



# RESTORING RECIPROACITY

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BY

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*M. Prof. Arch.*

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# RESTORING RECIPROCITY

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*Between Man and Nature through Architecture  
as the Mediating Device*

*Location:*

*South Berea 609, Corner of Nelson Mandela Boulevard (R21) and Thabo  
Sehume Street  
Fountains, Pretoria, 0002*

*GPS:*

*25°45'43.0"S 28°11'37.3"E*

*Programme:*

*A Wellness Centre for Urban Diseases*

*Study Field:*

*Environmental Potential*



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*by Gardiol Crous*

*Submitted in partial fulfilment of the requirements for the degree  
Master of Architecture (Professional)*

*in the*

*Faculty of Engineering, Built Environment and Information Technology University of  
Pretoria*

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*Course co-ordinator: Dr. Arthur Barker*

*Edited by: Karlien van Niekerk*

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# Declaration

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

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

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

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*Gardiol Crous*



# Acknowledgements

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A special thanks to:

My Heavenly Father, for unconditional favour,  
Dr. Arthur Barker, for your valuable guidance,  
Dr. Edna Peres, for your time, patience and extraordinary passion,  
My fellow colleagues and friends, for coffee, laughs and advice,  
My parents, for your endless support, prayers and motivation,  
My brother Mauritz, Barend & Wilan for your willing hearts and a helping hand  
My fellow dreamer and partner in crime, Lean,  
for all the rest.



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# Abstract

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In the quest for achieving a modern civilization, the interconnected relationship between nature and humankind has changed to one of disconnection. This disconnection does not only compromise the natural environment but also underpins most concerns about the health and well-being of people. This is reflected in rising trends in “diseases of affluence” such as allergies, food intolerances, asthma and eczema, which are increasingly affecting urban citizens of all walks of life.

The proposed program is a wellness centre that is centred on the Slow Food initiative, promoting the concept that inner wellness is derived from appropriate eating habits. The program includes permaculture activities, a cooking pavilion and a culinary school, all serving as educational devices. A treatment clinic also forms part of the program to facilitate the healing of urban diseases. The site is located on the periphery of South Berea, functioning as a nexus area between the natural and urban conditions of Pretoria where reciprocity can be effectively restored.

The aim of this dissertation is to explore how architecture can be the mediating device that on the one hand heals the deteriorating natural environment, and on the other heals humans that have been compromised by their environment, to ultimately restore the reciprocal relationship between them as part of the same living system. Regenerative architecture, bioremediation, biophilia and biomimicry will be investigated and adapted at different scales to create a theoretical design framework. This will support and inform the building to function as a social habitat that promotes resilient health in both nature and humans that is not only perceived as the absence of illness, but is expanded to include a state of general well-being, shifting the disconnected condition of “humans versus nature” to one of “humans with nature”.



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# Ekserp

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In die mens se soeke na 'n moderne samelewing, het die noodsaaklike interaktiewe verhouding tussen mens en natuur tot skade gelei. Hierdie gedronge verhouding het verslegtende gevolge vir beide die natuurlike omgewing, asook die algehele welstand en gesondheid van mense ingehou. Onder andere is daar 'n toenemende tendens waargeneem, veral in stedelike gebiede, van siektes soos allergie, sinisitus, voedsel intoleransies, asma en ekseem, wat 'n direkte verwantskap met klimaat en omgewings veranderinge het.

Die voorgestelde projek is 'n Gesondheidsentrum gabaseer op die "Slow-food" beweging wat die produksie van voedsel ondersteun wat geen toenemende las op die aarde se hulpbronne, ekosisteme en omgewing plaas nie en terselfde tyd die proses van genesing en algemene welstand vir mense bevorder. Die projek sluit permakulturele aktiwiteite in waarin die gemeenskap kan betrokke raak en 'n kulinêre skool wat oplossings verskaf vir 'n leefwyse waaruit beide die mens en natuur bevoordeel kan word deur toepaslike plant, eet en kook gewoontes. 'n Behandellingskliniek vorm deel van die projek om genesing te fasiliteer vir ernstige siekte toestande wat stedelike inwoners op 'n daaglikse basis ervaar in die konteks van 'n moderne samelewing.



Die perseel is geleë in die omgewing van Suid Berea, wat tans funksioneer as 'n drumpel gebied tussen die natuurlike en stedelike kondisie van Pretoria, waar die wederkerige verhouding tussen mens en natuur weer herstel kan word.

Die doel van die verhandeling is om ondersoek in te stel oor hoe argitektuur as 'n bemiddelaar geïmplementeer kan word, wat enersydse herstel kan bewerkstellig van die natuurlike omgewing en die gesondheidswelstand van die mens en sodoende die voortbestaan van 'n gesonde en lewensgewende ekosisteem te verseker.



