



# ARCHITECTURE AS A DRIVER FOR SOCIAL CHANGE:

TOWARDS THE DESIGN OF A SELF-SUSTAINABLE COMMUNITY ANCHOR IN KWAMASHU.

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Dissertation submitted in partial-fulfilment of the  
requirements for the degree of Master of Architecture to the  
School of Built Environment and Development Studies

University of KwaZulu-Natal.

Durban, South Africa

February 2018

i.

**Declaration:**

I, Banele Benedict Ngcamphalala, declare that this dissertation is my own, unaided work and carried out exclusively by me under the supervision of Mr. Sibusiso Sithole and Juan Soli-Arias.

I also declare that:

1. The research reported in this thesis, except where otherwise indicated, is my own original research.
2. This thesis has not been submitted for any degree or examination at any other university.
3. This thesis does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.
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Banele B. Ngcamphalala (210516717)

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Date

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Place

**ii.**

**Dedication:**

This dissertation is dedicated to parents, my lovely mother Mrs. Theresa Zandile Ngcamphalala and my father the late Mr. Dominic Bhekimpi Ngcamphalala. Thank you for the unconditional love, sacrifices and endless support for your children. From the humblest of beginnings, you both sacrificed comfortable lives and battled odds to secure an education for your children. For that we are eternally grateful, and hope you are proud of the family you raised.

To my siblings, Thulani, Andiswa, Celiwe, Zwivhuya, Wandile and Philile: you all are an inspiration. To Mongezi, Avuyile, Thando, Sisekelo, Sibusiso Jr. and Inam: I hope this inspires you to reach greater heights.

### iii.

#### **Acknowledgement:**

Of utmost importance is God, without whom none of this would have been possible. You have sustained me this far.

To my family, thank you all for the prayers and support from the beginning. You are truly an amazing bunch and I am truly blessed to have all of you in my corner. To Mokgadi - for pushing me to deliver the best I can, the support, prayers and input, I am truly honoured.

To my friends and my ACTS family, thank you for making university life bearable. From you I have gained a lot. To my architecture family, for your continued support and companionship, I am truly grateful - this architectural journey would not have been the same without any of you. A special mention to Buhlebenkosi, Lynette, Mhelo, Phumuzile my DoPW ladies and all that contributed to the success of this project.

And lastly the School of Architecture staff, thank you for the extra help and time sacrificed to provide help with the dissertation and design. To my research supervisors Mr. Sibusiso Sithole and Juan Solis-Arias, thank you for the valuable insight and patience throughout the writing of this document. You made it happen.

Special thanks to my KwaMashu guides Miss Zanele Ngubane and Mr. Mncedisi Sangweni for helping me navigate the area. Gratitude to Mr. Andre Duvenage, Kamalen Gounden, Tongaat Hullet and eThekweni Municipality for the assistance.

#### iv.

#### **Abstract:**

*“What is clear is that we are the only species with the power to destroy the earth. Birds and insects have no such power, nor does any other mammal. And yet if we have the capacity to destroy the earth, we also have the capacity to protect it. I believe we have an urgent responsibility to do so.”*

- His Holiness the Dalai Lama

The deterioration of our natural environment is proving to be the biggest threat to all life forms, and yet it is not given the necessary attention. This deterioration is as a result of continued human behaviour resulting in the depletion of natural resources, pollution, threats to ecosystems and biodiversity. With the continued abuse of the natural environment, future generations may not enjoy the same privileges and relationship with nature as antecedent generations have. This dissertation acknowledges the role played by the built environment as a major contributor to this detriment, and identifies architecture as having a moral duty to sensitise mankind of this predicament and offer solutions. The research reveals the plight on nature brought about by human activity identified through literature. Theories are used to explain the phenomena and formulate concepts to provide solutions. Through interviews, the perception of the local people of KwaMashu on the subject will be gathered, also as a way of supporting the secondary research. Case and precedent studies are used to present ideas on how these solutions have been executed elsewhere, and to what extent.

The township of KwaMashu is used as an example of the deteriorated relationship between the built environment and the natural environment as well as the resultant adverse effects on social stability. The findings of the research are used to generate a brief for a public building to cater for the needs of the community and become a social hub for community based activities. The ultimate purpose of the building is to function as an awareness tool aimed at establishing common ground between society, architecture and the environment. By being an exemplary environmentally responsible piece of architecture, the building will rekindle mankind's appreciation for the natural environment and mend the deteriorated relationship.

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# **PART ONE**

# CHAPTER ONE: INTRODUCTION

## 1.1 Introduction

This dissertation seeks to determine an appropriate architecture for a self-sustainable community building in an area with a sensitive history. In this introduction chapter, the research background will focus on fundamental questions which will aid in the investigation. The chosen concepts and theories will be introduced, which form the framework to this investigation later on in the document. It is hoped that this study will outline information which will be used as the basis for self-sufficiency within communities in urban environments.

### 1.1.1 Background

*“Out of all the global environmental problems, climate change is the most pervasively threatening to human well-being and in many aspects the most intractable” (Schipper & Meyers, 1994: 21).*

The energy sector plays a very crucial role in modern day economies, as highlighted in the 23rd World Energy Congress in Istanbul report (2016). South Africa possesses great wealth in minerals and fossil fuel deposits in the form of coal. The country has based its economic development on the extraction, processing and use of these minerals. According to the Department of Energy, approximately 69% of energy produced in the country in 2016 was from the burning of coal, compared to less than 12% from renewable sources. This excluded biomass which constitutes the majority of our renewable energy supply. Renewable energy sources have been barely exploited in South Africa (Department of Energy, 2017).

Residential, commercial and industrial buildings, consume most of the energy produced in carrying out different functions (The South African Energy Sector, 2009). With a continuation of the same practises that have created the issues in the first place, the problem is set to intensify. There is solid evidence of climate change (Strange, 2008), mainly because of our view of “nature as a great and infinite source existing to be used for our benefit” (Wells, 1981: 28), a view that is shared by both individuals and institutions. Even though the need is apparent to some, a profusion of people are still obtuse to these

devastating effects of climate change on the environment and problems we are creating for the future generations that will occupy space after us. Creating awareness for people to change their attitude towards the use of energy and overall people's relationship with the natural environment remains a challenge in the fight against environmental degradation.

It becomes the task of individuals working within the built environment to introduce new ways of thinking and practice for the benefit of all life. With the mind-set that an architect should leave the land no worse than he found it, the built environment has an obligation to get involved in realistic and workable alternatives to preserve natural resources. Research into how these alternatives can be explored architecturally and inform the design of a self-sustainable model is therefore necessary.

### **1.1.2 Motivation / Justification of Study**

Urbanization and industrialization brought issues of space and housing shortages. The rural to urban migration that ensued because of these created a high demand for housing. South Africa experienced this phenomenon from the year 1870, and laws to deal with this issue were developed and introduced in 1920 (Calderwood, 1953). Durban, being a port city, was not exempt from this growing population, a necessity to supply the labour force required to sustain the industrial needs of the city. The booming of the population of Durban during the 1950s aggravated a demand on the Durban City Council (DCC) to clear Durban of its slum areas and segregate urban areas. The white population cited security as the reason for this demand. The government declared KwaMashu an African zoned area, and it emerged as one of the first Durban townships that resulted from the Apartheid Group Areas Act taking effect (South African History Online, 2014).

Accommodation was provided in phases and occupied by the displaced African population by 1958, and by 1962 the numbers had exceeded forty thousand. Due to the quantity requirements, infrastructure was viewed in the lenses of time and cost; how to provide housing in a short space of time with limited funds. When discussing native housing in South Africa, Calderwood (1958: 190) noted that, "in any housing scheme it is not sufficient only to provide shelter." For KwaMashu this proved to be the case. Materials were chosen on the basis of cost and used to fulfil minimum spatial requirements with little or no consideration for performance of the buildings. The planning of the townships

involved no input from the residents that were to use them. This culture of providing buildings without considerations for sustainability and user has existed over the half a decade of KwaMashu's existence.

Apparent issues of inconsideration of sustainability and user have motivated the undertaking of this research. Lessons from this research will bring much needed information in providing spaces that will be aesthetically pleasing, easy to use, achieve high levels of comfort while achieving a reduced impact on the natural environment.

## 1.2 Definition of the Problem & Problem Statement

*“The environmental challenge we are undergoing, and its human roots, concern and affect us all.”*

- Pope Francis

Climate change is no longer considered as just a myth. It is a reality whose consequences the whole world is confronted with. Human activities that include fossil fuel combustion and deforestation are the dominant causes responsible for carbon emissions (Chen, 2015: n.d). These actions by mankind are destroying the environment and threatening the livelihood of diverse species including man himself. The unprecedented levels of carbon dioxide in the atmosphere are responsible for rising temperatures, extreme droughts, floods, wildfires and superstorms. These changes in climate and subsequent disasters threaten access to energy and clean water as well as food production and safety.

The biggest challenge is that the global society is unaware, irresponsible and dissociated from the natural environment. Awareness of how buildings can connect us with life and function in harmony with nature's forces is essential (Day, 2004) to reduce human impact on the natural environment is critical. There is an undeniable need to educate mankind on how to interact with the environment and to produce ecologically appropriate human settlements. In his book, *Architecture and Environmental Design as a Healing Art*, Christopher Day (2004: ix) submits that “the construction and operating of buildings accounts for over 60% of all carbon dioxide (CO<sub>2</sub>) generated”. Compared to the past, the design and construction of modern buildings suffer from a profit over care ethic approach. Day (2004) further argues that this accounts for the environmental anonymity and a loss of craftsmanship characteristic of buildings today. Built structures are haphazardly copied

and pasted from one landscape to the next without regard for local relevance, occupants or environmental sustainability. Regrettably, this way of producing buildings with environmentally destructive impacts such as artificially controlled indoor climate is the preferred option over more responsible ecological design architecture with strategies like the use of locally sourced materials and adapting to the local climate (Day, 2004: 13).

The township of KwaMashu is an example of the deteriorated relationship between the built environment and the natural environment with resultant adverse effects on social stability. A major misfortune voiced out by the residence was the implementation of load shedding in late 2014 by the national electricity distributor, Eskom. Eskom described it as a last resort to avoid the crumbling of the national power system due to demand exceeding supply, a result of high human consumption on energy and fuel, necessitating the shutdown of two major power stations (Eskom, n.d.). This unfortunate event exhibits some of the effects of human induced global warming as a product of our detriment to the environment. The prevalent social issues of poverty, criminal activity, and unemployment present challenges in trying to facilitate social change. What is worth noting is that the intensity of poverty often corresponds with illiteracy and high unemployment rates (King *et al*, 2007), as is the case in KwaMashu.

In this regard it is clear that efforts to address environmental sustainability need to simultaneously deal with social sustainability as well, establishing how a positive socially sustainable environment can be achieved. This means, sensitising the people and reconnecting mankind to nature through architectural interactions that benefit the environment. In this way, mankind can fulfil the responsibility the global community has towards creating ecologically appropriate human settlements, promoting economic vitality and strong sense of community, place-appropriate architecture. Furthermore, efforts can be made to minimise and reverse the devastating consequences of our adverse effects on the environment thereby providing a better environment for future inhabitants.

## **1.3 Aim & Objectives**

### **1.3.1 Aim**

The aim of this research is to establish common ground between society, architecture and the environment by creating exemplary architecture that is responsive to the environment while providing education on sustainable design and living.

### **1.3.2 Objectives**

The objectives are set as follows:

- i. To use sustainable principles in a building as a tool to demonstrate the implementation of green building technologies and achievement of aesthetic and comfort without contributing to environmental degradation.
- ii. To do a critical inquiry of existing sustainable development examples to investigate design principles which promote self-sustainability in building design.
- iii. To explore ways in which architecture can re-establish the connection between man and the natural environment to provide sustainable strategies for the Durban context.

## **1.4 Delimitation of Research Problem**

The research will briefly present a background on the origins of KwaMashu as a township, and its emergence in the 1950s. The study will focus on the conditions that this formation was under, as well as their effect on infrastructure and the social life within the community of KwaMashu. The challenges that face the residents of the area will be investigated and possible solutions analysed. The aim is to investigate how sustainable principles can be applied to architecture in KwaMashu to address environmental and social challenges.



## 1.5 Research Questions

### 1.5.1 Main Question

What role can architecture play in creating a symbiotic relationship with the natural environment and the community?

### 1.5.2 Sub-Questions

- i. How to provide environmentally responsive architecture with minimal impact on the natural environment?
- ii. How can a building be designed as a didactic tool to educate mankind about the culture of sustainable living?
- iii. How can the built environment facilitate the process of empowering the community of KwaMashu and find a remedy to the prevalent social issues affecting the area?

## 1.6 Concepts & Theories

A framework of complementary theories and concepts were carefully selected in order to interpret and conduct a thoughtful discussion of the findings in this study. The concepts include didactic architecture, skills development and poverty reduction as well as transit oriented development. Theories discussed are genius loci which also covers critical regionalism as well as bioclimatic design.

### 1.6.1 Concepts:

#### 1.6.1.1 Didactic Architecture

The word didactic is defined as “having the character or manner of a teacher or instructor; characterized by giving instruction” (The Oxford English Dictionary; n.d). Didactic Architecture is an old practise, exercised for centuries in the architecture of churches for instance, as a tool to teach good design, reconnect humans to nature and

sympathy to local culture. To effectively facilitate the process of raising awareness, the building itself needs to exhibit the very sustainable principles it teaches.

### **1.6.1.2 Skills Development & Poverty Reduction**

This concept is aimed at addressing the main issues that KwaMashu is faced with, namely low literacy levels, unemployment and crime. Formalised education and training systems are aimed at preparing students for formal sector employment. For an area with the demographic of KwaMashu in terms of human capital, such as low literacy and limited access to formal education, access to skills is much more effective. By equipping individuals with marketable skills, they are able to participate in the economy and are afforded options and a better chance at survival. This in turn ensures that personal attachments to the community are strengthened and the likelihood of that individual getting involved in criminal activity is reduced.

### **1.6.1.3 Transit Oriented Development (T.O.D.)**

T.O.D. is about creating sustainable settlements that are centred on rail or bus transit stations and extend to easy walkable distances. The urban fabric is developed at moderate to higher density mixed-uses ranging from residential, retail, employment, public and civic spaces. At the core of T.O.D. is compact development and avoiding the need to sprawl. The advantages range from environmental sustainability as a result of reduced private vehicle usage. This results in lower pollution and detrimental emissions. Other advantages include the ease in traffic congestion and thus major decrease in travel times between places of living, work, play and retail.

## **1.6.2 Theories:**

### **1.6.2.1 Genius Loci**

Christian Norberg-Schultz describes Genius Loci as the sense people have of a place, discerned as the aggregate of the physical and symbolic values in nature and the surrounding of humans. In seeking to facilitate social change, understanding the

perception the inhabitants of a unique place such as KwaMashu have of their habitat is key. The sense the people have of their place is strong albeit the plethora of social, environmental and economic issues the population is presented with. Much of its residents view KwaMashu as their only home and the only place they identify with. One must understand this strong sense of identity, short yet rich historical background and symbolic attachments to place in understanding the perceptions, attitudes and aspirations of the society in order to facilitate effective and welcomed change.

#### **1.6.2.1.1 Critical Regionalism**

Discussed in this research document as an extension of Genius Loci, Critical Regionalism emphasises the need for architects to understand each individual setting and respond to its specific characteristics. This moves away from providing universal architectural solutions to very dissimilar and incompatible situations. Through this deep understanding of the place, an architecture that truly represents its surroundings can be provided to address placelessness and lack of identity.

#### **1.6.1.2 Bioclimatic Design**

Bioclimatic design as a theory points to the consideration of the local climate as the point of departure in all architecture. This theory rejects the approach of producing similar buildings regardless of the environment and instead takes architecture back to the old practise of designing to suit the specific climatic zones and address the particular environmental challenges of the area. This practise learns from the vernacular architecture of the area to provide buildings which have minimal negative impact on the natural environment. With Durban's subtropical climate, a strong connection between the inside and outside is necessary to keep the inside cool in the hot summers and warm in winter. Orientation and cross-ventilation take precedence and successful execution of these not only guarantees quality indoor comfort levels but savings in energy, translating to a reduced impact on the environment.

## **1.7 Research Methods**

### **1.7.1 Introduction**

The research gathered within this document will generate a design of a self-sustainable community building in the township of KwaMashu. The design and function of the building will be to educate on and facilitate concord between society, architecture and the natural environment. This sub-chapter briefly outlines the research methodology and approach utilized in obtaining data and establishing adequate comprehension of the research problem.

### **1.7.2 Research Approach:**

For this research, mixed methods, involving both qualitative and quantitative research, were the most suitable in providing the information required to adequately understand the research problem. This research looks into understanding the phenomena and interpretations thereof. The research consists of both primary and secondary sources. The primary data will be mainly from first-hand sources that include local case studies, observations and interviews. Secondary data will be through the gathering and synthesis of existing literature/studies pertaining to the phenomena. A case study as well as local and international precedent studies will be explored to support the data. The outcome of this research will then be evaluated and used to arrive at conclusions that will later inform the design process.

### **1.7.3 Data Collection Instruments:**

Observations and document analysis constitute the primary data collection instruments. The bulk of the research will be secondary information, acquired from existing publications by other researchers and authors such as books, journals, conference proceeding, reports and the electronic media among the sources. Two precedent studies will be identified, one a local and the other an international building. These will be used to gain a better understanding of the theories and concepts as well as assess the successes and failures of the projects. For the primary data, a case study will be conducted specifically to investigate sustainability and environmental impact. A schedule of

interviews is to be prepared by the researcher and interviews conducted to better understand the residents' feelings as well as wishes for their habitat.

#### **1.7.4 Sampling Methods:**

Maximum variation/heterogeneous purposive sampling will be the main sampling method. This is a non-probability sampling method where the selected subjects provide a wide range of cases relevant to the research and in so doing give the closest representation of the demographic of the area. The purpose of this kind of sample design is to provide as much insight as possible into the phenomenon under examination.

#### **1.8 Conclusion**

A number of academic studies have highlighted apartheid planning as largely responsible for the high levels of unemployment, poverty, crime and urban decay in many townships like KwaMashu. These issues are further aggravated by global climate change, lack of access to fresh water and food security. The built environment can be used as a tool for improving the quality of life within the community and its surroundings. The literature highlights the effect of architecture on the natural environments. Furthermore, concepts and theories are used to mitigate this and simultaneously seek to uplift the community with skills and opportunities for employment.

## CHAPTER TWO: LITERATURE REVIEW

### 2.1 Introduction: Degradation of the Environment

With the constant need to make living more comfortable, easier and convenient, technology in the built environment has grown in leaps and bounds. However, it appears that with those efforts we have often found ourselves creating many sustainability problems, mainly by overlooking how architecture has always existed and has been governed by the natural environment. Developments of fabricated environments have contributed to, and are suffering the effects of this divide between the built and natural environments. The combustion of coal, South Africa's primary energy source (the Department of Energy), contributes a sizeable amount of greenhouse gases which are detrimental to the environment.

The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (2007) raised concerns and warnings of changing weather patterns and rising sea levels. The report cited these as a result of bountiful greenhouse gases into the atmosphere mainly from the human quest to produce energy. The effects of this, of which a lot have been experienced in recent years, include limited access to fresh water, food and energy. It is very concerning that while we have a variety of options to redress climate change, through both adaptation and mitigation, we continue with the same harmful practises. The Energy Efficiency Strategy of the Republic of South Africa attributed this to ignorance of consumers to the existence of these measures.

Throughout our existence, humans have always looked to nature for help, an act that has yielded abundant answers and ideas on how to build a fair world that works for all species (The Biomimicry Institute, 2016). The answer to the degradation of our environment and inefficient energy supplies has already been solved by nature. It should be the mission of all built environment professionals to promote energy saving, reduce the negative impact of energy use on the environment and contribute towards sustainable development.

## 2.2. KwaMashu: The Need for Social Revitalisation

Established by the City of Durban towards the end of the 1950s to accommodate the hordes of African people displaced from the city with the implementation of the Apartheid Group Areas Act, KwaMashu quickly became the hub of political activity in KwaZulu-Natal (DPLG, 2007). As the political violence receded around 1994, KwaMashu was confronted by a rise in criminal activity (Pestana, 2002), a problem which has persisted for over two decades. It should come as no surprise that KwaMashu is thronged with criminal activity, especially taking into account that KwaZulu-Natal was given the title of most dangerous province in the country in 2015 by the World Atlas, and Durban as the fifth most dangerous city in Africa. Furthermore, much of the crime responsible for Durban's inclusion in the 'Top 10 Most Dangerous African Cities' is attributed to the townships that surround it. It is in these settlements that the majority of the over 3 million Durban people living below the poverty line reside (World Atlas, 2016).

