

COMMUNITY INFORMED INCREMENTAL HOUSING IN KABILA C: LEARNING FROM MATERIALITY AND TEMPORALITY OF INFORMAL HOUSING IN HAVANA, WINDHOEK



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MASTERS THESIS

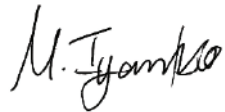
Thesis presented in partial fulfilment of the requirements for the degree of Master of Architecture at the Namibia University of Science and Technology.

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Year and month in which the degree is to be awarded: April 2024

DECLARATION

I, Maria Ndahafa Iyambo hereby declare that the work contained in the thesis entitled, Community Informed Incremental Housing in Kabila C: Learning from Materiality and Temporality of Informal Housing in Havana, Windhoek, is my own original work and that I have not previously in its entirety or in part submitted it at any university or other higher education institution for the award of a degree.

Signature:  Date: 31/10/2023

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to the community of Kabila C and the interviewees for their valuable contribution of information and insights to my research. I am grateful to my supervisors and lecturers for their guidance and feedback on my thesis. Additionally, I extend my thanks to my editor for their editing of the document.

IMPORTANT INFORMATION FROM THE AUTHOR

All figures, photographs, drawings, and text are done by Author unless specified.

The residents, from Kabilia C, will have fictional names for privacy purposes.

LIST OF ACRONYMS

CLIP	Community Land Information Programme
DWN	Development Workshop Namibia
NHAG	Namibia Housing Action Group
NHE	National Housing Enterprise
NGO	Non-governmental Organisation
MOHSS	Ministry of Health and Social Services
MURD	Ministry of Urban and Rural Development
LAs	Local Authorities
RCs	Regional Authorities
SDFN	Shack Dwellers Federation Namibia
SDG	Sustainable Development Goals
UN	United Nations



Figure 01: Render of the proposed housing development

ABSTRACT

Informal settlements are characterised by their multi-functional nature and a strong sense of community, which has the potential to foster housing incrementally. The purpose of this study is to design incremental housing informed by the community in Kabila C, assessing the materiality and temporality that affect informal housing in Havana, Windhoek.

Materials are not only connected to people physically, but also through their minds, experiences, and cultures. Temporality plays a crucial role in people's way of living and the structure they occupy, which impacts the sense of place. Materiality affects the sense of place, but temporality determines the type of experience people associate with that place. The housing could represent the user's individuality and identity, which is an essential part of representation in space.

The research applies various methods, including mapping, precedent studies, semi-structured interviews, focus groups, community workshops, photographic surveys, and observation to achieve this goal. The study assesses intangible aspects such as informality, temporality, and culture that influence informal housing. It also highlights the importance of the housing process in informal settlement upgrading, which is often neglected by municipalities, local authorities, and NGOs during the upgrading process.



Figure 02: Touchstone
The touchstone narrates the story of hidden aspects of informality. Gaps and cracks are formed during the formalisation process. Materiality is the filler that fills in the gap. It is part of people and forms part of people's identity.

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INTRODUCTION

01



Figure 03: SDFN housing

BACKGROUND TO STUDY

Informal housing in Namibia occurs due to rapid urbanization and the migration of people from rural areas to urban areas (Weber & Mendelsohn, 2017). Poor provision of land and the lack of affordable housing led to people settling on unauthorised land. Unauthorised land occupancy discourages secure land tenure, prompting occupants to construct informal structures with building materials that allow for temporal occupancy. The lack of ownership of land affects the choice of building materials and construction methods for informal housing, which is determined by what the occupant can afford.

The increased growth of informal settlements led to the establishment of informal settlement upgrading organisations such as National Housing Enterprise (NHE), a government organisation, and Shack Dwellers Federation Namibia (SDFN), a community-driven housing organisation. These organisations focus on providing the basic needs of people living in informal settlements categorised into housing, services, and secure land tenure. However, the organisations mainly focus on the provision of land, services, and predetermined structures following the detached housing typology. This leads to the neglect of the incremental development of the structure. Incremental housing allows for the construction of the structure and space to be adaptable to the occupant and progressively develop over time (Wainer et al., 2016).

The purpose of the study is to design incremental housing informed by the community in Kabila C, a case study area, through the knowledge gained from materiality and temporality in informal housing in Havana.



Figure 04: An aerial view of informal settlements in Windhoek (New Era, 2019)

STATEMENT OF PROBLEM

OBJECTIVE OF STUDY

The study aims to design community-informed incremental housing typologies in Kabila C, learning from the materiality and temporal incrementalism in the area. This requires to:

- To propose incremental housing typologies informed by materiality and temporality of existing housing in Kabila C.
- To investigate the relationship between materiality and temporality of informal housing structures in Kabila C.
- To explore methods of community involvement in housing design and construction processes.

RESEARCH QUESTIONS

How could materiality and temporality of the existing housing inform the proposed incremental housing typologies?

How do materiality and temporality inform informal housing structures in Kabila C?

What methods of community involvement could improve the housing design and construction processes?

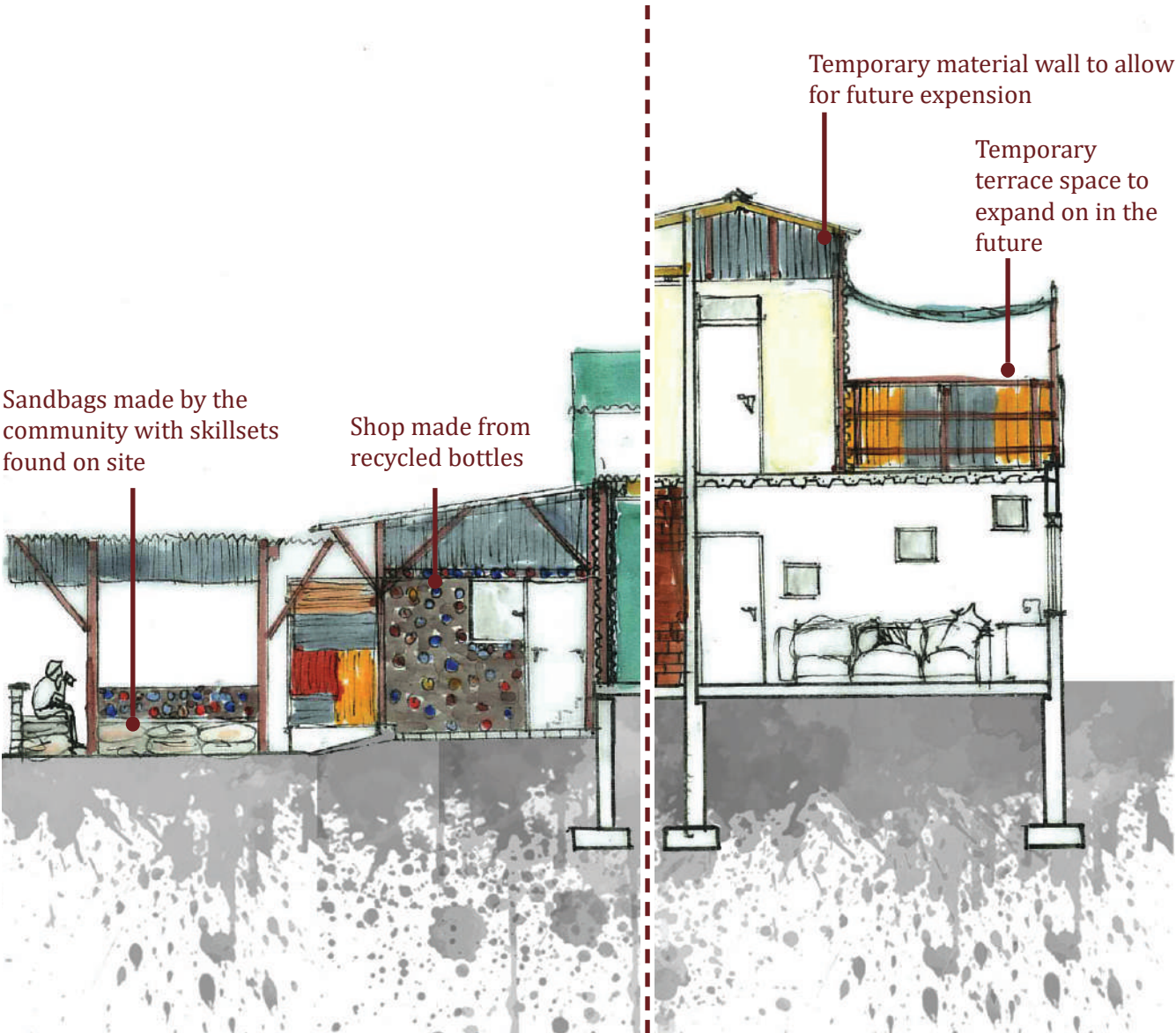


Figure 05: Proposed incremental housing typologies informed by materiality and temporality in Kabila C

LITERATURE REVIEW

Materiality is represented in a tangible form that has an intangible influence on people. According to Bardt (2019), people associate with materials through body experience, which is immersed in people's minds and thoughts. Materials in the physical form are temporary, however, permanent through the memories of the people due to the body experience. The experience people have with materials has an influence on their perception of materials and what it represents.

Informality is perceived as unregulated, disorganised, and unanticipated compared to formality (McFarlane, 2019). Materials can be perceived and experienced differently based on the informal and formal settings. The temporality of materials is experienced through living. For instance, the residents in Kabila C attach informal trading structures to the permanent living structure for easy assembling and disassembling of the structure to temporarily occupy the space. Their occupancy in the space is temporal, however, it becomes part of their everyday life.

According to Hoy (2019) temporality is related to human lived time, which is disassociated from universal time. Temporality is the appropriation of structure by people acting on a system of incrementality over a certain period. Structures constructed in a specific way with specific material based on status and use of occupancy. Colonialisation is influenced by the ideology of

formalization in the Global South. This has an impact on which culture and heritage override the other. Victor and Fryer (2008) claim that context and occupying land are connected to the sense of place and identity of the people. Someone who occupied land in the informal settlement for 15 years without land tenure could view the land as their own, in the absence of formal land rights. This is due to time progression and the impact time has on the relationship between the tangible environment and the individual.

Victor and Fryer (2008) argue for developing housing that accommodates a variety of typologies with flexible alternative architectural design approaches, instead of diversifying a singular typology of housing. Some residents in Kabila C follow the mixed-use typology which allows the occupant to have a main living space and a separate structure for informal trading, or they use one structure for living and informal trading. During upgrading, this housing typology in the form of the physical structure is demolished to make space for the prescribed housing typology.

LITERATURE REVIEW

Park (2015) disagrees with disregarding informality as a tool that can be resolved by improving the design of the structure. Formalisation is seen as a way to improve the conditions of the settlement by imposing foreign modernist housing principles instead of improving the conditions with what exists in the settlement.

According to Park (2015), in Latin America, informal settlements are used to question the rigid city planning scheme and adapt solutions from informality to produce new city projects. The flexibility of space and personalisation of structures due to less restrictive laws are some potentials that informality holds. These qualities should be used as a tool to improve the living conditions in informal settlements, instead of reintroducing foreign solutions that are not adaptable to the context.

Park (2015) suggests the use of both micro and macro-scale projects when upgrading informal settlements. Micro-scale projects highlight the participation of the community while macro-scale projects involve a broader scale of the city which has an indirect effect on informal settlements (Park, 2015).



Figure 06: Exterior view of the in-between spaces of proposed typology 1

LITERATURE REVIEW

According to Moatasim (2019), the material, form, and appearance of housing structures are impacted by the building regulations enforced in the area. The laws and policies influence how the user can personalise their space.

Moatasim (2019) explains how traders in Islamabad, Pakistan are encouraged to obtain licensing from the authorities to control and strategise the occupation of the trading structure and activity. This ideology is applicable in Windhoek, whereby formal structures in planned settlements follow specific standards provided by the City of Windhoek. Owning land leads to formalising the structure to adhere to the policies.

Moatasim (2019) further claims that unauthorised traders personalise temporary structures by refraining from adhering to policies and regulations. Unlicensed occupation of space is viewed as temporary occupation, therefore materials and methods of construction are viewed accordingly. Corrugated iron is encouraged by the City of Windhoek as a building material in informal settlements to easily assemble and disassemble the structure (Weber & Mendelsohn, 2017). Despite this claim, the technique of creating a structure that can be assembled and dissembled conveniently is not limited by the choice of materials.

Moatasim (2019) compares the use of authorised materials such as bricks to construct licensed trading structures and the use of the same material to construct an unlicensed trading structure temporarily in the case of Islamabad. Both trading structures utilise bricks, however, the techniques are different.

Weber and Mendelsohn (2017) state that backyard shack renting and accommodation are not authorized in some informal settlements in Namibia due to the inability of the authorities to control them. These informal activities provide income for people. Prohibiting informal activities in residential-zoned areas disregards how people live on the ground and creates economic opportunities.

PROPOSED RESEARCH DESIGN

The research design uses qualitative methodology through the investigation of case studies of informal settlements in Windhoek and precedent studies of informal settlements upgrading housing structures. Qualitative methodology uses interpretative procedures to collect data in its natural environment to understand specific conditions (Njie & Asimiran, 2014).

The methods to achieve this were mapping, precedent studies, semi-structured interviews, focus groups, community workshops, photographic surveys, and observation.

The mapping exercise utilised the layering method (Corner, 1999). This exercise explored different perceptions of the use of materiality in formal and informal settlements of Windhoek.

The precedent studies critically analysed the use of building materials, construction methods, and temporal incrementalism applied in other low-cost housing.

The interviewees and focus group participants were purposively sampled. The participants were persons living in Kabila C (both living in a shack and an upgraded house) and professionals involved in the upgrading of informal settlements.

The interviews were semi-structured to avoid deviations from the main topic while still allowing the participants to express their experiences. The interviews provided data on the everyday life of the people living in Kabila C about materiality and temporality. Data on the construction of formal houses and the process of the informal upgrading scheme and the typologies were collected from interviewing professionals involved in the upgrading of informal settlements.

The interviews and photo surveying assisted in formulating profiles of the residents living in Kabila C. According to Rose (2014), visuals in research assist with conveying information on social behaviour influenced by the environment. This served to generate urban profiles that illustrate how people use threshold spaces, building materials, temporary structures, and building responses to the environment. The profiles showed how the community architecturally responds to implications.

Community workshops were conducted throughout the project, where community engagement is needed during the concept and design stage of the project. The community workshops assisted with capturing the community's input in the design of the house.

Observations through field studies assisted in obtaining information on the type of materials used in Kabila C to understand the relationship between ownership of land and choice of material. The method aids in developing concepts and obtaining facts that are found in the space in its raw settling (Stangor, 2014). This aided with understanding how people respond to the environmental conditions on site and the housing typologies generated by the community.

PROPOSED RESEARCH DESIGN

The limitations of the study that may arise during the research could be due to language barriers leading to the misunderstanding of questions. The questions presented to the community have to be more conversational to understand the experience and opinions of the community.

Due to the nature of the research, ethical implications were considered. Conducting field studies in the informal settlement may be intimidating or offensive to the residents because numerous informal settlement field data collection is done in informal settlements which has not led to an improvement in the living conditions of the residents. Therefore, one has to request permission to take pictures. The identity of the residents, especially community-based research, was concealed unless authorized to respect the resident’s privacy (Wood, 2017). Written consent was presented to interviewees and focus groups.



Figure 07: Exterior view of typology 4

UNDERSTANDING MATERIALITY AND TEMPORALITY

02



Figure 08: Informal settlement street view in Katutura, Windhoek (Picture Alliance, 2011)

MATERIALITY

Materials act as a medium between the built form and the user. It is a tool that people use to represent their individuality through the built form. Materials can be connected to people through mind, experience, and culture.

Mind

Materiality is represented in a tangible form that has an intangible influence on people. According to Alexander (1977), materiality consolidates the image of a building present in mind into a practical functional building that can be transcendent into reality. People grow a connection with materials because it represents the narrative that was initially an idea.

Experience

According to Bardt (2019), people associate with materials through body experience, which is immersed in people's minds and thoughts. The use of textures, light/shadow, and colour could be experienced through building materials to generate different experiences based on the different functions of the structure. This allows the user to be a participant in the experiences in the built form.

Culture

Based on Al-Alwan and Mahmood (2020), tectonics describes utilizing various types of materials which is handcrafted by people to produce structures that invoke cultural expression. People can associate different materials with memory due to past experiences which generates a narrative. The identity and culture of the user and the context inform the choice of material and method of using certain materials.



Figure 09: Ceramics (Grynszpan, 2012)

The clay, which represents materiality, can be moulded and manipulated by the designer based on the mind-to-object connection. This is influenced by body experience. The final product represents cultural expression and identity.

TEMPORALITY

Temporality enables people to use incrementality to appropriate structure over time. It influences people's way of living and the structure the user occupies which impacts the sense of place. According to Massey (2008), a sense of place is the identity developed through the experience people have in a place. Materiality affects the sense of place, however, temporality controls the type of experience people associate with the place.

THE PERCEPTION OF TEMPORALITY

Massey (2008) describes the notion of a time-space compression age whereby space becomes smaller as technology evolves. In other words, the space which people associate as temporal, changes over time due to the globalization and improvement of technology. Temporality allows for constant growth of the place. It follows a progressive 'sense of place' because it embraces the constant development of places (Massey, 2008). This is also depicted in Figure 09, whereby temporality enables the change of an object of object while remaining constant in its true form.

Mainstream global urbanism promotes cities in the Global North as the standard of urbanism (Sheppard et al., 2013). This influences people's perception of temporality. Informality is viewed as temporary, however, informality has been around for many years in various cities in the Global South which makes informality a permanent condition. However, informality is temporary because of the character of the informal change. The identity of informality, nevertheless, is permanent in a place and space.

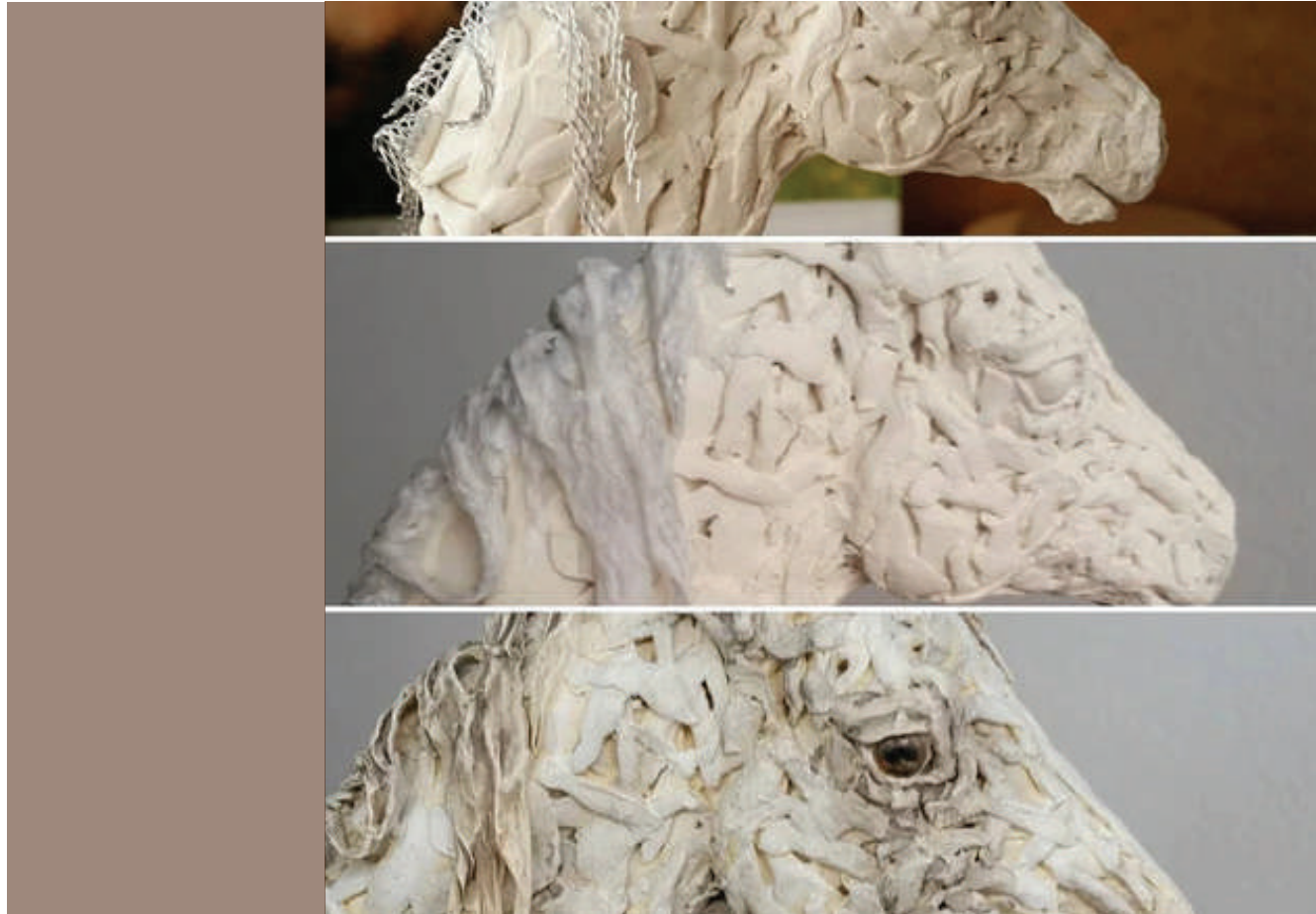


Figure 10: The stages of an air dry clay sculpture (Benes, 2018)
Temporality allows change of object for the form to develop while remaining constant to its true form.

TEMPORALITY AND MATERIALITY RELATION

According to Hoy (2019) temporality is related to human lived time, which is disassociated from universal time. Materials in the physical form are temporary, however, permanent through the memories of the people due to the body experience. People associate certain materials as temporary due to current living conditions, however, it becomes a language that forms an individual's space. The community involved in the JUST DO IT Creative Strategies of Survival project in Johannesburg utilises materials as a form of creative expression to personalise their shops, as shown in Figure 10. Temporality allows for flexibility and incremental development of the built form. Flexibility can appear in the form of material use or spatial organization.



Figure 11: Just Do It (Rohde, 2016)
Spaza shops under the JUST DO IT Creative Strategies of Survival project in Johannesburg, celebrate the use of various materials to construct shops and/or houses joined to the shop that is temporary and destructible. The project allows the users to creatively express themselves through various modes of art to create a livable and functional space.

METHODOLOGY

03



Figure 12: Community of Freedom Square, Gobabis (SDFN, 2015)

The community of Freedom Square, Gobabis involved in the mapping and planning phase of the Informal Settlement Upgrading process.

MAPPING

Year conducted: 2022

Method: Layering

Participants: none

According to UN-Habitat (2004), structures in informal settlements are perceived to lack durability, insufficient space, and secure land tenure. On the other hand, structures found in the formal settlement utilise durable materials because the land is secured by the occupant. Through observation, corrugated iron is commonly used in Windhoek because it is affordable, available, and easy to assemble and disassemble. Construction in formal settlements uses corrugated iron as cladding for warehouses and facades of some buildings. This is perceived to be acceptable and aesthetic value. On the contrary, structures made from corrugated iron in informal settlements, are perceived to be inhabitable and ephemeral. In a nutshell, the method of construction and the context affects how the material is perceived. This has been explored in Figure 12, considering the perceptions of corrugated iron in formal and informal settings.

People perceive corrugated iron to allow for temporal occupation in informal settlements and bricks to allow for permanent occupation in formal settlements. However, everything can be temporary because humans are not permanent.

Mapping is a tool used to unveil and showcase the hidden aspects and experiences in lived spaces (Corner, 1999). The mapping exercise applied the layering method to explore different perceptions of materiality in formal and informal contexts in Windhoek. This aided in understanding factors that influence the perception of materials. The exercise narrowed down materiality to focusing on corrugated iron as building material to explain materiality in practical terms.

Temporality is experienced through living while permanency exists through people's memories. This forms part of people's identity which allows for freedom of expression through the material.

MAPPING

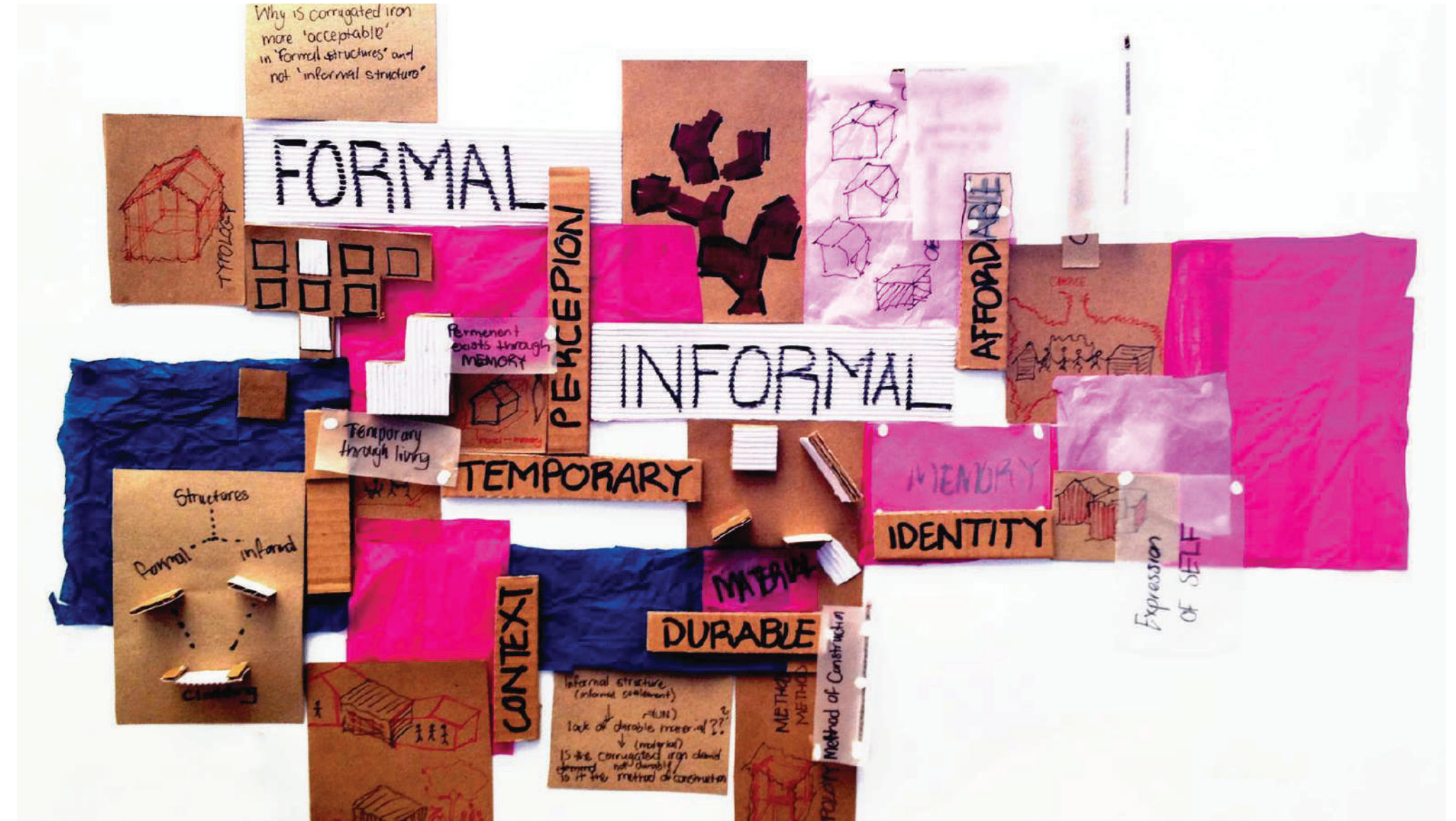


Figure 13: Layered mapping exercise
The layered mapping exercise explores different perceptions of materiality in formal and informal contexts in Windhoek.

INTERVIEWS

Interviews were carried out throughout the project to gather information on the National Housing Enterprise (NHE) and Shack Dweller Federation Namibia (SDFN) housing delivery procedure. Residents from Kabila C, an informal settlement in Havana which is currently in the formalization upgrading stage, were also interviewed to understand their living conditions and their perspective on housing. The full interviews are attached in the annexe.

NHE INTERVIEW

The organization prioritises quality over quantity when it comes to providing housing. This implies that they utilise quality materials to construct houses that last longer. The longevity of the house is important to ensuring that people have long-term access to safe and secure housing. Community participation is not considered by the organisation when designing and constructing the house. Community participation provides more insight into the conditions and needs in the particular context that will benefit the community. This information would better inform the design approach of the houses constructed.

Therefore, the proposed design will focus on involving the community in the process and providing houses that will last longer and can be further developed in the future.

SDFN INTERVIEW

Community participation is the driving force for the organisation. The organisation assists individuals to save funds and grants them loans to purchase land and construct a house. The proposed design will focus on the community as the main informant of the design of the individual’s house which allows the user to adjust it as best suits them.

COMMUNITY INTERVIEW

The community has a strong desire to upgrade to a brick house due to the identity associated with living in a corrugated iron house. The people have a profound emotional connection with the material due to their past struggles. From the perspective of the community, a brick house symbolises a better living environment. The community still makes use of corrugated iron around the house, however, they do not want to have their house made completely from it. Additionally, they want the freedom to personalise their house to make it their own.

COMMUNITY WORKSHOPS

Year conducted: 2022
Location: Location: Kabila C, Zimbabwe Street, Havana, Windhoek
Method: Focus groups
Participants: Mee Helena, Mee Molly, Selicia (friend/assistant)

According to Mee Molly, the shacks in the area are built by people from the community. The shack builders usually charge a small fee to construct a shack. Some of the materials used to construct the shop are recycled and found on-site. Mee Molly used corrugated iron to construct her shop for it to be easily assembled and disassembled. This is due to the town planning zoning regulations not permitting for home shops in residential areas.

The focus group workshop was conducted to gather information on resident’s current experiences and living conditions in the Shack Dwellers Federation (SDFN) households in Kabila C, Zimbabwe Street, Havana.

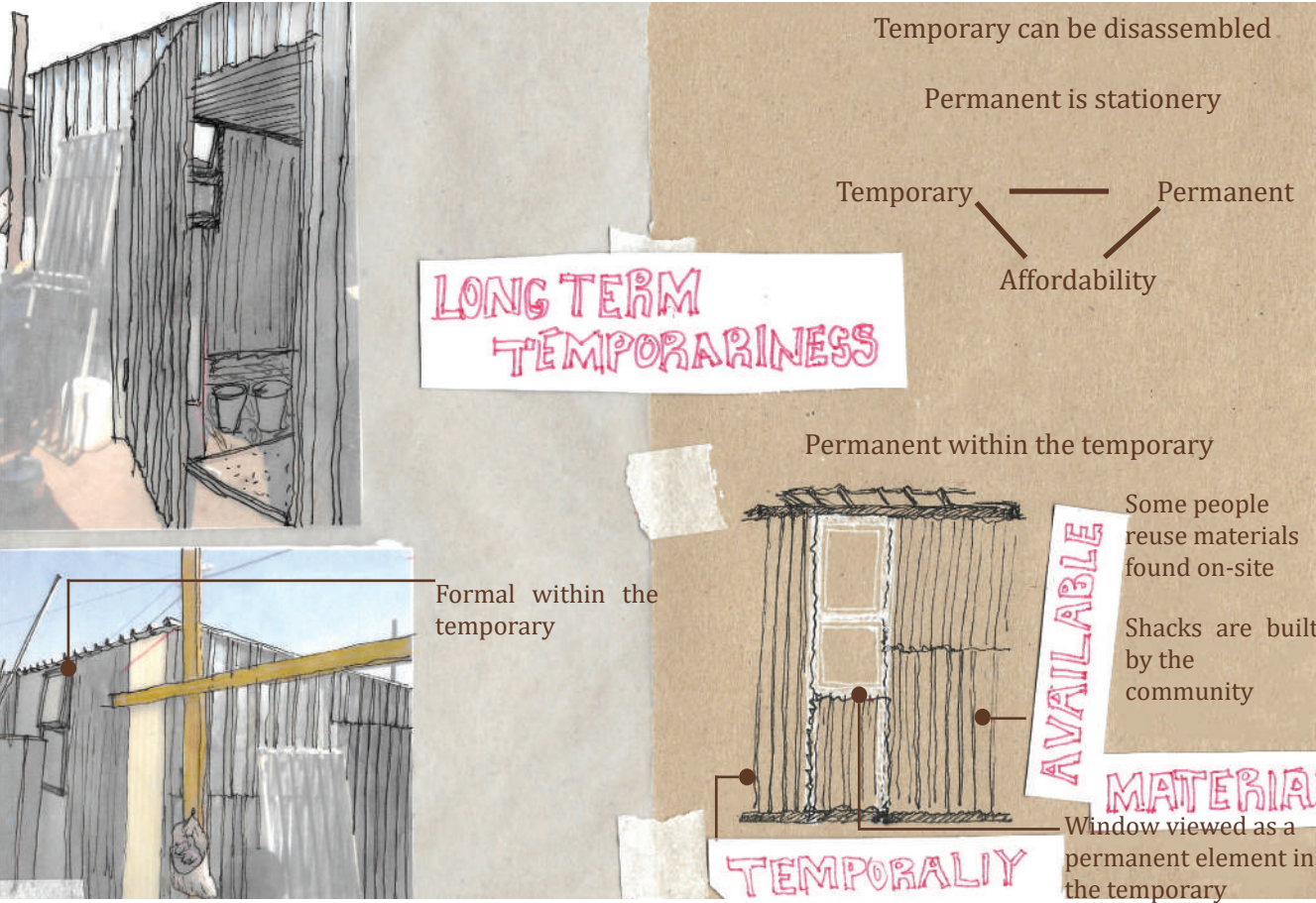


Figure 14: Sketch of Mee Molly’s shop in her yard, Kabila C, Havana, Windhoek

COMMUNITY WORKSHOPS

Based on Mee Helena and Mee Molly's explanation, SDFN provides one bedroom, a bathroom, and a kitchen to the member on loan and with the money saved by the member in their savings group. For the second extension, the owner can pay from their pocket. The resident can gradually pay back the loan over the coming years. The doors, windows, roof, and toilet facilities are provided by SDFN. Figure 14, Mee Molly expressed the lack of quality of the exterior door.

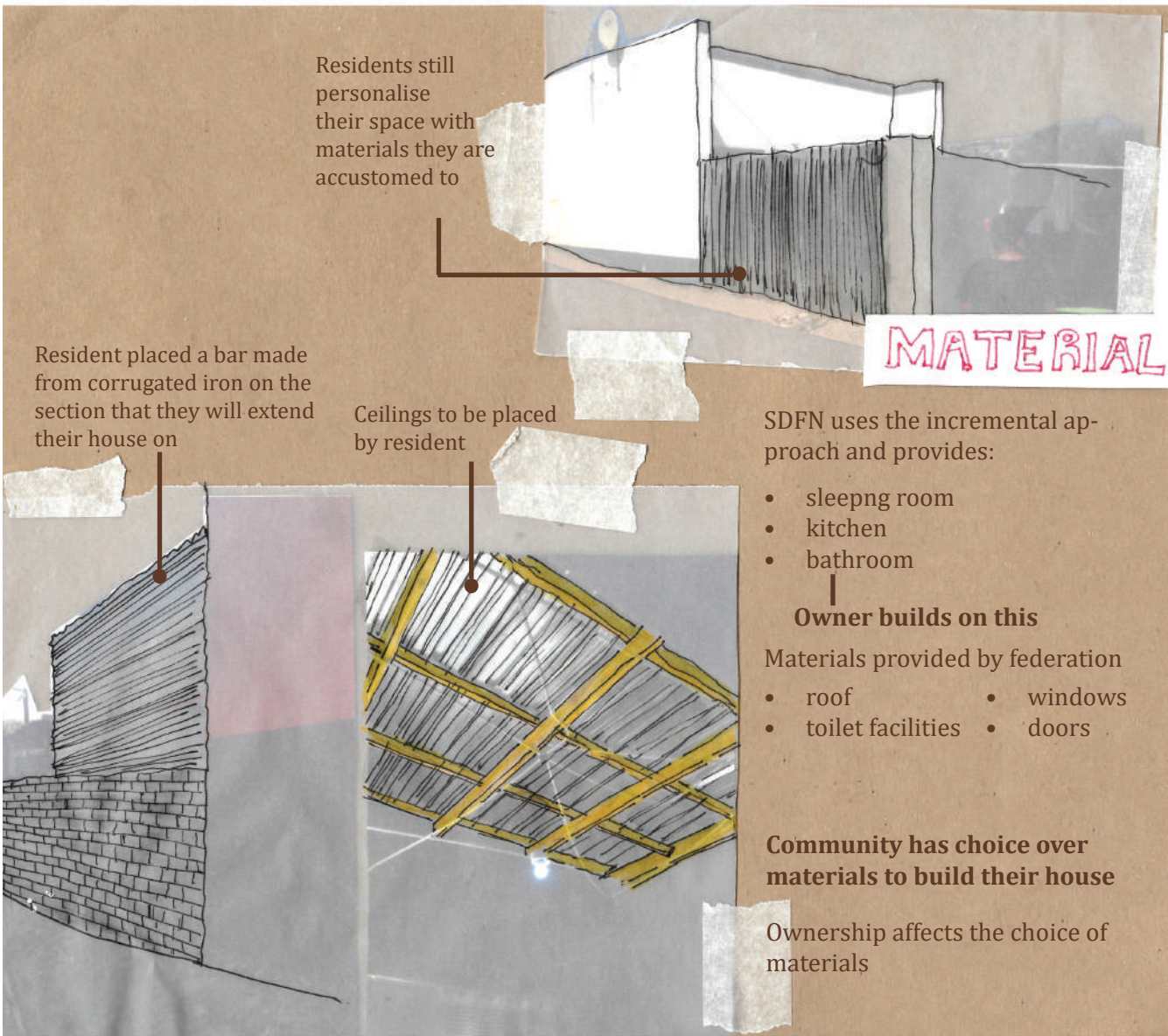


Figure 15: Elements provided by SDFN and the resident of Kabila C

COMMUNITY WORKSHOPS

The SDFN members from the Ituyeni savings group made the hollow block bricks that are used to construct their houses. The Ituyeni saving group provides a savings account for the community to save money for the construction of their house. This is facilitated by a nominated SDFN member in the community and the Namibia Housing Action Group (NHAG).

Mee Helena explains that members are required to use the hollow block bricks for the substructure. This is due to its durability. Some members built their superstructure with the standard superbrick to cut time on the construction process as the result of the lengthy process of producing hollow block bricks on-site. This has been explored in Figure 15, considering the context availability and durability of materials.



Figure 16: Factors that affect the choice of materials

COMMUNITY WORKSHOPS

Year conducted: 2023
Location: Windhoek West
Method: Concept and Design development feedback
Participants: Melody

The workshop was conducted to get feedback from a resident from the Kabila C and exchange knowledge which will aid in improving the typology and design of the proposed houses. The findings will be disclosed in the design development section of the document.



Figure 17: Concept and design development feedback from Melony, a resident from the community

SITE PROFILE AND PHOTO SURVEY

Kabila C is an informal settlement in Zimbabwe Street, Havana that is in the formalisation upgrading stage with the assistance of SDFN (Ley et al., 2022). The settlement consists of members in the Ituyeni savings group under the SDFN organization. About 11 households upgraded their houses through SDFN. The remaining households are currently in the saving phase.

The site profile was created with information from GoGlocal project questionnaires and personal observations, photo surveys, and interviews. The information collected consists of the everyday life of the residents living in Kabila C, the current houses the residents live in, business activities, services, energy consumption, additional improvements made by the residents, and the needs the residents require. The data assisted in the design approach of the proposed design project.

GoGlocal is a project, developed in 2021, aimed at understanding Sustainable Development Goals (SDG) 7, 11, and 13 concerning the Kabila C context and the community's requirements based on their everyday life (Ley et al., 2022). According to Katila (2019), SDG 7 relates to affordable and clean energy, SDG 11 is sustainable cities and communities, and SDG 13 is climate change. The project run under the University of Stuttgart in partnership with Namibia University of Science and Technology with the help of volunteers from the community and students from the university. Residents in Kabila C filled out the questionnaire provided by the university.