'n Teoretiese raamwerk met rigting-gewende ontwerp beginsels sal voorgestel word as 'n ondersteunings en inligting handleiding om die ontwikkeling van die argitektoniese taal ondersteun. Regeneratiewe ontwerp en ontwikkeling, Bio-remediëring, Biophilia en Bio-nabootsing is almal teoretiese beginsel wat verwys na die noodsaaklike interaksie tussen die mens en sy omgewing, om volhoubaarheid en toenemende lewenskwaliteit te bewerkstellig.

# Content

## Chapter 01 INTRODUCTION


 1.1 Preface	1.2 Background Information	1.3 Problem Statement <ul style="list-style-type: none"> <li>1.3.1 The general issue</li> <li>1.3.2 The architectural issue</li> <li>1.3.3 The urban issue</li> </ul> <hr/> 1.4 Site Choice
1.5 The Intention of the Dissertation <ul style="list-style-type: none"> <li>1.5.1 Dissertation questions</li> <li>1.5.2 Research questions</li> <li>1.5.3 Delimitations</li> <li>1.5.4 Assumptions</li> </ul>		1.6 Definitions of Terms and Concepts

## Chapter 02 THEORETICAL APPROACH



 2.1 Preface	2.2 Regenerative Design & Development <ul style="list-style-type: none"> <li>2.2.1 The role of humans</li> <li>2.2.2 A new mind</li> <li>2.2.3 A new role</li> <li>2.2.4 Working developmentally</li> <li>2.2.5 The importance of place</li> </ul>	2.3 Bio-remediation 
2.4 Biophilia and Biophilic Design <ul style="list-style-type: none"> <li>2.4.1 The characteristics of nature</li> <li>2.4.2 Direct contact with nature</li> <li>2.4.3 Indirect contact with nature</li> <li>2.4.4 Biomimetics &amp; symbolic contact With nature</li> </ul>	2.5 Biomimicry	2.6 Summary

*Illustrations by South-African Artist Lorraine Loots (Lorraine Loots, 2013-2015)*

## Chapter **03** THE PROGRAMME & CLIENT

3.1 Preface	3.2 A History of Urban Diseases	3.5 The Slow Food Movement 
3.3 Causes of Urban Diseases 3.3.1 Climate change 3.3.2 Pollution 3.3.3 Stress and placelessness 3.3.4 Inappropriate planting practices 3.3.5 Sick building syndrome (SBS) 3.3.6 What we eat 3.3.7 The changing of our immune systems		3.4 Types of Urban Diseases
		3.6 Programmatic Intentions
3.8 Summary		3.7 Programmatic Requirements 3.7.1 The Slow Food Production Core 3.7.2 The Specialized Culinary School 3.7.3 The Conference and Exhibition Facility 3.7.4 The Immunotherapy Clinic



## Chapter **04** CONTEXT & SITE

4.1 Preface	4.4 Site Analysis
4.2 The Urban Framework	4.4.1 Physical location & description 4.4.2 Site elements
4.3 Urban Analysis of South Berea 4.3.1 Historical context 4.3.2 Cultural context 4.3.3 Socio-economical context 4.3.4 Natural context	 
4.5 Summary	

# Content

---

## Chapter 05 CONCEPTUAL DEVELOPMENT & PRECEDENTS


	<p>5.2 Urban Proposal   Regenerative Ethos</p> <ul style="list-style-type: none"> <li>5.2.1 An urban foyer into the Pretoria CBD</li> <li>5.2.2 A public &amp; productive green corridor</li> <li>5.2.3 Restoring reciprocity between the East and the West</li> </ul>	
<p>5.1 Preface</p>	<p>5.3 Healing the Land   Bioremediation</p>	<p>5.4 Healing the People   Biophilia</p>
<p>5.5 From Disconnection To A Nexus Of Reciprocity</p>	<p>5.6 Summary</p> 	

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*Illustrations by South-African Artist Lorraine Loots (Lorraine Loots, 2013-2015)*



Chapter **06** DESIGN DEVELOPMENT


<p>6.1 Preface</p>	 <p>6.2 Site Proposal &amp; Development   Bioremediation</p> <ul style="list-style-type: none"> <li>6.2.1 The constructed wetland</li> <li>6.2.2 Permacultural and agricultural activities</li> <li>6.2.3 Appropriate planting practices</li> </ul>
<p>6.3 Design Evolution</p> <ul style="list-style-type: none"> <li>6.3.1 Programmatic development</li> <li>6.3.2 Initial conceptual translations</li> <li>6.3.3 Mid year design outcome</li> <li>6.3.4 Reflection</li> </ul>	<p>6.4 Design Revision</p> <ul style="list-style-type: none"> <li>6.4.1 Plan development</li> <li>6.4.2 Section development</li> <li>6.4.3 Place-based and vernacular relationships</li> <li>6.4.4 Natural shapes, forms &amp; analogues</li> <li>6.4.5 Environmental Features</li> <li>6.4.6 Natural patterns and processes</li> <li>6.4.7 Evolved human-nature relationship</li> </ul>
<p>6.5 From Disconnection To A Nexus Of Reciprocity</p>	<p>6.6 Design Iteration</p> <ul style="list-style-type: none"> <li>6.9.1 Site plan</li> <li>6.9.2 Plans</li> <li>6.9.3 Elevations and sections</li> </ul>



