

Drawn by Author (2021)

STITCHING THE DISCONNECT

How light infrastructure can become a connecting bridge to the fragmented village of Mpaka

by

Sifiso Mkhabela

Submitted in fulfillment of part of the requirements for the degree

Master of Architecture (Professional)

in the

Faculty of Engineering, Built Environment and Information Technology

University of Pretoria

November 2021

THANK YOU

My Creator:

Thank you for your faithfulness and protection.

Mom and Dad:

Thanks for all the love and discipline you instilled in us. You led the way and we followed.

Siblings:

To Sthe, Pepe, Fundo and Pukulu, thank you for all the love and support

Friends:

To Dr E, & Makhosi; you are more than just friends you are family.

Q and Prof Arthur:

Thank you for your mentorship and belief in my project!

ARC:

To Yolande: Thank you for your amazing heart, I wouldn't have done this without you. To Anton: Thank you for your amazing support, thank you for believing in me. Mo: thank you for mentoring me throughout my final year, you are such a great man. To Madi, I don't know where to start, You have laid such a good foundation in my career, thank you!

TITLE OF DISSERTATION

Stitching the Disconnect

How light infrastructure can become a connecting bridge to the fragmented village of Mpaka

STUDY LEADER

Mr. Qaqamba Makula

YEAR COORDINATOR

Prof. Arthur Baker

SITE

Mpaka, Lubombo, Swaziland

GPS COORDINATES

Latitude 26° 24' 47.21"S

Longitude 31° 46' 24.65"E

RESEARCH FIELD

Designed Ecologies

CLIENT

The Ministry of Tinkhundla and Administration

KEYWORDS

Agrarian urbanism, light infrastructure, development framework, local vernacular

PROGRAMME

Urban transect: Transportation facility hub, retail and commercial, agrarian urbanism, residential, sports and recreation and industrial node.

DEGREE

Architecture (Professional)

DEPARTMENT

Department of Architecture, Faculty of Engineering and Information Technology

UNIVERSITY

University of Pretoria, 2021

ARCHITECTURAL APPROACH

Interface between local vernacular and modern architecture

EDITOR

Debby Dewes

DECLARATION

In accordance with Regulation 4(c) of the General Regulations (G.57) for dissertations and theses, I declare that this Dissertation, which I hereby submit for the degree Master of Architecture (Professional) at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

I further state that no part of my thesis has already been, or is currently being, submitted for any such degree, diploma or other qualification.

I further declare that this thesis is substantially my own work. Where reference is made to the works of others, the extent to which that work has been used is indicated and fully acknowledged in the text and list of references.



.....
Signature

Contents

THANK YOU	11	1.16 RESEARCH PLAN	27
<i>List of Abbreviations</i>	03	1.16.4 <i>Data Analysis and Interpretation</i>	27
<i>List of Tables</i>	05	1.16.5 <i>Ethics and Limitations</i>	27
PROJECT SUMMARY	06	ESSAY 2 DESIGN RESEARCH	28
ABSTRACT	07	2.1 DESIGN ARGUMENT	30
ESSAY 1 POSITION AND SITUATION	08	2.1.1 <i>Social and Human Capital Investment</i>	31
1.1.1 <i>Background</i>	10	2.2 CASE STUDIES + PRECEDENT STUDIES	32
1.1 INTRODUCTION	10	2.2.1 <i>Case Study :1 Curitiba City</i>	33
1.2 CONTEXT AND SITE ANALYSIS	11	<i>Mantenga Cultural Village</i>	34
1.2.1 <i>Site Location</i>	11	<i>Case Study 2.2.2</i>	34
1.3 <i>Macro Analysis</i>	12	2.2.3 PRECEDENT STUDIES	36
1.4 <i>Meso Analysis</i>	13	<i>Agrarian Urbanism</i>	37
1.6 DEFINITION OF TERMS	16	<i>Culture and Heritage</i>	39
<i>Light Infrastructure</i>	16	<i>Climate Adaptation</i>	40
<i>Agrarian urbanism</i> :	16	<i>Local + Modern Material</i>	41
<i>Indigenous knowledge Systems</i> :	16	2.3 URBAN STRATEGIES	42
1.7 NORMATIVE POSITION	17	2.4 DESIGN OBJECTIVES	43
1.8 <i>General Issues to be Investigated</i>	18	2.5 OUTCOME: DESIGN CONCEPT	45
1.9 <i>Urban Issues to be Investigated</i>	19	2.6.1 <i>The Production of Space Henri Lefebvre</i>	46
1.10 <i>Architectural Issues to be Investigated</i>	20	2.6.2 <i>Jan Gehl Cities for People</i>	46
1.11 <i>Initial Analysis of the Situation</i>	22	2.6.3 <i>Kibbutz Community</i>	46
1.12 <i>Outcome</i>	23	2.6 THEORY AND FORM GENERATION	46
1.13.1 <i>Agrarian Urbanism</i>	24	2.6.4 <i>Kevin Lynch: The Image of the City</i>	47
1.13.2 <i>Garden Cities</i>	24	2.7 SPATIAL DEVELOPMENT FRAMEWORK	48
1.13 LITERATURE REVIEW	24	2.7.1 <i>Zoning the site</i>	49
1.13.3 <i>Miscellaneous</i>	24	2.7.2 <i>Nodes proposed framework for Mpaka</i>	50
1.13.4 <i>Triple Bottom Line</i>	24	2.8 CONCEPT EXPLORATION	52
1.13.5 <i>Landscape Urbanism</i>	25	2.9 MODEL EXPLORATION	54
1.14 <i>Research Question</i>	25	2.10 THE TRANSECT STRIP MASTER PLAN	56
1.15.1 <i>Qualitative Method</i>	26	2.10.1 <i>Urban development strategies (along node 1 and 3)</i>	57
1.15 RESEARCH METHODOLOGY	26	2.11 <i>Agrarian Precinct</i>	74
1.15.2 <i>Quantitative Method</i>	26	2.12 <i>Accommodation schedule</i>	76
1.15.3 <i>Hypothesis</i>	26	<i>Ground Floor Plan</i>	77
1.16.1 <i>Methods</i>	27	<i>First Floor</i>	79
1.16.2 <i>Instruments</i>	27	<i>Roof Plan</i>	80
1.16.3 <i>Sampling</i>	27	<i>Elevations</i>	82

ESSAY 3: SYNTHESIS	84
3.1.1 <i>Design Informants</i>	86
3.1 CONTEXTUAL ANALYSIS	86
3.2 <i>Critical Questions to Derive the Development Framework.</i>	89
<i>How can this proposal become a catalyst for developing a sustainable framework?</i>	89
3.3 <i>Aim</i>	89
3.5 TECHNOLOGICAL INTENTIONS	90
3.6 <i>Technological Responses</i>	92
3.7 <i>Structural System</i>	92
3.8 <i>Structural Intentions.</i>	93
3.9 <i>Materiality.</i>	94
3.10 <i>Sustainability – The Environmental System.</i>	95
<i>Local Material.</i>	95
<i>Local vernacular.</i>	95
3.11 <i>Systems</i>	96
3.12 <i>Services.</i>	98
3.13 <i>Technology</i>	103
3.14 <i>Precedent Study - Technology.</i>	104
3.15.1 <i>Transport Hub Plan.</i>	106
3.15.3 <i>Transport Hub Roof Plan</i>	106
3.15.2 <i>Transport Hub Section</i>	107
3.15.4 <i>Transport Hub Perspective.</i>	107
<i>Structural Intentions.</i>	108
3.7 <i>Structural System</i>	108
CONCEPT INTENTIONS	109
<i>Technological Responses</i>	109
<i>Mantenga Cultural Village.</i>	109
ELEVATIONS	110
SECTION A-A	112
SECTION AND DETAILS	112
LOCAL SKILL+CONTRACTOR INTERFACE	117
3.16 <i>Sefaira</i>	120
3.17 <i>SBAT Rating</i>	122
ESSAY 4: CRITICAL REFLECTION	124
4.1.1 <i>Original Normative Position</i>	126
4.1.2 <i>Dissertation Foundations</i>	126
4.1.3 <i>Research Explorations</i>	126
4.1.4 <i>Design Iterations and Conclusions</i>	126
4.1.5 <i>Technology Iterations and Conclusions.</i>	127
4.1.6 <i>Extension: What this Dissertation Could Mean for a Career in Architecture.</i>	127
4.2 <i>Outcome: Reflections on the Dissertation and Architectural Process</i>	127
APPENDIX	132

List of Abbreviations

CAADP	Comprehensive Africa Agricultural Development Programme
DPZ	Duany Plater-Zyberk
EPA	United States Environmental Protection Agency
FOA	Food and Agriculture Organisation of the United Nations
ha	Hectares
KMIII	King Mswati III
kms	Kilometres
Kwh	Kilowatts per Hour
LED	Light-emitting Diodes
m	Metres
NEPAD	New Partnership for Africa's Development
NGO	Non-governmental Organisation
SANBS	South African National Bureau of Standards
SMEs	Small-to-Medium-Scale Enterprises
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
UP	University of Pretoria
USDA	United States Department of Agriculture
W	Watts

