

FUTURE FRIDAYS

A Design Journey into the Sunset of Accumulation

Master's Thesis Project
2026

Architecture and Planning Beyond Sustainability
Chalmers University of Technology
David Bergman



CHALMERS

Master's Thesis Project
2026
Architecture and Planning Beyond Sustainability (MPDSD)

Profile: Urban and Rural Design and Planning

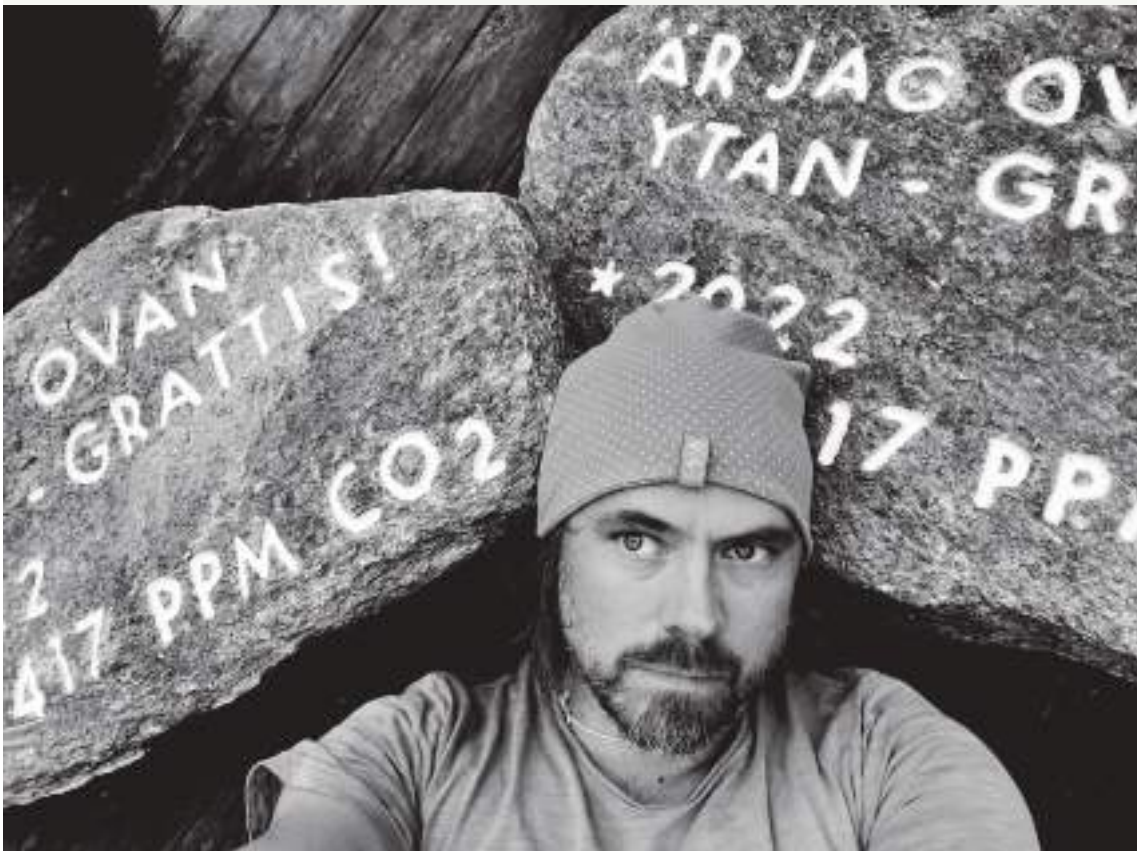
Student: David Bergman

Supervisor: John Helmfridsson

Examiner: Julia Fredriksson

Department of Architecture and Civil Engineering
Chalmers University of Technology
SE-412 96 Gothenburg
Sweden

Student Background



David Bergman

david.bergman@gmail.com
0706 29 36 88

David Bergman is a globally concerned and logically bewildered eco-architect (raised in Floda) with a Master of Science (M.Sc) degree in Technology and a career background in writing, programming, interaction design and freelance graphic design.

Acknowledgements

Buckets of gratitude to **John Helmfridson** for tirelessly sharing your deep expertise on everything from re-wilding to U-values of cob and the price of sunsets.

Thank you **Moa Lindahl** for crystal clear perception of my initial mess.

I acknowledge the use of **Gemini**, a large language model developed by Google, as a supportive tool for brainstorming and structural feedback during the drafting phase.

Stort tack to **Johanna** for not losing your mind during my late student years.

Honourable mentions to my sweet kids, my sponsor pappa Ulf, Ludvig "Vi tar väl en till?" Turegård and our cat Takbox.

Abstract

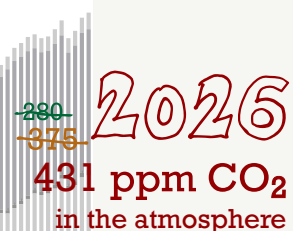
The generations currently coming of age – who conscientiously prepare for the responsibilities of citizenship – frequently encounter a **housing market that is virtually inaccessible** due to economic barriers. Concurrently, the global outlook remains profoundly bleak unless humanity can decouple from its fossil fuel dependency.

What could a **resource efficient** and **socially strong community** on the plateau of a joint valley landscape look like? This thesis investigates the extent of what can be achieved through design research on a specific site, aiming to maximize outcomes across the four dimensions of sustainability: ecological, social, economic, and cultural.

The research employs a multi-faceted methodology comprising literature study, situational analysis of the current socioeconomical system and site analysis. This is coupled with an iterative design process heavily informed by architectural case studies of precedent projects in Northern Europe.

The findings suggest that the typology of an **ecovillage** on elevated terrain is viable, provided that specific conditions are met, for example: site adaptation is prioritized over modification, building with **natural materials** and that hydrocarbon efficient climate strategies are integrated. Furthermore, the integration of Community Land Trusts (CLT), self-build groups and non-equity housing cooperatives can play a big role in future **green communities**. I conclude that there are good sustainability arguments for utilizing the geology of the traditionally uninteresting plateau, but there are probably other resources in the built environment that should be exhausted first.

We are globally on course for a **grim future**. In the words of Jay Inslee: *“We are the first generation to feel the sting of climate change, and we are the last generation that can do something about it.”* Architects, in particular, have a huge responsibility in this mitigation. We are approaching a paradigm shift where the prevailing conception of “the good life” is increasingly recognized as untenable. However, the alternative is not merely a necessity according to physics but can be a **desirable aspiration**. This thesis project serves to illustrate the tangible potential of such an alternative.



*My eyes collide head-on with stuffed
Graveyards, false gods, I scuff
At pettiness which plays so rough
Walk upside-down inside handcuffs
Kick my legs to crash it off
Say okay, I have had enough
what else can you show me?*

// Bob Dylan, "It's Alright, Ma (I'm Only Bleeding)" (1965)

Table of Contents

	page
1 Introduction	2
2 Macro Insights	4
3 Gap Insights	5
4 Evidence-Based Pathways	8
5 Housing Typology Analysis	12
6 Building Analysis	14
7 Precedent Analysis	19
8 Future Outlook Analysis	23
9 Site Analysis	25
10 Design Synthesis	36
11 SWOT Analysis	52
12 Discussion	53
13 Future Research	55
14 References	57
APPENDIX A – Biogeochemistry of CO ₂	59
APPENDIX B – Insights into the Paradox of Progress	60
APPENDIX C – Subset of Studied Precedents	68
APPENDIX D – Calculations	76
APPENDIX E – AI Generated Image Prompts	77

INTRODUCTION

Boasting hollow rhetoric, Sweden recently failed to meet all sub-goals of the **Paris Agreement**, again uncovering the huge chasm between climate policy and tangible action. This failure is accompanied by a disruptive technological shift: the rapid integration of **artificial intelligence**, which is fundamentally restructuring the labor market.

Simultaneously, a structural housing crisis has effectively locked out younger generations from the property market, deepening social inequality and eroding the sense of **collective solidarity** that once underpinned the Swedish social contract. We are all trapped within this economic framework that prioritizes short-term growth over long-term resilience. See Appendix A and B for detailed insights into this quagmire.

This research addresses the lack of scalable, holistic models by investigating the **residential ecovillage**, not merely as a housing project, but as a resilient socio-technical prototype. By focusing on circular neighborhoods, this design research explores how architecture can bridge the gap between climate theory and lived resilience.



Figure 1.1
The logics of the current economic system.

Objectives and Questions

My thesis is that there are solutions to the predicament we have put ourselves in. By researching the reasons, the current solutions and speculations into the future, I aim to present a cure that is not only necessary but desirable, from all perspectives of sustainability. The research question I seek to answer is: ***What could a resource efficient and socially strong community on the forested plateau of a joint valley landscape look like?***

To answer this, the study investigates three distinct sub-questions. First, it asks how can shared functions reduce the overall ecological footprint of the settlement. Second, it examines what spatial qualities are desirable to transition from a traditional consumer culture to a socially interdependent community. Finally, it explores how does the specific topography of the plateau dictate the placement of shared functions and ecological zones.

Theory

This project is positioned within the discourse of **social-ecological urbanism**, where the built environment is designed to support both future resilience and community agency. The theoretical framework is centered on **collective circularity**, exploring how urban design can transition from high individual consumption to shared resource loops.

The research utilizes a multi-case precedent study, drawing from built projects, mainly Danish ecovillages, to identify successful typologies for resilience through circular lifestyles and social cohesion. The architectural references provide a library of proven strategies that are tested and evolved on a specific site in Floda, Lerum.

Methods

This study is comprised of **literature research**, interviews and **iterative design** informed by analyses of relevant preceding **reference projects**, to extract successful suburban design strategies. A **speculative sequential narrative** is used to contextualize the design within a plausible future. Images were generated using ChatGPT, by OpenAI (2026), using a the prompting structure: "*[Subject description], in the style of Studio Ghibli*". I also employ cartoon satire art as a catalyst to visualize political contradictions.

Research Scope

Although a broader theoretical investigation was conducted, studying the underlying motivations and how a group could cooperatively build a settlement, the design project mainly focuses on the **social aspects of the ecovillage typology**.

While adaptive reuse is often the most ecological baseline for sustainable architecture, this thesis is delimited to an investigation of **geological** and **social resilience**. The project purposefully utilizes a site characterized by its soil-covered rock plateau and coniferous flora to test a "climate-refuge" typology. By engaging with this specific elevated topography, the research explores how architecture can be integrated into high-bearing, stable geologies – sites traditionally rejected but naturally resilient to storm flooding (and to some extent to heat waves and to winter inversion).

To mitigate the ecological impact of building on a currently lightly developed site, the focus is on regenerative design and "light-touch" tectonic systems. The scope is a proactive exploration of a settlement strategy on naturally secure terrain. The urban design research focuses on the **public realm**, the interior layouts of the buildings are mostly beyond the scope of this project.

Distilling the Future

I did a fair bit of background research to figure out what path of climate heating we are on and why the “green transition” is provenly moving at a snails pace (see Appendix A & B). My macro research is summarized in Figure 1.1–2.2.

The conclusion is that designing for **adaptation** and **resilience** is inevitable today. We should brace for impact and prepare by moving towards a local focus, building **strong social communities**.

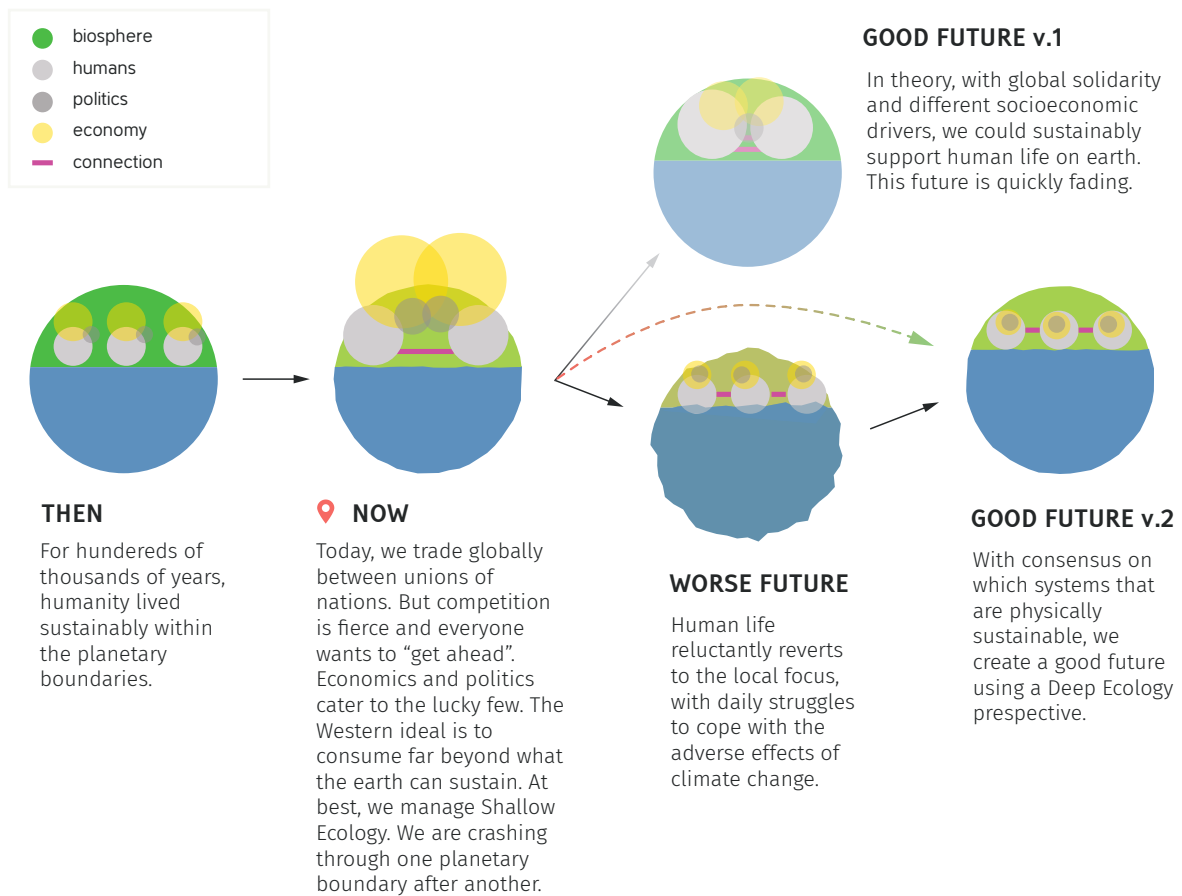
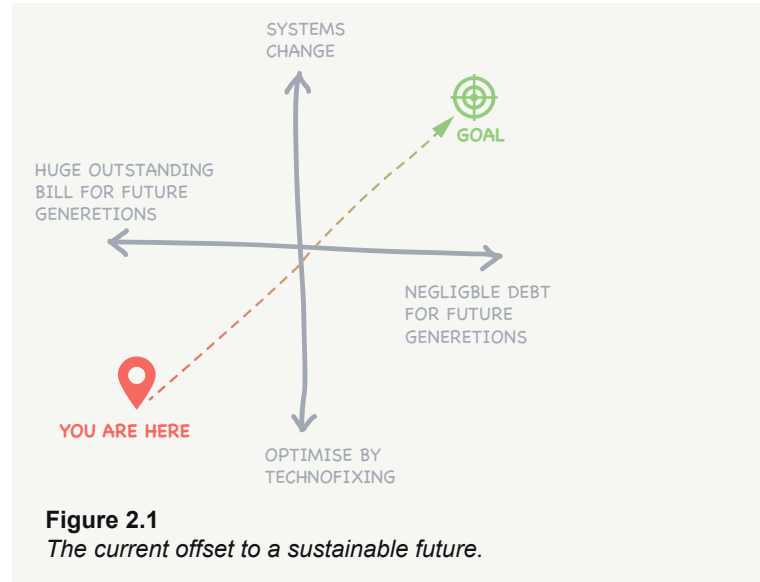


Figure 2.2
Macro insights of climate history, what trajectory we are on and where it will lead.

Identified Gaps

During my literature studies and interviews, I have identified a number of gaps where current societal states differ from what intuition and science identify as a better way. To contribute to the field of urban design, I aim to address at least some parts of these chasms:

THE GLOBAL CLIMATE-MIGRATION NEXUS

International solidarity is essential for sustainable future human life on earth (United Nations, 2015). When climate heating renders an origin site unfit for human habitation, due to our currently unstoppable excessive lifestyles, it would ethically be most appropriate to welcome future climate refugees to our country. In that case, even if we adopt more frugal living spaces and transform every unused built space we have, Sweden will need to produce many new dwellings. Developing strategies for this unthinkable scenario is sadly in the cards, since global climate niches collapse could potentially displace billions of people globally (Xu et al., 2020).



Figure 3.1
A simplified illustration of the path to a home in the late 20th century compared to today.

HOW TO AFFORD A HOME? (Affordability gap)

Younger Swedes are the first generation with **poorer access to housing** than their parents (Boverket, 2024). Since the mid-1990s, real house costs have far outpaced income growth. There is a mix of economic advantages for the old which has led to lock-in effects. Even in the rental market, the landlords' stock of older, cheaper apartments

GAP INSIGHTS

are held by older and are financed by new rental apartments in less central areas. Those very expensive apartments are often the only option for younger people. Moreover, construction in Sweden is among the most expensive in the EU, making it difficult to build affordable housing without subsidies.

BUSINESS AS USUAL (Planned Typology Gap)

Climate-smart housing strategies often emphasise **reducing floor area per capita** and using **low-carbon materials** such as light-frame timber construction. Lerum municipality have initiated a program plan in Floda – “Floda Södra” – of 180 ha, the largest project in the municipality for ten years. Initial sketches show foundations of concrete, brick facades and more of the usual carbon-intense construction materials. Building like this is not in the interest of future generations (see Appendix B).



Figure 3.2
Natural building materials generally have much less carbon emissions than today's go-to solutions.

Within Floda Södra there is a central area already under an existing program plan – “Kulladal”. Assuming transformation projects are not on the table (presumably for economic and/or political reasons, see Figure B4), what other visions could be proposed today, under the current Kulladal program, to inspire more sustainable future life in the planning of Floda Södra?

WELLBEING (Social Design Gap)

Humans are biologically wired to **thrive on close social connection**, historically maintaining stable community networks up to a cognitive limit of roughly 150 individuals (Dunbar, 1992). Yet, Sweden has one of the world's highest rates of solitary living. This gap likely stems from intentional societal design in the 1970s, like the manifesto “The Family of the Future” aimed to make every citizen **independent** of their family and partners. This has led to Swedes being notoriously bad at thin social ties (casual, daily chats) and science shows that these “weak ties” are actually crucial for daily happiness and feeling like you belong to a community (Sandstrom & Dunn, 2014).

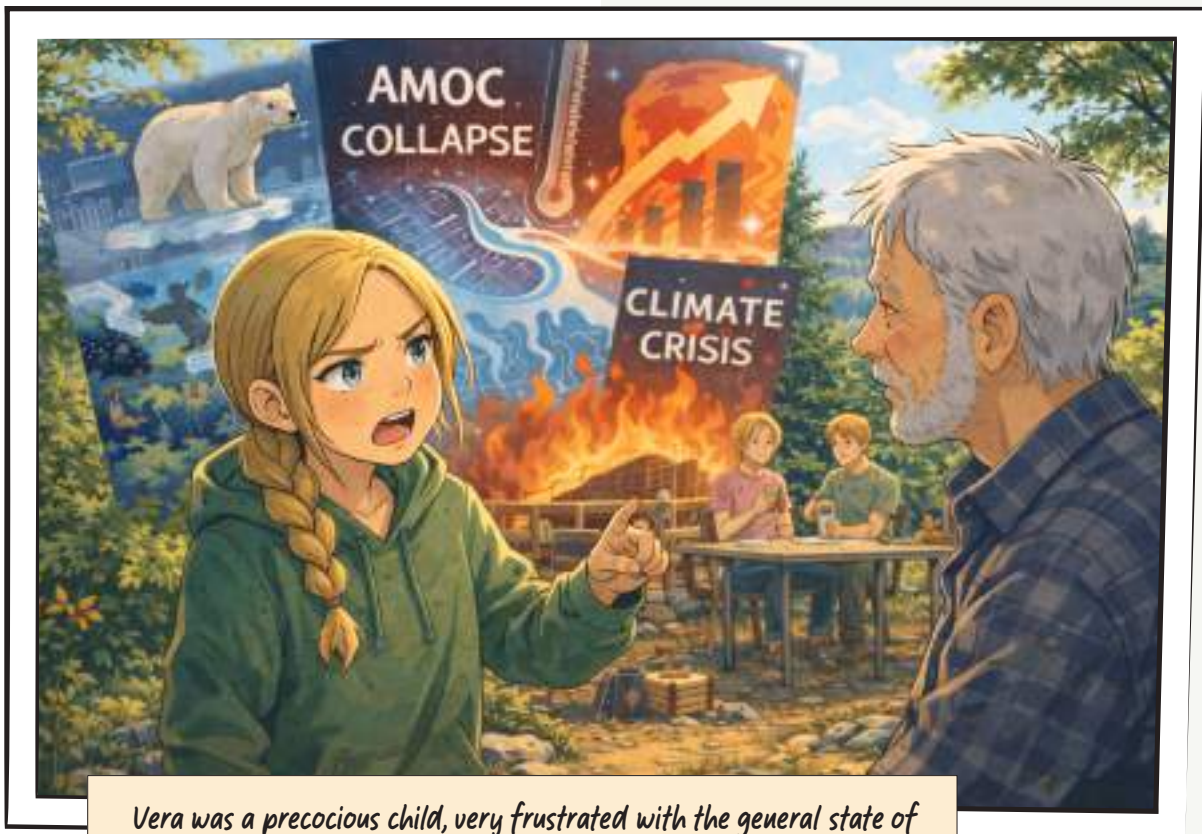
Ecovillage IMPLEMENTATION GAP

While a standard planning process in Sweden can take years, eco-villages face **unique complications** (due to unconventional solutions) that stretch these timelines even further. This, alongside many other reasons, leads to a lot of ecovillage projects dying in its infancy. By gathering and sharing updated knowledge of currently successful strategies, my work could help future ecovillage projects in Sweden to more easily get their wings off the ground.

HOW TO BUILD A HOME? (Bucket List Gap)

Ground-level housing – with nature close by – is a desirable form of living for most Swedes (Boverket, 2022). Many people harbor the dream of building their own home, but only a small fraction ever translate that aspiration into a completed project. Instead, they end up living in someone else's spreadsheet. How can homes and local plans be designed to allow for human centered living that is possible to pay for (at least in part) by **sweat equity** (building value through labor instead of money)?

Narrative, PART I



Vera was a precocious child, very frustrated with the general state of things. Leaving home, still a teenager, somewhat soothed her outrage.

EVIDENCE-BASED PATHWAYS

Narrative, PART II



*Vera and Liam met at Halmstad Högskola.
Some years later they have a baby girl, Eva.*

From Me to We

When viewed collectively, the identified gaps reveal a systemic failure in society that necessitates an architectural approach that is grounded in **solidarity**. Global solidarity as well as local. Solidarity with fellow humans as well as with fellow beings in nature. This finds its practical realization in the framework of **permaculture**, a design system often at the heart of eco-villages. These communities often implement ecological designs that serve as both physical shelter and a catalyst for collective commitment. Grounded in the permaculture core ethics of **earth care**, **people care**, and **fair shares**, the village typology provides the architectural and social tools to foster a “permanent culture” where human settlements function as part of, rather than apart from, the natural world. I believe that **biophilia** – the hypothesis that humans possess an innate, biologically driven need to connect with nature and other forms of life (Wilson, 1984) – is key.

My thesis presumes that there is a clear and growing motivation to embrace a multi-dimensional approach to sustainability that goes beyond traditional conservation and shift to **regenerative design**, which aims to restore, renew, or enhance ecological and social systems. Solidarity is thus expressed through lifestyle decisions, from local resource sharing to global knowledge exchange that honors the agency of both humans and the other-than-human entities.

