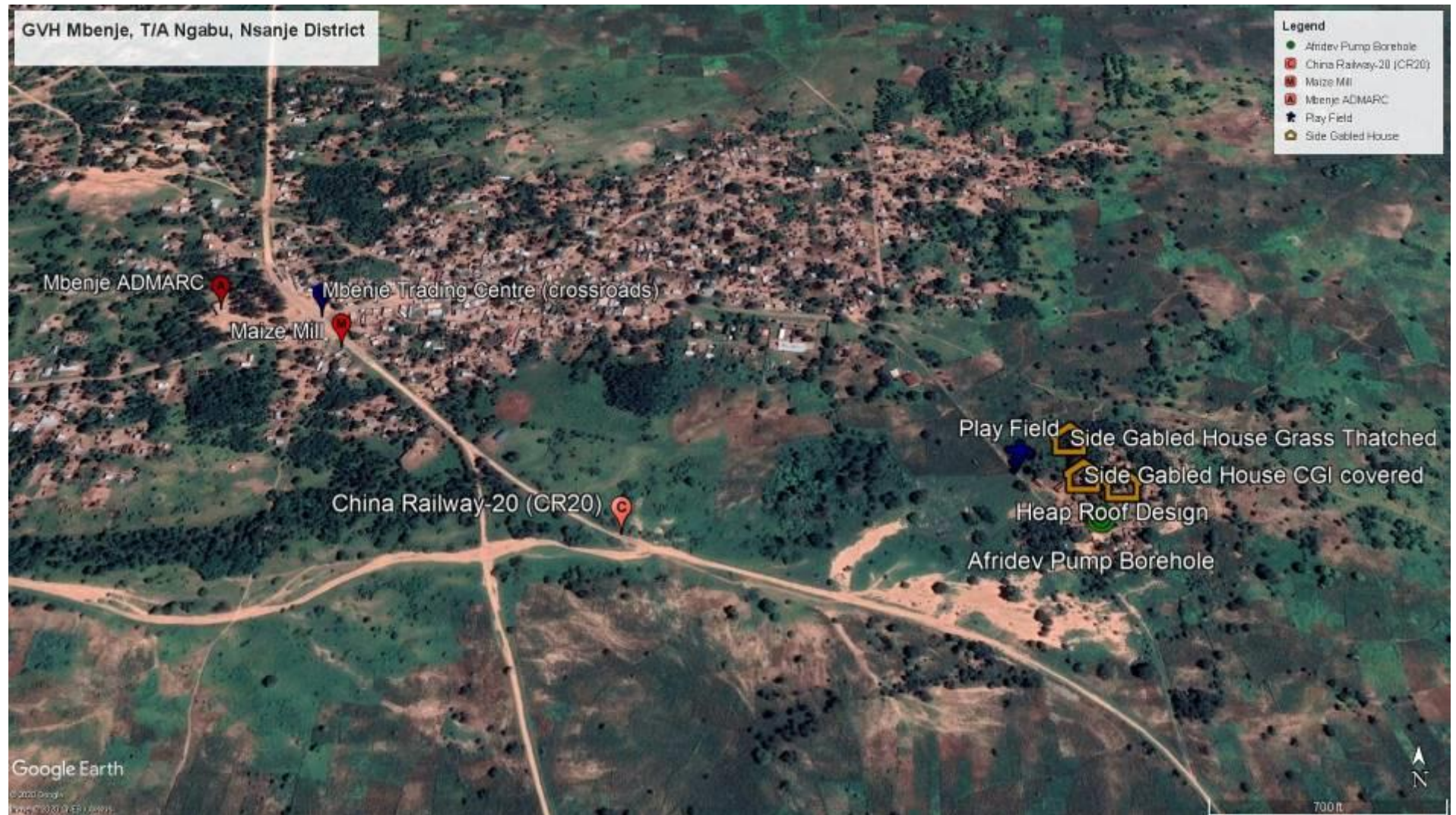


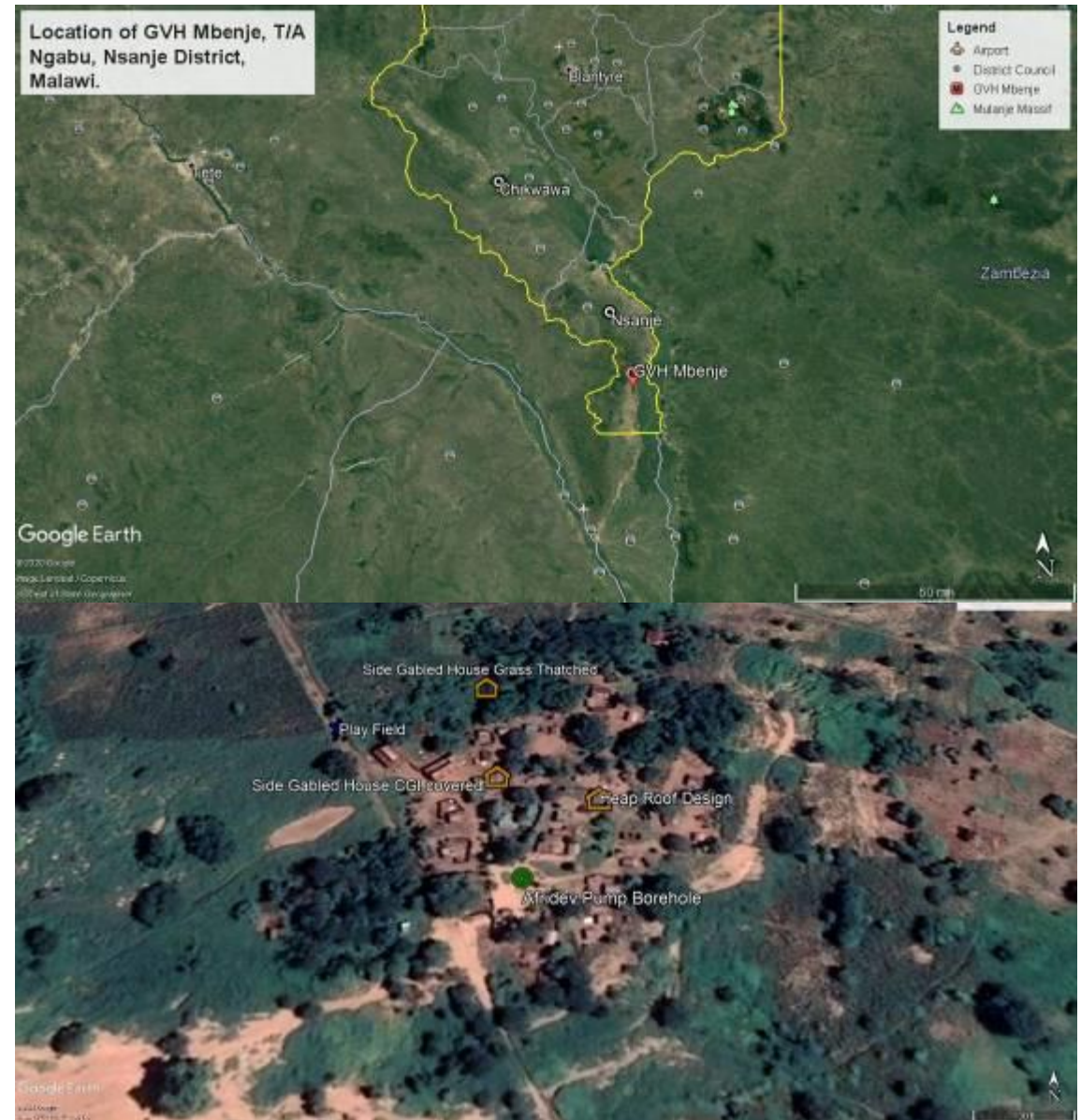
REPORT ON ASSESSMENT OF LOCAL CONSTRUCTION – OCTOBER 2020



1. SITE

SITUATION

Kambulukire Village, GVH Mbenje, T/A Ngabu, lies in south west of Nsanje district. It is along M1 road which links Malawi to Mozambique through MarkA border post from Blantyre (commercial city of Malawi). It is 15Kms to the southwest of Nsanje town. The area is about 5 square kilometers. It is surrounded by two perennial rivers Nyankotola and Nyachipere to the south of the village (3kms). To the west, there is Kirk range mountains where Nyankotola and Nyachipere rivers originates. It is a flat lowland area, hot with temperatures ranging from 20 – 48 degrees Celsius. The altitude is about 38m above sea level. The area is frequently flooded from the east side of the map by Shire river.