Unemployment is rife as it stands at a meagre 27% of the population. The majority of the population survive on low income elementary employment such as domestic work, informal/street trade, security guards, and etcetera. Only about 4% of the population holds a tertiary qualification (DPLG, 2007). This is directly responsible for the youth of the area lying idle, unemployed and bored with little or no options to escape this reality. According to Crime Stats SA, KwaMashu was among the ten worst precincts for crimes that include shoplifting, illegal possession of firearms and ammunition, assault and attempted murder among others, in the entire province of KwaZulu-Natal in 2016.

The township is plagued by apparent social issues which include poverty, possibly as a direct effect of unemployment and lack of education and training. Also apparent are high levels of substance abuse, and the resultant social dislocation and the criminal activity that KwaMashu has become notorious for. The area has inadequate physical infrastructure and severe degradation which are further aggravated by, and contribute to the high crime and unemployment levels (eThekweni Municipality, n.d.). Even though this is often exaggerated, KwaMashu is still notoriously dangerous; the hostel area being one area where this is at an extreme. The Community Policing Forum (CPF), formed to help control the high levels of crime, has made efforts to change perceptions of the Durban township, and yet even its members have fallen victim to the criminals because of their efforts to

bring safety to the community (Thathiah, D. ENCA: 2015). The formation of these is a clear indication of the residents' intolerance of crime, but yet it is clear that these efforts are not yielding much success.

It is quite clear that a fundamental change in the manner in which these issues are approached is necessary. To successfully address these socio-economic challenges that plague KwaMashu, the focus should shift from policing and safety to the improvement of individuals, and subsequently of the community as a whole. It should be stressed that it is not all gloom as there are a lot of positives that raise the profile of the area. KwaMashu is famous for its lively performing arts scene (Path Finder, 2009) among other positives. Beyond that, the capacity for self-initiated change is very limited especially as a result of poor education levels and poor skills development.

The main driver of crime is a complex junction of environmental influences, coming from the individual, to social institutions, to global and economic factors. The prevention of crime and violence therefore requires an incorporation of a range of role players in a system that involves cooperation among all these stakeholders involved. Vitally, the comprehension of tackling, preventing and overseeing social difficulties within a local setting requires recognizing and expanding on the intersections between different activities and needs: wrongdoing anticipation and creation of jobs, to lessening poverty, urban renewal and rural advancement.

There are various social criminality counteractive action activities that have been executed by local structures over the years. These include sports and recreational programmes to give recreational alternatives to crime; victim empowerment centres; schools programmes to encourage positive living amongst the school going youth and get them to censure crime. One other way to tackle crime, according to the KwaMashu and Inanda Crime Prevention Project, is through comprehensive environmental design (2015). This employs five fundamental principles with the aim of designing to reduce crime. These are the result of broad research into global literature, and despite the fact that they are all inclusive in the design of safer communities, they have been adjusted to suit the qualities of the local South African urban setting. Intensive comprehension of the principles is important to build up a foundation for future planning and designing to counteract crime and define strategies. The principles include: i) Surveillance and



Visibility; ii) Territoriality; iii) Access and Escape Routes; iv) Image and Aesthetics and Target Hardening.

It is vital to keep in mind that in any given circumstance these principles need to cooperate to contribute to a viable crime counteractive and/or mitigation program while simultaneously working close by other planning principles for more successful communities. One cannot expect the same methods to completely eradicate crime. Crime patterns for a particular place need to be comprehended so “specific sorts of wrongdoing can be tended to through specific design responses” (Napier *et. al.* cited in the KwaMashu and Inanda Crime Prevention Project, 2015: 4).

KwaMashu is a dormitory area, a residential area where the majority of its residents work in and around the nearby city of Durban. This means there is minimal economic activity, and as a result of its emergence, inadequate physical infrastructure and severe physical degradation. The Urban Renewal Programme (URP), launched by former president of the country Mr. Thabo Mbeki in 2001, was a Department of Provincial and Local Government strategy to address issues of poverty and underdevelopment. One of the objectives of the URP is to get the members of the community to play an influential role in their own development (Urban Renewal Programme: 2001). This requires a scope of exercises extending from creation of jobs, provision of infrastructure and improved investment in urban development. The INK Urban Renewal Strategy was basically aimed at bettering the lives of the community of Inanda, Ntuzuma and KwaMashu by:

- i) decreasing unemployment and poverty;
- ii) decreasing criminal and violent behaviour;
- iii) enhancing the natural environment;
- iv) easing access to social services;
- v) advancing housing environment;
- vi) advancing mutually-beneficial economic relationships with the broader municipal area;
- vii) increasing the skills base of the citizens (INK UR Business Plan cited in Rauch, 2002: 18).

## 2.3 Concepts

### 2.3.1 Didactic Architecture

Buildings have a significant impact on energy use and the environment as the energy consumed by the built environment continues to rise (Torcellini *et al.*, 2006). The world is losing over 27 000 species each year to extinction from destruction of their habitats alone in a period of unprecedented consumption and degradation to the natural environment. The evidence of environmental degradation and resultant climate change begs for a high performing kind of built architecture “that will not only address these environmental issues but also act as pedagogical tools that teach us how to live more sustainably” (Schiller, 2012: 5). This kind of architecture serves to change human attitude about the role of the built environment on the natural environment and enhance all life forms.

*“It is paradoxical that buildings on college and university campuses, places of intellect, characteristically show so little thought, imagination, sense of place, ecological awareness, and relation to any larger pedagogical intent.”*

- David Orr

Decreasing the multiple environmental concerns that humankind has created requires a deep comprehension of energy, water and building materials as well as their relationship to human and planetary health. The best way to impart this knowledge is in a learning environment where learners spend thousands of hours. Indisputably, this provides ample time for the environment of the school, physical appearance, and overall design to influence the perception of those occupying it (Deal *et al.* in Schiller, 2012).

‘Architecture as Pedagogy’ was conceived by Professor of Environmental Studies and Politics David Orr in 1994 to discuss the concept of receiving social and environmental lessons from buildings. According to Orr, “the built environment possesses great pedagogical potential and this potential is required to become teaching tools for sustainability” (Rohwedder in Schiller, 2012: 6). This has the added advantage of portraying the institution’s social responsibility and as one that is concerned about the future of the learners and of the environment. Apart from the numerous benefits to the environment, inhabiting green buildings has health benefits for its occupants as well as great financial savings. Through pedagogical architecture, we can have current future generations that have learned in and about buildings that not only teach but also address

the following crucial environmental concepts (Orr in Schiller, 2012: 6): i) Using the power from the sun; ii) efficient and reduced use of material; iii) sustainable growth of food; iv) eliminating the concept of waste; v) promoting biodiversity; vi) restoring degraded ecosystems; vii) rethinking the political basis for modern society; viii) advancing naturally sustainable economies and ix) fair distribution between generations.

Didactic architecture therefore provides a real life textbook that advances innovative solutions to the environmental concerns. Anne Taylor discusses the use of the built environment as a teaching tool where she discusses three main components for connecting the built, natural, and cultural environment with education. These are listed below:

- i) Context: “the physical setting being used to teach;
- ii) Content: “ what is being taught”; and
- iii) The Learning Process: “the specific strategies the buildings use to teach (Taylor in Schiller, 2012: 6).

Due to the complexities of the issues of sustainability, mankind cannot expect a single entity to supply all the solutions. For the proposed building to have the desired impact on the community of KwaMashu and its periphery, it needs to go beyond fostering conventional learning methods where one source educates a group, but also people learning from each other and the built environment.

### **2.3.2 Skills Development & Poverty Reduction**

A 1930s criminology theory identified unemployment as a major cause of crime. There is a direct and parallel link between opportunities for employment and education (Causes of Crime, n.d.). Crime was explained to be as a result of society putting pressure on individuals to amass money and purchase goods, and then failing to create a way for that to be possible. The unavailability of employment opportunities to attain these material goods, often as a result of people not being able to attain higher education qualifications, often persuades some individuals to achieve this illegally, therefore leading to crime (Causes of Crime, n.d.).

As discussed earlier in Chapter 2.2, a major challenge that KwaMashu faces is that of illiteracy and unemployment, from which emanate much of the apparent social struggles in the area. A concerning 27% of adults are unemployed, and much of the employed population is low-income jobs outside the formal sector. Of equal concern is the 4% of the population with tertiary qualification. Formalised education and training systems are geared towards employment in the formal sector employment. There is an increased requirement for the acquiring of skills for entrepreneurship/self-employment. This is especially true for people living in the most affected areas with limited options for employment, where the only chance for survival lies in self-employment.

In the formal education structure the development of skills doesn't correspond with their demand in the labour market. Morel (cited in King *et al.*, 2007: 43) observes that educators are often not aware of the needs and issues identified with the informal economy and thus fully preparing their students this sort of work becomes an issue. The Department of Higher Education and Training publishes a List of Occupations in High Demand which "provides useful insights into the skills needs of the economy and mismatches between qualifications and occupations (Department of Higher Education and Training, 2016: 8). This is a problem that is particularly important to address, given that the South African labour market is characterised by high unemployment on the one hand, and skills shortages, on the other."

In areas with low literacy or limited access to formal education, it can be argued that access to skills plays an integral part in accessing as well as creating employment opportunities (Musiolek cited in King *et al.*, 2007: 44). The definition of skills development goes beyond merely education and training. The term is used more generally to refer also to:

"The productive capacities acquired through all levels of education and training, occurring in formal, non-formal and on-the-job settings, which enable individuals in all areas of the economy to become fully and productively engaged in livelihoods and to have the opportunity to adapt these capacities to meet the changing demands and opportunities of the economy and labour market" (King *et al.*, 2007:7).

This is to say, over and above the education or training curricular, it is about the ability for production capacities of which these skills courses and programmes equip.

In attempting to eradicate poverty it is important to ensure that the necessary people have the necessary skills and access to assets, resources and services. Efforts to reduce poverty must therefore focus on the informal sector, recognising that this should be a point of departure in development and poverty eradication instead of viewing it as drawback for development, (Torm cited in King *et al.*, 2007: 46).

With the sufficient supply of human capital, measures should be put in place to enable this development of skills being translated into skills utilization and hence poverty reduction.

*‘Skills development has a role to play in job creation, but skills alone cannot create jobs. There needs to be other enabling factors in place. It is increasingly recognised that the skills, ideas and competencies of local people are a critical factor in supporting business creation, and in helping unemployed people to access jobs and increase their incomes’.*

*‘But it is clear that skills development in itself does not create employment. However if properly associated... to other local development tools (such as micro-credit, rehabilitation of social and rural infrastructure, access to water, maintenance of irrigation and drainage systems, production and marketing of local products, improvement of income generation potential, environment protection) it can be a powerful tool as a source of income generation’ (Morel cited in King *et al.*, 2007: 46).*

Technical and vocational education and training (TVET) is strategically aligned to means of employment, advocating the development of manual skills over intellectual skills. A. Victor Murray (King *et al.*, 2007: 43) argued that a good quality vocational education made use of “physical means as an approach to the world of mind and spirit. An education in words alone is necessarily an imperfect education.”

The gist of the definition of poverty, for most people, is a deficiency of money to afford basic needs, particularly of a physiological nature rather than of a social or psychological nature.

Efforts to reduce poverty come in the following types, as illustrated in Figure 2.3.2.1:

- (i) Poverty alleviation - this type tackles the symptoms of poverty and lessens the intensity of poverty. The people do not get improved in state from 'poor' to 'non-poor';
- (ii) Lifting people out of poverty - 'Poverty reduction' - in this type, the people get improved from 'poor' to 'non-poor'. The quantity of people that could be described as poor decreases;

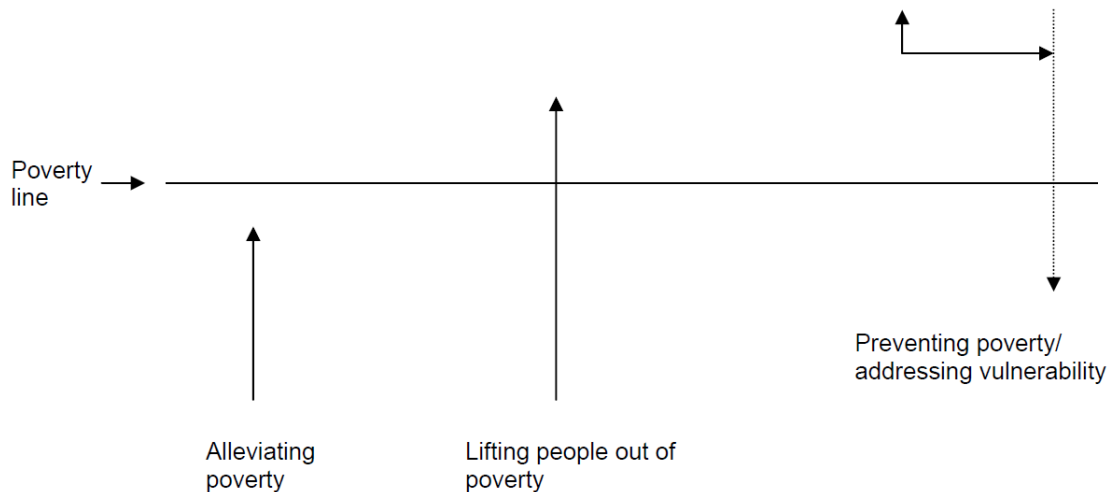


FIGURE 2.3.2.1: Diagrammatic Representation of the Three Kinds of Poverty Reduction; Source: King, 2007: 7

- (iii) Poverty prevention - in this type the effects of poverty are totally circumvented by reducing their vulnerability (King *et al.*, 2007: 7)

The definition of skills development goes beyond merely education and training. The term generally defines the “productive capacities acquired through all levels of education and training, occurring in formal, non-formal and on-the-job settings, which enable individuals in all areas of the economy to become fully and productively engaged in livelihoods and to have the opportunity to adapt these capacities to meet the changing demands and opportunities of the economy and labour market” (King, 2007:7). This is to say, over and above the education or training curricular, it is about the ability for production capacities of which these skills courses and programmes equip.

To put these production capacities into practise, facilitative infrastructure is required - which is where a skills centre comes in. By understanding the concepts of Skills

Development and Poverty Reduction, Didactic Architecture as well as T.O.D. in addition to the theories of Genius Loci and Bioclimatic Design, one begins to understand and therefore explain and predict how skills formally obtained through instruction cascades informally to those unskilled.

Criminologists conclude that having good employment opportunities makes individuals develop social and personal attachments to their community, which successively impacts their probability to engage in criminal activity. The likelihood of an individual engaging in criminal activity, albeit substantial rewards, is greatly lowered if that individual is tied to the community and is respected by its members.

### 2.3.3 Transit Oriented Development

Transit Oriented Development (T.O.D.) is the exciting rapidly spreading trend in creating vibrant, liveable, sustainable communities (Transit Oriented Development Institute, n.d.). The contemporary formulation of the concept originated in the United States of America during the late 1970s and early 1980s becoming prominent in the 1990s. It is in its core the establishment of compact, walkable, pedestrian-oriented, mixed-use communities intended to maximize access to public transportation. This kind of development is ordinarily characterised by a centre with a public transit station with high-density development within a walking distance, typically within 800 metres (half mile) radius as shown in Figure 2.3.3.1. The density decreases with increased distance from the centre (Holmes, 2008:4).

It is worth noting that geographic vicinity alone does not influence T.O.D. Numerous developments may be in propinquity to transit, only to find that they are not really intended to propose access and use. TOD therefore makes a vibrant community centred on access to public transport and reduced reliance on automobiles, contributing to living lower-stress life without dependence on automobiles. With the ability to cut the use of private automobiles by up to 85%, T.O.D provides a solution to the apparent climate change and global warming issue by eliminating the need for driving and consumption of energy (Transit Oriented Development Institute, n.d.). At the core of sustainability, it creates low carbon lifestyles, and thus results in cleaner air and eases traffic congestion.

"The choice is ours—yours and mine. We can stay with business as usual and preside over an economy that continues to destroy its natural support systems until it destroys itself, or we can adopt Plan B and be the generation that changes direction, moving the world onto a path of sustained progress. The choice will be made by our generation, but it will affect life on earth for all generations to come." - Lester Brown.

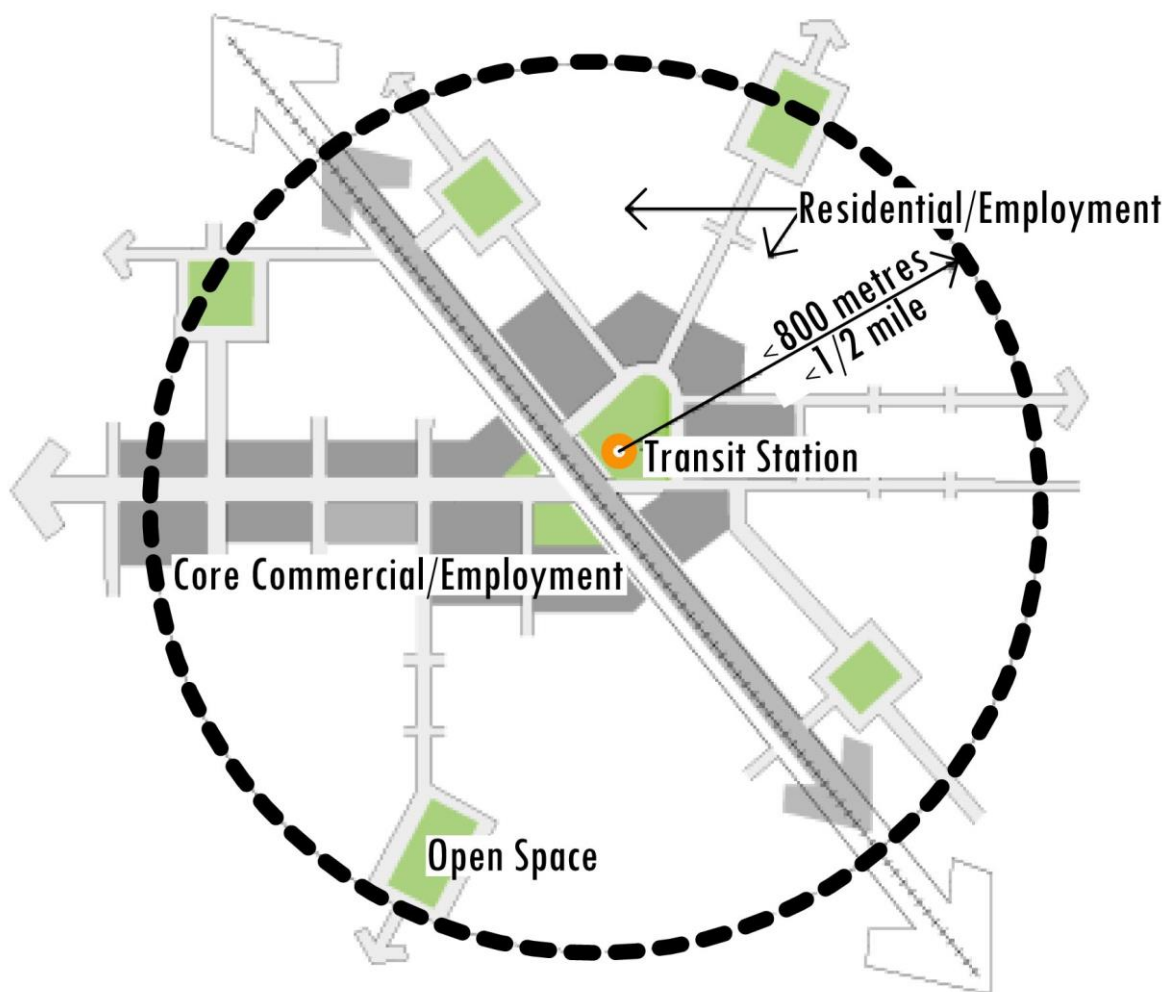


FIGURE 2.3.3.1: TOD Diagram; SOURCE: Pinterest, Accessed August 2017 <[www.pinterest.co.uk](http://www.pinterest.co.uk)>

T.O.D. has multiple benefits that include: enhancing the quality of life by providing better places to live, work, and play; simplifying movement; enhancing property values; healthier lifestyles; enhancing pedestrian traffic and customers for area businesses and the ability to maintain economic competitiveness. Simultaneously, it reduces: traffic congestion, car



accidents and injuries; transportation costs; housing/accommodation costs; the reliance on fossil fuel based energy, pollution and further degradation of the environment. This discourages the need to sprawl, encourages compact development resulting in less costs and stress (Transit Oriented Development Institute, n.d.).



