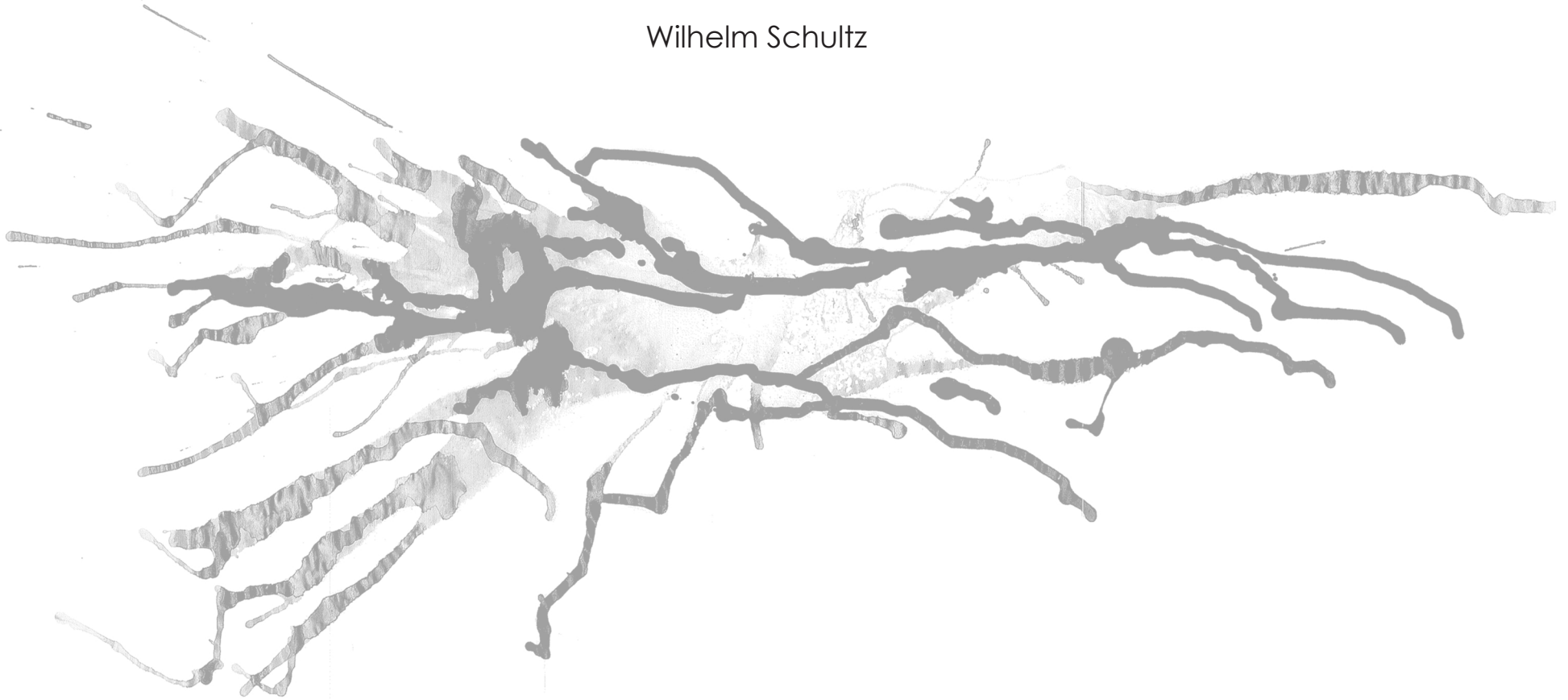


KA-BA-THI LEARNING CENTRE:

Creating a sense of place in Kavango East, Namibia

Wilhelm Schultz



Ka-Ba-Thi Learning Centre:
Creating a sense of place in Kavango East, Namibia

Wilhelm Schultz
Mini-thesis
Supervisor: Dr Phillip Lühl
November 2022

Declaration

I, Arnold Wilhelm Schultz, hereby declare that the work contained in the mini-thesis, entitled Ka-Ba-Thi Learning Centre: Creating a sense of place in Kavango East, Namibia, 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.

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“... but even then he understood that
the more one learns, the more one can
achieve.”

(Sharma, 2018)



Figure 1: Ndurukoro Campsite view of the Kavango River .

Figure 2: Common clay house near Mbapuka village.



PROJECT ABSTRACT

According to Pendleton, Crush and Nickanor (2014), Namibia's problematic, increasing rate of rural-urban migration is caused by tangible aspects in the form of employment, housing conditions, food security, education and healthcare. This explains why researchers primarily focus on resolving the tangible aspects linked to the exodus. I would argue that intangible aspects (sense of place) also form an equally important connection to the exodus and need to be incorporated into buildings when exploring ways to reduce the rapid rate of rural-urban migration through architectural design.

The dissertation represents the journey of designing the Ka-Ba-Thi Learning Centre by understanding and using four core aspects that create a sense of place and combining them with the tangible needs of the local, rural Kavango East community to inform future rural development schemes, aiming to reduce the rate of rural-urban migration and its associated problems.

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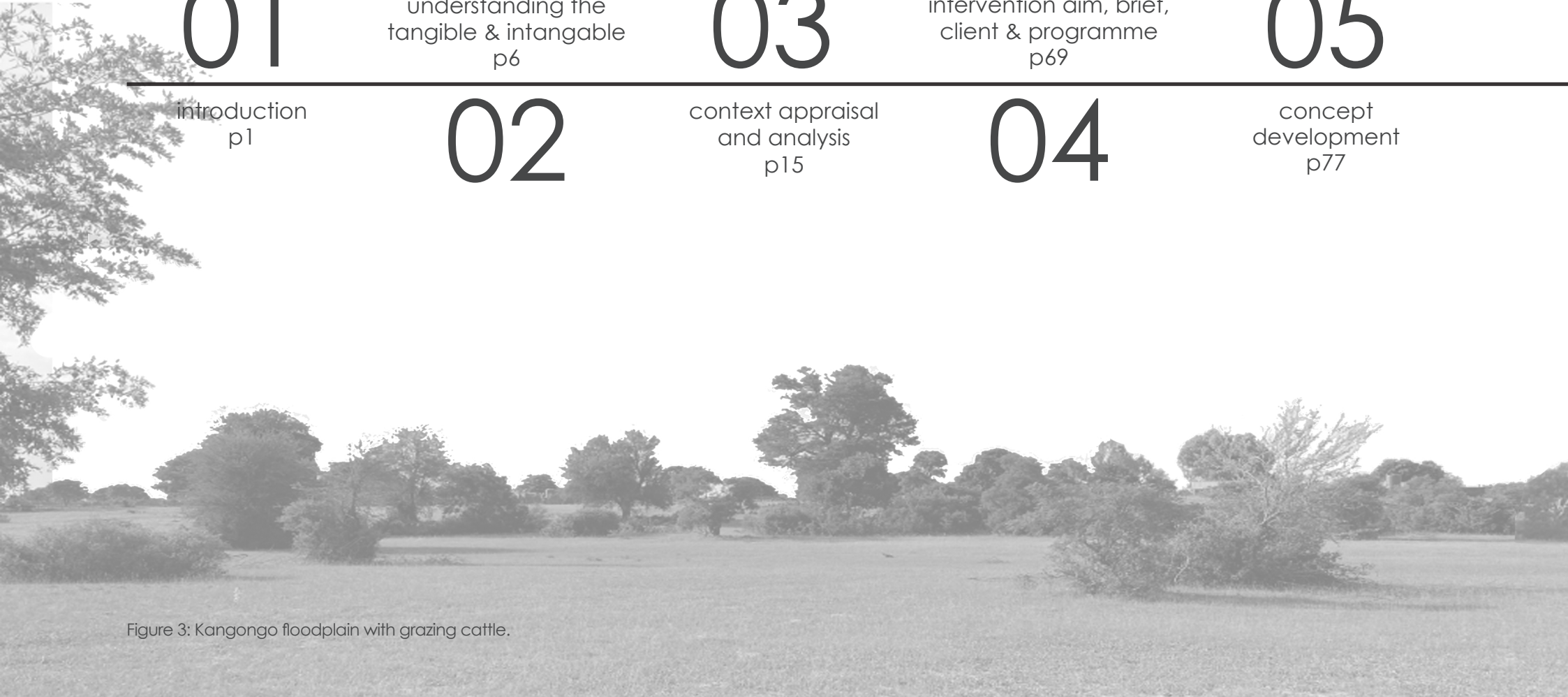
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Figure 4: Homestead near Kangongo village.

introduction

01

background of the study
statement of the problem
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BACKGROUND OF THE STUDY

According to Greiner (2011), relaxed movement limitations granted after the fall of the apartheid era caused a spike in rural-urban migration as people migrated in search of improved job opportunities, housing and sanitary conditions, education, healthcare, and food security (tangible reasons). Despite being independent for over 32 years, Namibia has experienced an urban population growth rate of 10% while rural areas (North East Namibia) have experienced a population decline of 10% over the last decade (Government of Namibia, 2012). This has contributed to overdevelopment in urban areas and underdevelopment in rural areas.

According to Pascual-de-Sans (2004), migration is caused by a decision(s) made. These decisions are determined by the emotional and/or physical connections or disconnections people feel towards a particular place, also known as sense of place.

Based on this statement, I would argue that Namibia's severe rural-urban migration could suggest that rural residents seek a more positive and fulfilling sense of place in urban areas.

According to Deutsch and Goulias (2009), cultural and social constructs, natural environment and personal state are four aspects that create a sense of place. By understanding how these four aspects create a sense of place and how they are linked to rural urban migration, one can explore different ways of reducing the rapidly increasing problem in the Kavango East region of Namibia.



Figure 5: Drawings of a child from the Mbapuka village capturing his/her sense of place (Participant, 2022)

STATEMENT OF THE PROBLEM

The severe rate of rural-urban migration within Namibia is causing numerous problems in both rural and urban areas (Government of Namibia, 2012).

Literature to date mostly focus on reducing the rate of rural-urban migration by investigating and addressing the tangible causes and connections to the exodus (Pendleton, Crush & Nickanor, 2014). There is a gap in understanding the intangible aspects (sense of place), how it is linked to rural-urban migration and how it can be used/improved to formulate sustainable solutions for the rapid rural-urban migration problem.

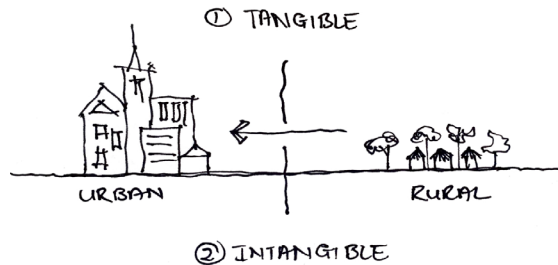


Figure 6: Diagram of rural-urban migration causes.

OBJECTIVES OF THE STUDY

The goal of the thesis is to formulate an understanding of how to plan, design and construct the ideal architectural response within rural areas of the Kavango East region by combining a sense of place (cultural and social constructs, natural environment and personal state) with the tangible needs of the local, surrounding communities.

Objectives of the study:

1. To identify the tangible needs of local residents.
2. To investigate the aspects (cultural, social, physical, and personal) that inform/contribute to a sense of place and/or a sense of belonging.
3. To explore various construction materials, methods, architectural spaces, and forms that could enable the configuration of a contextually appropriate sense of place.
4. To propose a design solution that combines the tangible and intangible aspects mentioned above.

Research Questions:

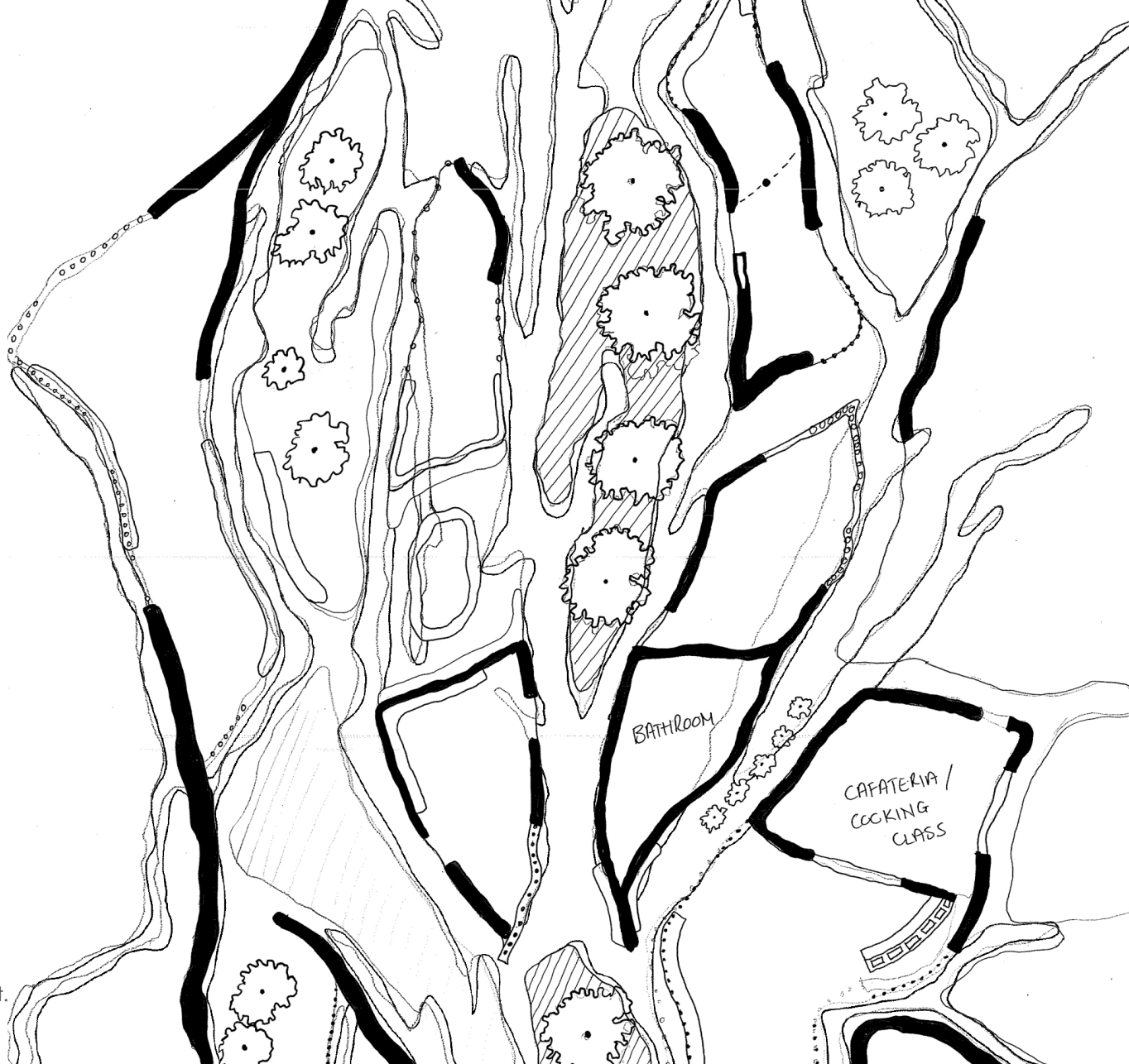
1. What tangible needs of the local community could inform the function of the design intervention?
2. How do the local cultural, social, physical, and personal aspects inform a sense of belonging?
3. How can the sense of place inform design, spaces, forms, materials and construction methods?
4. How can these tangible and intangible principles be combined to aid in the creation of a typological response that contributes to the reduction of rural-urban migration?

PROJECT BRIEF & SUMMARY

The dissertation focuses on producing an architectural intervention within the Kavango East region of Namibia where function is determined by the tangible needs of the local, rural community. The design is informed by the local sense of place to guide future rural development schemes in an attempt to reduce the severe rate of rural urban migration within the region.

Ka-Ba-Thi Learning Centre will be located in the North East of the Kavango East region of Namibia. Sited on the banks of the Kavango River in between three villages (**K**angongo, **M**bapuka and **T**hikanduko) Ka-Ba-Thi Learning Centre will primarily serve as a technical high school during mornings and as a Vocational Training Centre (VTC) in the afternoon. The centre will also include a clinic, library, cafeteria and community hall, available to all members of the public.

Figure 7: Ka-Ba-Thi Learning Centre conceptual sketched layout.



understanding the tangible & intangible

02

migration and it's effects
causes of rural-urban migration
aspects creating sense of place



Figure 8: Photomontage of rural residents moving to urban areas in Namibia.

This section shapes the theoretical groundwork by reviewing existing literature linked to rural-urban migration. Tuhkunen (2007) contends as follows: “Sense of place presumably has a great significance on the formation of migration eagerness”. It is for this reason that both, tangible and intangible aspects connected to rural-urban migration will be investigated to understand how these two aspects can be used in an intervention to reduce the rate of rural-urban migration.

MIGRATION AND IT'S EFFECTS

Namibia, experiences both internal and international migration patterns. Internal migration relates to the relocation of people within a country's borders while international migration refers to immigration of people into a country or the emigration of people out of a country. Hence, migration directly affects the size, growth, distribution and composition of the population (Government of Namibia, 2012). Therefore, migration either improves economic growth and development or puts pressure on resources if not planned and managed accordingly (Government of Namibia, 2012).

Internal migration can be linked to the relocation of people between urban and rural areas. Rural-urban migration involves the relocating of people from rural areas to urban areas, leading to the expansion of towns and cities (urbanisation). The relocation of people can have numerous positive or negative

effects on both urban and rural areas. It is recognised that urbanisation has a number of economic benefits at a national level as well as financial and socio-cultural migration remittances for rural areas (Tacoli, McGranahan, & Satterthwaite, 2015).

However, the pace of urbanisation poses a concern especially for low-income nations within the global south. Namibia's last Census (done in 2011) indicated a 10% urban growth rate from 33% in 2001 to 43% in 2011 as a result of rural-urban migration (Government of Namibia, 2012). These numbers have increased severely from 2011 to 2022. According to Kemp (2022), studies conducted at the start of 2022 showed how 53.8% of Namibia's population lives in urban areas while 46.2% lives in rural areas.

According to Pendleton (1998), "Large-scale rural-urban migration, especially from northern Namibia, is the major driver of contemporary urbanisation". Namibia's capital city,

Windhoek (Table 1) and the Kavango region's (Table 2) main town, Rundu, are highlighted as the two urban areas that experience the fastest growth rates.

Table 1: Population growth of Windhoek (Pendleton, Crush & Nickanor, 2014, p. 193).

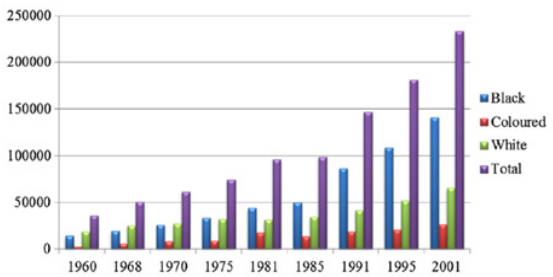


Table 2: Urbanisation in Kavango Region (Government of Namibia, 2011).

Area	Census year		Population change (2001 - 2011)	Annual growth rate (2001-2011)
	2001	2011		
Kavango	202 694	223 352	-20 658	1.0
Urban	36 964	64 049	-27 085	5.5
Rural	165 730	159 303	6 427	-0.4

The severe urbanisation rate in Namibia gives rise to an array of problems in both the urban and rural areas. According to Tacoli, McGranahan and Satterthwaite (2015), the

extreme urbanisation rates in low-income nations cause urban areas to experience a shortage in providing acceptable housing, basic infrastructure and services. The shortages are the result of the influx of an uneducated or unskilled workforce to urban areas.

The overcrowding of people however creates a strong and competitive workforce within the urban setting but essentially results in poverty as many migrants fail to secure employment or a sufficient income (Table 3). As a result, informal settlements develop on the outskirts of these urban areas resulting in poor living conditions.

Table 3: Employment status of migrant households in Windhoek (Pendleton, Crush & Nickanor, 2014, p. 198).

	Female %	Male %	Total %
Working full-time	42.9	60.0	51.3
Working part-time/casual	12.2	8.4	10.3
Unemployed — looking for work	32.3	23.5	27.1
Unemployed — not looking	12.6	8.1	10.4
Total	468	455	923

Rural areas experience a severe loss in their workforce as people migrate to towns and cities. As there is a rapid decline in the workforce, agriculture can no longer be sustained at a sufficient level causing food shortages in these areas. The shortage of workers also results in stagnant development of infrastructure and growth leading to an economic collapse of these areas. With a poor economy, employment and job opportunities are scarce, further resulting in poverty and poor living conditions in these areas. As people migrate to urban areas, the reduced population in rural areas may create social segregation, cultural starvation and an overall poor sense of place.

CAUSES OF RURAL-URBAN MIGRATION

There are several factors that influence and cause migration. These factors can be grouped into two categories namely, tangible and intangible aspects. Tangible aspects refer to the visible causes of migration while intangible aspects relate to the invisible causes of migration.

Tangible aspects can be linked to normal “push” and “pull” factors associated with rural-urban migration. Push and pull factors describe the reasons why areas either push people away or pull people closer. Jobs, money, poverty, food security, healthcare and education are the main tangible causes for rural-urban migration (Pendleton, Crush, & Nickanor, 2014).

Poor education, shortage of employment, poor housing and sanitary conditions, poverty, food insecurity and poor healthcare are all factors that push people away from a

particular area (rural area) while improved education, healthcare, housing conditions, employment and food security, often found within urban areas, draw people closer.

According to Gitonga and Visser (2019), after apartheid was abandoned and the strict movement limitations were lifted, Namibia began to experience severe rural-urban migration, rapid urbanisation and growing informal settlements (Seckelmann, 1997).

During apartheid, it was common for black men to work in urban areas as part of the contract labour system, providing income to sustain their families based in rural areas. The movement limitations allowed black men to relocate but did not allow their families to come with. After the limitations were lifted the men naturally brought their families with them causing severe overcrowding and related social and health problems.

Intangible aspects can also have an influence on migration. Intangible aspects refer to the invisible causes of migration in the form of emotional connection and sense of place. I would argue that sense of place can be defined as any (positive or negative) emotional and physical connection to a particular place or area.

According to Pascual-de-Sans (2004), migration is caused by a decision(s) made. Decisions are formed by particular feelings at particular times. These feelings are determined by the emotional or physical connections (positive or negative) people feel towards a particular place or area.

Despite numerous definitions, gleaned from various readings, it has become quite apparent that sense of place is formed by four categories. Indicated in figure 9, cultural and social constructs, physical attributes and personal states, all form part in explaining sense of place and emotional connection to place.

Here we realise that it is necessary for respective designers to appreciate sense of place before we can understand how it affects migration patterns. The four key aspects (cultural and social constructs, physical attributes and personal states), form the basis of sense of place and should be considered when formulating a hypothesis on how to reduce urbanisation and increase rural development.

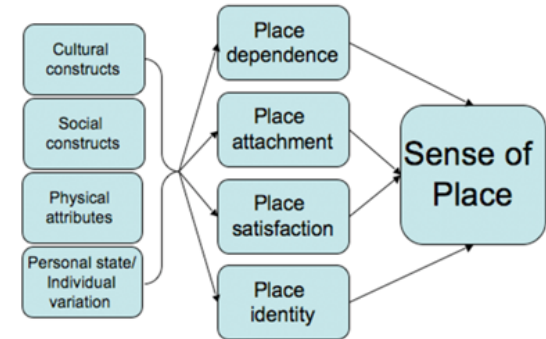


Figure 9: Four aspects creating a sense of place (Deutsch & Goulias, 2009, p. 6).

ASPECTS CREATING SENSE OF PLACE

1. Cultural Constructs

Low (1992), defines place attachment as: "... the symbolic relationship formed by people giving culturally shared emotional meanings to a particular space or piece of land...".

This statement would suggest that cultural beliefs form a nexus between people and place as place attachment is much more than just an emotional and mental experience. It is for this reason that an architectural intervention needs to incorporate culture/s relevant to its location.

Strong cultures and ways of living have evolved within the Kavango community as they have settled along the banks of the Okavango River for centuries. Different areas, villages or groups of people within the Kavango East region have developed unique traditional ways of life including dances, celebrations, ways of mourning, hunting, gathering

and food preparation. These need to be studied to inform an architectural intervention, shape, or form creating a positive sense of place, reducing the need to migrate elsewhere.

2. Social Construct

A social construct can be defined as shared ideas or perceptions created and accepted by people in a society. According to Hashemnezhad, Heidari and Mohammad (2013), the spirit of place is a mixture of features that gives a particular place a special feeling or personal attributes. He further states that these features are often identified by a person or a group of people.

Due to harsh living circumstances in the rural parts of the Kavango East region people rely on each other to live more comfortably creating a strong social connection and sense of place. The limited technology and infrastructure often cause people to form strong connections when they help each other plough,

harvest, build, herd cattle, cook or clean (Government of Namibia, 2012). Limited vehicular transport also contributes to people socialising over long walks when collecting water, walking to school, their homes or fields. Based on the statement above, an intervention focused on gathering people with similar interests, values, beliefs, goals or ways of living could create a special, social feeling reducing the need for people to migrate elsewhere in search of a particular sense of interaction.

3. Environmental Attributes

Sense of place could be interpreted as people's perceptions and feelings towards their environment. According to Altman and Low (2012): "Sense of place is certainly dual in nature linking both interpretive perspective on the environment and emotional reaction to the environment". This statement suggests that the environment and its physical factors play an important role in creating a sense of place. The limited development and infrastructure in the rural parts of the

Kavango East region, force residents to use available natural materials and features in order to survive. Wood is used to build houses, boats and tools to make a living. Locals use clay and sand to build houses and plant crops while the river provides fish, drinking water, the possibility to wash clothes, water for crops or water for clay to build homes and make pots.

An architectural intervention using local, natural materials and techniques will create a strong sense of place and belonging. A sense of pride and ownership could be developed when the local community participates in the construction process, strengthening their sense of place even further.

4. Personal State

Deutsch and Goulias (2009), express a sense of place as the experience of an individual in a certain location. The experience can either be positive (happy, excited, joyous, stimulated) or negative (anxious, sad, remorse).

Both of these experiences are personal and emotional connections to a particular place. By combining the three intangible aspects concerning the sense of place (cultural, social and physical constructs) I would argue that a positive sense of place could be created for most individuals.

This could decrease the rate of rural urban migration as people's "decisions" towards their surroundings are positive, reducing their need to migrate elsewhere.

Figure 10: Woman baking bread before the rest of her family returns home from the crop fields. A strong love/sense of belonging can be seen between family members.



Figure 11: Interviewing locals at their homesteads.



context appraisal and analysis

03

exploring the Kavango Region - macro scale
understanding the everyday life - meso scale
delving into people's sense of place - micro scale

exploring the Kavango
Region
(macro scale)

REGIONAL BACKGROUND

The old Kavango Region covered a total area of 42771km² before its separation. Its size and elongated form made managing the region difficult. In 2013 the region was split into two, forming a Kavango East and Kavango West region. According to archaeological records, the Kavango River (Kavango East Region's northern border) has resulted in a long history of settlement along its banks. The abundant water, fish, relatively fertile soils, grazing and wildlife have attracted farmers for thousands of years.

Looking at table 4, the Kavango East Region is now home to approximately 136 823 residents with the majority residing within an approximate 10km wide ribbon along the river (Government of Namibia 2012). The long, dense dispersal pattern has caused a shortage of open arable land near the river, forcing people to move south to less favourable farming lands. Due to the region's poor economy, limited infrastructure and lack of education most residents make a living through subsistence farming.

With limited capital, development and infrastructure most farmers are forced to plant and cultivate their crops by hand. This method of farming requires a large amount of labour for little production. Mahangu crops' low production rates and poor retail prices forces subsistence farming, preventing an agricultural income. Rural residents are

Table 4: Kavango East region key statistics (Government of Namibia, 2012, p. xiii).

Indicator	Kavango East	Namibia
Population		
Population size	Total 136,823 Females 72,936 Males 63,887	Total 2,113,077 Females 1,091,165 Males 1,021,912
Pop. Size as a % of National Pop.	6.47%	
Annual Growth Rate	0.7%	1.4%
Urban	n/a	43.0%
Rural	n/a	57.0%
Sex Ratio: Males per 100 Females	87.6	94.0
Area in sq. km	23,983	824,116
Pop. Density (persons / km ²)	5.7	2.1
Area of region as % of Namibia	2.9%	
Age Composition		
<5 Years	15%	14%
5 - 14 Years	26%	23%
15 - 59 Years	52%	57%
60 Years & Above	7%	7%
Main language spoken at home	Kavango languages 91%	
Climate & Rainfall		
Mean max temp in summer	32°-36°C	
Mean minimum in winter	4°-6°C	
Rainfall in Nov-April	80%	
Average Growing Period	61-90 days	

forced to seek better living circumstances in urban areas, resulting in rural-urban migration. Rural areas face a decreasing workforce, increasing poverty and stagnating development.

Household and Housing Characteristics				
Total No. of Private Households	30,467		464,839	
Average Household size	5.8 persons		4.4 persons	
Household Headship				
Female	44.6%		44%	
Male	55.4%		56%	
Literacy and Education				
Literacy Rate	81%		85%	
	Boys	Girls	Boys	Girls
Enrolment rates among 5 - 24 year olds	64.6	59.7	62.4	64
Leamer-teacher ratio	27.2		24.8	
Labour Force & Economic Conditions				
Labour force participation rate (2011)	Male: 63%	Female: 65%	Male: 67%	Female: 61%
Unemployed (2011)	Male: 47%	Female: 59%	Male: 30%	Female: 43%
Main Sources of Income:				
Farming	33%		16%	
Wages & Salaries	29%		48%	
Cash Remittance	7%		5%	
Business, non-farming	14%		12%	
Pensions	12%		15%	
Poverty Indicators (Former Kavango Region)				
Severely poor (2009/2010)	24 % of h/h		9.6% of h/h	
Poor	43.4 % of h/h		19.5% of h/h	
Ave. annual income per capita	N\$5,682		N\$14,559	
Poverty Share of total national poverty	22.4%			
Access to services (Former Kavango Region)				
Households with access to health service within 10 km (2009/10)	82.6%		78.9%	
Proportion of households walking >1km to safe water source (2009/10)	24%		10.9%	
Proportion of households without a safe toilet facility	75%		49%	

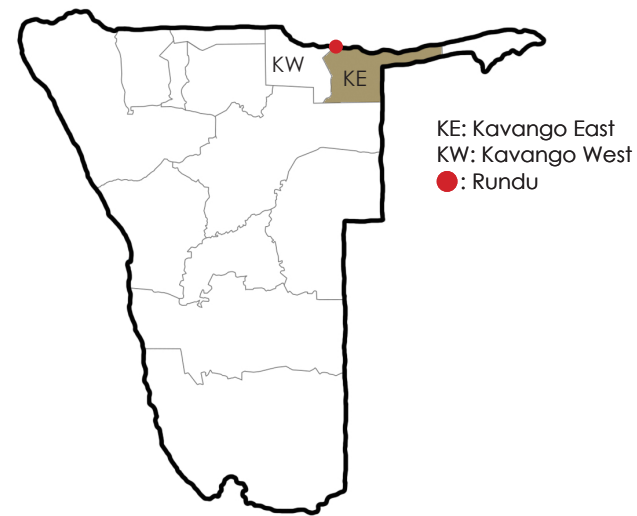
LOCALITY AND SIZE

The Kavango East Region's 23 983.2 km² elongated form starts just west of Rundu and stretches east to the eastern boundary of the former Kavango Region. The region is bordered by the Zambezi region to the east, Botswana to the south east, the Otjozondjupa Region to the south, the Kavango West Region to the west and the Kavango River and Angola to the north.

The Kavango East region is further divided into six constituencies namely: Rundu Rural, Rundu Urban, Mashare, Ndonga Linena, Mukwe and Ndiyona. Rundu is the capital city of the region and had a population of 63 431 residents in 2011 (Government of Namibia 2012). Rundu is the economic backbone of the region with approximately 80% of non-agricultural activities taking place in the area.

Namibia, Africa

Kavango East Region, Namibia



Kangongo settlement, Kavango East Region

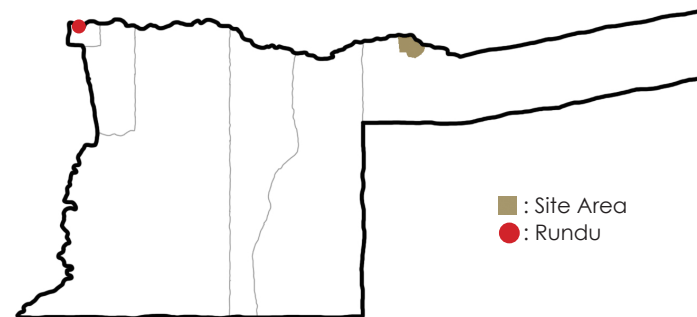


Figure 12: Diagrammatic representation of site location.

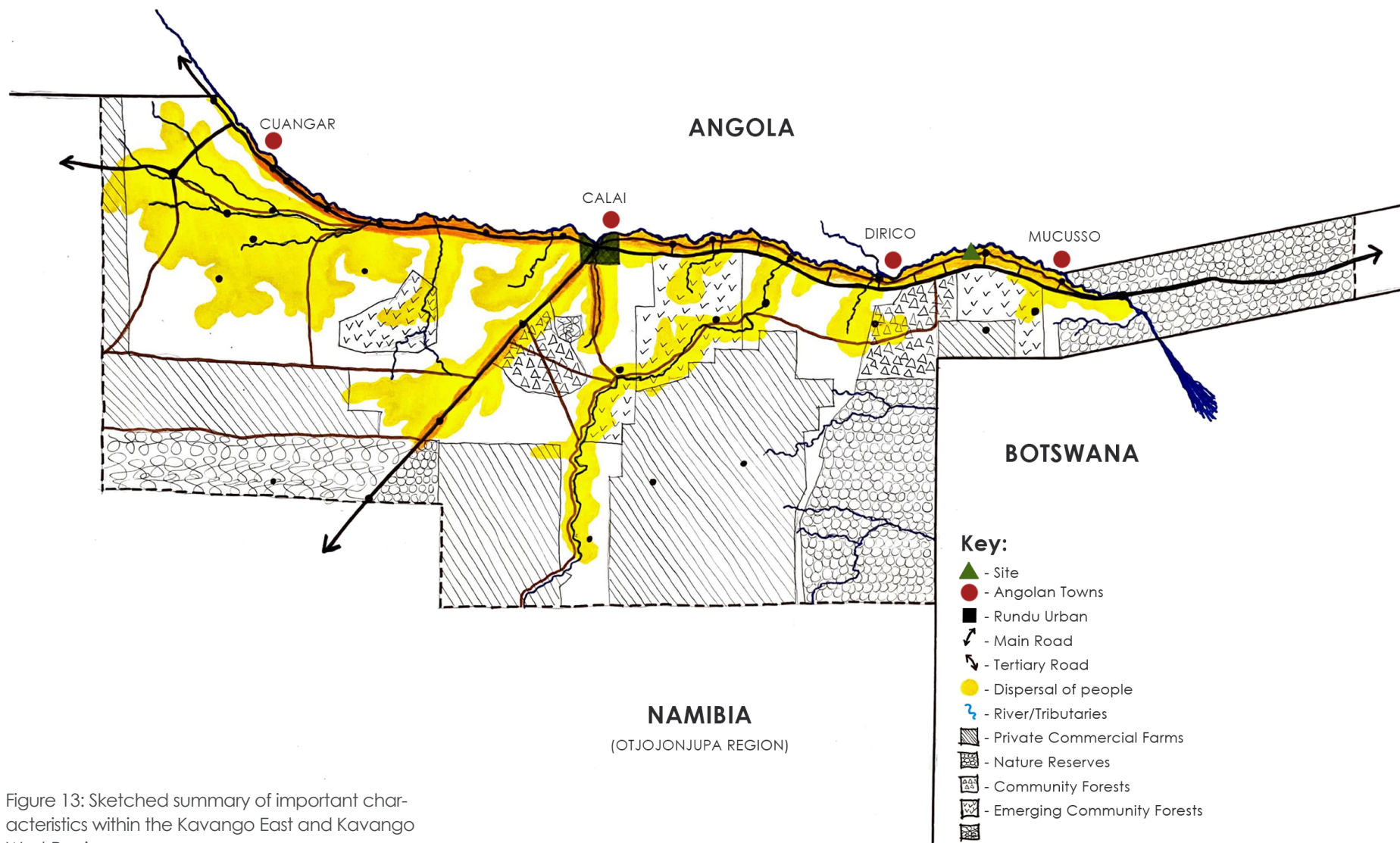


Figure 13: Sketched summary of important characteristics within the Kavango East and Kavango West Regions.

POPULATION

As the Kavango East Region loses a large number of its workforce through migration the region lacks development and infrastructure showing a mere 47% urbanization. Most of the region's residents live in and around Rundu seeking for job opportunities, improved education, housing and healthcare. "Historically, people settle where water and

soils permit farming, creating a pattern of unevenly distributed settlements within the region with nearly three-quarters of the population living near the Kavango River." (Government of Namibia 2012). Settlements later developed further south of the river due to a lack of open arable land close to the water source. Boreholes set up by wealthier farmers lead to the formation of small villages focused on farming with livestock.

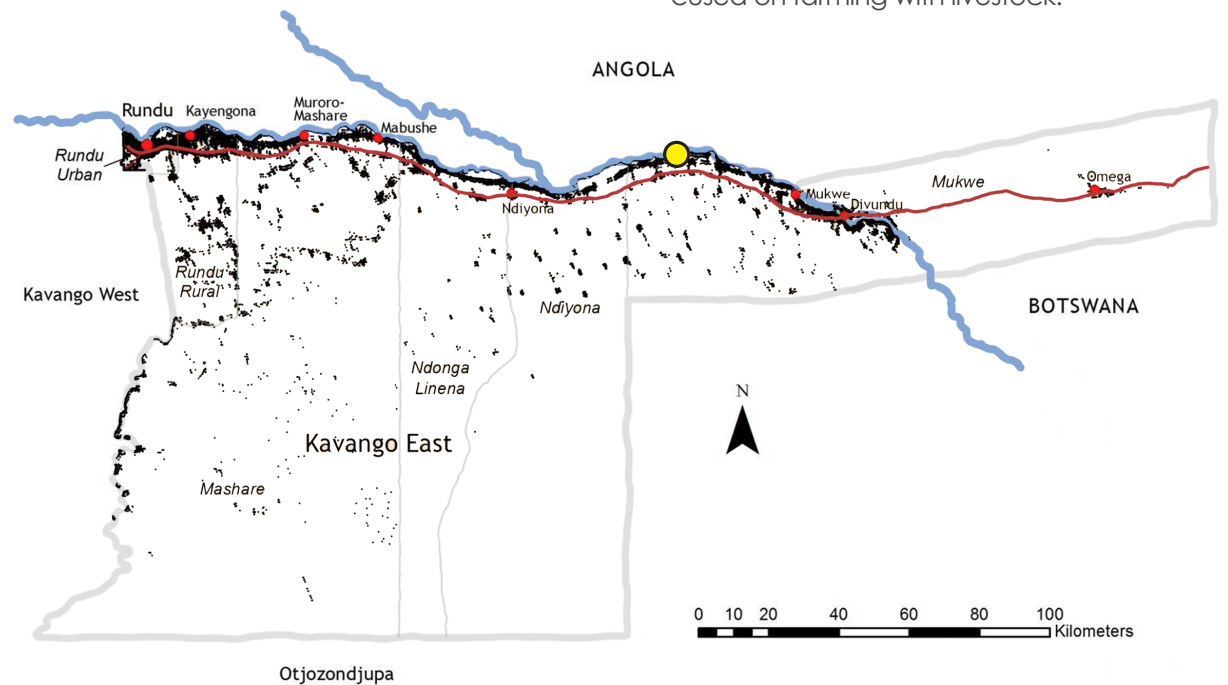


Figure 14: Diagram showcasing population density and distribution within the Kavango East Region.