List of Figures

Figure 01:	Mantenga cultural village; a window to the past (Author 2021)	0 9
Figure 02:	Site Location (Author 2021)	1 1
Figure 03:	Site Analysis: Land use (Author 2021)	1 2
Figure 04:	Site Analysis: Agrarian activity (Author 2021)	1 2
Figure 05:	Context Analysis (Author 2021)	1 3
Figure 06:	Context (Author 2021)	1 4
Figure 07:	Mpaka High School (Author 2021)	1 5
Figure 08:	Malindza Central Primary school (Author 2021)	1 5
Figure 09:	Mantenga Cultural Village (Author 2021)	1 8
Figure 10:	Hawane Resort (Author 2021)	1 8
Figure 11:	House on fire Arts and craft festival (Calburn 2021)	1 8
Figure 12:	Hlane Game reserve (Author 2021)	1 8
Figure 13:	Buganu National Ceremony (Author 2021)	1 8
Figure 14:	Umhlanga National Ceremony (Author 2021)	1 8
Figure 15:	Sibhaca Dance culture (Author 2021)	1 8
Figure 16:	Lusekwane/Incwala National ceremony (Author 2021)	1 8
Figure 17:	Mbabane Taxi Rank (Author 2021)	1 9
Figure 18:	Street market typology (Author 2021)	1 9
Figure 19:	Self help shelters (Author 2021)	1 9
Figure 20:	Traditional Ploughing methods (Author 2021)	1 9
Figure 21:	Grain storage facility (Author 2021)	1 9
Figure 22:	Local vernacular (Author 2021)	1 9
Figure 23:	Local construction material (Author 2021)	1 9
Figure 24:	Malindza Refugee Camp (Author 2021)	2 0
Figure 25:	Mpaka Market and bus stop (Author 2021)	2 0
Figure 26:	Typical homestead (Author 2021)	2 1
Figure 27:	Essentials of a typical homestead (Author 2021)	2 1

Figure 28:	Impact of Covid-19 (Author 2021)	2 2
Figure 29:	Impact of climate change (Author 2021)	2 2
Figure 30:	Derelict Street condition of the site (Author 2021)	2 9
Figure 31:	Mapping the street.	3 0
Figure 32:	Image (Author 2021)	3 2
Figure 33:	Nodes along Site (Matsapha Municipality, 2019, p. 130)	4 8
Figure 34:	Anticipated Zoning	4 9
Figure 35:	Seven Propose Nodes of the Development Framework	5 1
Figure 36:	Local vernacular as a main design language informant (Author 2021)	8 3
Figure 37:	Distance between the site and major city	8 4
Figure 38:	Agrarian Precinct location.	8 4
Figure 39:	Social Services.	8 4
Figure 40:	Topography and two water bodies	8 4
Figure 41:	Local vernacular (Author, 2021)	8 9
Figure 42:	Primary, Secondary, and Tertiary Structure (Author, 2021)	9 0
Figure 43:	Transport facility hub roof structure (Author, 2021)	9 1
Figure 44:	Monthly Precipitation and Yield (Author, 2021)	9 6
Figure 45:	Catchment Surface Area (Author, 2021)	9 6
Figure 46:	Irrigation Demand (Author, 2021)	9 8
Figure 47:	Solar heat gain (Author, 2021)	1 0 6
Figure 48:	Critical thinking (Author, 2021)	1 0 9

List of Tables

Table 01:	Monthly Precipitation and Yield	98
Table 02:	Catchment Surface Area	98
Table 03:	Irrigation Demand	100

Project Summary

Urban migration in populated cities remains a critical cause of urban sprawl. In turn, urban sprawl leads to large pieces of agricultural land being converted for non-agricultural purposes, at a fast rate, as more and more people move closer to necessary infrastructure and social services. Economic hardships play a key role in causing rural-to-urban migration, however, agrarian practices significantly impact the urbanisation of rural environments.

Due to the warm and semi-arid climatic condition, the Lubombo region is ideal for raising livestock for commercial use (i.e., the practice of ranching), as well as for the cultivation of vegetables, citrus, and sugarcane. Water catchment strategies are, therefore, an important practice in the collection and storage of water for domestic-animals and irrigation purposes within this region.

On an urban scale, the primary reason for people in Eswatini to move from rural areas to cities is the lack of built infrastructure in rural areas that could allow local economies to emerge and, thereby, enable residents to create start-up businesses and/or (otherwise) improve their quality of living. The lack of availability of such space and infrastructure, along with limited public services present within the rural setting stifles development and promotes social exclusion.

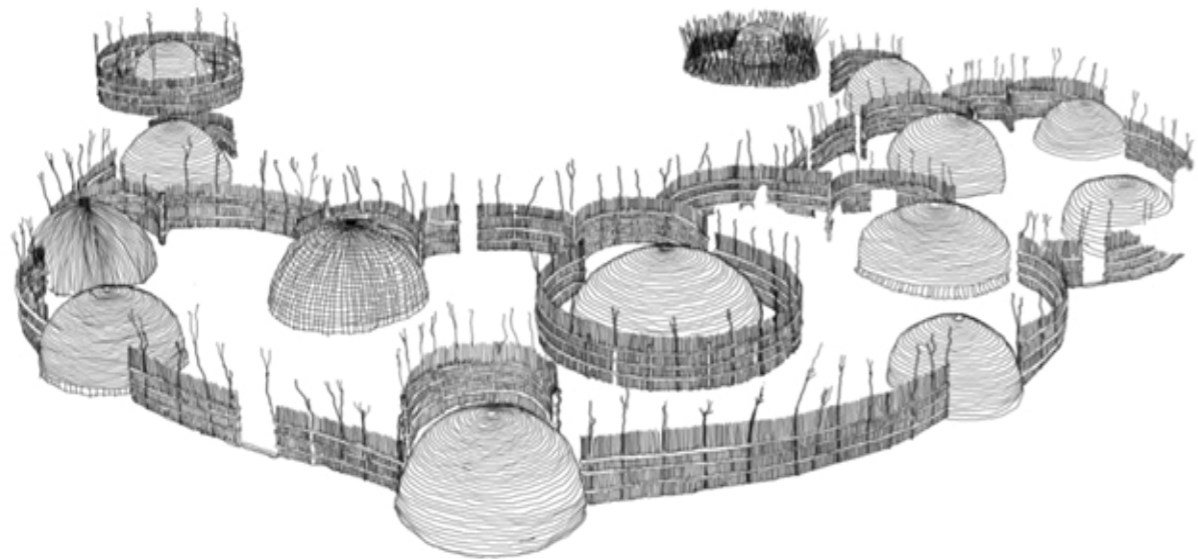
For the purposes of this study, the project manifesto was to work with available land and human resources in order to create a self-sustainable agrarian urban-transect. Such an approach involved working on a principle of zero-demolition, where no existing infrastructure is destroyed but rather enhanced architecturally. It also involved understanding the current nuances of the social and economic activities that take place on site so as to respond appropriately to the location's spatial and programmatic needs. This approach, therefore, aimed to reduce the area's carbon footprint caused by material imports by creating an opportunity to source local and indigenous knowledge and skills.

Furthermore, this project attempted to acquire local building material systems in order to create spaces that respond to the climatic and socio-economic needs of the site and, thereby, reduce rural-to-urban migration.

Abstract

It is projected that by the year 2050, over 60% of the world's population will be living in cities (United Nations [UN], 2018b, p. 1). General studies have shown that rural-urban migration leads to urban gentrification (Chong, 2017, p. 39). Such issues, in turn, cause urban sprawl, as low-income earners – due to increasing living expenses – drift towards urban fringes. The idea of densifying urban centres in a bid to create sustainable cities therefore remains a topic for debate. This presented study, thus, begins with a literature review on Frank Lloyd Wright's broad acre city, based on agrarian urbanism, in order to critique the current urban densification, as per Gray (2018, p. 150). The study then builds a case for a sustainable socio-economic development framework, situated in a rural setting, through light and regenerative infrastructure. A mixed-methods approach (i.e., the use of both qualitative and quantitative research methods) (Creswell, 2017, p. 294) is adopted to both measure and analyse data collected at Mpaka Village, located in the Kingdom of Eswatini, so as to identify key factors that cause urban migration. Since Mpaka is cultured in subsistence farming, the idea of agrarian urbanism is investigated in an attempt to create a circular economy that can, over time, grow into large-scale commercial farming. The research further investigates, through secondary sources, the motifs of traditional and cultural knowledge systems (i.e., spatial meanings, spatial hierarchies, thresholds, structural expressions, and envelopes) that could potentially drive form and place-making in the creation of sustainable socio-spatial conditions, in line with Nkambule (2015, p. 32). In all, this study aims to adapt the noted principles as a means to create interconnections that stitch together the fragmented Mpaka community.

Essay 1 Position and Situation



The following section serves to initiate the design project by developing a position in relation to the current condition of the kingdom of Eswatini. The outcome of this section is to formulate a research-by-design methodology.



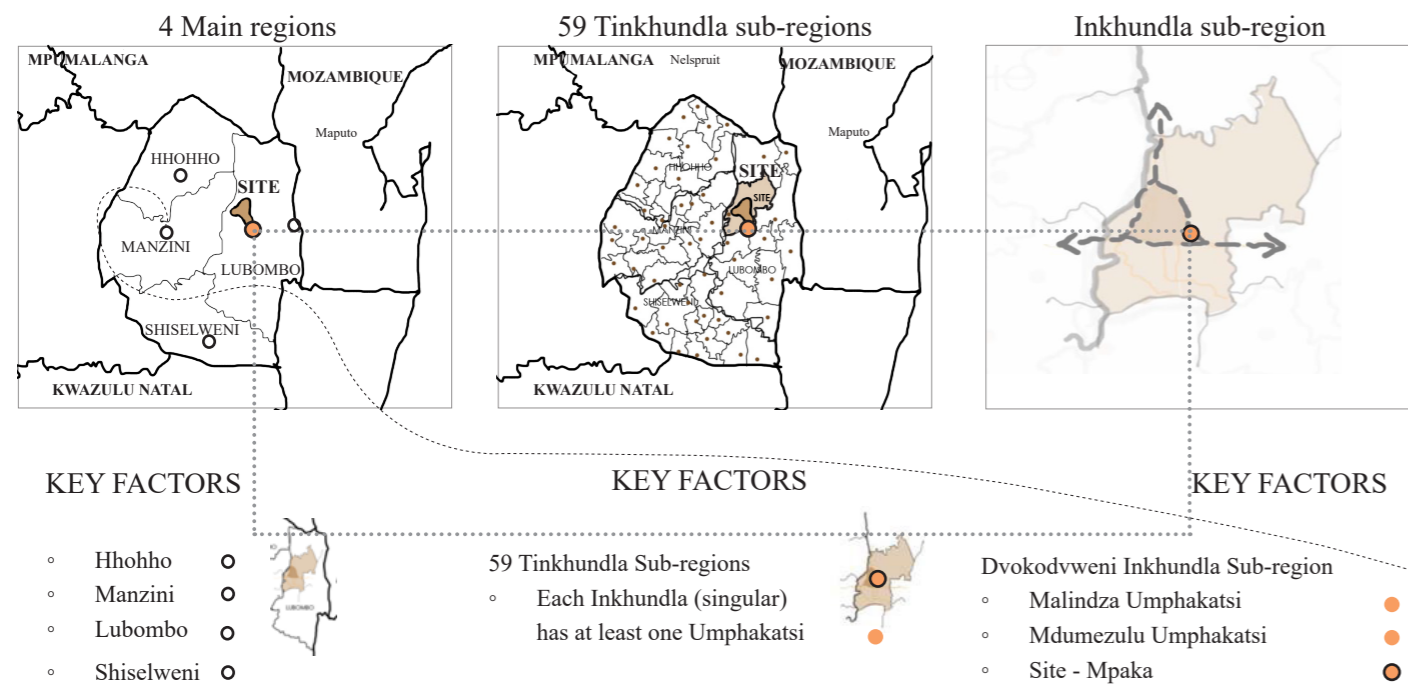
Mantenga cultural village; a window to the past (Author 2021)