ACCESS

The road to Kambulukire is an M1 road, earth and dusty from Nsanje to MarkA. The construction started in 2019. It is accessible by vehicles, bicycles and motorbikes during dry season (April to November), but becomes inaccessible the other months due to road damages by water runoff. The main mode of transport by local people is a motorbike and minibuses. Transport fares are relatively fair as from Nsanje town to Kambulukire costs MK1,500 (\$2), while on a minibus costs MK500.00. The M1 road is currently being upgraded by China Rail way construction company (CR20). Back in the years from 1970's to 1983, there was a Nacala railway line which used to pass through the area from Beira Mozambique to Blantyre but it stopped working due to Mozambique civil war and later it completely stopped working due to floods which washed some sections of the rail way. The railway was the most convenient source of transport as they would carry volumes of luggage to and from towns.

LANDSCAPE

The area is located at a flat lowland covered with silted sandy soil due to recurrent floods. It has scattered grass and trees with locations of houses cramped at one place. The community do not do farming around the homes instead they farm in the valleys of Shire river because that's where the soil is fertile for high yield. The upland has had great deforestation because of cutting down of trees used for charcoal burning and firewood mainly for sale and burning bricks. In the community, there is very limited alternatives to firewood. The villagers cannot afford equipment for electricity and gas usage. Besides, there is no electricity and sources of gas in the villages. Electricity is only centred at Mbenje trading centre.

The common trees are neem which provide home shade as the area is very hot



M1 earth road passing through Kambulukire village



A section of a railway line that was connecting Nsanje and Blantyre

LOCAL HAZARDS

The area experiences the following hazards: frequent floods, heavy rains and strong winds and earth quakes (rarely). These hazards occur mainly during rainy season (December to April). Earth quakes are not affecting them too badly. As described in the landscape, the area is in the valley, very flat with silted sand as topsoil due to frequent floods to the area. The area receives heavy and continuous rains from December to April. Usually, the heavy rains are accompanied by strong winds which causes a lot of damages to the villages such as blowing infrastructure roofs, trees and crops. The flooding mainly comes from the two perennial rivers Nyankotola and Nyachipere that are to the west of the area. These rivers emanate from the Kirk range mountains and passes very close (about 100 m away from the village) and causes havoc to the area. This year (2020), the height of water above the ground was at the maximum of 1.3m. Due to frequent floods the area is very silted and not suitable for farming, the roads get cut off. The most common damages are falling off of weak built structures, washing away crops and livestock. Regarding shelter, most houses that fell are the ones built with adobe blocks and mud mortar with no full coverage of a roof. The Mbenje health centre in the village becomes unfunctional as it gets flooded and filled with the debris from the rivers. When floods happen, people move to higher areas and take refuge in public infrastructures such as schools and churches. When water subsides, they move back to their homes assuming their shelters are still standing. The villagers would want to move out of this risky location and relocate to higher areas but due to lack of funds they fail to secure new land in the uplands due to high prices of land. The villagers are also reluctant to move to up lands for fear of losing their fertile land (gardens) in the Shire valley which is far from the up lands. Their income is mainly from farm produce which they generate from selling the farm yields.

The relocation recovery plan is spearheaded by the Village Civil protection Committee (VCPC) in the area, who supports the government plans for safe relocation.



Heavy siltation in Kambulukire village

2. HUMAN CONTEXT

HISTORY

The area is made up of the Mang'anja people who occupied the area in early 1800. They are a Chewa tribe who migrated from Congo Zaire now DRC. The history says that originally the Chewa tribe were led by Kalonga and Mlauli from Congo. They first settled in Chikwawa and then moved to Nsanje led by Mbona a nephew to Mlauli. They regrouped themselves at Mbenje area. In the 1950s, they were joined by the 4 Asian businessmen who migrated to Kambulukire from Mozambique. The coming in of the Asians to the area attracted Sena tribe from Mozambique. Main settlement structures in the area were Asian shops who were selling clothes and beads. However, in the 1964 after Malawi gained independence the then president (Kamuzu Banda) moved all Asians in the country from remote areas to town with an aim of expanding towns. The Asians sold their good houses in Kambulukire to 4 rich people from Mozambique who were refugees in the area after the war in Mozambique. The 4 rich men expanded their business and most people started moving in and settling in Kambulukire village. Most shelter designs in the area originated from Mozambique.



Shelters built by Asians who settled first in the village around 1950s for business.

POPULATION

The population of Kambulukire village is about 965 with an average family size of 7 people. Everyone who has stayed in the village for not less than 5 years is regarded as a citizen according to the by-laws of the village. The area is populated by the Mang'anja and Sena tribes. The common language spoken is Sena.

MAIN ECONOMIC ACTIVITIES

The inhabitant main economic activity is Agriculture, being supplemented with small scale businesses. They grow crops such as maize, sweet potatoes, Sorghum, millet, vegetables, potatoes, groundnuts and pumpkins. The cultivation is mainly done in Shire riverbanks using residual moisture and manual irrigation (March to September). They cultivate food mainly for their consumption and little for sale to meet their daily needs such as groceries. The middle-income households additionally rear animals such as goats, chickens and ducks for both commercial and household consumption. Most households engage in small scale businesses such as selling thobwa (local brewed drink), flitters, vegetables and bicycle taxi operation. The most vulnerable households depend on piece works (ganyu) for their survival. They have a vibrant local market at Mbenje trading centre on Tuesday and Thursday every week. The market which is mostly patronised by the villagers and other traders from other areas who come to sell clothes.



People selling sweet potatoes harvested from their fields

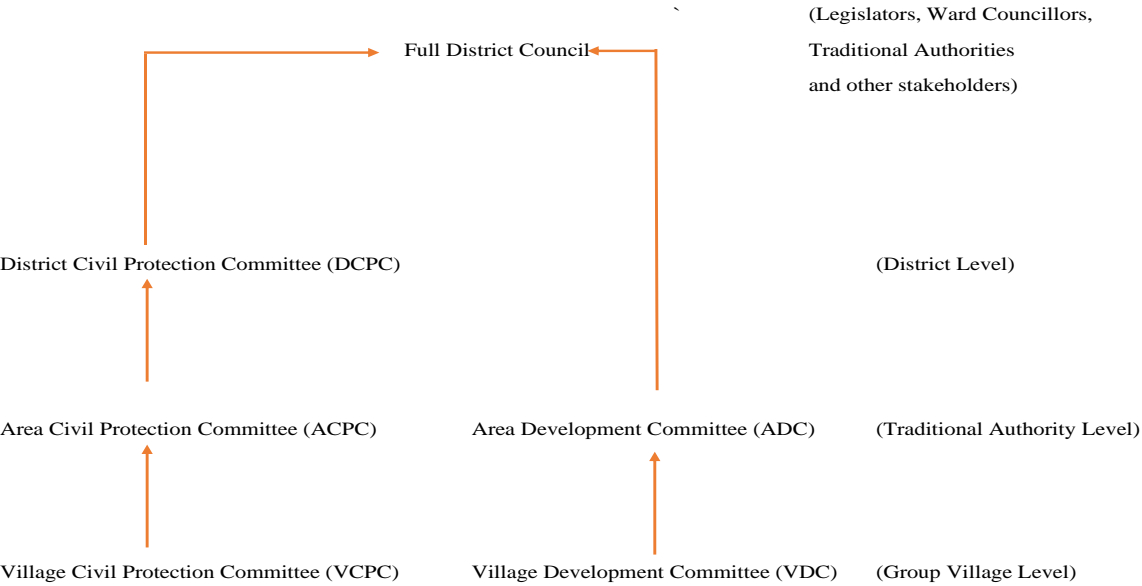


Vendors from other areas selling clothes at Mbenje trading centre on a market day