EVIDENCE-BASED PATHWAYS

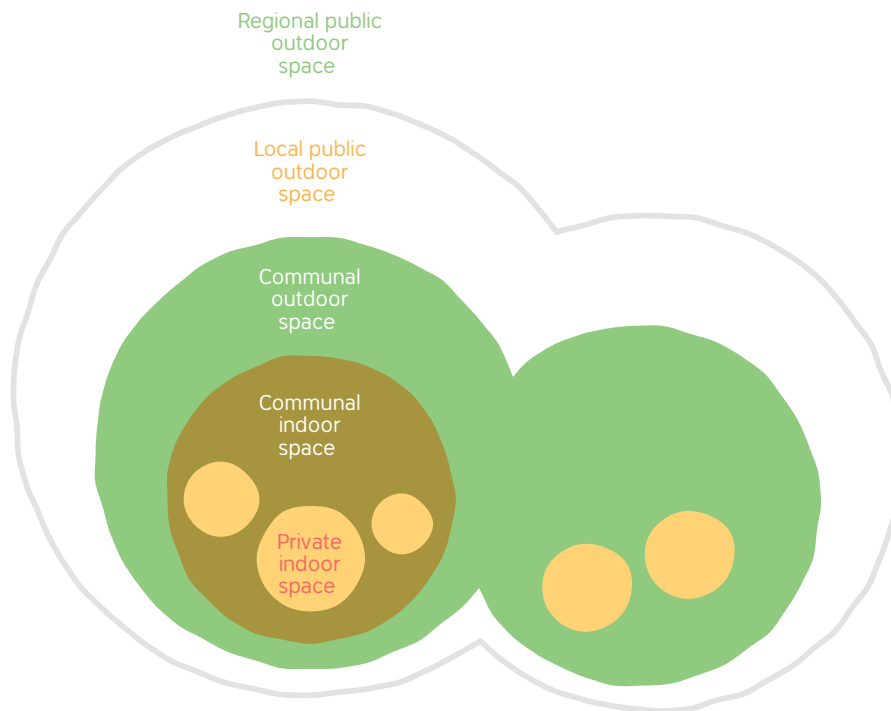


Figure 4.1
The “social onion”. Human-centered spacial organisation diagram.

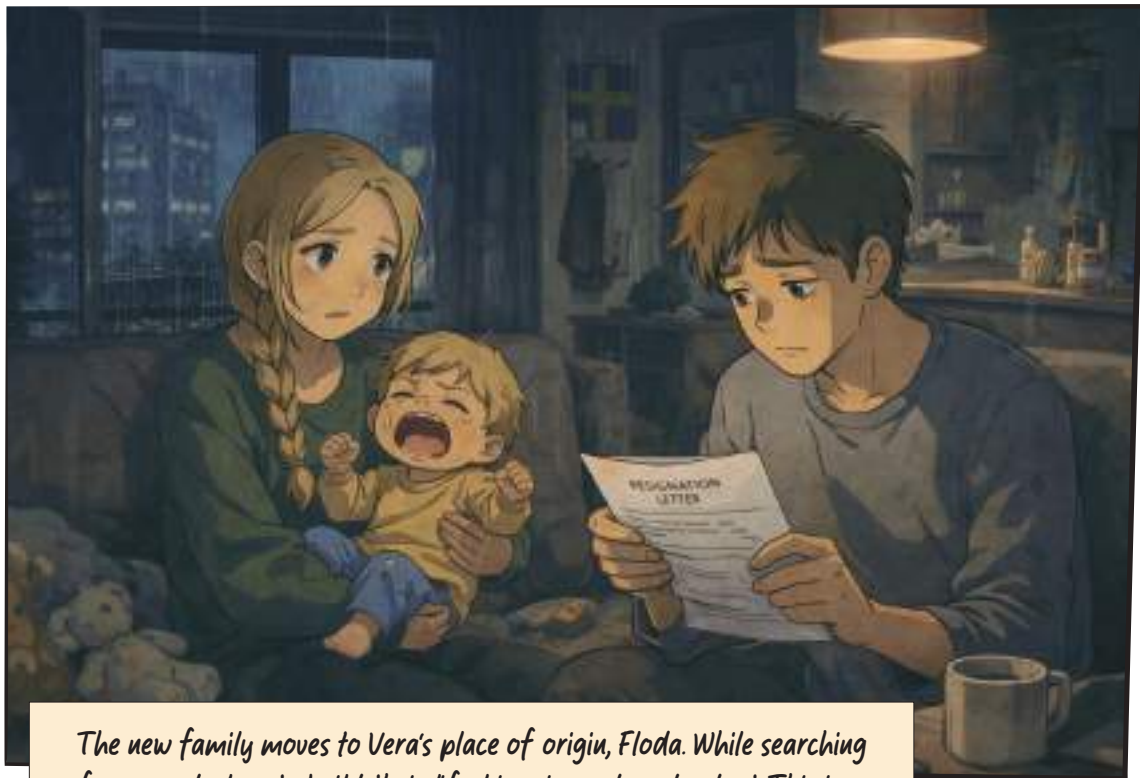
By integrating ecological, social, and economic goals with a fourth pillar- **cultural sustainability** (Hawkes, J. (2001) – societies (and communities) can prioritise and address health challenges like involuntary loneliness. The culture of caring for each other by joint activities goes a long way. But there must also be possible to withdraw into a **private space**. Further, architectural theorists like Jan Gehl argue that spatial design should support gradual transitions between the private to the public to in Figure 4.1.

CONCRETE ADVICE

When creating space for humans, building material is usually needed. Concrete is the most consumed substance on Earth, after water (Schneider et al., 2011). This is a huge climate heating problem (see Figure B3) that optimising does little to help. Its use have to be minimised by design and only be used when it is absolutely crucial. In general, in maintenance work as well as when building new spaces, it is paramount to use as much unrefined **natural materials** as possible (IPCC, 2022b). Minimally processed, bio-based materials (wood, straw, stone) typically have significantly lower embodied carbon than highly processed construction materials such as concrete, bricks, steel, and plastics.

In these weird interim times, those who align their lifestyles with market demands of consumerism are strongly rewarded. The strategy of “surfing the waves of overconsumption” by **repurposing** discarded building material and other “waste” is in practice, essential. Albeit a long term dead-end.

Narrative, PART III



The new family moves to Vera's place of origin, Floda. While searching for a good place to build their life, Liam is made redundant. This is a fate he shares with many peers of the Transition Generation.

HOUSING TYPOLOGY ANALYSIS

Housing Typology Analysis

Row houses are very common in ecovillages. Why is that? In this analysis I compare three dwelling typologies of equal size to find out why. Please note that I use the active living areas in this analysis. Plot sizes reflect new-build standards.

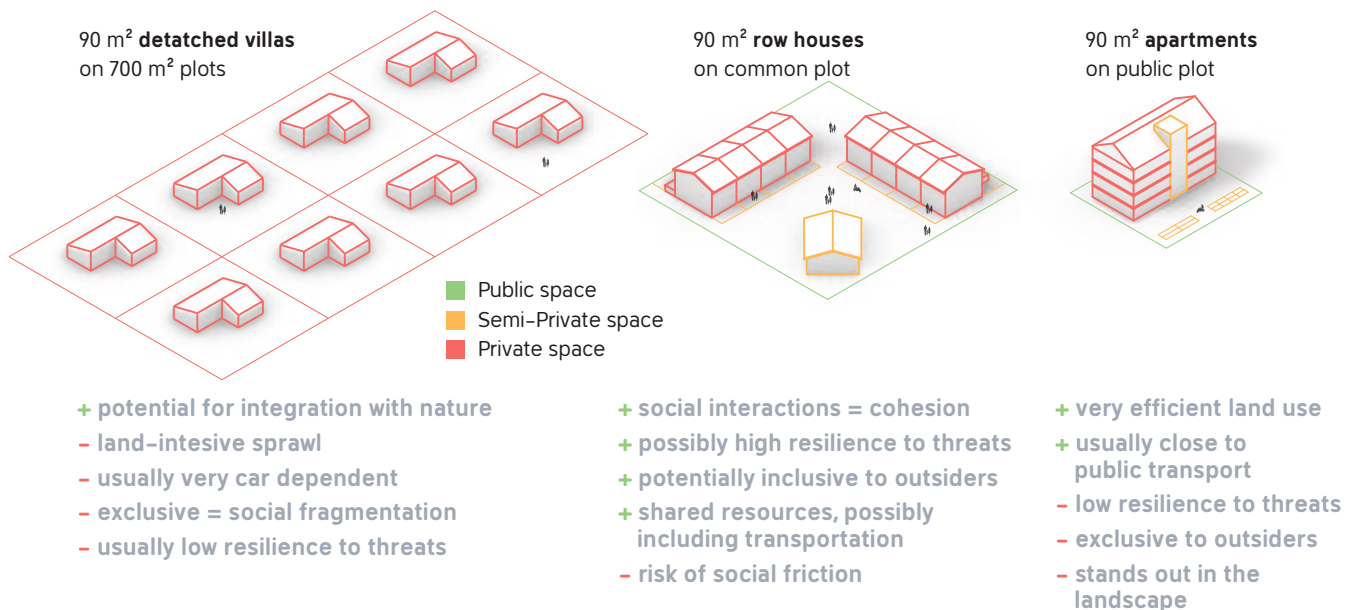


Figure 5.1
Comparison of 8 homes of 90 m² in 3 typologies.

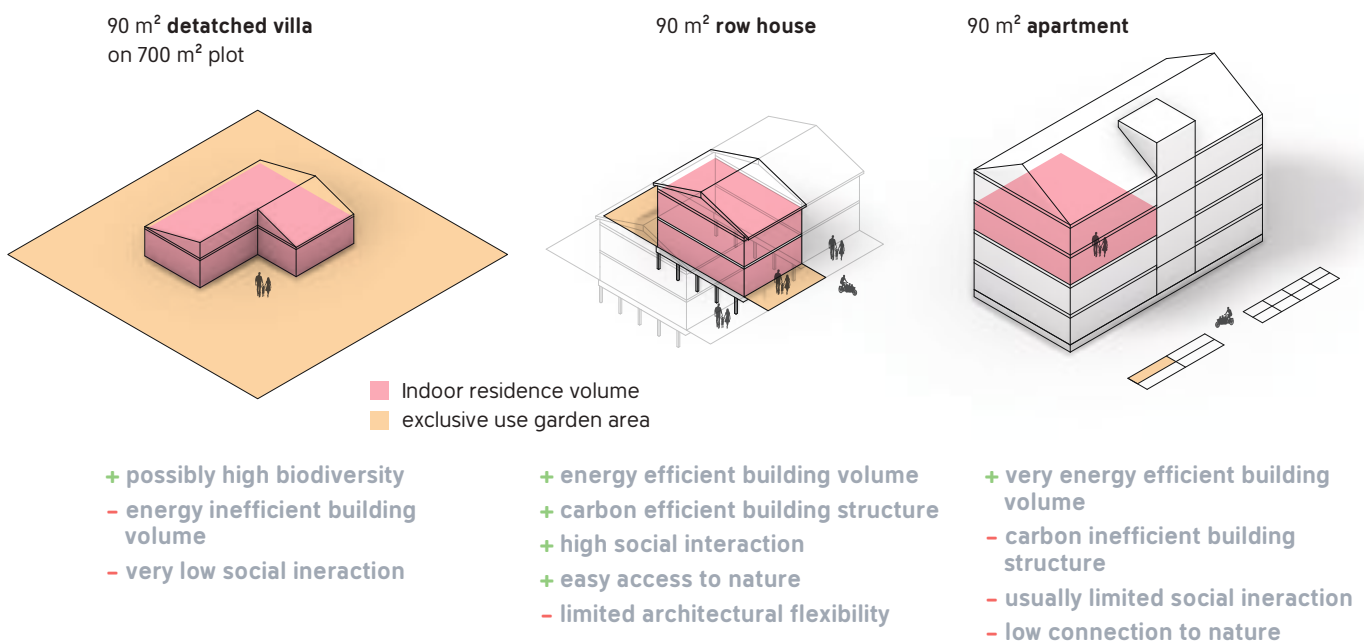


Figure 5.2
Comparison of a 90 m² home in 3 typologies.

HOUSING TYPOLOGY ANALYSIS

The detached villa is a strong status symbol for older generations. For younger generations today, it is largely economically unattainable. But is it even something to strive for? It is an **unnatural, lonely** way of living (see Figure 5.1) and it requires unsustainable levels of resources in the form of land, heating, material and transportation (Ala-Mantila et al., 2013; Gehl, J., 2010).

Villas are usually larger than the 90 m² used in my analysis. This is to accommodate for seldom used guest rooms and rooms to hoard personal items such as low-quality tools and other dust-gathering items. Row house areas and apartment buildings have more potential for **shared resources**, such as guest rooms or tools and functions (of industrial-level quality). Ecovillages usually gather such things in a common house.

Apartment buildings are better in many ways but not ideal in all settings. Often overlooked is the fact that embodied carbon per living area can be quite high in apartment buildings. This is mainly due to concrete cores, lifts, underground garages and the structure (being stronger to carry weight) and the thick internal floor/roofs (to be sound and fire proof). See Figure 5.3.

A row house in a village structure is evidently a good starting point for future suburban development.

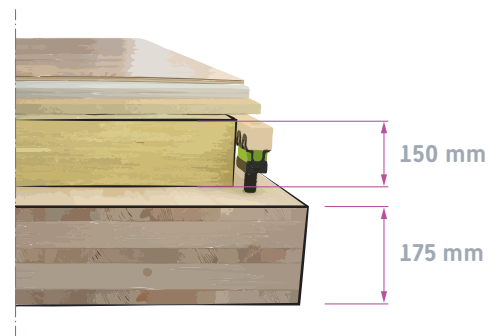


Figure 5.3
Essentials in the floor structure of a well designed multi-storey apartment building.

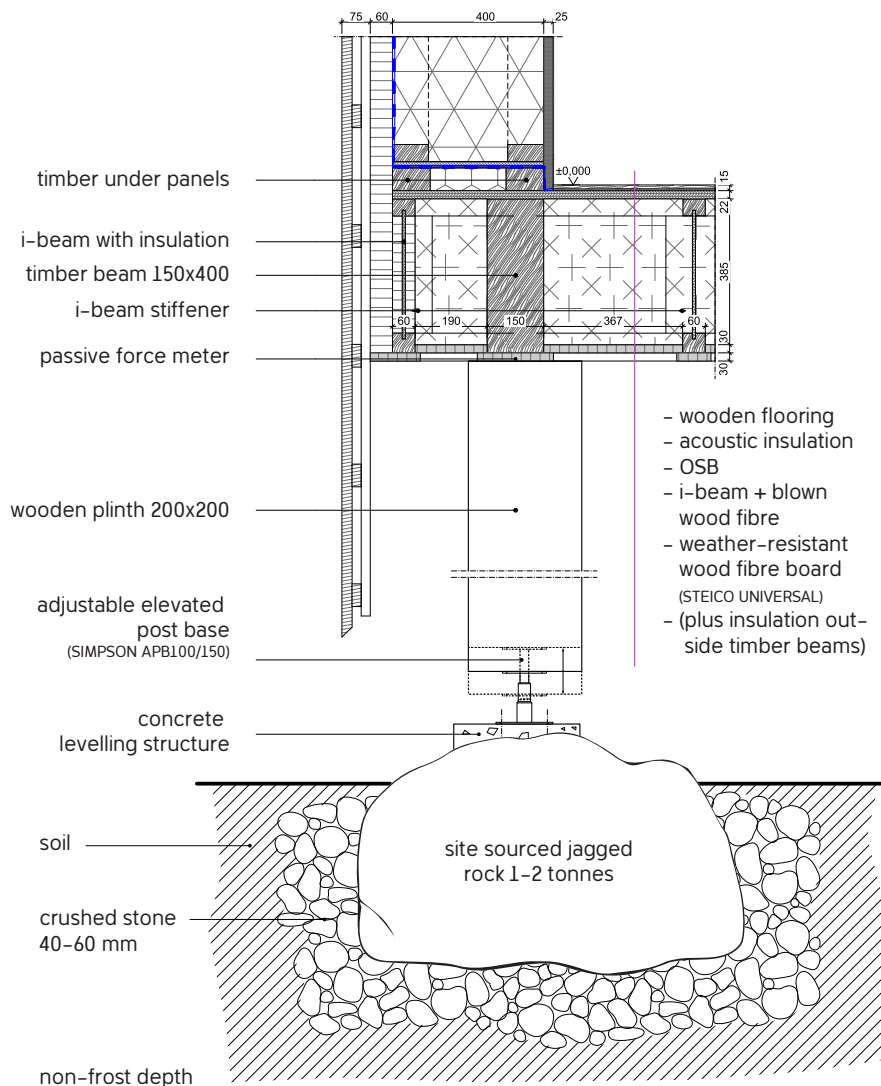


Figure 6.2
 Preliminary technical drawings of building envelope, part 2 of 2
 (adapted from EcoCocon original drawings).

Foundation

The habitual use of concrete must stop (see figure B3). This proposal instead use wooden plinths and **site sourced** rocks to secure the buildings to the ground. No need to reach non-frost depth and/or destroy tree roots. There might be some settlement issues during a year or two but that can be remedied by adjustable bases, that re-level the building. This “Greenland foundation” is a proven method that works well, albeit needing some initial monitoring. The entrance of the buildings will need stairs (and ramps for accessibility).

A modified modern soil bench version of this foundation could also be used, when appropriate. In that case, the floor insulation is made of crushed blue mussel shells or hasopor foam glass gravel (made from 100% recycled packaging glass).

Row house program

The row house is inherently relatively energy efficient thanks to its shared walls (Figure 6.3). By centralizing low-occupancy functions like guest rooms, laundry, and large dining areas into a single communal hub, you reduce the total heated envelope of the row house further. This row house program, with approximate areas, is therefore smaller than what is usually built in Sweden but it is a size that works well (and is considered generous internationally). The specific floor plan design is irrelevant to this thesis.

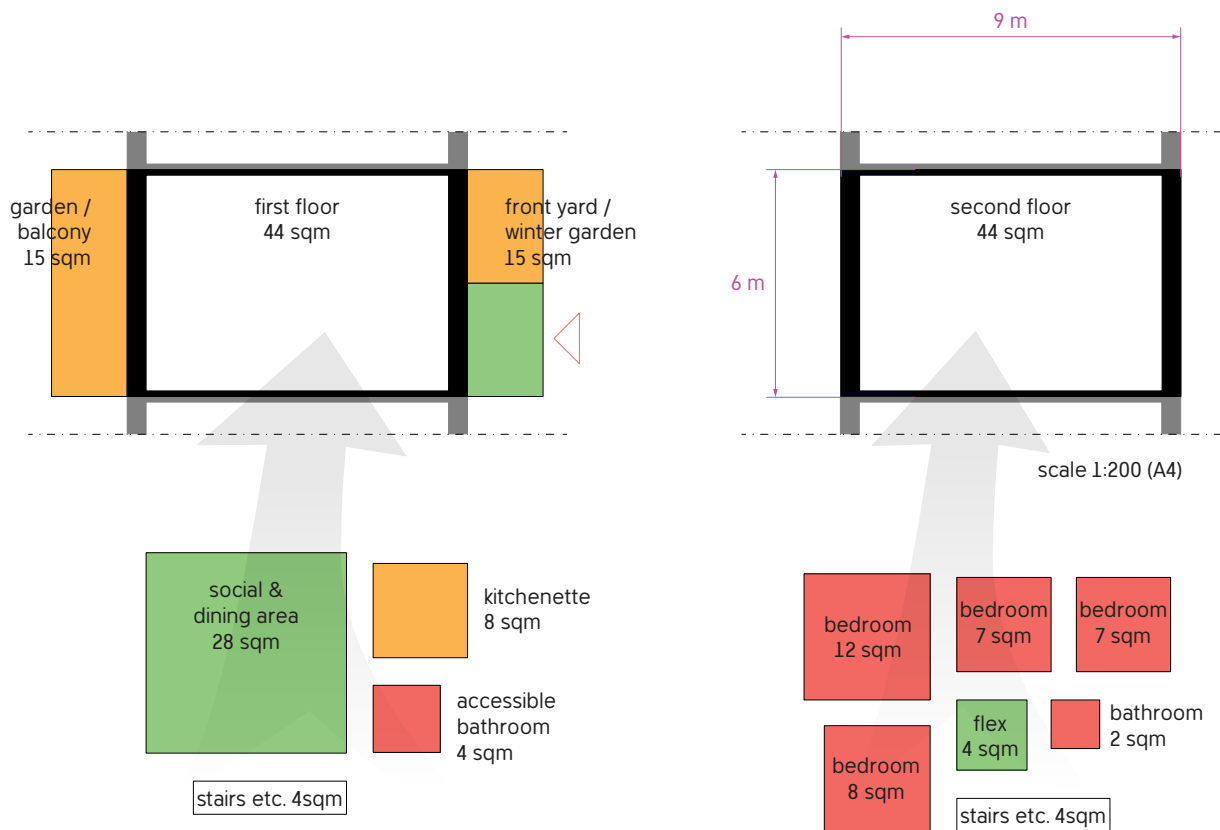


Figure 6.3
Row house example program, approximate areas

By sharing functions in a village structure, the energy efficiency, as well as overall construction footprint, is about 20% better than compared to having the same functions distributed in detached villas. Further, the ecovillage configuration is roughly 15–20% more cost-efficient annually than the standard row house development. This stems from **operational savings**, a smaller total heated footprint (including **social heat gains** in the common areas) and **economies of scale**. This allows for annual living costs of roughly 60–65% in that of a villa. However, ecological living extends far beyond sustainable architecture; it requires a personal commitment to an environmentally conscious lifestyle and deliberate daily behavior (Haraldsson et al., 2001).

BUILDING ANALYSIS - ENERGY USAGE

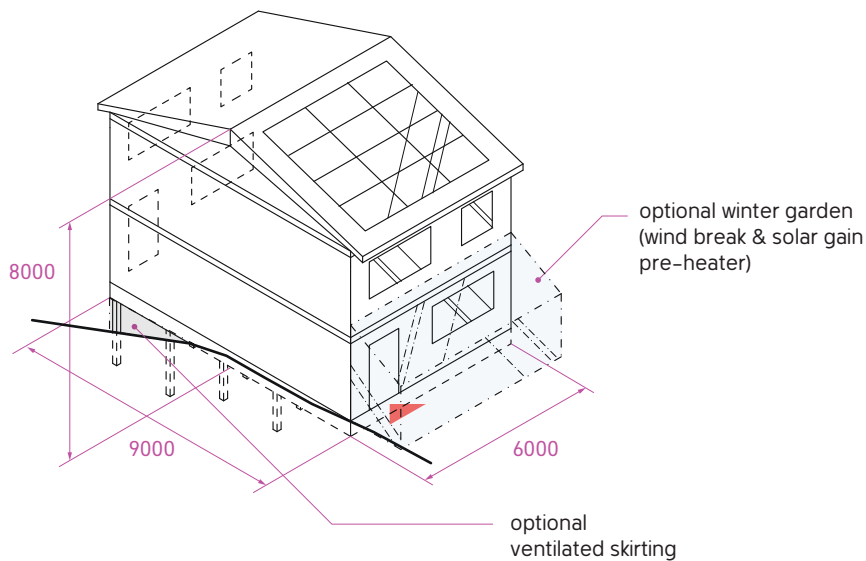


Figure 6.4
Heat loss calculation input parameters for an end-row house.

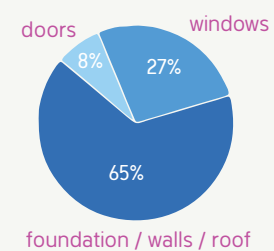


Figure 6.5
Heat loss breakdown by building element (W/K).

Energy-Plus Housing

An **energy-plus house** is a building that produces more renewable energy than it consumes over the course of a year.