RAINFALL

Apart from the Zambezi Region the former Kavango Region normally receives more rain than the rest of the country with an annual downpour of between 450-600mm with the majority falling to the north of the region.

Like normal rainfall patterns throughout Namibia, rain occurs during the summer months

between November-April. Despite having a water source throughout the year (Kavango River), subsistent farmers mostly rely on rain for their crops/fields. Residents living close to the river only use it during the winter months (dry months) for watering their vegetable gardens by hand.

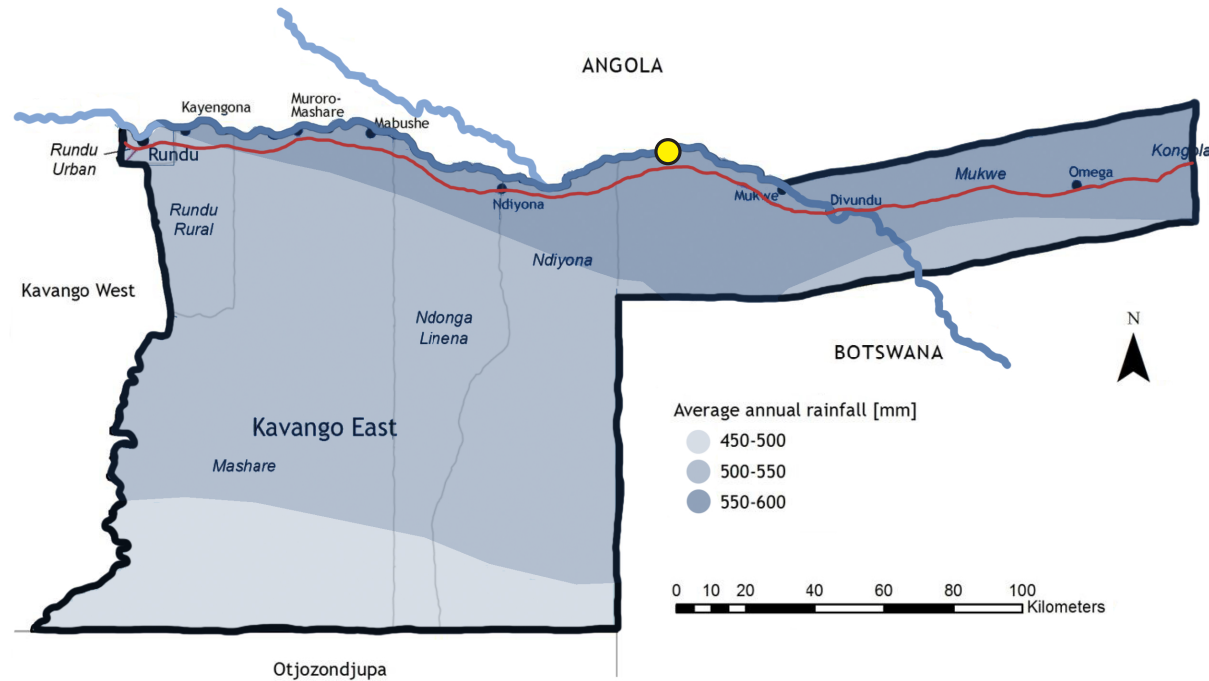


Figure 15: Diagram showcasing rainfall within the Kavango East Region.

Figure 16: Rainstorm at Mbapuka village.



TEMPERATURE

The Kavango Region has great potential to utilise solar power due to the area's high solar radiation levels throughout the year (Mendelsohn, et al., 2002). The region is known to experience minimum temperatures of 4-6°C during winter months of May, June, July and August. However, temperatures close to

the Kavango River and within low lying valleys are known to reach temperatures below freezing point. This reduces the variety of fruits and vegetables (frost-sensitive) locals are able to grow near the river. The Kavango Region stays fairly warm throughout the rest of the year, having average temperatures of over 30°C.

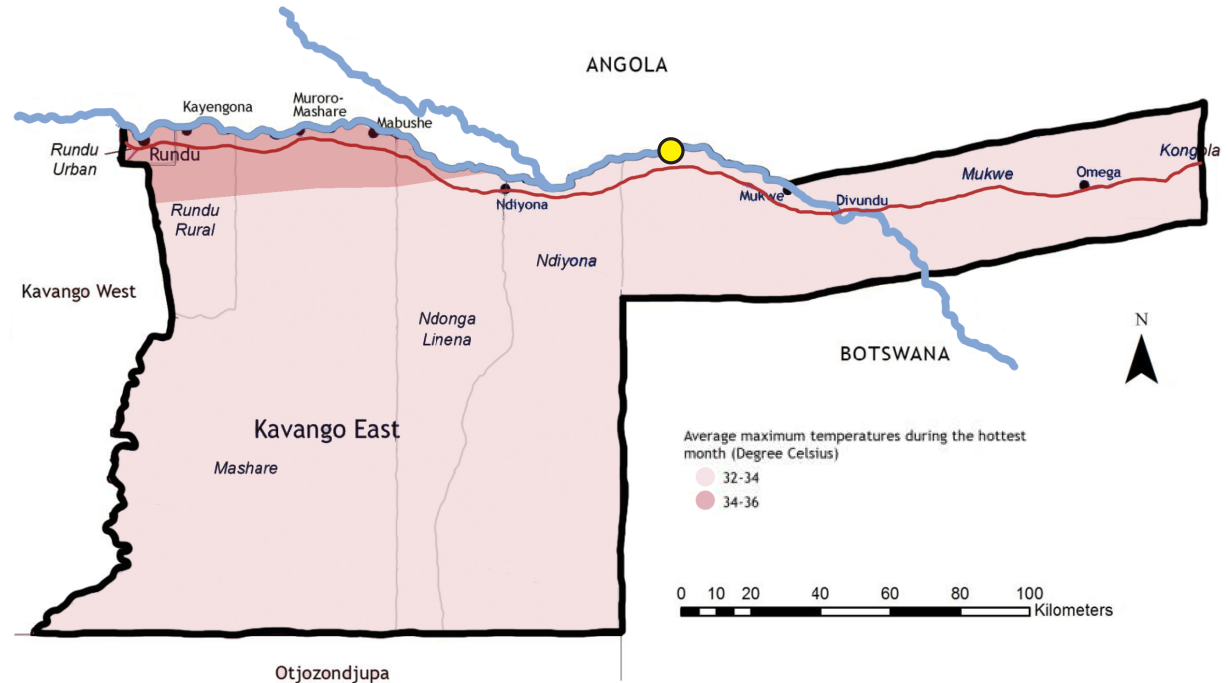


Figure 17: Diagram showcasing summer temperatures density within the Kavango East Region.

SOIL TYPES

Generally, the soil types in the Kavango East Region are not well suited for agricultural purposes. The most common soil type, aerosol has a very sandy texture causing water to drain quickly, reducing its ability to preserve nutrients for plants.

However, it is clear that nutrient rich soils are

usually found near the banks of the Kavango River and along some of its tributaries. These soils attract a number of locals (mostly farmers) in search of fertile land to produce good yielding crops. The soils further south do not allow for good yielding crops, forcing locals to farm with livestock, utilising the grassland plains.

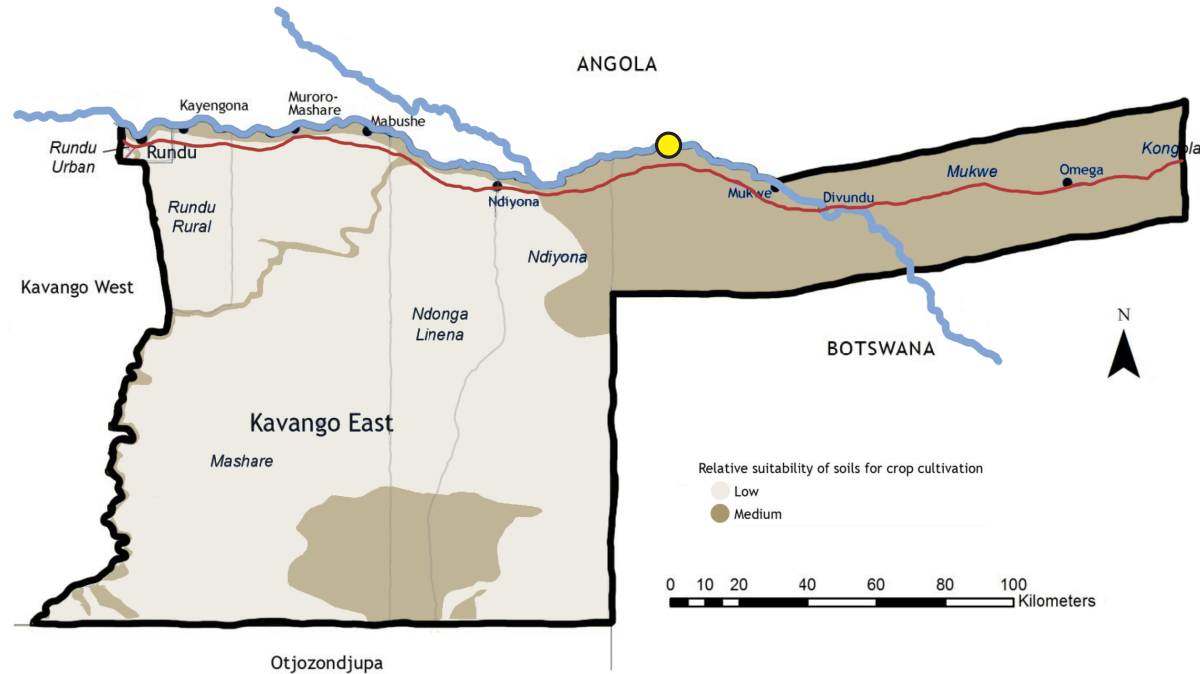


Figure 18: Diagram showcasing soil conditions within the Kavango East Region.

Figure 19: Maize planted using the better soil conditions found closer to the Kavango River.





WATER SURFACES

One of the most important natural features within the Kavango East region is the Kavango River. It runs along most of the region's northern border stretching 350km before crossing the region and flowing into Botswana.

According to Mendelsohn et al. (2002) a total of 9800mm³ of water runs through Namibia and ends up in Botswana. Despite some private and government operated green schemes, the water of the Kavango River is not used to full capacity.

The river is generally used for drinking water by both locals and livestock, to water winter crops, fishing, cooking and bathing. The large water source also attracts a number of tourists throughout the year causing people to invest and develop lodges along the river.

Figure 20: Locals on their way home after collecting river water.

POPULATION GROWTH RATE

The current population of the Kavango East Region was estimated to be 148466 in 2019 (Stankevica, 2019). The 2011 National Census shows a very slow overall growth rate of 0.7% with some constituencies like Mashare even showing a negative growth rate of -0.2%.

The constituencies that showed the highest growth rate are in and around the urban areas of Rundu Urban and Rundu Rural. With a population of 63 431 and a growth rate of 8.7%, Rundu is the main administrative and economic centre of the Kavango Region.

These statistics would suggest that the Kavango East Region is experiencing severe rural-urban migration caused by the push factors of rural areas and the pull factors of urban areas.

Due to the rural-urban migration the highest population density is found within the Rundu Urban Constituency with 407 people per km².

Table 5: Kavango East population growth (Government of Namibia, 2012, p. 21).

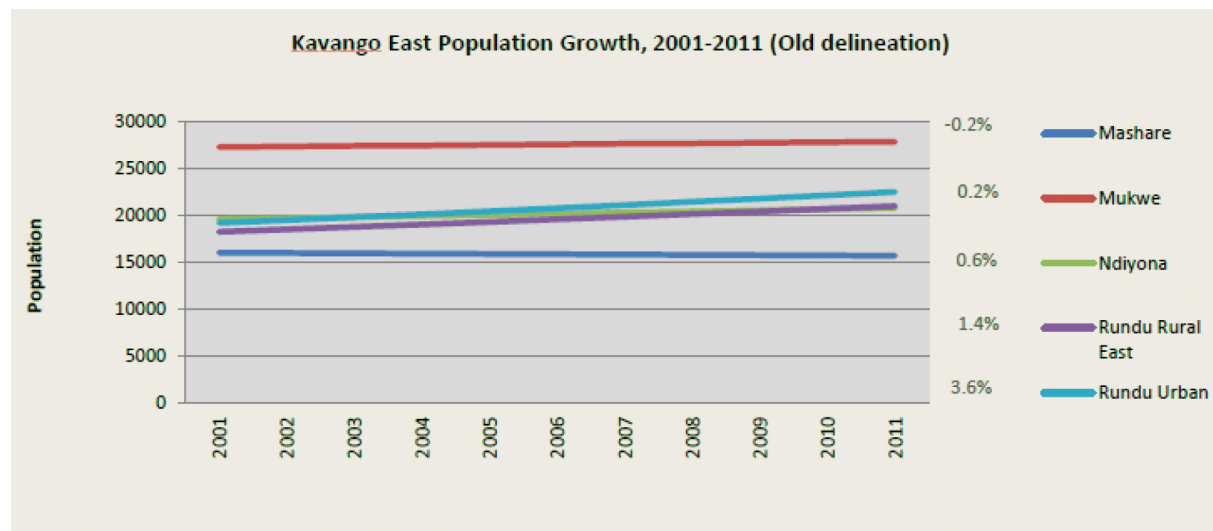


Table 6: Kavango East demographic statistics (Government of Namibia, 2012, p. 22).

	Kavango East Region	Mashare	Mukwe	Ndiyona	Ndonga Linena	Rundu Rural	Rundu Urban
Population size	136 823	15 688	27 690	9 551	11 082	9 381	63 431
Area (km ²)	23 983.2	9 140.2	5 537.0	5 231.0	2 850.6	1 068.7	155.8
Density (ppl per km ²)	5.7	1.7	5.0	1.8	3.9	8.8	407.1
Men per 100 women	88.0	91.0	93.0	87.0	84.3	89.0	85.0



Figure 21: Locals selling wood crafts next to the road to earn an income.

EMPLOYMENT RATE

People often migrate from rural to urban areas with a perception (often incorrect) of finding more and improved job opportunities. This usually leaves urban areas being overpopulated, having a large labour force with limited skills and education. With limited job opportunities and a large labour force, urban areas experience large unemployment rates ultimately increasing poverty.

Table 7 clearly shows the effects of rural urban migration on the Rundu Urban Constituency, having the largest labour force and the highest unemployment rate. This creates a weaker labour force in rural areas showing less unemployment.

Table 7: Kavango East unemployment rates (Government of Namibia, 2012, p. 27).

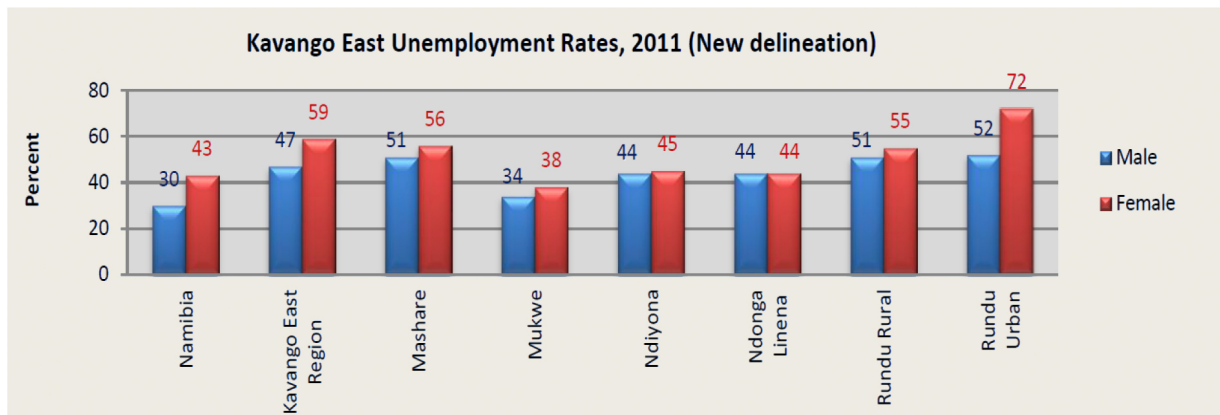




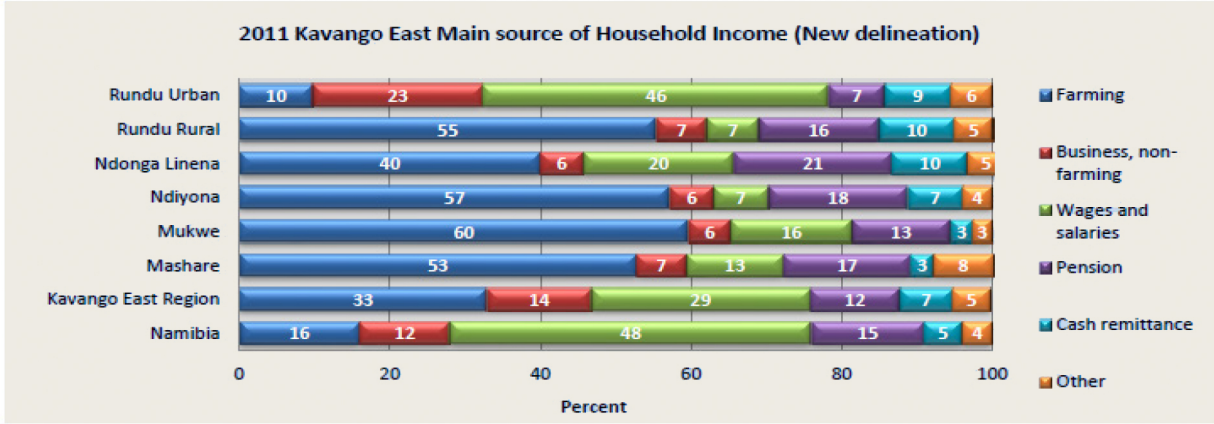
Figure 22: Subsistence farmer preparing his fields before the summer rains.

HOUSEHOLD INCOME

Looking at Table 8, farming is the main source of household income in the Kavango East Region. However, as most farmers (rural residents) are subsistence farmers, generating income is not the main focus. Instead, rural residents focus on creating a sustainable source of food throughout the year. The Rundu Urban and Rundu Rural Constituencies are the main areas where wages and salaries are an important source of household income. Kavango East residents have a very strong reliance on pension funds as it is the second

strongest source of household income across the region. According to field studies, it has become the norm for families ranging from 6 -14 people to depend on the elderly to sustain their family with N\$1100.00 government pension each month. This shows a rural-urban migration cycle where the workforce of rural areas migrate in search of employment (to send money home to their families), and would later return home after becoming a pensioner. This would suggest that Kavango East residents have a strong sense of place towards the area they grew up in.

Table 8: Kavango East main source of income (Government of Namibia, 2012, p. 29).



HOUSING TYPES AND CONDITIONS

Looking at Table 9, traditional dwellings are the most common housing typology across the Kavango East Region making up 64% of all houses in the region. Apart from the Rundu Urban Constituency, four out of five households reside in a traditional dwelling. Semi-detached or detached houses are the second most prevailing housing type found mostly in the urban areas such as Rundu Rural and Rundu Urban Constituencies.

Traditional dwellings are usually made from natural, local materials such as mud, clay, tree branches and trunks, grass, reeds, straw or cow dung (Table 10). Due to the high poverty rate in rural areas locals are forced to source natural building materials from their surroundings and often have to construct their own houses/homesteads. It is for this reason that most residents are fairly skilled in brick laying and construction. This creates a very strong sense of ownership and pride reinforcing a sense of place link between the natural environment and traditional housing.

Table 9: Kavango East housing types (Government of Namibia, 2012, p. 31).

% Households	Detached/ Semi-detached house	Flat	Traditional Dwelling	Improved Housing	Other
Namibia	37.8	5.6	37.7	16	2.9
Kavango East	26.1	1.5	64	6.4	2
Mashare	5.4	0.2	92.1	1.1	1.2
Mukwe	10.5	0.4	86	1	2.1
Ndiyona	9.4	0.1	83.2	5.2	2.1
Ndonga Linena	13.4	1.2	80.9	4.1	0.4
Rundu Rural	12.9	0.7	85	0.5	0.9
Rundu Urban	43.5	2.7	40.4	11.1	2.3

Table 10: Kavango East housing construction materials (Government of Namibia, 2012, p.31).

% Households	Namibia	Kavango East	Mashare	Mukwe	Ndiyona	Ndonga Linena	Rundu Rural	Rundu Urban
Cement bricks	41.1	20.1	6.6	10	3.4	10.4	4	34.8
Burnt bricks	0.8	0.6	0.2	0.4	0.7	0.6	0.1	0.9
Mud/Clay bricks	7.7	14.9	16.6	22.1	19.9	18.8	19.7	9.7
Corrugated iron/zinc	20.5	9.7	1.3	1.8	0.5	1.4	2.6	18.5
Prefabricated materials	3.1	2.16	0.5	1.2	0.9	3.5	1.4	3
Wood poles/sticks or grass/reeds	16.8	22.3	25.7	33.3	50.8	43.3	22.2	9.4
Sticks with mud/clay/ dung	8.4	28.9	48.6	30.1	23.3	21.1	48.9	23
Tin	0.7	0.2	0.2	0	0.2	0.3	0.1	0.2
Other	0.9	0.5	0.3	0.3	0.2	0.6	1	0.5

FOUR COMMON KAVANGO HOUSING TYPOLOGIES



Figure 23: Traditional clay house with corrugated iron roof.



Figure 24: Traditional clay house with thatched roof.



Figure 25: Corrugated iron housing typology.



Figure 26: Cement brick housing typology.

EDUCATION

The Kavango East had 116 primary schools, 13 secondary schools and 24 combined schools in 2012 (Government of Namibia, 2012).

Figure 27 shows how the location of schools have been established by comparing the population density and distribution to the school distribution. This diagram shows how villages to the central, southern and eastern parts of the region have limited access to schools or not within walking distance.

This often causes children below the age of 9 not to be enrolled at a school. Children frequently have to help with farming and other time intensive chores effecting their secondary and tertiary education. This reduces their chances of attaining a higher education, limiting their chances of finding employment either in rural or urban areas. Table 11 indicates the percent of population aged 15+ who left school to focus on finding any form of employment to sustain their family.

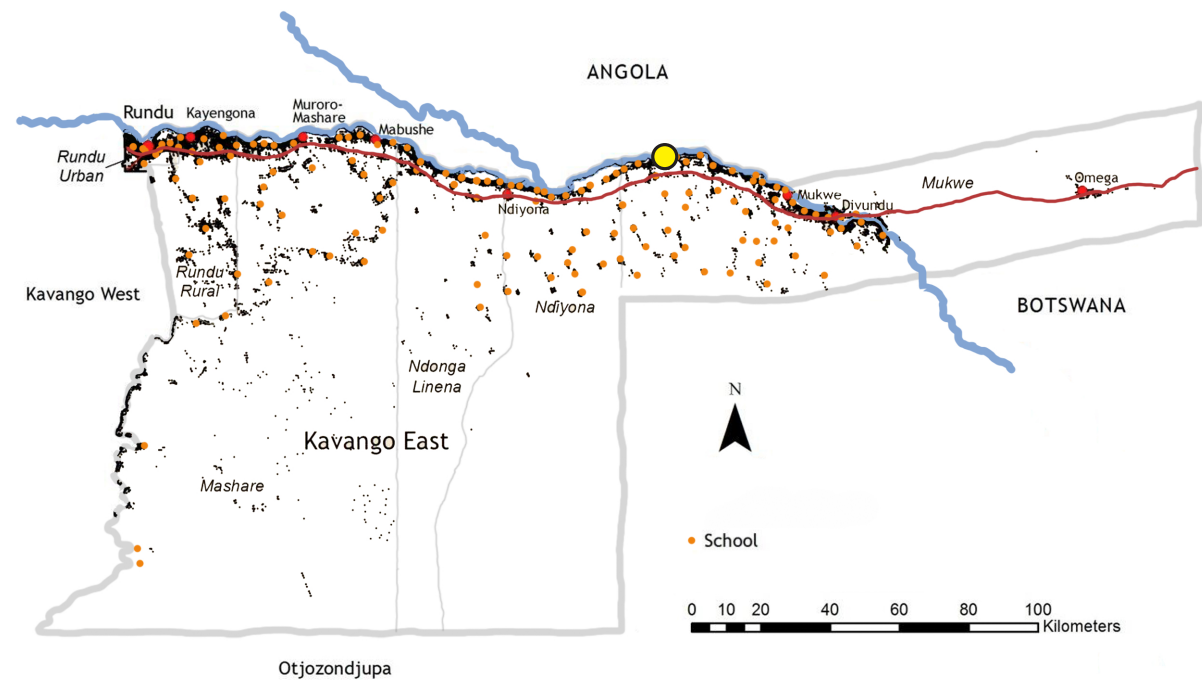


Figure 27: Diagram comparing school location to population distribution and density.

Table 11: Kavango East percent of population aged 15+ who left school by highest Level of educational attainment (Government of Namibia, 2012, p. 36).

% Population Aged 15+	Namibia				Former Kavango Region			
	2001		2011		2001		2011	
	Male	Female	Male	Female	Male	Female	Male	Female
No formal education/not stated	4.6	3.3	1.5	1.5	1.5	2	3.4	2.7
Incomplete primary	34.7	32.4	25.1	22.5	32.9	36.4	47.6	57.3
Primary education	38.8	43.8	46.6	50.1	47.4	49.1	33	35.5
Secondary education	15.9	15.2	20.8	20.3	14.5	10.1	9.7	5
Tertiary education	5.3	6	6	5.7	3.7	2.4	3.8	1.9

ROAD INFRASTRUCTURE

The Trans Caprivi Highway (B8) is one of the most important roads running through the Kavango East Region. The B8 does not only link the Zambezi Region to the rest of Namibia, it also connects Namibia to Zambia, Zimbabwe, Angola and even Northern Botswana. This road is a critical transport route for products that need to move to our neighbouring countries.

The B8 also plays an important part for the region's tourism sector as it is the road used by most tourists creating economic opportunities along it. A number of lodges have developed along this road. Locals have started to set up small shops selling handmade pottery and wood carvings as souvenirs. Figure 28 shows the B8 is located about 5 -10km south of the Kavango River while a secondary gravel road (D3402) runs alongside the river. Locals usually set up their larger summer fields in between these two roads.

Besides the B8 and the D3402 the road infra-



Figure 28: Kavango East major transport routes (Government of Namibia, 2012, p. 82).

structure across the region is fairly limited and in very poor condition. Villages located further south, away from the two main transport routes, often struggle to develop due to limited access. Medical and food supplies, water

and building material are therefore very limited in these areas. This makes living circumstances even tougher for residents located in southern villages.



Figure 29: Rural residents using solar power to charge their cell phones.

ELECTRICITY

Due to the poor economy and stagnant development throughout the region access to electricity is problematic. This leaves the majority of residents in the Kavango East Region without access to power. However, some residents rely on solar power for basic electrical

use (Fig. 29). Figure 30 shows how only 31.5% of households in the region has access to electricity provided by the NamPower grid. Half of those households are situated in the Rundu Urban Constituency. However, the region has a policy in place stipulating that all schools and government institutions within villages should have access to electricity.

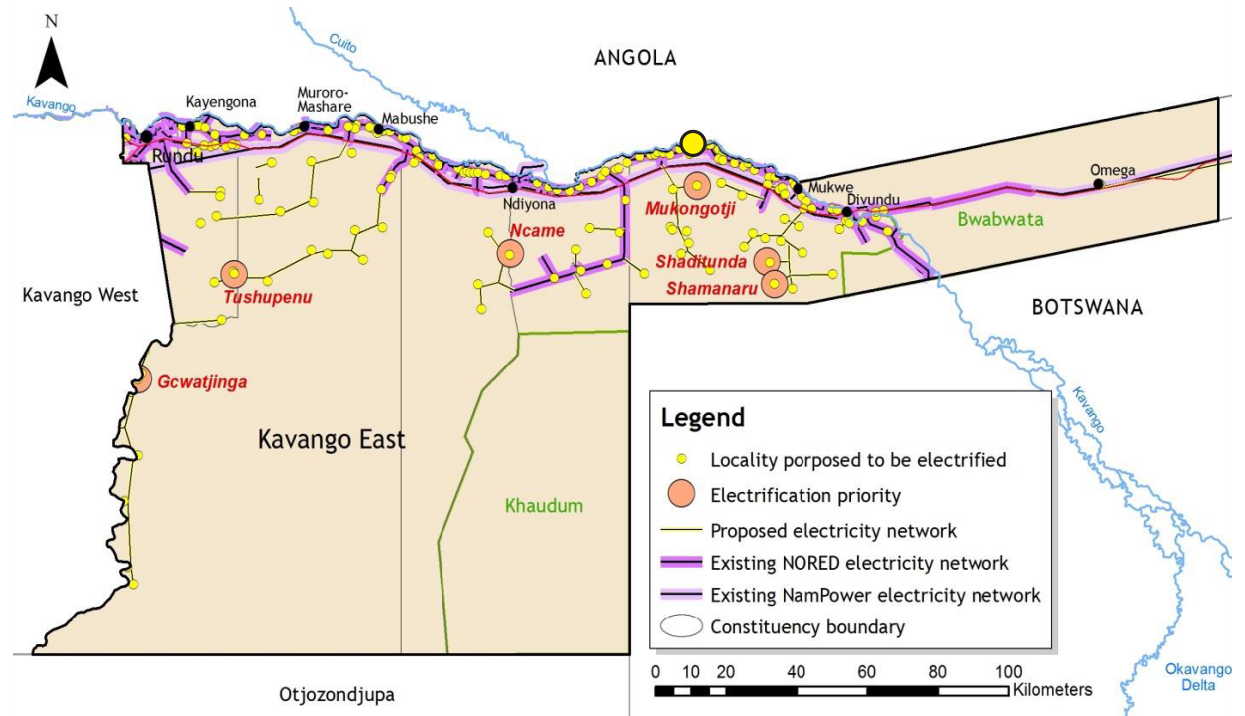


Figure 30: Kavango East electricity lines (Government of Namibia, 2012, p. 85).

WATER AND SANITARY CONDITIONS

The Kavango East Region is supplied by a main water source in the form of the Kavango River. However, it is only useful to those who live in close proximity. People have to make daily trips to the river in order to supply their homesteads with fresh water. These trips are often tedious and dangerous. Despite numerous crocodile attacks each year residents are forced to collect water from the river due to limited water services and infrastructure. The river water is generally used for drinking and cooking, and is usually consumed without any filtration or secondary cleaning risking the spread of diseases. They transport the water to their home by filling up buckets or tanks and carrying it by hand or by using oxen.

Figure 31 shows the distribution of water sources within the Kavango East Region. It can be noted that water sources to the south are less due to fewer residents located in these areas. Community boreholes are the main form in

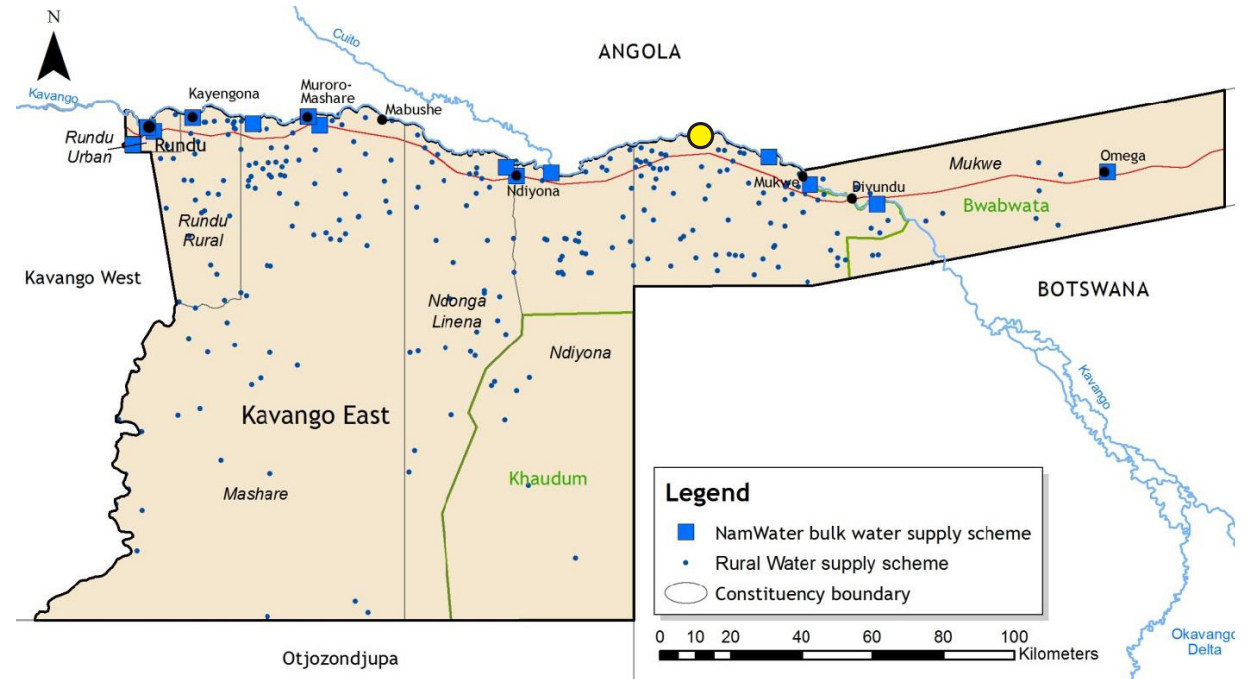


Figure 31: Kavango East water supplies (Government of Namibia, 2012, p. 89).

which southern communities access water. The boreholes are usually located within a village or large community to serve as many people as possible. Boreholes act as hotspots and attract both people and animals. This may lead to the overuse of water causing boreholes to dry up. It may also cause de-

forestation, attracting more people and livestock to a particular area. With the limited water infrastructure only 17% of the region have access to flush toilets. The majority are located within schools and government institutions, forcing many residents to resort to the bush (Table 12).

Table 12: Kavango East type of toilet facilities (Government of Namibia, 2012, p. 90).

% Households	Namibia	Kavango East Region	Mashare	Mukwe	Ndiyona	Ndonga Linena	Rundu Rural	Rundu Urban
Private Flush connected to sewer	24.8	10.8	1.9	3.3	1.4	4.0	1.0	19.7
Shared Flush connected to sewer	11.7	3.8	0.7	1.5	0.6	2.0	0.0	6.7
Private Flush connected to Septic	1.6	1.3	1.8	0.4	0.6	0.5	0.5	1.9
Shared Flush connected to Septic	1.4	0.6	0.2	0.2	0.1	0.6	0.0	1.1
Flush toilet	39.5	16.6	4.6	5.4	2.7	7.0	1.5	29.4
Pit Latrine with Ventilation Pipe	4.3	5.9	4.8	3.3	6.0	5.9	6.3	7.1
Covered Pit Latrine without Ventilation	3.2	3.9	0.8	1.2	3.0	2.2	1.8	6.5
Uncovered Pit Latrine without Ventilation Pipe	1.8	4.2	0.6	0.5	7.9	0.9	0.5	7.1
Bucket Toilet	1.8	1.8	0.7	2.4	1.4	2.5	1.4	1.9
No Toilet	48.6	67.0	87.5	86.9	78.7	81.4	88.2	47.4
Other	0.7	0.5	1.0	0.4	0.4	0.2	0.3	0.6

Figure 32: Kavango River: Main water source for most rural residents living close to the river.



understanding the
everyday life
(meso scale)

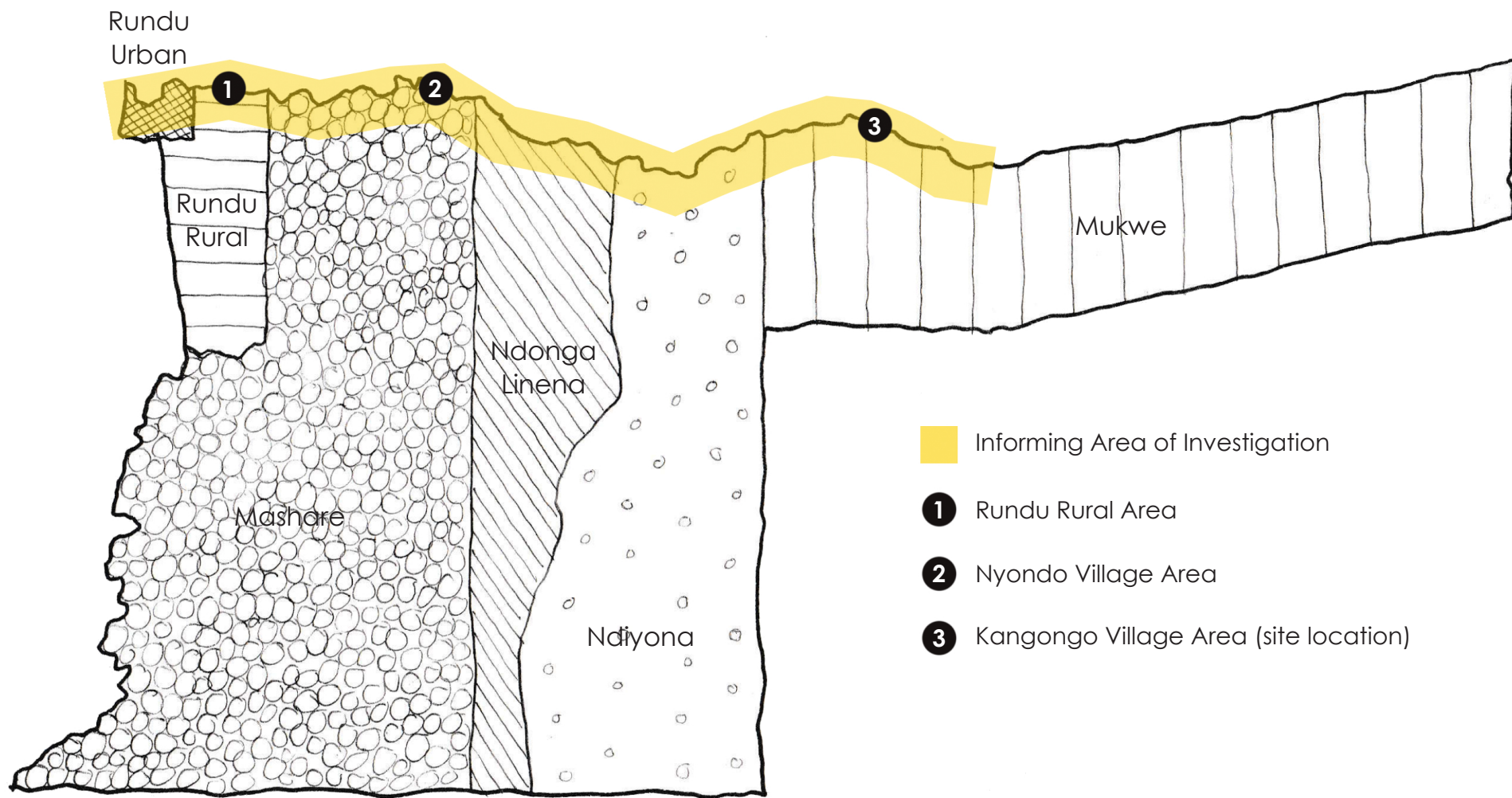


Figure 33: Exploring three different areas along the Kavango River.