Mbenje Trading Centre

GOVERNANCE



Interview with authorities in the village

STAKEHOLDERS

Stakeholder Register /Mapping

Location: GVH
Mbenje

Stakeholder Group	Stakeholder Name	Role, Project focus etc.	Contact Details (Phone, Email, Address, etc.)	Role (what is their task or job related to the affected community)	Stake (what role could this stakeholder play in the project)	Additional comment
	Care International	Integrated Resilience Program	Maxwell Supa 0999105996 amos.zaindi@care.org	Cash distribution	<ul style="list-style-type: none"> Cash can support shelter and WASH construction 	
	CARD	Shelter, Agriculture	Msowoya 0996080681 msowoyacf@gmail.com	Nutrition, environment and climate, disaster management, food security and agriculture	<ul style="list-style-type: none"> Use the knowledge in environment and Climate to understand why construction of shelter in uplands is recommended. 	
	Concern Worldwide	Food resilience	Tommy Chimpanzi 0884615456 Tommy.chimpanzi@cern.net	Food security and Nutrition	<ul style="list-style-type: none"> Shelter can support self-recovery through construction of strong granaries Funds from sales of Agricultural products can support shelter construction 	
	Action AID	Women empowerment	Assani Golowa 0888982982	Agriculture and food security, Economic empowerment, Environment and climate change, Education, Social support, governance, Disaster management, Nutrition, Health, Gender, Social welfare and child development	<ul style="list-style-type: none"> Women can be empowered in shelter construction for self-recovery Funds from sales of Agricultural products can support shelter construction 	

					<ul style="list-style-type: none"> Knowledge in disaster management can help in identification of safer areas for shelter construction 	
	Friends of AIDS Support Trust (FAST)	HIV and AIDS	Prince Nyakuleha 0888507940 princenyakuleha@yahoo.com	Education, HIV and AIDS, Gender, Social welfare and Child development		
Authorities	VCPC Chairperson		Misheck Baskolo Charle	Disseminating of disaster awareness messages	<ul style="list-style-type: none"> VCPC leaders can be key influencers in shelter self-recovery 	
	VDC Chairperson		Need person visit	Assessment of development needs in a community and relay the message to ACPC	<ul style="list-style-type: none"> VDC leaders can be key influencers in shelter self-recovery 	
	Village headman		Belesoni Kambulukire	Head of authority in a village to keep order	<ul style="list-style-type: none"> Traditional leaders can be key influencers in shelter self-recovery 	
Providers, Suppliers, Construction workers	Local artisans	Builders and Carpenter	Alufisha Jasten 0995685470 Lenard Tchale 0994771946 Simenti Norman Elias Patrick 0992643709 McLawrence Zembe	<ul style="list-style-type: none"> Selling of construction materials Construction expertise in the community 	<ul style="list-style-type: none"> By training local artisans on the skills of resilient shelters constructions skills, they can continue replicating the shelters to all who want the shelter design in the village in future 	
Influencers, opinion leaders	Village headman	Beleson Kambulukire	Need person visit	To stop problems and also change conflicts into positive ways through their authority	<ul style="list-style-type: none"> Act as key influencers in self-recovery shelter construction 	
	Group Village Headman	Jonasi Jongwe	Need person visit	To alleviate the conflict issues before sending them to the court.	<ul style="list-style-type: none"> Act as key influencers in self-recovery shelter construction 	

	Traditional Authority		Need person visit	Custodians of the cultural and traditional values of the community. They also perform a semi-judicial function settling customary disputes over land.	<ul style="list-style-type: none"> Act as key influencer in self-recovery shelter construction 	
Communication Media	Radio stations	Malawi Broadcasting corporation, Nsanje Community radio	Need person visit	Information dissemination, education and entertainment	<ul style="list-style-type: none"> airing out key messages on resilient shelter construction Showcase some examples of resilient shelters on TV 	
Education	Mchere Primary school		Need person visit	To educate individuals within the society, prepare and qualify them for work in economy	We can use the school children to take home shelter messages by providing them with flyers with shelter key messages to take home	
	Nursery schools		Need person visit	To provide the basic foundation and pacesetter of all other education levels to follow		
Other	China Railway 20 (CR20)	Construction of M1 road and railway	Need person visit	Upgrading (Construction) of M1 road from gravel to Chip seal.	Corporate social responsibility for the community e.g. construction of	

SECURITY

The village has no security enforcement agency (police unit/post) in the villages studied as such most people live for their own security measures. However, there are government efforts to support the area with community policing which reports to the Police office in the district. There are reports of thieves in the area with most household belongings, livestock and farm produce being stolen. The community is mainly afraid of thieves; farm produce can be stolen while still in the fields as well as when they are stored in the houses. Most structures are not protected. Most shelters have straw and grass made doors and hessians/plastic sheets windows which do not provide enough physical security. Use of such building materials pose a huge risk to life and property because they can easily be broken into by burglars. People prefer building without a window opening space just to avoid providing an entry to burglars. However, the covering of window openings by plastic sheet reduces the effectiveness of fresh air circulation. There is no electricity in the village as thus nights are quiet.

Women reported being abused by men in several ways. Home based violence is the common abuse. A few narrated that previously rape issues were rampant as women would return late from the market or fields, but now there are no cases since government has put in measures through VCPC intervention. Polygamous practice by men in the area also put women at a security risk, as the practice brings in hatred within women who often fight. When the man is not in the house (usually at the other woman's house) thieves take advantage and attack the other woman.

Persons living with disability feel insecure because of their condition that predisposes them to be easily attacked and have their houses broken into. There is no special protection of the disabled people in the area by the community as they are treated like any other person

All groups complained that due to security issues everyone in the village keeping their farm harvest in their homes and not into granaries. A good number of families sleep with their livestock in the same house to protect them from being stolen. They are aware of health risks associated with sleeping with animals in the house, but they have no choice as they need livestock for their needs. They would like to have a police unit in the area but government is yet to support them. Currently the nearby police is 15km away.



Door made of straw/reed with no security



Goats sleep inside the house together with people for fear of thieves

SERVICES (ADMINISTRATION, EDUCATION, HEALTH, MARKETS, ETC.)