Detailed calculations (using 85% efficient FTX ventilation) and assuming 20 kWh/m² of household electricity per year puts the total need of energy at 3 800 kWh per year. Adding solar panels to suitable roofs in the settlement conservatively evens out to 25 m² per row house. These panels would typically produce 4 500 kWh per year.

In short, the row house could definitely be **energy net positive**. Adding a skirt to the plinth foundation and/or an entrance thermal buffer would make the building even more energy efficient.

Worth noting, seen in Figure 6.5, is that the 14 m² of very well insulated windows (U-value 0.8 W/m²K) are still unproportionally responsible for the calculated heat loss of the envelope (227 m² of mean U-value 0.12 W/m²K).

Narrative, PART IV:



Thanks to the novel Adjustment Support Act, the parent group of 2027 decide to go for creating their own community-led housing.



The group grows. Individual house dreams find their true potential when they grow into a shared vision.

PRECEDENT ANALYSIS

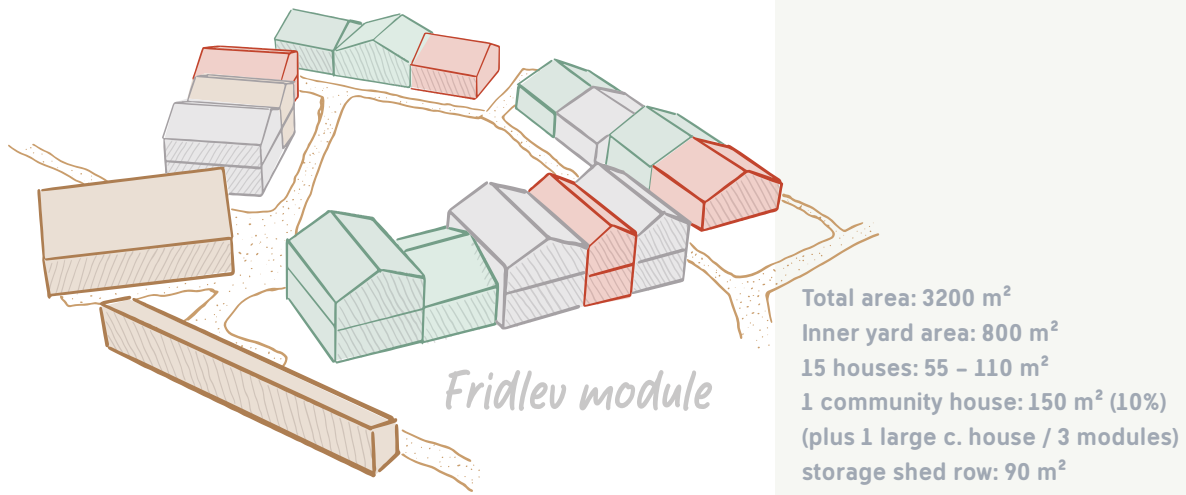


Figure 7.1
Area calculations for a third of the Fridlev ecovillage. (See also page 75)

Analysis of Built Projects

I studied more than twenty built projects, some briefly and others in more detail. I made site visits to a handful of them. Talking to residents is time consuming but always very rewarding. On top of that, I have lived for years in typologies akin to some of the references. My main take-aways from this research are described on the following pages. As a detached insight of my work process, I have included some of the precedents that I studied, described and succinctly critiqued in Appendix C.

FINDINGS OF LOW ARGUABILITY

First, in order to create a strong community, you need more in common than just the street name. A shared responsibility like a community association that tend to co-owned functions is the lowest bar. A shared long-standing goal of a creating a homestead with others builds even better communities. Especially when you are victorious against a common enemy like a cumbersome municipality or an obstinate loangiver. In a perfect world, all stakeholders are aligned with your goals and you get a swift process, ample free time, money and resources to design both common funtions as well as your personal dwelling. This is never the case today, adding to the **pride** when a challenging goal is reached. Working collaboratively toward shared objectives fosters bonding social capital, which is an essential foundation for internal group cohesion (Putnam, 2000). Also, the satisfaction of having physically built (at least parts of) your own space is hard to overestimate (Turner, 1976). A clear example of the fact that we value things higher when we help create them is true for Ikea furniture as well as for the dwellings of the Hedgehog Housing Co-op in Brighton (see page 71).

PRECEDENT ANALYSIS



Figure 7.2
A potentially functional community of 24 households.



Figure 7.3
In design, the “unresolved duality” is best avoided.

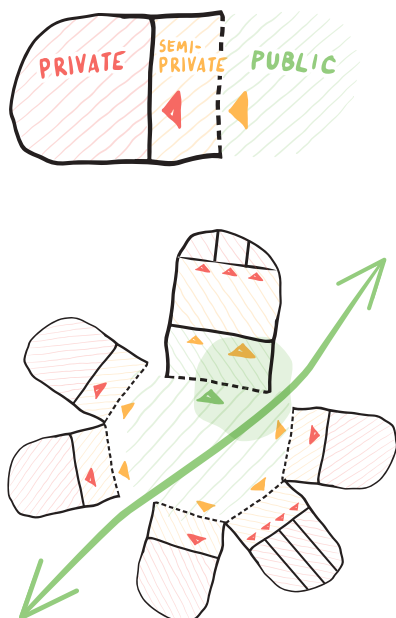


Figure 7.4
Typical privacy gradient of a well functioning ecovillage.

Concepts regarding group sizes, proposed by anthropologist Robin Dunbar, are clearly mirrored in many of the references that I studied. The 150-person threshold is the most important – above that number, individuals can no longer “know everyone” well enough to maintain a **cohesive social fabric**. International as well as Danish research suggests that the optimum size for a **functional community** is between 15 and 30 households (McCamant & Durrett, 1994; Vestbro, 2010).

Further, when dividing a group or a community into smaller entities, it is recommended to **avoid bifurcation**. When you divide an area into exactly two parts, you unconsciously create a structure for rivalry or comparison.

Urban flows and spaces should be designed to **make people meet** each other a lot and hopefully make them linger together. Good ways of achieving this are for example a strong “collecting” entrance or a main pedestrian spine (acting as a primary artery) through the estate. A community house is good. A community house with (superior versions of the) functions usually found in the private house is better. The best community house is both centrally placed and on the **best location of the site**. In Sweden, this “best location” is very often the one with a view of the setting sun. The community house makes people meet, **even in the winter**.

Assuming that all options of transforming existing buildings on the site (which is hard in practice but the best way in theory, second only to not building at all) have been exhausted, being resourceful with space and materials is key. This implies using as much natural materials as possible, and just the right amount of it. Carbon-intensive materials such as steel, concrete and bricks should be avoided, and only be used when absolutely necessary.

PRECEDENT ANALYSIS

In light of impending global climate crisis, achieving a specific “architectural expression” is not a good enough reason for deviation, to me. A final kick at an open door is that the urban design should strive to preserve as much of the existing ecosystem services as possible and try to add new such services in line with the ideas of **regenerative design**. Understenshöjden in Björkhagen does a good job of this (see page 70).

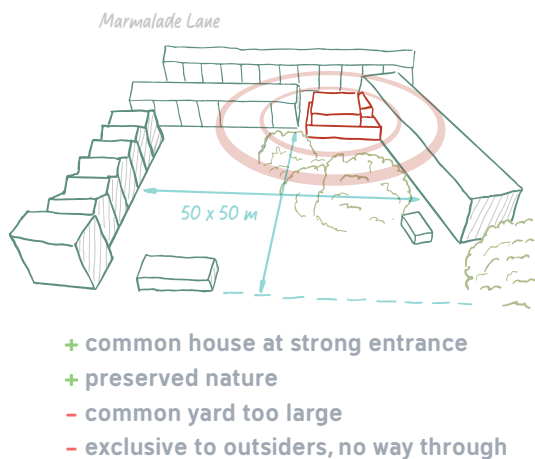


Figure 7.5
Take-aways from Marmalade lane. (Also p. 74)

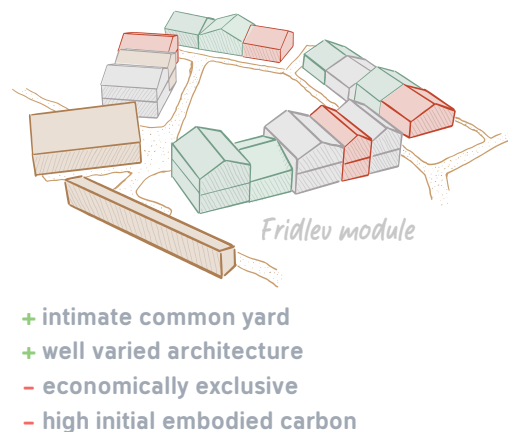


Figure 7.6
Take-aways from Fridlev Bofællesskab. (p. 75)

FINDINGS OF MEDIUM ARGUABILITY

These are the architectural learnings I have mined from my references that there might be opposing opinions on. As an architect, I need to show strong arguments for these claims.

A gated community is never an acceptable solution in a civilised world. Rather, a community should be inviting and **add quality to its neighbours**. This somewhat clashes with my personal insight that small and intimate court yards, like those in Djingis Khan (p. 68) and BBB Kvistgård (p. 72) are a fantastic way of communal living. If the courtyard, big or small, is **easy to oversee** thanks to clear lines of sight and it has a **generous entrance** and clear paths through the area, that is probably the way to go.

Proximity to neighbors is not a problem. In fact, it is usually a quality of **enhanced social strength** and security. The problem is usually lack of privacy and visual intrusion into our homes due to poor design. This is very much in line with the architectural framework “**tæt-lav**” (high-density low-rise) whose core intent is to build low to preserve easy **access to nature** and dense to achieve social contact – “everyday togetherness” (Nejst Jensen et al., 1971). On that note, the private entrance area can certainly be big enough for a nice private garden but it should not be big enough to accommodate a parked car. Based on personal observation of living in a cohousing environment, if it physically possible to park on “your” piece of land, some

PRECEDENT ANALYSIS

surely will, regardless of rules. Humans are **inherently lazy** and urban design can play a role in stifling such instincts. Taken to its extreme, building homes on elevations solely for the fitness of the inhabitants is not a very good argument. However, today's wide variety of personal electric vehicles do make the precious **long evenings on elevations** more accessible than ever.

FINDINGS OF CONFLICTING ARGUABILITY

After analysing and compiling all prerequisites in a project, the architects need to reach a conclusion on the pure **design conflicts** that arise. These conflicts can be seen as forks in the road where you have to make a choice between options of equal value. In these choices you have to be acutely aware of your personal bias, shaped by upbringing, culture and individual experiences. Biking around in the elevated Uddared (Floda) I swore to never live on a hill again but today, 20 years later, I find myself living on another elevation. The longer days are a major asset, to me. After discussing with the references, these are some of my revised beliefs:

The **row house is a good typology**. It hits the sweet spot of a small physical footprint (compared to private villas) along with low emissions per dwelling (compared to apartment buildings). Row houses paired with a lively public yard, with its festivities as well as conflicts, builds community. Swedes need to get better at this. We also need to fall out of love with cars. In my future, **cars have no place in residential zones**. Except for the accessibility for emergency vehicles, of course (Boverket, n.d.).

I prefer a **diverse architectural expression**, as seen in Fridlev which consists of a collection of distinct units of varied heights, colors, and facade setbacks (Figure C8). The monolithic gesture of for example Kvistgårdhusene (p. 72) – uniform materials and rooflines – should be avoided, if possible. Economic frugality is taken too far when it is the reason for painting thirteen blocks in the same colour.

A final interesting design conflict is that of keeping tall trees versus their shading effect on solar panels. This can usually be resolved by using solar studies to open up for a reasonable middle road.

Fit for Future

The ecovillage row house typology arguably hits the sweet spot of having high living qualities (living close to nature) and high social interaction (especially with common functions and sharing) while keeping embodied carbon low and the building elements of a manageable human-scale size. Using plinth foundations, a climate envelope can be built using a high degree of natural materials (wood, straw and clay). That building material, at end of its usable life cycle, can easily be **returned to nature**. No left over ruins of rubble made of concrete and non-degradable plastics.

ASPIRING ECOVILLAGERS

According to a seasoned house broker working in Lerum, there is currently no demand for truly climate-smart buildings *“And people don’t even consider efficient floor plans; they are only interested in row houses with a total area exceeding 110 square meters”* (M. Jönsson, personal communication, October 28, 2025). However, as we continue to breach planetary boundaries, research suggest that this demand will shift to align more with the scientific calculations on how **we must transform our Western lifestyles**.

The ecovillage, built of natural materials, can be considered an interim pilot project for the growing number of people that are today “eco-distressed”. This way of life can bring great sense of belonging and meaning: All neighbours striving to get us all closer to the global social tipping point. The goal is, of course, having **a global majority of people agreeing with science**. By then we can really start the green transition. Instead of hoarding stuff (including houses), we will focus on sharing, upgrading and taking better care of all that is already built. I could not find support in science for the popular claim that “we have already built all structures we need” but there is generally not an absolute shortage of dwellings, our “housing crises” are rather driven by unequal access, affordability, and unequal space distribution (UN-Habitat, 2020; Boverket, 2023).

Anyone who want their daily lives to align with their **ecological principles** would find this ecovillage life attractive. On top of this, ecovillages usually attract parents who value **safe environments** where children can grow up with diverse role models. Also, older adults often seek ecovillages to maintain independence while remaining active and valued members of a supportive social network, countering the isolation sometimes found in traditional retirement.

Ecovillage SITE SELECTION

This ecovillage strategy is, from a natural resource perspective, best applied to derelict land, possibly urban old industrial grounds (known as “brownfields”) where the inhabitants, while living on site, can **improve the local natural values**. Selecting a too polluted site can be risky though, as seen in the environmentally problematic transformation of Lomma harbour (Lomma kommun, n.d.). Also, old industrial sites are usually close to waterways which are more prone to **flooding** in a future of extreme weather. A more navigable path for pilot projects like this one is using unpolluted land of **low natural and agricultural value**. One such type of landscape is potentially the primary rock plateaus that are abundant in west Sweden.

REALISATION OF THE VILLAGE

Profit driven developers usually shy away from inaccessible hills due to unforeseen costs. Challenging terrain is more suitable for acupuncture-like small scale housing of site-adaptable design, where sophistication and careful development is required. These are the characteristics of projects realised by **self builders**.

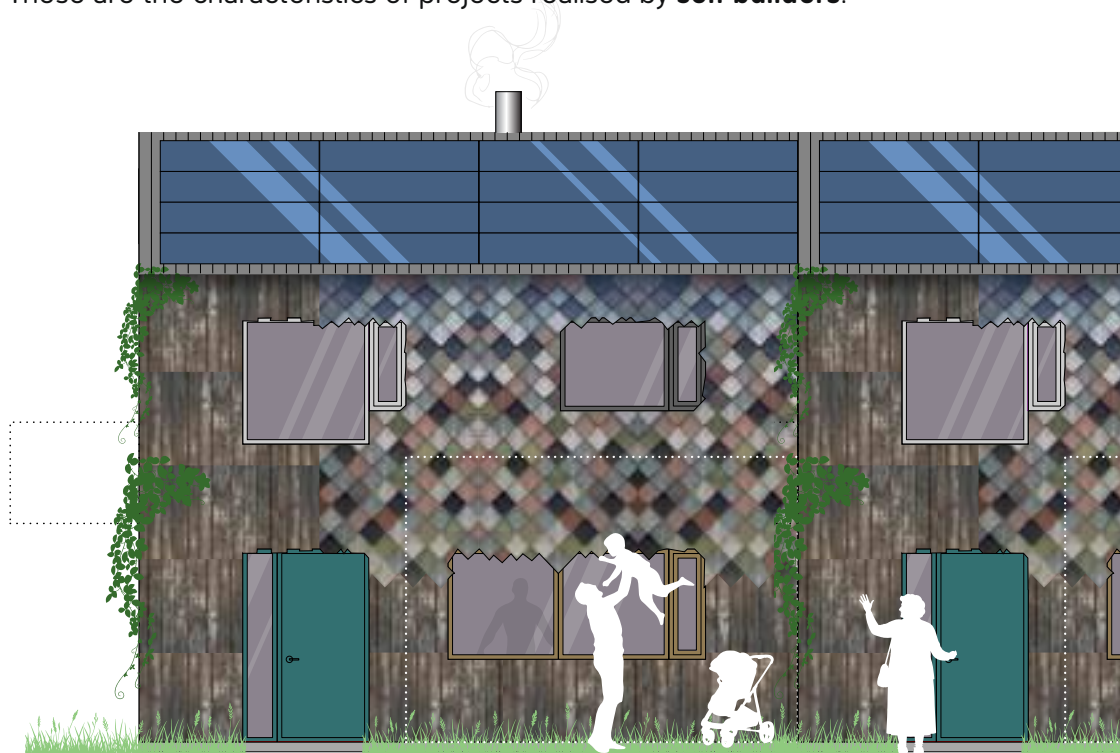


Figure 8.1
Ecovillage row house illustration, showing a facade of repurposed materials.

My motivation going forward to the site is this kind of unpretentious architecture. Instead of quickly placing ruthless concrete-grounded human containers, we build **humble functional carbon sinks** that serve humanity for as long as it is needed, but remain prepared to give way to nature once again.

Contextual Analysis

REGIONAL

Lerum is a prosperous suburban municipality, 20 km inland from Gothenburg, with historically **high ambitions in sustainability**. The site is part of an ongoing planning program “Floda Södra” which is the biggest city planning project in Lerum for ten years, with the potential for over 1 000 dwellings. An example of **future-proof typology** here could have a real impact and might even make ripples reaching far beyond Lerum.

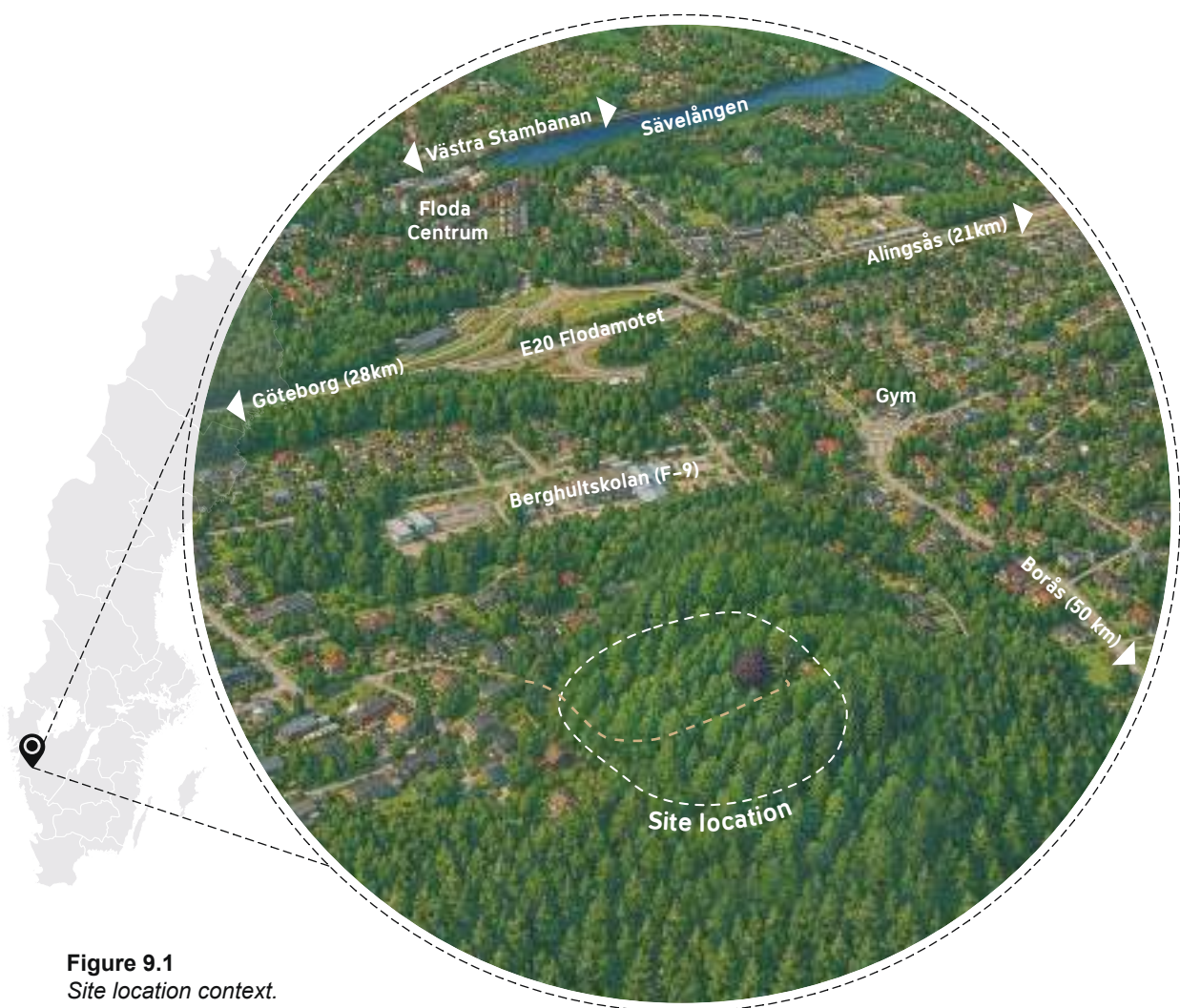


Figure 9.1
Site location context.

LOCAL

The site is located in Berghult, nestled among detached villa carpets (1-2 storeys), close to an expansive school and a 10 minute bike ride (2 km) to Floda Centrum. Living in Berghult is popular due to offering a balance of nature and convenience. Families and commuters appreciate the safe environment with easy access to major cities.

SITE ANALYSIS - CONTEXTUAL

Public transport is comprised of bus services to Floda Centrum, 531 departing twice an hour 200 m away and the 533 every quarter from 300 m away. The municipality plans to develop 180 hectares south of the site, and thus their ambitions to significantly **expand public transport**.

The site is part of Hagåsen, an elongated loaf-shaped plateau mountain in southern Floda, Lerum. The site is partly developed but currently uninhabited.

To the north, The mountain hillside drops 40 m and flattens out to accommodate the school Berghultskolan where 580 pupils attend (450 F-9, 130 pre-school). The school was built in 1974 and has since been expanded in phases, to accommodate a major **influx of families with children**.

A welcoming ecovillage in close proximity could be a great **extension to school activities**.



Figure 9.3
Berghultskolan, ambitiously renovated in 2024.



Figure 9.2
Site context shade map.



Figure 9.4
Stereotypical dream life by Lerum.

SITE ANALYSIS - RELEVANCE

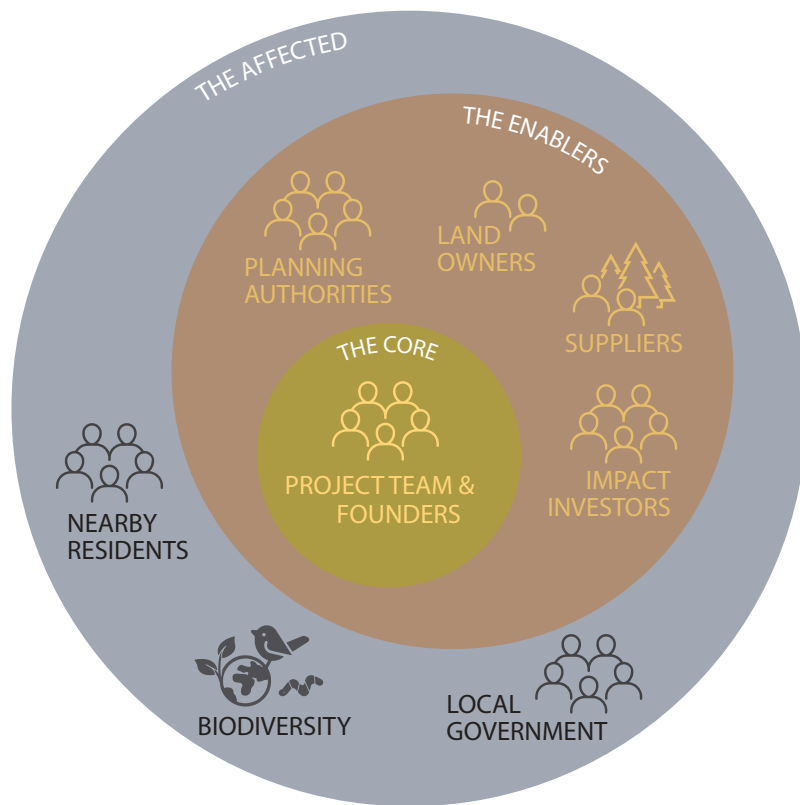


Figure 9.5
Project stakeholders



Figure 9.6
SDG goals

Relevance

FUTURE BUILD METHODS

Traditional building methods usually consume a big pie of the carbon emissions budget. Lerum municipality has long held the vision of being a leading **environmental municipality**. This project showcases what strategies must be implemented at a large scale to reach the **climate goals of 2030/2045**.

