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Cultivating Terraformation - Propagating agronomic empowerment through agricultural waste transformation in the farming corridor of Ofcolaco, Limpopo

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University of the Witwatersrand, Johannesburg

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CULTIVATING TERRAFORMATION

Propagating agronomic empowerment through agricultural waste transformation in the farming corridor of Ofcolaco, Limpopo.



Kayla Kate Mc Dougall
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2025 - 02 - 21



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Kayla Kate Mc Dougall
21 February 2025

Figure 0.1
Cover Art
front cover
Author , 2024

Figure 0.2
Leaflet Graphic
front over inside leaf
Author , 2024

acknowledgements

The journey to becoming an architect has been challenging, but the unwavering support of those closest to me has made this achievement possible.

Mom – Your strength and resilience have been my guiding light. Through every hardship, your belief in me never wavered. Thank you for being my rock.

Dad – Your quiet strength and steady encouragement have been a source of reassurance. Your belief in my journey has eant more than words can express.

Reece – Your patience and understanding, despite the sacrifices, have been deeply appreciated. Thank you for adapting and supporting me in ways I'll never forget.

Tyron – Your love and unwavering support have been my anchor. Through every late night and moment of doubt, you stood by me. Thank you for being my constant.

Sundeep Jivan – Your mentorship and insistence on excellence have pushed me beyond my limits. I am grateful for your guidance and belief in my potential.

This thesis is not just my achievement—it's a reflection of the support, sacrifices, and love from all of you. Thank you for being part of this journey.

glosssary

Cultivating

1 To foster the growth of
2 To improve by labor, care, or study
3 To seek the society of

Terra

Latin name for planet earth
1 Earth
2 Land
3 Ground
4 Soil

Terraform

To transform (a planet, moon, etc.) so that it is suitable for supporting human life.
Terraformation

Terraformation

Refers to the transformative process of reshaping or altering the land, specifically aimed at achieving sustainability.

Figure 0.3
Fabric Pattern
above
Northcott Fabrics , n.d

abstract

Cultivating Terraformation is an exploration into the intertwined lives of the farm, the farmer and the farm worker. In the remote farming corridor of Ofcolaco, Limpopo, where history's shadows still linger, a community is beginning to reawaken.

The thesis traces the deep colonial roots of land once taken and now in the slow, tender process of being restored to those from whom it was seized. In these lands, a vision unfolds – a vision of uniting the farm, farmer, and farm worker to stand as a beacon of renewal and progression.

The core of the research centres around the complex dynamics between the emerging black farmer and the generational white farmer. These two figures, bound by the same land but divided by history, represent both the obstacles and opportunities for transformation.

As these farmers adapt to life in post-apartheid South Africa the tensions, alliances, and possibilities become the forefront of change. The goal is the harmonization of the relationship between farm, farmer, and farm worker. The objective is to break the sector's cycle of inequality through the creation of a new beacon in agriculture that unites and uplifts. This new sector aims to connect the land, those who own it, and those who work it, and join in on a journey of mutual development and empowerment.

Central to this vision is the concept of material activism to unite all three entities of the agricultural sector. This approach redefines not only what the land and its people can produce but how it can sustain the environment and uplift its people. Through this alchemy, the study seeks to shape a post-apartheid farming industry that is more than a place – it is a symbol that guides the agricultural sector toward a shared future.

The aspirational endeavour seeks to offer the research as a blueprint for a reimagined agricultural landscape in South Africa. By addressing historical divides and present environmental challenges the systematic change strives to heal old wounds and cultivate new growth. The vision is a future where the scared land of our nation becomes a canvas of renewal, painting a picture of unity and resilience where the scars of the past are transformed into a tapestry of hope and harmony.

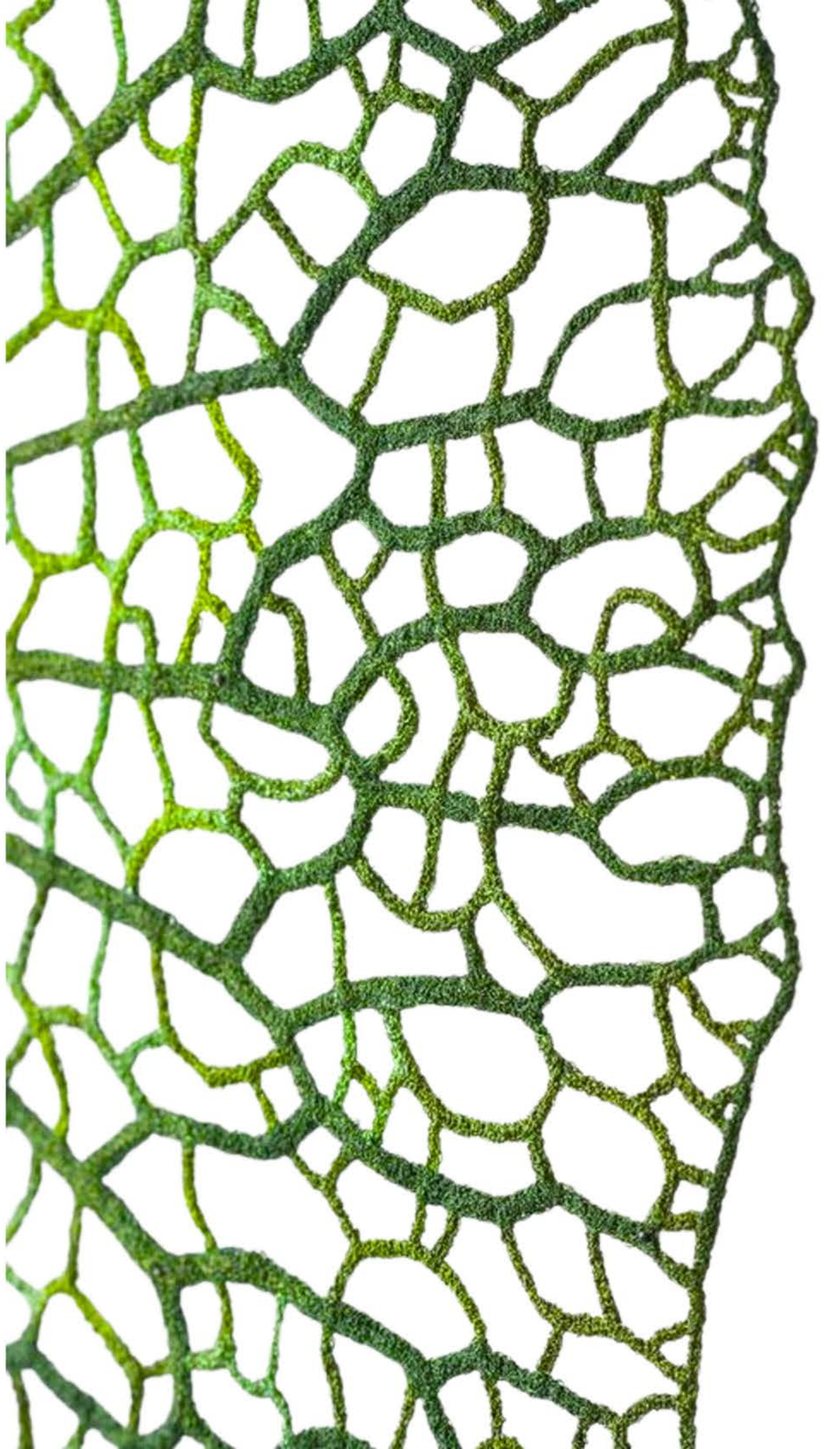


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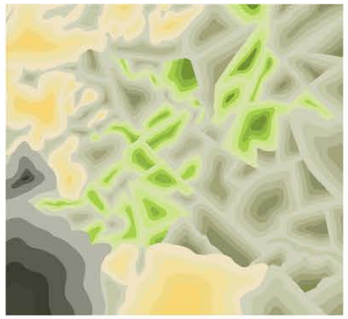
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fields



The research is located in the fields of Ofcolaco, a small farming corridor in Limpopo province. The corridor is located 43 km southeast of the main town, Tzaneen, and is situated in the centre route between Tzaneen and Hoedspruit.

Ofcolaco is named after the Officers Colonial Land Company, which consisted of retired officers settling along the Selati River in the 1920s. The demobilized British Army officers post-World War I sustained themselves by farming the region's citrus and subtropical fruits.

family



The site of intervention is a farm in the region that holds immense significance for my family and I. My grandfather attained the farm in the late 1960s, where my mother and her sisters grew up, and where I spent the early years of my life. It was home.

The rolling mountains, vast landscape, and people who cultivated the earth brought family to this place. Today, its soil stands as a ghost of a memory lost over a decade ago, but it is still pivotal in my family's history.

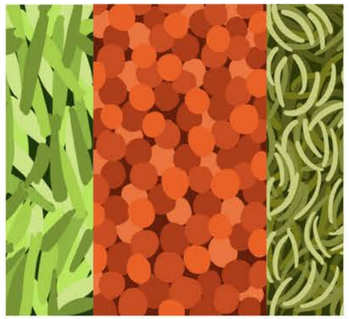
farm



Farmers of citrus, subtropical fruits, maize, and cattle work together as a community in Ofcolaco to keep each other's farms afloat and thriving. In a small farming corridor, everyone knows everyone, with bonds that run deep through history and friendship.

It is important to understand that some roots need to be broken for new roots to form. As is the case of welcoming a new generation to farming on a land that shadows the injustices of the past.

food



The fruits of the land—citrus, maize, and subtropical produce—are more than just crops; they are lifelines sustaining both the local community and South Africa's agricultural sector. However, food loss and waste in this sector threaten both economic stability and environmental health.

Addressing these challenges through innovative practices is crucial to ensuring that the fruits of the land fulfil their potential supporting food security, empowering farmers, and fostering sustainable growth.

farmer



In today's post-apartheid landscape, the stereotypical white generational farmer remains prominent, with the emerging black farmer disadvantaged to the white farmer's decades of experience and knowledge.

It is withing this complex relationship between black and white farmer that both tension and opportunity arise. By embracing diversity and fostering an environment of mutual respect, the farming industry can become a beacon of progress and unity in a post-apartheid world.

farm worker



If the farm is the body and the farmer is the heart, then the farm worker is the blood that flows through and makes the body function. Farm workers, often overlooked, play a crucial role in the farm's success.

Farm workers find themselves trapped in the same generational cycle as farmers, with no way out of this cycle. The farmworkers understand the farm more than anyone; they have rubbed the same soil for generations and cultivated the same crops for years.

1 chapter farm



Figure 1.1

Farm Chapter Cover

above

Author , 2024

agricultural overview of South Africa

Since the dawn of human existence, people have been farming crops and animals for consumption. Before what we have termed today as the **'agriculture industry'**, humans hunted and gathered to survive.

This ultimately led to planned farming and the harvesting of crops, with tools and practices developed to increase agricultural output. The practice of cultivating natural resources to sustain human life is overlooked by cosmopolitans, yet is vital for all of our existence.

Despite South Africa's intricate trade and economic history, we are currently the only country in Southern Africa capable of producing all its own basic crops (Ransom, 2015). This highlights the nations resilience and determination throughout history, with agricultural production taking place "in the shadow" (Ransom, 2015). Despite South Africa's prosperous agricultural industry, the nation has faced intense scrutiny for its "resource-intensiveness and environmental degradation" (Ransom, 2015), appearing to disregard all ethical principles in pursuit of maximum production.



Figure 1.2
'Pedi' Women with a Hoe
above
Izidro Duarte, n.d

Growing up in a house on the farm, my grandmother collected Izidro Duarte artworks. The artworks she curated were ones that told the behind-the-scenes landscape of farm life. The artwork above is a testament to this core memory.

Timeline :

Echoes of Agriculture on South African Soil

pre 1652

The earliest agricultural practices of South Africa were undertaken by indigenous communities. The Khoi and San people, often known as hunters and gatherers, practiced subsistence farming for survival. This entailed growing and maintaining crops and livestock to feed their families and tribes. Subsistence farming involves producing enough food to meet the needs of the farmers and their immediate community, without selling crops to other tribes.

1700

The arrival of the Dutch East India Company at the Cape of Good Hope led to the continual displacement of indigenous communities and their way of life. The expansion of these colonial settlements led to the establishment of formal farms and plantations.

1800

After their arrival, it didn't take the British long for them to completely colonize South Africa for themselves. This led to the implementation of new agricultural policies and infrastructure to better suit the colonial's needs. Ultimately, this led to the beginning of commercial farming in South Africa with subsistence farming by indigenous communities seen as irrelevant to the economy.

1900

The early 1800s led to increased British immigration to South Africa establishing an expansion of farms in the northerly direction. The Great Trek and Second Anglo-Boer war caused a significant disruption to the agricultural landscape with many farms destroyed and abandoned with the displacement of black farmers in the change of land ownership.

1948 - 1994

By 1948, the National Party had now come into power further entrenching racial segregation and economic disparities. The government enhanced white farmers' needs with mechanical machines and extensive land opportunities. This left people of colour unable to continue to commercially farm on their land. Additionally, they were forced into designated areas under the Group Areas Act of 1950.

1994

The monumental year of 1994 was revolutionary for South Africans seeing the end of apartheid and the judicial shift in society. To rectify the injustices of the past, Land Reform restitution policies were implemented. This played an astronomical role on rural farming land where tribes of the past had been forcibly removed and were now being granted the rights back to own their indigenous lands.

Present

The Land Reform restoration programs have continued into the 2000s causing ongoing challenges with food security in the ever-growing South African economy. Rural development and subsistence farming practices are being implemented back in the agricultural industry. These prospects are however seen to be running short for many community members in rural landscapes of South Africa.



Figure 1.3

Timeline : Echoes of Agriculture on South African Soil

above

Author, 2024

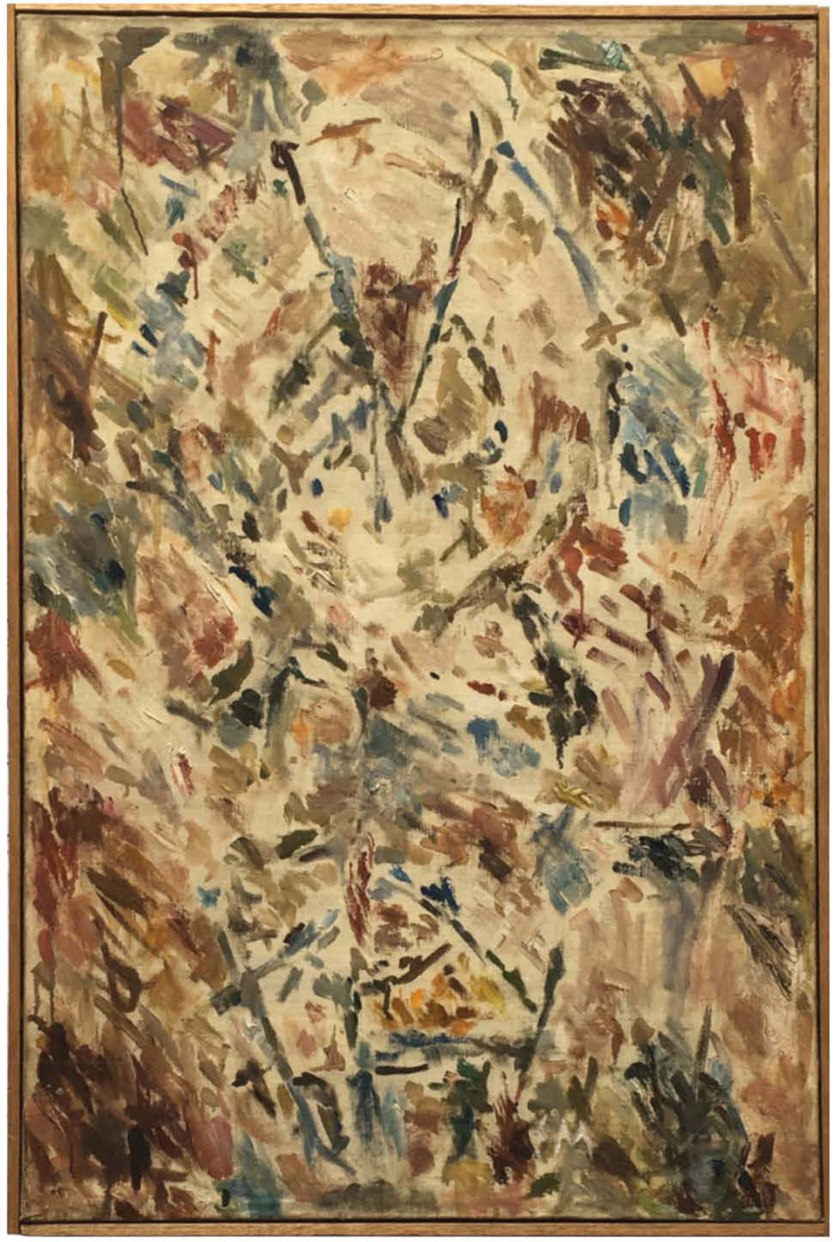


Figure 1.2
L'Ancêtre (Ancestor)
right
Ernest Mancoba, 1968-1970

umhlaba wookhokho bethu

Xhosa

1. *The land of our ancestors*

Racial exclusions and inequalities are deeply rooted in South Africa's dark history, profoundly shaping its agricultural landscape. The legacy of apartheid and colonialism created vast disparities in land ownership and access to resources, systematically disenfranchising black South Africans and marginalizing their role in agriculture. The **"new South Africa"** primarily addresses these past discretions through Land Reform legislation (Hall and Williams, n.d.).

The Land Reform initiative began with the implementation of the Department of Land Affairs (DLA), tasked with restoring land to those denied under the apartheid regime to **"alleviate the plight of the rural poor"** (Hall and Williams, n.d.)

The DLA implemented a refined redistribution policy in the year 2000. The policy saw a focus shift to promote agricultural production and commercial farming through the establishment of a new class of black small-scale farmers. The policy was committed to providing farming opportunities rather than **"unsustainable handouts"** (Hall and Williams, n.d.) to the rural poor. The policy's aim was inspiring; the implementation, however, was not.

The National African Farmers Union (NAFU) opposed the policy, accusing it of restricting the black farming community from establishing profitable and large-scale farms. This led to the implementation of the Integrated Programme and Land Redistribution and Agricultural Development in South Africa (IPLRAD).

The IPLRAD committed to providing farming opportunities to emergent farmers covering all subsistence farming, small, medium, and large-scale farming categories. The policy aimed to redistribute 30 percent of farmland to black people over a twenty-year period, with the establishment goal of black commercial farming in South Africa. However, this policy has been unsuccessful over the years due to the insufficient funding provided by welfare provisions for land purchase or transfer.

fThe plethora of initiatives between 1994 and 2006 failed to distribute 30 percent of agricultural land to black farmers. This led to the implementation of yet another policy, the Proactive Land Acquisition Strategy (PLAS).PLAS replaced all previous land redistribution acts starting afresh. The new forum involved the government purchasing armland previously owned by white farmers to redistribute to black farmers. By August 2022, the state had acquired 2.9 million hectares of farmland, spending over 12 billion rand in the restoration. This equates to 2 921 white farms leased to black farmers for 30 years. The restoration program carefully selected farms with high agricultural potential to ensure a high probability of success.

The Agricultural Research Council (ARC) conducted a study review on the program for the Department of Rural Development and Land Reform after 15 years. The findings revealed the program had fallen short significantly (Verschoor, Gandidzanwa, and Kirsten, 2023).

Nearly half of the farms (47%) have experienced degraded conditions since the change in ownership, and 13% experienced severe degradation beyond repair.

The agricultural sector is now positioned within this vast landscape of policy successes and failures. It is important to note that the architect does not hold the power to solve Land Reform in South Africa. Land reform lies at the core of South Africa's politics. However, within this rich history, our site, the small farming corridor of Ofcolaco, bears the brunt of these challenges.

Ofcolaco is home to an expanse of fertile land, which has seen a large surge in land claims. This is the result of the forced removals of the native northern Sotho tribes by British officers. The northern Sotho tribes make up more than half of South African northern Sotho people; therefore, one can justify how much land was stolen when the tribes were forced into Bantustans under the apartheid regime. Subsequently, the region has settled 2098 land claims, making it one of the most saturated land claim areas in South Africa.

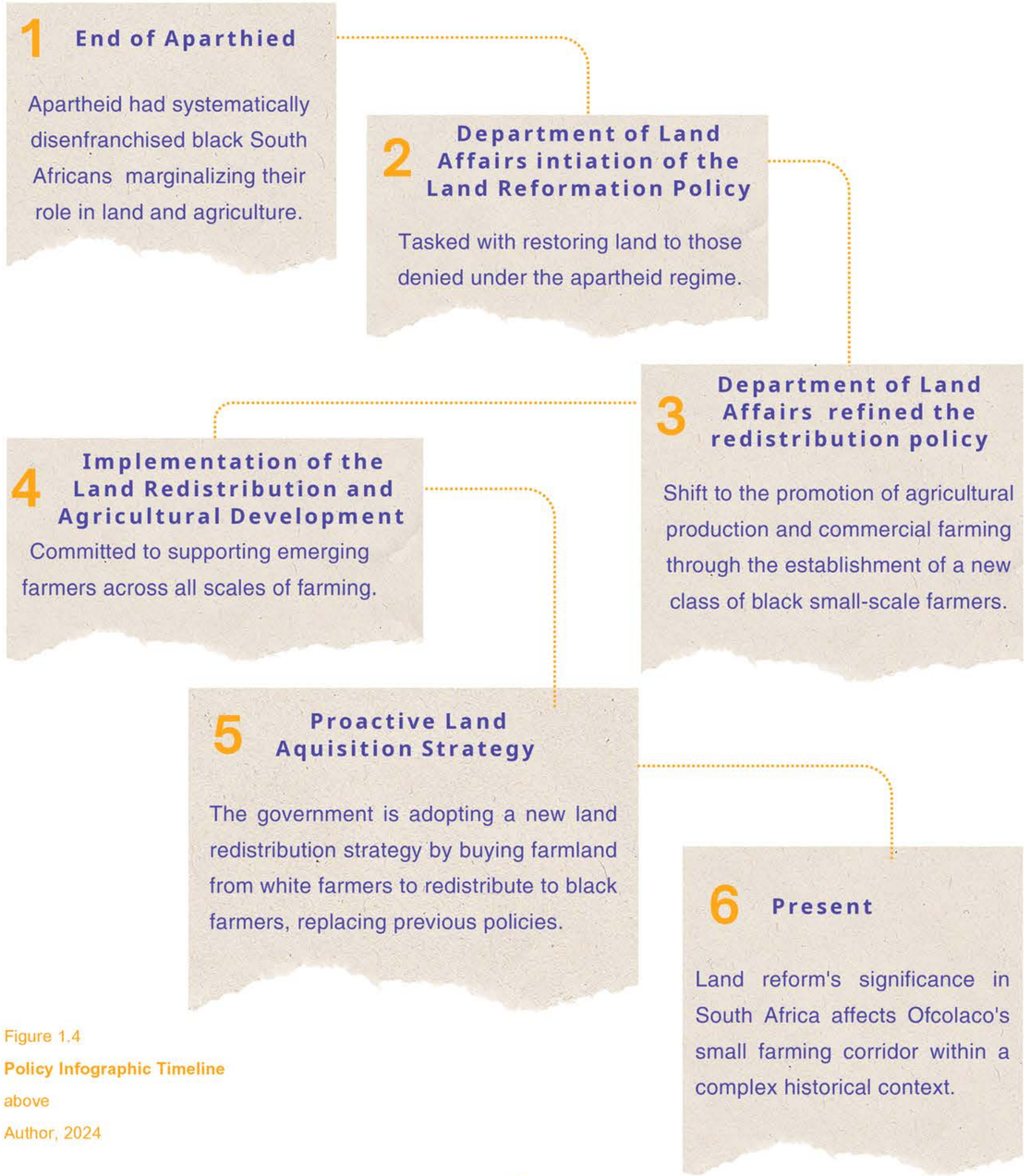


Figure 1.4
Policy Infographic Timeline
above
Author, 2024



investigation into the rural

A Project into the Unknown Rural

I, the author, have spent the majority of my life in Johannesburg. It is my home, the place that, when studying a degree in architecture, I have come to know like the back of my hand. The city surrounding me is filled with history within its walls and opportunities at every corner. Venturing into the rural South Africa is out of my comfort zone. The transition from the dense, complex urban environment to the open, sparsely populated rural landscape requires a complete shift in mindset to what I experience in the city.

In a farming corridor, the land is the primary character and the built environment is the secondary. Consequently, the design process must begin with a deep understanding of the land, climate, water vegetation, and topography. Natural systems at play must be considered, and the landscape's historical rhythms must be respected. The focus must lie on working with the land rather than imposing on it.

The rural landscape may not possess the visible layers of history that a city does. Nevertheless, beneath the surface level, the rich stories of its inhabitants contain generations of history embedded in the earth. One must see beyond the obvious and find value in the subtle relationships between the land and people, creating a space deeply rooted in its context.

Designing in isolation requires sensitivity to the existing environment with the patient observation of learning from the land and its inhabitors. It is possible to create a functional but meaningful design by embracing the rural rather than trying to combat its customs. It is about creating an environment that is as resilient and beautiful as the landscape that it embeds itself in; only then will it be truly successful.

Figure 1.1

A Project into the Unknown Rural Graphic

left

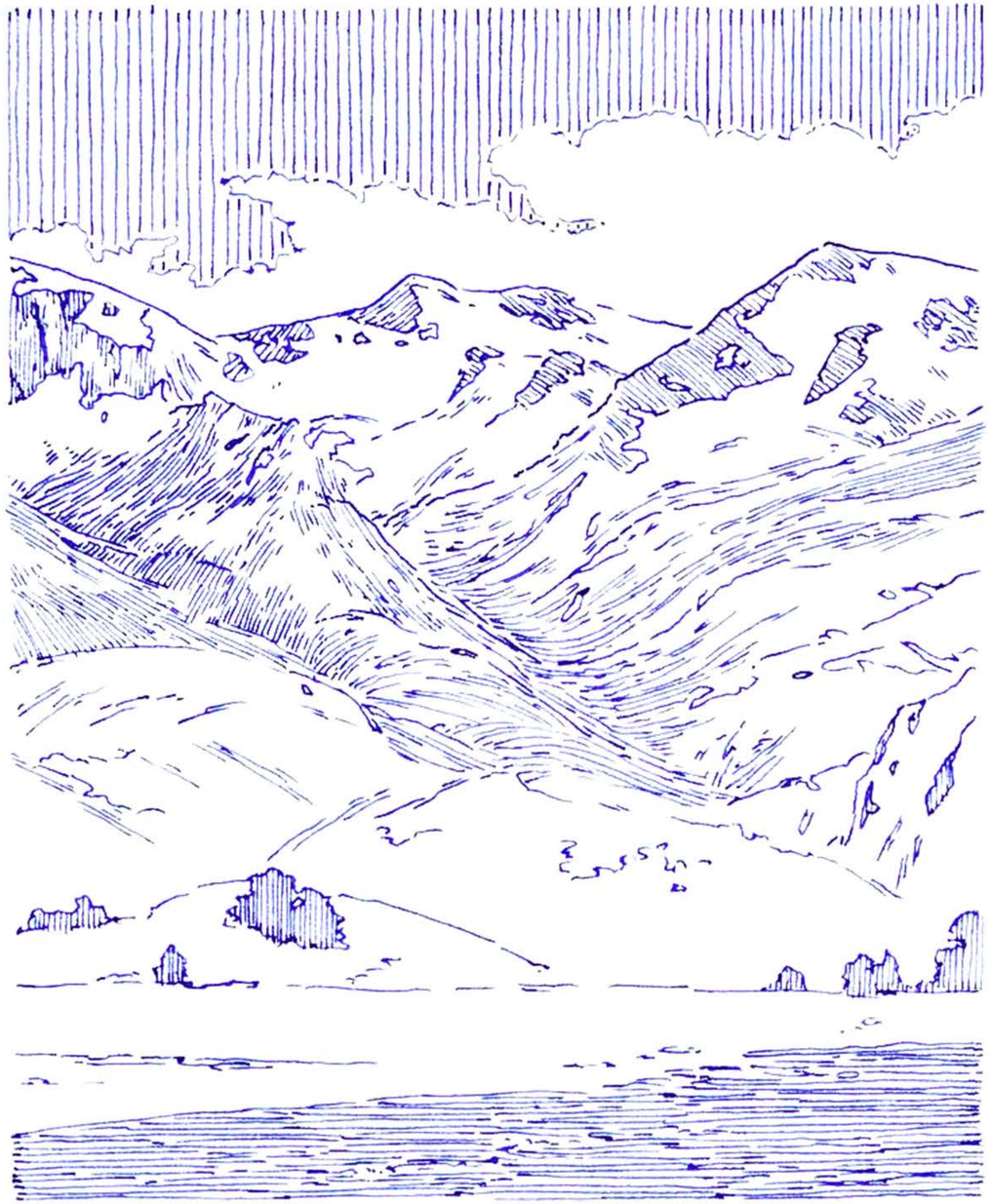
Author, 2024

Defining the Rural

Derived from the Latin word ***ruralis***, meaning 'open land,' the term rural in the English language has come to refer to anything "of or relating to the countryside, country life, or agriculture" ("Definition of Rural", 2024). Although the official definition refers to rural as both a geographical location and a way of life, there are divided opinions on what accurately constitutes rural life.

To some the cultural aspects emphasis the definition of rural while to others the focus is solely on the physical environment. In statistics and politics, rural is defined by the number of inhabitants of an area. In the built environment, we often refer to the rural as smaller village settlements, characterised by either agricultural landscapes, traditional building typologies, or sparse populations (Lindkvist, 2022).

As a result, there is no universal definition of what exactly signifies rural, as personal opinions, expectations, and impressions make the term ambiguous. Despite the conflicting interpretations of the term rural, there is one uniting factor among all perspectives: rural is universally considered to be the antithesis of urban.



'The Architect as a Rural Actor'

A term defined by Rebecca Lindkvist in the theory report titles 'Architectural Strategies for Resilient Rural Development' (Lindkvist, 2022).

The irony of the term rural being considered the **'antithesis of the urban'** is that this typecast is being challenged in the architectural realm. Architects are beginning to reevaluate this misconception of the urban holding the possibility and potential for the radical through design. With the rural as a left-alone entity that exists in its own right.

Figure 1.6
A View to the Peaks , Across the Plains
middle
Harry Frost, 2023

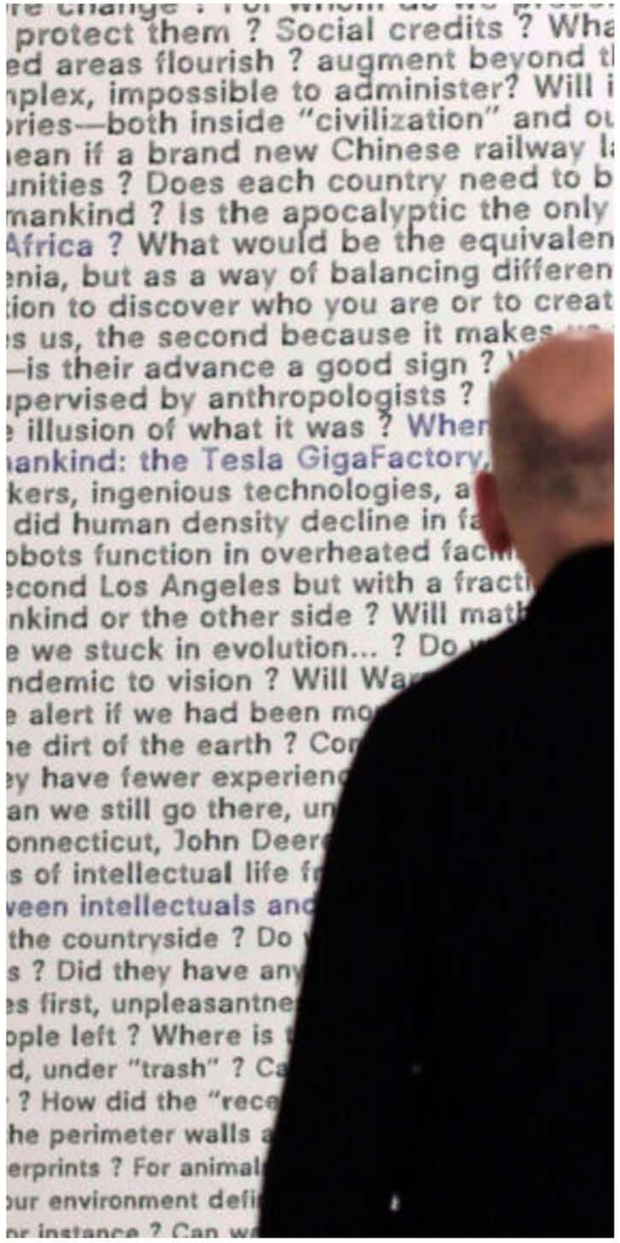


Figure 1.7

Rem Koolhaas at 'The Countryside' Exhibition

right

Photography by Guggenheim Museum , 2020

Figure 1.8

Rem Koolhaas Portrait

far right

Unknown, n.d

Rem Koolhaas in his shift to the ‘countryside’

Renowned architect Rem Koolhaas has sought to ‘abandon his obsession with the city’ in favour of what he declares ‘the countryside’. Koolhaas is certain that ‘the countryside’ is where the **“future is being built”** (Wainwright, 2020).

The architect has set out to step away from the urban radicalization theories he has shaped over the last 40 years, despite the significant impact he has made on the urban built environment. Instead, Koolhaas is shifting his focus onto the ‘98% of the Earth's surface that is not occupied by cities’. In a firm belief that the rest of the world has caught up to the ‘urban obsession’ feeling it is time to move on.

The architect finds obsession in the gaps of the built environment, though whether this is driven by capitalization or genuine interest is questionable.

Koolhaas states that he is “interested in the country for the same reason he was paying attention to New York in the '70s - "because no one was looking” (Wainwright, 2020). The architect’s radicalization of urbanization in the ‘70s saw the man in question finding opportunities in the overlooked and unexplored spaces that others ignore.

Now Koolhaas has set out to do the radical once again in the countryside. Though some view his visionary shift to the rural as naive, Koolhaas understands that the architectural profession, in embracing the rural, must adapt to it rather than force rural areas to overly change to accommodate the built.



Rem Koolhaas in his shift to the ‘countryside’

In 2020 Rem Koolhaas and Samir Bantel in collaboration with Koolhaas’ research studio AMO exhibited The Countryside, The Future at the Guggenheim Museum in New York. The exhibition was an expression of the rural from its **“historical importance, the importance in the 20th century, to its current state and how it can be used in the future”** (Rem Koolhaas, 2020).

Koolhaas explains his vision for the future by profoundly acknowledging the United Nations' prediction that in the future, only 20% of humanity will live in the countryside. The man views this as an 'absurd neglect' of potential futures. While cities are often seen as the forefront of modernization, the exhibition challenges this notion. Rather the exhibition suggests that the countryside is where new ideas and experimentation truly take place.

Exploiting the iconic rotunda ramps of the Guggenheim Museum the transcending experience was created through each level traveling a new theme :
Leisure / Escape, Political Redesign, Experimentation, Preservation / Nature, Cartesian Euphoria?

.

> *an urgent exploration of a long neglected - realm and its sublime beauty*
>
> Rem Koolhaas , 2020

Koolhaas is certain that a deep dive into the ins and outs of the rural is vital in understanding where the future is already present. If the notion of the future being ‘already present in the rural’ is embraced, it challenges the conventional wisdom that innovation is solely an urban phenomenon. This perspective shifts the focus to the countryside as a space of emerging trends and untapped potential. Where new ideas and practices are quietly shaping the future, often unnoticed by the urban-centric world













Figure 1.9
The Countryside Exhibition Collage
right
Photography by Guggenheim Museum , 2020

Xu Tiantian ‘Architectural Acupuncture’ Theory



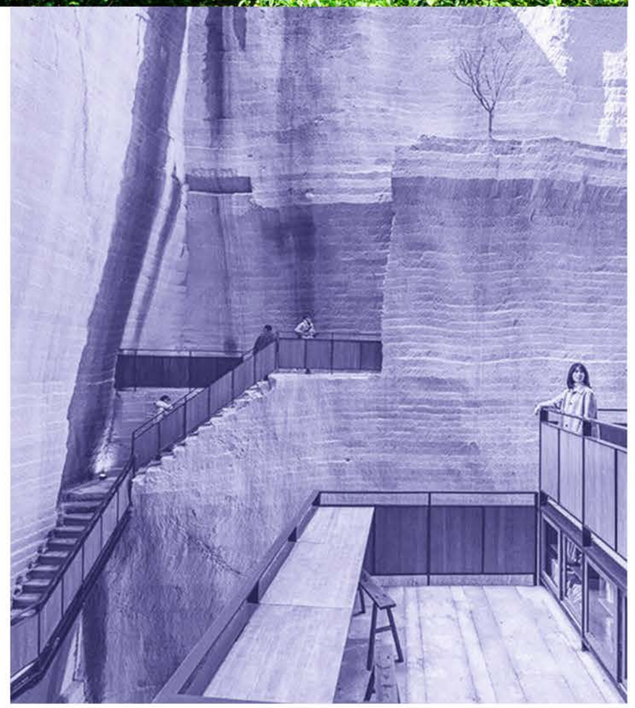


Figure 1.10
Healing Meadow
top right
Photography by Rujie Wang , 2022

Figure 1.11
Quarry #8
right
Photography by Ziling Wang, n.d

Figure 1.12
Xu Tiantian Portrait
far right
Photography by Ziling Wang, n.d

A vital force exploring a regenerative strategy for the rural is architect Xu Tiantian. Tiantian has termed her strategy ‘architectural acupuncture. This entails sensitive interventions of **“small-scale architecture of different functions aimed at healing the socioeconomic system”** (Lindkvist, 2022).

The strategy of ‘architectural acupuncture’ is derived from traditional Chinese medicine to “stimulate regeneration in the vicinity of the injection site – or place of intervention” (Linkvist, 2022). The aim is to design for prosperity and growth delivering motives for people to stay in or return to the rural region. With the implementation of over 25 projects, Tiantian highlights that the developments have **“less to do with their scale and more to do with the way they are designed for its local rural context and how they are connected”** (Lindkvist, 2022).

The act of inserting the contemporary into a sensitive landscape defeats all purpose. Rather the role of creating new opportunities for local residents, spaces that support creative cooperatives, local traditional craftmanship, and micro economy is at the forefront of a rural-based intervention.

A standout project of Xu Tiantian ‘architectural acupuncture’ is the Brown Sugar Factory in Xing Village. The region relies on the cultivation of sugarcane and the production of brown sugar as their primary source of income. This new community building serves as a place for the traditional production of brown sugar while also providing the community with communal space for cultural programs. The building juxtaposes industrial function with recreational spaces, serving not only to improve economic conditions but also as a catalyst for community regeneration, strengthening the village's cultural identity.



The community building is located on the edge of the village, at the transition zone to the fields used for agriculture. The building consists of several built elements all accommodating different functions which are connected by open-to-the-elements corridors. These corridors allow the transition between the built and natural to become fluid.

The completely transparent ground floor further enables this transition linking the work zones back to the surrounding fields. Through unobstructed views of the work zones, the production process is highlighted and glorified for visitors, made possible by the reduced material palette. The project aims to remind us that **“the demarcation of a space is a fundamental act of architecture”** and nonetheless can be achieved without the separation of the built and natural environment but rather can **“create and reinforce connections between the two”** (Lindkvist, 2022).

Keeping Tiantian's concept of ‘architectural acupuncture’ in mind the comparison between acupuncture in medicine and the built environment is intertwined. Acupuncture in medicine involves the precise stimulation of specific points to create a healing effect on the body.

So too does ‘architectural acupuncture’ involve the meticulous selection of rural projects that can revitalize and transform an area with minimal disruption to the existing environment.

So too does ‘architectural acupuncture’ involve the meticulous selection of rural projects that can revitalize and transform an area with minimal disruption to the existing environment.

Pinpointing strategic interventions can act as catalysts for broader socio-economic, and environmental change. Ultimately enhancing the overall holistic of a community. Just as holistic approaches consider the entirety of a system, understanding how elements relate to and influence one another rather than a superficial, one-size-fits-all solution—can have a profound impact. For example, instead of simply building a school to boost education in a rural context, a holistic approach would consider the local culture, needs, and existing infrastructure, in analysing if the needs are actually for a school at all.

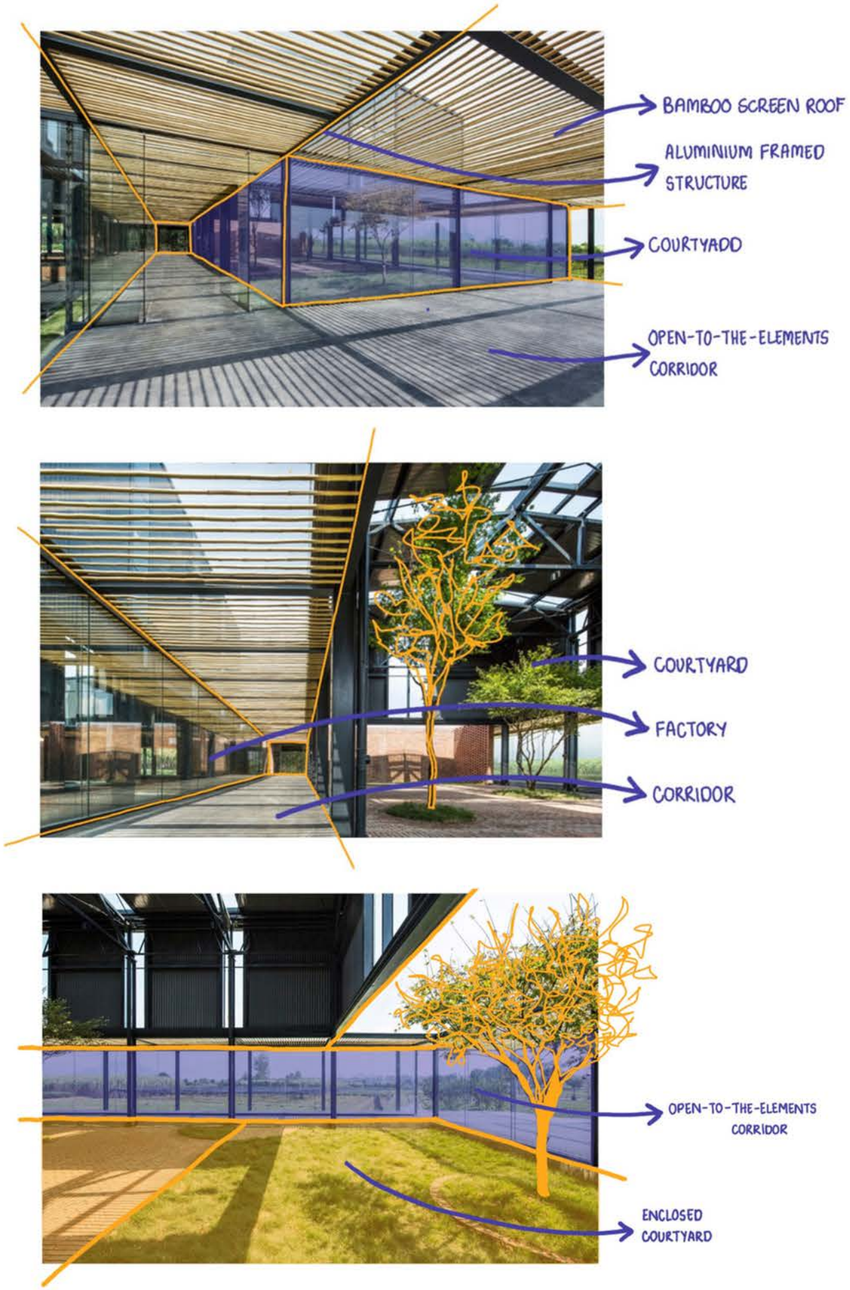


Figure 1.13

Brown Sugar Factory Edited Photography Collage

right

Photography by Ziling Wang - edited by author , 2024

2 chapter family



Figure 2.1

Family Chapter Cover

right

Author , 2024

Figure 2.2

Memory Collage

below

Author , 2024



a farm with a family story

My story begins in the small farming corridor of Ofcolaco, Limpopo. Demobilised British Army officers from World War I established the community of farmers by sustaining themselves through citrus and subtropical farming in the 1920s. The narrative begins to shape in the late 1960s, when my grandparents moved to Ofcolaco to pursue a career in agriculture.

My grandfather, an orphan from Johannesburg, travelled to this small town with my grandmother, a near-converted Catholic nun. My grandfather began working on the local farms until he was able to purchase land to start a farm of his own. The farm of purchase was called Dagbreek. The poetically fitting name, meaning daybreak, symbolizes the dawn of a new era. For my grandparents, this was the land of hope and opportunity, becoming the place to set up a home and career for their future family.

Dagbreek, a subtropical fruit farm, became more than just a source of livelihood; it became the embodiment of their life's footprint. They raised their daughters here, one of whom was my mother, who also raised me on the farm in my early years. The farm was home to three generations of my family – my grandparents , their children and their grandchildren. My grandparents were the first and last owners in the family to own the farm. This is not the typical narrative of the white generational farmer in South Africa.

My parents moved me away from Ofcolaco when they found work in the city of Johannesburg. I would spend every biweekly weekend travelling up to the farm. In some ways, the farm was still my home. Going back to the farm was a chance to find solitude and family again in a city full of people with no faces of familiarity. The farm was my refuge. It is difficult to explain the peace one finds in the simplicity of life on the farm compared to buzz of city living.

In the late 90s to the early 2000s the region experienced severe droughts effecting the crop yield. Just like their neighbouring farmers my grandparents grasped on to the hope that the rains may one day come and plenty their land once again. Their prayers came true years later and the heavens rained down in anger wiping out the potential yields. Though over a

70-hectare sum of land in my grandfather's ownership, the size was minimal in comparison to his neighbouring farmers who could cling onto scraps of yields to get them through.
My grandfather did not survive the floods, or more accurately the farm did not.

He was forced to sell the farm due to debt obtained during the droughts. The farm was sold to a private owner but soon faced land claims.

The sale of Dagbreek brought about a moral reckoning. Amidst adversity, the spectre of land claims loomed large, questioning the very foundation of our family's legacy. Reflecting on these events, I grapple with a legacy that is not solely my own—a history clouded by issues of ownership and justice. The farm, once a sanctuary of peace and belonging, became a symbol of contested pasts and uncertain futures.

As I navigate inherited guilt and responsibility, I seek understanding rather than absolution or condemnation. The racial perspectives of my grandparents' era remain opaque to me, and I distance myself from their potential wrongdoings. Yet, amidst these complexities, I find solace in the enduring bonds forged with those who lived and worked on the farm.

hese relationships, nurtured over generations, transcend the ambiguities of history.

Returning to the farm today reveals a stark contrast. What was once a refuge of solitude and familial embrace now evokes fear and caution. The simplicity of rural life, once a source of peace, has yielded apprehension in the face of rising insecurity. Formerly a sanctuary, the farm now symbolizes broader societal shifts, guarded by locked doors and vigilant watch.

In recounting my narrative, I invite reflection on the evolving dynamics of land, identity, and belonging. The farm remains a touchstone of my journey—a testament to resilience in the face of change and a catalyst for exploring deeper truths. As I embark on my thesis, I carry with me echoes of past injustices and aspirations for a future shaped by understanding and reconciliation.