Figure 18: Site location, Kabila C, Havana (Google Earth Pro, 2023)

SITE PROFILE AND PHOTO SURVEY

TATE PAULUS HOUSEHOLD | ERF 854/1

Owners (married couple)
Female, age 58, business at home, n/a income
Male, age 58, police worker, n/a income
Other occupants
Son, age 3, child
Daughter, age 6, child
Daughter, age 9, learner
Son, age 15, learner
Niece, age 22, student
Total occupants
7 (3 adults and 4 children)

Land: Owns land; plot size 150m2
Structure: Corrugated iron, concrete floor
Total rooms: Kitchen, 2 bedroom, living room
Additional improvements to the house: Tyres and cement were used to prevent the house flooding.
Energy used: Firewood is used to cook outdoors.
Gas and electricity are used to cook indoors.
Electricity is used for light indoors.
Services used: Communal taps and toilets are used on prepaid for N\$100 per month.
Food: Garden for food for the family
Needs: Clinic, secondary school, shopping mall, tarred roads, taxi rank
Organisation: Ituyeni savings group

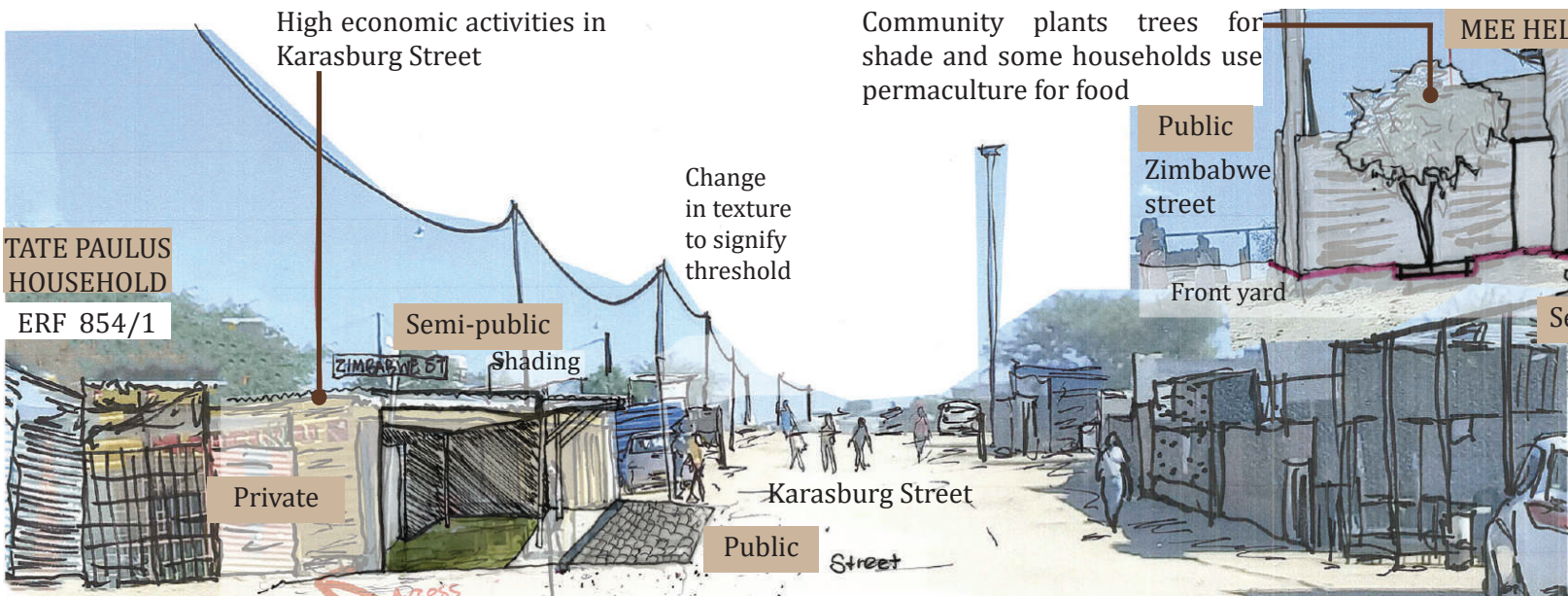


Figure 19: Photo Survey of Karasburg and Zimbabwe Street

SITE PROFILE AND PHOTO SURVEY

MEE HELENA HOUSEHOLD | ERF 855/1

Owners (married couple)
Male, age 50, self-employed, monthly income N\$ 2000
Female, age 42, monthly income N\$ 2000
Other occupants
Daughter, age 4, child
Daughter, age 7, learner
Son, age 12, learner
Son, age 16, learner
Total occupants
6 (2 adults and 4 children)

Land: Owns land; plot size 150m2
Structure: Corrugated iron, concrete floor
Total rooms: Kitchen, 2 bedrooms, living room
Additional improvements to the house: n/a
Business activities: Family has a mini butchery.
Energy used: Electricity is used to cook and light indoors.
Services used: Communal taps and toilets are used on prepaid for N\$300 per month.
Food: Garden for food for family, trees for shade
Needs: Clinic, open market, toilet maintenance, taxi rank/bus stops
Organisation: Ituyeni savings group

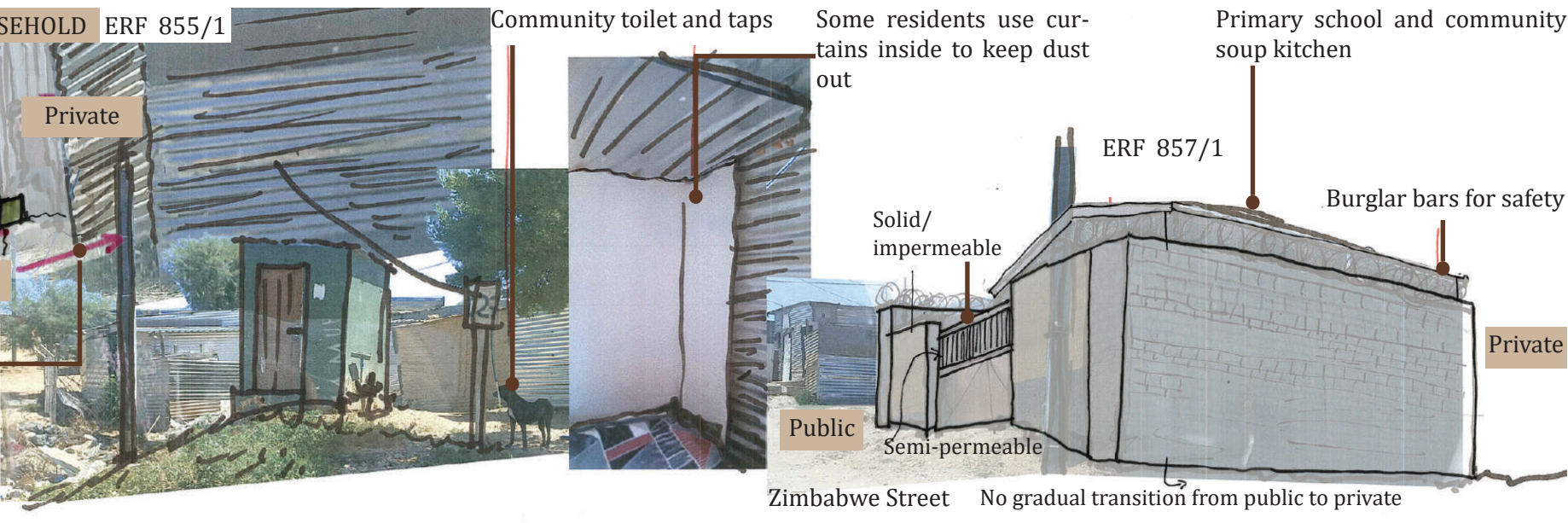


Figure 19: Photo Survey of Karasburg and Zimbabwe Street

SITE PROFILE AND PHOTO SURVEY

FRANCIS | ERF 855/2

Owners (married couple)
Male, age 33, self-employed, monthly income N\$ 1000
Other occupants
Mother, age 56, unemployed
Cousin, age 23, student
Sister, age 22, student
Daughter, age 3, child
Total occupants
5 (4 adults and 1 child)

Land: Owns land; plot size 150m2
Structure: Corrugated iron, floor sand
Total rooms: Kitchen/living room, 2 bedrooms
Additional improvements to the house: Curtains were added in the house (wall) to protect the shelter from natural disasters (dust, sand) and from heat stress (cool structure on hot days and heat structure on cold days).

Energy used: Firewood is used to cook outdoors. Gas is used to cook and electricity for light indoors.
Services used: Communal taps and toilets are used on prepaid.
Needs: Private taps and proper circulation, clinic, mall, ATMs
Organisation: Ituyeni savings group

SITE PROFILE AND PHOTO SURVEY

MEE MOLLY HOUSEHOLD | ERF 859

Owners (married couple)
Female, age 45, self-employed, monthly income N\$ 3500
Other occupants
Sister, age 22, self-employed
Niece, age 20, student
Son, age 15, learner
Total occupants
4 (3 adults and 1 child)

Land: Owns land; plot size 225m2
Structure: Brick house
Total rooms: Kitchen, 2 bedrooms, living room
Additional improvements to the house: Added boundary wall for safety
Business activities: Family has a food tuck shop attached to the house
Energy used: Electricity is used to cook and light indoors. Firewood to cook outdoors.
Services used: Communal taps and toilets are used on prepaid for N\$300 per month
Food: Garden for food for family
Needs: Clear subdivision of settlement, privacy, and social services
Organisation: SDFN member

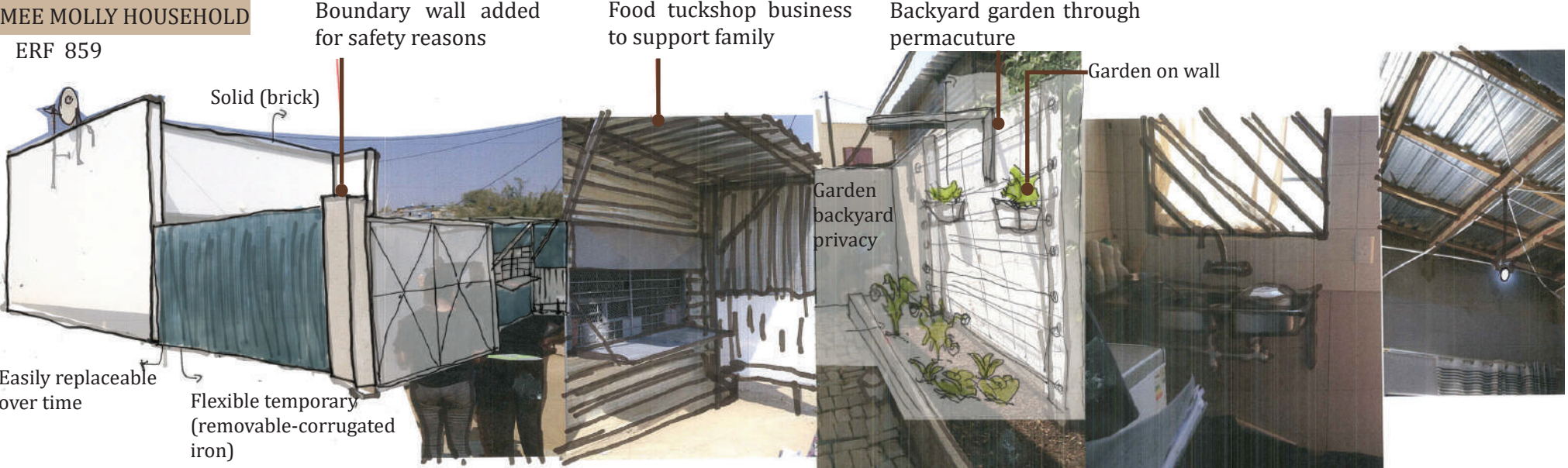


Figure 20: Photo Survey of Zimbabwe Street

SITE PROFILE AND PHOTO SURVEY

KATRINA HOUSEHOLD | ERF 861/1

Owner
Female, age 24, cleaner, monthly income N\$ 2000

Other occupants
None

Total occupants
1 adults

Land: Owns land; plot size 300m2

Structure: Corrugated iron, cement floor

Total rooms: Kitchen, 1 bedroom, living room

Additional improvements to the house: Tyres with sand to prevent house flooding. Added trees for shade.

Energy used: Gas for cooking indoors. Electricity and candles are used for light indoors.

Services used: Communal taps and toilets are used on prepaid for N\$300 per month.

Food: Garden for food

Needs: Permanent structure, private taps and toilet, tarred roads

Organisation: SDFN member; Ituyeni savings

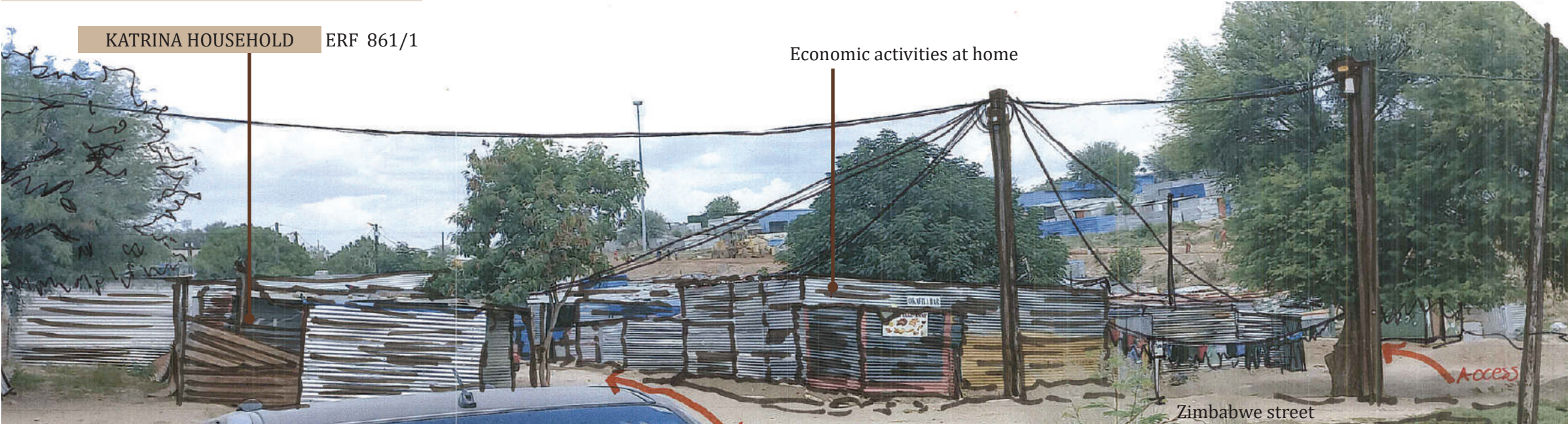


Figure 20: Photosurvey of Zimbabwe Street

SITE PROFILE AND PHOTO SURVEY

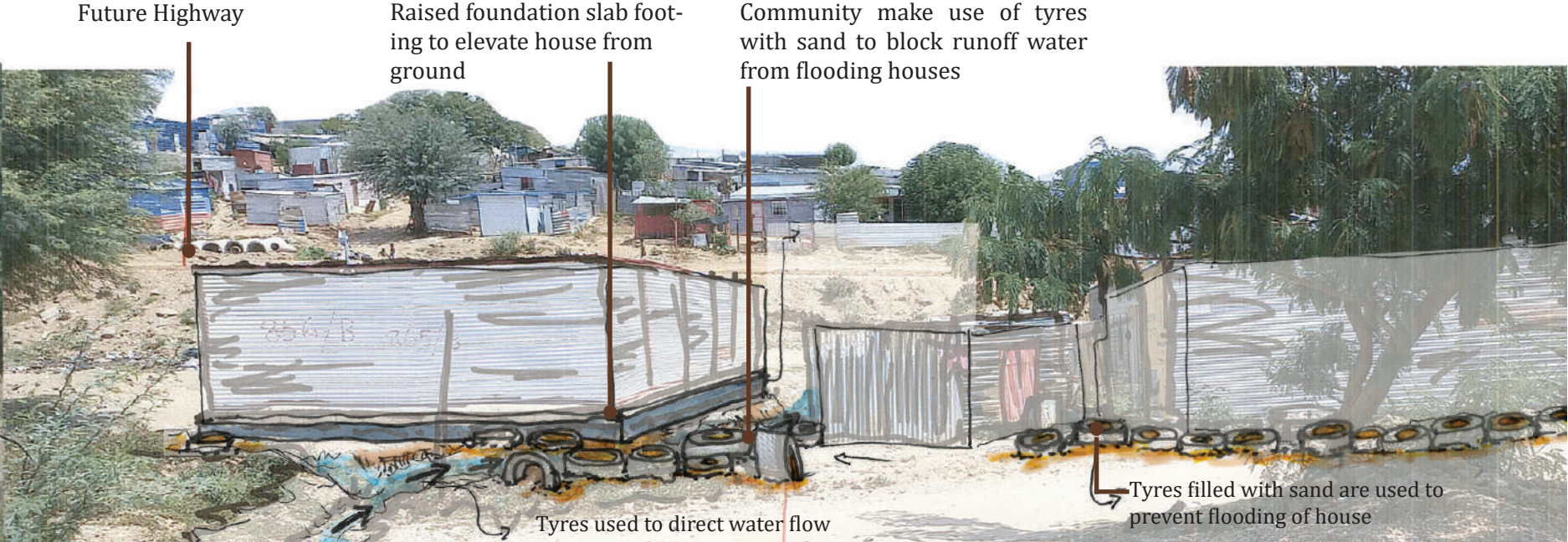


Figure 20: Photosurvey of Zimbabwe Street

SITE PROFILE AND PHOTO SURVEY

MELONY HOUSEHOLD | ERF 879/2

Owners (married couple)
Female, age 54, monthly income N\$ 1000
Male, age 58, truck driver, monthly income N\$4000

Other occupants
Daughter, age 27, technical assistant, monthly income N\$ 5000 |Niece, age 25, examination office, monthly income N\$ 5000 |Daughter, age 21, student part-time job |Niece, age 20, student

Total occupants
6 adults

Land: Owns land; plot size 150m2

Structure: Brick house

Total rooms: Kitchen, 2 bedroom, living room

Additional improvements to the house: Tyres add to stop water run-off to prevent flooding of the house. Due to the lack of safety, the family wants to add a boundary wall.

Energy used: Electricity is used to cook and for light indoors.

Services used: Communal taps and toilets are used on prepaid for N\$100 per month.

Food: Garden for food for the family

Needs: Clinic, taxi ranks, waste management, library, playground

Organisation: SDFN member, Ituyeni savings group

SITE PROFILE AND PHOTO SURVEY

MEE SARA HOUSEHOLD | ERF 871/2

Owners (married couple)
Female, age 42, self-employed and SDFN facilitator, monthly income N\$ 6400
Male, age 43, labour officer, monthly income N\$4000

Other occupants
Daughter, age 11, learner
Cousin, age 9, learner
Daughter, age 2, child

Total occupants
5 (2 adults and 3 children)

Land: Owns land; plot size 176m2

Structure: Brick house

Total rooms: Kitchen, 2 bedroom, living room

Additional improvements to the house: Added high foundation and internal steps to prevent flooding. Added burglar bars on windows and doors for safety.

Business activities: Family has a mini butchery.

Energy used: Sewing at home for Abraham Iyambo School.

Services used: Private taps and toilets are used.

Food: Garden for food for family

Needs: Tarred roads, clinic, taxi ranks and bus stop

Organisation: SDFN member, Ituyeni savings group facilitator

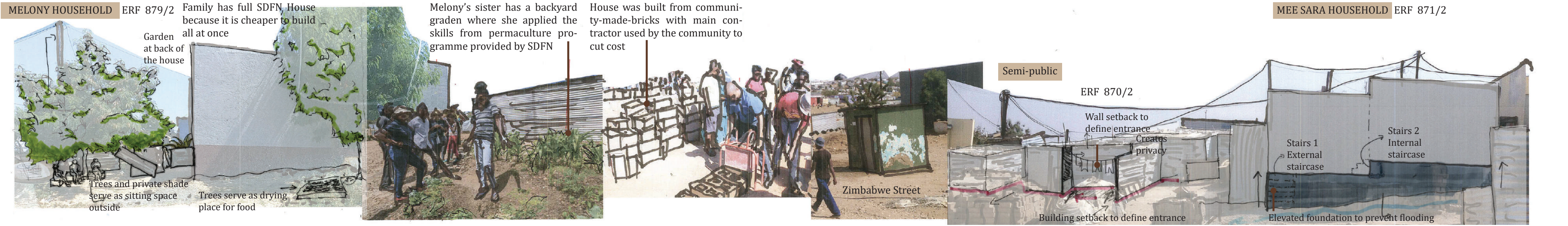


Figure 20: Photo Survey of Zimbabwe Street

Figure 20: Photo Survey of Zimbabwe Street

SITE PROFILE AND PHOTO SURVEY

MEME GINA HOUSEHOLD | ERF 873/1

Owners (married couple)

Female, age 44, seamstress, Kapana vendor, domestic worker, monthly income N\$ 6000

Male, age 50, Butcher, N\$ 10 000

Other occupants

Brother-in-law, age 45, taxi driver, N\$ 6000

|Daughter, age 27, student, self-employed, monthly income N\$ 3000

|Son, age 18, learner

Daughter, age 10, learner |Grandson, age 0, baby

Total occupants

7 (4 adults and 3 children)

Land: Owns land; plot size 150m2

Structure: Brick house

Total rooms: Kitchen, 3 bedrooms, living room

Additional improvements to the house: Added boundary wall and burglar bars on doors and windows for safety

Business activities: Sewing at home. Kapana stall on Karasburg Street.

Energy used: Gas is used to cook indoors. Fire-wood is used to cook outdoors.

Services used: Communal taps and toilets are used on prepaid

Food: Garden for food for family

Needs: Tarred road, accessible toilets, land for public facilities

Organisation: SDFN member, Ituyeni savings group

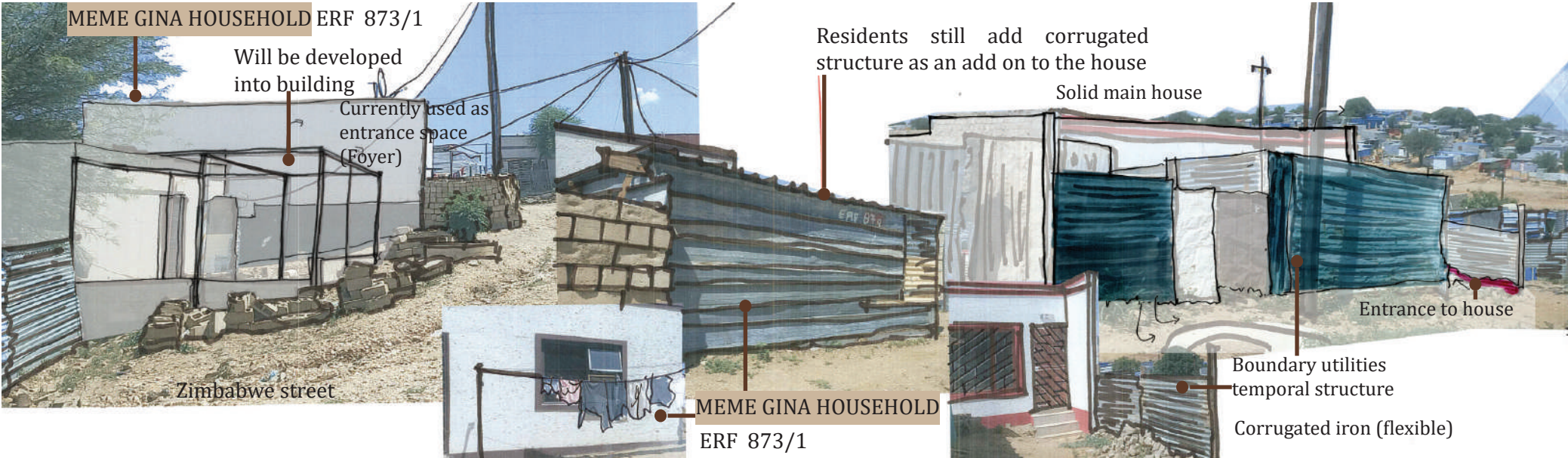


Figure 20: Photo Survey of Zimbabwe Street

SITE PROFILE AND PHOTO SURVEY

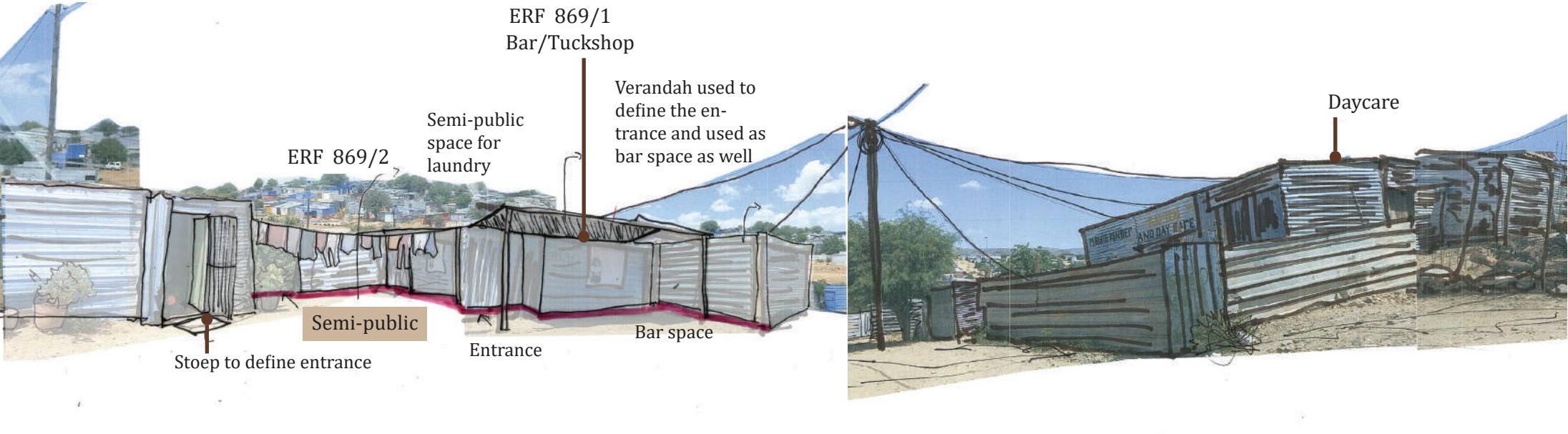


Figure 20: Photo Survey of Zimbabwe Street

SITE INVESTIGATION

04



Figure 21: Site map, Zimbabwe Street (Google Earth Pro, 2023)

URBAN ANALYSIS

WINDHOEK IN APARTHEID ERA

Namibia, previously called South-West Africa, was ruled by South Africa from 1915-1990 (Roland et al., 2023). During the Apartheid era, the urban framework of Windhoek, the capital city, was configured to promote racial and ethical segregation (Melber, 2016). Physical features such as the Western Bypass and riverbeds were used as barriers to subdivide the different races and ethnicities.

Black and Coloured inhabitants who migrated to Windhoek for work were initially located in the Old Location. According to Roland et al. (2023), in the Old location, the ethical groups were divided and the houses were categorized through building materials and typologies. For example, the Herero dwellers occupied houses made from recycled wood while the Coloured dwellers stayed in brick houses (Melber, 2016). After 1959, the inhabitants that lived in Old Location were relocated to Katutura. The black inhabitants relocated to Katutura and the Coloured inhabitants to Khomasdal.

Amenities and services such as cemeteries, shops, and churches, to name a few, were classified based on race and ethnicity. As shown in Figure 21, black people were buried at the Old Location cemetery and the white people at the Gammas cemetery. The churches for black people in white locations were not demolished after relocation, however, black people were not allowed to enter the churches.

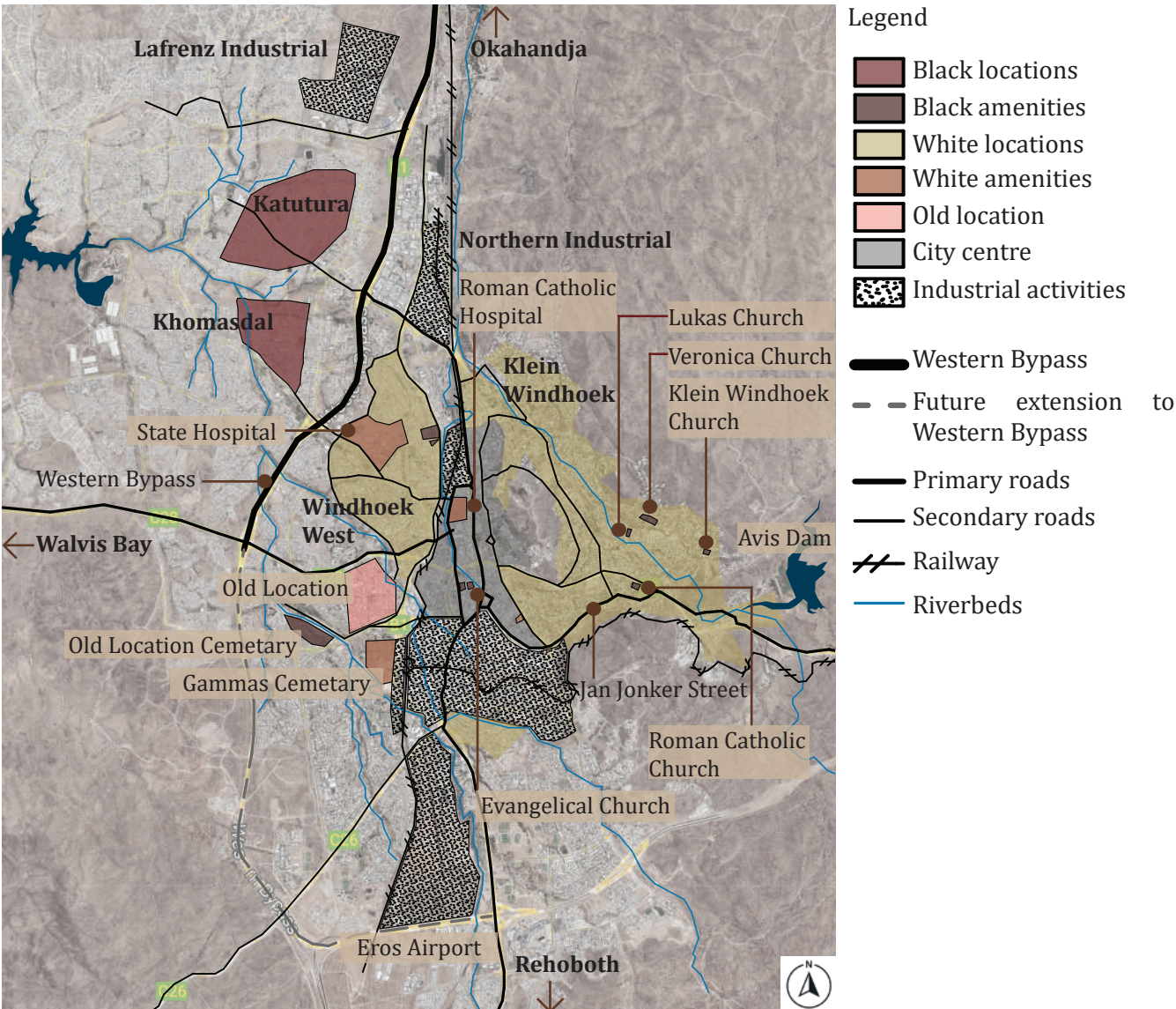


Figure 22: Windhoek 1960s map during the Apartheid era; Background map retrieved from Google Earth; Information retrieved from Roland et al. (2023)

URBAN ANALYSIS

WINDHOEK AFTER INDEPENDENCE

After Namibia gained Independence, in 1990, the population in Windhoek increased due to an influx of people who migrated to the city for better job opportunities, school, and health services (Roland et al., 2023). This led to people settling on land illegally which prompted the formulation of reception areas to temporarily host people who did not own land. These areas grew rapidly and became informal settlements.

After Independence, segregation appeared in the form of income groups. There is a distinct division between the ultra-low, low, middle, and high-income groups. The physical barriers constructed in the Apartheid era such as the Western Bypass, still act as a barrier, even though it is accessible to individuals in the city (Roland et al., 2023).

Most amenities and services are located in the high-income areas and city centre. This is a disadvantage to the ultra-low, low, and middle-income groups, as people have to commute long distances to access the amenities in the city centre. Housing typologies and building materials are classified based on income groups. Ultra-low-income areas use corrugated temporary shelters compared to high-income areas that use brick shelters. This is due to the laws enforced in formal and informal settlements.

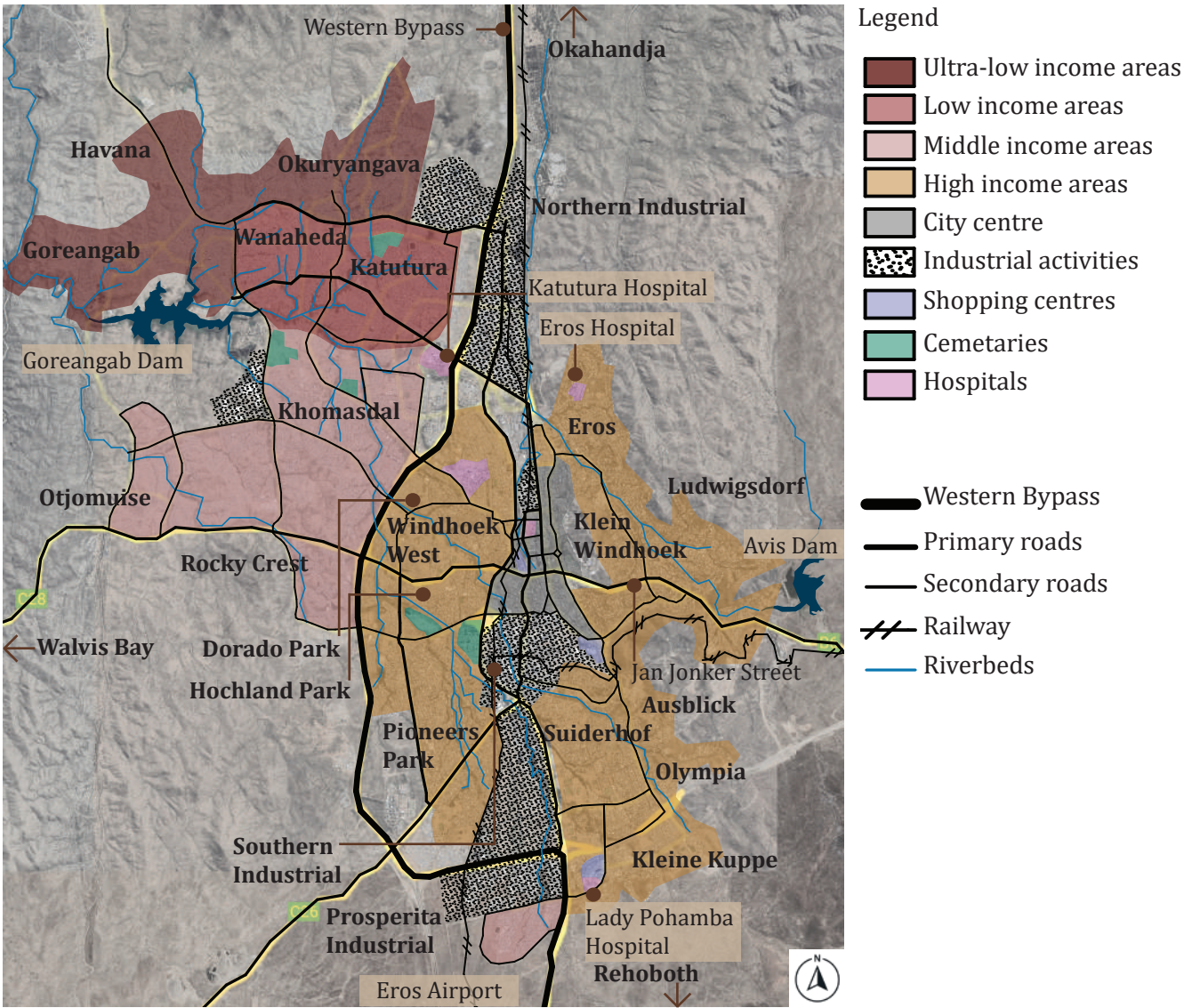


Figure 23: Windhoek 2013 map after Independence; Background map retrieved from Google Earth; Information retrieved from Roland et al. (2023)

CHARACTERISTICS OF INFORMAL SETTLEMENTS IN WINDHOEK

A brief site analysis of informal settlements in Windhoek was conducted in 2022. This analysis focused on capturing the use of temporality and materiality and its influence on the way people live in informal settlements.

A street view sketch collage, figure 24, was taken along Wilibal Kapuenene Street, Independence Avenue, Otjomuise Road, and Monte Christo Road leading to the main site in Zimbabwe Street, to identify the different characteristics found in Katutura, Wanheda, and Havana. It also shows the transition from formal to informal settlements and how it affects construction and location.

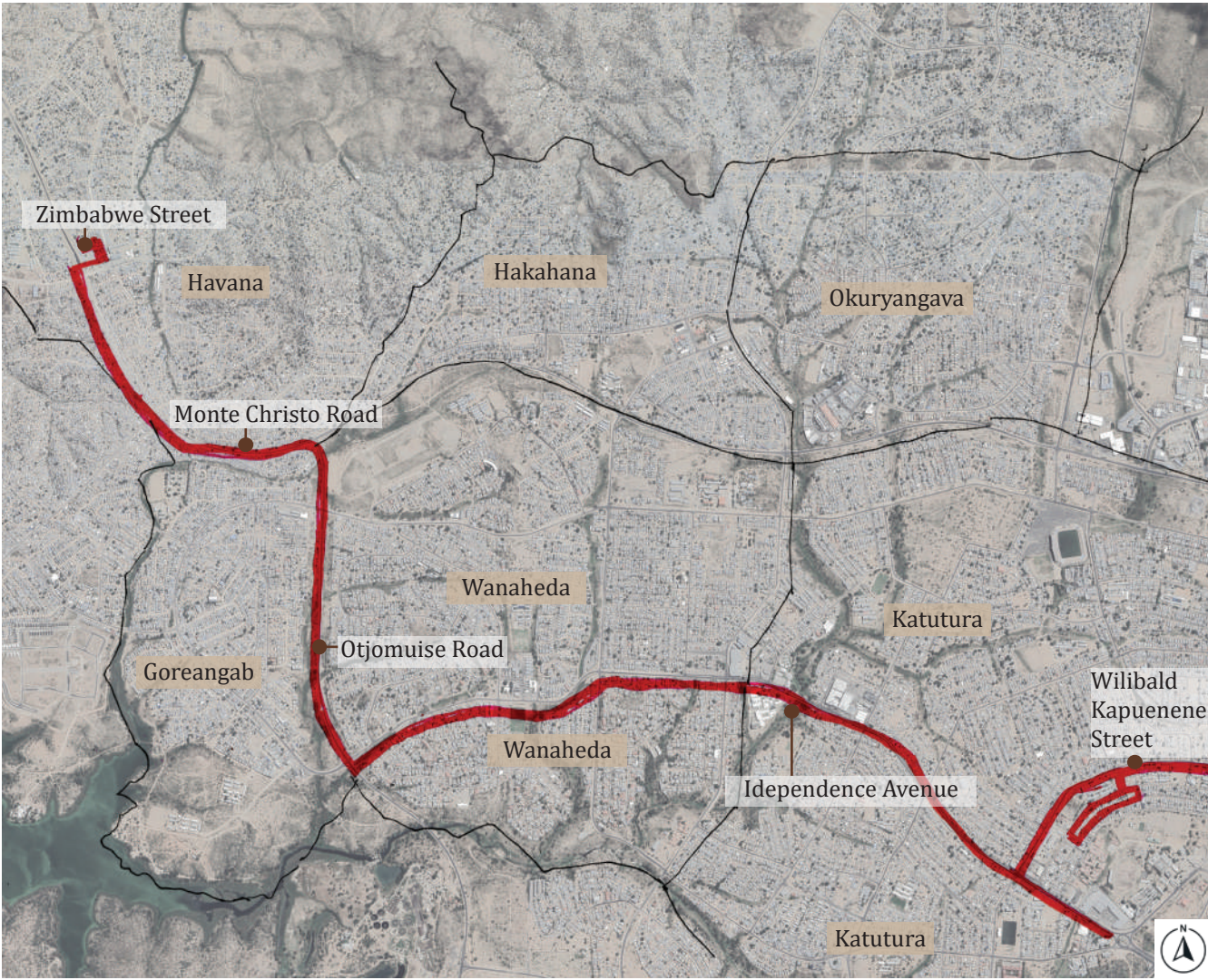


Figure 24: The route travelled. Background map retrieved from Google Earth

CHARACTERISTICS OF INFORMAL SETTLEMENTS IN WINDHOEK

Katutura is a formal settlement. People own land, however, residents still use temporal structures for informal trading, backyard flats, and storage spaces.