Figure 34: Rundu Urban aerial view.

1. RUNDU RURAL AREA

Looking at figure 34, it is clear that Rundu has experienced tremendous urbanisation and outward/horizontal growth along the Kavango River. As mentioned on page 26, rural residents migrate to Rundu in search of employment and income opportunities to provide financial support for their families. With limited job opportunities, Rundu cannot provide employment for all migrants. This causes unemployed rural residents to establish small subsistent farmlands around Rundu, hoping for future employment.

Studying figure 34, it can also be noted how Rundu's urbanisation and development activates development along the Kavango River. Angolan residents tend to settle close to Namibian towns and developments as they are free to move beyond the border within a 50km radius. Angola's poor infrastructure forces locals to use Namibian services like clinics, shops and schools.



Figure 35. Nyondo Village Area aerial view.

2. NYONDO VILLAGE AREA

Urbanisation becomes significantly less towards the east. Figure 35 indicates a similar farmland settlement pattern but not as densely packed as that of the Rundu Rural area. Due to fewer economic activities within the surrounding context the population density is lower and available land is more. Summer farmlands further south are therefore larger than those in Rural Rural area.

Nyondo Village is located on very fertile soil near a Kavango River tributary. This attracted agricultural schemes and local residents looking for employment and good farming land causing the population density to be higher than that of the Kangongo village further east.

3. KANGONGO VILLAGE AREA SITE AREA

As seen in figure 33, the Kangongo Village is located the furthest from Rundu. With even more limited surrounding economic activities than that of the Nyondo Village, the Kangongo area has fewer people and more available land. When Comparing figure 35 to 36 it is clear that Kangongo's summer farm-lands are larger than those of Nyondo and have not spread out as far south due to limited available land.

Resulting from the lack of infrastructure, development and services in the area, settlement across the river (Angola) is dispersed and small. Being an underdeveloped rural area with limited infrastructure and available land the Kangongo Village area is the ideal site to introduce the Ka-Ba-Thi Learning Centre.

Figure 36: Kangongo Village Area aerial view.



TYPICAL SETTLEMENT PATTERN

Although a few kilometres apart, the three aerial views in figures 34 - 36 reveal a number of similar features. The consistent settlement pattern along the Kavango River is predominantly influenced by the proximity of the D3402 gravel road, land availability and the river itself (figure 37). With limited/no water services at their disposal, most residents prefer to settle close to the river in order to facilitate regular water retrieval. With several connections between the B8 tar road and the D3402, the D3402 acts as the most important transportation link for locals. It also provides income opportunities for locals displaying their wood carvings and clay pots next to the road.

This results in a higher population density closer to the river, decreasing to the south. For this reason, available farming land close to the river is small and rarely available causing people to set up larger plantation fields (1-3

ha) further south in hopes of getting better crop yields. With their main plantation fields 5-10km away from the river, residents have to depend on summer rains for their crops. In the winter months residents depend on the river to water small vegetable gardens set up on the river's banks. In an attempt to provide ed

ucation and healthcare to the residents living in the rural strip, the Government of Namibia set up a number of low-cost, basic bush clinics and schools along the Kavango River, B8 and D3402. These services drew people closer increasing the size of the villages found along the river.

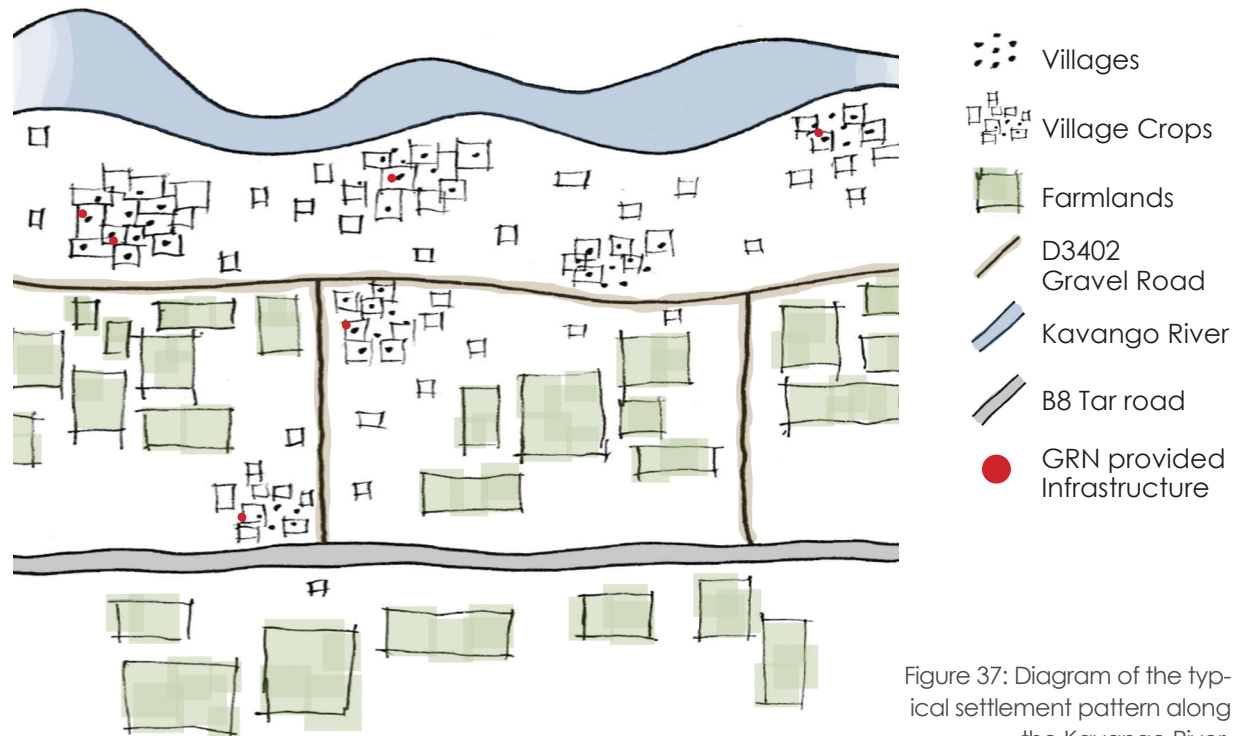


Figure 37: Diagram of the typical settlement pattern along the Kavango River.

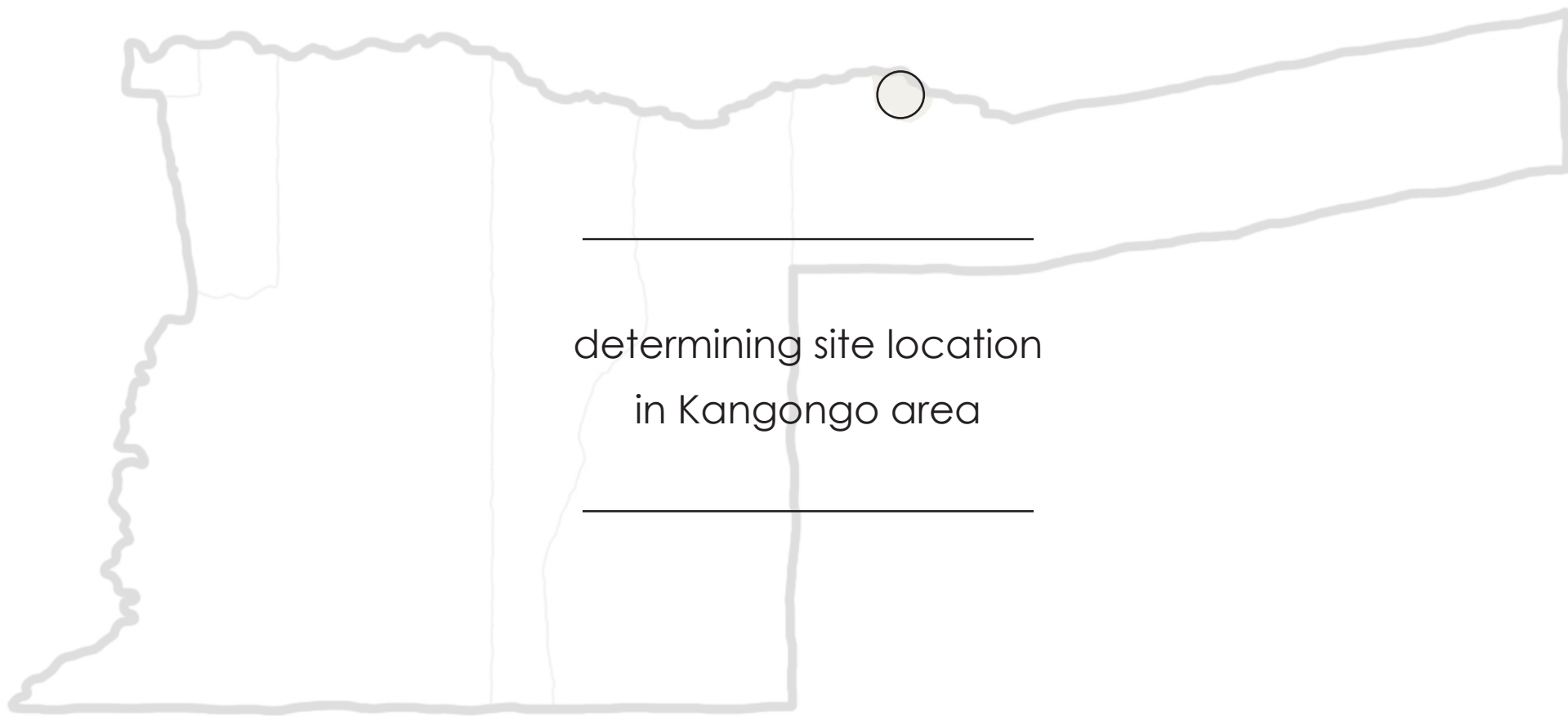




Figure 38: KA-BA-THI Learning Centre location.

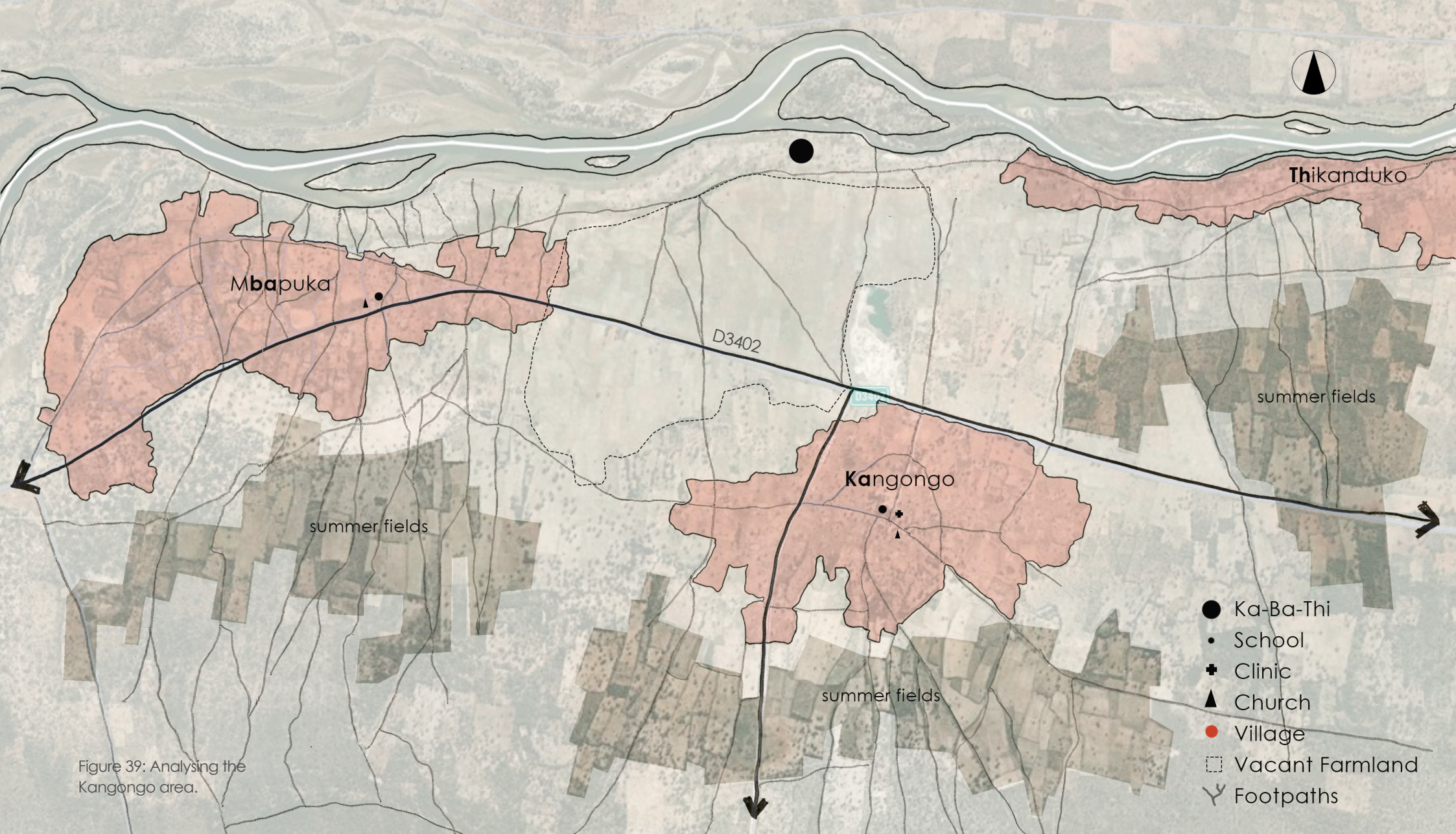


Figure 39: Analysing the Kangongo area.

THREE VILLAGES

The Kangongo area consists of three villages: Mbapuka to the west, Kangongo in the centre and Thikanduko to the East. Similar to most villages along the Kavango River, a primary school and a church can be found to the centre of each village. Kangongo is the only village in the area with a semi-high school (grade 8-10) and a clinic. These services attract residents from the surrounding two villages, making Kangongo the busiest village in the area.

However, Kangongo does not have the largest population because it serves as the middle ground where people come together to receive either medical care or higher education. Located closer to the Kavango River, Mbapuka and Thikanduko house most residents due to water availability/accessibility and fertile soils.

NORTH-SOUTH MOVEMENT

As mentioned on page 41, the high population density in and around villages reduces available agricultural land, causing farmers to set up summer farms 5 -10 km south of the Kavango River. With the Kavango River located to the north of their village and their summer fields to the south a clear movement pattern has emerged. Characterised by organic north-south footpaths, these footpaths serve as a key informant for the layout of Ka-Ba-Thi Learning Centre as the daily movement pattern is linked to their sense of place.



Figure 40: Children walking from Mbapuka to attend school at Kangongo.



Figure 41: A mother and child using a footpath after retrieving water from the Kavango River.



- Ka-Ba-Thi
- Village Centres
- Vacant Farmland
- ▨ Quarry
- 500 m
- 1000m

VACANT FARMLAND

Mbapuka and Kangongo are about 3km apart, separated by a plot of vacant farming land. According to the owner of Camp Ndurukoro, Leon Nederlof, the local Fumu (King) agreed to allow an agricultural farmer from Windhoek to farm the area. After the farmland was prepared and ready to be utilised the Fumu expected to receive monthly royalties. This led to a disagreement causing the Fumu to remove the farmer from his land. Already prepared, the vacant land creates various agricultural opportunities that can be utilised by locals residents.

Figure 42: Diagram indicating village distance, vacant land and quarry.

QUARRY

The Kavango Crusher is located next to the D3402 gravel road, opposite the Kangongo Village. It functions as both a quarry and a crusher that extracts rock material used for construction. Only a few locals work at the crusher as it requires specialised skills and individuals with a relevant tertiary education. The crusher can however supply building material to an intervention located close by. This will reduce construction costs tremendously.

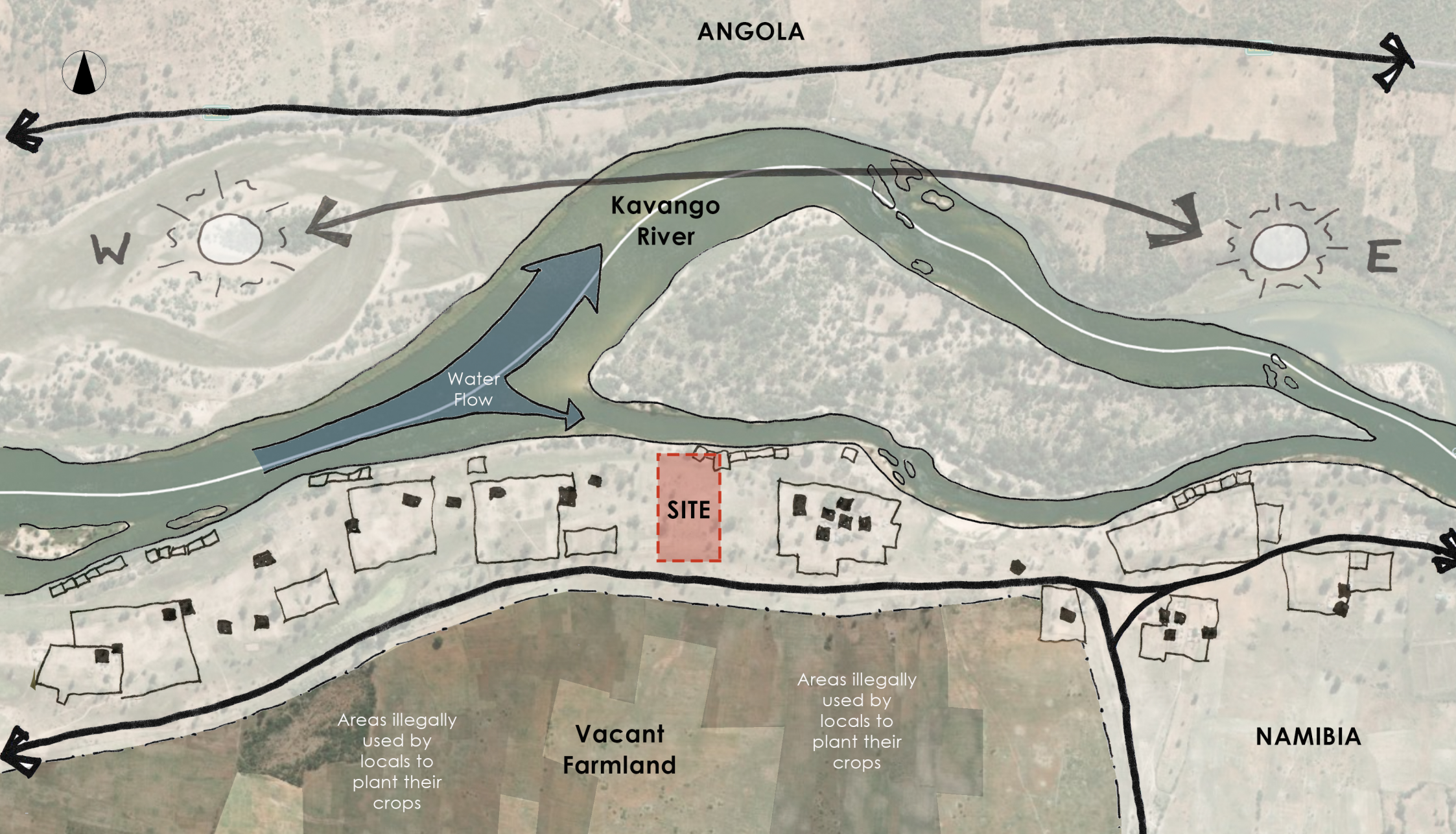


Figure 43: Kavango Crusher and quarry located north of Kangongo.

Site Analysis



Figure 44: Map showing the contextual features and characteristics around the site.



ANGOLA

Kavango River

Water Flow

SITE

Vacant Farmland

Areas illegally used by locals to plant their crops

NAMIBIA

W

E

Areas illegally used by locals to plant their crops

SURROUNDING CONTEXT

Being a technical high school and VTC, the Ka-Ba-Thi Learning Centre requires a site with easy access to water and a large portion of land to practice different agriculture and farming techniques. However, looking at figure 45 it is clear that the area does not have a lot of available land due to the high number of people that choose to settle close to the river. The site is carefully placed in-between existing farms and homesteads to avoid relocating residents. Despite being placed in-between homestead, Ka-Ba-Thi Learning

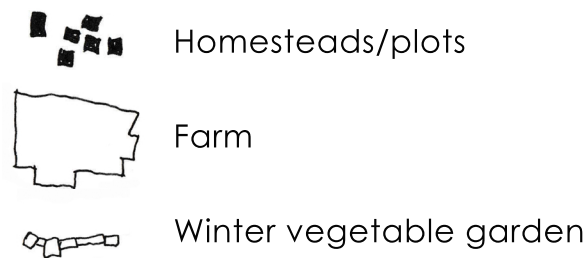


Figure 45: Site analysis of surrounding area.

Centre will ultimately connect to the large vacant (already prepared) farmland and use it for its large-scale agricultural purposes. The site is also easily accessible, located next to a tertiary road that runs between the farmland and the river, connecting to the D3402 further west.

Looking at the meandering nature of the river, the site is ideally located away from the main flow of the water. Exposed to a smaller branch with reduced water flow and a few rocky features, Ka-Ba-Thi Learning Centre exposes residents to a safe part of the river. The reduced currents allow people to swim while the rocky outcrops reduce crocodile and hippo activity in the area.

Figure 46: Winter vegetable garden positioned close to the Kavango River.



delving into people's
sense of place
(micro scale)



Figure 47: Informally interviewing local residents to understand their sense of place.

SPENDING TIME WITH LOCALS

In order to understand the site and surrounding context even better, a micro scale investigation was done in the form of a two-week field study. A total of nine days were spent with three different families (three days per family) from each village (Mbapuka, Kangongo, Thikanduko) to understand their daily routines and ways of life.

The families had an average size of 34 people often lead (important decisions made) by the family elder. Despite being older the elderly do not have perform daily chores like herding cattle, collecting water, washing clothes, cooking food, fishing or farming. They provide their family with financial support using their pension funds.

Family members between the ages of 6-55 have to perform daily household chores. Men, women and children often leave the homestead at 6am every morning. Men

would leave to go herd cattle while children embark on a long journey to school. Women often stay behind and do household chores like washing clothes, collecting water, cooking food, cleaning and watching over toddlers. Men would often return before sunset while children would return between 14:00h to 15:00h. Children would then be tasked to help their mothers with chores around the house, often neglecting homework. Children skip school 1-2 times a week to help their parents with these chores. Food (Mahangu meal and bread) prepared on the household fire is usually done by the women and children before the men arrive. The entire family will eat together telling stories and socialising before going to bed at around 21:00.

During the summer season men, women and children are responsible to prepare crop fields, plant and harvest Mahangu. Soils need to be prepared within a limited time window to increase the crop yield. The labour intensive, time sensitive process requires the help

from all family members forcing those working in urban areas to leave their jobs and attend the planting season.

The five other days were spent interacting with local villagers to understand their tangible and intangible needs. Their tangible needs were documented through informal interviews while their sense of place was documented through sketching and analysing the context through parti diagrams.

THROUGH THE EYES OF THE AUTHOR

3 parti diagrams were drawn at different scales in an attempt to understand sense of place though capturing the basic shapes, forms and materials of the local context.

Figure 48: Traditional house in the Thikanduko Village.



COMMON KAVANGO EAST CLAY HUT

The basic shape, form and structure of the common clay house was explored through drawing parti diagrams on site.

As shown in figure 49, residents typically use basic square or rectangular shapes to form spaces that usually serve one purpose due to their small size. These $\pm 12\text{m}^2$ structures mostly serve as bedrooms, providing shelter from the harsh Kavango East climate. Throughout the day, residents mostly gather under a tree or underneath an open-air roof structure mostly used as a kitchen.

Figures 50 - 51 show traditional hand-built structures using local natural materials like wooden poles, grass, clay and sand. Despite being cheaper, constructing these clay structures is time and labour intensive and only promises a lifespan of 5-6 years. For this reason, it is not unusual to find corrugated iron

and cement brick structures. Although construction is faster, these two structures create logistical, financial and thermal issues. Figure 51 illustrates the minimal openings due to waterproofing difficulties. Windows are therefore small and not able to open, only allowing minimal light to enter the space.

Due to similar waterproofing issues, traditional thatch roofs are replaced with corrugated iron sheets. All corrugated iron roofs are mono-pitched to prevent technical connections and waterproofing issues.

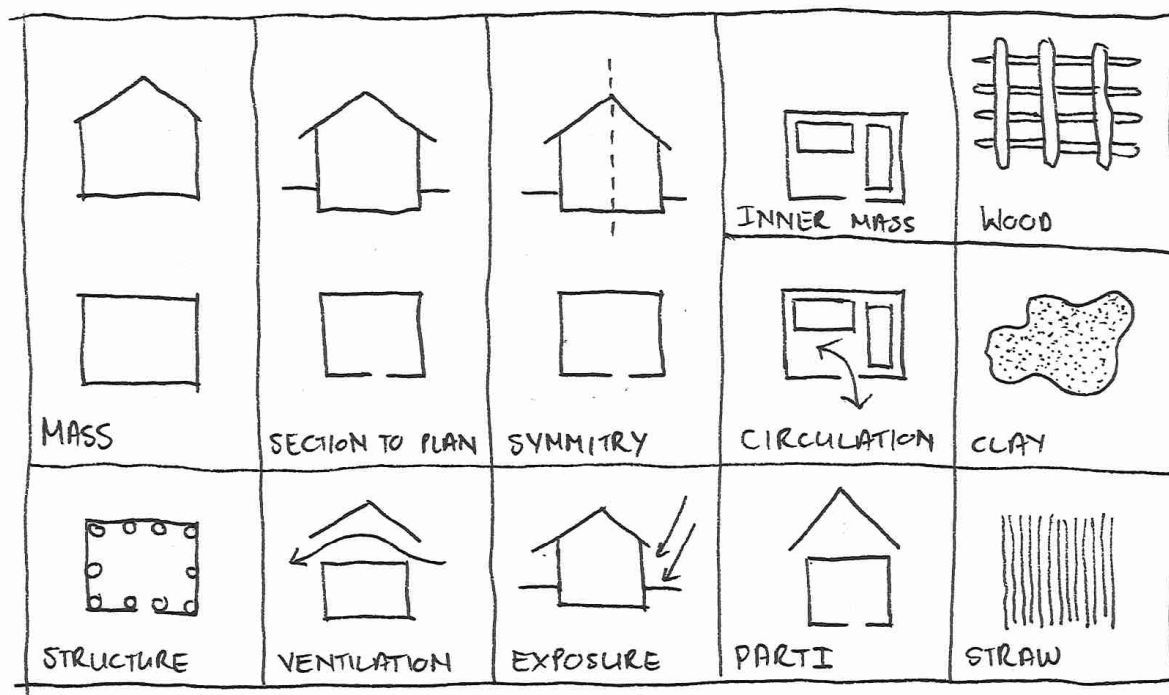


Figure 49: Parti diagram of existing traditional clay houses.

4 BASIC KANGONGO HOUSE/ROOM TYPES



Figure 50: Traditional clay house with mono-pitched corrugated iron roof with rock weights.



Figure 51: Traditional clay house with thatched roof.



Figure 52: Corrugated iron structure.



Figure 53: Single bedroom cement brick house.

COMMON KAVANGO EAST HOME-STEAD

Figure 54 shows a parti diagram explains the traditional homestead layout and settlement at different scales. The 1st column shows the basic farm shape, movement and use. As mentioned, these farmlands are not big enough to produce enough crops to support most families. However, the village farms still use the available space to plant Mahangu and for kraals for their cattle. Looking at figure 53, farms usually have a barrier (bush, fence, timber poles) to avoid ownership confusion and to prevent cattle destroying crops. This creates organic corridors between neighbouring farmlands to allow people and animals to move through.

The second column shows the angular homestead plots within the farms. The segmented "homestead plan/layout" is created over time as the family grows. The elderly's (grandparents) plot is usually located to the centre

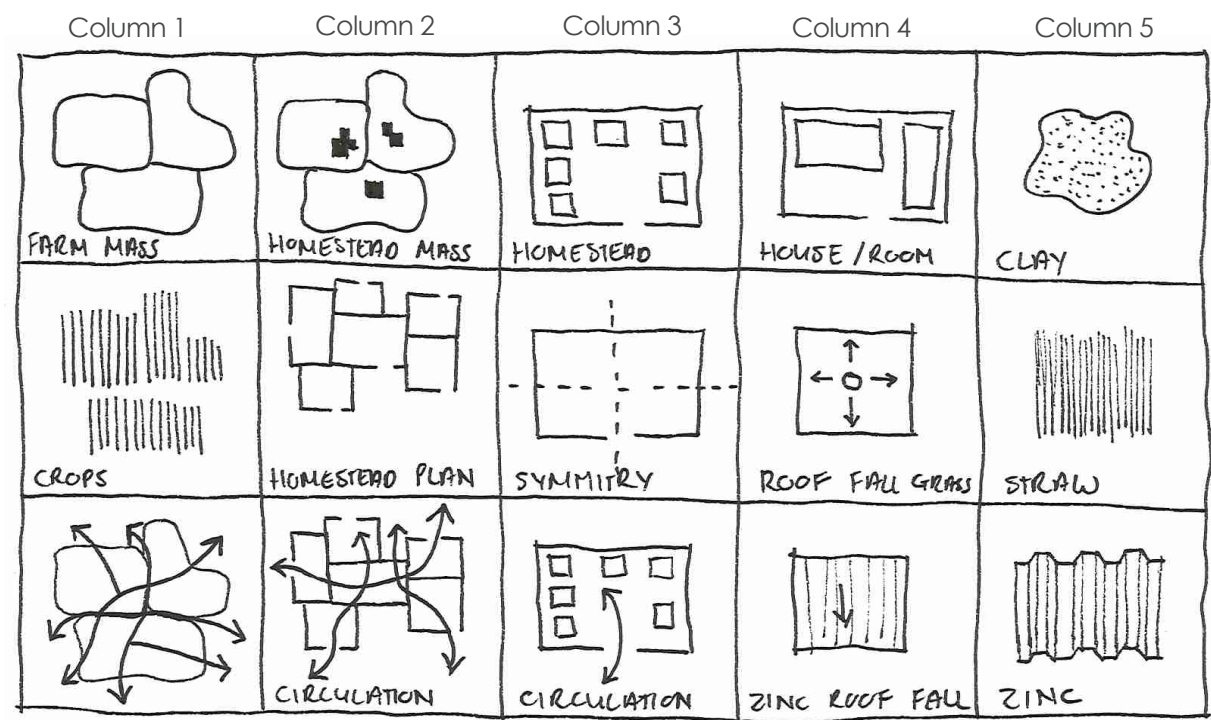


Figure 54: Parti diagram displaying settlement patterns of the Kangongo area.

with more plots connected around it. The surrounding homestead plots form over time as children grow up, marry and start their own family. Although these plots have a clear barrier (bushes or fence), they are still permeable allowing organic movement through the entire family homestead.

Column 3 shows houses with the same angular shape as the homestead layout. With a central fireplace, houses are usually positioned to the edge showing clear symmetry and order. Column 4 shows the basic layout of the room while column 5 elaborates on the basic construction materials.



Figure 55: Organic shaped farmlands divided by numerous footpaths and corridors.



COMMON KAVANGO EAST NATURAL ENVIRONMENT

After spending ten days with three different Kangongo families, trying to understand their daily routines and way of life, a strong connection to their surrounding environment was noted. As previously mentioned, the extreme poverty and lack of infrastructure within the local area forces residents to utilise raw natural materials and features in order to make a living.

Figure 56 shows a parti diagram of the main, surrounding natural features, drawn to explore possible forms and features that could inform the design of Ka-Ba-Thi Learning Centre. The basic shape of the Kavango River, a tree, Mahango crops and footpaths were diagrammatically sketched and combined to form an abstract drawing of a possible concept.

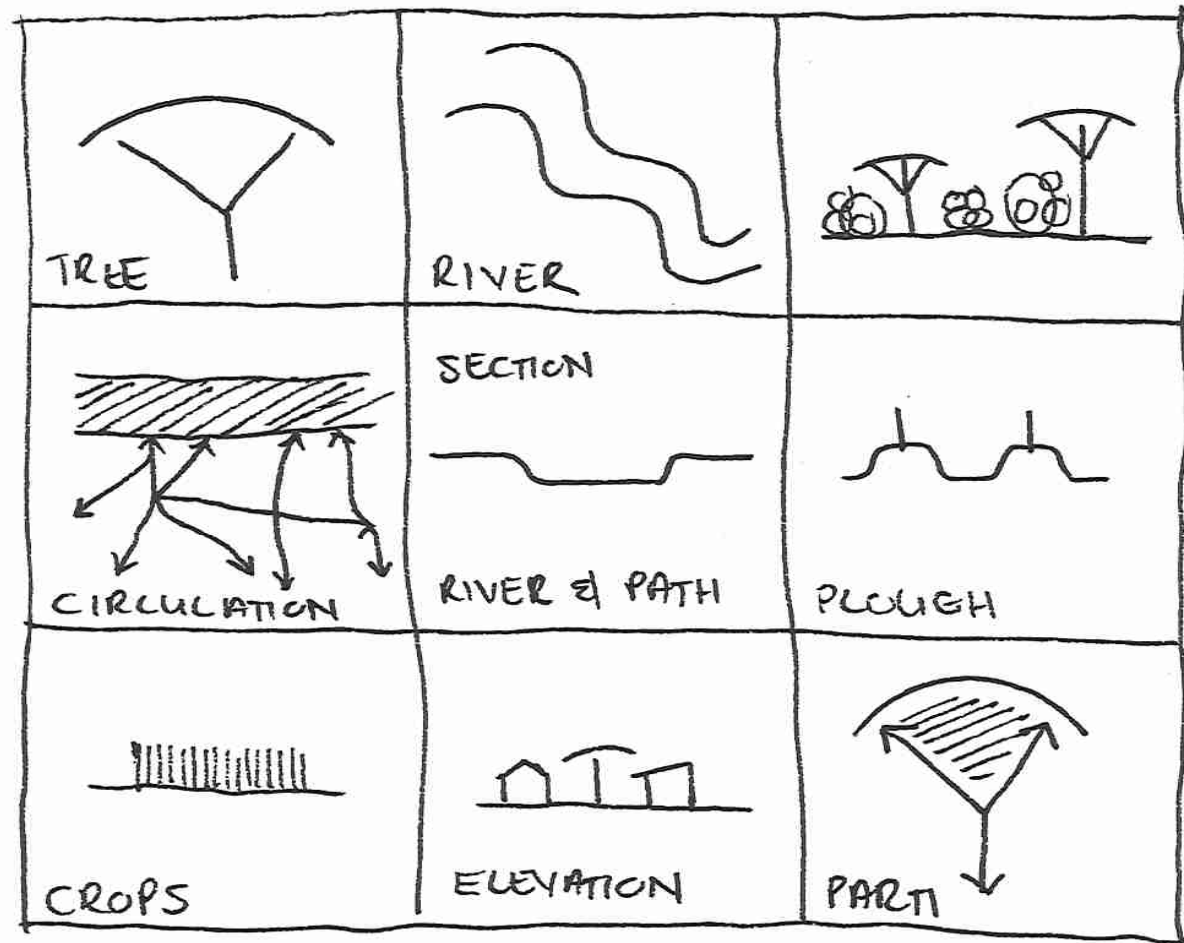


Figure 56: A parti diagram of the main features of the natural environment.

Figure 57: Cattle grazing - example of how the natural environment is utilised by farmers.



THROUGH THE EYES OF LOCALS

Interviews and cognitive mapping techniques were used in an attempt to understand sense of place through the eyes of local residents.



Figure 58: Photomontage of children's drawings from the Mbapuka Village.

CHILDREN'S SENSE OF PLACE

Being a technical high school and VTC, local adults and children's sense of place and tangible needs had to be explored as Ka-Ba-Thi Learning Centre would be used by both parties. To avoid explaining a complex topic like sense of place, grade four to seven learners from Mbapuka Primary School were asked to draw "the things they would miss if they had to relocate to another area". The drawings were compared to see the differences and similarities of the children's sense of place.

Most children included their mother and father (sometimes their siblings), house, school, church, livestock, crops, trees, footpaths and the Kavango River. Figure 59 tells a story of their daily routine and ways of life. Supporting chapter 3 – understanding the everyday life, figure 59 show the basic layout of the area and the distinctive north-south movement pattern, having their homestead connected by footpaths to the north lying Kavango River

and their southern summer farms. The child also shows a clear structural and material difference between his traditional home and that of the school, highlighting the importance of materiality, form and structure within the local context. The Kavango River dangers and advantages is also noted by looking at the crocodile and fish.

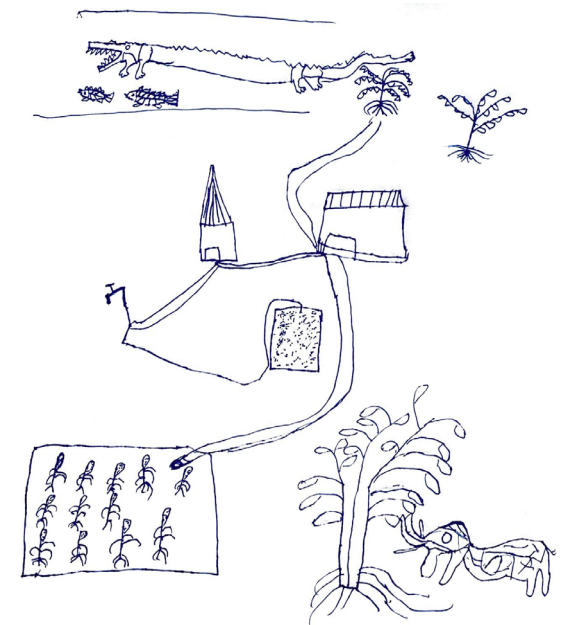


Figure 59: A child's drawing highlighting what he will miss if he had to relocate (Participant, 2022).

