ESSAY 03

SYNTHESIS

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3.1 Introduction

3.1.1 Design and its iterations and development

The overarching project intention is to link and integrate local efforts by separate stakeholders with each other as networks towards the emergence of a new system that upscales local innovation and enhances stakeholder connections. Envisioned as the project program (further elucidated upon in section 3.4) is a neighbourhood facility for regeneration (Gibberd 2013), that provides structural and didactic support to the Melusi community thus facilitating the scaling of the spatial and technological innovation inherent in its vernacular design.

The project site can be understood as a liminal space, between the housing or built space and the scarred landscape (Figures 3.1). The initial design investigation (discussed in chapter two) indicated the need for a spatial concept to guide the articulation of the threshold spaces, that is, between the sub-programmes and as it acts as an interface of the project with the neighbourhood and quarry pond. The spatial concept presented in this chapter, derives from the logic inherent in the layering of space in Melusi. The first section of this chapter attempts to unpack and comprehend the spatial design attributes of the Melusi vernacular by using Boettger's (2014) approach to the analysis of thresholds and space. The second focuses on how spatial principles derived from the spatial analysis translate into the project design and inform the design iterations. The third section elucidates how the lessons drawn from the vernacular technology inform the project's technological intentions, concept, materiality, and overall theme to build existing capabilities through place-specific solutions.

Figure 3.1: Site's liminality (Author 2021)

3.1.2 Spatial analysis of the Melusi pattern language

To comprehend or depict the spatial design of the Melusi vernacular condition, it was categorised into four patterns which represented the evolutions of the generative model from which the rationale behind the visual coherence in the settlement is defined. The four identified patterns present distinctions in street-edge conditions and spatial functions (Figure 3.5). These are:

A) Double-storey live/work typology

B) Multi-family typology

C) Single family typology

D) Single-floor live/work typology

Spatial notation of the patterns was considered to reveal spatial design techniques and spatial logic of the vernacular thus inform design decisions including the articulation of threshold spaces and spatial organisation. Spatial notation refers to "presentation of space that sheds light on its configuration" (Boettger 2014:54). Extracted from the identified patterns for spatial notation is the 'body of the space/threshold.' The 'body of the threshold' and 'spatial body' are constructions by Boettger (2014) which he employs in the documentation and analysis of space and thresholds. The 'body of the threshold' is composed of the space-delimiting elements, by whose perception "architectural space is created" (ibid.:7).

Figure 3.2: Pattern A (Placemaking and Placekeeping Studio 2021)

Figure 3.3: Pattern C (Malusi RFS Studio 2021)

Figure 3.4: Pattern B (Malusi RFS Studio 2021)

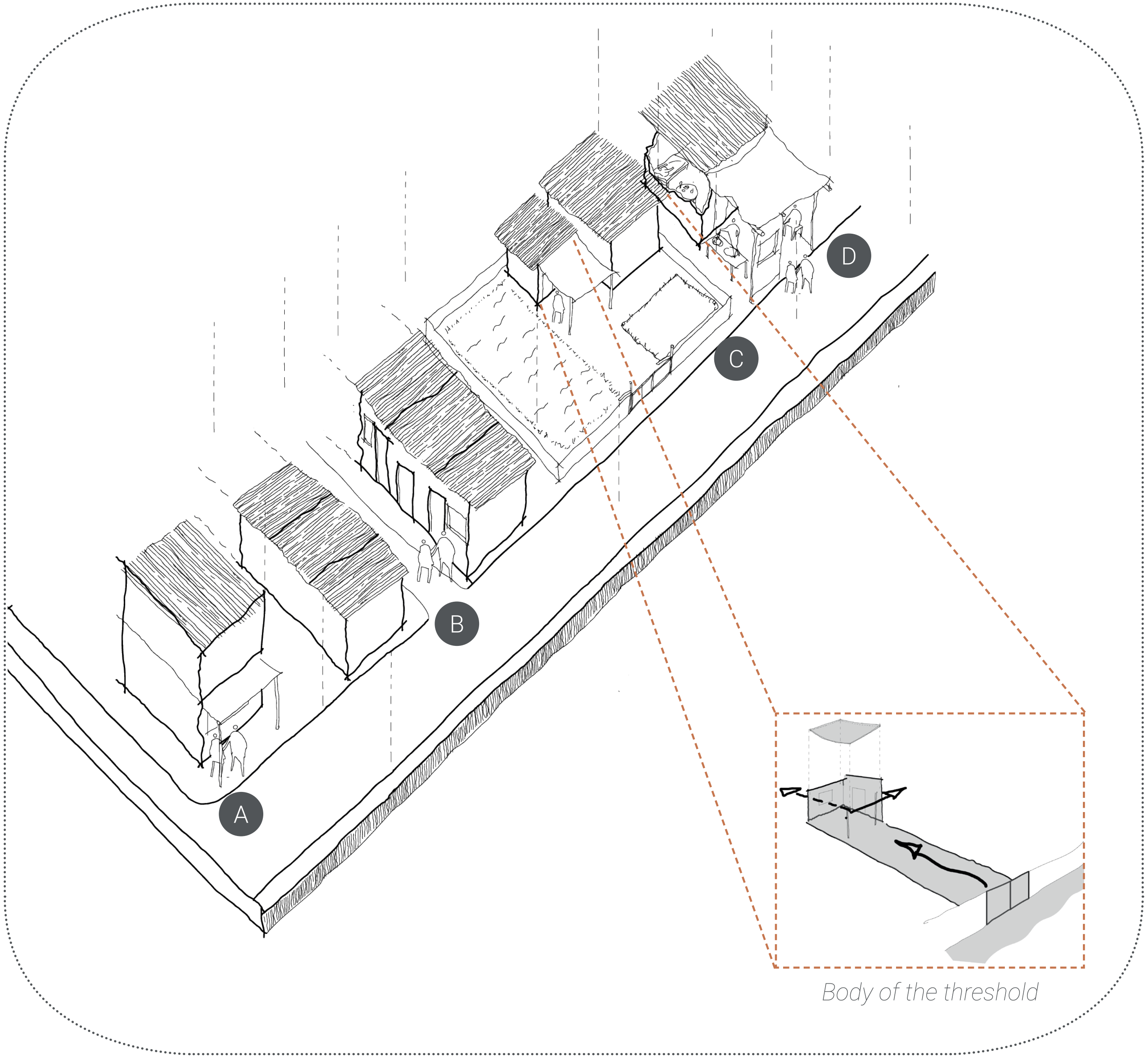


Figure 3.5: Patterns identified in Melusi

The analysis of the patterns was undertaken using Boettger's (2014) parameters for the analysis of thresholds and space. Boettger's (2014:56) approach to spatial analysis is a modification of Egon Schirmbeck's deductive approach for the graphical analysis of space using five parameters: "spatial design, spatial function, spatial definition, spatial structure, spatial sequence." He refines the approach by modifying the categorisation, providing a sequence through which the analysis can be conducted and adding a parameter, spatial situation. The parameters are (ibid.: 2014:57-58):

1. Delimitation (spatial definition): boundaries of the space
2. Sequence (spatial sequence): pathway and line of movement through space
3. Geometry (spatial structure): Organisation of space, geometric rules, and proportions
4. Topography (spatial situation): relationship between space and its context
5. Materiality (spatial design): contrast possessed by threshold space
6. Furnishings (spatial function): Use of space, space equipment support the threshold space (unobtrusive – self-contained)

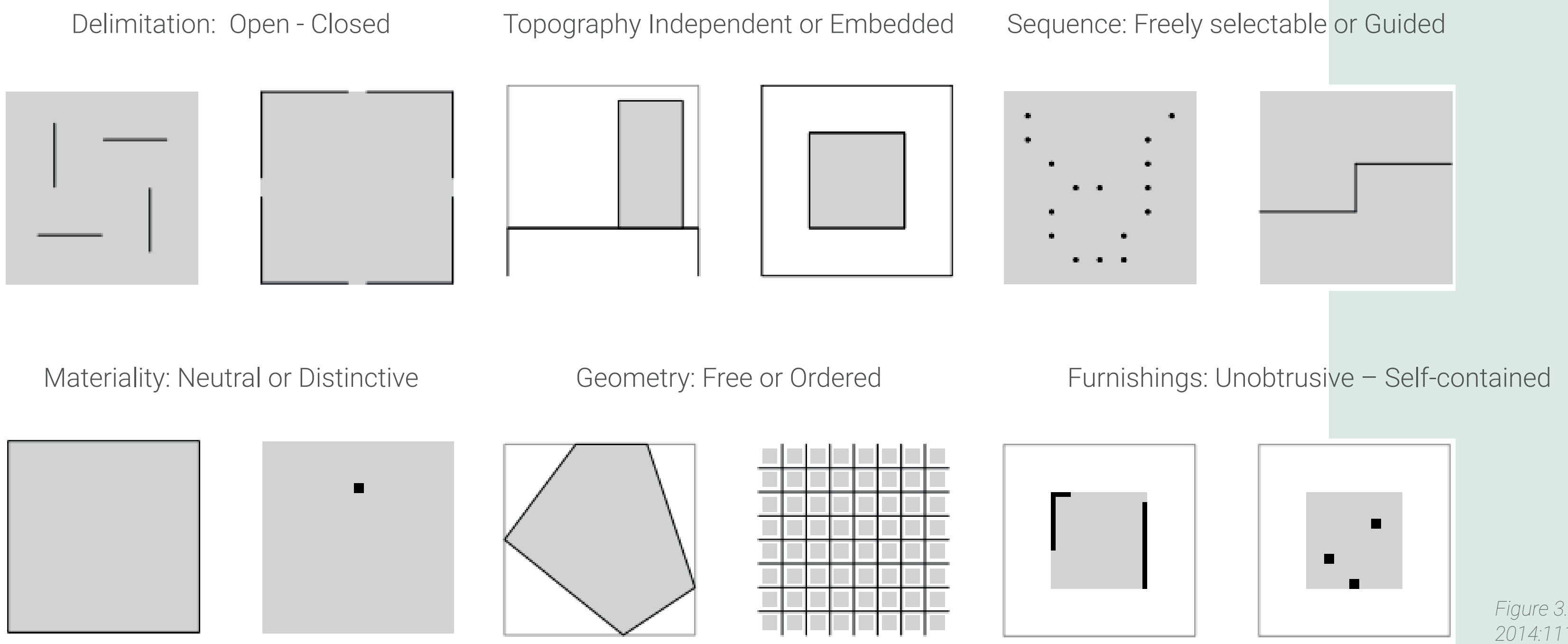
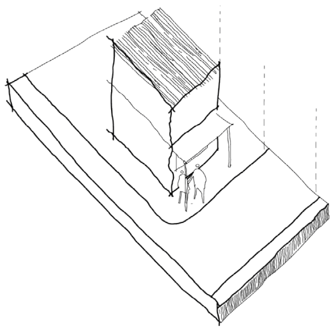
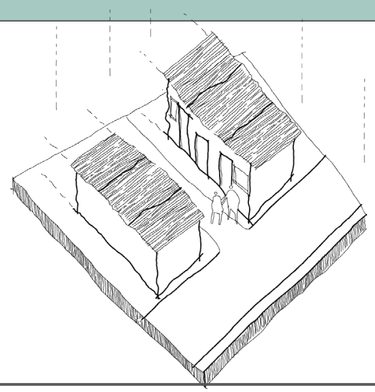
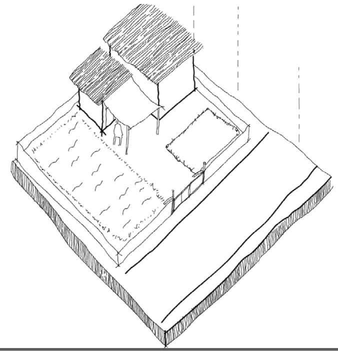
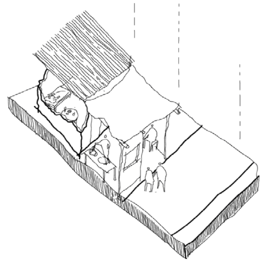
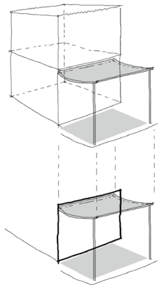
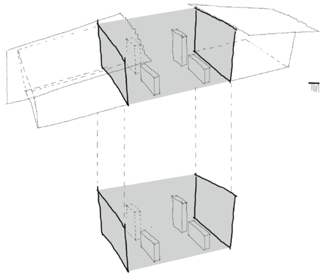
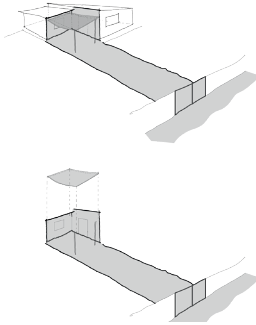
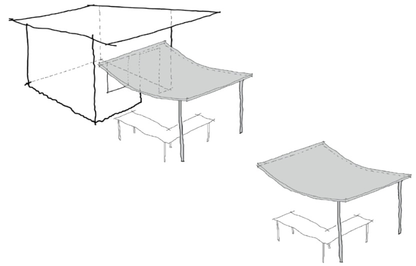
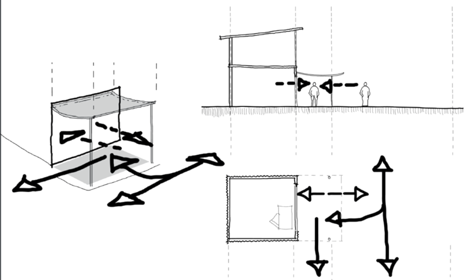
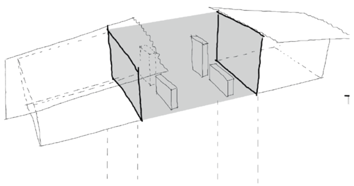
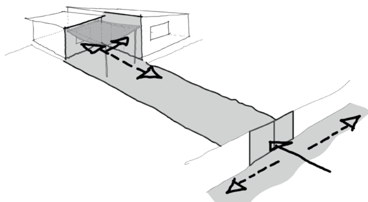
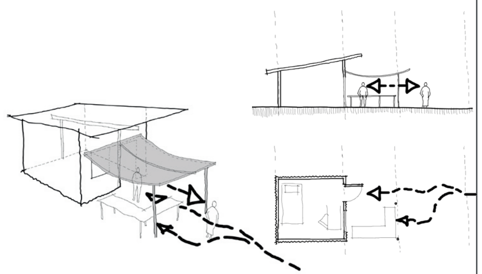
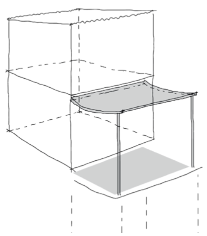
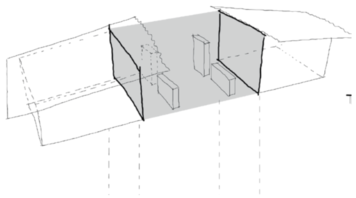
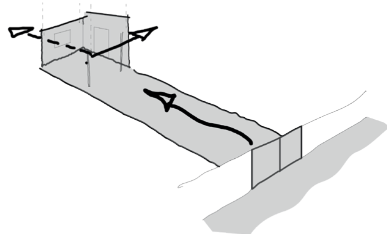
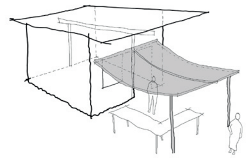
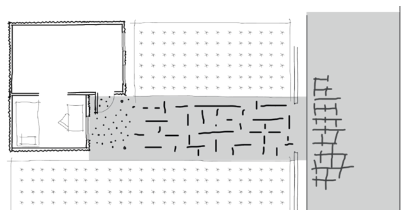


Figure 3.6: Threshold space parameters (Boettger 2014:111-116)

Table 3.1 Spatial analysis of Melusi vernacular patterns(Author 2021)

	Double-storey live/work typology	Multi-family typology	Single family typology	Single-floor live/work typology
PATTERNS				
DELIMITATION	 - Threshold is formed by an over-head horizontal element that serves as a shading device, provides vertical articulation and adds human scale to the structure.	 - Space is delimitated by buildings. These frame a shared space from which the individual units are accessed.	 - The threshold is formed by an over-head element, paved path, and fence.	 - The threshold is formed by an over-head element and furnishings.
SEQUENCE	 - Free movement from the street to the ground floor. Restricted movement to the upper floor, a private space.	 - The sequence creates a hierarchy of privacy that is perceived as one transitions from the public to the semi-public (shared) and then to the private spaces.	 - The positioning of the building opening is often such that it does not face the street. This creates a transition in which visual access to the more private spaces is limited. - Physical access is controlled by the placement of a fence and gate.	 - The entrance is directly off the street and faces it directly, providing a visual connection to passersby

	Double-storey live/work typology	Multi-family typology	Single family typology	Single-floor live/work typology
GEOMETRY	 - The scale in height being double what most buildings in the settlement are, creates a spatial hierachy that articulates the function/ program offen public in nature.	 - Building organisation is such that a shared (courtyard space) is framed and 'protected' by the structures. - Layout in rows also facilitates efficient use of space.	 - The building entrance is articulated by a side setback and vertically by the introduction of an over-head horizontal plane	 - Rectilinear form as in the vernacular model.
TOPOGRAPHY	- The scale of the structure contrasts most vernacular dwellings which have a single floor. It is embedded in the site through strategies such as vertical articulation using an overhead plane, and the layering of functions from the street edge.	- The materiality, scale and form of the structure make for an embedded spatial topography in the site.	- The materiality, scale and form of the structure make for an embedded spatial topography in the site.	- The materiality, scale and form of the structure make for an embedded spatial topography in the site.
MATERIALITY	- The design is characterised by the use of more structurally robust materials such as brick, and elements like shipping containers.	- Materiality of the threshold is nuetral to that of the context.	 - Material changes as one transitions from the street into the private spaces.	- Materials used such as paint, signage for the space to possess a contrast and draw people's attention to it.

3.1.3 Strategies for spatial articulation drawn from the Melusi vernacular

This section considers the spatial design strategies used in Melusi and how they have been applied and upscaled in precedents in similar contexts. These precedents include:

Usasazo Secondary School

Architects: Wolff Architects

Location: Khayelitsha, South Africa

Inkwenkwezi Secondary School

Architects: Noero Wolff Architects

Cape Town

Alexandria Interpretation Centre

Architects: Peter Rich

Alexandria, South Africa

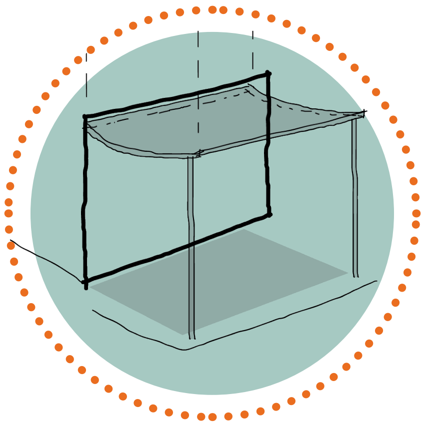


Figure 3.7: Strategy one (Author 2021)

1. Vertical articulation and delimiation using the overhead plane

In Melusi, overhead planes are often used for vertical articulation of entrances and for spatial definition. The work of Noero and Wolff Architects illustrates the application of this strategy, which they've termed 'section as form generator,' in projects such as the Usasazo Secondary school. The variation of sectional dimensions (between the overhead and ground planes) in each building responds to the perceived human dimension but is not limited by it. It also accomodates different functional requirments and responds to urban and environmental conditions.

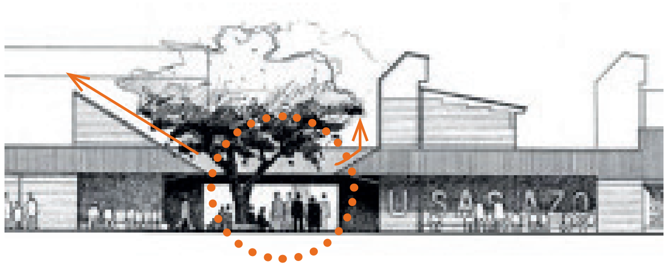


Figure 3.8: Elevation of Usasazo school (Wolf Architects)

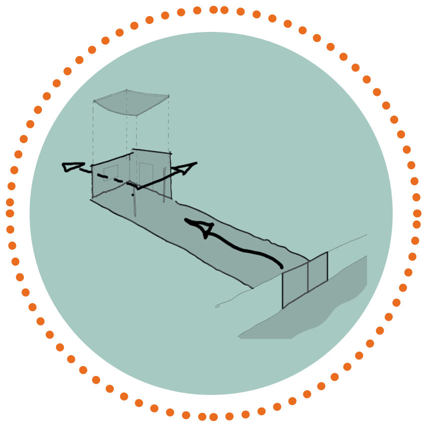


Figure 3.9: Strategy two (Author)

2. Offsetting planes and street edge setback

This strategy facilitates the articulation of various levels of privacy through a space and engages a guided spatial sequence. Private dwellings are often setback from the street in contrast to the the shops that are directly off the street or extend onto it.The application of this can also be observed in the Usasazo project, where the entrepreneurial classrooms that serve the public and school are situated along the street edge and double as a boundary as well (figure 3.10).

Figure 3.10: Usasazo school street edge (Wolf Architects)

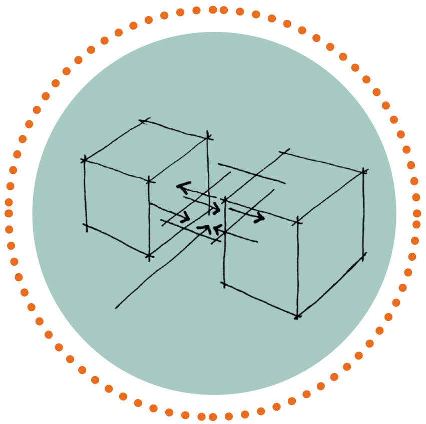


Figure 3.11: Strategy three (Author 2021)

3. Building as spatial delimiter of shared space

Observed as a strategy for delimiting shared space was the engagement of a spatial geometry in which the building framed a shared/ communal open space. Open space is an important yet limited resource in informal settlements.

The spatial geometry o f Inkwenkwezi school buildings is such that the school buildings are themselves a wall enclosing shared open space and protecting the school from vandalism and theft (figure 3.12).

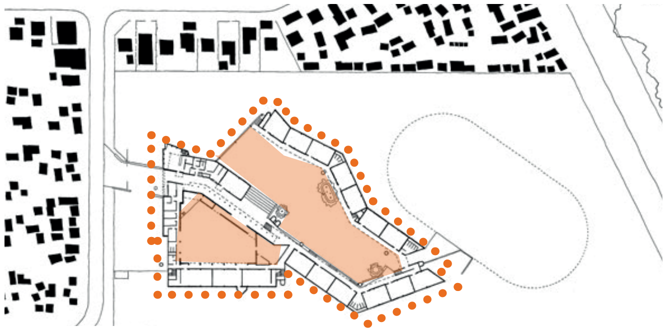


Figure 3.12: Site plan of Inkwenkwezi (Wolff Architects; edited by author 2021)

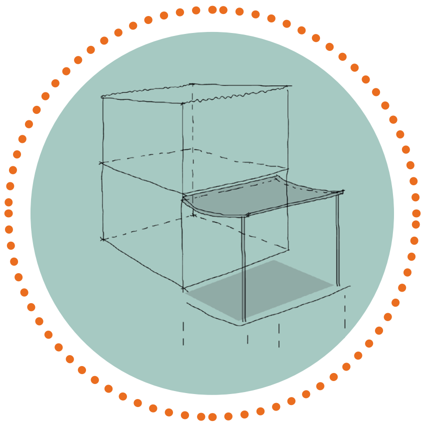


Figure 3.13: Strategy four (Author 2021)

4. Contrast of publicness

A fourth strategy was the use of the spatial hierachy to articulate buildings of public and civic nature. These either used the melusi vernacular model implicity, or contrasted it. The scale of Inkwenkwezi in relation to that of the scale of the informal dwellings in its context is great (figure 3.14). By contrast In Usasazo, the scale is built up as one transitions into the school from the street edge. The Alexandria project (figure 3.16) contrasts the settlement in scale but uses materiality to attain an embedded spatial topography.