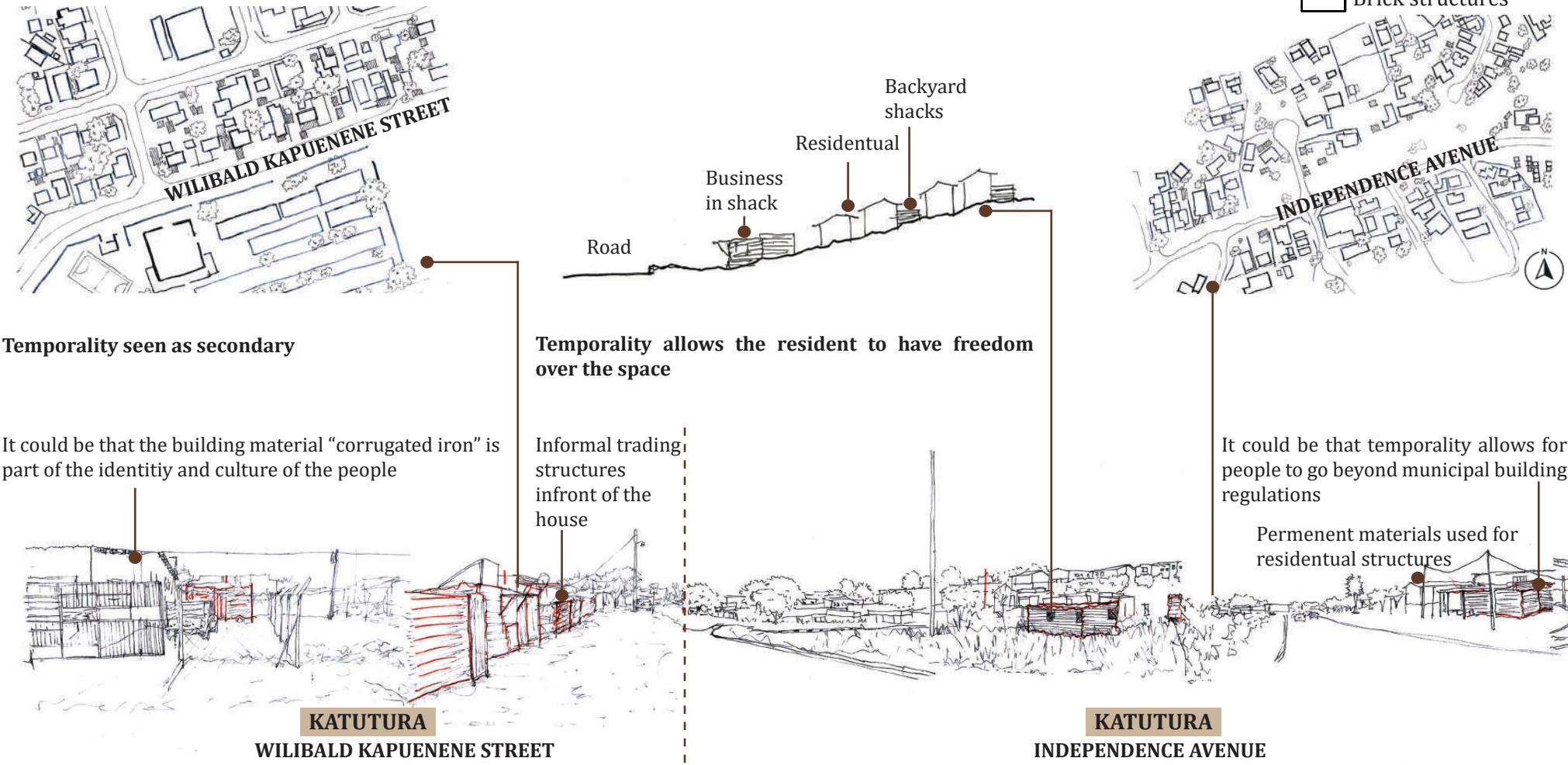


Figure 25: Street view sketch collage

CHARACTERISTICS OF INFORMAL SETTLEMENTS IN WINDHOEK

Wanaheda has formal and informal settlements. Residents construct their structures with bricks while still using corrugated iron structures for informal trading. Some residents do not own land construct houses with corrugated iron.

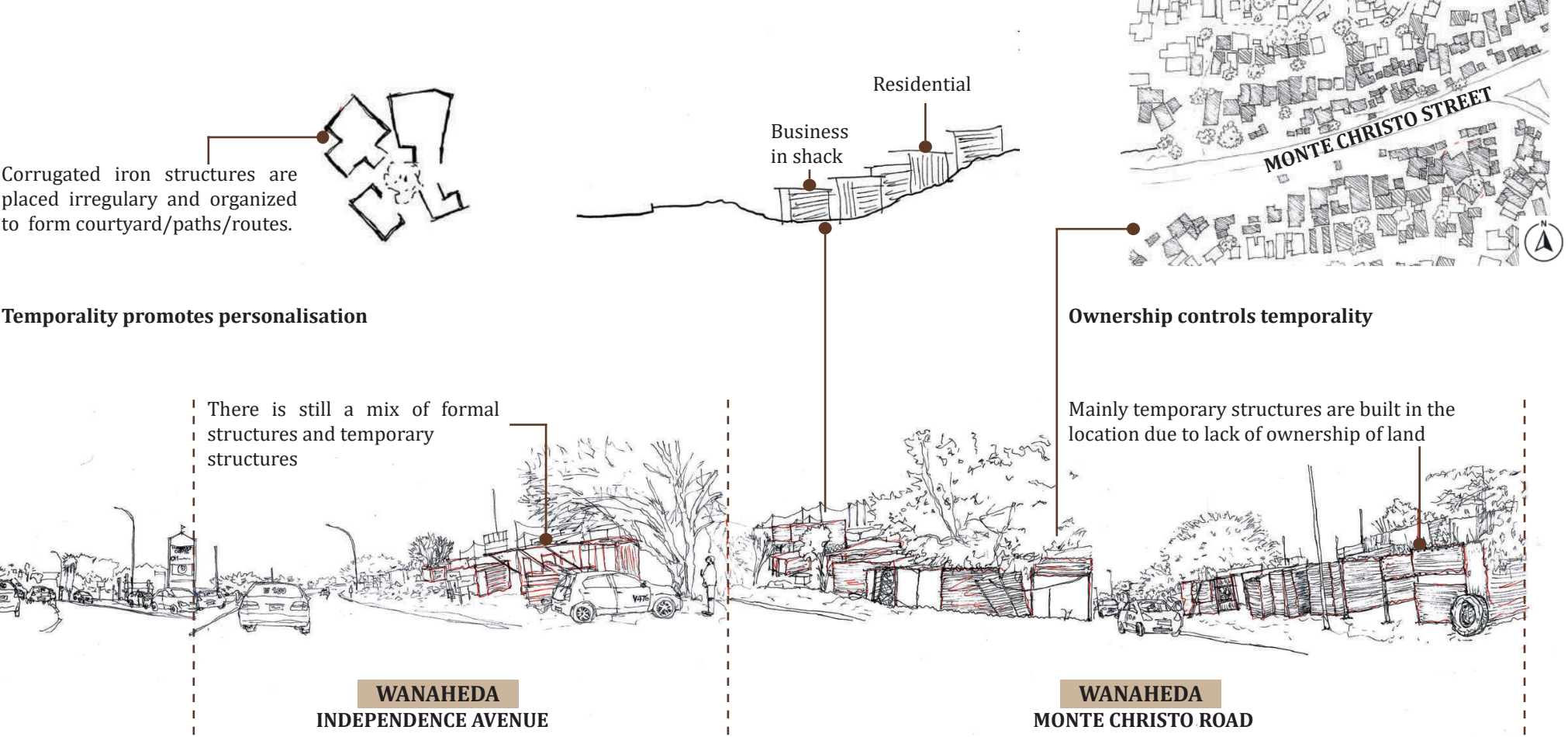


Figure 25: Street view sketch collage

CHARACTERISTICS OF INFORMAL SETTLEMENTS IN WINDHOEK

Havana has formal and informal settlements. Some residents own land, however, still utilise informal structures for residual use and businesses. Some areas are in the process of formalisation with the assistance of SDFN.

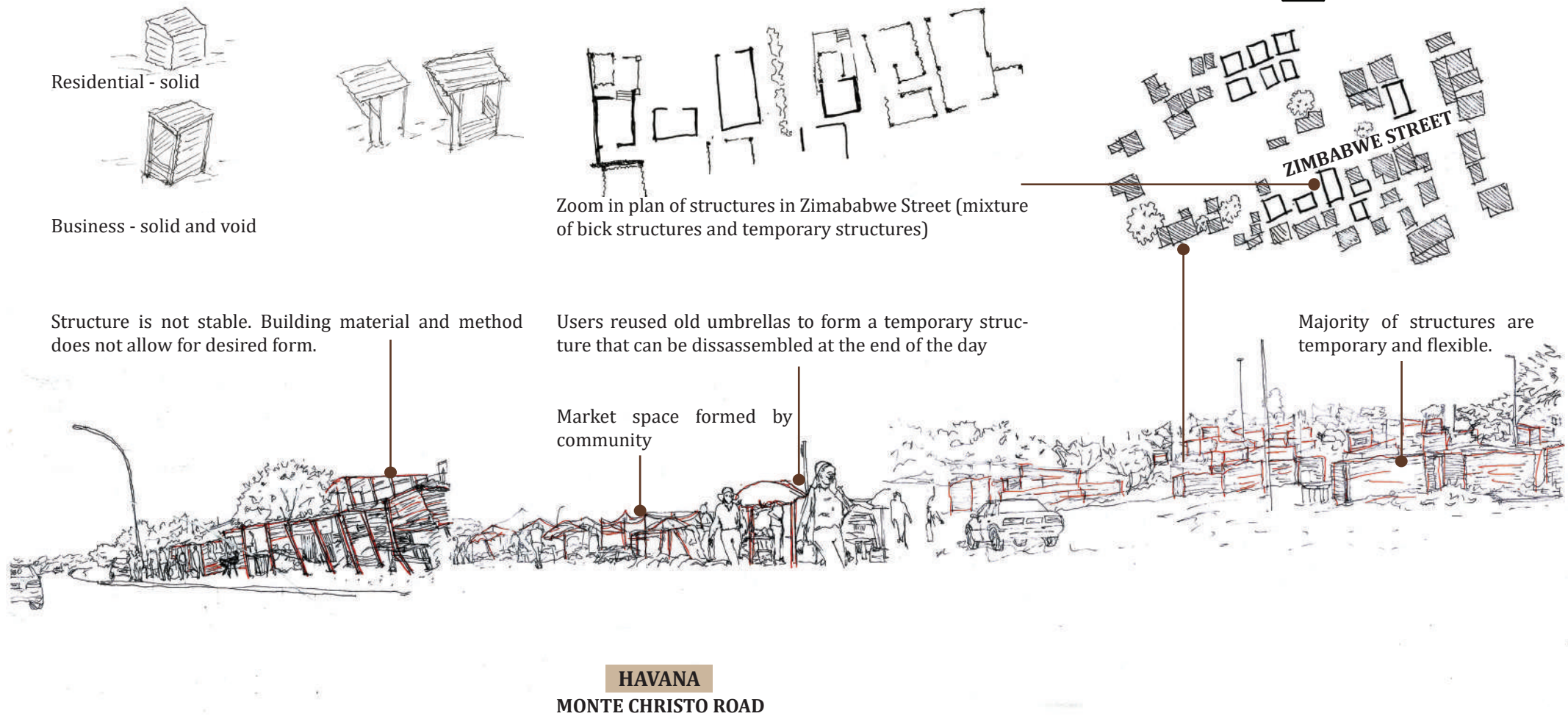


Figure 25: Street view sketch collage

SITE ANALYSIS

The focus site is located on Zimbabwe Street, Havana. The site contains Kabila C blocks and a portion of Kabila B blocks. The majority of the land is currently owned by the City of Windhoek, however, the residents with the assistance of SDFN are in the process of purchasing the land.

According to Ley et al. (2022), some residents in Kabila C own the land they are currently occupying. As shown in the figure, the 9 SDFN members own land and built their SDFN brick houses. Other residents purchased the land, however, have not yet begun building their SDFN brick houses. These residents are still saving for the building materials and services needed to construct their brick houses. In the meantime, they are staying in corrugated iron houses. Therefore, the Town Planning Scheme needs to produce a land-use scheme to accommodate home businesses at an affordable rate for informal upgrading settlements.



Figure 26: Site map depicting the current situation on site in Havana

SITE ANALYSIS

The site has a variety of informal businesses, mainly eateries, tuck shops, and bars. Monte Christo Road has an informal market formed by the community in that area. Karasburg Street is activated by informal trading which makes it a busy street. Zimbabwe Street is a less busy street due to the residential zoning, however, there are still some tuck shops along the street.

Based on the Municipal Cadastral Model for Havana, the site is under the residential town planning zoning. According to the Town Planning Scheme, the residential land-use zone has dwelling units as primary uses and residential buildings, Bed-and-breakfast to name a few as consent uses (Schemes et al., 2017). Home businesses and informal trading is not included in the list of consent uses which makes it prohibited in the zone. This regulation does not align with the true nature of the site. As specified by Schemes et al. (2017), the business land-use zone contains shops, business buildings, and dwelling units, to name a few, as primary uses. This zoning allows for home businesses, however, the Municipal service fees are more costly with business zoning compared to residential zoning. Business zoning is not conducive in informal settlements and settlements that are in the upgrading process. Therefore, the Town Planning Scheme needs to produce a land-use scheme to accommodate home businesses at an affordable rate for informal upgrading settlements.

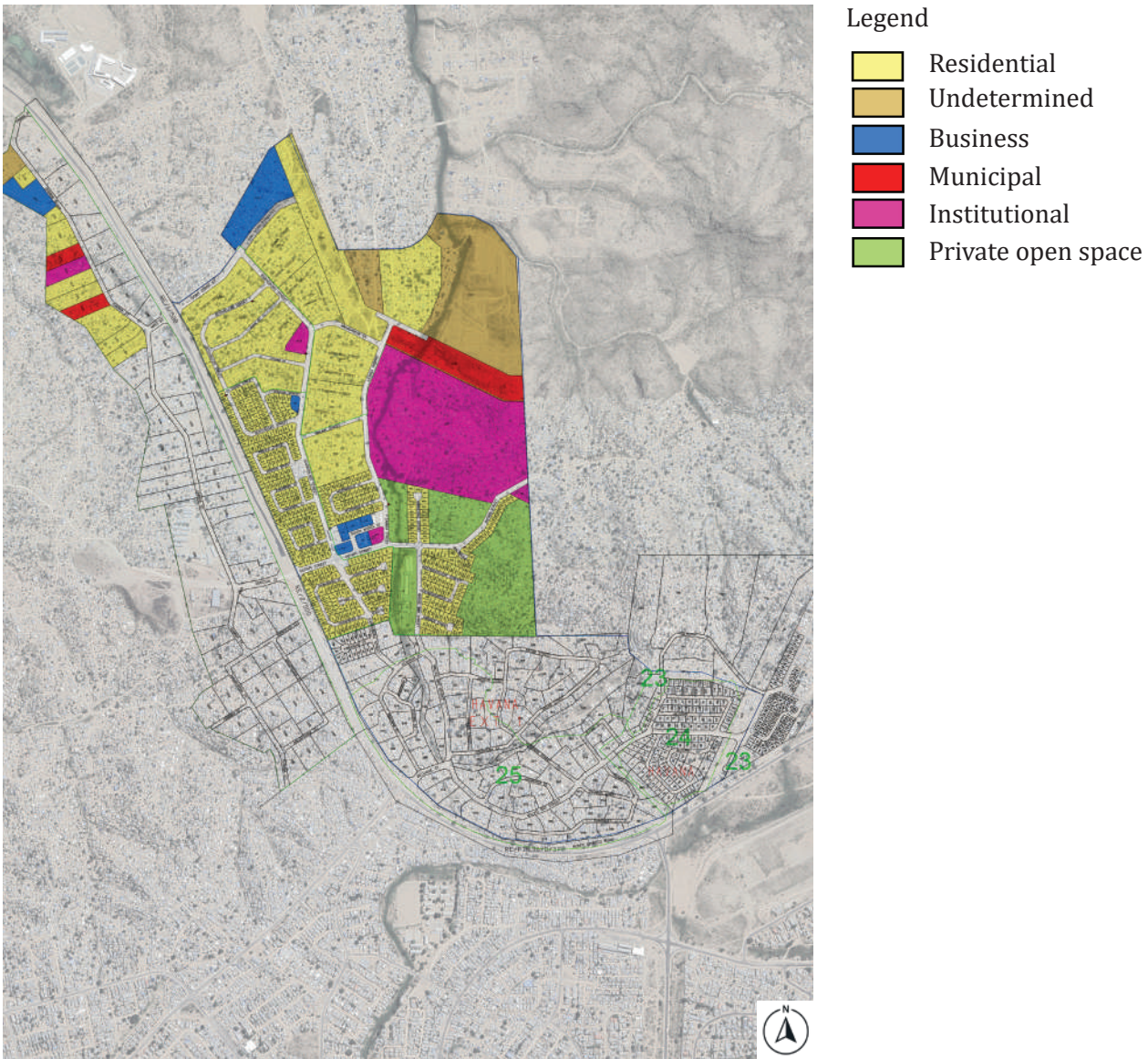


Figure 27: Current Town Planning Zoning of Havana retrieved from City of Windhoek; Google Earth background map

INFORMAL SETTLEMENT UPGRADING SYSTEMS IN WINDHOEK

05



Figure 28: Community reblocking to develop informal settlement (Mitlin, 2014)

INFORMAL UPGRADING ORGANISATIONS

Inadequate housing is a continuous challenge in urban regions in Namibia (Remmert & Ndhlovu, 2018). Informal settlements rapidly grow with the increase of urbanization in the country. This promoted the formulation of informal settlement upgrading organisations to aid in annihilating this issue.

According to Isandla (2019), the informal settlement upgrading process consists of the application phase, initiation phase, implementation phase, and finalisation phase. Figure 28 shows what each phase consists of. Often construction of housing is viewed in isolation. However, services provision, public amenities, and land tenure provision are some elements that form housing.

The current active organisations that aid in informal settlement upgrading in Windhoek are the National Housing Enterprise (NHE), Shack Dwellers Federation Namibia (SDFN), and Development Workshop Namibia (DWN). NHE focus on providing housing on serviced land. They only construct on serviced land and provide the complete house model to the users. SDFN provide secure land tenure, land servicing and housing in informal settlements while DWN focus on urban development and improving public sanitation in informal settlements (Remmert & Ndhlovu, 2018). The document will mainly focus on the implementation phase of informal settlements in regards to the housing structure provided by NHE and SDFN.

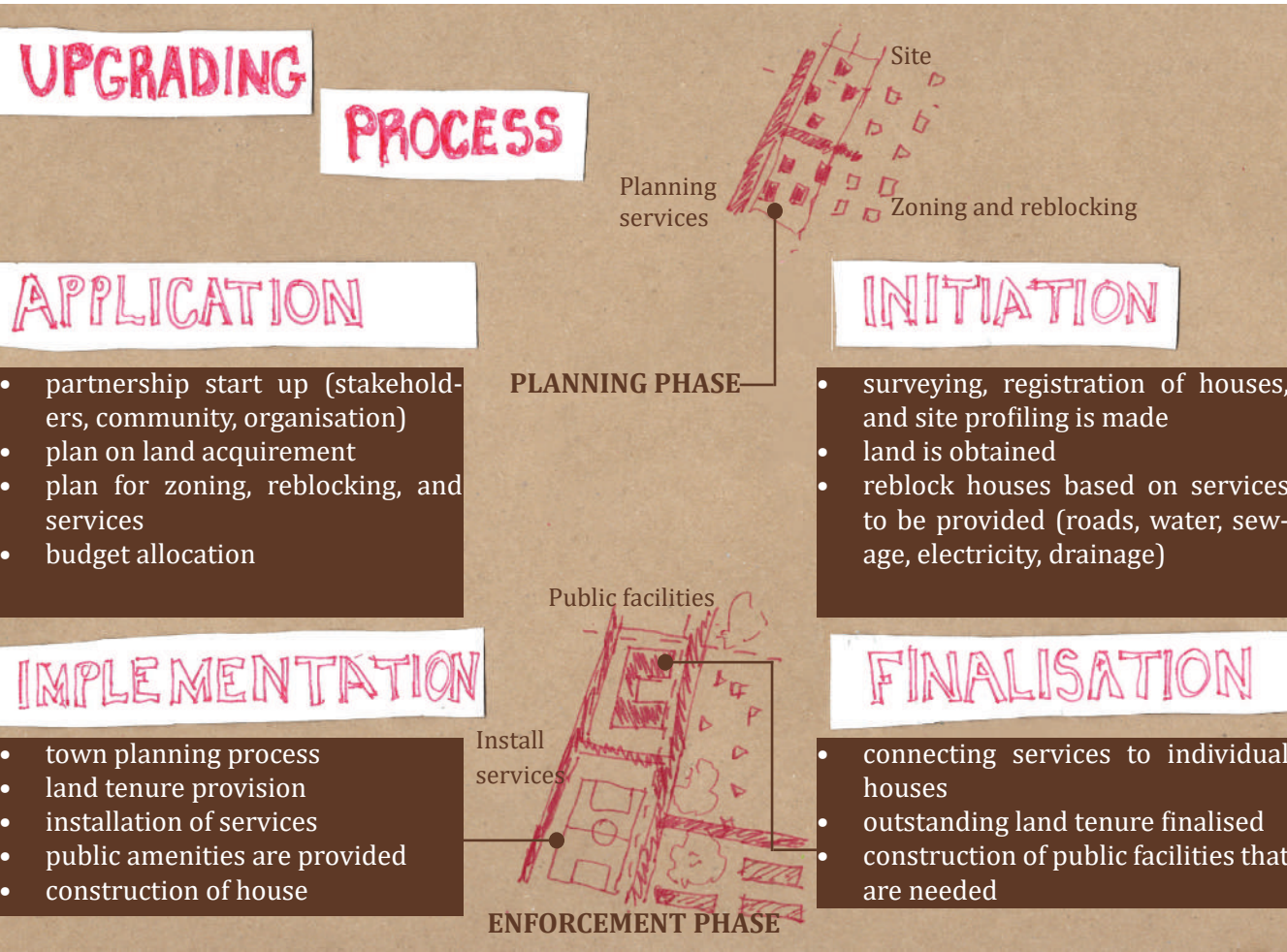


Figure 29: Informal settlement upgrading process

NATIONAL HOUSING ENTERPRISE

National Housing Enterprise (NHE) is a state-owned housing organisation that provides a variety of housing typologies targeted towards middle-low income groups (Remmert & Ndhlovu, 2018). The organisation provides conventional, core housing typologies, and informal settlement upgrading typologies.

NHE contains an informal settlement programme which was implemented in 2020. The project is in partnership with the City of Windhoek and the Ministry of Urban and Rural Development (MURD). The program provides design, construction services, and mortgages to individuals in low- to ultra-low-income groups. The organisation obtains subsidies from the government. The user buys a fully serviced complete house on loan from NHE. The user should have a title deed of the land.



Figure 30: NHE houses (NHE, n.d.)

NATIONAL HOUSING ENTERPRISE

BENEFITS

- The programme provides a variety of design typologies to incrementally upgrade depending on the user’s affordability.
- NHE aims to provide the user with quality materials such as basins, taps, and doors to increase the lifespan of the building and reduce maintenance fees for the user. Some houses are made from clay bricks to omit plastering and for low maintenance.
- The user obtains a finished house from the typology choices.

GAPS

- The plot sizes provided limit future expansion as typologies.
- The design of the building does not leave room for the user to personalize their space or improve it since the construction of the house is complete.
- The process lacks community participation. The design of the house is not influenced by the user and their particular living conditions.
- The land should be already owned by the user. The project does not assist with obtaining land and providing services for the user.

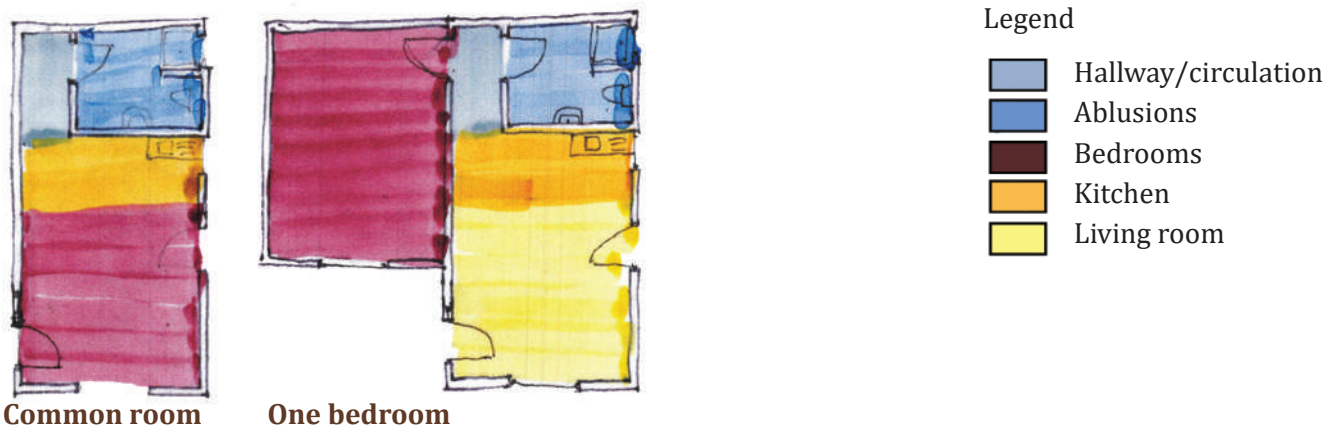


Figure 31: Initial typologies provided by NHE

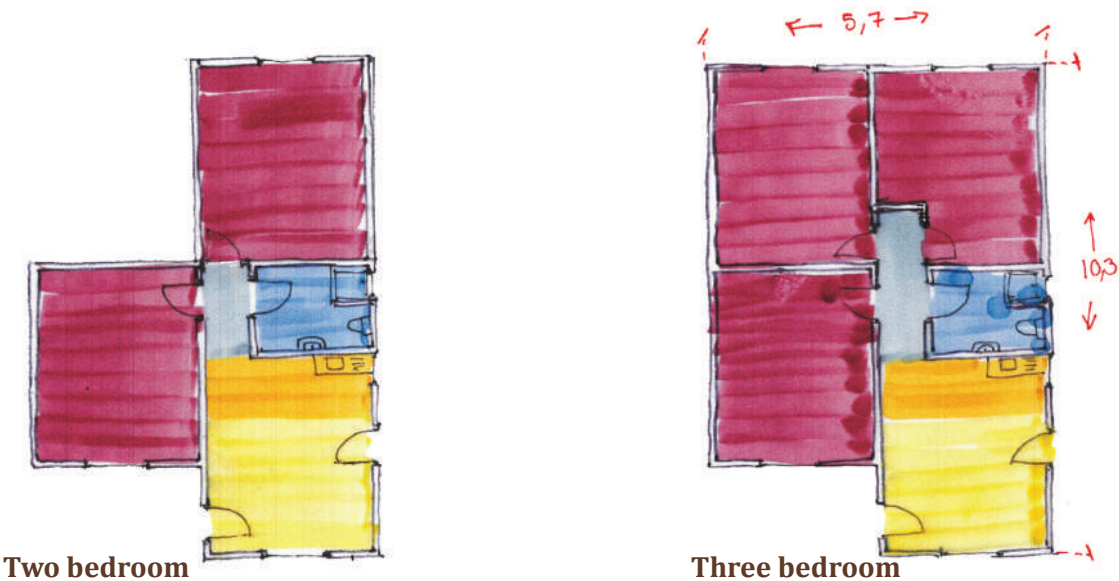


Figure 32: Advanced typologies provided by NHE

NAMIBIA HOUSING ACTION GROUP

According to Remmert and Ndhlovu (2018), the Namibia Housing Action Group (NHAG) is a civil society organization that supports the Shack Dwellers Federation Namibia (SDFN) by providing technical and management assistance, as well as financial support. NHAG aims to help SDFN to achieve their mission of providing affordable housing to low and ultra-low income communities.

The NHAG administers the Twahangana Fund, a community revolving fund that provides loans to SDFN members in savings groups (Scharrenbroich & Shuunyuni, 2020). This loan covers the acquisition and servicing of land, as well as the construction of houses. NHAG also manages donations and funding from the Ministry of Urban and Regional Development (MURD), Local Authorities (LAs), Regional Councils (RCs), and other organizations. The organization also facilitates Community Land Information Programme (CLIP) workshops to encourage community engagement and data collection of existing conditions to aid in re-blocking settlements (Scharrenbroich & Shuunyuni, 2020).



Figure 33: CLIP workshop organised by NHAG at Peter Nanyemba Informal Settlement in 2023

SHACK DWELLERS FEDERATION NAMIBIA

Shack Dwellers Federation Namibia (SDFN) community-driven organisation that aims to provide housing to people in the low-ultra low income groups. In partnership with NHAG, the organisation provides secure land tenure, re-blocking of plots, serviced land and housing. The organisation aid in the process of upgrading informal settlements to be more assessable to the community compared to the system and process provided by the City of Windhoek to improve services and provide security of tenure.

SDFN has various savings groups that receive loans from the Twahangana Fund (Scharrenbroich & Shuunyuni, 2020). The savings groups are community groups that form a savings scheme to accumulate money to construct their houses. The individuals in the groups add money to the account based on what they have. The loan provided to the individual will be paid over time. SDFN promotes and educates the community on permaculture through backyard gardening project, figure 34, and facilitating community brick-making, figure 35.



Figure 34: SDFN one-bedroom house (SDFN, 2022)

SHACK DWELLERS FEDERATION NAMIBIA

BENEFITS

- The project includes the community in the land and housing process.
- SDFN helps the user to get a land title deed and servicing of land.
- The project promotes and educates the community about permaculture to allow communities to grow and sell.
- Alternative forms of reducing cost are explored by the organisation such as incorporating the community in the construction process through making their own bricks, figure 35.

GAPS

- The project provides two sets of typologies which do not allow the user to further develop in the future, figure 33. The house occupies most of the site which leaves little space for further upgrading.
- The design is not adaptable to the specific user needs and the context.
- The site provided per erven is 150m2. The space provided does not cater for larger families and intergenerational use of the plot. In this case, upgrading the house vertically with 2 storey would be applicable in this scenarios. The incremental typologies provided only cater for 1 storey building.

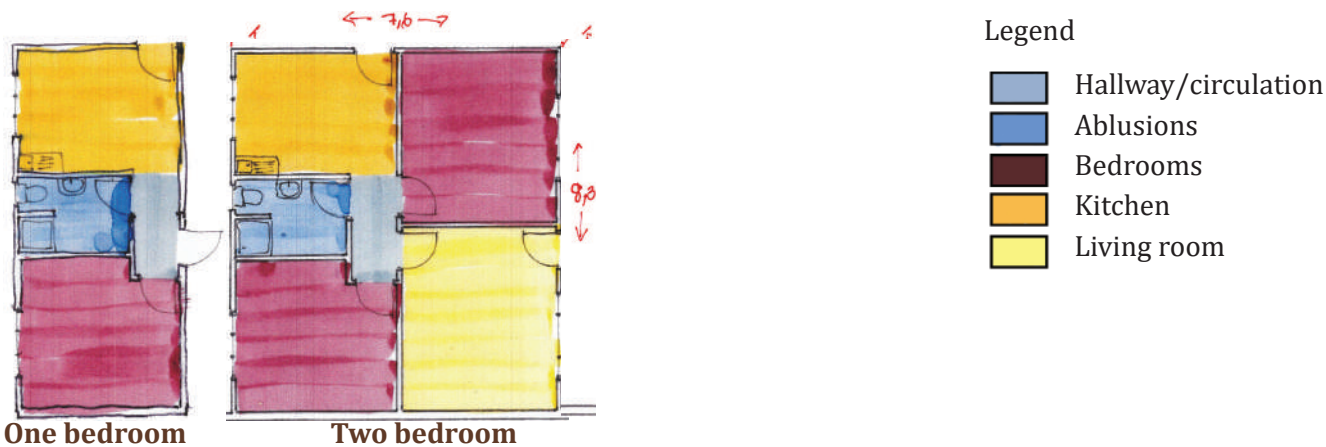


Figure 35: Typologies provided by SDFN



Figure 36: SDFN promotes permaculture in communities for food security



Figure 37: Community makes their bricks with the assistance of SDFN

PRECEDENT STUDIES



Figure 38: Empower Shack prototype incremental structure (Ras, 2014)

FORM

EMPOWER SHACK

Location: Khayelitsha, Cape Town, South Africa
Architect: Urban Think Tank
Year Constructed: 2014
Type of building: Incremental Housing

Empower Shack is a self-building prototype project in Cape Town. The project uses an incremental development construction process through the use of materiality and temporality to upgrade the structure over time. It encourages community participation by including the community throughout all phases of the project.

According to Urban Think Tank (2016), the first phase of the project starts with upgrading a typical shack into a double-storey structure using the typical materials used to construct a shack such as corrugated iron, and wooden framework. This phase of the project educates the community on how to construct and upgrade their shack vertically with the material they have available to optimise space. The final progression phase includes adding a bricklayer on some parts of the building for fire regulation and the service core while still maintaining the corrugated iron and wooden panels in other areas of the building. The final phase focus on upgrading the core and shell units into the fully upgraded unit. In other words, replacing the corrugated iron panels with a bricklayer.

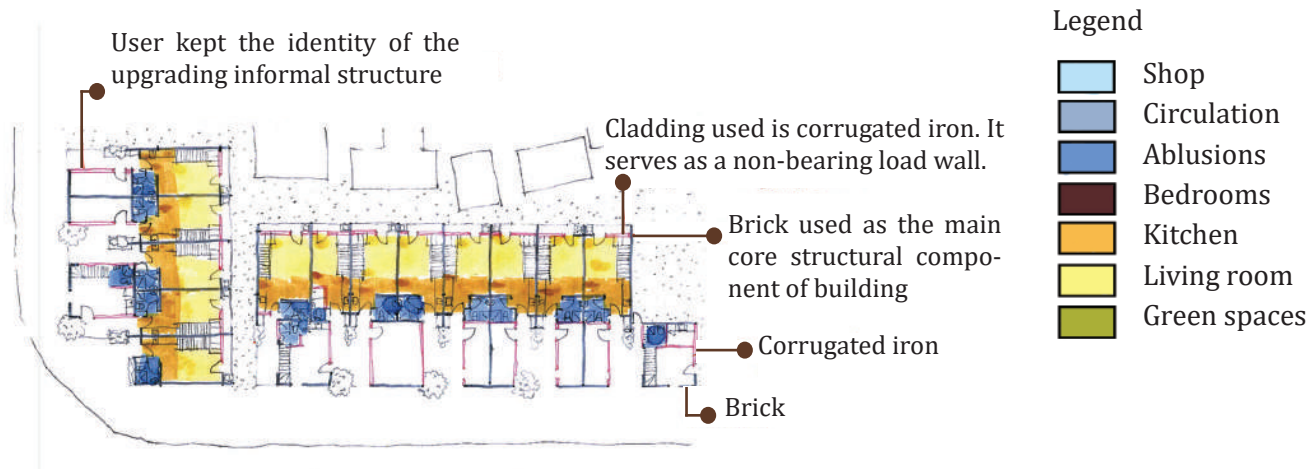


Figure 39: Site plan of the Empower Shack project

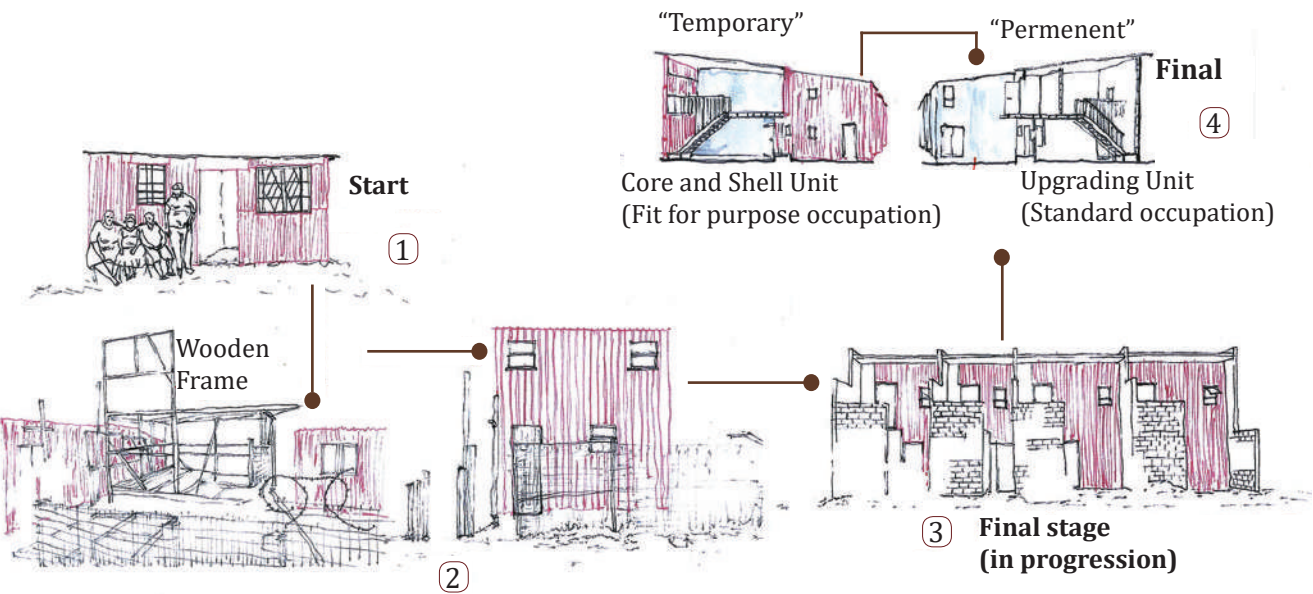


Figure 40: Incremental development of form

INCREMENTALITY

BELAPUR HOUSING

Location: India
Architect: Charles Corres
Year Constructed: 1985
Type of building: Incremental housing

The Belapur Housing aims to use traditional Indian techniques of incrementally developing the house (Davey, 2015). A simple traditional Indian house consists of the main house and an isolated bathroom as shown in Stage 1. Stage 2 promotes horizontal extension of the main house and bathroom. Stage 3, 4, and 5 allows the user to vertically upgrade the house to accommodate a growing family.

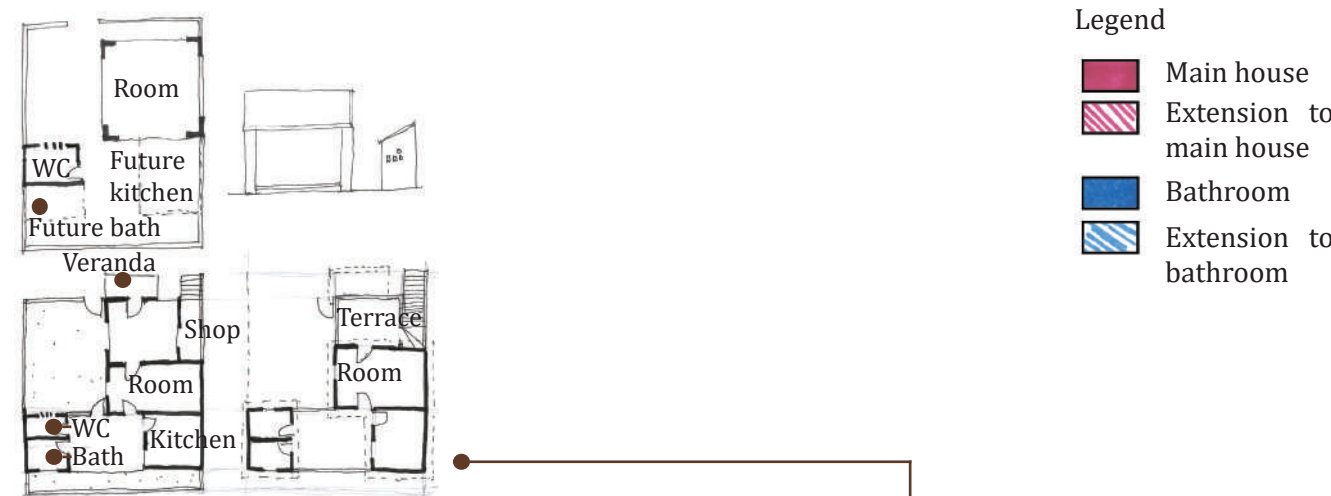


Figure 41: Final typology

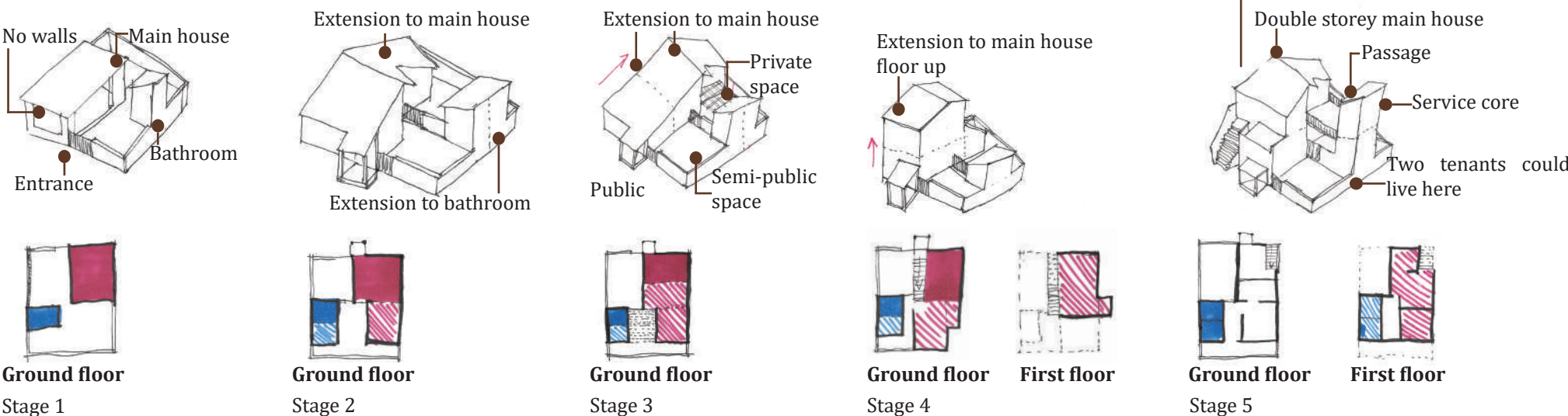


Figure 42: Incremental system

TPOLOGY

VILLA VERDE HOUSING

Location: Constitucion, Chile
Architect: Elemental
Year Constructed: 2010
Type of building: Social Housing

The Villa Verde Housing project was designed for the workers of the Arauco Forestry Company (Fracalossi, 2013). The project utilizes an incremental development construction process by providing the user with an empty volume in the unit to allow for expansion over time.