1.1 Introduction

1.1.1 Background

The study site is located at Mpaka Village, which falls under the Malindza chiefdom, in the Kingdom of Eswatini. The Malindza region is governed by traditional chief leaders under the *tinkhundla*¹ regional administration (Simelane, 2011, p. 1). This particular regional administration consists of a governance system that works together with traditional leaders (i.e., chiefs) in bringing services closer to the rural community. Traditional leaders, in turn, facilitate the administration and allocation of residential land through a system called *kukhonta*² (Government of Eswatini, 2020, p. 16).

The noted rural setting is currently in the process of developing into an airport city, with His Majesty King Mswati III (KMIII) declaring it an urban area in March 2019 – approximately 10 years on from the confirmation of the new construction of the KMIII International Airport (Eswatini Civil Aviation Authority, 2010, p. 1). It should be noted, however, that this announcement was met with much social unrest, as local residents were to be forcefully evicted from their homeland and moved further away from public services in order to provide land for the development (Dlamini, 2017, p. 1).



¹ A third-level Government subdivision under the Ministry of Tinkhundla Administration & Development (Government, 2021).

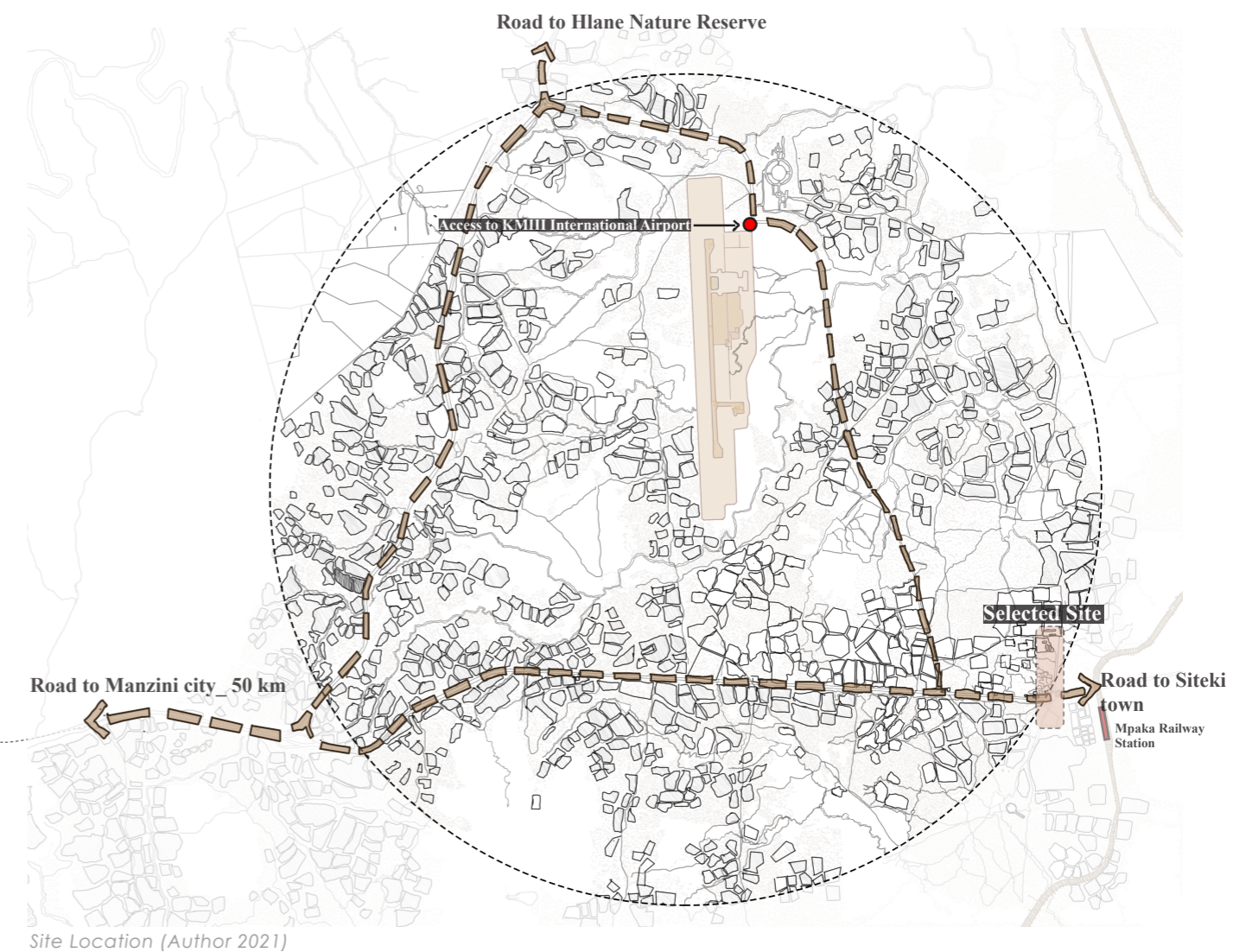
² Residential land is allocated via umphakatsi (i.e., local traditional authority). The land cannot be individually owned or sold. This land is big enough for self-sustaining families who undertake agricultural activities, since each homestead is provided with at least 2 hectares (ha) of arable land (Simelane & Sihlongonyane, 2021, p. 1).

1.2 Context and Site Analysis

1.2.1 Site Location

The chosen study site is situated 50 kilometres (kms) away from the main city of Manzini, where many jobs, businesses, and industrial developments are located. As detailed later in Section 1.5.1: Site Context, there are several disconnected social services present at this site, including the Malindza Primary and High Schools, the Mpaka Vocational Training Centre, and the Malindza Refugee Camp (Blandau, 2017, p. 1).

Aside from such disconnection, this site has been selected primarily for its agrarian potential and its close proximity to two major transport landmarks, namely the KMIII International Airport and the Mpaka Railway Station.

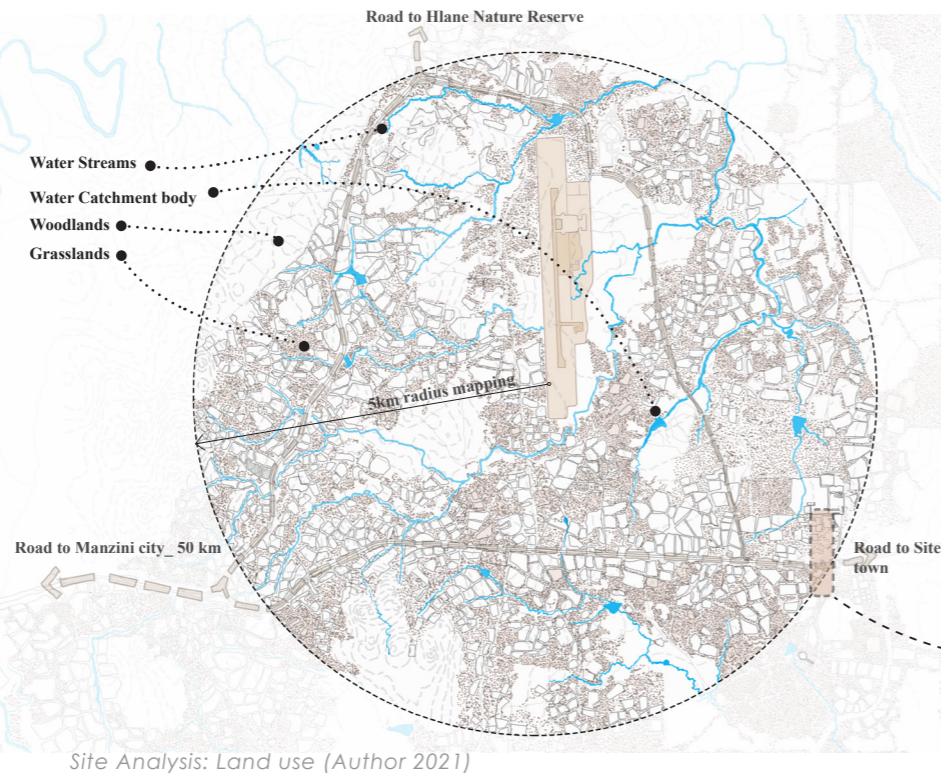


Site Location (Author 2021)

1.3 Macro Analysis

1.3.1 LAND USE

The main land use in Eswatini is extensive grazing. Communal grazing covers approximately 50% of the country, 19% of which relates to commercial ranching (Food and Agriculture Organisation [FAO], 2004, p. 3). Grazing also generally takes place on natural grasslands, savannas, and woodlands, with some of these areas further being used for community forestry (FAO, 2004, p. 3). Due to its warm and semi-arid climatic condition, the Lubombo region is ideal for raising livestock for commercial use (i.e., the practice of ranching), as well as for the cultivation of vegetables, citrus, and sugarcane . Water catchment strategies are, therefore, an important practice in the collection and storage of water for domestic-animals and irrigation purposes within this region.