Figure 3.14: View of Inkwenkwezi (Wolff Architects)

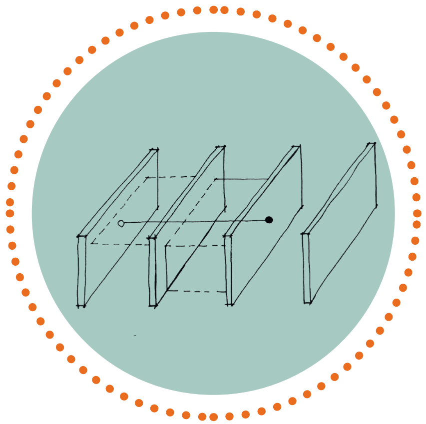


Figure 3.15: Strategy five (Author 2021)

5. Space and material efficiency in row typology

This strategy (figure 3.15) was mostly employed in rental housing typologies. It facilitated an efficient use of space and materials. It 's application in a precedent can be observed in the Empower shack project in Cape Town (figure 2.27)

Figure 3.16: Alexandria Interpretation centre (Peter Rich Architects)

3.2 Design

The design concept is presented in the parti (figure 3.17). Evisioned is a spatial geometry of buildings that grow in scale as one transitions from the street edge where the intervention interfaces the community dwellings. The different scale of the buildings not only responds to the scale of the vernacular dwellings but challenges it to accommodate different functional requirements of the various sub-programmes, and with the smaller ones accommodating the trade along the street, activating the street edge, and presenting an inviting threshold in the form of a market street.

3.2.1 Programme

The proposed program is a 'neighbourhood facility for regeneration'. This is an adaptation of Gibberd's (2013) construction, "Neighbourhood Facilities for Sustainability (NFS)." Gibberd (2013:226) who writes on building capabilities of communities in the context of sustainability argues for a shift in focus from an advocacy of energy efficiency and renewable energy to establishing NFS. These aim to "to enable households and communities to improve their quality of living in ways that also reduce environmental impacts and carbon emissions" (ibid.:226). His approach entails a process in which sustainability criteria are defined, translated into built-environment characteristics and a programmatic structure that incorporates these characteristics proposed (table 3.2).

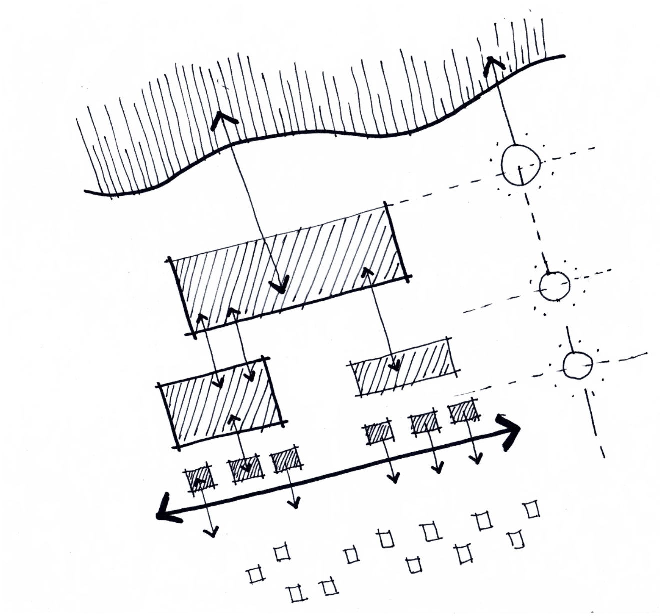


Figure 3.17: Parti skech (Author 2021)

Envisioned is a facility that engages regeneration through education and production. As such, knowledge is the regenerative criteria. The program investigates upscaling the MYDO model which caters to the youth in the community through a four-pronged approach; entrepreneurship programme, education through the afterschool programme, feeding scheme and recreation programmes. This is through consolidating educational enrichment programs that feed into each other and draw from the latent potential of the site as a water resource. The main program of the project is a makerspace. To guide the design decisions, the makerspace is designed around hemp production. Proposed as new elements to the vernacular material palette are industrial hemp products. Hemp is used in construction as hempcrete (a vegetal concrete comprised of biomass of hemp hurds and lime binder), insulation, hemp blocks and as hemp board (Mueller et al 2019). Importantly, industrial hemp is used to make various commercial and industrial products (figure 3.18) making of which can be housed in the makerspaces.

The subprogrammes include live/work housing and trade spaces at the interface of the facility and settlement, greenhouses for food production and demonstration of aquaponic technology and a dining facility for the feeding scheme and administrative offices.

3.2.1.1 User

Mehotra (2015) argues that where the client does not exist, the role of the architect is in making alignments and collaborations to civil society. Whilst the proposed operational client is the NGO, New Schools for Hope, the programme is envisioned as one that integrates multiple stakeholders. The primary users are the youth of Melusi, with a specific focus on the unemployed. During the community engagement, the issue of unemployment and the links to the need to provide spaces that upskill youth was one often raised. The role of designer here is to design soft thresholds that enable social and spatial porosity.

Table 3.2: Program (Author 2021)

Regeneration criteria	Regenerative built environment characteristics	Neighbourhood Facilities for Regeneration
Food	• "Local markets with low ecological footprint foods. Ability to produce low ecological footprint food" (Gibberd 2013:229).	• Informal and formal trade spaces • Greenhouse
Knowledge	• Access to learning facilities (ibid.).	• Greenhouse • Homework facility • Makerspace • Studios • Gathering space • Exhibition and tool rental spaces
Water	• Access to clean water (ibid.). • Storm water management • Grey water recycling	• Rainwater harvesting • Grey water and quarry water recycling and irrigation scheme

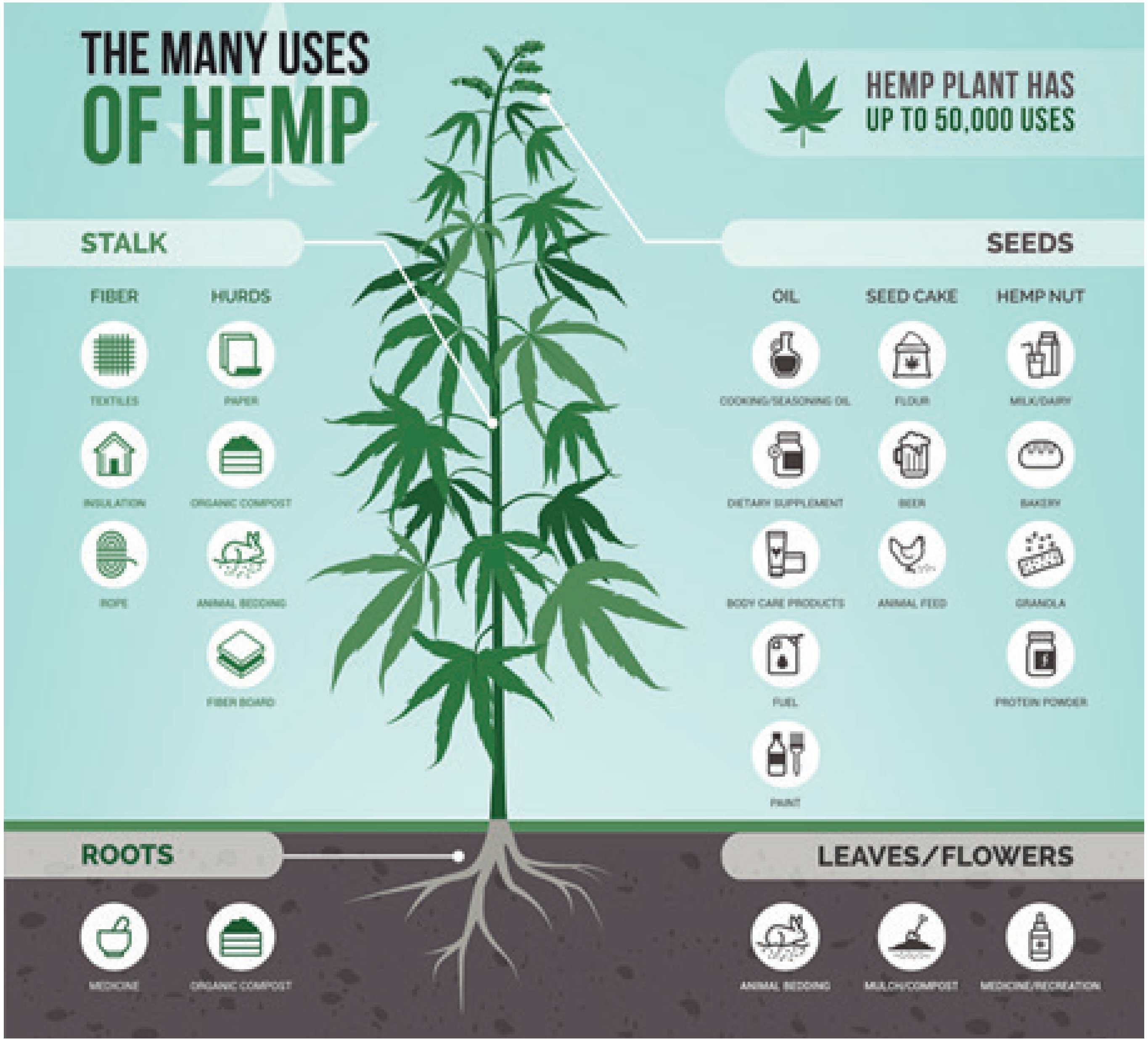
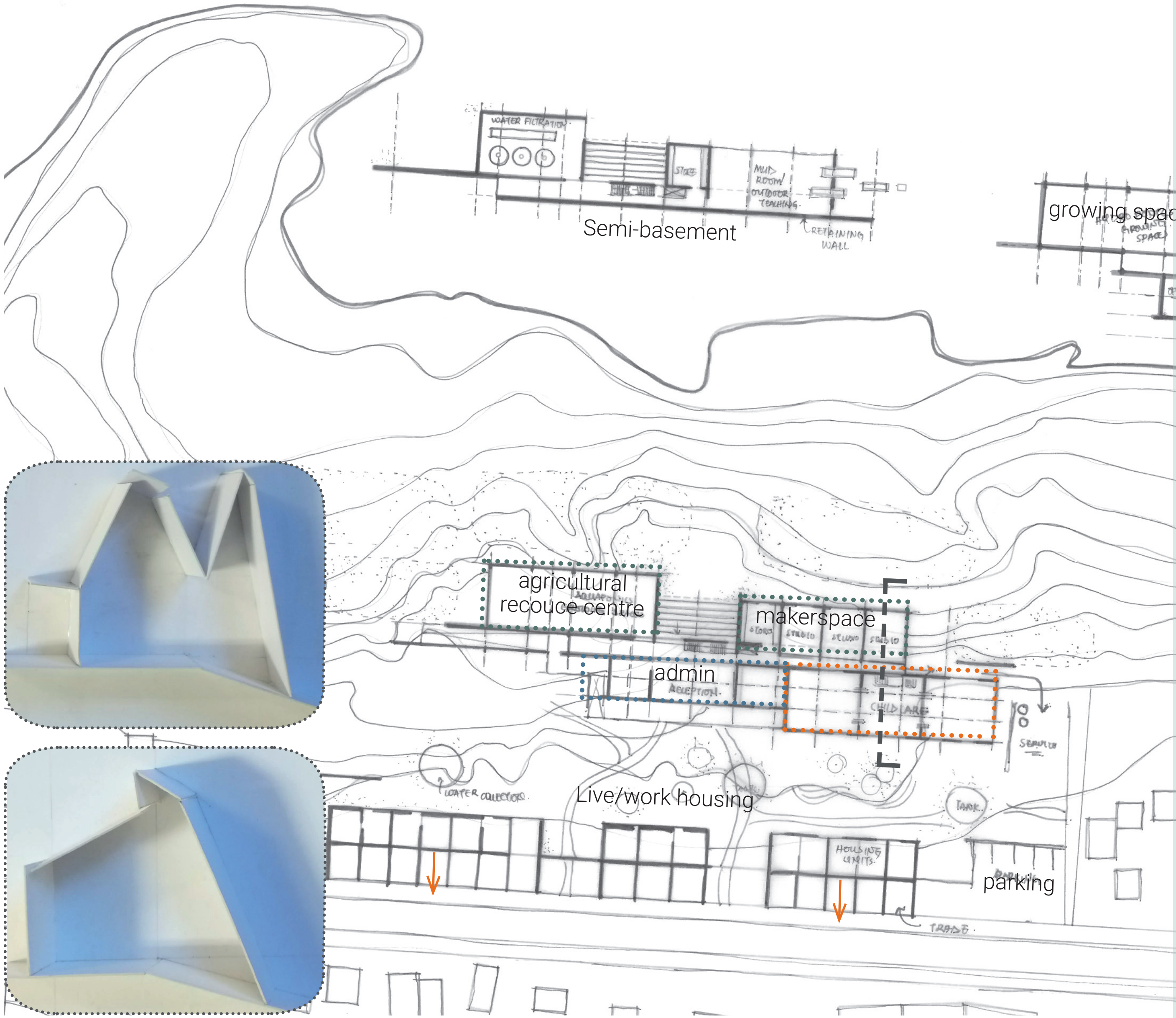
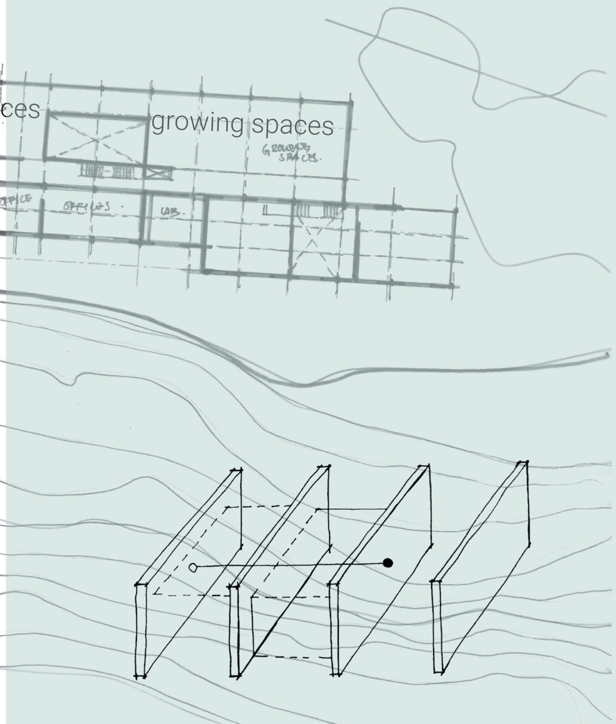


Figure 3.18: Industrial and commercial uses of hemp (Source: Hemp Foundation)

3.2.2 Iterations

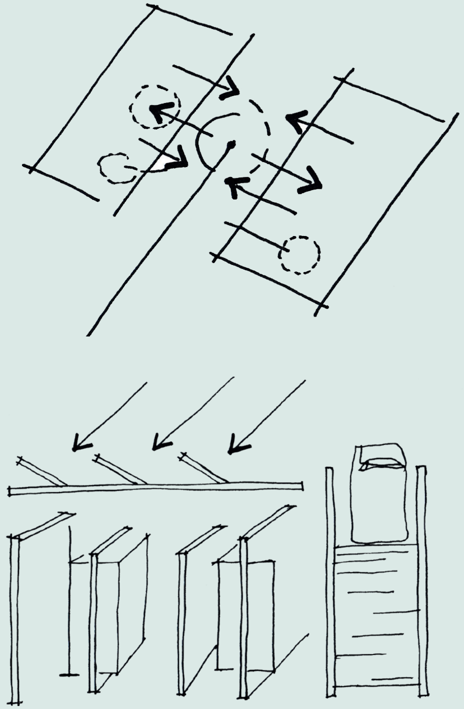




Iteration One

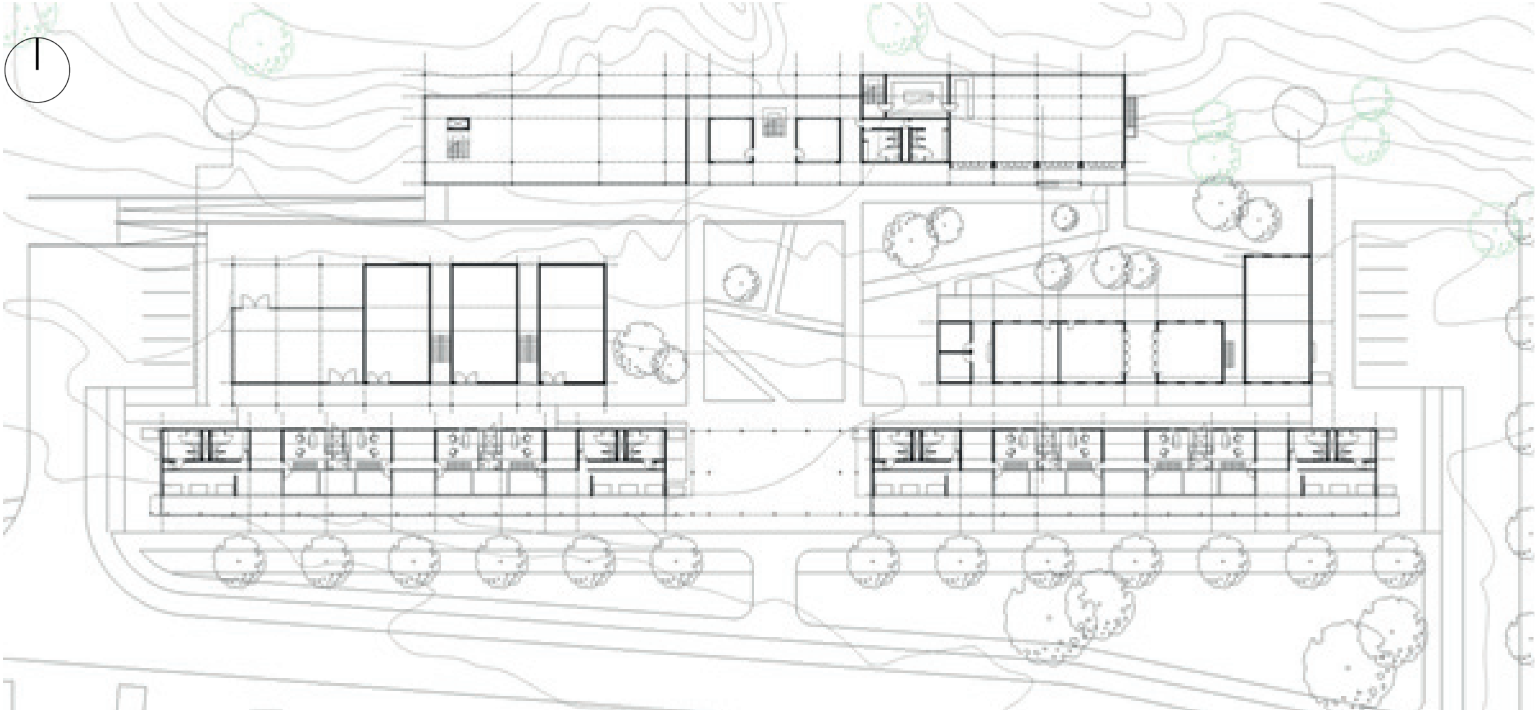
- Explored spatial layering; situating the live/work typology on the street edge to give the project a public interface.
- Considered building as delimiter of shared space.
- Explored modular construction in rows for efficiency of space

Figure 3.19: Design iteration one (Author 2021)



Iteration two

- Considered introducing a middle layer.
- Buildings frame a public square at the centre and setback from it creating transitional spaces to more private functions.
- Introduction of shared space in the housing units and centralised service cores.



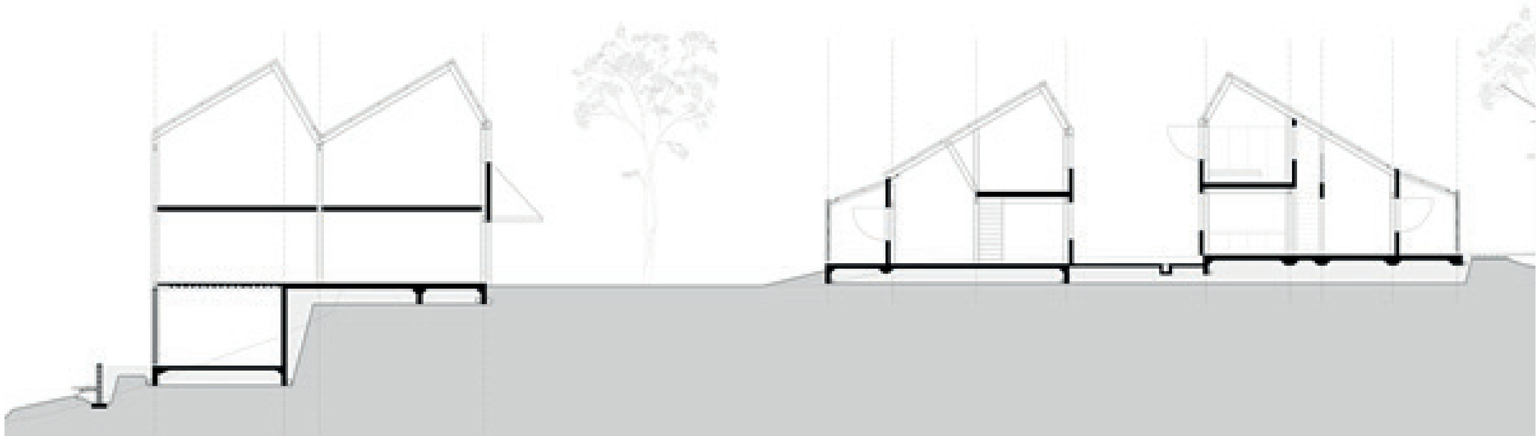
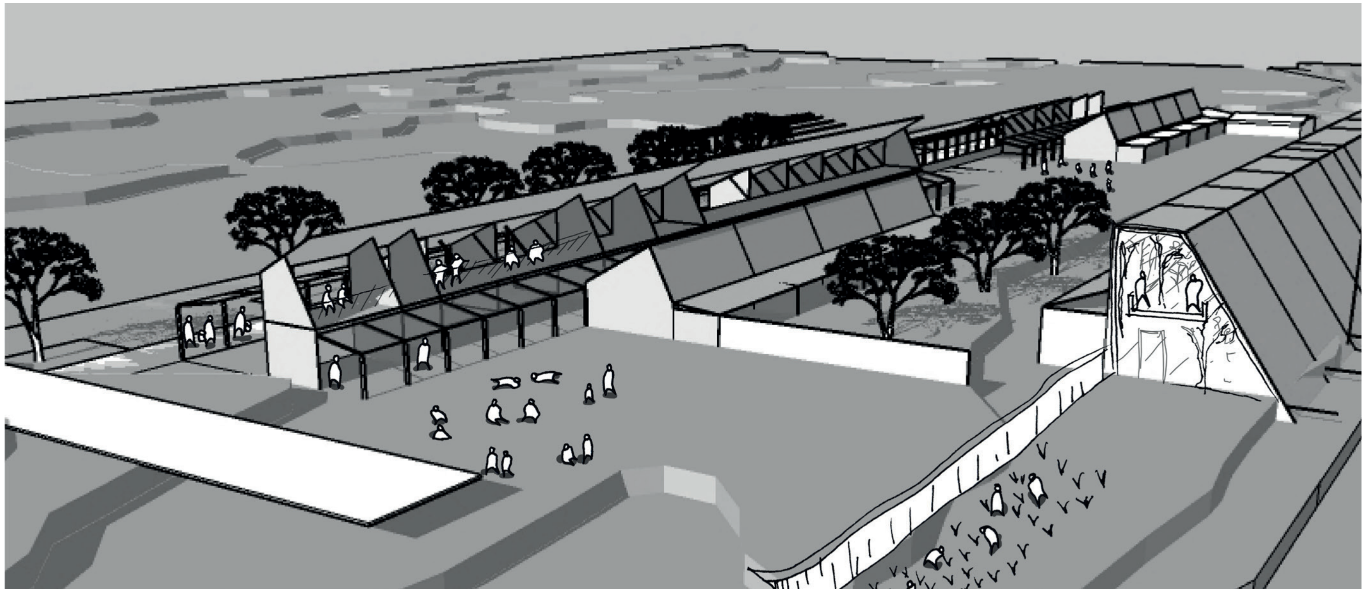