Figure 2.3
An Old Farm Photo
right
Author , 2024

This preface serves not just as an introduction but as a testament to the intertwined legacies of land and identity, urging us to confront the shadows of history with courage and compassion.



a farm tour

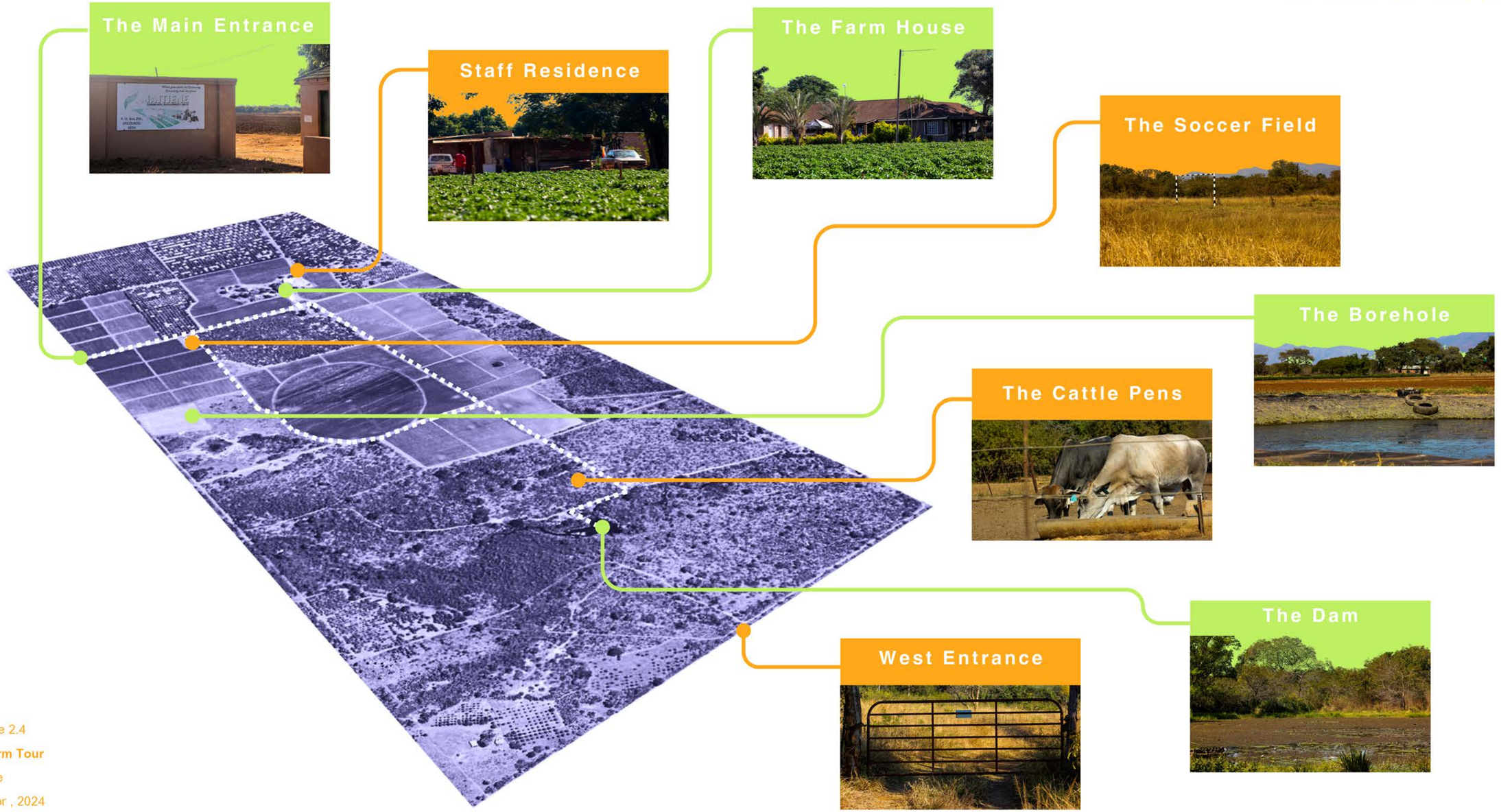


Figure 2.4

A Farm Tour

above

Author , 2024

3 chapter farm

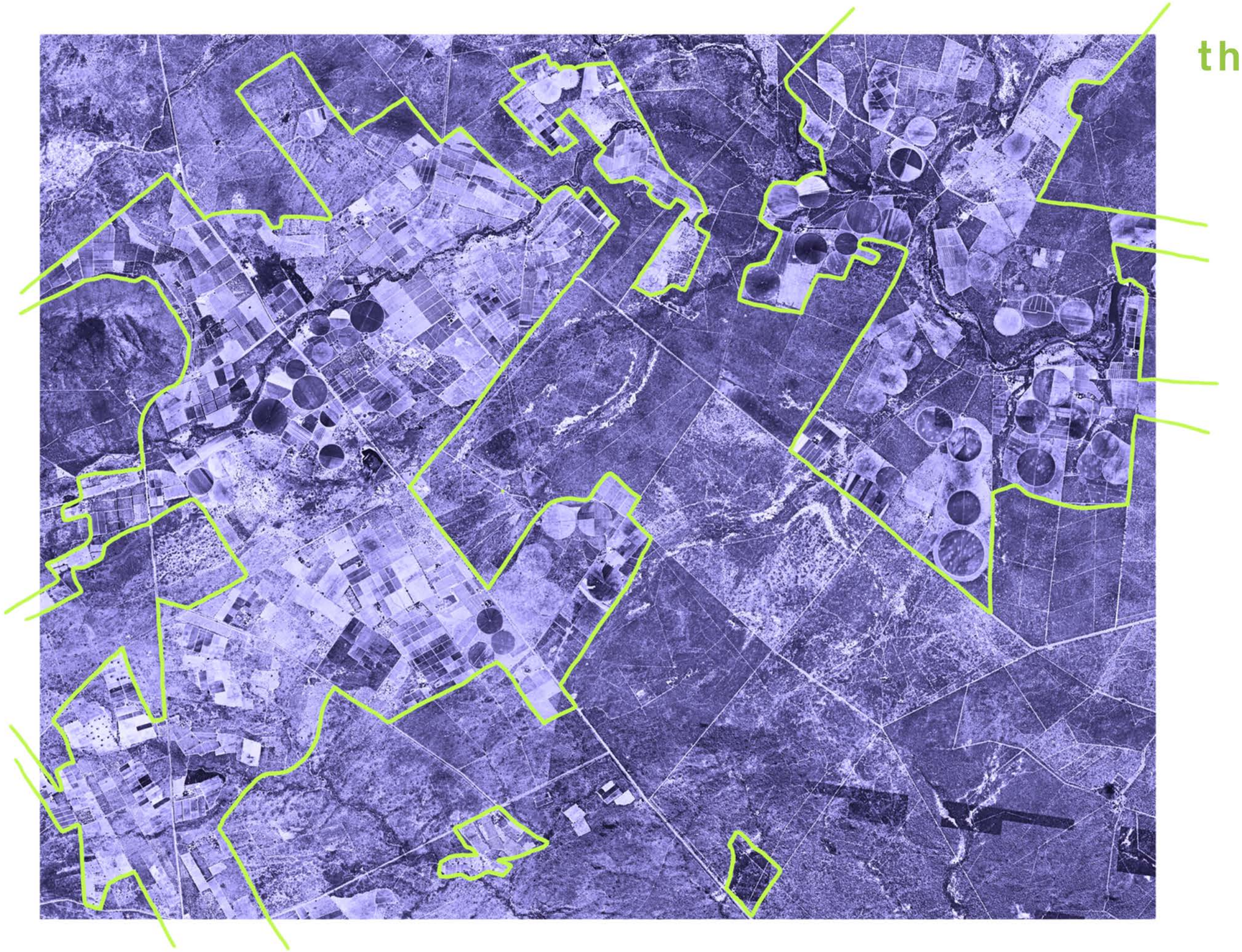


Figure 3.1

Farm Chapter Cover

right

Author , 2024



the farming corridor

What is a farming corridor?

A farming corridor refers to a specific geographic area designated or naturally suited for agricultural activities, often characterized by a concentration of farms, agricultural infrastructure, and related businesses. The concept of a farming corridor emphasizes the importance of agricultural production in the region, where the landscape and infrastructure are all oriented toward supporting farming. These areas have few buildings relying on the natural landscape for the support of their livelihoods.

Agricultural activities occupy 79% of the land in South Africa ("South Africa: Area of Agricultural Land," n.d.). As a result, farming corridors account for a significant portion of not only our land use but also our socio-economic structure.

Figure 3.2
Area map of Ofoclaco
left
Google Maps , 2024

Locate

The project takes root in the farming corridor of Ofcolaco, Limpopo, a secluded community that stands like an island surrounded by mountains and grasslands. Forming part of the Maruleng district, which is a provincial rural municipality centred on farming and traditional subsistence agriculture.

Ofcolaco is a close-knit farming enclave that is home to a few dedicated farmers but is often seen by travellers as just a convenient petrol stop. Situated halfway between Hoedspruit and Tzaneen—two key towns in the Limpopo region—Ofcolaco is frequently regarded as a mere midway point. However, the town efficiently sustains itself through the strong bonds of labour and produce.

In a farming corridor as remote as Ofcolaco, where basic amenities are distant and the town is easily passed over, it becomes a lifeline for its residents—many of whom have lived and worked on these farms for generations. It is in places like these, seemingly insignificant to the outside world, that demand the most attention.

As Koolhaas observed in his research on the countryside, it's often in the overlooked corners where the most profound insights can be found. Within this quaint little agricultural hub that our research aims to leave an imprint.

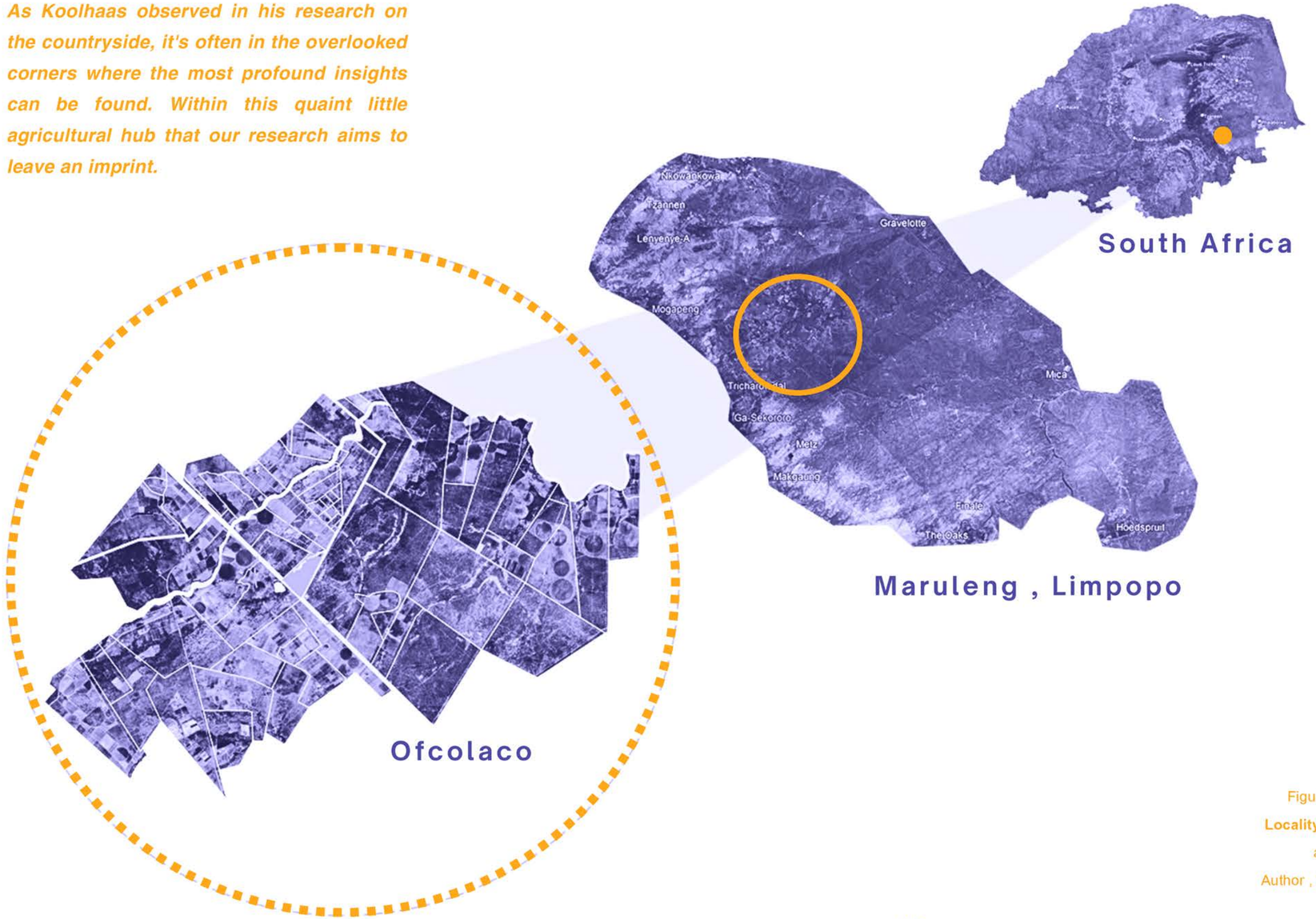


Figure 3.3
Locality Map
above
Author , 2024

Travel Routes

The Ofcolaco farming community is located 43 km from Tzaneen and 80 km from Hoedspruit, the two largest cities in the region. The R36, a major regional road in Limpopo, connects the corridor to Hoedspruit and Tzaneen. The main road , the R36, which traverses the corridor, divides the community into two distinct sections. This characteristic distinguishes it from the majority of farming corridors, which are typically located far from important roadways. However, the neighbourhood only has two connecting tar routes off the R36.

The first being the Orrie Baragwanath Pass, leading to the closely situated townships of Calais and Julesburg on the north-western border. This pass further extends onto the picturesque Drakensberg Mountains bordering the west of Ofcolaco. The pass is a connecting route from Ofcolaco to Lebowakgomo, the capital of Lebowa, one of the former eight Bantustan townships established during the Apartheid regime. The distance between these two is 163 km, but despite the distance, the scenic route through the Drakensberg Mountain range is a tourist attraction for many.

The most notable tourist attractions along this route are the J.G. Strydom Tunnel, which is a 133-meter-long tunnel through the mountains spanning 11 km, and the accompanying waterfall, which sees travellers stopping along the route for a picnic or photo opportunity under the cascading water.

The second major tar road, Morupu Mmola, connects Ofcolaco's neighbouring farming community, Trichardtsdal, and extends further to the southerly townships of Balloon and Lorraine.

The accompanying road network of Ofcolaco consists of only sand roads leading to and from farms for vital transportation. Even though I recommend driving at a leisurely pace in a small car, the road network maintains excellent condition to facilitate trucks for pickup and delivery to all farms.

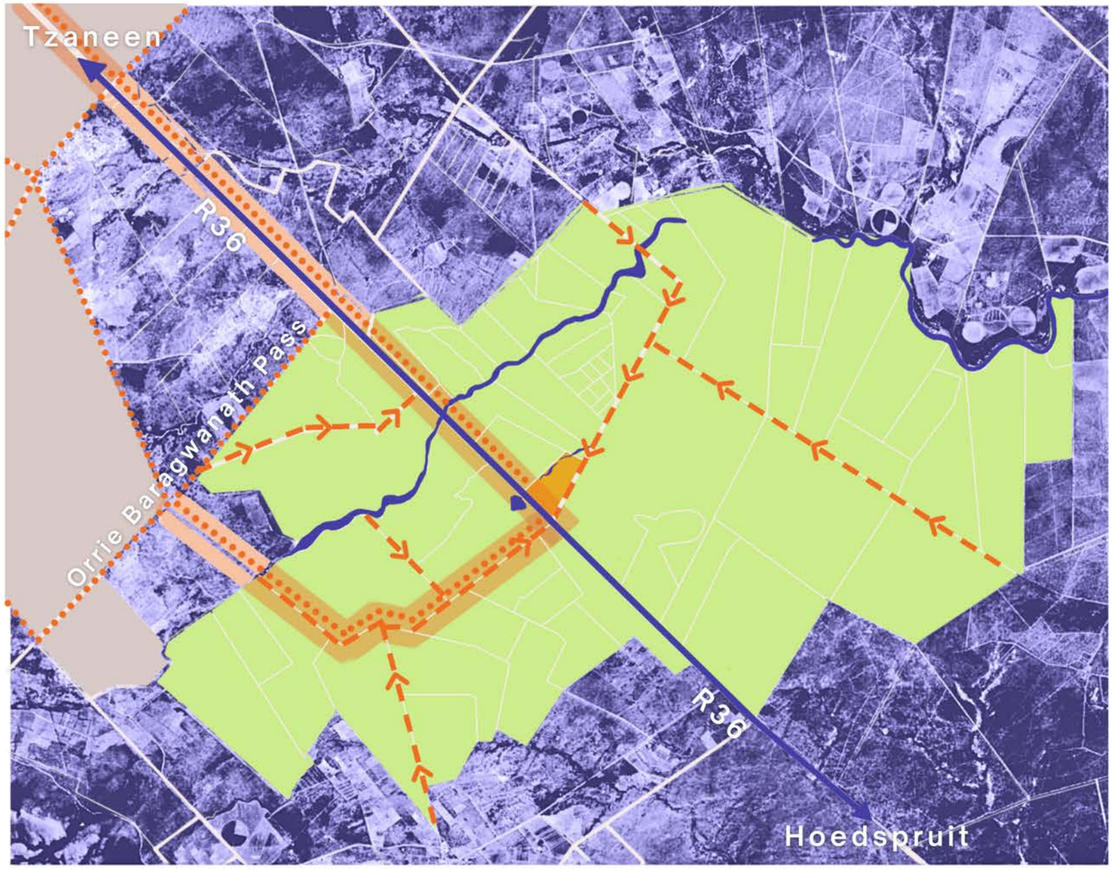


Figure 3.4
Travel Routes
above
Author , 2024

Figure 3.5

The Post Office and CNC Eskom Street View

below

Google Street View , 2024



If there is nothing than what is there?

In a place as small and minimally populated as this, the amenities are that of pure necessity. The petrol station hub can be considered the most commercial entity of the entire town boasting a mere two essential petrol pumps and a Quick@Ofcolaco convenience store. Don't expect the luxuries of city petrol stations though this shop is merely for your daily bread and milk and possibly a packet of chips to go.

Rather the community makes use of the main town of Tzaneen for its bulk shopping needs. A very traditional gender role concept sees farmers wives heading into town on a Saturday morning to go on a bulk shopping spree. The trip is a 45-minute drive one way and easily takes up to half a day for a trip to the 'little city'. For people that are used to a quick 5-minute drive down to the supermarket or the ease of access of catching a taxi to the nearest mall, the weekly 'trek' to the city might seem nauseating. However, when I lived on the farm, I remember the trip to Tzaneen being the highlight of my week, I would wake up at the crack of dawn and be ready to leave by 7 am – excited to head into the big town.

When you live in isolation it seems exciting to venture outdoors into the big bad world, however, farmers find peace and tranquillity in the fields and would not change that for convenience or material luxuries.

Google Maps refers to the petrol station as the Post Agency, likely because there is a small post office box on the site. A small liquor store complements both the petrol station and Quick shop. You won't find many options for a bottle of wine here, but you can observe farmers and workers enjoying a few cold ones to kick off their weekend. As far as community amenities go, a grocery shop, petrol station, and liquor store are the whole list, with the Post Agency Centre housing a small packhouse depot. Farmers drop off their crops at a packhouse for manual cleaning and packing before trucks pick them up to deliver to supermarkets.

This pack house on site is run by my aunt, the same aunt who worked on the Daybreak farm with many of the workers that were part of our family for generations, following my aunt to secure jobs with someone they knew and trusted.

One of these ladies particularly holds a special place in my family's heart. Her name is Johanna. Johanna served as the farm's housekeeper, and her daughter took on the role of my nanny when I was a newborn. These two women played a crucial role in my formative years. It has been nearly two decades since I had seen them and when visiting the pack house, they did not know who I was. However, upon disclosing my identity, they showered me with warm embraces. Although I may not remember these two ladies as young as I was, their love and warmth upon greeting me reminded me that the bonds of the community are never forgotten.

A few other amenities include a repair shop and the Eskom technical centre, which dispatches units for faults in the area and surrounds. Though a small, quaint town that most vehicles drive through enroute to a larger destination, Ofcolaco holds a sense of charm in community members as their home and the land they have built their lives on. There might not be much in Ofcolaco, but it’s the bonds that tie the community together for generations that stand as the most vital amenity.



Figure 3.6

Amenities in Ofcolaco

above

Author , 2024

Landscape

Figure 3.7
Landscape Photographic Collage
below
Author , 2024

The municipality of Maruleng is characterised by its rising and falling slopes of koppies and valleys. The great Drakensburg Mountains line the south-west, stretching for over 1000 kilometres. These picturesque mountains form the site's backdrop. The area's ecology is characterized by pristine conservation areas home to three threatened ecosystems.

These are the Endangered Tzaneen Sour Lowveld, which extends across mountainous areas; the Vulnerable Lowveld Riverine Forest along the Blyde River; and the Vulnerable Legogote Sour Bushveld. This biome encompasses savanna, forest, and grassland, making it the third-largest biosphere in the world (MUNICIPAL SPATIAL DEVELOPMENT FRAMEWORK, 2019-2024). It is within this biome that the agricultural region of Ofcolaco thrives.



Crop Production

Limpopo is referred to as the **“bread and fruit basket”** (Limpopo Province, South Africa's Food Basket, 2016) of South African agriculture. This where up to 60% of all fruit, vegetables and maize are produced. The Johannesburg Fresh Produce Market receives more than 45% of its annual turnover from this region with its high crop outputs.

The region has a semi-arid climate with hot summers and warm winters, making it the ideal destination for the farming of citrus, tomatoes, avocados, mangos, and maize. In Ofcolaco these crops are farmed at different times of the year.

This can be attributed to two different forces: the first is the seasonal crop cycles, and the second is the rotation of the soil. At the start of a season a rejuvenated soil patch is used to grow the crops associated with that time of year. When the crops are ready to be picked, farm workers swoop in for long shifts to harvest. Once the crops are yielded the stems, roots, and leaves from the picked produce are cleared. The minor residues left over from the clearings are ploughed back into the ground for soil rejuvenation.

The soil is left to rest to replenish nutrients for the next season's crop cycle. Farmers then cultivate a new section of soil for the growing of the next seasons crops. Each farmer has their own plot cycles that align with the seasonal crop yields and their farms land expanse.

Limpopo's agricultural success can be credited to the region's favourable climate, strategic farming practices, and hard-working workforce. Farmers in this province contribute significantly to South Africa's food security by carefully rotating crops, managing soil health, and harvesting efficiently. This ensures that the land remains fertile and productive year after year.

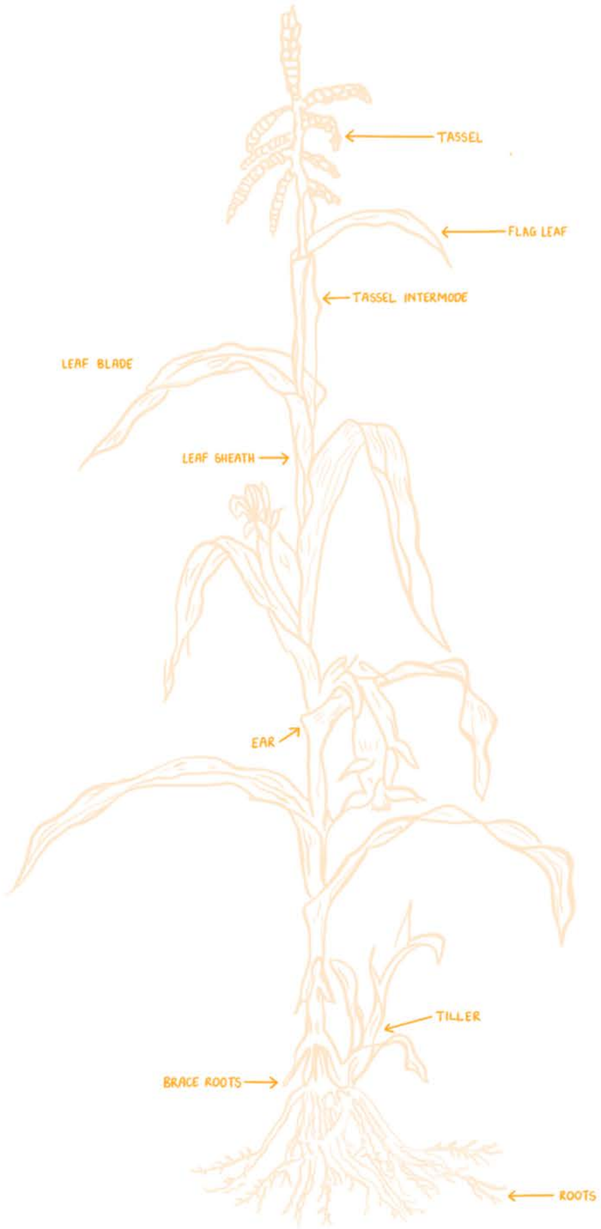
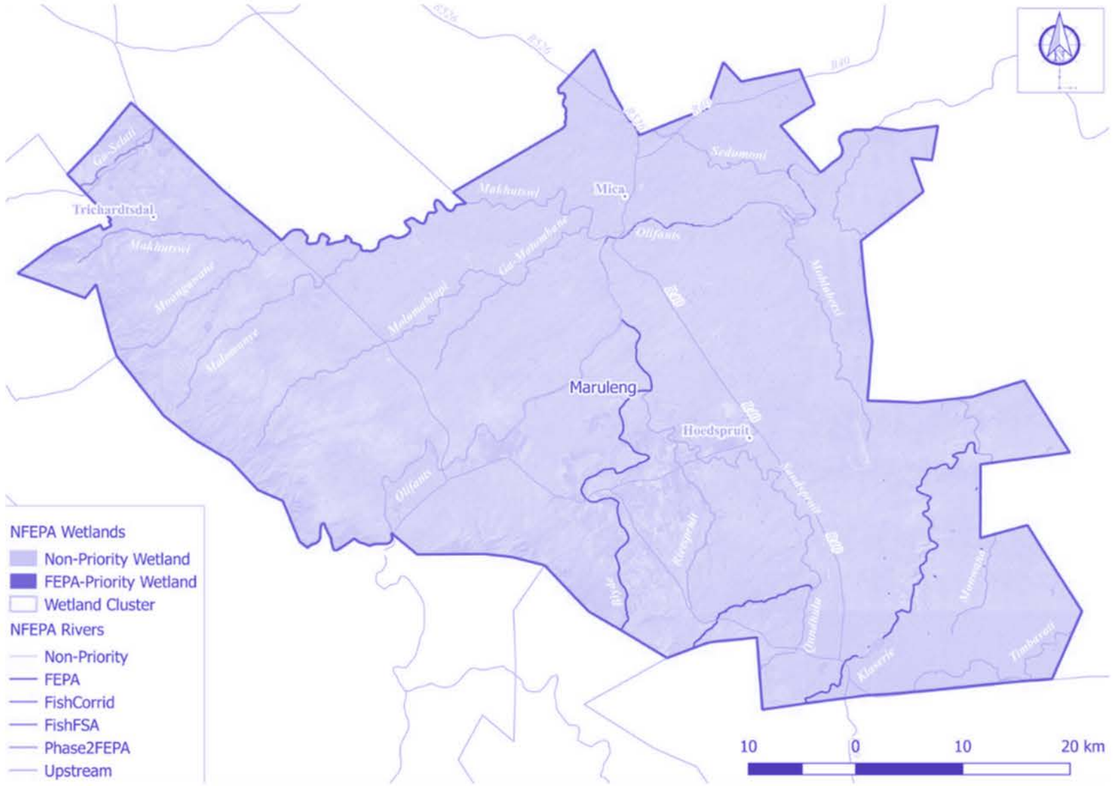


Figure 3.8
Corn Drawing
far left
Author , 2022

Figure 3.9
Maize Diagram
left
Author , 2024



Map indicating the key rivers in the Maruleng Municipality

There are four major river systems that navigate the Maruleng region. These are the Ga-Selati, Makhutswi, Oliphants and Klaserie Rivers. The Ga-Selati River flows along the northern border Ofcolaco and can be attributed to the main reason why the British Colonial Officers settled on this portion of land.

It is quite a phenomenon to understand that the agricultural industry uses an **"astonishing 70% of all freshwater worldwide"** (Warrender, 2023). The classification of the region climate is semi-arid, characterised as an environment with hot and warm temperatures throughout the year. The unreliable rainfall due to this climate typology forces farmers to rely on ground water systems for water harvesting. Despite the Ga-Selati River running along the north of Ofcolaco the distribution of this water is expensive. Therefore, farmers have resorted to onsite boreholes where possible. However, subsistence farming has had to rely solely on seasonal rainfall often halting crop production in the dry months.

In a climate of semi-arid, the probability of droughts is elevated. Consequently, commercial farms cannot afford to rely on erratic rainfalls resorting to the implementation of irrigation lines across the soils. Nevertheless, this process is extremely costly and is another benefit only large farms can benefit from.

The water challenges and semi-arid climate of the area highlights the critical importance of sustainable water sources in agriculture. Even though the Ga-Selati River provides some water security the high cost of distribution and rainfall to keep the river flowing force farmers to depend on more reliable water sources. As droughts become more frequent with global warming the need for accessible water solutions is vital to ensure the viability of agriculture in Ofcolaco.

Figure 3.10

Map indicating the key rivers in the Maruleng Municipality

above

Maruleng Local Munipality, 2019

the site , the farm



The farm is dagbreek is over 100 hectres large yet only half the soil is suited for farming , leaving the rest of the land poisoned with brackish earth that is left desolate and forgotten. It is within this overlooked soil that the building finds its home.

brackish soil

Brackish or alkaline soil is soil that contains an excessive content of salt and sodium, preventing the growth of crops. Many areas are too alkaline to begin farming on, but water with high quantities of salt used for irrigation purposes regularly will cause soil to turn brackish.

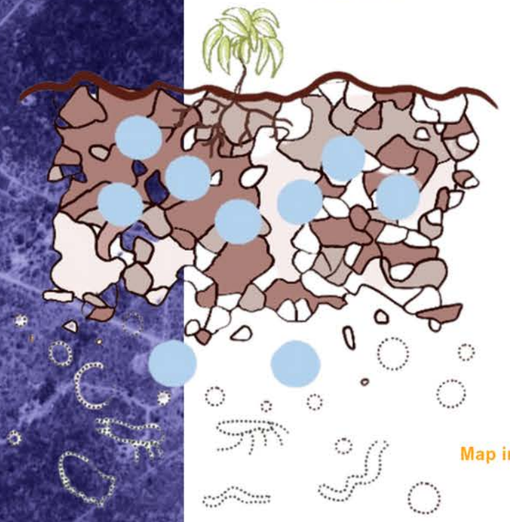


Figure 3.11

Map indicating the key areas on the farm

left

Author , 2024

Ownership

In the late 1960s, my grandfather purchased the farm Dagbreek from a British farmer. He spent the next 40 years cultivating the land, only to eventually succumb to selling it in the early 2000s. My grandfather sold the land to a private owner, who took over the farm. Shortly after the change in ownership, the Proactive Land Acquisition Strategy (PLAS) saw a shift in land ownership in the region from white farmers to black farmers.

The government purchased the site, still registered as government-owned agricultural land, for the Maitjene Community Development Trust. This trust was a land restitution program that allocated land claims to community members to employ and empower with farming skills. The Land Restitution Act 22 of 1994 established the trust in 2008 to address displacement.

The trust has successfully acquired 23 farms along the Ga-Selati River in Ofcolaco. The initiator, however, had difficulty transitioning unskilled community members to run the farm. In an attempt to avoid the farm's demise, the trust sought out training and guidance from previous landowners. My aunt, who worked closely with my grandfather on the farm on a daily basis, joined the initiative. However, due to the trust's limited financial resources and reliance on unskilled labour, the farm became unmanageable and yielded minimal profits.

A local farming conglomerate in the region stepped in to essentially save the farm. A business like this may have seen it as purely a business opportunity, but the trust knew that it was an opportunity for them too. It would not only keep the farm running but also ensure employment for its community members.

For the last 15 years, Maitjene Community Development Trust has rented the land to Boerseun, which runs and manages the farm. This has become a widespread phenomenon in South African agriculture. Boerseun rents a number of farms in the area from trusts like these that ensure the success of the farms due to their generational farming expertise.

South Africa's agricultural campaign halts at this complex junction. Things that were put in place to empower black communities have once again fallen into the hands of white men. The white man, however, holds the generational knowledge of South African agriculture. This leads to a complex cycle of and ownership and those who lease it.

Though agriculturally successful, the farm's story underscores a deeper issue: it reveals how efforts to address past injustices have often fallen short, perpetuating a cycle where historical inequalities are merely reshaped rather than resolved, leaving the social wounds of the past unhealed.

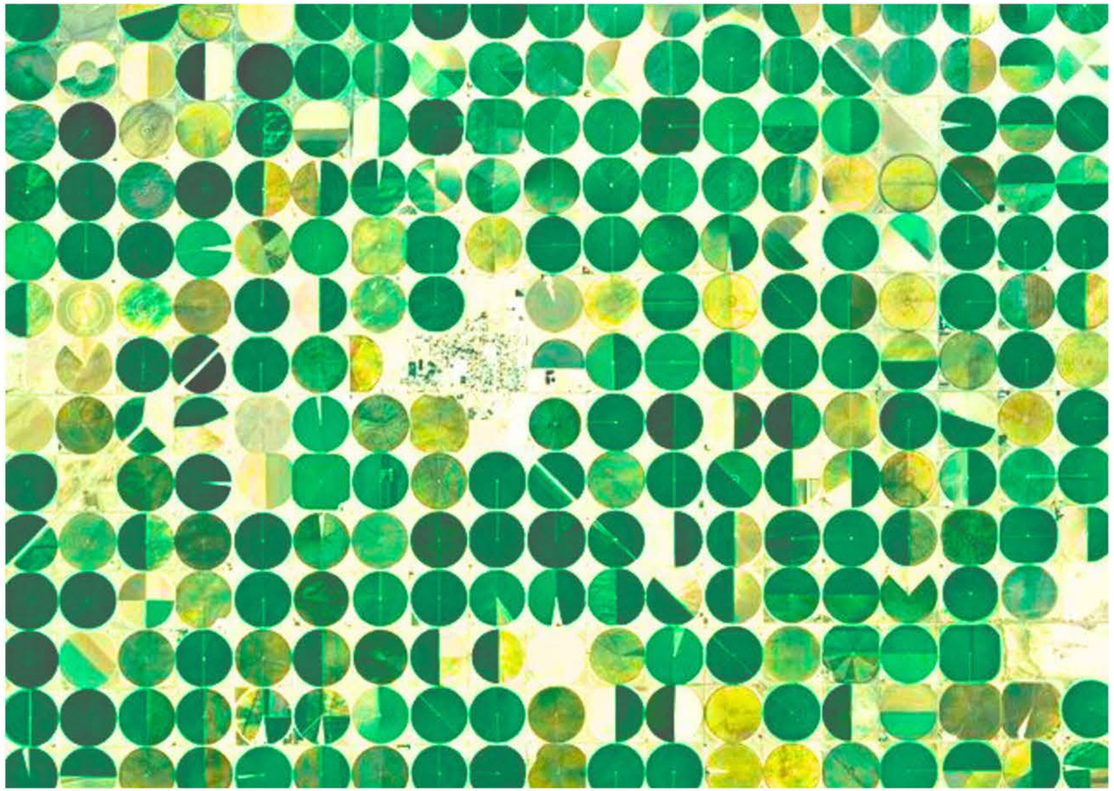


Figure 3.12

Farming Aerial Photograph

above

Author , 2024

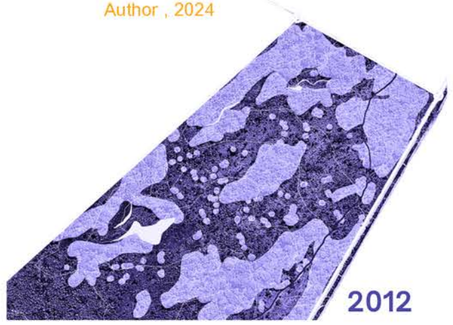
Figure 3.14

Physical Site Changes from 2012 - 2022

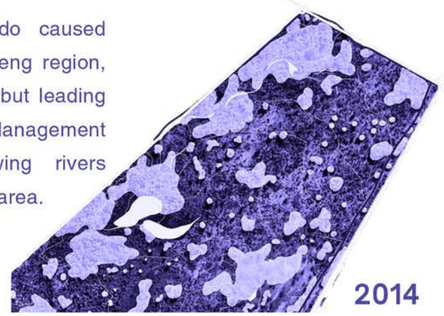
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Author , 2024

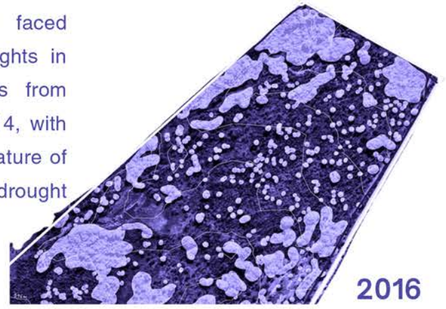
Ecological Climate Analysis Of The Site Of Intervention

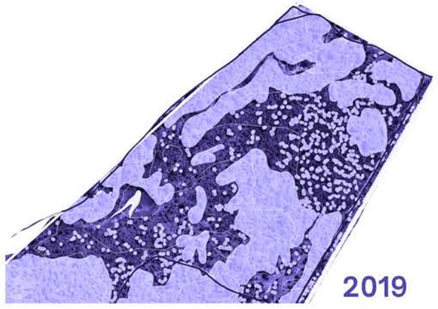


In 2012, Cyclone Dando caused heavy rains in the Maruleng region, filling up water reserves but leading to flooding. Disaster Management intervened as overflowing rivers blocked circulation in the area.

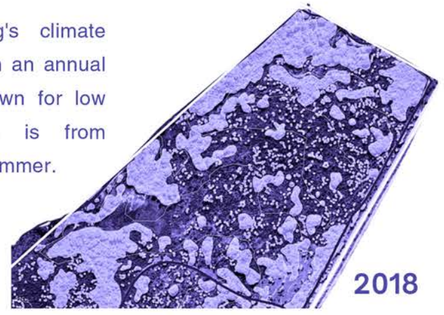


The Maruleng region faced unexpected severe droughts in 2015-2016 despite hints from high temperatures in 2014, with a record average temperature of 33 degrees during the drought season.

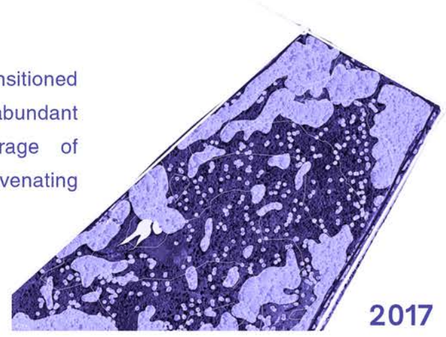


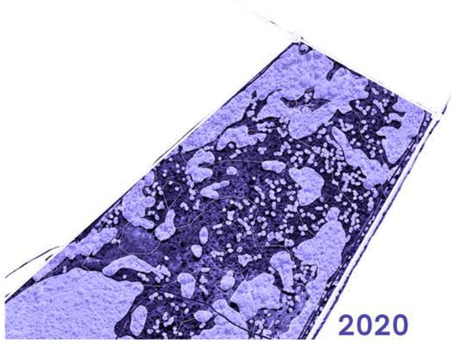


As of 2018, Maruleng's climate became more stable with an annual rainfall of 1000mm, known for low rainfall. Rainy season is from October to February in summer.

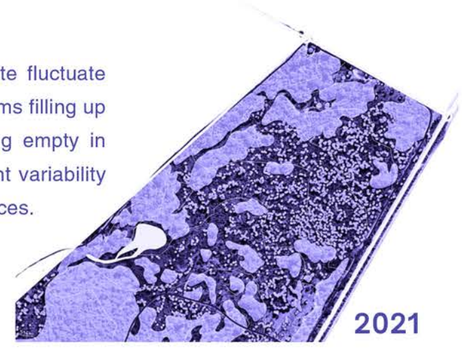


In 2017, the region transitioned from drought to abundant rainfall, with an average of 1000mm, rejuvenating previously dry lands.

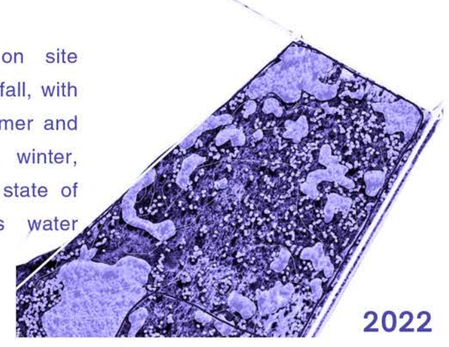




The water sources on site fluctuate based on rainfall, with dams filling up in summer and remaining empty in winter, leading to constant variability in the region's water sources.



The water sources on site fluctuate based on rainfall, with dams filling up in summer and remaining empty in winter, leading to a constant state of flux for the region's water sources.



Over the past twenty years of climate analysis in the region, the site has undergone continuous fluctuations. These changes are primarily attributed to severe droughts affecting the area, leading to the withering of vegetation and depletion of water sources.

The drought in Limpopo is linked to changes in sea surface temperatures (SSTs) in the eastern equatorial Pacific Ocean, known as the El Nino phenomenon. This phenomenon impacts surface air temperatures, air pressures, winds, and rainfall patterns across the tropics. As the El Nino phenomenon continues to influence the climate in the region, it is crucial for scientists and researchers to closely monitor these patterns and fluctuations. By understanding the relationship between sea surface temperatures and drought occurrences, we can better predict and prepare for future climate challenges in Limpopo.

In response to the ongoing changes, local communities and authorities are implementing strategies to mitigate the impacts of drought. These initiatives include water conservation efforts, sustainable farming practices, and community education on climate resilience.

4 chapter food

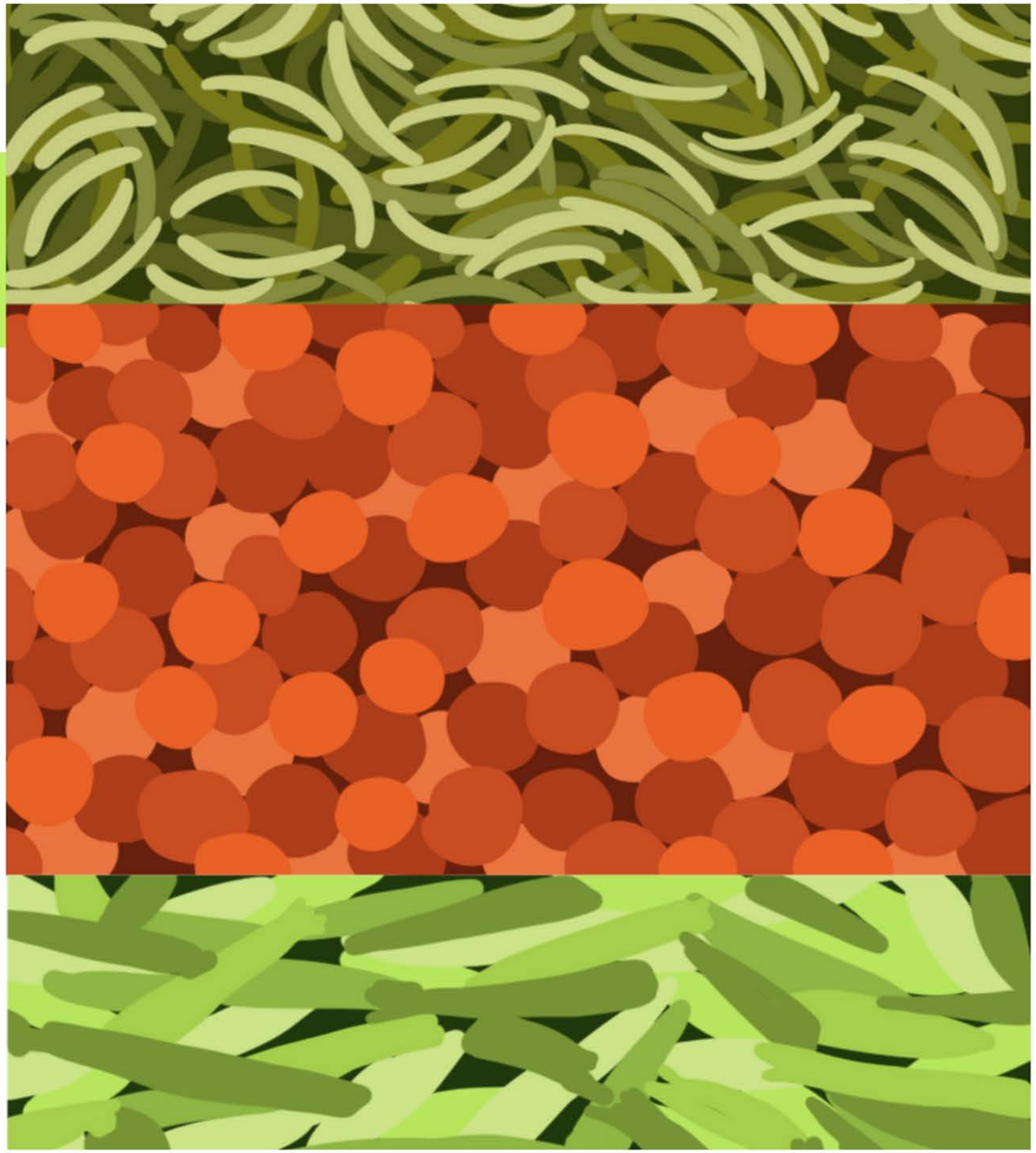


Figure 4.1

Food Chapter Cover

above

Author , 2024

waste in agriculture

South Africa generates a total of 122 million metric tonnes of waste per year (Essop, 2024). Of this waste, 90% is landfilled or dumped illegally, while only 10% is recycled and recovered for alternate uses. The estimate is that agricultural waste creates up to two billion metric tonnes each year (“Agricultural Waste Facts,” n.d.). Agricultural waste refers to the residues resulted from the growing and processing of raw agricultural products. The research process focuses on non-edible plant parts left over after harvesting. This includes stems, leaves, roots, etc.

It is important to note that the agricultural waste studied pertains only to the industry's primary production and harvesting processes. The findings do not examine food waste, as it occurs at the distribution level. Food waste refers to food that, when leaving the farm, was at an edible standard but is discarded due to oversupply, spoilage, shopping habits, etc (Fourie, Engelbrecht, and Govender, 2023). The farm's waste generation is the sole focus, not the post-processing that occurs after harvesting.

The agriculture sector's relative lack of research when compared to other stages in the food supply chain makes it difficult to collect measurable food waste and loss statistics at the primary production level. This is due to the industry's heterogeneity (Fourie, Engelbrecht, and Govender, 2023). The term heterogeneity refers to the quality or state of being diverse in character or content. This pertains to the unique farming methods that each farm and farmer employs.Setting a baseline is impossible due to the inconsistencies in farming practices.

However ambiguous the sectors data may be the research indicates that 34.3% of South Africa's total food waste occurs at the primary production level (High Levels of Food Waste on Farms Can Be Turned Around, n.d.). Waste is inevitable in production. Most farmers see waste as a right off and a byproduct of farming. If farmers actually measure the amount of waste during the farming process, they would be faced with the harsh reality that 40% of crop production is considered waste (High Levels of Food Waste on Farms Can Be Turned Around, n.d.).



Figure 4.2

Food Waste Dump

above

Quest Resource Management Group , 2013

To effectively address the significant concerns raised by agricultural waste, it is necessary to recognize the complex processes at work in the sector. The diversity of farming operations makes it impossible to develop a one-size-fits-all solution to waste management. Nonetheless, it is critical to identify and investigate the potential for reducing waste at the core manufacturing level. There is a potential to help both the environment and the economy, with the results having a substantial impact on South Africa's agricultural sector.



waste in the region of Ofcolaco

A field trip to the region of Ofcolaco, Limpopo, occurred in the middle of 2024. Despite having family ties to this region, my knowledge of the farming sector was limited and required extensive on-site research.