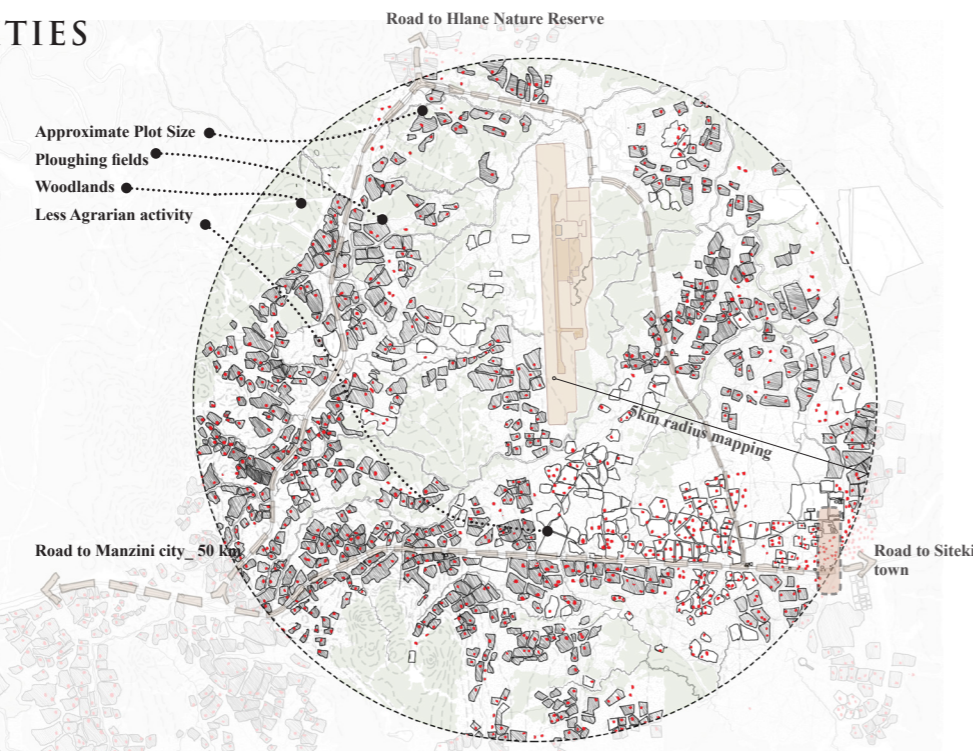


Site Analysis: Land use (Author 2021)

1.3.2 AGRARIAN ACTIVITIES

The total area under investigation is 113km². Each homestead has an approximate plot size of 2-4 hectares (ha) of arable land, allocated through the system of kukhonta. In all, there are approximately 650 homesteads located across this area (African Financials, 2020, p. 1).

Although these homesteads have acquired large portions of land to conduct agrarian activities, and include grass-strips, homesteads, and other infrastructure, only 12% of such land is used for commercial farming, with the remaining 88% consisting of small-scale, subsistence, rain-fed agriculture . The majority of this region is, thus, used solely for subsistence purposes, primarily as a result of a lack of infrastructure and services that could better facilitate economic practices (Mavuso, 2015, p. 86).



Site Analysis: Agrarian activity (Author 2021)

1.4 Meso Analysis

KEY

- Natural Forestry
- Ploughing fields
- Grazing Land
- Selected Site



Context Analysis (Author 2021)

SCALE 1:7000

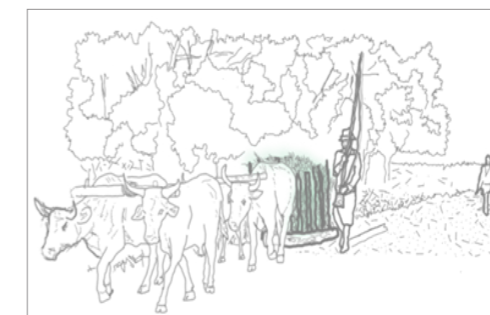
1.4.1 AGRARIAN HISTORY

New technologies and techniques have drastically changed agricultural practices from small-scale to large-scale farming (Systems Innovation, 2019). Most these traditional agricultural techniques were adapted towards locally available animals, human resources, and climatic conditions specific to a given area (Swilling & Anneck, 2006, p. 315). The industrial revolution, however, shifted the economic balance between small-scale farmers and large farm corporations (Anderson, 2010,

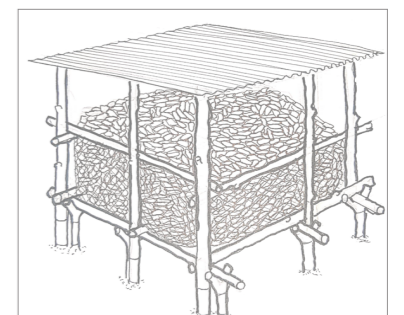
pp. 3007-3021). Consequently, according to a Ministry of Agriculture and Cooperative report published in 2005, over 60% of all food consumed by Swazi residents is imported (Grima, 2014, p. 6). This includes items such as maize, wheat, vegetables, dry products, and other food commodities (Grima, 2014, p. 7). By 2016, the United States Department of Agriculture (USDA) reported that 90% of all agricultural products are imported to Eswatini (Torry, 2016, p. 2).



Prevalent Subsistence farming with enough land for commercial farming



Domestic animals used as labor force



Self help grain storage facility

1.5 Micro Analysis

1.5.1 SITE CONTEXT

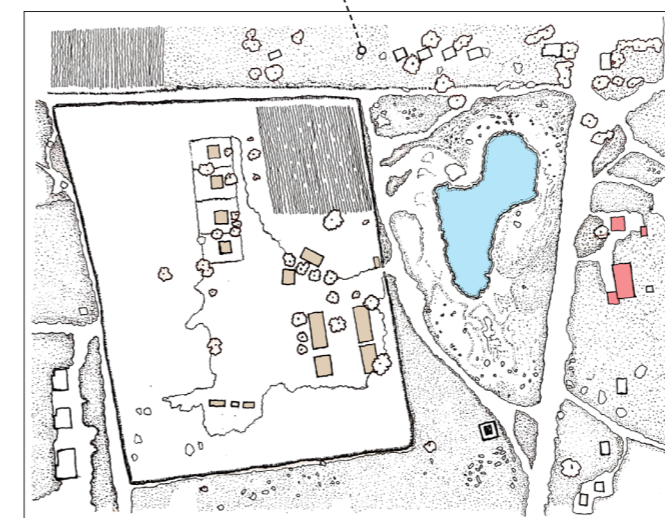
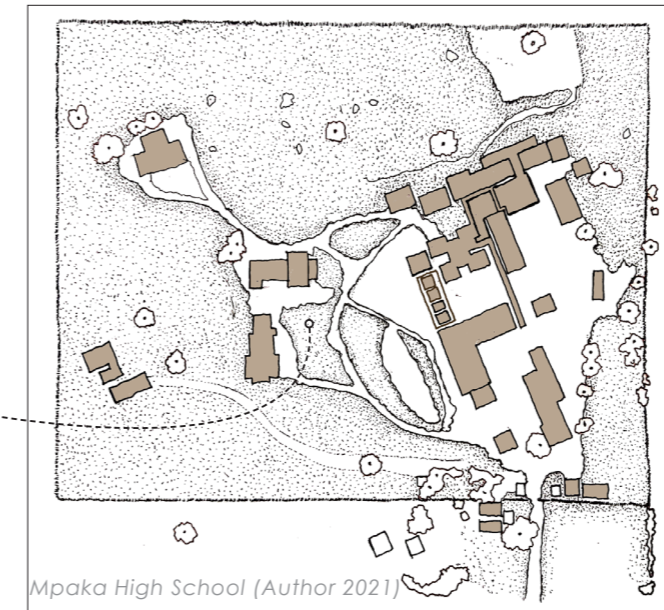
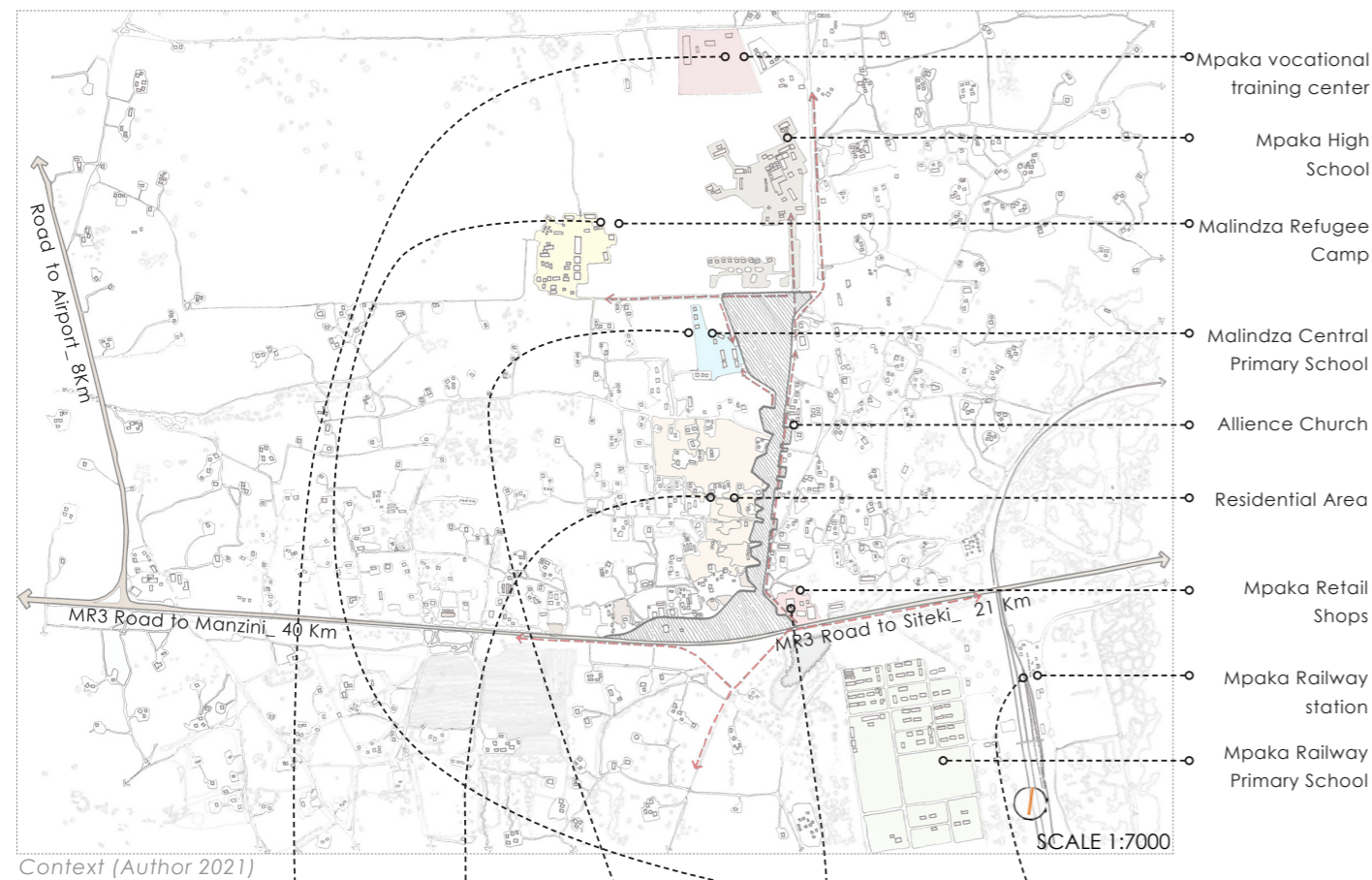
As noted previously, the selected site is situated in close proximity to important social and economic infrastructure and services, including the Mpaka Vocational Training Centre, the Malindza Refugee Camp, the Malindza Central Primary, the Mpaka High School, and the Mpaka Railway Station. However, the main challenge facing this community is the area's fragmentation,