The following are government services rendered in Kambulukire village

- Health facility (Mbenje Health Centre)
- Nursery and primary school
- Market
- Agriculture
- Road networks
- Communication

Parastatal organisations

- ADMARC
- Electricity supply company of Malawi (ESCOM)
- Water supply company



Farm yields stored in the house to avoid thieves



Afridev pump borehole at Mbenje health centre

Non-governmental organisations services

- Care International
- Church Action for Relief and Development
- Concern Worldwide
- Action AID
- Friends of AIDS Support Trust (FAST)



Mbenje health facility block



Mbenje Agricultural Development and Marketing Corporation (ADMARC)



China rail way construction company (CR20)



Mchere primary school blocks in GVH Mbenje



Mobile telecommunication tower behind Mbenje market



Assemblies of God Church in GVH Mbenje



Mwachitatolo maize mill at Mbenje market

SITUATION OF WOMEN

There are several women in the village. Almost all the women are housewives, small scale businesses and farmers. Their main responsibilities are centred at housekeeping such as preparing food, taking care of children and farming. Their main source of income is farming. At family level they are second decision makers with a man being the head of the family and thus the decision maker. At community level, they can hold positions in the local committees but men outnumber women. In the committees, most women's decisions are not taken on board as men deem women not capable to make sound decisions. In shelter construction women play a role of fetching water, fetching grass for thatching, cooking for the masons, cladding of the walls and smearing the floor.



A woman working as a sales lady selling fliters for some one at Mbenje market



A woman preparing food under a tree

Their main challenges are physical and emotional abuse from husbands who practice polygamy as the women lack care. Lack of income to make ends meet on their daily need. Lack of security from rape when they travel at odd hours. They women further complained of spending more hours to fetch water as there's only one borehole in the village.

SITUATION OF DISABLED PERSONS

There are approximately 11 people with disability in Kambulukire village. The types of disability are blindness, lame extremities, deaf, dumb and mental disability. They are the most vulnerable people in Kambulukire as the community perceive them as being of no use when it comes to development issues. They attend meetings in the village but are rarely consulted or chosen to be part of any committees. Those with minor disability are able to work and find means for their survival unlike the severe ones who depend on relatives. Their main complaints are lack of care from relatives, lack of mobility means, income challenges, living in crowded houses, exposed to diseases due to hygiene issues, lack of security, lack of participation in decision making forums as thus their voice is not heard, no access to social cash transfer programs (mtukula pakhomu) and no access to schools because of their condition. Most of their houses are adapted to their special needs. On the



Interviews with PWD

improvement needed to their life and houses, PWD responded that they lack basic needs. On the house improvement, they cited need for the CGI roof unlike the grass thatched roof because thatch needs frequent maintenance and they do not have the capacity to do such roof maintenance due to their condition.

COMMUNICATION

Communication in the Kambulukire is mainly through the following ways: Phone calls, village criers, radio, use of whistle, beating of a drum, Door to door communication, calling for meetings, use of posters, flyers and public address system.

ENGAGEMENT CHANNEL REGISTER

Engagement Channel Register				
Most common means of communication	Used mainly by...	Advantage reported	Challenges reported	Comments
Community meetings	Chiefs Government Officials			This is the most effective method
Listening to radio	Everyone in the village with access to the radio receiver.	The message reaches masses and distances instantly and physical obstacles is not a barrier.	Not everyone has access to a radio receiver because some cannot afford to buy it.	This is an effective method
Cell phones	Everyone in the village with access to the cell phone.	The message reaches distances instantly and physical obstacles is not a barrier.	Use of Cell phones is expensive as they are required to recharge with airtime as well as the cost of charging phone battery (many do not have electricity hence they seek the service to others who provide it at a cost). Due to illiteracy some people cannot read short messages	Used all times
Whistles-blowing	Leaders representatives	It's a pre-communicated code where when one hears it knows that it's an emergency.	There is a need to accompany the whistleblowing with a raised voice message to define the cause of whistle blowing.	During funerals and emergency gatherings

Caller messengers who move around the community to spread the message	<ul style="list-style-type: none"> • Calling meetings • Informing the community of an impending disaster or any pandemic 	Cheap and easy, readily available means, culturally acceptable.	<p>It can be biased. The messengers sometimes deliberately choose to leave out other community members when it comes to important communication such as registration and distribution of some relief hand-outs.</p> <p>It cannot reach every one e.g. those with hearing impairment, working in fields at time of spreading the message, etc</p>	Usually done at dawn and dusk to call for emergency meetings
Use of megaphones	Government/NGO officers	The message reach masses at once especially at gathering/busy places e.g. trading centres, church gatherings, rallies.	Megaphones lack maintenance and mostly are in bad condition for use and normally not affordable by the communities.	Use of pictorial messages is effective to the illiterate and impaired
Pasting posters on trees, Markets, churches, schools and any open places	Religious groups, Health personnel, schools, singers, dramatists,	Is cheap, reaches many people, readily available	A barrier to the illiterate or/and visual impaired, Poster can easily be removed or destroyed by rains. Reaches only those who get to the poster e.g. those with disability and elderly	Use of pictorial messages is effective to the illiterate and impaired
Flyers	Government/NGOs	The message reaches the targeted groups,	A barrier to the illiterate or/and visual impaired	Use of pictorial messages is effective to the illiterate and impaired

ACCESS TO LAND

Land issues in Kambulukire are manned by local chiefs. They are the ones who distribute land to whoever wants it, settle issues and disputes. Land is distributed at free cost in the area. Of late (since last year) few people are selling land. Most people have customary land which they inherited from their forefathers. Land is shared per family and everyone is free to do what he wants with it. However, there are some families which allow only men to have family land, women are not supposed to be shared family land as they will go to live with their husband once they get married. Customary land is not registered by the laws of Malawi.

Most families in the village have the right to access of land whether women, men and disability. Everyone have access to choose the site of plot, setup of the compound, choice to design of the settlements, choice to choose building materials and choice to the choose who should be the builder. All land disputes are settled by village chiefs but anyone is free to consult the courts if not satisfied by the final verdict

WASTE MANAGEMENT

In Kambulukire village there is no proper outlined waste management. Everyone is at liberty to manage his own waste. Some households throw litter in rubbish pits in their homes, some burn the waste while others throw them around their surroundings. Some households have pit latrines, some share one pit latrine while others do open defaecation in the nearby bushes. Almost all the pit latrines, we came along are made of

bricks and not roofed. Their explanation is that they construct temporally structures because the area is mainly sandy soil so the pit cannot withstand to floods.

Government structures such as schools and Health Facility has well-built pit latrines



Trash pit in the village



Bathroom



Pit latrine in the the village



Modern pit latrine at health centre



Placenta pit at Mbenje health facility



An incenarator at Mbenje health facility

SEASONAL CALENDAR

[illegible]

	Collection of tomatoes												
	Tobacco sales and auctions												
	Cattle/Livestock sales or auctions												
	Casual Labour												
Hazards	Flooding season/peak												
	Dry season/peak												
	Hurricane/Thyphoon season/peak												
	Maize/Rice price peak												
	Lean season (Hunger)												
Health	Diarrhoea												
	Malaria, dengue, cough/cold, measles, tetanus												
Other	Fire wood collection												

3. HOUSING

GENERAL DESCRIPTION OF SETTLEMENT

Kambulukire Village is comprised of people of all ages such as the children, youth and elderly. They acquired the land through their ancestors, it's a customary land. Mostly, all the people living in this village are related and they share settlement land through family relations.

The area is flat with a lot of trees such as cassia, neem and mango. Houses are compacted, not far from each other whereby they share some infrastructures such as pit latrines, bathrooms, water source and play ground. Most of them are peasant farmers whereby they earn their living through farming. The house designs are very similar with gabled houses being more prominent. Their houses are mainly two roomed with (a bedroom and a living room) because they can't afford to build a bigger house as it needs more building materials and high labour cost. Most houses have no kitchen and use a veranda as a kitchen because they reported that they cannot afford to build a kitchen. Due to polygamous marriages men fail to cater the responsible to build kitchens for all women. The responsibility is left to women who in the end fail to build on their own. Culturally, bathrooms and pit latrines are built outside the house as they are considered waste disposal facilities so they cannot be inside the house.