BIODIVERSITY

New development can rightfully be critiqued in light of successful transformation projects but a permaculture approach can actually increase biodiversity through regenerative landscaping, crop plots, and natural stormwater management.

PLACEMAKING

Lerum aims to keep ranking high as a “framtidskommun” (municipality for the future). Social sustainability is high in collaborative, community-driven approach to planning, designing and managing spaces. Ecovillages attract **engaged and resource-aware residents** interested in building resilient communities, highly motivated to engage in, and expand, **circular economy**.

ENERGY EFFICIENCY

Lerum is actively working on its energy plan and wants to promote sustainable energy. **Plus-energy housing** is very much in line with this ambition.

SITE ANALYSIS - POLITICAL STATUS



Figure 9.7

Site added to principle map of Floda Södra planning program (Lerum municipality, 2026, p. 5).

Planning Status

During the writing of this thesis (in March 2026) Lerum published a planning program for “Södra Floda”. The area of 180 ha includes approx. 1000 homes and municipal services. The consultation document is full of adequately vague green ambitions, aiming to please politicians, investors, developers as well as concerned municipal residents. It is business as usual, with a hint of green. This, of course, is just as to be expected (see Appendix B). On the other hand, a small step for a municipality opens up for a bigger stride for an ecovillage. The program subtly suggests that there are parts of the Lerum planning authority that wish they could **implement more radical approaches** for our common future.

Site History

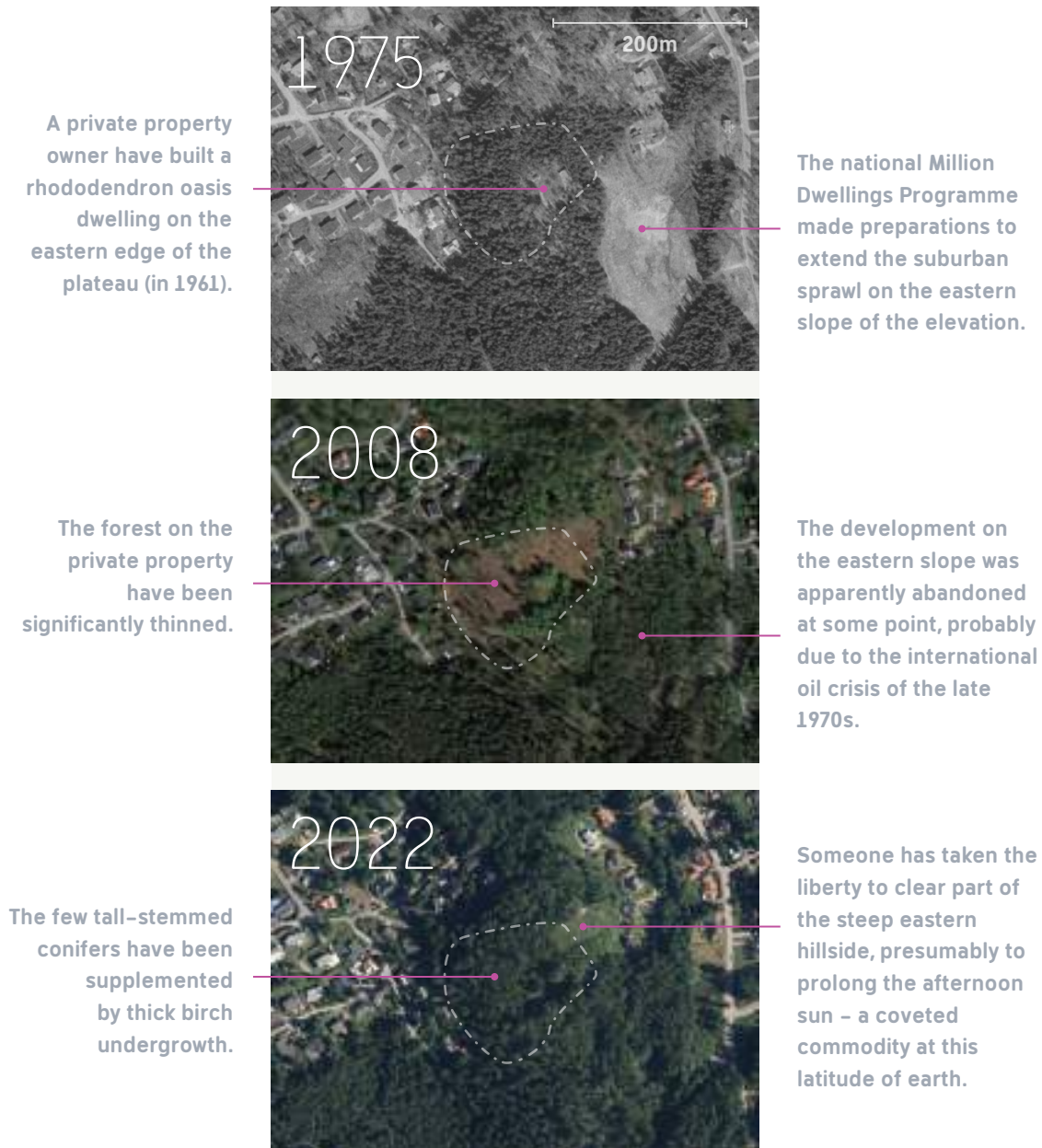


Figure 9.8

Aerial photos of from 1975, 2008 and 2022 and notable observations. Photos from Lantmäteriet (n.d.)

The main insights gained from studying the site history, old planning programs and newer technical reports are:

1. The silhouette of the hill is important to preserve as a **visual landmark**.
2. The southern half of the “loaf” has been untouched for longer and has a higher natural value.
3. There is a healthy (100+ yrs) purple beech deemed valuable as a **landmark tree**.
4. A few pine trees are usually left when thinning to be “legacy trees” for the eco system (they have a strong taproot that withstand winds).

SITE ANALYSIS - DIAGRAMS

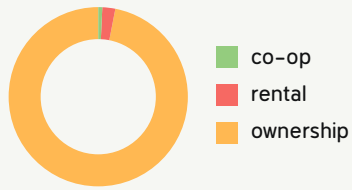
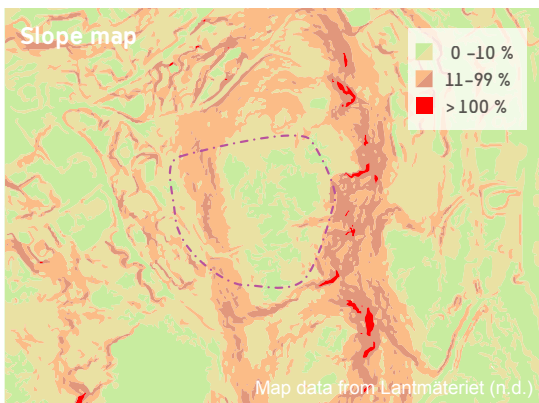


Figure 9.9
Tenures in sothern Floda. Data from Statistiska centralbyrån (n.d.)

Socio Economy

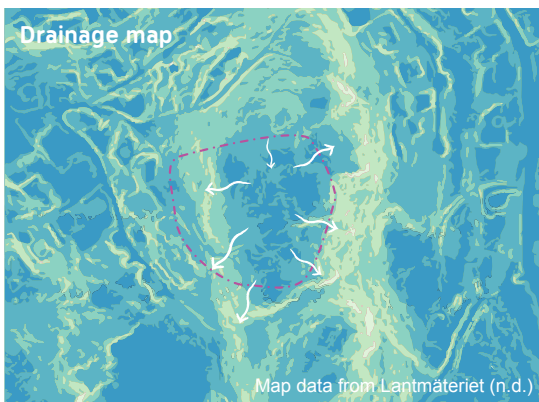
The whole of Floda has an a very high proportion of homeownership. A more diverse mix of tenures is desirable to **avoid segregation** and to increase flexibility. Young people usually rent their first home, for example.

Site Analysis



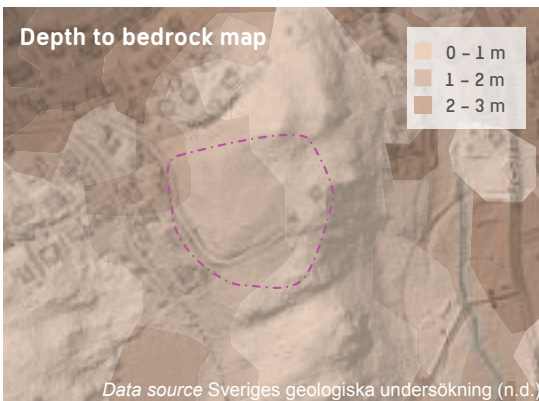
TOPOGRAPHY

The site is of typical West Sweden fissure valley landscape with a **flat-topped plateau**, shaped by The Fennoscandian Ice Sheet. The plateau is tilted a few degrees to the south and framed by 18% inclines except for the east slope which is interspersed with >100% incline rock formations.



WATER FLOW

The elevation is somewhat loaf-shaped, with no indentations to hold water for long.



SUBSOIL

The precambrian bedrock is gneiss, an ancient (1000 million years old), non-porous and extremely hard stone. The estimated soil depth of the site is 1-3 meters, deeper on the western half of the plateau. This is **unsuitable** for high-yield farming but good conditions for adding a biodiverse pond.

Figure 9.10
Site analysis diagrams.

SITE ANALYSIS - THE OUTER RIM

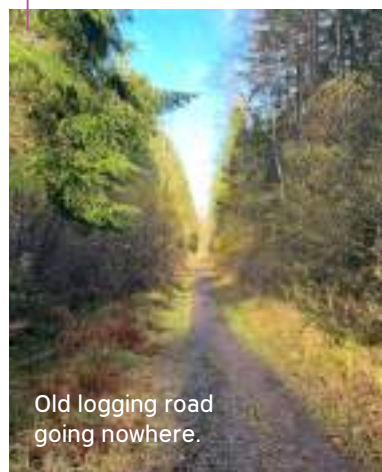
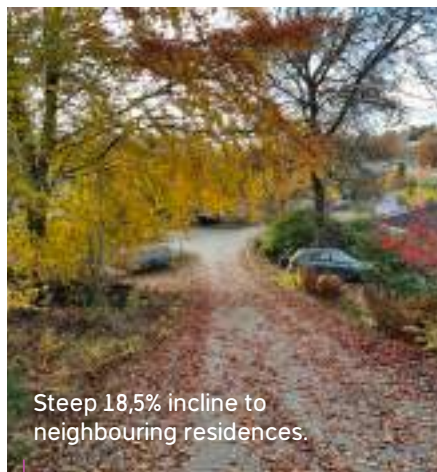


Figure 9.11
Photos showing the ubiquitous single-family housing among nature of high recreational value.

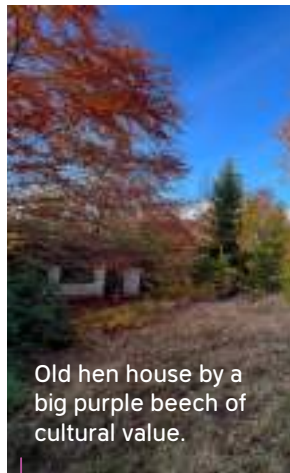
SITE ANALYSIS - THE PLATEAU



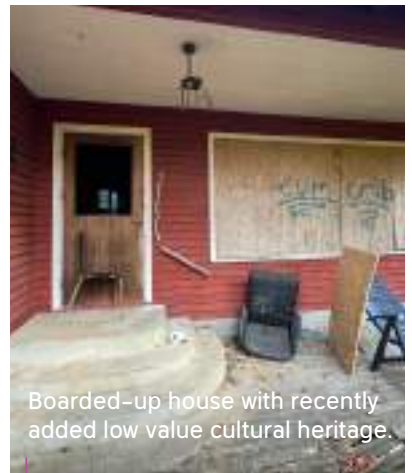
Dense mixed forest.



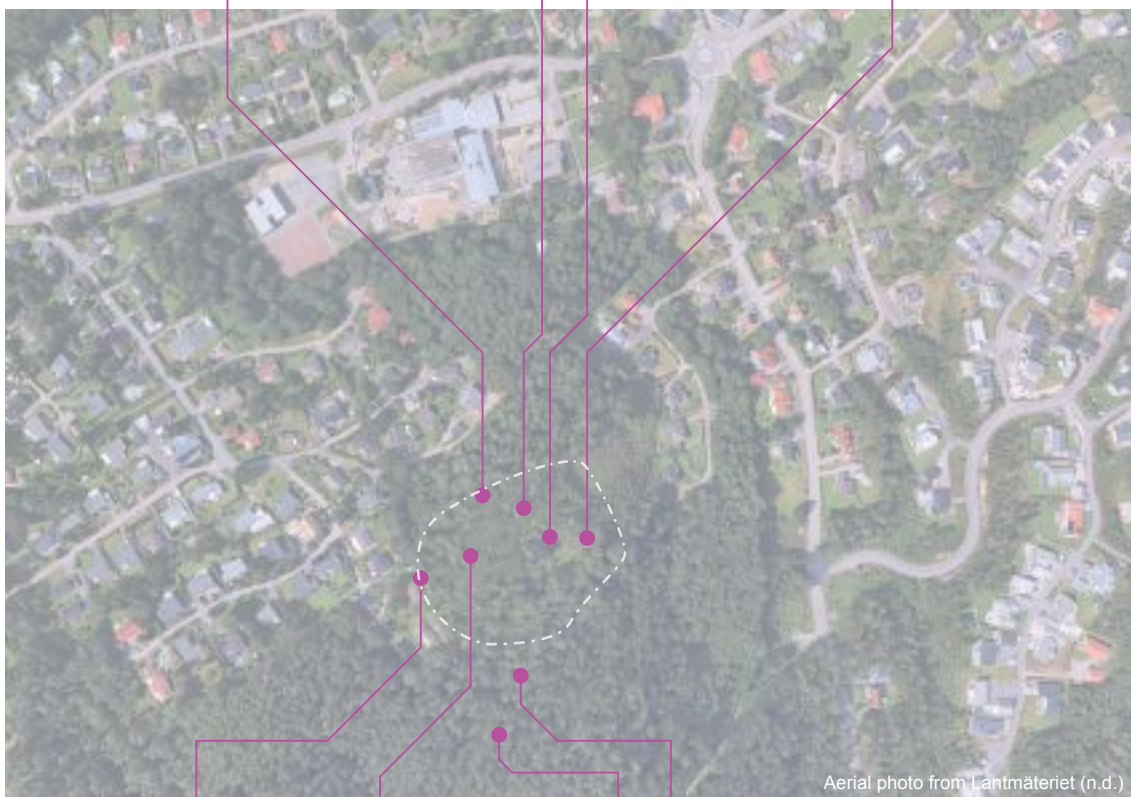
A big (> 2 tonnes?) glacial erratic rock.



Old hen house by a big purple beech of cultural value.



Boarded-up house with recently added low value cultural heritage.



Aerial photo from Lantmäteriet (n.d.)



A strip of healthy deciduous trees.



Thickets of young birch.



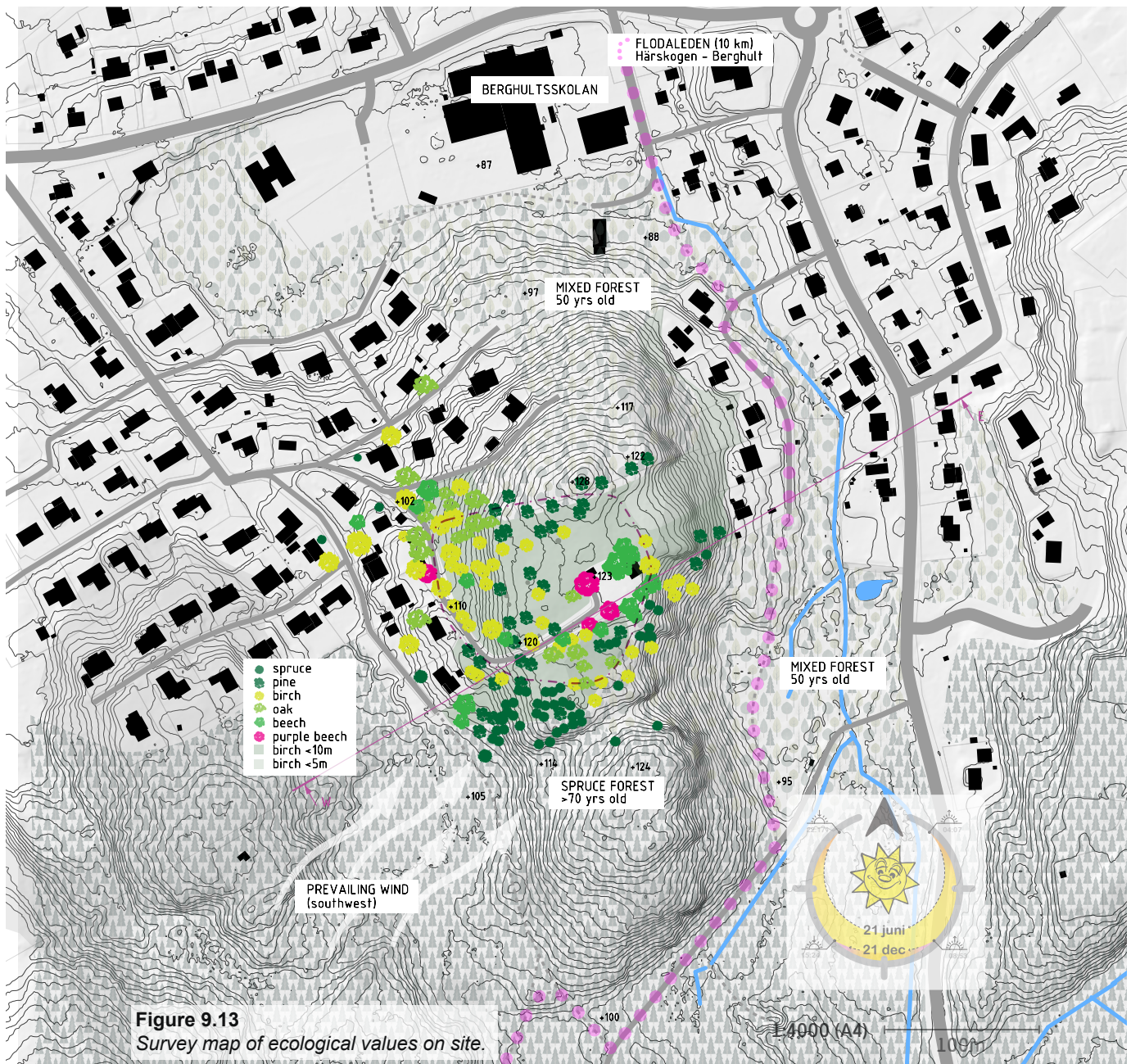
Thickets of older spruce.



Open coniferous forest on sloping rocky grounds.

Figure 9.12
Site photos showing qualities of nature and culture. Both are of very varying value.

SITE ANALYSIS - VEGETATION SURVEY



Vegetation Survey

I spent quite a lot of time on site, cataloging mainly all major trees on the site and in its surroundings. The natural values are as expected in an area that was cleared about 15 years ago. Notable exceptions are where the previous property owner took up residence – first in a small shack to the west and later in a house (built in 1961) on the eastern edge of the plateau – where he planted purple beech and lots of rhododendron. His tiny 5 m² pond built out of concrete is since long cracked and devoid of water and life.

The big **purple beech** is especially worthy of preservation due to its value of **cultural heritage value** and as a **landscape asset**.

Narrative, PART V:

After months of research and planning, Liam, Vera and their future neighbours are thrilled to dig into the site preparation.



SITE ANALYSIS - SECTION



Figure 9.14
Site Section (see Figure 9.13) from west to east, showing the qualities of the current dwelling.

Site Section

The elevated placement of the only house current on the plateau tells the story of a hermit that appreciated the extensive **view of the sunrise** as well as rays of sun on his western porch long into the evenings. I am certainly biased but life on the plateau is literally brighter than in the shaded valley to the east.

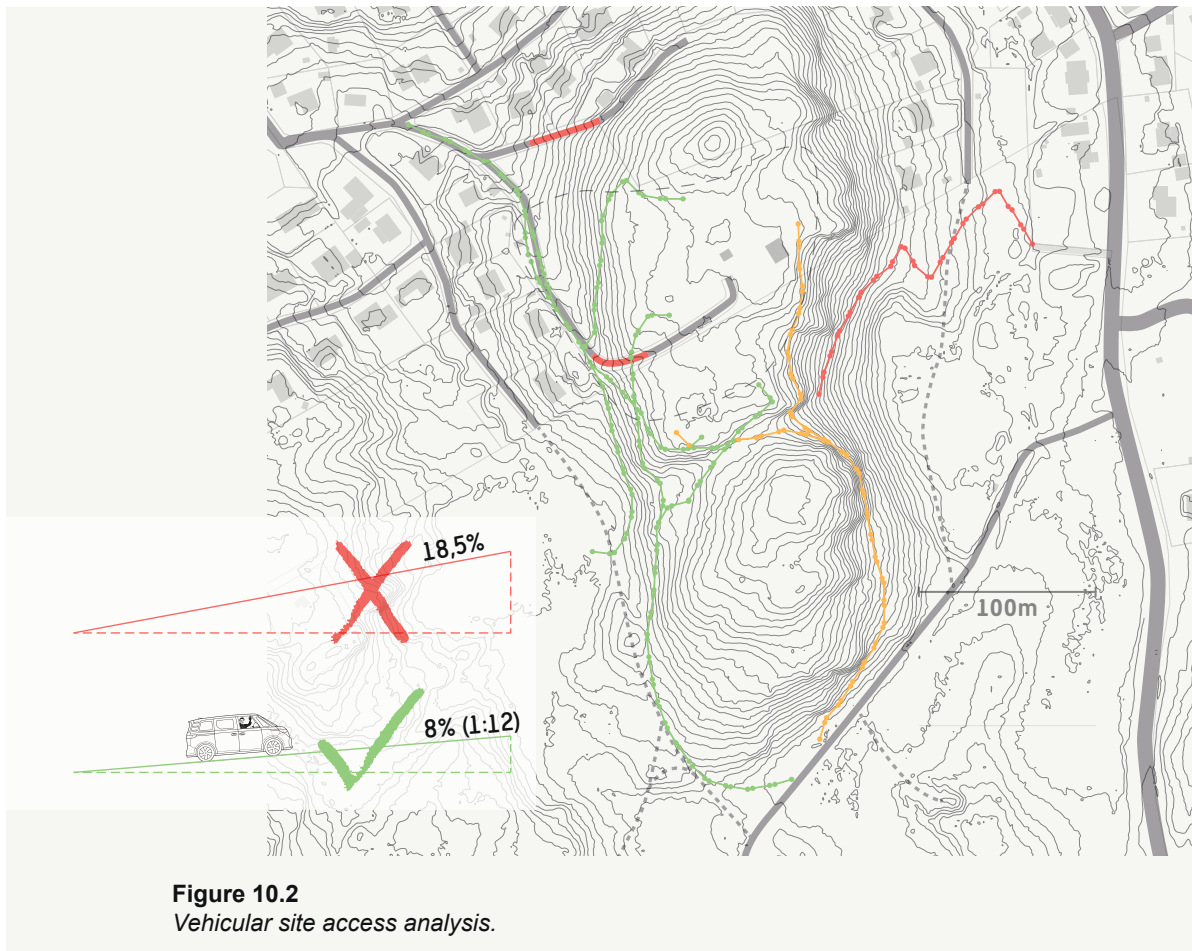
The section implies that it is very hard to build anything on the eastern slope. The western slope is easier to build on but more suitable for rows of linked houses, where it would be hard to achieve equivalent connections to a common social hub. On the other hand, the western slope offers better connections to the existing neighborhood, which is generally a feature of integration to strive for. This is especially true for an ecovillage, which in today's public discourse risk being seen as a socially isolated island for non-conformist people. However, sacrificing social qualities and building on a more challenging site than the plateau, simply to convince a few neighbors of the inevitable transition we must undergo, seems an unreasonable priority to make.