Affordability is one of the main factors that influenced the typology produced. The Arauco forestry company availed funds for the completed portion of the house for their employee as a subsidy (Fracalossi, 2013).

The complete portion of the house has a living space/kitchen, services, and 2 bedrooms. The remaining portion of the house is left empty to allow the user to build further when they accumulate more funds. The project also consisted of providing a functional neighbourhood which consists of courtyard shared spaces between the houses, private and shared backyards, parking, paths/streets, playgrounds, sports fields, and community centres. These elements play a role in what makes up a house.



Figure 43: Overall site of Villa Verde

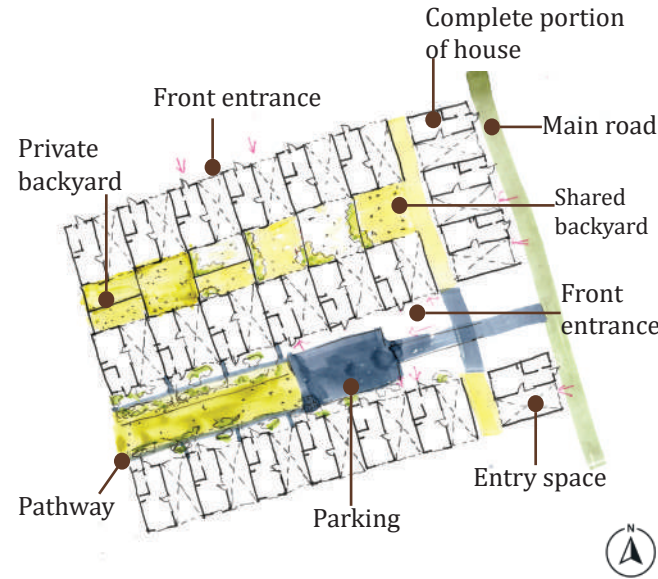


Figure 44: Neighborhood scale of Villa Verde

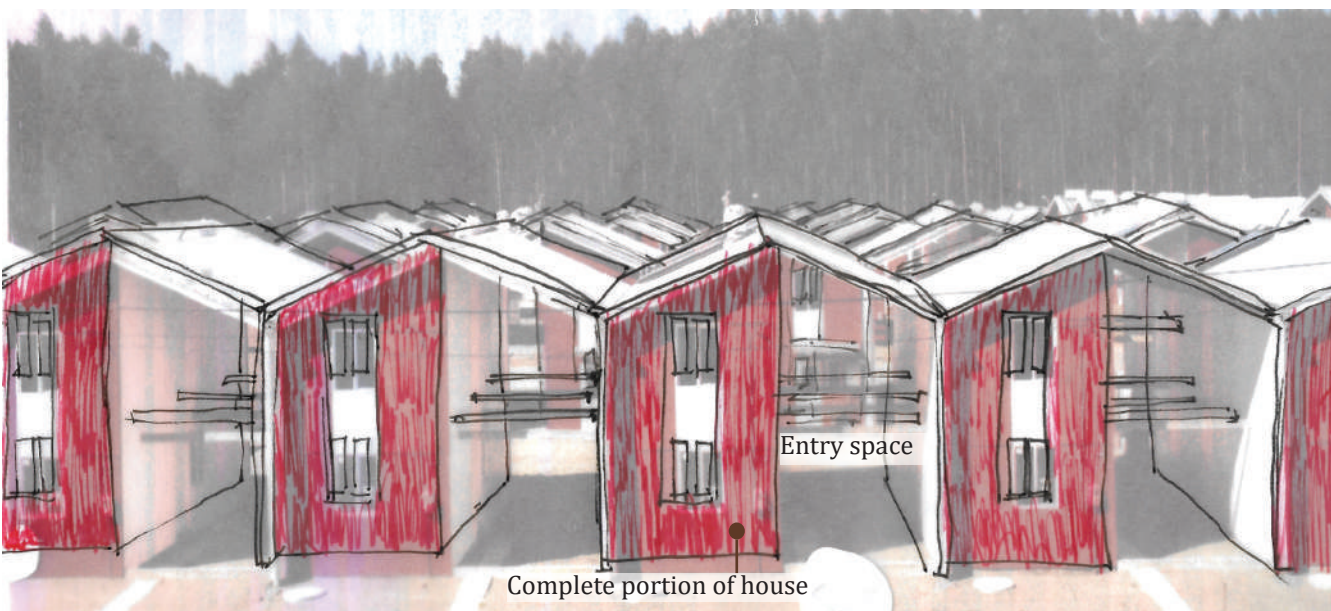


Figure 45: Units with completed and incomplete portions

MATERIALITY

RURAL HOUSE

Location: Ciudad De Cuetzalan, Mexico
Architect: Comunal Taller de Arquitectura
Year Constructed: 2016
Type of building: Housing

According to Leiva (2017), the rural house project aimed at promoting a self-built system and utilising locally sourced materials to construct the homes of the Tepetzintan community in Ciudad De Cuetzalan. The structural frame and roof system were made off-site to decrease the duration of construction.

The structural frame is made from bamboo that is treated with tissue from coffee sacks and mortar layers for maintenance purposes (Leiva, 2017). The layer below the window openings is constructed out of bricks and the openings are left untouched to allow the user to add preferred material. This allows the user to personalise their space based on preference, availability, and affordability.

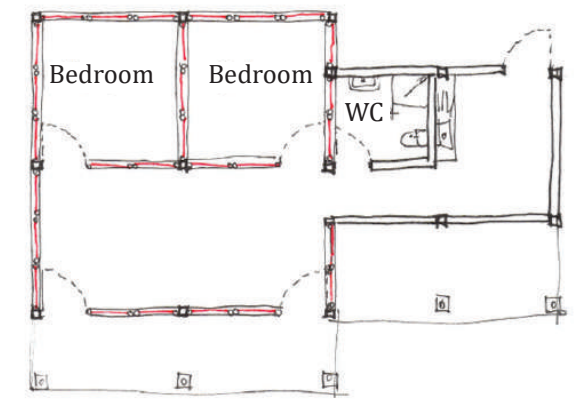


Figure 46: Ground floor plan

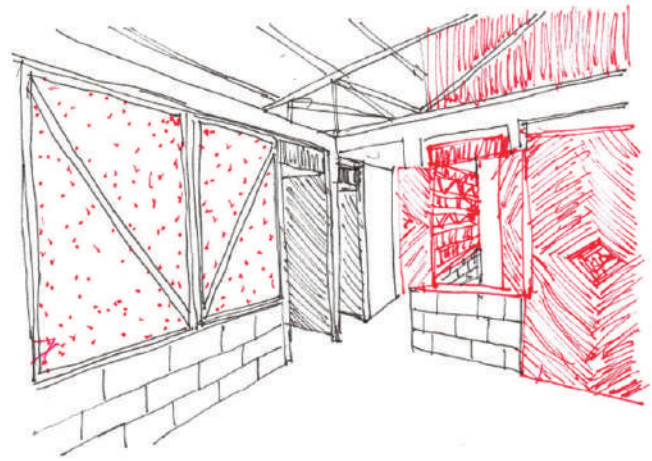


Figure 47: Interior use of various materials as infill

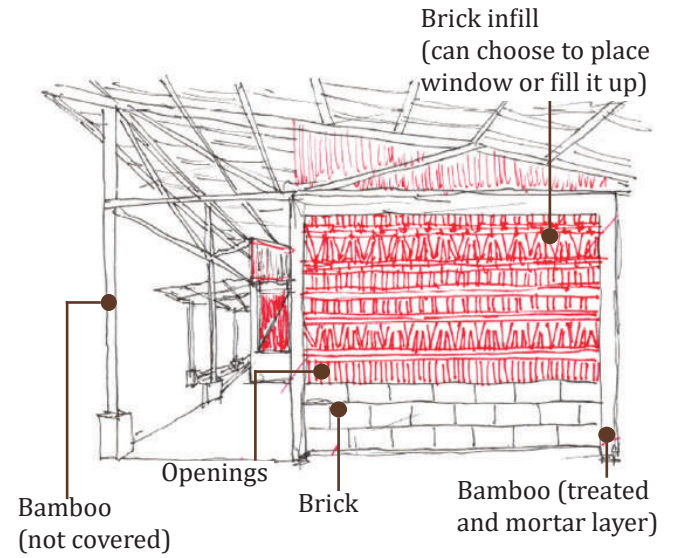
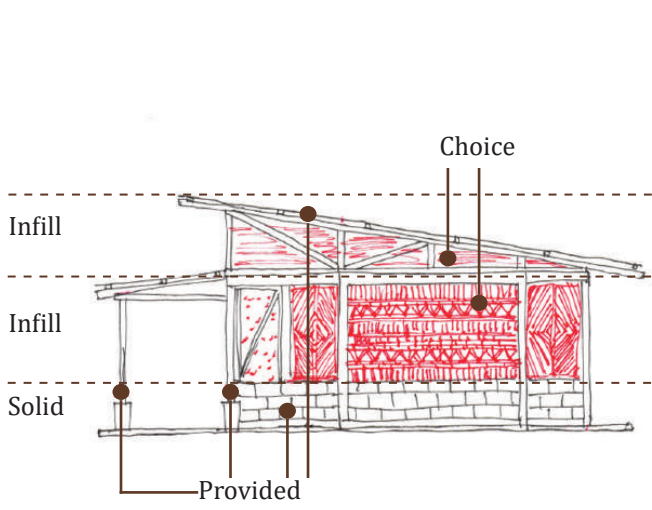


Figure 48: Exterior use of various materials



MATERIALITY

S HOUSE

Location: Mekong Delta, Tan An, Vietnam
Architect: VTN Architects
Year Constructed: 2014
Type of building: Social Housing

The S house was designed to accommodate people in the Mekong Delta from the low-income group who live in temporary structures that are in bad condition (Aguilar, 2014). The project aims at providing semi-permanent housing that is flexible for the user.

The house is made from a precast concrete frame with steel bracings that function as the permanent structural element of the structure. The frame is covered with a Nipa palm panel which is an affordable, readily available locally sourced material (Aguilar, 2014). The Nipa palm panel is temporarily fixed to the frame and can be replaced by the user when best suited. The roof system has a double layer for thermal comfort and to protect the structure against heavy rain.

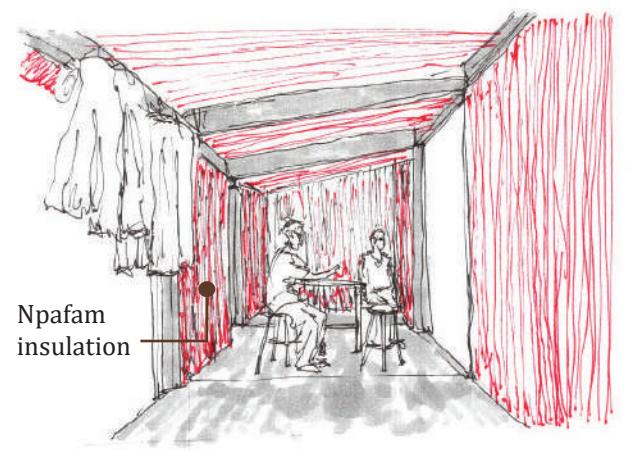


Figure 49: Affordable local materials such as Nipa palm panels were used

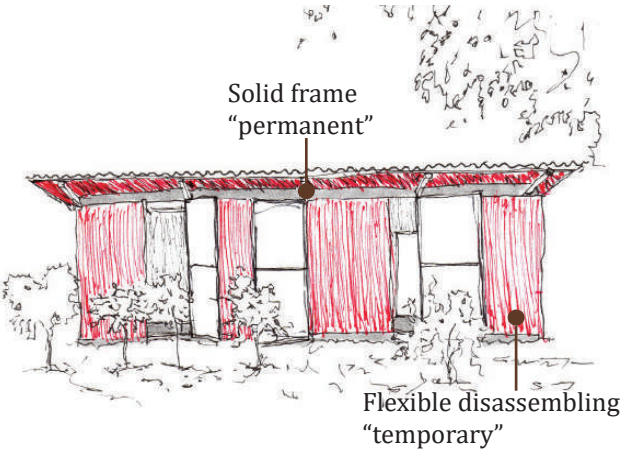


Figure 50: The house is made up of permanent and temporary elements

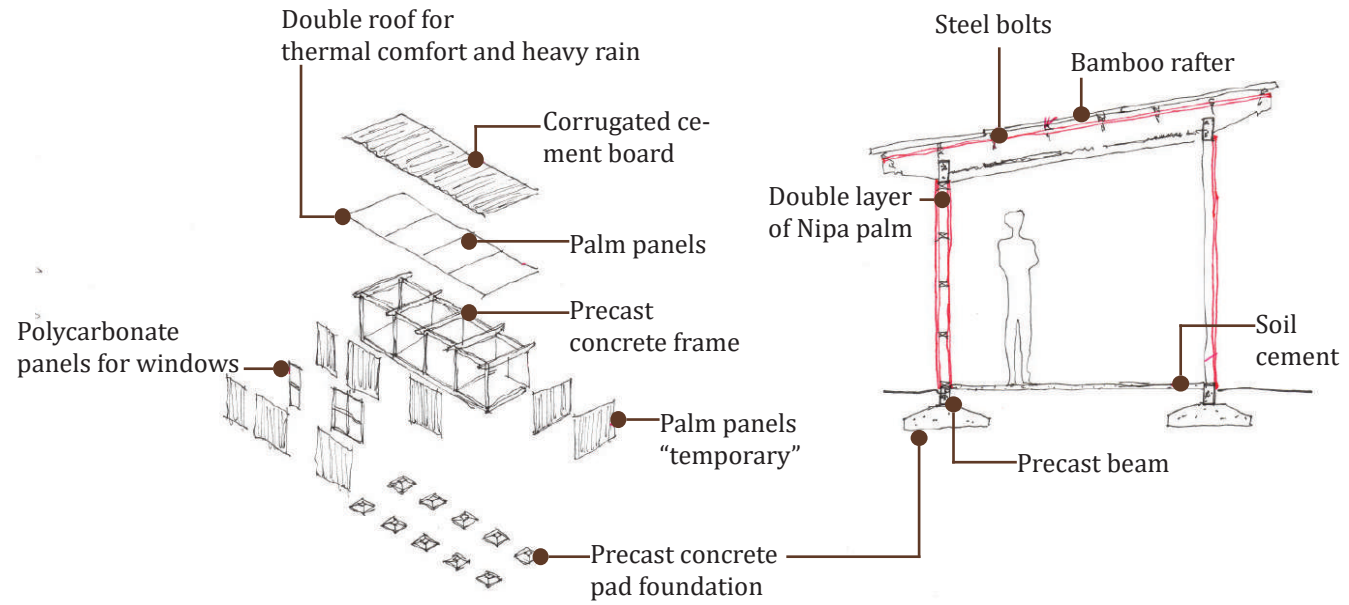


Figure 51: Structural and material system of the S House

CONCEPT AND DESIGN DEVELOPMENT

07



Figure 52: Concept model

TOUCHSTONE

The touchstone depicts materiality intertwining with the lives of people and the impact it has when it is erased from people's lives. Figure 51 shows various mediums of materials with different textures that are stitched around people's everyday life activities. These materials have become part of people's identity and narrate the story of hidden aspects of informality. Fragments of the way people live are erased for formalization process. Foreign elements and laws are imposed in an informal context.

Kabila C has clusters of households which allows neighbours to share outdoor spaces and driveways. This is lost when houses are upgraded and boundary walls are placed to demarcate space. The style of material use is mimicked across the community which forms part of the identity of the space. However, the individual still manages to personalise their space. This contributes to the sense of community while still promoting identity.



- Fragments people's everyday life e.g. family sitting under a veranda made by the family with recycled materials
- Foreign elements and laws are imposed in informal context
- Cloth (silk, stretchy)
- Corrugated iron (rough, rhythm)
- Newspaper and paper (soft, moldable)
- Newspaper and paper (soft, moldable)
- Informal trading at home disappearing due to laws that are not conducive to the context

Figure 53: Touchstone model

CONCEPT

The project's motive is to develop incremental housing in Kabila C using materiality and temporality informed by the community. This development approach enables future up-grad-ing of space and structure, providing flexibility to accommodate growth across gener-ations. Moreover, it offers residents the freedom to personalise their living space accord-ing to their preferences.

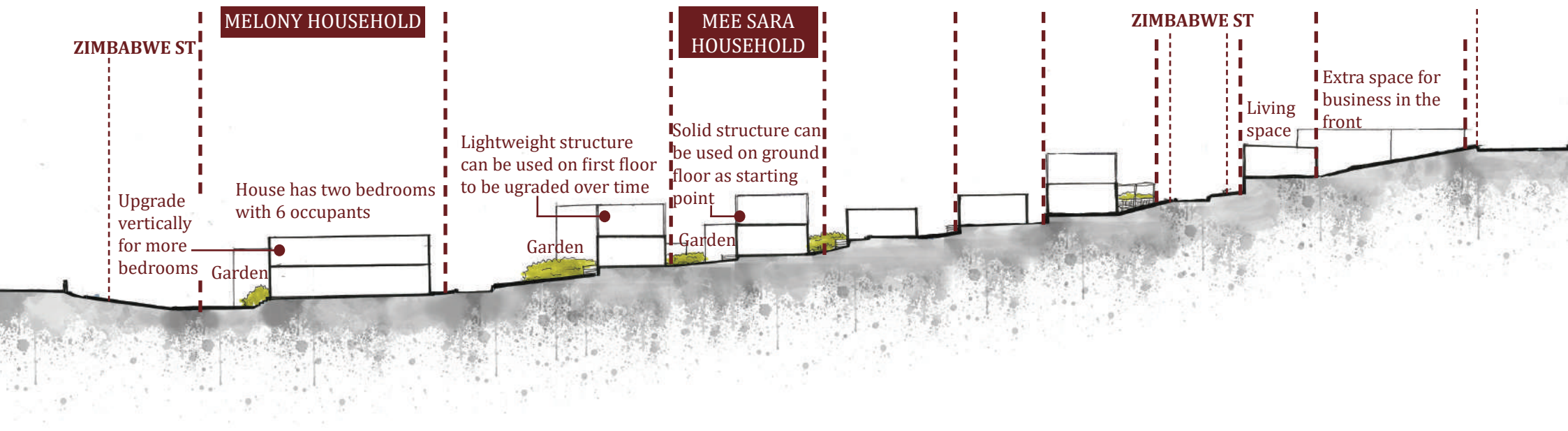


Figure 54: Site concept section, Kabila C

CONCEPT



Figure 55: Site concept plan, Kabila C

CONCEPT MODEL EXPLORATION



Figure 56: Exploration of spatial organisation



Figure 57: Exploration of hierarchy and spatial configuration



Figure 58: Concept exploration with various typologies and spatial organisation

DESIGN EXPLORATION

TPOLOGY 1

Typology 1 is influenced by the informal trading activities, occurring in Karasburg Street, Block A. Most households in this block, have home businesses that spill out into the street. The typology aims to provide a space for a shop and enables it to be easily accessible and connected to the house, kitchen, and water source. It also provides access for the resident to upgrade the house vertically over time.

The resident is given the option to begin construction with corrugated iron, as shown in Figure 57, and then upgrade to brick over time, Figure 58. This method of material incrementally enables the resident to build their house with what they can afford and later improve their house as much as possible.

After consulting the community through the community workshop conducted in 2023, residents are not keen to use corrugated iron as their primary material. They would rather stay in their current temporary structure until they have sufficient finance to construct a brick house.

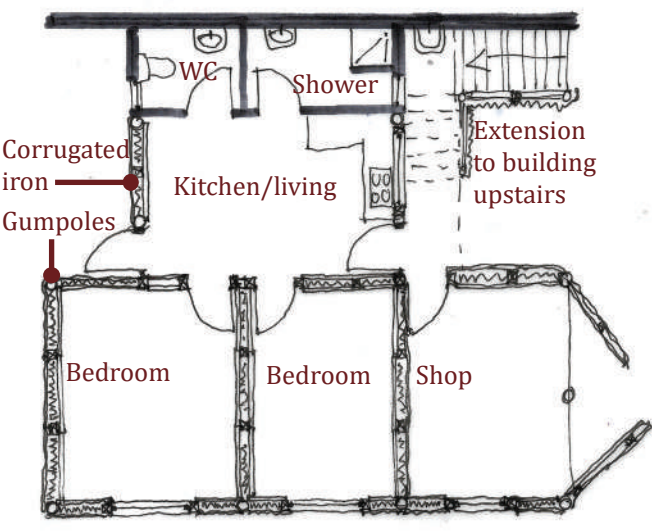


Figure 59: Type 1; Ground Floor

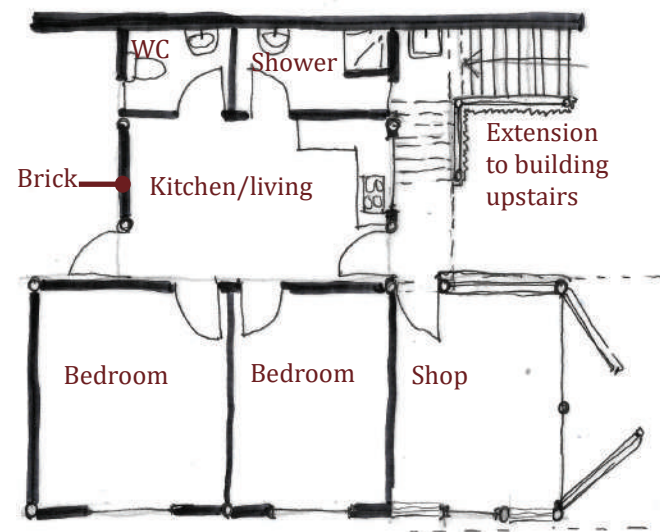


Figure 60: Type 2; Ground Floor

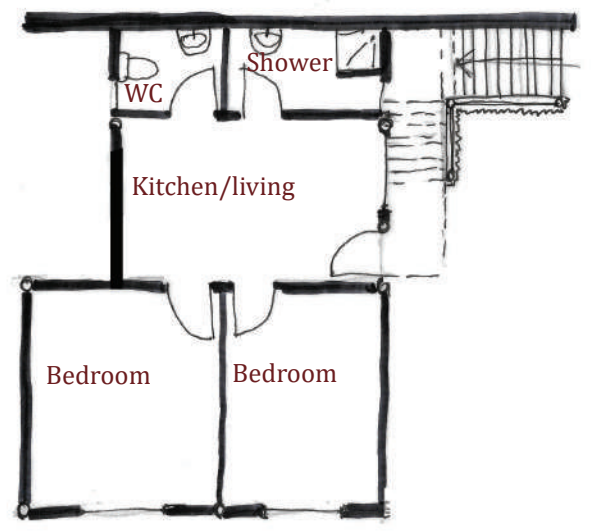


Figure 61: Type 2; First Floor

DESIGN EXPLORATION

TPOLOGY 2

In Kabila C, there are two one-bedroom SDFN houses and seven two-bedroom complete SDFN houses. However, some SDFN houses in Kabila C have a high number of occupants living in them. For instance, Meme Gina’s household of seven people lives in a two-bedroom SDFN house. Due to the lack of space in the house, residents are forced to build temporary structures next to the house.

The current typology of the houses is limited to two bedrooms, and it does not allow for future expansion to accommodate additional occupants. To counteract this issue, residents living in the current SDFN typology would be given two options to upgrade their current houses on the additional storey beyond the two-bedroom one-storey typology.

Option one allows residents to upgrade upstairs by providing two additional bedrooms and storage space. Option two provides two bedrooms, a bathroom, storage, a kitchen and a living room for an additional tenant to live on the first storey.

The option to allow two households to live on

both floors was not favoured by the residents. The residents in the current SDFN typology do not want to share a house with other tenants, as stated during the community workshop. Therefore, only one household will live on both storeys, however, residents still have to option to rent out the first floor if desired.



Figure 62: Existing SDFN Type

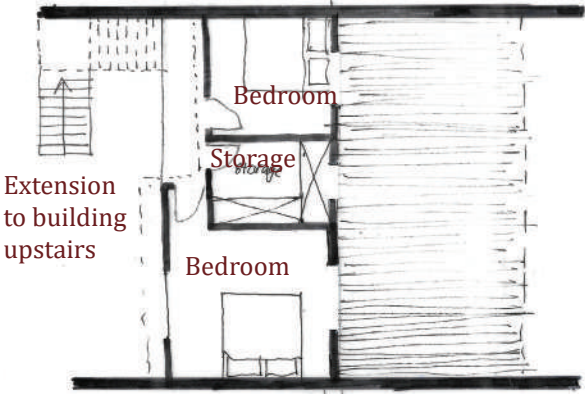


Figure 63: First Floor (option 1)

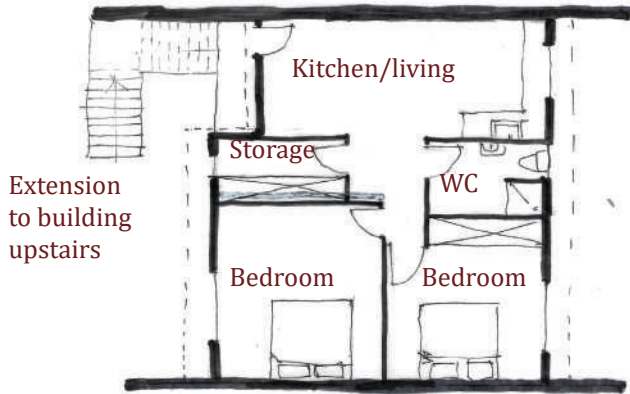


Figure 64: First Floor (option 2)

DESIGN EXPLORATION

TPOLOGY 3

Typology 3 provides the option for residents to share the ground floor facilities with other tenants while still having privacy. Some residents cannot afford a complete house. As they accumulate funds, sharing facilities with another tenant can assist with this. This typology is suited for residents who live alone or with few tenants.

This option would be the first stage of upgrading. This typology residents to construct their own two-bedroom house and share the construction cost with the tenant or neighbour to construct the bathroom, kitchen, and living room. The second tenant, figure 64, will have a two-bedroom and storage space.

The second stage allows both tenants will have full ownership over the floors they occupy. The sharing of facilities will be amended. The cost of the previously shared facilities will be settled amongst the tenants. This typology could also work with only having one owner on both floors, especially if there are more occupants in one family.



Figure 65: Ground Floor

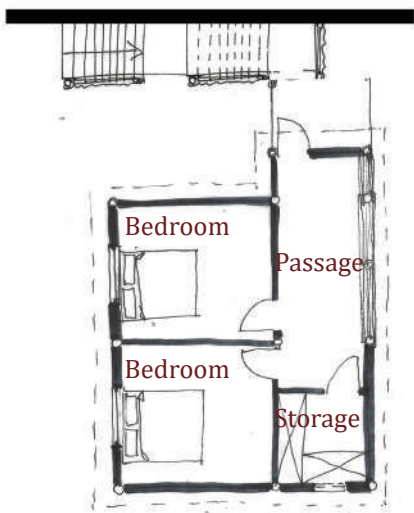


Figure 66: First Floor

DESIGN EXPLORATION

TPOLOGY 4

Typology 4 examines the possibility of expanding the house both horizontally and vertically. The City of Windhoek has approved the exception to divide the 300m² erf into two plots of 150m² each, to accommodate two households on a single erf in Kabila C.

This approach enables more households to fit into fewer ervens. The downside of this method is that residents have less space to upgrade horizontally. Block D has a wider 300m² erf than the other blocks, which allows for horizontal upgrading.



Figure 67: Horizontal upgrade to house Ground Floor (option 1)

The horizontal upgrade option, figure 65, provides two bedrooms, a kitchen, a living room, storage space, and a bathroom. The resident can add two additional bedrooms in the future. The vertical upgrade option provides for one household to upgrade on the first floor or have a tenant to rent off the first floor.

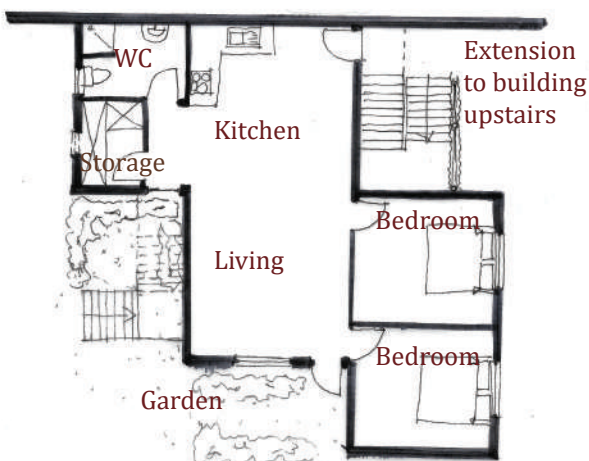


Figure 68: Vertical upgrade to house Ground Floor (option 2)

The issue that arose with this attempt was the lack of shared outdoor space for residents. Residents on the first floor will not have access to a garden space.

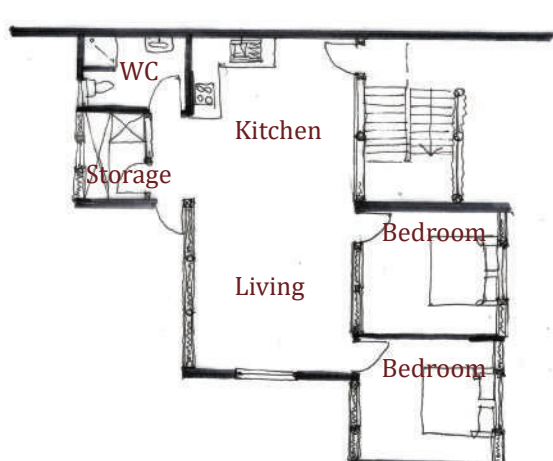


Figure 69: Vertical extension to house First Floor (option 2)

DESIGN EXPLORATION

COMMUNAL CLINIC

The majority of the residents living in Kabila C require a clinic in the vicinity as a need, as indicated in the site profile. The clinic will be located in the Kabila C neighbourhood. It will serve as a multifunctional medical vicinity which will host seasonal occupational health posts for vaccinations and health education. The clinic will have a consultation space and a small pharmacy. Two or more people will facilitate the clinic. The clinic is intended to assist with mild medical cases in the community, serious medical cases will be directed to hospitals.

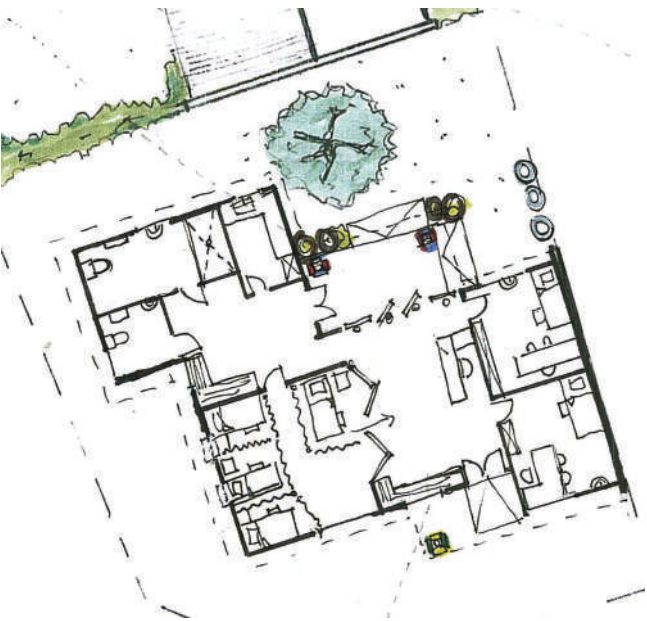


Figure 70: Attempt 1 sketch exploration

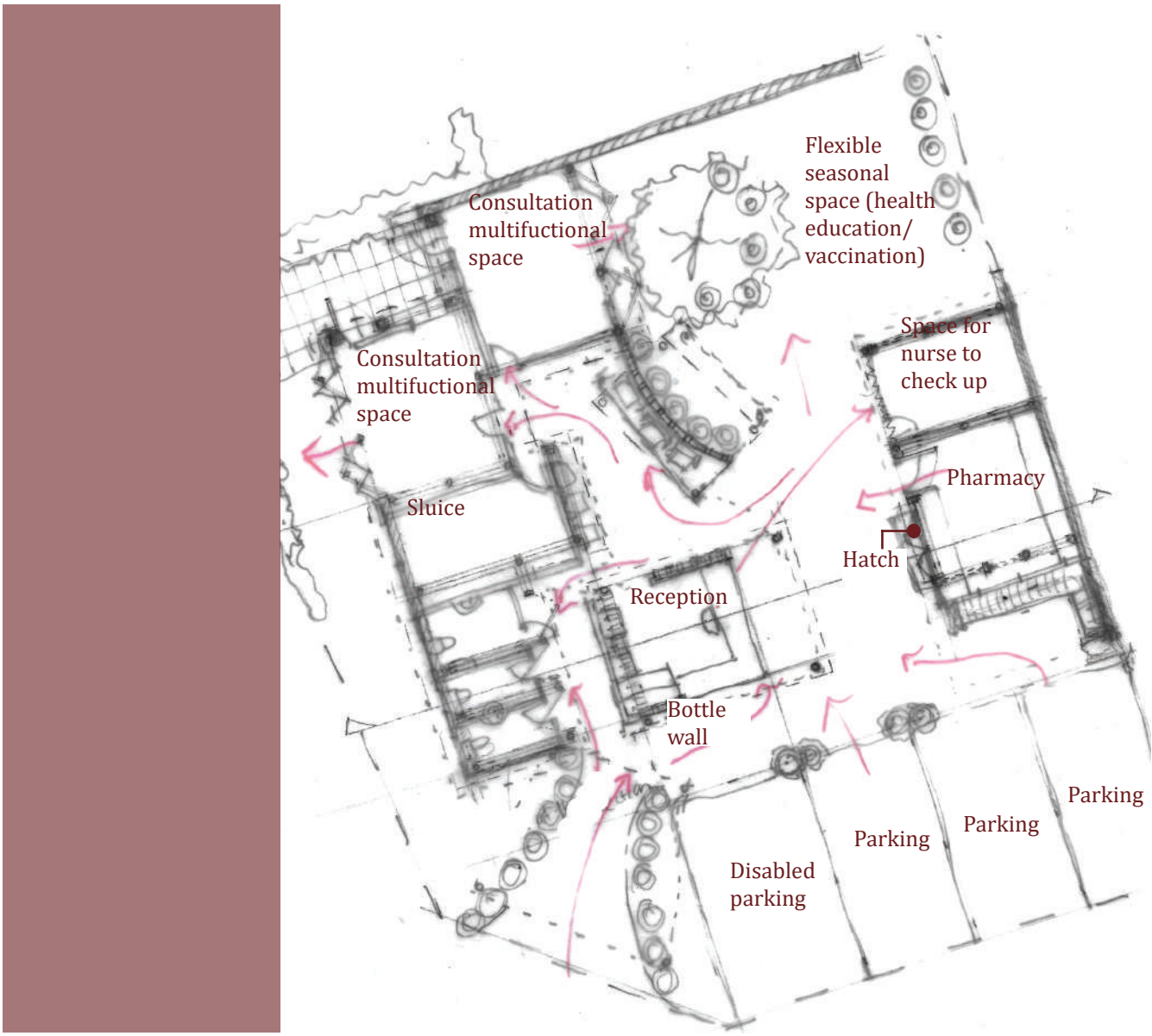


Figure 71: Attempt 2 sketch exploration

DESIGN EXPLORATION

COMMUNAL WATER TAP AND TOILETS

Communal water taps and toilet is the most used public facility in Kabila C. Currently, only 2 households have access to functional private bathrooms. Most SDFN-completed houses are currently in the process of obtaining access to water or sewerage connections from the City of Windhoek. This prompts residents to use the communal water taps and toilets. There are four existing communal water taps and toilets in the neighbourhood, however, there is a need for more and better ones.



Figure 72: Existing communal water tap and toilet

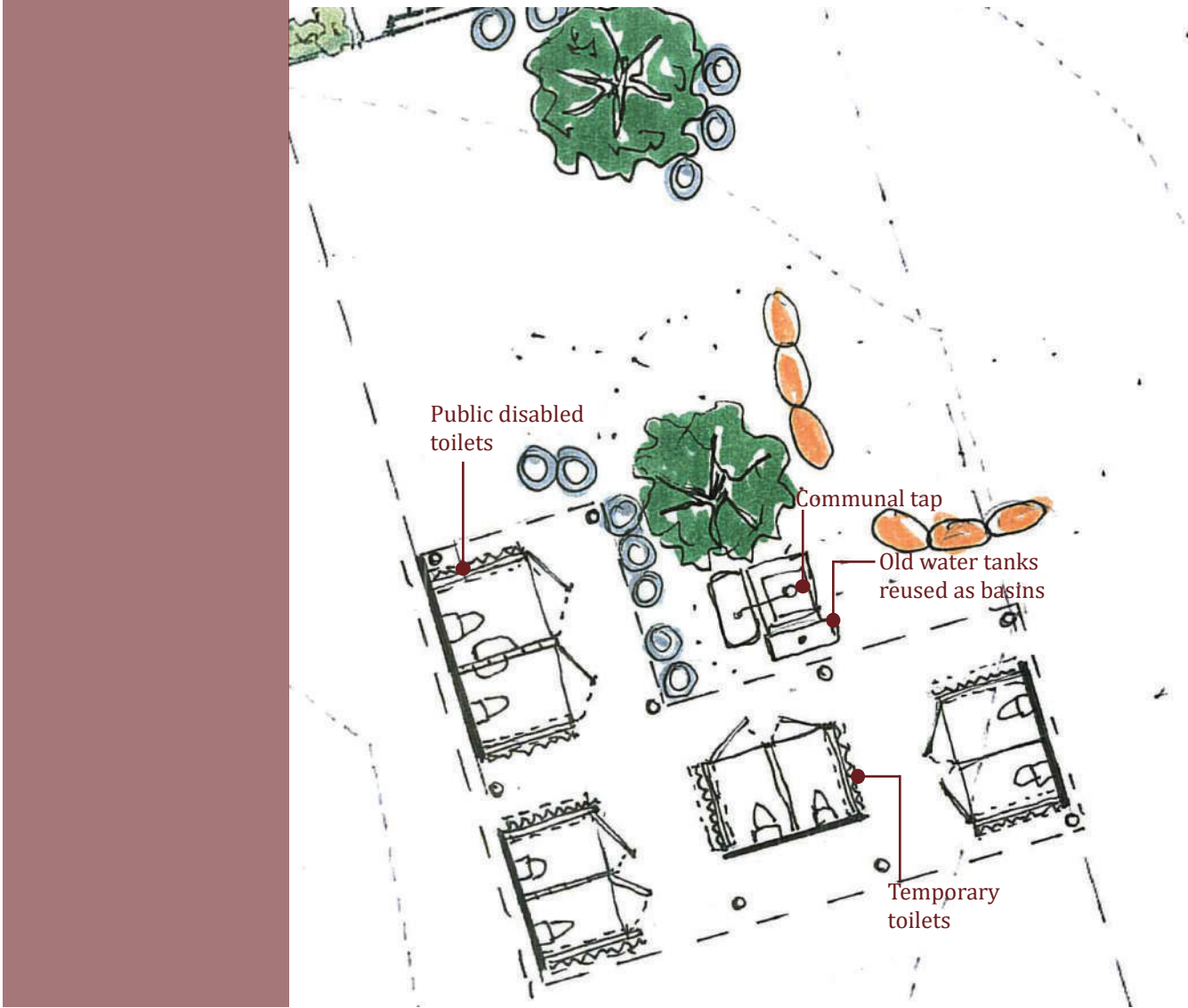


Figure 73: Exploration sketch of communal water taps and toilets
The additional proposed communal toilets will be constructed with materials that can be assembled to allow for easy disassembling when the community has no use for them in the future.