Prior to my visit, meetings with local farmers were set up in order to achieve maximum output in a short period of time. My family ties in the area may have contributed to the local farmers' accommodating nature, but I will leave it to their generosity.

A typical interview with a local farmer began with the explanation of my research and ethical protocols. The farmers would lead me on a walking tour of their land, focusing on the current harvest areas. During the walk, I conducted a verbal interview with the farmer with a portion of the interview focused on agricultural waste on farms. This endeavour enabled me to gather firsthand personal experiences and perspectives on the waste issues faced in the Ofcolaco region.

Figure 4.3

Food Stamps

far left

Kendyll Hillegas , n.d

Study Method

The Food Loss Waste Report: Insights from South African Farmers acted as the framework to guide the Ofcolaco farmers' interview process (Fourie, Engelbrecht, and Govender , 2023). The WWF report established an overall framework for South African food waste research. Using the overall research of south Africa's agricultural waste issues coupled together with the personal interview I conducted in the Ofcolaco region an overall analysis was formed. The findings are detailed in the same process as the above-mentioned report to determine paying particular focus on the region in question.

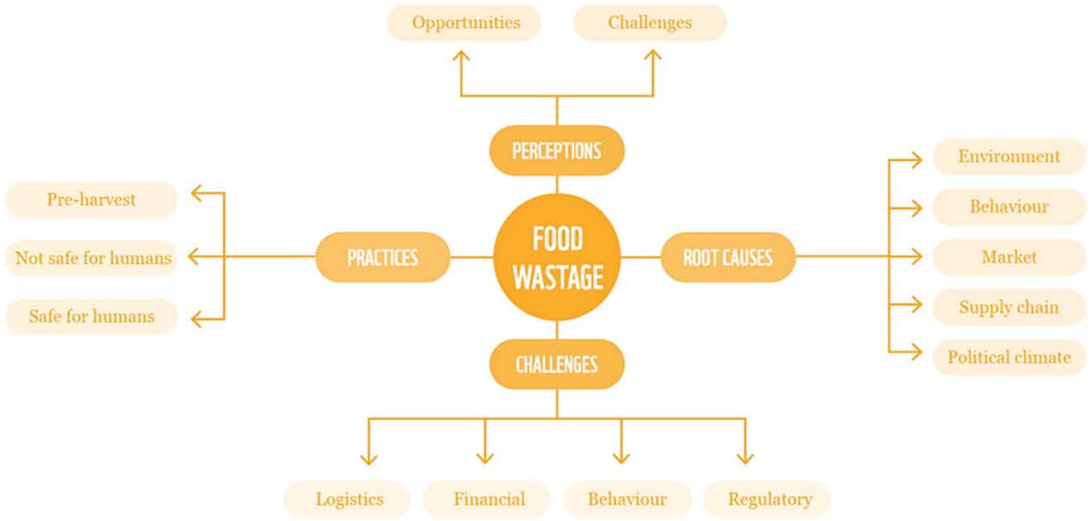


Figure 4.4

Coding framework for the thematic analysis showing the four key themes and their subthemes

above

Fourie, Engelbrecht, and Govender , 2023

theme 1

Perceptions of Food Wastage



There are only two outcomes to a problem. Either a problem is **opportunistic**, or it is a **challenge**. This concept divides the region. Large agricultural conglomerates and successful high-profit farms view waste as an income opportunity. Smaller-scale farms perceive waste as a challenge that they lack the resources to address.

Large farms in Ofcolaco use crop waste as an opportunity to start a new business in herding cattle. The crop waste is then fed to the cattle, reducing feed costs while at the same time generating a new revenue stream for crop farmers. Only farms with substantial equity can afford the expenses associated with maintaining cattle, even with their feed expense being retracted. As a result, the luxury of addressing waste sustainably and building new revenue once again lies within those who have the means to do so.

Smaller farms are not able to herd cattle. This is accredited to two factors. Firstly, smaller farms typically have a smaller land area, making it difficult to implement cattle herding. Second, cattle require extensive care, which these farms cannot afford. Smaller farms frequently offer their cattle feed to larger farmers, but their large quantities often result in rejection. Therefore, these farms must dispose of the waste, as they cannot profit from other waste sources.

Figure 4.5

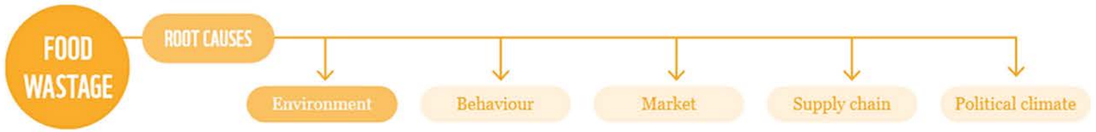
Perceptions of Food waste

above

Fourie, Engelbrecht, and Govender , 2023

theme 2

Root Causes of Food Wastage



Farmers maintain this symbolic relationship with their land. The environment can provide, but it can also take away. They must trust their earth more than they can control it. Every day puts this relationship to the test, often stabbing the farmer in the back when least expected.

The farmers of the region suffer dearly with their semi-arid, inconsistent climate. Studied in Chapter 3 : Farm with floods and droughts destroying a farmer's yield, forcing him to succumb to a force greater than himself. The environment's unpredictable nature is the force that drives a farm but can also be the farm's greatest downfall.

The root causes of food wastage are : Environment , Behavior , Market , Supply Chain and Political Climate.

Figure 4.6

Root Causes Food Wastage

above

Fourie, Engelbrecht, and Govender , 2023

Environment

t comes as no surprise that the environment is the primary cause of food waste at primary production level. Extreme and catastrophic weather conditions lead to the destruction of crops. Often, the smaller day-to-day environmental impacts cause more frequent losses. These include hail, frost, sun damage, and even wind destruction.

When referring to the environment as the root cause of food waste, it is important to note that this includes pests and diseases. It may seem trivial, but in an isolated countryside like Ofcolaco, animals roam free. I'm not referring to lions roaming freely on the streets. Instead, buck and jackals, often from escaped nature reserves, will feast on farmers' crops at night, leaving a trail of destruction in their wake. Diseases, however, can spread quickly and are uncontrollable when detected, wiping out large portions of yields.



Figure 4.7

Sketch of a male nyala

right

Lindybugdesign , n.d

> *"When things go bad with the weather, it goes really bad. It just takes one big hail storm to destroy an entire crop. You could easily lose 80–100% of your crop to bad weather or pests. That happened to us last year: one big hail storm and 80% of our fruits were on the ground"*

Fourie, Engelbrecht, and Govender , 2023

theme 4

Practices to Prevent Food Wastage



Farming regularly incorporates crop residue into the soil as a form of compost feed. Instead of extracting the residues for compost making, farmers plough them back into the soil for rejuvenation after harvest. As effective as this practice is, large residues cannot be ploughed back into the soil and still pose a high mitigation issue.

Farmers in the region have implemented crop residue for animal feed and compost to decrease agricultural waste, nevertheless, these methods still fall short of providing a sole solution to the problem. The surplus cannot be mitigated, which highlights the need for innovative waste management strategies in the agricultural sector. Developing a new waste mitigation strategy could alleviate the problem and serve as a solution for other farming corridors.

Figure 4.8

Practices to Prevent Food Wastage

top

Fourie, Engelbrecht, and Govender , 2023

waste on site

The agricultural waste on the site is generated from the annual crop cycles of maize, beans, and citrus. Maize being the primary producer of waste.

The images depicted below were taken after the mid-year maize crop cycle. After the maize yield the waste from the plants is removed to make way for the winter crop growth of beans. On-site, this waste is transported by tractor and trailer to designated dumping areas. There, workers sort the waste into large plastic bags, and larger residues are ground up with a small shredder if necessary.

Each farm implements its unique private waste management solutions and the waste mitigation on site must not be considered as the norm.

On the site, a large cattle breeding program has been introduced to turn agricultural waste into a profitable venture. The farm's cattle are fed with the crop residues, significantly reducing feed costs while simultaneously providing an alternative stream of profit. This modern technique has been implemented in farming corridors nationwide, as many farmers, overwhelmed with agricultural waste, designate areas of their land purely for dumping purposes.

The site's farm is part of the largest corporate farming conglomerate in the Ofcolaco area, Boerseun. They can invest in cattle to manage their crop waste and still turn a profit. However, many farms in the area are only a fraction of the size of this conglomerate and are forced into dumping due to the lack of agricultural waste management schemes. It is important to note that crop farmers in the area often donate their waste to local cattle farmers. Yet, with the surplus of crop farmers and only small-scale cattle breeding schemes, the waste ultimately becomes a significant challenge for farmers to dispose of.



Figure 4.9

Waste on Site Photohraphic Collage

right

Author , 2024

A Story from a Local Farmer

I load my waste onto tractor trailers, and my drivers travel around the community, attempting to responsibly dispose of it by donating it to cattle farmers. The drivers consistently return with an empty trailer, and I believe that by responsibly disposing of my waste, I am contributing to the community and preventing landfills from overflowing. It wasn't until I received a call from the local township that I realized where my waste was truly going. The community's spokesperson phoned me in a fit of rage; they said they were tired of our tractors dumping the waste on their sacred lands and that we were disrespectful to the livelihood of their people. I couldn't understand what this member meant; if my driver was dumping on the empty fields between our communities, that was also news to me. Of course, this could upset some members, but to say that I was dumping on sacred lands and disrespecting the livelihoods of their people, there had to be more to the story. It was then that I learnt that my waste was being dumped on not just empty lands but the lands of their ancestors and where they had been laid to rest.

This narrative underscores the complex and often unintended consequences of waste management practices in agricultural communities, highlighting the need for more effective and respectful waste disposal solutions.

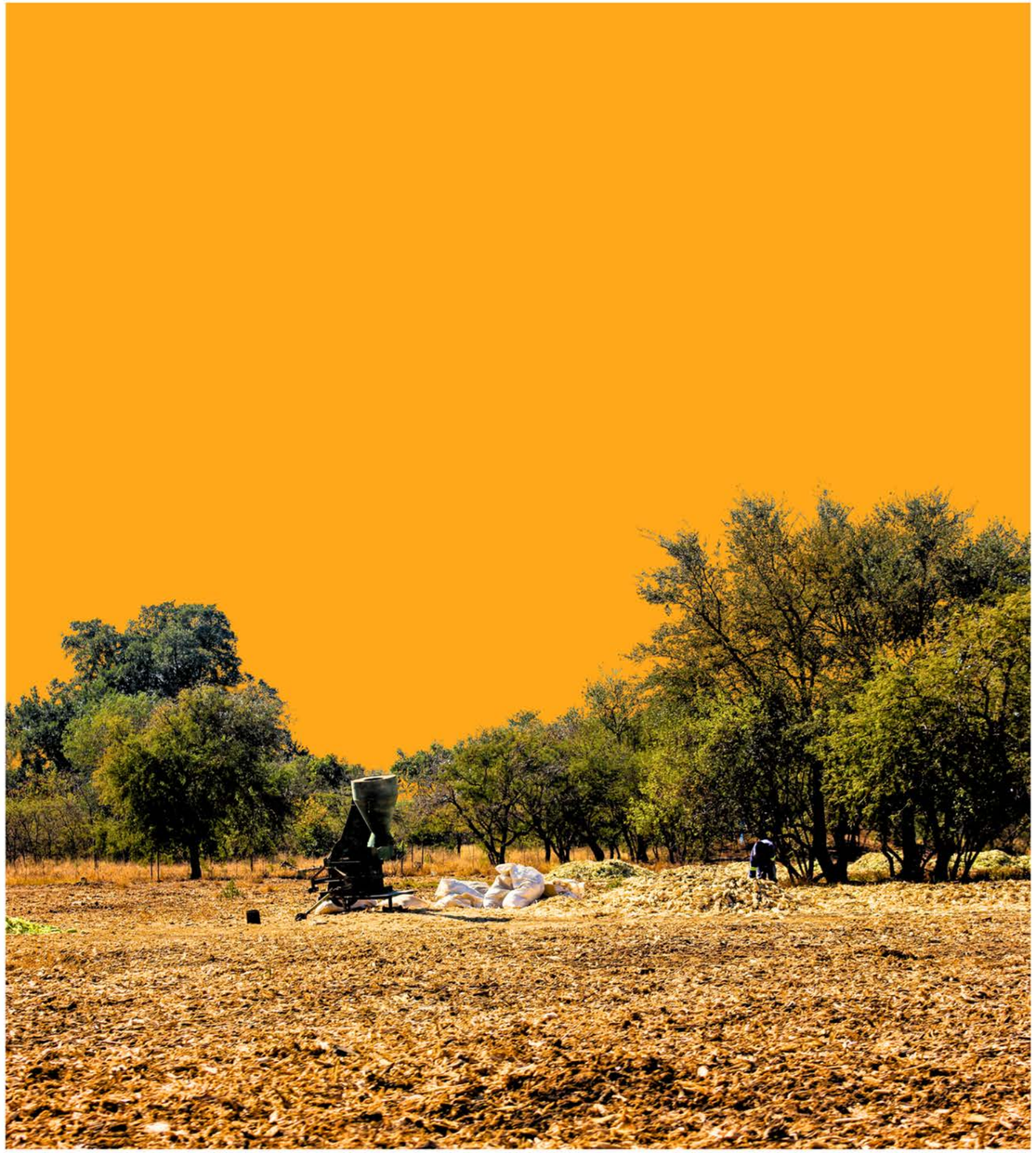


Figure 4.10

Farm Waste on Site

right

Photography by Author, 2014

material activism

A term first coined by Miriam Ribul in their exploration of the Embodied Energy Series: Recipes for Material Activism. The exploration endeavours to develop a variety of models to replace traditional manufacturing systems. The result is a collection of prototypes that demonstrate the potential for creating alternative aesthetics and processes for materials and making.

As architects and designers, we have become experts in the process of material selection to suit our project briefs. The Industrial Revolution transformed the creation of materials from a person's hands to that of a machine. As the world advanced, so did the machines and the variety of materials available for production.

As architects in the 21st century, we sit with a material library of mass-produced products, with a selection that we barely scrape the surface of. It is only when a specific architectural endeavour calls for a transformative material palette that the architect truly engages with a sector of the material library.

In today's context, it is rare for an architect to design with the intent of creating a new material that fits the design. Instead, architects design with the intention of manipulating an existing material. We only push the limits of a material's capabilities, not its potential. Mass production systems have degraded the craftsmanship of architects, and this has led to a decline in our ability to innovate. Architects are creators of the built environment, but they have chosen to leave the building material to the masses.

Miriam Ribul's exploration takes flight in this closed system of architects' dependence on material selection and lack of product innovation. The aim of "research material and people-focused processes for sustainable manufacturing" (Ribul , 2014) involves the exploration of simple do-it-yourself home-based techniques to develop a chemistry-based material library, as illustrated on the next page.

Figure 4.11

Recipes for Material Activism

right

Miriam Ribul , 2014



Material Activism through Kitchen - Based Innovation

To activate a new material, one must be a designer. As designers, we share capabilities with art, engineering, biology, chemistry, and most importantly, the social sciences. With this design capability in mind, material activists' processes can further be divided into artisans, chefs, and alchemists.

> *The term **'material activism'** is used to define contemporary exploration and cross disciplinary do-it-yourself practices for low-tech appraoches in the production and design of materials with working in-between an alchemist , artisan or chef*

Term coined by Miriam Ribul in the Embodied Energy Series : Recipes for Material Activism

In the query into material activism, I have conducted an experimental character utilising food waste around the house bound with binder additives to create a new material. I have taken on the role as a design chef through material activism through kitchen-based innovation. The exploration draws inspiration from Miriam Ribul's concept of "Recipes for Material Activism" (Ribul , 2014) in the advocation for developing alternative manufacturing methods to replace traditional systems.

In response to Ribuls exploration, my own material activist experiment embraces a different paradigm. Through the repurposing of food waste, I have sought to develop new methods of material exploration that poetically produce the possibility for something more. This kitchen-based approach aligns with Ribul's advocacy for simple, do-it-yourself techniques.



Figure 4.12
Mixing Food Waste Photography
right
Author , 2024



Figure 4.13

Kitchen - Based Charette Collage

above

Author , 2024

Figure 4.14

Kitchen - Based Charette

right

Author , 2024

The charette process involved the experimentation with lying around the house food products. Corn, onions, and grapefruit were the ingredients used. Only the residues not edible for humans' use were used: corn husk, onion peels, and grapefruit skin.

The residues were chopped or ground up using a blender to form a homogenous mixture. Some mixtures were soaked in vinegar to perform a colour alteration. The mixtures were all individually bound with an additive source—hot glue, wood glue, craft glue.

The result is an array of prototype materials with diverse textures, appearances, and strength properties. Every prototype narrates a tale of metamorphosis and promise, arising from what would otherwise be considered waste.

The charettes core is the highlight of designers as material activists. That we may become the individuals to bridge the gap between art, science, and practical application. I have embraced the role of a design chef in a poetic sense, but now it's time to realize the potential of poetics.



exploring innovative transformations for crop residues

Farm owners have attempted to solve the agricultural waste problem through small scale mitigation methods. However, if large investors really took on the problem as an opportunity a new sustainable business venture could rise. There are three main mitigation schemes that will be analysed below to understand what the best mitigation method implementation could be.

Research Outcome 1: Biogas

According to Professor Vincent Okudoh, an Associate Professor in Biotechnology at the Department of Biotechnology & Consumer Sciences at Cape Peninsula University of Technology, **"South Africa has a wealth of waste that could potentially address power challenges"** (ProAgri Media, 2023). In a country with severe power problems, it is ironic that a solution lies in waste. It solves two problems with one stone.

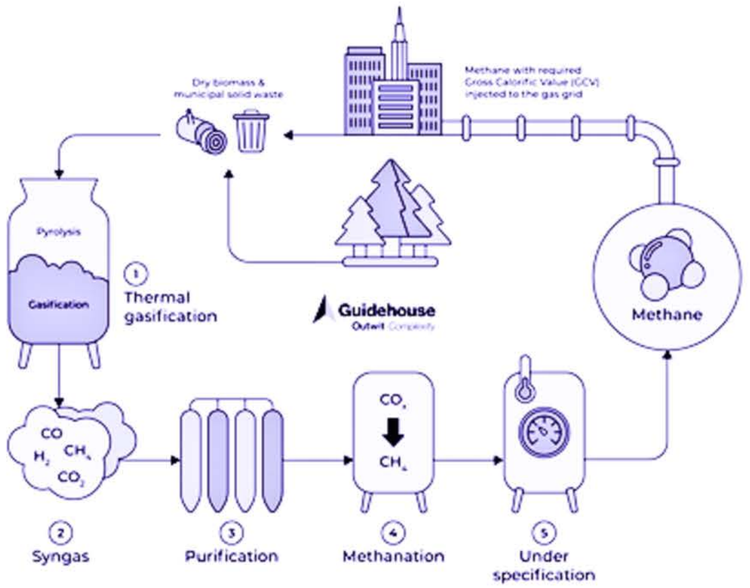
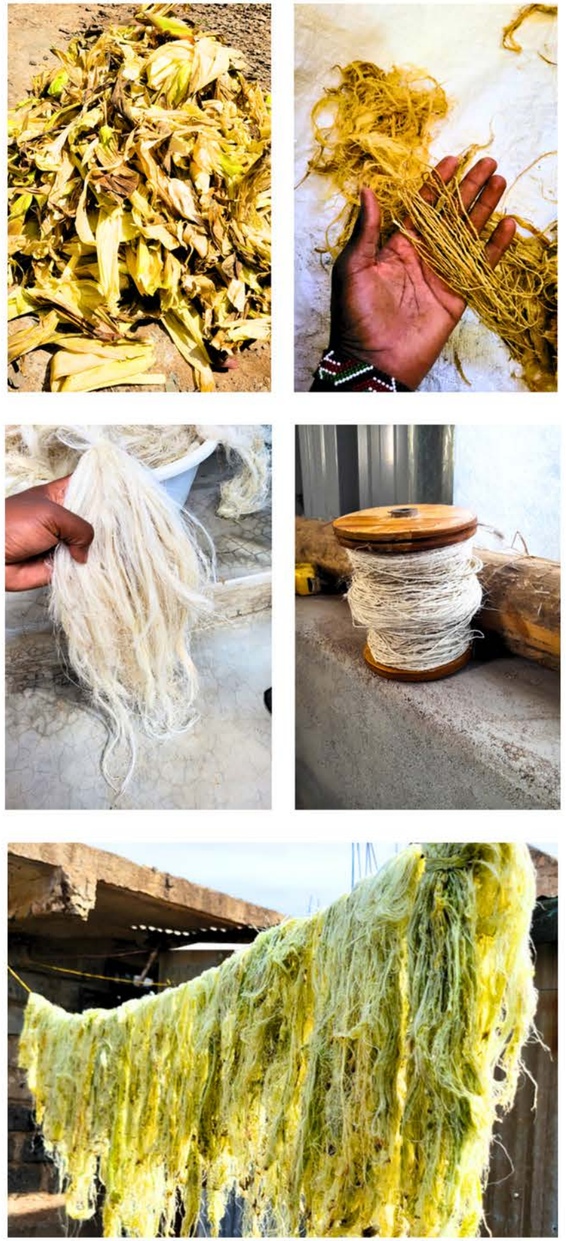


Figure 4.15
Agricultural Biogas Plant
right
Clarke Energy , n.d

Okudoh's research sees the transformation of organic residues into a valuable source of renewable energy through anaerobic digestion. The process breaks down organic materials by bacteria in an oxygen-free environment, producing biogas as a byproduct. The biogas is a mixture of methane and carbon dioxide. The methane is then used as a source of renewable energy and the carbon dioxide as ahigh-quality fertiliser.

A solution that may seem so plain and simple is yet the endeavour of essentially a new power station. Firstly, the establishment of a biogas station requires engineering expertise, and the complexity of such a project in an isolated farming corridor like Ofcolaco makes it impracticable. Plonking a biogas plant on a farm is not an architectural solution. It does not maintain the sensitivity and response to the environment with which it is placed. Therefore, while it may be an exciting mitigation method, it is not the most effective method for the region or research.



Research Outcome 2 : Textiles

Charles Oyamo, a remarkable student at the University of Nairobi, has created a genius solution for turning agricultural waste into textiles. Fibres from leaves are washed and dried before being dyed and spun into yarns, which can then be woven into fabric by weavers. These leaf fibres are so similar to normal fabric that they can be spun by a conventional textile spinner.

The fabric is described by Charles as being a “bit coarser and a little stiffer than cotton (Ho , 2023). What is described as a “future fit fabric"—the textiles are 100% biodegradable, solving not just an agricultural waste problem but the textile dumping problem.

In such an isolated community the opportunity for retail is minimal. Thought it is interesting to see the complexities and two completely different sectors merging. Textile and agricultural. The first is heavily man made and want basis while the second is up to nature meeting man’s needs.

Figure 4.16

Biobased Textiles

right

Ho , 2023

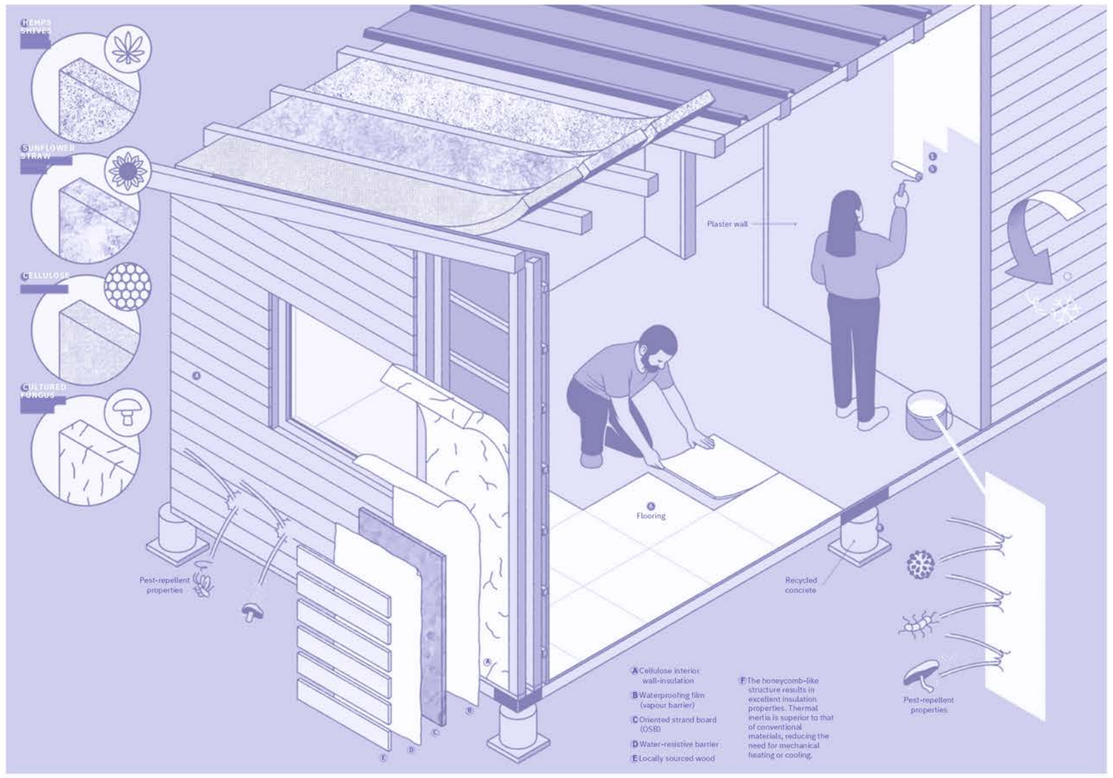
Research Outcome 3 : Biobased Materials

The last few decades have seen a wave of innovation and the emergence of new biobased products. The term 'bio-based' originates from the term 'biomass', signifying a product that either fully or partially originates from biomass (FRONT , 2024).

Researchers have extensively investigated agro-waste over the years to develop sustainable construction materials. The consensus of the studies is that they aim to tackle two generic problems. The first is to reduce the impact of the construction industry's carbon footprint with alternative solutions. The second is to resolve the issue of waste disposal through landfills, giving them a new purpose after their expiration date.

Researchers have conducted extensive investigations on the transformation of natural waste to meet the needs of the standardised building industry's material library. So much research has been done that, in some way or another, almost every standardized material has been experimented with to create a biobased material of the same function. The research primarily draws from the bioclimate natural resource library at the researcher's disposal.





Researchers have experimented with biobased materials for **thermal insulation, masonry components, 'green concrete', reinforcement materials, panel boards, plastics, and fibre cement**. In the construction industry, biobased materials can pretty much complete a full material library.

Figure 4.17
Biobased Materials for Building Tomorrow
above
INRAE , n.d

Figure 4.18
Biobased Material Pallette
left
Cornwall and Building Centre, London , 2023



case study 1

Mae-Ling Lokko on Waste Transformation

Mae-Ling Lokko, an architectural scientist, is a visionary who wants to transform agricultural waste into the future of building materials. Her studies as an assistant professor at Yale University's School of Architecture focus on investigating and prototyping renewable biobased materials from agro-waste.

Her adolescent studies in Ghana forged a profound bond with her surrounding environment. The architect subsequently began her early research, connecting the dots between agriculture, construction, and the social equity of the region. Agriculture and the food industry appear to have no connection to architecture, but the overlap of these areas piques the architect's interest.

The study of Ghana's coconut industry earned the architect worldwide acclaim. Lokko explores the transformation of coconut production's byproduct into sustainable building materials. The coconut agro-waste serves as a substrate for the production of low-density panels as alternatives to the typical thermal insulation found in the construction industry. The process consists of much lower embodied energy driven by a waste transformation process that is remarkably sustainable.



Figure 4.19
Healing Meadow
left
Photography by Selma Gurbuz , 2022

Figure 4.20
Mae - Ling Lokko Portrait
right
Photography by Shannon Straney - edited by author , 2024

Lokko's research reveals that collecting this waste from the source gives the creator immense control over the material transformation. However, relying on only coconut husk is severely limiting due to the unpredictability and irregularity of the agricultural industry. It would be best if waste sources included various avenues to ensure production consistency (Lavranou, 2023).

Lokkos research has found that husk can be incorporated into construction materials and a durable additive that can implemented in a range of applications. The explorations have found husk incorporated into ceiling and roof components. Most notably though is how broken-down husk combined with fungal mycelium (Mycelium is an extensively researched biobased possible material in itself) created a new material that can be compared to Styrofoam. The fungi consumes the sugar in the husk to form an entirely new material.

An object has three options at the end of its lifespan: reuse, recycle, or dump. Researchers have extensively studied the preservation and extension of an object's lifespan, yet they haven't focused on its afterlife. This is where architect Mae-Ling Lokko introduces her perspective—the afterlife.







> *you begin to reimagine your relationship to plants and to other living systems and to frame building materials around their impact on climate change*

Mae - Ling Lokko , 2023

Figure 4.21
Grounds for Return
top left
Photography by Selma Gurbuz , 2022

Figure 4.22
Grounds for Return
middle left
Photography by Selma Gurbuz , 2022

Figure 4.23
CASE Upcycling Pavilion
bottom left
Photography by Sarah Reynolds , 2016

case study 2

Earthship Biotecture by Michael Reynolds

Lokko credits her fascination with her research field to Michael Reynolds. Reynolds is an architect, environmentalist, and founder of Earthship Biotecture. Earthship Biotecture is a type of built-form architecture that utilizes natural, upcycled, and recycled materials to function as passive solar shelters (Moliner 2017). Reynolds believes that his biotecture addresses environmental and shelter challenges in a basic logical sense, something that standard architecture has failed to accomplish.



Figure 4.24
Michael Reynolds Portrait
right
Photography by Earthship Biotecture , n.d

Figure 4.25
Michael Reynolds Portrait
far right
Michael Reynolds giving a Seminar , edited by author , 2024

> *“I just blew off the architecture profession, really. I mean, I have blown it off in my mind as a profession because it’s not addressing the issues that we face. So, I coined a new word called ‘biotecture,’ and I use that. I would say I’m a ‘biotect’”*

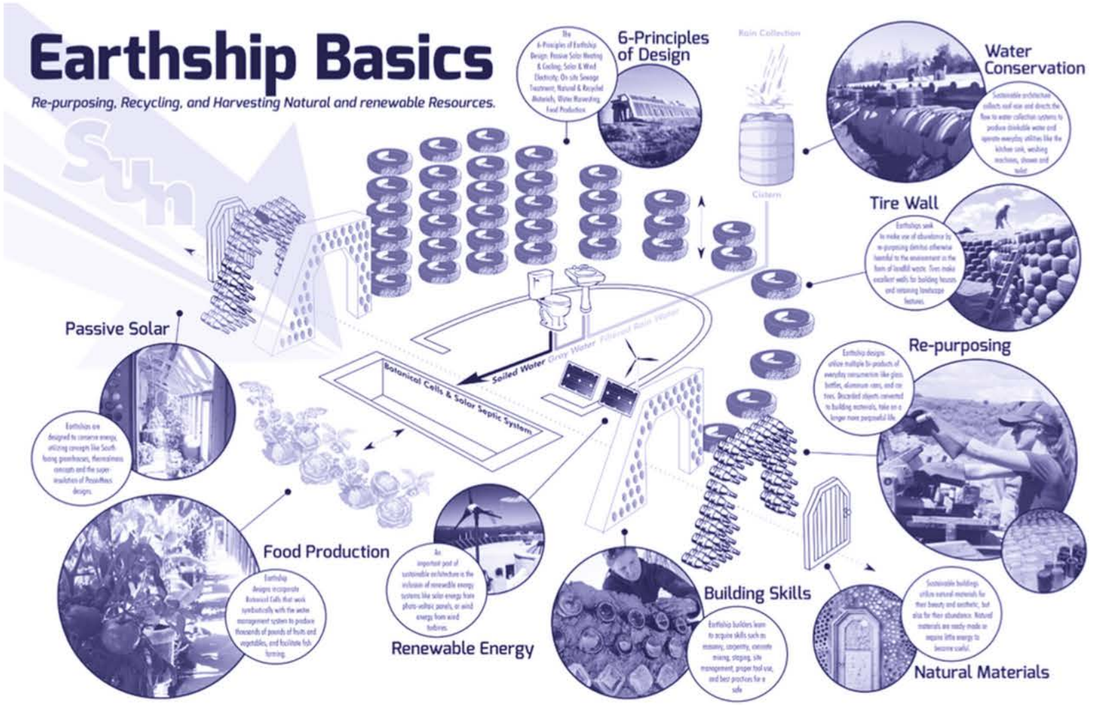
Michael Reynolds , 2023



Reynolds ‘Earthships’ are passive structures designed to provide for six essential human needs: shelter, electricity, water, waste management, sewage management, and food provisions. Typically, these structures have been made out of old car tires filled with earth and stacked atop one another with soil, stone, and adobe added for stability—creating a type of rammed earth wall. These structures are curvaceous, with tin cans enveloping the façade to allow the allow the structure to function as bricks would.

Reynolds' transcendent built structures forced him to give up his architectural license over two decades ago due to his unconventional building practices. Ironically, Reynolds has acquired a great following for his radical approach to building design, performing lectures globally to bewilder fans. Reynolds fanatics have even landed him a documentary in which he has been titled the “Garbage Warrior (Franco , 2023).

Reynolds' ideals, which began as a rebellion against the energy crisis of the 1970s, are now as prominent as ever. The modern material economy is in crisis. Reynolds understood that to find a solution, one needs to use the problem to solve the solution—"the problem is the solution” (Lavranou , 2023).



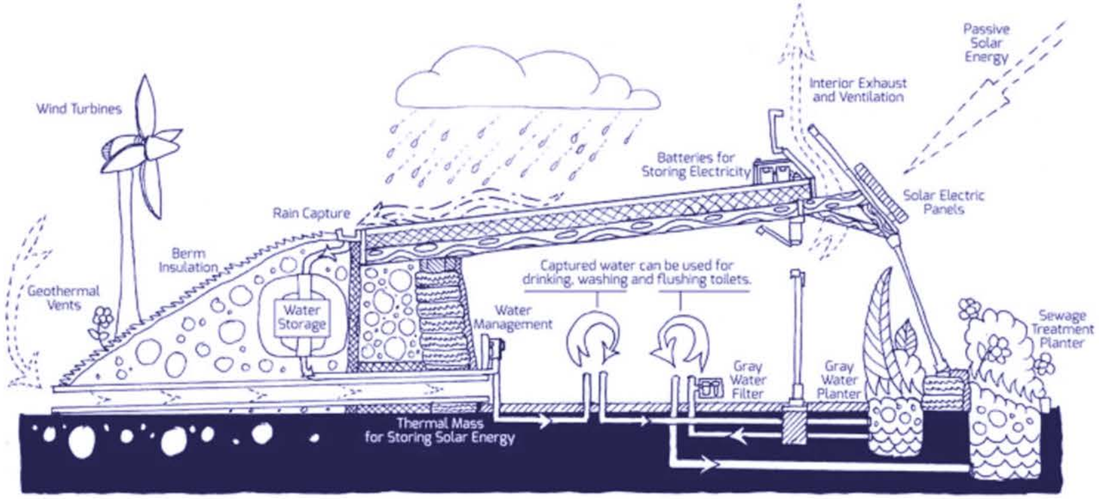


Figure 4.26

Earthship Basics Illustration

top right

Illustration by Earthship Biotecture , n.d

Figure 4.27

Earthship Section

right bottom

Illustration by Earthship Biotecture , n.d

> *if the first ecology was that of the oceans—the place of life's origin—and the second ecology was life on land, the third ecology began with the recognition that humanity now had the ability to alter the planet: that "the man-made and the natural are now inseparable.*

Reynolds , 2015



Figure 4.28

Earthship Biotecture Collage

right

Photography by Earthship Biotecture , n.d

turing agricultural waste into building materials

Agricultural waste mitigation is, at best, an informal proposition that farmers lack the means to address. However, in Reynolds's words, a problem is always the solution. Creating a plant to turn waste into energy in an area as sparsely populated as Ofcolaco is meaningless. Similarly, establishing a textile factory serves no purpose. However, a factory that produces materials requires investigation.

Between 1935 and 2022, there were 671 published articles on the study of agricultural waste used as building materials. However, the publication of the greatest number of articles occurred between 2015 and 2020, suggesting a peak in interest or perhaps a dire need.

From Lokkos' research alone, it is evident that the **"plant world has so much to offer the built world"** (Lokko, 2023). However, the research focusses on coconuts, a crop not traditionally grown in the region. The exploration needs to investigate the feasibility of transforming the waste from Ofcolacos crops into construction materials.



Particleboards / wallpanels

Particleboards are engineered wood panels formed by compressing woodchips, sawdust, or wood shavings bound with synthetic resin (Maraveas, 2020). Typically, people use these panels for cladding, panelling, and indoor partitioning. Because wood products require large amounts of renewable resources, the potential to replace them with medium-density particleboards is encouraging.

The process involves substituting wood fibres for agricultural waste fibres bound together with resin binders. Experimented examples made use of sugarcane, cotton stalks, or beet leaves. From the results, it was concluded that agro-waste particleboards adhere to construction standards, demonstrating excellent results in density, thickness, and tensile strength (Maraveas, 2020).

Figure 4.29
Detailed shot of an OSB board
left
Riaz , n.d

Cultivating Wall Panels from Corn Husk

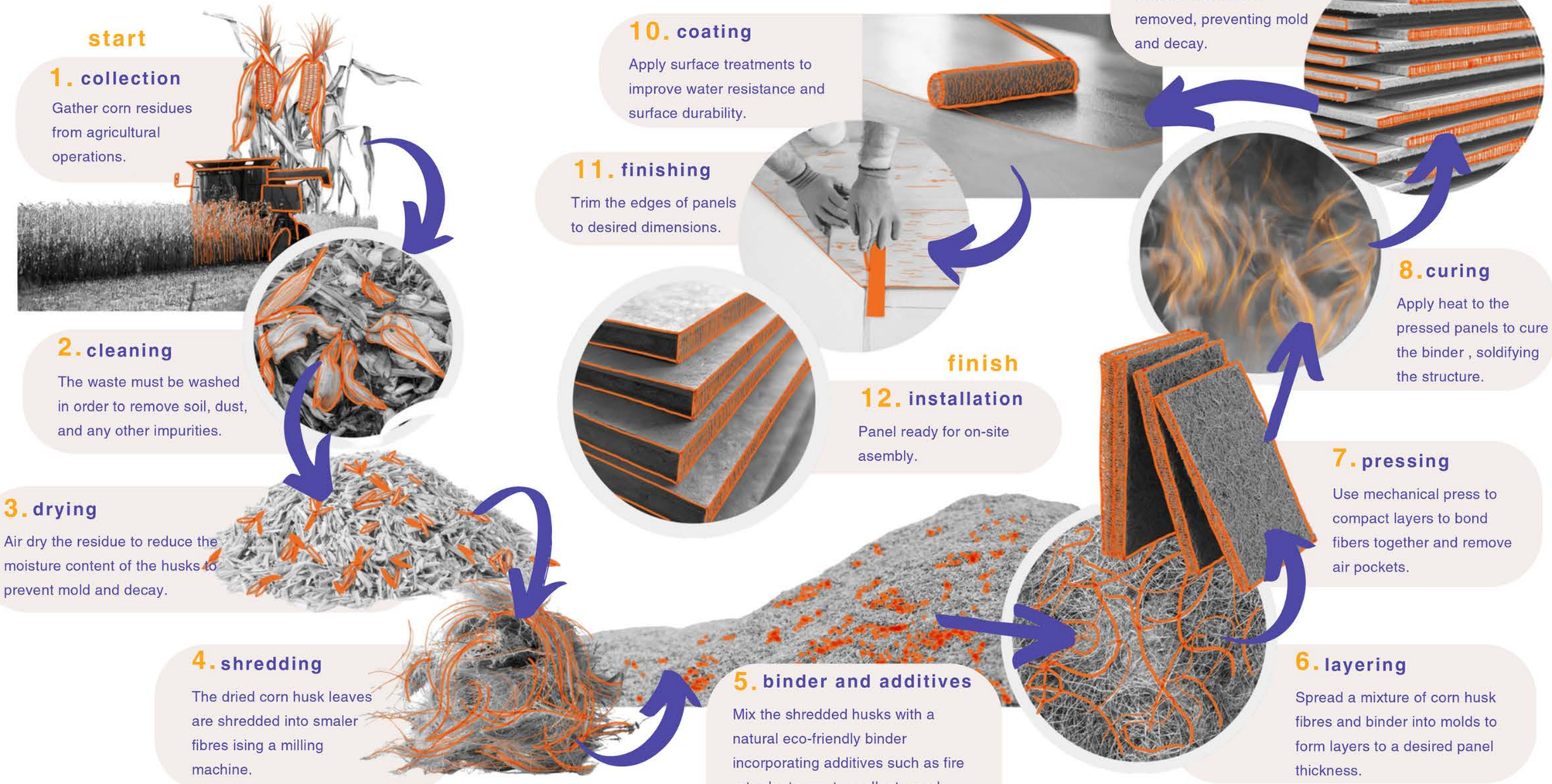
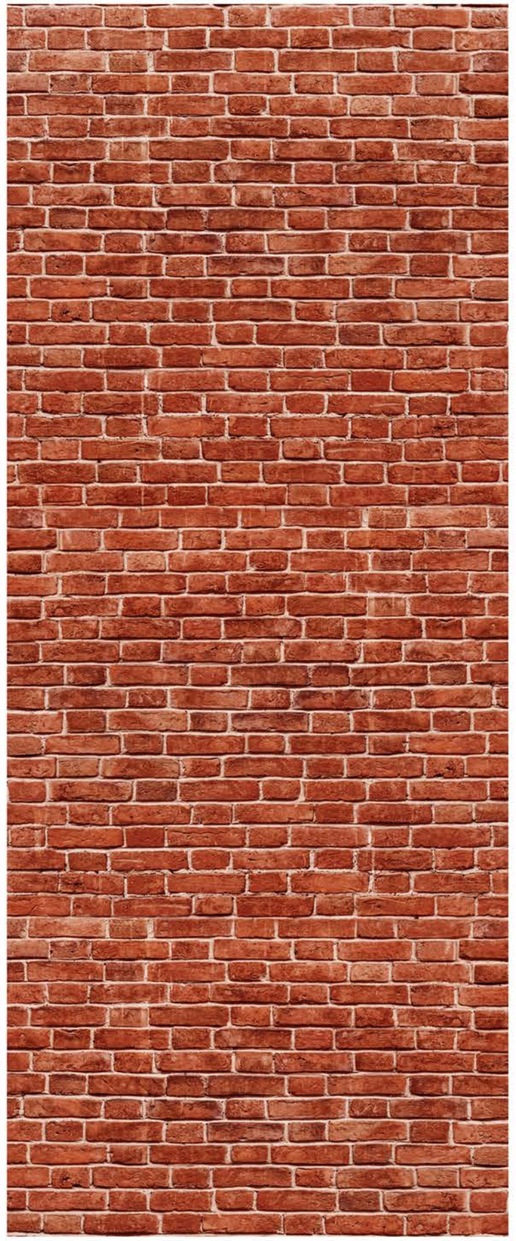


Figure 4.30

Cultivating Wall Panels from Corn Husk Graphic above

Author , 2024



Masonary

The brick is the most universal constrcution material. Traditionally, the brick-making process consists of three fundamental steps: mixing raw materials, brick moulding and drying, and lastly, firing. This process not only uses large quantities of non-renewable resources (clay and water) but also emits substantial amounts of greenhouse gases through their traditional brick kilns.

There are over a dozen experimental solutions to making bricks from agricultural waste (Maraveas, 2020). The experiments include the following agricultural wastes: rice husk, oat husk, barley husk, coconut fibre, etc.

The basis for brick making with agricultural waste is unanimous . The process involves shredding agro-residues into ash or husk, which then combines with clay. The use of agricultural residues in bricks enhances porosity, leading to improved thermal insulation, noise reduction, and reduced structural load in buildings.

Figure 4.31

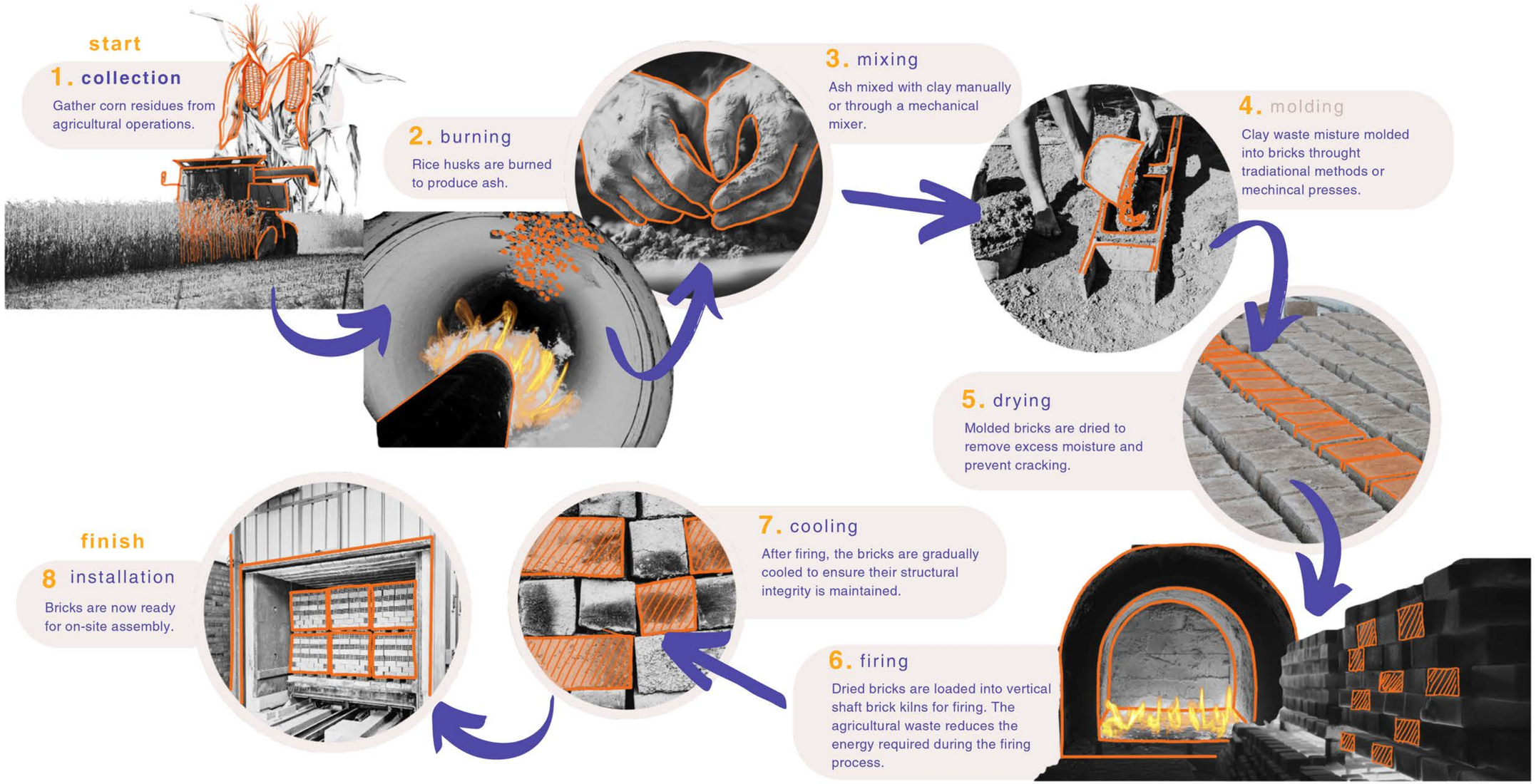
Detailed shot of a Masonary Wall

left

Riaz , n.d

Cultivating Masonary from Corn Husk

Figure 4.32
Cultivating Masonary from Corn Husk Graphic
below
Author , 2024



implementation of local crop residues

Creating building materials is only half the solution. If the built materials do not correspond to the needs of the region's environment, then the possibility becomes null and void. Focussing in on maize, the largest crop residue producer of the region, to determine the probability of success.