Figure 10.1
Bird's eye view of Tråhögden ecovillage in a 1:300 presentation model.

Site-Specific Response

After the initial broad analysis, the design research moves into a more detailed phase, where local rules, site conditions, and selected design principles dictate my choices. Figure 10.1 illustrates a spoiler of the response from the following pages.



Vehicular Site Access

There are many theoretically possible ways to access the plateau, using a maximum of 8% incline which is the recommended maximum for permanent housing in Lerum municipality. But only a couple of routings are practically feasible. Preferably, an access point to Hagåsvägen (in the east) should be arranged, since a cul-de-sac (only one access from the west) is potentially a problem in emergency situations.

The plateaued precambrian solid rock hills of west Sweden are generally accessible by building roads in this way, meandering upwards.

Design Principles

Like many like-minded designers, I chose to work according to permaculture principles. They provide a proven holistic framework for creating systems that fosters both **earth care** and **people care**. David Holmgren formulated 12 Design Principles in 2002. A subset of 7 of these are selected – the ones that feel most relevant for my site (Figure 10.3). I use these principles to act as thinking tools for my design research.

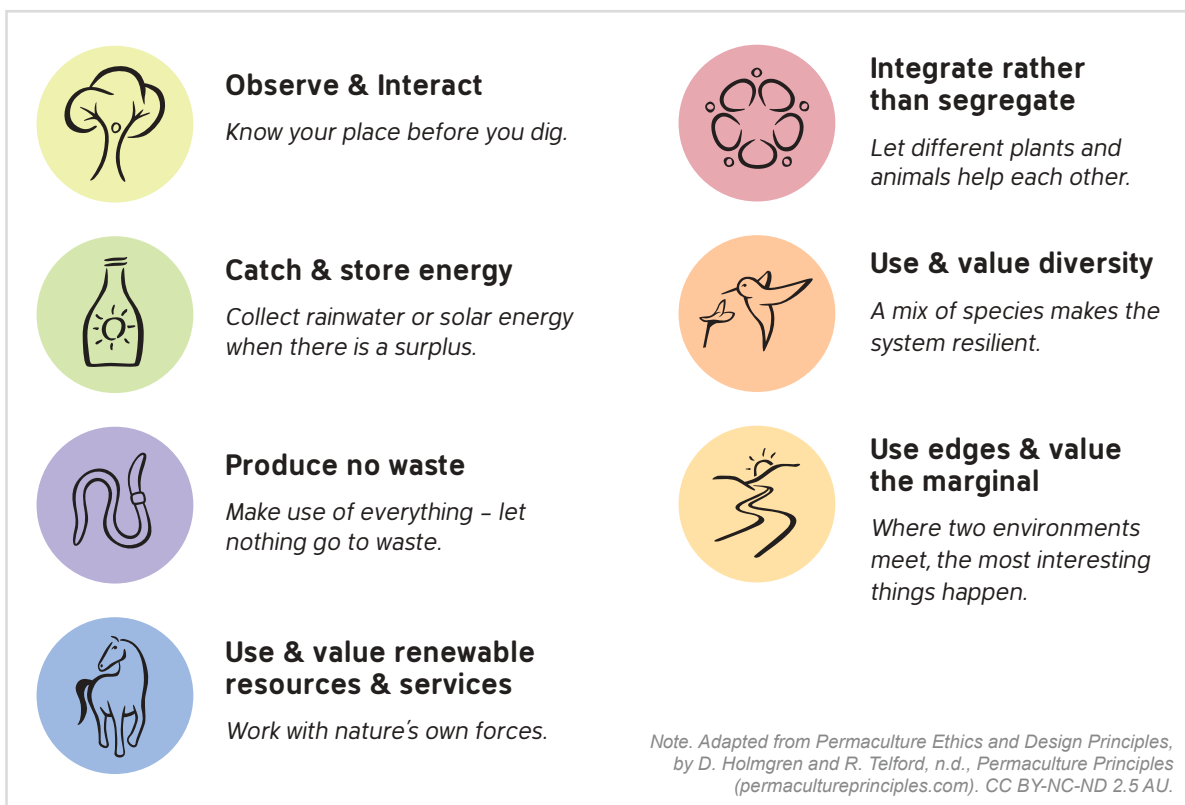


Figure 10.3
Selected Permaculture Ethics and Design Principles

ZONING

Permaculture zones are a design tool used to organize a property based on efficiency of movement and frequency of use. The Northwestern corner of the plateau has the highest architectural qualities and is therefore the place to put the common house. This placement also makes for a strong entrance to the area, naturally gathering **residents as well as visitors**. See Figure 10.4.

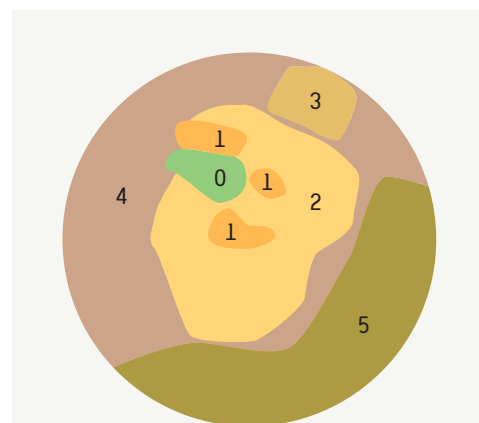


Figure 10.4
Site permaculture Zones.

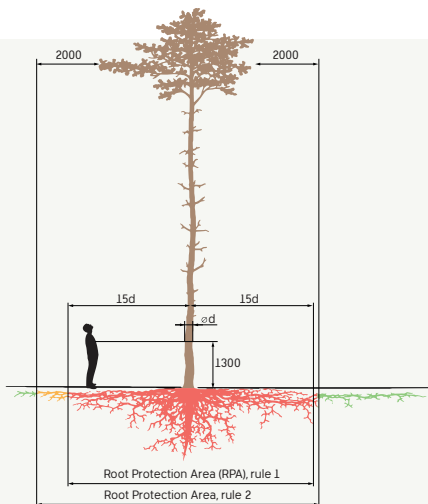


Figure 10.5
Root protection rules.

Tree Care



Protecting as many as possible of the existing trees is important in this project. Established **root protection area calculations** lead the way to how close to the trunk you may disturb the ground (see Figure 10.5).

In my design, about 25 trees need to be felled and 5 are at risk. The only tree given absolute priority over **people care** is the purple beech.



Figure 10.6
A feasible frugal design of the subordinated and off-set parking area.

Parking



The parking policy of Lerum municipality aim to “support and encourage sustainable car use from ecological, economic, and social perspectives and facilitate and encourage the use of public transport and cycling”. **Car pooling** is encouraged. Thus, a **parking ratio** of close to 1 space per dwelling is assumed acceptable. Roughly 5% of parking should be made more accessible according to praxis so a 2–3 places are available on the plateau.

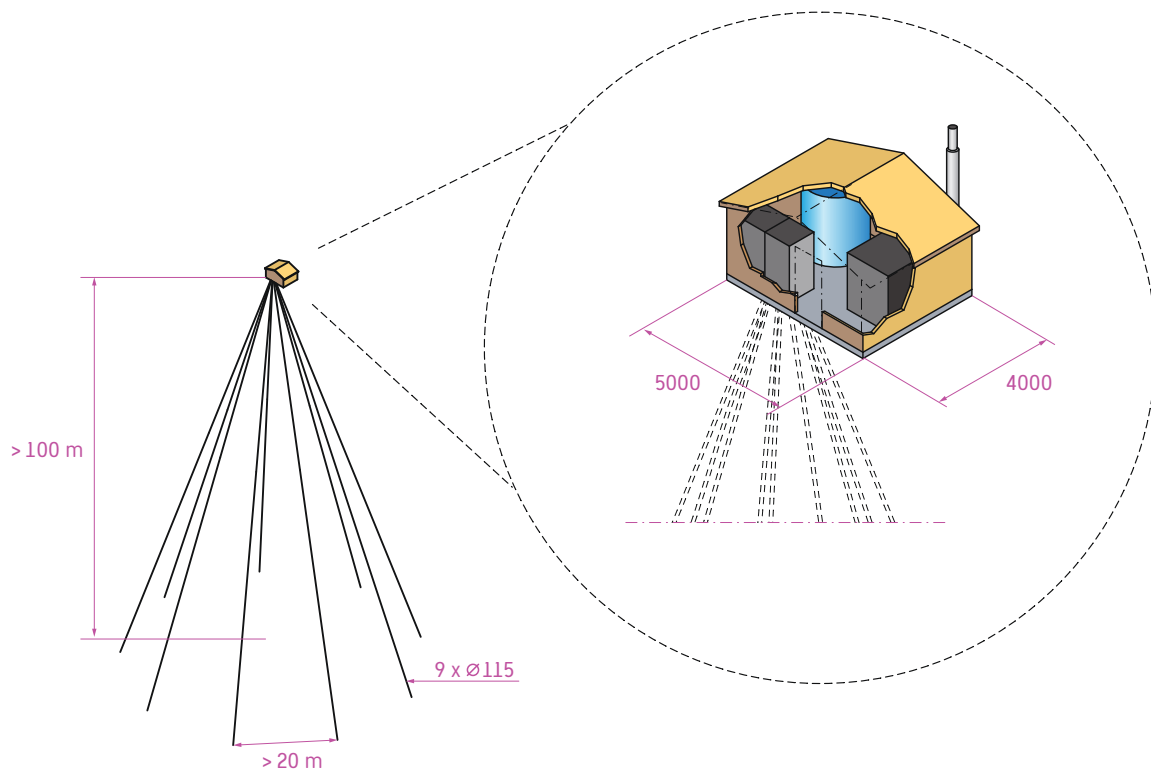


Figure 10.7
A resilient setup for communal heating of the village.

Proposal for Heating

Geothermal heating is the most cost and energy efficient solution, in the longer run. The site has a very shallow layer of soil (2–3 m) which allows for unusually short steel casing pipes (used before reaching the bedrock). The setup consists of 2 geothermal heat pumps (used interchangeably and/or as backup) connected two 9 holes, drilled at an angle and to a depth of 100–150 m. A 5 000 liter heat buffer tank store water for space heating and hot water. As an **emergency backup**, a 75 kW wood boiler is also installed.

This setup, including both space heating and domestic hot water, is estimated at using 35,000–45,000 kWh per year. Thus, each household would use roughly 1,000–1,300 kWh of electricity annually for all their heating and hot water needs, costing approximately 1,500–2,000 SEK per year, which is **less than a tenth of the typical cost**.

This heating solution would improve the result of the previous energy calculations even further.

DESIGN SYNTHESIS - PROGRAMS

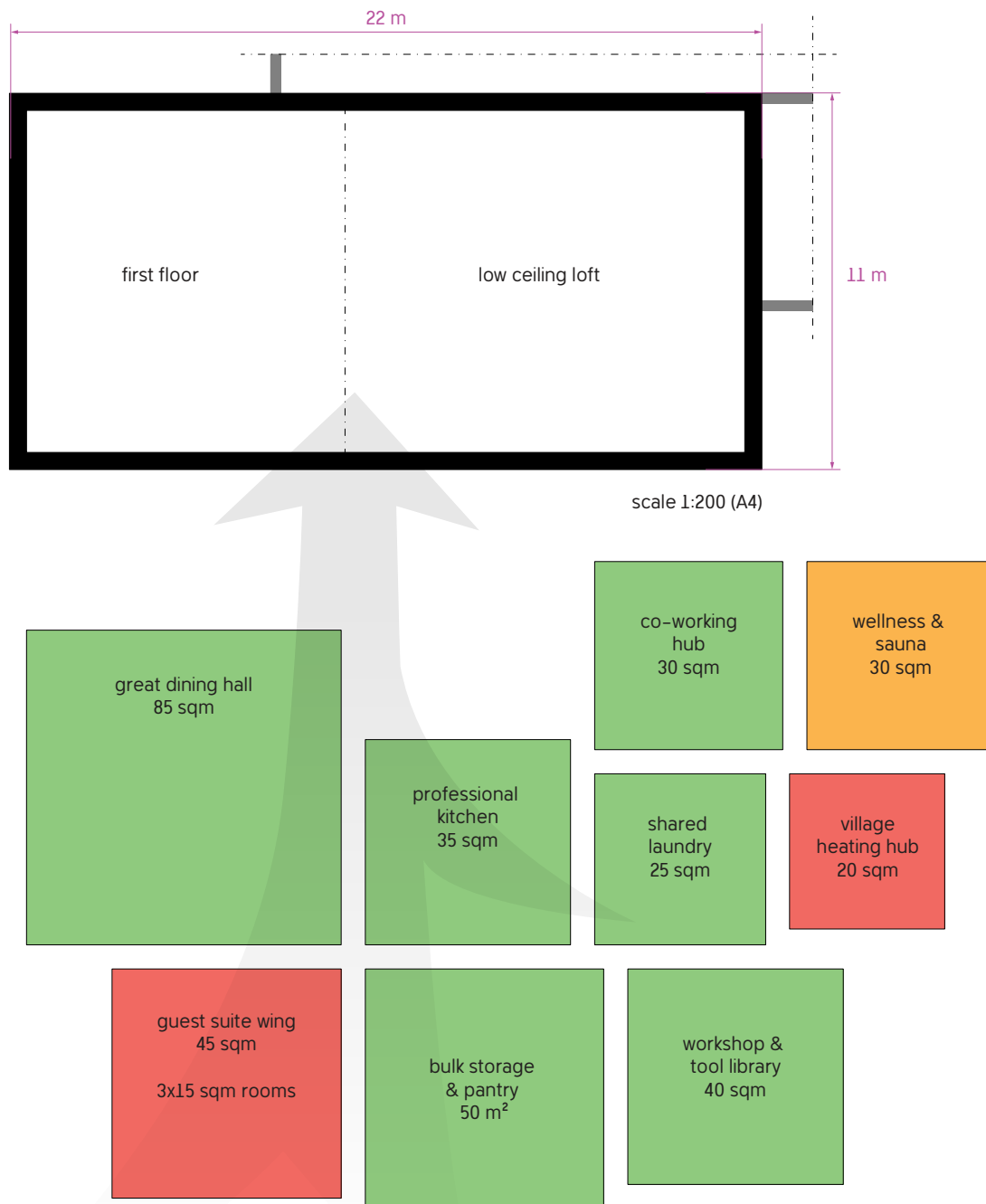


Figure 10.8
Common hub program, approximate areas

Common Hub program



By sharing functions in a common house, living efficiency is boosted (along with social sustainability). The space of the common functions vary a lot but is typically 10–15% of the total residence area in an ecovillage (McCamant & Durrett, 2011; Kollektivhus NU. (n.d.). My village has about 34 dwellings and the mean area of those result in a proposed program like the one in Figure 10.8. The specific design is beyond the scope of this thesis. This village (with its common house) eliminate about 520 m² of construction and heated volume compared to standard Swedish 115 m² row houses.

Narrative, PART VI:



The project, as well as Vera and Liam's relationship, is far from smooth sailing. But unlike other couples, they push on.

DESIGN ITERATIONS

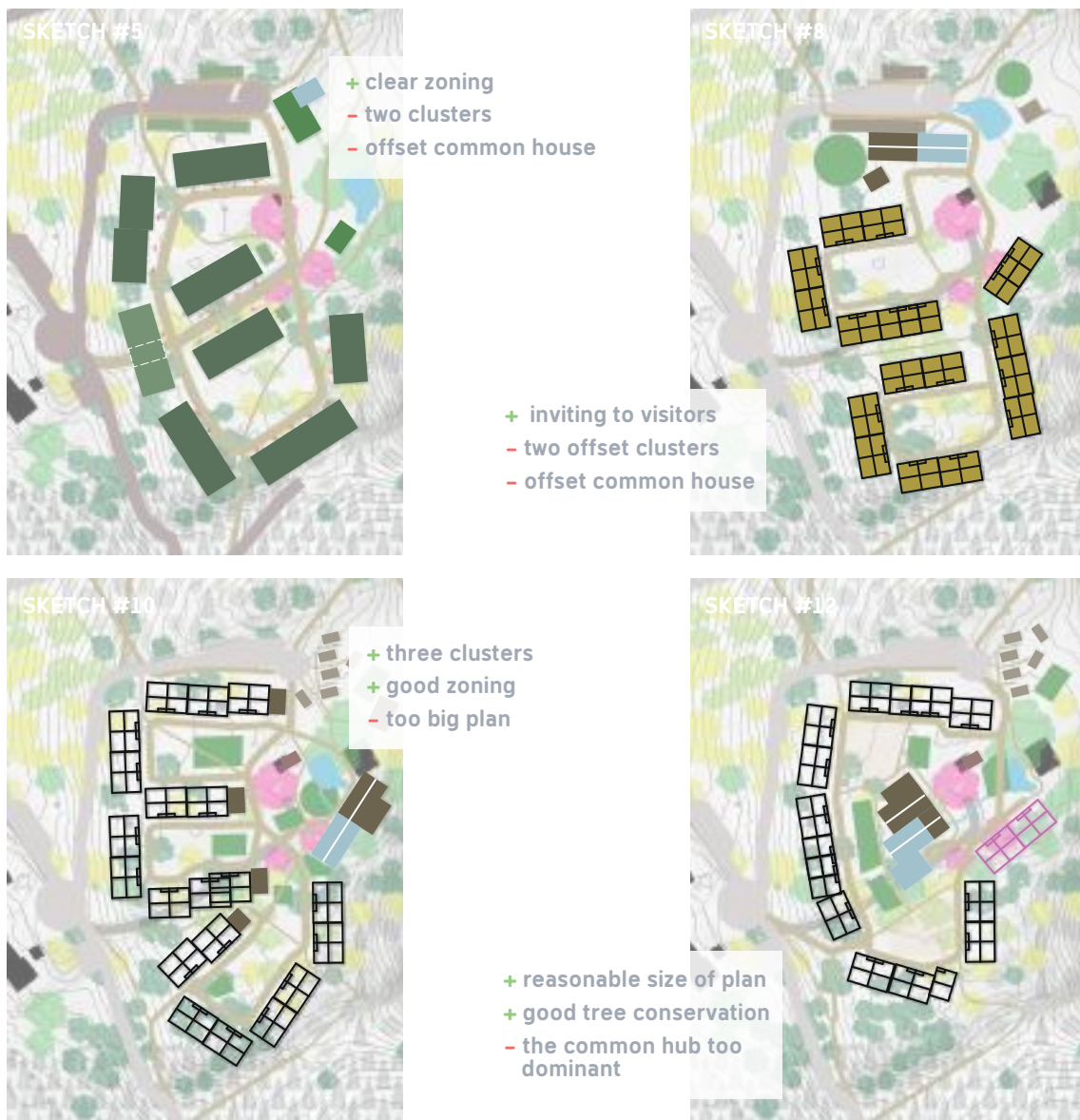


Figure 10.9
Early master plan sketches of questionable qualities.

Discarded Design Paths

Based on my research and findings, a multitude of sketches was produced in order to find a good solution for my site. For example, a village structure of three clusters along a central path (as seen in Fridlev bofællesskab) was massaged for a long time but ultimately abandoned in favor of keeping more of the noble hardwood trees and having a better connection to common functions for all residents.

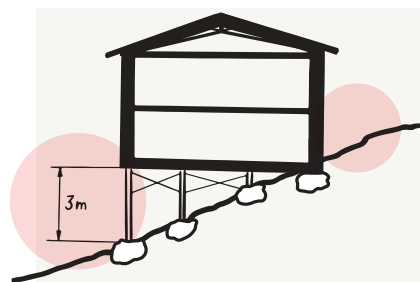
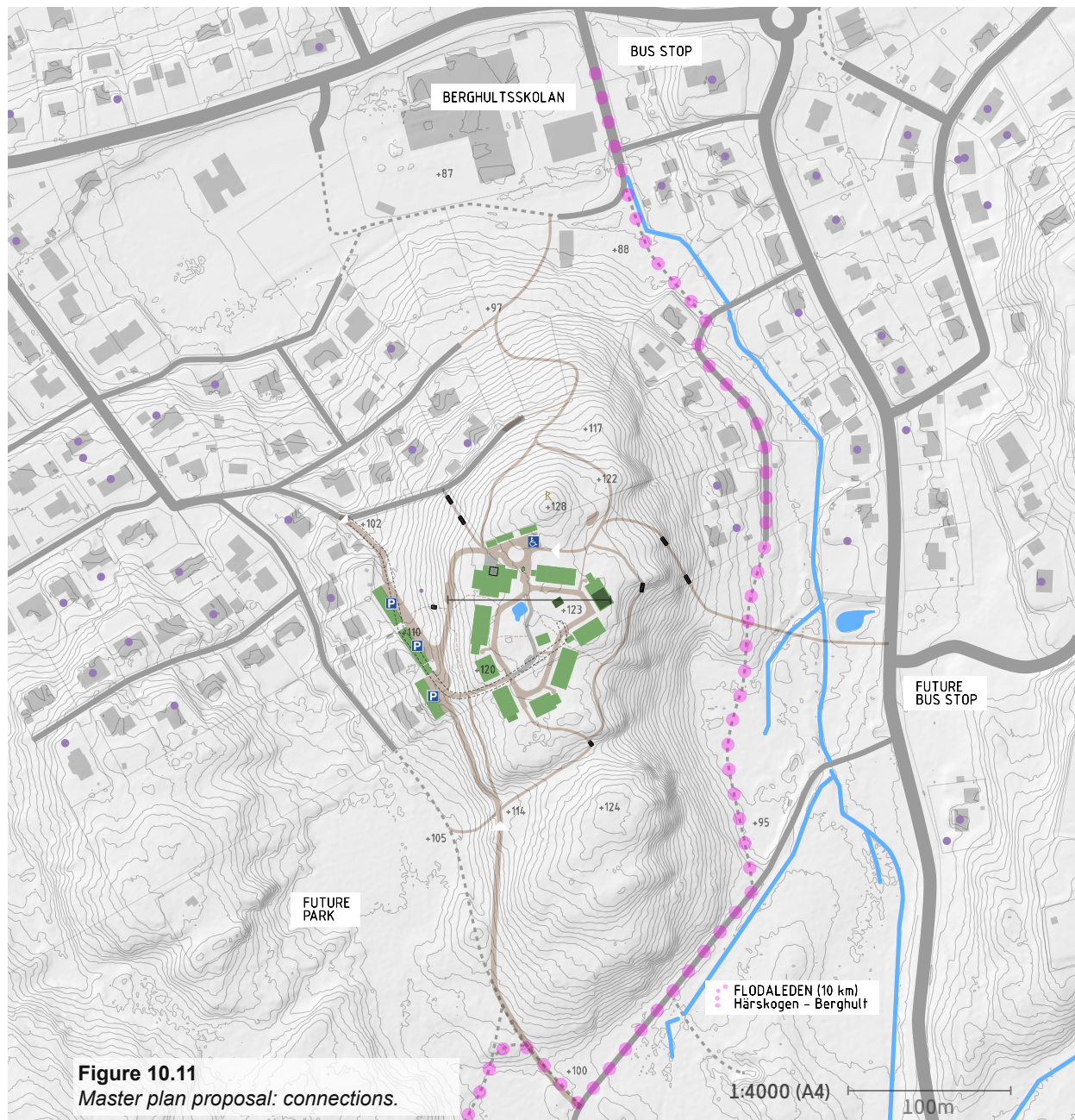


Figure 10.10
Building on the brow of the hill proved problematic.