Figure 3.20: Design iteration two (Author 2021)



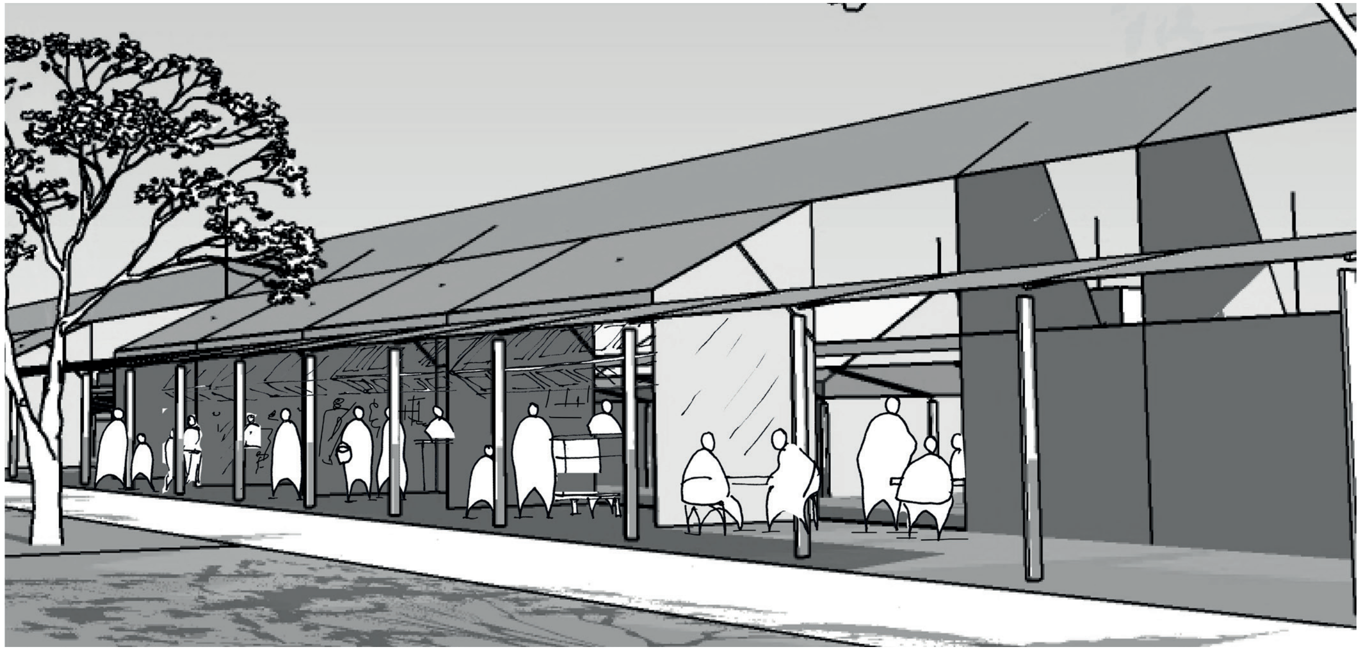
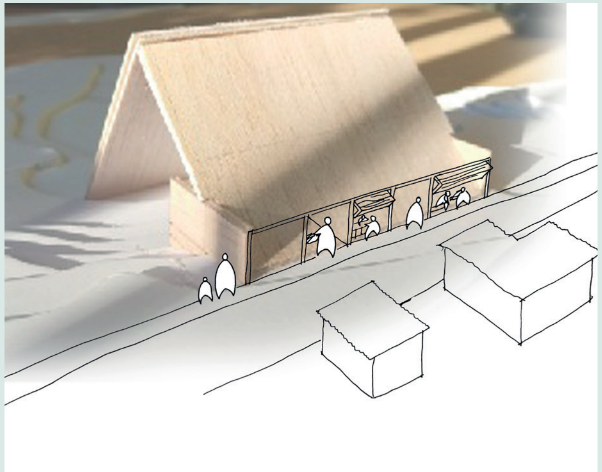
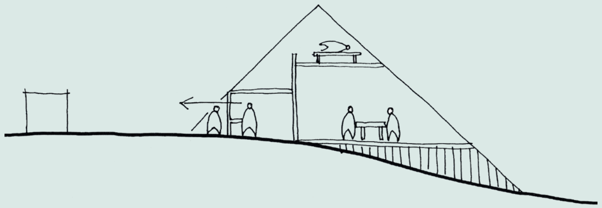


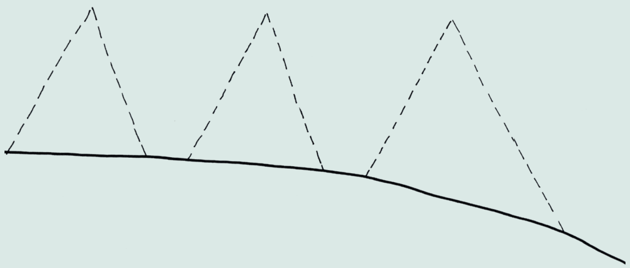
Figure 3.21: Design iteration three (Author 2021)

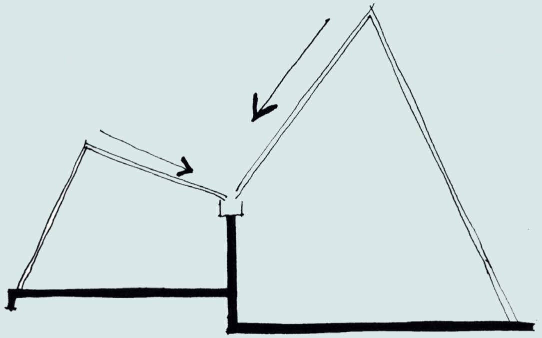


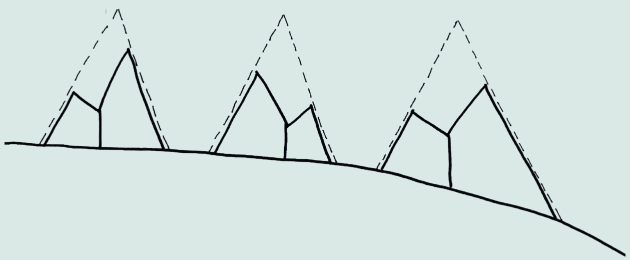


Iteration three

- Explored a shared language (rythm) in the roofscape of all buildings. This led to the exploration of the spatial concept of a triangular form as a roof and independent spatial delimiter.







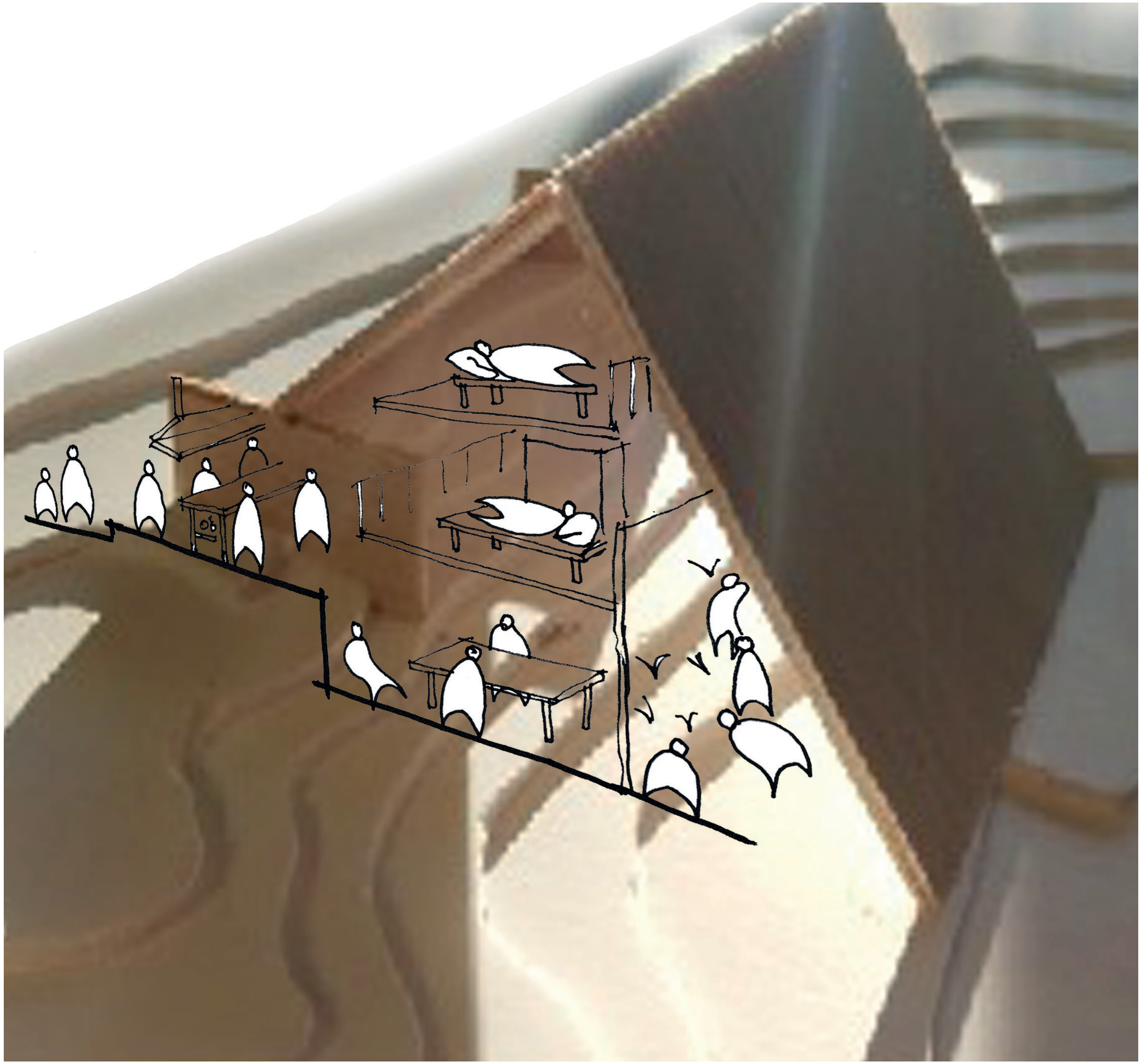
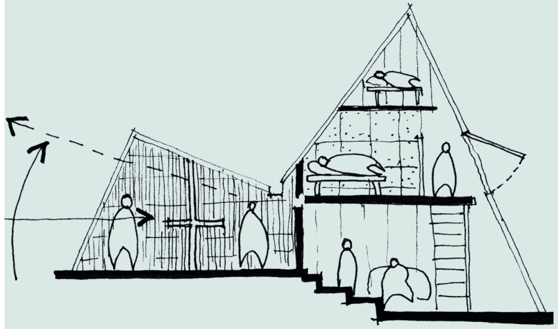
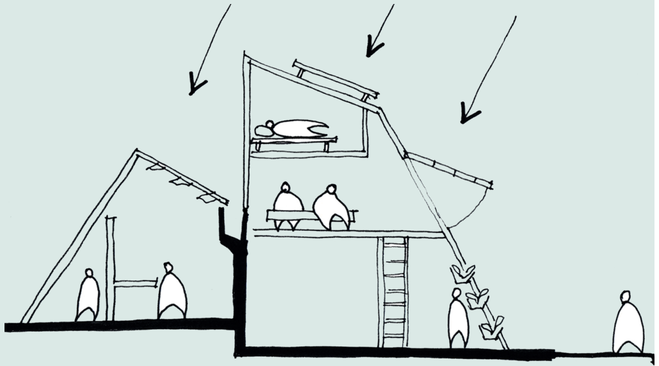


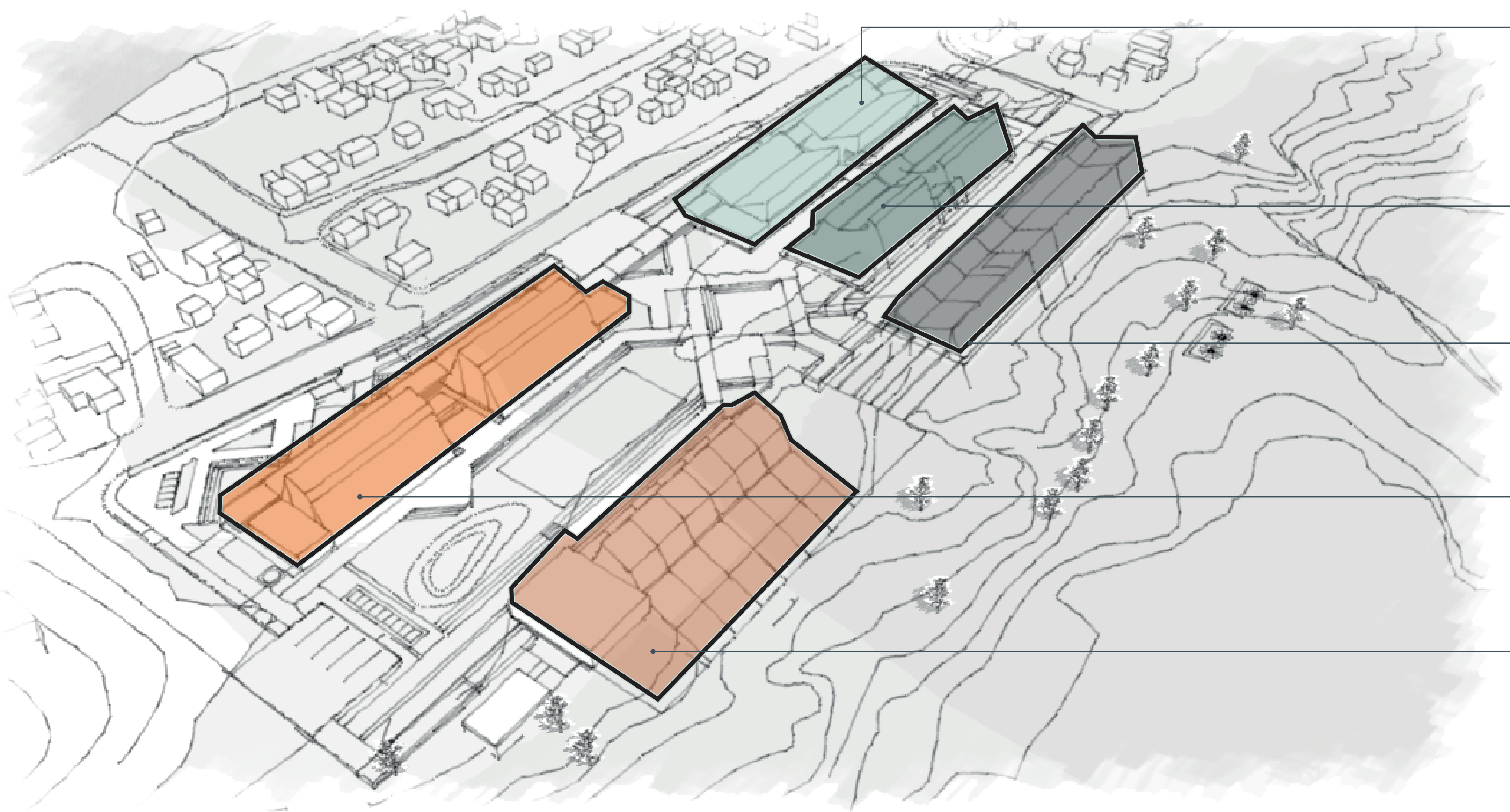
Figure 3.22: Design iteration five sketch explorations (Author 2021)

Figure 3.23: Design iteration five model exploreation (Author 2021)





The spatial geometry is such that the scale of the buildings increases as one moves through the site from the street. Buildings are also set back to create a public square and semi-public shared spaces.



Three layers exist with the mixed-use spaces at public interface on the street edge, the semi-public education facilities in the middle layer, and the production at the quarry edge.

On the East of the intervention are the trade and housing spaces as the first layer, then the child-care facilities as the second layer. On the Western end are trade facilities on the street edge, and consultation rooms for entrepreneurship and skills consultancy as well as registration for (type) opportunities within the community. This then transitions into makerspaces where people in the community can share the facilities to produce and exchange knowledge.

Figure 3.24: Programme (Author 2021)

3.3 Tecné

3.3.1 Technical Concept

The technical concept explores the upscaling of vernacular technology and innovation. It is two-part, the first concerned with the structure and making and the second with the building and production systems. The structural concept adopts the structural model of the vernacular which in essence is a lightweight structure and infill tectonic architecture (figure 2.87). Similarly, the systems concept draws, circularity, draws from the vernacular construction in which high levels of circularity demonstrated in the recycling and reuse of materials. Circularity is extended to and upscaled in the water systems, and through the introduction of hemp to the material pallet.

3.3.1.1 Structure, construction, and materiality

The overarching project theme of building existing capabilities translates into two structural intentions, a) didactic in nature and b) facilitate collaborative construction. Concerning didactic intentions, the project learns from the vernacular, but rather than a fully replicative approach, an improvement outlook is taken in which problematic aspects of the vernacular construction are addressed and opportunities considered. In that regard, robustness of the structure, thermal comfort, fire resistance and scale, aspects about which the informal vernacular buildings fall short motivate the proposed alterations or challenges to the vernacular construction and design. Additionally, the system of construction, structure, and assembly are exposed and construction is envisioned as collaborative so that the project has didactic capacity.

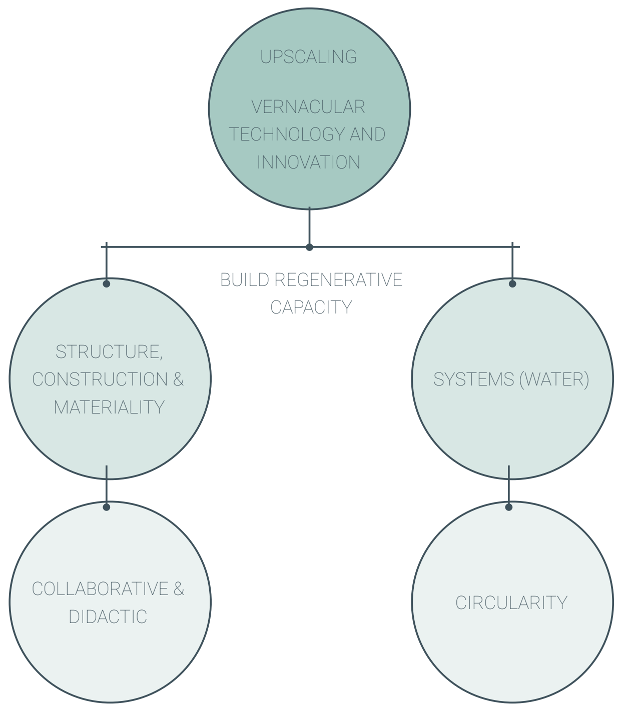


Figure 3.25: Technical concept (Author 2021)

Figure 3.26: Material palette of Melusi (Author 2021)

Regarding collaborative construction, the project explores the application of the hallmarks of vernacular construction, identified as:

1. Use of light-weight construction (enables the participation of women and children and the transportation using available means such as by hand or wheelbarrow).
2. Multiplicity in material application (enables efficiency in the use of found materials, and keeping of materials in cycle).
3. Local sourcing of material (accomodates an economy of means).
4. Labour-intensive construction (use of un-tutored labour and knowledge and skill sharing. Also accomodates an economy of means).
5. Ease of assembly and disassembly (enables collaborative participation and that of unskilled participants).

The design adopts a tectonic approach postulated as a primary timber structure onto which light-weight elements are layered. Timber is chosen as the structural material because of its qualities that facilitate fast assembly and disassembly, adaptability of design, recyclability, and lightweight and environmentally low-impact construction. The traits are like those of vernacular construction in which gumpoles and timber are used as structural elements onto which lightweight materials are added as infill. A cause for concern is assembly that creates a more robust structure than that observed in the informal vernacular construction which is often more vulnerable to fire, rot and termites. The aesthetic quality also gives an appearance of lightness which furthers the concept of an embedded spatial topography of the intervention.

Proposed as the main materials for the secondary structure are hemp and corrugated metal sheets. The adaptable qualities of timber will facilitate the application of these and other materials in the site's material palette (figure 3.26). However, overtime as hemp, which is proposed as an addition to the existing material pallet is grown and processed on site, it will be applied to the community dwellings as well. Hemp is proposed due to its positive attributes to the environment, qualities that can facilitate the realisation of collaborative construction through the application of vernacular construction traits. These include:

1. Light-weight material.
2. Multiplicity: Can be applied to walls, ceilings, roofs, and even floors.
3. Labour-intensive construction and production
4. Monolithic (reducing layers and making construction easier to understand, diagnose and maintain)

It provides advantages for construction that improve building performance and reduce vulnerabilities, including:

1. Good thermal insulation qualities and thermal mass (table 3.3).
2. Good hygrothermal behaviour. Passively regulates moisture in the air, eliminating mould and condestation.
3. Good acoustic insulation.
4. Resilient: Passive fire strategy removes the need for toxic coatings, additional linings.
5. Compostable: Can return to the ground without doing any damage.

However, it has low compressive strength and can only be used as a non-loadbearing element. Lastly, hemp has regenerative benefits as a plant with capacity to improve land quality through phyto-remediation, has carbon sequestration properties and can be converted into non-toxic construction materials with low embodied energy (Mueller et al 2019). Whilst it is a light-weight material in construction, it can give the impression of heaviness especially when cast as hempcrete or plastered hemp blocks (figure 3.27). It will also be used as insulation in the roof and where corrugated metal is used as a wall finish, especially on the street edge, which is the neighbourhood interface. In essence, the structure engages the tectonic use of steel and of lightweight in-fill elements that communicate an interplay between light and heavy elements.

Figure 3.27: Hempblock (Stanwix 2021).

Thickness in cm	8	12	15	20	25	30	36	40
Density in kg/m3	330	330	330	330	330	330	330	330
Lambda Thermal Conductivity in W/(mK)	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Thermal transmittance (U-value) in W/m2K	0.76	0.53	0.43	0.35	0.27	0.22	0.19	0.17
Resistance to water vapour diffusion (m)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Specific heat capacity (J/kgK)	1870	1870	1870	1870	1870	1870	1870	1870
Coefficient of sound absorption	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Reaction to fire with plaster	Non-Flammable			Non-Flammable			Non-Flammable	
Phase shift without plaster	3h9m	5h53m	7h58m	12h35m	14h48m	18h13m	22h19m	24h4m

Table 3.3: Typical hempcrete performance (Sparrow 2021).