Plants' cell walls contain lignocellulosic material, which is abundant in maize (Cai et al. 2017). Materials that are high in lignocellulosic have become ideal candidates for designing new biobased materials (Fortunati, Kenny, and Torre 2019). This is due to their high mechanical strength, thermal stability, biodegradability, chemical resistance, and water absorption properties.

In the above-mentioned study of turning agricultural waste into clay bricks, oat and rice husks were experimented with. The term husk refers to the outer covering of various fruits. Therefore, substituting one husk for another with similar fibrous structures would produce a similar outcome.

In turn, producing particleboards from cornhusk would also produce a successful outcome. This is because the maize husk's lignocellulosic material properties are similar to those of wood fibres.

Therefore, the lignocellulosic traits of a natural material contribute to the success of biobased materials. Consequently, the production process can incorporate all residues possessing this property. Citrus, beans, tomatoes, and avocados grown in these regions also possess the lignocellulosic trait, making them suitable for the creation of biobased materials.

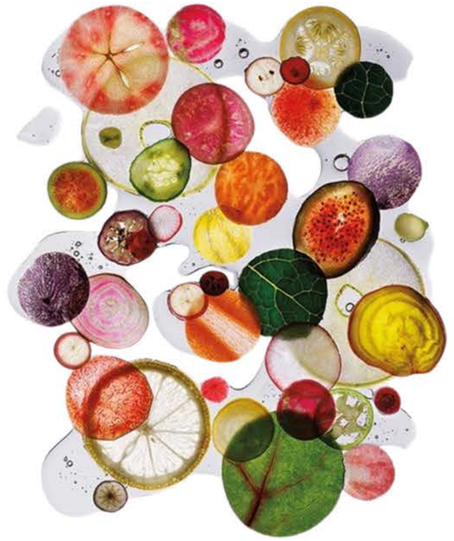


Figure 4.33
Kitchen Photography
left
Maren Caruso , n.d

precedent

The Biological House

> *It sounds like science fiction that you can build a house from things such as tomato stems, straw and seaweed, which is just as durable as normal buildings and at the time has a healthy economy and complies with the rules," says Danish Environmental Minister Kirsten Brosbøl. "However, the Biological House shows that it is possible here and now. I appreciate that way we really get some value from materials that otherwise would end up at an incineration plant.*

Nick Lavers , 2017



Location :

BIOTOPE Ecopark , Middelfart , Denmark

Architect :

By the multidisciplinary team involving more than 40 partners, including Copenhagen-Een TII Een, GXN, Kebony and the Danish Ministry of Environment.

Project year :

2017

Termed the 'Worlds First Biological House' (Lavers , 2017) , the architectural precendent portrays the real-life implementation of agricultural waste as the materiality palette.

The structure demonstrates the transformation of agricultural by-products, typically considered waste, into high-quality building components. The project uses Cradle to Cradle principles to emphasise circularity in materials, waste minimisation, and environmental sustainability.

The house integrates digital manufacturing and advanced material technologies to upcycle wheat straw, rice straw, hemp, and cellulose fibres into typical building materials. Digital fabrication methods combine these natural fibres to create a biocomposite material that replaces conventional playwood panels.

Figure 4.34
The Biological House
left
Kebony , n.d

Figure 4.35
Board for the Biological House
right
GXN , n.d





5 chapter farmer

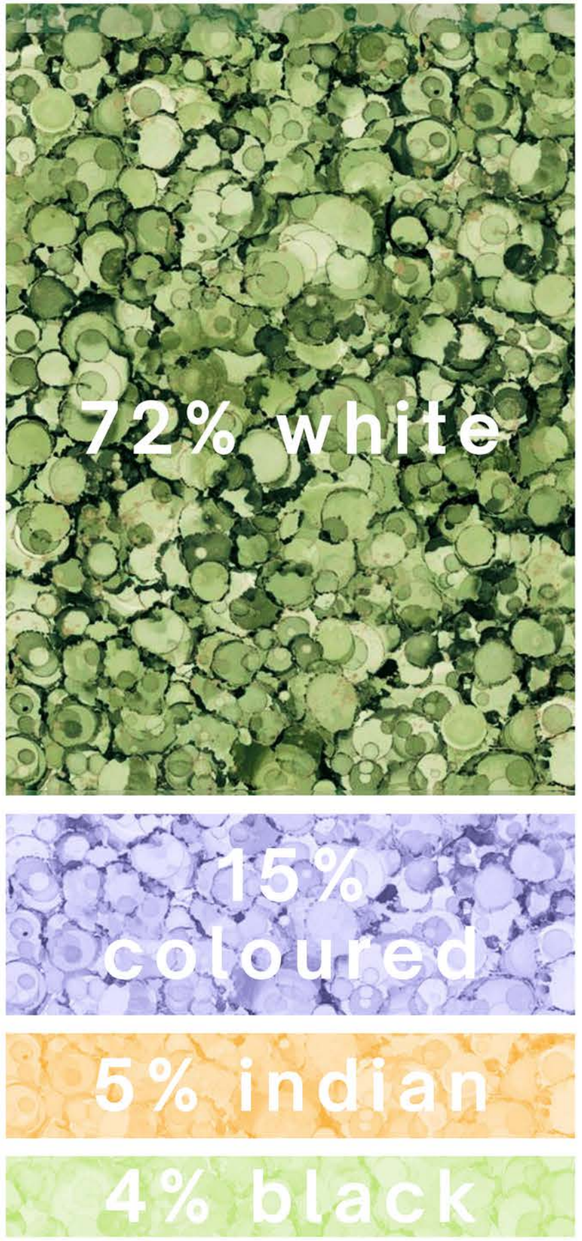


Figure 5.1

Farmer Chapter Cover

right

Author , 2024



farmers in a democratic country

It has been three decades since the dawn of democracy. Nevertheless, South Africa battles on with the phenomena of **'two agricultures'** (Kirsten and Sihlobo, 2021). This key feature of dualism sees two distinct agricultural production systems. These are the large-scale farming industry and the small-holder farming scheme.

The dual nature of these two systems has evolved as a result of the long historical segregation policies of apartheid. During this period white farmers were aided in setting up large-scale commercial farms on fertile land. Efforts to build an inclusive agricultural sector though the upliftment of black farmers by the new democratic government since 1994 have [mostly] failed (Vink, 2012). At present the white farmer predominately makes up the largescale farming sector still with the black farmer as the small-holder farming sector. This dual nature makes up the phenomena of "two agricultures".

According to the Land Audit Report of November 2017, the **white** population still maintains predominant ownership of agricultural holdings, with **72%** white ownership. The **Black African** population occupies only **4%** of all agricultural holdings, while **Coloured** persons account for **15%** and **Indians** for **5%** (Department of Rural Development and Land Reform, 2017). Therefore, the black population in agriculture holds the least amount of farm ownership even today, 30 years post-apartheid.

Figure 5.2
Agricultural Holding Ownership
far left
Author , 2024

Now this is the law of the land, son,
As old and as true as the hills,
And the farmer who keeps it may prosper,
But the farmer who breaks it, it kills.

Unlike the laws of man, son,
This law it never runs slack,
What you take from the soil
for your own, son,
You've damn well got to put back.

Now we of the old generation,
Took land on the cheap and made good,
We ploughed, we stocked
and we burnt, son,
We took whatever we could.

But erosion came creeping slowly,
Then hastened on with a rush,
Our rooigras went to glory,
And the steekgras we don't relish much.

The good old days are gone, son,
When those slopes were white
with lambs,
The good old days are gone, son,
When those slopes were white
with lambs,
The lands lie thin and starved, son,
And the silt has choked our dams.

I have paid for this farm and fenced it,
I have robbed it and now I unmask,
You've got to put it back, son,
And yours is the harder task.

Stock all your paddocks wisely,
Rotate them all that you can,
Block all the storm waters flowing,
And spread them out like a fan.

Tramp all your straw into compost,
And feed it back to the soil,
Contour your lands where they need it,
There is virtue in sweat and toil.

We don't really own the land, son,
We hold it and pass away,
The land belongs to the nation,
To the dawn of judgement day.

And the nation will hold you worthy,
And if you are straight and just,
You will see that to rob the land, son,
Is betraying a nation's trust.

Don't ask of your farm a fortune,
True worth ranks higher than gold,
To farm is a way of living,
Learn it before you grow old.

So this is the law of the land, son,
To take you've got to put back,
And you'll find that your
days were full, son,
When it's time to shoulder your pack.

a poem

Law of the Land

Oswin Ramsay

Through a father-son dialogue, the poem takes on a stance. This portrays the reflection on the mistakes of previous generations who exploited the land for personal gain and greed. The father, through his reflection, urges his son to be a better farmer than he and the men before him were. Rather than pursuing wealth, he seeks fulfillment in community and stewardship. The father explains to his son that farmers are custodians of the land, entrusted with its care for the nation's well-being and future generations.

In the context of South African agriculture, the issue of land ownership resonates deeply with the country's historical and ongoing challenges. Farmers continue to grapple with the aftermath of historical injustices.

The poem's message about the importance of sustainable farming speaks directly to the need for a new generation of farmers to adopt a more regenerative approach and responsibility for land stewardship. The concept of balancing what is taken from the land with what is returned aligns with agricultural efforts to promote ecological restoration and rural development.

The poem emphasises farming as a moral duty to the nation, mirroring the broader concept around land reform in South Africa. Land is seen not just as an economic asset but as a key to healing social and environmental wounds.

Land and identity:

The complex dynamics of black and white farmers in South Africa

There rages a contrasting fight between the black and white farmer in South Africa. A complex struggle over land and identity reveals deep tensions between the two farming communities. This tension is not only a reflection of economic disparities but rather deeply intertwined with historical injustices and social inequalities.

The white farmer represents a group deeply entangled with the country's agricultural history. These farmers are often descendants of European settlers, holding a legacy that traces back to colonial times. However, this legacy is closely dishevelled with South Africa's history of dispossession and inequality. To the white farmer their generational family farm marks a tradition of legacy (Smith, 2019). However, to the black-disposed community it is a symbol of stolen land.

The black farmer occupies a unique and challenging position within the agricultural landscape. Through history marginalization and disposition the black farmers strive to reclaim their place in an industry long dominated by the **'boer'** (Dutch: farmer).

To the black farmer it is not just an economic opportunity but an opportunity to rectify historical injustices. It is a pathway to restoring dignity and reclaiming their rightful place. The land holds spiritual and cultural significance, serving as a link to their ancestors and a symbol of resilience in the face of adversity (Smith, 2019).

Both the black and white farmer hold deep roots in the land. It is difficult to foster a mutual understanding between both sides leaving divides. Bridging this gap requires more than policy changes and land transfers: it demands a shift in understanding and valuing the lands significance to both communities.

The black and white farmer could share a future where the land is not a battleground but a space of collaborative pride and prosperity.



Figure 5.3
It takes Two to Forget Collage
right
Sarah Paulsen , 2017

interviewing farmers of Ofcolaco

Foreword

The farmers' Sam and Frank are bordering neighbours. They do not always see eye to eye, but I do not believe upon interviewing them this is through a racial divide. These farmers are stubborn in their ways, and they are even more steadfast in their claim to their land. Over the 26 years of being neighbours, these farmers have found a sense of middle ground in learning to work together for the success of both of their farms in the realisation that the degradation of one farm will ultimately lead to the degradation of the neighbours.



Figure 5.4

Farmer Sam and Farmer Frank Collage

above

Author , 2024

An interview with Sam

From the local village of Balloon came farmer Sam from humble beginnings, starting his career as a security guard in Nelspruit. Sam, along with a few members of the local tribe of Balloon, acquired land in Ofcolaco through land reformation in 1998. The land was no reaping reward for the aspiring farmers being entrenched in famine upon the change in ownership.

After several years of disappointing yields, the farm became unprofitable. Internal conflict within the group of farmers left the farm worse off than when the tribe initially received it. At this juncture, Sam rose to the occasion; he perceived the potential of the farm, and in the face of all other tribe members' defeat, he perceived hope and opportunity.

Sam's individual ownership of the farm led to the formation of a newfound friendship with my aunt, Jude. As I sat with them, recounting their tales of farm life together, leaning on one another in a community that had ostracized them, a pure friendship bloomed. My aunt, having spent years farming with my grandfather, taught Sam the generational knowledge she had acquired to enable him to succeed. My aunt might have been the friend

Sam needed to learn the ways of the land, but Sam was a friend who gave my aunt a new purpose in life. Their trust in one another ensured both of their lives' success.

Today, Sam farms for large corporate conglomerates such as SPAR and Woolworths to meet their high demands. Sam's ability to supply these large retailers demonstrates the high quality of crops he has been able to produce on his farm. Sam is a truly successful example of the Land Reformation Policy of South Africa.

When I asked Sam about his family and who stays with him on the farm, I was surprised to learn that not even he had truly made the farm his home. His family still resides in the village of Balloon, where his children attend school and live. Sam, too, still lives in Balloon; his primary home is in the village, and the farmhouse on site is not considered his home. Even his brother, who lives and works in Johannesburg, still maintains a house in the village and will return upon retirement.

Figure 5.5

Farmer Sam Collage

right

Author , 2024



An interview with Frank

Farmer Frank is a second-generation farmer in Ofcolaco. Taking over from his father, Frank has cultivated the lands since his mid-twenties. Often in more recent (two to three generational farms), white farmers send their children to obtain a degree before coming back to eventually take over the farm. This was the case for Frank too.

The farm was owned by the family for 44 years before being subjected to land claim policies in 2003. However, the Franks family maintained the right to run the farm, renting the land from the government through a 30-year lease.

In my interview, Frank goes on to reflect on the social and economic changes he has witnessed over his years in the region. Frank also contemplates his encounter with farmer Sam, revealing that years of obstacles and miscommunications paved the path to their amicable bond.

When I was asked about the biggest challenge he has faced as a farmer, I initially assumed it would be the hardships he has faced in maintaining his right to farm the land. However, I now know that a farmer's biggest hardship will always be the environment that rules over him.

On his farm, Frank farms butternut, maize, and beans, making use of technological advancements to aid his endeavour. Tractors and centre pivots are employed to landscape his surroundings. Sam's 20-year-old bakkie stands in stark contrast.

Like most typical white farmers, he and his family live on a property fenced off with high security measures, portraying the harsh realities.

As our interview came to a close, it became clear that Frank's story is the portrayal of the broader complexities of the white farmer. His journey from inheriting his family farm to navigating land claims and cultivating relationships with black farmers reflects a delicate balance of history, tradition, and progress. It is, and will always be, the environment that remains the ultimate test for the farmer. The unpredictable forces of nature continue to shape his path, just as they did for the generations before him, anchoring his life in the soil.



Figure 5.6

Farmer Frank Collage

right

Author , 2024

farm transportation

It is no secret that a farmer loves his **‘bakkie’** , it is said that the “most enduring love story in the history of the South African agricultural industry is the loyal, undying love affair between the farmer and their bakkie” (AGRIFOODSA, 2018).

South African cultures and traditions have ingrained bakkies so deeply that the agricultural work environment and leisure activities are now synonymous with farmers and their faithful horses. The term "bakkie" is so deeply ingrained in the South African psyche that I felt inclined to conduct a Google search to determine the more formal and accurate term for this vehicle.

For matters of formality the correct term according to, Oxford Dictionaries, for a ‘bakkie' is “light truck or pickup truck” (Mirte, 2016). These light trucks transport crops and waste from each farm on a daily basis using a trailer on the back.

Farmers have been using their pickup trucks and trailers to transport farm workers to and from the townships for many generations. Although this is not a legal requirement for farmers, the remote geographical location of agricultural hubs means that the townships where the workers reside are situated at vast distances away. Due to these great distances, the agricultural industry often lacks reliable public transport, leaving farm workers to rely on the good intentions of their farmers to get them to their workplace.

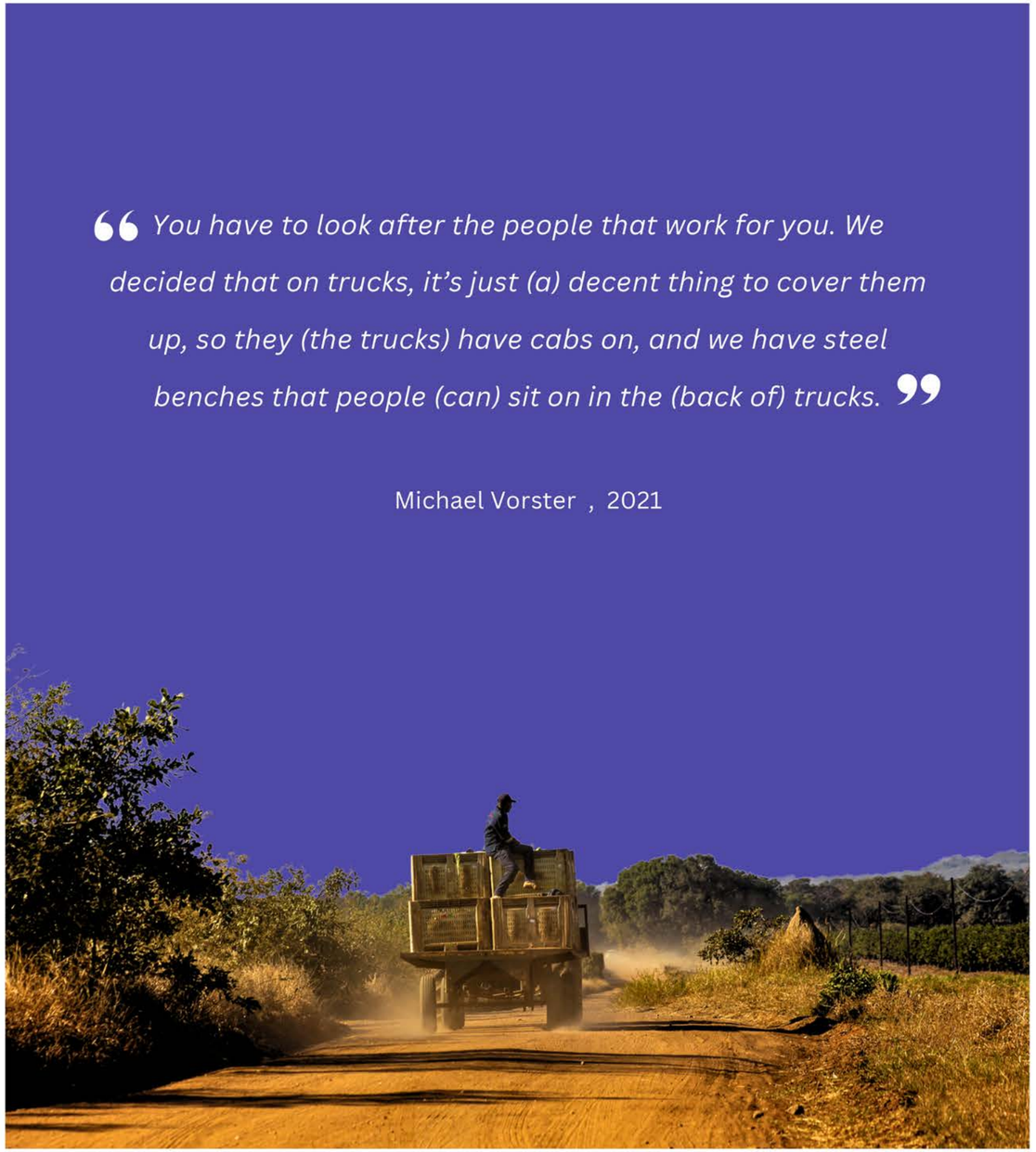
However, in recent years, this issue has become a source of controversy in its own right. In January 2021 alone, trucks transporting farmworkers to work in the Western Cape inflicted injuries on over 130 of them. This prompted the Department of Agriculture to legalize what constitutes a vehicle to be able to carry such workers. In an attempt to prevent farm workers from being injured by these pickup trucks and trailer vehicles, the Department of Agriculture has inadvertently created an additional challenge for farm workers.

Unless a farmworker has a bus, which would have to be a school bus in order to fit the large number of farmworkers, a farm worker is not able to facilitate his farmworkers in getting to and from work.





Figure 5.7
Tractor and Trailor Illustration
above
Author , 2024



The writer, Noluthando Ngcakani, titled his piece for the digital site Food for Mzansi, "Transportation: Your Farmworkers Aren't Cattle". The title, "Transportation: Your Farmworkers Aren't Cattle," asserts that people shouldn't ride in trailers designed for animals, as humans are not considered animals (Ngcakani, 2021). Ngcakani raises valid points, but then quotes a farmer, Michael Vorster, who asserts that “workers cannot stop using trucks because they would not be able to get to work otherwise” (Ngcakani, 2021). What does one do?

If a farmer fails to pick up his workers, he puts his farm at risk of losing labour, and if he does, he jeopardizes their lives.

If a farmer fails to pick up his workers, he puts his farm at risk of losing labour, and if he does, he jeopardizes their lives. In the case of the workers, they now have to arrange their own transportation, a task that can be challenging and highly unreliable in remote areas. They also don't want to risk their lives simply to reach the farm. However, in such a rural context, there is no work available, making this their only opportunity. Where does the solution lie? In every case, someone loses and puts their life at risk.

Unfortunately, this problem has not been resolved in Ofcolaco, and farmers and farmworkers continue to rely on the "bakkie and trailer" methods of transportation.
Although the pickup truck and trailer are used to transport crops, the tractor and trailer are more often used on the farm with larger closed trucks for processed crop transportation.

Figure 5.8
Worker on Tractor Photograph
left
Author , 2024

6 chapter farm worker



Figure 6.1

Farm Worker Chapter Cover

right

Author , 2024

employment and education

Employment



In an area marked by the Maruleng Municipality in the Spatial Framework Review of 2023 (MUNICIPAL SPATIAL DEVELOPMENT FRAMEWORK, 2019-2024) as a **"rural poverty area,"** unemployment is as high as ever. Agriculture is the municipality's main employment attribute, providing 30% of all employment in the areas, with over 600 households relying on agricultural-related activities for income.

In a municipality with just under 52,000 people, the unemployment rate has increased by 20% in the last 20 years. The municipality highlights that most unemployed persons are situated in these **"rural poverty areas,"** with the major contributor in agricultural employment decline from 2016 to 2021 being related to **"growing challenges and climate change"** (MUNICIPAL SPATIAL DEVELOPMENT FRAMEWORK, 2019-2024). The specific nature of these **'growing challenges'** remains unclear.

However, if we consider how six main villages feed into the closest agricultural hub of the greater Ofcolaco corridor, which is a considerably smaller farming corridor, it is understandable that these farms cannot account for all employment in the region.

The region has experienced a 20% decline in agricultural fixed employment. This decline can be attributed to two factors: firstly, a shift away from regular, permanent workers and an increase in the use of casual workers (Simbi and Aliber, n.d.), which has left residents with little security and consistency in their income. Secondly, the substitution of manual labour for machines.

Figure 6.2
Trader
far left
Lisette Forsyth, 2024

In a municipality with an already grave state of unemployment, then the already **“grave problem of rural employment will become graver still”** (Simbi and Aliber, n.d.). Though agricultural employment has decreased, the active population in these agricultural corridors has not, which implies that people remain in rural areas even after losing their jobs.

A new avenue in the agricultural sector can alleviate the plight of unemployment in these rural contexts by framing corridors with limited job opportunities, which are capped at the stable number of farm workers employed by farmers.

The agricultural-processing hub seeks to bridge this gap. It addresses the issue of unskilled rural unemployment by creating jobs that require a new skill. It is not always about teaching a person how to be a doctor (unless that is what a person desires)**, but rather, by teaching a person in this context, a new skill that does not exist can revolutionize their lives. A job is a job, but a job learning a new skill in a new agricultural economy holds the power to change lives.**



Figure 6.2
Pedestrians in Ofcolaco Photograph
right
Author , 2024

Education

Despite the high unemployment rate, it's crucial to acknowledge the quality of the educational facilities in the area. As Nelson Mandela famously said, **"Education is the most powerful weapon that you can use to change the world."** Education in these villages could be the key to alleviating poverty. The Maruleng Municipality Review highlights the presence of 39 primary schools and 22 secondary schools in the region (MUNICIPAL SPATIAL DEVELOPMENT FRAMEWORK, 2019-2024). According to the six rural villages in the area of study, there are five primary schools and seven secondary schools; however, there are no tertiary or higher education institutions.

At this point, the majority of scholars find themselves employed in low-skilled agricultural activities. This presents a wonderful opportunity to explore upskilled educational development. This is not to be confused with formal education at a dedicated institution. Rather, it stands as a space for learning a trade (plumbing, electrician, etc.). I do not mean literally a place to learn a trade; there are institutions and colleges set up for that profession. Rather, the trade is referred to as the upskilled development opportunity that serves to develop knowledge in a region where it is inaccessible.

Establishing a tertiary education facility in a remote area like Ofcolaco is a recipe for failure. It is not about providing education for the next generation to diminish their plight. It is about alleviating the plight of today's people, who have endured hardships for generations. The space should facilitate the exchange of knowledge and skills with people who are unable to obtain them themselves. It is a space for sharing information, and that in itself is educational.

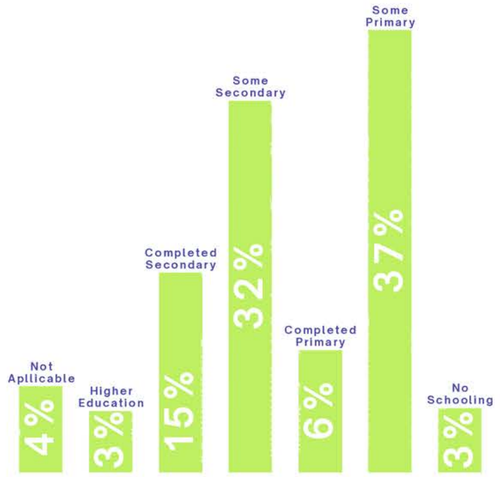




Figure 6.3
Social And Personal Intimacy
left
Liseete Forsyth , n.d

Figure 6.3
Education Levels in the Maruleng Region
far left
Statistics by Maruleng District
edited graphically by Author , 2024

the townships

In South Africa, the term **‘township’** is the name specifically used to refer to the “urban ghetto reserved as places for all black people during the apartheid regime" ("Townsh-ESAT,” n.d.). Despite their prominence during the apartheid regime, the concept of townships dates back to the early colonization of South Africa, when these systems were already in place.

The systematic township system regulated groups of people who were not white to underdeveloped, racially segregated areas on the peripheries of towns and cities. These designated areas were deliberately underfunded and overcrowded by the apartheid government to maintain control of the residents residing within them. Despite the end of Apartheid and the removal of racially segregated areas, townships persist 30 years later.

Today, townships predominately exist on the periphery of economic hubs categorized as “underdeveloped urban neighbourhoods (Moghayedi et al. 2023). More than 90% of the residents in the Maruleng District of Limpopo live in 33 rural villages positioned along the municipality's north-western quadrant. The Rural Development Task Team of South Africa has defined ‘rural areas’ as **“sparsely populated, in which people farm or depend on natural resources, including villages and small towns dispersed throughout these areas. In addition, they include large settlements in the former homelands, created by apartheid removals, which depend for their survival on migratory labour and remittances”** (HOW IS AN AREA VERIFIED AS RURAL?” n.d.).

Between the Drakensberg mountains on the west and Ofcolaco on the east is the corridor of rural villages extending north to the main town of Tzaneen and south to the game reserve hub of Hoedspruit. There are 6 main villages that serve the Ofcolaco agricultural employment sector. These are **Calais, Balloon, Bordeaux, Loraine, Ga-Sekororo, and Julesburg,** which are all run by the traditional authority of Banareng Ba Ga-Sekororo.



Figure 6.5
Township Designation
right
Author , 2024

These rural villages are predominately owned by the state; a large percentage of the land is held under leasehold titles and Permissions to Occupy (PTO) with most land under the custodianship of traditional authorities within tribal jurisdictions. Despite being classified as 'rural villages,' these townships do not conform to the norms that we, as city dwellers, typically associate with them.

As city dwellers, we perceive townships as densely populated corrugated iron houses that provide limited or non-existent basic services to their residents. However, the infrastructure of these rural villagers differs significantly from the city's informal settlements.The typical home is a simple brick structure with a clay tiled roof on a single dwelling, with the brick of choice being the cement stock brick due to its low cost.

These homes are widespread due to the vast amount of space in these rural areas, with almost all residents having access to waste removal services and just under half the households having access to electricity. It is the lack of access to water supply that is the most notable concern rated as the number one priority by Maruleng District residents, especially in a climate as hot as this. The rural villages depend almost entirely on boreholes with poor quality water supply (MUNICIPAL SPATIAL DEVELOPMENT FRAMEWORK, 2019-2024).

The concept of rural villages is considerably different from that of city townships; nonetheless, rural villages are confronted with their own distinct challenges that are inextricably linked to the "countryside" way of life.

Figure 6.6

Township Photography of Region

below

Author , 2024











Is this a housing crisis?

Rural villages are where the majority of the region's farm workers live. Though explained on the previous page , the housing itself is not the forefront issue. Instead, the main challenge lies in the significant distances between the townships and the farms (as mentioned in Chapter 5: Farmer - Farm Transportation). This daily commute adds strain to the lives of farmworkers.

The village is their home; to relocate farmworkers to be closer to the farms feels selfish. Instead, a temporary residential solution closer to the farms could provide workers with a workweek housing option.

It is critical to differentiate the proposed housing scheme from a hostel. In South Africa, the term hostel refers to a historical concept of places designed **"to enforce total control"** (Miller, n.d.). During the apartheid regime, the original purpose of hostels was to house black labourers in the diamond and gold mines.

These units were built as cheaply as possible to ensure the bare minimum standards were met. Spaces for socialisation and social upliftment were null and void. This scheme must abolish the dehumanisation of hostel structures.

The temporary residence for workers must foster a sense of community in a supportive environment. This, in turn, could improve aspects of farmwork and simultaneously enhance a harmony between the farm and the worker.

Figure 6.6

Hostels in South Africa Photographic Collage

left

Johnny Miller , n.d

case study 1

Monterrey Housing



Location :

Santa Catarina , Mexico

Architect :

ELEMENTAL

Project year :

2010

ocated in Monterrey, Mexico, the project addresses the need for affordable housing while respecting the local context and environment. The design approach emphasizes flexibility and efficiency, using modular elements that adapt to various needs and contexts. The use of local materials and passive design strategies helps create comfortable, energy-efficient living spaces. The project stands out for its integration with the landscape and its commitment to enhancing community living through thoughtful, context-sensitive architecture.

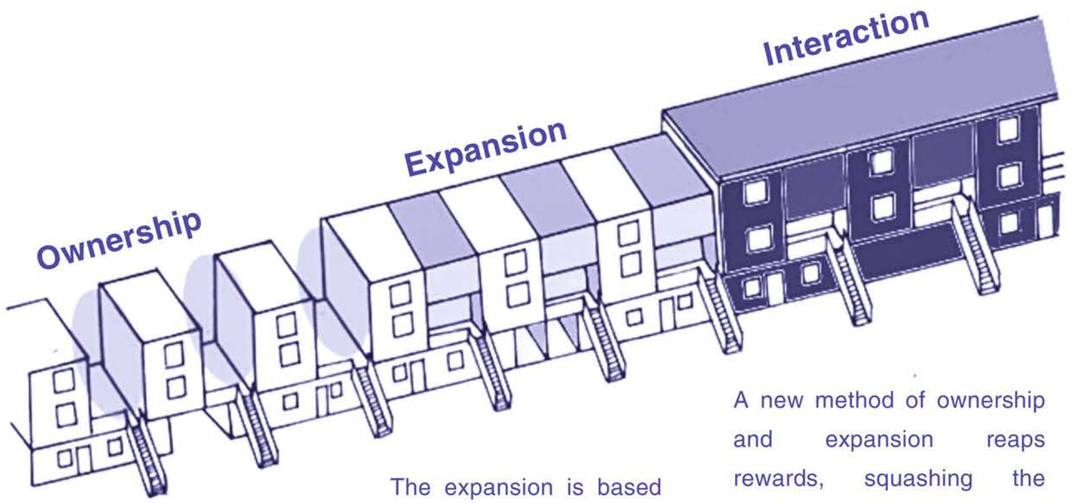
By adapting modular and context-sensitive approach from Monterrey Housing to my project of creating building materials from agricultural waste, I can enhance both flexibility and sustainability in residential design. Using locally sourced agricultural byproducts allows me to reduce environmental impact while creating materials that seamlessly integrate with their surroundings, reflecting local agricultural practices. This approach fosters energy efficiency and community pride, aligning with my goals of adaptable, sustainable architecture and supporting a circular economy, all while connecting new structures with their cultural and environmental context.

Figure 6.7

Monterrey Housing Illustration

left

Author , 2024



Instead of a small house, the construction of half of a well-designed structure provides a foundation for future expansion and self-construction.

The expansion is based on the unique owner's needs and economic capabilities. The housing design allows for the extension of each unit, with the design and time period entirely dependent on the owner.

A new method of ownership and expansion reaps rewards, squashing the popular small residential and densely packed building design approach to low-income housing. By creating a mixed housing site with great architecture and interesting form, diverse needs are met that and boost the community.

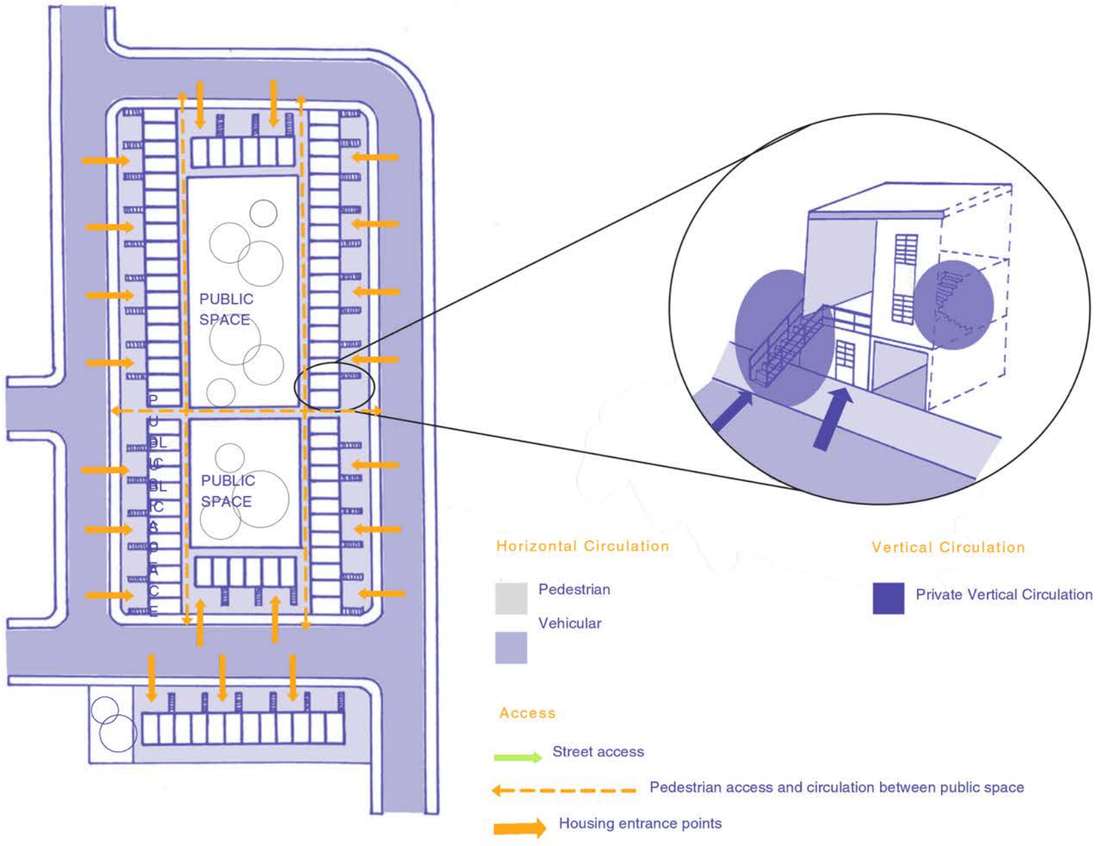


Figure 6.8
Monterrey Housing Typology
left
Kebony , n.d

Figure 6.9
Monterry Housing Access
right
GXN , n.d

case study 2

Las Pajareras Lodges

Location :

Papallacta , Ecuador

Architect :

Ignacio Muñoz, Javier Mera Luna

Project year :

2024

The combination of vaulted roofs and water management systems in Las Pajareras Lodges exemplifies how architecture can respond to environmental conditions while maintaining a deep connection to the landscape. The vaulted roofs offer structural efficiency and thermal comfort, while the integration of water features underscores a commitment to sustainability and harmony with nature. This design approach not only addresses practical needs but also enriches the experience of the lodges, making them a model of environmentally responsive architecture

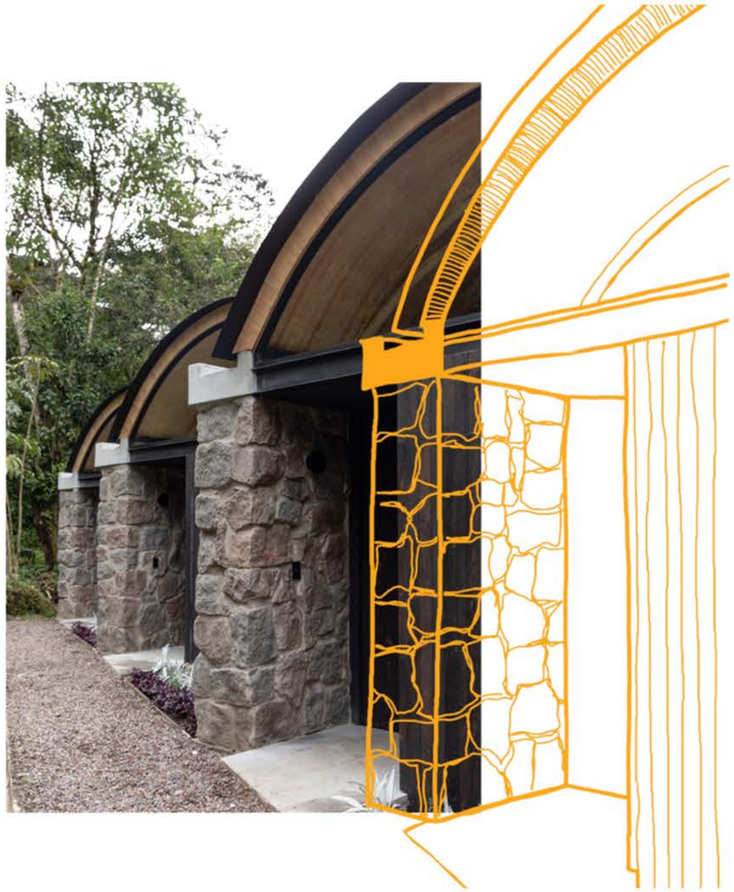


Figure 6.10

Entrance to Lodge

right

Photography by JAG STudio , 2024



Figure 6.11

Landscape of Las Pajareras Lodge

far right

Photography by JAG STudio , 2024

The vaulted roofs of Las Pajareras Lodges are designed with a parabolic or catenary shape that not only provides a visually striking form but also enhances structural efficiency. These roofs distribute loads evenly, reduce material usage, and offer natural ventilation and cooling, making them well-suited to the warm climate of the lodges. Constructed with locally sourced materials, the vaults integrate seamlessly with the surrounding landscape while contributing to the building's overall thermal performance.

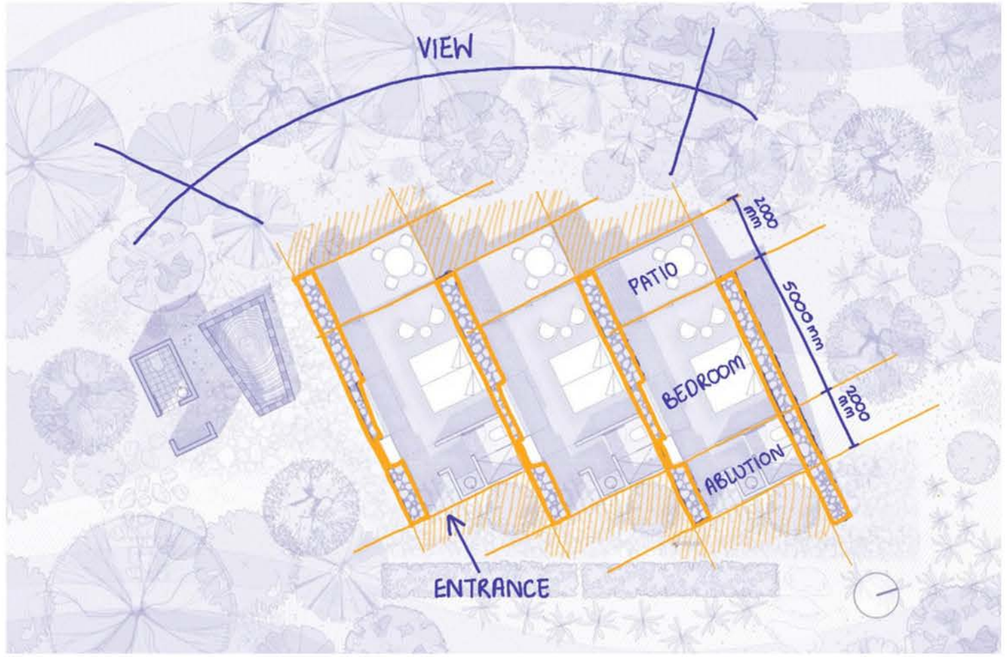


Figure 6.12

Las Pajareras Lodge Floor Plan

top

Photography by JAG Studio - edited by author , 2024

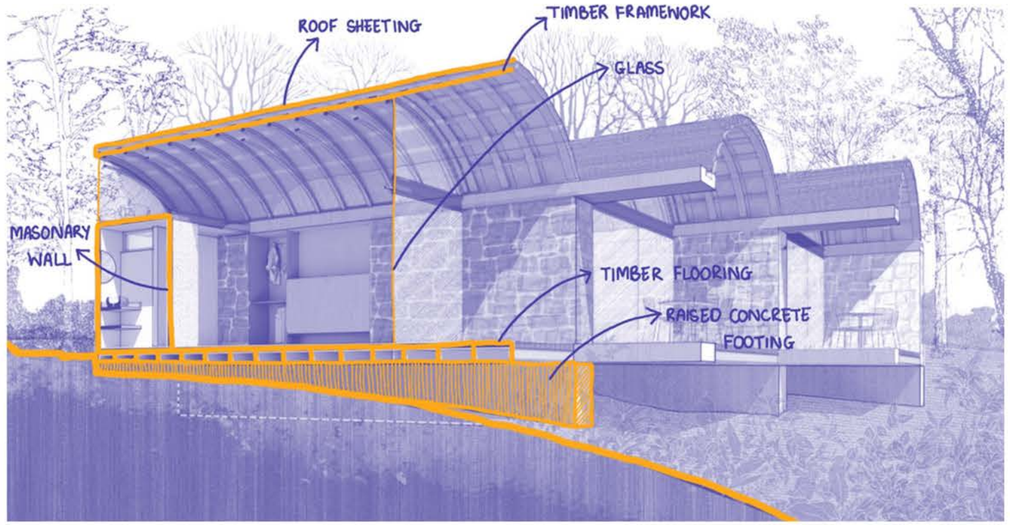


Figure 6.13

Las Pajareras Lodge Section

bottom

Photography by JAG Studio - edited by author , 2024



The water integration at the lodges is designed to efficiently capture and utilize rainwater through strategically placed channels and gutters in the vaulted roofs. This system directs harvested rainwater to storage, providing a sustainable water source for the lodges. Aesthetic water features, such as decorative channels and ponds, are incorporated into the design, enhancing the visual appeal while contributing to the local ecosystem and ensuring resource conservation.

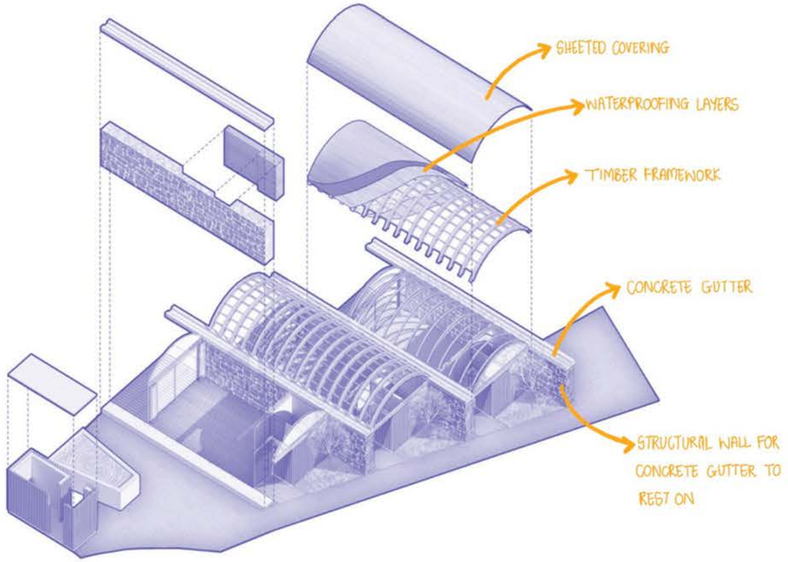


Figure 6.14

Las Pajareras Lodge Water Movement Diagram

top

Diagram by Ignacio Muñoz and Javier Mera Luna , 2024

Figure 6.15

Las Pajareras Lodge Axonometric

bottom

Diagram by Ignacio Muñoz and Javier Mera Luna , 2024

interviews with Ofcolacos farmworkers

Foreword

The aim of interviewing the farm workers in the region was important in hearing the voices of all aspects that make up the farming community. With the farm workers making up the backbone of the community.

It was important to understand the farm workers' realities they face from their daily commute and job opportunities to the intergenerational family connections and challenges in professional growth. These insights were vital to comprehend a picture of the agricultural landscape and the socioeconomic factors that influence the lives of those who cultivate the land.

The interviews with the farm workers portrayed a significant language barrier. I enlisted the help of my aunt, who was able to translate the region's Native language of Sotho.



Figure 6.16
Farm worker Chapter Cover bottom
Author , 2024



Figure 6.17

Farm Worker Photography

below

Author , 2024

A Farm Workers Life

The life of a farm worker in Ofcolaco reveals a complex blend of tradition, economic necessity, and resilience. Many of these workers are generational employees, reflecting a long-standing connection to agricultural labour that spans several years, from 1 to 10 years in many cases.

For most farm workers , working on a farm is a familial tradition rather than a new endeavour. Job opportunities within the community are predominantly cantered around farm labour roles, such as farm worker, pack house worker, and farm picker.

Many workers reside in nearby areas like Balloon or Ga-Sekororo and face the daily challenge of commuting to their workplaces via truck and trailer. A significant aspect of their lives is their role as primary income earners for their households, with many also attending secondary schools in the township.