DESIGN EXPLORATION

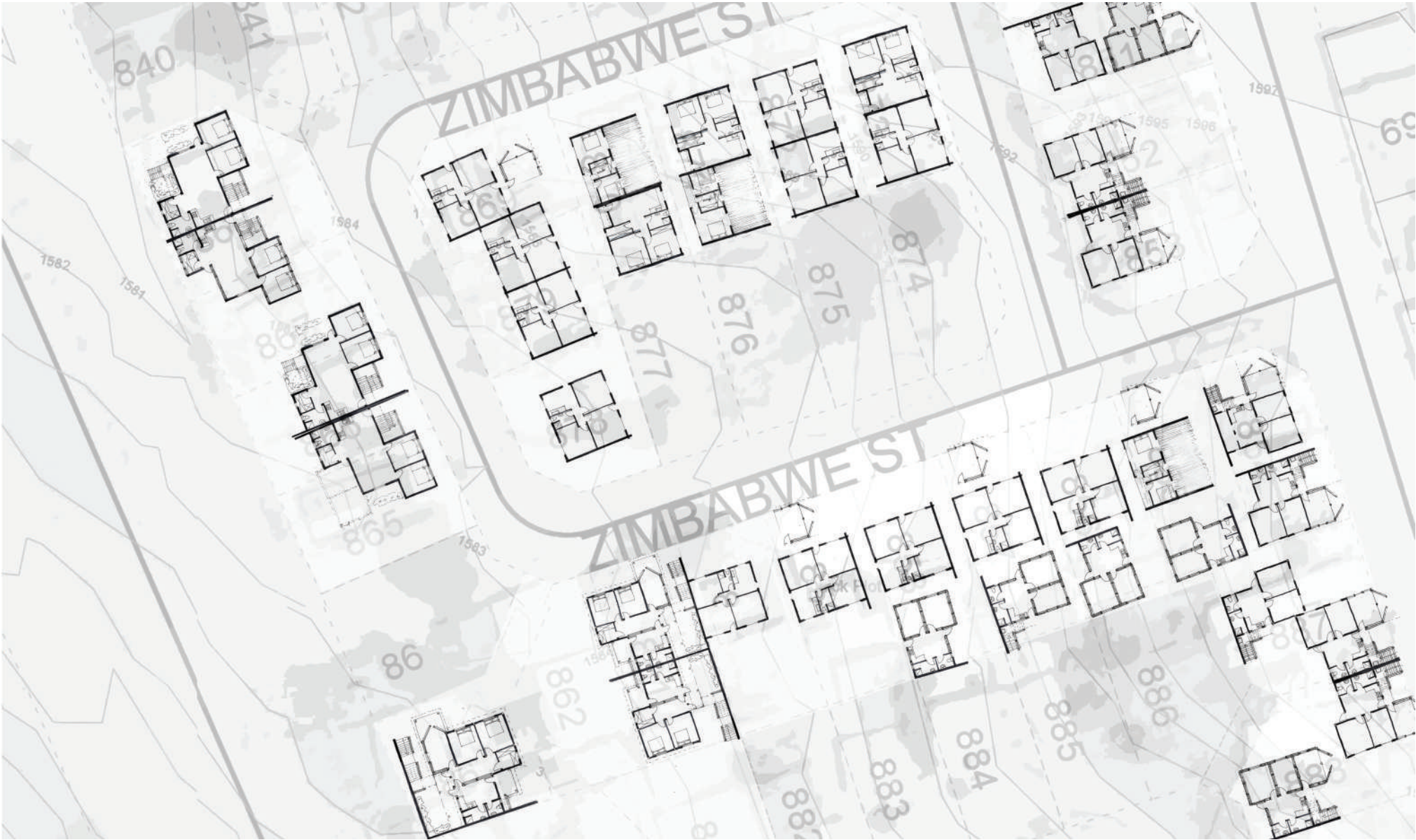


Figure 74: Exploration of Master Site Plan



Figure 75: Street view of proposed incremental typologies

DESIGN DESCRIPTION

The project aims to provide four housing typologies that will be altered and adjusted based on the urban profiles, interviews, and community workshops collected from the community members in Kabila C. Site orientation and environmental conditions will also have an effect on the housing typologies. This approach will aid in designing houses that are tailored to the user while still allowing the user to personalize their space and incrementally upgrade their house . Exploration of materials and temporal upgrading will be used as tools to design affordable housing for the community. Public facilities such as mobile clinic, communal water points and toilets, and communal playground and meeting point will be provided as it influences housing and the community.

DESIGN DESCRIPTION



Figure 76: Design Master Site Plan

TPOLOGY 1

HELENA HOUSEHOLD

Helena lives in a corrugated iron house with her husband, two daughters, and two sons. All her children are currently going to school. The family obtains a total monthly income of approximately N\$ 4000. Helena and her husband own a mini butchery in her yard where they sell meat to the community. The family has a small garden in their backyard to plant food for their family and shade.



Figure 77: Helena’s house currently

TPOLOGY 1

IMPROVENETS TO HELENA HOUSE

The mini butchery is important for the family to generate income. A structure made from cor-
rugated iron or tires will be constructed at the front of the house for the mini butchery. This will allow the family to sell at the street front and remove the structure if they desire to shift their business elsewhere. The front part of their yard will also have planters and a drain that flows to the planter to reuse the water from the butchery to water the plants. An outdoor braai area will be provided in case the family want to sell braai meat or cooked food for their business or themselves. Recycled bricks and tiles will be used to pave the front of the house should the family wish to. The main house is elevated to prevent the house from being flooded with water during rainy seasons. During stage one of upgrading the house, a bath-
room, two bedrooms, kitchen, and living space will constructed. The family is given the option to construct the interior walls with drywall or bricks based on what they can afford.

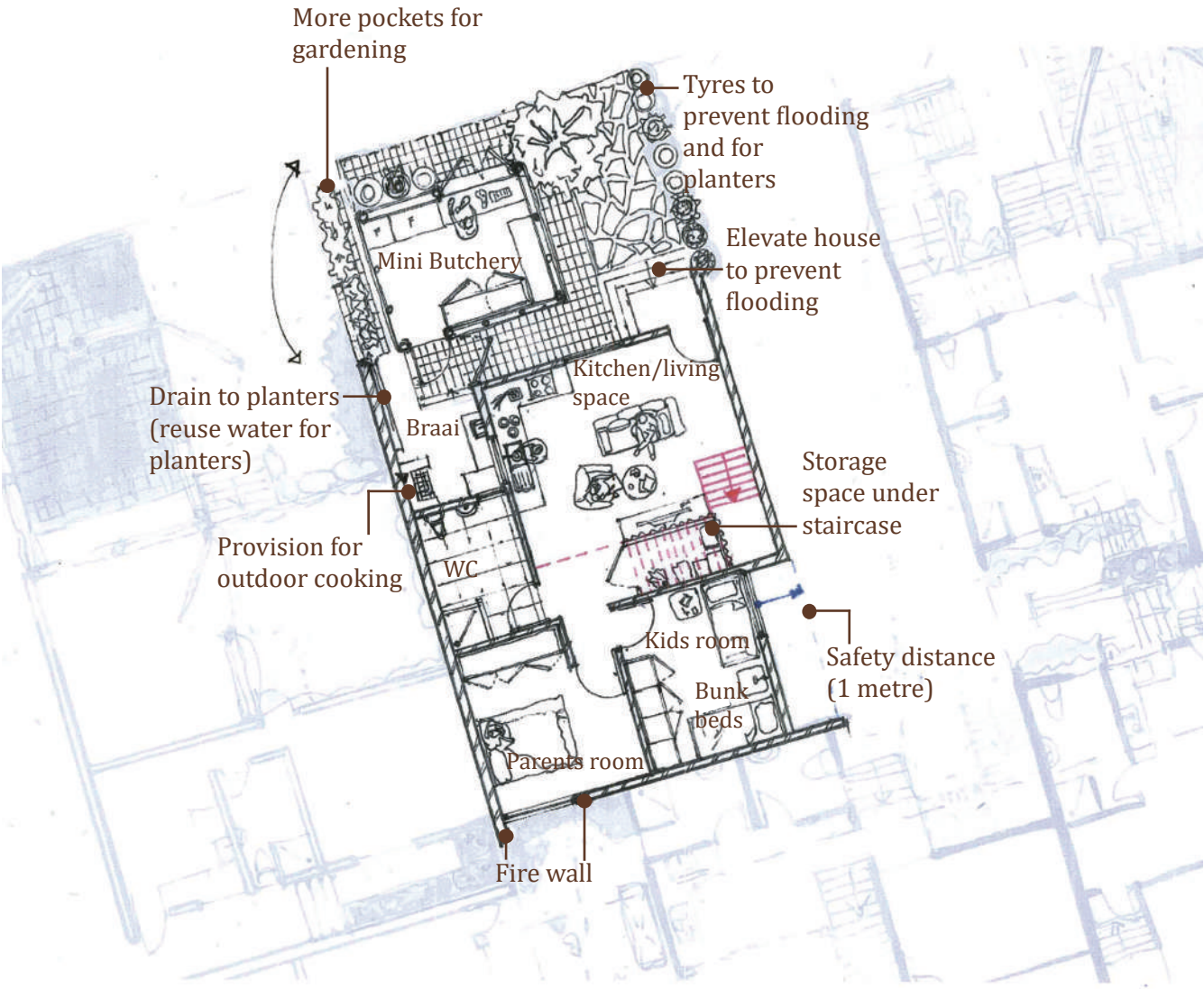


Figure 78: Ground floor of stage 1 of upgrading the house



TYPOLGY 1

IMPROVENETS TO HELENA HOUSE

In stage two of upgrading of house, the family can decide to construct a mezzanine floor for children to study. The space under the stair-case will be used for storage. When the children grow older, the family can construct an additional room on the first floor. This room can be further divided into two with corrugated iron or drywall as a barrier. The slab floor on the first floor can be constructed from reused bricks which are stacked in different layers to create a stable floor.



Figure 79: First Floor of stage 2 of upgrading the house

TYPOLGY 1

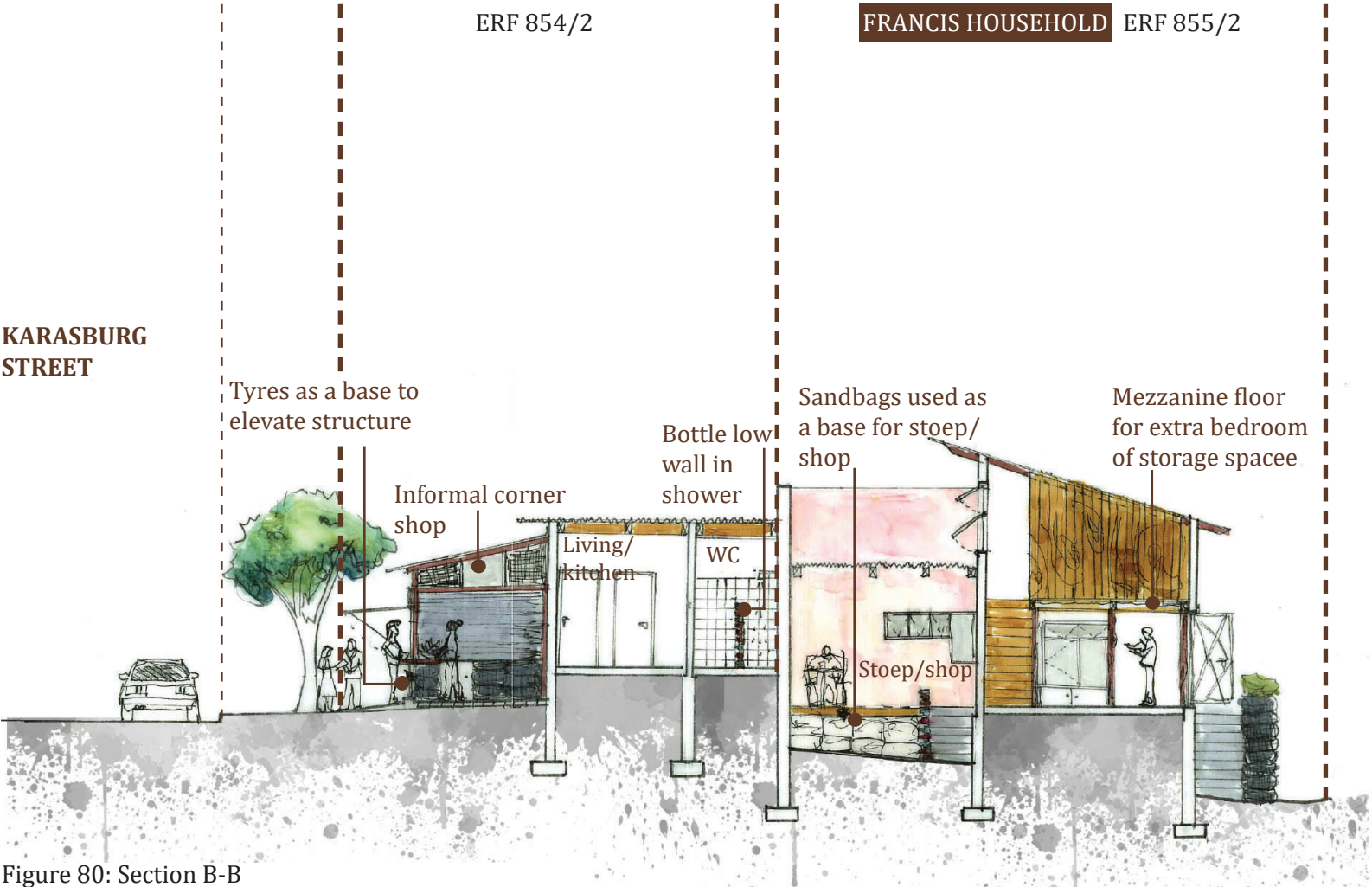


Figure 80: Section B-B

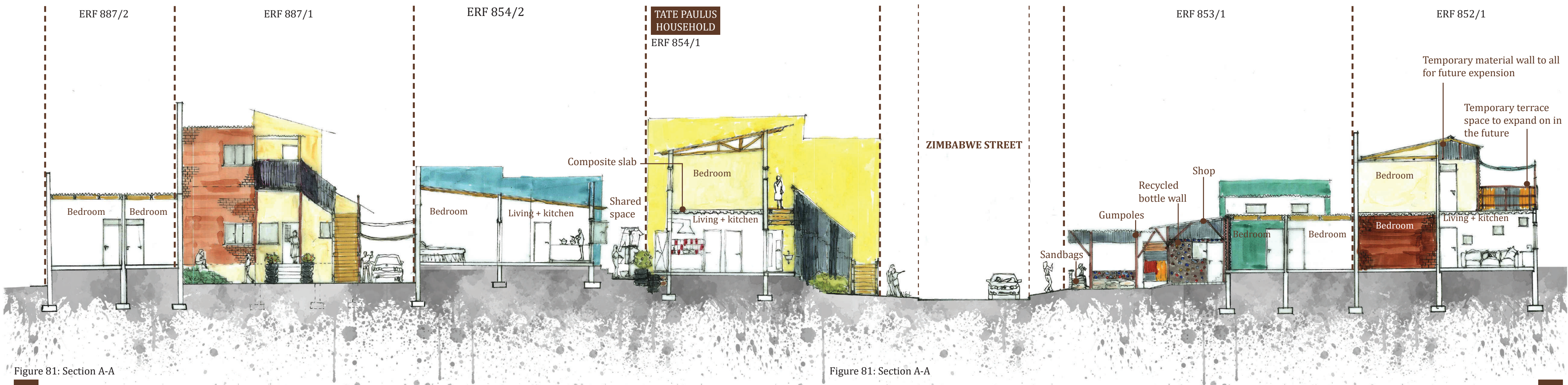


Figure 81: Section A-A

Figure 81: Section A-A

TYPOLGY 2

GINA HOUSEHOLD

Gina lives in a brick house constructed by SDFN with her family of seven people (including herself). She lives with her husband, her brother-in-law, three children, and grandson. Gina works as a seamstress and domestic worker. She also has a stall on Karasburg Street where she sells Kapana. The household acquires a total of N\$ 25,000 per month. Her husband is a butcher. Her brother-in-law is a taxi driver and her oldest daughter is self-employed. The family has a garden in their backyard to plant food for their family.



Figure 82: Gina’s house currently

TYPOLGY 2

IMPROVEMENTS TO GINA'S HOUSE

The two-bedroom house the family occupies fails to provide sufficient space for them. This could have resulted in the family constructing a shack next to the house for the brother-in-law to stay in or for storage.

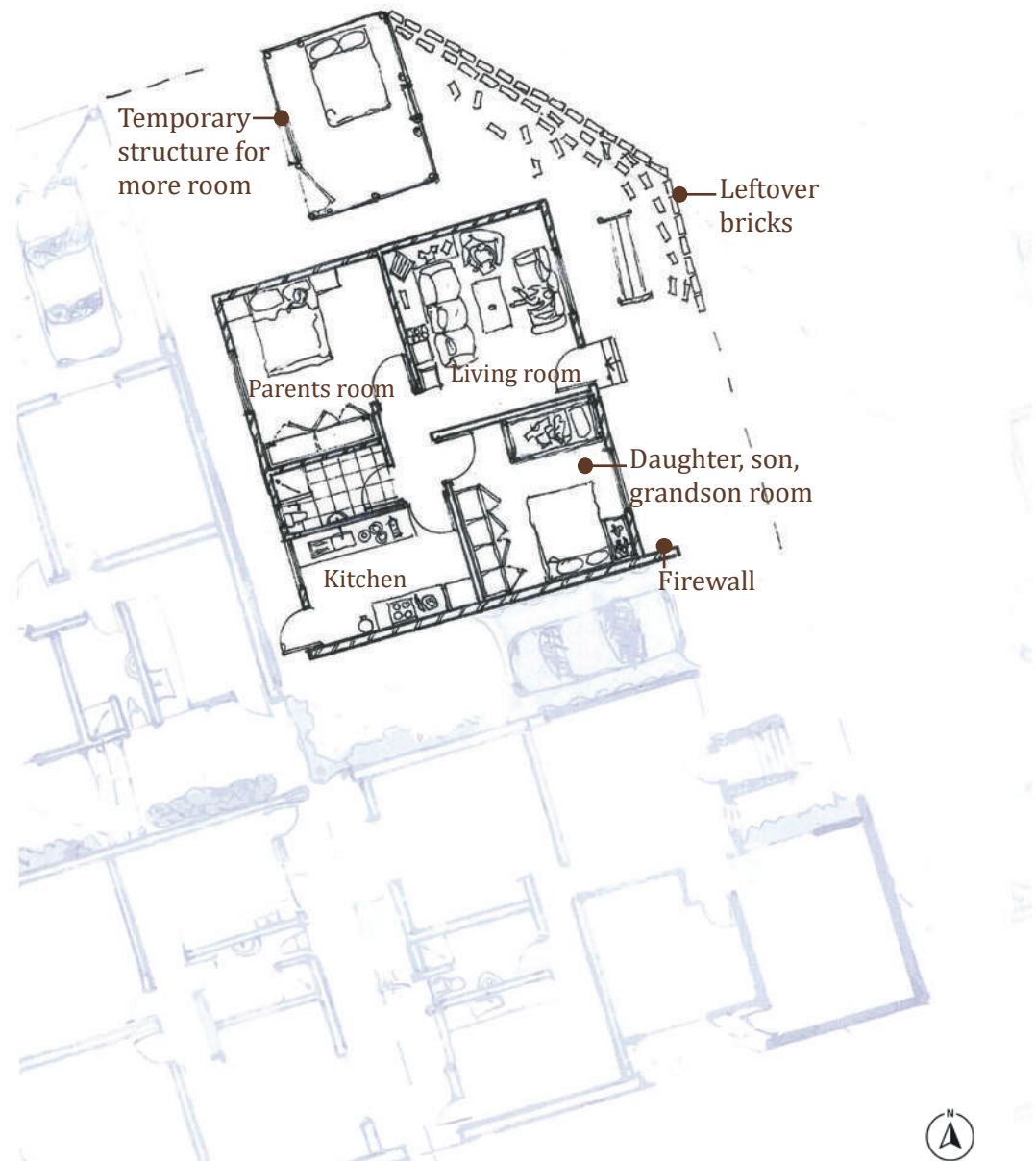


Figure 83: Existing SDFN house ground floor

TYPOLGY 2

IMPROVEMENTS TO GINA'S HOUSE

Stage 1 aims to provide a mezzanine floor made from wooden panels for Gina to do her sewing. An additional bedroom will be added for the brother-in-law on the first floor. This will provide more space for the family garden and for the children to play. A storage will be provided on the first floor for Gina to store her clothes and textiles for her business.

During stage 2, Gina can extend her sewing space as her business grows. Additional rooms can be constructed on the first floor when the children grow up in the future.

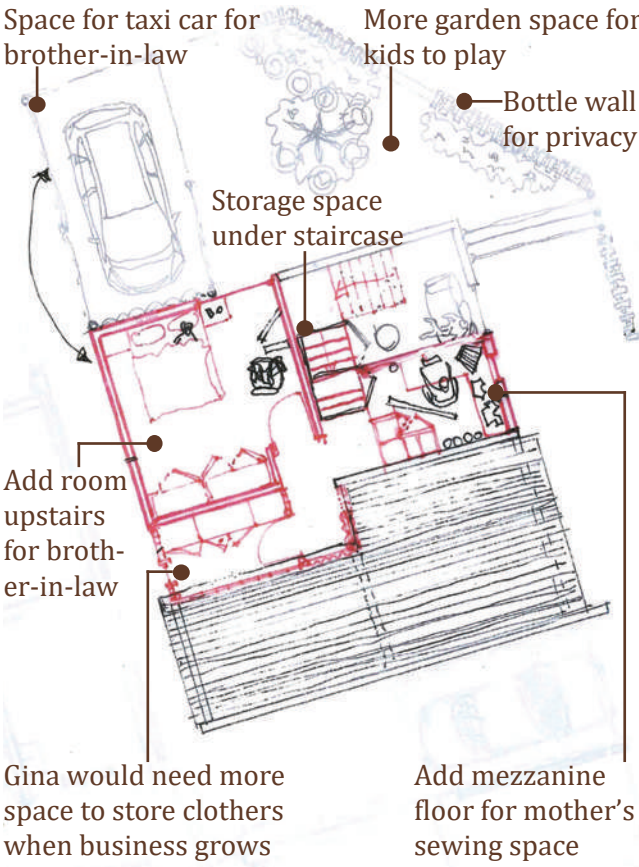


Figure 84: First Floor Upgrade 1



Figure 85: First Floor Upgrade 2

TYPOLGY 2

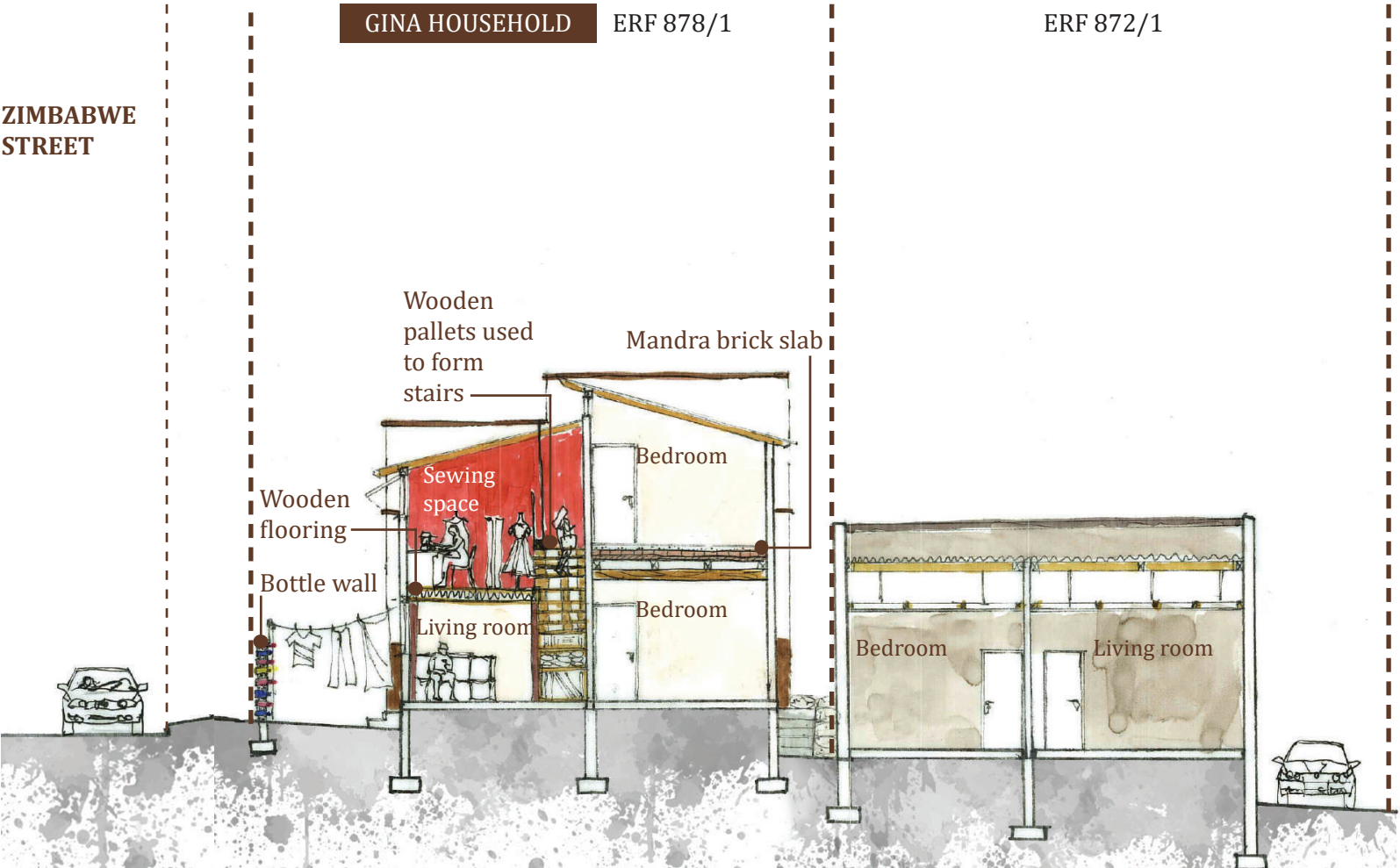


Figure 86: Section C-C

TYPOLGY 3

KATRINA HOUSEHOLD

Katrina lives alone in her corrugated iron house. She earns a monthly income of N\$ 2000. Katrina is an SDFN member who owns the land she occupies. She is part of the Ituyeni savings group and is currently still saving up before she can construct her brick house. She uses electricity indoors, however, sometimes she uses candles indoors for light.



Figure 87: Katrina's house currently

TYPOLGY 3

IMPROVEMENTS TO KATRINA'S HOUSE

Stage 1 allows Katrina to construct a portion of her house with the savings she has accumulated. She has the option to share the ground floor facilities with her neighbour, family member or a tenant. Alternatively, she could also choose to construct stages 1 and 2 simultaneously to avoid sharing facilities. Stage 1 is designed to assist residents who live alone or in small families and are struggling to construct a full house with their earnings.

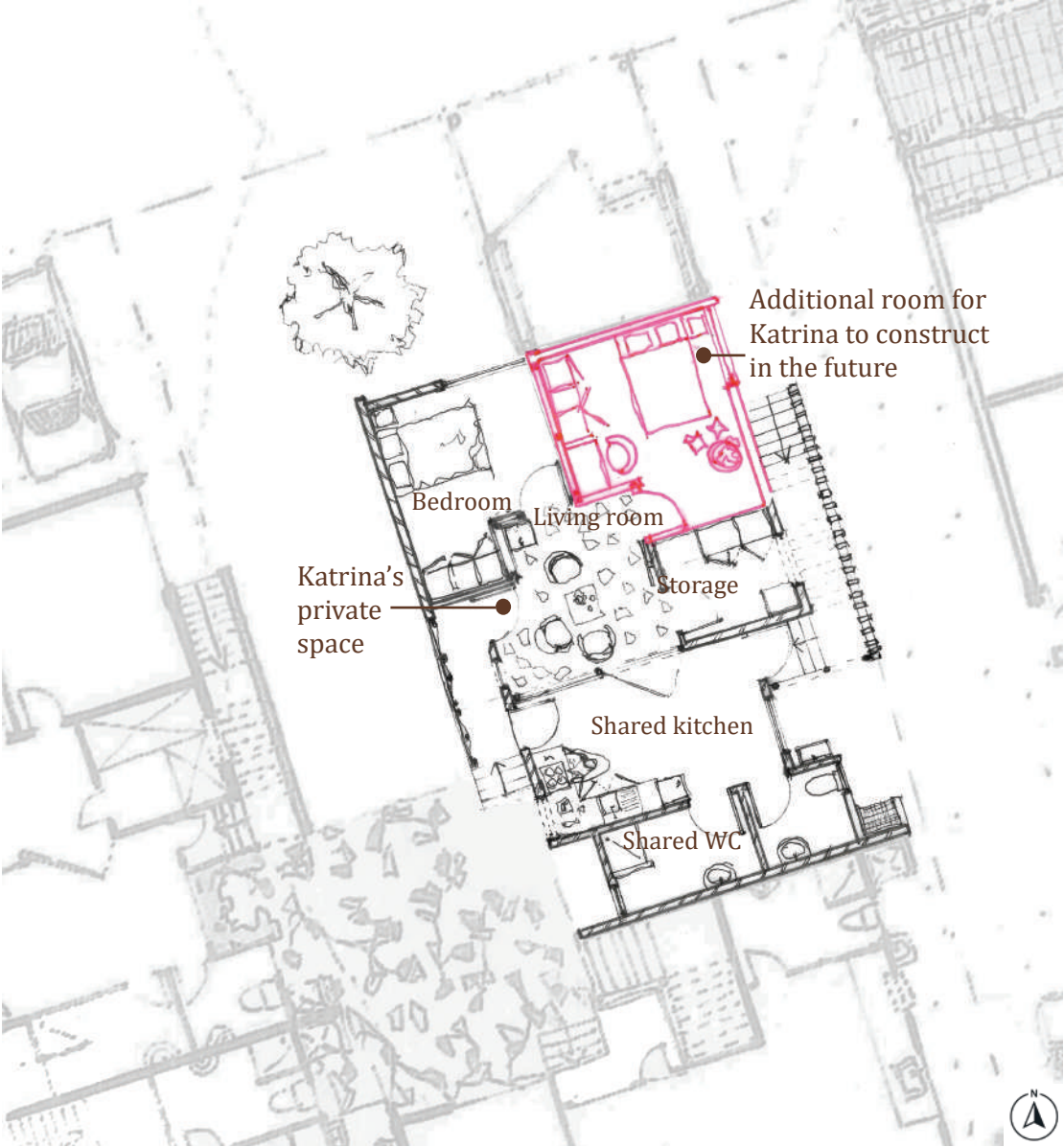


Figure 88: Ground floor

TPOLOGY 3

IMPROVEMENTS TO KATRINA'S HOUSE

In stage 2, Katrina will have her full house completed.

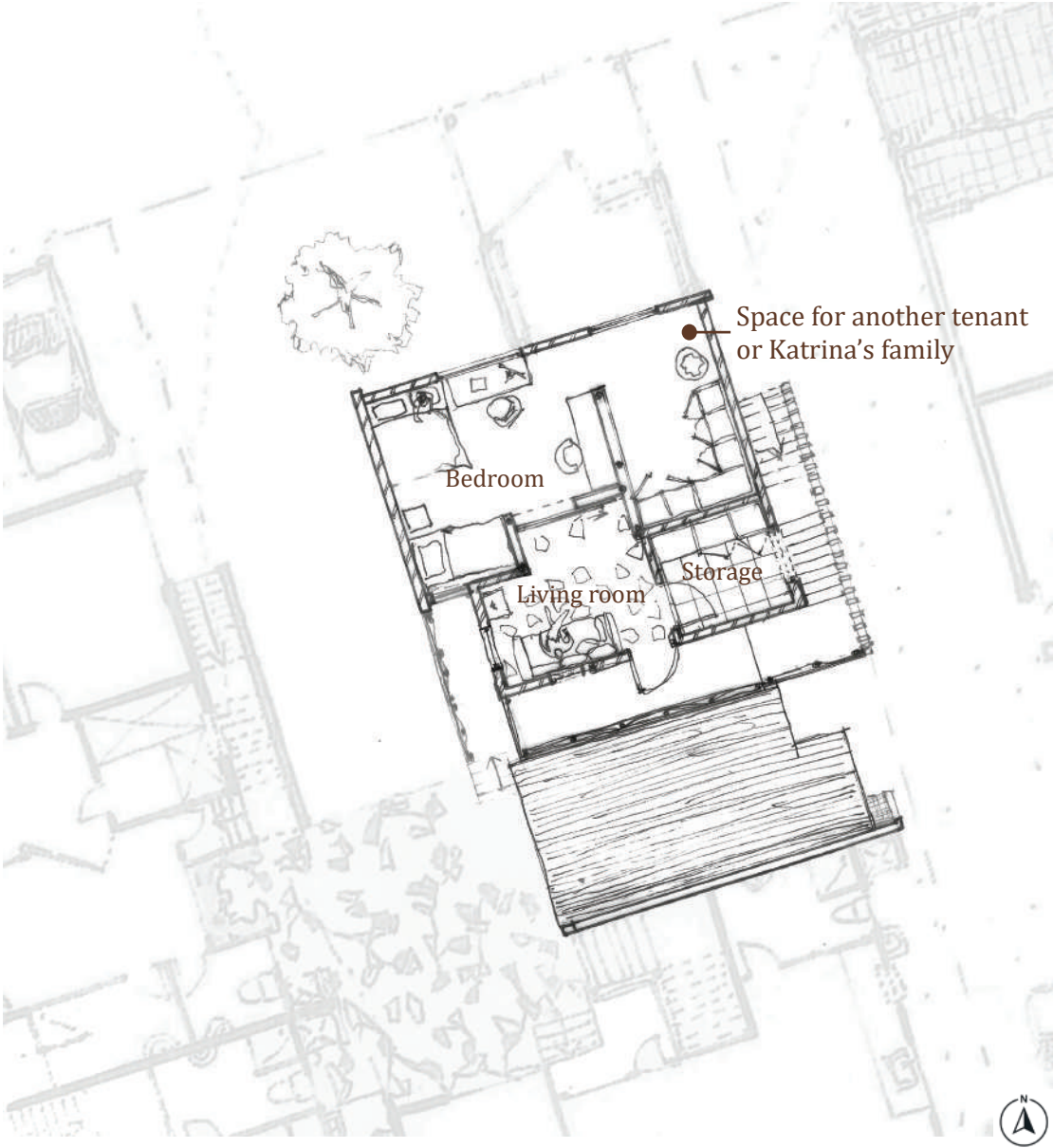


Figure 89: First Floor Upgrade 2

TPOLOGY 3

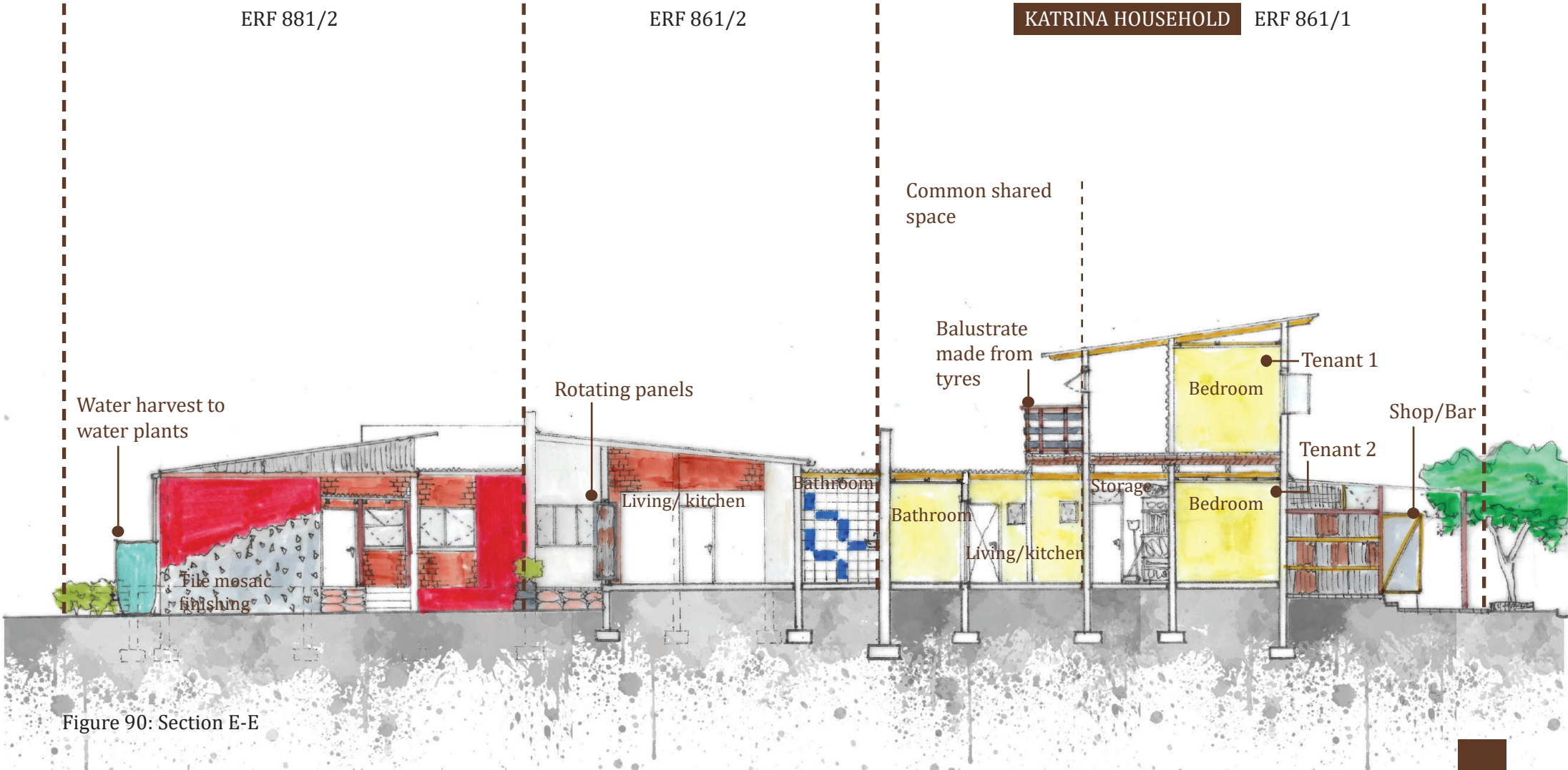


Figure 90: Section E-E

TYPOLGY 4

Block D experiences more flooding due to it being located at the lowest point on site. Residents elevate their corrugated iron houses or they place tyres in front of houses to redirect the water flow.



Figure 91: Current houses

TYPOLGY 4

IMPROVEMENTS

Typology 04 is a housing concept that prioritizes shared open spaces over boundary walls for security. The residents are provided with a central courtyard paved with recycled tiles, where they can interact and spend time together. Additionally, each resident gets a private outdoor space for gardening, and a driveway for parking. The design also includes provisional space for staircases, which allows residents to construct additional floors in the future. The houses are raised 1 meter off the ground to prevent flooding. Tyres, sandbags, and vegetation are used at the front of the house to redirect the water.

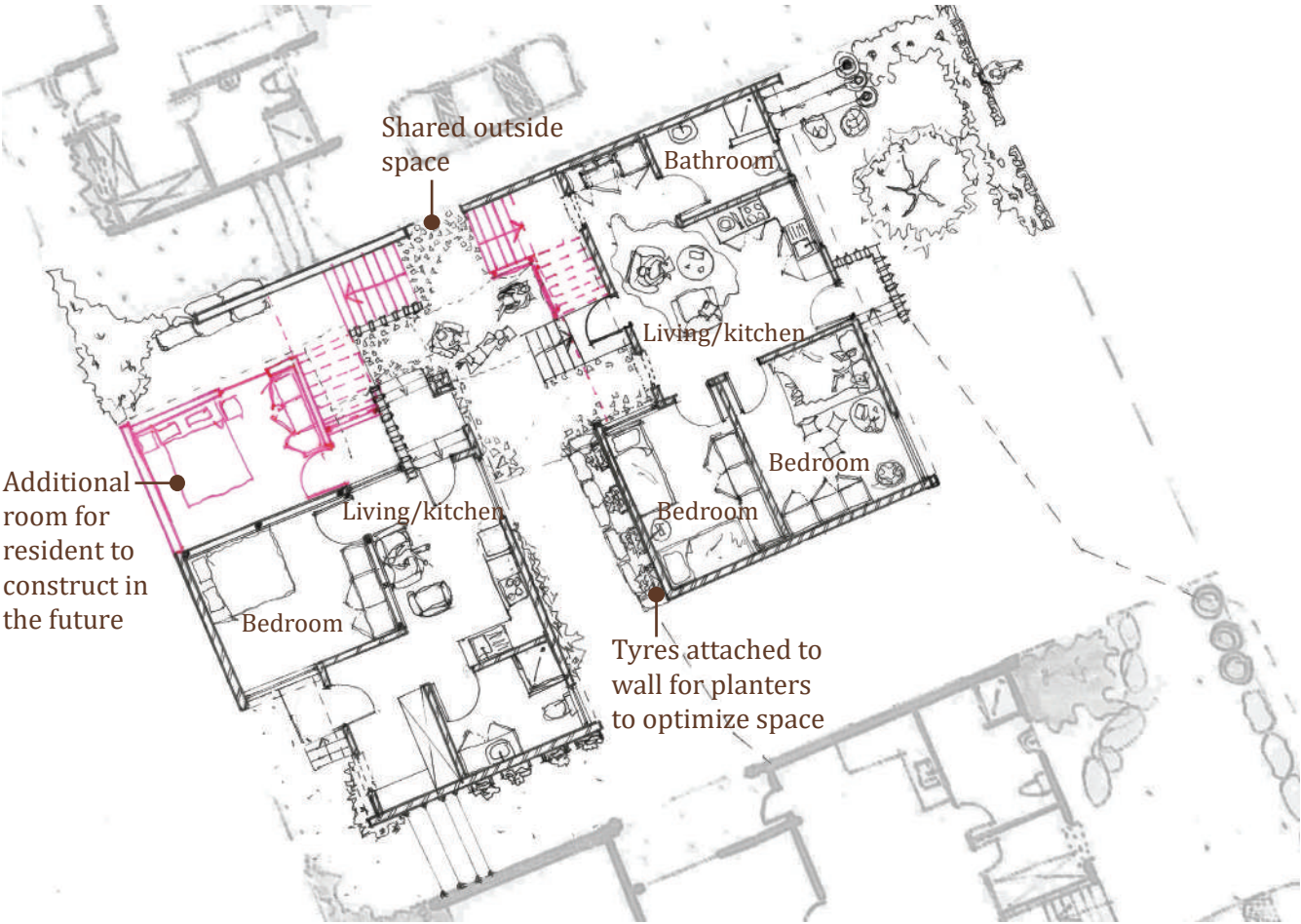


Figure 92: Ground floor

TYPOLGY 4

ZIMBABWE STREET

ERF 867/1

ERF 867/2

BUFFER SPACE TO MONTE CHRISTO ROAD



Figure 93: Section D-D

COMMUNAL CLINIC

According to MOHSS (2004), a rural clinic should consist of a waiting area, a reception, a consultation space, a sluice, bathrooms with at least one shower, and a medicine store. The communal clinic was designed based on the typical plan of the prototype rural clinic as they are similar in nature and scale (MOHSS, 2004). The communal clinic features an outdoor waiting area with tyres serving as sitting spaces. The reception area is situated at the entrance for easy access. The clinic has a pharmacy and storage unit with a private delivery entrance. The consultation spaces are multipurpose, allowing for use as health posts and seasonal vaccination areas, and can spill out to the outside for more space. An ambulance entrance is placed next to the consultation room to allow patients to be transported to the hospital in case of an emergency. The clinic also has a kitchenette for staff and patients staying overnight. The clinic utilizes material techniques used in some proposed houses such as bottle walls, rotating panels, and recycled tyres. To provide easy access to water, four water fountains are spread across the clinic for patients and visitors.