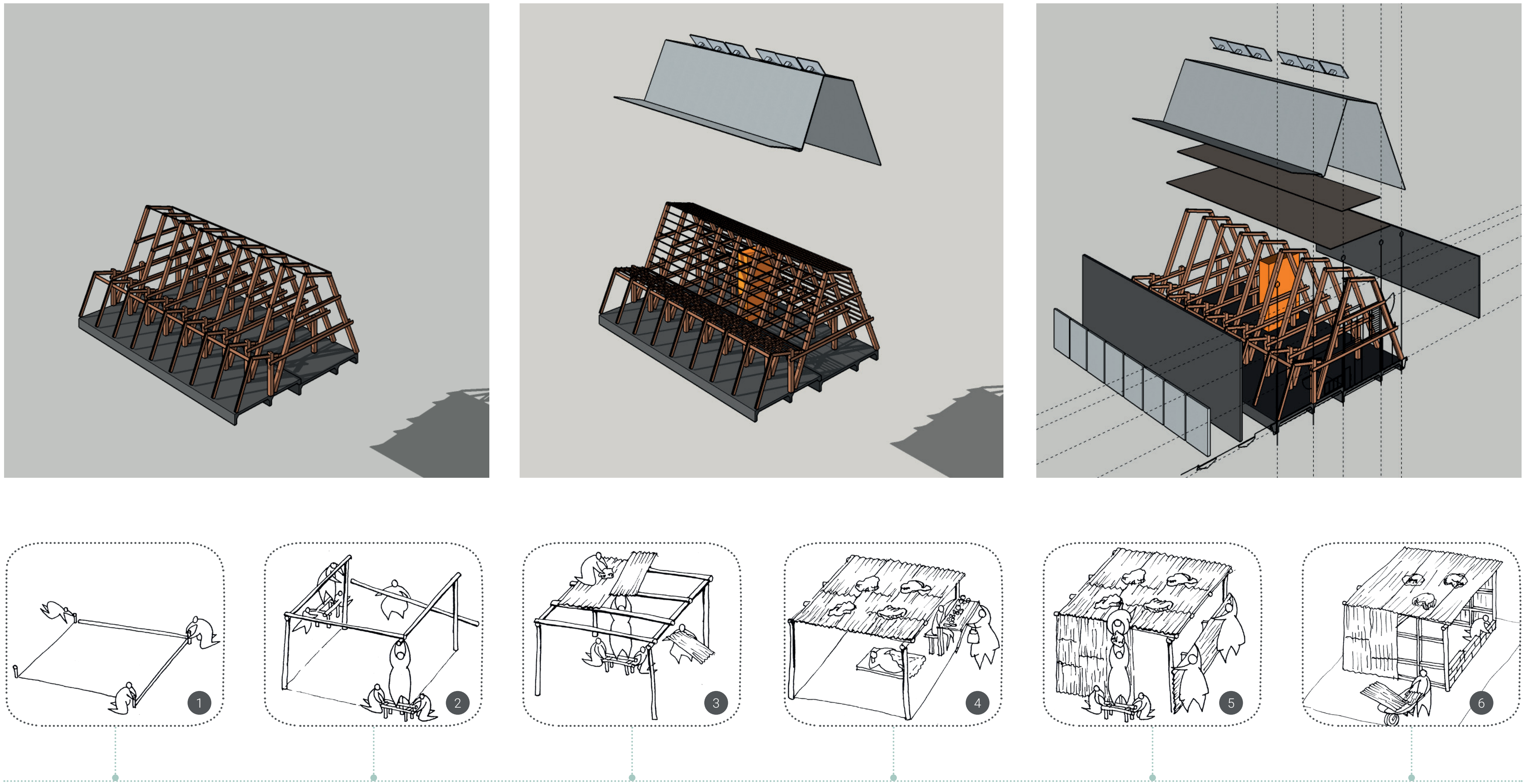


Figure 3.28: Construction sequence (Author 2021).

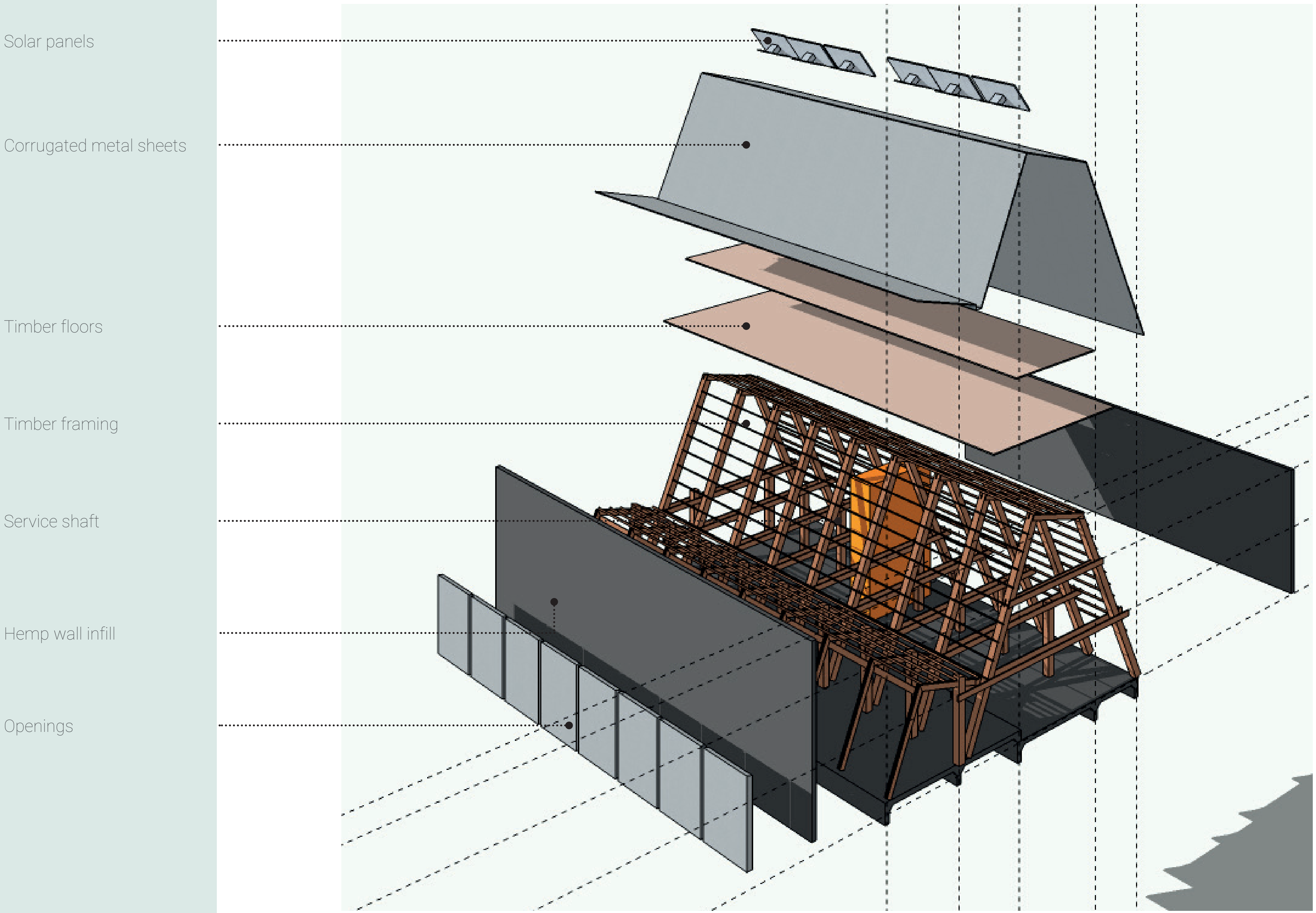


Table 3.29: Structural layering (Author 2021).

3.3.1.2 Systems

Considering the site's situation on a scarred landscape and in a community experiencing water-related vulnerabilities (figure 3.32), water and the landscape are the main foci regarding building systems. Incorporated in the intervention's landscape, detailing and growing systems are elements to facilitate circularity in the water system in connection to the quarry pond and to the settlement. Proposed is an integrated water system: involving the collection and re-use of water: stormwater management, rainwater harvesting, grey water recycling and quarry pond water harvesting (figure: 3.30).

As proposed in the urban framework stormwater runoff from the roads and paving is directed into the bioswales and tree wells which treat and retain water, decreasing runoff into the site and quarry pond (figure 3.31).

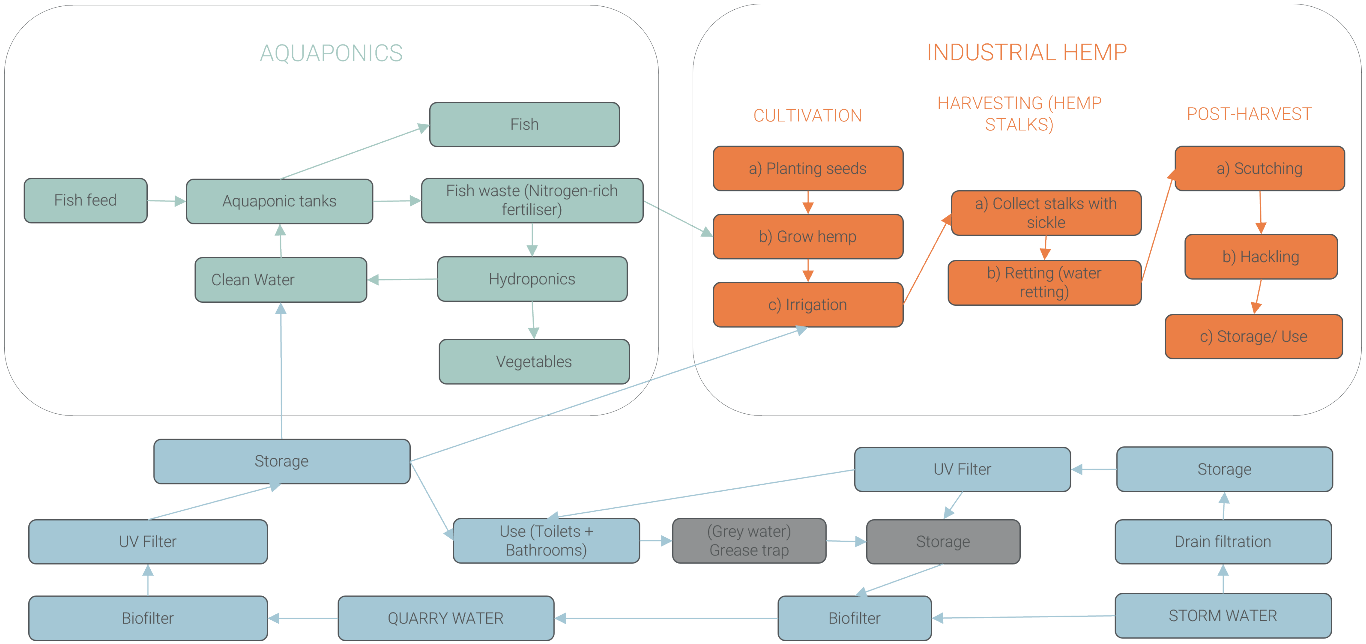
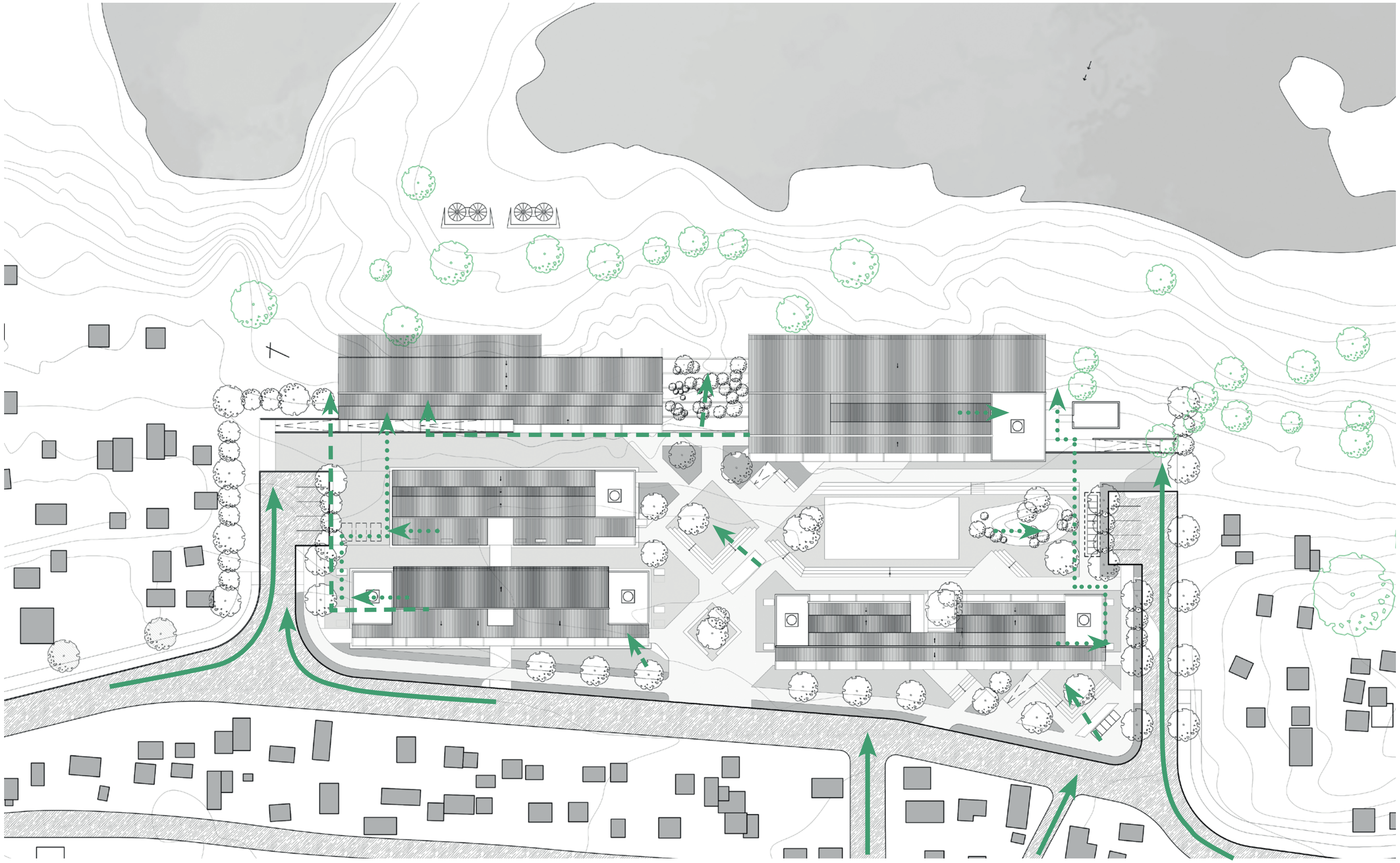


Figure 3.30: Water integrated systems drawing. Adapted from Buchner 2014 (Author 2021)



Stormwater in tree wells

Bioswales

Dish drains

Figure 3.31: Stormwater management (Author 2021)

Figure 3.32: Flooding in Melusi (Author 2021)

In Pretoria, the rainy season falls between November and January, whilst the dry season falls between May and August (figure 3.33). To satisfy the water needs, without any reliance on municipal water supply, a hybrid system is proposed. During the dry periods, the project will rely on water collected from the quarry pond. Using a low-tech filtration system (figure 3.36), the pollutants are removed. Subsequently, the water is then pumped to the central filtration and purification system housed in the basement of the hemp processing facility. There it is UV filtered. It is then pumped to the water tanks within the site which use low-pressure systems to provide the facilities with water for irrigation and other uses. (figure 3.35). The pumps will be powered by solar electricity and restricted to day-time use.

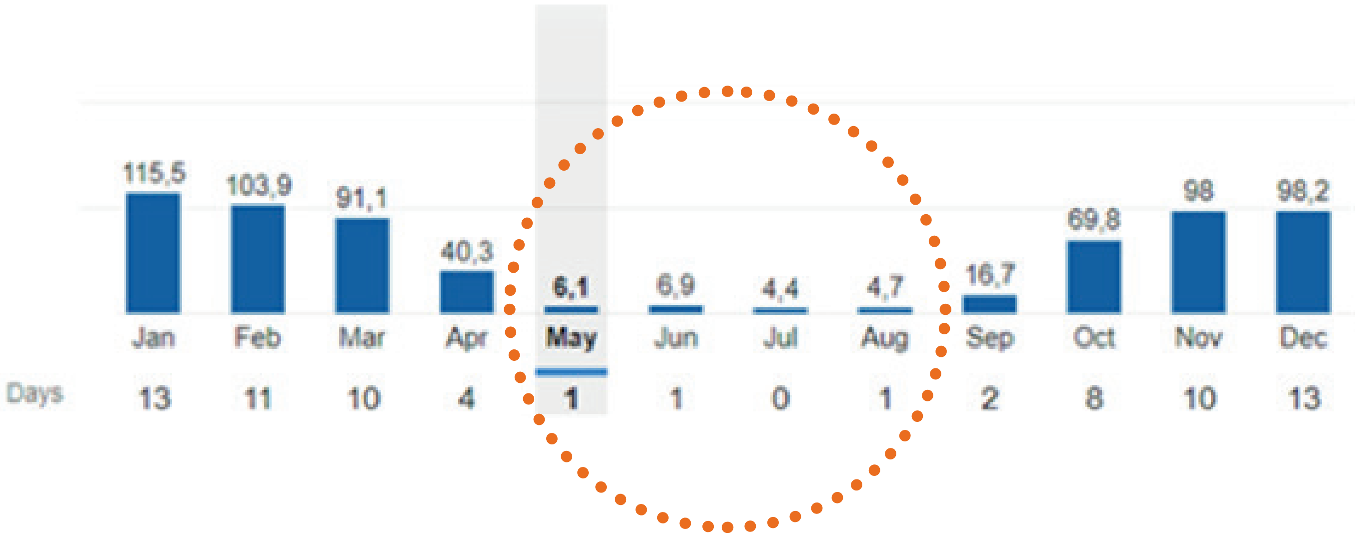


Figure 3.33: Pretoria rainfall (Gibberd 2020 citing National Centers for Environmental Information 2020)

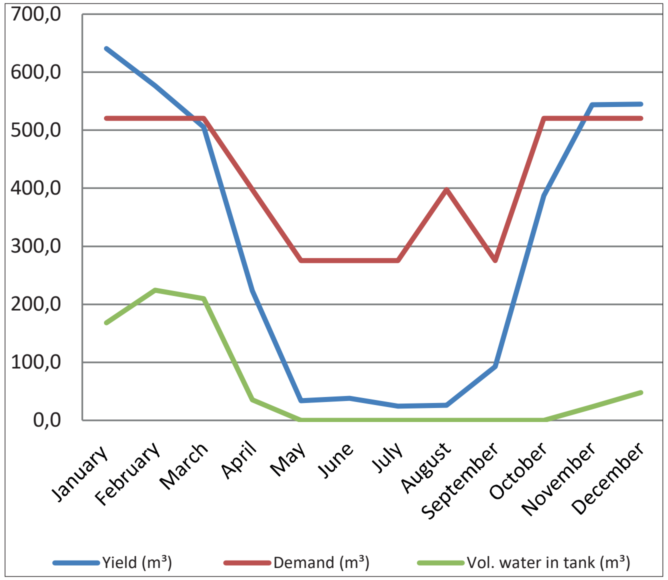
During the rainy season, rainwater will be regarded as the primary source of water. It will be collected from precipitation runoff from the roofs by gutters of all buildings on site. It will then be directed into drains whereby pollutants are removed. Thereafter, it will be channelled into the filtration planters, then to the central filtration.

Biodigesters are proposed, one on the East and another on the Western end of the site. They will be fed by the toilets on the facility. The output can be used as fertiliser for the community gardens. Methane gas collected will be pumped to the kitchen facilities.

Figure 3.4: Table showing estimated annual rainwater collection (Author 2021)

Month	Yield (m³)	Demand (m³)	Monthly balance	Vol. water in tank (m³)
January	640,7	520,2	120,5	168,3
February	576,3	520,2	56,1	224,4
March	505,3	520,2	-14,9	209,5
April	223,5	397,7	-174,2	35,4
May	33,8	275,2	-241,4	0,0
June	38,3	275,2	-237,0	0,0
July	24,4	275,2	-250,8	0,0
August	26,1	397,7	-371,7	0,0
September	92,6	275,2	-182,6	0,0
October	387,2	520,2	-133,0	0,0
November	543,6	520,2	23,4	23,4
December	544,7	520,2	24,5	47,9
ANNUAL AVE.	3636,6132	5017,7	-1381,087	

Figure 3.34: Graph showing estimated annual rainwater collection (Author 2021)



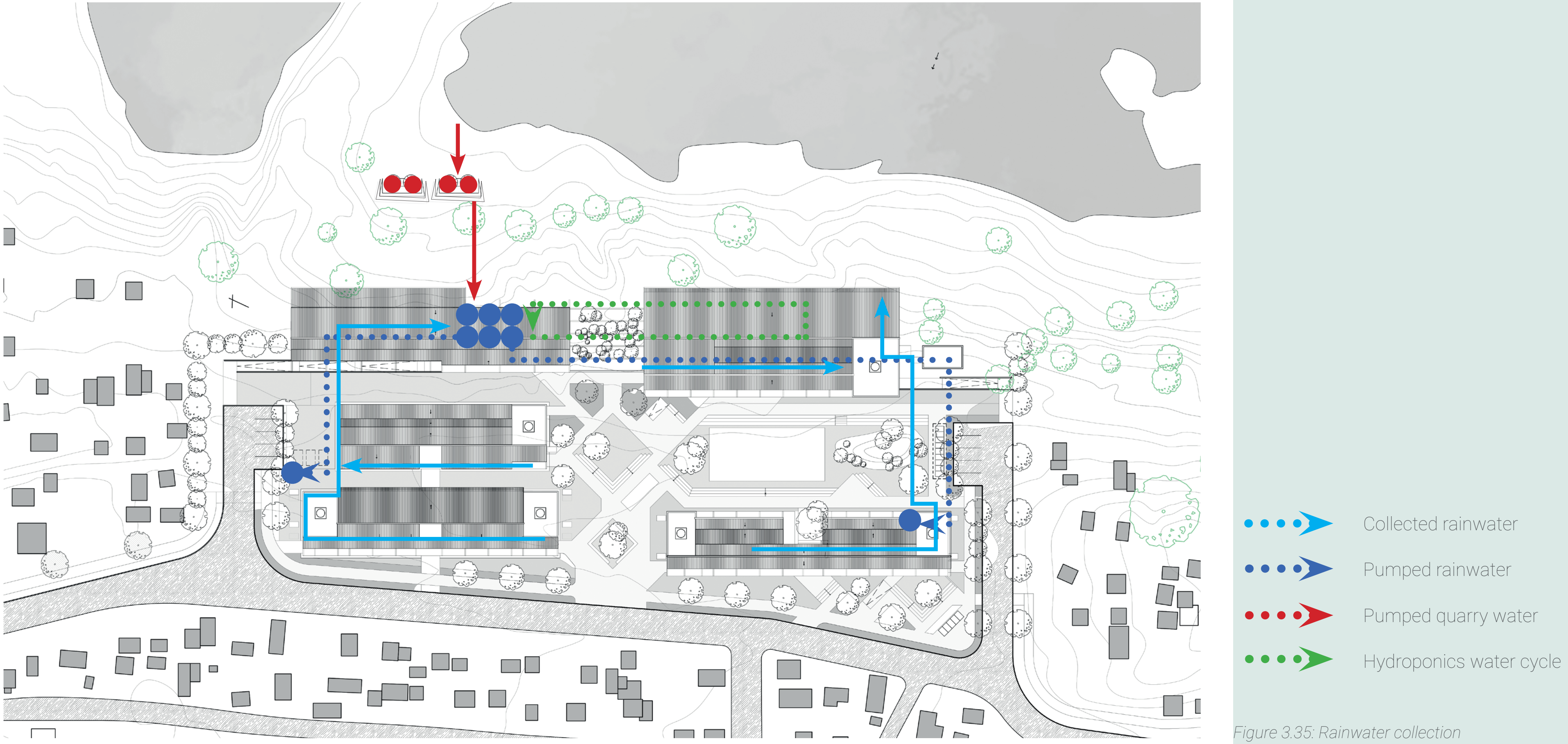


Figure 3.35: Rainwater collection

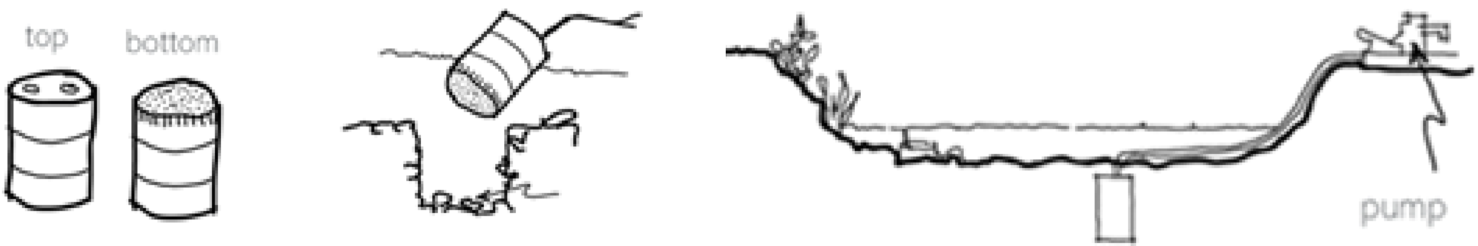


Figure 3.36: Filtration of pond water (van Lengen 2008)

Runoff from the site and grey water is channelled to the filtration planters on the terraces and filtered through Phyto-purification and then to the quarry pond. Hemp will be cultivated on the banks of the quarry pond, facilitating phytoremediation; absorbing phosphates and other toxins from the water as in wetlands.