which is causing difficulty for community members to access available services. Such fragmentation is largely due to a lack of effective town and regional planning structures (Eswatini, 2007, pp. 110-151). For example, the MR3 highway creates a disconnect between the northern and southern areas of the public transport hub (Dlamini, 2018, p. 5). This disconnection has

resulted in an unsafe pedestrian space, particularly for school children and informal traders, who conduct business along the station and/or use it as a thoroughfare.

MPAKA HIGH SCHOOL

Enclosed public school creates unsafe spaces for school children as they walk around dangerous alleys to arrive at the school



MALINDZA CENTRAL PRIMARY SCHOOL

There is no provision of student accommodation (boarding school). School children walk up to 10 kilometers (km) to get to the school. In addition, the school does not have enough extracurricular activities to enhance learning



Lack of Job Opportunities after skills training



No extra curricular activities for school kids



Alienation of refugees_ restricted from integrating with community



Lack of government support in residential property development



Self Help shelters for Vendors



Missed opportunity to transport goods in and out of the country

1.6 Definition of Terms

Light Infrastructure

Current urban conditions require the re-imagining of built spaces, where structures are interrogated in terms of programme, and reduced or broken down into their 'essence' (Light Infrastructure, 2020). Thus, instead of having a large and expensive building structure, the project presented in this current study aims to reduce the design to its essential function by using light and affordable structural materials.

Agrarian urbanism:

Contrary to 'urban agriculture'³ and 'agricultural urbanism'⁴, Duany, Plater-Zyberk and Speck (2000) define 'agrarian urbanism' as a strategy that involves the whole (i.e., where every community member is involved in the cultivation of the extant land)..

Indigenous knowledge Systems:

In the construction of Freedom Park, Jethro (2013, p. 33-34) refers to 'traditional knowledge' as the analysis of material history in construction, and indicates how spatial arrangements can be derived from traditional (i.e., indigenous) knowledge systems.

³ Process of producing and distributing food in and around urban environments.

⁴ Urban design strategies that centralise development and complement such development with farmland (Duany et al., 2000).

1.7 Normative Position

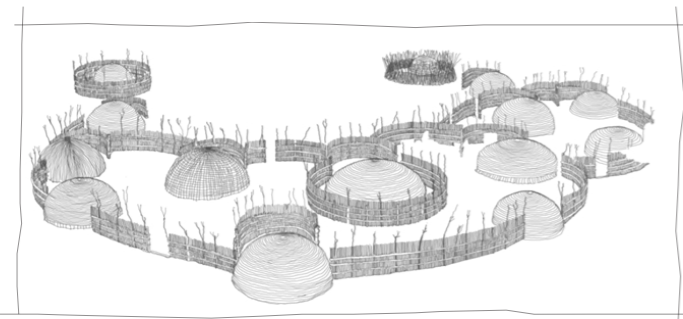
Urban migration in populated cities remains a critical cause of urban sprawl (Mckeown, 2004, p. 155). In turn, urban sprawl leads to large pieces of agricultural land being converted for non-agricultural purposes, at a fast rate, as more and more people move closer to necessary infrastructure and social services (Freilich, Sitowski, & Mennillo, 2010, p. 369). According to Smith (2014, p. 516-533), economic hardships play a key role in causing rural-to-urban migration. In particular, this author demonstrates how agrarian practices significantly impact the urbanisation of rural environments (Smith, 2014, p. 516-533).

In Eswatini, 70% of the population lives in pastoral areas, where an average of 3ha of land is provided for each homestead (Manyatsi, Masarirambi, & Hachigonta, 2020, p. 213). As such, each homestead has enough land to produce its own food (Magagula, 1982). For the purposes of this study, the normative position was to work with available land and human resources in order to create a self-sustainable agrarian urban-transect. Such an approach involved working on a principle of zero-demolition, where no existing infrastructure is destroyed but rather enhanced architecturally. It also involved understanding the current nuances of the social and economic activities that take place on site so as to respond appropriately to the location's spatial and programmatic needs. This approach, therefore, aimed to reduce the area's carbon footprint caused by material imports by creating an opportunity to source local and indigenous knowledge and skills. Furthermore, this project attempted to acquire local building material systems in order to create spaces that respond to the climatic and socio-economic needs of the site and, thereby, reduce rural-to-urban migration.

1.8 General Issues to be Investigated

The Kingdom of Eswatini is well-known for its rich cultural and traditional practices (Mavuso, 2015, p. 86). However, there exists a general issue of limited documentation related to the country's local architecture and built forms. There is, thus, a need for future research into the intricacies of the cultural practices that hold influence

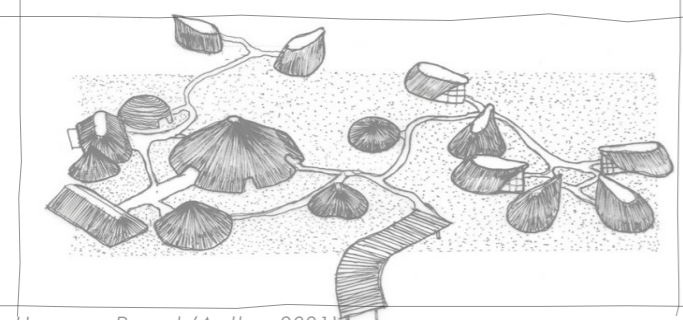
on this country's vernacular architecture. Such research could prove particularly valuable by highlighting how these cultural practices involve the use of local materials, such as thatched huts and reed screens, that define public and semi-public spatial thresholds (Frescura, 1980, p. 40).



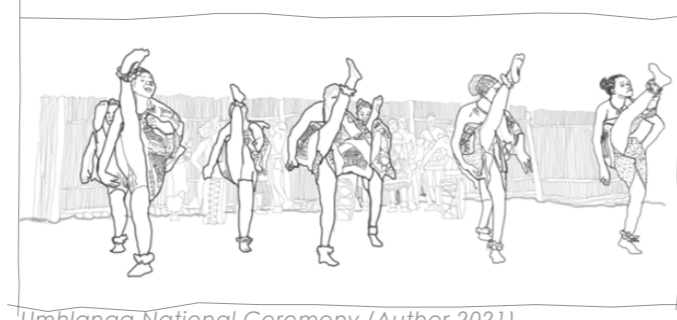
Mantenga Cultural Village (Author 2021)



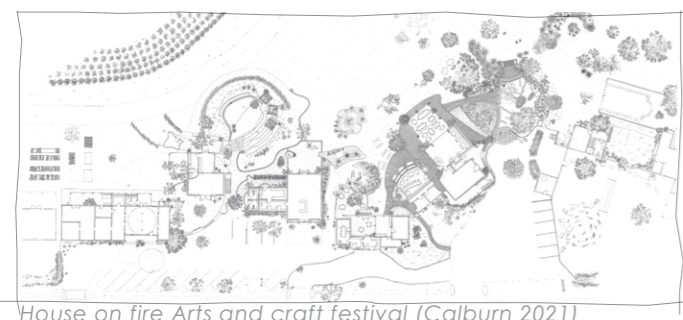
Buganu National Ceremony (Author 2021)



Hawane Resort (Author 2021)



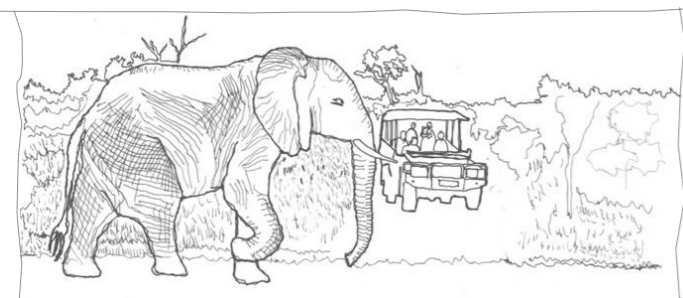
Umdlhanga National Ceremony (Author 2021)



House on fire Arts and craft festival (Calburn 2021)



Sibhaca Dance culture (Author 2021)



Hlane Game reserve (Author 2021)



Lusekwane/Incwala National ceremony (Author 2021)

1.9 Urban Issues to be Investigated

On an urban scale, the primary reason for people in Eswatini to move from rural areas to cities is the lack of built infrastructure in rural areas that could allow local economies to emerge and, thereby, enable residents to create start-up businesses and/or (otherwise) improve their quality of living (United

States Environmental Protection Agency [EPA], 2011, p. 1). The lack of availability of such space and infrastructure, along with limited public services present within the rural setting stifles development and promotes social exclusion (Ozkazanc, 2017, p. 74).