FIGURE 2.3.3.2: The Choice Between Unsustainable & Toxic versus Sustainable & Green; SOURCE: Transit Oriented Development, Accessed August 2017 <<http://www.tod.org/sustainability.html>>

### 2.3.3.1 Elements of Placemaking

Placemaking is the art of creating quality spaces that people want to live, work, learn and play in (Wyckoff, 2013: 2). Placemaking ought to be the nucleus of T.O.D. as it enhances the places in a neighbourhood by uniting various components physical and operational components. Wyckoff views placemaking as a process, the result of which is the creation of quality places - places with a strong sense of place. These spaces are usually characterised by activity, unique locations, are interesting, aesthetically pleasing and as such people and businesses want to inhabit them. These places with a strong sense of place are termed quality places and exhibit the following components:

- i) Have a mixture of different uses to cater for different functions of daily living;

- ii) Have quality public spaces and green spaces that people will be attracted to and often form attachments to;
- iii) Are conducive for high speed communication which brings information at lighting speed to the user and keeps them connected to the entire globe;
- iv) Present a variety of transportation options with emphasis of public rather than private transport;
- v) Present multiple housing options to cater for different needs and family/household requirements;
- vi) Provide spaces for art, culture, creativity and recreation, and
- vii) Preserve historic structures and the heritage of the community.

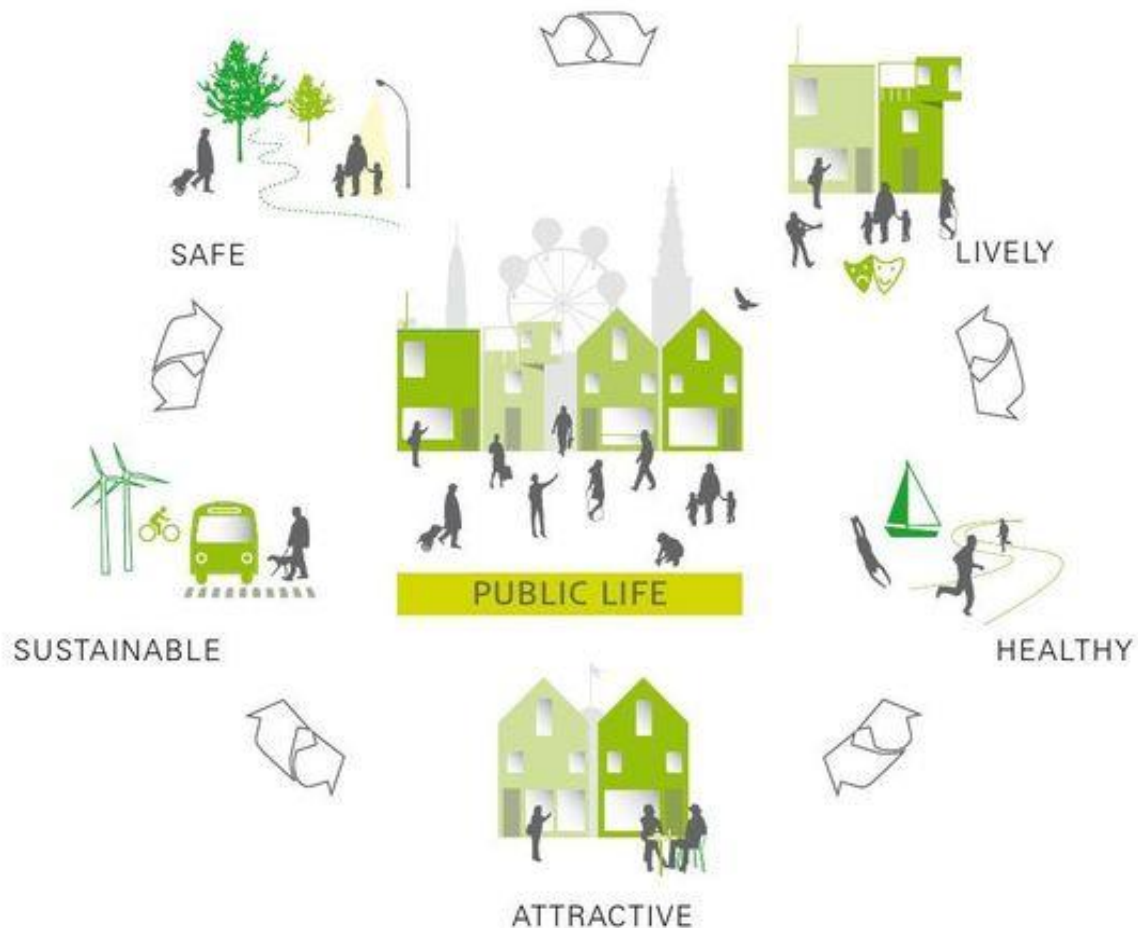


FIGURE 2.3.3.1.1: Characteristics of Quality Spaces; SOURCE: ISSU Online, Accessed June 2017 <[issuu.com/gehlarchitects/docs/565\\_seattle\\_pspl/12](http://issuu.com/gehlarchitects/docs/565_seattle_pspl/12)>.

Being analogous with the concept of T.O.D., quality spaces are dense and exhibit an affinity for human scale. They are pedestrian oriented, have provision for cyclists, are safe, connected, welcoming and comfortable. An important characteristic is accessibility - quality spaces have to allow for easy movement within, along and between the public places. They ought to have a physical fabric that encourages the connection and interaction of people and facilitate civic engagement (Wyckoff, 2013).

## 2.4 Theories

### 2.4.1 Genius Loci

Genius loci has its origins in ancient Rome (Roman religion and Roman mythology), where it is believed that every independent being has its own genius or rather guardian spirit (Norberg-Schulz, 1980). This “guardian who watches over their part of the world and imbues it with a special character” gives life to people and places and is ever present in the existence of that being (Norberg-Schulz, 1980: 18). This view demonstrates the importance of realising and accepting the genius of the place where the processes of life take place.

*“A good environmental image gives its possessor an important sense of emotional security” (Lynch cited in Schulz, 1980: 19).*

The Latin meaning of the term *genius loci* as a protective spirit attached to a place has somewhat changed over the past few decades (Jive’N, 2003: 68). In the reality of the present day, despite everything, we have the capacity to recognize a place’s genius loci to properly comprehend that particular environment we are working with (Hilty, 2014).

*“‘Sense of place’ is a much used expression, chiefly by architects but taken over by urban planners and interior decorators and the promoters of condominiums, so that now it means very little. It is an awkward and ambiguous translation of the Latin term genius loci. In classical times it means not so much the place itself as the guardian divinity of that place. In the eighteenth century the Latin phrase was*

*usually translated as 'the genius of a place', meaning its influence. The current version is now used to describe the atmosphere to a place, the quality of its environment. Nevertheless, we recognize that certain localities have an attraction which gives us a certain indefinable sense of well-being and which we want to return to, time and again"* (Jackson cited in Jiven, 2003: 68)

At the point when Jackson talks of the atmosphere, he shows that the term *genius loci* has become noticeably associated to the idea of the "character" of a place. These qualities influence the psychological experience of, and response to, places thusly further entangling the idea of 'character' and *genius loci*. This combination of thoughts is most unmistakably found in conversation of 'the past' and conservation. Lowenthal (cited in Jiven, 2003: 68) suggests that 'the past' exists as an idea of both the individual and community, with shared values and experiences being essential. Group identity is connected with the form and history of place, making a sense of place or *genius loci*:

*"...in the course of time the landscape, whether that of a large region like a country or of a small locality like a market town, acquires its specific genius loci, its culture- and history-conditioned character which commonly reflects not only the work and aspirations of the society at present in occupancy but also that of its precursors in the area"* (Conzen cited in Jive 'N, 2003: 69).

Through many different works, Christian Norberg-Schulz did some key work in trying to examine and explain the *genius loci* phenomena over decades. In his book *Genius Loci: Towards a Phenomenology of Architecture* (1980: 11), he describes *genius loci* as "representing the sense people have of a place, understood as the sum of all physical as well as symbolic values in nature and the human environment". Learning from Kevin Lynch, Norberg-Schulz moves from analysing buildings on structure and identity and focuses on the character that these gave the buildings. His use of the concept of *genius loci* outlines four thematic levels: (i) the topography of the earth's surface; (ii) the cosmological light conditions and the sky as natural conditions; (iii) buildings, as well as ; (iv) symbolic and existential meanings in the cultural landscape (Jive 'N. 2003: 70). He goes on to illustrate that people experience place in four levels: image; space; character and *genius loci*. His feeling is that nature's relation to objects is what gives them meaning.

### 2.4.1.1 Critical regionalism

Viewed in this instance as an extension of Genius Loci, Kenneth Frampton argues that it is "critical to adopt universal values of modernism, taking into account the geographical context of the building" (1993: 21). Introduced in the 1970s, Critical Regionalism was advanced to give a theoretical framework to the emerging work by architects of that time that sought to "produce architecture that was a product of the specifics of an individual situation" (Lefaivre, 2003: 10). The idea was to use this to address the failures of and as a substitute for postmodernism which was dominant at the time.

Critical regionalism provided a different attitude towards design, prioritizing the character of the specific instead of complying with general authoritative opinions. It stresses the need to establish the identity of the particular rather than conforming to universal precepts with the idea of universality and ending up with economically costly and environmentally destructive environments. Through this concept mankind can learn to produce an architecture that "owes its attraction to the particular naturally-given qualities of a place rather than an imposed order of universal rules".

This indicated a move from the top-down approach employed by modernist and postmodernist buildings that disregarded the idea of place and adopt a new bottom-up way of thinking. Critical regionalism in this regard "recognises the value of the identity of the physical, social and cultural situation", rather than forcing narcissistic ideas from the top down. Architecture in this way is a product of natural causes and logic, formed by carefully considering the particular internal and external physical limitations of an area. "The differences between the kinds of building one finds going from region to region resulted from different physical environments, and the varying characteristics of a house as ordained by nature" (Lefaivre, 2003: 11).

### 2.4.1.2 Conclusion

Genius Loci is key in ensuring that the built environment is a meaningful and satisfactory place. Understanding the spirit of KwaMashu is pivotal in analysing the challenges faced by the community and subsequently coming up with a solution. Activities that are alike, occur

in different ways in various settings. These activities request places with various properties as per distinctive social customs and diverse environmental conditions. While other areas may have the same challenges as the study area, addressing these would not take a similar route since the characters are different. Genius loci is in this case key in remedying the approach to infrastructure taken by the Durban City Council in the 1950s. Through this deeper understanding of place, the architectural intervention made in KwaMashu will be viewed through the lens of critical regionalism, rethought through the concept of region.

### 2.4.2 Bioclimatic Design

One of the challenges presented by subtropical climate is that spending prolonged times indoors is usually uncomfortable, especially during the day. For most buildings in subtropical areas, artificial air-conditioning is usually the chosen solution. It comes with the advantage of giving the architect the flexibility to do as he pleases with the envelope of the building to achieve whatever aesthetic is desired (Bay, 2006: 3). Since over and above providing an opportunity for stylistically open-ended architecture, using artificial air-conditioning and illumination comes with the added advantage of resolving environmental comfort challenges with ease. This makes it popular with the public. The continued use of these environmentally ignorant systems brings with it concerns of costs and environmental degradation.

Climate ought to be the point of departure all architecture. Joo-Wha Bay and Boon Lay Ong define modern tropical architecture as the “adaptation of modern trends in design and construction to climate, taking into consideration some changes in lifestyle that the tropical climate affords” (2006: 3). This practise starts going back to the age old tendency of defining building styles by climate zones and less by national frontiers, a practise which became less prominent with the blooming of industrialisation. Upon studying various vernacular typologies globally, one starts to realise that dwellings have always been adapted to address the particular environmental challenges of the area they are to exist in. This involved bringing together a great deal of attention to climate and craftsmanship to start addressing issues of comfort and protection, prompting buildings which expressed the true character of the area (Olgyay cited in Hyde *et al.*, 2009: 230).

Architect, city planner, author and pioneer of bioclimatism, Victor Olgyay was first to identify bioclimatic issues in the field of architecture in the 1950s. Olgyay developed these issues into design processes to bring human physiology, climatology and building physics which have become the foundation in the design of sustainable buildings (Olgyay cited in Hyde *et al.*, 2009). Bioclimatic design therefore has to do with the way the built environment deals with the relationship between humankind and the climate. According to Kean Yeang, the attitude is “to build with minimal impact on the natural environment, to integrate the built-environment and its systems with the ecosystems of the locality and if possible, to positively contribute to the ecological and energy productivity of the location” (2006: 45).

It is quite clear that presently the use of mechanical systems to achieve thermal and visual comfort is far common and that bioclimatic design principles have been ignored in the built environment. The design and use of more efficient mechanical systems has been the focus in the effort to accomplish comfort in buildings rather than examining factors, such as the passive elements of the building, which would eventually result to an integrated solution. David Lloyd Jones suggests that “by utilising a building’s microclimate, form and fabric, rather than mechanical equipment, an office building for instance, will use as little as 15% of the energy consumed by a conventional building of the same size and typology over its lifespan” (Yeang cited in Hyde *et al.*, 2009: 230).

By returning the focus back to the design of the form and fabric of the building envelope and on the use of new technologies, bioclimatic design can be achieved. An array of passive biophysical elements, have been pioneered by Ken Yeang which can be used to achieve ‘net zero energy buildings’. Although there is still a need for more research in this area, with current knowledge and reference from work like Yeang’s, ‘net zero energy buildings’ are a possibility (Gilijamse cited in Hyde *et al.*, 2009: 230).

The ‘net zero-energy building’ is “an ideal concept in which no fossil fuels are used and sufficient electricity is generated from natural sources to meet the service needs of the occupants. This idea sets the optimal design target for a building in terms of minimising the environmental effect and energy cost of the dwelling”. The charm of this concept is the idea of utilising ‘free’ energy that is made available by the natural environment, solar and wind for instance. The process of using this ‘free’ energy with the goal of attaining

the zero-energy involves engaging both passive and active solar technologies (Wittchen cited in Hyde *et al.*, 2009).

Theoretically, the zero-energy dwelling concept can be achieved by: i) minimising the energy demands of the building by increasing energy efficiency; and ii) using the building envelope for electricity generation/harvesting 'free energy'. Much of the scepticism from professionals is due to the scarcity of workable examples of large-scale bioclimatic buildings where these concepts have been successfully employed, especially within the borders of South Africa. The divide between issues of implementing sustainability and financial worth is as a result of the scarcity of sufficient information and solid proof relating to costs and benefits. Further research and good examples in the form of successful examples are necessary to establish more benefits, key performance indicators as well as reveal accurate cost implications. Essentially, how successful a building is will be determined by the symbiotic relationship involving mankind, the built environment, the natural environment as well as technology.

## 2.5 Conclusion

Together with the concepts, the theories provide principles that are necessary to provide a precise account of the existing phenomena under investigation and give predictions on behaviour, processes, relationships, variables and/or events. In order to test the hypotheses and answer the main question and key sub-questions outlined in the first chapter, an array of theories and concepts were selected to examine the role of architecture and urban design in facilitating skills transfer.

The chapter begins by identifying the key problems of environmental degradation and social dislocation that are being researched. Possible solution approaches are discussed as concepts, with intended outcomes highlighted. These concepts focus on the type of architecture needed, impact on the social and economic life, the urban environment as well as nature. Chosen theories mainly highlight the unique character of KwaMashu, and attempt to explain the desired effect that the building is to have on human beings and the natural environment.



## CHAPTER THREE: PRECEDENT STUDIES

### 3.1 Introduction

The following precedent studies have been carefully identified in the form of an existing local and an international building. The purpose of these is to review and analyse these existing buildings on how they incorporate concepts and theories that have been discussed in the above literature review chapter. Through the analysis of these concepts and theories as the framework of the designing processes for the precedents, one can begin to understand their practical application in building design. From these precedents, various supportive principles can be formulated that will aid in providing a framework in the architectural design of the proposed working model of this research project. Conclusions will be drawn on their triumphs as well as in their application and their relevance in the local context.

### 3.2 Precedent 1: Eastgate Centre, Harare



FIGURE 3.2.1: Eastgate Centre, Harare, Zimbabwe; SOURCE: Harare News Online, Accessed September 2017 <<http://www.hararenews.co.zw/2014/05/whats-that-building-eastgate-mall/>>.

**Location:** Robert Mugabe Rd, Harare, Zimbabwe, Southern Africa.

**Typology:** Mixed Office Complex + Shopping Mall

**Area:** 55 000 m<sup>2</sup>

**Finished:** 1996

**Architects:** Mick Pearce + Ove Arup and Partners Engineers

**Client:** Old Mutual Properties

### 3.2.1 Location, Introduction & Justification



FIGURE 3.2.1.1: Location of Harare, Harare Province, Zimbabwe, Southern Africa; SOURCE: Deboomfotografie, Accessed September 2017 <[www.deboomfotografie.nl](http://www.deboomfotografie.nl)>.

For buildings to be able to deal with the temperate climate of Harare, the cost implications of buying, installing, and maintaining conventional air-conditioning systems are quite high. The Eastgate Centre in Harare provides an ideal demonstration of the use of biomimicry principles in the built environment. The design process required a close study of the patterns and strategies of the self-cooling mounds of African termites - systems developed, tried and tested by nature over centuries.

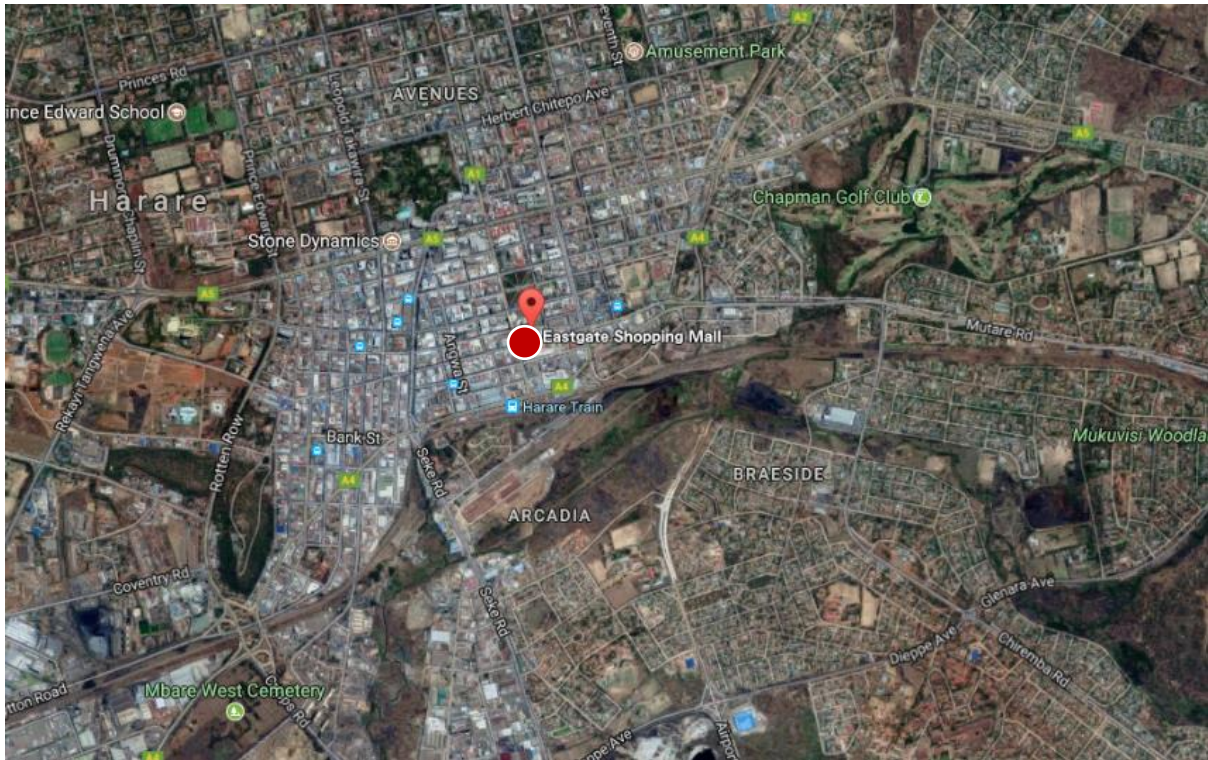


FIGURE 3.2.1.2: Location of Site: Harare, Zimbabwe; SOURCE: Google Maps, Accessed September 2017 <<https://maps.google.com>>.

The resultant structure, a mid-rise mixed-use building, achieves maximum thermal comfort without the use of any conventional energy-intensive heating or cooling. The lessons from termite mounds resulted in an efficiently ventilated building, Zimbabwe’s biggest mixed-office and shopping complex ventilated entirely by natural means.

### 3.2.2 Understanding of Place

The ‘spirit of a place’ includes the mystical sense of place - a special relationship that one forms with place, influenced by its identity and character informed by natural and cultural features in the landscape. The architecture draws inspiration from Mashonaland. The Centre is fundamentally two side by side buildings with a glass canopy covering the space in the middle. Below this, steel bridges and lifts suspended on cables from steel lattice beams span over the atrium below.