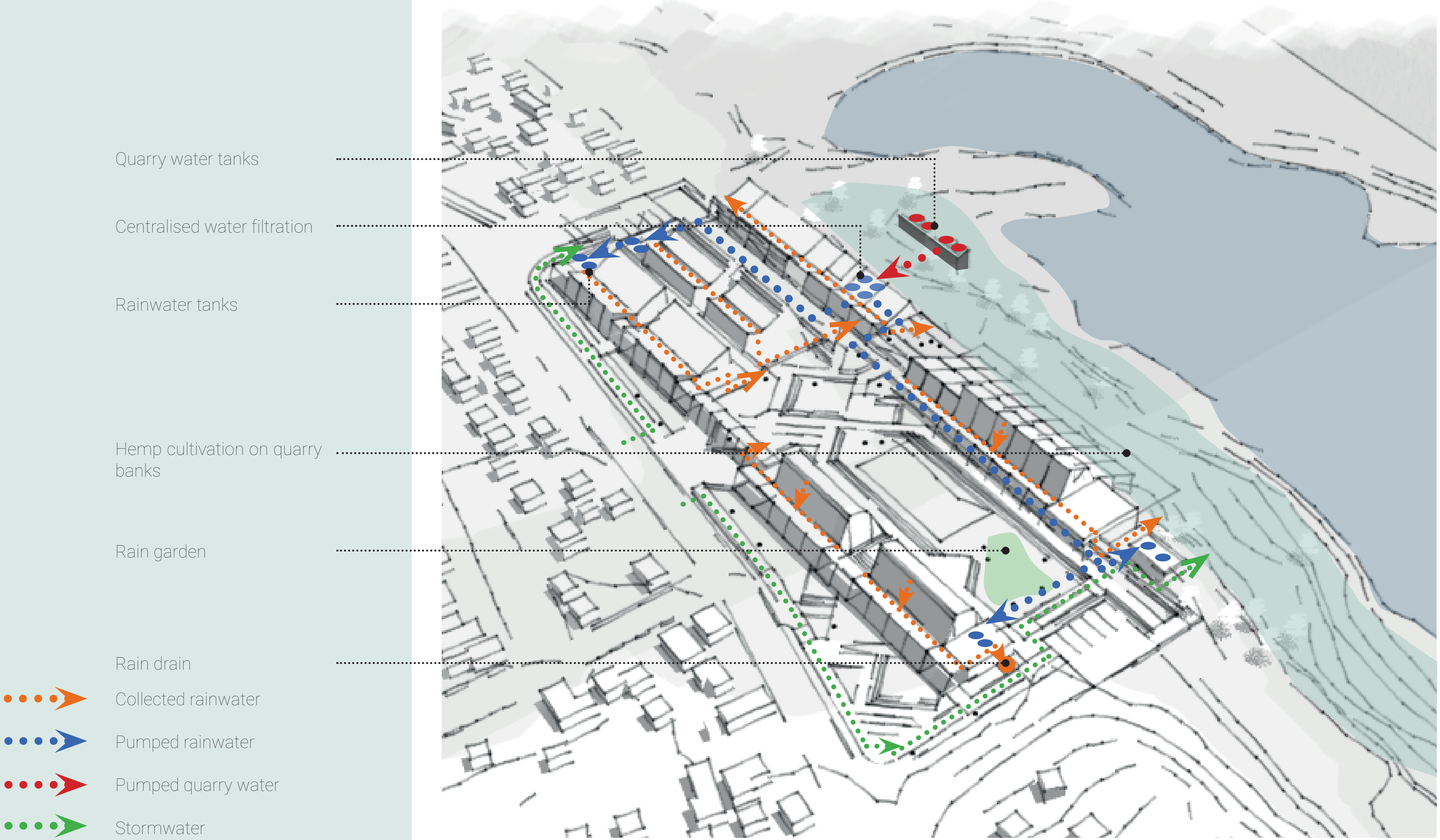


Figure 3.37: Water systems (Author 2021)

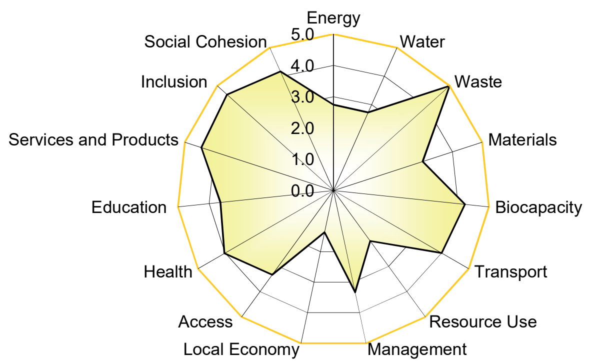
SUSTAINABLE BUILDING ASSESSMENT TOOL RESIDENTIAL
1.04

		Achieved
SB	**SBAT REPORT**	**3.5**

SB1 Project
Melusi Resource Facility

SB2 Address
Melusi, Pretoria

SB3 SBAT Graph



SB4 Environmental, Social and Economic Performance	Score
Environmental	3.5
Economic	2.8
Social	4.2
SBAT Rating	3.5

SB5 EF and HDI Factors	Score
EF Factor	3.6
HDI Factor	3.4

SB6 Targets	Percentage
Environmental	70
Economic	73
Social	76

SB7 Self Assessment: Information supplied and and confirmed by

Name	Date
Signature	

SB8 Validation: Documentation validated by

Name	Date
Signature	

SB9 Validation Report Version

IVR

Figure 3.37: SBAT Rating (Author 2021)

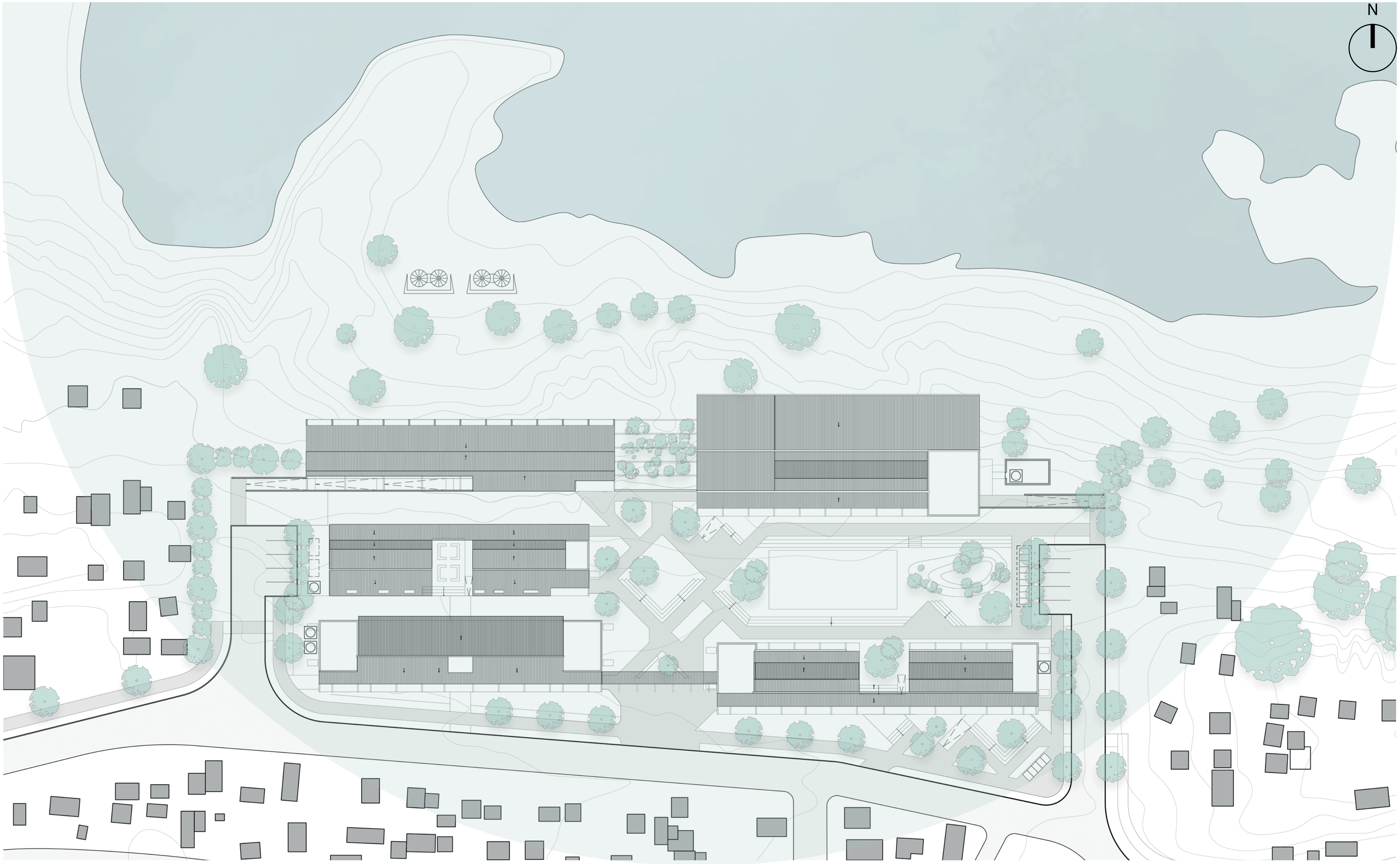


Figure 3.38: Site plan. Original drawn at 1:500 (Author 2021)

Figure 3.39: Model image.. Original built at 1:250 (Author 2021)

Figure 3.40: Ground floor plan. Originally drawn at 1:100 (Author 2021)

Figure 3.41: Model image.. Originally modelled at 1:250 (Author 2021)

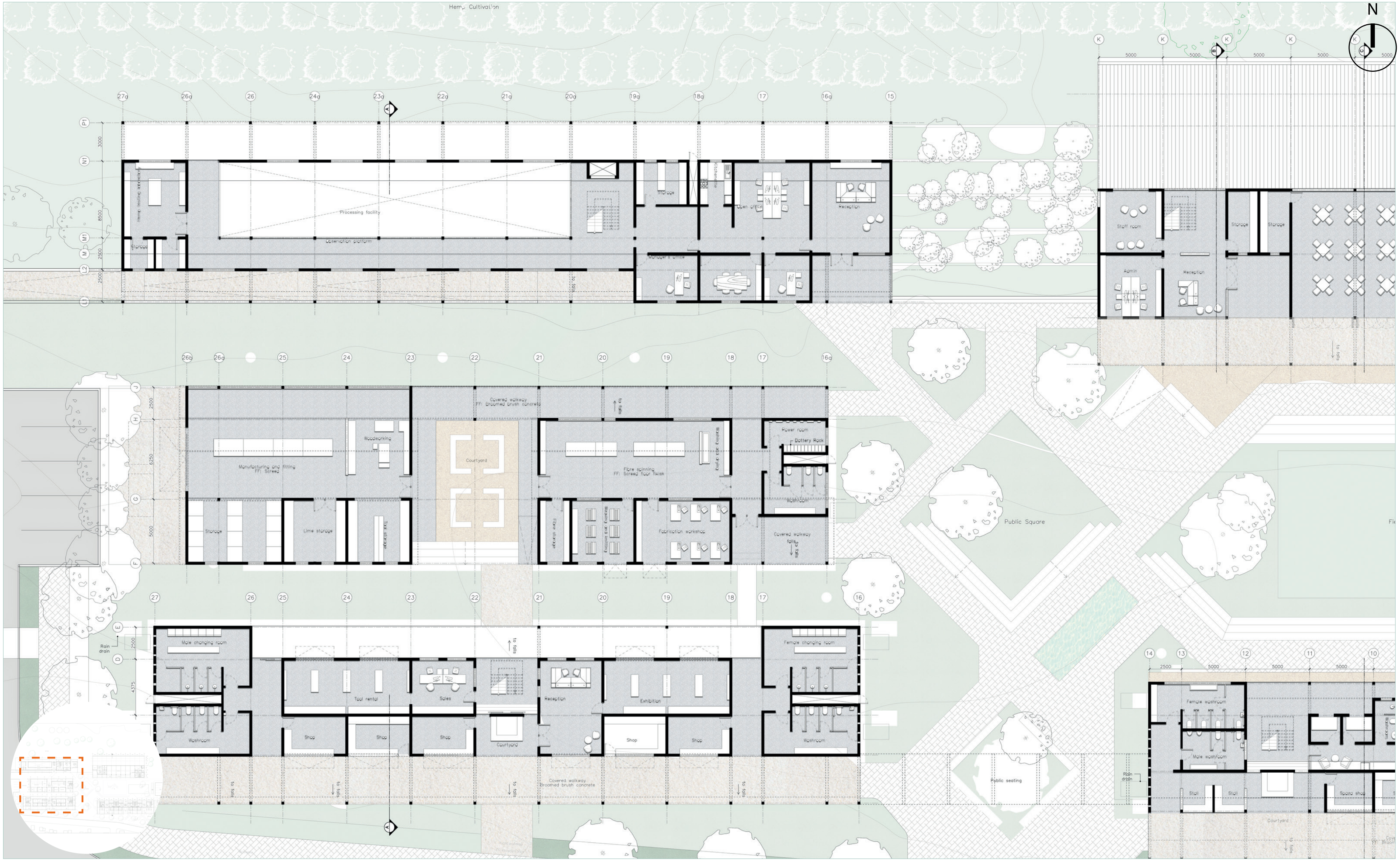


Figure 3.42: Ground floor plan (Hemp processing facility and makerspace). Originally drawn at 1:100 (Author 2021)

Figure 3.43: Perspective of the market street and site entrance (Author 2021)

Figure 3.44: Model image.. Originally modelled at 1:250 (Author 2021)

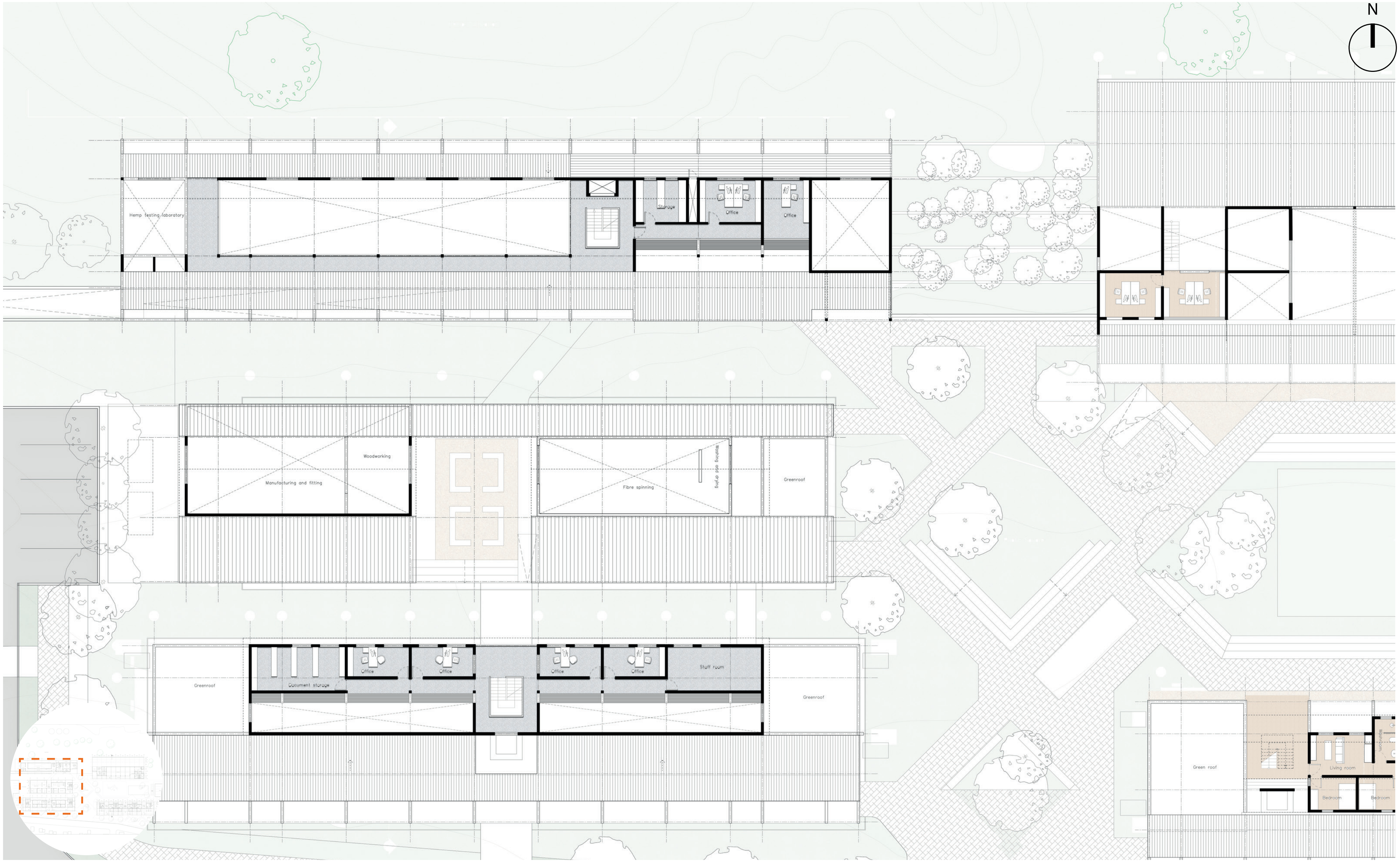


Figure 3.45: First floor plan (Hemp processing facility and makerspace). Originally drawn at 1:100 (Author 2021)

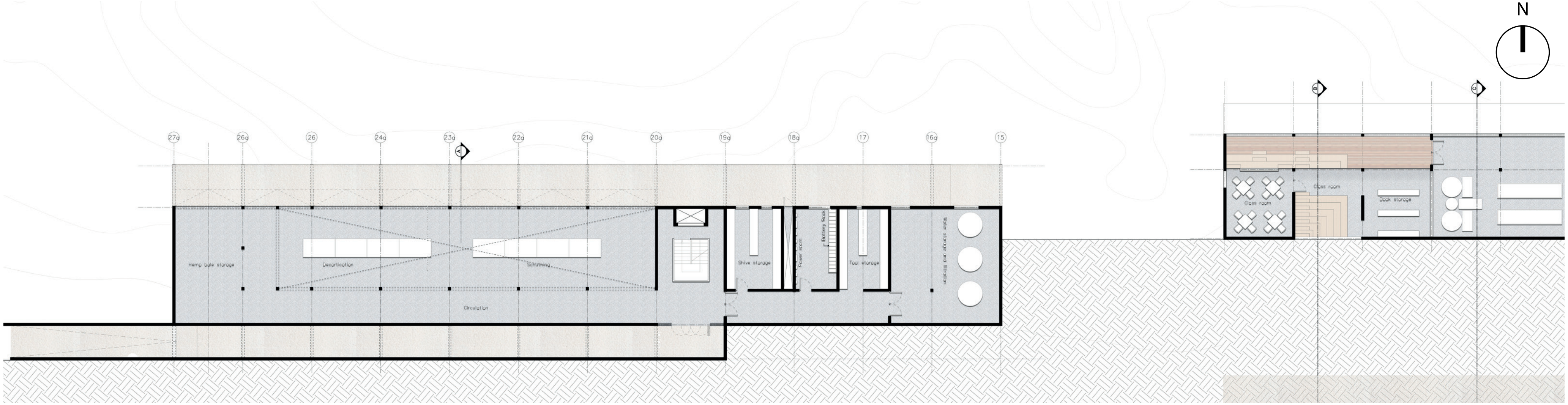


Figure 3.46: Basement floor plan (Hemp processing facility). Originally drawn at 1:100 (Author 2021)