Figure 94: Communal clinic

COMMUNAL WATER TAP AND TOILETS

The communal water taps will have sandbags surrounding them with shading to make the space more conducive to the users. The additional toilets will be constructed with a tyre wall and corrugated iron cladding. Steel wire mesh will be used at the top of the structure instead of using conventional glass windows. Old barrels will be used as basins and a filtration system will be placed close to the water points. This enables the community to do laundry next to the water point and dispose of the grey water into the filtration system. This filtered water will be used to water the trees and plants at the communal park. The water run-off from the water tap will be collected and reused to water plants. Sitting spaces and shading will be provided around the toilets and taps to make the space more conducive for the community to use.



Figure 95: Communal water point and toilet

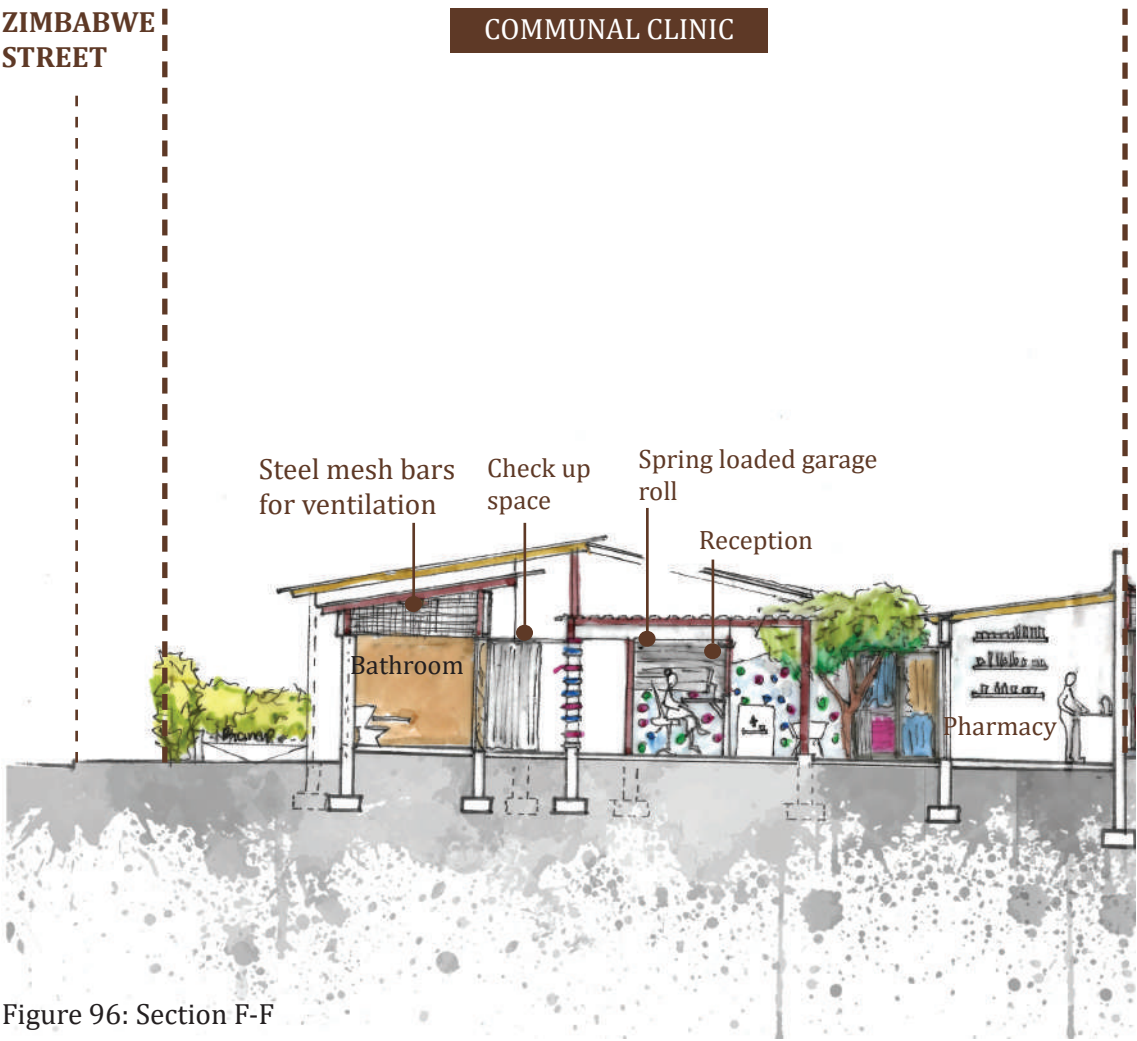


Figure 96: Section F-F

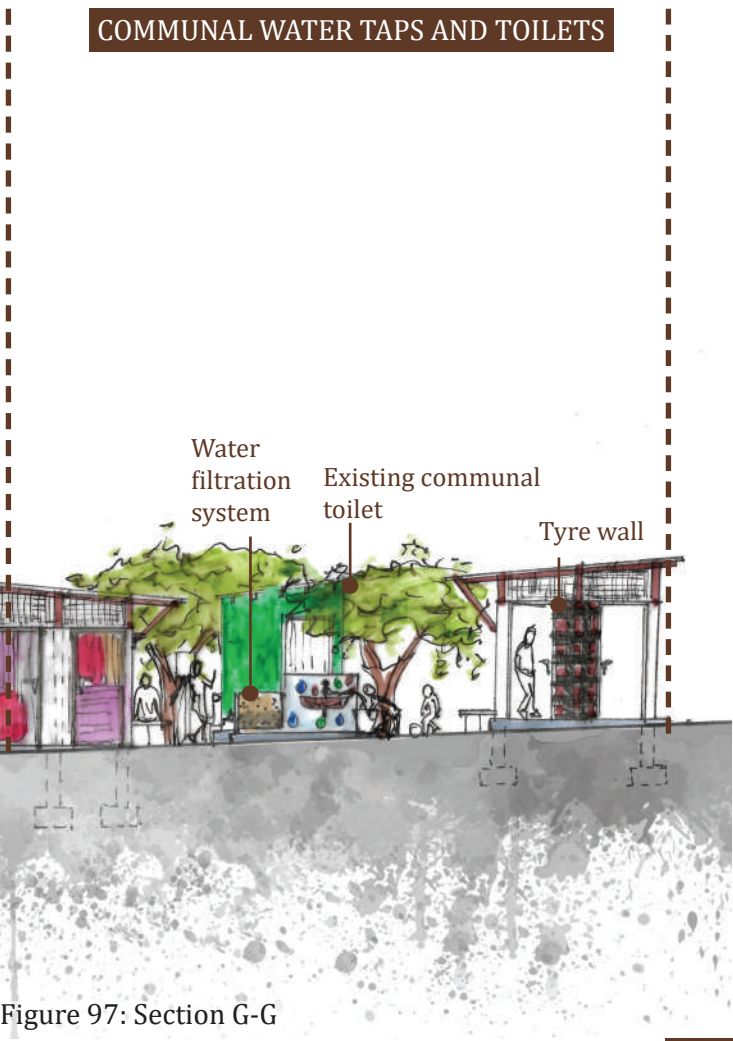


Figure 97: Section G-G

TECHNICAL RESOLUTION

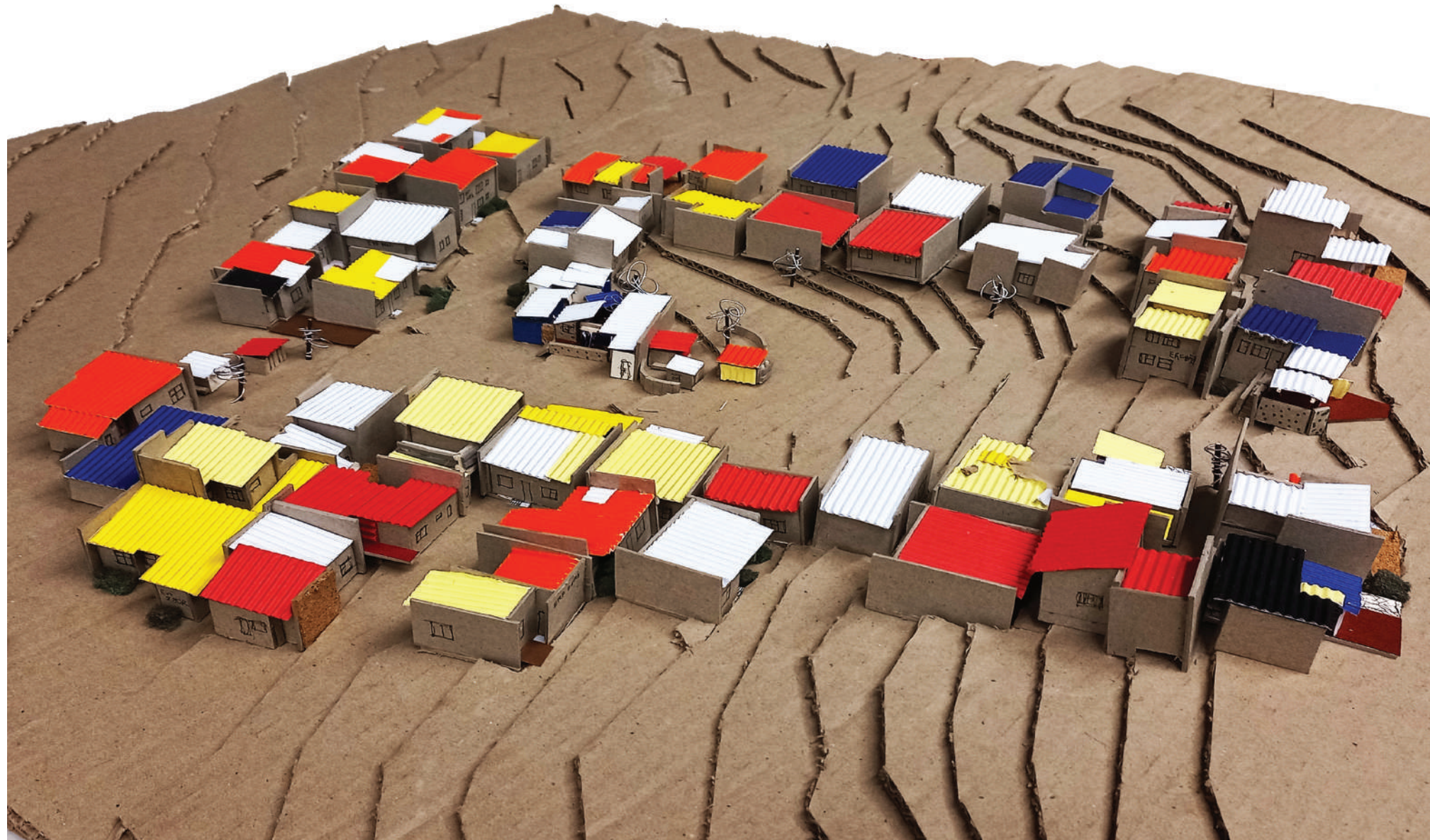


Figure 98: Physical model of proposed housing development

09

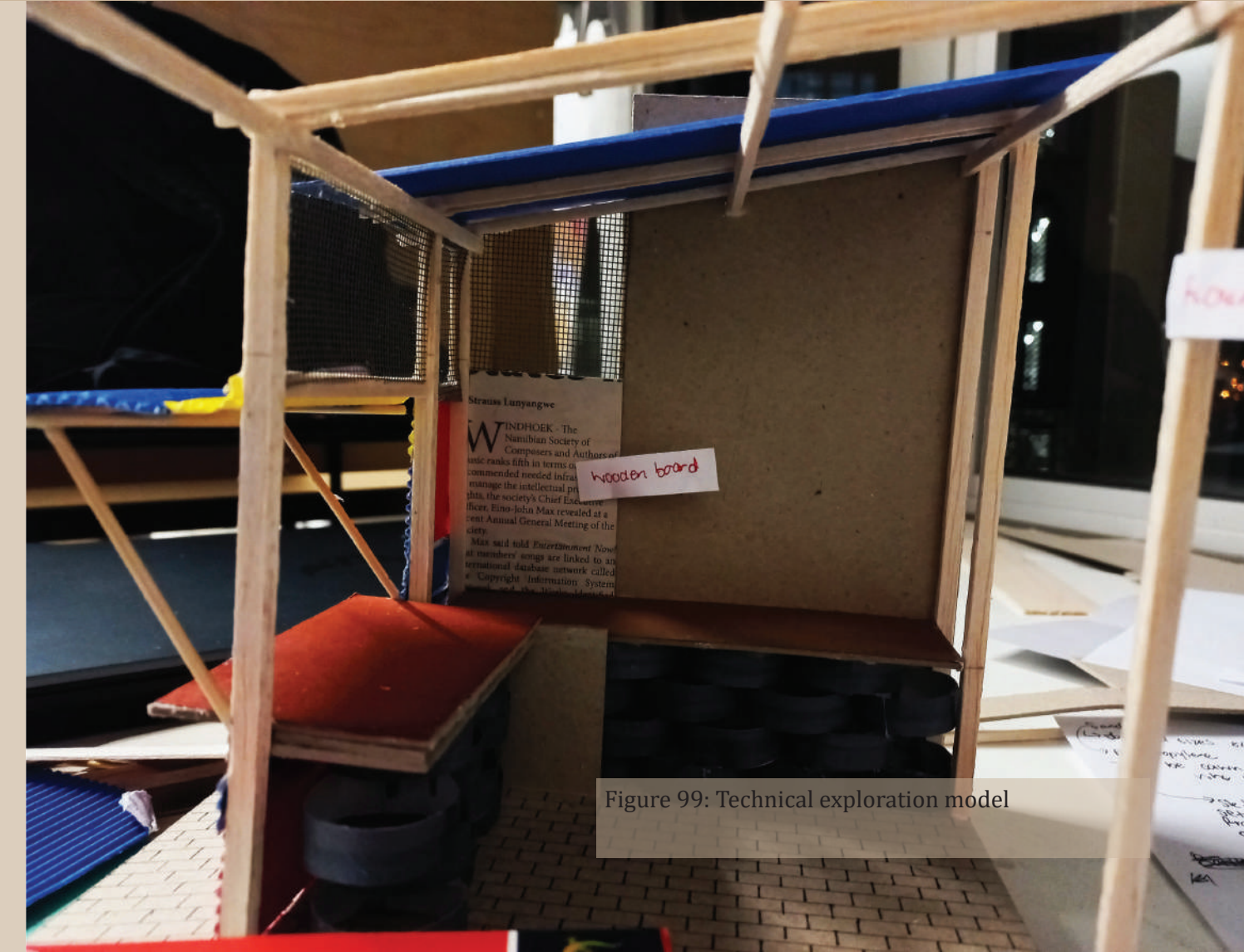


Figure 99: Technical exploration model

SUSTAINABLE MATERIAL LAB EXPLORATION

The sustainable material lab focuses on exploring recycled materials and technical construction methods to reduce the cost in some areas of the houses. This targets economic, environmental, and social elements. Recycled tyres, sandbags, glass and plastic bottles, reusing pallets for staircases, gum pole flooring, mantra flooring, and water harvesting systems.

SUSTAINABLE MATERIAL LAB EXPLORATION

RECYCLED TYRES

Tyres are commonly used by the community of Kabila C as barriers to redirect water away from the house. Some residents also use tyres use as planters. This inspired further exploration of using tyres in the housing scheme. Tyres could be used in the shops as a base that holds the countertop as depicted in figure 98. Tyres can also be mounted on the walls to increase the space in some backyards. Recycled tyres can be found at car dump sites and Derenas Investments and rubber product manufacturing.

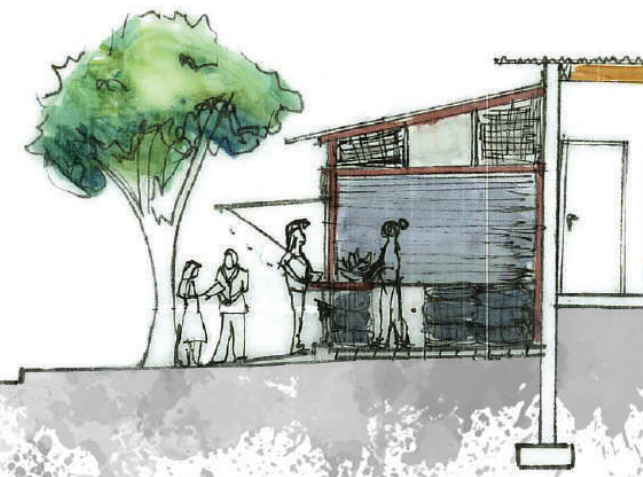


Figure 100: Shop on Erf 854/2

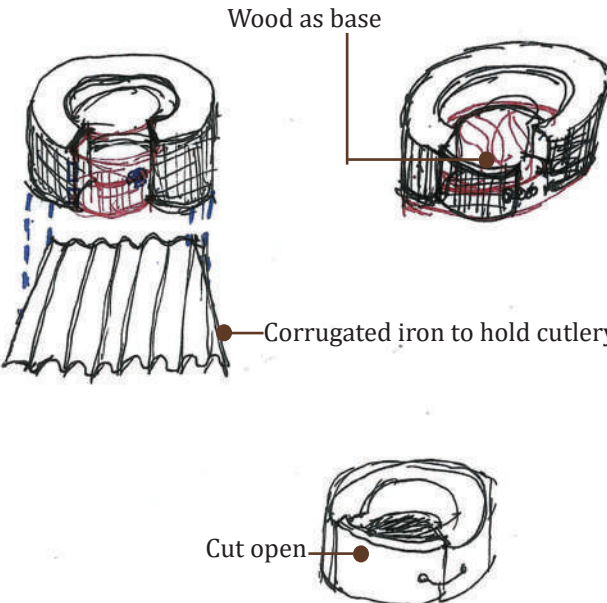
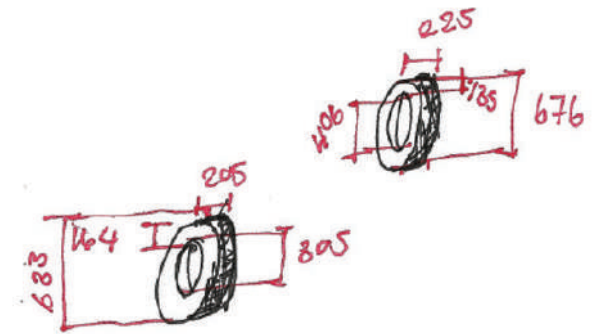
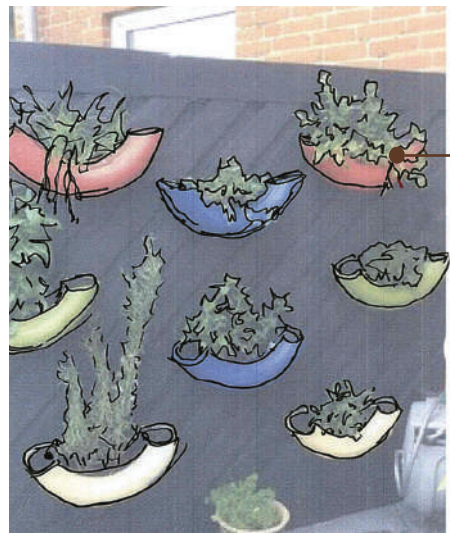


Figure 101: Tyres for storage
The shop will have tyres as the base to hold the countertop. Some tyres will act as a storage unit.



Tyres can be mounted on the walls in the backyard to hold planters to optimise space

Figure 102: Tyres for planters
This method saves space. Some existing SDFN houses have little space for gardening.

SUSTAINABLE MATERIAL LAB EXPLORATION

RECYCLED PLASTIC BOTTLES

Plastic bottles can be reused in construction systems to reduce pollution and cut the cost of materials used. Some outdoor stairs in the neighbourhood can be made from plastic bottles and filled with sand for structural support. The terrace can be made from recycled bricks that form different patterns.

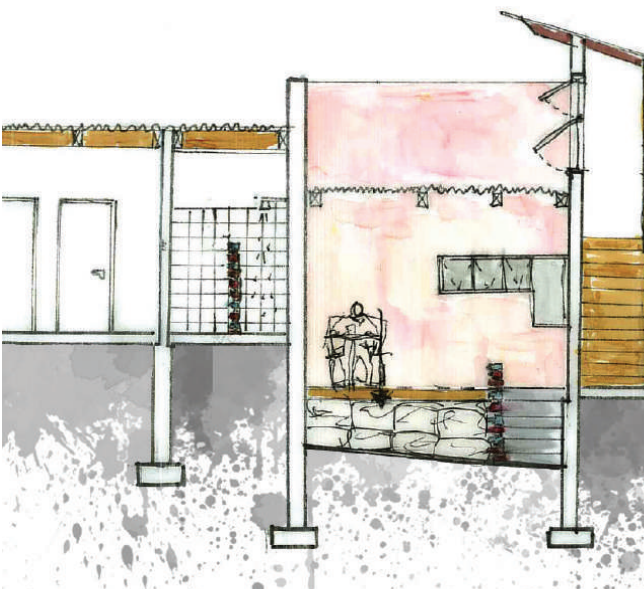


Figure 103: Terrace or shop space in Erf 855/2

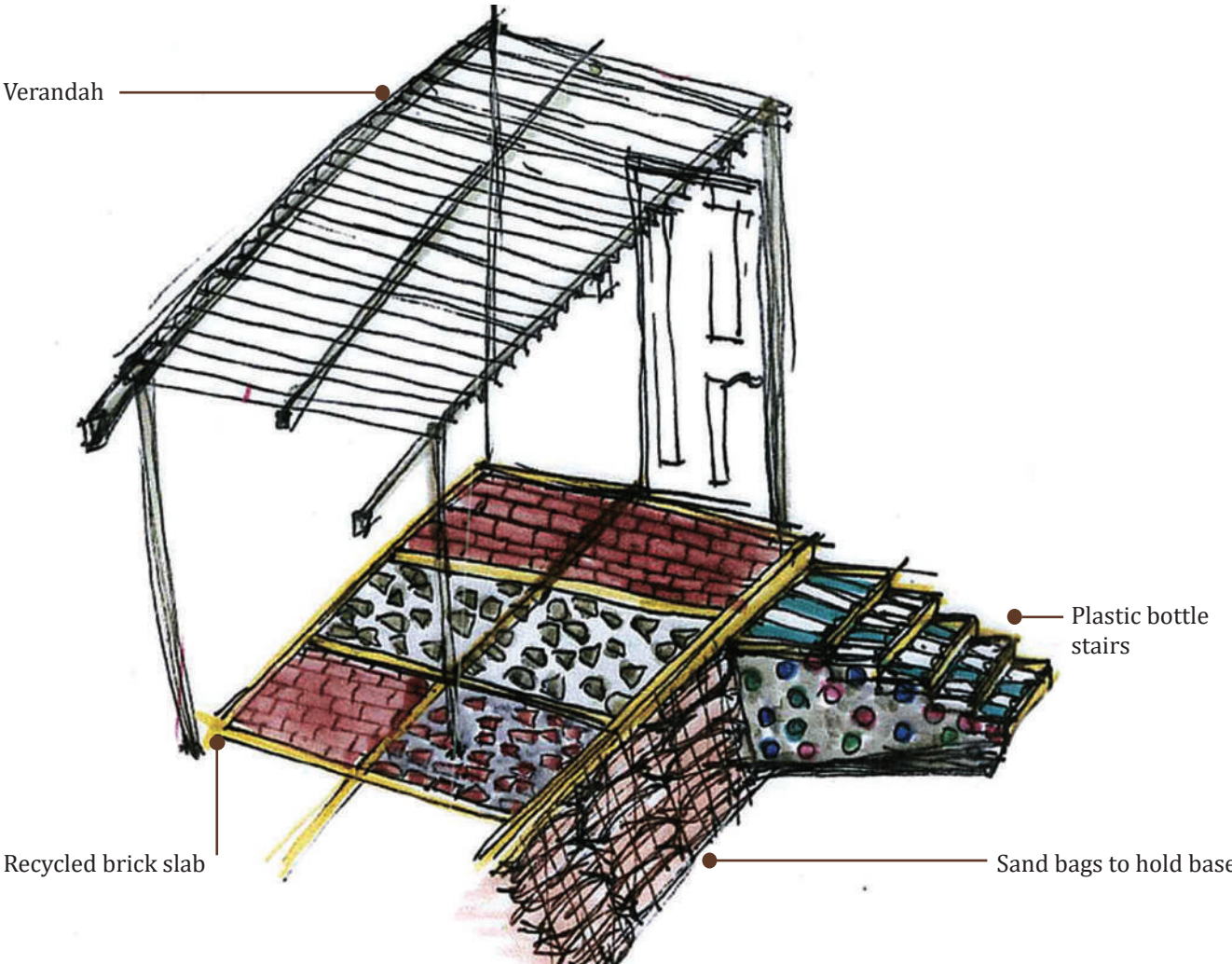


Figure 104: Focus area on terrace/ shop space

SUSTAINABLE MATERIAL LAB EXPLORATION

RECYCLED PLASTIC BOTTLE STAIRS

Location: Elmina, Ghana
Designers: Peace On Earthbench Movement
Year constructed: 2009
Name of innovation: Bottle Brick Bench

According to Peace on Earthbench movement (2009), the bottle brick bench is made from 50 plastic bottles filled with littered plastics. This initiative was made to reduce plastic pollution in Ghana. The plastic bottles are placed in a concrete bed frame and stacked on top of each other with a layer of mortar to form a bench.

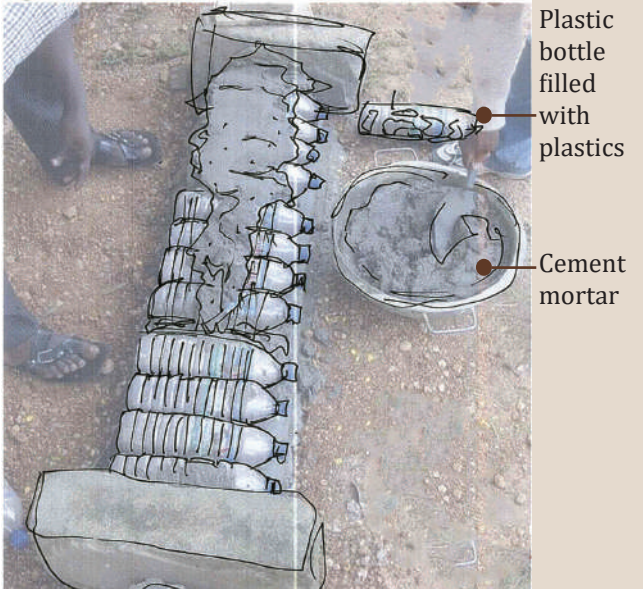


Figure 105: Bottle Brick Bench

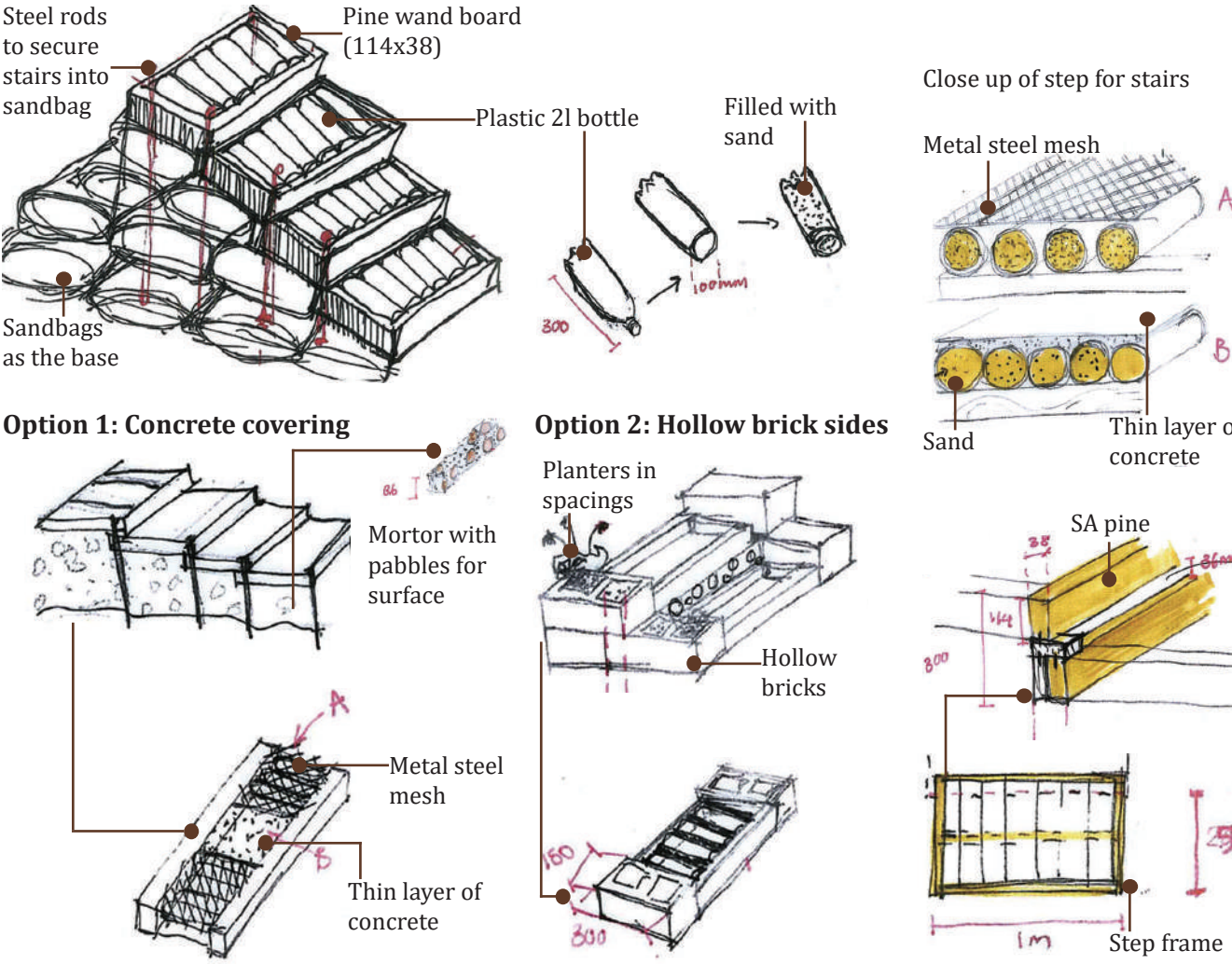


Figure 106: Exploration of recycled plastic bottle stairs

SUSTAINABLE MATERIAL LAB EXPLORATION

GUM POLE MEZZANINE FLOORS AND PALLET STAIRCASE

Gum poles are locally produced affordable building materials that could be used to make flooring that mimics bamboo floor construction. This technique could be applied to suspended floors. Wooden pallets are commonly used to transport items. They are often reused by informal traders in Windhoek, Figure 109, as counter-tops and tables.

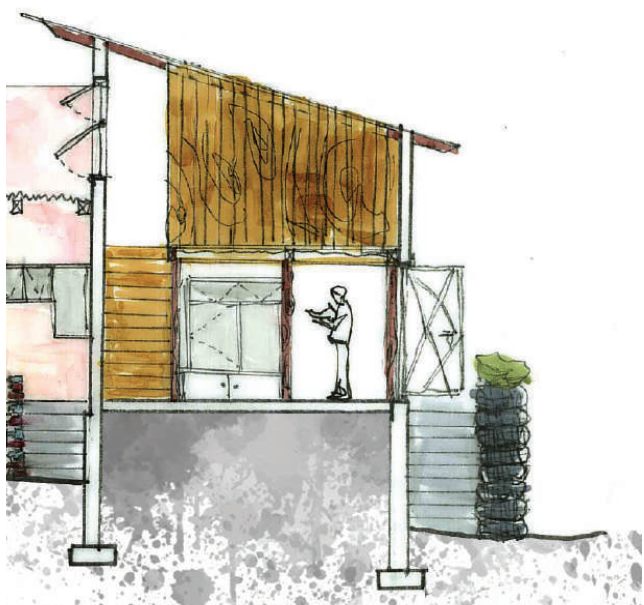


Figure 107: Mezzanine floor in Erf 855/2

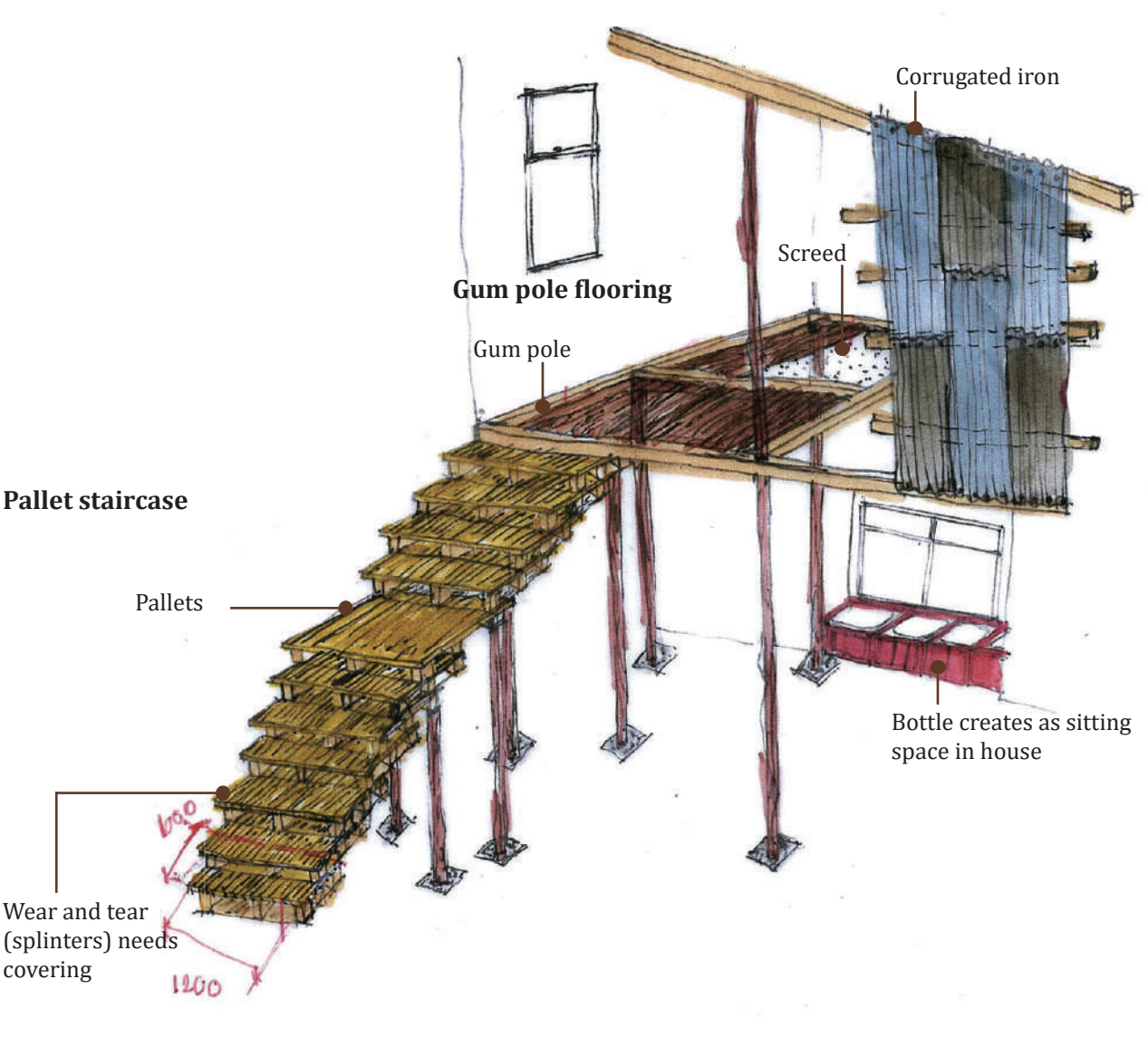


Figure 108: Focus area

SUSTAINABLE MATERIAL LAB EXPLORATION

GUM POLE MEZZANINE FLOOR

Location: Kouk Khleang Youth Centre, Cambodia
Architect: Komitu Architects
Year constructed: 2010
Type of building: Communal building
The Kouk Khleang Youth Centre is constructed with earth bricks for structural walls and bamboo is used for shading, façade, and beams that hold up the wooden flooring (Minke, 2016). Bamboo is a structural element to carries a secondary flooring.



Figure 109: Bamboo beams (Rakz, 2014)

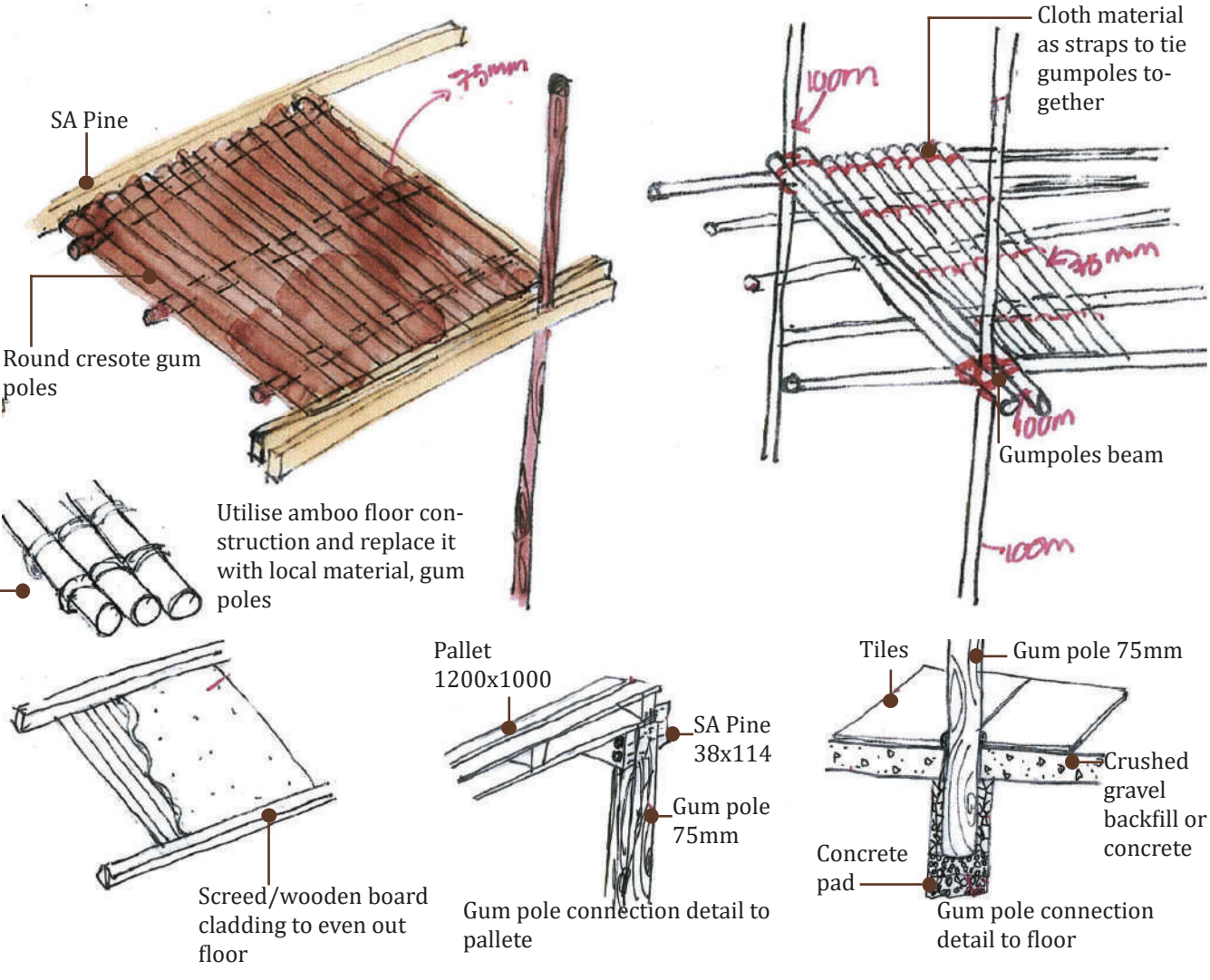


Figure 110: Exploration of gum pole mezzanine flooring

SUSTAINABLE MATERIAL LAB EXPLORATION

PALLET STAIRCASE

Wooden pallets can sustain heavy loads. It is often reused by informal traders in Windhoek, Figure 109, as countertops and tables. It can also be used to form staircase, as depicted in figure 108.