The building is in itself “An expression of two forms of architecture; the new order of brick and reconstructed stone and the old order of steel and glass. The new order moves

away from the international glamour of the pristine glass tower archetype towards a regionalized style that responds to the biosphere, to the ancient traditional stone architecture of Great Zimbabwe and to local human resources” (Mick Pearce Architecture, n.d.). The old order expresses the technology of steel and glass imported by settlers seeking minerals. This is made up of the lattice steel work, the hanging lift cars, suspension bridges and the glass canopy.

Massive protruding precast concrete elements are used to maximise the surface area of the building and aid the loss of heat during night time and lessen its capture during daytime as well as provide solar shading for the small windows (Figure 3.2.2.1). The concrete is brushed to expose the granite aggregate which mimics the lichen-covered rocks of the wild landscape of Zimbabwe. The building also borrows from the indigenous masonry of Great Zimbabwe. The horizontal protruding ledges are interrupted by columns of steel rings supporting green vines to bring nature back into the city. The building becomes much like an ecosystem than a machine.



FIGURE 3.2.2.1: Precast Concrete Elements; SOURCE: Ask Nature, Accessed September 2017 <<https://asknature.org/idea/eastgate-centre/#.WpaFLexWM8>>.

### 3.2.3 Bioclimatic & Biomimetic Design

The Building harnesses thermal mass as well as what is described as a “specific air change schedule, using high rates of mechanical night cooling, supplemented by smaller rates of passive ventilation during the day” to maintain thermal comfort and keep the air fresh. To allow this, the construction materials used in the building, have been strategically chosen to have a high thermal capacity, giving them the ability to store and release heat from the environment (The Biomimicry Institute, 2016). Timed electrical fans are used to supplement the storage of heat which is in abundance during the day, and at night electrical fans suck in cold air, which passes through the building, cooling the thermal mass and expelling heat out of the chimney again (Mick Pearce Architecture, n.d.).

The structure is built around a central chimney, as illustrated in Figure 3.2.3.1. At the apex of the roof, there are 48 brick funnels, designed to pull the exhaust air out of the seven floors of offices below. A mezzanine plant room is situated on the floor below the seven office floors, where 32 banks of low and high volume fans draw air from the atrium through filters. This air is pushed up through the supply section of vertical ducts in the

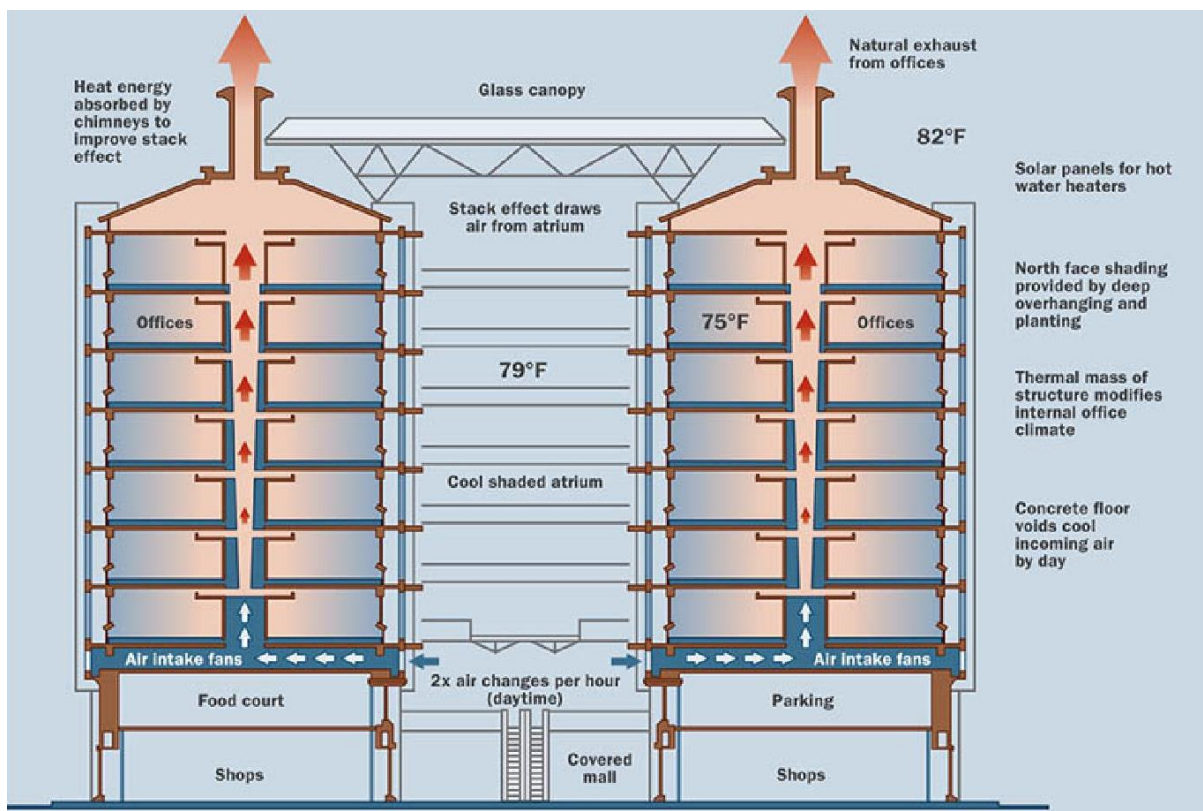


FIGURE 3.2.3.1: Passive Cooling/Heating Diagram; SOURCE: Mick Pearce Architecture, Accessed September 2017 <<http://www.mickpearce.com/Eastgate.html>>.

central spine core of each office wing. From the duct the air is fed through the hollow floors to low level grilles under the windows.

The energy emitted by the occupants and appliances within the building is used to drive airflow within the building's large, internal open spaces. The heat from the spaces on the lower floors rises up, naturally drawn through convection out of open rooftop chimneys while the radiant heat gets transmitted into the thermal mass (Figure 3.2.3.2). This further enhances the convection. The building takes advantage of outside winds to enable passive internal airflow through several openings. In addition fan power requirements are reduced by stack effect ventilation through the building, and the buoyancy effect generated by the occupants' metabolic activities (The Biomimicry Institute, 2016). In the office space uplighters use the concrete vaulted ceiling to reflect light downwards and to absorb their heat.

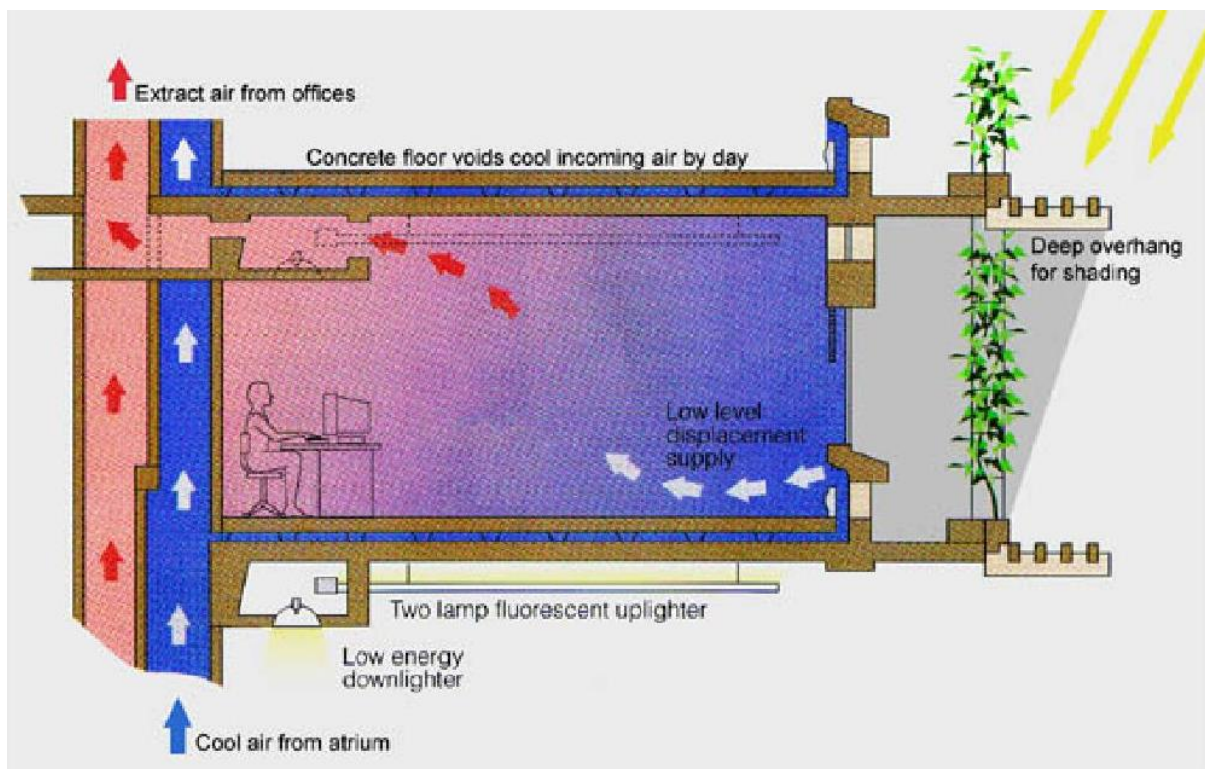


FIGURE 3.2.3.2: Detail of Passive Cooling/Heating Diagram; SOURCE: Mick Pearce Architecture, Accessed September 2017 < <http://www.mickpearce.com/Eastgate.html> >.

### 3.2.4 Conclusion

Pearce uses his knowledge of building science and the function of the building and occupants to achieve a thermal comfort. Through this information, he was able to produce a building that uses minimal energy, through the understanding of the local climate. The termite mounds which he mimicked, use wind driven and thermosiphon flow powered by the termites own bodies to accelerate ventilation through the nest (Figure 3.2.4.1). The termites' techniques have been clearly applied to the form of this building leading to reduced reliance on external power generation and so less external energy consumption from the wider national grid. To cover this energy deficit, the termites employ some micro-generation strategies, just as the building is connected to the power grid to supplement the natural ventilation and power appliances.

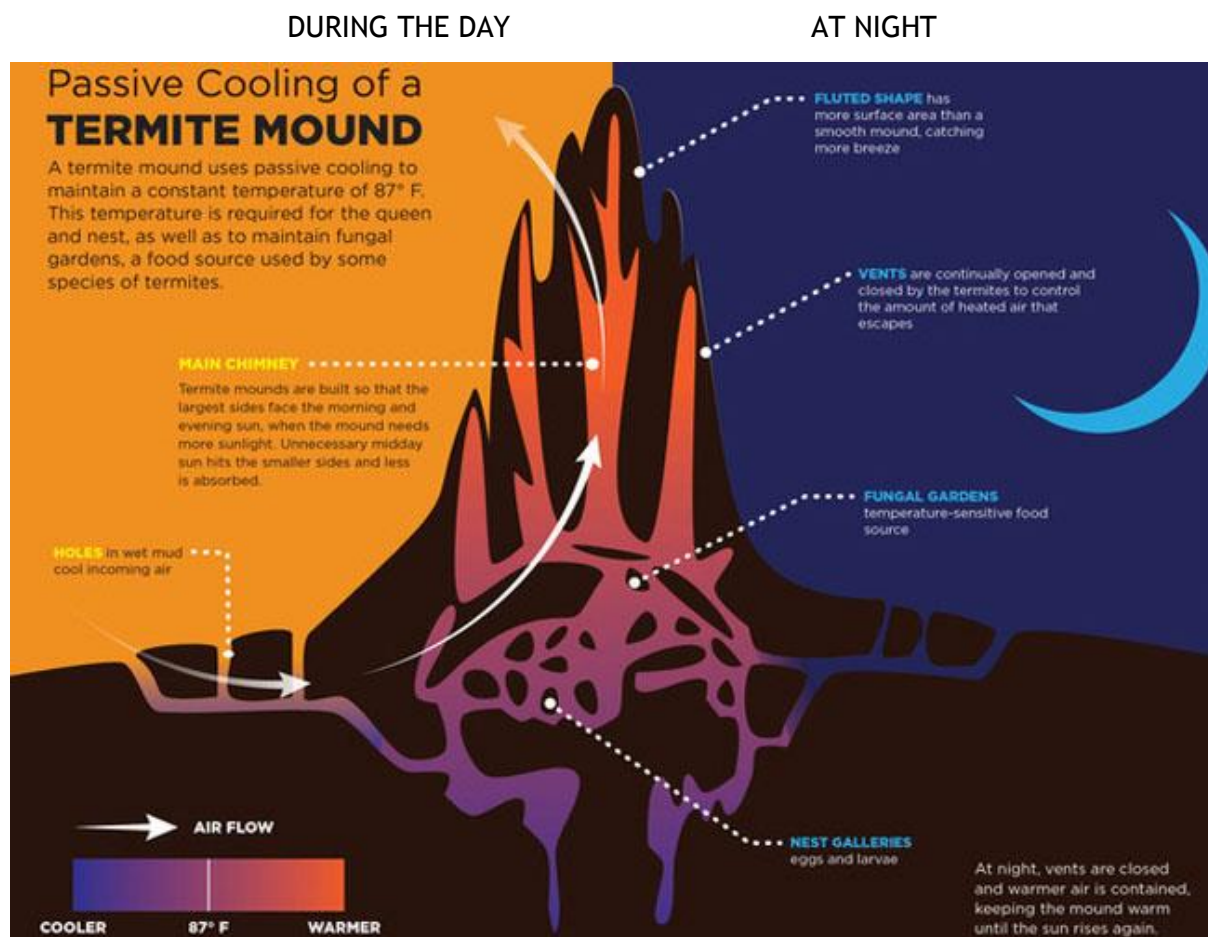


FIGURE 3.2.4.1: Passive Cooling of Termite Mounds; SOURCE: Randy Topp Business Improvement, Accessed September 2017 <<http://rt-bi.nl/social-responsibility/biomimicry/macrotermite-termites/>>.

Through the use of the above highlighted cost-effective and energy-efficient mechanisms originally inspired by termite mounds, the Eastgate Centre is able to accomplish comfortable controlled internal climate. These mechanisms ensure that as the temperatures outside fluctuate, internal temperatures are kept generally constant, never varying more than 1.5°C between low level and high level temperatures.

Through comparisons between Eastgate's energy consumption with that of other conventional HVAC-reliant buildings, the genius of the building is highlighted. By eliminating the need for conventional HVAC systems, up to a fifth was saved on the initial building costs totalling about \$3.5 million (R50 million), compared to the other buildings of the same magnitude. The building recorded a use of less than half of the energy used, compared to other buildings in Harare without compromising on comfort conditions (Mick Pearce Architecture, n.d.). These savings in the construction, maintenance and powering of air-conditioning systems translate to savings for occupants. This means that not only do residents experience optimum comfort levels, they also pay affordable rent for it.

### 3.3 Precedent 2: Valpoi Bus Stand and Community Hall



FIGURE 3.3.1: Valpoi Bus Stand and Community Hall. SOURCE: Archdaily, Accessed November 2017 < <https://www.archdaily.com/798500/valpoi-busstand-and-community-hall-rahul-deshpande-and-associates>>.



**Location:** Valpoi, Goa 403506, Western Ghats, India.

**Area:** 2862.0 sqm

**Finished:** 2012

**Architects:** Rahul Deshpande and Associates

**Client:** Goa State Infrastructure Development Corporation

### 3.3.1 Location



FIGURE 3.3.1.1: Location of Valpoi, Goa, Western Ghats, India, Asia. SOURCE: : Deboomfotografie, Accessed September 2017 <[www.deboomfotografie.nl](http://www.deboomfotografie.nl)>.

The building is located in Valpoi, a small town in Western Ghats, Western India. It has a tropical monsoon climate with a 27.6 °C average temperature and significant rainfall almost through the year. The rainfall averages 2 625 mm, compared to the average 975 mm of Durban (ClimateData-Org, n.d.). The topography is characterised by rocky mountains and thick forest.

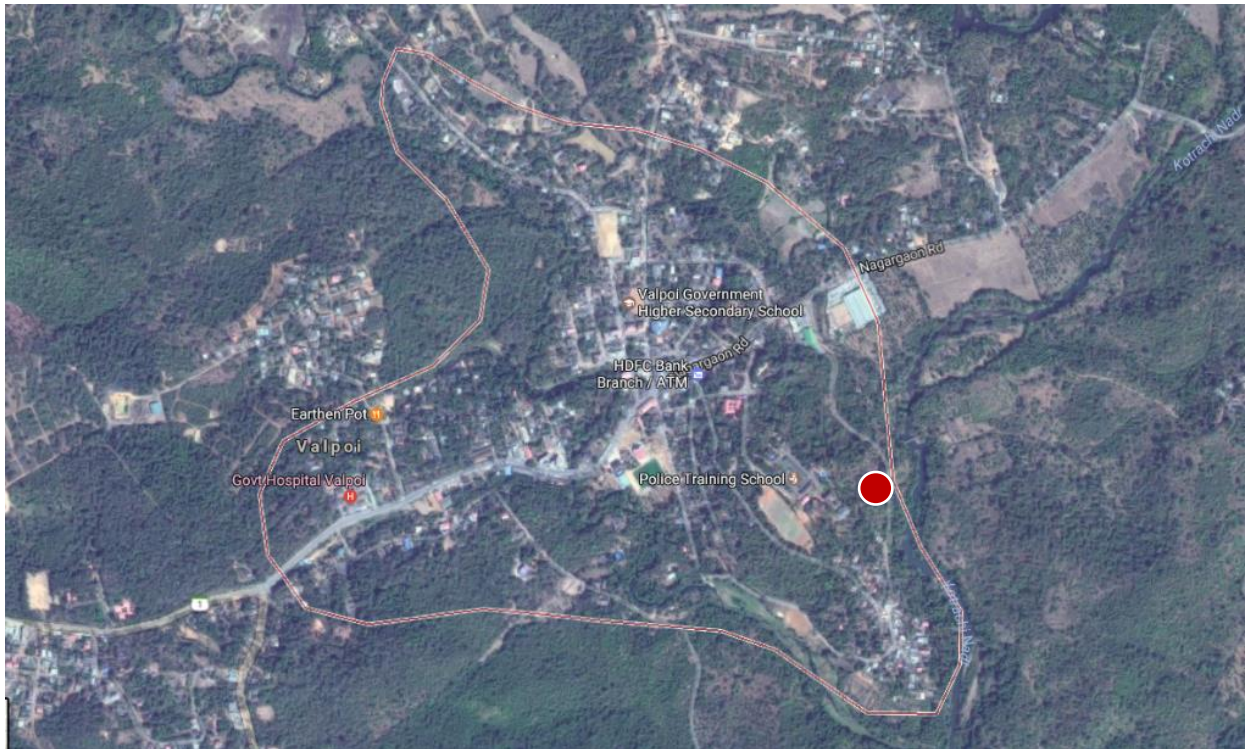


FIGURE 3.3.1.2: Location of site in Valpoi, Goa. SOURCE: Google Maps, Accessed November 2017 < <https://maps.google.com>>.

### 3.3.2. Introduction & Justification

The Government of Goa proposed the design of a multi-purpose communal building to house a Community Hall, Bus Stand and a Children’s Park with a Jogging track. Primary to the requirements of the brief was that the building units should be independent in their operations, administration and that has low construction and maintenance costs (Archdaily, 2016). The design was proposed to generate an encounter of a building that is not only the core of Valpoi as a place, but also its collective identity.

The design evolved in response to the brief and the climate which demonstrates how a building can minimise its impact on the environment it exists in through lessons from Climatic Design. The aim was to provide architecture that is not subjugated by pre-constructed conditions but as an active response to reality. The result is a demonstration of great consideration for material, a piece of architecture taken beyond its isolated being and deeper into the conditions of its existence. This project has been identified for having a great socio-economic impact while being sustainable.

### 3.3.3 Spirit of Place

The design of the building is influenced by the identity and character of the place and is informed by natural and cultural features in the landscape. The Western Ghats is exposed to bouts of thunder and lightning. The building emulates the sense of wafting clouds against the mountain slopes, as an extension of the picturesque backdrop. A seemingly afloat metal roof (Figure 3.3.3.1) which at times teases to express itself as a stroke of lightning, is designed to crown the random rubble laterite stone wall. The galvanised metal roof sheeting has a figurative reference to the lightning sparked sky.



FIGURE 3.3.3.1: Walls mimicking the landscape and roof mimicking suspended rain clouds. SOURCE: Archdaily, Accessed November 2017 < <https://www.archdaily.com/798500/valpoi-busstand-and-community-hall-rahul-deshpande-and-associates>>.

Functionally, it is connected in fragments of the three spatial activities - each co-opting a single volume. The plan therefore is compact, less porous, yet open in its attitude, well ventilated and adequately lit. The architecture identifies ineffably to the *genus* of the place. Taking from the mining quarry nature of the site, the mounds of laterite are translated to the triangular exposed laterite walls masquerading as mountains in the landscape (Figure 3.3.3.2). The shape of the walls also helps to give a sense of direction to the visitor and his eye. With flexibility, the community hall space emerges as a physical environment that can adapt to the diversity of the community. A winding walkway of about half a kilometre in dialogue with the play area and orchid, doubles as a Joggers' Park (Figure 3.3.3.3).