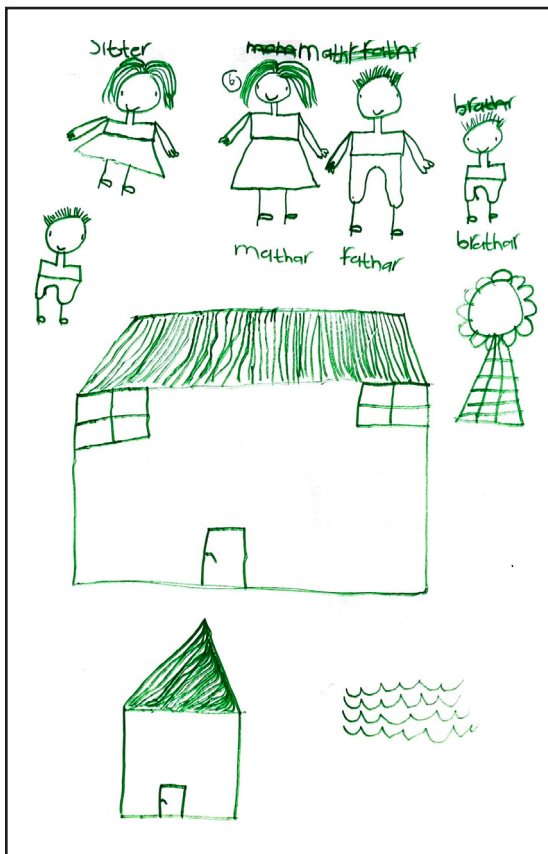


Figure 60: Comparing the similarities and differences of drawings in an attempt to understand the children's sense of place (Paticipant, 2022).

Figure 61: Conversations with local residents understanding their tangible needs and sense of place.



ADULT VIEWS

A number of adults were interviewed (unstructured) either in groups or individually. Information was gathered by having informal conversations with local residents to gain their trust and to allow them to freely express themselves and understand their tangible needs and current sense of place.

TWO BROTHERS

Having completed their matric exams recently, the two brothers are optimistic about their future. Being better educated than most of their family members, both brothers intend to move to Windhoek with hopes of finding employment if their applications to attend a tertiary education in Rundu are not approved. The brothers plan on living in Windhoek and sending money to their families before returning as pensioners and living on the farm.

According to the brothers, the community will

be better educated if a high school was located closer to their villages. Andara combined school is the closest, located 36km from the Kangongo area. Attracting pupils from all over the area, the school and hostel runs at full capacity and cannot cater for more children. Therefore, most children in the local area finish school after completing grade 10.

SCHOOL PRINCIPAL

According to the principal of Mbapuka Primary School, the six-classroom school has 200 pupils from grade zero to seven, using the Cambridge learning system. With limited government funding, the school struggles to provide pupils with basic stationery, school uniforms and food. Most children need to walk between 2-6km to reach the school. According to the principal, most children skip school 1-2 times per week to attend to family chores (herding cattle, ploughing fields) or during heavy rain showers.

The principal suggested that the school needs to find a way to operate without solely relying on monthly government funding. He is also of the opinion that the current school curriculum needs to address aspects that local residents can use in their everyday life.

TOUR GUIDE

The tour guide attended Andara Combined School, studied tourism at Rundu and found a job close to Katima Mulilo (360km away from Kangongo). He works at the lodge for four months at a time, before returning home for two weeks. On his return home he normally helps with household chores like herding cattle, collecting river water or preparing the soil for cultivation.

The guide wants to be a full-time farmer but needs to work in order to provide financial support for his family. He intends on returning home as soon as he becomes a pensioner. According to the guide, he was born on the

farm and has an unexplainable love towards the area despite having to battle challenging living circumstances every day. He says that in spite of having a good job in Katima he feels a sense of belonging being surrounded by familiar cultures, features and ways of

VILLAGE ELDER

The village elder was born in Mbapuka, finished high school at Andara, found a job as a bricklayer in Otjiwarongo and returned home after becoming a pensioner. Being a part of the construction industry for over 40 years, he has mastered painting, metalwork and gained a code C driving licence. As a child, he used to help his father build various family huts and developed a love for the craft. He says there was no better feeling looking at the end product after weeks of hard work. He feels like children should be taught practical skills like bricklaying, joinery and metal work if they want to succeed in finding a job in town and cities.



Figure 62: Ka-Ba-Thi Library perspective drawing.

Ka-Ba-Thi Learning Centre

04

intervention aim
intervention brief
client
programme

INTERVENTION AIM

The dissertation focuses on producing an architectural intervention within the Kavango East Region of Namibia where function is determined by the tangible needs of the local, rural Kavango East community. The design is informed by the local sense of place to guide future rural development schemes in an attempt to reduce the severe rate of rural urban migration within the region.

70 |

In an effort to create a building function that reduces the need for rural-urban migration, tangible needs of local, rural residents were identified at different scales in chapter 3. One can quickly see how the pull factors of urban areas, identified in chapter 2, align with the needs of the local, rural Kavango East residents identified in chapter 3. Employment, income and education were the three major tangible needs of local residents identified through interviews and field studies.

A problematic cycle in rural areas is evident

when a shortage of education, tertiary qualification and skills results in unemployment and low income, leading to poverty and ultimately food shortages, poor living conditions, poor sanitary conditions and stagnant rural development. By providing locals with education and/or qualifications aimed at bettering their everyday life, the rural poverty cycle could be broken. When people are able to use their education, qualification and/or new skills to find employment and earn an income, rural growth/development is created either by locals using their newly acquired skills or by using their income for investment purposes.

By attempting to reduce the need for rural-urban migration even more the intervention aims to create an ideal sense of place and/or working/learning environment around its function. The four aspects creating a sense of place (chapter 2) were used to inform design spaces, materials, forms and construction techniques based on the information gath-

ered at meso and micro scale (chapter 3) from the surrounding context.

The intervention intends to be accessible to as many people as possible, providing locals with needed services/functions within their ideal sense of place. It will therefore be placed next to the Kavango River, in-between the **Kangongo**, **Mbapuka** and **Thikanduko** villages to connect the three communities, hence the name Ka-Ba-Thi Learning Centre.

Figure 63 shows how this technique intends to form part of a future Kavango East rural development scheme where different interventions using similar design informants will be placed in-between villages attempting to connect communities and encourage development in open areas, forming a linked, more developed settlement pattern along the Kavango River.

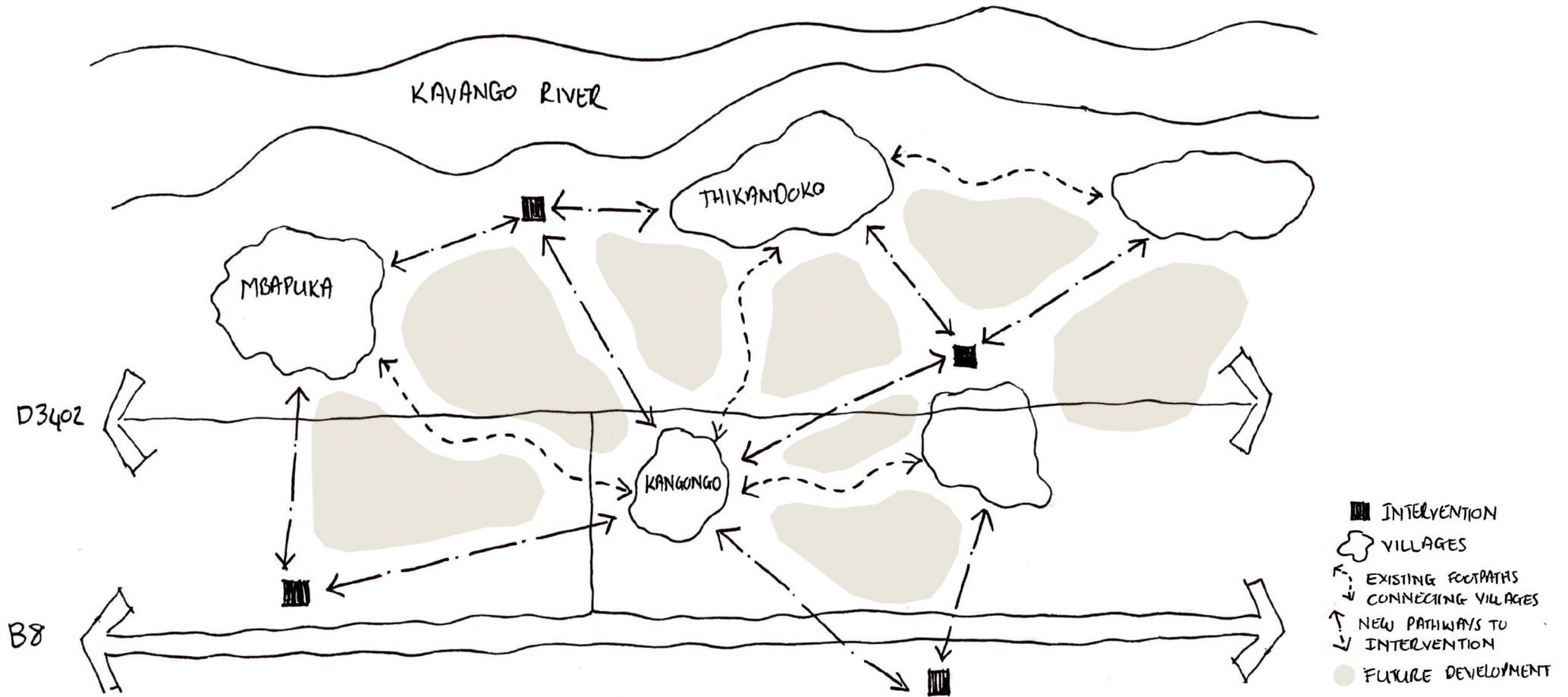


Figure 63: Diagram exploring the intended Kavango East development system connecting villages and inspiring development in-between communities.

INTERVENTION BRIEF

Ka-Ba-Thi Learning Centre will be located in the North East of the Kavango East region of Namibia. Sitting on the banks of the Kavan- go River between three villages (Kangongo, Mbapuka & Thikanduko) Ka-Ba-Thi Learn- ing Centre will primarily serve as a technical high school before noon and as a Vocation- al Training Centre (VTC) after noon. Being a technical high school, pupils will only follow part of Namibia's common school curriculum - Cambridge. The school intends to provide students with Cambridge subjects like math- ematics, biology, languages and science before focusing on its technical subjects like construction, agriculture, metalwork, wood- work, pottery, art, beading and weaving, knitting and cooking. The centre will have a mixture of appropriate open and closed classrooms and workshops/studios to facili- tate pupils in the morning and VTC students in the afternoon. The VTC intends to provide ter- tiary level academic and technical services

to allow students to graduate with a proper/ accredited qualification.

The centre aims to operate by sustaining it- self using the services and produce from its technical classes. Pupils/students who at- tend agriculture classes will learn to farm by planting and harvesting fruit and vegetables and supplying it to the cafeteria. Those at- tending cooking classes can now learn how to prepare food by providing meals to class- mates. The classrooms and spaces could be maintained/developed by those attending the construction, woodwork and metalwork classes. School uniforms could be produced by those attending knitting/stitching classes.

Ka-ba-thi Learning Centre will not only have several classrooms, workshops storage areas and toilets but a cafeteria, library, communi- ty hall and clinic to increase the number of functions available to the community. The design will focus on adopting and using the four aspects creating a sense of place ac-

cording to the local ways of life and context. The construction of the centre will be done with the help of the local community using local construction techniques, methods and materials. This will create a feeling of owner- ship and value, strengthening the sense of place and reducing the cost of construction.

CLIENT

Being a government funded technical high school located within a rural area that fo- cuses on agricultural production, Ka-Ba-Thi Learning Centre would have needed the ap- proval of three different Namibian ministries. The basic program of the school will need to adhere to the requirements of Ministry of Edu- cation, Arts and Culture in order to follow the educational facility protocols. The agricultural component linked to Ka-Ba-Thi Learning Cen- tre would need the follow the requirements of the Ministry of Agriculture, Water and Land Reform as the Kavango River would be used as the main water source.

Lastly, being located within a rural setting Ka-Ba-Thi Learning Centre would require the approval and guidelines of the Ministry of Urban and Rural Development.

Although these three ministries need to provide the proper approval for Ka-Ba-Thi Learning Centre, they would not be regarded as the main clients.



Figure 64: Interacting with residents to understand their needs.

The functions within Ka-Ba-Thi Learning Centre were carefully assessed in order to create a particular sequence of sustainability. As mentioned, students would support the school while gaining valuable practical experience, planting crops, cooking food, building/repairing classrooms and knitting school clothes. Therefore, the school has a number of different classrooms, workshops and studios. Inspired by the various local ways of gathering, meeting spaces within Ka-Ba-Thi vary between closed and open-air spaces complementing the existing sense of place.

Ka-Ba-Thi will harness the water source (Kavango River) by collecting, filtering and pumping water to the centre. The water would be used for drinking and cooking, irrigation and for sewage purposes.

Ka-Ba-Thi Learning Centre will also include a clinic, observation ward, community hall,

cafeteria and library aiming to attract more people by providing needed services. Due to the specific spatial and functional requirements of areas within a clinic, figure 65 was studied to formulate a similar design interpretation, adhering to rural clinic necessities.

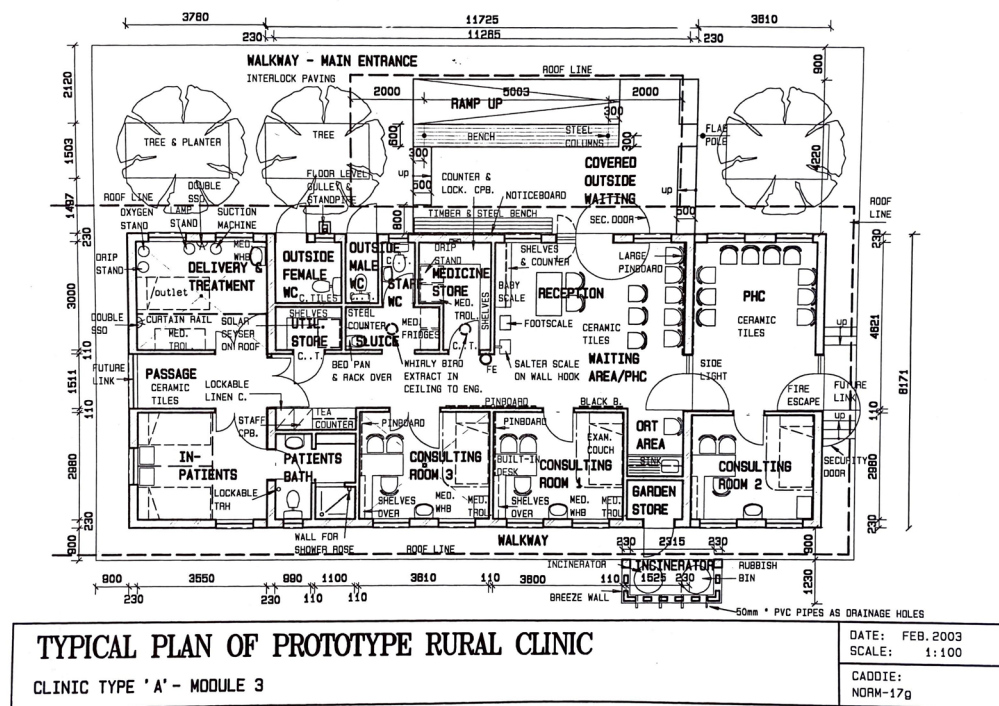


Figure 65: A typical plan of a prototype rural clinic (Ministry of Health and Social Services, 2004).



Figure 66: Conceptual exploration of organic North, South pathways.

concept
development

05

touchstone
development 1
development 2
development 3

TOUCHSTONE

This abstract artwork was the first attempt in creating form to establish a starting point for the designing process (Fig. 66). The touchstone was inspired and informed by the main contextual features like the Kavango River, the D3402 and B8 roads, footpaths, housing shapes and materials.

Figure 68 shows the exploration of the touchstone model by sketching it at different angles. This process revealed the same settlement framework indicated on page 41 and the clear north-south movement pattern indicated on page 45.



Figure 67: Touchstone: model one.

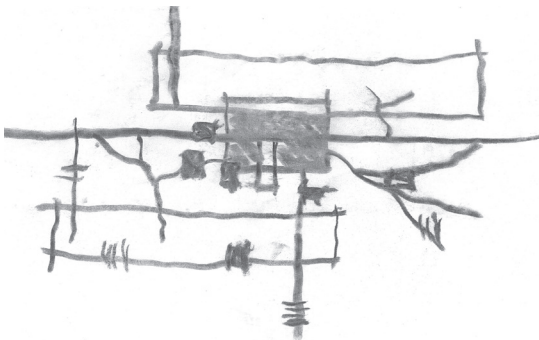


Figure 68: Sketching touchstone model.



CONCEPT EXPLORATION ONE

Looking at figure 71, the first concept was inspired by the north-south movement pattern and the local traditional square, clay houses attempting to recreate the existing sense of place.

As mentioned in chapter 4, construction would be done at low cost by local residents using local materials and building techniques. This led to exploring inexpensive and efficient passive cooling techniques. Figure 69 shows a section through Gando Primary School where Francis Kéré raised the roof off the building, allowing internal warm air to escape through holes in the vault.

Figure 70 explores a similar method where the roof is lifted off the building to allow warm air to escape. The design layout had to be reinvestigated as figure 70 creates ordered and planned motion through the building, contradicting the organic, local way of movement.

Gando Primary School - Burkina Faso

A hand-drawn diagram of a rectangular enclosure, possibly a field or a plot. The enclosure is defined by a solid black line. Inside the enclosure, there is a dashed black line forming a shape that resembles a stylized 'C' or a partial circle. A red dashed line runs diagonally across the enclosure, from the bottom-left towards the top-right. The corners of the enclosure are marked with small black dots. The background of the enclosure is filled with horizontal lines, suggesting a field or a plot. The entire diagram is enclosed in a rectangular frame.

Diagram illustrating a raised roof ventilation system. The diagram shows a cross-section of a building with a raised roof. Arrows indicate hot air escaping from the roof and through ceiling weepholes. A dashed line represents the ventilation path. Labels include: Raised roof, Hot air escaping, Ceiling Weepholes, and Ventilation.

Figure 69: Gando Primary School by Francis Kéré using holes to allow warm air to escape.

Figure 70: Model two.

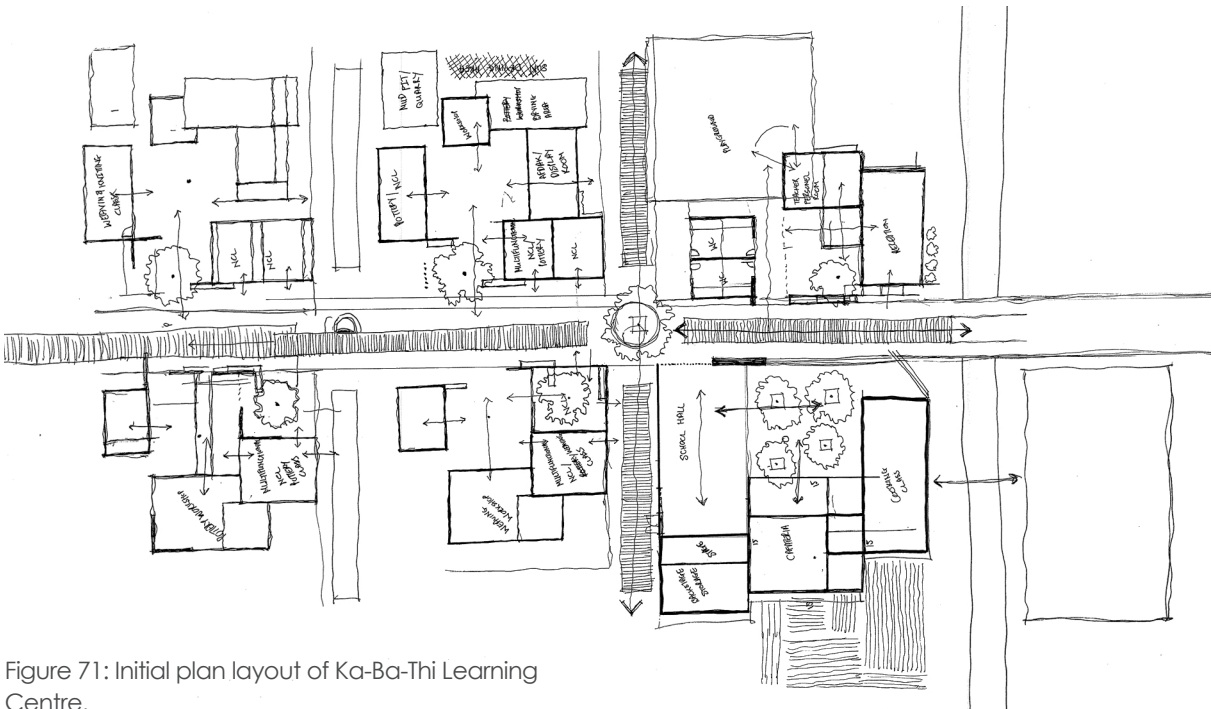


Figure 71: Initial plan layout of Ka-Ba-Thi Learning Centre.



CONCEPT EXPLORATION TWO

Inspired by the children's strong sense of place towards their daily footpaths and routes (p. 66), different organic patterns and forms were explored. Created by blowing ink with a straw, figure 66 replicates the organic footpaths of the Kangongo area. The artwork was used as a base layer to determine the overall layout of Ka-Ba-Thi Learning Centre. The organic base layer required exploration into organic walls and how they can determine movement through a site. Figure 72 shows how Namibian based architect Nina Maritz controls access through the Uiba-Oas Crystal market by allowing organic walls to guide people in a particular direction towards a particular opening or function.

Basic Structure

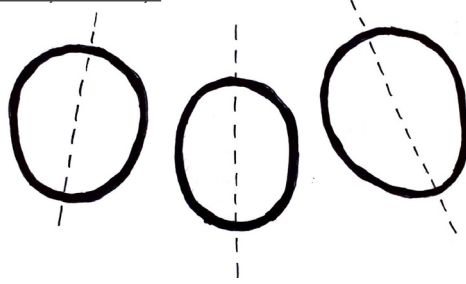


Figure 72: Uiba-Oas Crystal market by Nina Maritz access control using organic walls.

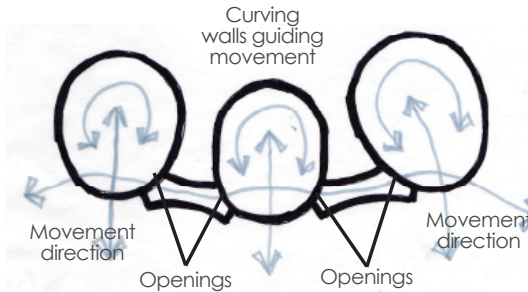
PRECEDENT ANALYSIS:

Uiba-Oas Crystal market: Namibia

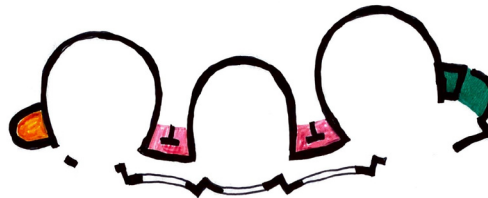
Basic Symmetry



Movement Control



Hidden Services



CONCEPT EXPLORATION THREE

The organic wall was investigated further to explore new/different forms, materials and their limitations. Figure 73 shows a section through the Maya Somaiya Library designed by Sameep Padora and Associates investigating how a material can transform from a floor to a wall to a roof, creating an organic shape.

Figure 74 shows how a similar system was explored with the hopes of creating a unique intervention with the organic link to the local footpaths. After investigating the cost and construction difficulty of the Maya Somaiya Library it was clear that the design did not fit the Ka-Ba-Thi program.

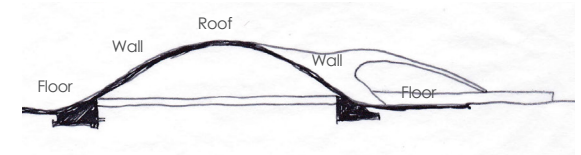


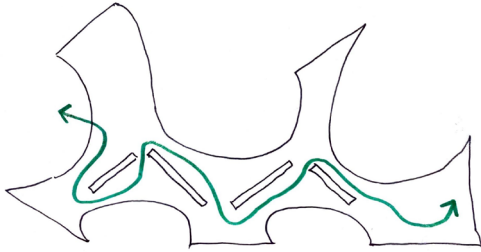
Figure 73: Maya Somaiya Library by Sameep Padora and Associates section exploring the organic form.

PRECEDENT ANALYSIS:

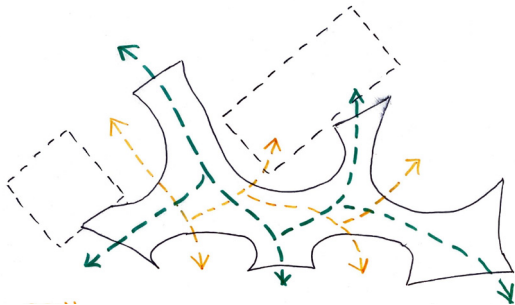
Maya Somaiya Library: Maharashtra

Basic Structure & Movement

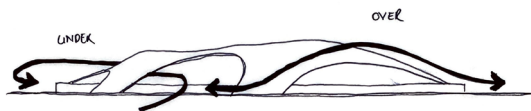
Furniture determining movement through the building



Building Shape determining movement



Movement over and underneath the roof structure



EXPLORATION:

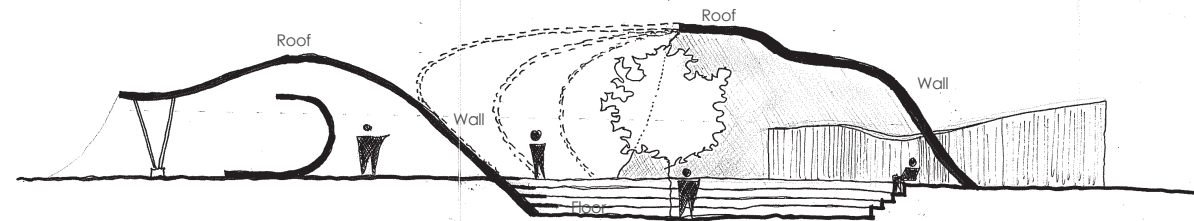
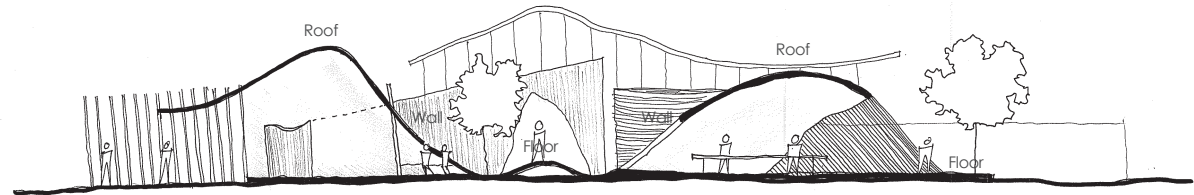
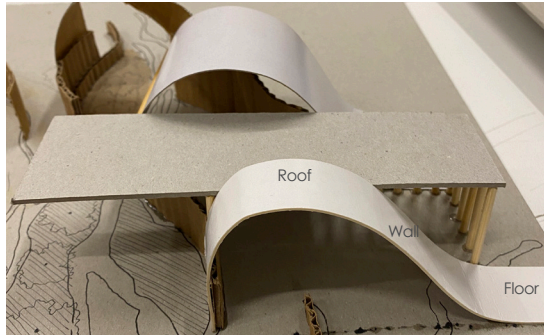


Figure 74: Connected floor, wall and roof system exploration.

CONCEPT EXPLORATION FOUR

Due to the previous concept not being feasible and too technical another organic shaped alternative had to be explored. Focus was shifted from complex organic walls to an organic roof. Figures 75 and 76 investigate the locally (Senegal) sourced Thread Building roof structure designed by Toshiko Mori Architects. Figure 75 indicates how the organic shape collects rainwater in a reservoir while figure 76 shows the organic structure, shape and material of the roof. These two aspects could be used at Ka-Ba-Thi Learning Centre as it fits well within the program.

Figure 77 shows a similar roof structure exploration where the same principles were applied. However, combining curved walls with an organic roof diverted from the local sense of place once again as a subtle, rectangular/square element found within every homestead needed to find its place within the design.

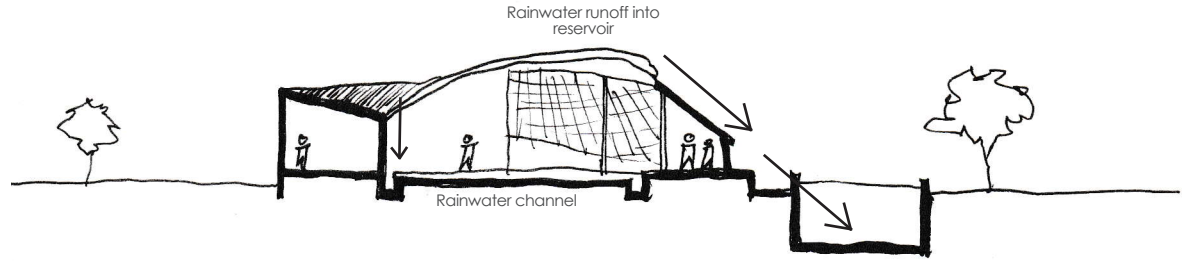


Figure 75: Thread Building roof structure funnelling water to reservoir.

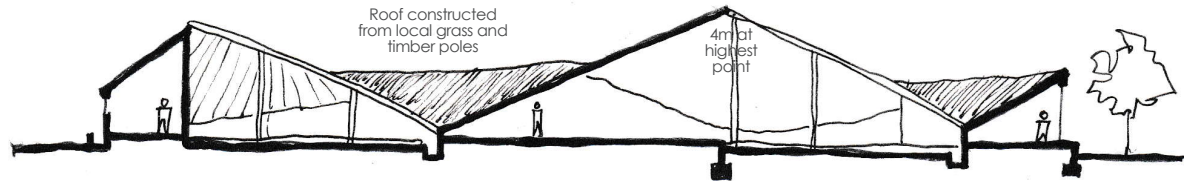


Figure 76: Investigating Thread Building roof structure proportion and structure.

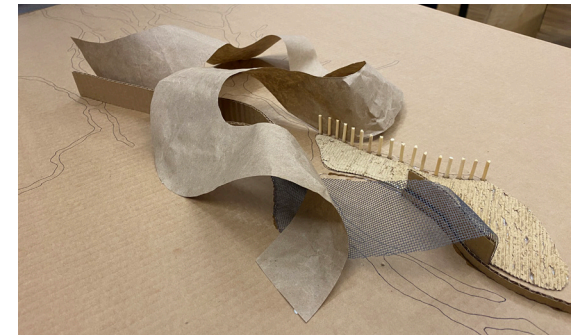


Figure 77: Exploring an organic roof structure on Ka-Ba-Thi concept model.

DESIGN INFORMANTS SUMMARY

In order to celebrate the rectangular housing typologies and settlement patterns as well as the organic footpaths and surrounding natural features, organic and angular forms had to be merged within the design to acknowledge the contrasting shapes and unique sense of place. Inspired by the simplicity and effectiveness of the organic wall used by Nina Maritz at the Uiba-Oas Crystal market, Ka-Ba-Thi Learning Centre would use a similar system to guide individuals through the building celebrating the organic north-south movement of locals. Similar to the Gando Primary School project, Ka-Ba-Thi will be constructed by the local community using mostly local materials to reduce costs and strengthen the buildings sense of place. With a limited budget and poor electrical service in the local area, passive heating and cooling techniques need to be incorporated, similar to that implemented at Gando Primary School and explored in figure 69.



Figure 78: Ka-Ba-Thi Learning Centre: Render of the Library Reading Garden.

design
documentation

06

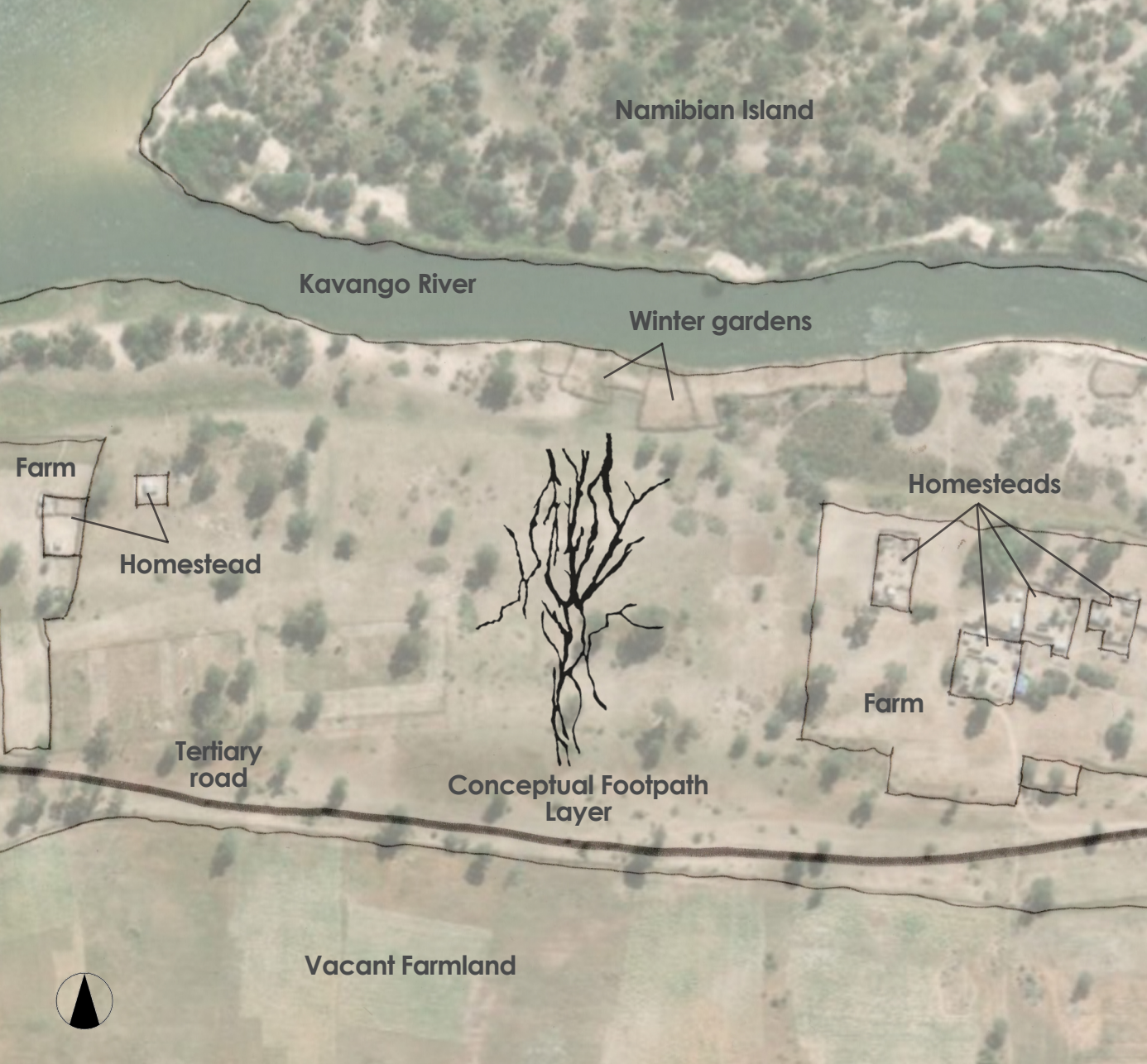
design development
design resolution

design development

- site overview
- layout and functions
- walls, pathways and access



Figure 79: Ka-Ba-Thi Learning Centre
Conceptual Sketch.



SITE OVERVIEW

Being a technical school/VTC providing agricultural subjects and courses, the centre's site needed to be located close to the Okavango River in order to utilise the water source in an inexpensive manner. It also needed to be situated close or on a large open plot of land where crops can be planted and livestock can be kept. Close proximity to the natural border (Kavango River) also reduces the distance travelled by Angolan residents interested in attending Ka-Ba-Thi Learning Centre (Fig. 80).

The organic, abstract artwork identified on page 76 was scaled and placed strategically in between existing trees, at a safe distance from the river to avoid floods and close enough to the vacant plot for efficient farming.

Figure 80: Placement of the conceptual movement exploration on site.

OKAYANGO RIVER

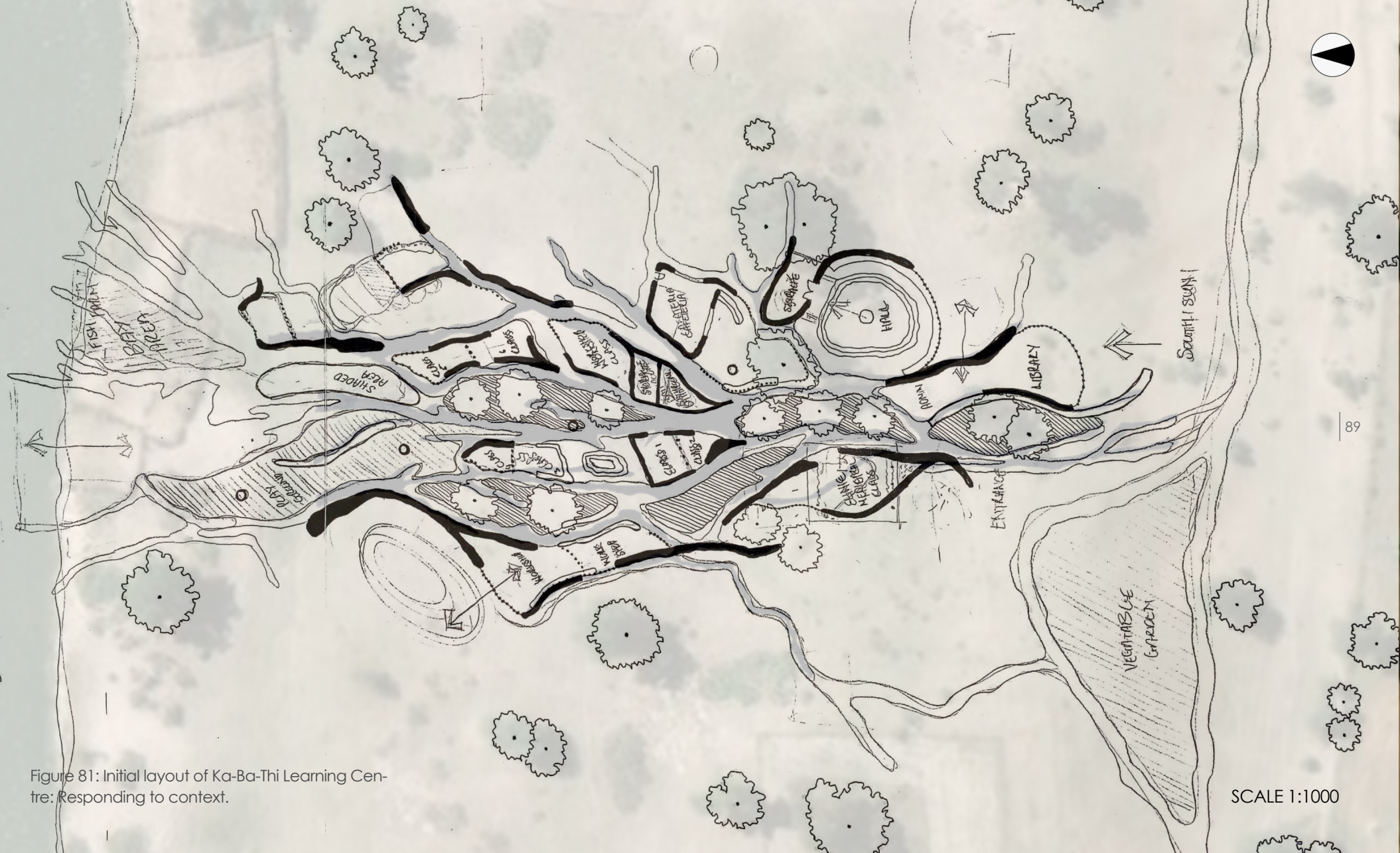


Figure 81: Initial layout of Ka-Ba-Thi Learning Centre: Responding to context.