This dual responsibility underscores their crucial contribution to both their families and the broader agricultural sector, highlighting their perseverance amidst economic and social challenges

chapter

7 design development

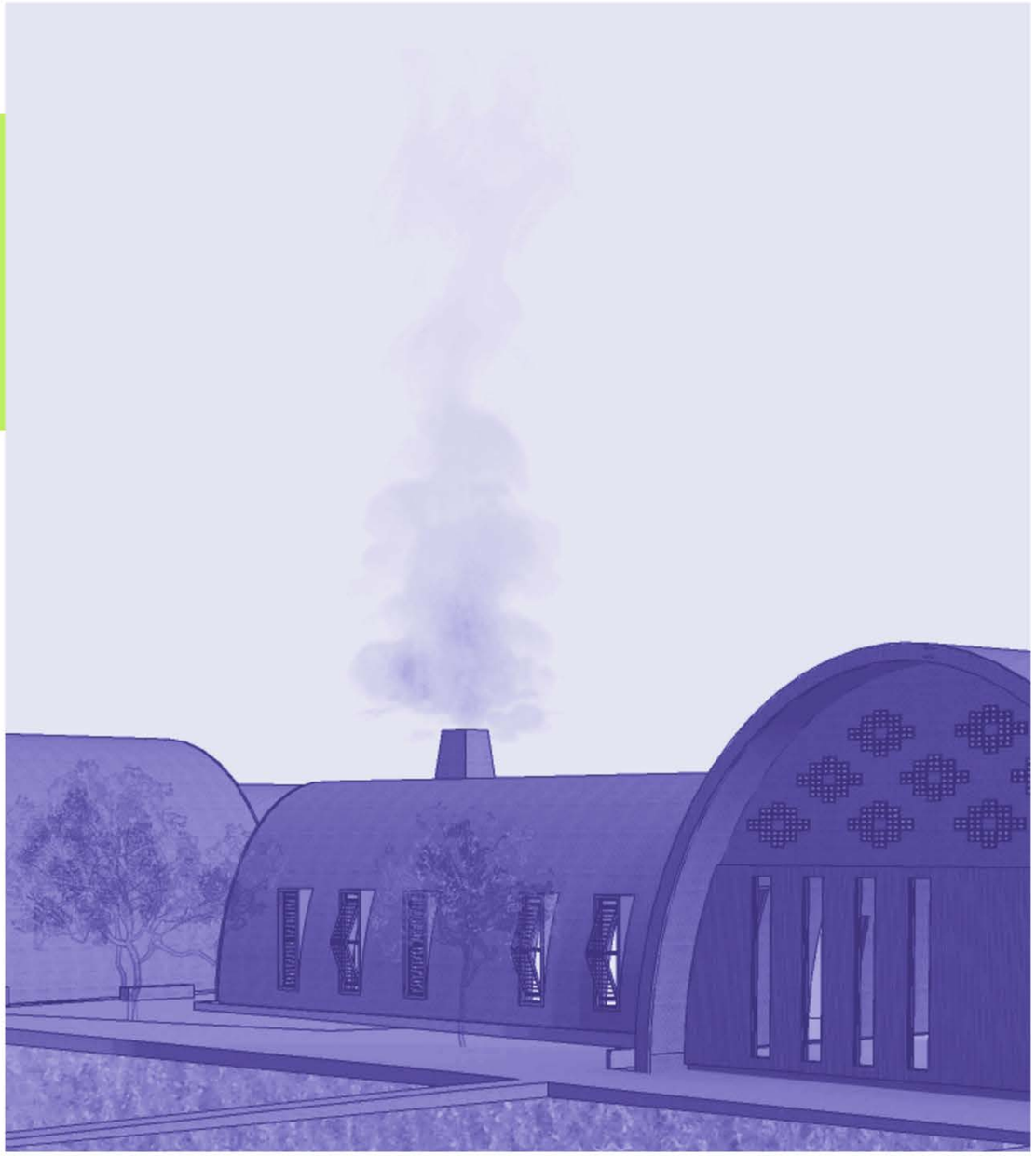


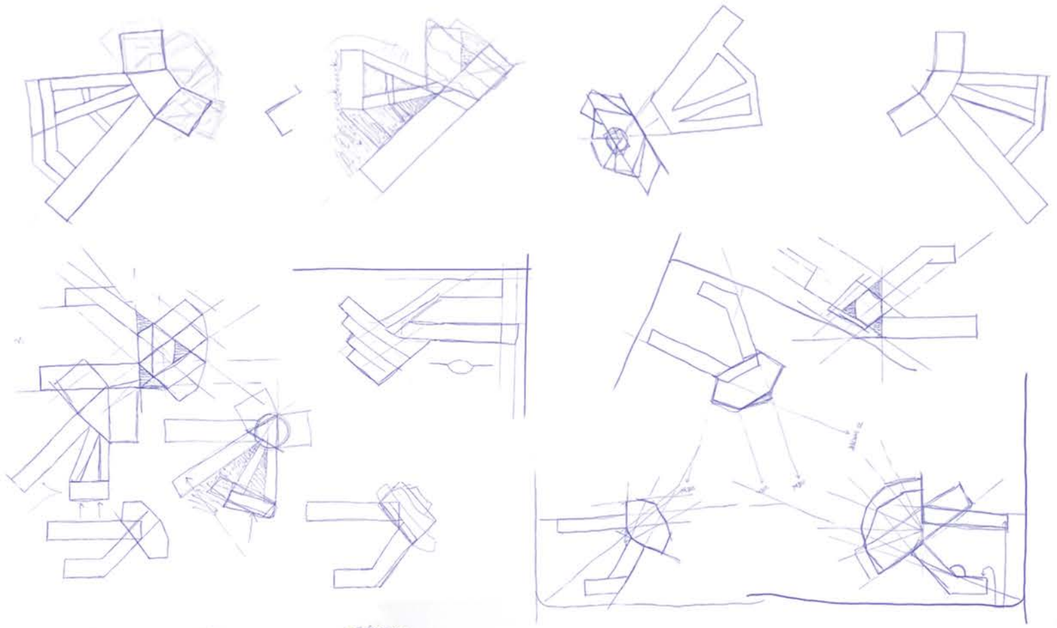
Figure 7.1

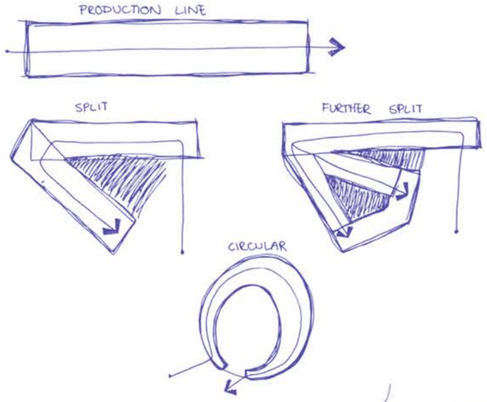
Design Development Chapter Cover

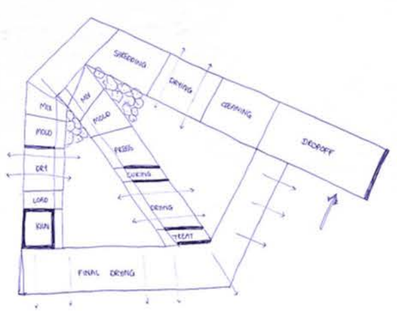
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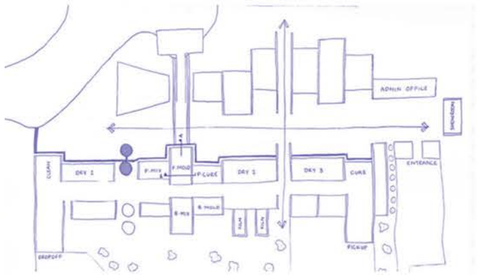
Author , 2024

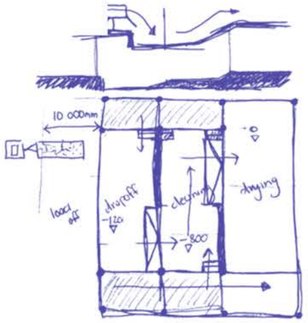
spatial exploration sketches

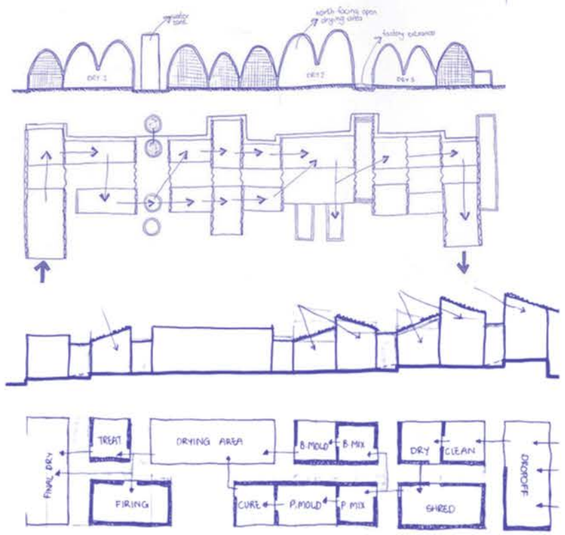


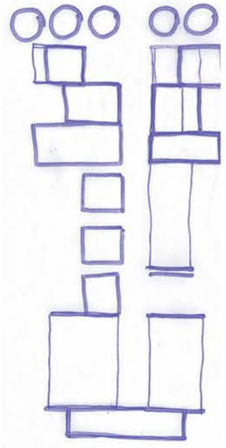


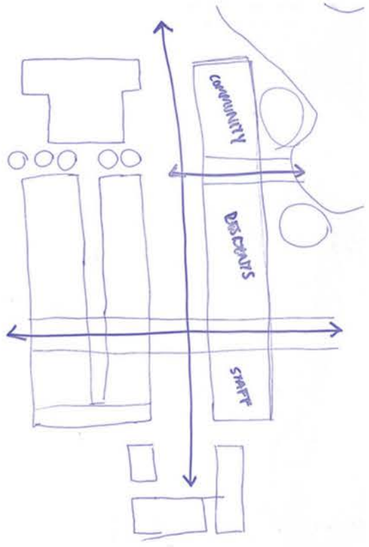




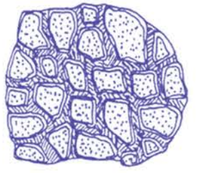












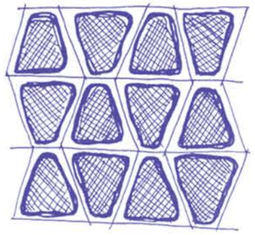


Figure 7.2
Exploration Sketches
whole page
Author , 2024

charette

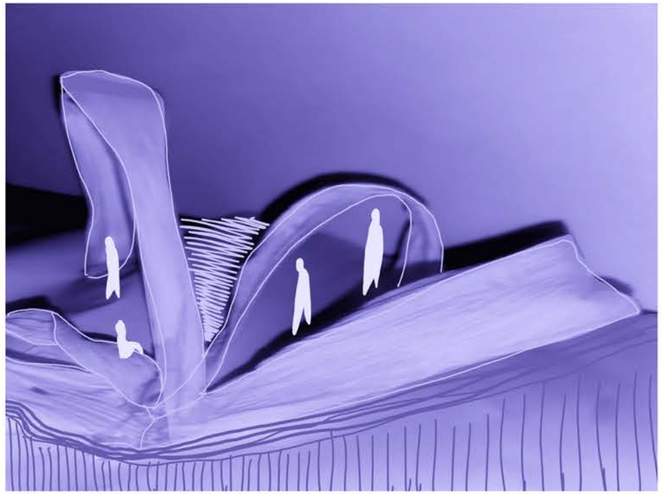
form exploration







The process of Exploration materializes through a charette ritual. Firstly, a Tower of Clay is fashioned using clay, agricultural remnants, and traces of sustenance, culminating in a spire sculpted from discarded elements. Subsequently, dried corn husks are intricately interwoven to create empty spaces. These voids, influenced by a mystical hand, give rise to intricate constructions and curtains, inviting interpretation on a grand scale.





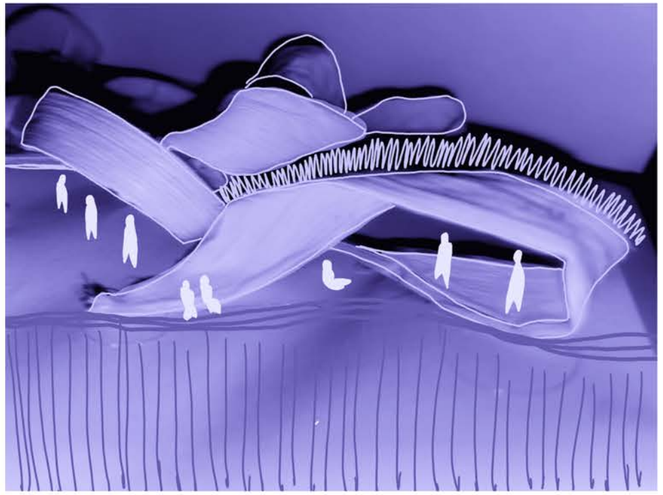
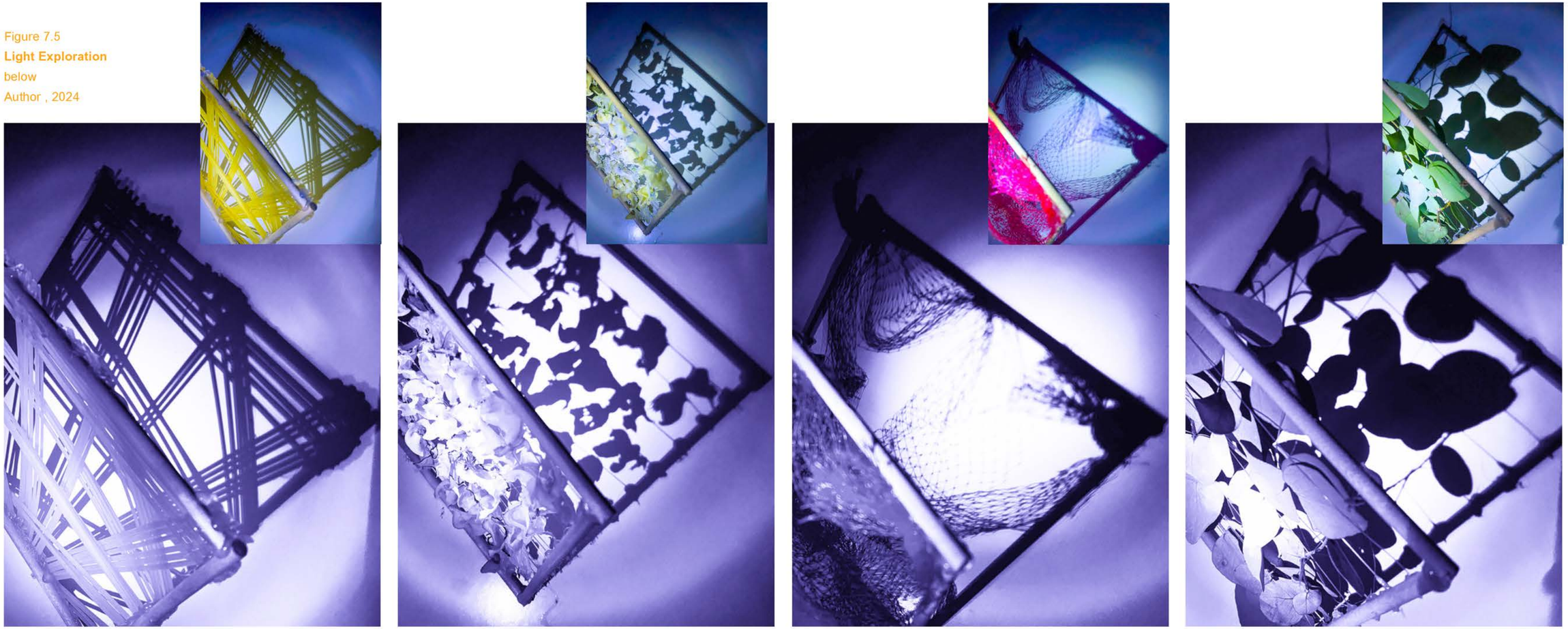


Figure 7.3
Clay Tower
top right
Author , 2024

Figure 7.4
Dried Maize Husk and Drawing
right
Author , 2024

The artistry of light, showcased in a charette, is illustrated below. Elaborate structures of sticks are carefully constructed to hold remnants of food waste collected around the house. When sunlight filters through this complex lattice, a mosaic of shadows falls across the ground. Even within discarded items, a magnificence surfaces, emphasizing the beauty of perceiving through a unique lens.

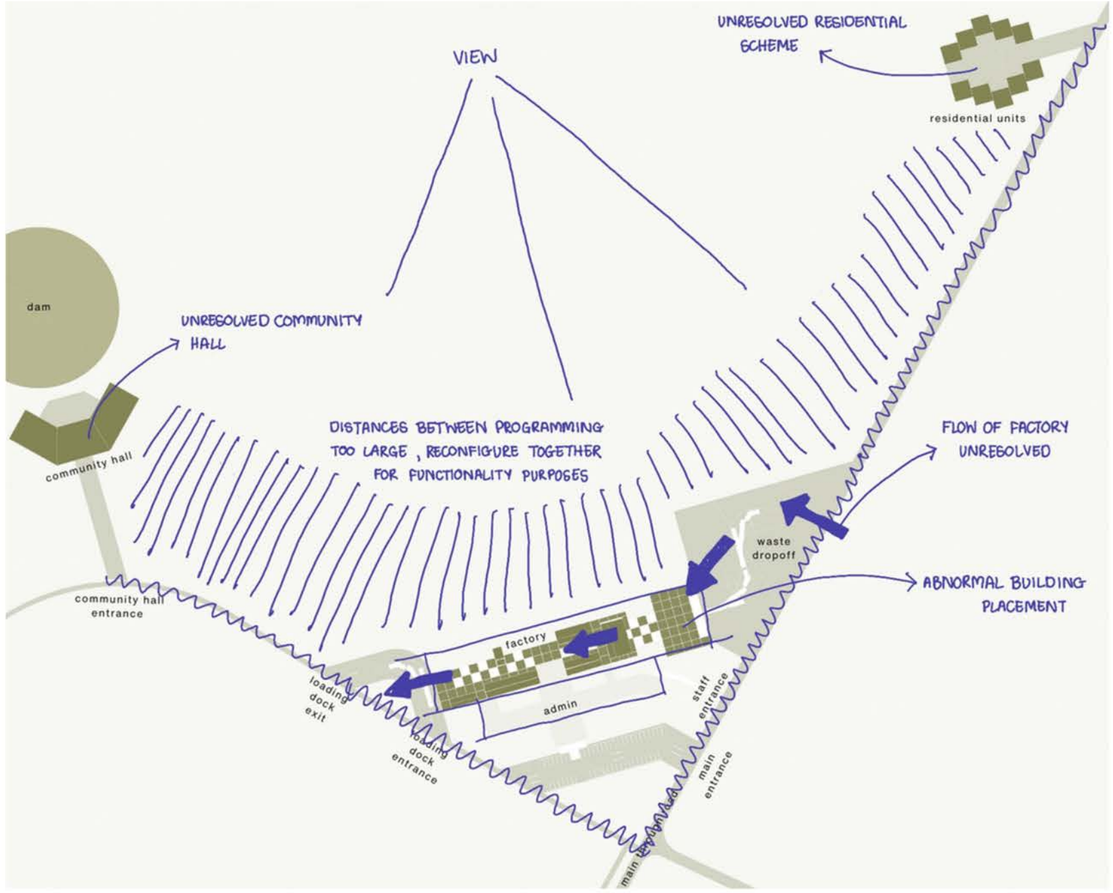
Figure 7.5
Light Exploration
below
Author , 2024



design 01: **the corner**

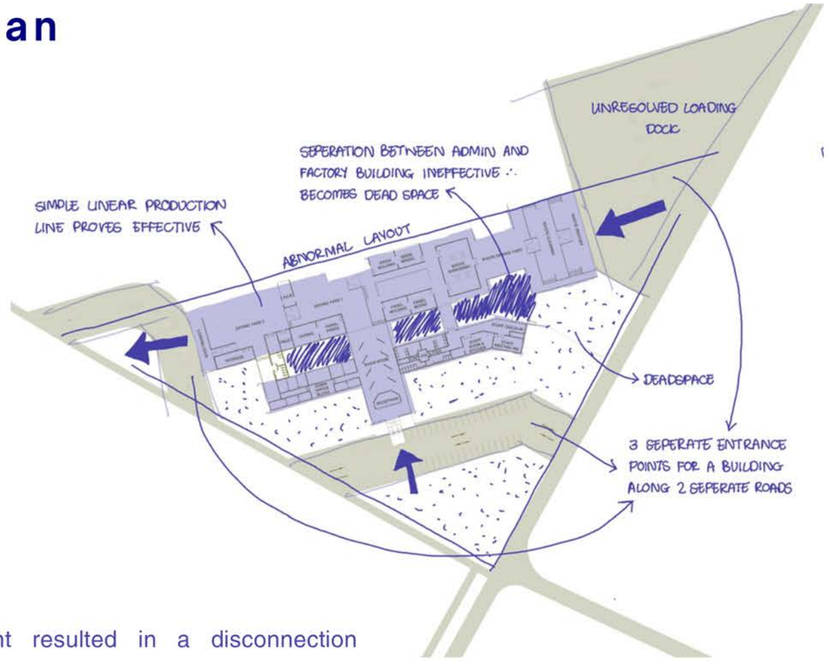
the site

1 : 100



the floor plan

1 : 100



This spatial arrangement resulted in a disconnection between the programming elements and the surrounding landscapeThe factory was orientated northwesterly towards the vast landscape, resulting in a diagonally longitudinal footprint along the corner. This made for awkward junctions and an abnormal layout.

The corner design concept focused on prioritizing the entrance to the site, positioning the building along the main sand road. Consequently, the factory was placed at the corner, distinct from the residential and community hub located deeper within the site.

Figure 7.6
Site Plan #1
far left
Author , 2024

Figure 7.7
Factory Ground Floor PLan #1
left
Author , 2024

factory axonometric

1 : 100

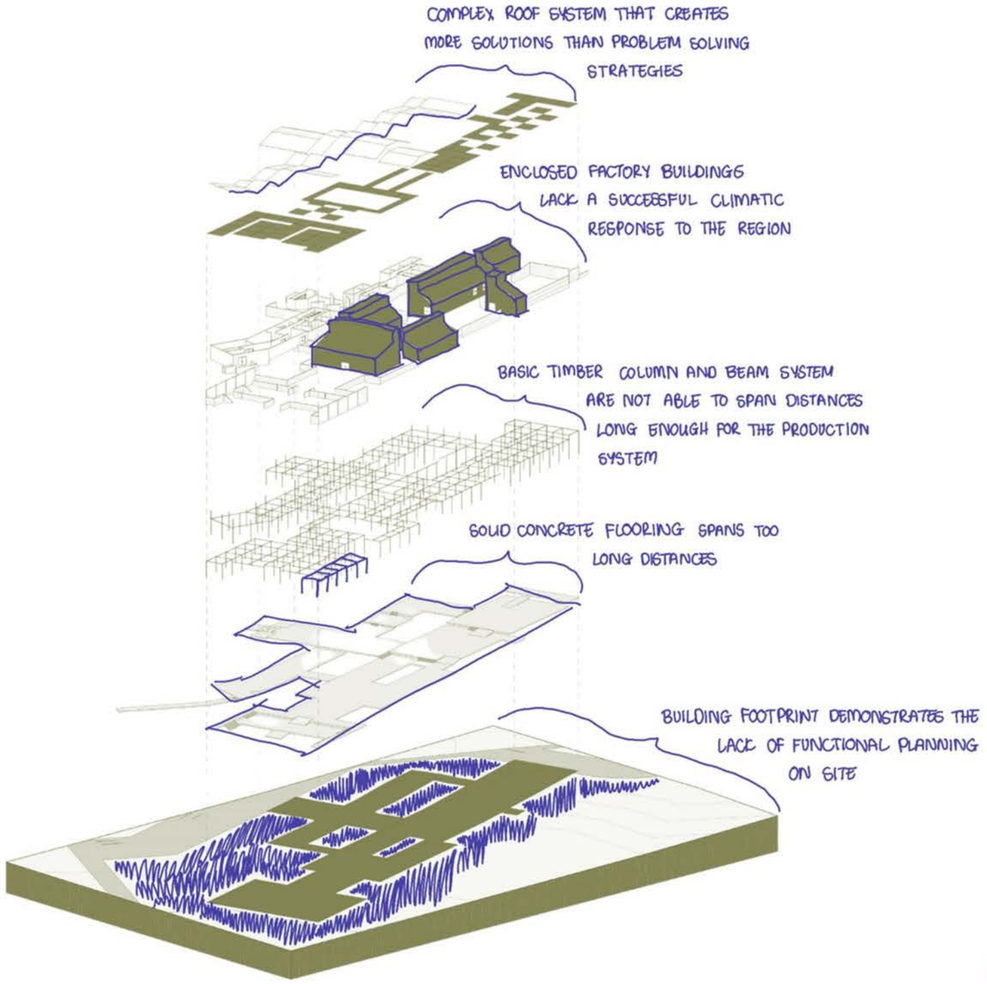
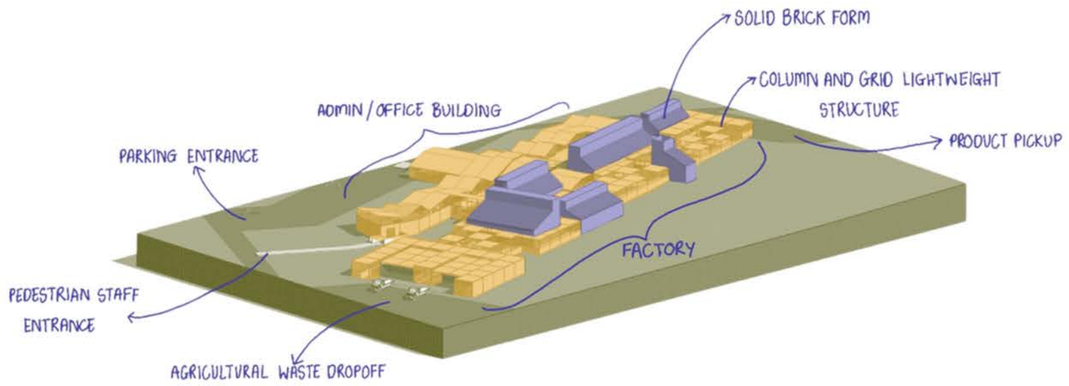


Figure 7.8
Factory Axonometric
left
Author , 2024

factory massing

1 : 100



The factory was situated on a conventional timber beam and column grid. However, this grid system proved inadequate for accommodating the necessary spans required within the production zones of the factory.

The concept involved developing a lightweight timber framework featuring slot-in screen walls and roofing designs to facilitate passive ventilation and provide shade against the intense heat.

To contrast the lightweight timber structure, a robust masonry system was utilized in the machinery zones of the factory. The masonry acted as a sound barrier to mitigate the noise emitted from these areas.

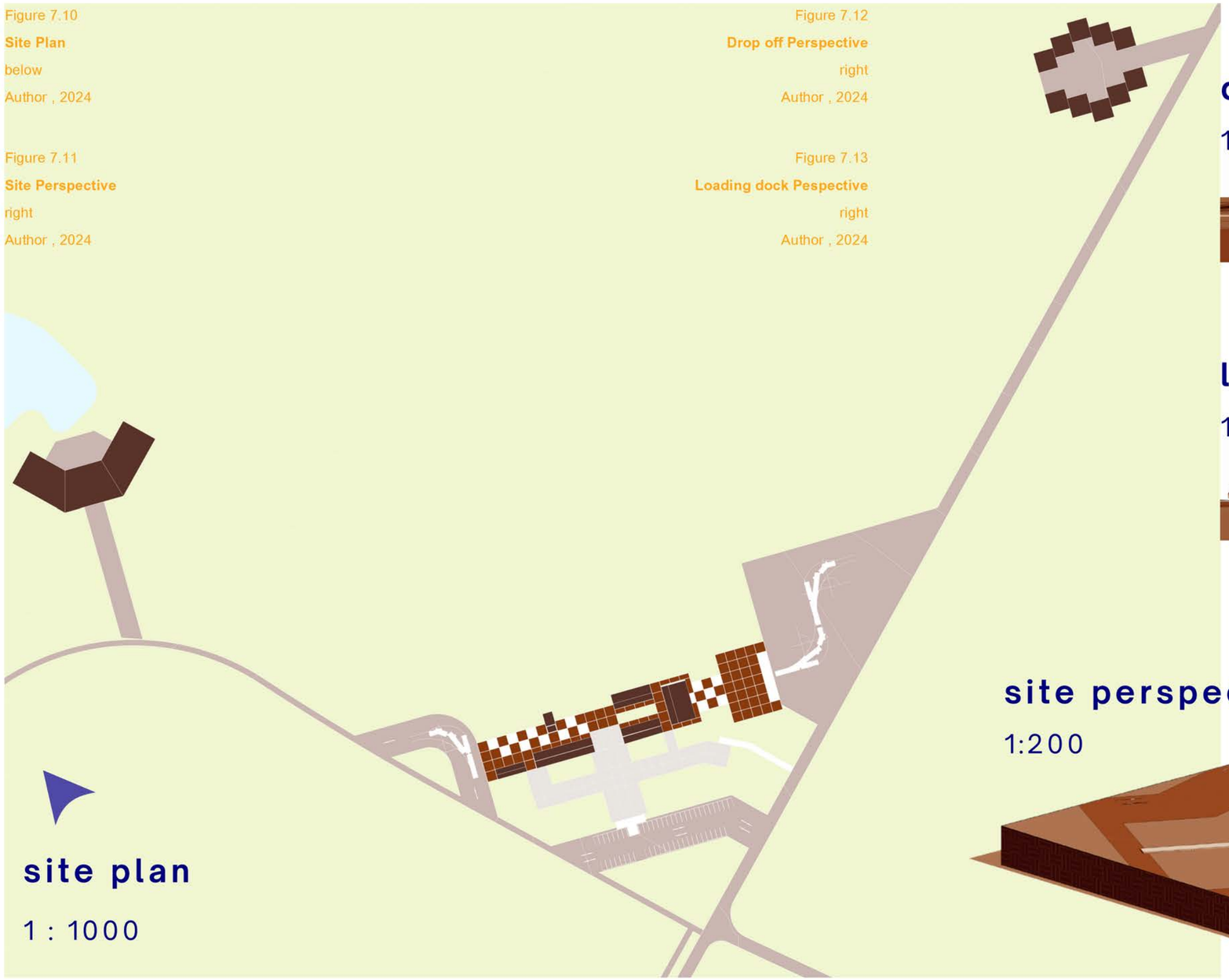
Figure 7.9
Factory Massing
above
Author , 2024

Figure 7.10
Site Plan
below
Author , 2024

Figure 7.11
Site Perspective
right
Author , 2024

Figure 7.12
Drop off Perspective
right
Author , 2024

Figure 7.13
Loading dock Pespective
right
Author , 2024



site plan

1 : 1000

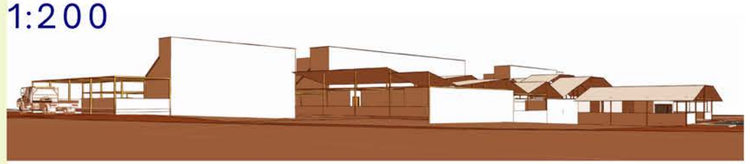
drop off perspective

1:200



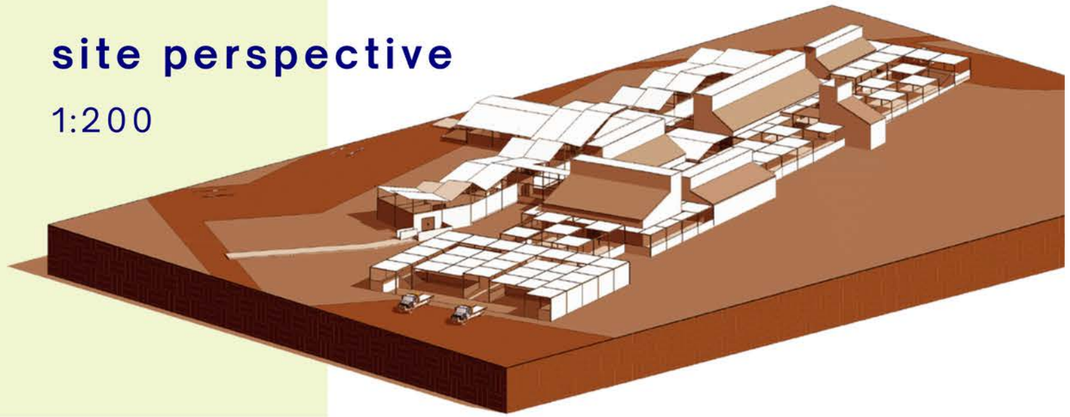
loading dock perspective

1:200



site perspective

1:200



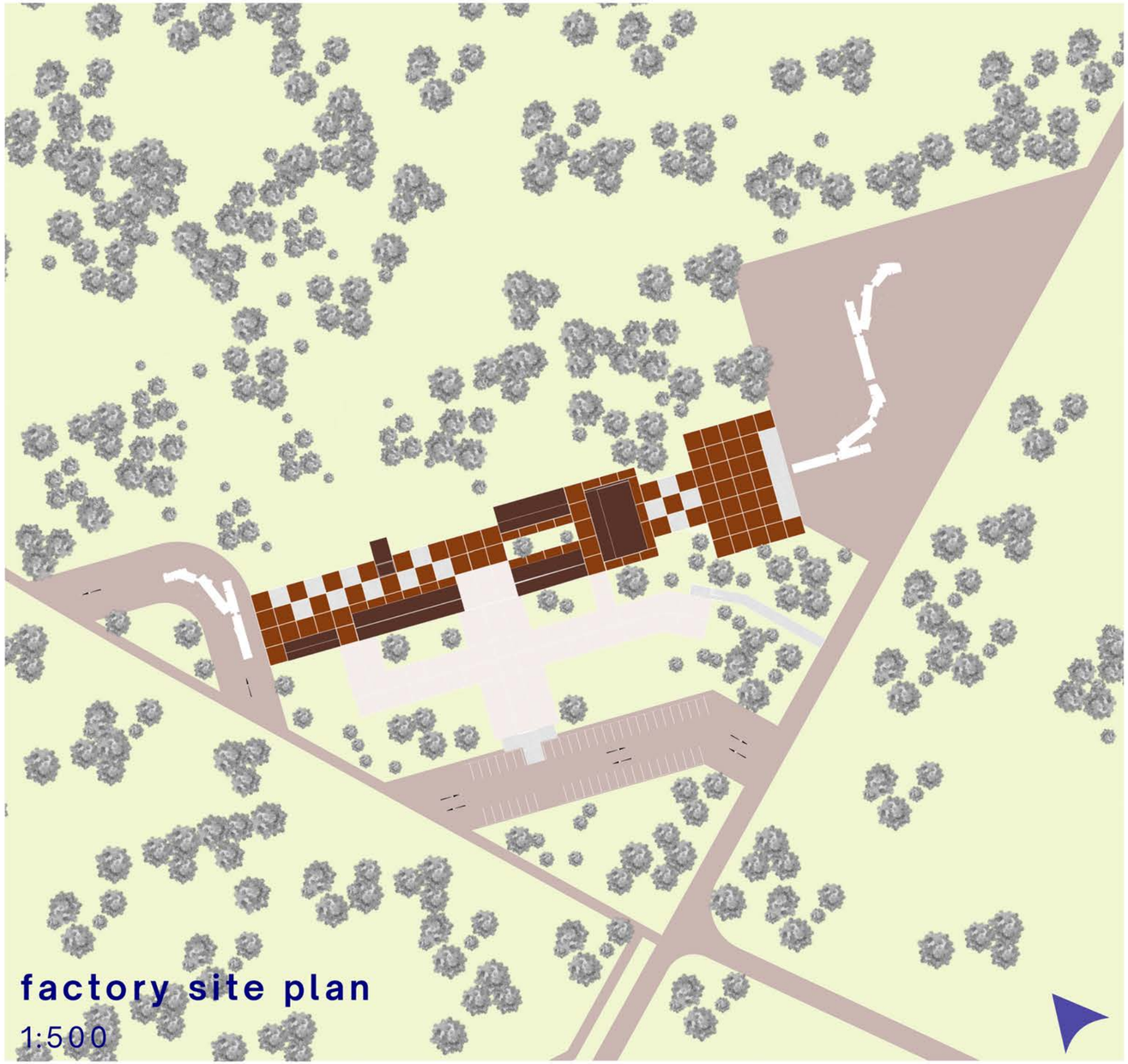






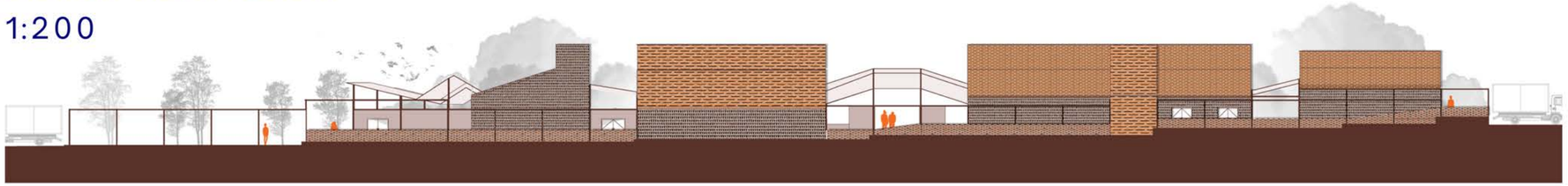
Figure 7.14
Factory Floor Plan
left
Author , 2024

Figure 7.15
Community Floor Plan
left
Author , 2024

Figure 7.16
Housing Site Plan
left
Author , 2024

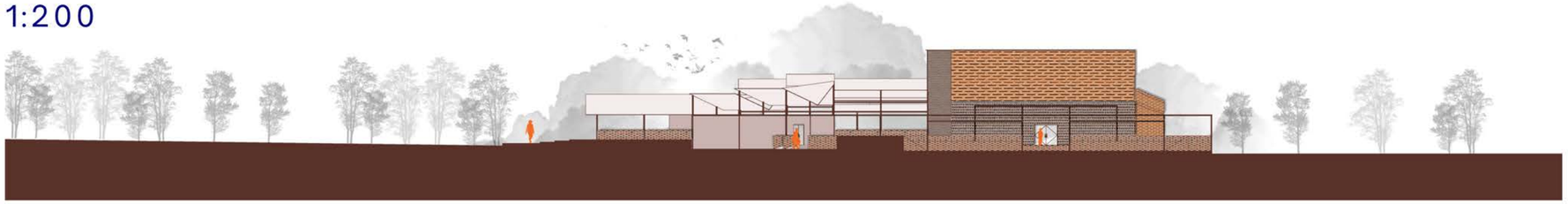
north elevation

1:200



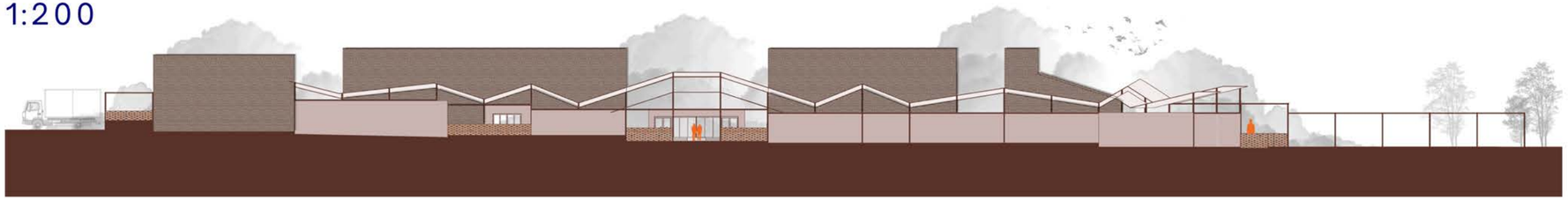
east elevation

1:200



south elevation

1:200



west elevation

1:200

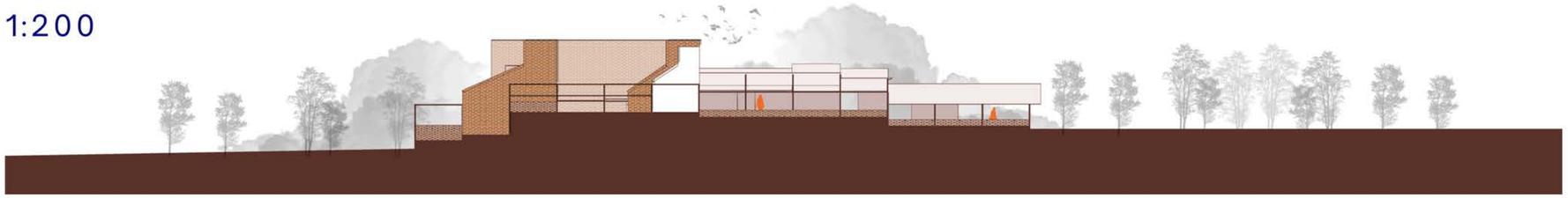


Figure 7.17
North Elevation
left
Author , 2024

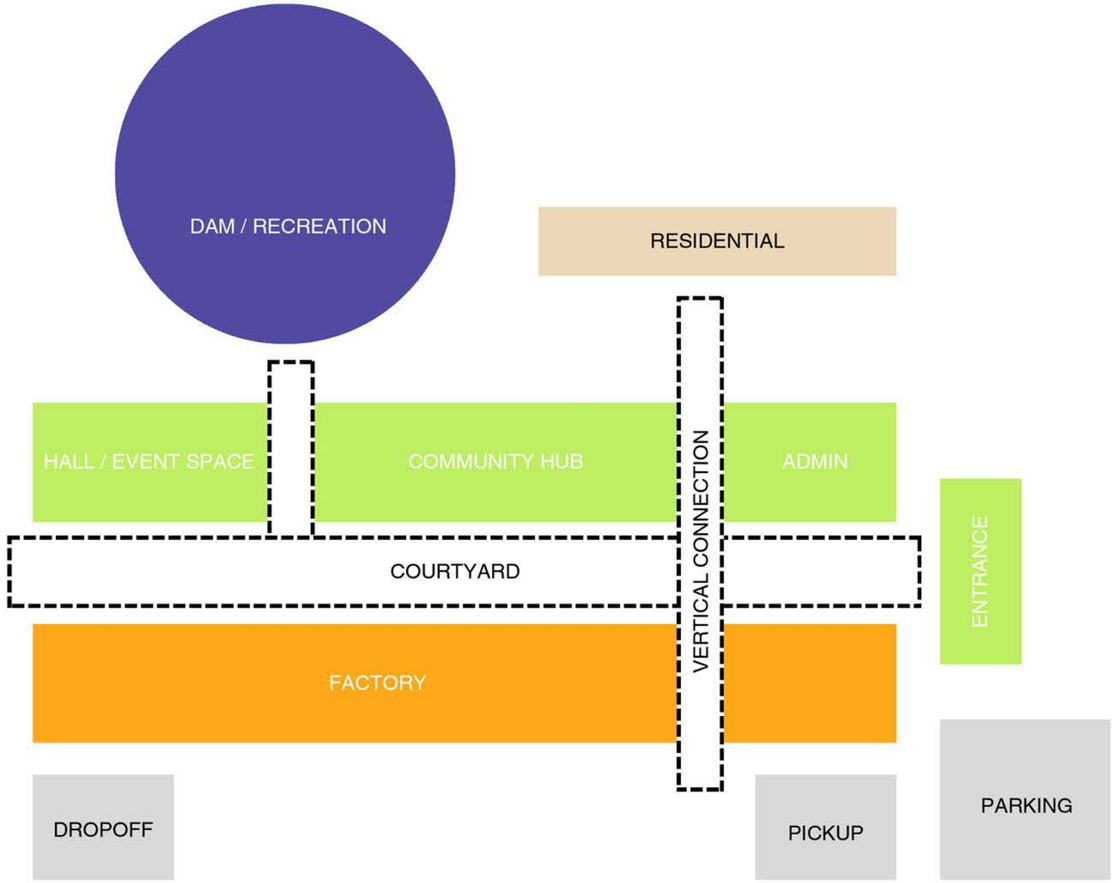
Figure 7.18
East Elevation
left
Author , 2024

Figure 7.19
South Elevation
left
Author , 2024

Figure 7.20
West Elevation
left
Author , 2024

design 02: **the linear**

Foreword



The site framework is based on a linear design, divided by a central courtyard to distinguish the community hub from the factory. This linear concept is inspired by the factory's production line.

The community hub will face the dam, featuring two vertical break points that run through the linear layout. These will lead to the dam and residential areas, respectively.

A primary vertical circulation path will connect the residential spaces to the community hub and courtyard, extending to the factory.

At the western end of the design, the entrance and showroom will provide views overlooking the countryside to the east.

Figure 7.21
Programme Framework
above
Author , 2024

industrial factory framework

The factory serves as the focal point of the site, drawing in the community. As a result, the factory provides the foundation for the programming around which the site revolves.

The factory will mitigate agricultural waste in the area by transforming it into building materials. The building will be a standalone entity on the site. As a result, the factory will function to drop off waste, transform waste, and pick up the final materials after production. The production line adopts a linear design for optimal functionality. The linear form facilitates a smooth production process and ensures that all drying areas face north to receive the most direct sunlight. The drop-off and pick-up are on each end of the linear, with the production process in between.

The factory's programmatic spaces encompass all the processes necessary for transforming agricultural waste into building materials. There are two circulations through fares. The horizontal circulation line is designed to simplify the process lines' approach. The factory features a vertical circulation route that links it to both the northerly programming and the southerly access road.

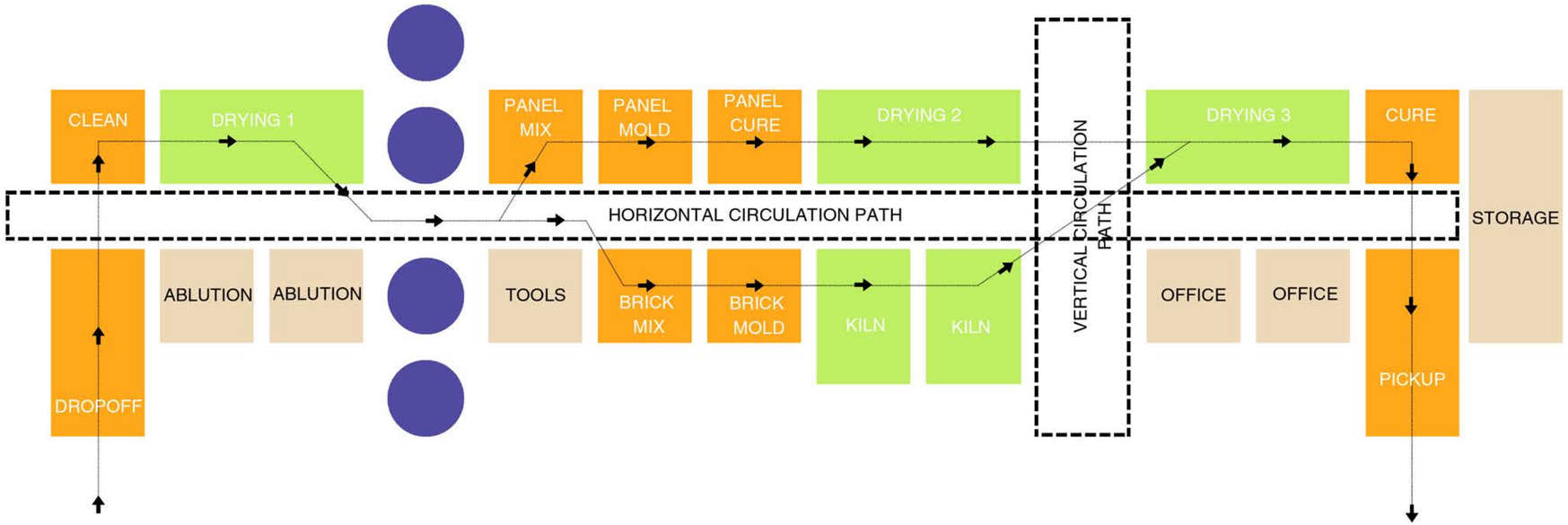


Figure 7.22
Factory Framwork
above
Author , 2024

community hub framework

The community hub functions as a multifaceted area for education and recreation, catering to both farmers and farm workers through collaborative efforts and educational initiatives.