FIGURE 3.3.3.2: Triangular Walls Made From Locally Laterite walls. SOURCE: Archdaily, Accessed November 2017 <<https://www.archdaily.com/798500/valpoi-busstand-and-community-hall-rahul-deshpande-and-associates>>.



FIGURE 3.3.3.3: Play Area & Jogger's Park. SOURCE: Archdaily, Accessed November 2017 <<https://www.archdaily.com/798500/valpoi-busstand-and-community-hall-rahul-deshpande-and-associates>>.

### 3.3.4 Bioclimatic Design

The Valpoi Bus Stand and Community Hall is a demonstration of architecture that is not a product of self-constructed condition, but rather an active response to the realities that it exists within. The designers, Rahul Deshpande and Associates, carried the idea of “taking architecture beyond its isolated being, deeper into the conditions of its existence” (Indian Architect and Builder, 2013: 90) throughout the project. A lot of attention was paid to the local climate with great consideration for materials.



FIGURE 3.3.4.1: Deep Overhang for Shelter from Sun and Rain. SOURCE: Archdaily, Accessed November 2017 <<https://www.archdaily.com/798500/valpoi-busstand-and-community-hall-rahul-deshpande-and-associates>>.

The design therefore is compact and impermeable, while adopting an attitude of openness, well ventilated and adequately lit. It is a requirement that a building in this climate protects from the scorching sun and assaulting torrents of rain while allowing for adequate light and airflow. The floating roof with overwhelming overhangs was used to achieve this. In

addition, the roof is designed to induce water harvesting towards the middle. This collected rainwater is used for the orchid and other utilities within the site.

The use of the laterite for the walls, which is not just sourced locally but on the very site of the building, is a huge factor in the sustainability efforts of the building. In addition to resonating with the place, using this laterite severely cuts costs and contributes to an overall low carbon footprint by not requiring to be transported to site. The other primary material, TATA BlueScope roof sheet is also easily available, manufactured locally and an overall durable material with little to no environmental impact.

### 3.3.5 Conclusion

The project demonstrates the vital role that a civic building housing a mix of different activities can play in influencing a community. The complex caters for public transport as well as provides services and facilities such as toilets, drinking water, telephone booths, waiting areas, canteen, ticketing offices, restrooms, etc. which are located in close proximity to ensure passenger comfort.

The complex is a successful example of a destination for the community. Much like the Thusong Centres which are one-stop, integrated community development centres, the building provides services relevant to needs of the community of Valpoi with participation for all groups. The bus stand and shops will always pull commuters, and the park has the ability to pull considerable activity. For the multipurpose community hall, however, attracting constant use all through the week becomes challenging, a factor required of the proposed centre in KwaMashu.

The precedent is a good demonstration of how we can start looking at the environment for ideas and solutions in the built environment. The disappointment is that, upon scratching the surface, it doesn't fully utilize the opportunity to create a fully responsive piece of architecture. There is not much mention of the use of other sustainable practises, especially with regards to alternative/green energy. Being in an area that receives major sunlight, an opportunity to utilise solar power has been passed.

## CHAPTER FOUR: CASE STUDY

### 4.1 UMnini Thusong Community Centre



FIGURE 4.1.1: Entrance to uMnini Thusong Centre; SOURCE: eThekweni Municipality, Accessed August 2017 <[http://www.durban.gov.za/City\\_Services/engineering%20unit/City%20Architects/Documents/ThusongCentre.pdf](http://www.durban.gov.za/City_Services/engineering%20unit/City%20Architects/Documents/ThusongCentre.pdf)>

**Location:** N2, Danganya, Luthuli, 4105, South Africa

**Typology:** Community Centre

**Architects:** Sandy Naiker, eThekweni Municipality, City Architects

**Completed:** 2017

**Client:** eThekweni Municipality

### 4.1.1 Introduction and Justification

The Case study is one of a number of multi-purpose community centres by the government termed Thusong Service Centres. They are defined as “primary vehicles for the implementation of development communication and information and to integrate government services into primarily rural communities” (Thusong Service Centre, n.d.) They are aimed at confronting a variety of historical, social and economic circumstances that posed challenges to the residents’ access to services, information and engagement in community issues. The dedicated website describes Thusong Service Centres as one-stop, integrated community development centres, fostering the engagement of the community. Further, specific services are tailored for the needs of that society and geared towards improving the lives of the poverty-stricken and disadvantaged. The building is a successful example of a community building, with its open and welcoming design as well as usable gathering spaces.

### 4.1.2 Location and Social Context



FIGURE 4.1.2.1: Location of site: Luthuli, KwaZulu-Natal, South Africa, Africa; SOURCE: Deboomfotografie, Accessed September 2017 <[www.deboomfotografie.nl](http://www.deboomfotografie.nl)>.

UMnini is a predominantly black rural seaside community in the South Coast of KwaZulu Natal, near Umgababa. Only about 40 minutes’ drive South of Durban, the areas of Umgababa were deliberately set aside by apartheid beach planners for Black South

Africans. This made it quite different from a lot of black settlements that were planned away from the shore to make space for ‘white only’ suburbs (eThekweni Municipality, n.d.).



FIGURE 4.1.2.2: Location of uMnini Thusong Community Centre; SOURCE: EtheKwini GIS, Accessed August 2017 <<http://gis.durban.gov.za>>.

The site is located on a key site that is easily visible and accessible to the community and visitors, mainly via the N2 and R102 roads. This provides easy access for pedestrians, motorists and commuters especially on taxi and trains. Being a poverty and disadvantaged settlement, public transport is very prominent in the area, with taxi and bus routes just outside the centre. A railway station, which is connected by bus, is a mere 2 kilometres away from the site. The site is vast, and accessed from the north-west presenting plenty opportunity for North orientation.



### 4.1.3 Genuis Loci:

For this project, the designers' objective was to provide a building that not only sought to enhance the quality of lives through effective and efficient delivery of services but provide architecture that is an experimental model for sustainable design as well. What they came up with was a model that provides a response to the changing climatic, economic and social requirements for the disadvantaged community.

The architecture is a very good product of genius loci with its demonstration of a good understanding of the place and community it exists within. Over and above recognising the need for and providing the various government services such as the departments of Home Affairs and Social Development among others, the centre rectifies the scarcity of social facilities for the community. The issues of social instability are addressed by providing a hall to support recreational activities, social gathering spaces and assisting local businesses. Both interior as well as exterior spaces are extensively used throughout the day with planning and attention to place that resulted in the creation of quality spaces that the community can work, play and learn in.

### 4.1.4 Sustainability

The centre fundamentally encourages environmental, social and economic sustainability in the community it serves. The building is a suitable response to the climatic demands, a piece of architecture, positioned on a vast site, with the buildings around big courtyards,



**FIGURE 4.1.4.1: Covered Walkway and Courtyard; Use of Vegetation; Collection of Rainwater for use within the Building; Solar panels on the roof; SOURCE: Author**

designed to interact with the natural landscape. Covered paved walkways connect the fragmented blocks of the building and define these courtyards (Figures 4.1.4.1, 4.1.4.2 and 4.1.4.3). The walkways themselves provide seating and shelter from harsh weather. These courtyards were planned to be vegetable gardens, play areas as well as open spaces for outdoor events. Vegetation is used to soften the spaces, provide shading and wind breaking and as an accessory to the low buildings on the site.



FIGURE 4.1.4.2: Covered Walkways with Seating. Solar panels on the roof; SOURCE: Author



FIGURE 4.1.4.3: Covered Walkways with Seating; SOURCE: Author

Taking advantage of prevailing sea winds and proper sun orientation, the design makes use of 'whirlybird' ventilators and fixed aluminium louvres to allow for natural daylighting and ventilation (Figures 4.1.4.4, 4.1.4.6 & 4.1.4.7). In addition to the energy savings from elimination the use of conventional air-conditioning, the centre makes use photovoltaic cells connected to solar energy panels. Reported to be insufficient, the solar energy is used to back up the electricity grid in efforts to conserve energy, reduce initial and operational spending as well as reduce the building's impact on the environment. Rain water is harvested from the sloping roofs and stored in numerous polyethylene tanks and reused within the centre.

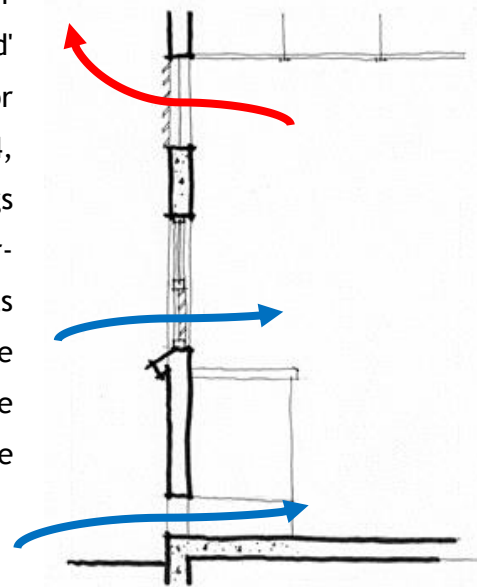


FIGURE 4.1.4.4: Strip Section through Typical Wall; SOURCE: Author

Locally sourced face-brick, steel and aluminium panels make some of the materials were used. In much of the building, save for the main wing, interior passages are avoided to ease cross ventilation especially into the interior spaces. Where they

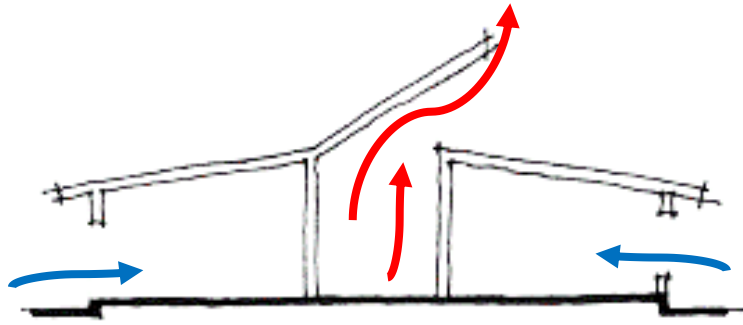


FIGURE 4.1.4.5: Section Showing Natural Ventilation Detail; SOURCE: Author

are used, the wide double loaded passages are well lit and ventilated through various natural methods. Figure 4.1.4.5 illustrates clerestory windows allow for diffused South-lighting into the walkways which also serve as waiting and seating areas.



FIGURE 4.1.4.6: Aluminium Louvre Ventilation Detail in Toilets; SOURCE:

FIGURE 4.1.4.7: Under Counter Ventilation Openings in Toilets; SOURCE: Author





FIGURE 4.1.4.8: Double Loaded Passage with Clerestory Lighting; SOURCE: Author.



FIGURE 4.1.4.9: Lockable Trading Stalls; SOURCE: Author.

On the road side of the centre is the market centre, which takes advantage of the foot traffic channelling into the centre. Traders from the surrounding community make use of

lockable stalls to conduct their business, which most use to support themselves and their families (Figure 4.1.4.9). The different components of the centre also contribute to the fight against poverty as they provide various employment opportunities for the locals. These include among others, the tasks of running the centre, the various departments and community services, private establishments and cleaning and security.

#### 4.1.5 Conclusion

This secondary investigation was aimed at informing the design process of a piece of architecture in the form of a community building that is both environmentally conscious and didactic. The significance in this chapter was to demonstrate how similar issues have been addressed in the local context and to then assess its merits and flaws.

Drawing from the use of the centre, one can conclude that the spaces created are of good quality, providing valuable lessons in placemaking. The community uses the centre far more than merely a building where government and municipal services are housed. Members of the uMnini community such as school going children use the spaces to gather and relax after a hard day of learning. The plants in and around the courtyard and lawn areas create usable social spaces, shaded from the hot sun and open to the breeze from the Indian Ocean.

The building provides a lot of valuable lessons in sustainability in both its design and intended functioning. Principal to the drawbacks of the use of uMnini Thusong Centre as a case study in this research is its horizontal nature. Being a single story building, it does not fully address other issues that a mid-rise building may face. Examples of this may include lessons on how to approach vertical circulation in a manner that causes the least strain in the energy supply.

Just as much as the triumphs, the failures provide a chance to learn as well. The traders' stalls are underutilised. One argument could be that they were greatly provided. Another argument could be the placement and accessibility of the stalls. Albeit being placed to face the passing vehicular and pedestrian traffic, they are removed from the road and require that one enters the centre to use them. In trying to achieve this, the stalls turn

their back on the centre itself and pose an accessibility challenge from within the centre as well.

Another handicap is the failure to completely disengage from the municipal electricity grid and fully run the centre on solar power. The area receives sufficient sunlight even in winter months. Combined with the horizontal nature of the building, this provides perfect conditions for harvesting solar energy to adequately provide for the power requirements of the entire centre. The drawback is that although the solar provides a sustainable supply of power, the provision of panels and cells is insufficient for the energy demands of the building, although low. Panels and possibly cells would have to be increased to fully cater for the needs of the entire building.

Heating is also an issue as during a visit, the major concern raised was that although the building performs exceptionally in hot weather, the interior spaces tend to be cold as the temperatures drop. The deep covered walkways are in part responsible for this case. They provide more than sufficient shading from the hot summer sun, but prove too deep for heat to enter the interior spaces in summer. Interior spaces therefore require heating at daytime during winter season, adding further burden on the energy supply. Narrowing the walkway covering would allow access of sunlight to the interior spaces in the winter months to provide much needed heat.

## **CHAPTER FIVE: PRESENTATION OF DATA AND ANALYSIS**

### **5.1 Introduction**

The aim of this research is to gain an understanding of the social life of KwaMashu and then establish the existing relationship the society has with the built and natural environments. A mixed approach involving both qualitative and quantitative research was utilised. The researcher presents results obtained from three main sources: i) Secondary data obtained from works that were consulted for the purpose of to understanding and investigate the research problem ; ii) Selected precedent and case studies and iii) Primary data collected by the researcher on site through a limited twenty interview participants.

Purposive Sample was used in selecting participants for the research project. A maximum variation/heterogeneous purposive sample is one which is selected to provide a diverse range of cases relevant to a particular phenomenon or event. The purpose of this kind of sample design is to provide as much insight as possible into the phenomenon under examination (ThoughtCo., 2017). A diverse range of people selected from the community of KwaMashu were interviewed to investigate their understanding of their relationship with architecture and nature, and their practises with regards with the two environments.

Data was obtained and analysed to support and confirm the secondary data thereby shaping the lens through which theory and literature were being analysed. To ensure that all the research both primary and secondary correspond, interview questions were set up to also understand background, housing and household information among other information. To enforce the heterogeneous requirements for the research, the range of participants interviewed in the area had to be of varying age, gender, class and from different geographical settings (Section) within the township.

## 5.2 Data Presentation and Discussion

### 5.2.1 Profile of the Sample (Representative of KwaMashu Residents)

Participants were chosen from a range of sections of KwaMashu including Sections B, C, F, H, K, L P and Besters. By gender split, the sample of twenty participants interviewed represented an equal representation: ten females and ten males of varying marital status, employment and age. The ages ranged from twenty to eighty and a single participant preferred not to reveal his age as shown on Figure 5.2.1.1.

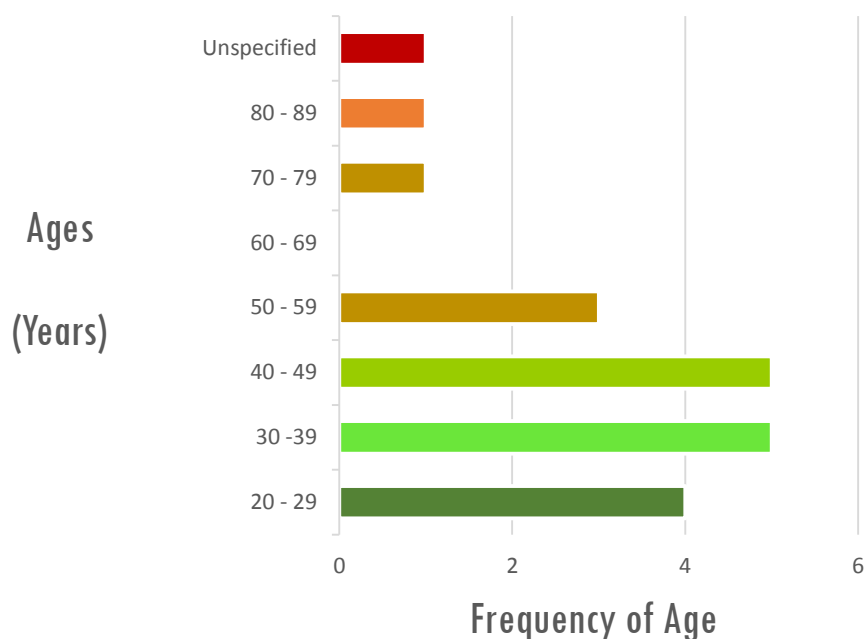


FIGURE 5.2.1.1: Respondents by Age; SOURCE: Author.

Results show that half of the residents sampled were not earning any income (either unemployed or students) with the other half employed in various fields. The employed population was made up of 40% females with the 60% male. Save for those seeking employment, the majority of the unemployed and non-students are lying idle, with little to no marketable skill and therefore not economically active. Of the twenty households represented, a fifth (20%) of them are informal housing (shacks), none traditional and the remaining 80% formal. Fully owned and fully paid houses make up 60% of the homes. Of the remaining 40%, half of the participants (20%) live in rented houses, 5% are partially owned and 15% occupy their homes through other unspecified means.



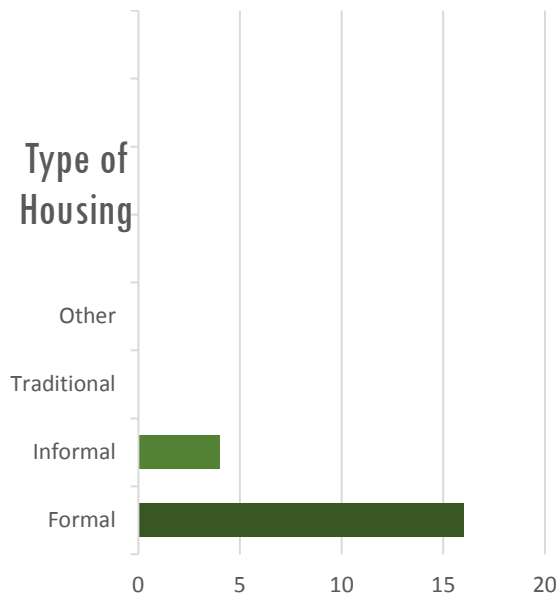


FIGURE 5.2.1.2: Type of Housing; SOURCE: Author.

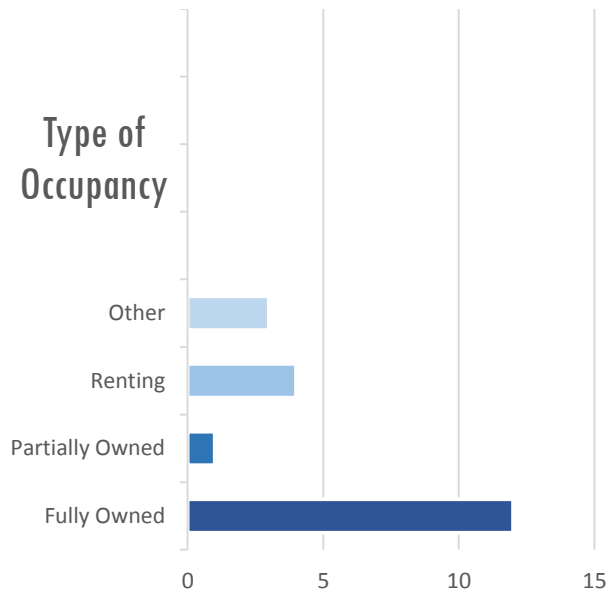


FIGURE 5.2.1.3: Type of Occupancy; SOURCE: Author.

A majority of the households are occupied by multiple individuals, usually forming an extended family. On average, the occupancy was 6.3 people per household. The smallest two households each had one male living in them, both renting, indicating that their reason for being in KwaMashu was possibly employment related. They both had been living in the township for over a decade. The biggest household was made up of fourteen individuals.