SCALE 1:1000



Figure 82: Mahangu and various vegetables planted in between homesteads.

LAYOUT & FUNCTIONS

A number of different spacial explorations were considered to determine the ideal layout. Sound/noise and public versus private space were two factors that created a hierarchical order to the layout of Ka-Ba-Thi Learning Centre.

Looking at figure 83, visitors pass by the library, information desk and clinic when entering from the south. These spaces had to be located further away from noisy spaces like workshops, and close to the road as they are accessible to all members of the public. Moving further north is a semi-private courtyard area surrounded by the clinic, library, cafeteria, classrooms, studios, workshops, lawn and crop fields. This area would mostly be used by people visiting the library or clinic, high school pupils and members of the VTC. Inspired by the vegetable gardens and crops within local homesteads (Fig. 82), lawns/green areas, vegetable gardens and crop fields can be

found within the centre. This visually strengthens the sense of place, creates a sense of pride when students can harvest their crops and protects the crops from Hippos.

Being more private, classrooms, workshops and studios are located further north as these are only used by teachers, pupils and members enrolled at the VTC. Similar to the houses/rooms found in local homesteads, most buildings in the centre will work independently, having a particular purpose or function. Explained in chapter 7, workshops, classrooms and studios will vary between closed, semi-closed and open-air spaces, typologically inspired by local construction methods and materials. The clinic and library will however be closed spaces (refere to chapter 7). A canoe dock will be located next to the river temporarily housing boats of members/students that travelled along the river. A river collection point designed to protect people from crocodiles will also be available to the public.

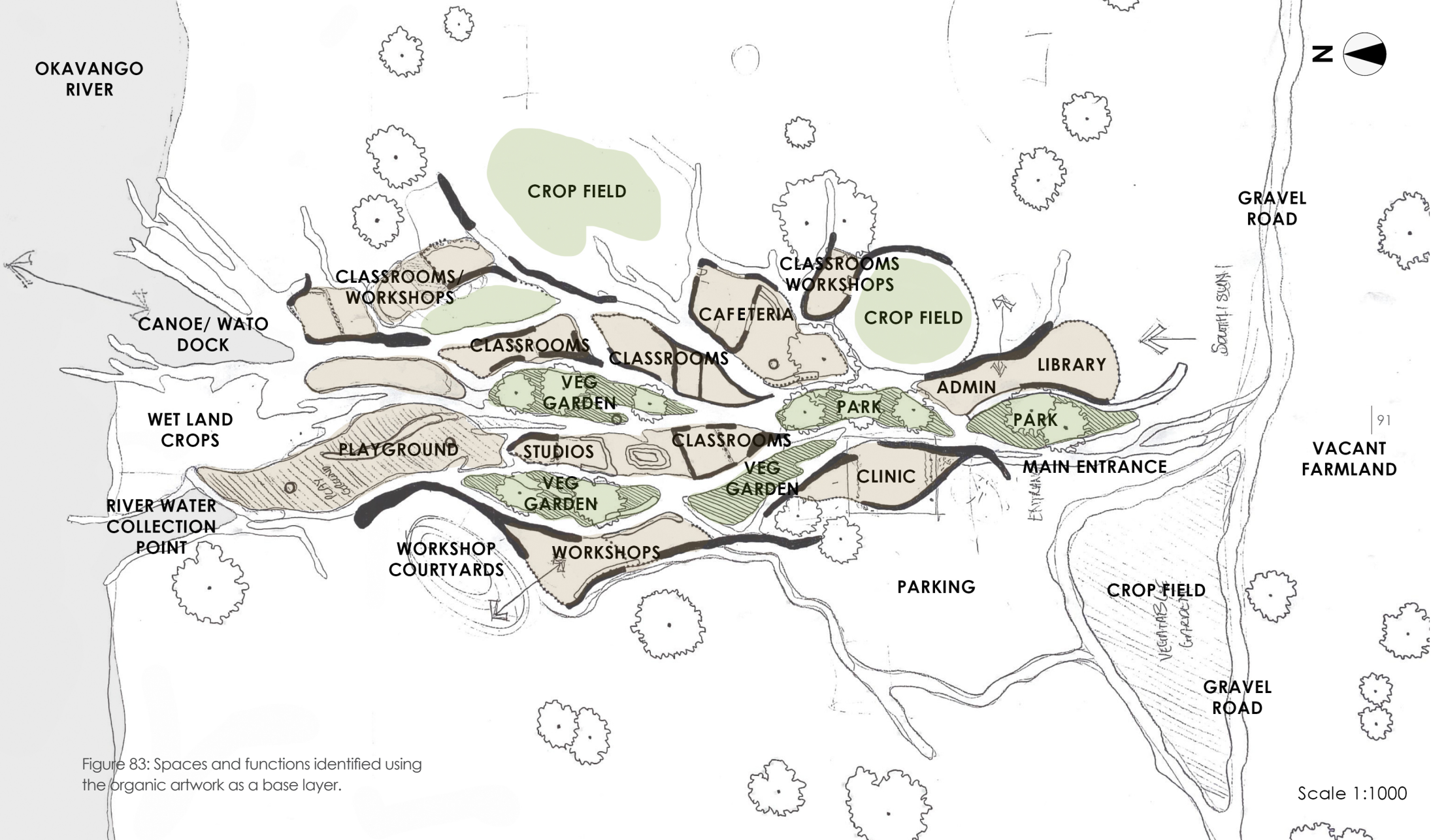


Figure 83: Spaces and functions identified using the organic artwork as a base layer.



Figure 84: Areal view of Mbapuka showing the corridor created by the organic farms.

WALLS, PATHWAYS & ACCESS

The organic layout of Ka-Ba-Thi Learning Centre was inspired by the weaving footpaths and corridors separating various organic shaped farmlands in and around the three local villages (Fig. 84). Page 64 - 65 shows how children's positive sense of place is not only linked to the destination but to the journey. Locals usually travel in groups to farm, gather natural resources, attend school or to go to church. It could be argued that a positive sense of place is created when locals interact and socialise along their journey which needs to be incorporated into the design.

The organic artwork identified on page 76 replicates the weaving footpaths and corridors in between surrounding farmlands. This creates a number of isolated, irregular shaped "islands" within the intervention that mimic the organic farmlands around the local villages (Fig. 84). Figure 86 shows how

these "farmlands" were given specific building functions using a hierarchical order that would later be developed according to special needs and sense of place. The intervention follows the free and explorative pathway concept further by being permeable and accessible from all directions.



Figure 85: Child's drawing showing his/her connection to pathways.

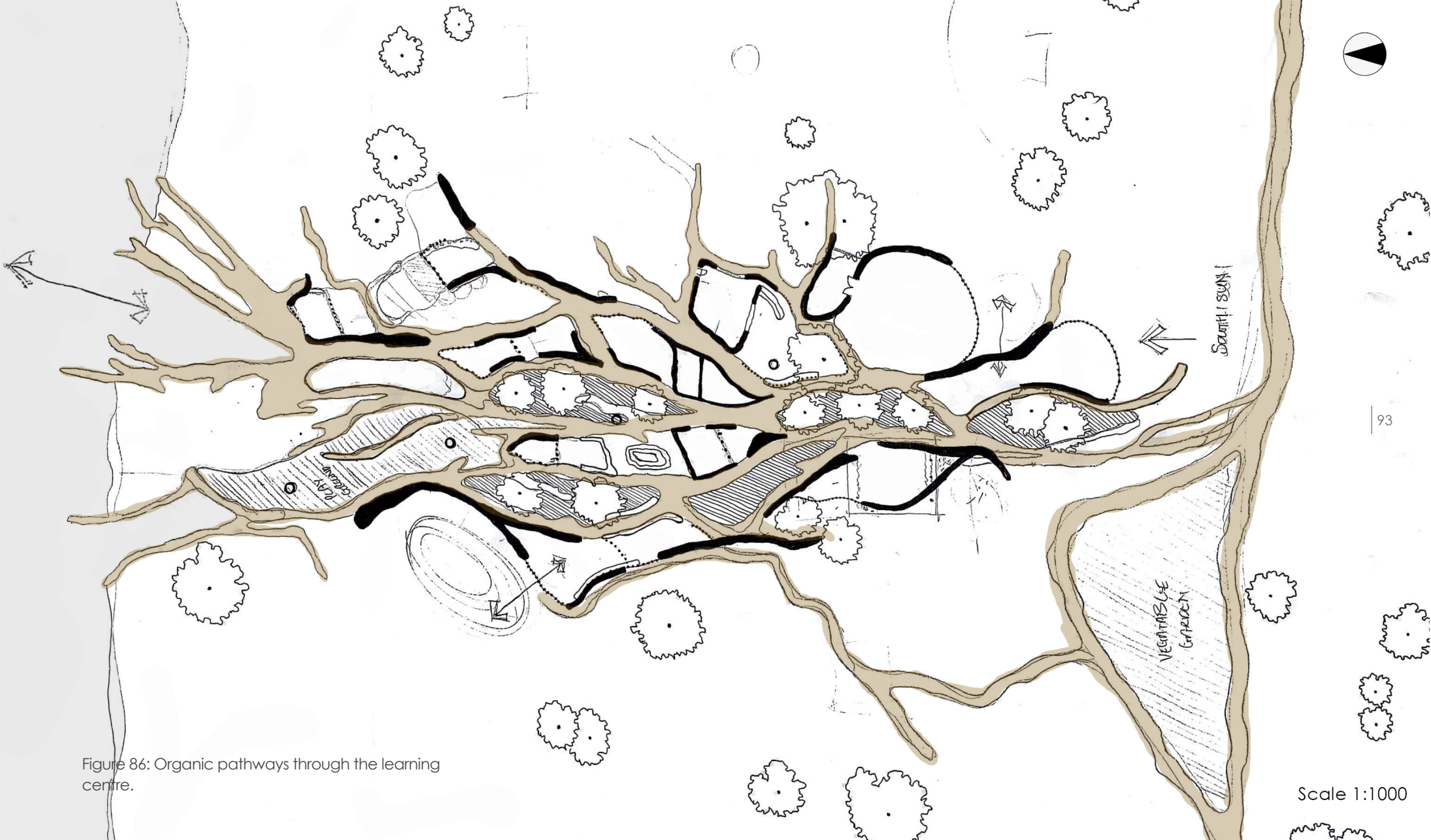


Figure 86: Organic pathways through the learning centre.

Scale 1:1000

design resolution

- phased development
- construction materials and methods
- column grid
- contrast and articulation
- orientation
- movement and organic walls
- roof layout
- tree life
- spatial layout and experience



Figure 87: Perspective sketch of the Ka-Ba-Thi Library.

PHASED DEVELOPMENT

Due to its large size, Ka-Ba-Thi Learning Centre will be constructed in two separate phases. Looking at figure 88, the first phase will include the library, resource centre, clinic, observation ward, pharmacy, cafeteria, meeting pavilion, two classrooms, three workshops/studios, a vegetable garden and two crop fields. In order to ensure the success of the overall project the first phase aims to attract people from the surrounding villages by providing them a variety of services.

After the first phase proved to be well established and used regularly, the second phase will be constructed. The phased development allows the opportunity to make necessary design and construction adjustments to the second phase, based on how locals felt towards the previous development. The sense of place could be further reinforced by allowing the community to participate in the design and construction process for a second time.

Figure 88: Phased development layout.

SCALE 1:1000

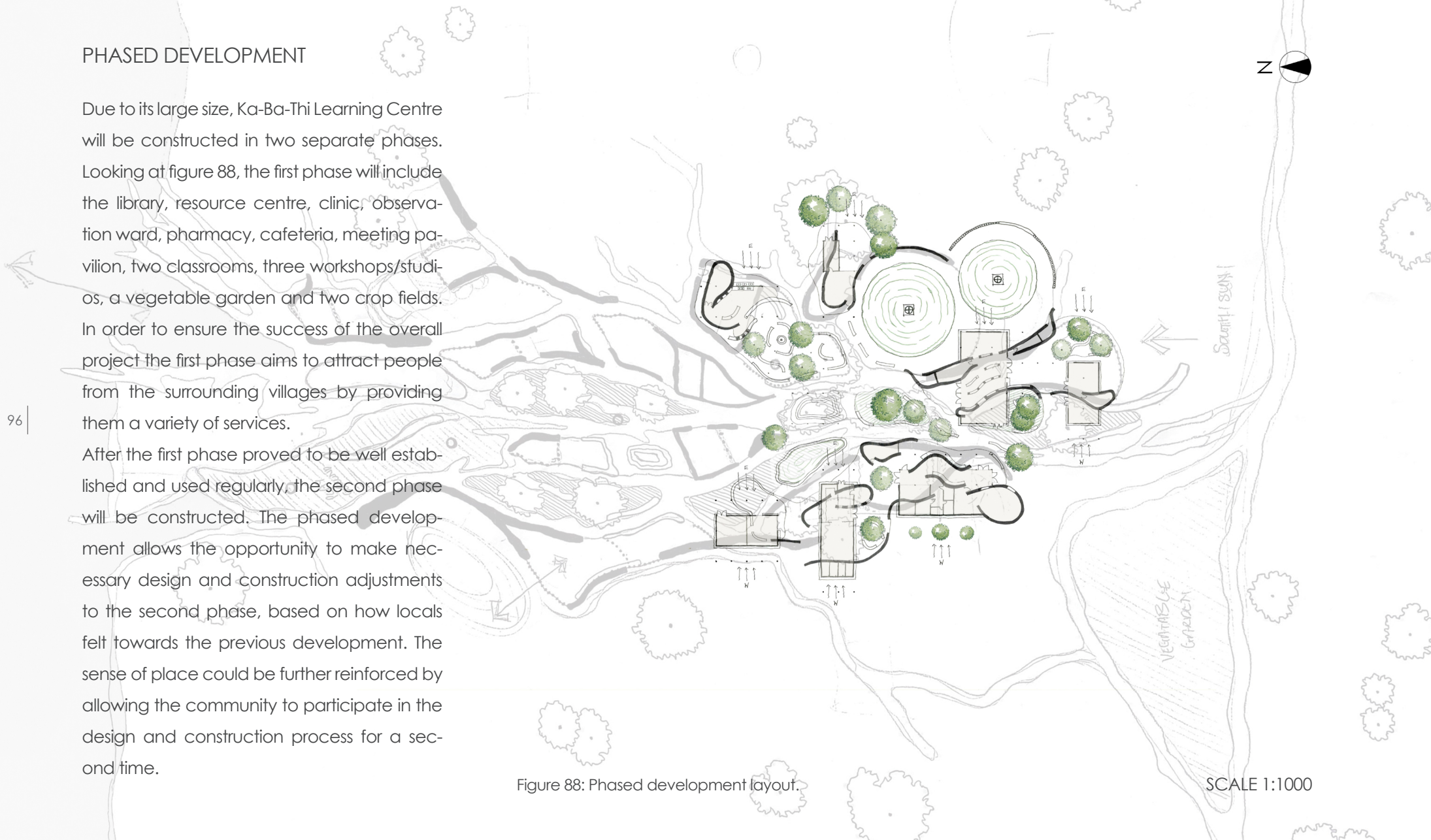




Figure 89: Common clay hut construction method and materials.

CONSTRUCTION METHODS & MATERIALS

The surrounding cultural constructs and physical/natural environment informed the different types of building materials and construction methods used within Ka-Ba-Thi Learning Centre, in order to recreate a local sense of place. The Centre will make use of the community self-help building scheme similar to that used by Francis Kéré in his Gando Primary School project where local residents will be responsible for the construction of the project. This method will reduce construction costs, educate locals and create a sense of pride, achievement and responsibility, strengthening their sense of place even further.

Imitating the surrounding traditional houses, clay and timber would be the main building materials used for construction. These materials do not only contribute to the local sense of place, it reduces construction cost, found locally, sustainable and has good thermal

properties. However, different construction methods had to be explored due to the 5-year lifespan of traditional houses. This creates a great opportunity to implement more efficient construction methods whilst preserving the local sense of place.



Figure 90: Gando Primary School constructed by the local community (Identitecture, 2021: online.).

COLUMN GRID

Due to the loosely arranged organic wall structures, a 3 x 3m grid system has been used to accurately determine the correct positions of the walls by referring to particular setting out points. The system could reduce construction errors made by inexperienced community members building the learning centre.

Figure 91 shows how the grid system was also used to determine the positions of columns creating a rectangular spatial order in between the organic spaces that adds to the contrasting, typological sense of place mentioned on page 83.

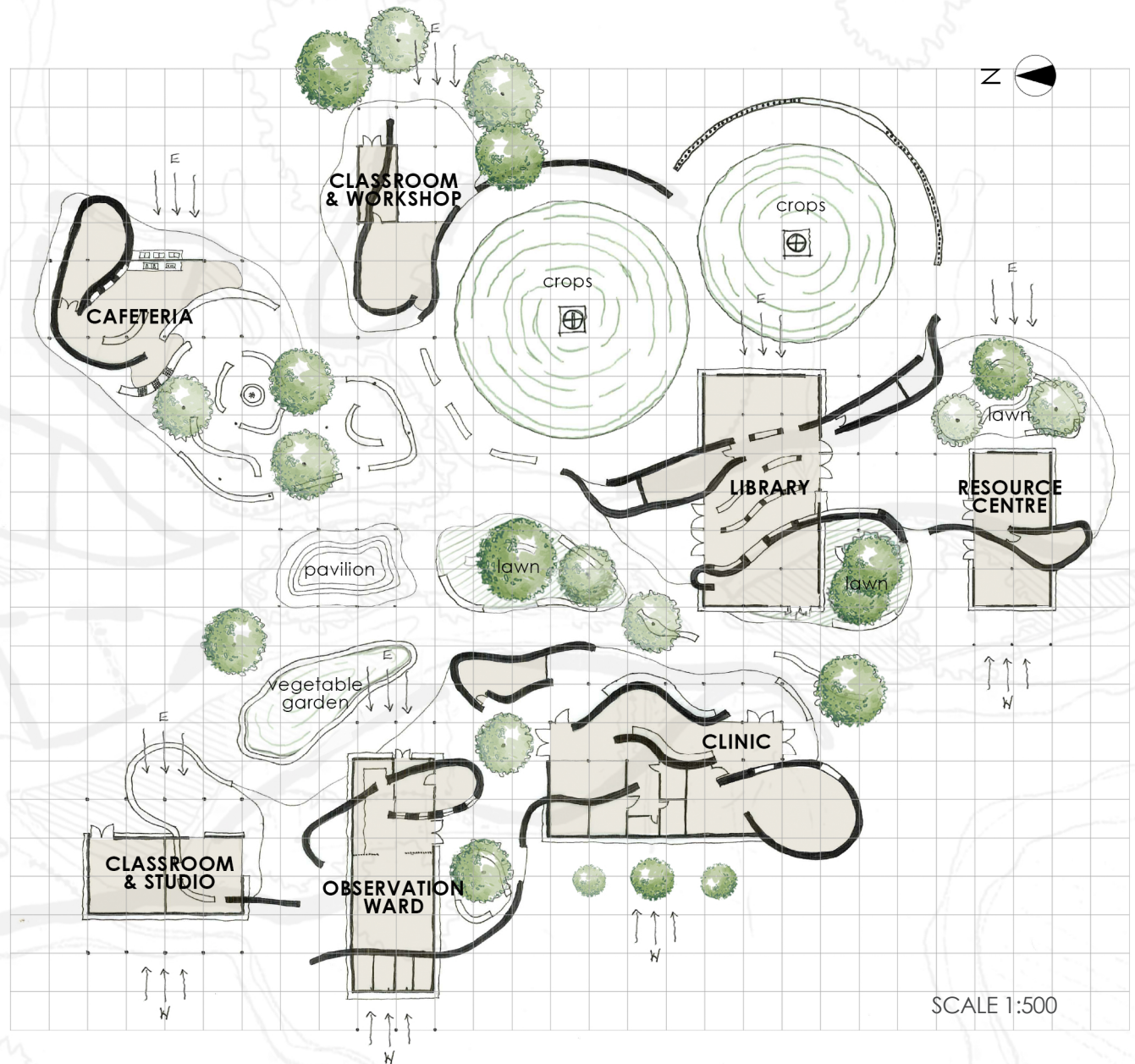


Figure 91: Column grid system.

CONTRAST & ARTICULATION

As mentioned on page 83, a contrasting typological sense of place needs to be achieved. Looking at figure 91, rectangular shaped functions inspired by the form of the traditional clay hut cuts through the thick organic walls. These contrasting forms are clearly articulated on plan by extending far past each other. The articulation is further reenforced by means of materiality. All organic walls would be constructed using a plastered adobe bricks while angular walls would be constructed using various construction materials and methods inspired by the local context (refer to chapter 7).

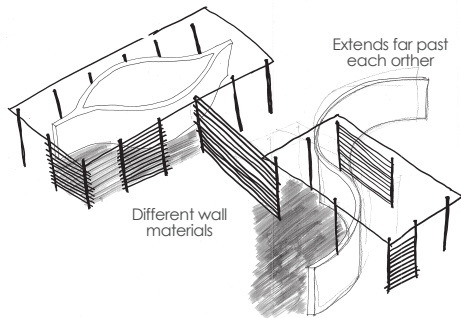


Figure 92: Diagram exploring different articulation methods.

ORIENTATION

Buildings within the southern hemisphere are exposed to morning sunlight from the east and afternoon sunlight from the west. In order to reduce heat gain, buildings normally face north to avoid the consistent, daily sunlight exposure.

Looking at figure 93, Ka-Ba-Thi adopted the same principle, where smaller facades face east and west to reduce heat gain. Figure 93 continues to show how trees and large roof overhangs were used on eastern and western edges to reduce facades being exposed to direct heat rays.

Walls facing east and west would normally be constructed with clay and/or timber due to their good thermal characteristics, absorbing heat at a slow rate. For this reason, with its poor thermal performances, corrugated iron facades would usually face north and south.

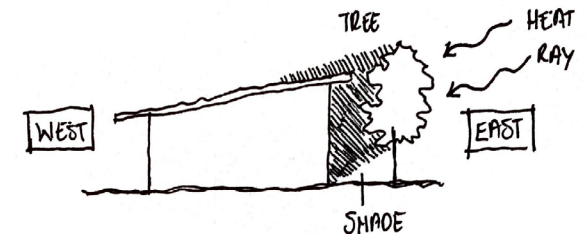
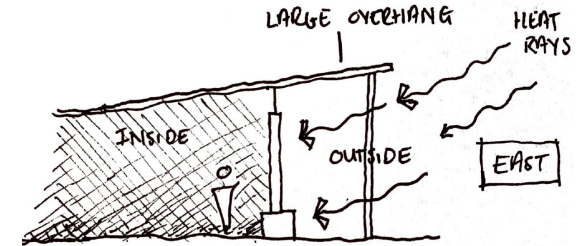
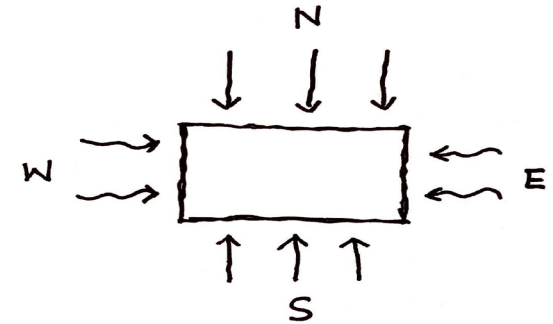


Figure 93: Diagram exploring different ways to reduce eastern and western heat gain.

MOVEMENT

As described on page 92, the organic movement through Ka-Ba-Thi Learning Centre was inspired by the numerous corridors in between the farms, surrounding the local villages. The movement pattern and overall layout of the centre was then determined by the abstract artwork seen on page 76.

Movement would however not only be determined by the organic footpaths meandering through the centre. It would also be determined by a variety of organic walls spread across the site. Uiba-Oas Crystal market, designed by Nina Maritz (Fig. 72), served as the main informant on how to control movement through a site. It showed how walls can be used, not only as a barrier but as a guiding agent. The organic walls spread out through the site has various heights to allow visual permeability and seating while guiding users to a particular area.

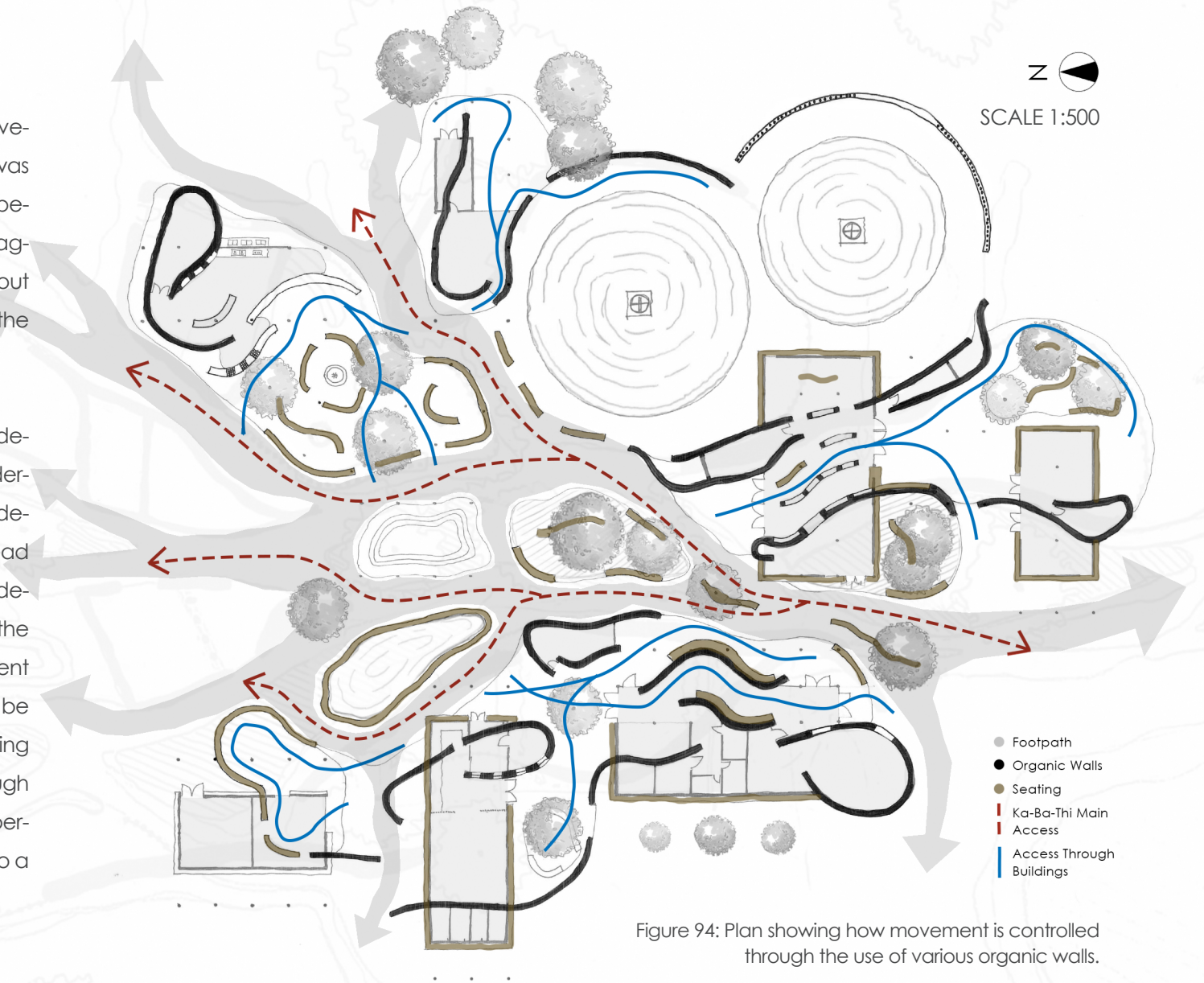


Figure 94: Plan showing how movement is controlled through the use of various organic walls.

ORGANIC WALLS

As mentioned on page 100, the organic walls aimed to serve more than one purpose. The organic walls were used to act as barriers and seating, determining and controlling movement, hiding services and providing storage.

Figure 96 was studied to understand how walls can be used to facilitate and hide services. Victor Ebergenyi Kelly places services within a seemingly thick wall by a tapered wall technique to the building's edges. This method inspired how bookshelves and cupboards would be used and inserted within the organic walls.

Figure 95 shows how the Ka-Ba-Thi Library used organic walls to determine the flow through the space. Some of these walls provide seating while others serve as cupboards, displaying the various books the library has to offer.

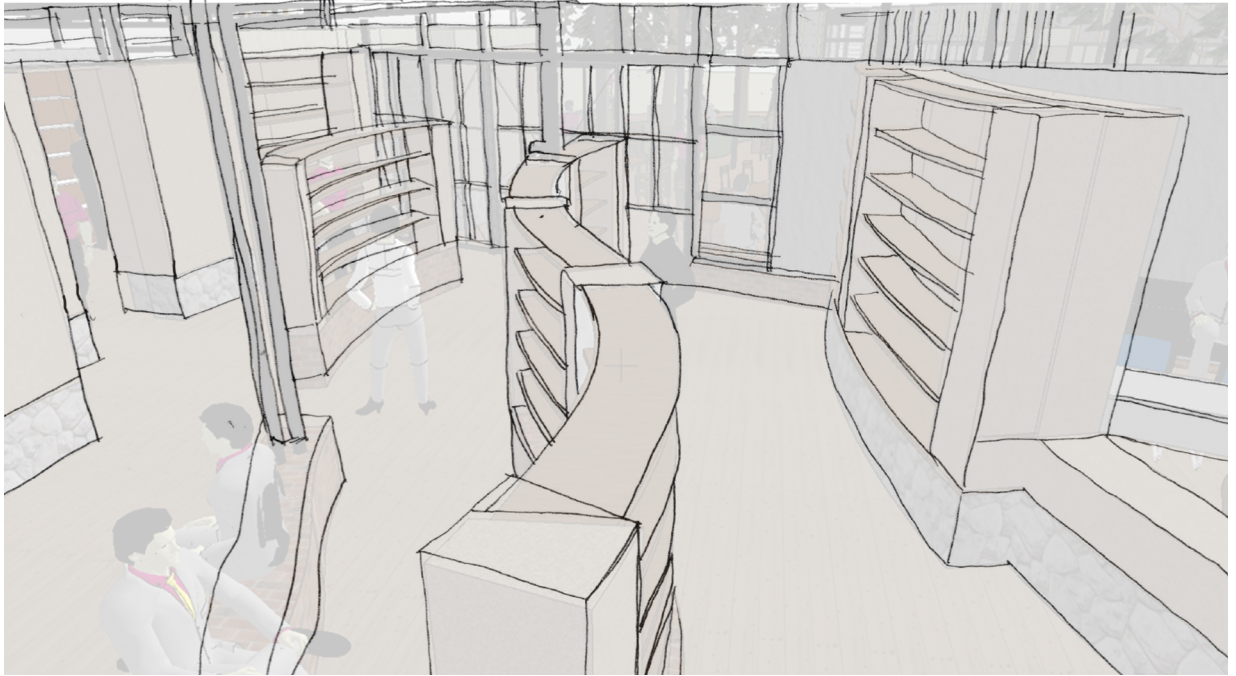


Figure 95: Perspective showing how walls in the library are used in different manners to control movement.

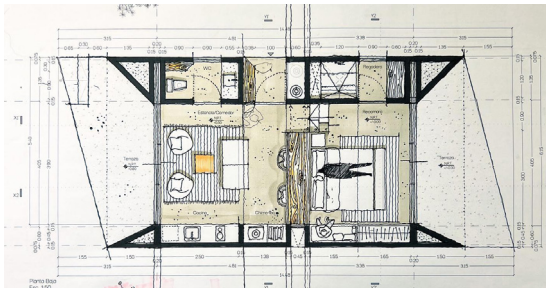


Figure 96: How walls can be used to facilitate services.

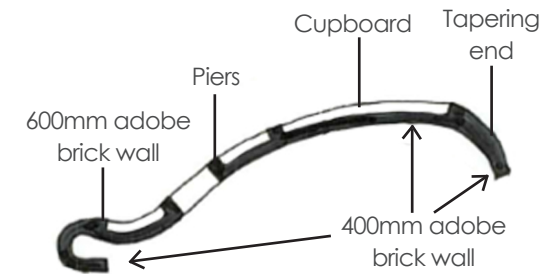


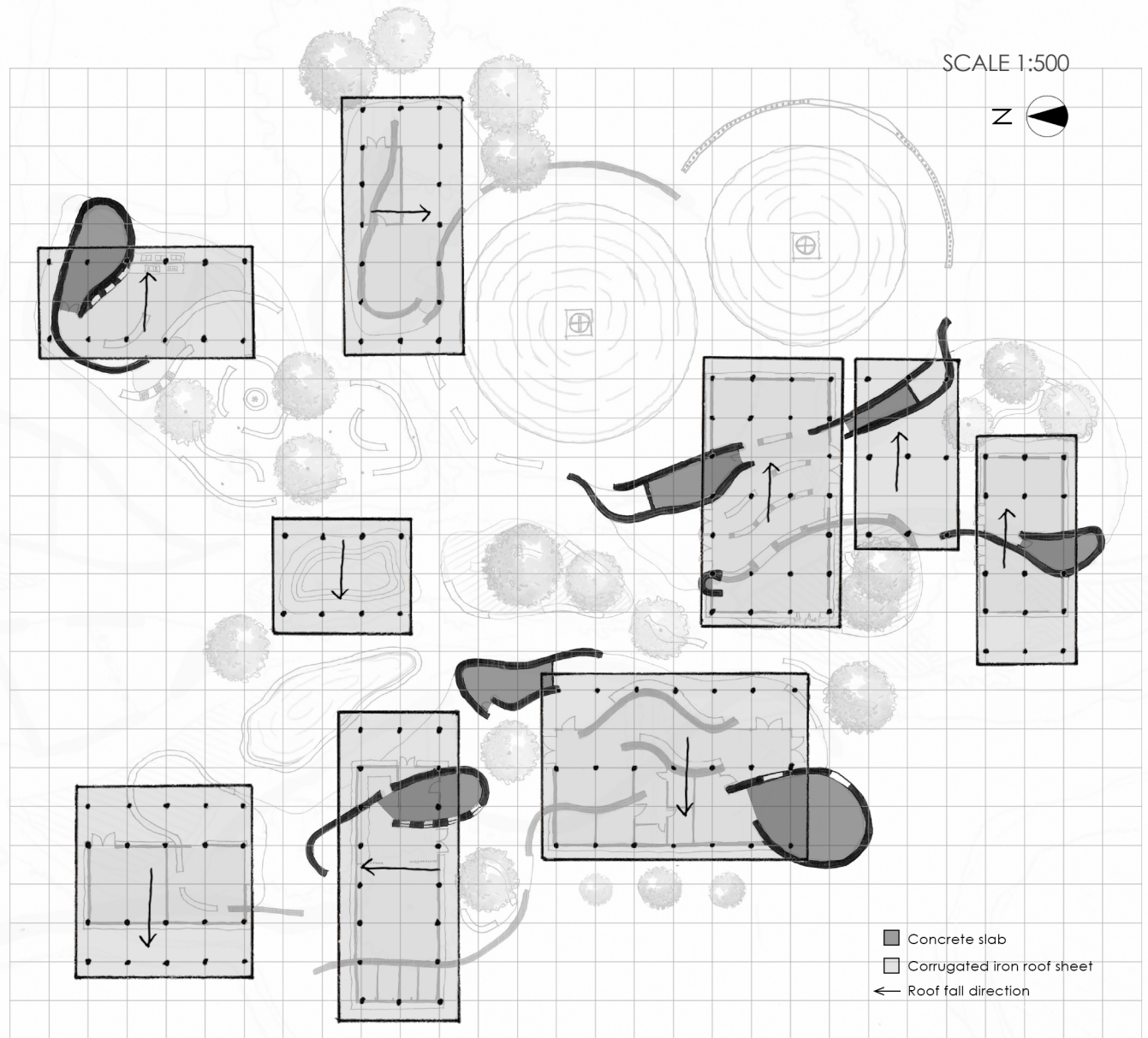
Figure 97: Tapering organic wall used to fit cupboards within.

ROOF LAYOUT

Informed by the local, mono-pitched roof system mentioned on page 56, Ka-Ba-Thi Learning Centre adopted a similar scheme to replicate the surrounding sense of place and to simplify the construction techniques and methods carried out by the local community.

The roofing layout followed the grid system mentioned on page 98, covering the angular shaped spaces that cuts through the organic walls, reenforcing the articulation of the contrasting shapes. The 2° mono-pitched corrugated iron roofs fall in various directions to imitate the same irregular roofs seen within local villages. Looking at figure 98, organic spaces that protrude beyond the roof line were covered by concrete slabs that sit within parapet walls to articulate the contrasting shapes even further.

Figure 98: Ka-Ba-Thi roof layout.



GREEN SPACE AND TREES

Green spaces in and around Ka-Ba-Thi Learning Centre were inspired by the vegetable gardens within local homesteads. As seen on figure 100 there are three different types of green spaces used within the centre: vegetable gardens, larger mahangu crop fields and lawn areas.