Trees, siltation and proximity in shelters in the village

FUNCTIONS OF DIFFERENT BUILDINGS

Houses (living spaces/sleeping rooms): used as bedroom during the night, storing food stuffs (sweet potatoes, mangoes, maize, sorghum), storing of kitchen utensils, keeping of water in buckets, keeping of livestock's and some poultry (goats and chicken)

Kitchen: For preparing of food

Latrines: For waste disposal

Bathroom: for bathing and washing clothes

External covered spaces: for resting, keeping construction materials (grass for thatching)

Granaries/stables: There are no granaries. People keep crops inside their houses due to security reasons

Bird shelters (Khola): for keeping of poultry, pigeons, ducks (Dove)

Fence: for privacy and protection of the home compound



Bed room also used for storing food stuff



Fence for privacy on a shelter



Kitchen on the veranda



Shelter surrounding space provide shade to livestock



Harvested thatch grass rack



Pigeon shelter

GENERAL DESCRIPTION OF EXISTING HOUSING DESIGNS

DESIGN 1: HIP ROOFED HOUSE (GRASS THATCHED ROOF)

DESCRIPTION:

Average dimensions: 4.2m x 3.5m

Reason: It lasts long, mostly constructed by those with a source of income because it needs more building materials and special skill.

Location: 16°59'47.461" S, 35°13'26.488" E

Construction process: Simple, done within one week.

Origin of materials: All materials are locally available in the village

Average lifetime: Not less than 8 years as reported by dwellers (not expert calculated)

Maintenance: Done every two years overhaul replacement of thatch grass on the roof, smearing is done monthly, and cladding is done once in a year.

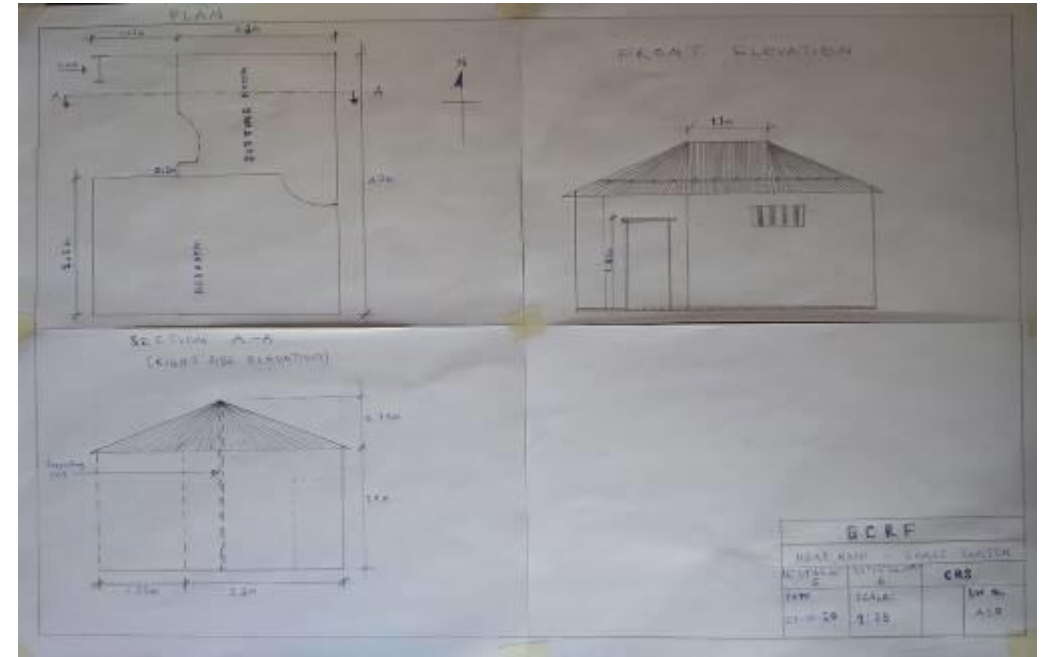
1. Labour costs: MK25,000.00 (\$34) for foundation and superstructure while roofing costs MK10,000.00 (\$13.5). Otherwise labour cost responds directly to increase in number of partitions.

2. Materials costs: All locally available materials cost nothing except labour effort by owner but assuming they are bought they can cost MK39,000.00 (\$53).

CONSTRUCTION ELEMENTS

Foundation/base course: No foundation, they just start with a header course

Walls and partitions: Unburnt bricks, because they are the ones the family can afford due to their income level. One brick thick wall for both outer walls and partitioning walls.



Heap grass thatched roof design



Heap (grass thatched) roof design house in the village – front view

Roof structure: Timber poles for framing members e.g. ridge pole, rafters and wall plates. Reed for battens. Ropes are used to tie the frame members.

Roof covering: Generally, they thatch with grass, sometimes they put a polythene paper underneath

Floors: Filled and compacted with a smooth smeared finishing.

Openings: wood frames without a lintel on top mostly used for door openings only while on windows they put a lintel and made small and left open if not rebuild with bricks.

Finishing: With clay soil, interior cladded with mud.

STRENGTHS

- Use of adobe masonry column which cannot be attacked by termites
- Roof well thatched and clamped with a tied bamboo
- All materials used are locally available hence easy to maintain and affordable.
- The wall is vertically straight making it to stand firm.
- Heap roof design resists the roof from getting blown off.
- Structure wall; adobe is bonded by mud-mortar of the same type which was used for molding adobe achieving the optimum strengths.
- Well decorated with a fisher-board made of reeds.
- There is a wooden door fixed, which improves the security of the house.
- Wall plate is ties to the wall by ropes enhancing the resistance to wind blow-off.
- There is a supporting timber post to carry the load
- Materials used for roofing are lighter reducing the load bearing effect on masonry walls
- There are wall plates around the wall on top for even distribution of load on the masonry wall
- Embarkment around the lower part of the house.
- The house is surrounded by trees which helps to prevent the effect of strong wind.



Heap (grass thatched) roof design house in the village – Side view



Rope binding wall plate to the wall

WEAKNESSES

- Adobe masonry column exposed to rain risking structural failure assuming it's a load bearing column.
- Lack of foundation/basecourse risking the house to collapse due to waters. They find constructing a base as expensive in the sense that it takes a lot of bricks and it attracts a higher labour cost.
- Lack of plinth wall reducing the protection factor of the wall from getting soaked. They find constructing a plinth expensive and a waste of bricks and laborious. They don't know the importance
- Adobe column can easily get soaked and fell since it is exposed to rains. There is a need for and overhang of at least 1 m. This practice is not being practiced because they don't know the importance of the concept behind it.
- Exterior wall is not cladded hence reducing a protection layer as well as taking off her beauty. They only do it to beautify the house they don't know the importance of doing
- Wall can easily fall with prolonged rains or floods because it has no plinth wall as well the foundation and the roofing doesn't fully cover the structure to protect it from rains. They say that constructing a plinth needs more bricks which make the house expensive
- Timber wall plates are not commonly treated because they cannot afford to purchase termicide



Wall starting on a header course on the ground without foundation

- Lack of foundation withdraws the expectation of having a raised base course. They say that constructing a plinth needs more bricks which make the house expensive
- Built on a low platform can easily be damaged by floods. They fail to relocate because they cannot afford the cost of land in upland
- Rebuild window openings reduces light inside the house but they do so to improve security

DESIGN 2: SIDE GABLED HOUSE (CGI ROOF)

DESCRIPTION

Average dimensions: 7m x 6m

Reason: It is simple to build, constructed by those with source of income because it needs to purchase CGI and have the bricks burnt. Special skill is involved.

