtyard referenced in the initial motivation *(see pp.164-165)* - a site that initially sparked the project's interest and vision. By testing the design concept in this second, structurally different courtyard, the proposal demonstrates its adaptability across varied urban typologies. The Edge-In-between-Core framework demonstrates spatial flexibility while supporting a range of user patterns and adapting to diverse environmental conditions.

This validation underlines the broader relevance of the approach: it is not merely a site-specific solution, but a **strategic methodology for unlocking overlooked urban areas**. In this light, the pilot project becomes both a **design proposition and a strategic tool for urban change** - anchored in site realities but scalable to other contexts in Aalborg, Denmark, and beyond. It reflects not only a local intervention, but a broader vision of how design can cultivate resilient, inclusive, and biodiverse cities from the ground up.



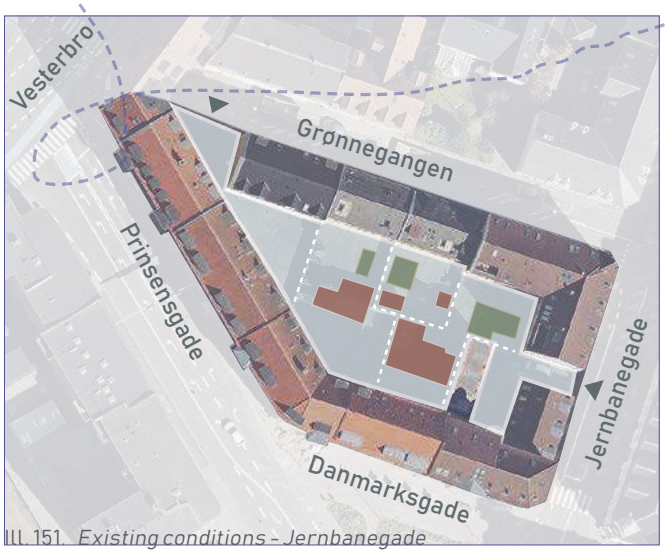


Ill. 149. *Seeds of transformation*

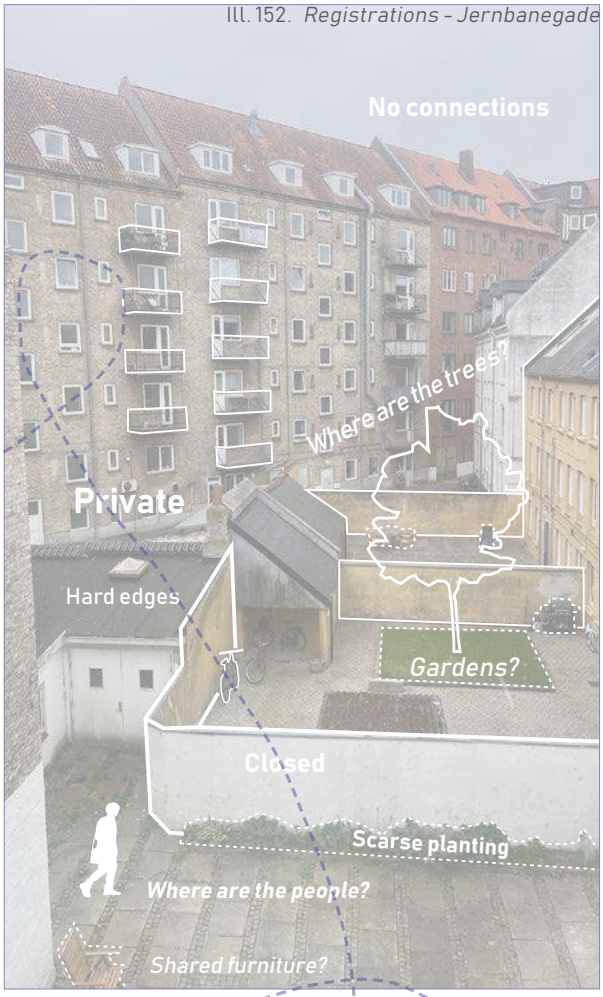
A NEW COURTYARD

Due to its structural simplicity, **the design concept** serves as a transferable tool for the transformation of other neglected urban courtyards.