Figure 99: Ka-Ba-Thi green space layout

- Existing Trees
- New Trees
- A Vegetable Garden
- B Lawn
- C Crops
- Perspective View

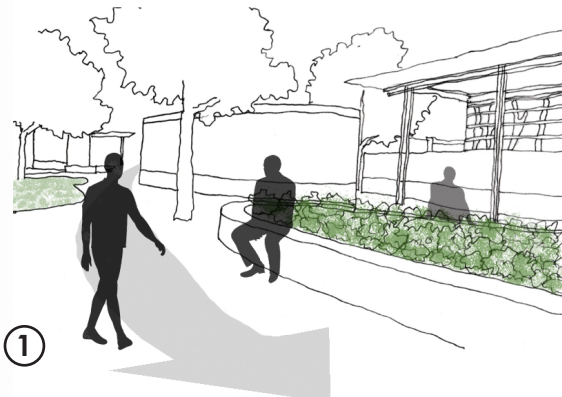
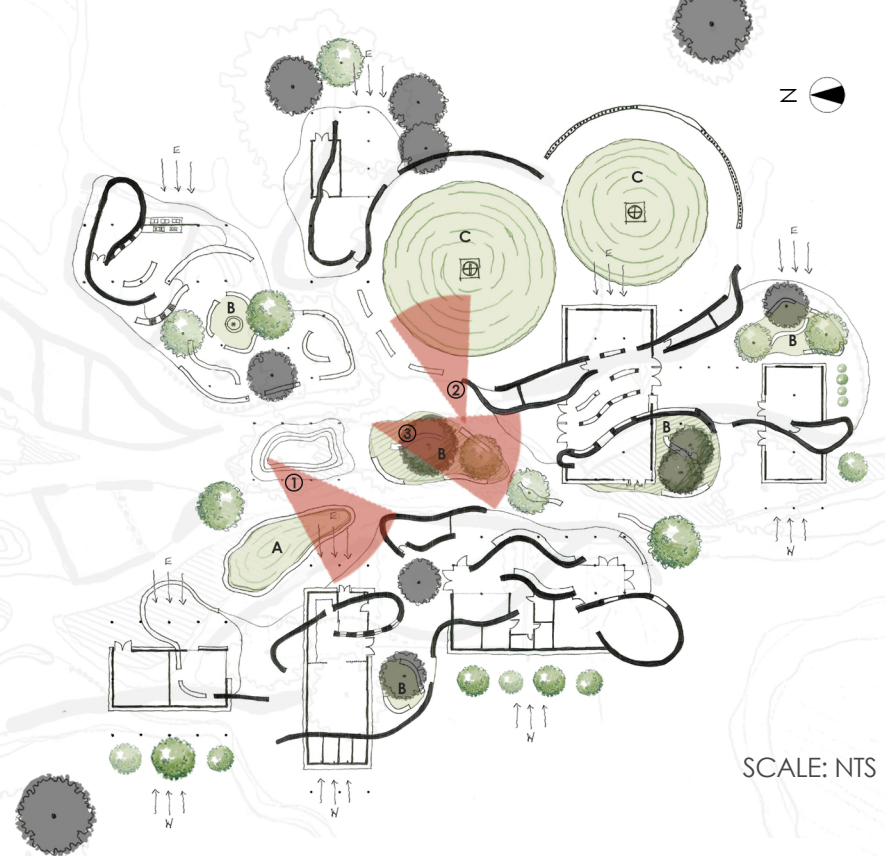


Figure 100: Ka-Ba-Thi green space perspectives

LIBRARY FUNCTIONS AND SPATIAL LAYOUT

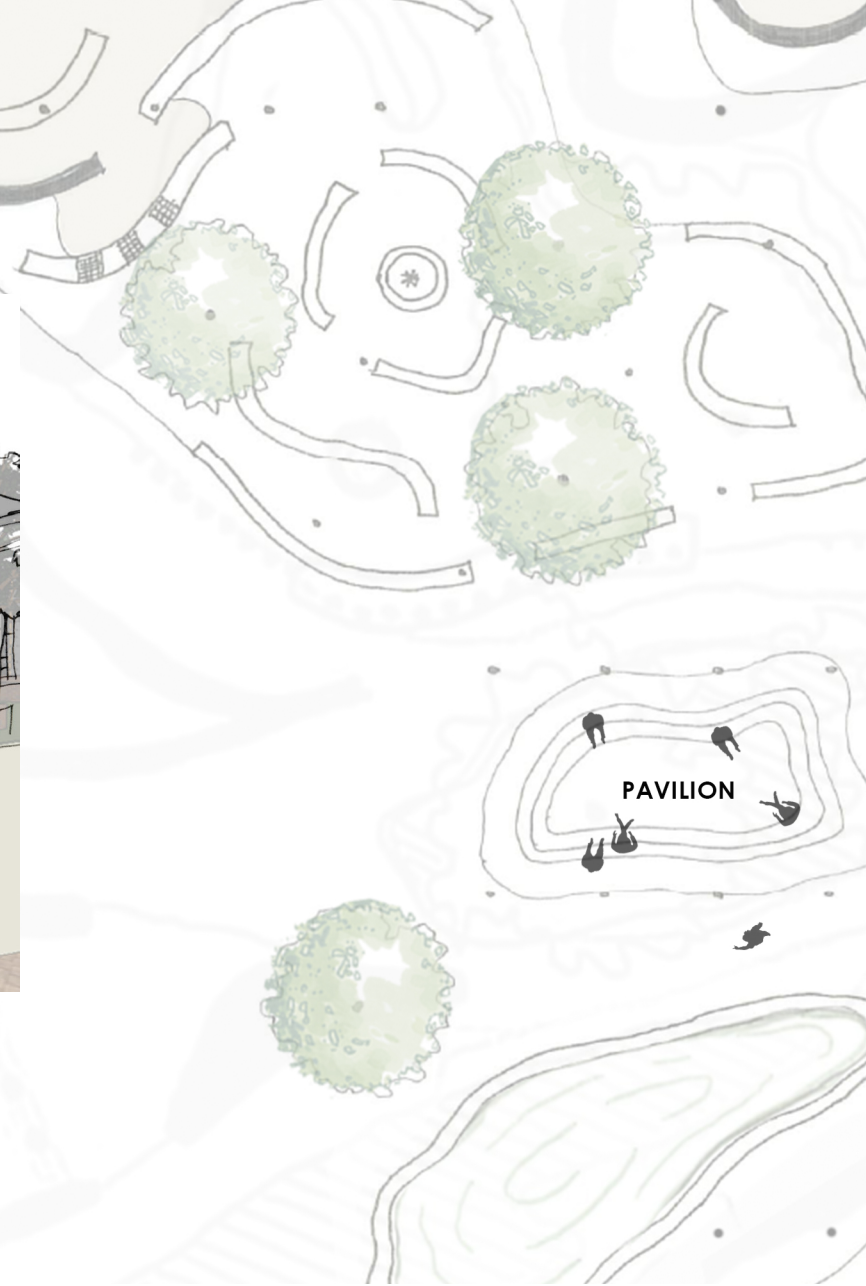
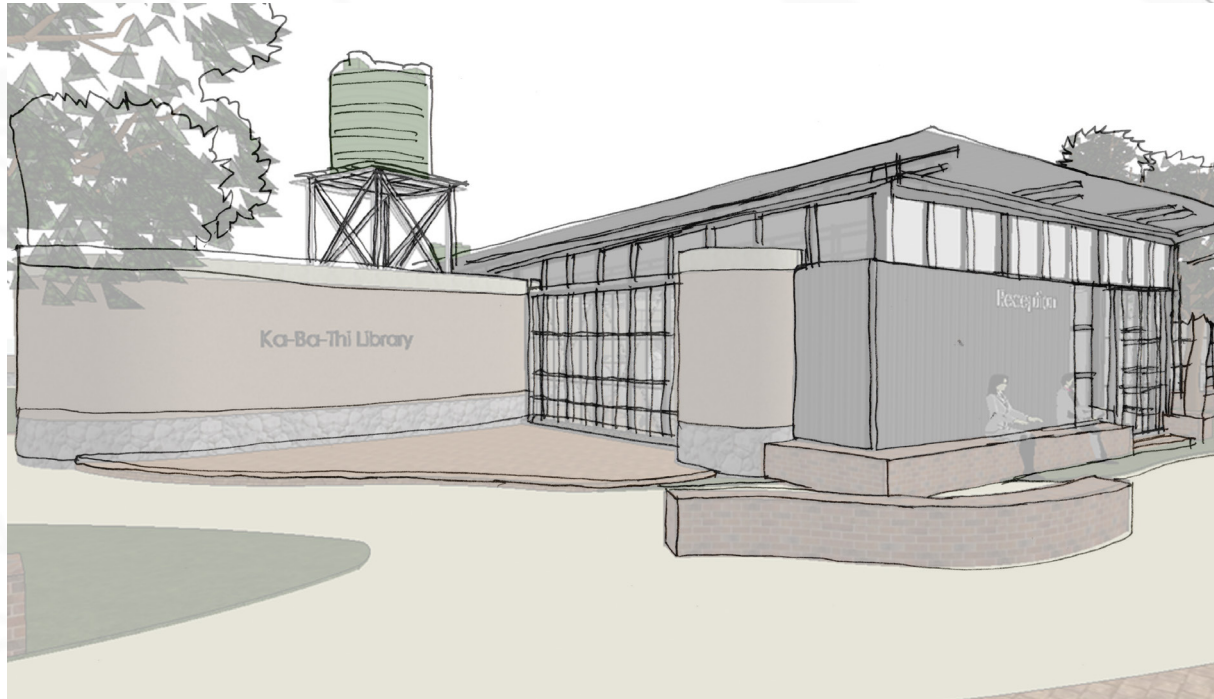
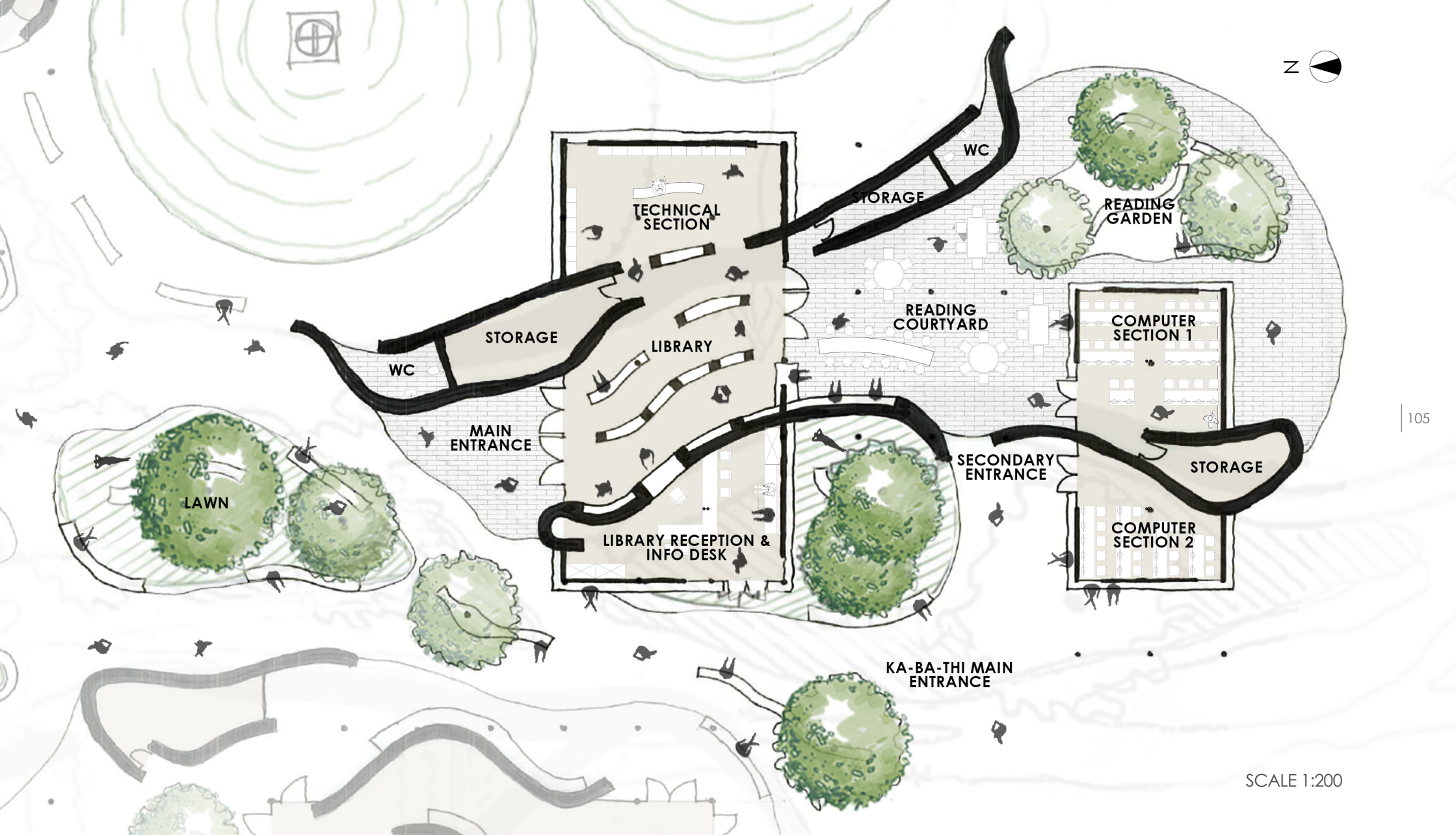


Figure 101: Ka-Ba-Thi Library spacial layout and functions



REPLICATING EXISTING CONTEXT

- Reception & Info Area

The reception area has a combination of corrugated iron walls and traditional clay wall structures replicating existing structures from various homesteads to reenforce KA-Ba-Thi's sense of place.

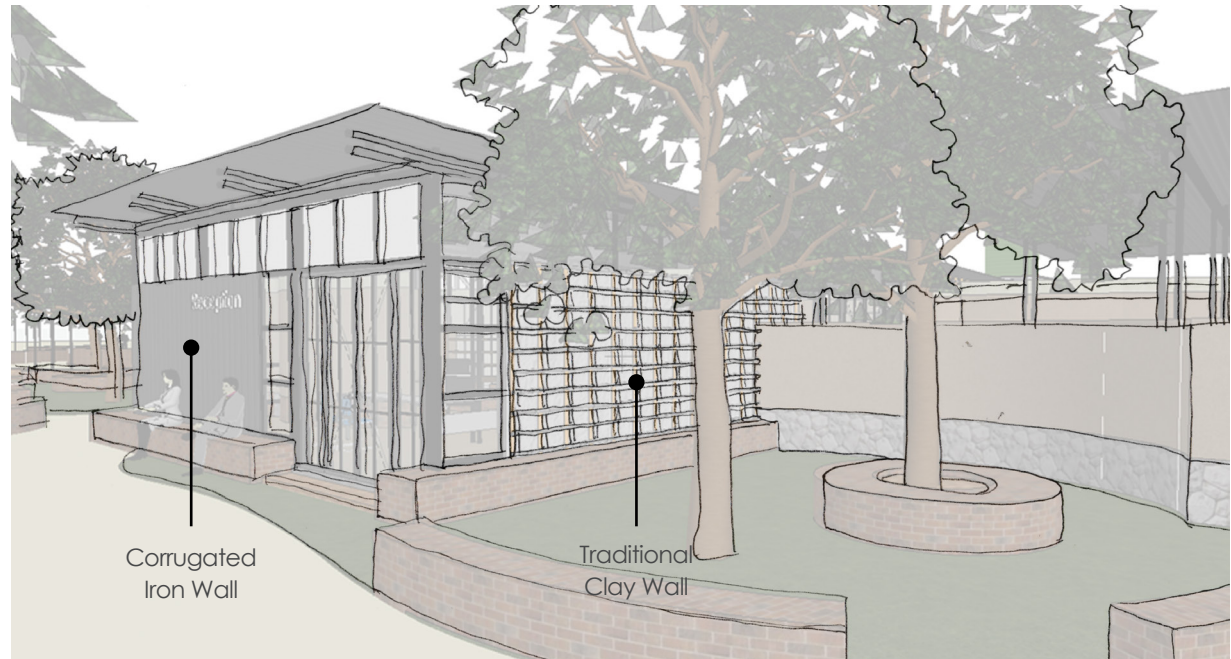


Figure 102: Ka-Ba-Thi reception and information centre: Corrugated iron and clay walls



Figure 103: Homestead with corrugated iron structures and traditional clay wall houses.

REPLICATING EXISTING CONTEXT

- Computer Centre

The computer centre replicated the existing traditional clay wall structure at the bottom to reduce heat gain. The top part of the wall is constructed from the exposed wooden frame system to allow light into the building.

COMPUTER CENTRE

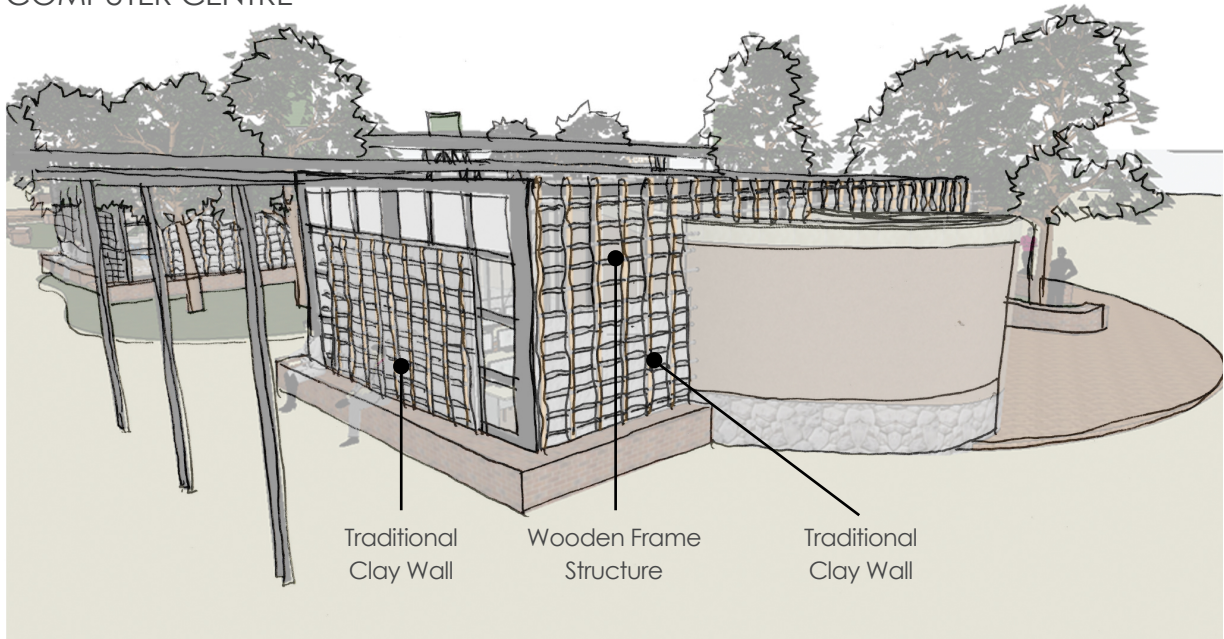


Figure 104: Ka-Ba-Thi computer centre replicating the clay wall structure and the wooden frame system



Figure 105: Homestead kitchen with an exposed wooden frame structure

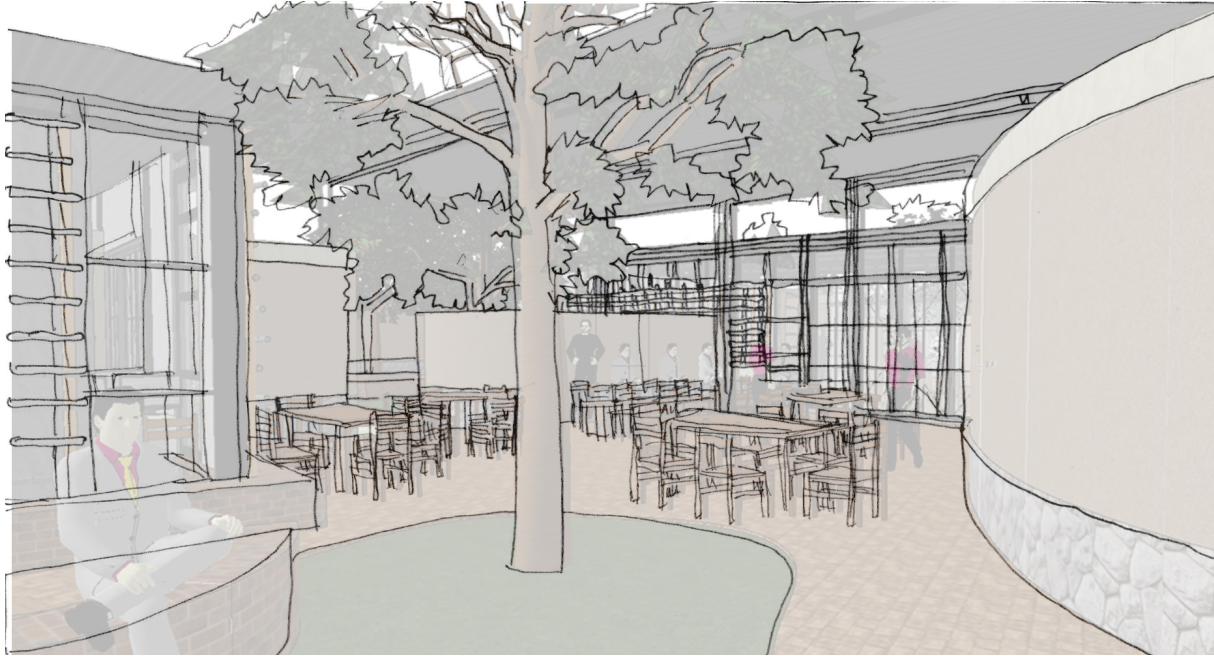


Figure 106: Ka-Ba-Thi reading courtyard with people sitting outside, experiencing the exterior walls.



Figure 107: Interviews were always done next to the traditional clay house.

REPLICATING EXISTING CONTEXT

- Reading Courtyard

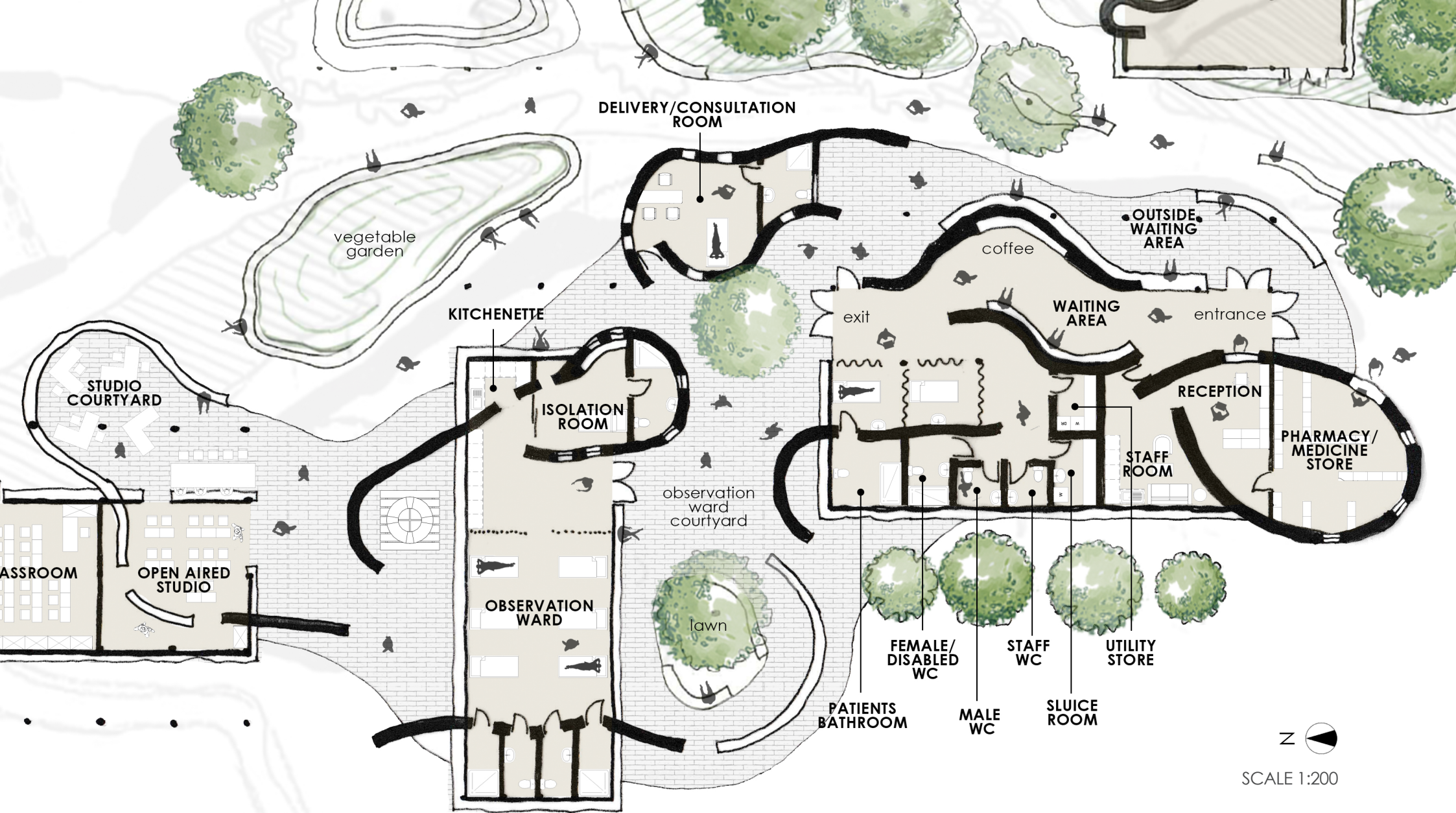
Interviews were always conducted outside the traditional clay hut as it only served one purpose (Bedroom). The reading courtyards allows people to socialise outside experiencing the exterior clay and corrugated iron walls recreating the same social atmosphere.

CLINIC FUNCTIONS AND SPATIAL LAYOUT



Figure 108: Ka-Ba-Thi Clinic spatial layout and functions





SCALE 1:200

REPLICATING EXISTING CONTEXT

- Open-air Studio

The open-air studio uses the same principle as the homestead kitchen to allow air and light to pass through as it is not necessary to close the space.

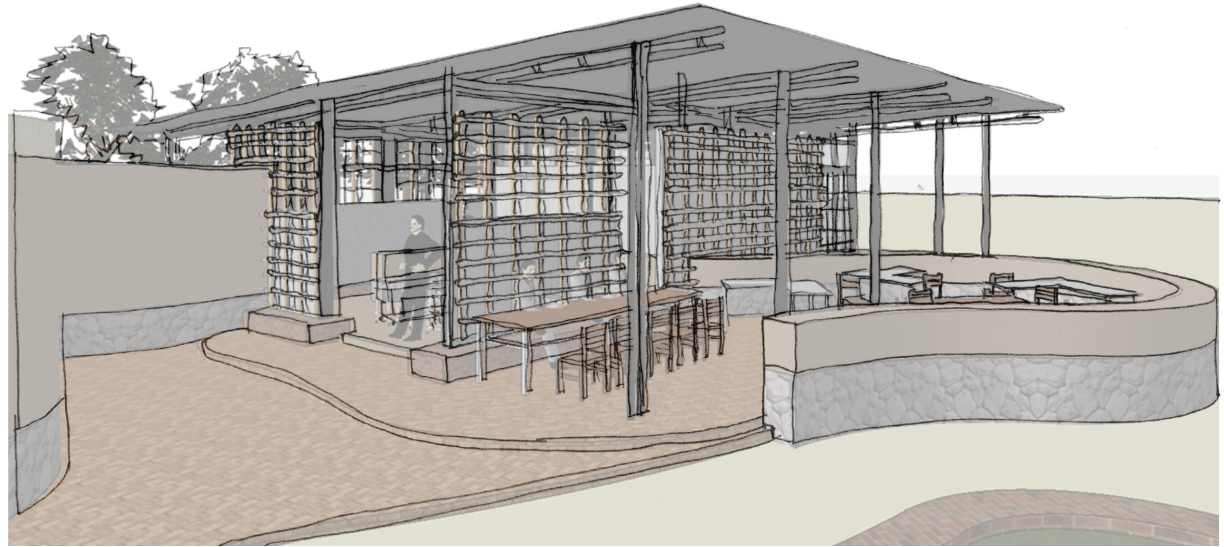


Figure 109: Open-air studio using the same wooden frame structure allowing light and air to pass through



Figure 110: Homestead kitchen wooden frame structure allowing light and air to pass through

REPLICATING EXISTING CONTEXT

- Open-air Studio (Internal View)

The same internal atmosphere is created when the kitchen's wooden framed structure is replicated forming a familiar feeling of home to locals using the studio.

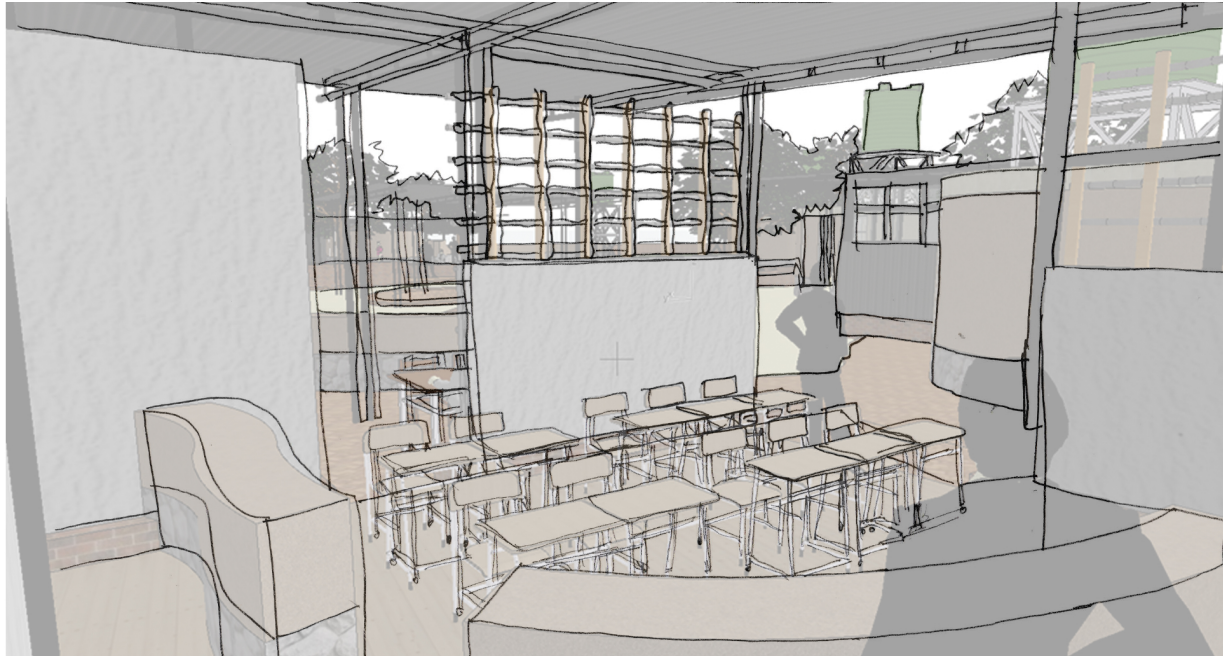
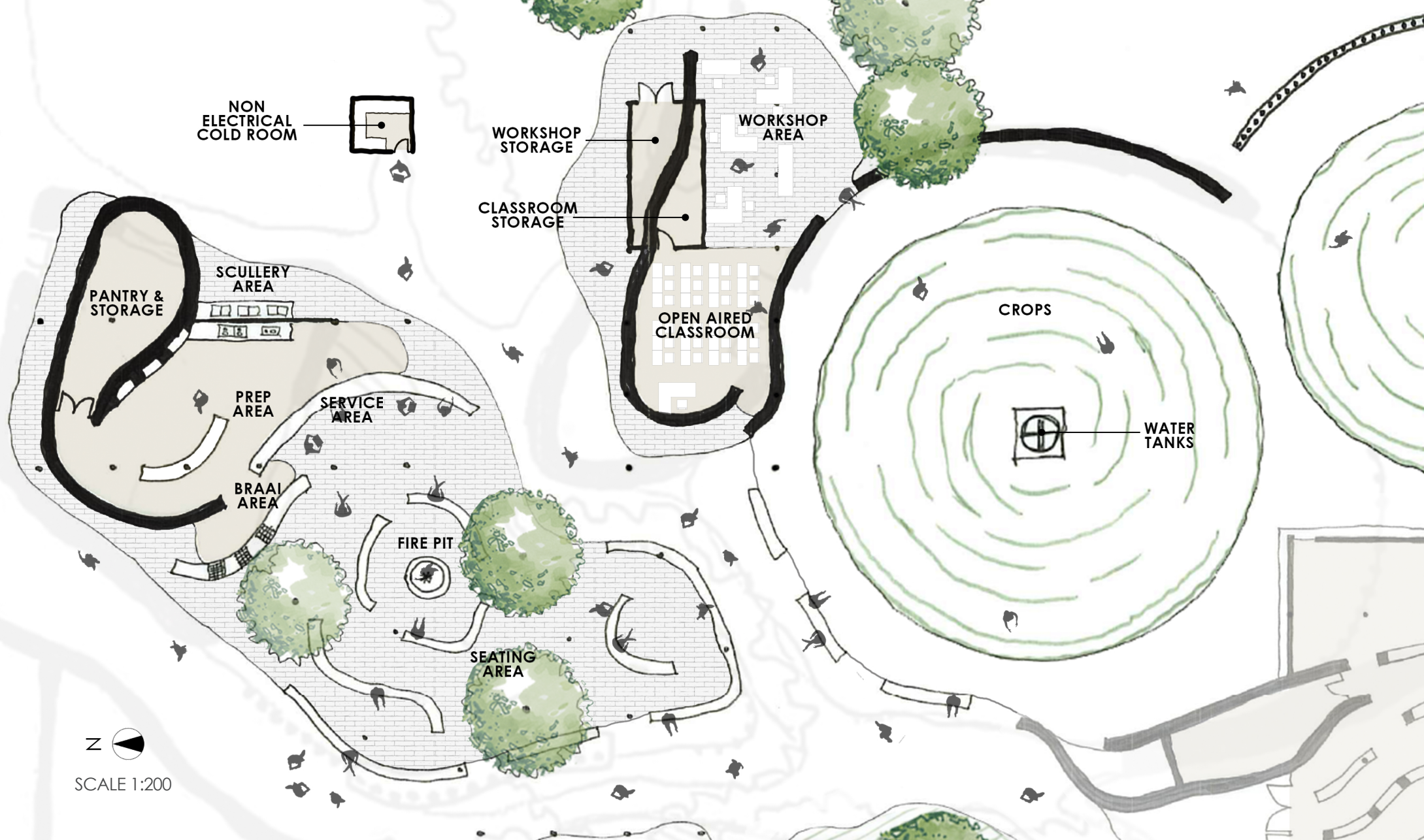


Figure 111: Open-air studio creating a similar internal feeling as the kitchen.



Figure 112: Homestead kitchen wooden frame structure creating a particular feeling.



NON
ELECTRICAL
COLD ROOM

WORKSHOP
STORAGE

WORKSHOP
AREA

CLASSROOM
STORAGE

OPEN AIRED
CLASSROOM

CROPS

WATER
TANKS

PANTRY &
STORAGE

SCULLERY
AREA

PREP
AREA

SERVICE
AREA

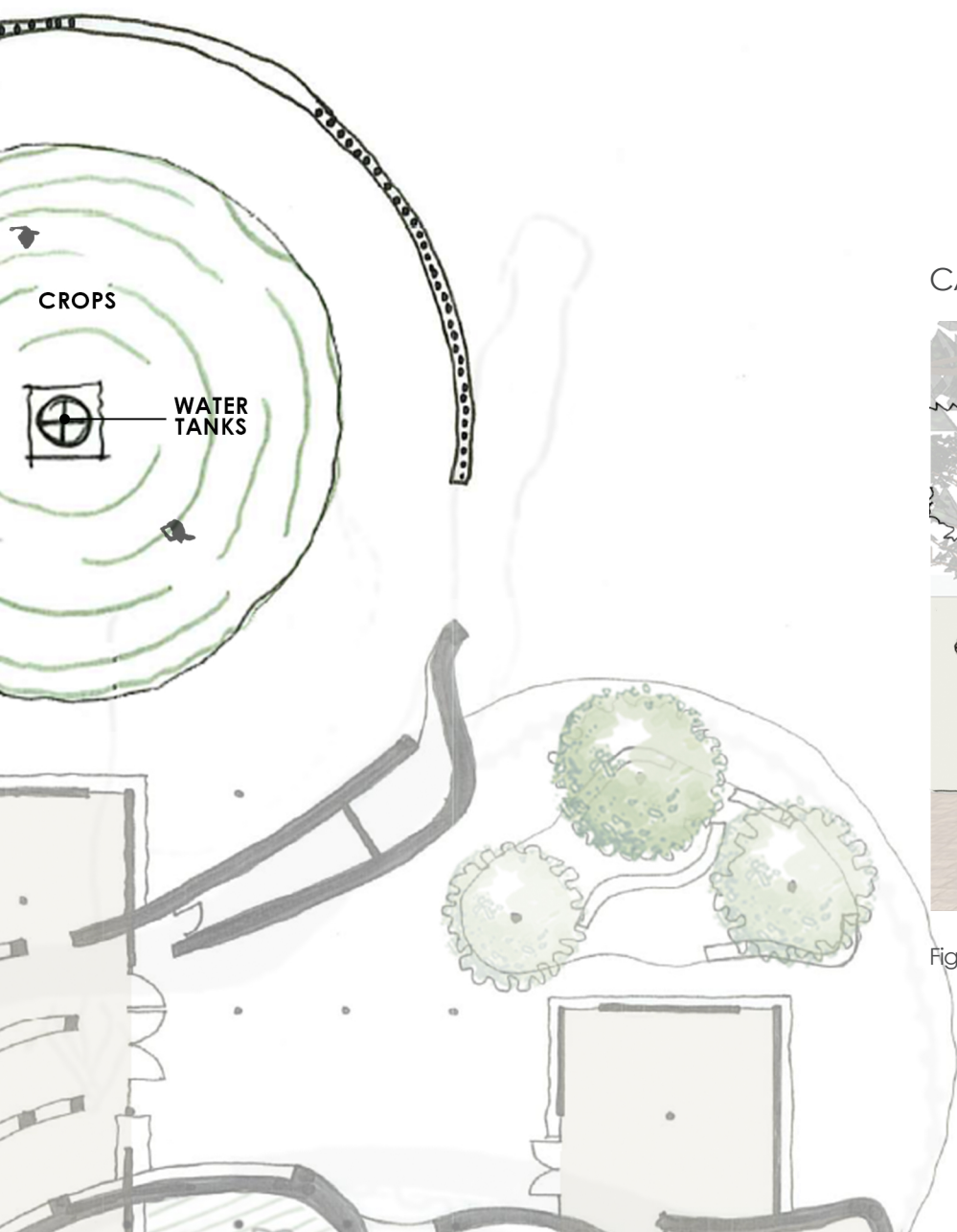
BRAAI
AREA

FIRE PIT

SEATING
AREA



SCALE 1:200



CAFETERIA & CLASSROOM FUNCTIONS AND SPATIAL LAYOUT

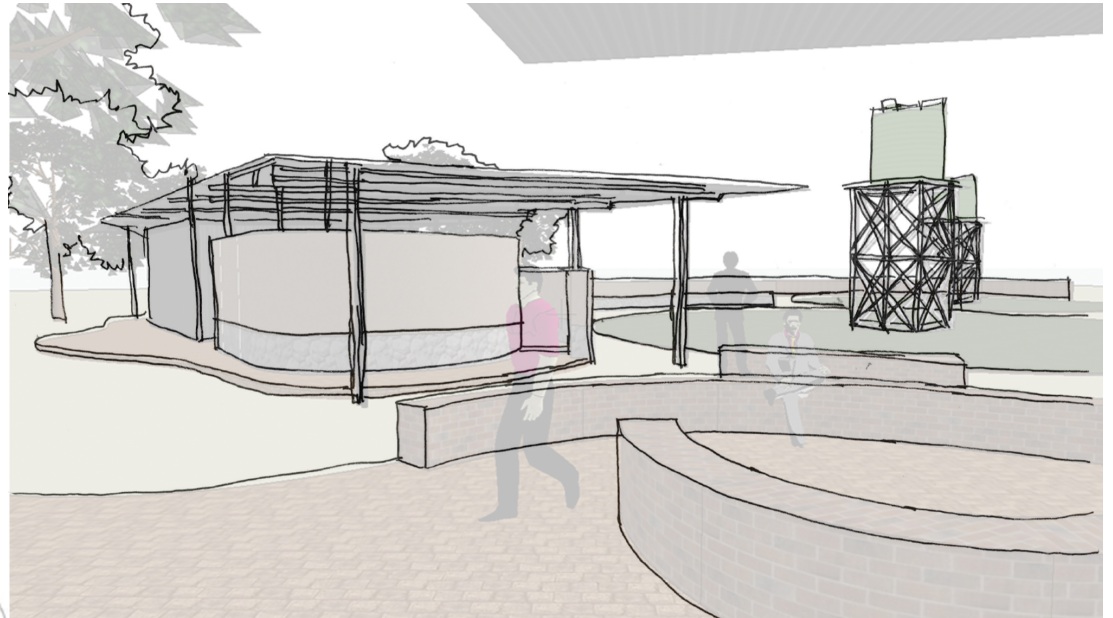


Figure 113: Cafeteria and classroom functions and spatial layout

Figure 114: Open-air roof structures used for gatherings and to prepare food



REPLICATING EXISTING CONTEXT

- Open-air Cafeteria

The cafeteria adopted the same open-air concept as seen in figure 114. This method recreates a sense of place and reduces construction costs by not being closed.