Location: 16°59'48.276" S, 35°13'24.706" E

Construction process: Usually done within a month.

Origin of materials: All materials (locally sourced as well as purchased) are originated locally.

Average lifetime: More than 20 years as reported by dwellers (not expert calculated).

Maintenance: Smearing done on bimonthly basis.

1. Labour costs: MK50,000.00 (\$68) for foundation and superstructure while framing and CGI covering costs MK30,000.00 (\$40.5)

2. Materials costs: Some are locally available e.g. bricks but some are

CONSTRUCTION ELEMENTS

Foundation/base course: Most shelters have a shallow foundation if not without foundation.

Walls and partitions: burnt bricks, one brick thick wall, interior.

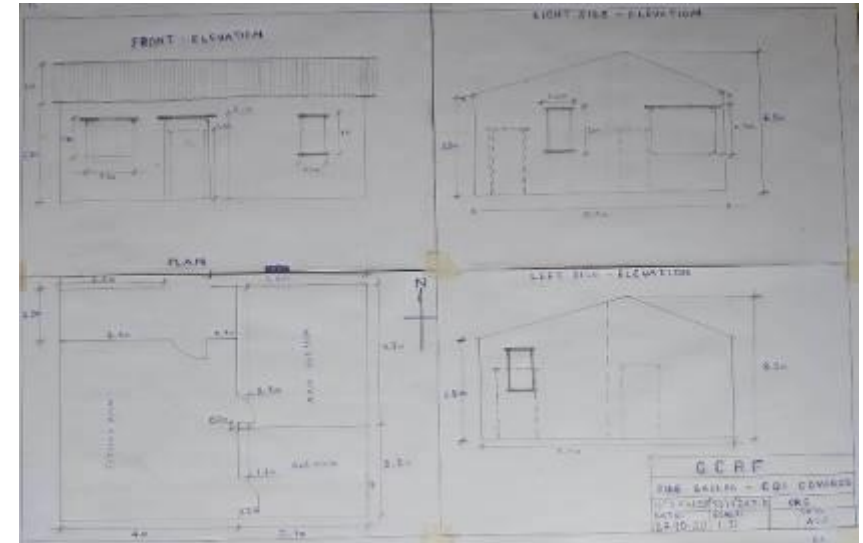
Roof structure: Timber plank for framing (mostly not braced), wall plates and battens.

Roof covering: Colligated Galvanized Iron sheets of 32 gauge.

Floors: Filled and compacted with a smooth smeared finishing (few they put cement).

Openings: wooden frames mostly used for door openings only while on windows they put lintels and made small and left open if not rebuild with bricks or covered with hessians/plastic sheet.

Finishing: With clay soil or cement on floor, some use water paint on exterior and interior walls.



Side Gable CGI covered Design



Side Gable CGI covered Design – Front view

STRENGTHS

- mesh to prevent entry of flies in the house.
- There is a wooden door fixed, which improves the security of the house.
- Framing members are knotted to the wall by a galvanized wire preventing the impact of strong winds.
- The shelter has a foundation/base course.
- Materials used for roofing are lighter reducing the load bearing effect on masonry walls.
- Shelter design uses little materials making it affordable
- There are wall plates on both lower parallel end walls on top for even distribution of roofing load on the masonry wall.
- Some plasters with cement mortar up to window level to protect it from flooding water.
- Timber planks for wall plates are treated with termicide.

WEAKNESSES

- Lintels are of longer span and of poor strength to resist the loading effect of bricks loaded on top of it. This is commonly done due to lack of knowledge.
- The foundation is not raised enough to avoid flooding water entering the house and the absence of a plinth wall exposes the foundation to soaking by flooding waters.
- Exterior wall is not cladded/plastered hence reducing a protection layer as well as taking off her beauty.
- Site selection is poor risking the shelter to be washed away by floods, but they are limited on it.
- A compulsory veranda being used as a cooking point pollutes the fresh air in the house risking inhabitants to suffocation. They find the veranda convenient for kitchen chores.
- The design exposes the wall to rains risking it to failure due to prolonged rain
- Rebuild window openings/covering with plastic sheets reduces light inside the house but it is being practiced to enhance security.



*Side Gable CGI covered (burnt brick)
Design – with mosquito mesh on a window*



*Side Gable CGI covered (burnt brick)
Design – lintel failing due to heavy brick*

DESIGN 3: SIDE GABLED HOUSE (GRASS THATCHED ROOF)

DESCRIPTION

Average dimensions: 5.6m x 4m

Reason: Simple to build, only bricks needed to be purchased, widely they use unburnt bricks.

Location: 16°59'46.664" S, 35°13'24.502" E

Construction process: Usually done within a month.

Origin of materials: All materials are locally sourced and originated.

Average lifetime: More than 10 years as reported by dwellers (not expert calculated)

Maintenance: Smearing done on monthly basis.

1. Labour costs: MK30,000.00 (\$401) for foundation and superstructure while framing and grass thatching costs MK10,000.00 (\$14)

2. Materials costs: Materials are self-made and fetched e.g. bricks except door and door frame which are purchased and they cost MK11,000.00 (\$15)

CONSTRUCTION ELEMENTS

Foundation/base course: Most shelters have no foundations/base course as they find constructing a foundation needs more bricks, laborious and bricklayers charge more for foundations/ base.

Exterior and partitions walls: burnt bricks, one brick thick wall. Mystery

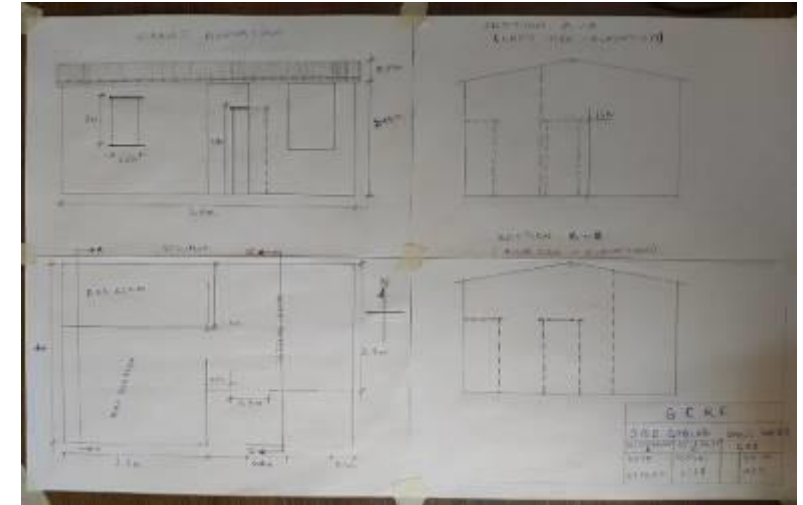
Roof structure: Timber poles for framing (mostly not braced) and reeds for battens.

Roof covering: grass thatched.

Floors: Filled and compacted with a smooth smeared.

Openings: wooden frames mostly used without lintels because they don't know that they serve different purposes. They usually think that a lintel acts in absence of a frame. Frames are put for door openings only while on windows they put lintels and made small and left open if not rebuild with bricks or covered with hessians/plastic sheet.

Finishing: With clay soil on floor, few use cements to plaster the exterior walls.