Mbabane Taxi Rank (Author 2021)



Traditional Ploughing methods (Author 2021)



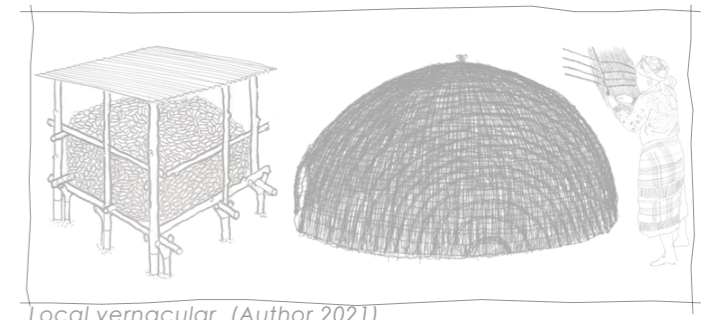
Vendor Markets (Author 2021)



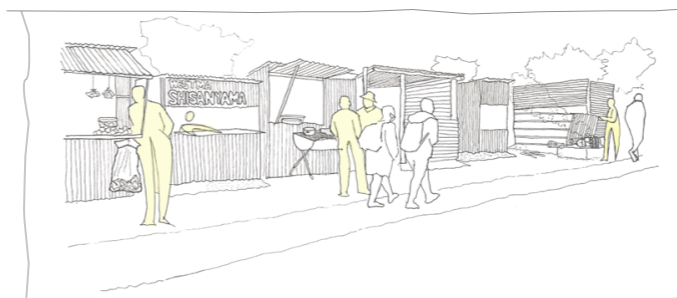
Grain storage facility (Author 2021)



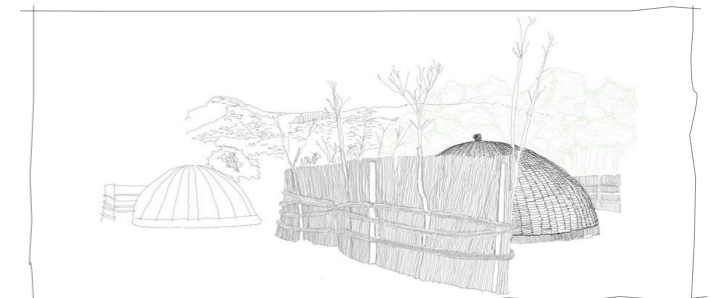
Street market typology (Author 2021)



Local vernacular (Author 2021)



Self help shelters (Author 2021)



Local construction material (Author 2021)

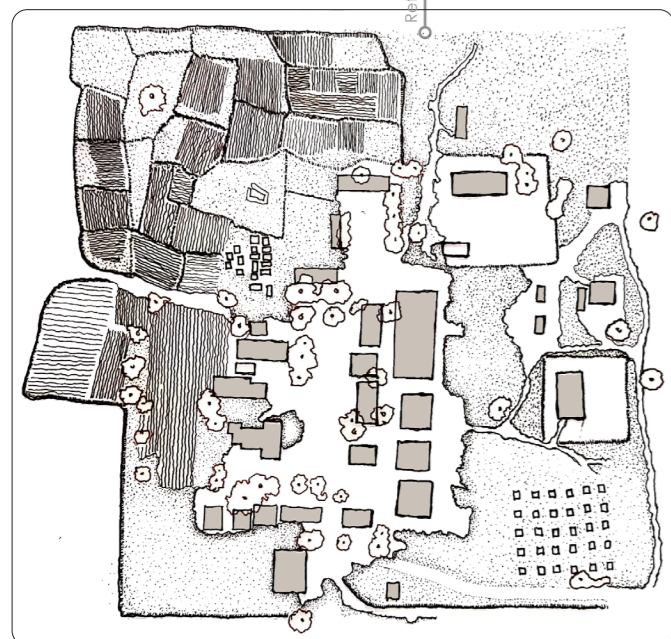
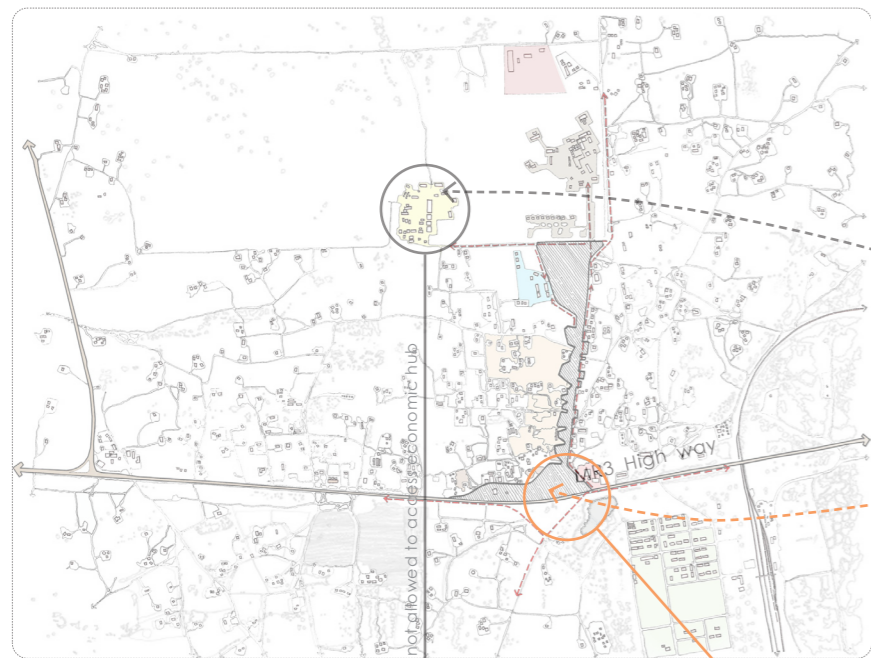
1.10 Architectural Issues to be Investigated

Several architectural issues are, therefore, investigated in this project – the most prominent of which is the aforementioned issue of fragmentation and the disconnect between the local community and necessary social and economic services. An example of this issue is specifically seen in the alienation of refugees residing at the Malindza Refugee

Camp, whereby asylum seekers are not allowed to integrate with the community, particularly in regard to engaging in economic activities and social exchange (e.g., the sharing of knowledge and skills such as farming techniques) (Rulashe, 2006, p. 1).

A further issue relates to the spatial arrangements of Swazi Nation Land, which is, as previously noted, 70% rural (New Partnership for Africa's Development [NEPAD], Comprehensive Africa Agricultural Development Programme [CAADP], & FOA, 2005, p. 1). As a result, locals tend to primarily live in scattered patterns, where almost every household in Malindza occupies an average of 2-4ha for agricultural activity (Baker & Dradri, 2006, p. 18). Such activity mostly constitutes growing maize, supplemented with cucurbits and sorghum (Baker & Dradri, 2006, p. 18). Many other mixed crops, such as sweet potatoes, legumes, and vegetables, are also grown for subsistence use (Manyatsi et al., 2020, p. 242). This high focus on subsistence farming is due to a lack of infrastructure, knowledge, and skills in respect to how best to utilise the available plot sizes in semi-arid climatic conditions and/or scaling up the production of already-available crops and vegetables for commercial purposes (Ndlangamandla, 2007, p. 32).

The current project seeks, therefore, to create decentralised economies through agrarianism by establishing equal opportunities for locals and refugees by 'stitching together' social and economic nodes in a bid to reduce fragmentation. This attempt is in line with recommendations presented by Berke (2008).



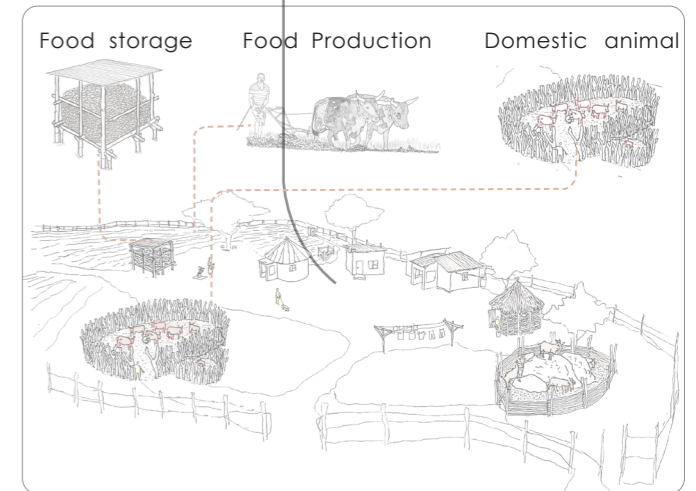
Malindza Refugee Camp (Author 2021)



Mpaka Market and bus stop (Author 2021)



Typical homestead (Author 2021)



Essentials of a typical homestead (Author 2021)

1.11 Initial Analysis of the Situation



Impact of climate change (Author 2021)

According to the Ministry of Economic and Development of the Kingdom of Eswatini, it is predicted that the number of rural-to-urban immigrants will increase by 26.5% in 2030 (Dlamini, 2013, p. 1). Furthermore, according to the World Bank (2019, p. 1), people living in rural

areas depend on agriculture, yet, due to climate change (e.g., changes in rainfall patterns and/or the destabilisation of ploughing seasons), many farmers are being forced to abandon their land and migrate to cities for better jobs opportunities. The general lack of basic services and

infrastructure in rural areas has also increased global hunger (World Bank, 2019, p. 2). As such, over 75% of the world's impoverished people currently living in rural places are predicted to have migrated to cities by 2050 (UN, 2018 a, p. 1).