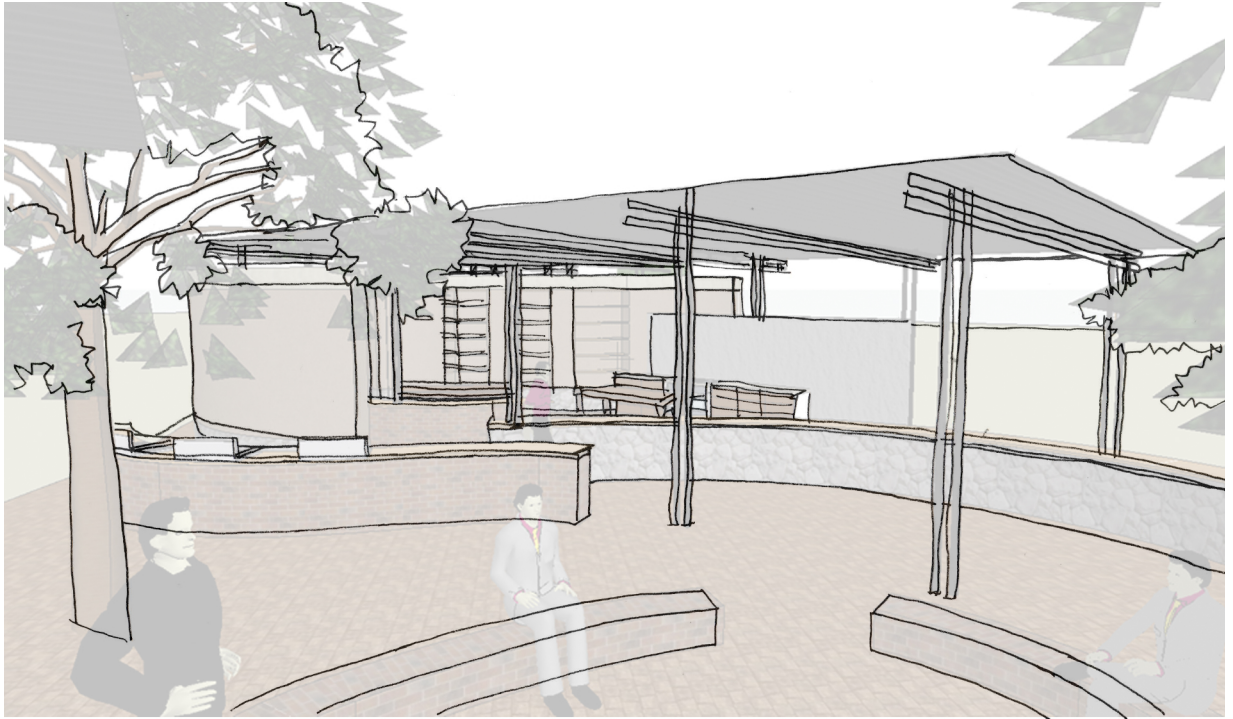
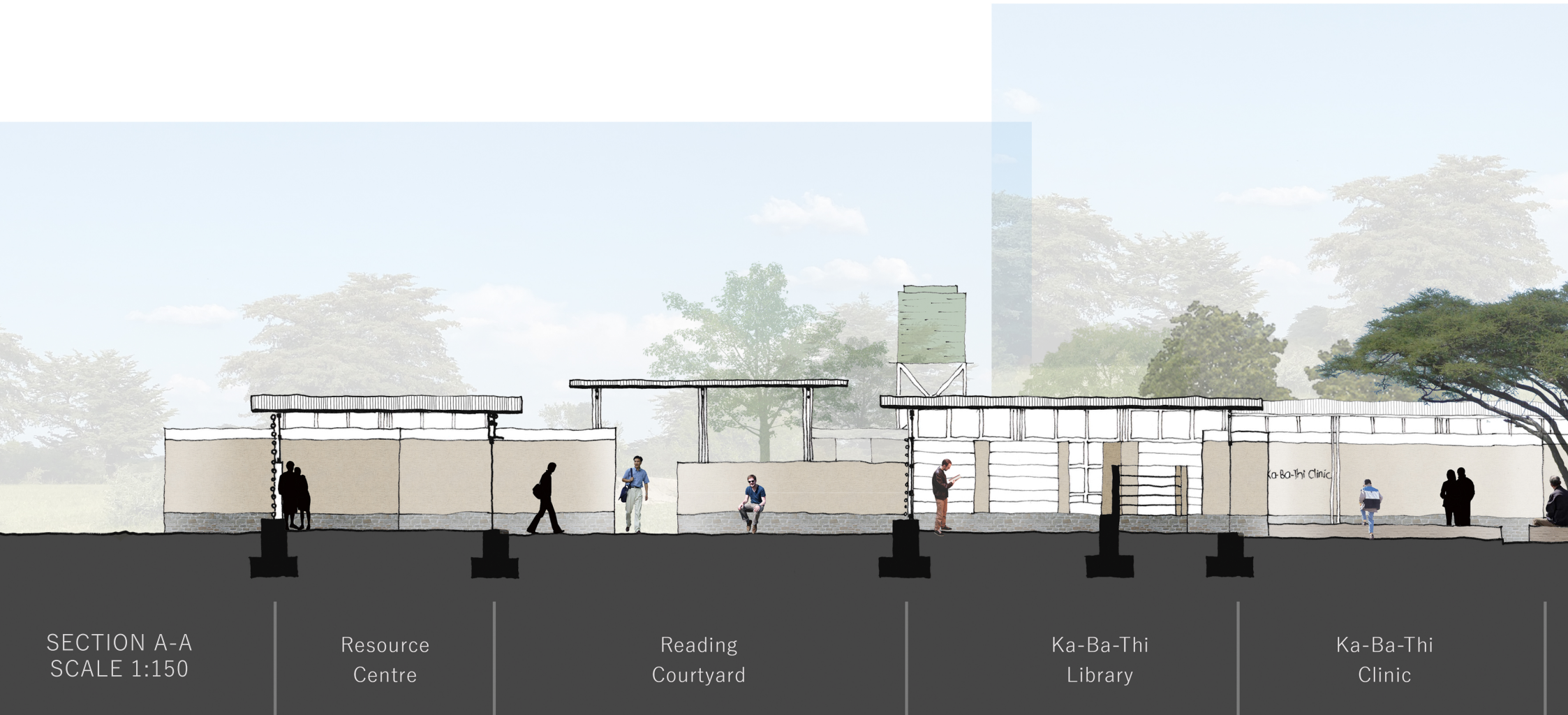


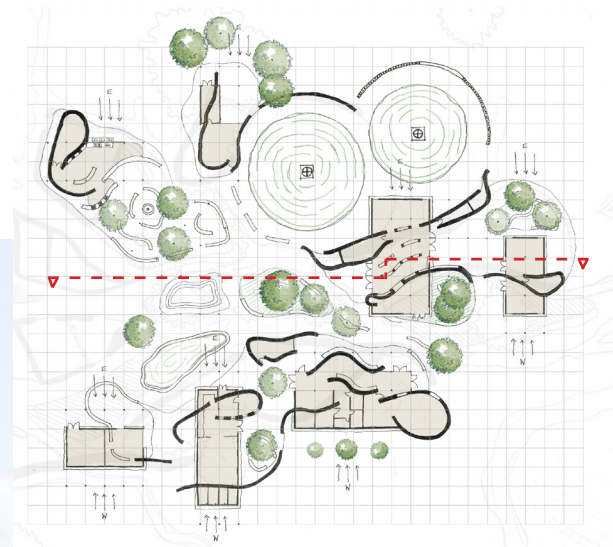
Figure 115: Ka-Ba-Thi open aired kitchen/cafeteria



Figure 116: Open aired classroom and workshop

Figure 117: Section 1





Lawn Area

Corridor

Pavilion

Corridor

Studio/Classroom

3D views of Ka-Ba-Thi

- renders
- model

Figure 118: Render: Clinic and Information area





Figure 119: Render: Clinic and lawn area



Figure 120: Render: Library Reading Garden

Figure 121: Render: Crops and Library



Figure 122: Render: vegetable garden and observation ward



Figure 123: Render: workshop area looking out onto crops



Figure 124: Render: looking out of open-air studio





Ka-Ba-Thi Learning Centre Model









Figure 118: Clay wall structure used to construct traditional houses.

technical
documentation

07

technical development
technical resolution

technical development

- organic wall
- angular wall
- water & sewage
- drinking fountain detail
- electricity
- passive cooling techniques

ORGANIC BRICK WALL

Ka-Ba-Thi Learning Centre adopted the same organic clay brick wall construction method used by the Gurunsi Tribe located in Burkina Faso. The construction method has been used for centuries as it proved to withstand the harsh Sahara Desert climate.

The Gurunsi tribe makes use of 200x200x400 mm sun dried clay bricks. Clay is gathered from the surrounding area, mixed with fibres materials (straw/cow dung) moulded and then left to dry for one week. After the drying period has completed, construction can start. Figure 125 illustrates how the clay bricks are layered with their longer (400mm) sides facing each other in a stretcher bond formation, creating a ± 500 mm thick clay wall (with plaster). However, this method does not allow for narrow bends. Figure 126 indicates how the large clay bricks are layered in a vertical position to allow the thick wall to achieve tight bends. A mortar clay mixture mixture is

used in between the sun dried clay bricks. After the bricks are layered the wall is plastered by hand with another fibrous, clay mixture and left to dry for ten days. The plastered layer is then polished using smooth riverbed stones to prevent it from absorbing any water.

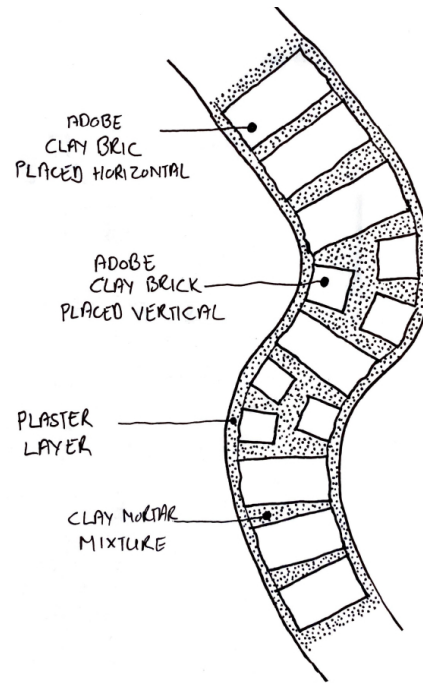


Figure 125: Brick layout used to construct organic walls of Ka-Ba-Thi.



Figure 126: Building a traditional mud house in Bolgatanga, Ghana (YouTube, 2019)

ANGULAR WALL

Precedent Study: Local Clay Hut

In order to recreate a local sense of place, the angular walls within Ka-Ba-Thi Learning Centre would be constructed using the same building materials (clay and corrugated iron sheets) and techniques from the surrounding context. Local building methods could also allow residents to comprehend and construct a familiar structure with relative ease. The local, traditional hut was analysed to determine how the structure could be incorporated within Ka-Ba-Thi. Figure 127 shows the construction process. A wooden frame created from locally sourced, vertical and horizontal branches is constructed, followed by the roof. After the roof is completed, locally sourced clay is filled (from the inside of the structure) in between the wooden frame. Figure 128 shows how the wooden structure is always exposed to the outside and concealed on the inside with a plastered layer.

Proposed Clay Wall Construction

Ka-Ba-Thi adopted a similar framed construction method. 75x75 Steel square tubing would be used to create a frame structure in between columns. This structure would support both the clay wall system and the corrugated iron wall system.

The square tube steel frame would be supported by a foundation wall that rises 500mm

above the natural ground level that could also be used for seating. The branches would then be fixed to the steel frame and filled in (from the inside of the building) with clay before being plastered on the inside to replicate the local sense of place. Despite the five year lifespan of the clay wall, constant maintenance will be done by scholars and VTC members attending construction classes gaining practical experience.

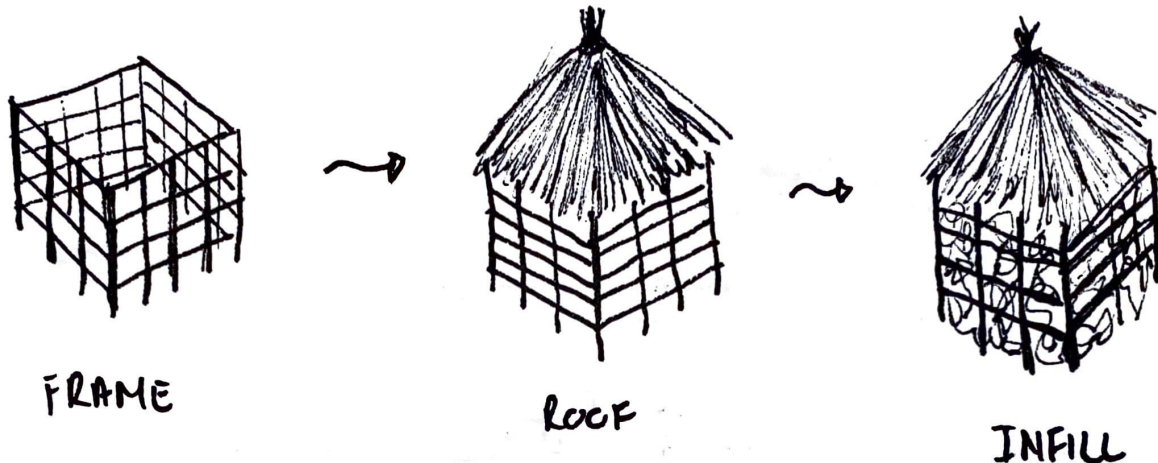


Figure 127: Traditional house construction process.

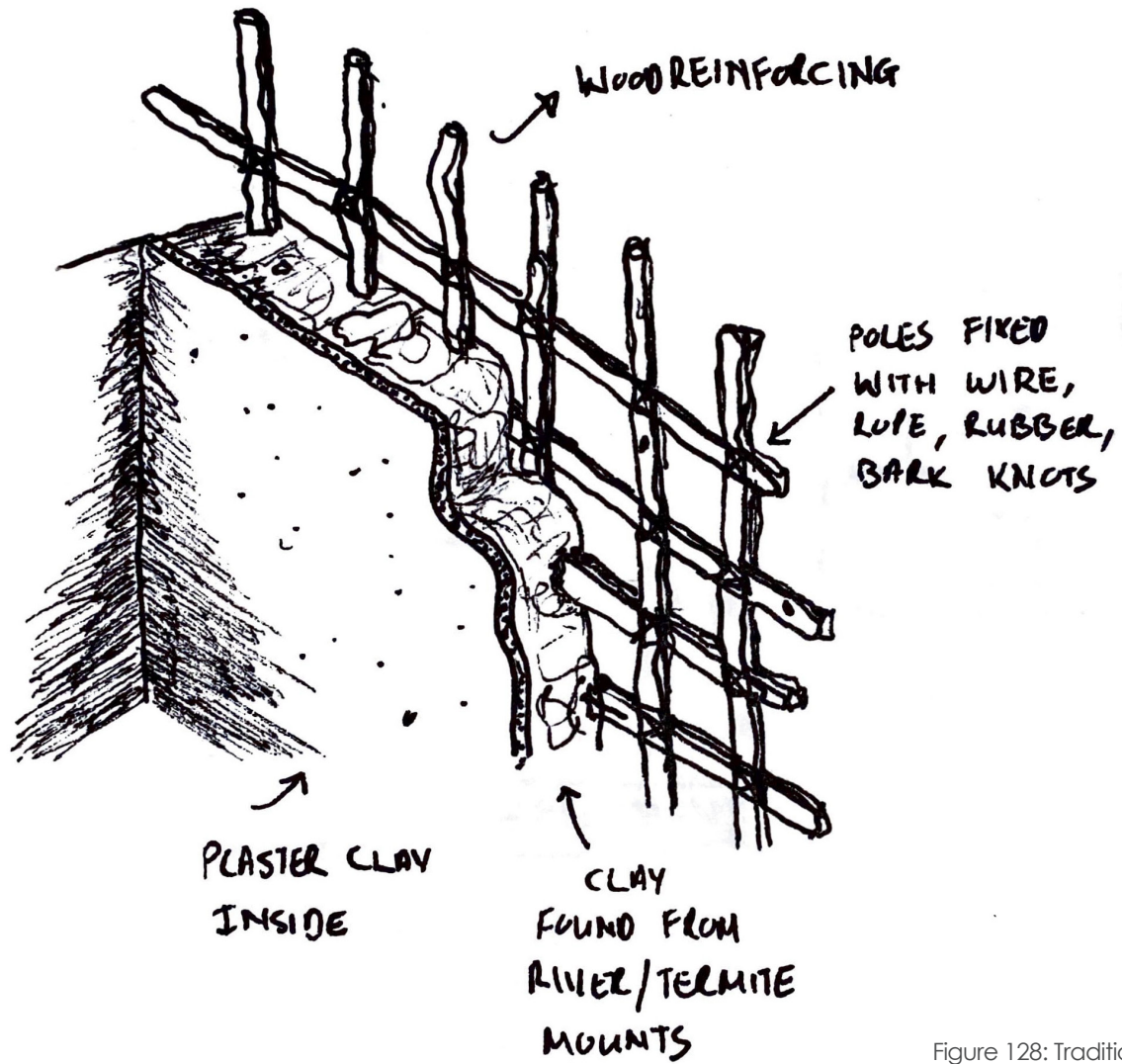


Figure 128: Traditional clay house wall structure diagram.

WATER & SANITARY SERVICES

Ka-Ba-Thi Learning Centre intends to attract people and create a positive sense of place by providing them with clean drinking water after noting the poor sanitary conditions indicated on page 33-34.

The Kavango River would serve as the main water source for Ka-Ba-Thi Learning Centre. Looking at figure 130 water is pumped from the river to the Water Pump and Filtration Room located close to the source on the northern edge of the site. Two main water pumps would then direct water to the centre itself and to its main crop fields located further south on the reused farmland. Water pumped to the centre would run through a filtration process removing harmful bacteria as it will be used for drinking, cooking and watering the centres green spaces. Nine 10 000 litre elevated Jojo tanks would be used to store water pumped from the Filtration Room. The tanks were placed close to services like

bathrooms, kitchens, the clinic and gardens that require a daily water supply. The tanks would be placed on top of the various concrete roofs or on high steel structure to gain elevation ensuring adequate water pressure.

SEWAGE

A great need for proper toilet facilities was noted after studying table 12. For this reason, a number of flushing toilets would be accessible to all members visiting Ka-Ba-Thi Learning Centre. The toilets would be using a septic tank sewage system. This system segregates

waste into three layers (scum, liquid, sludge) before microbes naturally break down the sludge layer. The excess water then passes into a secondary compartment where further treatment is done by microbes. The excess treated water then exits the septic tank to be discharged in the drainage field.

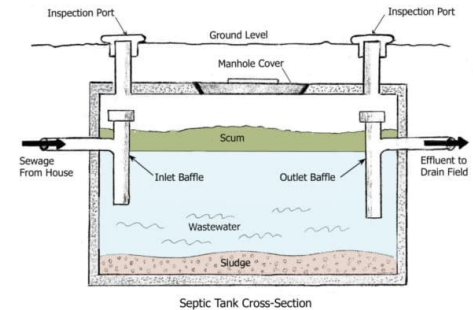


Figure 129: Septic tank diagram (Alcona Septic Service, 2020).

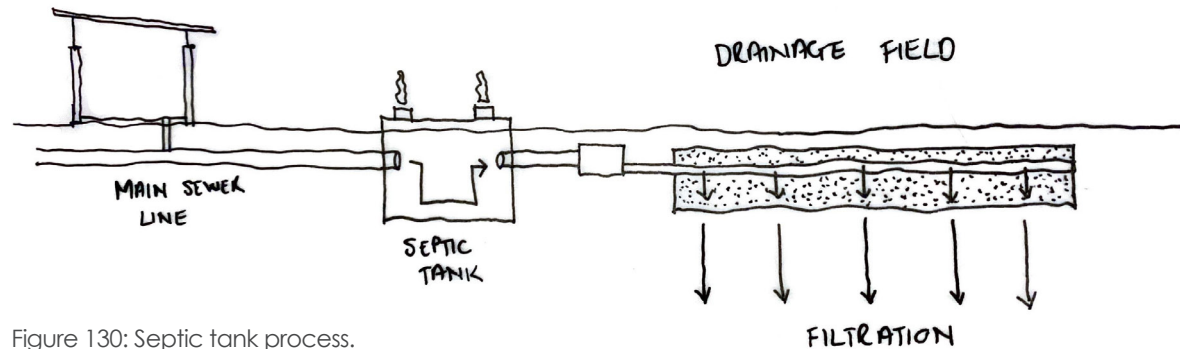


Figure 130: Septic tank process.

Kavango River

Canoe/Wato Dock

Wetland Crops

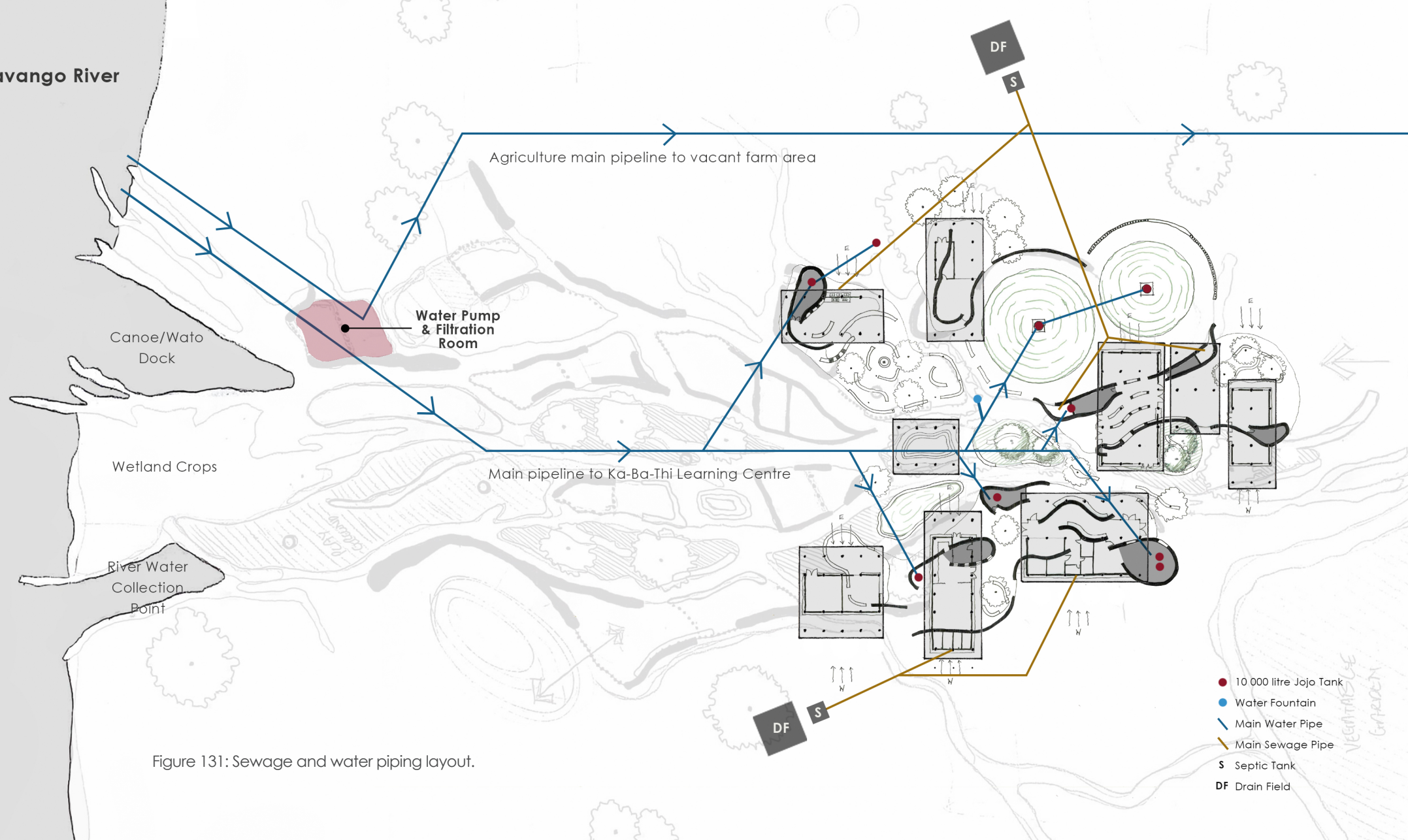
River Water Collection Point

Water Pump & Filtration Room

Agriculture main pipeline to vacant farm area

Main pipeline to Ka-Ba-Thi Learning Centre

Figure 131: Sewage and water piping layout.



- 10 000 litre Jojo Tank
- Water Fountain
- Main Water Pipe
- Main Sewage Pipe
- S Septic Tank
- DF Drain Field

DRINKING FOUNTAIN

A number of drinking fountains would be located within Ka-Ba-Thi. Figure 132 shows a typical drinking fountain drawing that would be used and incorporated within the intervention.

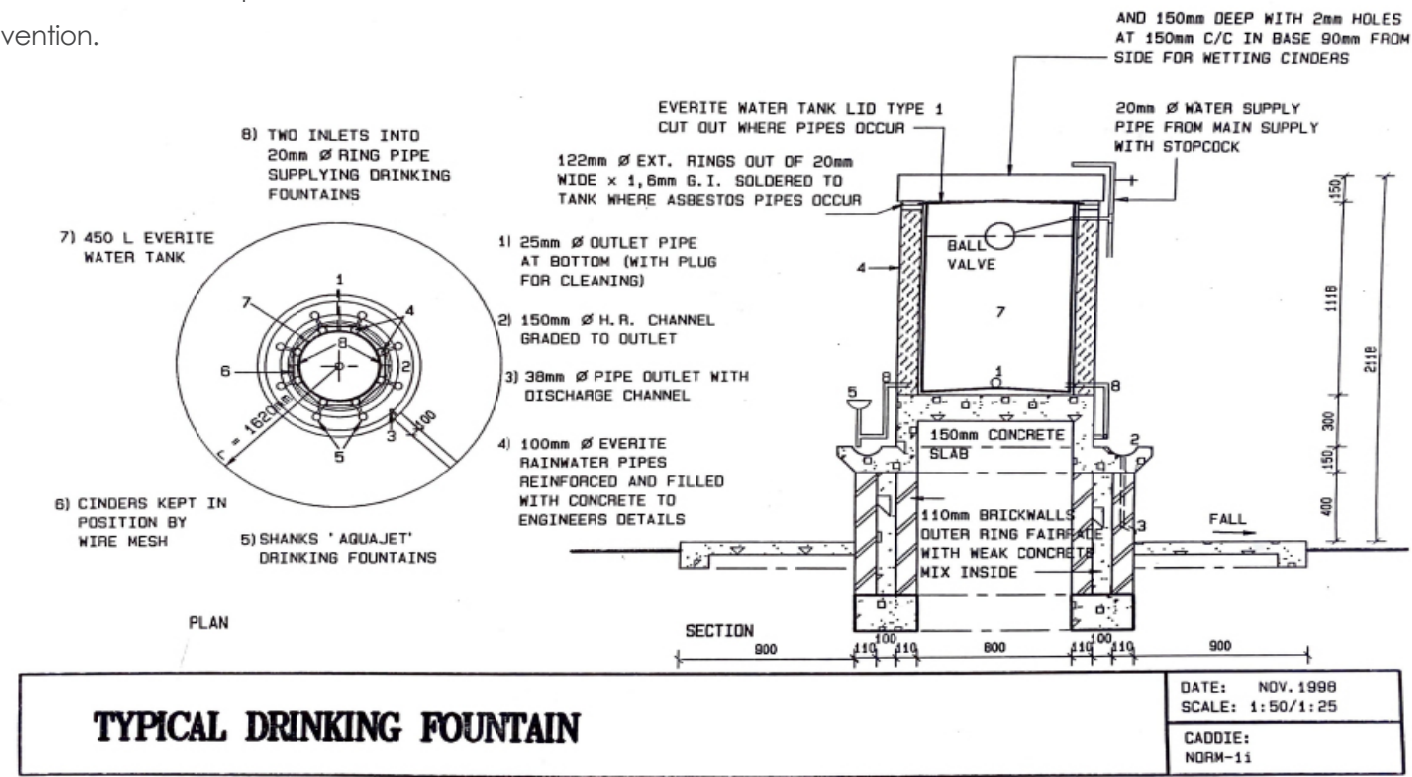


Figure 132: Typical drinking fountain detail (Ministry of Health and Social Services, 2004).

ELECTRICITY

Figure 133 shows how local residents depend on solar panels to generate electricity. The limited and unreliable local electricity mentioned on page 32 means that Ka-Ba-Thi would also need to rely on solar power. The centre would however limit the use of electricity by cooling down spaces using passive cooling techniques (p. 134). Apart from the clinic, electricity would mostly be used to power water pumps, filtration pumps and lights.

Although solar panels are more efficient facing north, the 2° roof pitch allows solar panels to be placed on roofs sloping in a northern, eastern, southern and western direction. The charge controller, inverter, batteries and service box will be kept in the libraries courtyard storage room.

Figure 133: Solar panels used by local residents.



PASSIVE COOLING TECHNIQUES

Ka-Ba-Thi applied a similar passive cooling technique used by Francis Kéré at the Gando Primary School (p. 79). However, Gando experiences high temperatures throughout the year, meaning Kéré only had to implement passive cooling techniques. Page 22 indicates a large temperature difference between the summer and winter months in the Kavango East Region. Ka-Ba-Thi therefore had to implement passive heating and cooling techniques.

Figure 134 displays the voids created by a number of 60x3mm steel spacers welded in between two 60x3mm steel tubes. These voids will allow a constant, gentle airflow through the various buildings within Ka-Ba-Thi. Pupils/VTC members attending the metal workshops will install steel framed windows within the 75x75mm steel frame mentioned on page 126. This will allow better control over the airflow and temperatures within the building (Fig. 135).

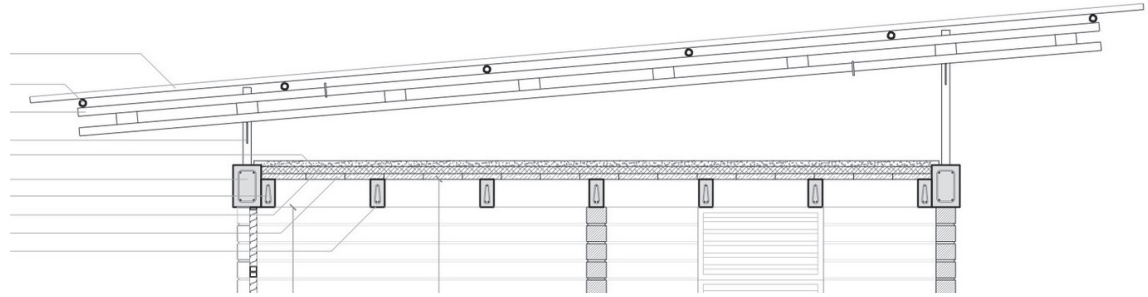


Figure 134: Laafi nursing school roof system by Albert Faus (Archdaily, 2014: online.).

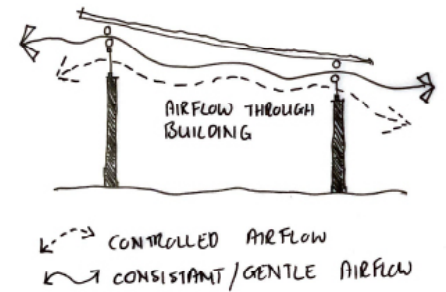
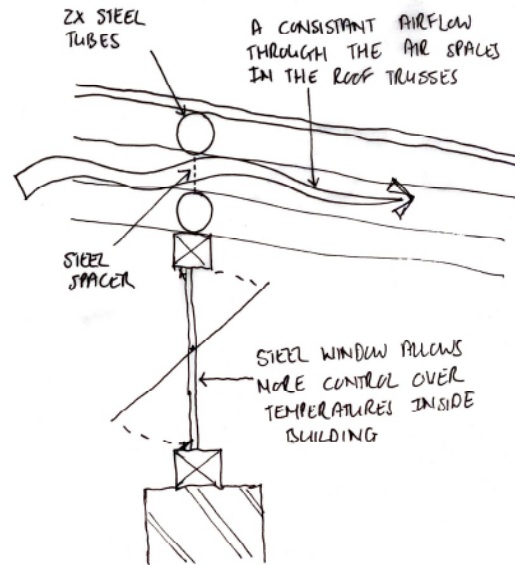


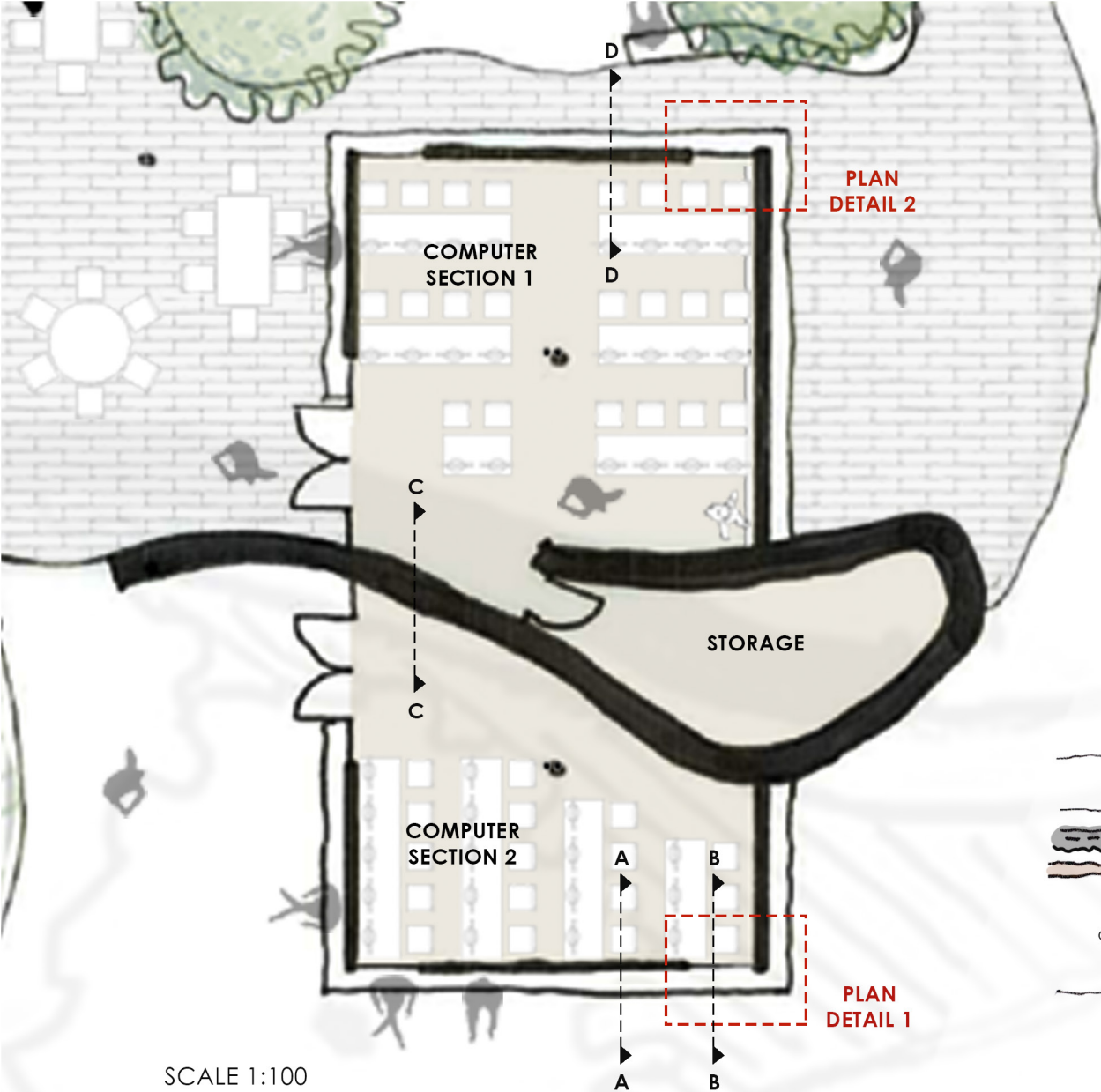
Figure 135: Controlling airflow through Ka-Ba-Thi buildings.