Side Gable Grass Thatched Design



Window opening covered with steel

STRENGTHS

- Burnt bricks has a better compressive strength
- Well thatched and clamped grass to resist strong winds.
- All materials used are locally available in the village and on a nearby market
- The wall is vertically straight making it to stand firm.
- Bonding done by mud mortar reducing the cost of the shelter.
- There is a metal burglar protector at the window to bedroom and a wooden door fixed enhancing security to property.
- Use of reeds on battens reduces the load bearing effect on masonry walls.
- Shelter design uses little materials making it affordable
- The shelter is erected on a high land reducing the risk of flooding effect.



Side Gabled Grass Thatched Design – built on a raised land

WEAKNESSES

- There are no wall plates, owner said that burnt bricks are stronger and they don't dissolve hence wall-plate irrelevant.
- No lintels on top of door frames, they find it irrelevant.
- The structure is not seating on a foundation/base course hence load not evenly distributed on subgrade.
- Exterior wall is not cladded/plastered hence reducing a protection layer as well as taking off her beauty. This was justified by saying that when they clad it people want recognize them that they have a house built using burnt bricks.
- Needs routine smearing of the floor on short intervals.
- A compulsory veranda being used as a cooking point pollutes the fresh air in the house risking inhabitants to suffocation.



A bathroom constructed without roofing risking failure due to exposure to rain

- The design exposes the wall to rains risking it to failure due to prolonged rain
- Rebuild window openings/covering with plastic sheets reduces light inside the house.
- Window are not properly covered allowing mosquitos to get into the house through windows.
- Roof framing members are not tied to the wall to protect it from strong winds.
- The house face south which is a usual direction where wind comes from.



Missing wall plate for even distribution of load on the wall

WATER

The community has one borehole with an afridev pump as a source of safe drinking water and other purposes. The borehole gives soft, clean and safe water that the village is satisfied. However, they complained that the water gets contaminated, unclean during the times of flooding disaster. The focus group said that they make sure that they fetch water with clean buckets and cover on their way to their houses to make sure that water doesn't get contaminated after being pumped. The community allows its member to use the borehole for construction except for molding of bricks where they fetch unclean and dirty water from the nearby river which mostly done by women. Every household contributes K50.00(7 cents) per month for maintenance of the afridev pump on the borehole and they further said that they collect per month they said they collect around K1500.00 (\$2) per month. During disaster the afridev pump gets covered with sand due to siltation, the community wish their borehole to be shifted away from the river bank to an upper land because in such times they have no safe and unclean water.

SANITATION

Most of the households don't have their own pit latrines instead several households share the same pit latrine which promotes unhygienic practice. On why they don't have a pit latrine at each household they said that their floods washed away they pit latrine housing while some filled with sand, so they are in a process of rebuilding. They are taking longer to rebuild because they don't have timber logs to cover the pit. Some use railway sleepers (illegally because they take advantage of an idle railway which passes close to the village) as logs to cover their pits. Handwashing facilities are strategically placed only where there is a gathering, school and at health center. Pit latrines don't have hand washing facilities e.g. tippy tap. The community has no formal waste disposal facilities e.g. trash pits. This makes the community members to dispose their waste anyhow.



Afridev pump borehole in a heavy silted land



Bathroom built without roofing

IMPROVEMENT / EXTENSION OF CONSTRUCTION

There has been an improvement in as far as shelter construction is concerned. Some houses are now being constructed with modern materials such as iron sheets and cement. There has been an improvement in wall plastering with cement mortar by trained masons instead of smearing with mud mortar which was done by women.

There is an improvement in ventilating the house, the old shelters mostly had no windows, but now, some houses have bigger windows covered with mosquito nets.

Straw doors are being replaced with wooden ones

The improvement is due to the earnings from selling farm yields such as beans, pumpkins and sweet potatoes which are commonly grown in winter season.

Use of solar power for lighting the houses is another improvement



Solar panel source of electric energy for lighting and charging phones



A well secured door with a padlock on it



House cement-plastered up to window level with a painting finish/



Mosquito shield mesh

ORIENTATION

Most of the houses are oriented for three reasons. Firstly, houses face the road. Secondly, they face off-south in order to avoid wind direction which usually is from south to North. Lastly, they make sure that houses face each other for the related families. Some do not follow any orientation.



House with a compulsory veranda and trees surrounding



Cooking point on a compulsory veranda



Plastered with cement to prevent soaking during

4. PRODUCTION OF HOUSING

GENERAL CONSTRUCTION PROCESS

The general construction process in the area of GVH Mbenje is that the most vulnerable households do not engage any artisans in their house construction. As man of the household, he mobilises the family to mould adobe bricks and he will build it using the skills he learnt somewhere and a house will stand. For the thatch he will ask family members to collect it and ask someone skilled in thatching to support him if he cannot do it alone. The middle income and better off families are the ones who moulds bricks and can afford to buy firewood for burning the bricks and later will hire an artisan to construct all stages of the shelter.

SOLIDARITY MECHANISMS IN CONSTRUCTION

In solidarity when an elderly or disabled person is unable to support themselves for valid reasons, for example if he/she has children or relatives who can support them, the community through VCPC organises themselves to support them in terms of labour. The VCPC will call for a meeting and divide labour within the people for support

SEASON FOR CONSTRUCTION

Shelter are constructed from August to November

AVAILABLE SKILLS

Number of masons / bricklayers / labourers / carpenters...

Masons =0, Bricklayers = 7, unskilled labourers = many and carpenters =2,

Training: Masons in Kambulukire are not trained by vocational schools instead they learn through hands on experience. They start as unskilled labour then later they master the art. Most of them have had relatives who were masons and through assisting them in construction they got trained



Building materials at Mbenje market



Interview with local artisans



Artisans working tools in a hardware shop at

Participation of tradespeople in design: Tradespeople have no role in the house design. All they do is sale their merchandise. They sale items which are frequently sold

Association of tradespeople: There is no association of tradespeople. Each one operates in any way that he likes

Payment system: Tradespeople accept both cash and on loan payments. Loan is given to only people they personally know and have assets so that when they fail to pay back, the tradesperson can recover his money through getting the assets. The local artisans are paid through part payments depending on the agreement they make. The agreement is done verbally. In some cases, the wife of the local artisans acts as a witness to part payment.

Cost of labour: Foundation and wall for a 6x4 m house is K20,000, roofing is K10,000 grass thatch and K18,000 for CGI

MATERIALS

Type and dimensions	Origin	Price	Quality	Availability year-round	Other information
Adobe bricks	Locally made	K5.00	Strong	June to November	Only available during dry seasons
Burnt bricks	Locally made	K10.00	Strong	Available all year round	
Thatch grass	Locally grown	K100.00/bundle	With medium stems	Available from May to August	Mostly available at the beginning of dry season
Straw/reed doors	Locally made	K1500/bundle	matured	May to November	Only available during dry seasons
Wooden doors	Locally made	K8000	hardwood	Available all year round	Made by local carpenters
Rim rock	China/South Africa	K1500	poor	Available all year round	Imported
Timber planks	Locally found and processed	K7500/plank	Not thoroughly finished	Available all year round	2" x 4"x 18ft
Sand	Locally found	No cost	good	Available all year round	Transportation labour cost may apply if not done by owner
CGI:	Sourced from China and South Africa but processed locally	K4300 K3800	10 ft 32 gauge 10ft 36 gauge	Available all year round	
Nails (all sizes)	Sourced from China and South Africa but	K1500/kg	good	Available all year round	