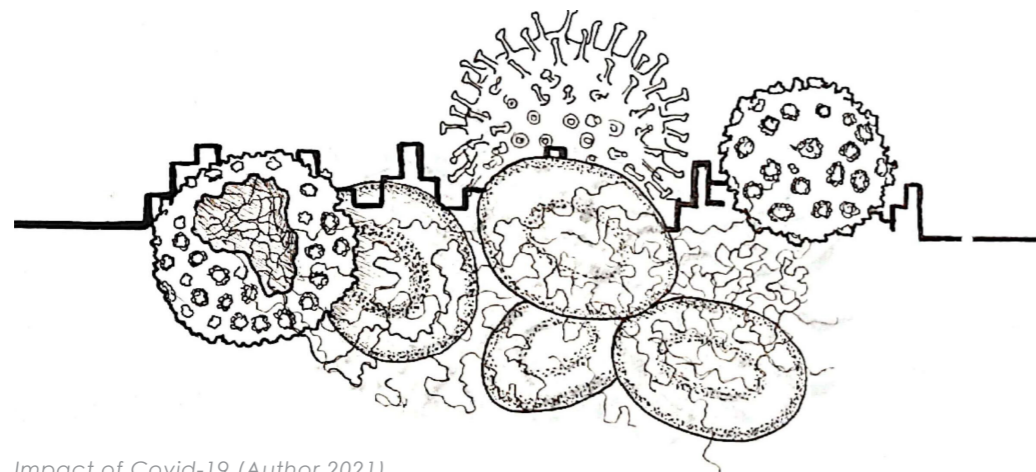
The aim of this research is to validate the reasons and importance of agrarian culture, which promotes and preserves natural ecosystems and biodiversity. Such preservation is achieved through the growing and preserving of organic seeds

1.12 Outcome



and/or growing indigenous trees for both domestic and wild ecology purposes; thereby creating a complete 'human and eco-systemic' cycle (Shiva et al., 2017, p. 13). The bigger vision, then, is to create a rural-urban framework where

locally produced fresh food can be supplied to both local markets and small-scale industries to process, package, and export food products through an established circular economy, as promoted by Hart (1995).

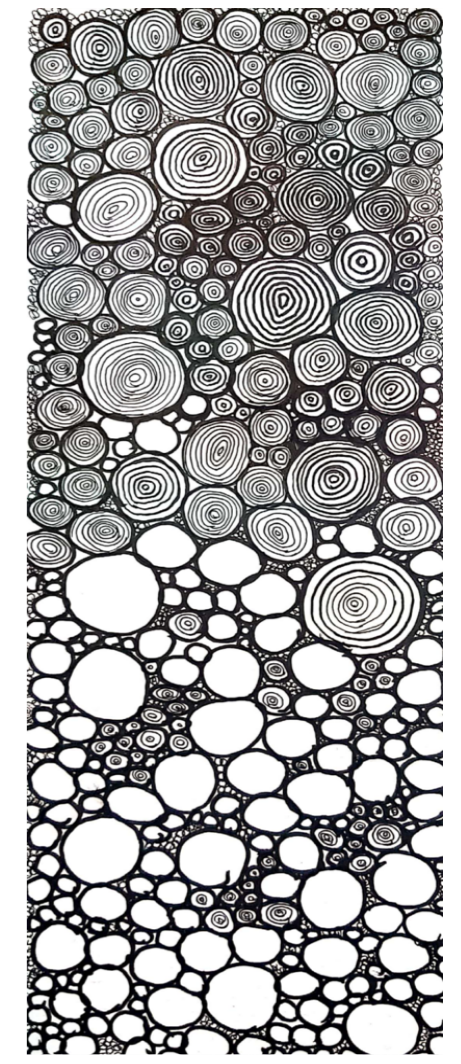
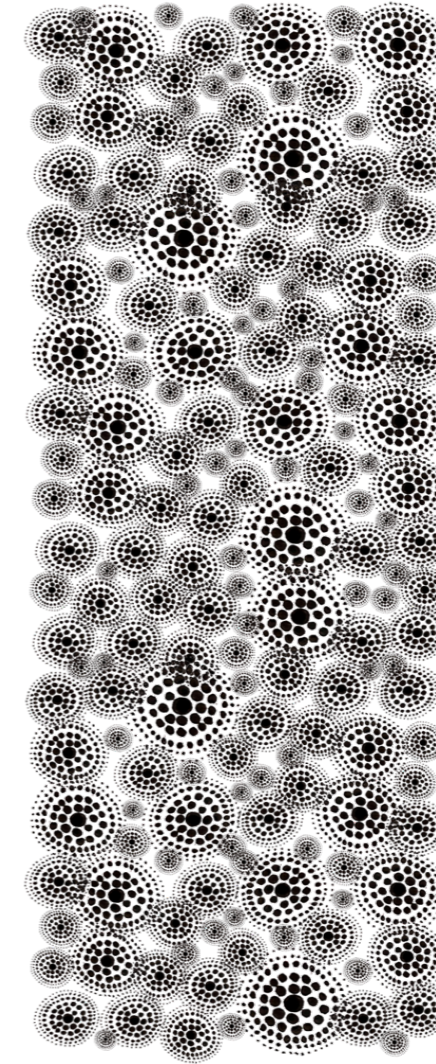
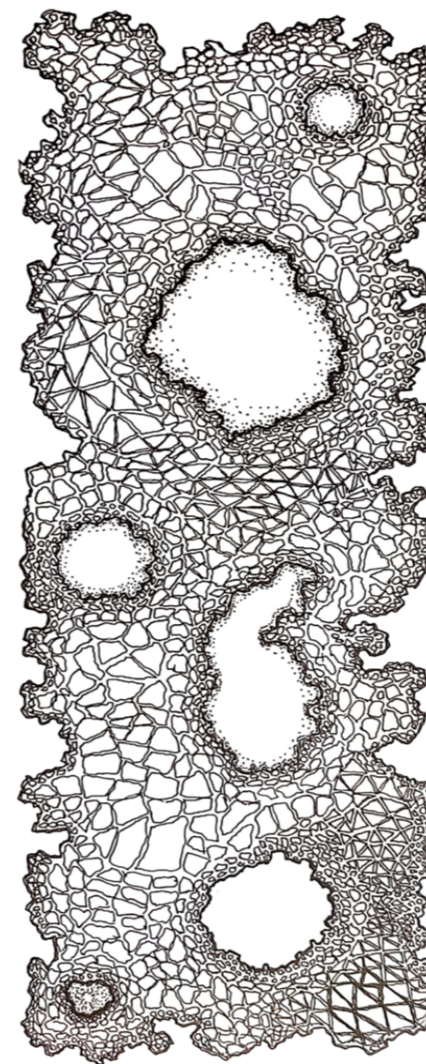


Impact of Covid-19 (Author 2021)

A converse consideration is, however, the persistent threat posed by the recent Covid-19 pandemic, which has accelerated an exodus away from cosmopolitan cities to more pastoral areas (Freear, Mirafitab, & Okolichany, 2021). In this case, many individuals are beginning to weigh out the restrictions placed on

city-dwellers (e.g., quarantine, school closures, and working from home) in relation to the possible 'freedoms' associated with rural living. Recent studies by labour economies have also shown that city-based jobs are no longer guaranteed, which is transforming the real estate market in cities, especially in respect

to office space (although the impact also extends to residential preferences). As such, it suffices to state that the pandemic has exposed how unprepared and vulnerable the world's cities can be in terms of job security and built infrastructure (Dizikes, 2020, p. 1).



1.13 Literature Review

1.13.1 Agrarian Urbanism

Frank Lloyd Wright is one of America's most respected architects (Alofsin, 2017, p. 225). Wright confirmed the importance of decentralising communities in order to create a society that recognises both individual home property and, more importantly, small-scale farming (Robert, 2013, p. 25). This notion of decentralisation was clearly demonstrated on Wright's 12x12 inch broadacre city model, presented at the Rockefeller Center on April 14, 1935 (Gray, 2018, p. 1). Specifically, the model demonstrated 'agrarian urbanism' as a form of agriculture that allows every individual in the community to participate in the process of producing and/or selling food produce (Lapping, 1979, pp. 11-23). It should be noted that such a model is not limited to only growing food but involves other sectors as well, including education, health, and sales; or, at the very least, incorporates becoming urban consumers who buy and support locally produced food (de la Salle, 2014, pp. 237-250).

1.13.2 Garden Cities

Ebenezer Howard, who was inspired by Edward Bellamy's book *Looking Backward* (Talen, 2015, p. 1), writes about his 'utopian plan', where communities are defined by agrarian practices and where socio-economic infrastructure is surrounded by agriculture belts. Howard further argues that green spaces should not be relegated to urban fringes but should, rather, form an integral part of the urban lifestyle (Haney, 2005, pp. 14-15).

1.13.3 Miscellaneous

New urbanism, compact cities, and green infrastructure: Andres Duany, who is one of the founders of Duany Plater-Zyberk (DPZ), first introduced the 'smart code' that reflects agrarian urbanism as an approach to New Urbanism (Primoz, 2017, p. 110). As part of this code, Duany et al. (2000) encourage small plot sizes as a means to promote larger open public spaces.

1.13.4 Triple Bottom Line

Douglas Farr, presents a theory that focusses on the three dimensions of sustainable and resilient urban lifestyle, namely social, economic, and environmental considerations (Wise, 2016, p. 30). In Farr's (2018, p. 313) section entitled *The Agrarian Lifestyle*, the author puts forward the idea of mixed-use neighbourhoods and communities, where the practice of food production is not merely seen as a means of living but a lifestyle. Farr further emphasises the importance of organic farming, which, for centuries, has been the practice upon which small-scale farmers have survived. Agrarianism is also not limited solely to farming but involves economic aspects such as producing crafts that are sold to local retail shops, providing storage facilities, creating bookstores, and maintaining stables (Mitchell, 2016, p. 15). In terms of social and environmental concerns, Farr (2018, p. 314) argues that instead of planting non-fruit-bearing trees along streets, in between nodes, streets can be lined with berry, pecan, and walnut trees. Such trees can play a role in educating children as they walk to school (i.e., learn to understand different tree types and changes in seasons) (Patelski, 2008, p. 126).