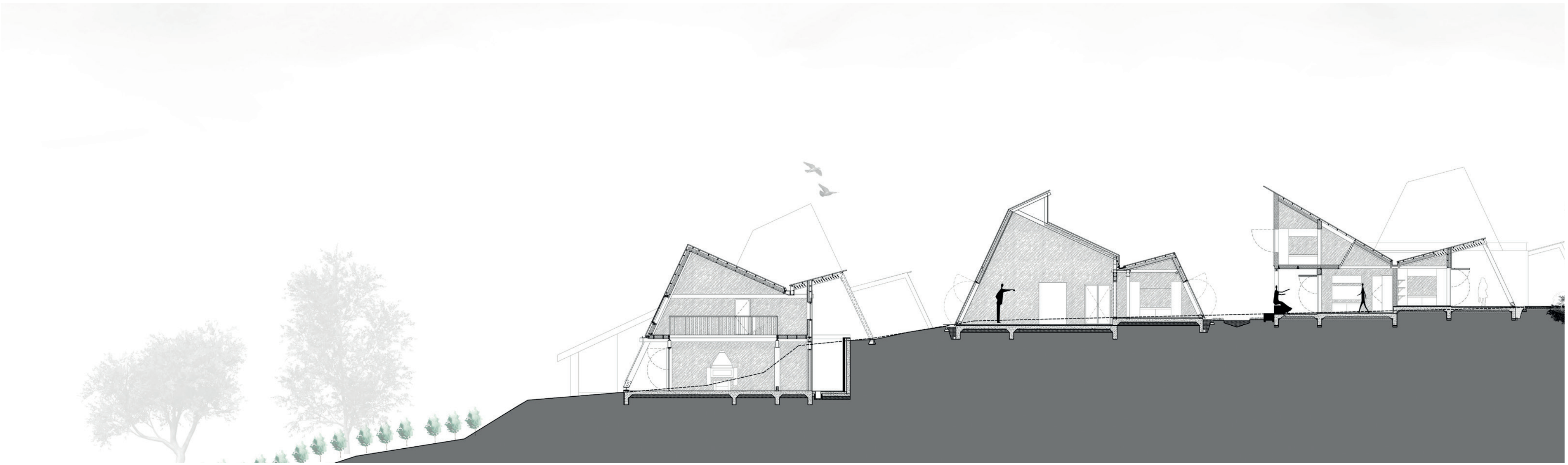


Figure 3.47: Section A (Author 2021)

a HEMP CULTIVATION

Hemp cultivation
Retting

b HEMP PROCESSING

Bale storage
Decortication
Scutching

c1 HEMP BLOCKS

Bale storage
Decortication
Scutching

c2 HEMP TEXTILE WORKSHOPS

Fibre cleaning
Shive cleaning
Refining
Weaving and knitting

d1 SALES

Sale of hemp products
to the community

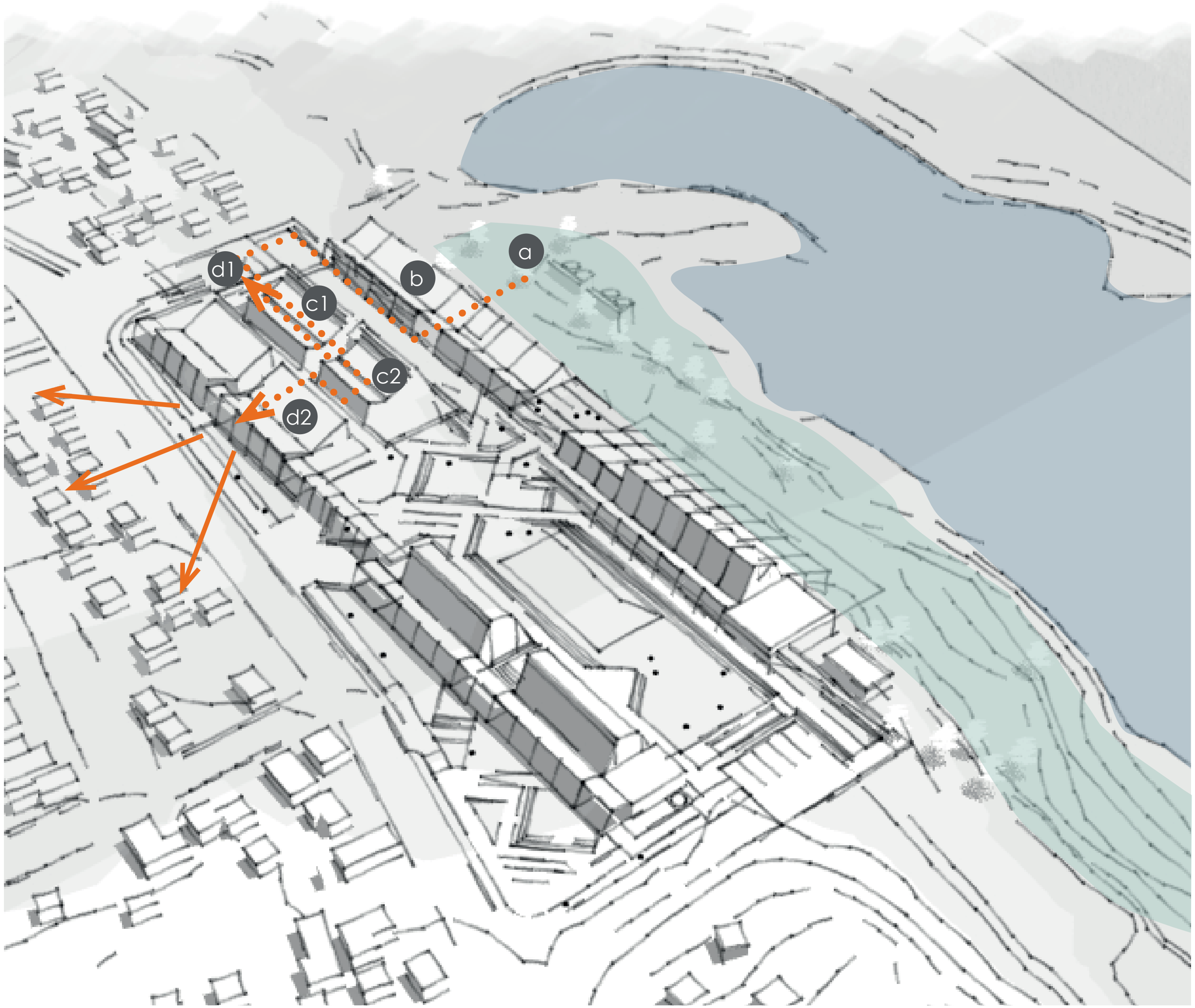


Figure 3.48: Hemp processing (Author 2021)

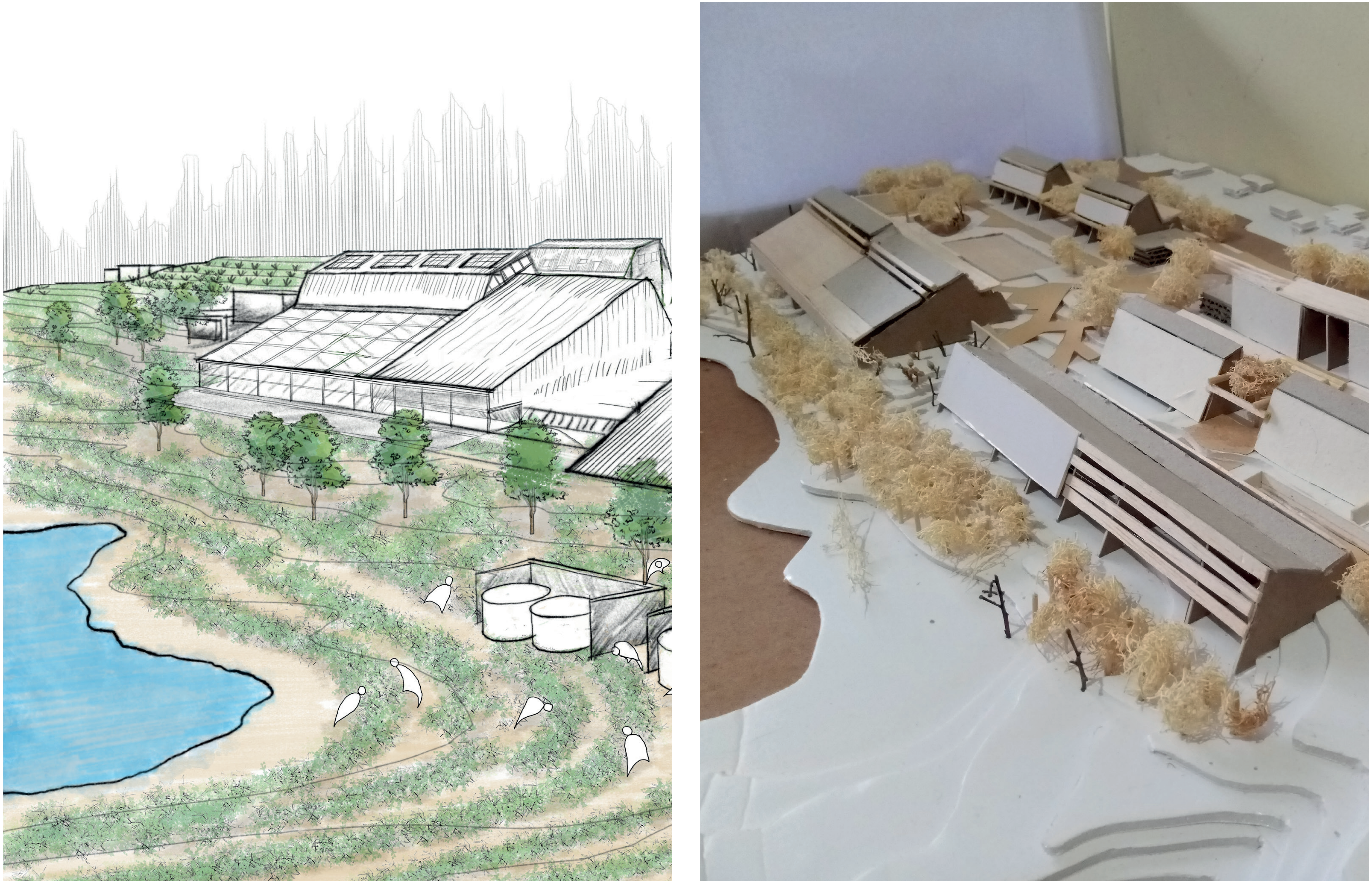


Figure 3.49: Perspective of hemp cultivation on the quarry banks (Author 2021)

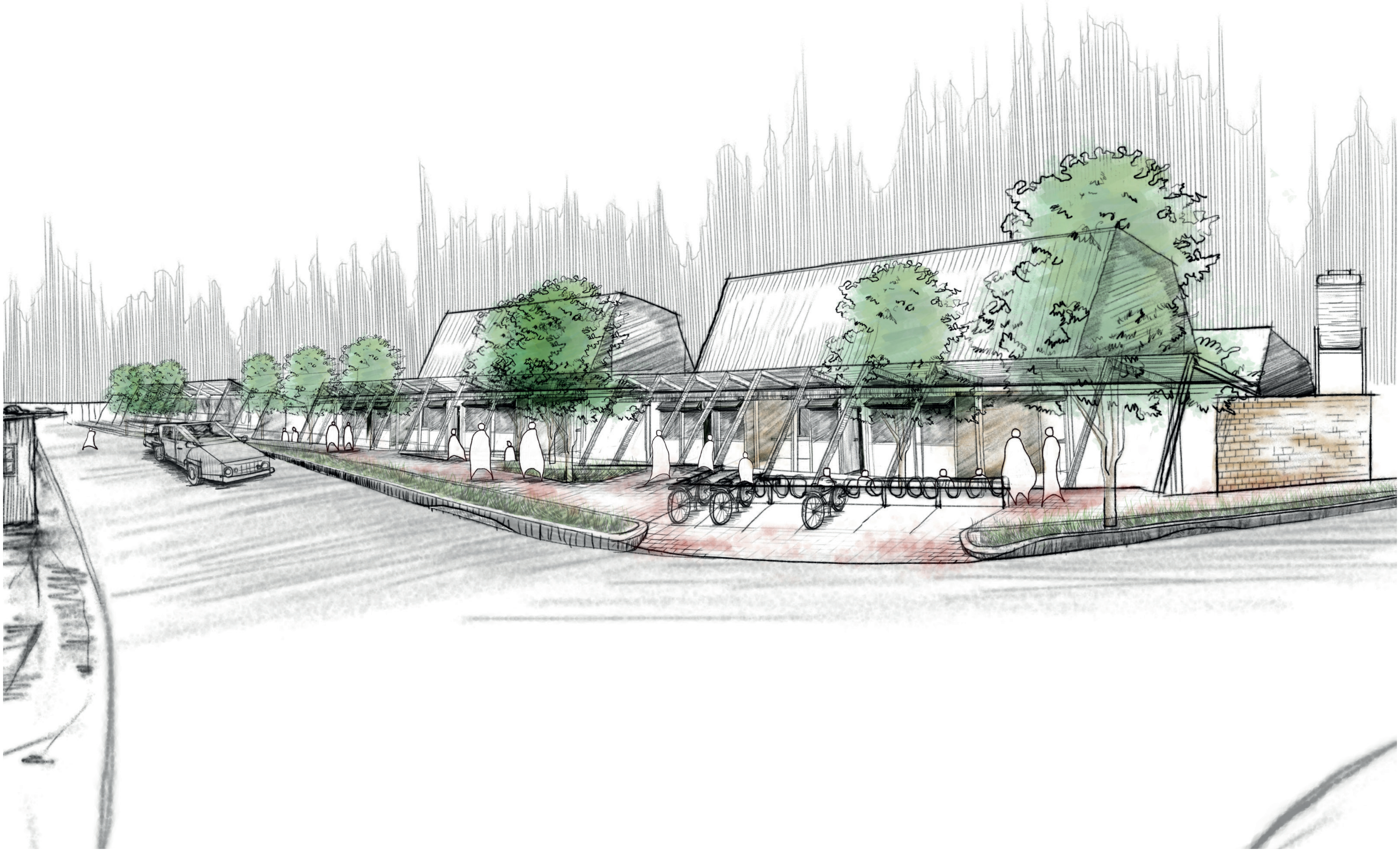


Figure 3.50: Street perspective of the live/work spaces. Originally drawn at 1:100 (Author 2021)

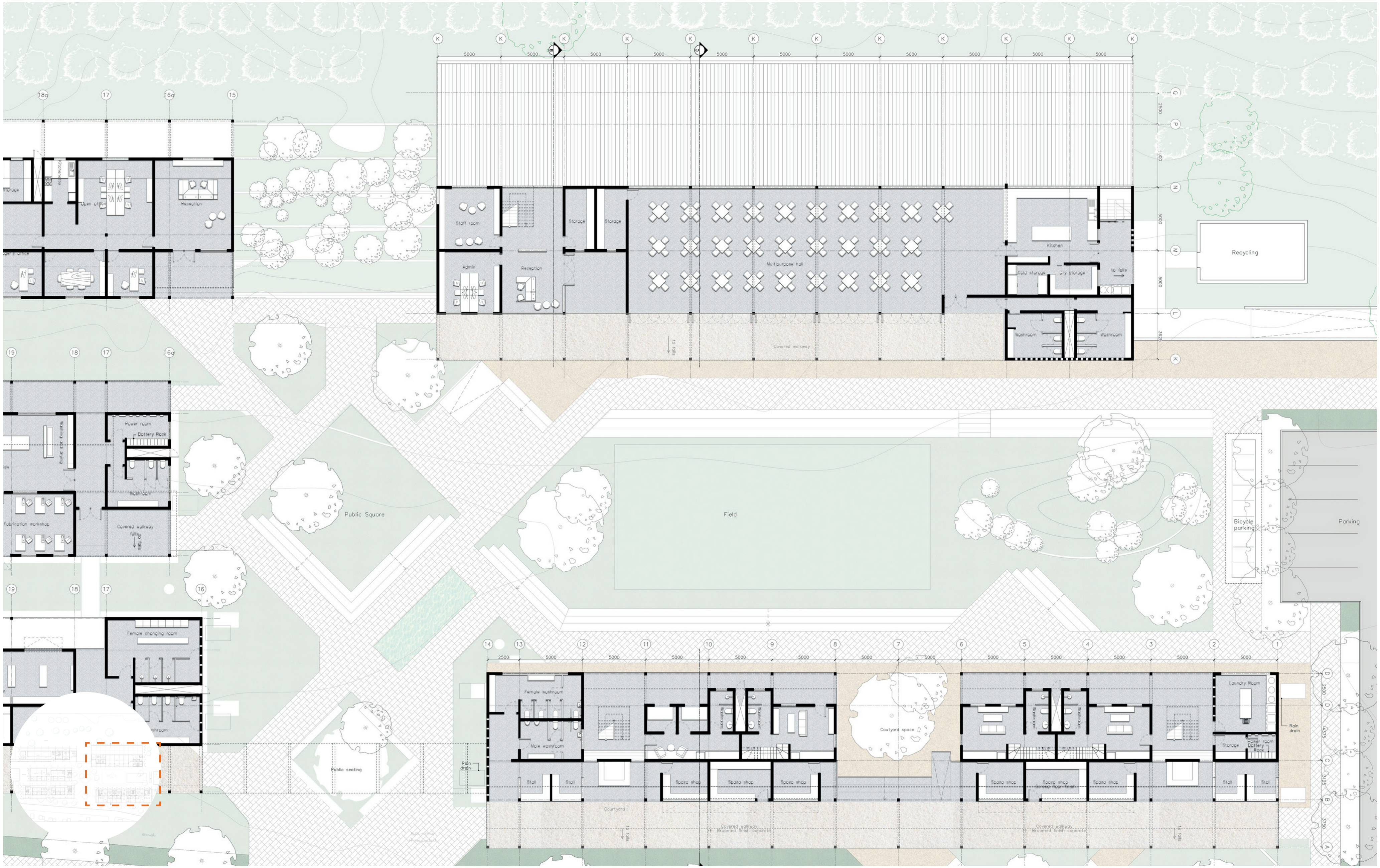


Figure 3.51: Ground floor plan (live/work and afterschool programme). Originally drawn at 1:100 (Author 2021)

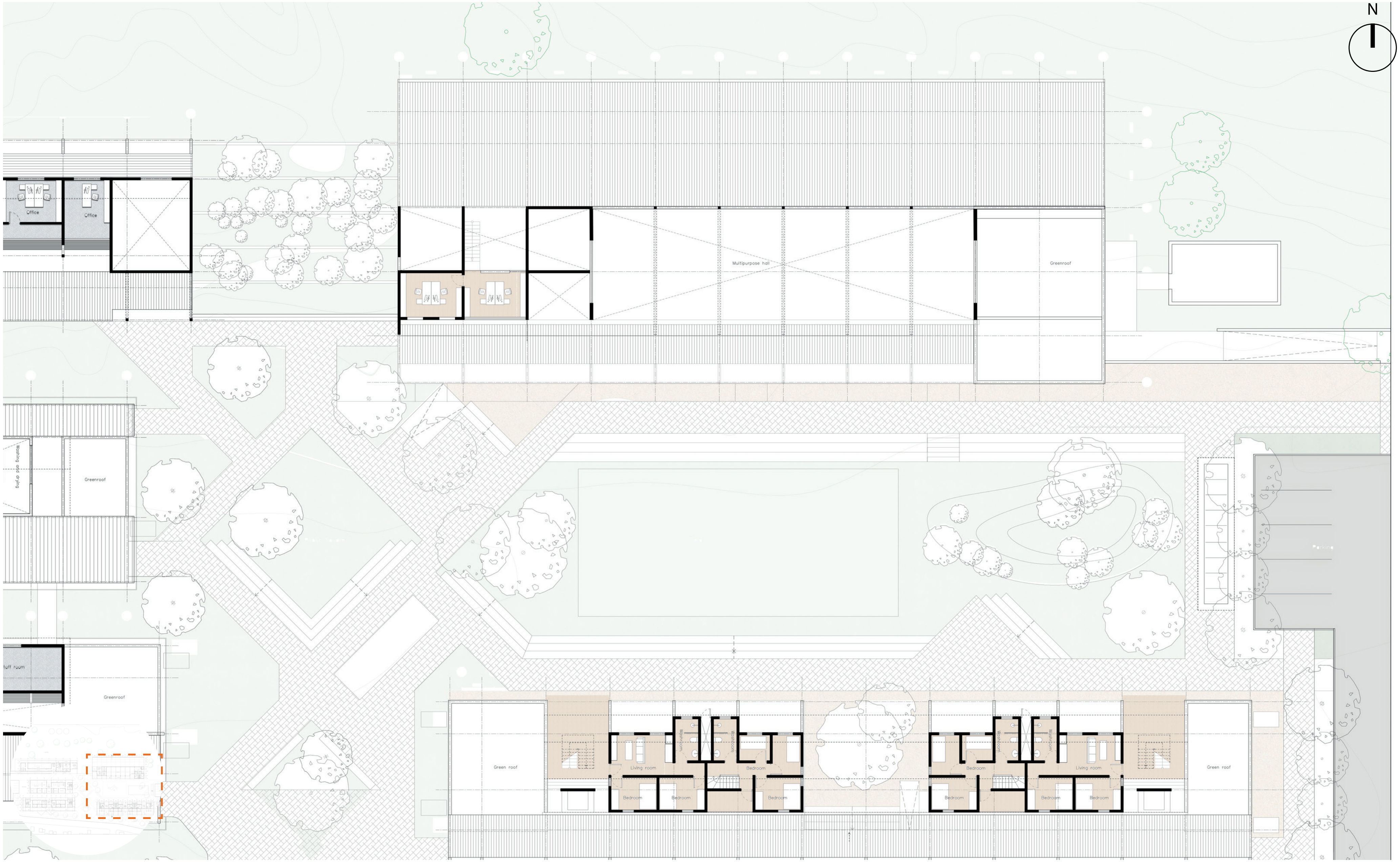


Figure 3.52 First floor plan (live/work and afterschool programme). Originally drawn at 1:100 (Author 2021)

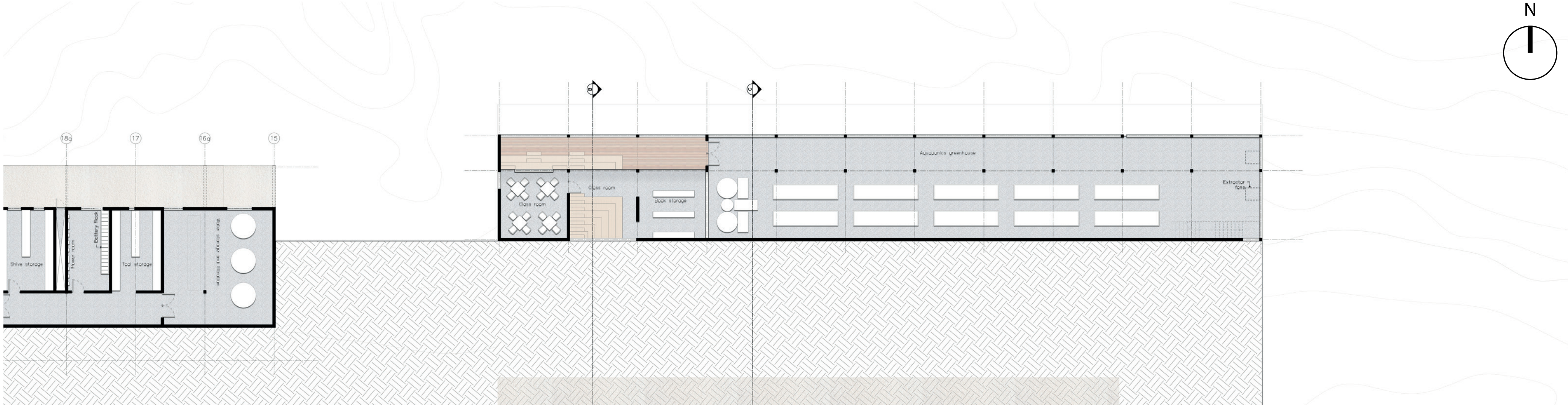


Figure 3.53: Basement floor plan (afterschool programme). Originally drawn at 1:100 (Author 2021)

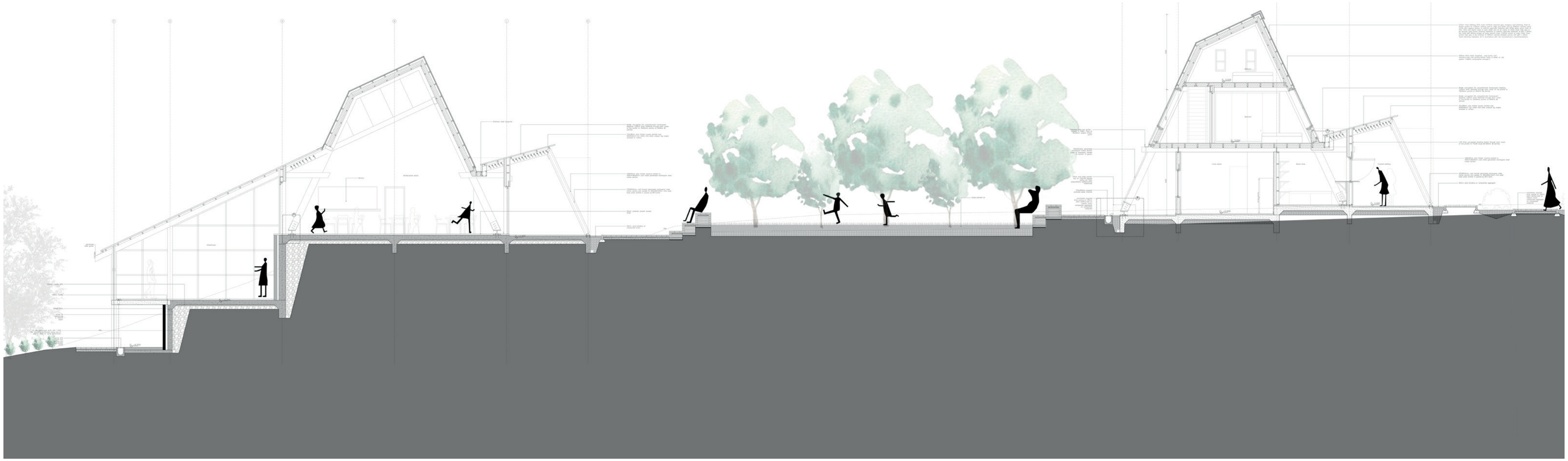


Figure 3.54: Section C (live/work and afterschool programme). Originally drawn at 1:20 (Author 2021)