	processed locally				
Doors	Locally made	K20,000	hardwood	Available all year round	Sourced locally
Door frames	Locally made	K6000	hardwood	Available all year round	Sourced locally
Window frames	Locally made	K4500	hardwood	Available all year round	Sourced locally
Cement	Malawi	K8500/50kgs	32.5R	Available all year round	Manufactured locally
Window sashes	Locally made	K3500	Hardwood	Available all year round	Sourced locally
Yield Reinforcement	China/South Africa	K700/kg	good	Available all year round	Available in different diameters and lengths
Bulb	China/ South Africa	K400	good	Available all year round	imported
Sockets	Malawi	K1500	medium	Available all year round	Manufactured in Blantyre
Air vent	Malawi	K500 per pair	Metal/plastic	Available all year round	
Padlock	Malawi	K1500	poor	Available all year round	
Plastic sheets	Malawi	K4500 per 100 yards roll	Less than 200 microns	Available all year round	
PSM Lime	Malawi	K6,000	good	Available all year round	Locally manufactured
Panga knives	Malawi	K1500	low	Available all year round	
Tie wire	Malawi	K800	Poor tensile strength	Available all year round	
Spirit level	China	K3000	plastic	Available all year round	
Hoe	Malawi	K4500	strong	Available all year round	
Tower bolt	china	K1800	poor	Available all year round	
Pronto	Malawi	K2500	timber	Available all year round	
Linear threads	Malawi	K200 /strip	Very strong	Available all year round	Extracted from used tyres
Hammer	China	K1200	Very poor	Available all year round	

MAINTENANCE

People in Kambulukire area maintain their houses depending on the type of the house (roofing, wall and foundation) and how it has been affected; Grass thatched roof house are being maintained after 2 to 3 years by adding new grass and the plastic sheet. Earth floor house is maintained by smearing the floor and cladding the wall. Smearing is done every month while cladding is done whenever it wears out



Well grass thatched house



House smeared inside

5. LESSONS LEARNT FROM LOCAL ARCHITECTURE

WEAKNESSES

Strong winds

- Roofing is just seated on the wall without being tied to wall. They find the practice not useful hence costly.
- Framing members are not braced to be firm to strong winds.
- The side-gabled design is common in the village for its low material consumption but it's a risk to be blown off.



Lintel on a window opening with small thickness failing due to heavy load by bricks on top of it



House without foundation and loose grass bundles on the roof

Floods

- A lot of shelter does not have the foundation/base course and plinth wall. Very few have a non-raised foundation. This does not only risk the wall to soaking with flooding water but also the strength of the structure is compromised as the load is not evenly distributed in the subgrade.
- Some houses are built in low lands where flooding water settles and sink the house.
- The community is very close to the rivers that floods risking loss of human life and damage to property.

Design

- Side gabled house design exposes walls to windy rain pattern.
- Due to lack of knowledge on how they can overcome the compressive load. Some houses have lintels that are longer, shortening the span (a solution at a low cost) or increasing the thickness of the timber plank can also be a solution (increased cost)

Rain

- Non-extended roof exposes walls to windy pattern rains leading to collapse due to swelling of materials, especially for adobe bricks and mud-mortar.
- Most latrines and bathrooms in the community do not have roof risking the shelters to structural failure during rains due to soaking.

Other

- Most shelters don't have wall plate for even distribution of roof load on the wall.
- Houses are built on low land and close to the river risks soaking in flooding water.
- Some doors are made of straws risking property to thieves
- Rebuilding of window openings with bricks or covering with hessians reduces penetration of day light in the house and air ventilation
- Foregoing lintels on openings especially where there is a door frame is placed risks the house to structural failure due to heavy load on a frame. Some use a thin timber plank on a long span.
- Uncovered window openings allow flies e.g. mosquitos to get into house putting the life of inhabitants at a health risk.
- A compulsory veranda provides a cooking space during rainy for those that do not have kitchen. However, the smoke from the fire pollutes the fresh air and risking the shelter to catch fire for those that have a grass thatched roof. Some puts ventilation openings on the veranda wall. The villagers takes the sooting of the roof from the veranda in a positive manner. Sooting of the roof helps the roofing materials not to be attacked by termites and other insects as thus it stays longer.



Bathroom built close to a tree and without roof



Ventilation openings on the veranda wall to help voiding the smoke

STRENGTHS / GOOD PRACTICES

Strong winds

- They are able to tie the framing to the wall by a galvanized wire or in absence of such they use ropes extracted from palm tree leaves
- The heap-roof design is braced to make it firm to withstand strong winds.
- Orientation of shelters facing away from the usual direction that wind comes from.
- They community has a lot of trees protecting their houses from the effects of strong wind.
- Well thatched and clamped by bamboo adds protection to the roofing to resist strong winds.

Floods

- Some houses are built on a high land to reduce the risk of it getting washed away during floods.
- Few houses have a base course though not that much raised.
- Use of burnt bricks makes the structure withstand soaking during floods.
- Plastering of the shelter to window level with cement mortar blocks penetration of water to affect the wall during floods.

Rain

- Use of same material used for molding bricks on preparation of mud-mortar puts the structure on a better side to withstand structural failure since the mortar and adobe expands/swell at the same rate.



Wall-plate tied to the wall with a rope



House built on a high land with metal strips on a window

Other details

- Use of locally sourced materials makes the shelter affordable.
- Light weight roofing materials (e.g. bamboos, reeds, etc.) exerts less pressure on walls hence easing pressure on walls.
- Use of timber doors on main entry improves security.

Bioclimatic / Use / comfort / aesthetics

- Use of reeds to look like fisher-board improves beauty to the house.
- Trees providing shade around the house as well as keeping the temperature low inside the house.



House with tied grass on a roof and an embarkment around the house

PESTEL Analysis

A good tool to use to help you identify all your stakeholders is PESTLE. By considering each of these categories and how they relate to your project, you can then identify stakeholders. For example, when thinking about the Legal aspect, you may realise a contract for services is needed. This will require input from our Legal team, so clearly, they are a stakeholder.

(from the 'Stakeholder analysis and management toolkit', University of Manchester;
<https://www.alnap.org/help-library/stakeholder-analysis-toolkit>)



The factors explored in a PESTLE Analysis include:

THEMATIC		COMMENT	STAKEHOLDERS
P	Political	Extent to which political factors influence the market and accordingly the project. This would include new taxes, regulations, construction codes, political strategies, etc.	Legislators, ward councillors, district council and district executive committee
E	Economic	This includes overall economic forces that could affect the project, such as inflation rates, interest rates, foreign exchange rates, or economic growth patterns.	Trades people, revenue authority, central bank, commercial bank, VSL, Farmers, Mobile money agents
S	Social	These factors look the social environment of the market, such as cultural trends, demographics and population analysis. Also important to this part of the analysis are attitudes and shared beliefs of the target consumer, including those around health, work, leisure, money, family and religion.	District Council, health workers, Faith leaders and Tradition leaders
T	Technological	These factors include advancements in technology which could influence your product, either positively or negatively. Examples include communication technology, automation, legislation around technology and intellectual property, as well as competitor technology development.	Telekom Networks Malawi plc (TNM), Airtel Malawi plc and Mobile money agents
L	Legal	This includes current and future legal and regulatory requirements impacting a product. These factors can include laws around consumer protection, labour, health and safety, taxes and trade regulations in the individual countries where the product will be sold.	Traditional Authorities, Semi-judiciary courts (championed by local leaders)
E	Environmental	These factors include all those that influence or are determined by the surrounding environment. This aspect of the PESTLE is most important for industries such as tourism, farming, and agriculture. Examples of factors to analyse from an environmental angle are climate, weather, geographical location, and climate changes.	Farmers, Fishermen and Government environmental Officers