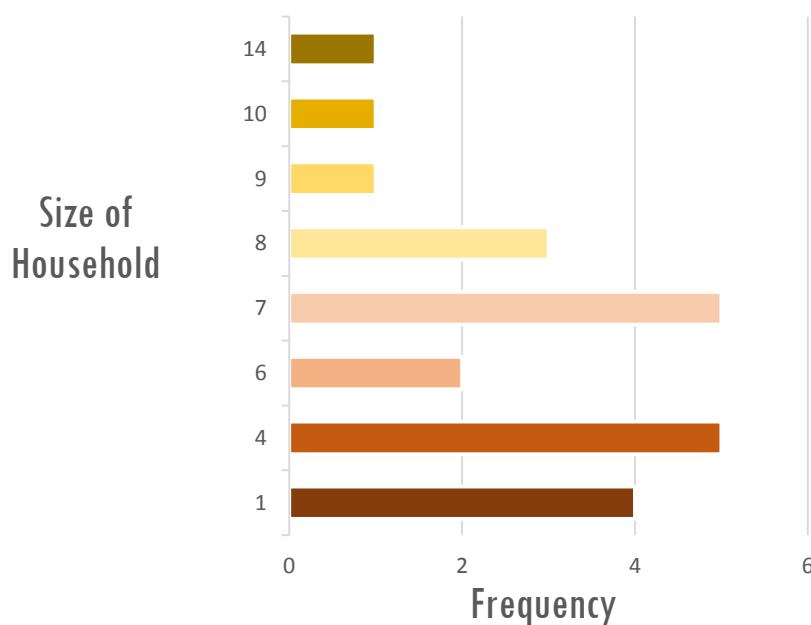


FIGURE 5.2.1.4 Number of Occupants per Household; SOURCE: Author.

## 5.2.2 Infrastructure, Climate Change, Power and Sustainability.

The interviews revealed that out of the twenty Participants, only eight (40%) understood what climate change meant at the beginning of the interviews. A total of three (15%) of the participants said they had no idea what it meant while nine (45%) had a vague idea but were not sure they completely understood the phenomenon as show in Figure 5.2.2.1. Only a quarter understood the origins of the mains electricity they used and the impact the mining and burning of coal for the production of this source of energy has on the natural environment.

On the issue of the performance of their houses to weather, only 40% expressed satisfaction with the way their houses dealt with heat and cold. The general feeling was that the houses do get cold as the temperatures drop and hot when they rise. These variations in temperatures however, do not get too uncomfortable unless outside conditions reach extremes. Some expressed that they wouldn't know as the conditions are all they know, having lived in KwaMashu for decades, and therefore that is all they are familiar with. 55% complained that the fluctuation of the conditions was too high, and it gets uncomfortable. This suggests that there was possibly no regard for the use of passive heat manipulation methods and achieving thermal comfort via natural means. The norm is that energy-intensive appliances (fans and heaters) are used to counter these extremes in temperatures.

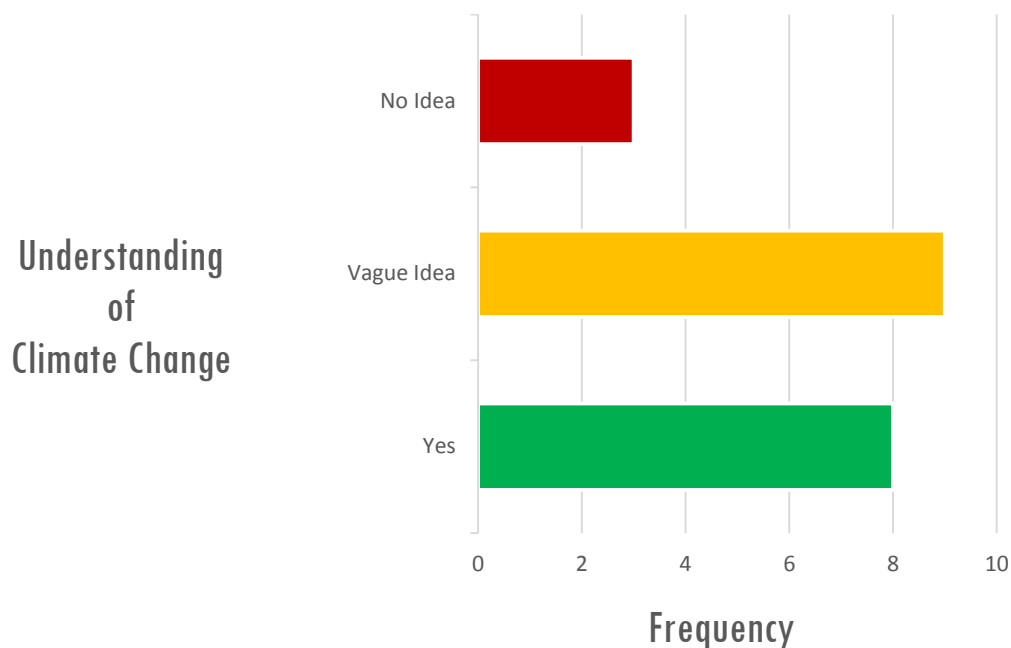


FIGURE 5.2.2.1 Respondents' Understanding of Climate Change; SOURCE: Author.

As mentioned above, 40% cited space as their main concern and the change they would enforce, given a chance. 20% percent considered sustainability, and mentioned introducing water tanks and solar power to their homes. These changes would be mainly to address the issues of load shedding, water cuts and high water and electricity bills. Concerns were however raised over sustainability being costly. Only two of the interviewees said they would not change anything from their homes, but only because they were renting and would rather make changes to property they owned. The remaining 30% suggested various changes including renovations and concerns over the theft of electricity.

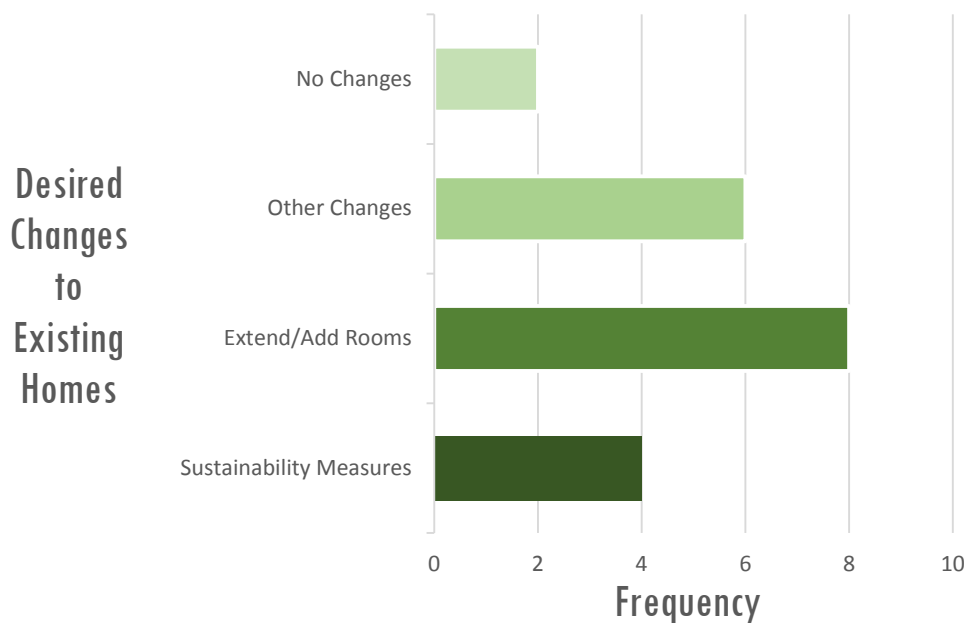


FIGURE 5.2.2.2 Respondents' Understanding of Climate Change; SOURCE: Author.

### 5.3 Conclusion

A prominent feature in the interviews was the issue of space. The majority of households are overcrowded, often with a single bread winner. These challenges emphasize the low employment and low income levels that KwaMashu is facing. These were further highlighted on the discussion of changes one would like to make to their dwelling given a chance and resources where a vast majority of the participants indicated the wish to extend their houses, to deal with the crowding issues. Although one participant preferred leaving the township, stating crime as the reason, the rest suggested changes that would be carried out at their respective existing homes. Changes included design related issues

(i.e. orientation), changing roofs or rebuilding the structure due to dilapidation and leaking.

The analysis of the results reveals a lack of substantial knowledge on the phenomena of climate change and the practises related to it within the built environment. The levels of unemployment, unemployability and low income are clearly underlined by the results. Addressing the issues of unemployment, crime and low income would be just as important as educating about the degradation of the environment and sustainable living. To make an impactful improvement between the community and the natural environment, especially the way infrastructure is approached, it is vital that individuals are empowered and uplifted. The needs of the community and searching for a better state of social and economic sustainability should be first addressed if environmental sustainability is to be achieved.

## CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

### 6.1 Introduction

Relating back to the main question, this research has focused on investigating how the perception humankind has of the natural environment impacts/shapes our attitude towards architecture. The document starts by establishing the current perception and relationship, and with the belief that man has the ability and obligation to, cultivate intention to establish a new symbiotic relationship, potentially benefitting all life.

The disjuncture in the relationship between humanity and nature is pretty conspicuous, and its repercussions quite tragic. Our practises are leading to dire consequences that include rising temperatures and the resultant sea level rises, displacement of humans, food and water shortages, threats to biodiversity and energy, among others (Kumar, 2014: 158). There is a vital need to promote environmental awareness and re-establish that view of nature as a precious source of all life. By investigating a selection of literature, key theories and developing concepts, this dissertation begins to tackle this issue, which addresses the evident issues of the area in a building that aims at educating and equipping the user with lessons on how to confront environmental issues through a responsive architecture.

The chosen literature summarised the need to create quality spaces that the public will want to use. The overall architecture must connect with the user and encourage living, working, learning and playing through implementing a variety of design elements. Emphasis has been directed at putting the focus on and harnessing the spirit of the area, to highlight its special character. The identified case and precedent are some of the ways to demonstrate a variety of ways sense of place can be established or enhanced through architecture.

The physical environment has an influence on the social environment and task interactions among the people in it (Brand, n.d.). The design has to put an emphasis in creating spaces that attract and sustain social relations, experiences and memories through the movement about and use of the space. People should interact, make acquaintances, share and exchange ideas, memories and experiences.

Our view of nature as an infinite source to be exploited to our benefit and persistent application of the very practises that have brought degradation to our environment continues to put life at a greater threat. The findings of the research demonstrate that awareness remains the main challenge in dealing with issues relating to the current state of the natural environment.

## 6.2 Addressing Research Questions

- i. *How can a building be designed to operate as a tool to educate about the environment and promote the well-being of the natural environment, raising awareness on it and developing a culture of sustainable living?*

Environmental awareness is a very crucial subject if the relationship between mankind and nature is to be improved. Environmental awareness stimulates a “sense of connection to the natural world, promoting sustainable development and encouraging conservation of irreplaceable natural resources and vulnerable plant and animal species” (Moss, 2016:13). By educating the public that the natural environment is indispensable, fragile and its resources finite, we can begin fixing the problems that threaten it. Schiller (2012) alludes this point, stating that a ‘deeper understanding of sustainability needs to be promoted in order to change this mind-set and promote a more sustainable built environment’.

Public awareness about the environment is present, but was clearly underlined in the literature, and corroborated by the interviews as being minimal. It appears that ordinary environmental awareness efforts have not yielded the desired effect and a lot still has to be done to conscientize regular citizens. By designing high performing teaching tools that address these issues, we can provide students with a real life and practical textbook for innovative solutions to environmental problems. This requires research on literature regarding design features, specific technologies, influence on green building practices, and the importance to occupancy and performance (Janda *et. al.*, cited in Schiller, 2012). Equally necessary is research on the physical environment and educational theory, and exploring how these two fields interact with each other and how they can be combined. The main precedent study, albeit not specifically designed for pedagogical purposes, is an outstanding tool for demonstrating environmental sustainability.

- ii. *How to provide environmentally responsive architecture with minimal impact on the natural environment?*

Modern day buildings have disconnected from the natural environment. Most often than not, because of industrialisation, buildings can be put up anywhere with no regard for the climatic challenges and opportunities that place has. To achieve liveable conditions, energy intensive mechanical means are employed. These practises within the built environment exacerbate these adverse effects of the detriment that industrialisation has brought to the natural environment. Through attention to nature during the inception, design and erection and use of a building, precedents have demonstrated that buildings can easily have a minimal impact of on natural environment.

- iii. *What are the main social issues affecting KwaMashu and how can the built environment contribute to finding a remedy to these?*

Through the study of literature and the interviews conducted, the key issues of unemployment, crime and illiteracy that KwaMashu is battling with are presented. According to *Encyclopaedias Almanacs Transcripts and Maps* (n.d), “a person is less likely to commit a crime, even if there will be substantial rewards, if he or she is tied to the community and is respected by its members”. In this regard, a strong sense of community must be encouraged in dealing with social disintegration. Criminal activity is arguably the most severe of these social issues and possesses the potential to aggravate other visible issues.

Economic deprivation or simply poverty is a major cause of crime all around the world (Topyaps, 2012). The concept of Skills Development & Poverty Reduction presents an approach to this issue through providing activities and skills for those unable to receive a formal education, marketable skill or any means to make a living.

### 6.3 Conclusion

Based on literature review, precedent studies, case study and interviews, it is certain that architecture has a crucial responsibility in advancing environmental awareness. Through awareness strategies, the residents of KwaMashu are given lessons to live by and possibly cultivating a shift in their perception through environmental awareness and didactic

architecture. Through these lessons, the built environment can facilitate a symbiotic relationship between mankind and the natural environment.



## **PART TWO**

## CHAPTER SEVEN: DESIGN RESOLUTION

### 7.1 Introduction

#### 7.1.1 The Brief

The building should demonstrate the built environment can facilitate education and the transfer and development of skills amongst the urban poor in the area of KwaMashu and immediate surrounding townships. These skills will provide opportunities for entrepreneurship and improve the employability among the languishing youth in an effort to heal social ills associated with illiteracy, poverty, crime and drugs.

The building must demonstrate a good relationship between different functions that contribute to cohesion within a community. Emphasis should be put on making sure all the components of the skills centre as well as community centre enhance each other. The building should be thoughtfully laid out around a greened courtyard in a landscaped environment. Interaction with the street is crucial.



FIGURE 7.1.1.1 Components of Sustainable Design; SOURCE: [www.ofsrc.ul.ie](http://www.ofsrc.ul.ie)

The main requirement is that the building is itself a lesson on sustainability. The building should exhibit & emphasize all green design principles (Figure 7.1.1.1). This calls for a building that is light and airy, spacious with good control of day lighting while not compromising on aesthetics. It should have a character that is easily identifiable; create quality spaces within and without the building for the public to enjoy - a 24 hour building for surveillance & maximum occupancy. Access should be emphasized here - highlighting the community's access and entry to a new way of living - a PARADIGM SHIFT from the historical deliberate under provision of infrastructure in South African townships.

#### 7.1.1.1 Who?

The community of KwaMashu and surrounding areas (focus on INK Area).

#### 7.1.1.2 Why?

To address social and environmental issues through an architectural intervention.

#### 7.1.1.3 How?

An appropriate architectural approach to Urban Living with reduced impact on the natural environment.

### 7.1.2 Building Typology

Community anchors are independent community led organisations. They are multi-purpose and provide long term holistic solutions to local problems and challenges (no quick fixes). This, therefore, makes them the driving force in community renewal. The accommodation depends on the needs of the particular community.

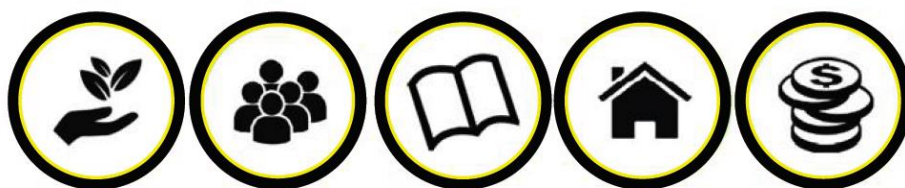


FIGURE 7.1.2.1 Components for Proposed Community Anchor in KwaMashu; SOURCE: Author.

Figure 7.1.2.1 highlights key components to consider in the design of a community anchor as suggested by the research on the needs of the area revealed by the research. The building is to include: i) Sustainable design principles; ii) Social gathering spaces; iii) Educational facility (Skills Centre); iv) An affordable housing component and v) opportunities to generate revenue.

### 7.1.3. Client

The clients are two Government departments (the Department of Higher Education and Training (DHET) & Department of Environmental Affairs) in conjunction with eThekweni Municipality



FIGURE 7.1.3.1 Official logos of the DHET, DEA and eThekweni Municipality; SOURCE: Author.

The new DHET was specifically established to focus on post-school education and training holistically. It is the mission of the Department of Higher Education and Training to develop capable, well-educated and skilled citizens who are able to compete in a sustainable, diversified and knowledge-intensive international economy, which meets the development goals of our country.

The Department of Environmental Affairs is responsible for protecting, conserving and improving the environment and natural resources.

### 7.1.4 Proposed Schedule of Accommodation

#### 7.1.4.1 Administration & Community Centre

Activity	Quantity	Area
Lobby/Entrance Foyer	1	100 m <sup>2</sup>
Reception & Enquiry Desk	1	40 m <sup>2</sup>
Media Centre	1	66 m <sup>2</sup>

### Administration & Community Centre (Continued)

Cyber Café	1	85 m <sup>2</sup>
Hot Desking	1	110 m <sup>2</sup>
Discussion/Meeting Room	1	80 m <sup>2</sup>
Seminar Room	1	80 m <sup>2</sup>
Business Support Unit	1	105 m <sup>2</sup>
Staff Area	1	50 m <sup>2</sup>
Ablutions	2	100 m <sup>2</sup>
Gymnasium	1	135 m <sup>2</sup>

### 7.1.4.2 Skills Training

Activity	Quantity	Area
Reception	1	66 m <sup>2</sup>
Office	1	20 m <sup>2</sup>
Staff Room	1	55 m <sup>2</sup>
Break Room	1	50 m <sup>2</sup>
Classrooms/Group Study	2	120 m <sup>2</sup>
Study Carrels	1	60 m <sup>2</sup>
Computer LAN	1	90 m <sup>2</sup>
Examination Hall	1	300 m <sup>2</sup>
Ablutions + Change Rooms	1	120 m <sup>2</sup>

### 7.1.4.3 Cabinetry Workshop

Activity	Quantity
Material Storage	1
Finished Product Storage	1
Cabinet Storage	1
Timber Cutting to Size	1
Board Cutting to Size	1
Machine Space	1
Gluing - Veneering	1
Assembly Space	1

<b>Cabinetry Workshop (Continued)</b>	
Surface Treatment	1
Staining/Bleaching Room	1
Spraying/Casting/Rolling Space	1
Drying & Finishing	1
Final Assembly/Dispatch	1
Boiler Room	1
Ablutions	1
<b>Total Workshop Area</b>	<b>650 m<sup>2</sup></b>

#### 7.1.4.4 Waste Material Buy Back Centre

<b>Activity</b>	<b>Quantity</b>
Waste Delivery	1
Sorting, Weighing + Washing	1
Baler	1
Bail Stacks	1
Storage	1
Dispatch	1
<b>Total Buy Back Centre Area</b>	<b>420 m<sup>2</sup></b>

#### 7.1.4.5 Environmental + Services

<b>Activity</b>	<b>Quantity</b>	<b>Area</b>
Rainwater Storage Tanks	3	60 m <sup>2</sup>
Recycling Waste Storage	1	50 m <sup>2</sup>
Service Area	1	40 m <sup>2</sup>
Secure Bicycle Storage	16	20 m <sup>2</sup>
Moped/Scooter/Motorbike Parking	16	20 m <sup>2</sup>
Electric Car Park and Charge	3	37.5 m <sup>2</sup>
Paraplegic Parking	2	37.5 m <sup>2</sup>
Basement Parking	10	125 m <sup>2</sup>
Solar Power Panels	-	-
Geothermal Heat Exchanger	-	-

### 7.1.4.7 Social + Commercial Spaces

Activity	Quantity	Area
Shisanyama & Seating	1	600 m <sup>2</sup>
Convenience Store	1	120 m <sup>2</sup>
Craft Market	1	220 m <sup>2</sup>
Small Scale Retailer (Vendor) Units	10	80 m <sup>2</sup>

## 7.2 Site Selection

### 7.2.1 Introduction

The study is to be carried out primarily in KwaMashu, Durban. Durban is a city found in KwaZulu-Natal, South Africa. Located at -29.86 latitude and 31.03 longitude, Durban has a warm sub-tropical climate and has an elevation of 21 meters above sea level (World Atlas). The study should focus on KwaMashu, its geographical and socio-economic character within the INK (Inanda, Ntuzuma and KwaMashu) areas. The INK is an agglomeration of residential township settlements and home to about five hundred thousand residents. This area is plagued by high levels of unemployment, social dislocation, poverty and crime. KwaMashu is the biggest of the three areas, and has inadequate physical infrastructure and severe degradation. (eThekweni Municipality).