The eastern block is designated for staff areas within the factory, while the central block houses educational facilities. The western block culminates in an open recreational hall designed to meet the public's recreational needs.

The southern facade of the community hub overlooks the central courtyard, while the northern facade faces the dam and residential areas.

Vertical circulation is facilitated through two points: one leading to the dam on the west side and another connecting to the residential section on the east.

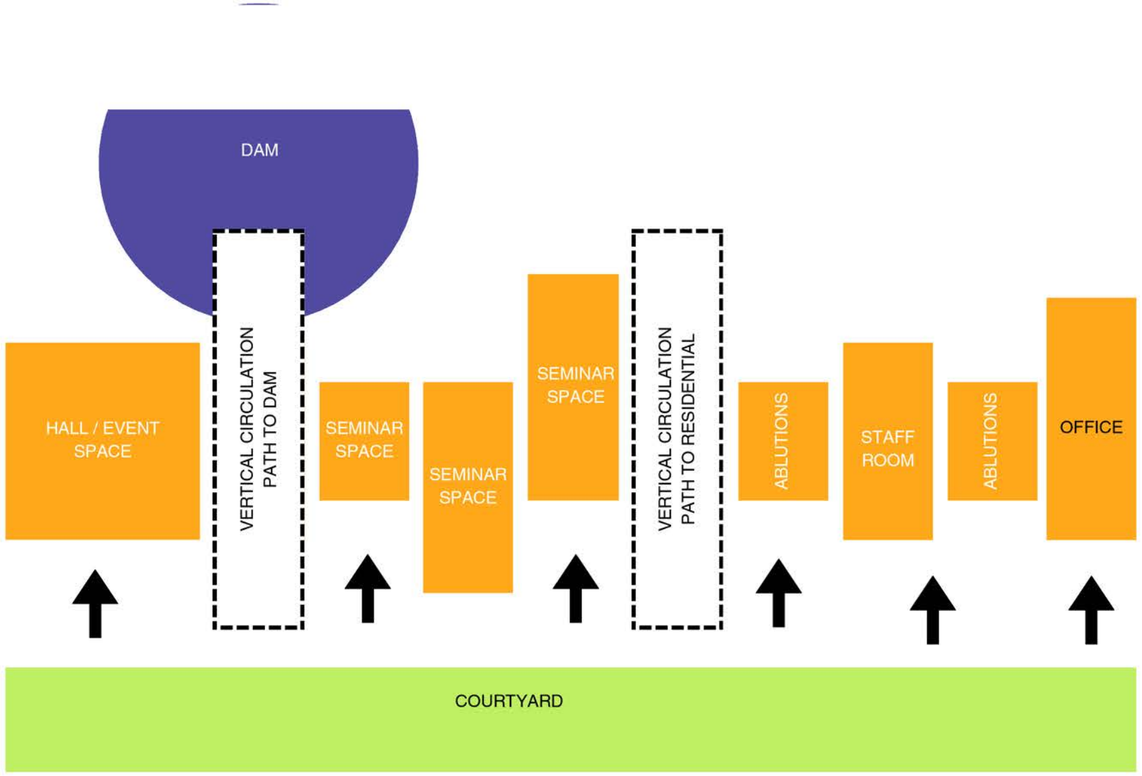


Figure 7.23
Community Hub Framwork
above
Author , 2024

the production line

Figure 7.24
Production Line
below
Author , 2024

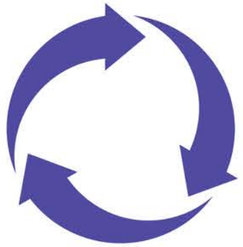
Raw Materials

The factory's raw materials are agricultural waste from nearby farms. Farmers will drop off the wastes in their various trucks, necessitating a designated drop-off point. To facilitate the process from the truck to the building, a standardized platform is required. The waste that is dropped off requires a temporary pile zone before it can enter the cleaning zone. These two drop-off and cleaning stations would need to sit adjacent to one another to allow for fluid production flow. A manually operated conveyor belt will be implemented to ease the flow from drop-off to cleaning zones.



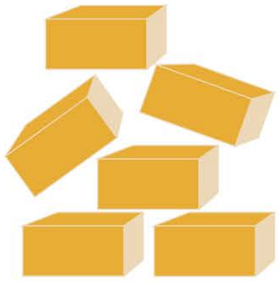
Work In Progress (WIP)

The WIP flow is defined as the movement of materials around the factory. A main horizontal circulation path will branch off into various production zones, enabling a smooth, linear process from one end to the other (from raw product to final product). Differentiating production zones with specific machinery enables the zones to concentrate solely on the specific tasks associated with that production process, thereby facilitating a smooth production line.



Finished Product

The final product will have two options at final assembly. Either it will be sent to the product storage for future sales. Alternatively, consumers will pick it up directly from the collection point. This allows the production line to continue with no backup in products, taking up space in the production zone.



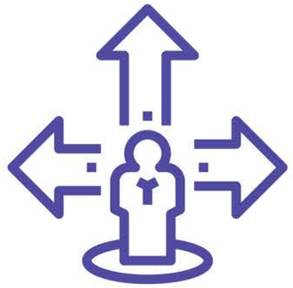
Consumables

The consumables in a production line refer to the materials and machinery needed to operate the factory. All machinery will be fixed into set production zones. While raw materials will enter the production line through supply from farmers. Consumable supplies such as additives and binders will be stocked in a supply room at hand when needed.



People Movement

People will move along the same horizontal circulation path as those in the factory. The pathway therefore needs to accommodate both the movement of materials and people. The circulation path separates all production zones, preventing any obstructions. A vertical circulation path would be implemented for the movement of people to enter and exit the building, not hindering the main horizontal circulation path.



Information

Information refers to how the production line is instructed to operate. Dedicated production zones for a single process reduce task overlap and misinformation. Each zone has a specific intended purpose and is designed to assist with that specific process only, ensuring no confusion as to where the assemblage is in the production line.



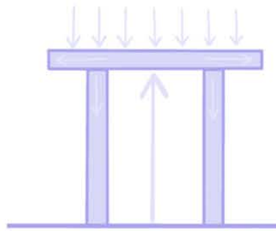
Waste

The factory involved in waste transformation produces a limited amount of waste. The waste produced would be from abnormalities in agricultural residues and building material products. Other waste would include products needed for the production line, such as chemical bottles. For easy access, there will be a refuse area to accommodate all of this along the main horizontal circulation path. This would face towards the road for simple waste removal access.



spanning the distance

Post and Lintel Roof

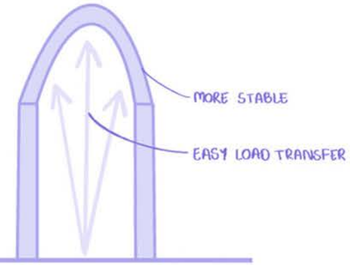


- Relies on simple vertical and horizontal elements.
- Most straight forward.
- Limited span and design flexibility.

Peaked-Beam Roof

- Form a sloped roof.
- Btter suited for water management and insulation.

Vault Roof



- Use arches to create curved expansive ceilings.
- Span large distances.

Figure 7.25
Roof Typologies
above
Author , 2024

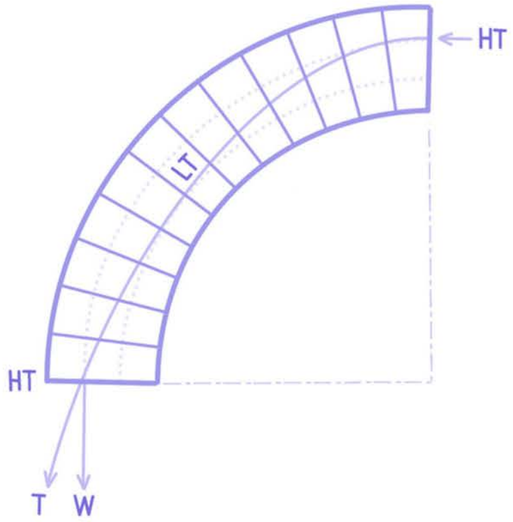
What is a vault?

A vault is a **“structural form composed of a series of arches typically found in the construction of ceilings and roofs”** (“ARCHS , VAULTS AND DOMES” 2022).

Arches are a curved structural form carrying loads around an opening and transferring them to either side of the arch, are structurally stable in compression due to the balancing act of their loads.

For this reason, the series of arches making up a vault creates the structural stability of the assembly. Vaults must have the ability to withstand outward pressure on their lower parts which can be resisted by thick supporting walls, supporting columns, buttresses, stiffening diaphragm beams, side anchors, or parallel walls that can distribute the stress.

Therefore, even though the construction of the vault itself is structurally sound the junction from the vault to the ground must maintain the structural integrity of the outward pressures.



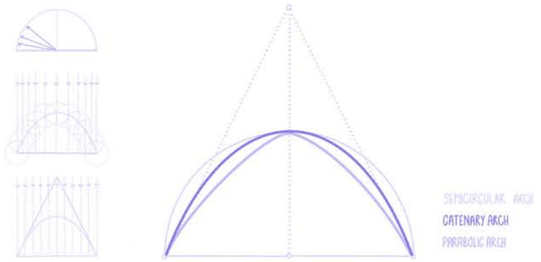


Figure 7.26
Vault Studies
above
Author , 2024

Figure 7.27
Types of Vaults
right
Author , 2024

Barrel Vault

The barrel vault is categorized as a **“continuous, unbroken and elongated semi-circular or pointed arch”**(Pramod, 2023).Often referred to as the tunnel vault the curved extrusion effectively distributes the loading weight providing structural stability over a wide area without the necessity of cross-beams for support.

Groin Vault

The groin vault is the intersection of two-barrel vaults at a 90-degree angle. The intersection creates an X-shape with the two vaults meeting at the point known as the groin. Their versatility to span rectangular, square, and abstract quadrilateral spaces creates a dramatic architectural effect over large open areas.

Ribbed Vault

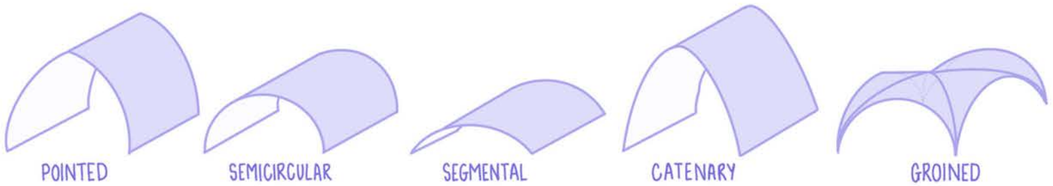
The rib vault applies arches known as ribs to extend across a vaulted surface. The ribs provide additional structural support by distributing the weight of the vault itself allowing for intricate designs to be formed.

Dome Vault

The distinctive architectural feature of a dome vault employs curved segments to create a rounded effect. The grandeur effect achieved by such made the dome vault a prominent architectural style during historical periods.

Catenary Vault

The catenary vault is a variety of architectural arch that follows an inverted catenary curve. The curve is in perfect equilibriumproviding the maximum structural stability.



A Brief History of Vaults

Vaults of Ramesseum , Egypt

Leading up to the 19th century, the arch and the vault were the only alternative to the simplistic post-and-lintel system to support a roof. One of the earliest forms of vaults in architecture dates back to 1300 BC in Egypt. The vaults of granaries of Ramesseuem, Egypt were built using what in today's society is deemed the Nubian Vault Construction Technique which relied on a back wall for the vaulted structural blocks to stock onto to increase the adhesion by force of gravity.



Figure 7.28
Vaults of Ramesseum , Egypt
above
Unknown , n.d

Vaults of Basilica Nova , Rome

The Romans contribution to the vault system is far more developed and mature as seen in the barrel vaults of Basilica Nova in 312AD. The vault system is made of one solid mass by casting concrete devoid of external thrusts creating perfect rigidity. The process involved centering and formwork to construct and support the weight of the concrete. First, a centering arched wooden frame was constructed to achieve the fundamental shape of the form. On top of the centering lies the formwork made up of numerous straight beams joined together to achieve the circular shape of the vault. The formwork sits upon the centering and acts as a surface on which the concrete can be placed. The introduction of centering and formwork in Roman vaults created an enduring legacy for Roman Vaulted Architecture.



Figure 7.29
Vaults of Basilica Nova , Rome
left
Unknown, n.d

Crystal Palace

The Industrial Revolution brought the mass production of standard components to the building industry homogenizing the built-form landscape globally. Ironically, it could be considered to some that the most impressive vaulted structure was constructed within this time. This is of course the Crystal Palace by Joseph Paxton in 1851. Paxton's combination of prefabricated cast iron, laminated wood, and standard-sized glass sheets created the **"ridgeand-furrow"** ("Wallmakers designs a church with catenary arches in clay bricks | Floornature," n.d.) roof design. The method of construction for the vault was a breakthrough in technology and design acting as a self-supporting shell spanning over 124m.

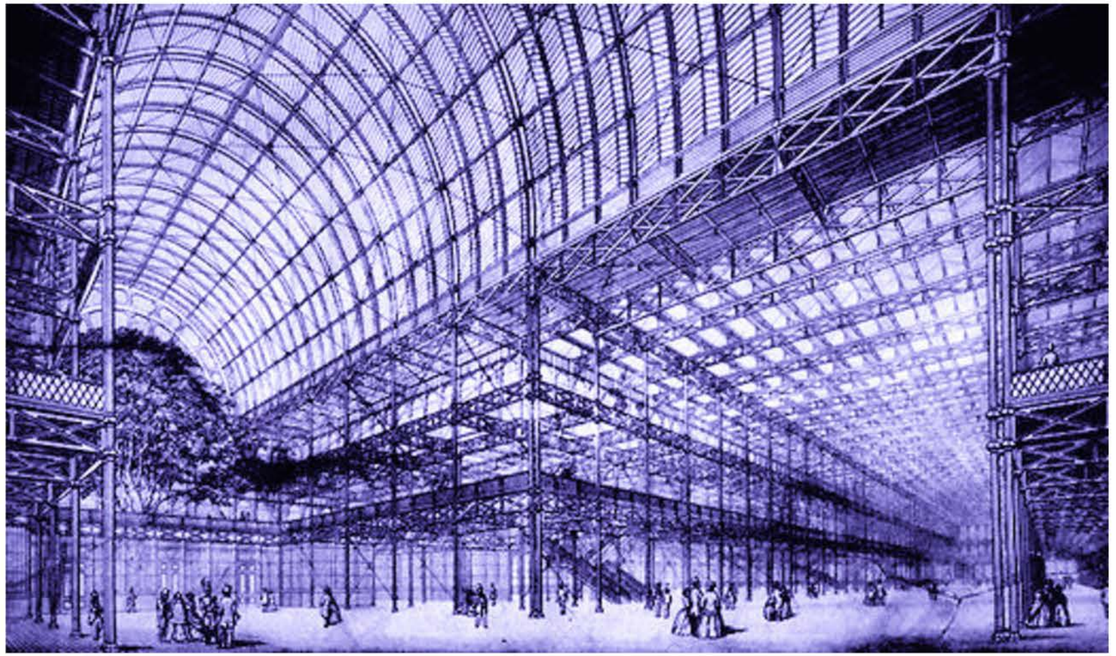


Figure 7.30
Crystal Palace
above
Unknown, n.d

Barrel Vault Technical Exploration

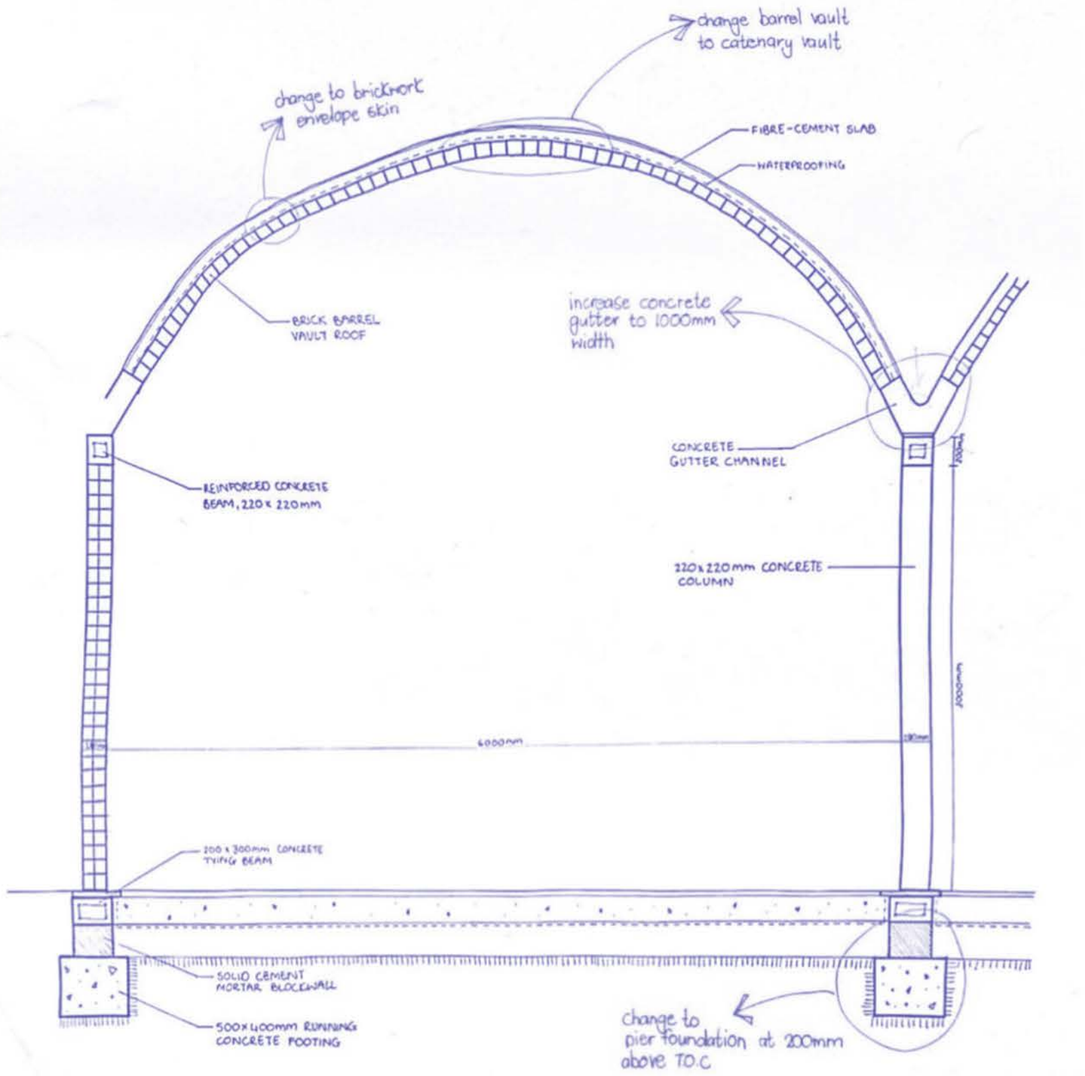


Figure 7.31
Barrel Vault Technical Exploration
right
Author , 2024

Catenary Vaults

A catenary arch is naturally made shape when a hanging line is draped between two posts. By hanging a simple cable by its endpoints the curved shape from its suspension reaches perfect equilibrium making it the strongest possible arch form.

One cannot consider catenary vaults without paying homage to the catenary master himself Antonia Gaudi. Gaudi's revival of the catenary arch revolved around the search for the true nature of the form. The architecture of these vaults is a landmark but the true pioneering structures to architects are the suspended scale models Gaudi produced to achieve a purity of form. Gaudi would suspend hundreds of cables which were weighted down to correspond with the appropriate floor weight causing a change in shape of the cable. The cables under these loads were used to adopt the most appropriate shape that was mimical of the exact mathematical shape.





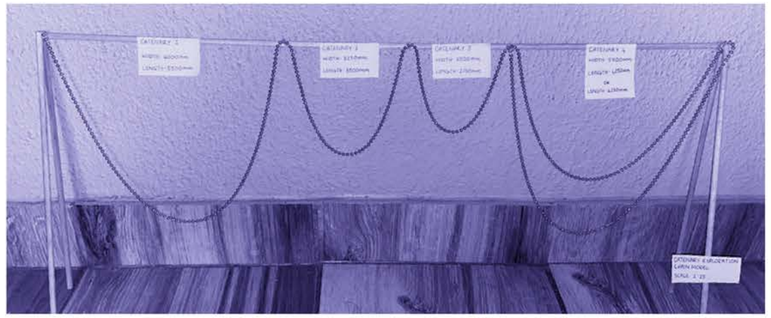


Figure 7.2

Gaudi Hanging Models

top right

Unknown, n.d

Catenary Vault Technical Exploration

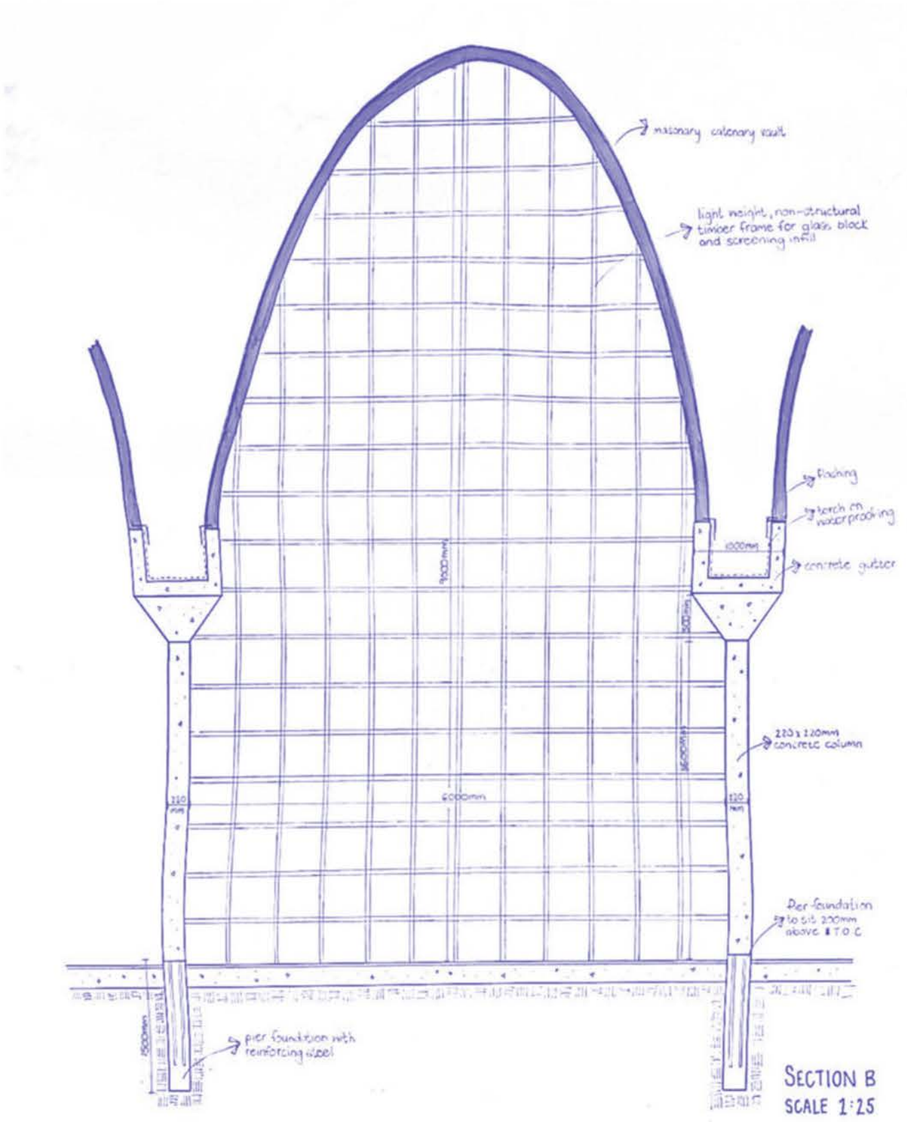
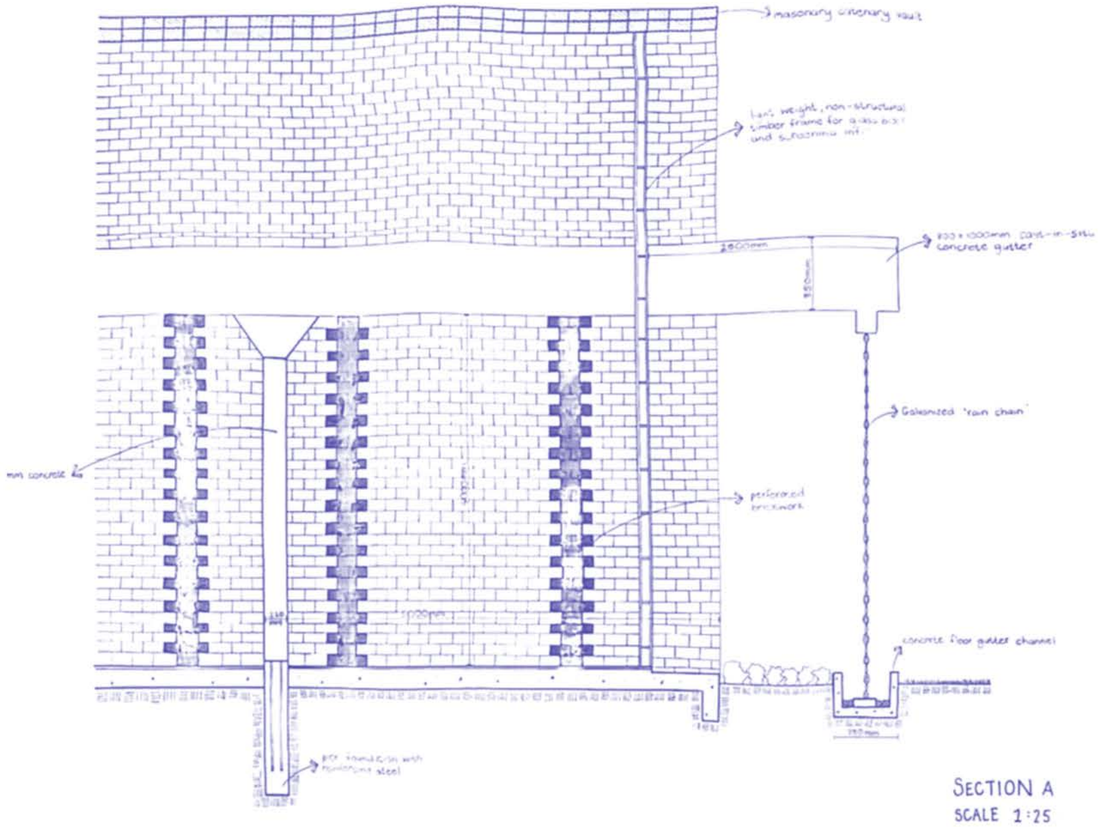


Figure 7.33

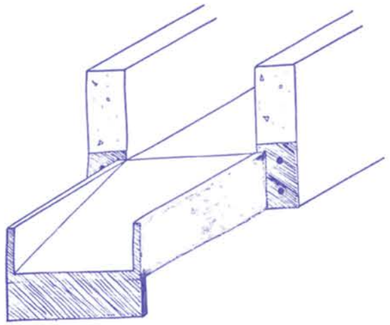
Catenary Vault Technical Exploration

right

Author , 2024



The development sets a precedent for farming corridors nationwide, addressing employment shortages, waste management challenges, and inadequate housing, thereby challenging the traditional cycle of generational agricultural labour.



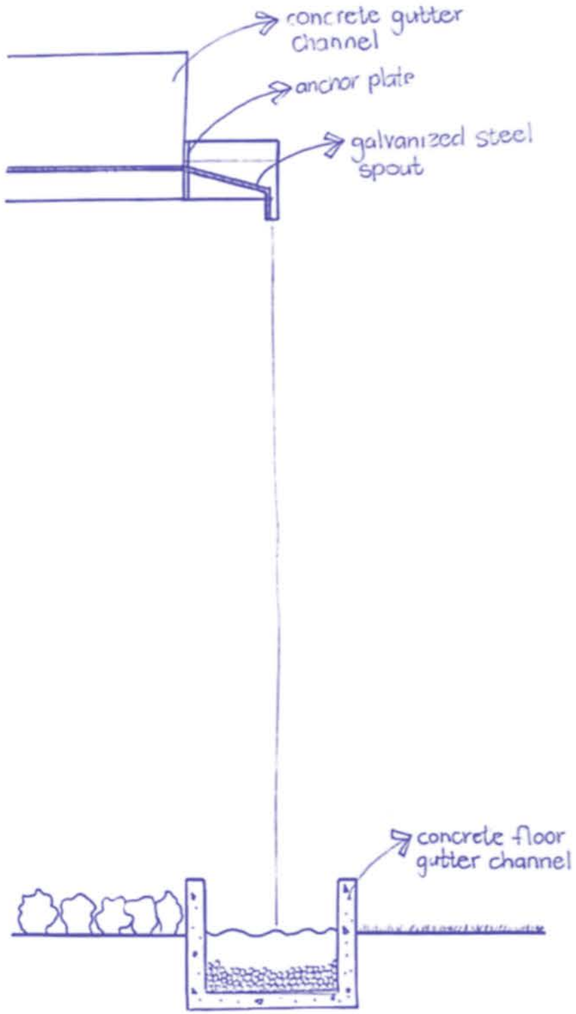


Figure 7.34
Technical Exploration Section
left
Author , 2024

Figure 7.35
Water Channel
above
Author , 2024

Figure 7.36
Water Chain Exploration
right
Author , 2024

The integration of a catenary vault structure with concrete gutters for water collection in the design of an agricultural processing waste factory transforms both the structural and environmental performance of the facility. The catenary vault's inherent efficiency allows for expansive, open spaces ideal for housing processing equipment and storage, while the concrete gutters enable sustainable water management, directing rainwater into harvesting systems. This synergy not only optimizes material use and reduces energy demands but also aligns with the factory's mission of repurposing agricultural waste into building materials, reinforcing a holistic approach to sustainability in both production and construction.

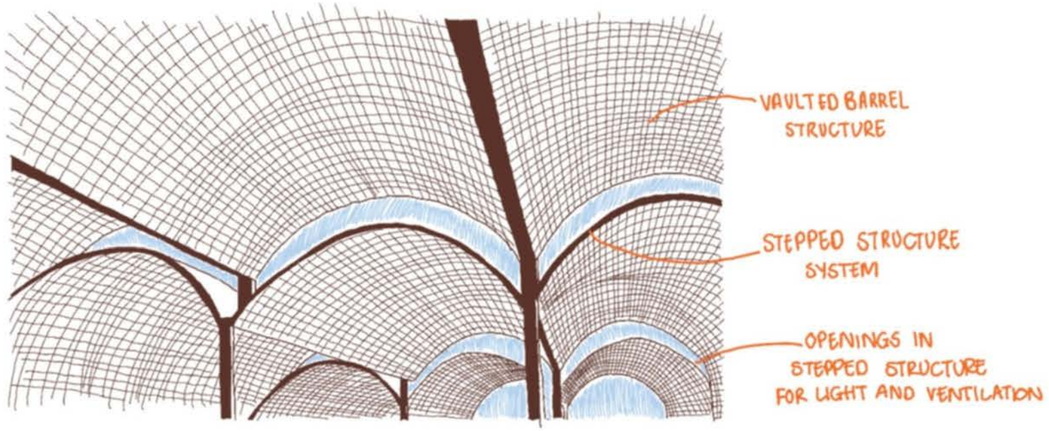


Figure 7.37

Vault Roof Exploration

above

Author , 2024

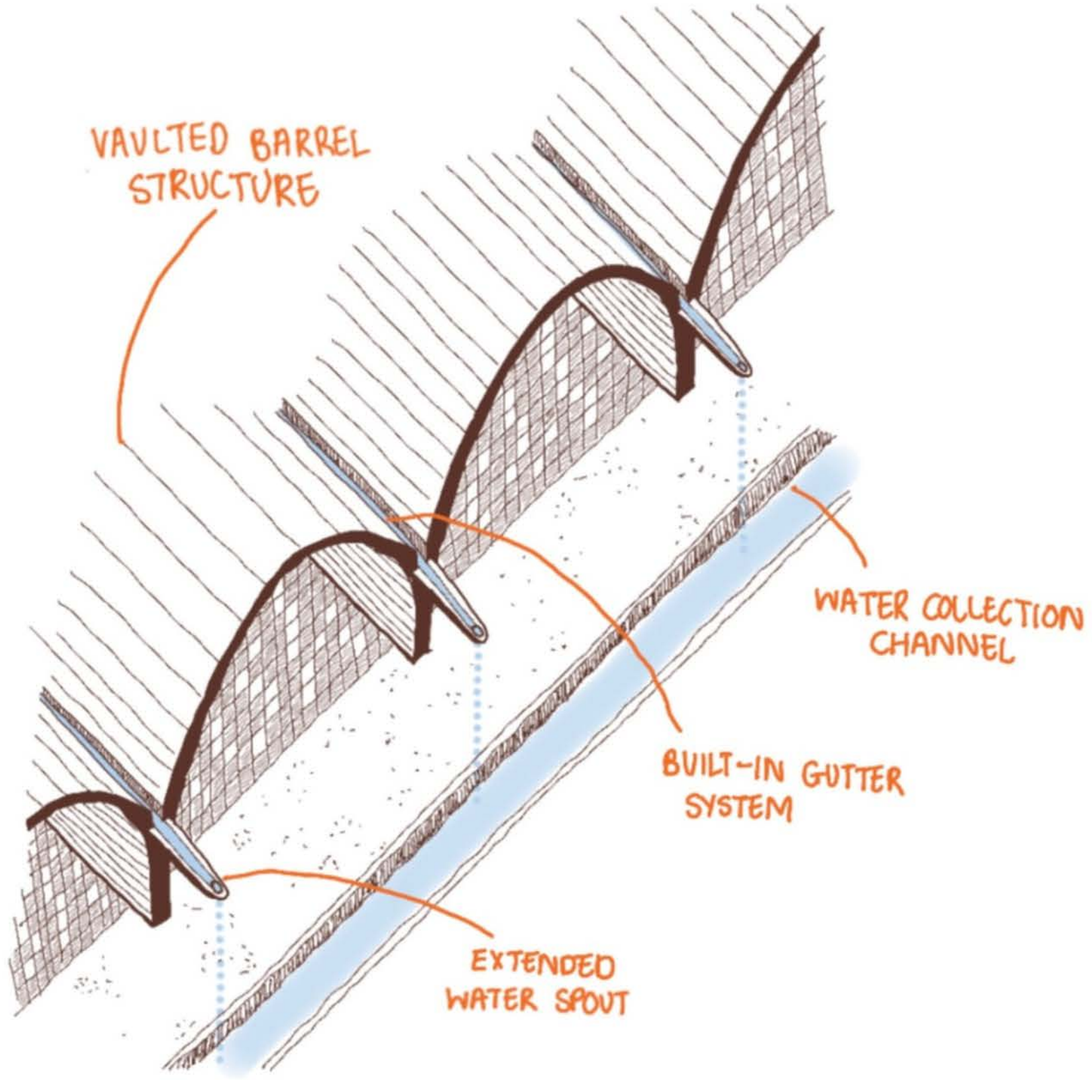


Figure 7.38

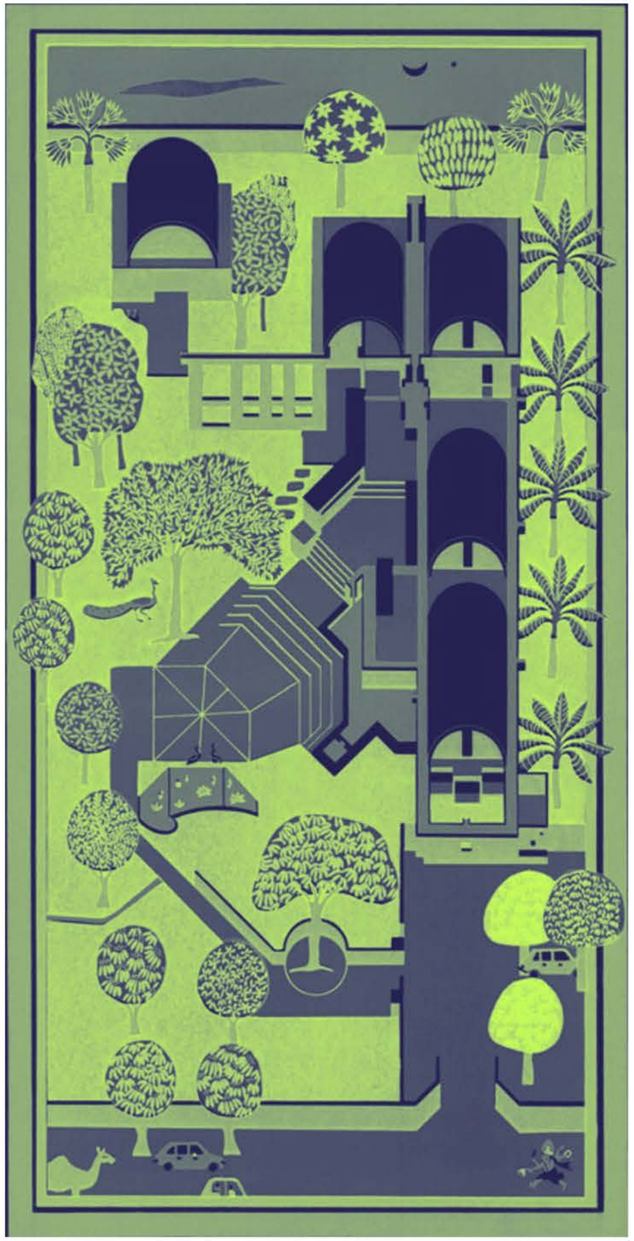
Vault and Water Channels

right

Author , 2024

sangath

Balkrishna Doshi



Doshi's Sangath architecture can significantly influence the concept of integrating water and vaults in an agricultural processing waste factory by offering a model of climate-responsive design that seamlessly merges form, function, and environmental sustainability.

At Sangath, vaulted roofs play a crucial role in regulating temperature by reducing direct solar heat gain and allowing for natural cooling. This approach can be mirrored in the design of a factory, where catenary vaults not only serve as structural elements but also help maintain a cooler internal environment, reducing the need for artificial cooling systems. By incorporating vaults, the design aligns with passive cooling strategies essential in hot, rural areas, enhancing energy efficiency.

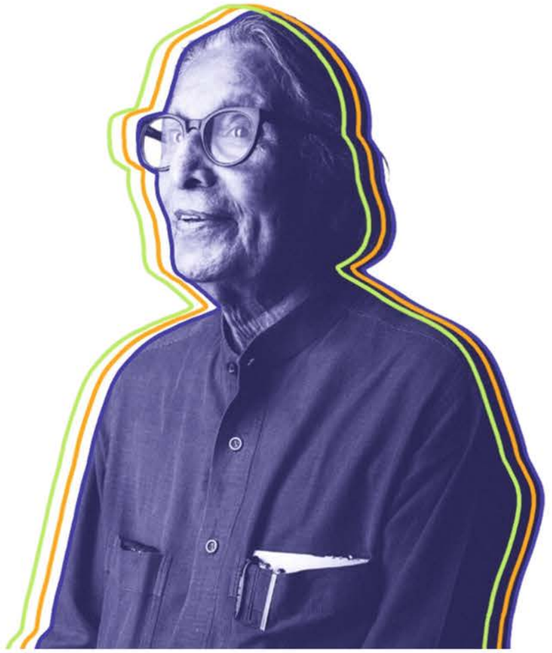


Figure 7.39
Sangath Plan
far left
Doshi, n.d

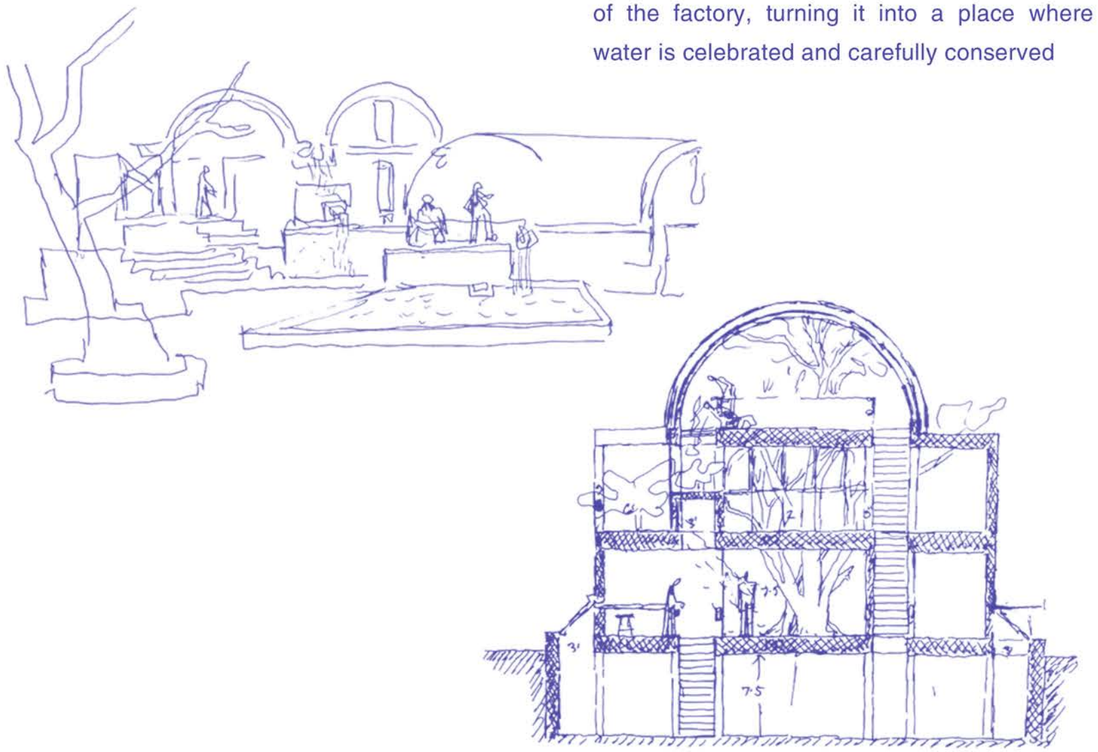
Figure 7.40
Balkrishna Doshi
left
Unknown , n.d

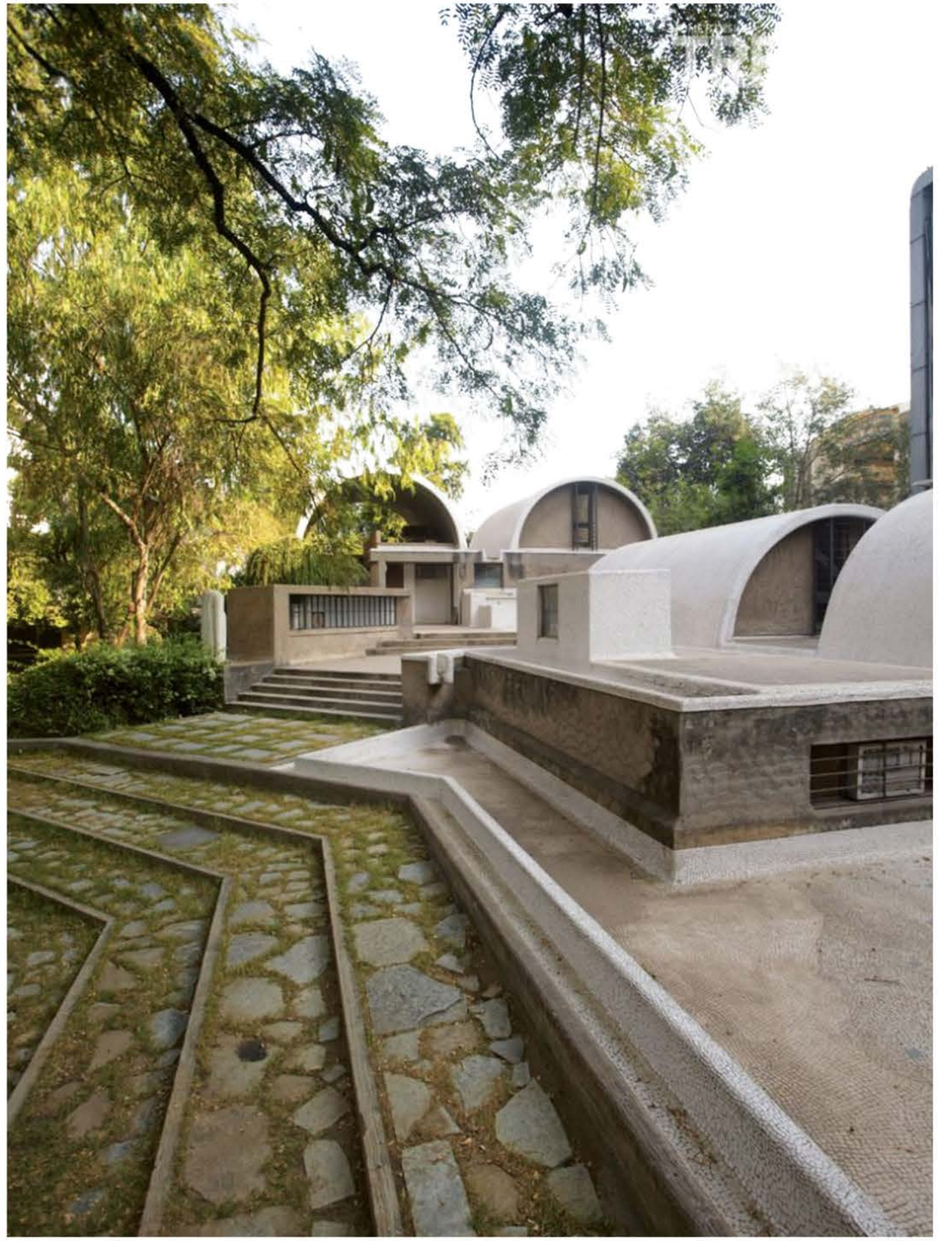
Figure 7.41
Balkrishna Doshi
far right
Unknown , n.d

Figure 7.42
Balkrishna Doshi Drawing #1
below
Doshi , n.d

Figure 7.43
Balkrishna Doshi Drawing #2
below
Doshi , n.d

Doshi's thoughtful integration of water features into the landscape of Sangath demonstrates how water can be an integral design element rather than a byproduct to be managed. The factory design can take inspiration from Sangath by embedding water channels or concrete gutters between vaults, creating a natural system for rainwater harvesting. In Doshi's work, water features are not just functional but also symbolic, reflecting the cultural and spiritual importance of water—a concept that can enrich the agricultural setting of the factory, turning it into a place where water is celebrated and carefully conserved