Master Plan

Figure 10.11 to 10.15 describe my final proposal for the site. New **gravel paths** connect the village to the public services in the north and to the planned new bus stop in the east. Cars are generally kept out of the village. A connection to the major road in the east would enable a second entrance for cars. The plot ratio of the site is 0,19 which is lower than the 0,3 proposed by the municipality. The **green parking ratio** is 1,0. The residents get equal, but naturally differing, architectural values. Entrances face the shared paths with clear lines of sight to the high-quality common functions gathered in and around the common house, see Figure 10.12 to 10.14.



- berry bush
- fruit tree
- drilled well
- wild bee habitat
- 2. bike parking
- 3. charging shed
- 4. entrance art (on existing boulder)
- 5. cluster mailbox
- 6. honesty stall (bread / eggs / crafts)
- 7. open-air summer cinema
- 8. playground
- 9. water play
- 10. amphibian pond (+ ice skating)
- 11. play path (recycled asphalt)
- 12. trampoline (professional quality)
- 13. tree house
- 14. climbing wall
- 15. kitchen + laundry w.view of playground
- 16. dining hall (with sunset view)
- 17. a nice place for a barbeque
- 18. allotment farming
- 19. green house (earth-sheltered)
- 20. hen house (renovated)
- 21. outdoor gym
- 22. fitness trail (600m)
- 23. mini ramp
- 24. ball court
- 25. sauna
- 26. wood-fired hot tub
- 27. wood-splitting station
- 28. workshop
- 29. village heating hub
- 30. handcart parking lot
- 31. emergency access path
- 32. resource recovery station
- 33. service turnaround
- 34. car pool / parking lot (see Figure 10.6)
- 35. accessible parking lot

Figure 10.12
Master plan proposal: detailed

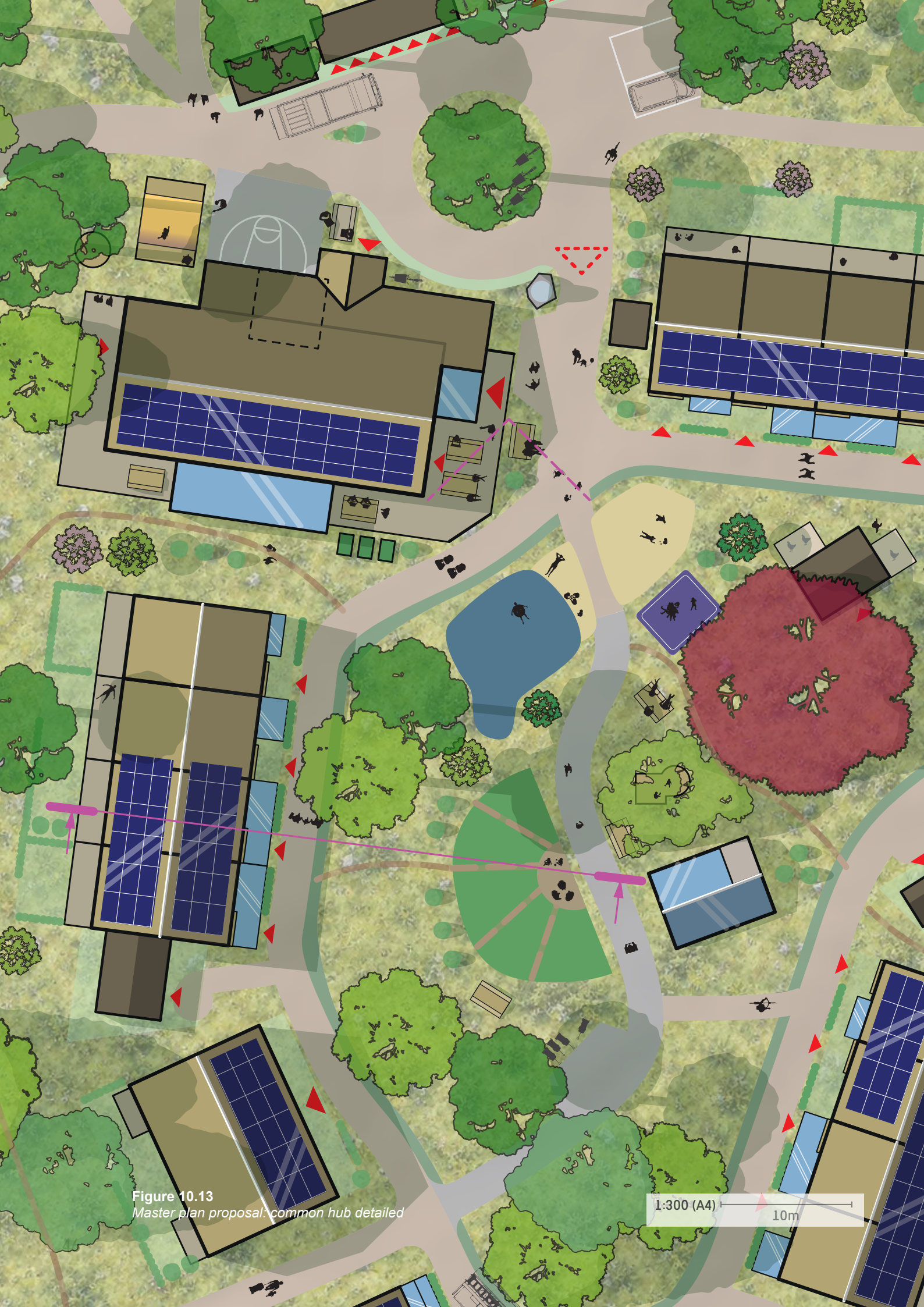


Figure 10.13
Master plan proposal: common hub detailed

1:300 (A4) 10m

DESIGN SYNTHESIS - SECTION

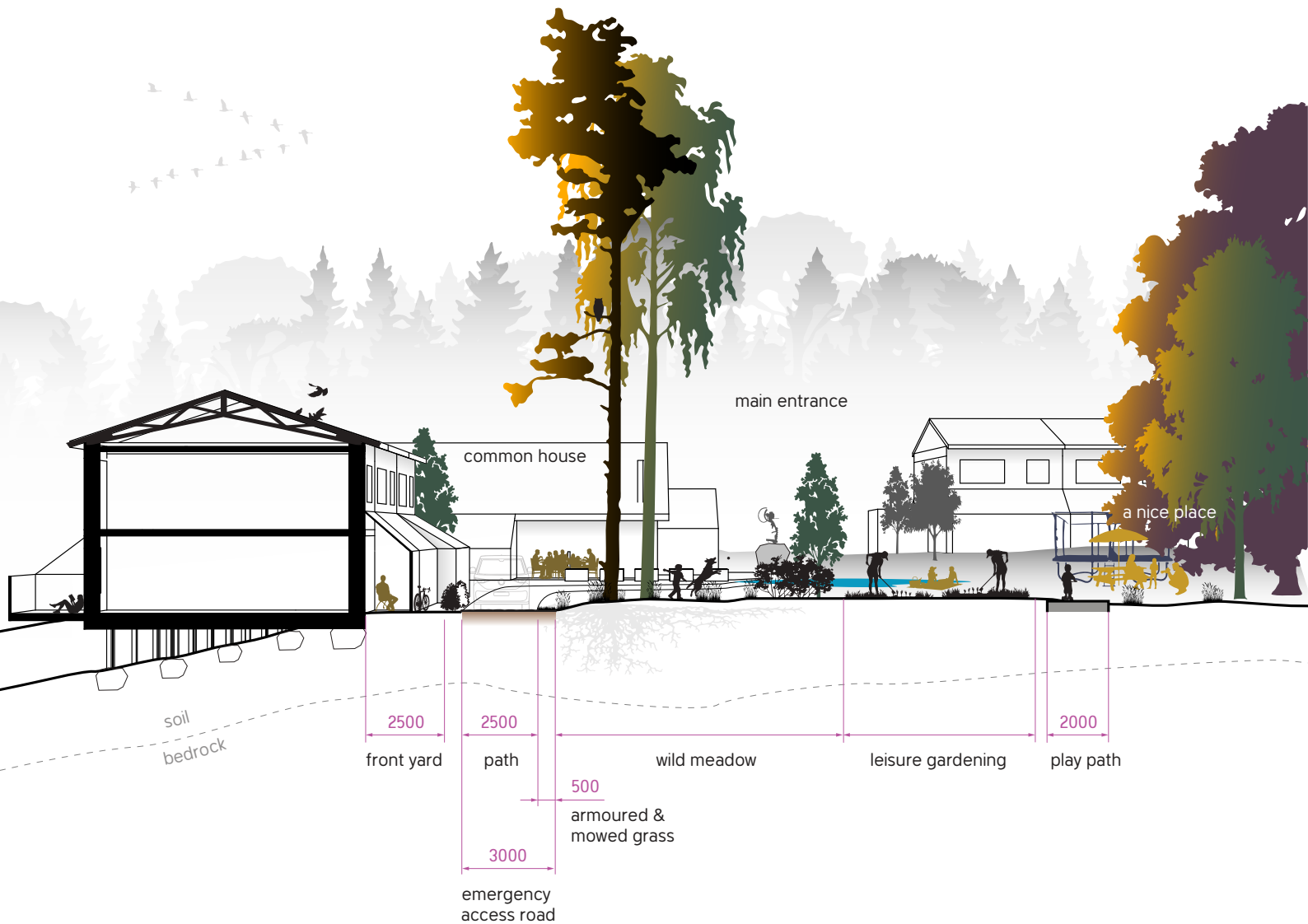


Figure 10.14

A section from west to east (see Figure 10.12), showing some of the qualities for residents and visitors.

The Social Section

Common functions (and their social qualities) are gathered in the vicinity of the common house. The purple beech shelters a nice place to enjoy the last rays of the sun.

The semi-private front yard of the row houses are kept small to increase social interaction. The optional glazed vestibule can be of various sizes, depending on priority of the resident. The section also shows the private balcony area, a very important feature in communal living.

Cars are kept out of the village but may on occasion access the dwellings. A small section of armoured (by natural stone) and mowed grass paving function both as a visual framing for the wild meadow and as load bearer for emergency vehicles. The central path consists of biogenic asphalt pavement to function well for kids and their tiny-wheeled rides.

DESIGN SYNTHESIS - RENDERINGS



Figure 10.15

Dad's eye view from the deck outside the common house entrance. "Ungar, kom in och ät!"



Figure 10.16

View from the common house deck, summer edition.

Energy Use Potential

The total community surplus (if they use geothermal energy) is around 42 000 kWh per year, roughly equivalent to the total annual electricity consumption of 10 to 12 average non-passive homes.

Energy storage in some form (usually batteries) could also be installed. These would primarily be used to run common functions in case of regional power failure but could potentially also help balance the regional grid. Thanks to **green technology tax advantages**, depending on future political will, the community could potentially access up to 3.5 million SEK in tax breaks for a large-scale installation.

Economic Potential

On the preceding note, if the same socioeconomic arrangement as in the praised Hedgehog Housing Co-op (see Appendix C) were applied to this village, where could it land?

I assume a **baugruppe** (a self-build group) that are able to lower the cost of work hours, using **sweat equity**, by 70 % and the land owner setting up a non-profit, long-time **leasehold** (50+ years) to get loan givers on board. Residents must make a member deposit of 300 000 SEK to get this "hyreskooperativ" (**housing co-op**) started. This could potentially result in a monthly rent of 6 500 SEK per household (total cost to cover: 45 MSEK, see Appendix D).

In contrast, if the village was **developed by residents**, to more of a **turnkey project** (the land owner sells the land and contractors build it all to a turnkey state), the cost of being a member of this "bostadsrättsförening" (**tenant-owner association**) would be around 2 700 000 SEK to join plus 8 700 SEK in monthly fee (total cost to cover: 140 MSEK). This is still well below the 4,5–5,5 Mkr of a standard 110 m² Lerum row house (100% commercial profit-driven development with a 15–20% profit margin).

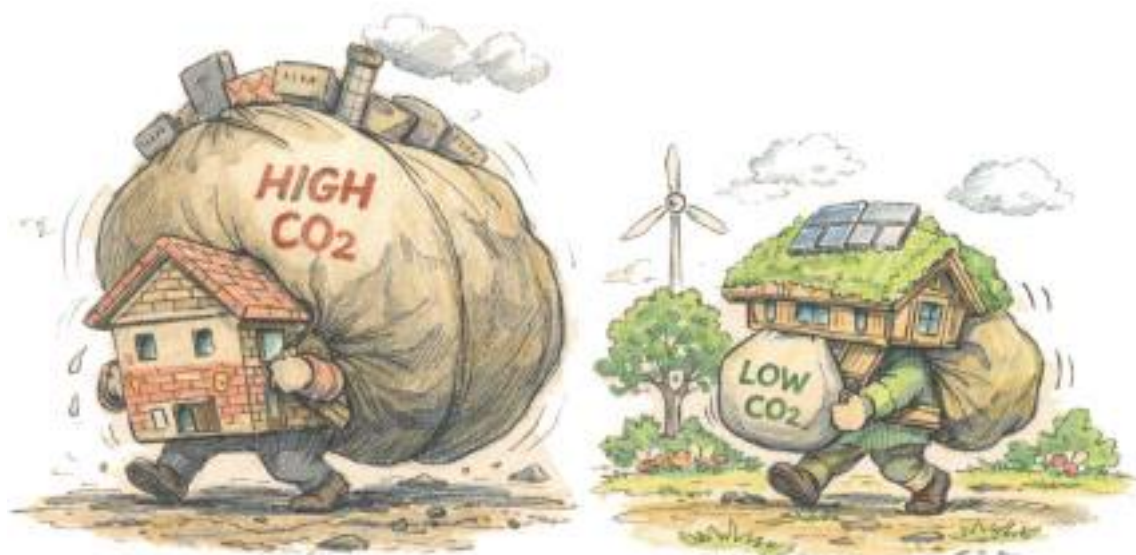


Figure 10.17

A caricatured illustration of the “carbon rucksack” of a standard house and an eco house.

Carbon Emissions Potential

A modern, “energy-efficient” house (with its praxis 10 – 20 tonnes of concrete foundation, plaster boards and mineral wool insulation) have a 50/50 split of CO₂ emissions between the construction phase and the operational phase (of 50 years). My proposed energy solution is highly efficient, thus having the construction phase responsible for 70–80% of the total carbon footprint, making that part relatively more important.

By using as much natural material as possible, I have calculated the emissions conservatively to **120 kg CO₂e/m²**, excluding solar panels etcetera (see Appendix D). This means that erecting of a row house emits **-12 tonnes of CO₂ equivalents**, about the same as what the average Swede emits in 1,5 years of daily life (or what a family of four emits when flying to Thailand or Tokyo). Steering our carbon budget away from luxury consumption to homes that will shelter generations should be an easy priority to make.

By comparison, Boverket are proposing new limits of 180 kg CO₂e/m² for new single-family homes and about 375 kg CO₂e/m² for apartment buildings, with legalization slated for 2027/2028 (Boverket, 2023).

Social Potential

Eco-villages possess significant potential for social sustainability by serving as **living laboratories** for resilience against climate change and socioeconomic stress. Strength lies in **social capital** – the shared values and connections that enable groups to work together to adapt to crises (Carmen et al., 2022).

- In an era of increasing social fragmentation, eco-villages foster deep interpersonal connections and **collective empowerment**.
- These communities act as **educational hubs**, sharing knowledge and trying out innovative low-carbon technologies.
- **Shared goals** and frequent social interactions provide a strong antidote to modern loneliness, which is increasingly linked to climate-related mental health issues.
- Pooling resources for energy, food, and housing is economical as well as giving **better preparedness for unfortunate events**.
- Opportunities for **social entrepreneurship** and vocational training, which can help address unemployment and the “meaning crisis” associated with modern work.
- **Intergenerational living** allows for better childcare and elder care, reducing family stress.

Narrative, PART VII



Due to Vera having a rough second pregnancy, the four of them are among the last to move in to Tråhöjden Bogemenskap. Finally!

SWOT ANALYSIS

STRENGTHS

- Pilot project for future societal development.
- High potential for net-positive energy and carbon sequestration.
- Shared responsibility increases motivation and the long-term sustainability of the project.
- Diverse skill sets among members.
- Strong social cohesion + high degree of self-sufficiency = resilience against threats.
- Meeting the rising internal and external demand to be part of the solution to climate change.
- Circular resource management.
- Strong value-based branding attracts motivated members and partners.

WEAKNESSES

- Limited pool of potential suppliers.
- Reliance on key individuals.
- Time-intensive decision-making to achieve group consensus..
- Higher upfront costs for geothermal heating than air-to-water heat pumps.
- Politically, a higher need for successful implementation than conventional development.

OPPORTUNITIES

- Many aspects of the project can serve as a direct inspiration for the future development of Södra Floda.
- Strengthened regional brand for the municipality.
- Could create ripple effects reaching far beyond Lerum.
- Growing demand for sustainable living.
- Access to government grants and subsidies.
- Partnerships with research institutions and/or educational workshops.

THREATS

- Difficulty securing long-term financing due to timid investors.
- Hesitancy among local stakeholders.
- Lack of skilled labor.
- Gentrification and social exclusion.
- Unforeseen international threats.

DISCUSSION



Figure 12.1
Successful living in the monomyth of Western culture.

DISCUSSION

My design research positions the **resilient ecovillage** as a strategic response to the current resistance to the large scale systemic transformation that is needed. Rather than demanding a sacrifice of comfort, the project explores how architecture can create psychological contentment and hopefully foster earth-friendly social norms through spatial configuration and suburban design. By designing for **collective resilience** – by sharing resources and lives – the proposal demonstrate that a future-resilient lifestyle is not just an ecological necessity, but a socially aspirational “good life”. The ecovillage offers a home with very low energy consumption, access to a large community center and a level of social cohesion that money simply cannot buy in a other neighbourhoods.

The residents can be from all walks of life but preferably able to contribute labor and services to the community. One argument for using a plateau for a self built ecovillage is that building groups can take on tougher plots than commercial players.

This thesis lives under the assumption that the residents have a deep climate crisis awareness, a sense of urgency and a want to emit less greenhouse gasses. Carpooling from the ecovillage to Göteborg in an electric car is highly feasible and would cut down the transportation emissions, which are usually high for residents of Floda.

DISCUSSION

New infrastructure always has high costs – in capital, hydrocarbon emissions and loss of biodiversity. Even gravel roads. I designed the village for many to share those costs but the village could be made tighter, and that way possibly achieve even higher social cohesion, given the residents suit each other well.

The costs of new production, no matter how regenerative and frugal, is of course vastly larger than the most logical solution, which is to instead distribute the living space in Sweden more equally. This is rarely discussed and would surely be political suicide today. Instead, we are currently in a state where **rebound effects** are a huge issue. That is, implemented efficiency improvements often lead to behavioral changes that partially or completely offset the intended environmental benefits. If the energy costs are lowered, why not book a flight to Barcelona? People tend to “live within your means” and thus consume more when they can. My design instead hope for a **time rebound effect** where residents are able to work less and value the time savings to promote a slower life of better human health and happiness. Automation taxes and universal basic income are paradigms that will surely play a part in the future.

As to where people want to live, the ideal that is strongly promoted today is still the busy city life. Perhaps some of my design strategies can be applicable to transform already built sprawled rural areas into denser typologies with strong social hubs, making them an attractive alternative to the rat race.



Figure 12.2
Better living through community.

CONCLUSION AND FUTURE RESEARCH

CONCLUSION

In short, I have contributed to the field of urban design by studying how to add a future-proof typology on the geology of the traditionally uninteresting plateau, which is elevated and clad in forest. I conclude that there are good arguments of sustainability to this approach, but there are probably other resources in the built environment that should be exhausted first.

FUTURE RESEARCH

ARCHITECTURE

The village would benefit from a **more diverse typology**, including single-story houses with better accessibility. That research could look for justifications of architectural qualities compared to energy loss. The phases of the actual building of a village in a forest is also interesting. Human scale systems **designed for disassembly** could also be studied. Another challenge is designing for **voluntary simplicity**, which is almost impossible to force within a market economy.

FOOD PRODUCTION

Local food production, a vital part of permaculture, is largely excluded from this project. Like moral philosopher Peter Singer, I believe in the idea of using high-tech solutions to replace industrial agriculture. I imagine a small factory, within e-biking distance of Tråhöjden, comprised of sunken green houses where you grow and farm nutrients from hyper-efficient plants (like the **amazing protein source duckweed** that is largely unknown to Western culture). Plateaus could also make an excellent place for such farms.

TECHNICAL OPTIMIZATION

Climate calculations can be refined further. Additional features to account for include **culverted ventilation** (reducing heating in winter and adding cooling in summer), low-voltage systems (for household electricity), **heat exchange of hot water** (from showers and appliances), and **local management of human waste** by urine diversion.

FUTURE RESEARCH AND REFLECTION

SOCIAL SCIENCE

How to assemble functioning groups for self-building communities in challenging topography and what is the group psychology of such a building process.

ETHICS

Sweden is one of the countries thought to be least negatively affected by future climate change, at least for an interim period. As a country that built its wealth on the Industrial Revolution (and selfishly covering away from war), **Sweden has a moral debt**. Planning for social typologies that welcome climate refugees would be turning net-zero talk into a first step of action that actually make a difference.

LEGAL

How can a legally binding **restoration plan** be made? Could a plan specify the percent of organic materials, energy use, prohibit soil sealing etcetera. Can bylaws create a residential area with a “best-before date” – a temporary settlement awaiting to be reclaimed by nature.