Figure 136: Limited openings in the traditional clay walls.



technical resolution

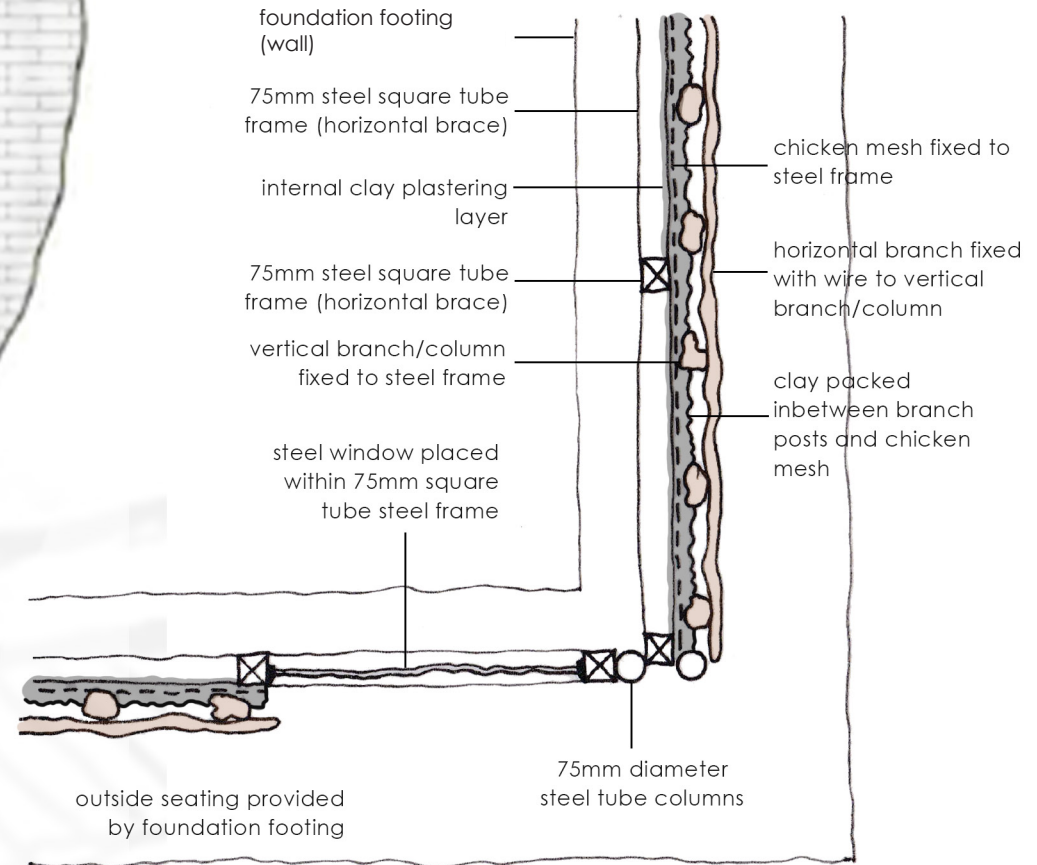
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- strip section
- details

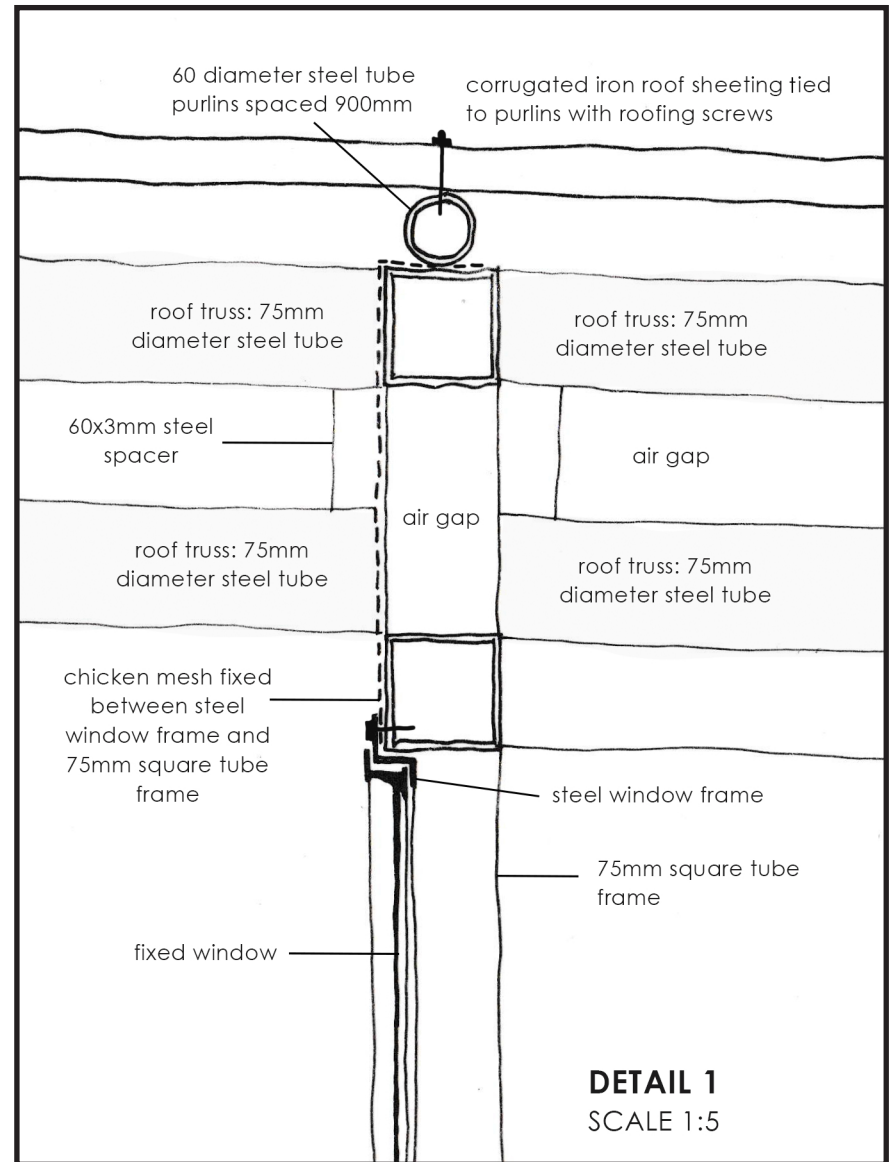
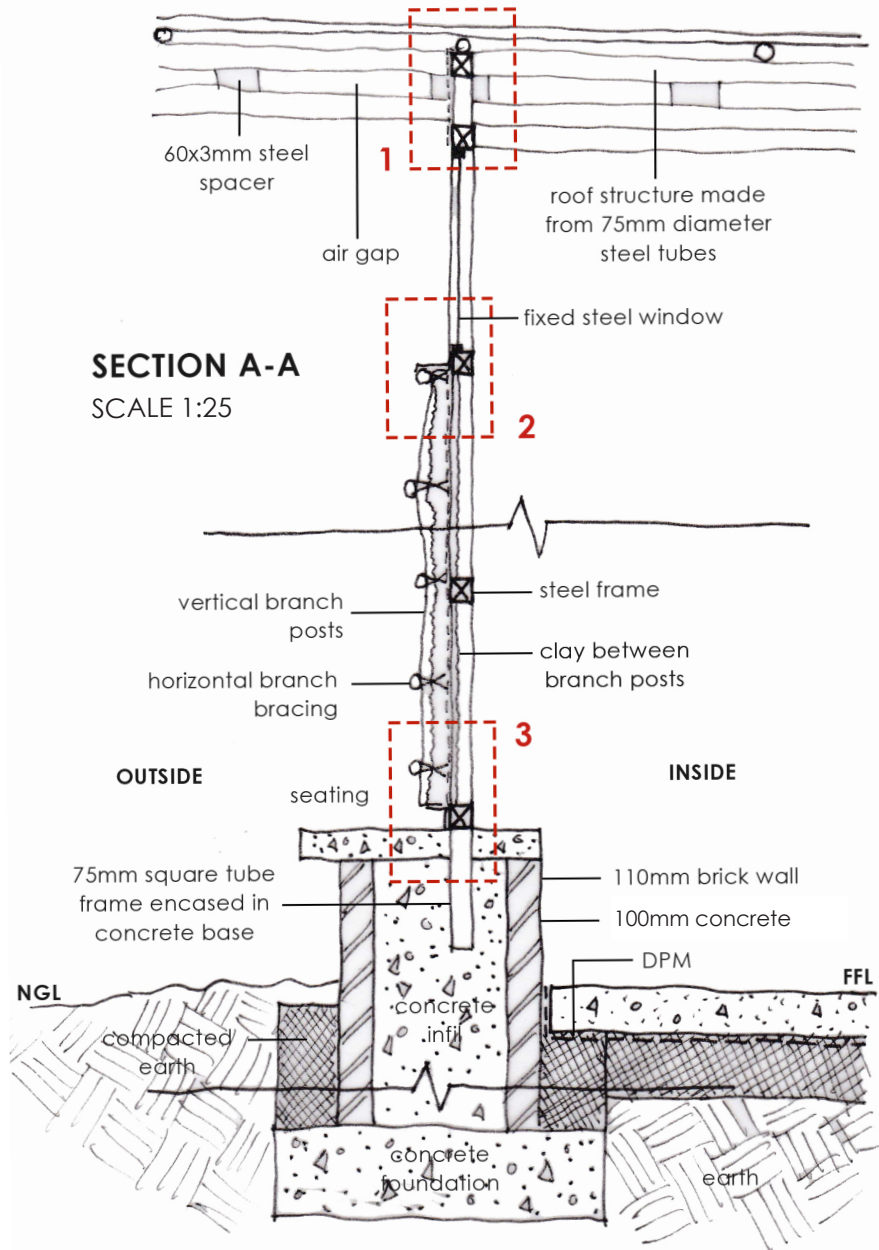


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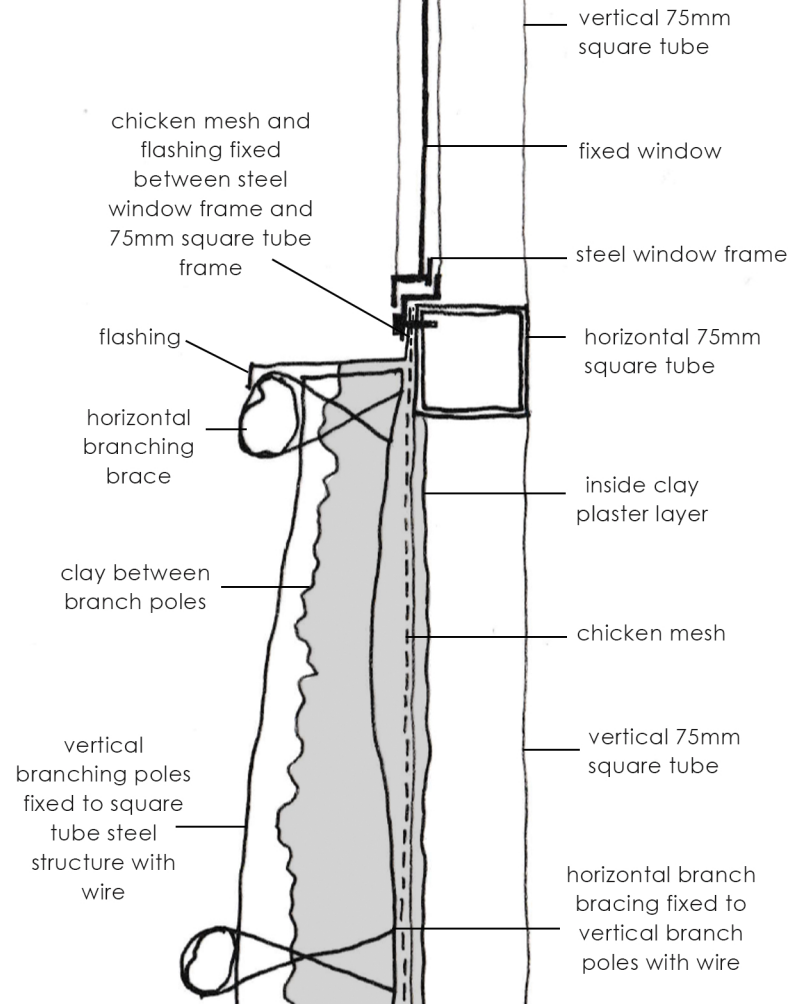
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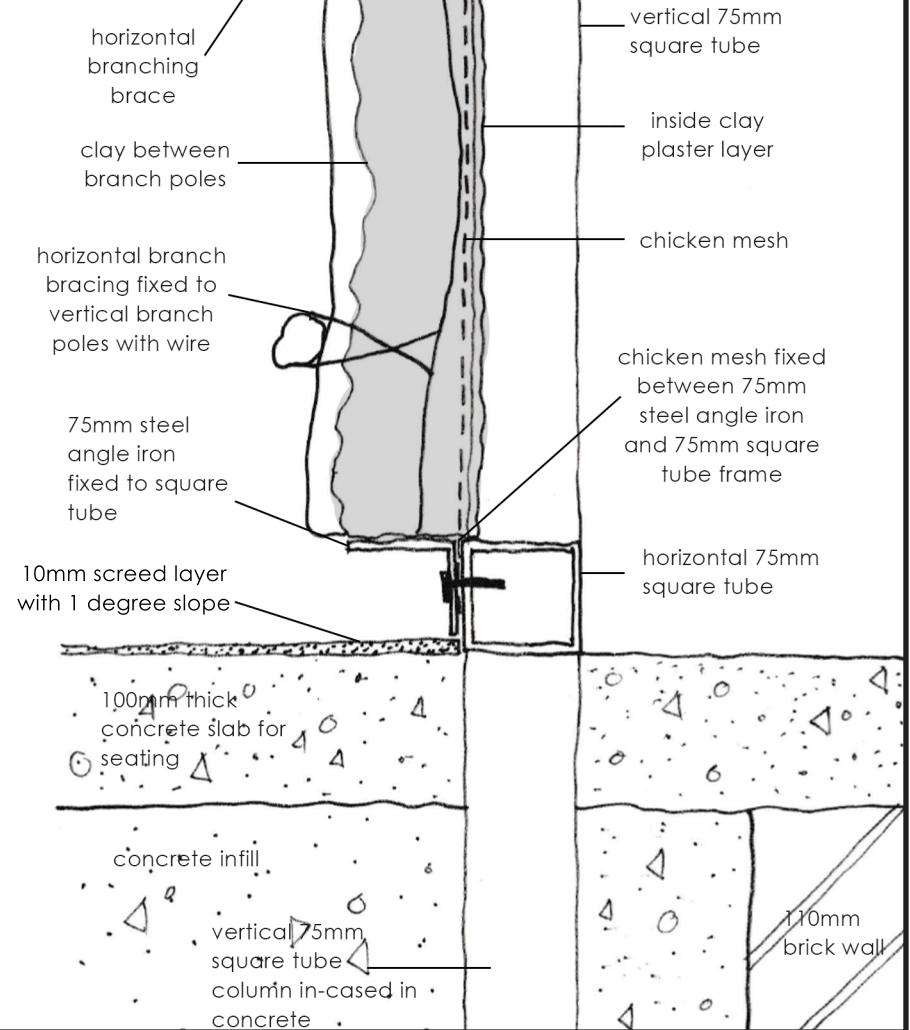
DETAIL 2

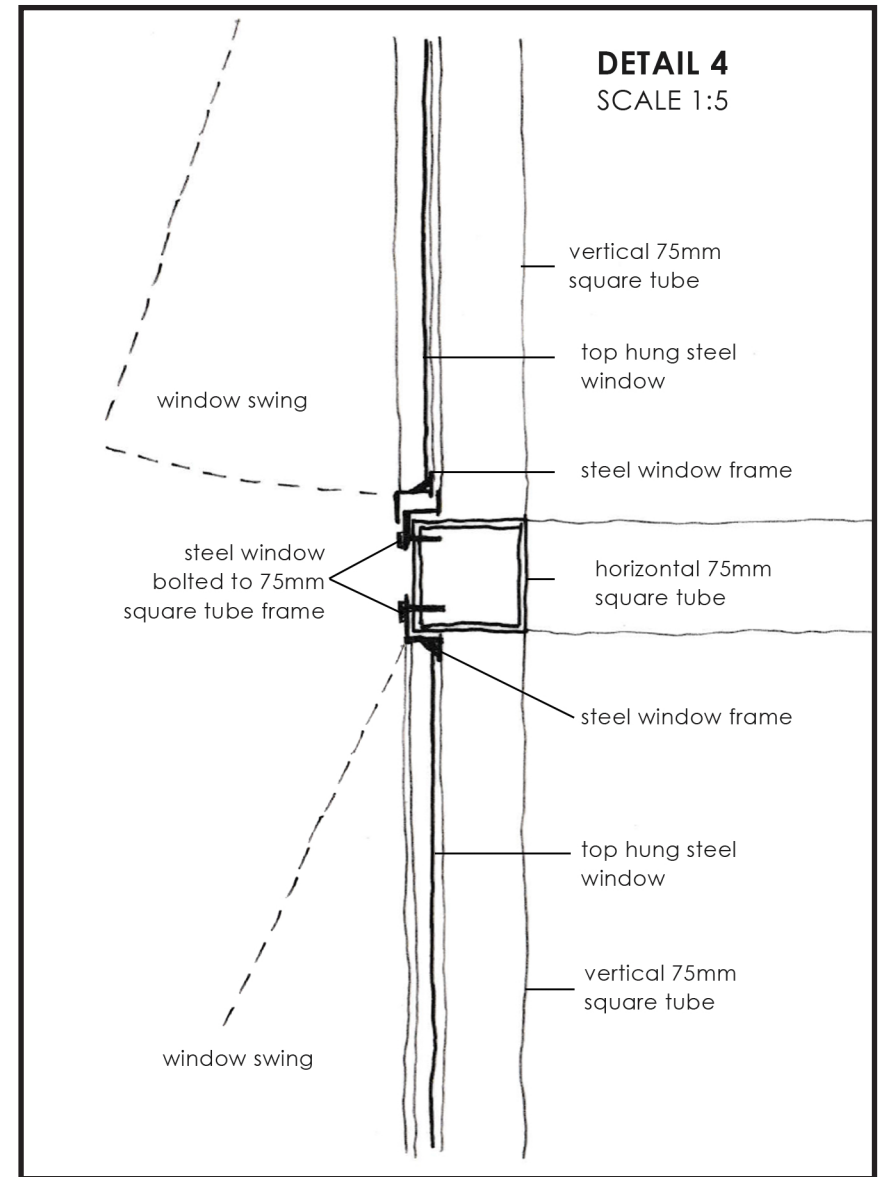
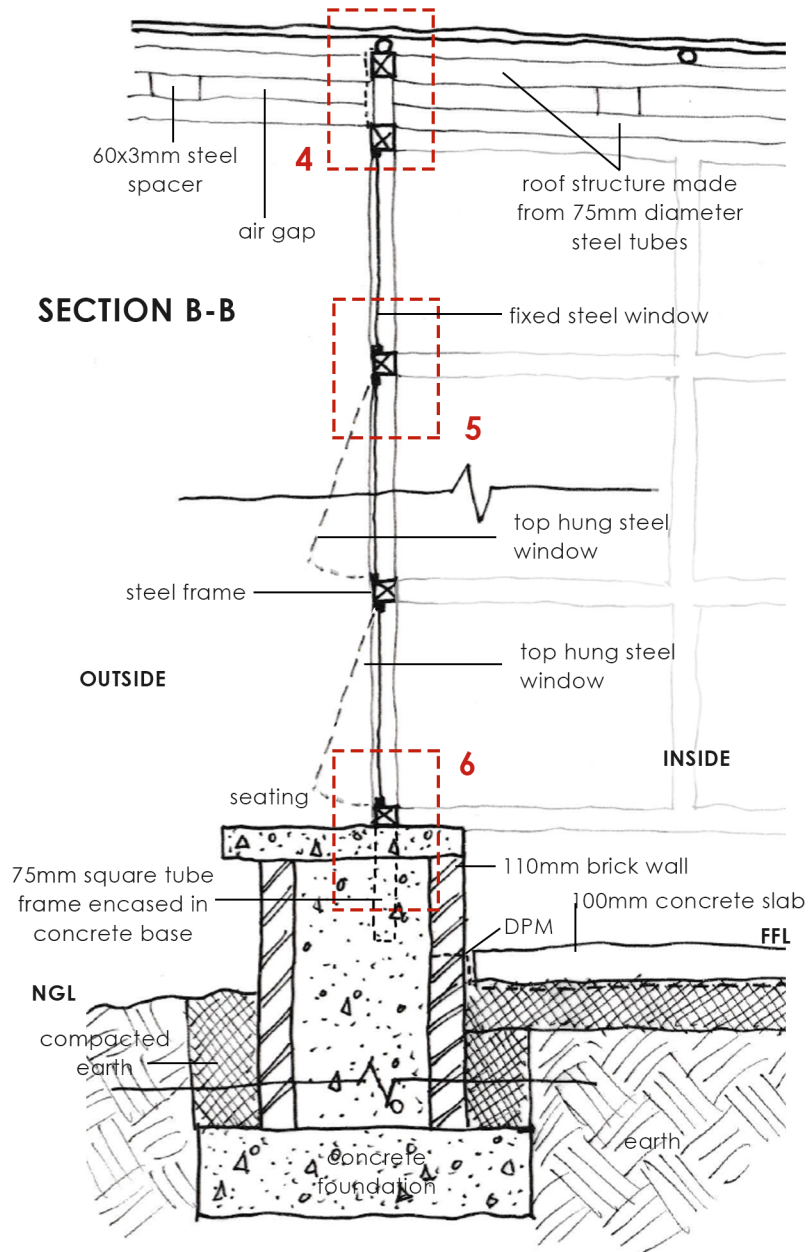
SCALE 1:5



DETAIL 3

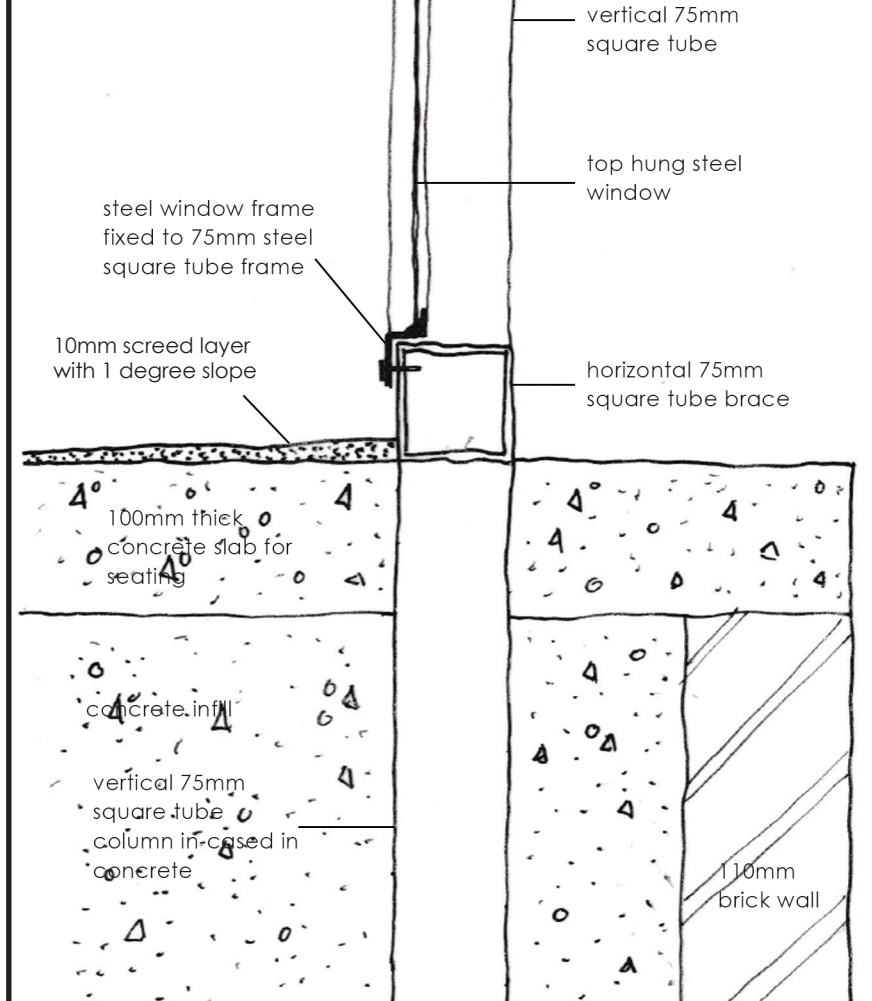
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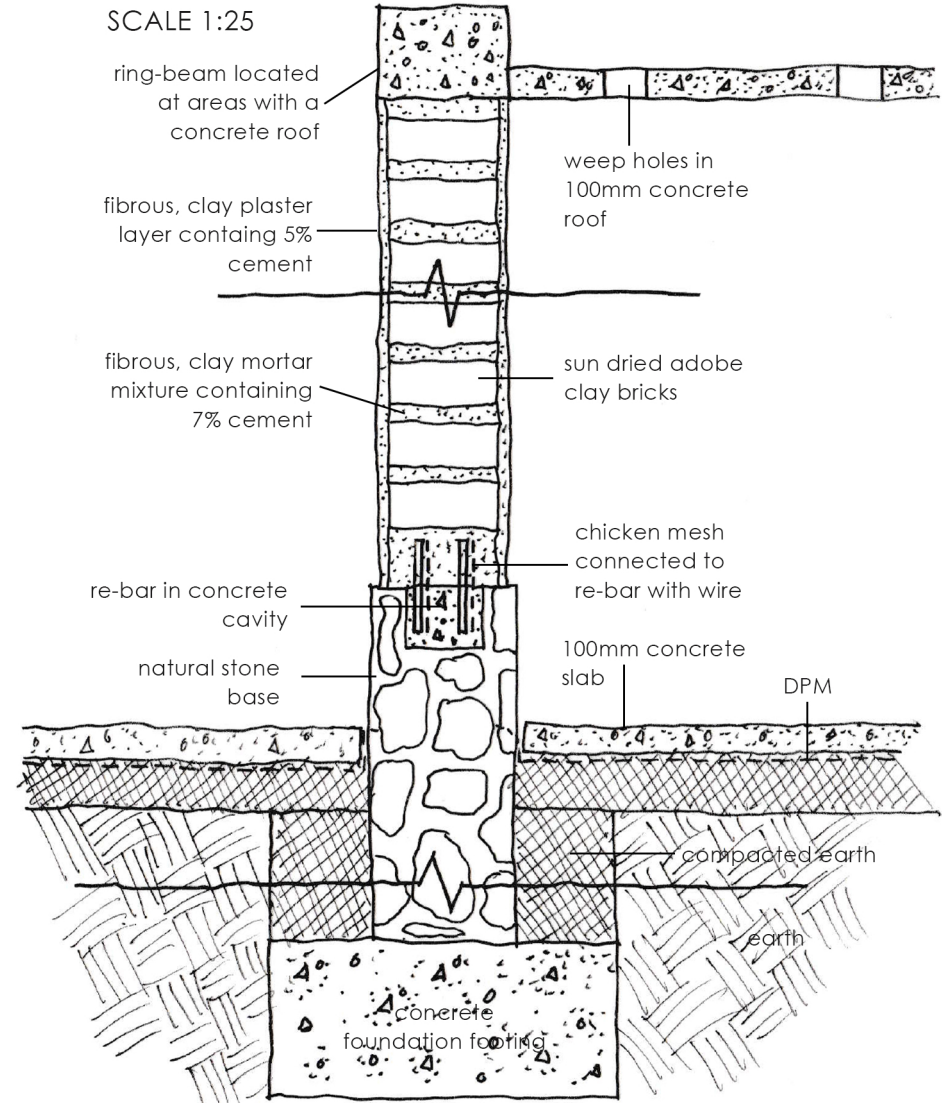
DETAIL 5

SCALE 1:5



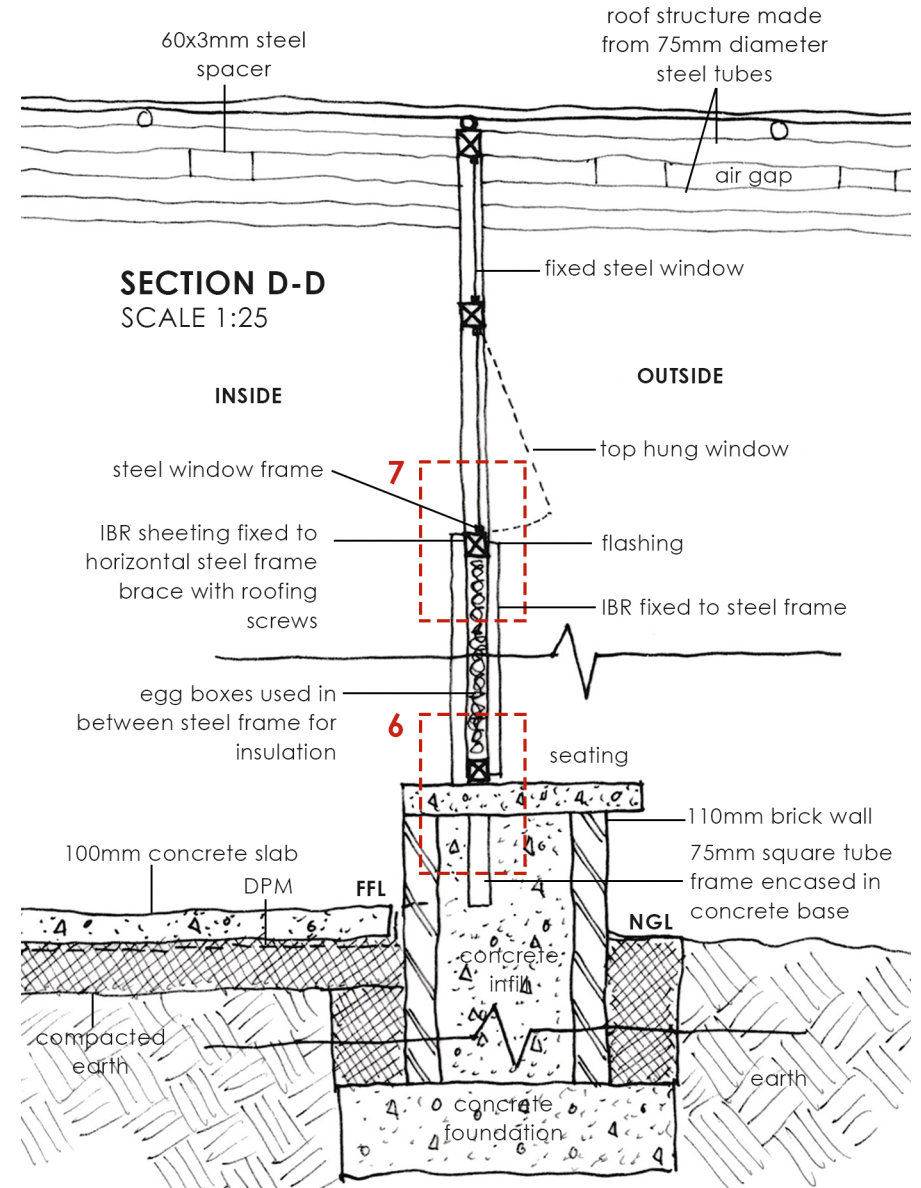
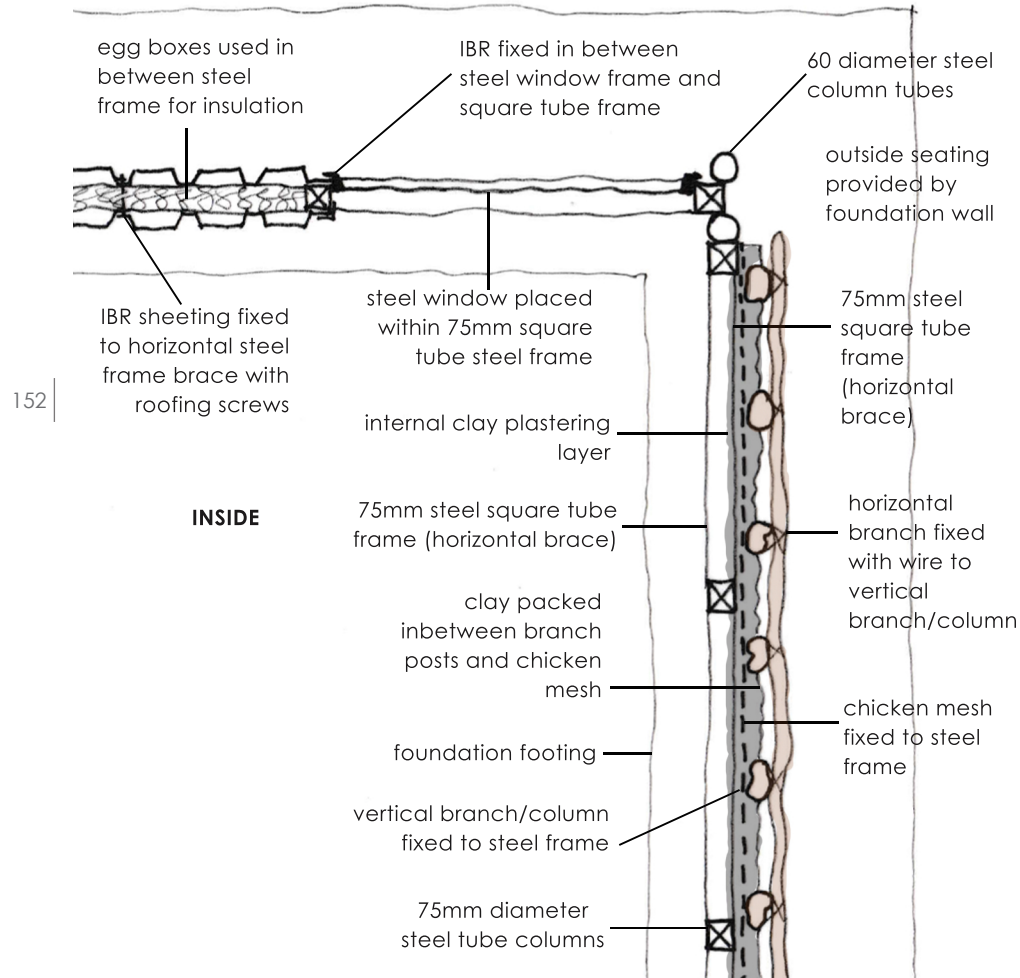
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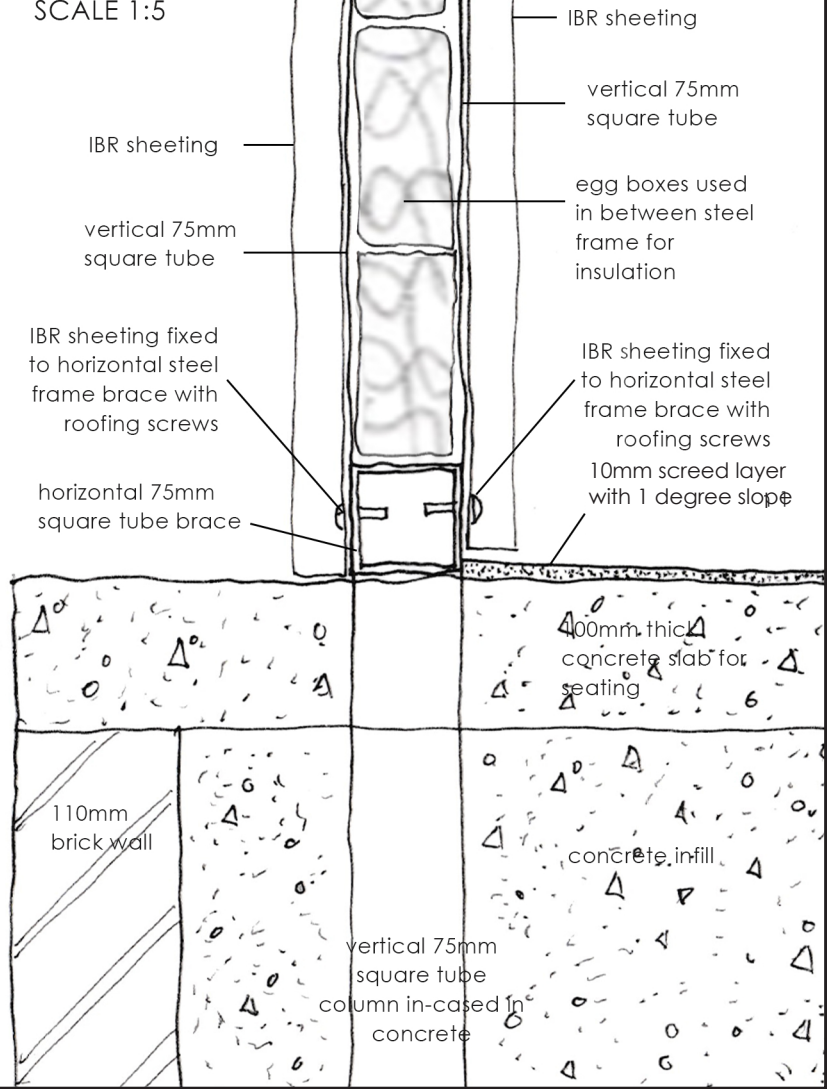


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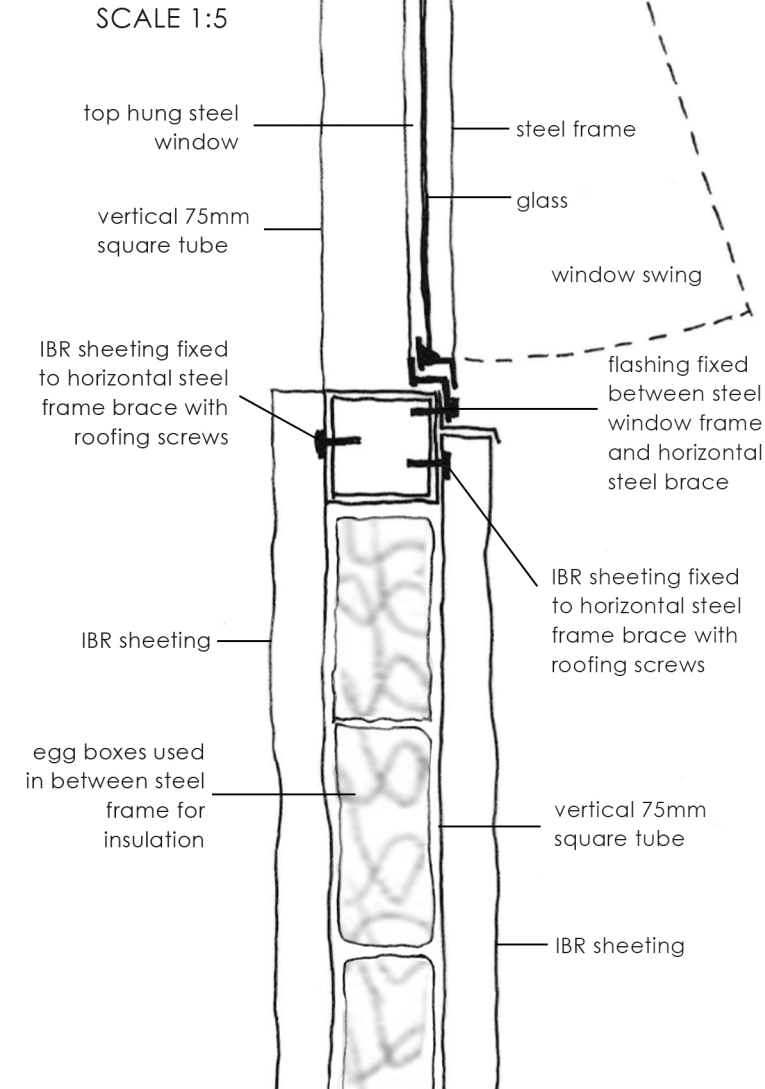
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DETAIL 6
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DETAIL 7
SCALE 1:5



project reflection &
remarks

08

conclusion

CONCLUSION

In order to reduce the rapid rate of rural urban migration, a positive sense of place needed to be introduced to the local rural community. Ka-Ba-Thi Learning Centre aims to create a positive sense of place by focusing on the tangible and intangible needs of the local residents.

By providing local residents with desired functions and services (library, clinic, school and cafeteria) their need to relocate reduces significantly. Ka-Ba-Thi's positive sense of place is further reinforced by recreating a known, familiar feeling informed by the local context. Familiar, local construction materials, techniques and spaces strengthen the link between locals and the centre forming a positive sense of place, lessening their urge to migrate. The self-help construction scheme used to build Ka-Ba-Thi Learning Centre reduces construction costs while creating a sense of pride and achievement, strengthening the link even further.

However, one intervention alone would not reduce rural-urban migration in the Kavango East region. Ka-Ba-Thi Learning Centre therefore provides a prototype to inform a system of interconnected rural development schemes along the thin stretch of the Kavango River.

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09

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