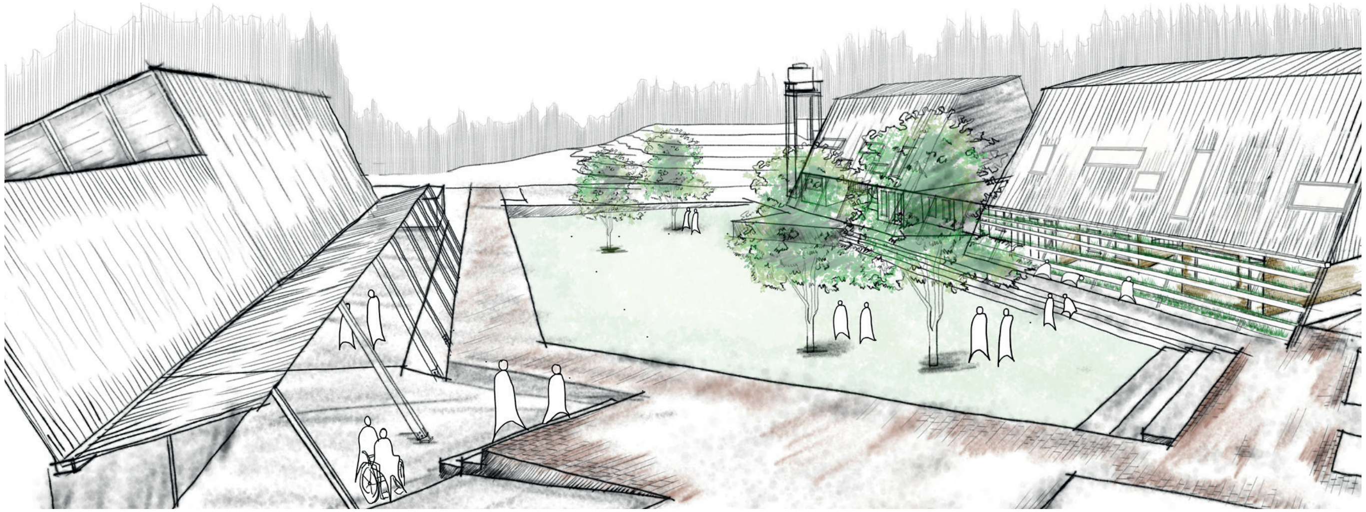


Figure 3.55: Perspective of shared space between the live/work and afterschool programmes. (Author 2021)

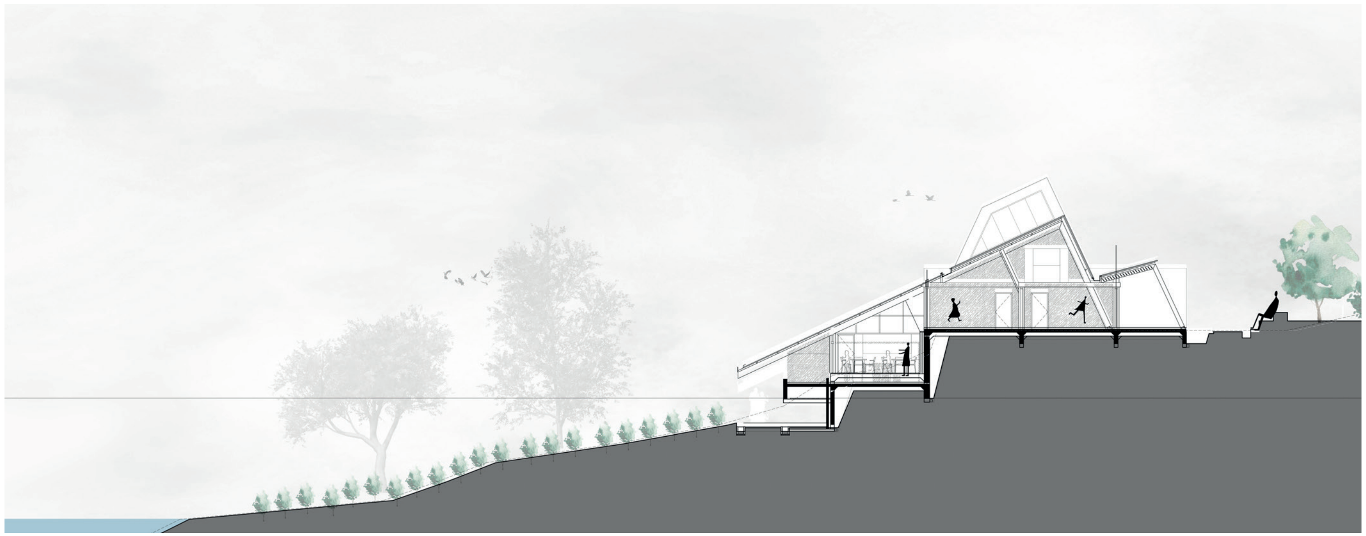


Figure 3.56: Section B (afterschool programme). Originally drawn at 1:100 (Author 2021)

Figure 3.57: Model images.. Originally modelled at 1:250 (Author 2021)

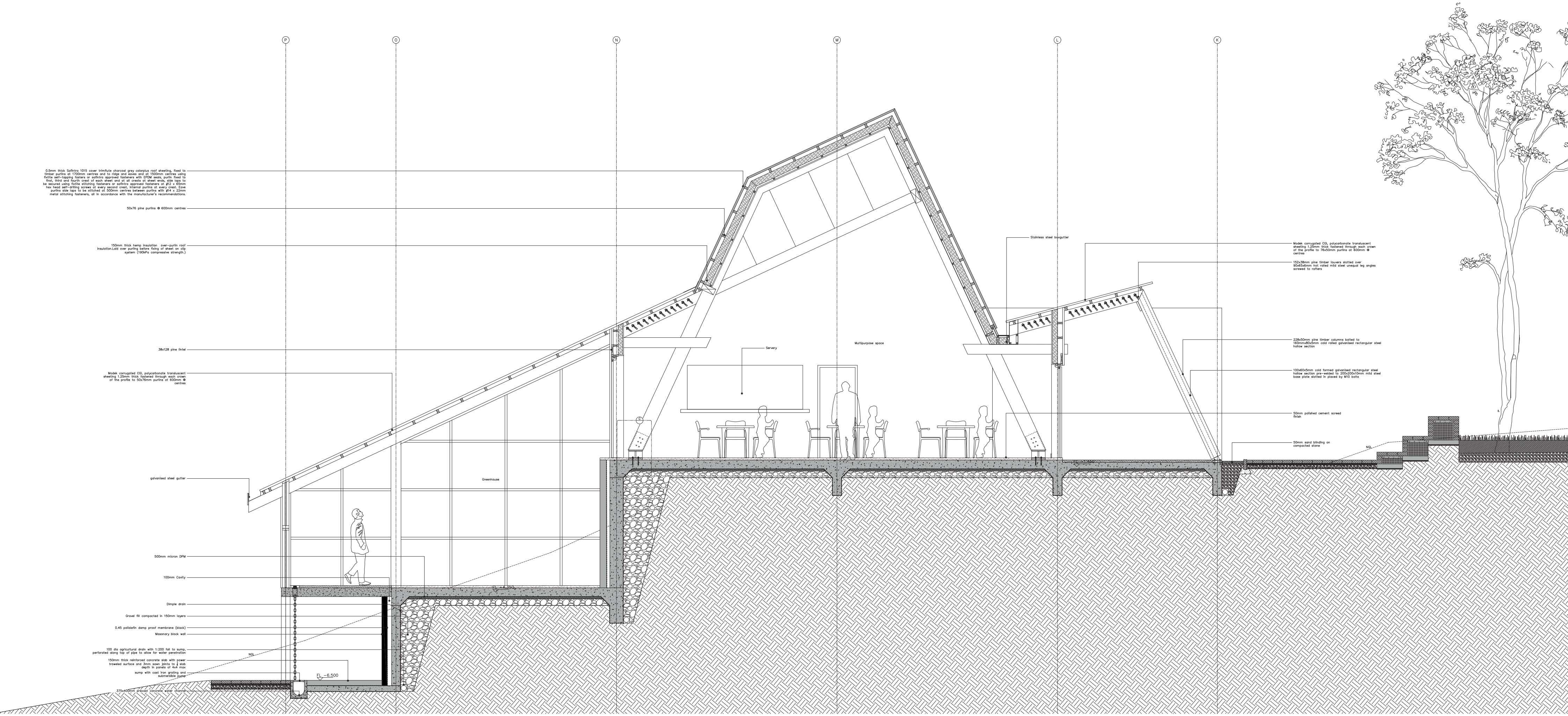
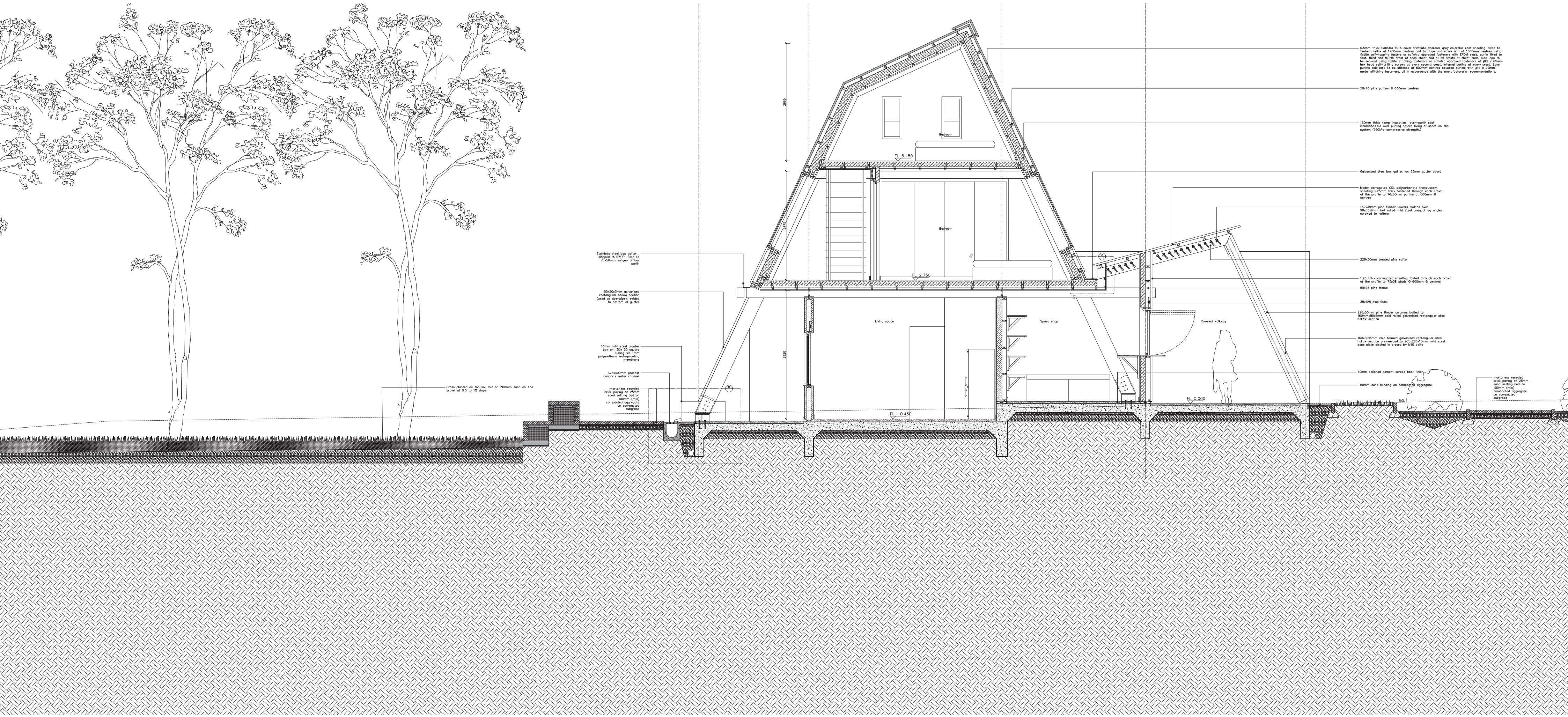


Figure 3.58: Section C. Originally drawn at 1:20 (Author 2021)


Grass planted on top soil laid on 300mm sand on fine gravel at 0.5 to 1% slope
Stainless steel box gutter , slopped to RWDP, fixed to 76x50mm saligna timber purlin
150x50x3mm galvanised rectangular hollow section (used as downpipe), welded to bottom of gutter
10mm mild steel planter box on 150x150 square tubing wit 1mm polyurethane waterproofing membrane
375x400mm precast concrete water channel
mortarless recycled brick paving on 25mm sand setting bed on 100mm (min) compacted aggregate on compacted subgrade
2665
2475
2920
Bedroom
FL 5.450
Bedroom
FL 2.750
Living space
Spaza shop
Covered walkway
FL -0.450
FL 0.000
A
B
NGL
0.5mm thick Safintra 1015 cover trimflute charcoal grey colorplus roof sheeting, fixed to timber purlins at 1700mm centres and to ridge and eaves and at 1500mm centres using fixtite self-tapping fasters or safintra approved fasteners with EPDM seals, purlin fixed to first, third and fourth crest of each sheet and at all crests at sheet ends, side laps to be secured using fixtite stitching fasteners or safintra approved fasteners at #12 x 65mm hex head self-drilling screws at every second crest, internal purlins at every crest. Eave purlins side laps to be stitched at 500mm centres between purlins with #14 x 22mm metal stitching fasteners, all in accordance with the manufacturer's recommendations.
50x76 pine purlins @ 600mm centres
150mm thick hemp insulation over-purlin roof insulation.Laid over purling before fixing of sheet on clip system (190kPa compressive strength.)
Galvanised steel box gutter, on 25mm gutter board
Modek corrugated CGI, polycarbonate transluscent sheeting 1.25mm thick fastened through each crown of the profile to 76x50mm purlins at 600mm @ centres
152x38mm pine timber louvers slotted over 90x65x6mm hot rolled mild steel unequal leg angles screwed to rafters
228x50mm treated pine rafter
1.25 thick corrugated sheeting fasted through each crown of the profile to 75x38 studs @ 600mm @ centres
50x76 pine frame
38x128 pine lintel
228x50mm pine timber columns bolted to 160mmx80x5mm cold rolled galvanised rectangular steel hollow section
160x80x5mm cold formed galvanised rectangular steel hollow section pre-welded to 265x280x10mm mild steel base plate slotted in placed by M10 bolts
50mm polished cement screed floor finish
50mm sand blinding on compacted aggregate
mortarless recycled brick paving on 25mm sand setting bed on 100mm (min) compacted aggregate on compacted subgrade

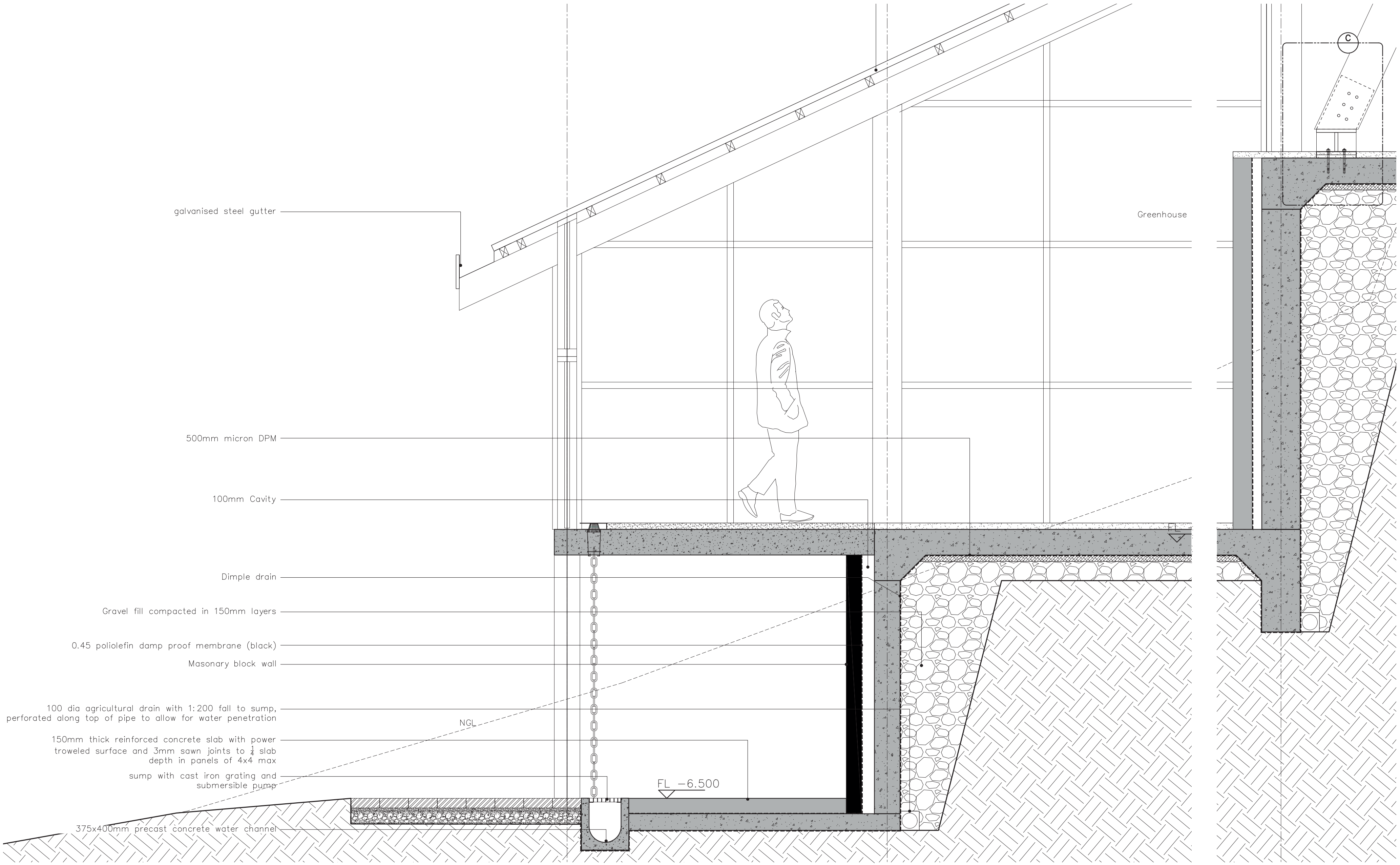


Figure 3.59: Section C. Originally drawn at 1:20 (Author 2021)

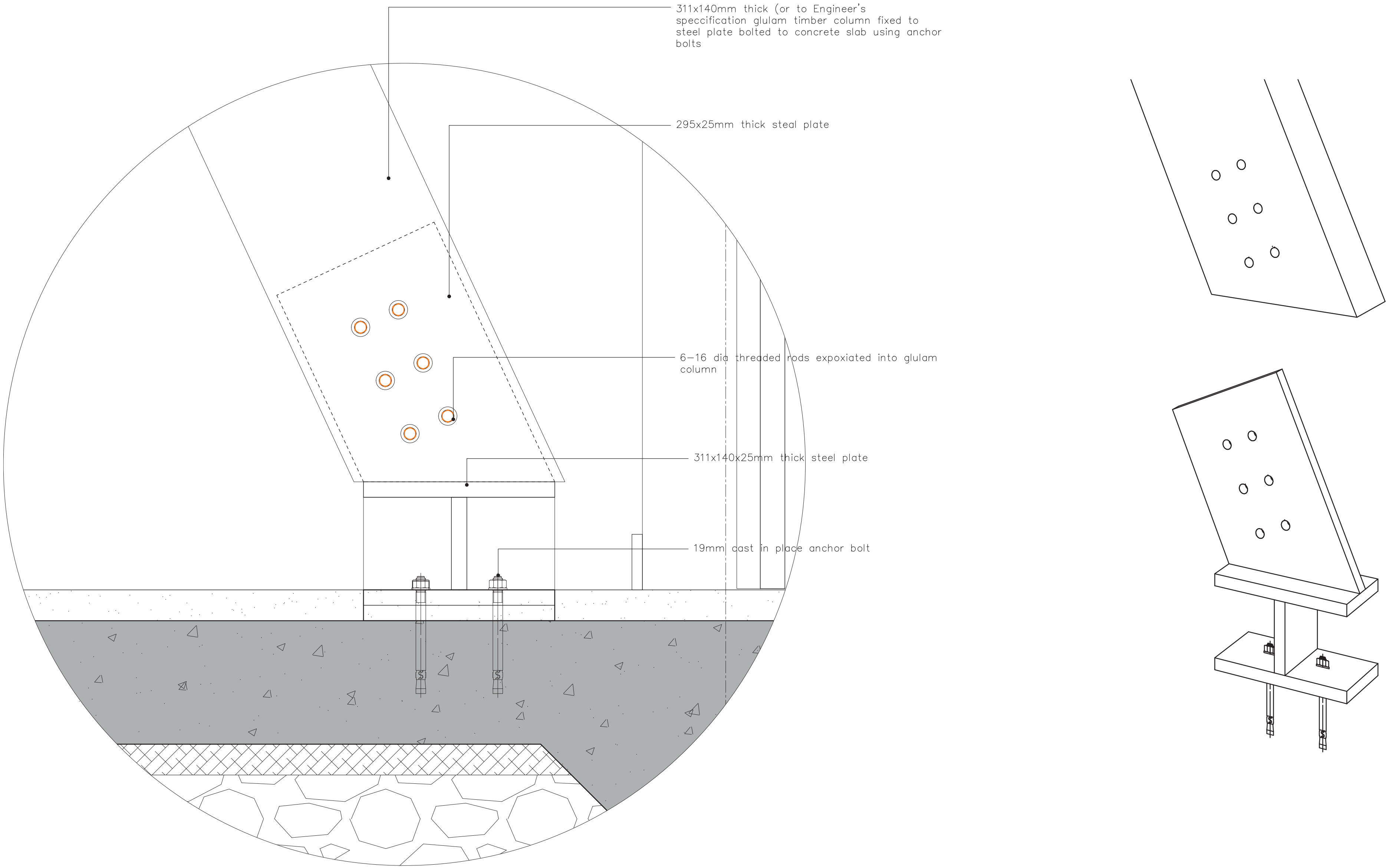


Figure 3.60: Detail C facility. Originally drawn at 1:5 (Author 2021)