### 7.2.2 Historical Background

The name KwaMashu means Place of Marshall, in honour of Sir Marshall Campbell a pioneer of the sugar industry in the Colony of Natal and parliamentarian concerned with Bantu affairs. Historically, at its inception authorities deliberately underprovided infrastructure in the townships, and when they did, the buildings were provided without any consultation with or understanding of the user. Housing, whether formal or informal, has been always about finding the quickest, simplest and cheapest way to provide shelter, with no thought spared beyond that. Construction is informal and unregulated by the government. From this culture then, sustainable design has never been a consideration, a practise which continues to this day.

The main idea is reclaiming KwaMashu for the people - take a place that has not been fully for the people, and giving it back to the people, to shape. This is the focus of the VPUU (Violence Prevention through Urban Upgrading) to build safe and sustainable neighbourhoods in dialogue with residents to shape their future cities. The BCD therefore represents a fresh start for KwaMashu, without the need to relocate.

### 7.2.3 Site Selection Criteria

The selected site is within the Bridge City Urban Precinct Development (BCD). The site, to its western edge, is at the gateway into the development. The BCD sits at the heart of KwaMashu and is easily accessible to the other INK townships as well as Phoenix. It forms part of eThekweni's high priority public transport corridor being situated 17 kilometres from the Durban port and 23 kilometres from the King Shaka International Airport.

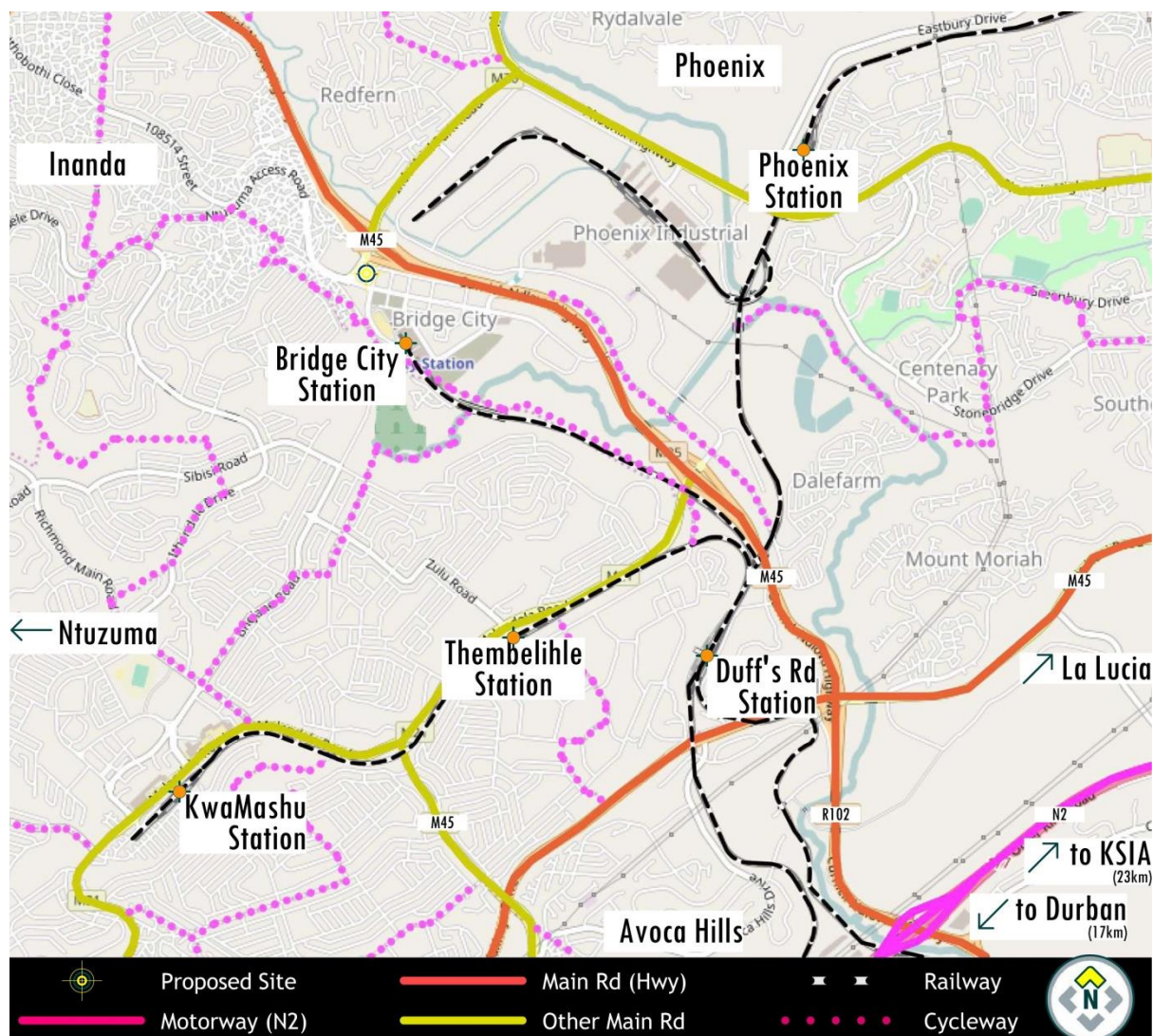


FIGURE 7.2.3.1 Micro Context & Transportation; SOURCE: Author.



This development begins tackling a few of the issues of social sustainability and therefore becomes a good starting point for this proposal to grow from. The BCD is largely a mixed-use urban precinct that also houses a few civic buildings - a court, hospitals and other small civic functions. The BCD looks to bring economic development into an area that has been largely unplanned and hugely under developed. Importantly the BCD brings the Bus Rapid Transport system as well as a new train station into the area, both of which are housed around the mall which sits immediately to the South East of the selected site.

### Advantages of the Site

- Train and BRT Station below Bridge City Shopping Centre, less than 5 minutes' walk from the site.
- The shopping centre already has a well-established taxi rank which will be incorporated into an intermodal facility (Integrated Rapid Public Transport Network).
- Carnick Ndlovu Highway serves as a barrier to the industrial area to the North (Phoenix). This highway becomes the main access point for vehicular traffic. The site can be easily accessible from Nogwaja Road and Bridge City Boulevard as well as from the onsite taxi rank and train station.
- It is a localised town centre, where the whole of KwaMashu meets and conducts much of its commercial activities.
- It is central and reaches a broader spectrum of people and as thus starts to address the same issues in Inanda and Ntuzuma (INK).
- The site becomes the gateway into the BCD. By its location at the heart of this great area, the site becomes the anchoring point of the community and a central focus point for the people of the area for their social & economic functions.

As the gateway into the BCD, the majority of pedestrian and vehicular traffic around Bridge City circulates around or through the site as it stands. Pedestrians currently use the site as a movement pathway to their destinations. The main road to the North of the site is the main road through the BCD and therefore a heavily used pedestrian and vehicular route which this proposal uses to activate its retail edges. With the existing mall, existing railway line (housed in the mall) and the proposed BRT system all just to the South East of the site, the site becomes the intermediary point of a major convergence zone. This is used within the design to activate the sites social atmosphere. By allowing people to

continue moving through the site, rather than restricting flow, and using this consistent foot traffic the proposal becomes hugely activated and a constant source of goings-on.

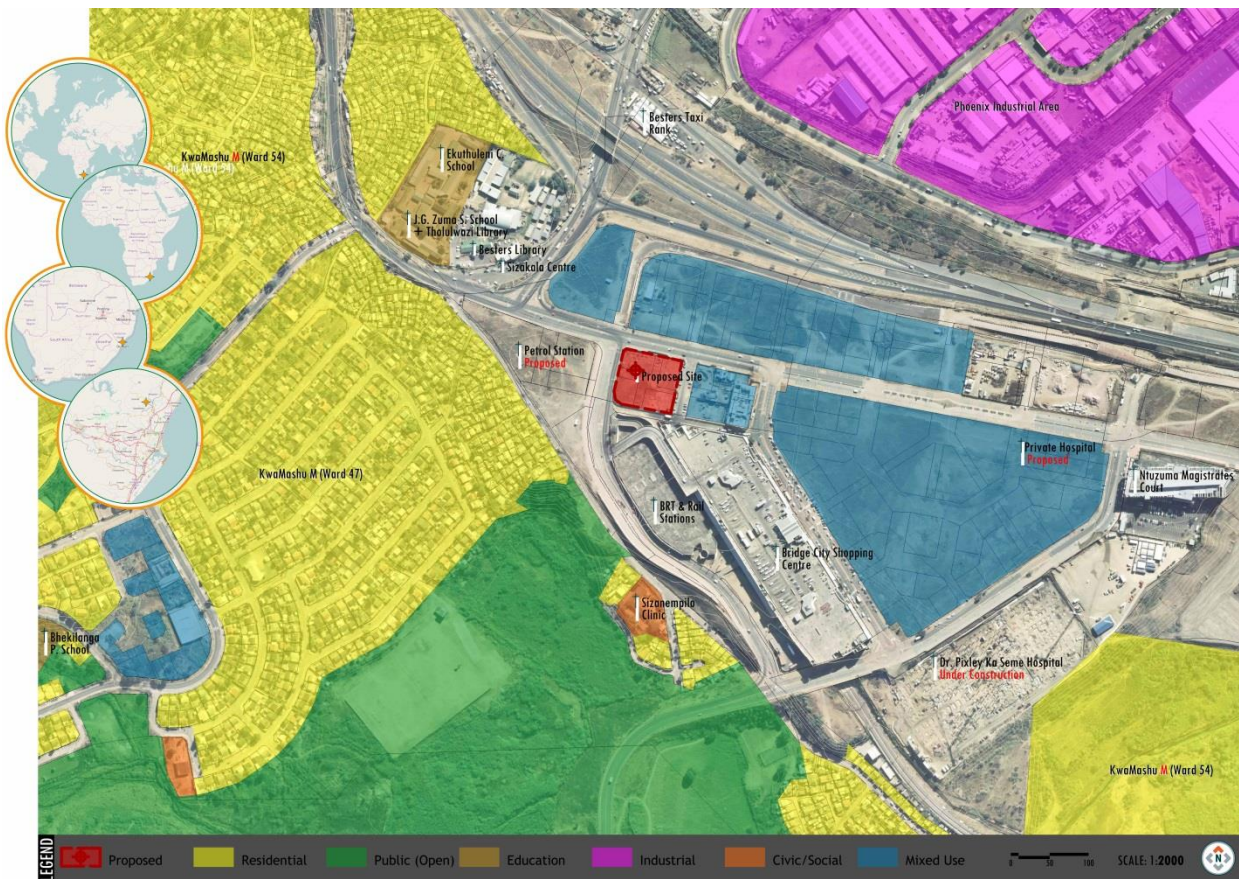


FIGURE 7.2.3.2 Location of Site and its Macro Context; SOURCE: Author.

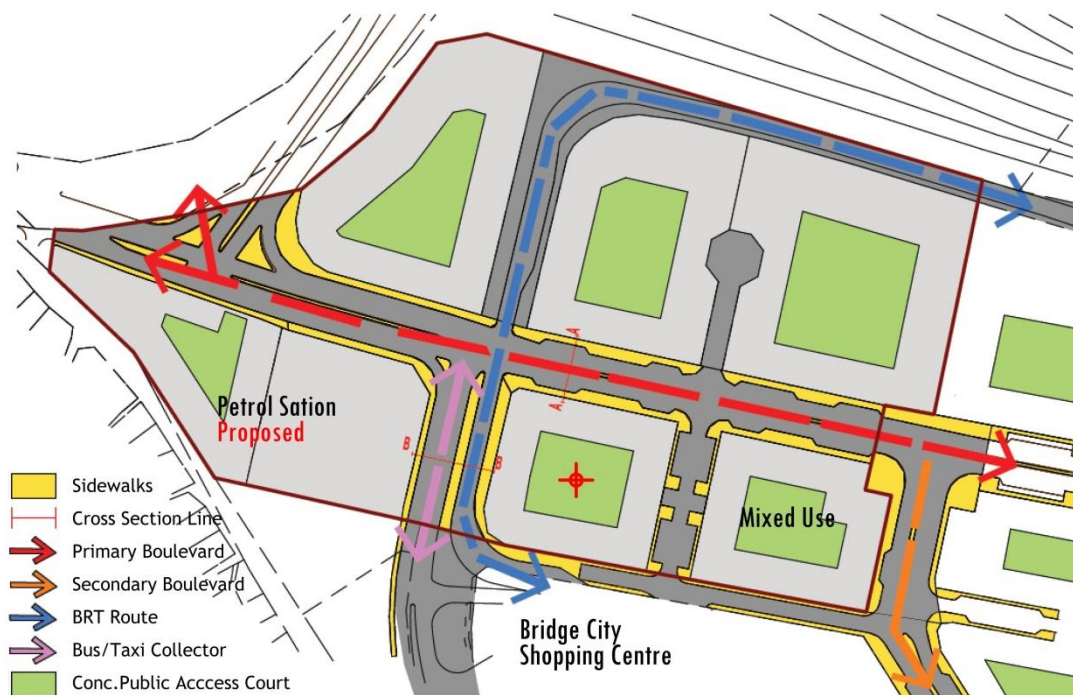


FIGURE 7.2.3.3 Pedestrian & Circulation Around the Site; SOURCE: Author.

## 7.2.4 Conclusion

The site had to fulfil three main criteria:

**Location:** The site is located at a very strategic meeting point for different land use zones. The North of the site is primarily INDUSTRIAL, RESIDENTIAL to the West and itself exists in a MIXED USE zoned area that stretches to the East.

**Visibility:** The site is easily visible as it is elevated in comparison to its surroundings. It can be spotted at a distance from Carnick Ndlovu Highway as well as the arterial roads around the site.

**Accessibility:** The site is accessible to the general public by foot, public as well as private transport. The site is accessed off of the main road of the development - Bridge City Boulevard. Dedicated bus lanes are to the immediate West of the site.

From the primary and secondary data collected, this site is most suitable for the proposed intervention. Not only is it at the heart of the township, but the BCD presents a whole new development to change the face of KwaMashu. It has access to the necessary transport infrastructure for TOD, and already exists in an already buzzing commercial hub.