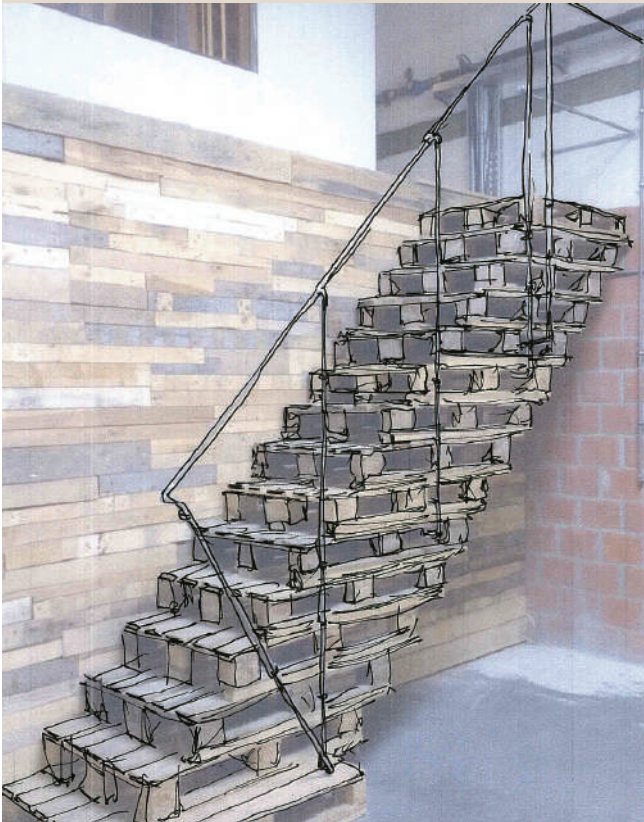


Figure 111: Pallet staircase (Smith, 2021)



Figure 112: Informal traders at Single Quarters, re-purposing pallets (The Namibian, 2020)

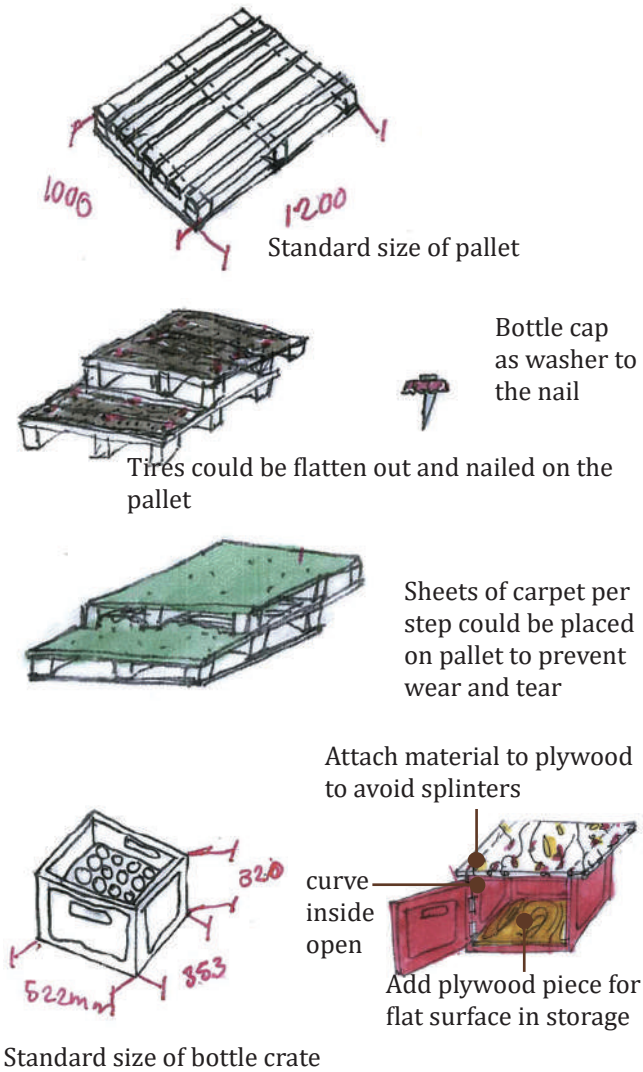


Figure 113: Exploration of pallet staircase and bottle crate plinth

SUSTAINABLE MATERIAL LAB EXPLORATION

RAINWATER HARVEST

Residents will be given the option to harvest rainwater through method 1 or method 2. This depends on the budget of the resident. Method 1 utilizes one or two 200ml plastic barrels. Method 2 makes use of reusing 20l sunflower containers to collect and filter water. The containers will be attached to a stationary cage and can be replaced when worn out.

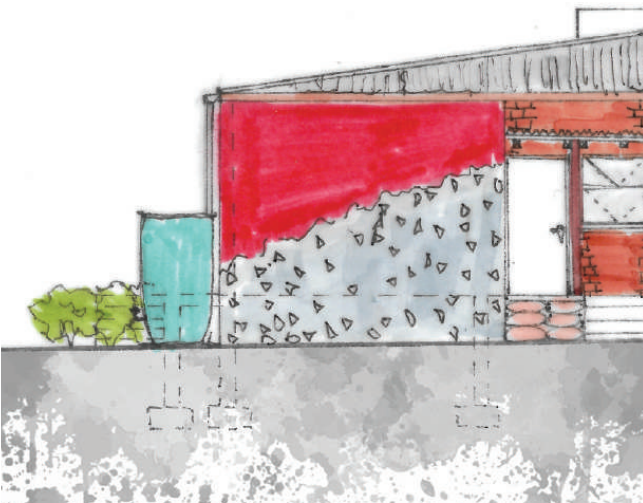


Figure 114: Rainwater harvest Erf 881/2

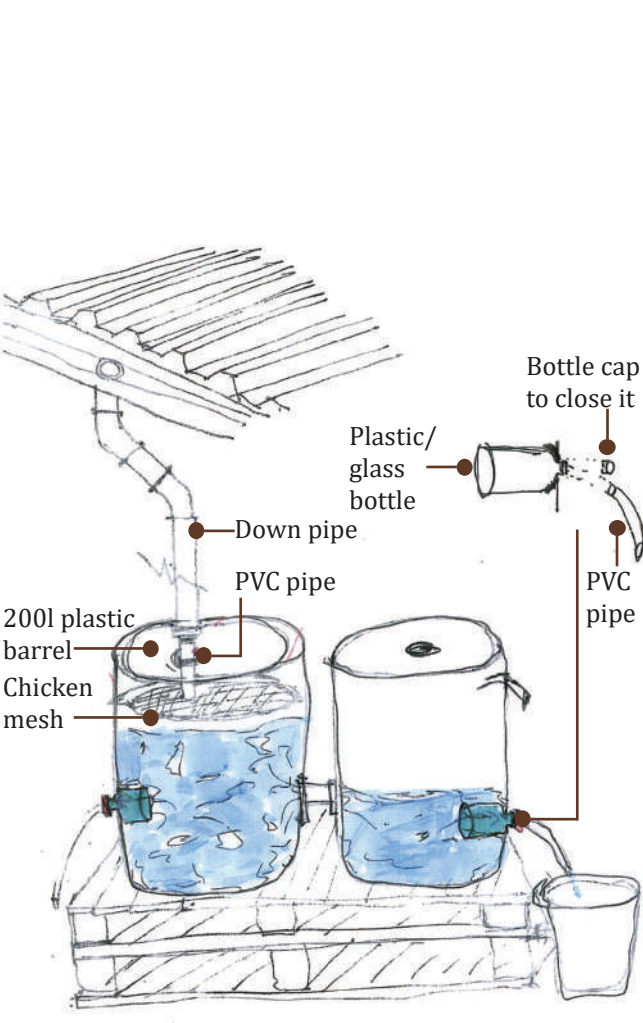


Figure 115: Exploration of method 1, plastic barrel

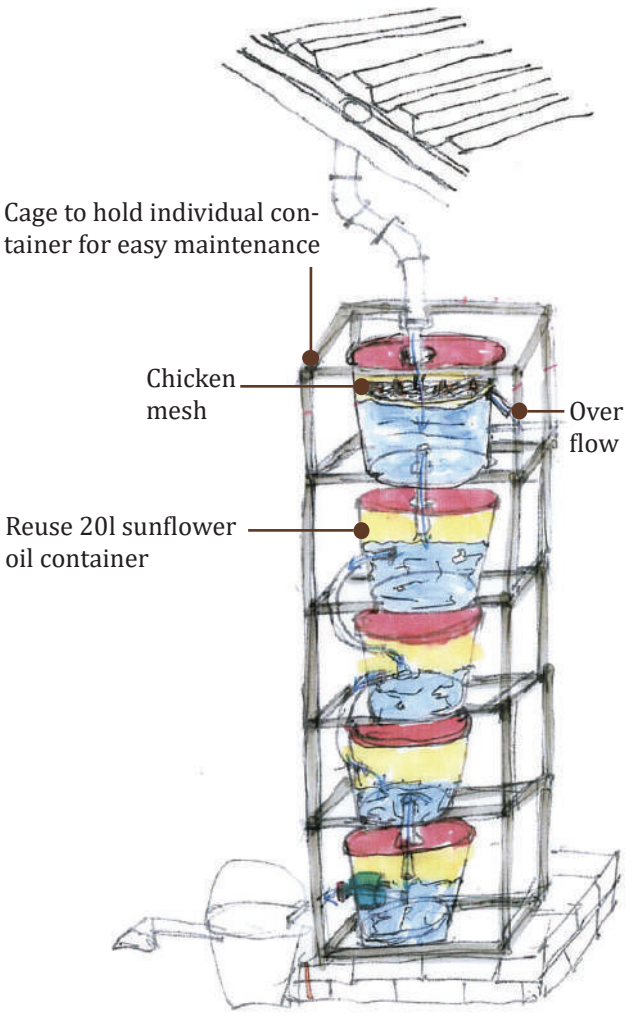


Figure 116: Exploration of method 2, sunflower container

SUSTAINABLE MATERIAL LAB EXPLORATION

ROTATING PANELS

The rotating panels allow residents to experiment with different materials, textures, and patterns. This encourages residents to be creative and personalise their space according to their style.

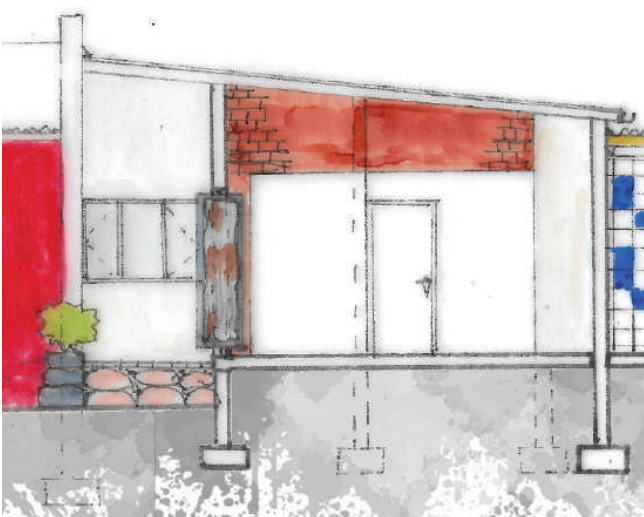


Figure 117: Terrace area in Erf 861/2

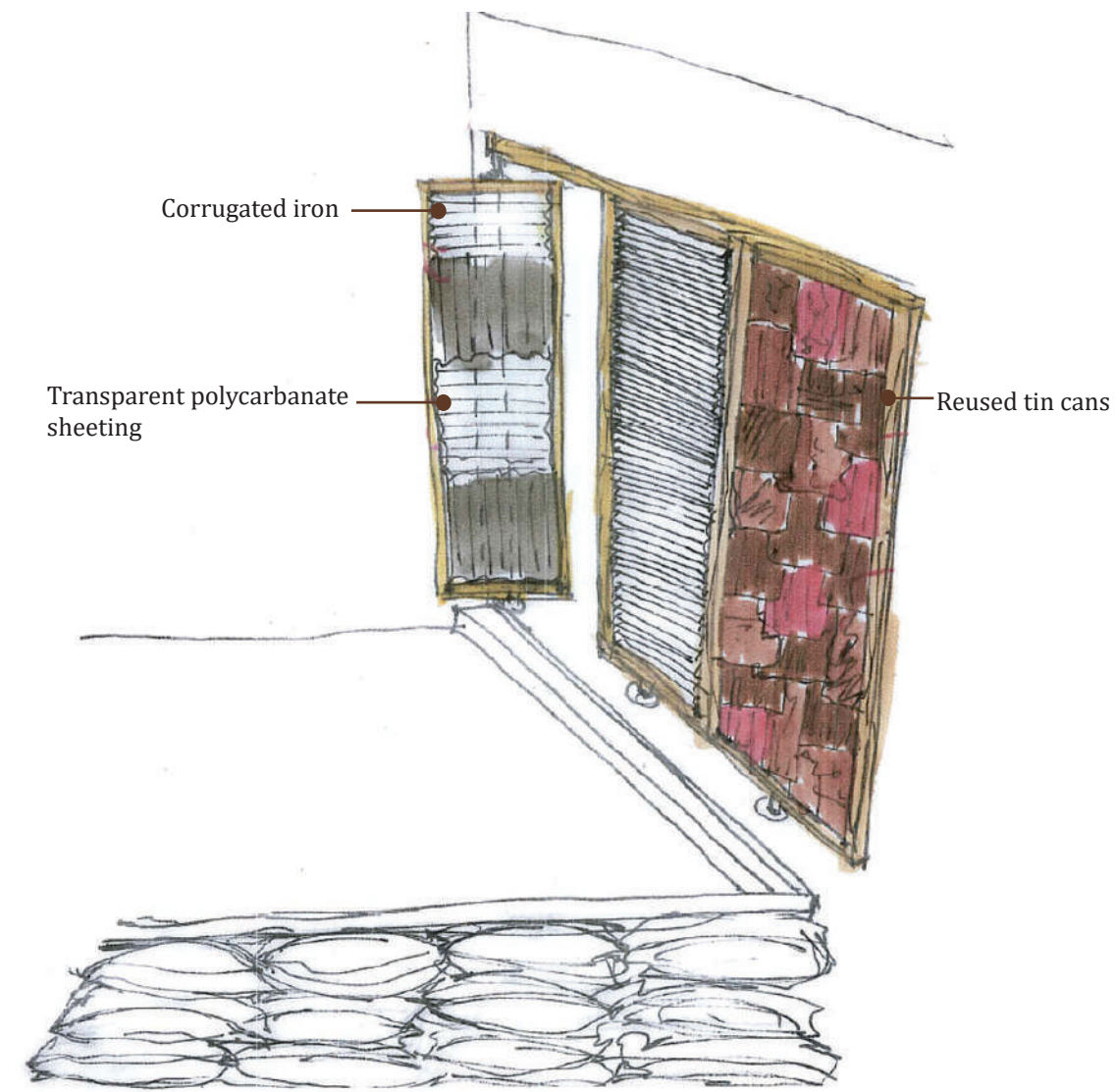


Figure 118: Rotating panels on the terrace

SUSTAINABLE MATERIAL LAB EXPLORATION

ROTATING PANELS

Location: Otavalo, Ecuador
Architect: Archquid think-act tank
Year constructed: 2016
Type of building: Pavellion

The Totora Cube explores the use of handmade art and crafts produced by the community. The cube has a wooden structural frame with rotating panels. The panels are clad with different fabrics and reeds to create patterns on each panel.

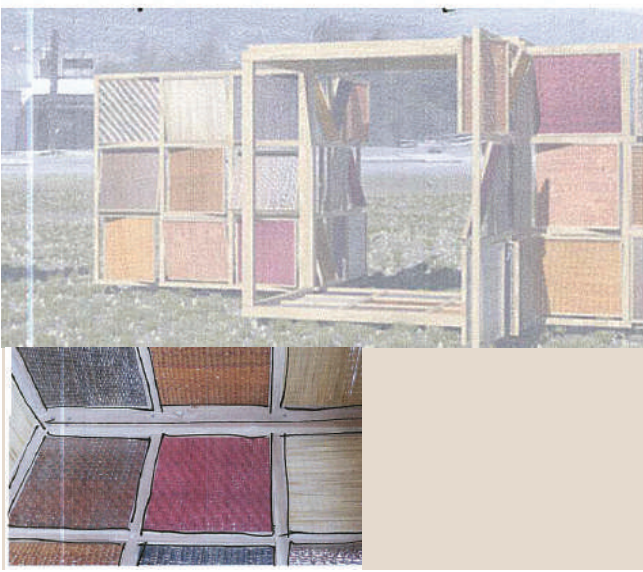


Figure 119: Cube with rotating cube panels (Lerner, 2016)

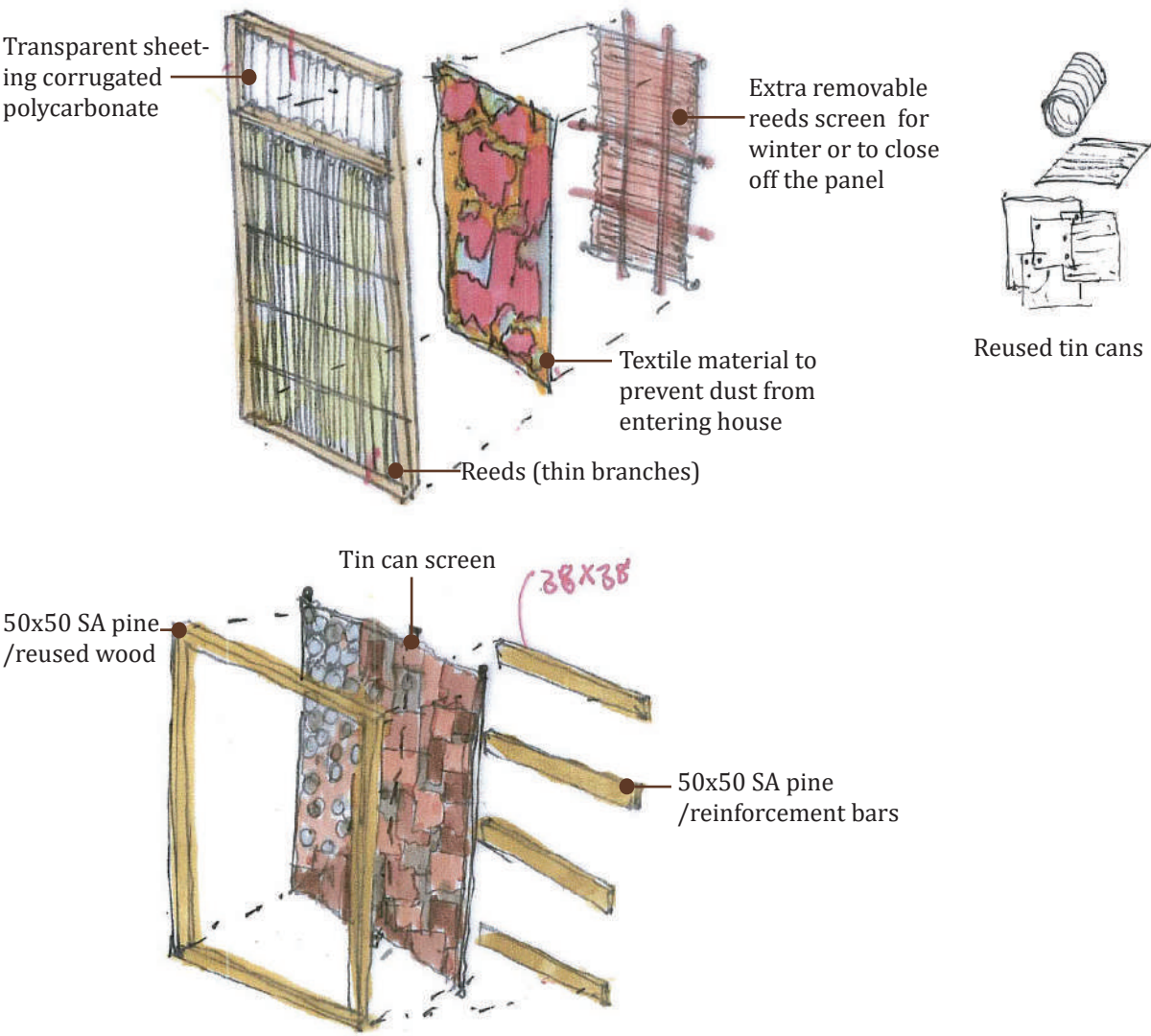


Figure 120: Exploration of rotating panels

SUSTAINABLE MATERIAL LAB EXPLORATION

TYRE BALUSTRADE AND MADRA FLOOR

The balustrade will be cladded with tyres on the railings and flooring. The interior floor slab will made from recycled bricks using the Madra method using locally available material. The floor will be cladded with broken tiles to form crazy flooring. The sliding corrugated iron panel will presented as an alternative replacement to the internal door.

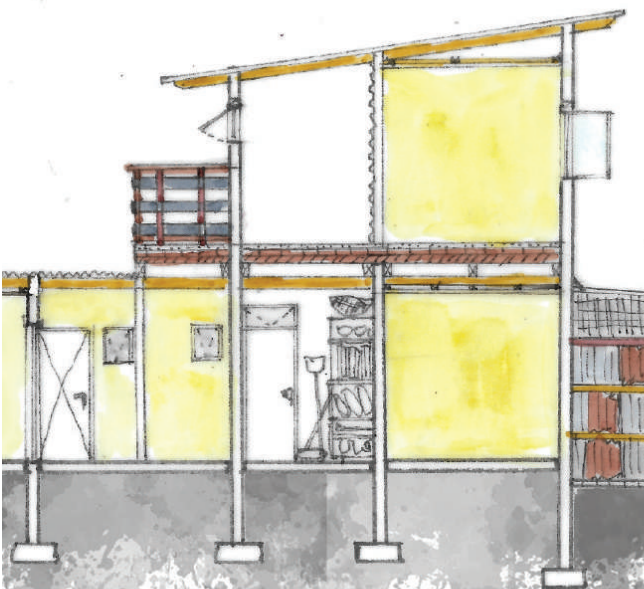


Figure 121: Tyre balustrade and Madra floor Erf 861/1

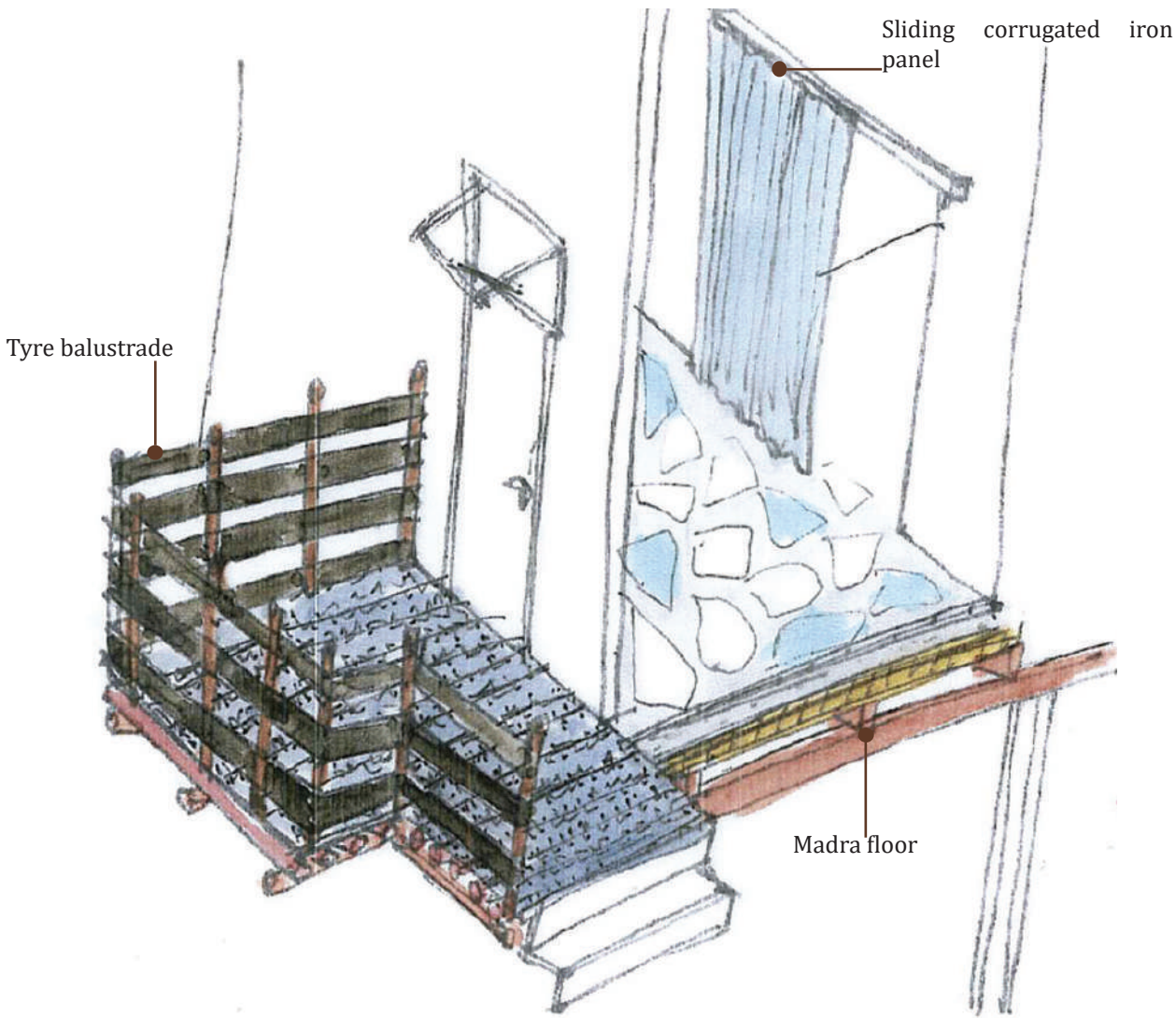


Figure 122: Focus area on tyre balustrade first floor

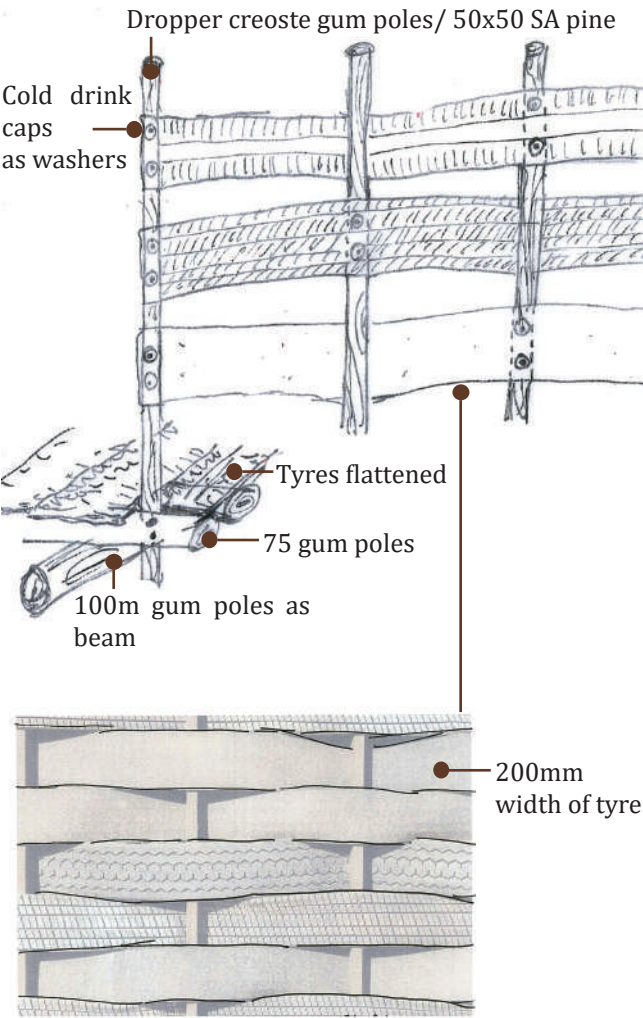


Figure 123: Tyre used on the balustrade

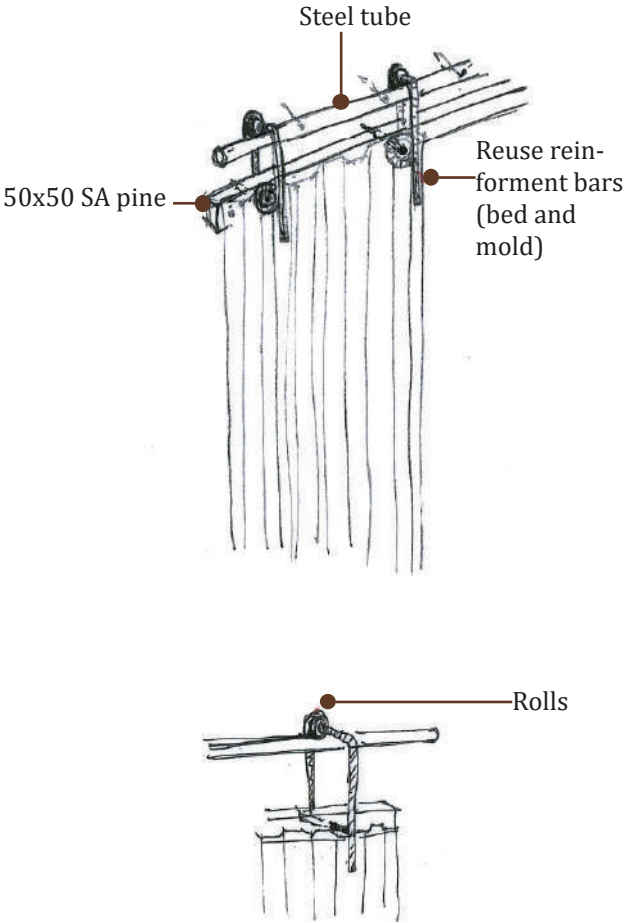


Figure 124: Sliding corrugated panel

SUSTAINABLE MATERIAL
LAB EXPLORATION

MADRA FLOOR

Location: India
Builder: Thatha
Year constructed: 2020
Name of innovation: Brick layered floor

Madra is a traditional brick floor slab commonly used in India (Bingham, 2020). Beams are first placed then tile bricks are stacked diagonally with limecrete. The second layer of tile bricks is placed in the opposite direction. Then waterproofing and a layer of screed with tile finishing.

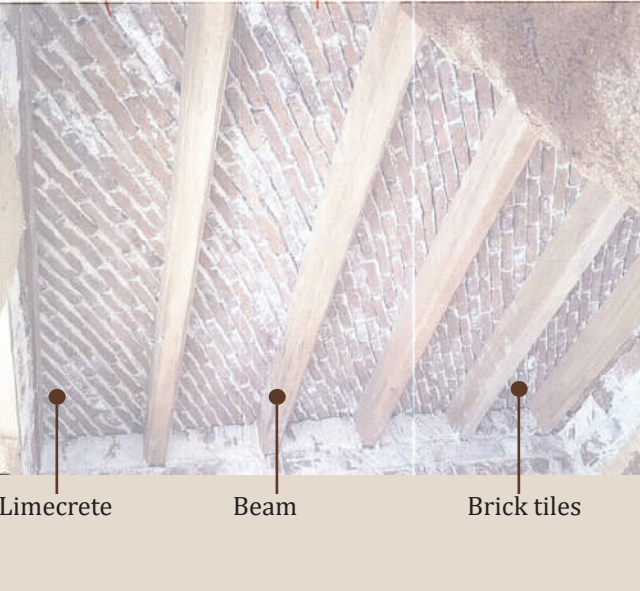


Figure 125: Madra Floor (Bingham, 2020)

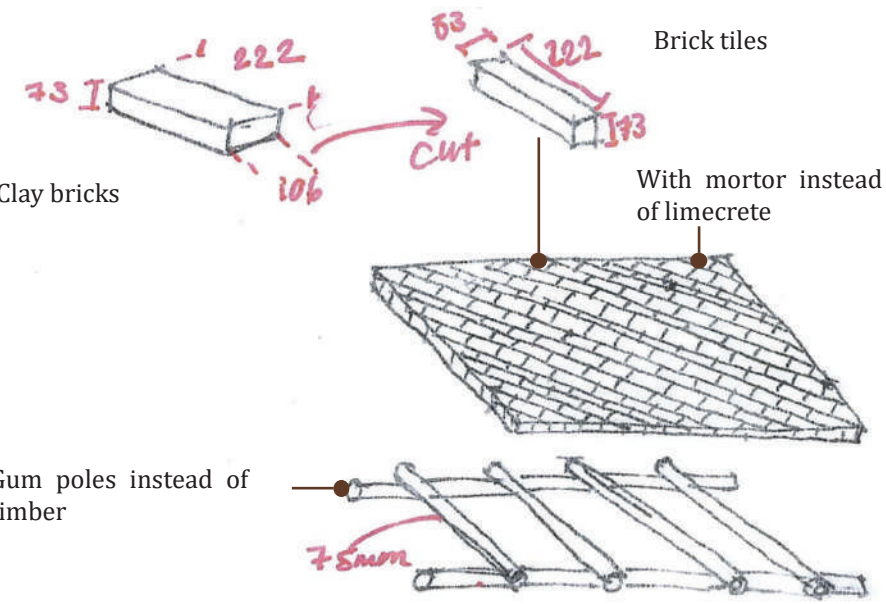
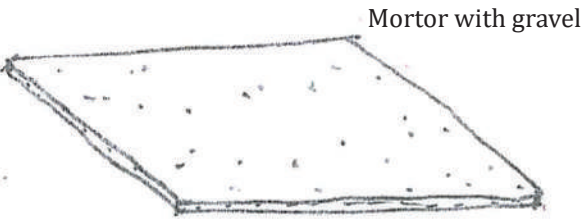


Figure 126: Exploration of Madra Floor with local material

TECHNICAL DETAIL

This section contains the technical details which was built on the sustainable material lab explorations.

TECHNICAL DETAIL

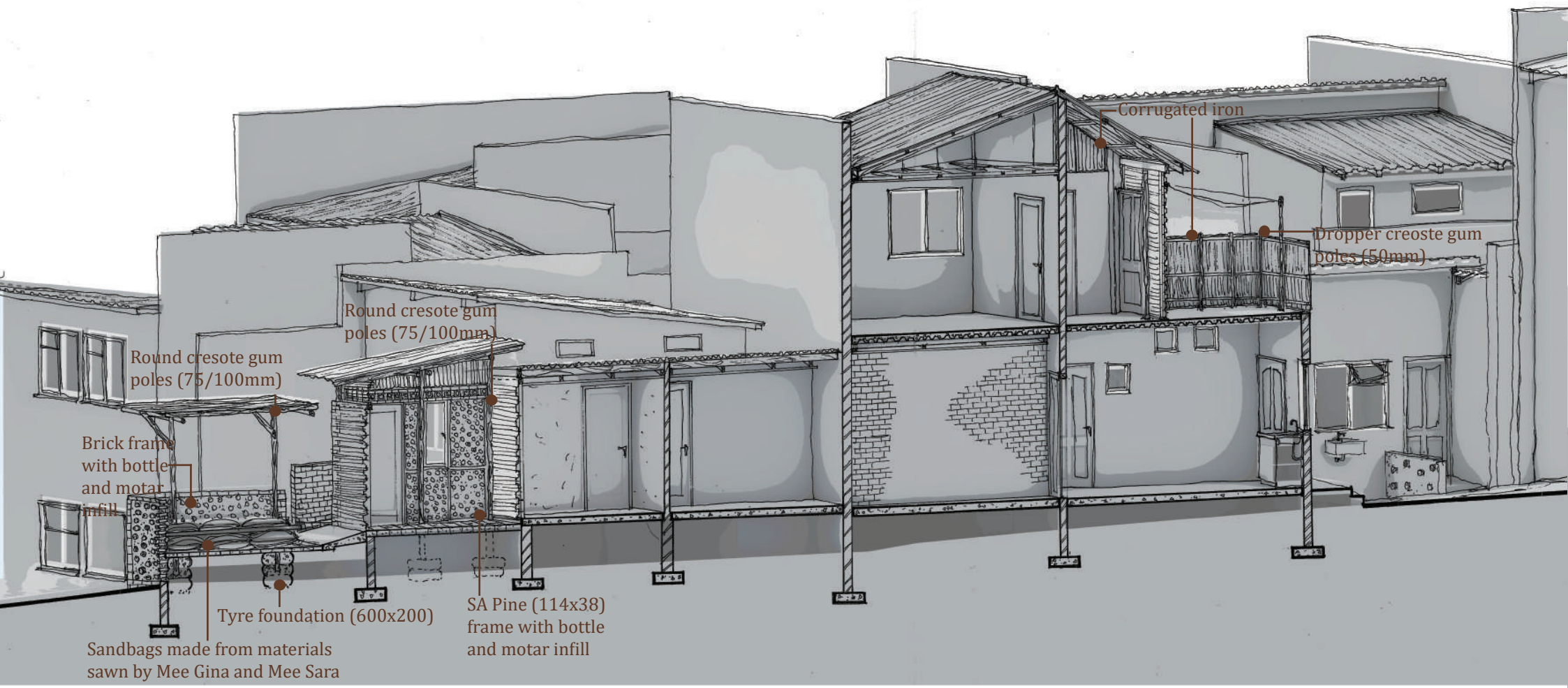


Figure 127: Technical Section A-A

TECHNICAL DETAIL

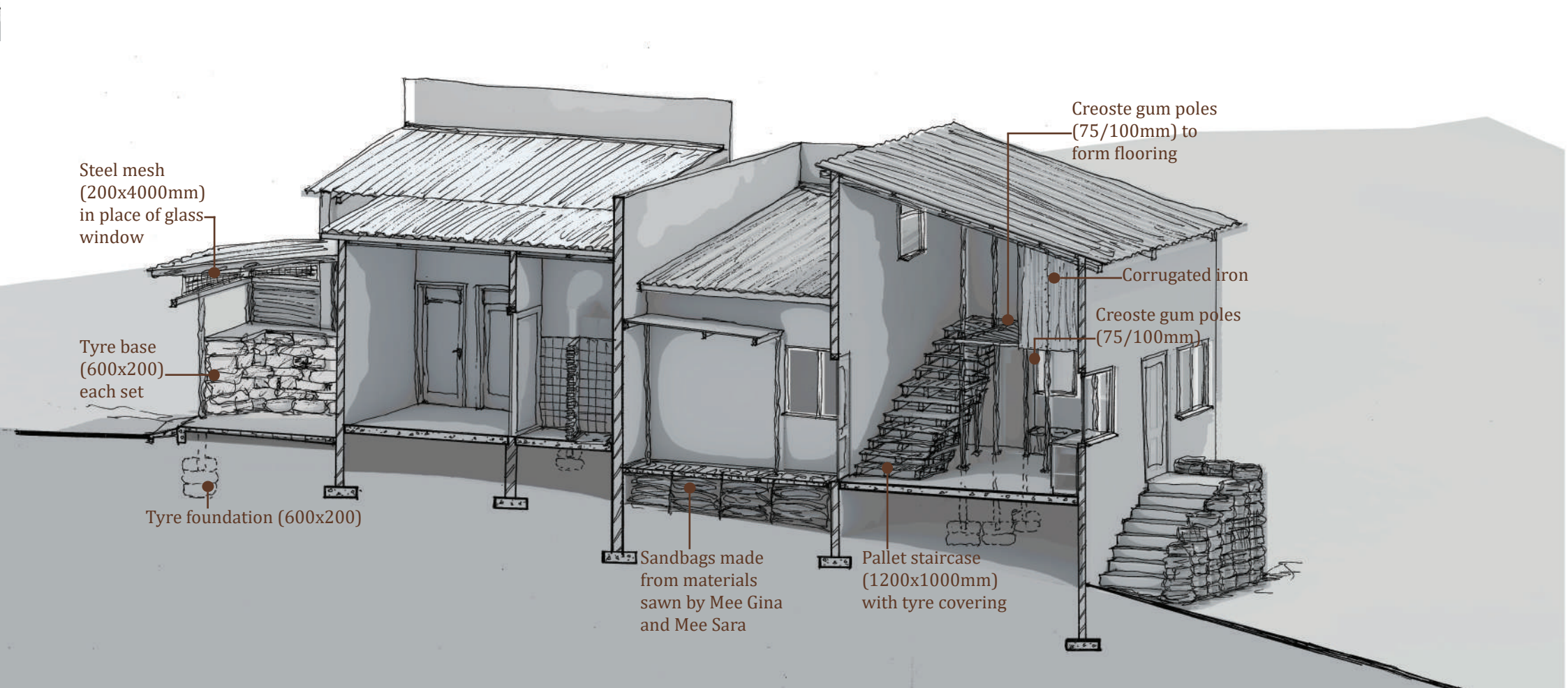


Figure 128: Technical Section B-B

TECHNICAL DETAIL

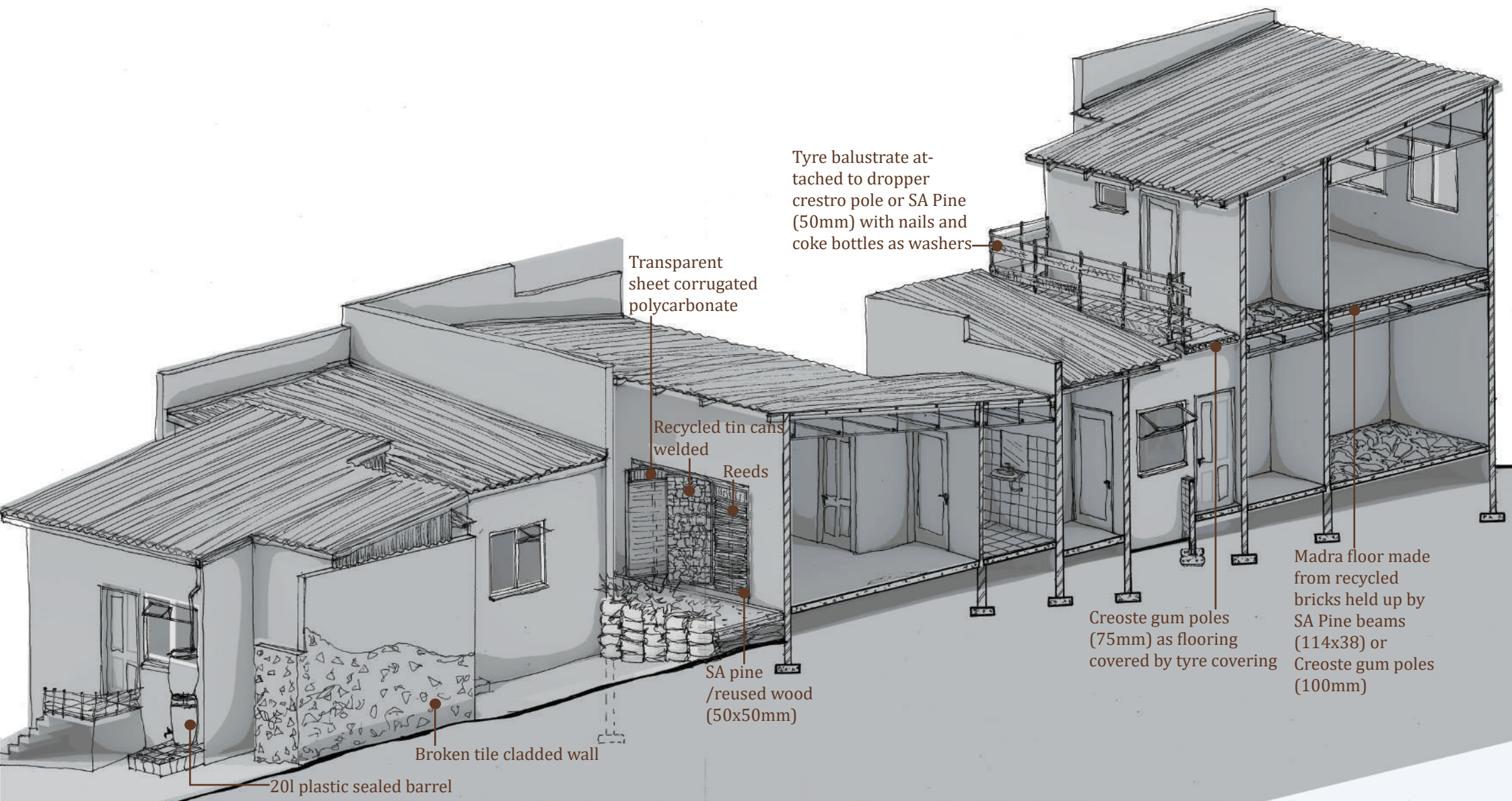


Figure 129: Technical Section E-E



Figure 130: Street view of proposed development in Kabila C

COST ESTIMATE

The cost of building materials was estimated based on four different households, each representing a different typology as described in the Design section. The calculations provide the cost estimate of different options of materials and construction methods to provide the user with options based on their budget and preference. Some of the options calculated include buying single bricks, brick pallets or community making their own bricks, to name a few.