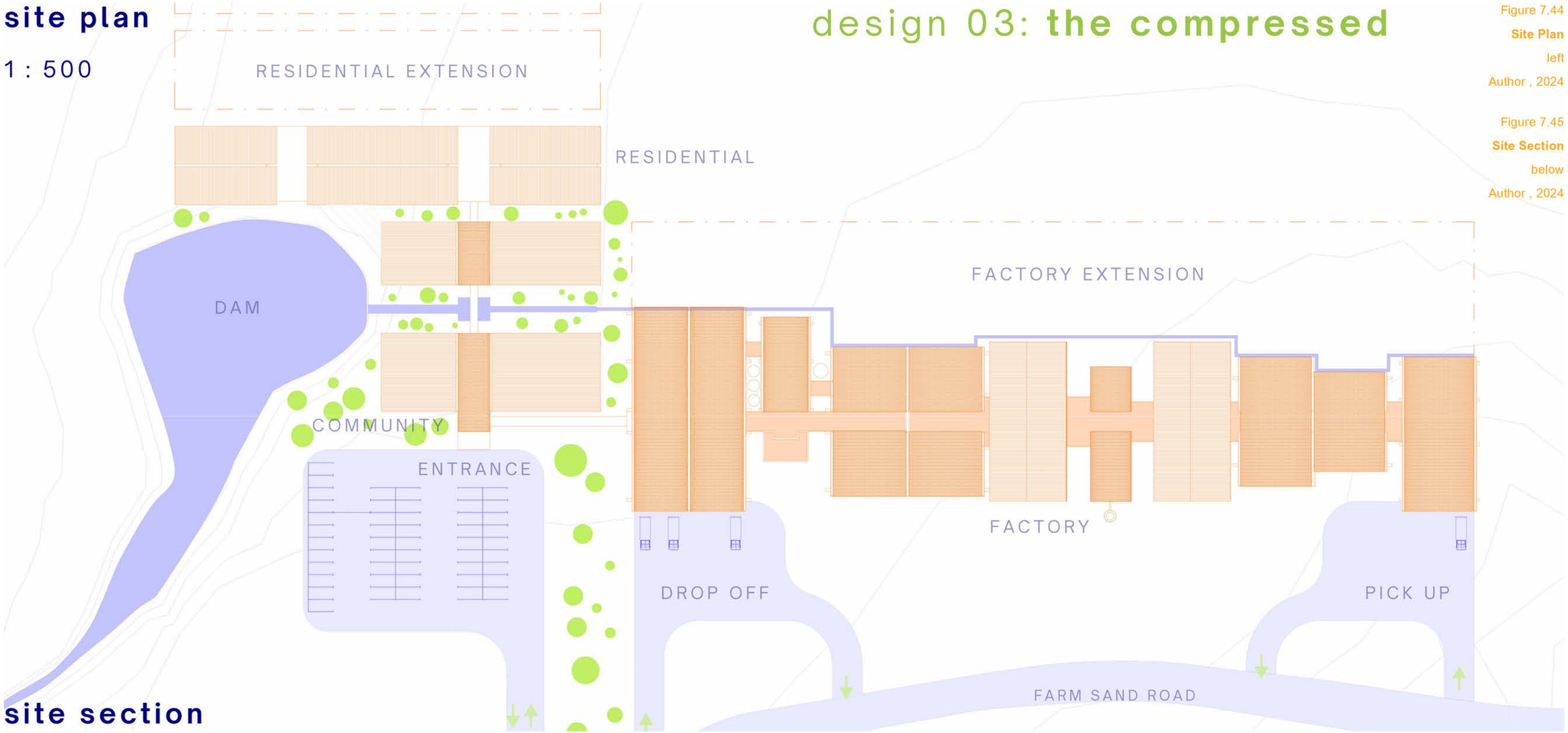




design 03: **the compressed**

site plan

1 : 500



site section

1 : 500

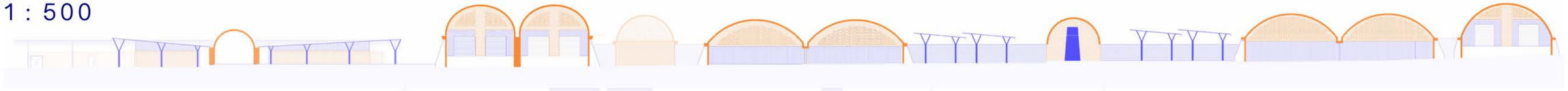


Figure 7.44
Site Plan
left
Author , 2024

Figure 7.45
Site Section
below
Author , 2024

Figure 7.46

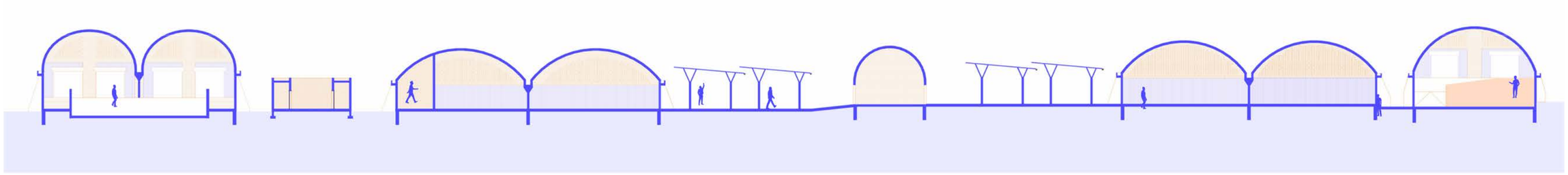
Factory Section

below

Author , 2024

factory section

1 : 100



factory ground floor plan

1 : 100

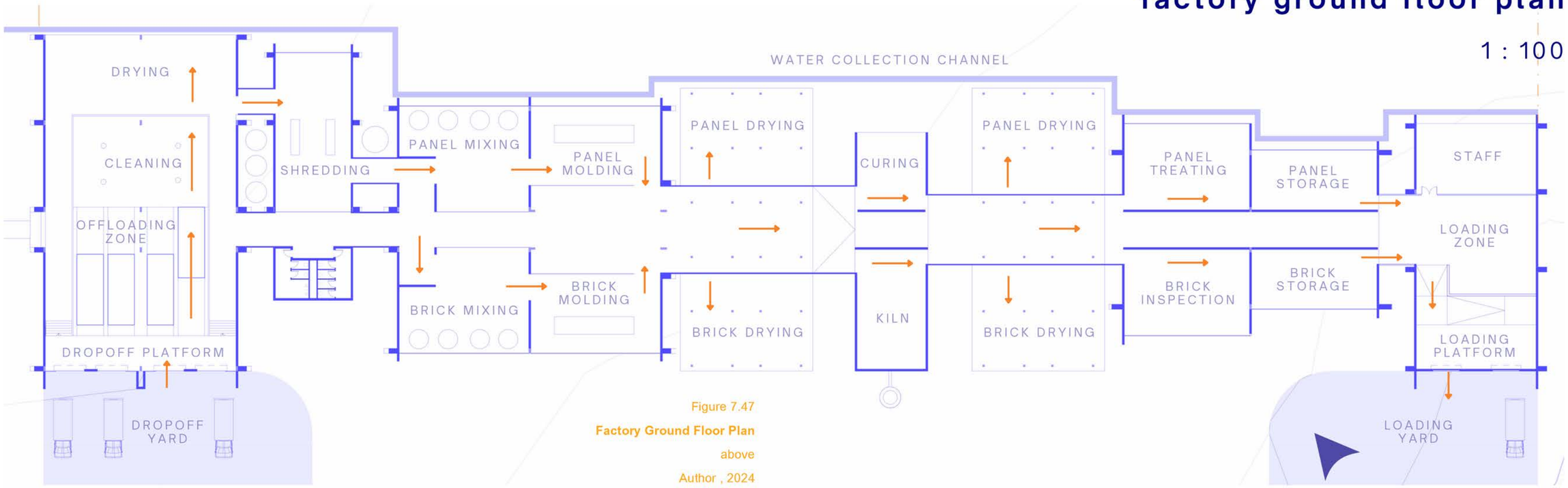


Figure 7.47

Factory Ground Floor Plan

above

Author , 2024

Figure 7.48

Vault Section Detail

below

Author , 2024

vault section detail

1 : 25

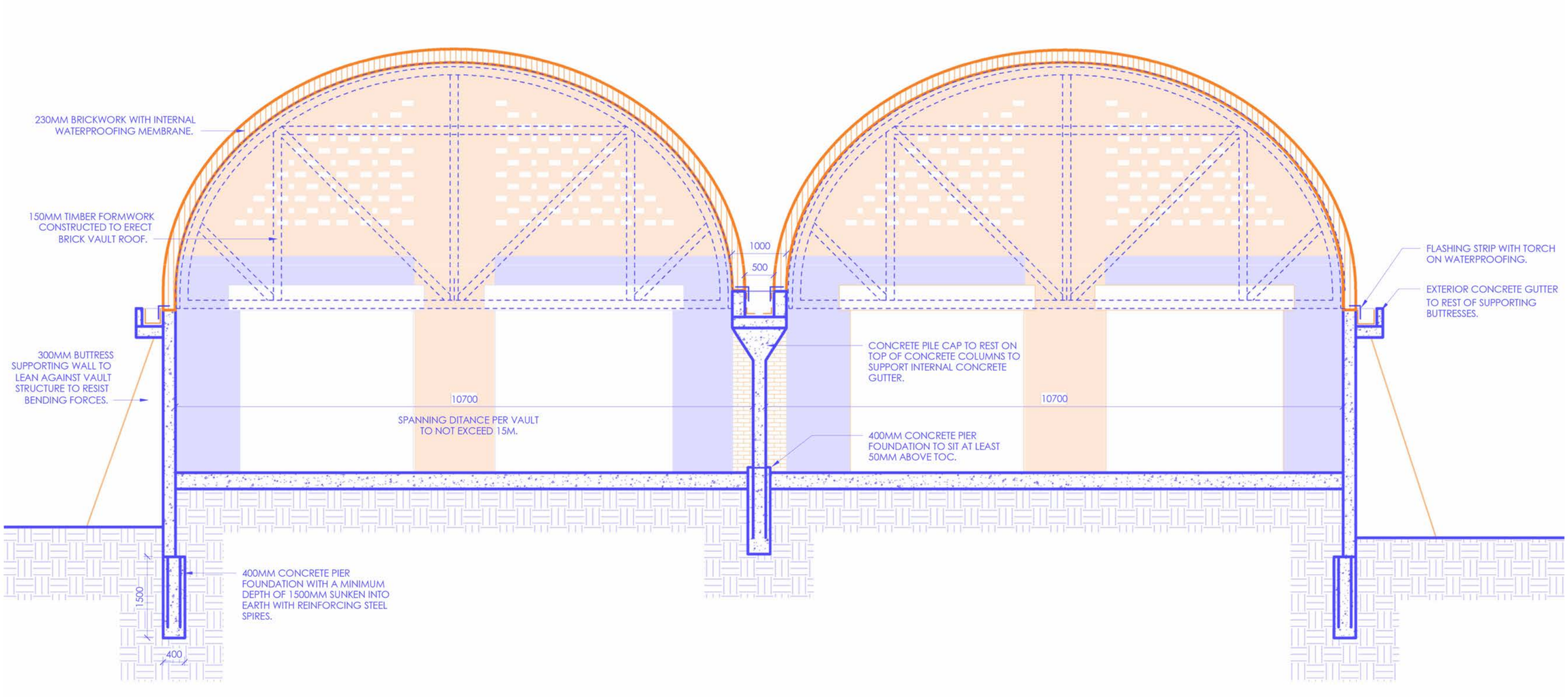


Figure 7.51

Community Floor Plan

below

Author , 2024



community ground floor plan

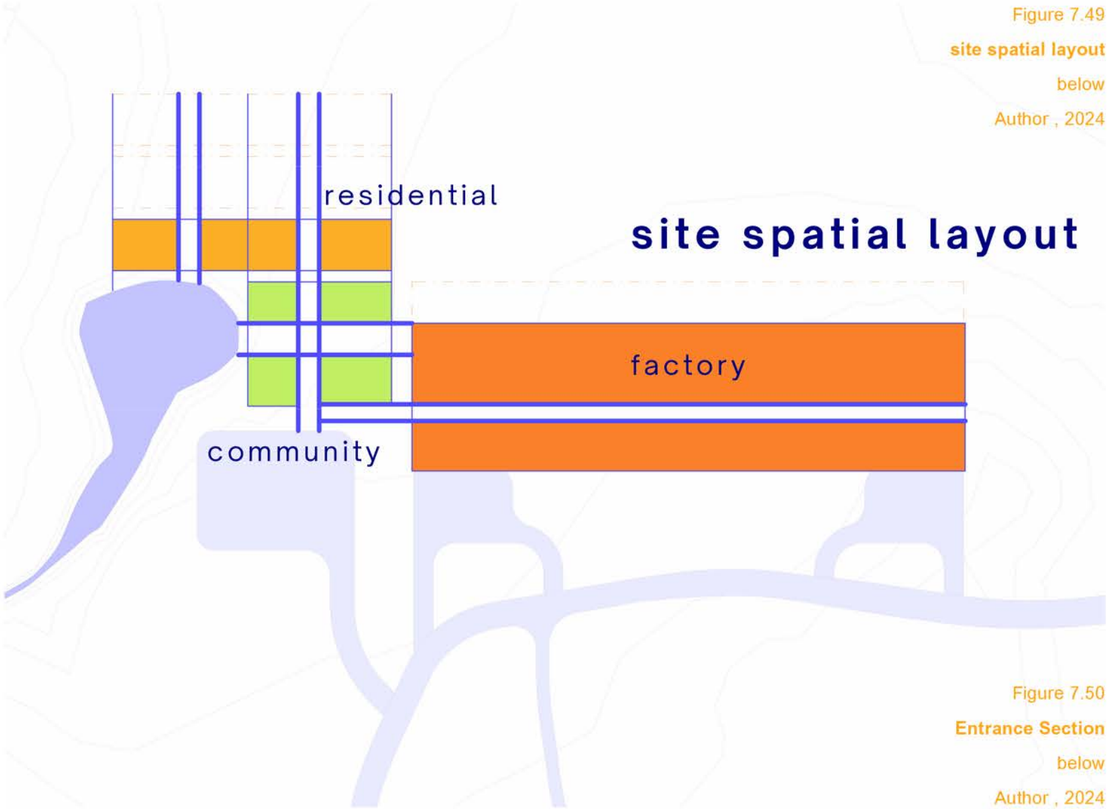
1 : 100

Figure 7.49

site spatial layout

below

Author , 2024



site spatial layout

Figure 7.50

Entrance Section

below

Author , 2024

entrance section

1 : 200

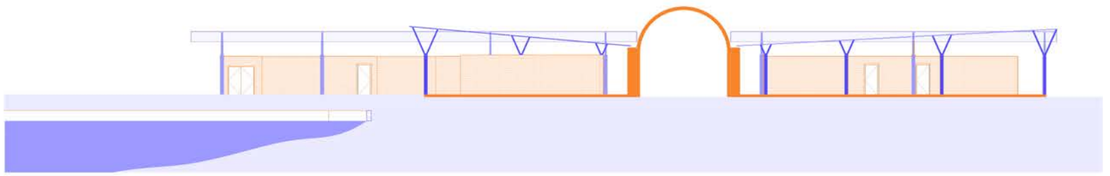


Figure 7.52

Residential Floor Plan

below

Author , 2024

residential ground floor plan

1 : 100

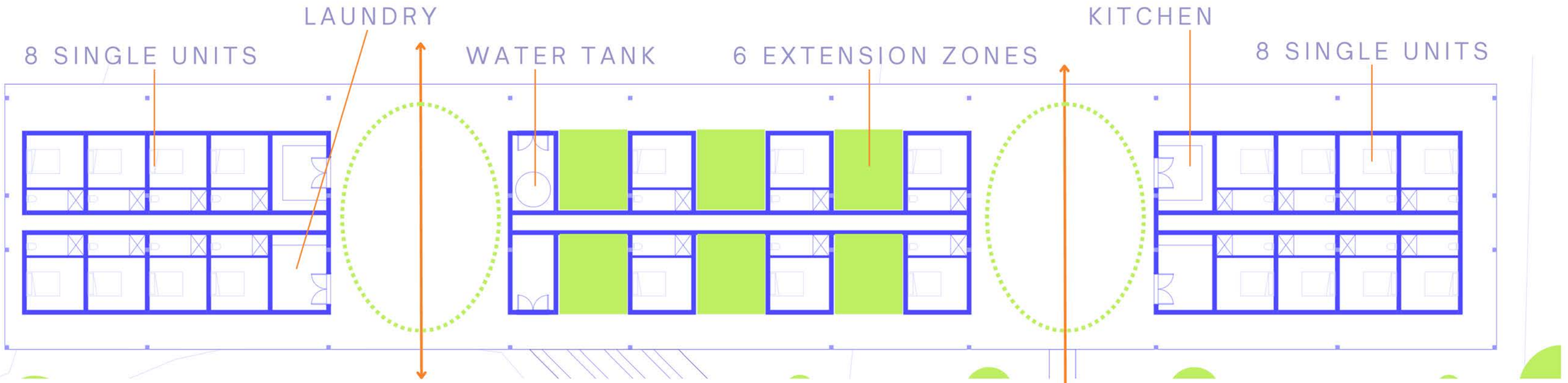


Figure 7.53

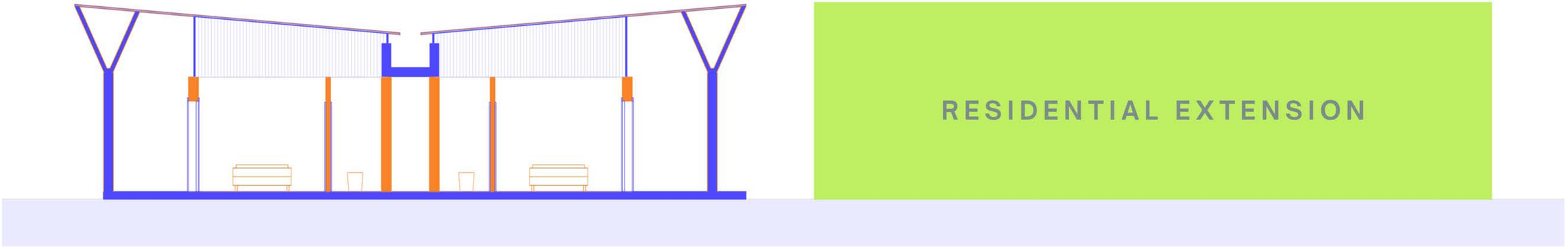
Residential Section

below

Author , 2024

residential section

1 : 100



8 chapter final design

the site

the factory

the community

the housing



Figure 8.1

Final Design Chapter Cover

right

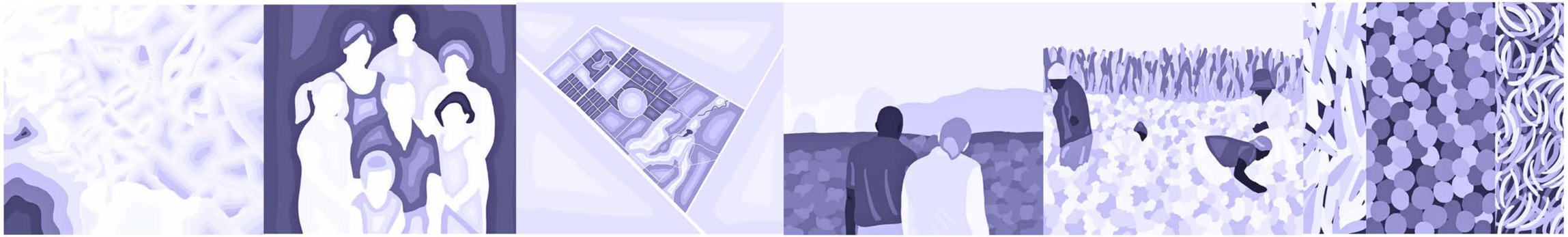
Author , 2024

the site

Figure 8.2
Infographic
Below
Author , 2024

The project transcends beyond merely comprehending a location; but rather evolved into an exploration of my emotional bond with the place I once called home. This is a personal narrative about my hope for post-apartheid agricultural communities across South Africa, which stems from my sensitive background.

While I once saw the farm as a place of solitude and familiarity, it now symbolizes a broader societal shift, with guarded and locked doors, and a vigilant watch. The complex dynamics between land, identity, and belonging that I possess, along with the inherent guilt of grappling with a legacy of indirect past injustices, have embarked me on a journey to heal the soil that has been trampled over for generations.





the site

1 : 1000

The project aims to harmonise the scarred relationship between the farm, or in other words the land, the farmer, and the farm worker by breaking the sector's generational cycle trapped in farming. The design offers a beacon blueprint for a reimagined agricultural landscape in a wounded South Africa that unites and uplifts. The new sector will connect the land—those who own it and those who work it—to join in on a journey of mutual development, striving to heal old wounds and cultivate new growth.

The finalized site plan envisions the development of the factory, community hub, and residence as a prototype for an innovative agricultural integration. The goal is to establish a space that fosters belonging, nurtures community, and promotes skilled empowerment.



Figure 8.3

Site Plan

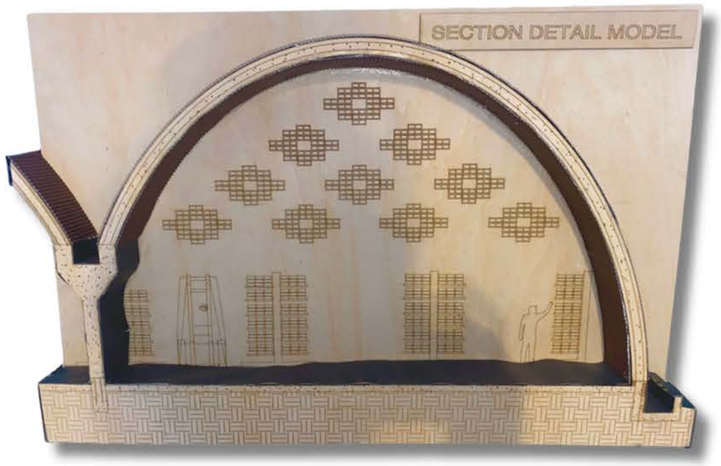
Right

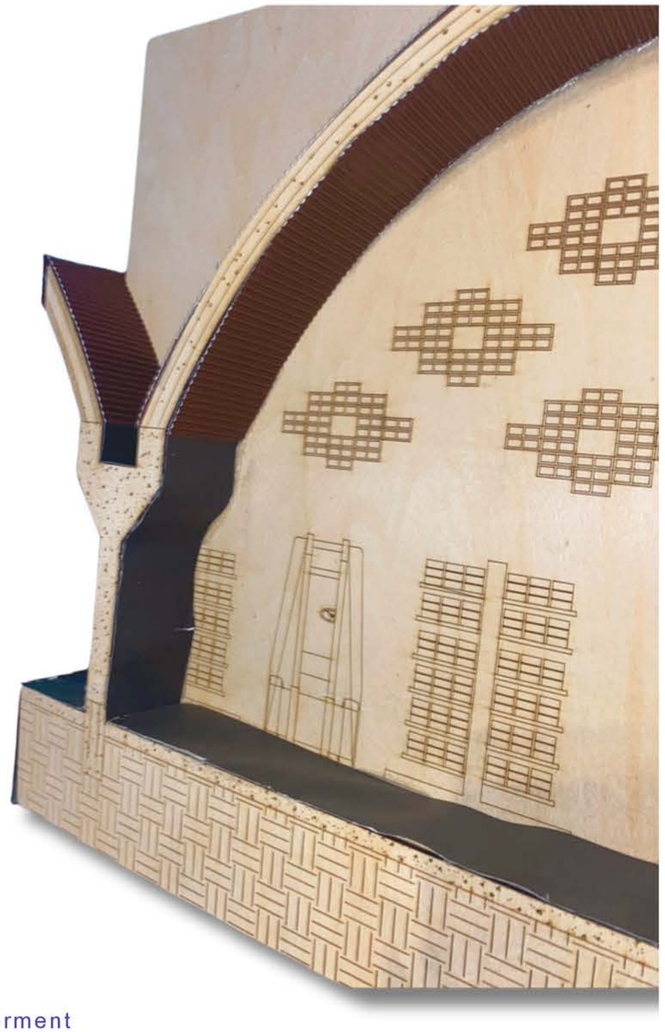
Author , 2024

Figure 8.4
Section Model
Right
Author , 2024

Figure 8.5
Section Model
Right
Author , 2024

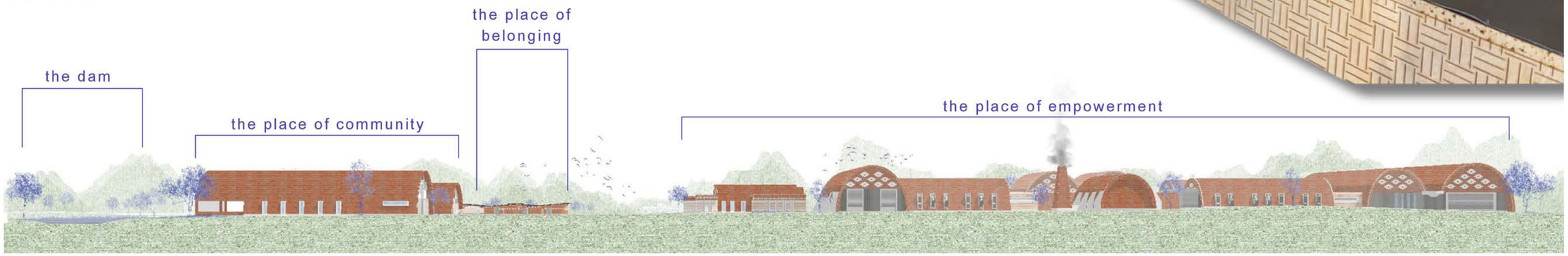
Figure 8.6
Site Elevation
Below
Author , 2024





site elevation

1 : 500



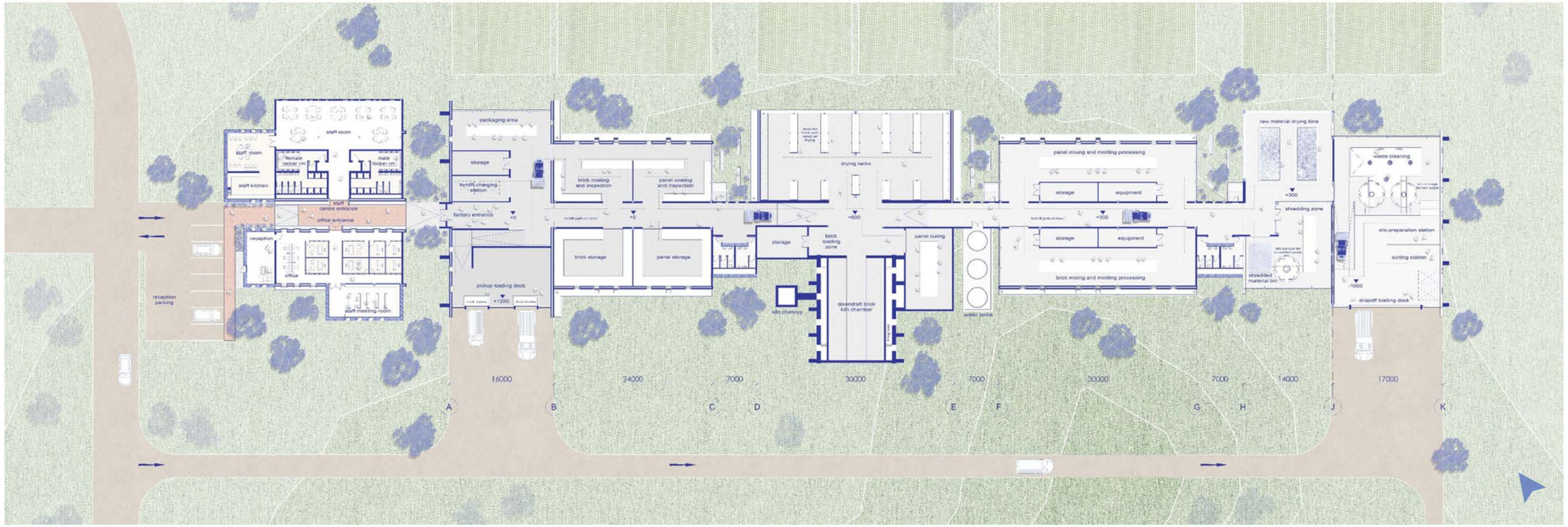
the factory : **place of empowerment**

The concept of empowerment is fueled by practical sustainability and material activism. Agricultural waste poses a significant challenge in crop farming, with no clear strategy for disposal. In an environment where waste is abundant and resources are scarce, merging these two aspects opens up the possibility of transforming waste into usable materials. The potential is limitless, but I want to emphasize the opportunity for creating bricks and panels.

Bricks are a fundamental building material, while panels and timber-like products are extensively used in agriculture for collection and packaging. Both processes have similar production lines, making it straightforward to produce them concurrently. By transforming agricultural waste into usable materials, we can turn factories into hubs of skilled empowerment.



Figure 8.7
Factory Perspective
below
Author , 2024



factory ground floor plan

1 : 100

In the place of skilled empowerment is the factory. The factory cements the concept into the soil grounding the viability of the aspiration. the layout follows a standard linear production flow from east to west to maintain the utmost functionality a factory desires.

IUpon entering from the east is the dropoff dock for farmers to deposit their agricultural waste. The waste enters the production line whereby it is sorted and stored into silos for use when the production line is active.

From here the waste is cleaned and deposited into north facing air drying bins which is then shredded and stored for use. It is at this point that the material formation production line begins with mixing and molding of the brick and panels.

These are then transported to another air drying yard in preparation for curing and firing.finally the materials are coated and packaged for future use. It is at the western point that the loading dock becomes the ends of the production line. It is from this process that the building form of vaults takes root.

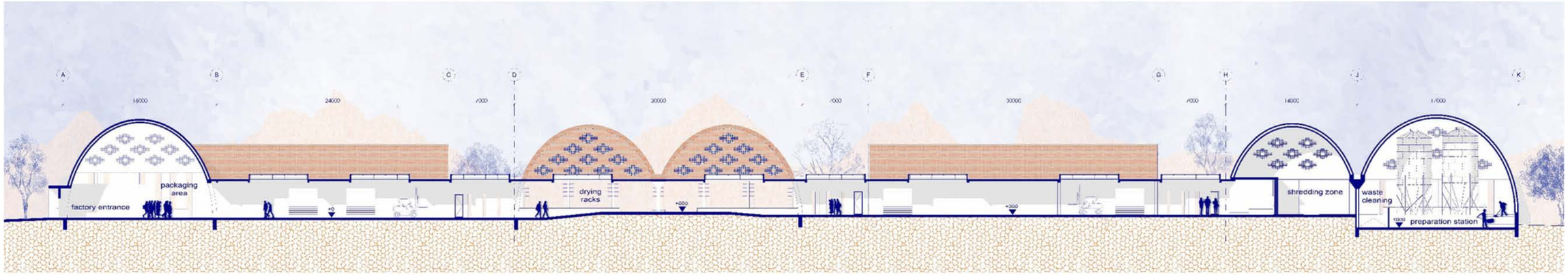
Figure 8.8

Factory Ground Floor Design Plan above

Author , 2024

section through the factory

1 : 200



. The choice of the vault was to void all imposing structural systems limiting the most straightforward linear production line. The vaults are specialized catnaries over typical barrel vaults to achieve the highest spans with the catnary being the most sttrcuturally sound form of the vaults allowing for these spaces rather than limited to the spans of barrels.

Looking at the section model the vault is formed through the assembly of formwork to create a structural concrete infill which is further supported by masonry on both the interior and exterior.

With this vault typology a gutter system is formed for water collection on both the ground and roof level. .

This water collection system forms a key process in the design to restore the brackish soil by flushing out salts with high quanities of water which is not accessible in farming regions

Figure 8.9
Section Through the Factory
bottom
Author , 2024

Figure 8.10
Section Through the Vaults
right
Author , 2024

section through the vaults

1 : 200

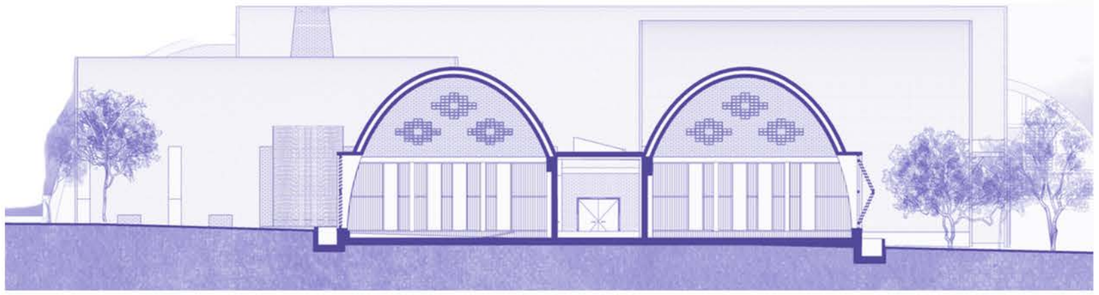


Figure 8.11

Factory Perspective 01

left

Author , 2024

Figure 8.12

Factory Perspective 02

below

Author , 2024





the technical plan

1 : 100

Figure 8.13
Technical Factory Ground Floor Plan
below
Author , 2024

Figure 8.14
North Face Longitudinal Section
below
Author , 2024

The technical plan delves into the complex dynamics of making a factory function efficiently. Exploring the areas and sizes of the vaults provides a tangible scale to an otherwise abstract concept. Without understanding the scale of the factory, it is difficult to grasp its intricate systems and interwoven processes.

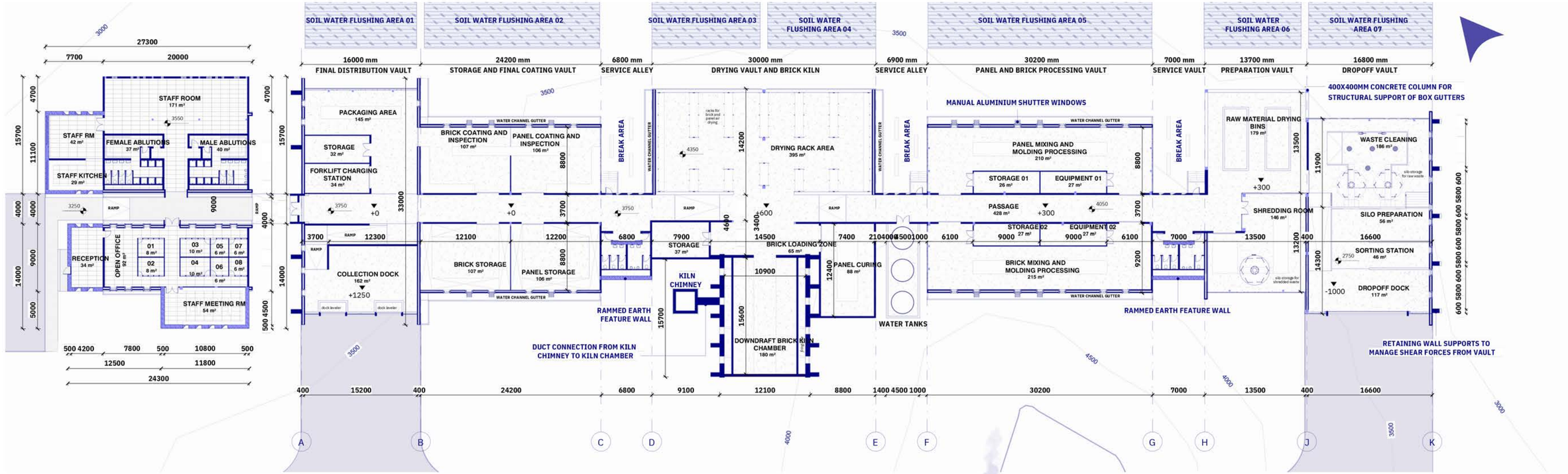










Figure 8.15
Perspective 03
above
Author , 2024

Figure 8.16
Perspective 04
right
Author , 2024

Figure 8.17
Perspective 05
right
Author , 2024

office elevation

1 : 100

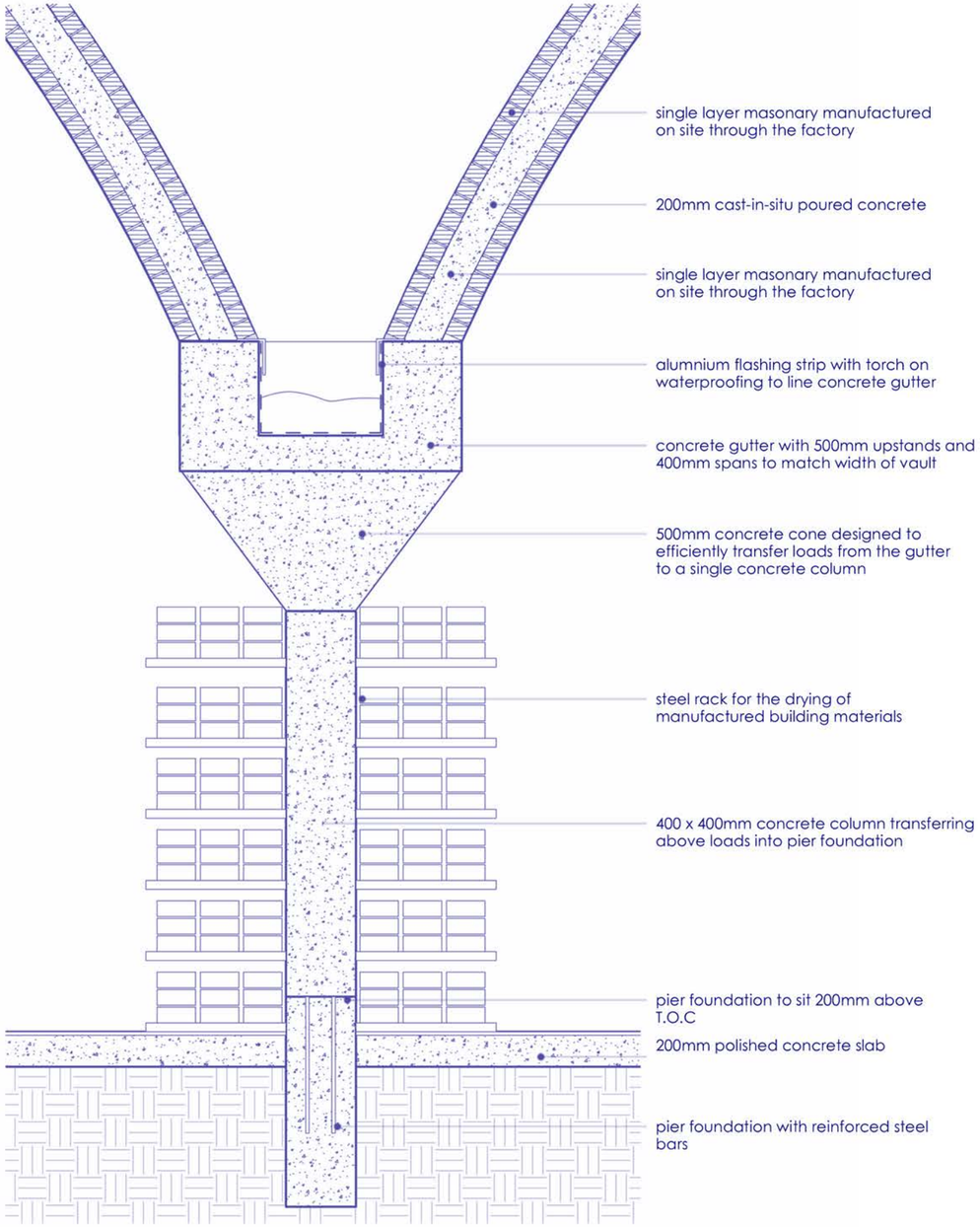


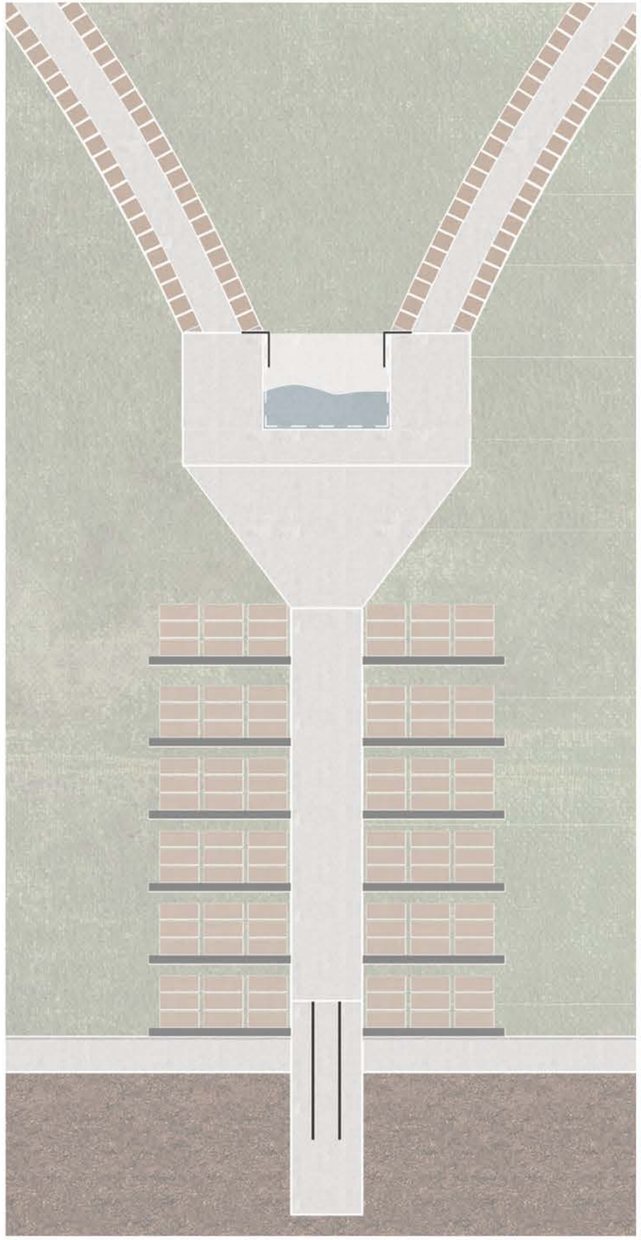
Figure 8.19

Office Front Elevation

below

Author , 2024





box gutter section

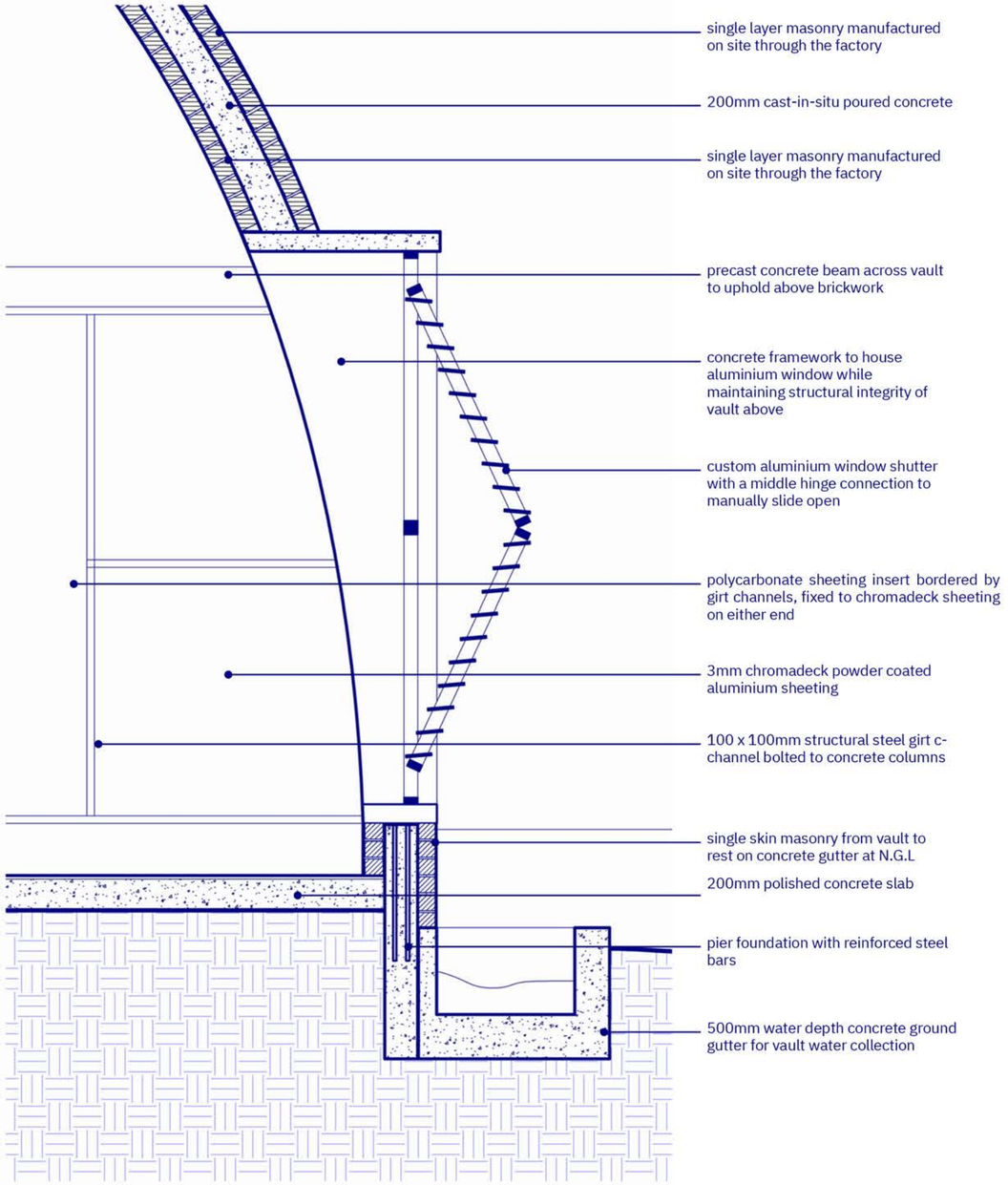
1 : 25

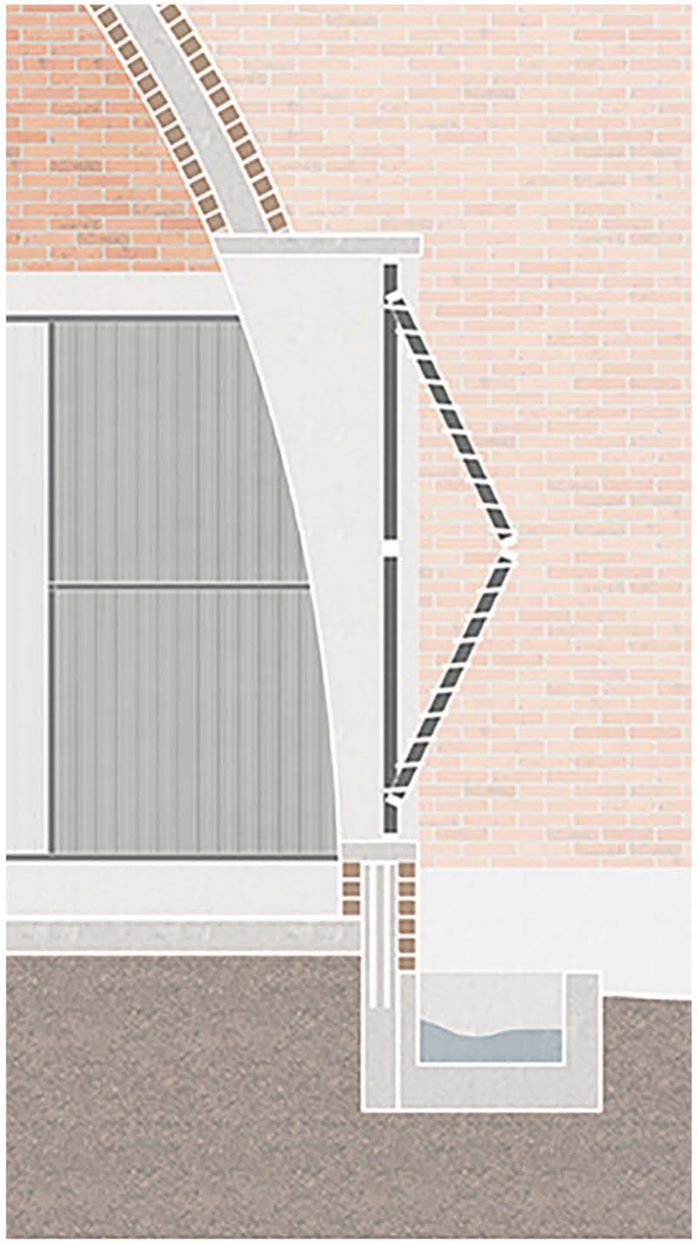
This section detail showcases a construction typology that integrates a cast-in-situ concrete structure, site-manufactured masonry, and a concrete gutter system for efficient load transfer and water management.

Designed for durability and functionality, the system employs reinforced pier foundations, polished concrete slabs, and strategic waterproofing to ensure longevity.