## 7.3 Design Intervention

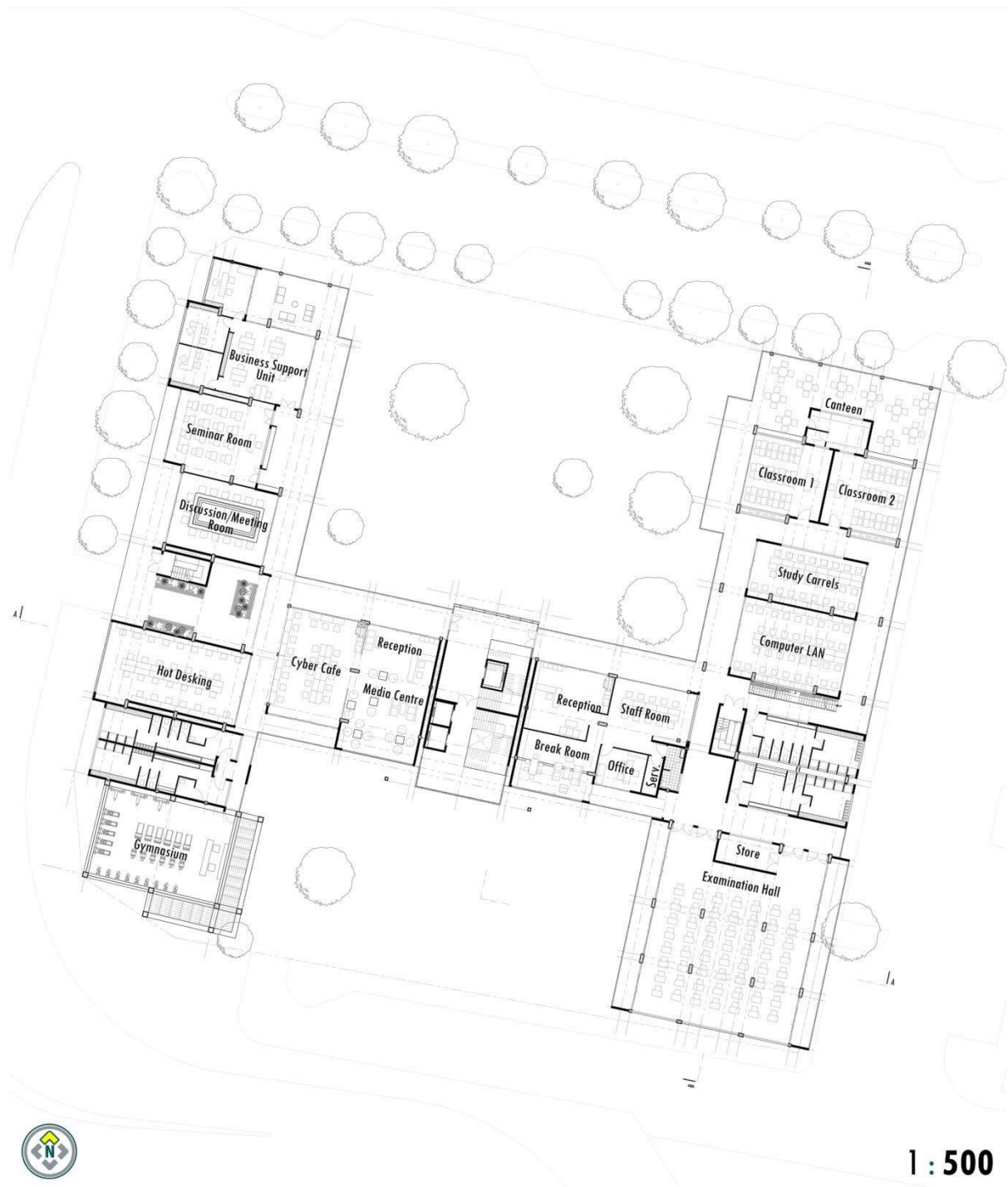
### Roof Plan



# Site Layout + Ground Floor Plan



# First Floor Plan



## Second Floor Plan



## Third Floor Plan



# Fourth Floor Plan





## Fifth Floor Plan

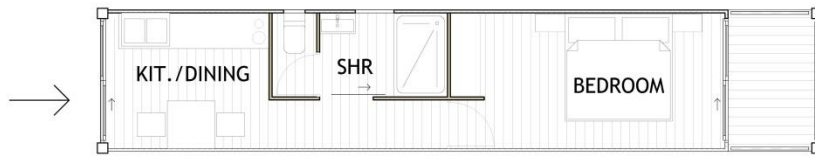


## Detailed Plans of Residential Units

### Typical 2-Bedroom 20" Unit



### Typical 1-Bedroom 40' Unit



### Typical 1-Bedroom 40' Unit



# Sections & Elevations

## Section A-A

1:500



## Section B-B

1:500



## North Elevation

1:500



## West Elevation

1:500



# Elevations

## South Elevation

1:500



## East Elevation

1:500



## East Sectional-Elevation

1:500



## West Sectional-Elevation

1:500



### 3D Views (Artist's Impression)

#### Aerial View from Above Bridge City Boulevard



#### View from Indlanzi Lane on the South Looking into the Shisanyama



### 3D Views (Artist's Impression)

#### View from Second Floor Looking South



#### Typical Greened Social Space for Residential Floors



### 3D Views (Artist's Impression)

#### Street View from Bridge City Boulevard



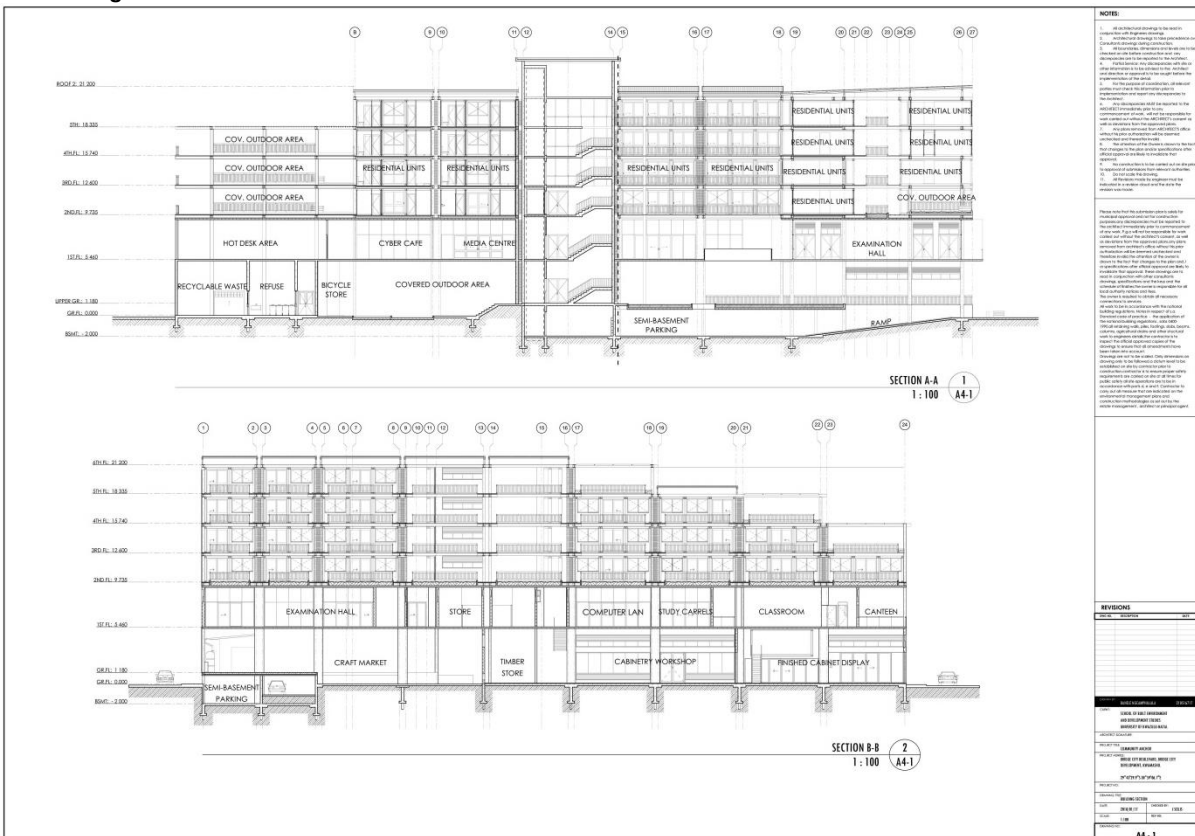
#### Street View from Nkunzana Road



# Technology Ground Floor Plan



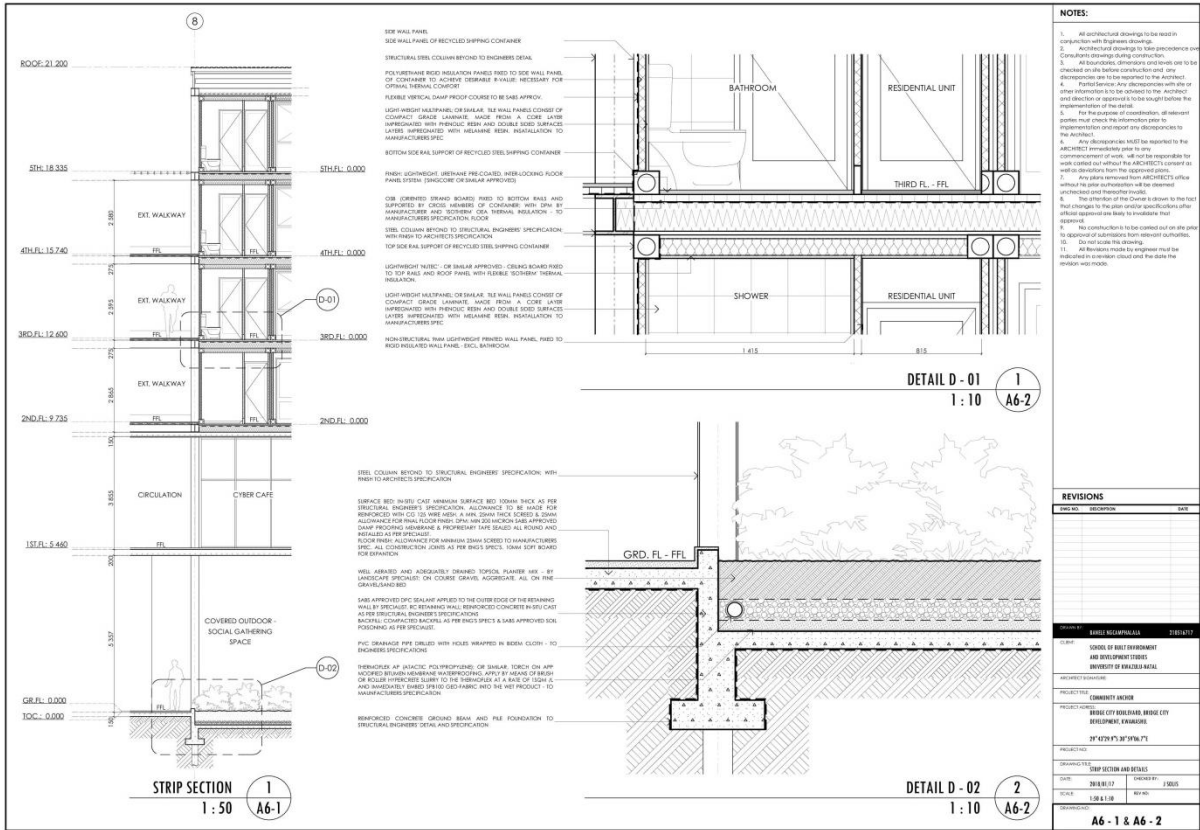
# Building Sections



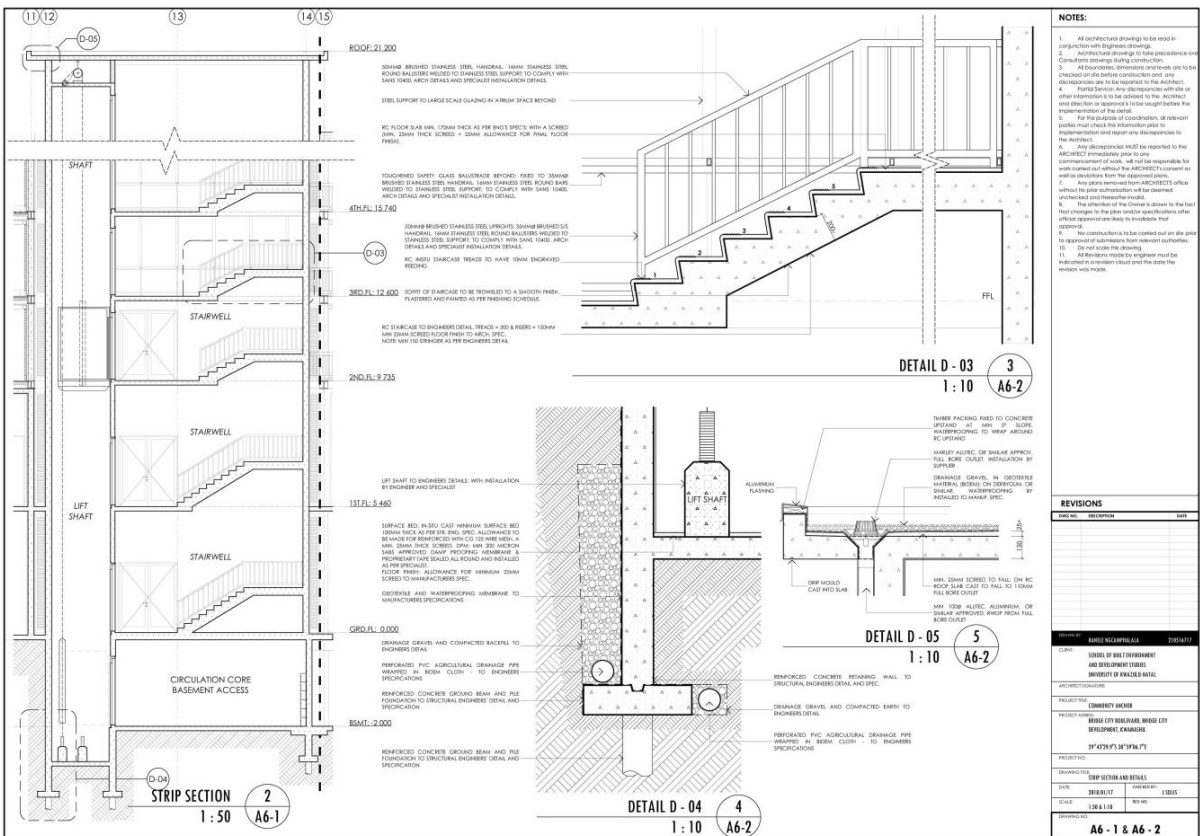


# Technology

## Strip Section & Details



## Strip Section & Details



## CHAPTER EIGHT: APPENDICES

### 8.1 Ethics Approval



25 July 2017

Mr Banele Benedict Ngcamphalala (210516717)  
School of Built Environment & Development Studies  
Howard College Campus

Dear Mr Ngcamphalala,

**Protocol reference number: HSS/0655/017M**

**Project title: Architecture as a Driver for Social Change: Towards the design of a Self-Sustainable Community Anchor in KwaMashu**

#### **Approval Notification – Expedited Application**

In response to your application received on 29 May 2017, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

**PLEASE NOTE:** Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Dr Shenuka Singh (Chair)

/ms

Cc Supervisor: Mr Sibusiso Sithole and Mr Juan Solis-Arias  
Cc Academic Leader Research: Professor O Mtapuri  
Cc School Administrator: Ms Nolundi Mzolo

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#### Humanities & Social Sciences Research Ethics Committee

Dr Shenuka Singh (Chair)

Westville Campus, Govan Mbeki Building

Postal Address: Private Bag X54001, Durban 4000

Telephone: +27 (0) 31 260 3587/8350/4557 Facsimile: +27 (0) 31 260 4609 Email: [ximbap@ukzn.ac.za](mailto:ximbap@ukzn.ac.za) / [snymanm@ukzn.ac.za](mailto:snymanm@ukzn.ac.za) / [mohunp@ukzn.ac.za](mailto:mohunp@ukzn.ac.za)

Website: [www.ukzn.ac.za](http://www.ukzn.ac.za)



Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

## 8.2 Informed Consent Form (English)

# UKZN HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE (HSSREC)

## APPLICATION FOR ETHICS APPROVAL For research with human participants

### INFORMED CONSENT FORM

Note to researchers: Notwithstanding the need for scientific and legal accuracy, every effort should be made to produce a consent document that is as linguistically clear and simple as possible, without omitting important details as outlined below. Certified translated versions will be required once the original version is approved.

There are specific circumstances where witnessed verbal consent might be acceptable, and circumstances where individual informed consent may be waived by HSSREC.

#### Information Sheet and Consent to Participate in Research

Date: \_\_\_\_\_

Dear Sir/Madam.

My name is Banele Benedict Ngcamphalala from the Masters in Architecture program at the University of KwaZulu-Natal.

You are being invited to consider participating in a study that involves research in sustainability in the built environment. The aim and purpose of this research is to understand your understanding of human activity and our impact on the environment, as well as awareness of and efforts to address the problem. The study is expected to enroll not more than 20 participants from a range of backgrounds. The duration of your participation if you choose to enroll and remain in the study is expected to be only be a single interview. This is a self-funded study.

The study will create no direct benefits for you, but will hopefully be a significant step in understanding how the built environment can move away from practices that harm the natural environment and adopt greener practices to benefit all life.

The research does not involve any risk and additional information can be obtained from:

Banele Ngcamphalala

Cell: +27 76 4014168

Email: b.msutfu@gmail.com

This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (*approval number*).

In the event of any problems or concerns/questions you may contact the researcher at the above details or the UKZN Humanities & Social Sciences Research Ethics Committee, contact details as follows:

#### **HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION**

Research Office, Westville Campus

Govan Mbeki Building

Private Bag X 54001

Durban

4000

KwaZulu-Natal, SOUTH AFRICA

Tel: 27 31 2604557- Fax: 27 31 2604609

Email: HSSREC@ukzn.ac.za

Your participation in this research is voluntary and you may withdraw participation at any point if you so wish, in the event of which you will not incur penalty or loss of treatment or other benefit to which they are normally entitled. Your participation is very much appreciated and your withdrawal would decrease the range of opinions required to make this research a success. You are free to withdraw at any point during the interview by means of verbal communication.

All information obtained from the interview will be used solely for the purposes of my dissertation. After submission of the dissertation document to the tertiary institution (university of Kwa-Zulu Natal), the information is to be stored in my personal computer and hard drive. This information is to be then deleted and drives reformatted to remove any traces of data after five years, as required. Names and other personal details may be changed if you so wish.

#### **CONSENT**

I \_\_\_\_\_ have been informed about the study entitled “Architecture as a Driver for Social Change: Towards the Design of a Self-Sustainable Community Anchor in KwaMashu” by Banele Ngcamphalala.

I understand the purpose and procedures of the study.

I have been given an opportunity to answer questions about the study and have had answers to my satisfaction.

I declare that my participation in this study is entirely voluntary and that I may withdraw at any time without affecting any of the benefits that I usually am entitled to.

If I have any further questions/concerns or queries related to the study, I understand that I may contact the researcher.

If I have any questions or concerns about my rights as a study participant, or if I am concerned about an aspect of the study or the researchers then I may contact:

**HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION**

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Durban

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KwaZulu-Natal, SOUTH AFRICA

Tel: 27 31 2604557 - Fax: 27 31 2604609

Email: HSSREC@ukzn.ac.za

Additional consent, where applicable

I hereby provide consent to:

Audio-record my interview / focus group discussion      YES / NO

Video-record my interview / focus group discussion      YES / NO

Use of my photographs for research purposes      YES / NO

\_\_\_\_\_  
Signature of Participant

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of Witness  
(Where applicable)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of Translator  
(Where applicable)

\_\_\_\_\_  
Date

### 8.3 Informed Consent Form (IsiZulu)

## **UKZN HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE (HSSREC)**

### **APPLICATION FOR ETHICS APPROVAL**

For research with human participants

### **IFOMU LEMVUMO EYAZISIWE**

Note to researchers: Notwithstanding the need for scientific and legal accuracy, every effort should be made to produce a consent document that is as linguistically clear and simple as possible, without omitting important details as outlined below. Certified translated versions will be required once the original version is approved.

There are specific circumstances where witnessed verbal consent might be acceptable, and circumstances where individual informed consent may be waived by HSSREC.

#### **Iphepha Leminingwane neMvumo Yokubamba Iqhaza Ocwaningweni**

Usuku : \_\_\_\_\_

Wena Othandekayo

Igama lami ngingu Banele Benedict Ngcamphalala owenza iziqu zobu ngcweti kwezezakhiwo (Masters in Architecture) esikhungweni esiphezulu se Nyuvesi yaKwaZulu Natali.

Uyamenywa ukuba uhlanganyele kucwaningo olumayelana nokusimama kwezezakhiwo (sustainability in the built environment). Inhlalo nenjongo yalolucwaningo ukuthola ukuqonda kwakho okwenziwa ngabantu kanye nemithelela lezo zenzo ezinayo kwimvelo kanye nolwazi nemizamo yokuxazulula lenkinga. Ucwaningo kulindeleke ukuba lwenziwe abahlanganyeli abangeqile kuma-20 abasuka ezizindeni ezahlukene. Isikhathi sokubamba iqhaza kwakho uma ukhetha ukubhalisa futhi uhlale esifundweni kulindeleke ukuthi singeqi kwingxoxo eyodwa . Lolucwaningo aluxhasiwe ngokwezimali.

Ucwaningo ngeke ludale izinzuzo eziqondile kuwe, kodwa ngokuqinisekile kuyoba isinyathelo esibalulekile ekuqondeni ukuthi indawo eyakhiwe ingasuka kanjani emikhubeni elimaza indawo yemvelo ezungezile futhi ithathe imikhuba emihle ukuze kuzuze yonke impilo.

Lolu cwaningo alubandakanyi noma iyiphi ingozi futhi ulwazi olungeziwe lungatholakala ku:  
Banele Ngcamphalala  
Cell: +27 76 4014168  
Email: b.msutfu@gmail.com

Lolu cwaningo luye lwabuyekezwa ngokomthetho futhi luvunyiwe yikomiti yezokuziphatha zomphakathi enyuvesi yaKwaZulu Natali (*Inombolo yemvume*).

Uma kwenzeka kunoma yiziphi izinkinga noma ukukhathazeka noma imibuzo ungaxhumana nomcwaningi ngemininingwane engenhla noma iKomiti Yezokuziphatha Yokucwaninga Kwezenhlalakahle yase nyuvesi yaKwaZulu Natali (UKZN Humanities & Social Sciences Research Ethics Committee) kulemininingwane yokuxhumana elandelayo kanje:

#### **HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION**

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Email: HSSREC@ukzn.ac.za

Ukuhlanganyela kwakho kulolucwaningo kungukuzithandela futhi ungahoxisa iqhaza nganoma yisiphi isikhathi uma ufisa kanjalo, futhi uma lokho kwenzeka angeke uthole ukujeziswa noma ukulahlekelwe yinoma yiphi inzuzo onelungelo lokuthi uyithole. Ukubamba iqhaza kwakho siyakwazisa kakhulu futhi ukuhoxiswa kwakho kunganciphisa ububanzi bezimvo ezidingekayo ukwenza lolu cwaningo luphumelele. Ukhululekile ukuhoxisa nganoma yisiphi isikhathi ngesikhathi sokuxoxisana ngokukhulumisana ngamazwi nomcwaningi.

Lonke ulwazi olutholakala kulengxogxo luzosetshenziselwa kuphela ngezinjongo zokubhala i-dissertation yami. Ngemuva kokuthunyelwa kwedokumenti yokubhaliswa esikhungweni semfundo ephakeme (enyuvesi yaKwaZulu-Natali), ulwazi kufanele lugcinwe kwikhompyutha yami kanye ne-hard drive. Lolu lwazi luzosuswa bese i-hard drive icishwe ukuze kususwe noma yimuphi umniningwane emva kweminyaka emihlanu, njengoba kudingeka. Amagama neminye imininingwane yomuntu kungashintshwa uma ufisa.

## UKUVUMA

Mina \_\_\_\_\_ ngaziswe mayelana nocwaningo eluhlosiwe osihloko salo sithi “Architecture as a Driver for Social Change: Towards the Design of a Self-Sustainable Community Anchor in KwaMashu” olwenziwa ngu- Banele Ngcamphalala. Ngiyaqonda injongo nenqubo yocwaningo.

Nginikezwe ithuba lokuphendula imibuzo mayelana nokufunda futhi ngibe nezimpendulo ngokwaneliseka kwami.

Ngimemezela ukuthi ukubamba iqhaza kwami kulolu cwaningo kuphelele ngokuzithandela nokuthi ngizohoxisa nganoma yisiphi isikhathi ngaphandle kokuthinta noma yiziphi izinzuzo engivame ukuzenza.

Uma ngineminye imibuzo mayelna nalolucwaningo noma ukukhathazeka, ngiyaqonda ukuthi ngingathintana nomcwaningi.

Uma nginemibuzo noma ukukhathazeka ngamalungelo ami njengomhlanganyeli wocwaningo, noma uma ngikhathazekile ngesici sesifundo noma abacwaningi ngingaxhumana nabo:

### **HUMANITIES & SOCIAL SCIENCES RESEARCH ETHICS ADMINISTRATION**

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Tel: 27 31 2604557 - Fax: 27 31 2604609

Email: HSSREC@ukzn.ac.za

Imvume eyengeziwe, lapho kufanele khona

Nginikeza imvume:

Yokuthwetshulwa komsindo (audio-record) wodliwanonendle	YEBO / CHA
Yokuthwetshulwa isithombe msindo (video-record) sodliwanonendle	YEBO / CHA
Yokusetshenziswa kwezithombe zami ocwaningweni	YEBO / CHA



---

Uphawu Lombambi Qhaza

---

Usuku

---

Signature Lofakazi  
(Uma kunesidingo)

---

Usuku

---

Uphawu Lomtoliki  
(Uma kunesidingo)

---

Usuku

## 8.4 Interview Schedule Sample

Background Information:

*Name of Respondent:* Pretty

*Place:* KwaMashu P-Section

*Date:* 31 July 2017

*Time:* 15:53

1. *Gender:*  
Female
2. *Age:*  
50
3. *Marital Status:*  
Married
4. *Are You Currently Employed:*  
Yes

Key Information:

5. *For how long have you been living in KwaMashu?*  
38 years
6. *What type of dwelling (Formal/Informal/Traditional/Other) do you live in?*  
Formal Housing
7. *What type of dwelling tenure (Fully Owned/Partially Owned/Renting/Other) is it occupied under?*  
Fully owned
8. *How many people live in household?*  
7 people.
9. *How do you think your house performs in cold/hot weather? i.e. Does it get excessively hot in summer or excessively cold in winter?*  
I do not see a difference. It is because I have been here for too long.
10. *What do you think are the main challenges you face living in this house?*  
Water shortages.
11. *Given a chance, what would you change about your house?*  
Nothing.

12. *Do you have access to mains power?*

Yes.

13. *Do you know where that energy comes from?*

Eskom.

14. *Are you aware of the impact (if any) that your particular energy source has on the environment?*

Not really. I once heard my boss talk about it polluting the earth.

15. *What is your understanding of Climate change?*

My boss always says that the weather is changing and we are going to die.

16. *Do you think you can/are you doing anything to help the situation? If yes, what is it?*

No. I am just a domestic worker, what can I do.

17. *Given a chance to do over, would you consider options and practices that are friendlier to the environment for your home?*

Nothing.

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