The calculations only take into account the basic cost of the materials and do not include any additional costs for labour, transportation, concrete flooring, finishes, or detailed quantities.

TPOLOGY 1 HELENA
HOUSEHOLD

STAGE 1



Figure 131: Ground Floor, 57m² total built area

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
1. Purchasing Bricks (superstructure) Option 1						
1.1.a	220mm Standard bricks double brick wall (exterior walls)	m2	Pupkewitz	7292	3.00	21 876.00
1.1.b	220mm double brick (firewall)	m2	Pupkewitz	6562	3.00	19 686.00
Total Cost						41 562.00
1.2.a	140mm cement max bricks (exterior walls)	Per pallet	Build it * pallet contains 224 bricks	14	1495.00	20 930.00
1.2.b	140mm cement max bricks double brick wall (firewall)	Per pallet	Build it * pallet contains 224 bricks	28	1495.00	41 860.00
Total Cost						62 790.00

Table 01: Purchasing bricks, stage 1 with option to by per brick or per pallet

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
2. Community Making Bricks On-site (superstructure) Option 2						
2.1	300x150x150mm Hollow bricks (exterior walls excluding firewall)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	69	90.00	6 210.00
	Building sand	m3	Pupkewitz/ Build it	12	279.00	3 348.00
	Stone	m3	Pupkewitz/ Build it	12	399.00	4 788.00
Total Cost						14 346.00
2.2	300x150x150mm Hollow bricks (firewall)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	120	90.00	10 800.00
	Building sand	m3	Pupkewitz/ Build it	21	279.00	5 859.00
	Stone	m3	Pupkewitz/ Build it	21	399.00	8 379.00
Total Cost						25 038.00

Table 02: Community making bricks on-site, stage 1

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
3. Dry Walls						
3.1	Gypsum ceiling board 1200x3000x6.4	Sheet	Pupkewitz Megabuild	8	99.00	792.00
3.2	Creosote poles gumpoles 75/100mm round 3.0m	m	Pupkewitz Megabuild	5	119.00	595.00
3.3	SA Pine 38x50mm 3.6m	m	Pupkewitz Megabuild	8	85.00	680.00
3.4	SA Pine 38x114mm 3.6m	m	Pupkewitz Megabuild	6	100.00	600.00
3.5	Recycle old clothes for insulation / old newspapers	n/a	n/a	n/a	0.0	0.0
Total Cost						2 667.00

Table 03: Dry wall for the interior walls, stage 1

TPOLOGY 1 HELENA
HOUSEHOLD

STAGE 2

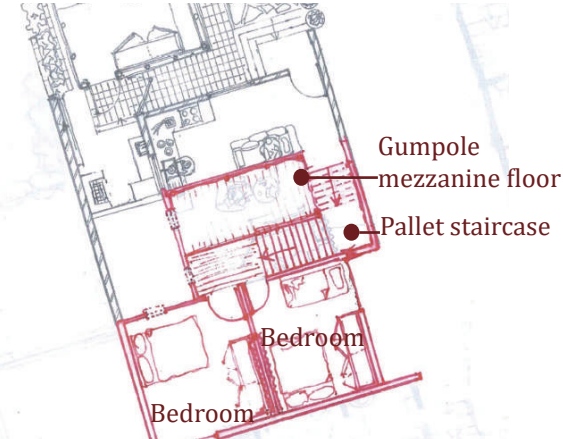


Figure 132: First floor, 36m² built area of stage 2

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
4. Purchasing Bricks (superstructure)						
4.1.a	220mm Standard bricks double brick wall (exterior walls)	m2	Pupkewitz	864	3.00	2 592.00
4.2.a	140mm cement max bricks (exterior walls)	Per pallet	Build it * pallet contains 224 bricks	3	1495.00	4 485.00

Table 04: Purchasing bricks, stage 2

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
5. Community Making Bricks On-site (superstructure)						
5.1	300x150x150mm Hollow bricks (exterior walls excluding firewall)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	3	90.00	270.00
	Building sand	m3	Pupkewitz/ Build it	0.48	279.00	133.92
	Stone	m3	Pupkewitz/ Build it	0.48	399.00	191.52
Total Cost						595.44

Table 05: Community making bricks on-site, stage 2

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
6. Dry Walls						
6.1	Option 1: Gypsum ceiling board 1200x3000x6.4	Sheet	Pupkewitz Megabuild	3	99.00	297.00
	Option 2: Roofing galvanized corrugated iron 2.4m	m	Pupkewitz Megabuild	3	85.00	255.00
6.2	SA Pine 38x50mm 3.6m	m	Pupkewitz Megabuild	3	85.00	255.00
6.3	SA Pine 38x114mm 3.6m	m	Pupkewitz Megabuild	4	100.00	400.00
6.4	Recycle old clothes for insulation / old newspapers	n/a	n/a	n/a	0.0	0.0
Total Cost						1 207.00

Table 06: Dry wall for the interior walls, stage 2

TPOLOGY 1 HELENA
HOUSEHOLD

STAGE 1

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
7. Roofing						
7.1	Gypsum ceiling board 1200x3000x6.4	Sheet	Pupkewitz Megabuild	17	99.00	1 683.00
7.2	SA Pine 38x38mm 3.6m	m	Build it	11	38.00	418.00
7.3	SA Pine 38x38mm 4.8m	m	Build it	4	55.00	220.00
7.4	SA Pine 38x114mm 6.0m	m	Pupkewitz Megabuild Build it	8	185.00	1 480.00
7.5	Roofing galvanized corrugated iron 3.6m	m	Pupkewitz Megabuild	3	199.00	597.00
7.6	Roofing galvanized corrugated iron 6.0m	m	Pupkewitz Megabuild	15	325.00	4 875.00
Total Cost						9 273.00

Table 07: Roofing, stage 1

STAGE 2

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
8. Pallet Staircase and Gumpole Mezzanine Floor						
8.1	Recycled pallets 1200x1000	m	n/a	11	n/a	0.0
8.2	Creosote poles gumpoles 75/100mm round 2.1m	m	Pupkewitz Megabuild	5	69.00	345.00
8.3	Creosote poles gumpoles 75/100mm round 1.8m	m	Pupkewitz Megabuild	4	60.00	240.00
8.4	Creosote poles gumpoles 75/100mm round 3.0m	m	Pupkewitz Megabuild	18	119.00	2 142.00
Total Cost						2 727.00

Table 08: Pallet staircase and gumpole mezzanine floor, stage 2

TPOLOGY 2 GINA
HOUSEHOLD

STAGE 1

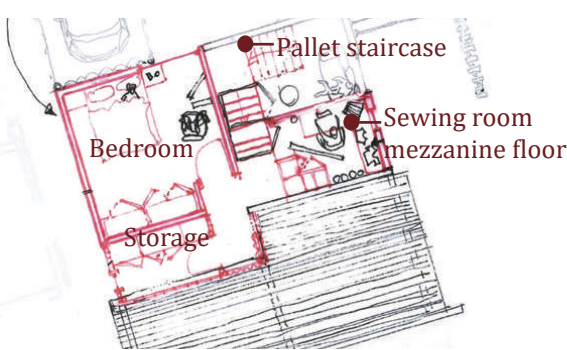


Figure 133: First floor, 31m² built area of stage 1

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
1. Purchasing Bricks (superstructure) Option 1						
1.1.a	220mm Standard bricks double brick wall (exterior walls)	m2	Pupkewitz	2812	3.00	8 436.00
1.1.b	220mm Standard bricks single brick wall (interior walls)	m2	Pupkewitz	562	3.00	1 686.00
Total Cost						10 122.00
1.1.c	220mm double brick (firewall)	m2	Pupkewitz	2232	3.00	6 696.00
1.2.a	140mm cement max bricks double brick wall (exterior walls)	Per pallet	Build it * pallet contains 224 bricks	12	1495.00	17 940.00
1.2.b	140mm cement max bricks single brick wall (interior walls)	Per pallet	Build it * pallet contains 224 bricks	2	1495.00	2 990.00
1.2.b	140mm cement max bricks double brick wall (firewall)	Per pallet	Build it * pallet contains 224 bricks	10	1495.00	14 950.00
Total Cost						42 576.00

Table 09: Purchasing bricks, stage 1

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
2. Community Making Bricks On-site (superstructure) Option 2						
2.1	300x150x150mm Hollow bricks (exterior walls excluding firewall)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	59	90.00	5 310.00
	Building sand	m3	Pupkewitz/ Build it	10	279.00	2 790.00
	Stone	m3	Pupkewitz/ Build it	10	399.00	3 990.00
Total Cost						12 090.00
2.2	300x150x150mm Hollow bricks (interior walls)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	17	90.00	1 530.00
	Building sand	m3	Pupkewitz/ Build it	3	279.00	837.00
	Stone	m3	Pupkewitz/ Build it	3	399.00	1 197.00
Total Cost						3 567.00
2.3	300x150x150mm Hollow bricks (firewall)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	41	90.00	3 690.00
	Building sand	m3	Pupkewitz/ Build it	7.2	279.00	2 008.80
	Stone	m3	Pupkewitz/ Build it	7.2	399.00	2 872.80
Total Cost						8 571.60

Table 10: Community making bricks on-site, stage 1

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
3. Pallet staircase						
3.1	Recycled pallets 1200x1000	m	n/a	15	n/a	0.0
3.2	Creosote poles gumpoles 75/100mm round 2.1m	m	Pupkewitz Megabuild	7	69.00	483.00
Total Cost						483.00

Table 11: Pallet staircase, stage 1

TPOLOGY 2 GINA
HOUSEHOLD

STAGE 2



Figure 134: First floor, 22m² built area of stage 2

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
4. Purchasing Bricks (superstructure) Option 1						
4.1.a	220mm Standard bricks double brick wall (exterior walls)	m2	Pupkewitz	1560	3.00	4 680.00
4.1.b	220mm Standard bricks single brick wall (interior walls)	m2	Pupkewitz	798	3.00	2 394.00
4.1.c	220mm double brick (firewall)	m2	Pupkewitz	2232	3.00	6 696.00
Total Cost						13 770.00
4.2.a	140mm cement max bricks double brick wall (exterior walls)	Per pallet	Build it * pallet contains 224 bricks	7	1495.00	10 465.00
4.2.b	140mm cement max bricks single brick wall (interior walls)	Per pallet	Build it * pallet contains 224 bricks	4	1495.00	4 485.00
4.2.c	140mm cement max bricks double brick wall (firewall)	Per pallet	Build it * pallet contains 224 bricks	10	1495.00	14 950.00
Total Cost						29 900.00

Table 12: Purchasing bricks, stage 2

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
5. Community Making Bricks On-site (superstructure) Option 2						
5.1	300x150x150mm Hollow bricks (exterior walls excluding firewall)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	28	90.00	2 520.00
	Building sand	m3	Pupkewitz/ Build it	5.04	279.00	1 406.16
	Stone	m3	Pupkewitz/ Build it	5.04	399.00	2 010.96
Total Cost						5 937.12
5.2	300x150x150mm Hollow bricks (interior walls)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	14	90.00	1 260.00
	Building sand	m3	Pupkewitz/ Build it	2.52	279.00	703.08
	Stone	m3	Pupkewitz/ Build it	2.52	399.00	1 005.48
Total Cost						2 968.56
5.3	300x150x150mm Hollow bricks (firewall)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	41	90.00	3 690.00
	Building sand	m3	Pupkewitz/ Build it	7.2	279.00	2 008.80
	Stone	m3	Pupkewitz/ Build it	7.2	399.00	2 872.80
Total Cost						8 571.60

Table 13: Community making bricks on-site, stage 2

TPOLOGY 3 KATRINA
HOUSEHOLD

STAGE 1 (MAIN HOUSE/ TENANTS HOUSE)

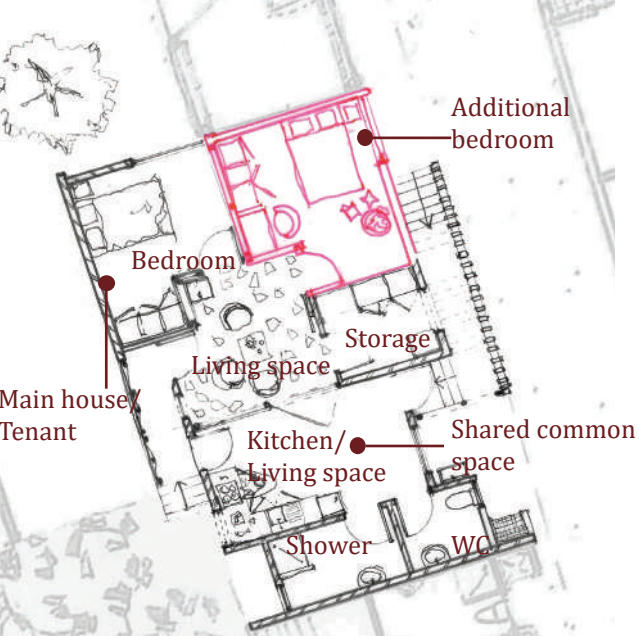


Figure 135: Ground Floor
26m² Main House/ Tenant built area, 14m² added bedroom, and 21m² Common Shared built area.

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
1. Purchasing Bricks (Main House/ Tenants House) (superstructure) 1 bedroom Option 1						
1.1.a	220mm Standard bricks double brick wall (exterior walls)	m2	Pupkewitz	3160	3.00	9 480.00
1.1.b	220mm Standard bricks single brick wall (interior walls)	m2	Pupkewitz	831	3.00	2 493.00
1.1.c	220mm double brick (firewall)	m2	Pupkewitz	1182	3.00	3 546.00
Total Cost						15 519.00
1.2.a	140mm cement max bricks (exterior walls)	Per pallet	Build it * pallet contains 224 bricks	14	1495.00	20 930.00
1.2.b	140mm cement max bricks single brick wall (interior walls)	Per pallet	Build it * pallet contains 224 bricks	4	1495.00	5 980.00
1.2.c	140mm cement max bricks double brick wall (firewall)	Per pallet	Build it * pallet contains 224 bricks	5	1495.00	7 475.00
Total Cost						34 382.00

Table 14: Purchasing bricks for main house/ tenant house, stage 1

TPOLOGY 3 KATRINA
HOUSEHOLD

STAGE 1 (MAIN HOUSE/ TENANTS
HOUSE

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
2. Community Making Bricks On-site (Main House/Tenants) 1 bedroom Option 2						
2.1	300x150x150mm Hollow bricks (exterior walls excluding firewall)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	57	90.00	5 130.00
	Building sand	m3	Pupkewitz/ Build it	10	279.00	2 790.00
	Stone	m3	Pupkewitz/ Build it	10	399.00	3 990.00
Total Cost						11 910.00
2.2	300x150x150mm Hollow bricks (interior walls)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	17	90.00	1 530.00
	Building sand	m3	Pupkewitz/ Build it	3	279.00	837.00
	Stone	m3	Pupkewitz/ Build it	3	399.00	1 197.00
Total Cost						3 564.00
2.3	300x150x150mm Hollow bricks (firewall)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	22	90.00	1 980.00
	Building sand	m3	Pupkewitz/ Build it	4	279.00	1 116.00
	Stone	m3	Pupkewitz/ Build it	4	399.00	1 596.00
Total Cost						4 692.00

Table 15: Community making bricks on-site for main house/ tenant house, stage 1

TPOLOGY 3 KATRINA
HOUSEHOLD

STAGE 1 (MAIN HOUSE/ TENANTS
HOUSE

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
3. Dry Walls (replacement for interior brick walls) (Main House/ Tenants) 1 bedroom						
3.1	Option 1: Gypsum ceiling board 1200x3000x6.4	Sheet	Pupkewitz Megabuild	5	99.00	495.00
3.2	Roofing galvanized corrugated iron 3.6m	m	Pupkewitz Megabuild	4	116.00	464.00
3.2	SA Pine 38x50mm 3.6m	m	Pupkewitz Megabuild	13	85.00	1 105.00
3.3	SA Pine 38x114mm 3.6m	m	Pupkewitz Megabuild	8	100.00	800.00
3.4	Recycle old clothes for insulation / old newspapers	n/a	n/a	n/a	0.0	0.0
Total Cost						2 864.00

Table 16: Dry wall for the interior walls for main house/ tenants, stage 1

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
4. Tyre Balustrade (Main House/ Tenants)						
4.1	Creosote poles gumpoles 75/100mm round 3.0m	Sheet	Pupkewitz Megabuild	4	119.00	476.00
4.2	Creosote poles wood droppers 35/50mm round 1.2m	m	Pupkewitz Megabuild	13	20.00	260.00
4.3	Creosote poles gumpoles 75/100mm round 1.8m	m	Pupkewitz Megabuild	6	60.00	360.00
4.4	Creosote poles gumpoles 75/100mm round 3.0m	m	Pupkewitz Megabuild	30	119.00	3 570.00
4.5	Recycle tyres	n/a	n/a	n/a	0.0	0.0
Total Cost						4 666.00

Table 17: Tyre balustrade and gumpole floor for main house/tenants, stage 1

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
5. Roofing (Main House/ Tenants) 1 bedroom						
5.1	Gypsum ceiling board 1200x3000x6.4	Sheet	Pupkewitz Megabuild	8	99.00	792.00
5.2	SA Pine 38x38mm 3.6m	m	Build it	10	38.00	380.00
5.3	SA Pine 38x114mm 6.0m	m	Pupkewitz Megabuild Build it	6	185.00	1 110.00
5.4	Roofing galvanized corrugated iron 6.0m	m	Pupkewitz Megabuild	12	325.00	3 900.00
Total Cost						6 182.00

Table 18: Roofing for main house/ tenant, stage 1

TPOLOGY 3 KATRINA
HOUSEHOLD

STAGE 1 SHARED COMMON SPACE

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
6. Purchasing Bricks (Shared common space) (superstructure) Option 1						
6.1.a	220mm Standard bricks double brick wall (exterior walls)	m2	Pupkewitz	2366	3.00	7 098.00
6.1.b	220mm Standard bricks single brick wall (interior walls)	m2	Pupkewitz	567	3.00	1 701.00
6.1.c	220mm double brick (firewall)	m2	Pupkewitz	2010	3.00	6 030.00
Total Cost						14 829.00
6.2.a	140mm cement max bricks (exterior walls)	Per pallet	Build it * pallet contains 224 bricks	11	1495.00	16 445.00
6.2.b	140mm cement max bricks single brick wall (interior walls)	Per pallet	Build it * pallet contains 224 bricks	3	1495.00	4 485.00
6.2.c	140mm cement max bricks double brick wall (firewall)	Per pallet	Build it * pallet contains 224 bricks	9	1495.00	13 455.00
Total Cost						34 385.00

Table 19: Purchasing bricks for shared common space

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
7. Roofing (Shared common space)						
7.1	Gypsum ceiling board 1200x3000x6.4	Sheet	Pupkewitz Megabuild	8	99.00	792.00
7.2	SA Pine 38x38mm 3.6m	m	Build it	10	38.00	380.00
7.3	SA Pine 38x114mm 6.0m	m	Pupkewitz Megabuild	3	169.00	507.00
7.4	Roofing galvanized corrugated iron 6.0m	m	Pupkewitz Megabuild	5	325.00	1 625.00
Total Cost						3 304.00

Table 20: Roofing for shared common space

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
8. Community Making Bricks On-site (Shared common space) Option 2						
8.1	300x150x150mm Hollow bricks (exterior walls excluding firewall)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	81	90.00	7 290.00
	Building sand	m3	Pupkewitz/ Build it	14	279.00	3 906.00
	Stone	m3	Pupkewitz/ Build it	14	399.00	5 586.00
Total Cost						16 782.00
8.2	300x150x150mm Hollow bricks (interior walls)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	19	90.00	1 710.00
	Building sand	m3	Pupkewitz/ Build it	3	279.00	837.00
	Stone	m3	Pupkewitz/ Build it	3	399.00	1 197.00
Total Cost						3 744.00
8.3	300x150x150mm Hollow bricks (firewall)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	17	90.00	1 530.00
	Building sand	m3	Pupkewitz/ Build it	6	279.00	1 674.00
	Stone	m3	Pupkewitz/ Build it	6	399.00	2 394.00
Total Cost						5 598.00

Table 21: Community making bricks on-site for shared common space

TPOLOGY 3 KATRINA
HOUSEHOLD

STAGE 2 (MAIN HOUSE/ TENANTS HOUSE

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
9. Purchasing Bricks (Main House/ Tenants House) (superstructure) additional bedroom Option 1						
9.1.a	220mm Standard bricks double brick wall (exterior walls)	m2	Pupkewitz	896	3.00	2 688.00
9.2.a	140mm cement max bricks (exterior walls)	Per pallet	Build it * pallet contains 224 bricks	4	1495.00	5 980.00

Table 22: Purchasing bricks for main house/ tenant house, stage 2

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
10. Community Making Bricks On-site (Main House/Tenants) 1 bedroom Option 2						
10.1	300x150x150mm Hollow bricks (exterior walls excluding firewall)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	31	90.00	2 790.00
	Building sand	m3	Pupkewitz/ Build it	5	279.00	1 395.00
	Stone	m3	Pupkewitz/ Build it	5	399.00	1 995.00
Total Cost						6 180.00

Table 23: Community making bricks on-site for main house/ tenant, stage 2

TPOLOGY 4

TYPE 1



Figure 136: Ground floor, 49m² total built area

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
1. Purchasing Bricks (superstructure) (Ground floor) Option 1 Type 1						
1.1.a	220mm Standard bricks double brick wall (exterior walls)	m2	Pupkewitz	3800	3.00	11 400.00
1.1.b	220mm Standard bricks single brick wall (interior walls)	m2	Pupkewitz	1345	3.00	4 035.00
1.1.c	220mm double brick (firewall)	m2	Pupkewitz	4830	3.00	14 490.00
Total Cost						29 925.00
1.2.a	140mm cement max bricks (exterior walls)	Per pallet	Build it * pallet contains 224 bricks	16	1495.00	23 920.00
1.2.b	140mm cement max bricks single brick wall (interior walls)	Per pallet	Build it * pallet contains 224 bricks	6	1495.00	8 970.00
1.2.c	140mm cement max bricks double brick wall (firewall)	Per pallet	Build it * pallet contains 224 bricks	21	1495.00	31 395.00
Total Cost						64 285.00

Table 24: Purchasing bricks for type 1

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
2. Community Making Bricks On-site (Ground Floor) Option 2 Type 1						
2.1	300x150x150mm Hollow bricks (exterior walls excluding firewall)					
	Ohorongo cement CEM II A-LL 42.5N	Per bag 50kg	Pupkewitz/ Build it	70	90.00	6 300.00
	Building sand	m3	Pupkewitz/ Build it	12	279.00	3 348.00
	Stone	m3	Pupkewitz/ Build it	12	399.00	4 788.00
Total Cost						14 436.00
2.2	300x150x150mm Hollow bricks (interior walls)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	25	90.00	2 250.00
	Building sand	m3	Pupkewitz/ Build it	4	279.00	1 116.00
	Stone	m3	Pupkewitz/ Build it	4	399.00	1 596.00
Total Cost						4 962.00
2.3	300x150x150mm Hollow bricks (firewall)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	89	90.00	8 010.00
	Building sand	m3	Pupkewitz/ Build it	15	279.00	4 185.00
	Stone	m3	Pupkewitz/ Build it	15	399.00	5 985.00
Total Cost						18 180.00

Table 25: Community making bricks on-site for type 1

TPOLOGY 4

TYPE 1

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
3. Dry Walls (replacement for interior brick walls) Type 1						
3.1	Option 1: Gypsum ceiling board 1200x3000x6.4	Sheet	Pupkewitz Megabuild	9	99.00	810.00
3.2	Creosote poles gumpoles 75/100mm round 3.0m	m	Pupkewitz Megabuild	8	119.00	952.00
3.2	SA Pine 38x50mm 3.6m	m	Pupkewitz Megabuild	15	85.00	1 275.00
3.3	SA Pine 38x114mm 3.6m	m	Pupkewitz Megabuild	8	100.00	800.00
3.4	Recycle old clothes for insulation / old newspapers	n/a	n/a	n/a	0.0	0.0
Total Cost						3 837.00

Table 26: Dry wall for the interior walls for type 1

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
4. Roofing, Type 1						
4.1	Gypsum ceiling board 1200x3000x6.4	Sheet	Pupkewitz Megabuild	14	99.00	1 386.00
4.2	SA Pine 38x38mm 3.6m	m	Build it	16	38.00	608.00
4.3	SA Pine 38x114mm 3.6m	m	Pupkewitz Megabuild Build it	6	100.00	600.00
4.4	SA Pine 38x114mm 4.8m	m	Pupkewitz Megabuild Build it	6	130.00	780.00
4.5	Roofing galvanized corrugated iron 3.6m	m	Pupkewitz Megabuild	6	199.00	1 194.00
4.6	Roofing galvanized corrugated iron 4.8m	m	Pupkewitz Megabuild	9	261.00	2 349.00
Total Cost						6 917.00

Table 27: Roofing for type 1

TPOLOGY 4

STAGE 1 TYPE 2



Figure 137: Ground floor
38m² built area of stage 1 and 13m² built area of stage 2

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
5. Purchasing Bricks (superstructure) (Ground floor) Option 1, Type 2						
5.1.a	220mm Standard bricks double brick wall (exterior walls)	m2	Pupkewitz	4396	3.00	13 188.00
5.1.b	220mm Standard bricks single brick wall (interior walls)	m2	Pupkewitz	767	3.00	2 301.00
5.1.c	220mm double brick (firewall)	m2	Pupkewitz	2700	3.00	8 100.00
Total Cost						23 589.00
5.2.a	140mm cement max bricks (exterior walls)	Per pallet	Build it * pallet contains 224 bricks	19	1495.00	28 405.00
5.2.b	140mm cement max bricks single brick wall (interior walls)	Per pallet	Build it * pallet contains 224 bricks	3	1495.00	4 485.00
5.2.c	140mm cement max bricks double brick wall (firewall)	Per pallet	Build it * pallet contains 224 bricks	12	1495.00	17 940.00
Total Cost						50 830.00

Table 28: Purchasing bricks for type 2, stage 1

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
6. Community Making Bricks On-site (Ground Floor) Option 2, Type 2						
6.1	300x150x150mm Hollow bricks (exterior walls excluding firewall)					
	Cement	Per bag 50kg	Pupkewitz/ Build it	83	90.00	7 470.00
	Building sand	m3	Pupkewitz/ Build it	14	279.00	3 906.00
	Stone	m3	Pupkewitz/ Build it	14	399.00	5 586.00
Total Cost						16 962.00
6.2	300x150x150mm Hollow bricks (interior walls)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	19	90.00	1 710.00
	Building sand	m3	Pupkewitz/ Build it	3	279.00	837.00
	Stone	m3	Pupkewitz/ Build it	3	399.00	1 197.00
Total Cost						3 744.00
6.3	300x150x150mm Hollow bricks (firewall)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	50	90.00	4 500.00
	Building sand	m3	Pupkewitz/ Build it	8	279.00	2 232.00
	Stone	m3	Pupkewitz/ Build it	8	399.00	3 192.00
Total Cost						9 924.00

Table 29: Community making bricks on-site for type 2, stage 1

TPOLOGY 4

STAGE 1 TYPE 2

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
7. Dry Walls (replacement for interior brick walls) Type 2						
7.1	Option 1: Gypsum ceiling board 1200x3000x6.4	Sheet	Pupkewitz Megabuild	7	99.00	693.00
7.2	Creosote poles gumpoles 75/100mm round 3.0m	m	Pupkewitz Megabuild	6	119.00	714.00
7.2	SA Pine 38x50mm 3.6m	m	Pupkewitz Megabuild	9	85.00	765.00
7.3	SA Pine 38x114mm 3.6m	m	Pupkewitz Megabuild	6	100.00	600.00
7.4	Recycle old clothes for insulation / old newspapers	n/a	n/a	n/a	0.0	0.0
Total Cost						2 772.00

Table 30: Dry wall for the interior walls for type 2, stage 1

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
8. Roofing, Type 2						
8.1	Gypsum ceiling board 1200x3000x6.4	Sheet	Pupkewitz Megabuild	12	99.00	1 188.00
8.2	SA Pine 38x38mm 3.6m	m	Build it	14	38.00	532.00
8.3	SA Pine 38x114mm 3.6m	m	Pupkewitz Megabuild Build it	3	100.00	300.00
8.4	SA Pine 38x114mm 6.0m	m	Pupkewitz Megabuild Build it	4	169.00	676.00
8.5	Roofing galvanized corrugated iron 3.0m	m	Pupkewitz Megabuild	9	180.00	1 620.00
8.6	Roofing galvanized corrugated iron 6.0m	m	Pupkewitz Megabuild	8	325.00	2 600.00
Total Cost						6 916.00

Table 31: Roofing for type 2, stage 1

TYPOLGY 4

STAGE 2 TYPE 2

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
9. Purchasing Bricks (superstructure) (Ground floor) Option 1, Type 2						
9.1.a	220mm Standard bricks double brick wall (exterior walls)	m2	Pupkewitz	1736	3.00	5 208.00
9.1.b	220mm double brick (firewall)	m2	Pupkewitz	1500	3.00	4 500.00
Total Cost						9 708.00
9.2.a	140mm cement max bricks (exterior walls)	Per pallet	Build it * pallet contains 224 bricks	7	1495.00	10 465.00
9.2.b	140mm cement max bricks double brick wall (firewall)	Per pallet	Build it * pallet contains 224 bricks	6	1495.00	8 970.00
Total Cost						19 435.00

Table 32: Purchasing bricks for type 2, stage 2

Item	Description	Unit	Purchase locations	Quantity	Rate	Amount
10.Community Making Bricks On-site (Ground Floor) Option 2, Type 2						
10.1	300x150x150mm Hollow bricks (exterior walls excluding firewall)					
	Ohorongo cement CEM II A-LL 42.5N	Per bag 50kg	Pupkewitz/ Build it	32	90.00	2 880.00
	Building sand	m3	Pupkewitz/ Build it	5	279.00	1 395.00
	Stone	m3	Pupkewitz/ Build it	5	399.00	1 995.00
Total Cost						6 270.00
10.2	300x150x150mm Hollow bricks (firewall)					
	Ohorongo cement CEM II A-LL 42.5N	50kg bag	Pupkewitz/ Build it	28	90.00	2 520.00
	Building sand	m3	Pupkewitz/ Build it	4	279.00	1 116.00
	Stone	m3	Pupkewitz/ Build it	4	399.00	1 596.00
Total Cost						5 232.00

Table 33: Community making bricks on-site for type 2, stage 2

CONCLUSION



Figure 138: Exterior view of tyre balustrate

CONTRIBUTION

Informal settlements have multi-functional characteristics and a strong community that has the potential to develop the proposed incremental housing. The proposed study will contribute to designing incremental structures that are informed by the community of Kabila C.

The flexible structure produced will assist the user to incrementally upgrade over time through the use of building materials and spatial configuration. The research assesses intangible aspects, such as informality, temporality, and culture that inform and influence informal housing. It also explores the importance of the housing layer in informal settlement upgrading that is neglected by municipalities, local authorities, and NGOs in the process of informal settlement upgrading.

In conclusion, a house is not simply a structure. Housing is influenced by the community, culture, experience, environment, planning, affordability, and services. It holds a personal connection with the user through materiality and temporality. Materiality is a tangible element that relates the user to the built form. This is lost when houses are duplicated for communities in any context. Duplication hinders the personalisation of space.

Temporality is the connection between the user and the structure in terms of time. Life is temporal. People and structures are temporal. Temporality encourages flexibility. It accommodates intergenerational growth and structure. It is always the structure to grow with the people.

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PREMISSION LETTER



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3 March 2023

Request for permission to access information and site for study purposes

To whom it may concern

Herewith is a request to allow students from the Department of Architecture, Planning and Construction from the Namibia University of Science and Technology (NUST) to access the site or information as required. The students are currently working on their individual thesis projects, toward the Master of Architecture degree qualification. This is only a proposed project with no direct impact on the site or environment.

The students registered for the Master of Architecture programme are listed below:

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Figure 139: Premission letter from the Department

INTERVIEW

SDFN/NHAG: Namibia Housing Action Group

Interviewee: NHAG representative who deals with projects out of town, Augusto

Introduction
Namibia Housing Action Group aims to support the members of the Shack Dwellers Federation Namibia program. The program is currently having ongoing projects in Havana, Otjomuise, Karibib, Oshivalo, and Gobabis.

Who benefits from the project?
Individuals, 35 years old and above, who live in informal settlements, who are members of the SDFN.

What is the land service provision offered by the program?
The program provides land through Greenfields. Greenfields are planned unoccupied land. The federation requests land for members. The members contribute to the fund to buy land. The program also assists the members to buy land they occupy on. The federation assists in servicing land obtained.

How is the community involved in the program?
The community is involved in the accumulation of funds through community functions e.g. braai.

After the land is obtained, the members of the community have a planning studio where they plan the urban layout. The federation provides the community with a technician to facilitate the construction process, however, the community takes over the construction process. The community has a committee that has committee members and representatives who handle the project on the ground.

Which projects are you working on in Windhoek and out of town?
Havana

- Ituyani group, neighborhood
- Formalized area (Zimbabwe street)

Karibib

- 1000 plots obtained
- Usab currently provides services
- Issue of hard rock which damages machinery

How long does it take to approve plans at the municipality?
It can take months to a year.

Date 08/02/2023

INTERVIEW

NHE Department of Informal Settlement Project

Interviewee: Head of department, Herman Bock

Introduction
The informal settlement program started in 2020. The project is in partnership with NHE, the City of Windhoek, and MURD. The program provides design, construction services, and mortgages to individuals in low- to ultra-low-income groups. Havana, Onika, Otjomuise, and Hakahana are some of the locations with completed houses from the program.

Who qualifies for the program?
Individuals who fall under the low to ultra-low-income groups who are title deed owners (own land).

What housing options do you provide?
3 designs through incremental upgrading
Common room (basic shelter) ----- N\$ 95 000
1 bedroom (bachelor) ----- N\$ 140 000
2 bedroom ----- N\$ 150 000
3 bedroom

What elements influence the design of houses provided?

- The cost was the major driven influence of the design.
- The erf conditions (how much space the client has on the erf)

- Design follows simplicity approach to providing shelter
- Eco-friendly approach
- Incrementalism
- Zoning of the plots- Town planning scheme

Does the design in corporate community participation?
The program hosts community gatherings to introduce the program to the community. The project does not offer community participation in the project.

Why does the project only provide the option of single storey and not double storey?
The floor structure, 1 brick layered wall, and foundation structure do not allow for double-storey construction. The cost also plays a part in the factor.

What materials are used to construct the houses?

- Brick and mortar
- Timber rafters
- Aluminum windows
- Clay bricks (plastered outside only)
- Ceilings and tiles are not provided (client has to do it on their own)

Date 17/02/2023

INTERVIEW

NHE Department of Informal Settlement Project

Interviewee: Head of department, Herman Bock

Why are similar designs provided to all clients?

Practicality purposes to manage the project better. The planning process is better and easier.

What makes the project eco-friendly?

Instead of steel windows, aluminum windows made from recyclable metal/plastic are used instead to last longer and for thermal quality. Clay bricks (internal and external) are used instead of cement bricks to reduce plaster and for low maintenance and longer lifespan. Mono-pitch roof instead of gable roof for easy construction and reduce gutter to one side only. Provision for more natural lighting is used in the houses through larger windows to reduce mechanical lighting use. The design aims to help the client save money for the future. These approaches allow the house to last longer and be more durable.

How long does it take to approve the plans for the client at the municipality?

The program falls under the special project scheme therefore it takes max 2 weeks to approve.

How does the servicing of land and contrac-

tual process work?

The client owns the plots and services and sewer are provided by the City of Windhoek. The project works with a pool of different contractors accumulated from previous projects. Why does the project only provide dwelling houses? Dwelling housing is more favored by residents in Windhoek. Complex housing requires every individual to be registered on the plot and a land server to give every resident a title deed.

Why informal shops are not made provision in the project?

Some shops are not kept if the owner does not get compliance and does not allow single residential zoning. The City of Windhoek does not allow for this, however, the city of Windhoek would like to provide more market spaces that do not interfere with residential use.

Date 17/02/2023

INTERVIEW

SDFN/NHAG: Committee Ituayni group

Interviewee: Committee member, Hendrin

How did your family get to build your house through SDFN?

My family was part of the SDFN/NHAG Ituyani savings group in Hakahana. After being dedicated to the SDFN/NHAG membership fundraisers, in 2019, my family got a plot in Havana.

What happens when you get the plot through SDFN/NHAG?

The land is serviced by the municipality. The SDFN provides the plan and the community upgrade on its own.

How do you construct your houses?

The community makes its bricks as a group. Each weekend, the community would gather to make bricks for a house and rotate to the next house when the task is complete. SDFN/NHAG taught us how to make bricks. The process takes time. Some members of the community buy their bricks if they do not want to go through the process of making bricks and if they can afford it. The community also shares one contractor to get a discount to reduce costs.

Do you like having the same house as everyone part of the SDFN/NHAG?

Date 18/02/2023

No, it would be nice to change the house and not look the same as others.

What challenges do you face with the site and house?

- The erf is too small. There is only enough space to make a garden.
- Small businesses are not accommodated
- Backyard renting is not allowed at the beginning of the house being complete.
- There are no playgrounds or libraries
- No official market space
- Taxi is hard to get if you want to go to town. One has to walk a long distance to get one.
- Safety issue, the outdoor doors provided were not strong enough. We are planning on adding a boundary wall for protection.

What do you think about upgrading with corrugated iron?

People do not want to continue using corrugated iron once they upgraded. We want a more durable material like bricks.

Would you like to live in a double-storey house?

Yes, I would. It will always be more space for the family or another family can live upstairs. When it comes to flats, people want their own privacy.