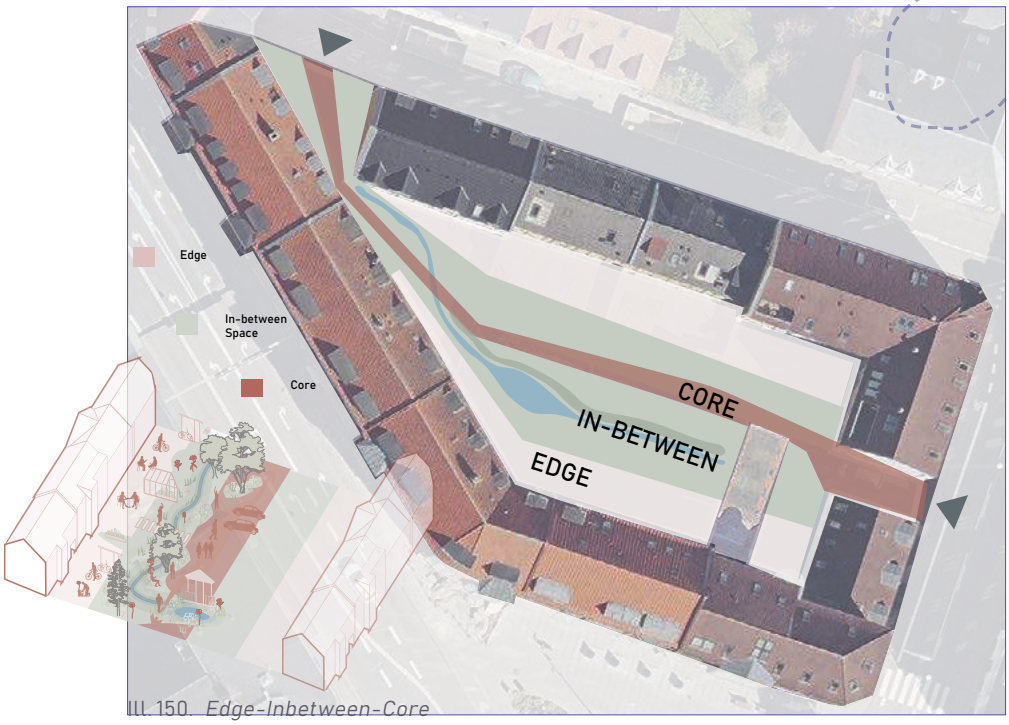
By registering and understanding the existing conditions, followed by the implementation of the concept, the **transformation is set in motion**.



Ill. 151. *Existing conditions - Jernbanegade*



Ill. 152. *Registrations - Jernbanegade*



Ill. 150. *Edge-Inbetween-Core*

A previously grey, fragmented, and socially disconnected courtyard is **reimagined** as a **vibrant green space** – anchored in a **shared core** and accommodating **biodiversity, social interaction, water management**, and room for private initiative.

"In this light, the initial design vision, once perhaps dismissed as wishful thinking, proves to be within reach."

Ill. 153. *A new transformed courtyard*

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ILLUSTRATION LIST

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Ill. 39. 1 : 15:000 - Stormwater	*Own production, map data: scalgo,com*
Ill. 41. Sea level rise	*Own production*
Ill. 40. 1 : 10:000 - Sea level and Storm surge	*Own production, map data: scalgo,com*
Ill. 42. Storm surge	*Own production*
Ill. 43. High- and low permability	*Own production*
Ill. 44. Natural absorbtion	*Own production*
Ill. 45. 1 : 15:000 - Surface permability	*Own production, map data: scalgo,com*
Ill. 46. 1 : 15:000 - Groundwater	*Own production, map data: scalgo,com*
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Ill. 80. Courtyard registrations	*Own production, Photo: Authors, 2025*
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