A FINAL REFLECTION

In the words of Stefan Lundin of White Architects: “*Architecture is difficult.*” I totally agree. Yet, designing homes that are better for the future than what is being produced today is not. However, my main take-away from this project is this: **Regenerative design may feel like an illusion in a degenerative system. But enough seeds will grow a forest.**

// dB

REFERENCES

- Ala-Mantila, S., Heinonen, J., & Junnila, S. (2013). *Greenhouse gas implications of urban sprawl in the Helsinki metropolitan area*. *Sustainability*, 5(10), 4461–4478. <https://doi.org/10.3390/su5104461>
- Andre, P., Boneva, T., Chopra, F., & Falk, A. (2024). *Globally representative evidence on the actual and perceived support for climate action*. *Nature Climate Change*. <https://doi.org/10.1038/s41558-024-01925-3>
- Boverket. (n.d.). *Framkomlighet för uttryckningsfordon på tomter och till byggnader*. <https://www.boverket.se/sv/PBL-kunskapsbanken/regler-om-byggande/krav-pa-byggnadsverk-tomter-mm/krav-pa-tomter/brand/>
- Boverket. (2023). *Gränsvärde för byggnaders klimatpåverkan och en utökad klimatdeklaration*. Boverket. <https://www.boverket.se/>
- Boverket. (2022). *Så vill vi bo – En studie av bostadsprefereenser i Sverige*. Boverket.
- Boverket. (2024). *Ungdomar och unga vuxna på bostadsmarknaden*. <https://www.boverket.se/sv/kommunernas-bostadsforsorjning/analys-bostadsbehov/bostadsbehov/kommunalt-planeringsansvar/>
- Carmen, E., Fazey, I., Ross, H., Bedinger, M., Smith, F. M., Prager, K., McClymont, K., & Morrison, D. (2022). Building community resilience in a context of climate change: The role of social capital. *Ambio*, 51(6), 1371–1387. <https://doi.org/10.1007/s13280-021-01678-9>
- Centola, D., Becker, J., Brackbill, D., & Baronchelli, A. (2018). *Experimental evidence for tipping points in social convention*. *Science*, 360(6393), 1116–1119. <https://doi.org/10.1126/science.aas8827>
- Dunbar, R. I. M. (1992). *Neocortex size as a constraint on group size in primates*. *Journal of Human Evolution*, 22(6), 469–493. [https://doi.org/10.1016/0047-2484\(92\)90081-J](https://doi.org/10.1016/0047-2484(92)90081-J)
- Gehl, J. (2010). *Cities for people*. Island Press.
- Haraldsson, H. V., Ranhagen, U., & Sverdrup, H. (2001). *Is eco-living more sustainable than conventional living? Comparing sustainability performances between two townships in Southern Sweden*. *Journal of Environmental Planning and Management*, 44(5), 663–679. <https://doi.org/10.1080/09640560120079966>
- Hawkes, J. (2001). *The fourth pillar of sustainability: Culture's essential role in public planning*. Common Ground Publishing.
- International Energy Agency. (2023). *World energy outlook 2023*. IEA.
- Intergovernmental Panel on Climate Change. (2022a). *Climate change 2022: Impacts, adaptation and vulnerability*. Cambridge University Press.
- Intergovernmental Panel on Climate Change. (2022b). *Climate change 2022: Mitigation of climate change* (Working Group III contribution to the Sixth Assessment Report). Cambridge University Press.
- Intergovernmental Panel on Climate Change. (2023). *Climate change 2023: Synthesis report*. IPCC.
- Kollektivhus NU. (n.d.). *Gemensamhetslokaler i kollektivhus*. <https://www.kollektivhus.nu>
- Lyle, J. T. (1994). *Regenerative design for sustainable development*. John Wiley & Sons.
- Lomma kommun. (n.d.). *Konsekvensbeskrivning Lomma hamn*. <https://lomma.se>
- McCamant, K., & Durrett, C. (1994). *Cohousing: A contemporary approach to housing ourselves*. Ten Speed Press.
- McCamant, K., & Durrett, C. (2011). *Creating cohousing: Building sustainable communities* (rev. ed.). New Society Publishers.
- Murphy, T. W., Jr. (2022). *Limits to economic growth*. *Nature Physics*, 18(8), 844–847. <https://doi.org/10.1038/s41567-022-01652-6>
- Nejst Jensen, C., Kirstein, T., Ryding, E., & Vedel-Petersen, F. (1971). *Tæt-lav – en boligform: Bo-miljøundersøgelse i 11 bebyggelser. Studie af beboerreaktioner*. SBI forlag.
- Nordström, N. (2022, October 11). *Djingis Khans hemlighet. Arkitekten*. <https://arkitekten.se/reportage/djingis-khans-hemlighet/>
- Pew Research Center. (2021). *In response to climate change, citizens in advanced economies are willing to alter how they live and work*. [pewresearch.org](https://www.pewresearch.org)
- Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. Simon & Schuster.
- Schneider, M., Romer, M., Tschudin, M., & Bolio, H. (2011). Sustainable cement production—present and future. *Journal of Cleaner Production*, 19(2–3), 103–112.
- Sandstrom, G. M., & Dunn, E. W. (2014). Social interactions and well-being: The surprising power of weak ties. *Personality and Social Psychology Bulletin*, 40(7), 910–922. <https://doi.org/10.1177/0146167214529799>
- Statistiska centralbyrån. (n.d.). *Bostadsbestånd i Sverige* [Interactive data visualization]. <https://experience.arcgis.com/>
- Sveriges geologiska undersökning. (n.d.). *Jordarter 1:25 000–1:100 000* [Dataset]. Retrieved May 6, 2026, from <https://apps.sgu.se/kartvisare/>
- Turner, J. F. C. (1976). *Housing by people: Towards autonomy in building environments*. Marion Boyars.
- United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. United Nations.
- Vestbro, D. U. (2010). *Living together—Cohousing ideas and realities around the world*. Proceedings of the International Collaborative Housing Conference.
- Wilson, E. O. (1984). *Biophilia*. Harvard University Press.
- Xu, C., Kohler, T. A., Lenton, T. M., Svenning, J.-C., & Scheffer, M. (2020). Future of the human climate niche. *Proceedings of the National Academy of Sciences*, 117(21), 11350–11355. <https://doi.org/10.1073/pnas.1910114117>

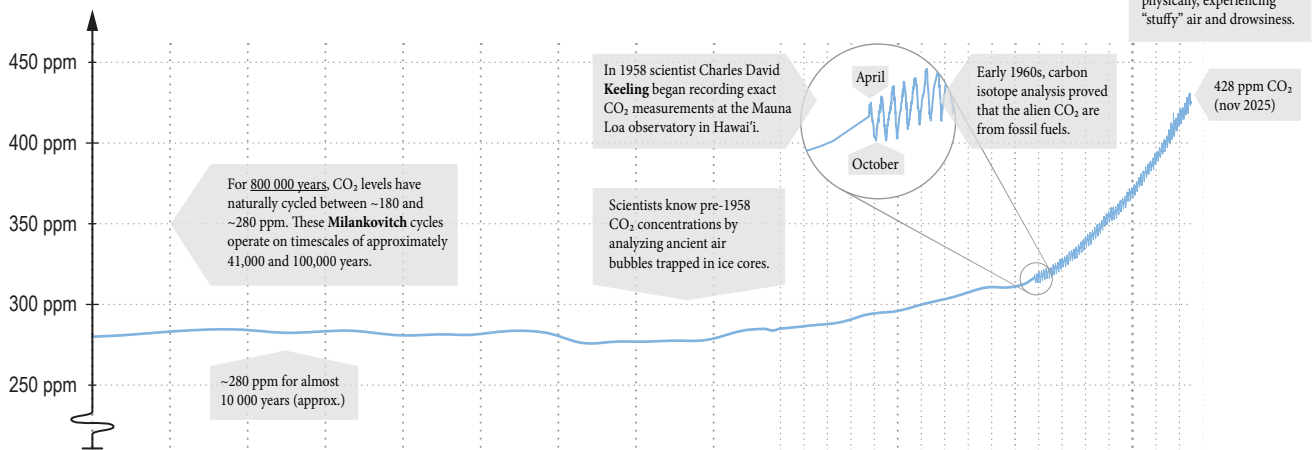
APPENDIX A - Biogeochemistry of CO₂

FUTURE FRIDAYS

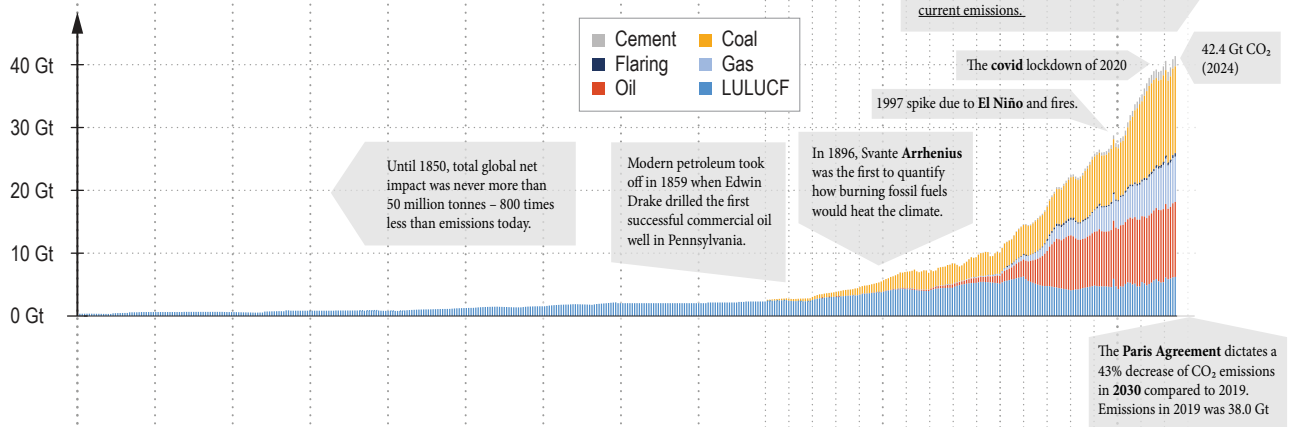
Diagrams constructed using data from Intergovernmental Panel on Climate Change (IPCC), Potsdam Institute for Climate Impact Research (PIK), Joint Research Centre (JRC) and a mean of the HYDE, KK10 and Pongratz data.

A comprehensive introduction to the scientific facts of fossil fuel combustion in the anthropocene

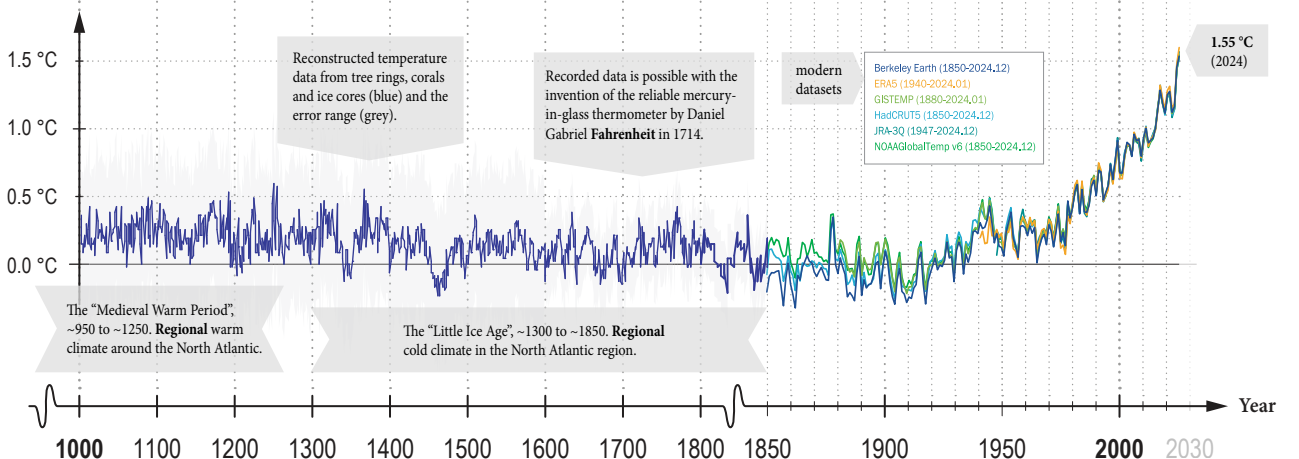
Global CO₂ levels [Parts/molecules per million of air molecules]



CO₂ emissions caused by humans, sources [Gigatonnes per Year]



Global mean temperature [°C] (difference from 1850-1900 average)



APPENDIX B - Insights into the Paradox of Progress



Your system ran into a problem and needs to restart.

Let us start small with the **Fermi paradox**. It is the riddle of the contradiction between the high statistical probability that extraterrestrial civilisations exist and the total lack of evidence that we have ever encountered them. One solution proposed by scientists and philosophers is **The Great Filter**. Its answer entails that there is a nearly insurmountable barrier in the development of life that prevents civilisations from reaching an interstellar stage. This filter could be behind us (life is rare) or ahead of us – civilisations always destroy themselves. Advanced Human civilisation have already fallen on several occasions (Figure B1). Today, while actually dipping our toes in the cosmic shallows, we once again seem intent on destabilizing the very systems that sustain us.

Civilization	Temporal Range	Defining Architectural Legacy
<i>The Antecedent Culture</i>	-10,900 to -9600	<i>Global megalithic precision; zero-tolerance joinery.</i>
<i>The Sumerians</i>	-4000 to -1750	<i>Mass-produced mud-brick infrastructure.</i>
<i>The Maya</i>	250–900	<i>Lithic urbanism and stone-carved mathematics.</i>
<i>The Roman Empire</i>	-27 to 1453	<i>Systemic infrastructure and hydraulic concrete.</i>
<i>The Modern Era</i>	1850 – ?	<i>Resource-devouring boxes and planned obsolescence.</i>

Figure B1

Key civilizations and the defining industrial techniques that shaped their environments.

INSIGHTS - How bad is it?

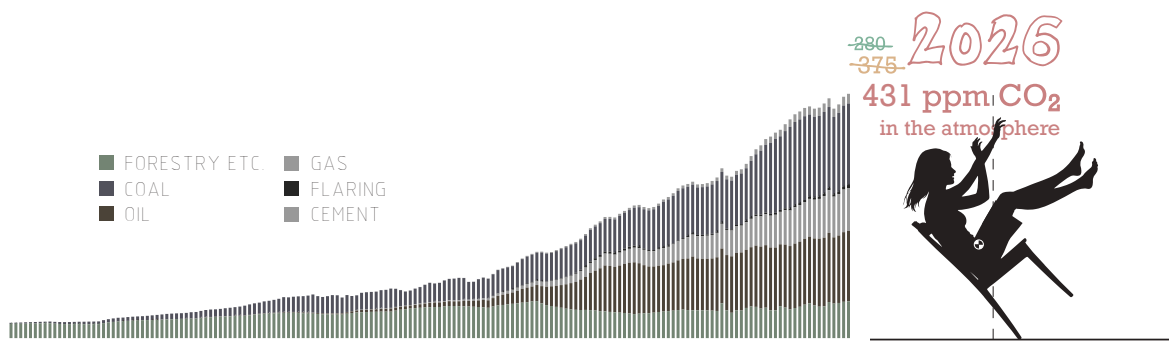


Figure B2
Global anthropogenic CO₂ emissions *per year*, 1850–2025. See Appendix A.

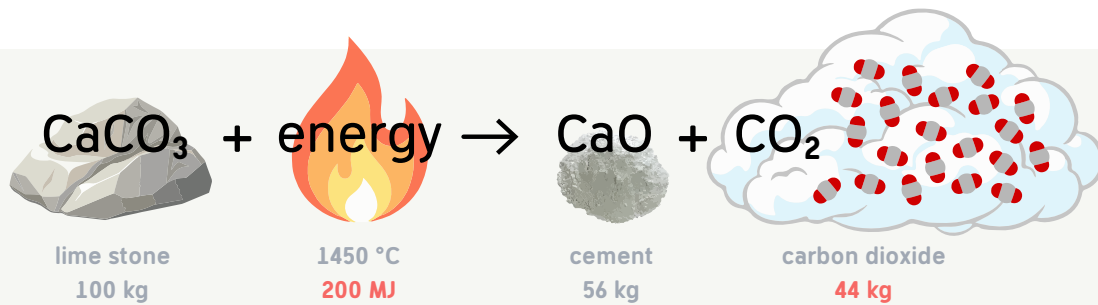


Figure B3
The climate heating penalty of Portland cement.

This program has performed an illegal operation.

Our modern era have replaced energy from muscles, wind, water and forests with concentrated ancient hydrocarbons. The paradoxical brilliance of fossil fuels lies in their energy density – they are essentially **bottled sunlight** from millions of years of photosynthesis, compressed by geological time into a hyper-efficient portable battery. This prehistoric resource have allowed humanity to fuel a global explosion of consumption of unprecedented scale. However, us burning through this resource that took 300 million years to create in a brief industrial sprint is the definition of a **thermodynamic dead end**.

Despite the performative exuberance of global climate summits, our “green transition” is a masterclass in thermodynamic self-delusion. We are not replacing fossil fuels, we are just stacking renewables on top of a record-breaking consumption of hydrocarbons (International Energy Agency, 2023). See Appendix A. Despite headlines of AI being a power guzzler, the growth in energy demand is all about lifting billions out of poverty in emerging economies. And they still receive just a small fraction of clean investment, forcing a parallel expansion of coal and gas just to keep the lights on.

We are driving up costs and emissions simultaneously while solely focusing on complicating the emissions ledger. By 2029, we will have burned through the total 1.5°C carbon budget like a raging wildfire (IPCC, 2023).

INSIGHTS - The deadlock

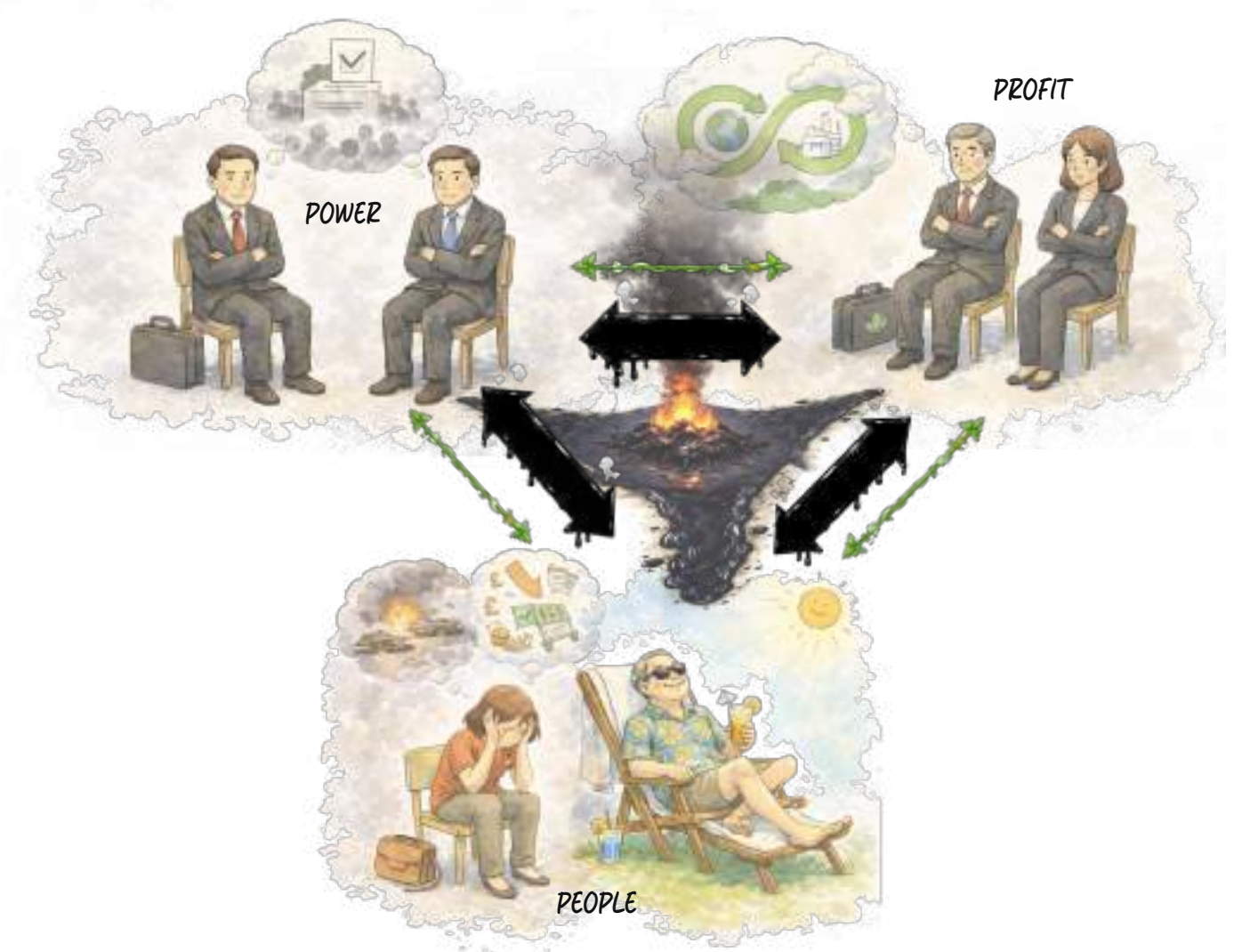


Figure B4
The current socio-political deadlock.

End process? [Wait]

We are waiting for each other in a circle:

- Companies are waiting for customers to demand sustainability and/or subsidies from politicians to make their green products competitive.
- Consumers are waiting for the green alternatives to be the cheapest.
- Politicians are waiting for voters to give them a mandate to act.

This is why one might feel that no one is doing anything – we are in a **social lockdown**. To break this, it usually takes either an **external shock** (like a disaster that directly affects the wallet) or a critical mass to start acting on **pure principle**, regardless of what others do (IPCC, 2022a).

INSIGHTS - Breaking the deadlock



Figure B5

We have a biological drive to consume, a religious framework that justifies it, and a financial system that demands it.



The application is not responding.

Scientific research suggests that the lack of large-scale action on critical global issues, such as climate change, is deeply rooted in human herd behavior and evolutionary psychology. Humans are biologically wired to **prioritize social conformity**, a survival mechanism that makes it psychologically taxing for individuals or small groups to deviate from the established norm. Ask anyone who has chosen to be vegan.

This collective inertia is reinforced by **pluralistic ignorance**, where individuals privately disagree with a lack of action but publicly follow the crowd because they assume others support the status quo. Further, the **bystander effect** on a global scale creates a diffusion of responsibility and when everyone waits for a “leader” to move first, the herd remains frozen, making it incredibly difficult for localized efforts to gain the critical mass necessary to break the cycle of inaction. On the bright side, some research suggest that as little as 25% is needed to get the majority on board (Centola et al., 2018).

INSIGHTS - The Backup Plan



Figure B6

A visualisation of the difficulty of carbon capture. The concentration of red is 417 ppm.

$$W_{min} = -R \cdot T \cdot \ln \left(\frac{P_{init}}{P_{final}} \right)$$

Figure B7

Gibbs Free Energy is the fundamental thermodynamic property that determines the theoretical minimum energy cost of Direct Air Capture (DAC).

The energy required to remove 10 Gt/year would require **60% of the electricity used today** (fossil emissions are currently 38 Gt/year and assuming 8% efficiency DAC).

Figure B8

Calculation result of the energy required to sequester just 1/4 of current annual emissions.

Task failed successfully.

What about a plan B? Actually, it is already in effect. Current political policies, like the Paris Agreement, rely heavily on future technologies to capture and store already emitted carbon dioxide. As explained in Figure B6 to B8, it essentially requires building two new Chinas' worth of power plants dedicated solely to running "giant vacuum cleaners" just to make a dent in current wasteful lifestyles.

The point is that, regardless of us crashing into the future or somehow managing to break the social deadlock, there simply is no perceivable option of future human life on earth that does not entail **shrinking our carbon footprint dramatically**.

To finish off the analogy of pc errors messages (that all Windows-users can relate to), we do not want the BIOS to throw an "Operating System Not Found". We cannot allow ourselves to destroy the very life support systems we all depend on.

INSIGHTS - Reality Check



Photo by Martin Smedjeback, 2025.



Photo by Martin Smedjeback, 2025.

Figure B9

Reclaiming the Future: Activists staging a peaceful blockade of fossil fuel infrastructure.

Reality check

As a local audit on how close we are to breaking the social deadlock, I joined a peaceful protest organised by Extinction Rebellion mid-december 2025. They had openly invited all concerned citizens to join them in a demonstration to highlight the fact that there is not yet even an embryo of a plan to phase out Gothenburg's "Energy Port" (more aptly known by its old name "Oljehamnen"). A very reasonable demand, by most means. How many citizens would turn up to show their support? I counted 36 persons. In the words of climate activist Jonas Lundström: "If only there were enough of us, we could do more."