1.13.5 Landscape Urbanism

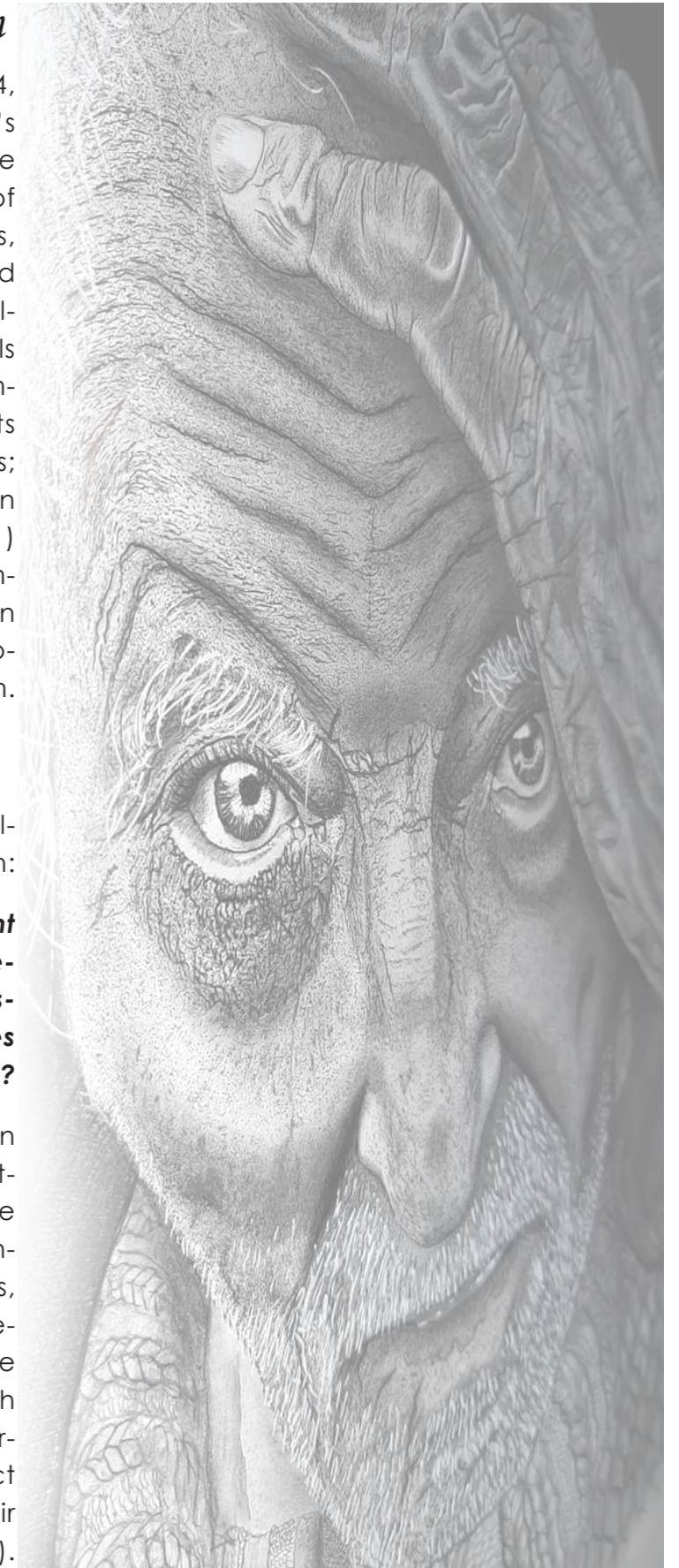
James Corner, according to Bennett (2014, p. 42), in reference to van Valkenburgh's earlier claims, states that cities should be designed around the existing presence of their particular landscapes. In other words, the landscape itself should inform how and where urban forms should be placed (Viljoen, 2005, pp. 21-29). This approach calls for the understanding of spatial, programmatic, and logical strategic arrangements that grow and adapt to changing times; thereby creating a more resilient urban framework (Green, 2021). Corner (2014) also emphasises the same notion of the importance of agrarian- and horticulture in respect to understanding the use and application of material systems in urbanism.

1.14 Research Question

This study aims to answer the following primary research question:

How can agrarian urbanism, through light and regenerative infrastructure, create a development framework that sustains local and socio-economic activities through indigenous knowledge systems?

In a dissertation on architecture's role in culture, Nakanishi, Sheppard, and Hutton (2020, pp. 88-90) present evidence regarding the importance of creating infrastructure that speaks to historical roots, heritage, and culture – particularly in relation to the context of African people groups. Not only can such an approach prevent failed projects, but it can encourage inhabitants to identify with the project at hand, since it speaks directly to their identity (Folkers & van Buiten, 2010, p. 19).

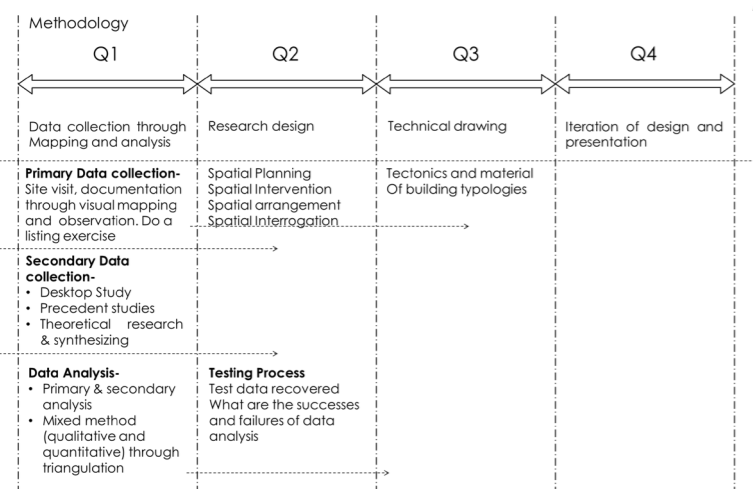


1.15 Research Methodology

In this study a mixed-methods approach was utilised (i.e., where both qualitative and quantitative approaches are employed).

1.15.1 Qualitative Method

The qualitative research method takes a philosophical stance by undertaking an ontological and epistemological approach to analyse a given study area (Lincoln, Lynham, & Guba, 2011). With regard to indigenous knowledge systems, as pertaining to the current study, an inductive approach is undertaken in order to search for design patterns, motifs, forms, tectonic and spatial traditional arrangements, and contemporary architecture inspired by vernacular building typologies. This approach also broadens the African context through the use of secondary sources by conducting the same type of exercise (i.e., expanding previous work by incorporating the refugees who come from different African countries in the study location). This qualitative exercise also aims to derive design principles such as hierarchy, progression, approach, and material use with the objective of establishing a design language that speaks to local African identity.



1.15.2 Quantitative Method

Based on both primary and secondary data, a deductive approach is used in this study to develop an hypothesis that promises to develop design strategies that form a framework that can effectively respond to the social and economic needs of the site in question. This exercise is conducted through a process of primary data collection, where most architectural firms in Eswatini were visited in order to collect a selected number of design projects. The objective was, then, to identify each project's design approach, purpose, brief, lead architect, and client in an attempt to deduce an hypothesis that might derive a theoretical position in validating the project's credibility and adding value to the chosen site.

1.15.3 Hypothesis

This study offers two hypotheses:

H1: *It is possible to, through identification, prove that certain factors cause urban migration.*

H2: *It is possible to, through the use of secondary sources, gather evidence that proves that the development framework can work in improving the social and economic aspects of the given rural community.*

1.16 Research Plan

1.16.1 Methods

In order to achieve the study's purpose, an exercise of mapping and surveying the site was first conducted as a means to better understand the culture and existing social and economic activities, as well as to identify indigenous knowledge systems that have made the communities within the chosen location thrive in the past. Such an approach included the study of large plots, the benefits and limitations of small-scale farming, and how agrarian urbanism can be implemented so as to create a balance between a community and its ecosystems. This initial rural spatial analysis was conducted over a 50km radius around the site. The site-analysis exercise was also undertaken in order to identify existing infrastructure, such as rivers, dams, schools, roads, and clinics. An exercise in listing was then also included so as to map out and identify economic nodes (e.g., amenities) that can grow over time.

1.16.2 Instruments

As noted previously, the current study is concerned with spatial analysis, as based on community needs and observational methods. The study has, thus, been conducted by documenting the chosen area through visual mapping and the general collection of information. Tools such as a digital camera, ArcGIS, Google Earth, cellphone recordings, and interviews with architects have all been used for data collection. The University of Pretoria (UP) library was also consulted in a bid to collect relevant secondary information. Such information has been employed as a tool to supplement the study as a whole, and the primary collected data in particular.

1.16.3 Sampling

The research focusses on local farmers,

vendors, refugees, the youth, and entrepreneurs in an attempt to create a comprehensive development framework.

1.16.4 Data Analysis and Interpretation

The project was conducted during the third quarter of the second semester of the current year (2021), where both testing and evaluating was undertaken through the adoption of a triangulation method aimed at validating the research.

1.16.5 Ethics and Limitations

The site was visited three times. The first visit was to request permission from the Commissioner for Refugees to conduct the research. No interviews were conducted with refugees themselves, only with the refugee administrators. The second visit was undertaken in order to consult with local architects and acquire their selected works for academic purposes (Appendix A). The third site visit was conducted for the purpose of observing and understanding the urban context of the Mbabane, Manzini, and Matsapha areas and, thereby deriving an insightful hypothesis regarding how a development framework might successfully be implemented at the study site.

Several photographs were taken on-site to support the noted spatial analysis and observations. Such photographic information has been recreated in the form of relevant sketches or sketch diagrams in this study so as to uphold relevant ethical considerations regarding the use of sensitive photographic data. Furthermore, a budget of R5 000 was saved for site visits, and no incentives were provided to participating architects.