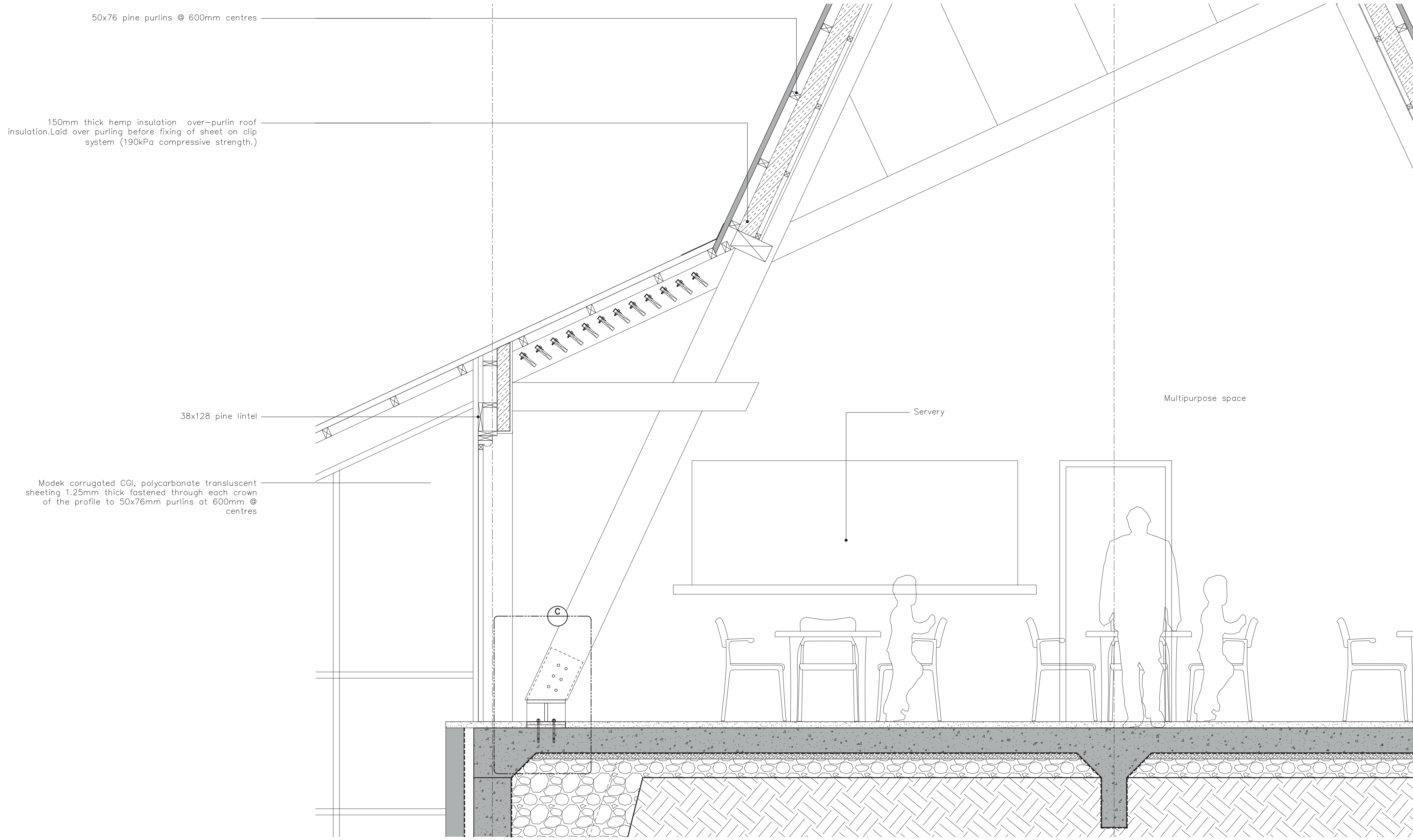
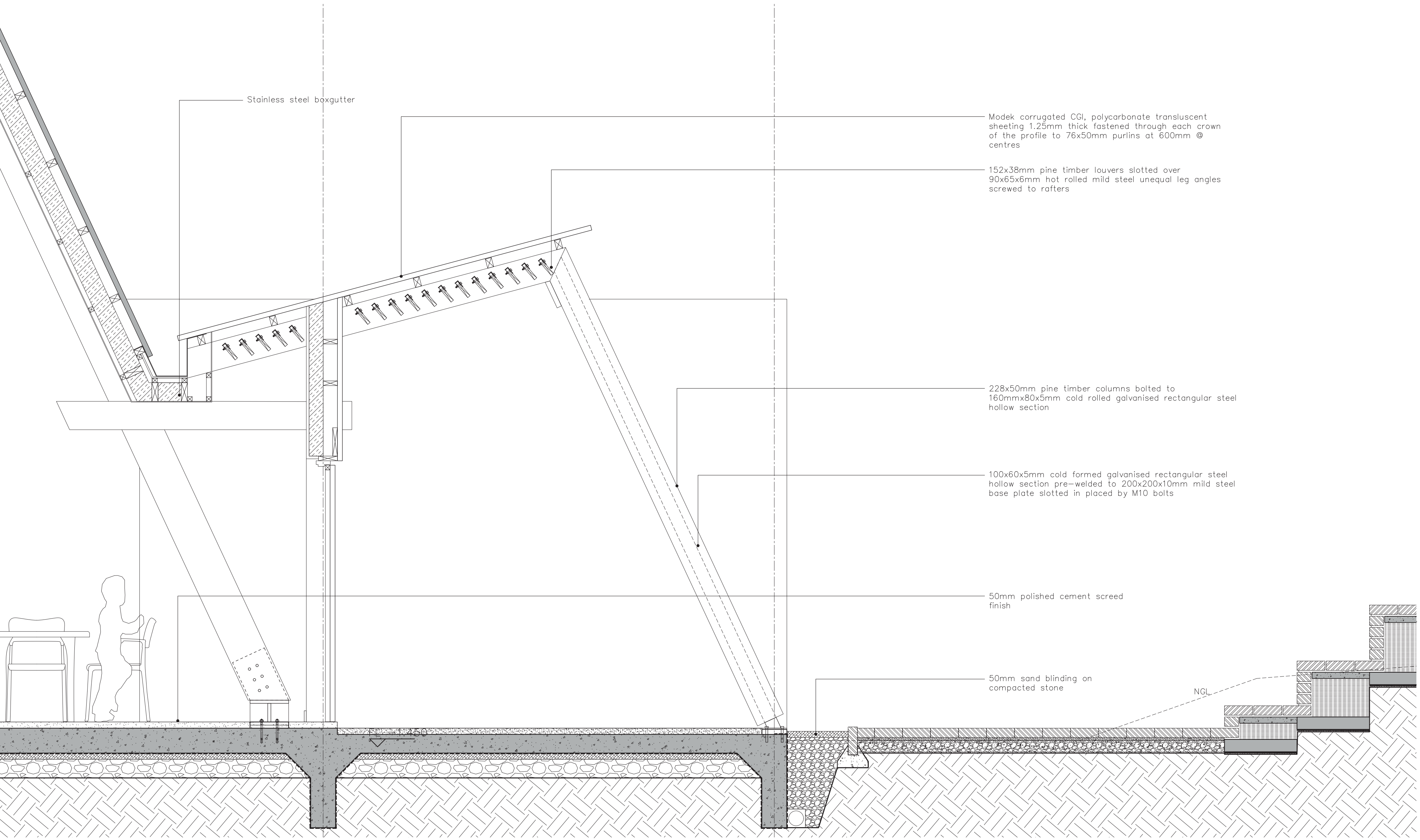


Figure 3.61: Section C. Originally drawn at 1:20 (Author 2021)


Stainless steel boxgutter
Modek corrugated CGI, polycarbonate transluscent sheeting 1.25mm thick fastened through each crown of the profile to 76x50mm purlins at 600mm @ centres
152x38mm pine timber louvers slotted over 90x65x6mm hot rolled mild steel unequal leg angles screwed to rafters
228x50mm pine timber columns bolted to 160mmx80x5mm cold rolled galvanised rectangular steel hollow section
100x60x5mm cold formed galvanised rectangular steel hollow section pre-welded to 200x200x10mm mild steel base plate slotted in placed by M10 bolts
50mm polished cement screed finish
50mm sand blinding on compacted stone
NGL

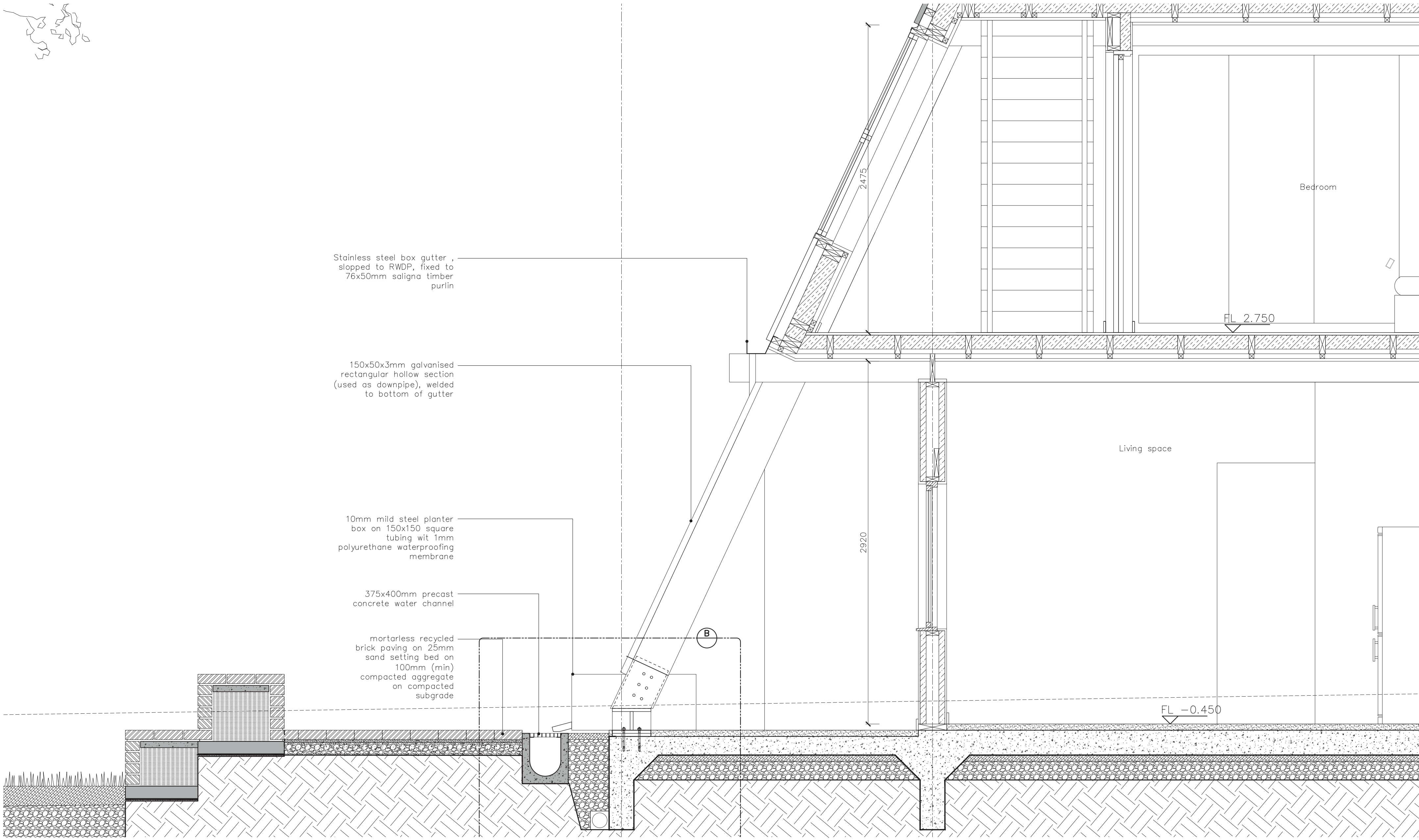
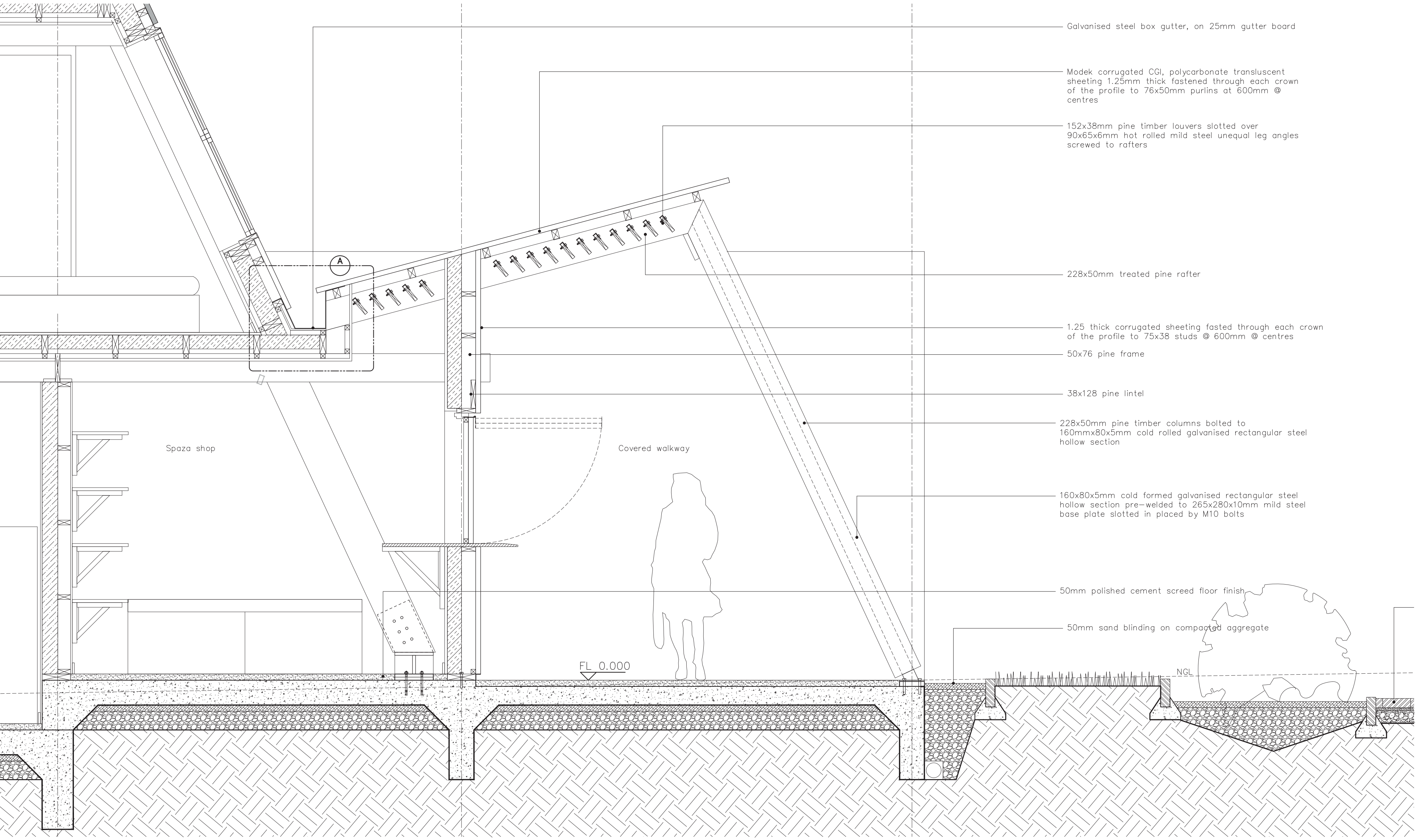


Figure 3.62: Section C. Originally drawn at 1:20 (Author 2021)


Galvanised steel box gutter, on 25mm gutter board
Modek corrugated CGI, polycarbonate transluscent sheeting 1.25mm thick fastened through each crown of the profile to 76x50mm purlins at 600mm @ centres
152x38mm pine timber louvers slotted over 90x65x6mm hot rolled mild steel unequal leg angles screwed to rafters
A
228x50mm treated pine rafter
1.25 thick corrugated sheeting fasted through each crown of the profile to 75x38 studs @ 600mm @ centres
50x76 pine frame
38x128 pine lintel
228x50mm pine timber columns bolted to 160mmx80x5mm cold rolled galvanised rectangular steel hollow section
Spaza shop
Covered walkway
160x80x5mm cold formed galvanised rectangular steel hollow section pre-welded to 265x280x10mm mild steel base plate slotted in placed by M10 bolts
50mm polished cement screed floor finish
50mm sand blinding on compacted aggregate
FL 0.000
NGL

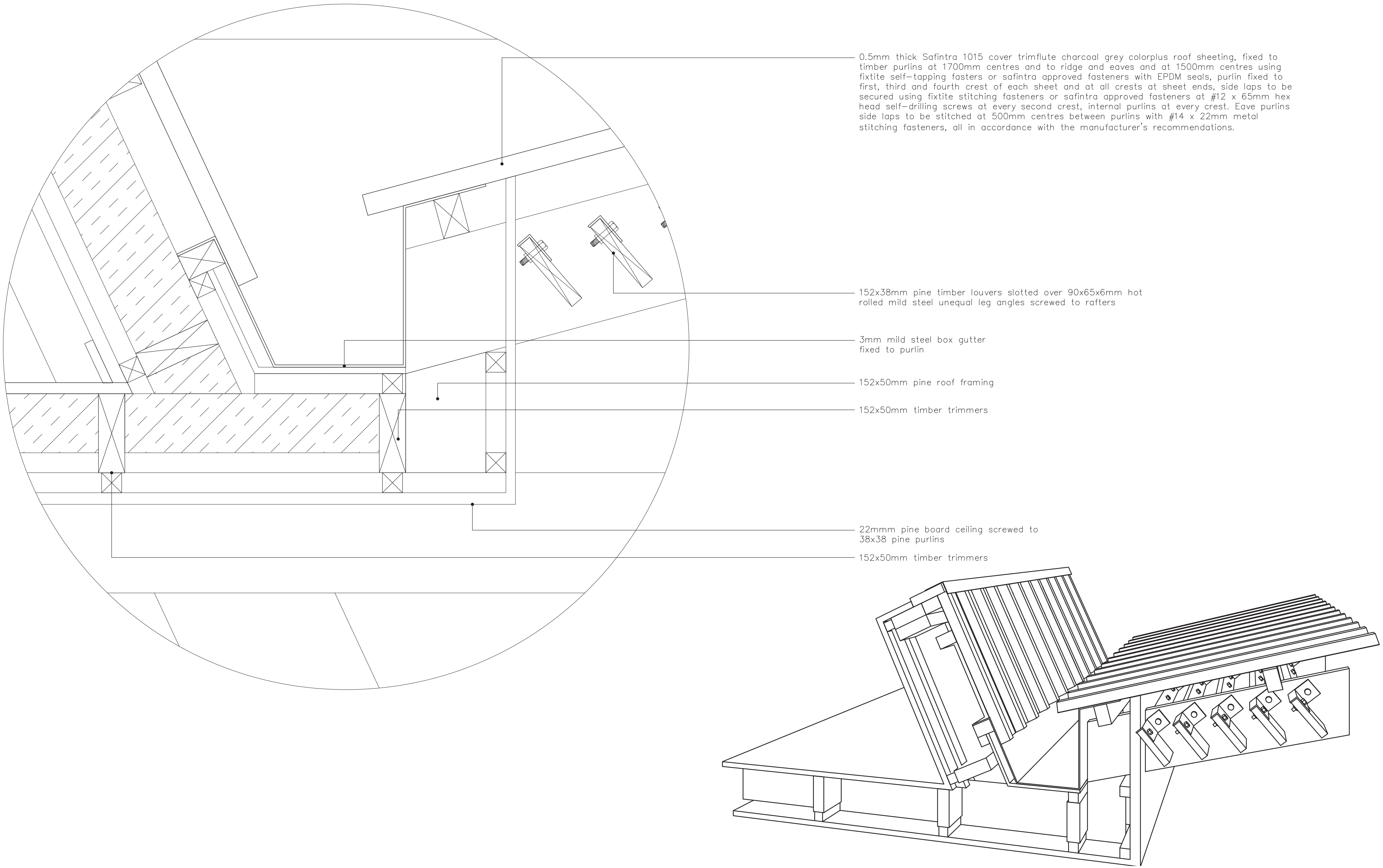


Figure 3.63: Detail A. Originally drawn at 1:5 (Author 2021).

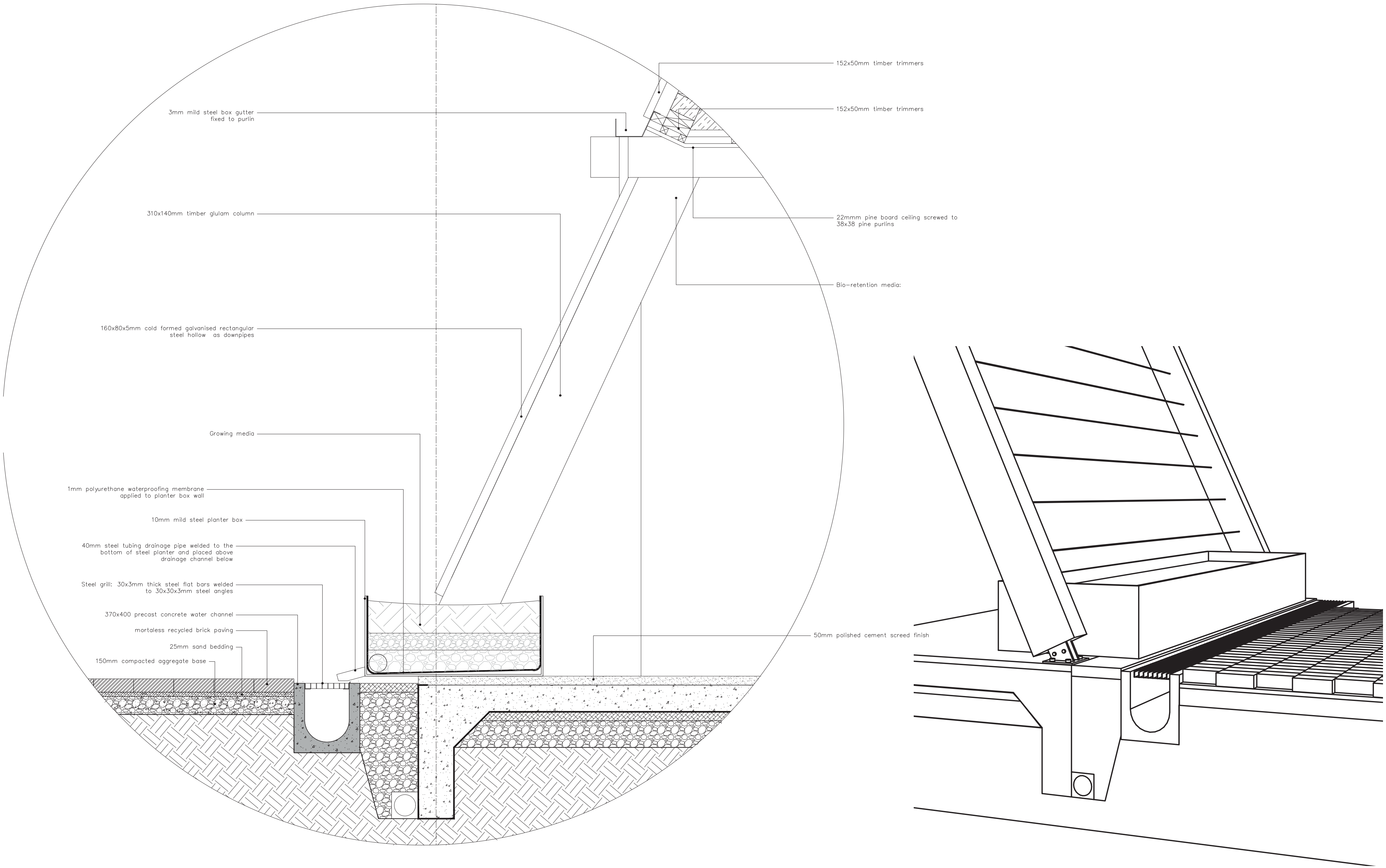


Figure 3.64: Detail B. Originally drawn at 1:5 (Author 2021).