Additionally, a steel drying rack is incorporated to support the curing of building materials, reinforcing the synergy between structural and production elements.

Figure 8.20
box gutter detail
left
Author , 2024





window shutter and floor gutter section

1 : 25

This window detail illustrates a construction system that integrates site-manufactured masonry, a reinforced concrete framework, and a custom aluminium window shutter within a structurally cohesive vault system.
A precast concrete beam supports the brickwork above, ensuring stability, while a concrete gutter at natural ground level (N.G.L) collects vault water runoff. The window housing is reinforced with chromadeck-coated aluminium sheeting and polycarbonate inserts, providing durability and controlled ventilation.

A 100x100mm structural steel girt channel, bolted to concrete columns, reinforces the window assembly. This system balances structural integrity, water management, and passive ventilation, optimizing the efficiency of the building envelope.

Figure 8.21
window detail
left
Author , 2024



Figure 8.22

Perspective 06

bottom

Author , 2024

the community: **the place of unity**

1 : 100

A place of unity aims to unite the generational farmer with the new democratic farmer while joining the farm worker in unison. The needs of all three entities vary, but a space for collaboration can create the partnership still lacking 30 years post-apartheid. Therefore, a community centre, a hub of activity and teamwork as a space for all, blurs the wire fencing surrounding the plots.

Figure 8.23
Perspective 07
below
Author , 2024



community floor plan

1 : 100

Moving onto the place of unity which is the community centre the form continues with the vault construction to produce large event and semiar spaces with the implementation of rammed earth and picado.

Picado is the formation of a cementitious like material made through the mixing of crushed brick and cement which is chipped away to reveal a staggered surface.

The implementation of earth into the community centre aims to conceptually cement the land through its walls to the people within it. The façade of the centre sees a concrete framework system applied to the ends of the vaults with brick , cinder block and glass infill.

Allowing for an expression of place through identity opposed to the faced of the factory with cinder block and masonry infills of functionality.



Figure 8.324

Community Ground Floor Plan

right

Author , 2024

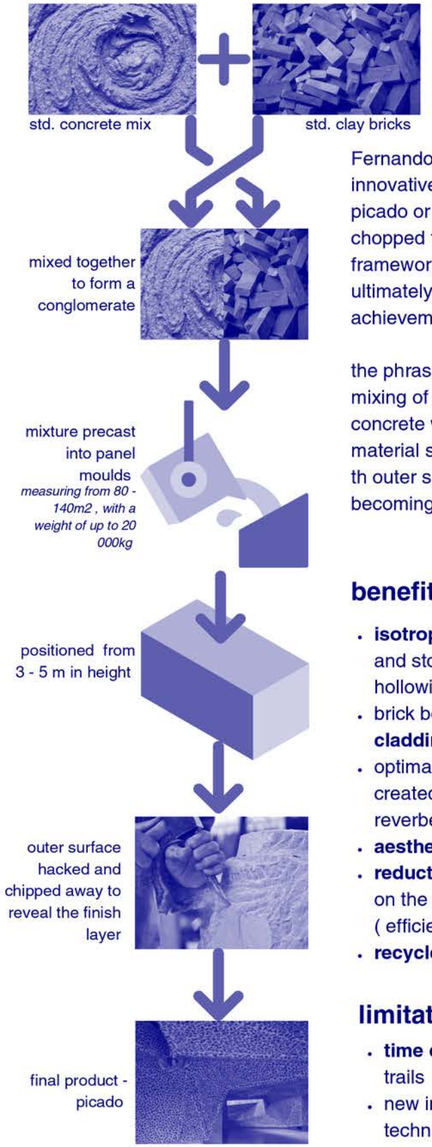
commuinity front elevation

1 : 100

Figure 8.26
Community Front Elevation
below
Author , 2024



picado construction technique



Fernando Menis developed the innovative technique termed picado or known to others as chopped to develop the structural framework of his design which ultimately led to the aesthetic achievement of the building.

the phrase picado refers to the mixing of thick reinforced concrete with another BUILDING material such as brick wherefter th outer surface is hacked off becoming the finishing facade.

benefits

- **isotropic properties** of concrete and stone allow for carving , hollowing and forging
- brick becomes **structural and cladding** material
- optimal **accoustic** parameters created (sound absorptioon and reverberation control)
- **aesthetic**
- **reduction of negative impact** on the natural environment (efficient resource strategy)
- **recycle** old brick

limitations

- **time consuming** requiring many trails
- new inventive construction technique requiring trial tests



Figure 8.27
Picado Technique
left
Author , 2024

Figure 8.28
Community Model
right
Author , 2024

Figure 8.29
Community Model
under
Author , 2024

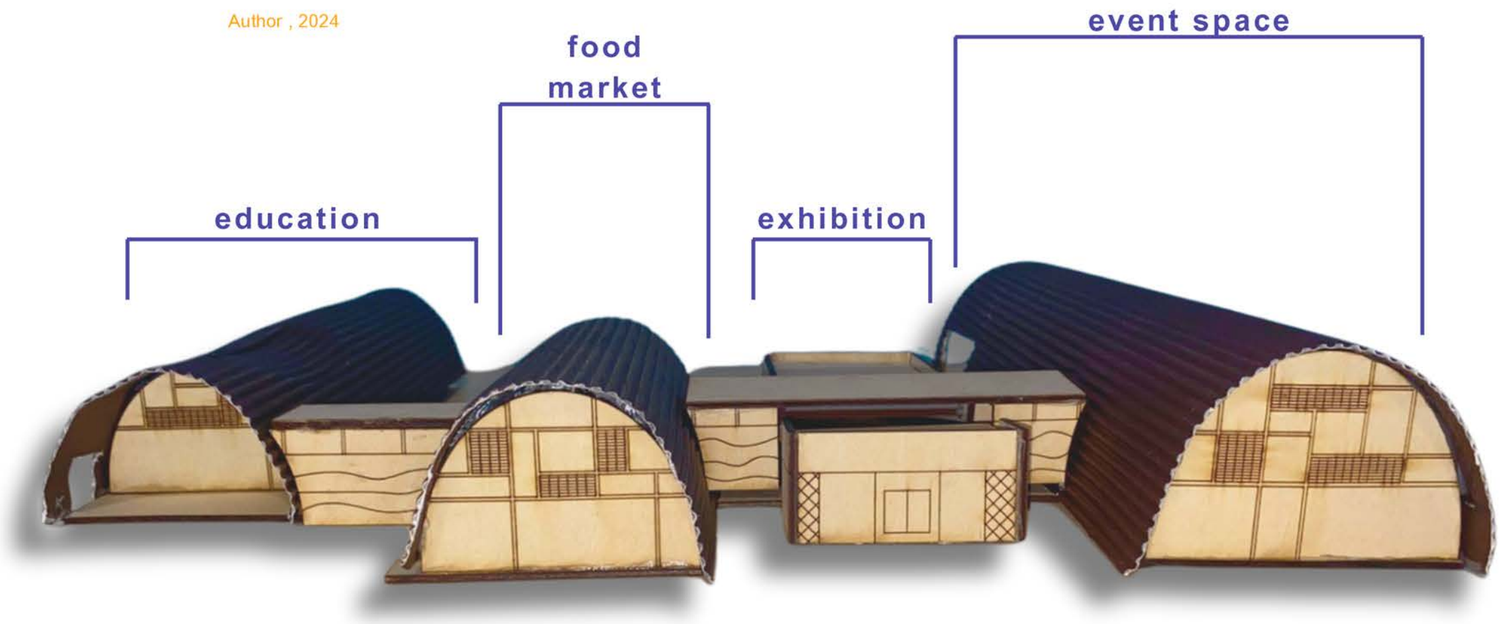


Figure 8.30
Perspective 08
under
Author , 2024

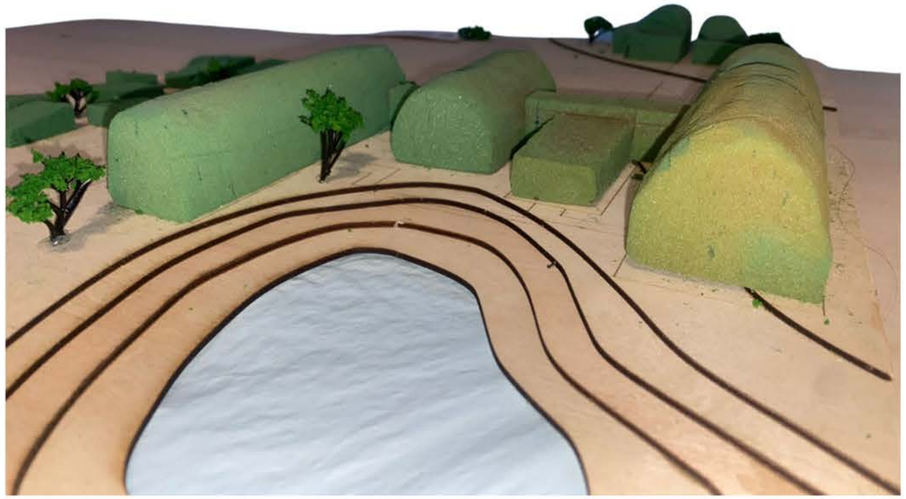


Figure 8.31
Perspective 09
right
Author , 2024



Figure 8.32
Perspective 10
right
Author , 2024





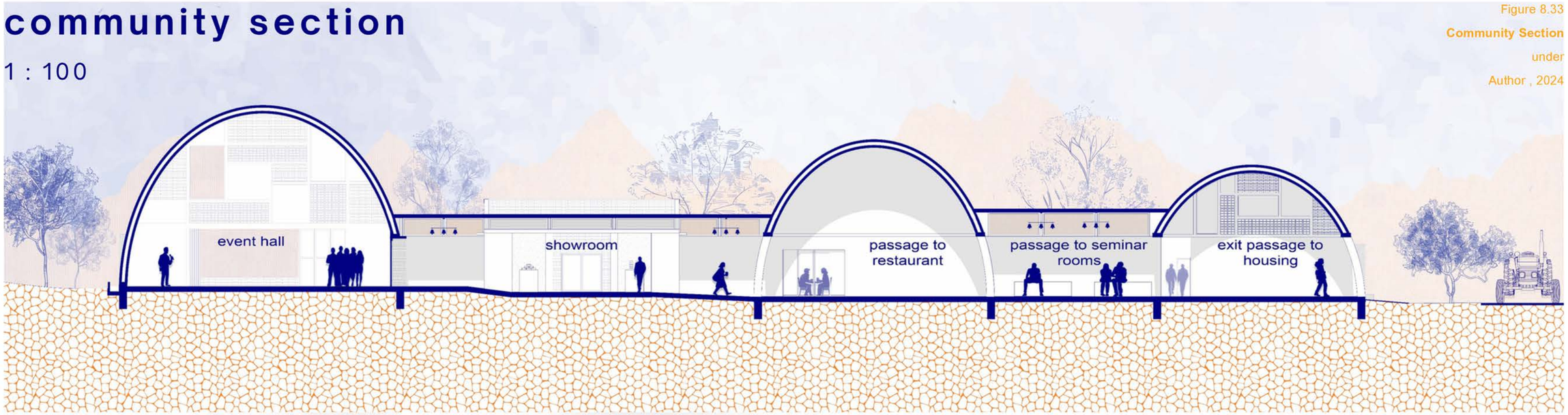


Figure 8.33
Community Section
under
Author , 2024

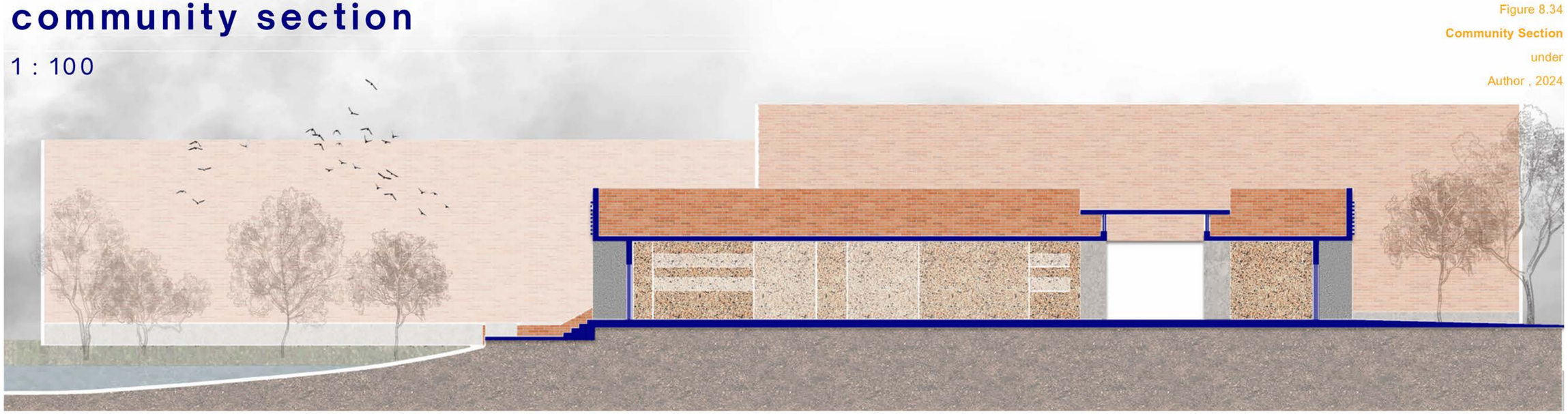


Figure 8.34
Community Section
under
Author , 2024



Figure 8.35

Perspective 11

below

Author , 2024

the housing: the place of unity

A place of belonging zooms in on the workers who travel from the surrounding townships every day to the farms. Farm workers in this corridor have not been given accommodation on the farms like in other farming corridors. Leaving vast distances to travel each day, as in the agricultural rural landscape programme, is spread out vastly. A place of belonging provides temporary housing accommodation to the employees of the site in a communal living complex that embeds the farm workers' imprint on the land they sow.

Figure 8.36
Perspective 12
below
Author , 2024



floor plan

1 : 100

Lastly, the place of belonging creates a housing complex for workers of the site. A standard typology of masonry and sheeting creates a perimeter formwork for the infill of divisions to be set by the user.

The first typology follows a single unit system of an individual bedroom and an attached bathroom to share a communal kitchen and living space. The second typology of the double unit splits the standard typology into two, creating privacy.

The final unit offers a family typology of four-bedroom units with two shared bathrooms and a central living space. All units are arranged to create an exterior courtyard.



Figure 8.37

Housing Ground Floor Plan

right

Author , 2024

standard housing formwork

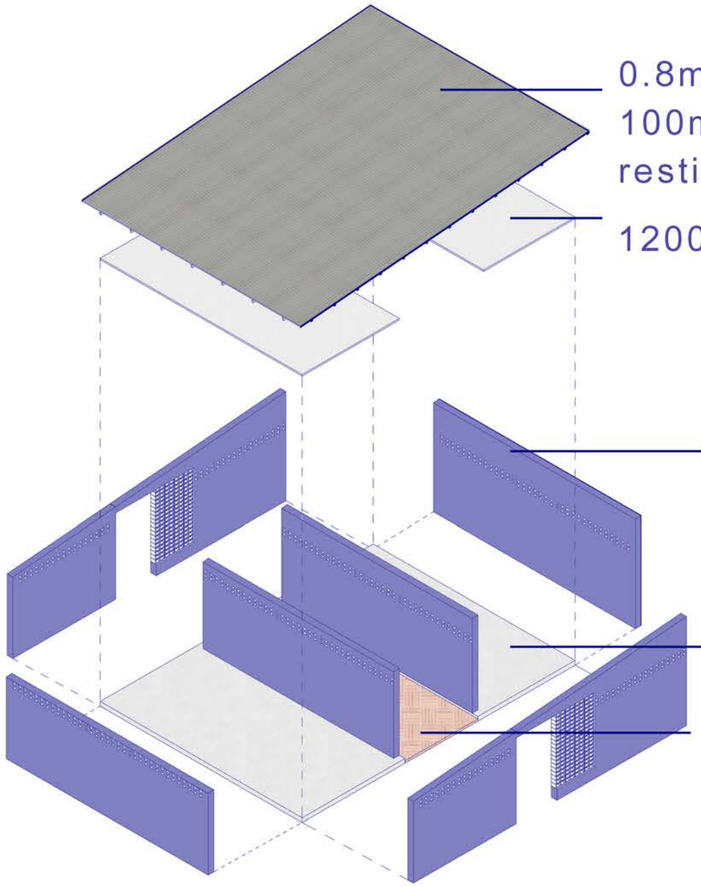


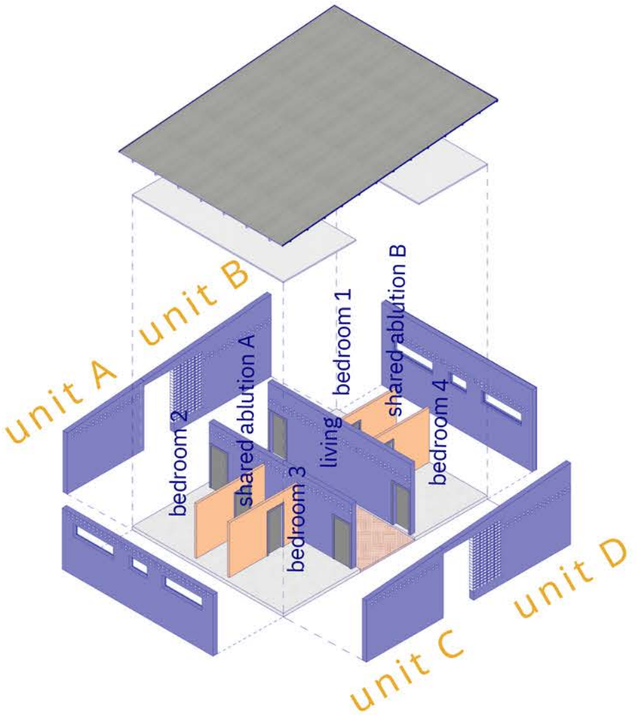
Figure 8.38
Housing Typology
above
Author , 2024



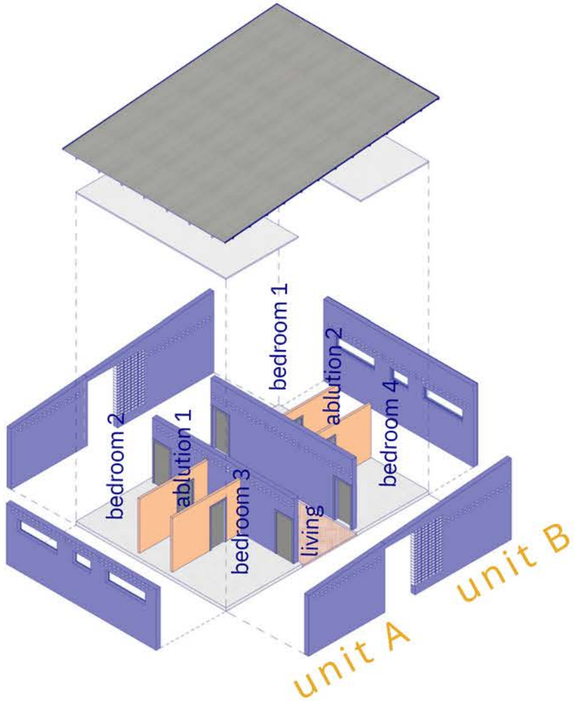
Figure 8.39
Housing model
right
Author , 2024

unit typologies

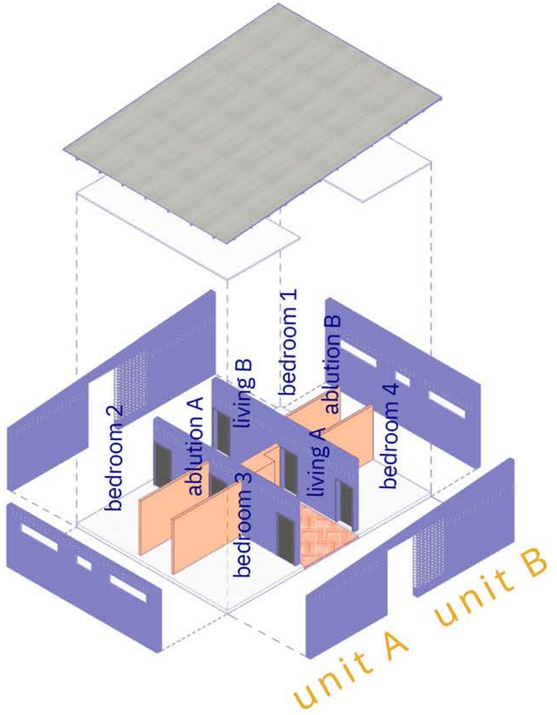
single unit typology



family unit typology



double unit typology



standard housing perimeter walls

unit typology infill walls

Figure 8.40
Housing typologies above
Author , 2024



Figure 8.41

Perspective 13

left

Author , 2024

housing model typology

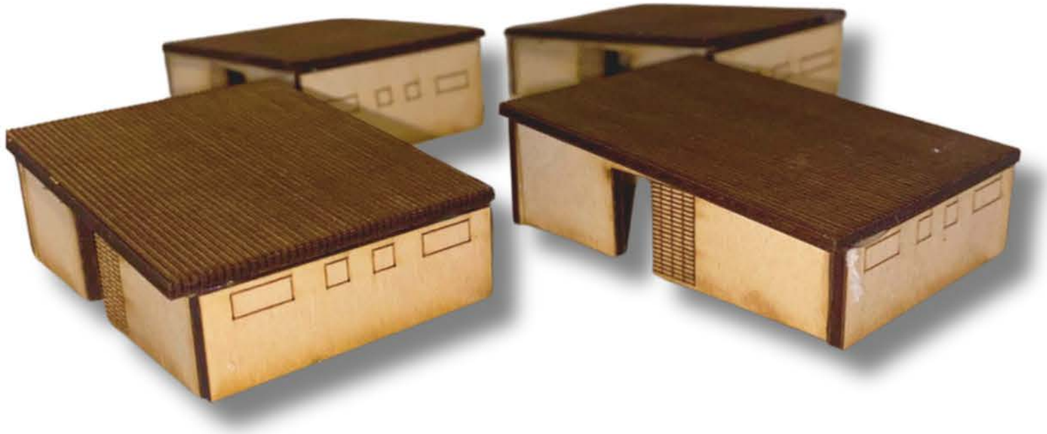


Figure 8.42
Housing model 01
left
Author , 2024



Figure 8.43
Housing model 02
left
Author , 2024

housing elevation

1 : 200



Figure 8.44
Housing Elevation
below
Author , 2024

It is with a place of skilled empowerment , a place of unity and a place of belonging that cultivating terraformation invisions a future where the scared land of our nation becomes a canvas of renewal painting a picture of resiliencewhere the scars of the past are transformed into a tapestry of hope and harmony.

appendix

viability report

1. Project brief
2. Client
3. Financial considerations
4. Professional team
5. Site
6. Design, sustainability, and materiality
7. conclusion



Project Brief

The project proposal is to design a new industry hub and residence for the agricultural sector in the small-town farming corridor of Ofcolaco, Limpopo. The design is centered around creating an agricultural waste processing and production center to mitigate the excessive quantities of crop residue produced in farming. It has been estimated that 45% of South Africa's total available food supply is wasted annually, with the primary production stage of the food cycle on farms being the major contributor.

Therefore, the design intends to mitigate this agricultural problem into a profitable infrastructure system. The system will allow for the processing and production of agricultural waste in the farming corridor to be developed into durable and profitable building materials for local communities. The building serves to employ a new generation in agriculture, forming a new business sector in the agriculture industry while combating the excessive environmental effects of agriculture.

The centre aims to engage in three different functions: Sustainability and recycling, community engagement and upliftment, and residential empowerment.

At the heart of this endeavour lies the processing and production hub for agricultural waste to be transformed into built materiality. Secondly, the centre aims to unite the community gap between farmers and farmworkers; a community hall for town meetings and educational seminars will instil a sense of place in the scattered farming corridor.

Lastly, the proposal will also encompass on-site housing for the hub workers and families, bridging the gap between farm owners and township workers. The design becomes a beacon example for other farming corridors across South Africa in mitigating employment shortages, waste excess, and sub-standard housing, breaking the mould of the farmworker stuck in the generational cycle of agriculture.

funding

The project is to be initated by government and local authorities putting the funding on departmental facalties with external ventures in sustainable agricultural funding.

1. Agri-Business Fund

The Agri-Business Fund (ABC Fund) is an initiative made possible by IFAD, an international financial institution and specialized United Nations agency. The ABC Fund provides loans and equity investments tailored to the needs of farmers' organizations and agri-preneurs, targeting commercially viable ventures that can help generate employment, especially for youth and women, and provide rural livelihoods. The development is an ideal proposal for the fund, as it aims to generate employment for farmworkers while sustainably recycling byproducts of farming, aligning with the organization's climate-smart products that promote sustainable production values. Their large grant expenditure of $23.2 billion has provided African farmers with a means to do more since 1978.The fund will be beneficial in securing a large portion of expenditure for the construction of the agri-processing hub due to their large

2. GreenAgri

GreenAgri is an organization with strategic goals aimed at developing a Green Economy Strategic Framework, focusing on smart agri-production plans, sustainable farming practices, conservation needs, resource efficiency, and waste minimization. Investments are made when a proposal demonstrates an increase in employment, modernized machinery, competitiveness, and productivity. The organization has categories of investment to which one can apply.

3. Alliance for a Green Revolution in Africa

The Alliance for a Green Revolution in Africa (AGRA) is a farmer-centered, African-led, and partnerships-driven institution that is transforming Africa’s smallholder farming from a solitary struggle to survive to businesses that thrive. The organization's aim is to invest in projects that can have measurable impact and AGRA aims to drive change in agriculture through government-aligned investments. Requests for Proposals, Applications, and Concept Notes are used to solicit grant applications, which must align with guidelines. AGRA grants are based on available funds and may not fully fund projects, but offer investment opportunities for the Green Revolution in South Africa.

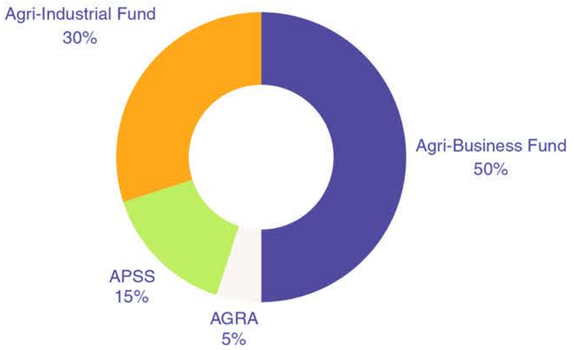
a. Agro-Processing Support Scheme

The Agro-Processing Support Scheme aims to stimulate investment by the South African agro-processing enterprises. The scheme offers a 20% to a 30% cost-sharing grant to a maximum of R20 million over a two-year investment period, with a last claim to be submitted within six months after the final approved milestone. The consideration of an additional 10% grant for projects that meet all economic benefit criteria such as employment, transformation, geographic spread and local procurement can be met to lower cost-sharing.The grant in achieving the cap of R20 million will provide for the professional fees on the project.

Figure 0.1
Client Ornanogram
left
Author , 2024

b. Agri-Industrial Fund

The Industrial Development Corporation (IDC), in partnership with the Department of Agriculture, Land Reform & Rural Development (DALRRD), has established the Agri-Industrial Fund to support a wide range of economically viable activities in the agro-processing sectors. This is a debt and grant fund that provides equity on a case-by-case basis. The fund size is R1 billion, sourced from public funding that is to be repaid. The funding is required by the state to be used for purchasing capital equipment and infrastructure, allowing for the purchase of machinery for development.Given that this is a community-led development initiative, the criterion for the fund, requiring at least 60% ownership by black individuals or entities, is both relevant and viable.



funding

The development sets a precedent for farming corridors nationwide, addressing employment shortages, waste management challenges, and inadequate housing, thereby challenging the traditional cycle of generational agricultural labour.

The design holds three different functional zones:

1. Processing and production hub
2. Community area
3. Residential

GreenAgri is an organization with strategic goals aimed at developing a Green Economy Strategic Framework, focusing on smart agri-production plans, sustainable farming practices, conservation needs, resource efficiency, and waste minimization. Investments are made when a proposal demonstrates an increase in employment, modernized machinery, competitiveness, and productivity. The organization has categories of investment to which one can apply.

1. Agriculture Processing and Production Hub

At the heart of the design is the agricultural waste transformation system turning ergonomic residue into durable building materials.

2. Community Area

The community area aims to bridge the gap between farmers and farmworkers, fostering unity within the scattered farming corridor. A community hall designed for town meetings and educational seminars will serve as a hub, cultivating a shared sense of belonging and purpose among residents.

3. Residential Units

The proposal includes on-site housing for hub workers and their families, facilitating closer connections between farm owners and township workers.

4. Transitional Zones and Circulation

Strategic interventions that delineate places and boundaries are essential. Situating the three interventions on the site must be executed seamlessly yet distinctly to ensure smooth transitions. In high-traffic areas, providing shaded coverings becomes imperative to mitigate the harsh climate's impact on extensive travel, particularly during scorching heat.

ZONE	PROGRAMME	SIZE (m2)	COST (R/M2)	TOTAL COST (R)
AGRICULTURAL HUB *(CALCULATED AT 7000M2 FOR OFFICES AND 10 000M2 FOR INDUSTRIAL)*	RECEPTION	20	10 000	200 000
	SHOWROOM	200	7000	2 400 000
	WORKSHOP	120	7000	840 000
	OFFICES	120	10 000	1 200 000
	KITCHEN/STAFF RM	30	7000	210 000
	PRODUCTION ZONE	400	7000	2 800 000
	STORAGE	60	7000	420 000
	ABLUTIONS	50	7000	350 000
	SERVICES	120	7000	840 000
	DROPOFF	50	7000	350 000
	SORTING STATION	100	7000	700 000
	DRYING STATION	150	7000	1 050 000
TOTAL COST OF RESIDENTIAL	**R11 360 000**			

ZONE	PROGRAMME	SIZE (m2)	COST (R/M2)	TOTAL COST (R)
COMMUNITY CENTRE *(CALCULATED AT 12 000M2)*	COMMUNITY HALL	600	12 000	7 200 000
	ABLUTIONS	40	12 000	480 000
	STORAGE	30	12 000	360 000
	KITCHENETTE	30	12 000	360 000
	EXTERNAL VERANDA	400	12 000	4 800 000
TOTAL COST OF COMMUNITY AREA	**R6 720 000**			

ZONE	PROGRAMME	SIZE (m2)	COST (R/M2)	TOTAL COST (R)
RESIDENTIAL UNITS *(CALCULATED AT 12 000M2)*	SINGLE UNIT	35 PER UNIT	5000	1 750 000
	FAMILY UNIT	100 PER UNIT	3000	2 500 000
TOTAL COST OF RESIDENTIAL UNITS	**R4 250 000**			

ZONE	PROGRAMME	SIZE (m2)	COST (R/M2)	TOTAL COST (R)
SITE WORKS	PARKING	2000	700	1 400 000
	LANDSCAPING	5000	500	2 500 000
	CIRCULATION	1500	2000	3 000 000
TOTAL COST OF SITE WORKS	**R6 900 000**			

ZONE	TOTAL COST (R)
AGRICULTURAL HUB	11 360 000
COMMUNITY CENTRE	6 720 000
RESIDENTIAL UNITS	4 250 000
SITE WORKS	6 900 000
TOTAL COST OF SITE WORKS	**R29 230 000**

Figure 0.1
Client Ornanogram
left
Author , 2024

financial considerations

Site Purchasing Cost

The site is owned by the Maitjene Community Develpment Trust. Therefore no site purchase will be needed to be made as the land is under ownership of the government already in which the devlopment proposal is intended.

1. Long - Term Finacial considerations

TThe project aims to serve two crucial purposes: firstly, to establish a sustainable revenue stream for the Maitjene Community Development Trust, and secondly, to address the pressing issue of inadequate waste disposal sites within the Greater Tzaneen Municipality.

Establishing a new revenue stream for the Maitjene Trust will enable the organization to expand its economic horizons. This initiative not only reinvests money into the trust but also creates jobs and income for the community.

but also serves as a model for similar endeavors in farming corridors across South Africa. The success and scalability of the project hinge on robust government support, emphasizing the critical role of government backing in facilitating its expansion, growth, and overall development.

By effectively managing agricultural waste, this initiative not only benefits the local community but also serves as a model for similar endeavors in farming corridors across South Africa. The success and scalability of the project hinge on robust government support, emphasizing the critical role of government backing in facilitating its expansion, growth, and overall development.

professional team

Given the public nature of the development, it is beneficial to issue an open tender for the creation of the professional teams' contractual services. This process allows consultants to submit their proposals, enabling the client to select suitable candidates based on budget, skills, and the required timeframe for the project. An open tender ensures transparency in the public sector and promotes fair appointment of contractual services. Once a tender is accepted, it becomes a binding business contract. The professional team will then enter into the JBCC Principal Agreement, ensuring that discrepancies, time management, and payments are handled within a formal contractual framework.

1. Architect

The architectural designer will maintain their role throughout the project's timeline, appointed for their partial services. A registered, qualified architect will be fully appointed as Principal Agent, Principal Consultant, and Architect. The architect will enter into the Client-Architect Agreement (SAIA) with the client, which forms the basis of their legal relationship. As the appointed professional for full services, the architect will act on behalf of the client and oversee all consultants appointed to the professional team.

2. Attorney

The attorney will be responsible for drawing up all contrtacts between governemnt and inter-governemental departments and entities.

3. Quantity Surveyor

The primary responsibility of a quantity surveyor revolves around cost management. Their expertise will provide a factual costing on all components of construction and maintaining the project costs in alignment with the contractual terms.

4. Land surveyor

There is no record of a site survey ever being conducted. Therefore, to understand the potential flood risk due to water sources on site, a land surveyor must be brought in, as flooding poses a potential threat to the development.

Figure 0.1
Client Ornanogram
left
Author , 2024

5. Geotechnical Engineer

A Geotechnical engineer needs to be appointerd to understand the soil conditions on site. The soil contains a high acidic value, characterized as brackish soil which could affect positioning on site and foundational layouts and specifications.

6. Engineering Consultants

An electrical engineer will need to be appointed to design and oversee all electrical components of the design. Their expertise in solar is also crucial for the renewable energy source to be implemented on site.

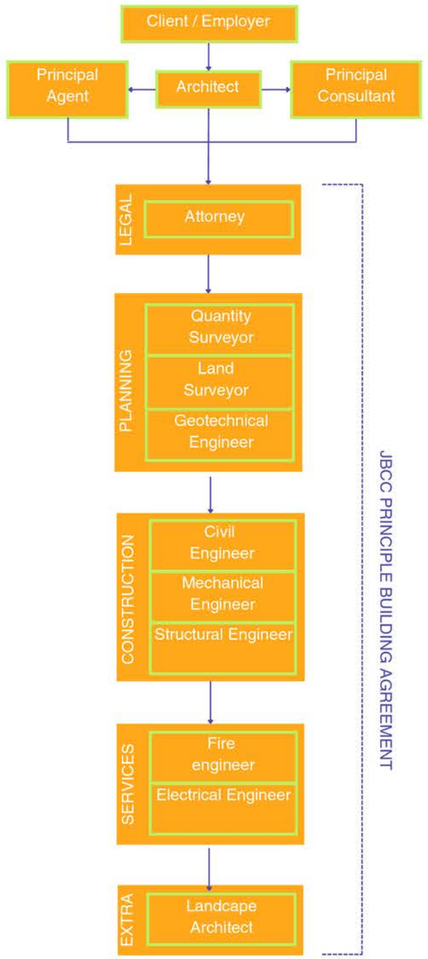
A civil engineer is to appointed to erect and produce a structural integrity on site. They also hold the power to sign off on the structural regulations of the buildings.

The mechanical engineer will oversee all mechanical systems of the building. The development will house technical machinary for processing and prodcution which will require the consultants specification and approval.

The fire engineer will provide specifications on regulating the building for a potential fire hazard.

7. Landscape Architect

In dealing with the Limpopo Savannah biome a landscape architect with knowledge on green space in this sphere needs to be understood to adhere to the indigenous ecosystem.



the site

P.O BOX 245 , OFCOLACO, LIMPOPO	
ERF	ERF 24 PORTION 55
SITE AREA	731 032m²
ZONING	
OWNERSHIP	MAITJENE COMMUNITY DEVELOPMENT TRUST

The entire ERF of Luxemburg 24 is subdivided into 55 portions. The zones in question are portions 9 and 55 situated side by side. The Maitjene Community Development Trust owns this land established in 2008 by the Department of Land Affairs to provide provisions for the Land Restitution Act 22 of 1994.

The trust has claimed 23 farms along the Selati River of Ofcolaco to rectify the unjustly forced removals of native communities from their lands at the end of World War 1. Today the M.C.D.T has ownership of 7 902 hectares of land valued at R83 million.

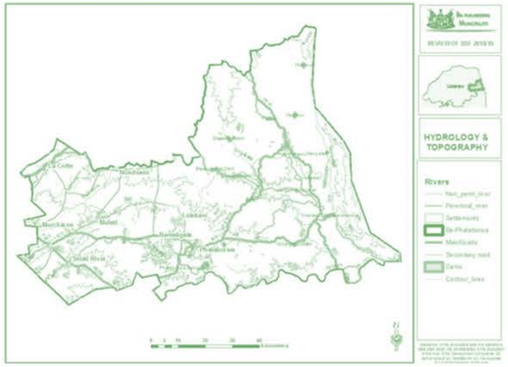
In claiming back these farms the trust has chosen to rent 18 of the farms to the previous owners at 2% of the original buying price. This is because the trust does not want to see the fall of successful farms to the unfairly unskilled and untrained community. Rather by renting out the trust's claimed land back to the original farmers, the agreement states that community members must be employed and upskilled to uplift the farm workers to become the new generation of farmers. This is what M.C.D.T has chosen to do with the portion 9 of ERF 24 with portion 55 vacant due to uncultivable land.

environmental considerations

1. Hydrology

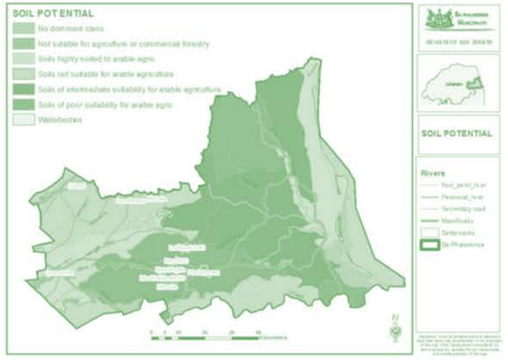
The town of Ofcolaco finds the Selati River running through its community, though not directly along the site, small water sources such as a dam and seasonal stream hold a place on the farm. This poses the threat of floods and requires compliance with the National Water Act which states that no development shall be permitted that is subjected to flooding by a 1:100-year flood. The municipality will however consent to the erection of buildings on such portion of the ERF if it is satisfied that the said portion will no longer be subject to inundation, which in the case of the proposed site holds true.

Figure 0.1
Client Ornanogram
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Author , 2024



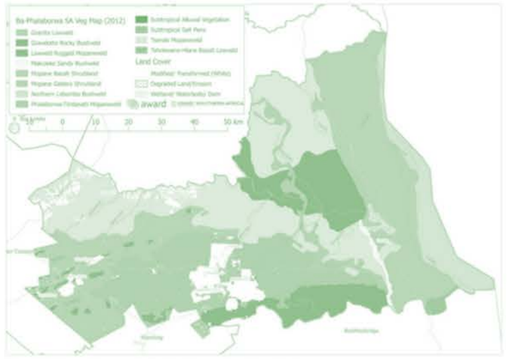
2. Soil Conditions

The farm is divided into portions 9 and 55 comprised of cultivated and uncultivated land. Where the intervention takes host on portion 55 which has an unsuitable soil potential for arable agriculture due to its high alkalinity levels. This soil is known as brackish soil. Due to this, the land sits vacant and possesses the great opportunity for development in the area.



3. Vegetation

The farm is divided into portions 9 and 55 comprised of cultivated and uncultivated land. Where the intervention takes host on portion 55 which has an unsuitable soil potential for arable agriculture due to its high alkalinity levels. This soil is known as brackish soil. Due to this, the land sits vacant and possesses the great opportunity for development in the area.



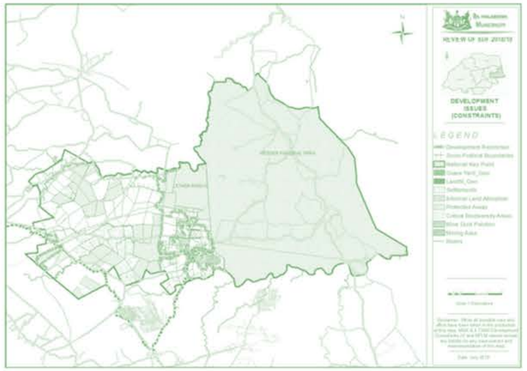
4. Land Claims

The Restitution of Land Rights Act of 1994 aims to return land to those forcibly removed. The Maitjene community reclaimed their native land through an outstanding land claim.



4. Development Constraints

No development constraints in the site region despite surrounding protected areas and the Ga-Selati River, enabling smooth development.



sustainability

Social

The project aims to revolutionize a new sector within agriculture. Given that Ofoclaco is primarily a generationally-owned farm community, this initiative empowers the underprivileged farm workers to establish their presence on the land. This innovative sector provides training for farm workers to break the cycle of generational farming in the region. Additionally, this development generates numerous job opportunities and paves the way for future growth and expansion.

The project's vision is to introduce sustainable farming practices that not only benefit the environment but also empower the local community. By equipping farm workers with new skills and knowledge, they are better positioned to take ownership of their work and contribute to the growth of the agricultural sector. This initiative not only breaks the cycle of traditional farming methods but also fosters a sense of pride and self-sufficiency among the workers. As job opportunities increase and the industry expands, it sets the stage for a brighter and more prosperous future for all involved.

Economic

The economic impact of the development arises from the post-processing of recycling agricultural waste into usable building materials. These materials not only offer better building solutions for the local townships compared to current aluminum sheeting but also ensure a sustainable future for the environment. By transforming agricultural waste into construction materials, we reduce waste and introduce a more environmentally friendly option to traditional building materials. This progressive method benefits the community by providing enhanced building solutions and serves as a positive model for other regions.

The economic advantages go beyond material creation, extending to job opportunities, skill development, and a shift towards a more sustainable and circular economy. Consequently, this development not only fosters economic growth but also supports a greener and more promising future for upcoming generations.

Environmental

The project aims to implement innovative solutions that not only address the waste crisis but also promote environmental conservation. By transforming agricultural waste into valuable resources through recycling, the project not only reduces the environmental impact but also creates opportunities for a more sustainable future. Through collaboration with local farmers and stakeholders, the project strives to create a circular economy model that benefits both the community and the environment. This initiative sets a positive example for other regions facing similar challenges and demonstrates the power of collective action in creating a greener, more sustainable world.

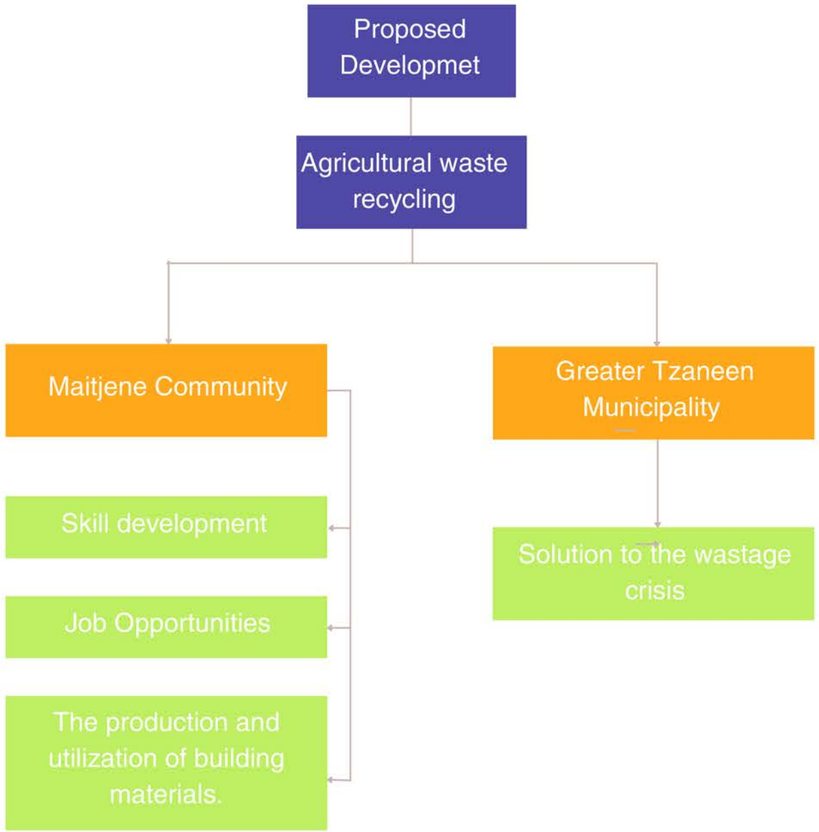


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Client Ornanogram
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Author , 2024

materiality

Materiality

The design utilizes building materials produced from agricultural waste, demonstrating an innovative and sustainable approach to construction. By converting agricultural byproducts into durable building materials, this project not only addresses waste management issues but also contributes to the community's economic and environmental well-being.

Agricultural waste, such as straw, husks, and other organic residues, can be processed and transformed into high-quality construction materials. These materials are not only environmentally friendly but also offer excellent durability and insulation properties. By using agricultural waste, the project reduces the reliance on traditional construction materials, which are often more costly and have a higher environmental impact.

Conclusion

The proposed development project for the Maitjene Community Development Trust demonstrates a comprehensive approach to sustainability, economic growth, and community empowerment. By leveraging agricultural waste to produce durable building materials, the project addresses critical waste management challenges while contributing to environmental conservation and resource efficiency.

The initiative not only establishes a new revenue stream for the Maitjene Trust but also creates meaningful employment opportunities and improves the standard of living for local community members. The strategic alignment with governmental and international funding criteria further enhances the project's feasibility and potential for expansion.

The commitment to transparency and fairness through an open tender process ensures that the best-qualified professionals are engaged, fostering trust and accountability within the public sector. Additionally, the implementation of the JBCC Principal Agreement and the Client-Architect Agreement (SAIA) provides a solid legal framework to manage project timelines, discrepancies, and financial matters effectively.

Overall, this project serves as a model for integrating sustainable practices in agricultural and construction sectors, showcasing how innovative solutions can drive economic and social development. The Maitjene Community Development Trust stands to benefit significantly from this endeavor, positioning itself as a leader in sustainable development and setting a precedent for future projects across South Africa

list of figures

0.1 Author, 2022

0.2 Author, 2022

0.3 “Northcott Fabrics.” n.d. Accessed September 9, 2024. https://northcott.com/product-detail.aspx?fbid=156&colid=3067&colorid=4130.

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1.3 Author, 2024

1.4 Author, 2024

1.5 Author, 2024

1.6 Daily Overview [@DOverview]. 2021. “Hundreds of Pivot Irrigation Circles Surround the Town of Center, Colorado. Located on the Border of Rio Grande and Saguach...See More Here: Https://Bit.Ly/3oiMpVt /// #dailyoverview #aerialphotography #earth #picoftheday #colorado #agriculture #irrigation #circles #patterns Https://T.Co/ImBR7fVw34.” Tweet. Twitter. https://x.com/DOverview/status/1393281742715432962.

1.7 “Countryside, The Future Exhibition Has ‘Nothing to Do with Architecture’ Says Rem Koolhaas.” 2020. Dezeen. February 21, 2020. https://www.dezeen.com/2020/02/21/countryside-the-future-exhibit-rem-koolhaas-guggenheim-new-york/.

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