INSIGHTS - Social Tipping Point of Göteborg

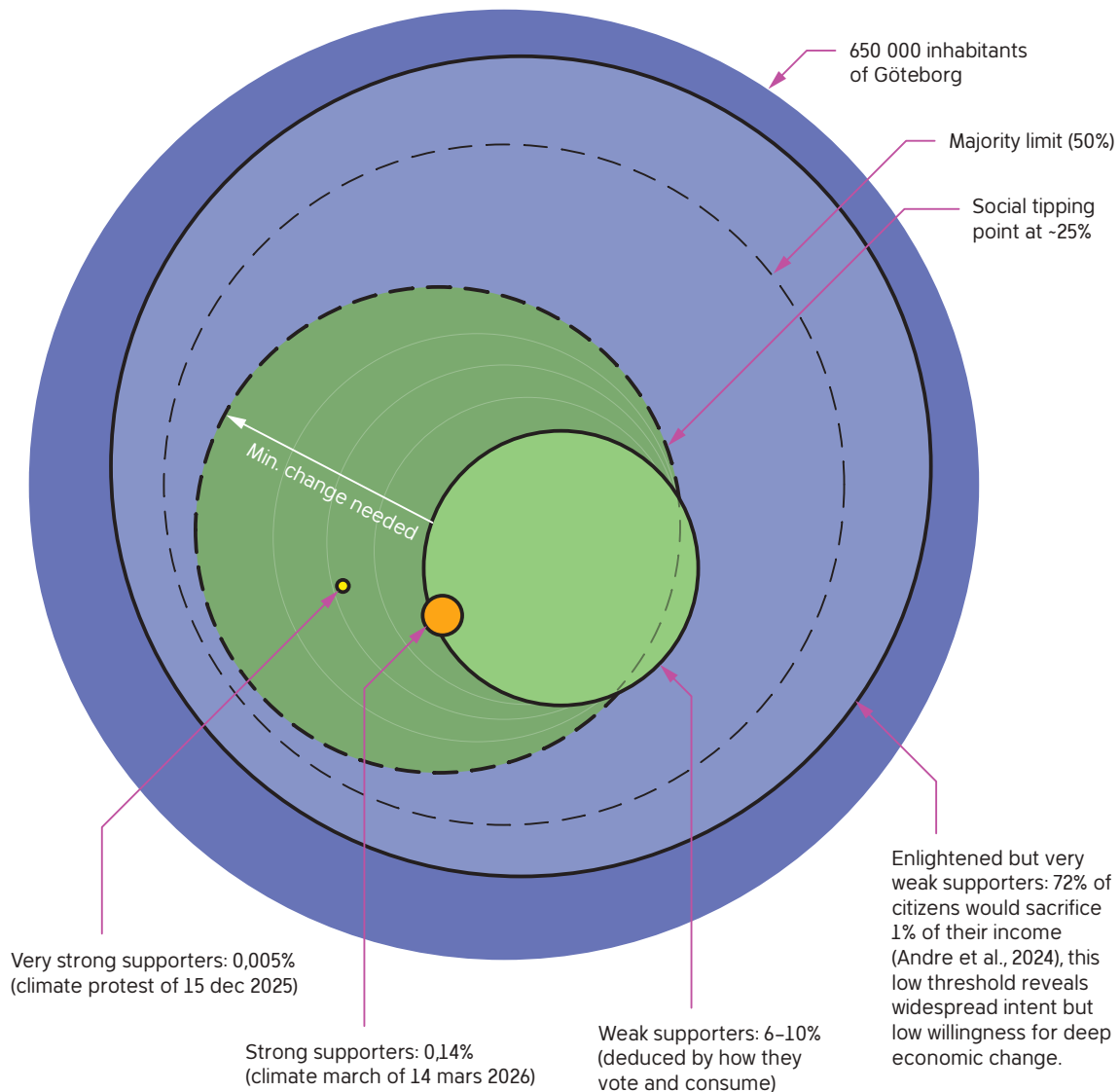


Figure B10

An infographic of how close the citizens of Göteborg is to the social tipping point.

Distance to Target

Research indicates that we are likely at a **critical mass of awareness** of roughly 60–70% that are concerned about climate change (Pew Research Center, 2021). But we are still well below the **critical mass of action** – the 25% that actually change their spending and voting behavior, highly influencing others to follow. (Centola et al., 2018). My analysis of the citizens of Göteborg align with this reality (Figure B10).

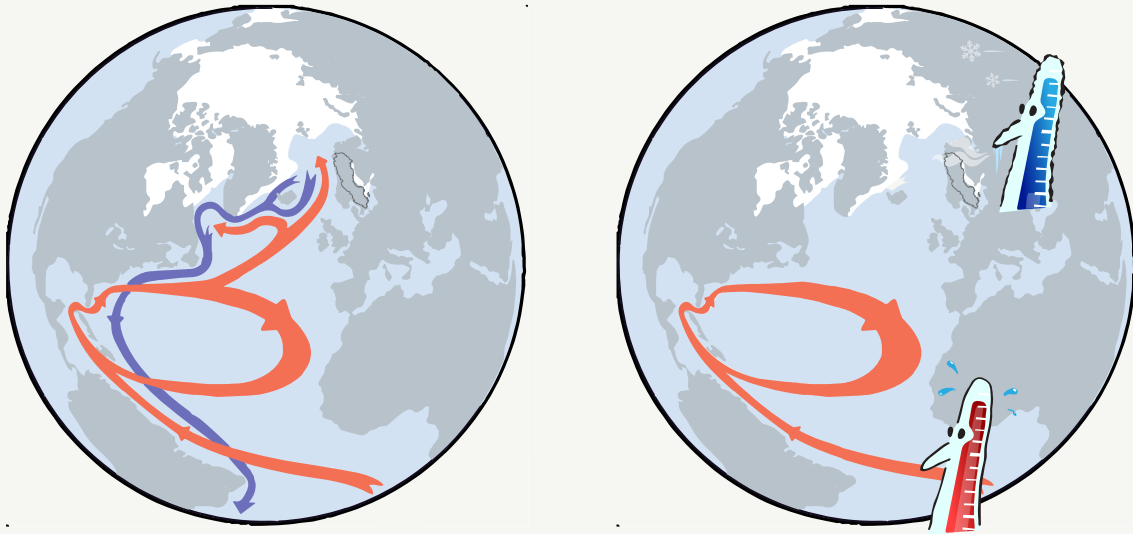


Figure B11
Current AMOC (Atlantic Meridional Overturning Circulation) system compared to an AMOC collapse.

Extrapolating the near Future

Strictly from a national average annual temperature point of view, science suggests that Scandinavia might experience a brief respite in the global heating during the coming century. This is “thanks to” the parallel slow collapse of the AMOC. Make no mistake though, this is certainly the smallest comfort imaginable for **future generations**.

Extrapolating the far Future

Finally, there is a thermodynamic limit to humanity’s growth, calculated by physicists like Tom Murphy: If we continue the current growth rate in demand for energy (2.3% annual) for roughly 400 years, the waste heat alone will be enough to reach the boiling point of water on Earth’s surface. This is regardless of if we stop all CO₂ emissions and/or reach net zero.

But rather than predicting that we will actually build exospheric heat-exporting machines, it proves that infinite exponential growth on a finite planet is physically impossible (Murphy, 2022). This hypothetical filter is often referred to as the **thermodynamic solution** to Fermi’s Paradox.

APPENDIX C - Subset of Studied Precedents



Djingis Khan

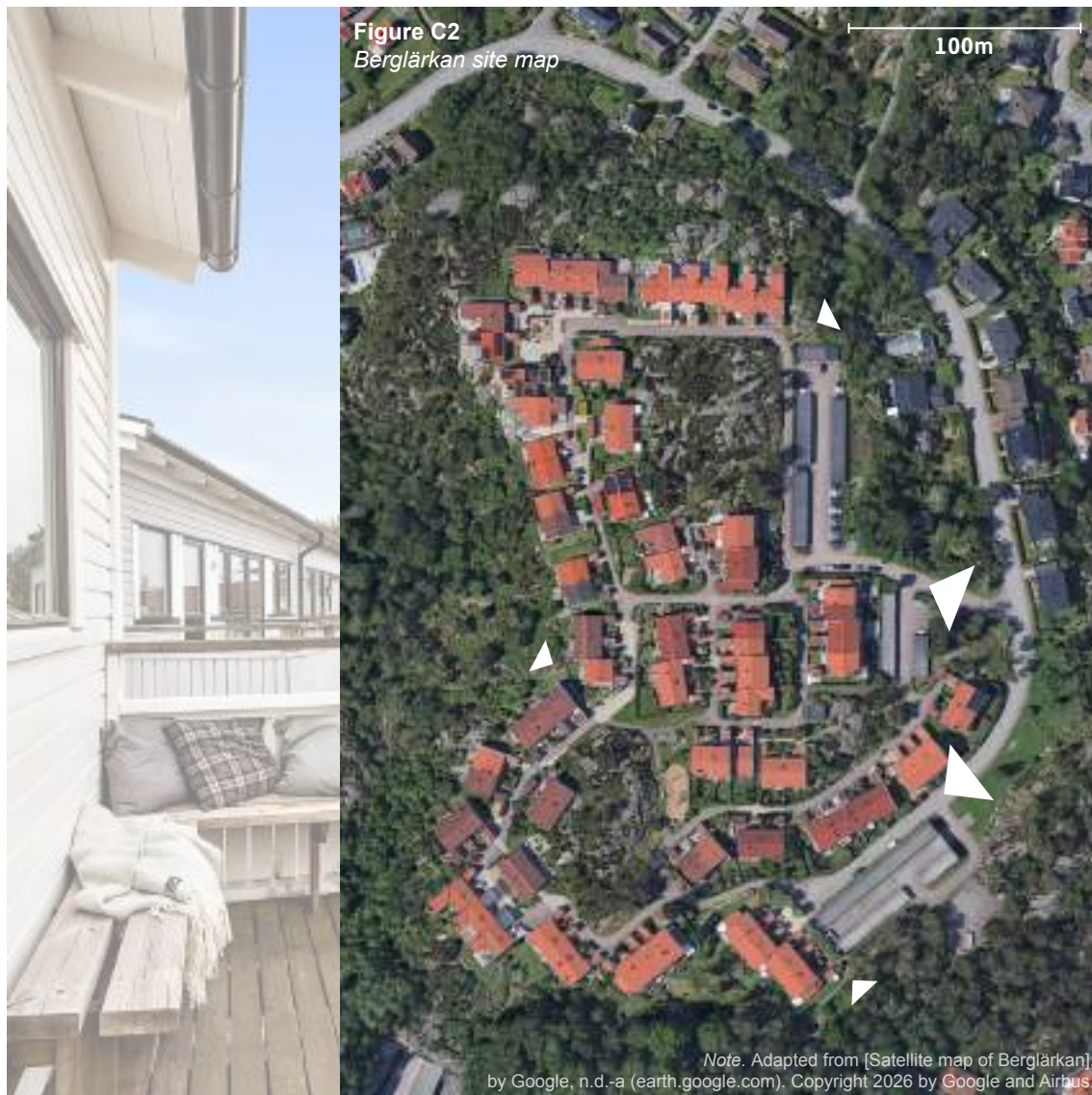
Lejre, Lund

- 💡 Kjell Aage Nilson + Ettore Nobis
- ✂ Akademiska Föreningen + HSB
- ★ 1972 + 1985



My analysis: Bizarrely named (seemingly after the warlord and serial rapist), this modernist **community-focused superblock** was originally solely made up of **monotonous** prefabricated volume elements. It showcases **traffic segregation** at its best (impossible today) and an extreme focus on **interpersonal spaces**: the circular **courtyards** and the **greenery** are the true architectural strengths. This very **dense living** remains highly attractive, due to the design successfully upholding the **visual privacy** of each home.

Subset of Studied Precedents



Berglärkan

Västra Frölunda, Sweden

- 💡 *Pietro Raffone,
Henrik Falkenberg*
- ✂ *Egnahemsbolaget*
- ★ *1981*

My analysis: The design is **uninviting** to outsiders and internally vague. Zoning and centralities could be more prominent. Eight types of houses are two or three too many. The design have failed to **keep cars out**. The use of spacial resources is **inefficient** due to duplex buildings and single-sided streets (due to the topography). Many of the inhabitants are architects who praise the **exceptional light** and the longer days that come with living on an elevation.

Subset of Studied Precedents



Photo: Holger Ellgaard, 2009. CC BY-SA 3.0



Figure C3
Understenshöjden site map

100m

Note. Adapted from [Satellite map of Björkhagen], by Google, n.d.-b (earth.google.com), Copyright 2026 by Google and Copernicus. CC BY 3.0 IGO

Understenshöjden

Björkhagen, Sweden

💡 Mia Torpes, Bengt Bilén

✂ Småa + self build

★ 1995

My analysis: Late to sprout, Stockholm's first ecovillage had high ambitions. Many of the **technically complex** solutions have since failed and the dwellings have fallen short in flexibility, heat management and **accessibility**. The urban design puts **nature first** but the village could be more compact. Highlights include the freedom from cars and the generous **community house**, placed at the village entrance.

Subset of Studied Precedents



Figure C4
Hedgehog Housing site map



Hedgehog Housing Co-op

Brighton, U.K.

- 💡 *Walter Segal + Robin Hillier*
- ✂️ *Geoff Stow + self built*
- ★ *2000*



My analysis: This pioneering project was designed to **provide permanent housing** for people without the financial means to enter the private market. This is **relevant today**, more than ever. It used a **"Sweat Equity"** model where each household committed to 30 hours of labor per week for two years to build the homes. In exchange, they received an assured tenancy and a 30% **discount on housing** rent. Although some **NIMBY** (not in my back yard) resistance, it turned out a brilliant model in **community building**.

Subset of Studied Precedents



Figure C5
BBB Kvistgård site map

Note: Adapted from [Satellite map of Helsingør], by Google, n.d.-d (earth.google.com). Copyright 2026 by Google, Data SIO, NOAA, U.S. Navy,, NGA, GEBCO

Bedre Billigere Boliger Kvistgård

Helsingør, Denmark

☀️ Tegnstuen Vandkunsten

✂️ DFE A/S

★ 2004 – 2008



Photo: SEIER+SEIER, 2009. CC-BY-2.0

My analysis: A prime example of tæt-lav (dense-low) typology. There is room to **grow organically**. The dwellings, tightly clustered around a courtyard, make for a **strong social fabric**. The clusters are dotted along a central monolithic **automotive-centric** road. “Don’t play in the road, kids!” The common functions are on the **sparse** side and **too far apart**. The central lake is a great **asset for biodiversity** and the inhabitants. (Obviously, chill Danish parents do not consider nearby open water a safety hazard.)

Subset of Studied Precedents



Lomma Brohus

Lomma, Sweden

- ☀ Brunnberg & Forshed
- ✂ CA Fastigheter
- ★ 2011



My analysis: In order to transform this former brick and asbestos cement plant, an iconic silo of high **cultural heritage value was torn down** and enormous amounts of contaminated soil was replaced. The row houses in this failed Garden City (the Floor-Area-Ratio had to come up a lot due to unforeseen costs) are *très chic* in its **colours** but otherwise **flat**, with **inhumane balconies** that no one will ever use. The project Lomma Hamn turned into a **gentrified** enclave that increased the **social segregation** in the whole region.

Subset of Studied Precedents

Figure C7
Marmalade Lane site map



Marmalade Lane

Cambridge, U.K.

💡 Mole Architects

✂ Trivselhus

★ 2018

My analysis: This large co-housing project features a **generous common green area** and a **central common house**, the latter acting like the **social heart** of the estate. The community is, however, **spacially exclusive to neighbours**.

Using **timber frames** and a **strong climate shield** (imported from Sweden) might be novel to Brits but building the row houses on **concrete foundations** and using **new brick facade** send the initial carbon emissions skyrocketing.



Subset of Studied Precedents



Fridlev Bofællesskab

Lejre, Denmark

☀️ LOOP Architects Aarhus

✂️ Almenr

★ 2023



My analysis: A **strong community** clustered in three villages connected along a spine, built on undulating ground. The design is nicely **varied** in expression and dwelling sizes. Great for **Intergenerational** living. **Colour drenching** is usually a bad idea (due to lightfastness). The use of prime arable land is surprising to a Swede but Denmark is restoring a lot of cropland to **natural habitats**. There is perhaps a plan for sophisticated net-positive regeneration. No sign of that so far though, just **“green desert” lawns**.

APPENDIX D - Calculations

Post	Description	Estimated Cost (MSEK)
Land & Planning	Detailed development plan (1 MSEK) + free land	1.0
Row houses (34 units)	3 060 m ² at 10 000 SEK/m ² (Materials + 30% hired expertise)	30.6
Community building	250 m ² (Simpler standard, high degree of self-build)	2.5
Facades	Included in row house price 20% reused facade saves approx. 0.5 MSEK	(Included above)
Parking spaces	30 gravel parking spaces (Self-build materials/machinery only)	0.3
Geothermal & Plumbing	Shared system + geothermal heating system for 34 houses	4.5
Solar panels	1 200 m ² (Industrial scale approx. 1.5 MSEK after subsidies/economies of scale)	1.5
Other/Buffer	Contingency connection fees (water / electricity) developer fees	2.2
Public artwork by Markus Hvass	Confrontational and thought-provoking, placed at community entrance	0.5
TOTAL		43.1

Figure D1

Investment budget (rough preliminary estimate) for the unconventional self-build variant where labor costs are to 70% paid by sweat equity.

Element	Quantity	Factor	Total Upfront (kg CO ₂ e)
Local Straw Wall/Roof Panels	227 m ²	27.38/m ²	6215
Wood Fiber Insulation (Floor)	13.5 m ³	15.50/m ³	209
Floor Timber Structure (Joists)	45 m ²	25.00/m ²	1125
Wooden Board Roof Finish	45 m ²	13.40/m ²	603
Triple Glazed Windows	15 m ²	64.00/m ²	960
Metal Fixings (Screws/Brackets)	162 kg	2.80/kg	454
Internal Clay Plaster (20mm)	180 m ²	2.40/m ²	432
Timber Flooring (Massive)	90 m ²	4.50/m ²	405
Site-Harvested Stone Plinths	40 m ²	25.00/m ²	1000
TOTAL UPFRONT DEBT (A1-A3)			11403

Figure D2

Preliminary carbon debt LCA (Stages A1–A3) cradle-to-gate environmental impact of one eco-village end-row housing unit. Material factors represent rough order-of-magnitude estimates aggregated from various public sources and are intended solely for early-stage conceptual scoping.

APPENDIX E - AI Generated Image Prompts

Figure	AI Tool	Prompt Used	Date
Narrative II	OpenAI ChatGPT	Can you make a Studio Ghibli style illustration of a young nordic couple that are on a road trip with their beat up volkswagen ID Buzz in a mediterranean scene. The woman is pregnant and life is great.	2026-02-20
Narrative III	OpenAI ChatGPT	Fantastic! Can you show the same couple a year from that, when life is not as great: they are struggling parents back in rainy and dark Sweden, in a boring apartment, the toddler is crying and the man is reading his resignation letter, looking let down and the wife is looking worried.	2026-02-20
Narrative IV	OpenAI ChatGPT	In the fresh sunny but still chilly spring, with a small forest-laden lake in the background, the small family is meeting other small families in a nice ecological playground. The kids are happily playing and most of the parents are having an informal meeting where our man is very excited and seems to proclaim that the families have made a joint decision of action.	2026-02-20
Narrative V	OpenAI ChatGPT	Det är en fin höstdag i Sverige. Den lilla familjen, och de andra familjerna du ritade, är nu samlade i en större skogsglänta på en höjd. Några barn leker, såklart. De vuxna har precis satt igång sitt stora projekt med att bygga ett småhusområde där i skogen på berget. En övernattnings-trailer kan synas. De vuxna har arbetskläder och verkar var i färd med att mäta ut och markera var stigar ska gå. I bakgrunden syns en äldre herre med skäggstubb och axellångt grått hår som anlägger en damm i en gammal husgrund. Bortom honom är det milsvid utsikt över granskogen.	2026-02-20
Narrative VI	OpenAI ChatGPT	Next, it is a rainy sloppy Swedish winter on the clearing on the hill. The exhausted parents, no kids around, are in a windy half-finished community house or room and in a heated debate over some drawings. A couple of people are seen leaving, apparently fed up with the process of building their ecovillage. The project has hit its low point.	2026-02-20
Narrative I	OpenAI ChatGPT	Could you generate another ghibli style image of the mother but when she herself is a tween in sweden and illustrate how she was a precocious child, very frustrated with climate change and how no grown up, including her parents, seemed to take it seriously. She can be seen disappointed or arguing with her grandfather, with graphics of the amoc collapse, animal rights, climate heating etcetera towering up behind her, sort of? It can be a nice summers day and yet she can only think of doom and gloom and her dark future	2026-02-21
Narrative VIII	OpenAI ChatGPT	At the end of my story, the child of the mother is herself an old woman and the narrative is "The winter of 2086 is yet again an extremely cold one, Sweden has climate like Alaska now. Eva silently curses the bygone Locust Generations as she bites down on her duckweed burger." I need the old woman in a kitchen of an eco-village with a large window in the background and a person struggling in the windy snow outside, long views with strange looking extreme cold and lightning winter storm far away. The dwelling is made of natural material such as wood and perhaps a fireplace can be seen. But there should also be future tech visible, somehow. Solar panels and contraptions that does unknown things, perhaps lowering the co2 level indoors.	2026-02-21
Narrative VII	OpenAI ChatGPT	I also need a ghibli prespective of the family, now with their daughter 3 years old and a stroller for their new-born, arriving in the finished eco-village, consisting of two-storey wooden row houses, High-stemmed pines scattered in the open area. The other families greeting are them with festive outdoor dinner on a summers day. A lush pond and far views in the background. Also show a communal house with part green house, cargo bikes, if possible. Very happy ending to their community building project.	2026-02-23
Figure 3.1	OpenAI ChatGPT	can you make an diagrammatic illustration showing the property ladder of the sixties and comparabe to todays mountain wall, which is VERY hard to climb. Minimalistic style, leaning towards studio ghibli sketches, sort of	2026-02-29
Figure B5	OpenAI ChatGPT	can you make a studio ghibli sketch style describing "We have a biological drive to consume, a religious framework that justifies it, and a financial system that demands it."	2026-02-29
Figure B4	OpenAI ChatGPT	could you make another ghibli-like diagram showing these 3 "actors" waiting for each other according to: We are waiting for each other in a circle. Companies are waiting for customers to demand sustainability. Customers (us) are waiting for prices to drop and for politicians to regulate away the harmful alternatives. Politicians are waiting for voters to give them a mandate to act. This is why it feels like no one is doing anything—we are stuck in a social deadlock.	2026-02-29
Figure 10.17	OpenAI ChatGPT	can you make a studio ghibli style sketch of the concept ecological rucksack / carbon rucksack in terms of building materials used in residents? Perhaps an eco house with light weight and a "normal" house with a very heavy sack?	2026-04-10
Figure 10.15	OpenAI ChatGPT	Could you turn this into a studio ghibli like illustration of this idyllic ecovillage in the winter? Stay very close to the geometries. It is in sweden and consists of row houses in apart from the house two the right with two balconies, that one has 4 apartments in it. dark blue are glassed volumes, the purple is a centrally placed asphalt road and the brown is gravel going around in the area but they can both be covered in snow with some added foot steps in the snow. the wooden veranda and the wooden picnic tables can be cleaned of snow. the most important is the light blue area which is a frozen pond where 5-6 kids are ice skating. To the left is a purple beech, the other trees are pine and birch and oak.	2026-04-29
Figure 10.16	OpenAI ChatGPT	fantastic! could you make a summer's version of this image? Very lush with lots of vegetation in the pond as well as in the areas that are not gravel path or asphalt path. The vegetation is not tidy, it is allowed to grow free in order to improve biodiversity. Show birds and some butterflies. Finally, hade 2 or 3 kids playing by the pond and also add a group of people having a festive dinner at the tables. The glass volumes can be more glass-like, not a dark blue tint	2026-04-29
Figure 12.1	OpenAI ChatGPT	Can you make me a sketch studio ghibli like drawing of k pop demon hunters apartment, somehow showing what a lonely life it must be to live like that.	2026-05-07
Figure 12.2	OpenAI ChatGPT	ok and another interior image of contrasting intergenerational life in a common house kitchen. same rainy weather outside but in an ecovillage and a very warm atmosphere revolving around cooking dinner, talking and playing in their lush kitchen of industrial high quality	2026-05-07

Figure E1
The prompts used to generate images by using AI.

FUTURE FRIDAYS

A future for humanity without degrowth of our resource use is physically impossible. Science has long known this. Yet, even in 2026, neither politicians nor voters are prepared to accept this and to act in any meaningful way.

This project explores how ecovillage strategies - resource efficient living with strong social cohesion - are not a sacrifice, but something to strive for.

Narrative, PART VIII



The winter of 2086 is yet again an extremely cold one. Eva silently curses the bygone Locust Generations as she bites down on her duckweed burger.