# Content

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## Chapter **07** TECHNIFICATION

7.1 Preface	7.2 Technical Concept	7.3 Materiality <ul style="list-style-type: none"> <li>7.3.1 Natural materials</li> <li>7.3.2 Synthetic / man-made materials</li> <li>7.3.3 Hybrid materials And reciprocal possibilities</li> </ul>
7.4 The Structure <ul style="list-style-type: none"> <li>7.4.1 The primary structure</li> <li>7.4.2 The secondary structure</li> <li>7.4.3 The tertiary structure</li> </ul>		7.5 Systemic Implementations of Permaculture <ul style="list-style-type: none"> <li>7.5.1 Water harvesting and treatment</li> <li>7.5.2 Composting and waste feedback loops</li> <li>7.5.3 Permaculture practices and technologies</li> </ul>
7.6 Environmental Systems & Sustainability <ul style="list-style-type: none"> <li>7.6.1 Passive climate control</li> <li>7.6.2 Daylighting</li> <li>7.6.3 SBAT rating</li> </ul>		7.7 Technologies <ul style="list-style-type: none"> <li>7.7.1 The implementation of biomimicry technology</li> <li>7.7.2 Bio-Gas digesting of methane gas</li> </ul>
7.8 Detail Resolution	7.9 Summary	





Chapter **08** APPENDICES

10.1 Final Presentation

10.2 Final Model



Chapter **09** CONCLUSION



Chapter **10** BIBLIOGRAPHY



9.1 List of Figures

9.2 References

Illustrations by South-African Artist Lorraine Loots (Lorraine Loots, 2013-2015)



**FIGURE 1.1**

*Day 259, The Athlone Cooling Towers*

*(Lorraine Loots, 2013)*

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*chapter one*

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# INTRODUCTION

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1.1 PREFACE

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“  
**T**he quality of the air we breathe, the purity of the water we drink, the wholesomeness of the food we eat and the level of radiation we are exposed to is in an endless state of flux and flow. As a consequence, our judgments of “nature” vary continuously. Nature can be perceived as redemptive, but the contemporary reality and perception has regrettably become one of a toxic and hazardous environment, bearing the threat of illnesses.”

*Giovanna Borasi & Mirko Zardini (2012: 21)*



## 1.2 BACKGROUND INFORMATION

**I**ronically, it is by the hand of human beings in their quest towards achieving a **modern civilization** that the very foundation of human existence has been compromised, and nature, the ideal source of healing, has become that which makes us sick. This is unavoidably evident within the context of Pretoria. According to Borasi and Zardini (2012: 20), pollution and smog, fine dust and biotechnology, genetic manipulation and global warming underpin most concerns about the future of the city and consequently have an impact on **human health and well-being**.

A constantly changing relationship exists between our bodies and the environment, and unfortunately these changes now seem to become worse (Borasi & Zardini, 2012: 15). The immunologist Marc Jackson (2006: 174) claims that it is not surprising that dramatic modifications in modern lives were implicated in rising trends of diseases such as allergies, food intolerances and asthma, previously defined as **“diseases of affluence”**. Our bodies are not biologically suited to cope with the sudden **environmental changes** they have been subjected to in recent decades. Researchers Michael L. Power and Jay Schulkin (Borasi & Zardini, 2012: 35) share this opinion, speaking of a “mismatch between adaptive biological characteristics of our species and the modern environment.” There is



thus a great urgency to unravel and understand the real crises of which illness is only a symptom. To **‘diagnose’** the root of the problem we should investigate the historical connections between the natural environment, the health and wellbeing of its users, and the design of our urban environments (Borasi & Zardini, 2012: 16).



**FIGURE 1.2**

*Image of urban inhabitants compromised by nature*

*(Borasi & Zardini, 2012)*

## 1.3 PROBLEM STATEMENT

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### 1.3.1 THE GENERAL ISSUE

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It becomes necessary to imagine and explore how architecture and urban design can play a different role that, on one hand, repairs the environment and contributes to the responsible use of a region's resources, and on the other gives the architect or designer the chance to fulfill a new therapeutic function (Borasi & Zardini, 2012: 26) A building thus adopts the role of being the **mediator** between humanity compromised by nature's detrimental effects and the natural environment itself, in order to facilitate a healing process and repair a **disconnected relationship**.

All these attempts operate on the optimistic premise that design is capable of delivering individual and **collective wellbeing**. The environment is considered the prime determinant of a population's state of health. In this regard, architecture can play a fundamental role in ensuring **reciprocity**; a relationship between opposites that allows for mutual exchange of benefits. The most significant shift for architecture and urbanism will be from the idea of **'cure'** to the idea of **'care'**, not only of our bodies, but also our environments, in order to regenerate a more holistic relationship to place (Mang, 2009: 7).

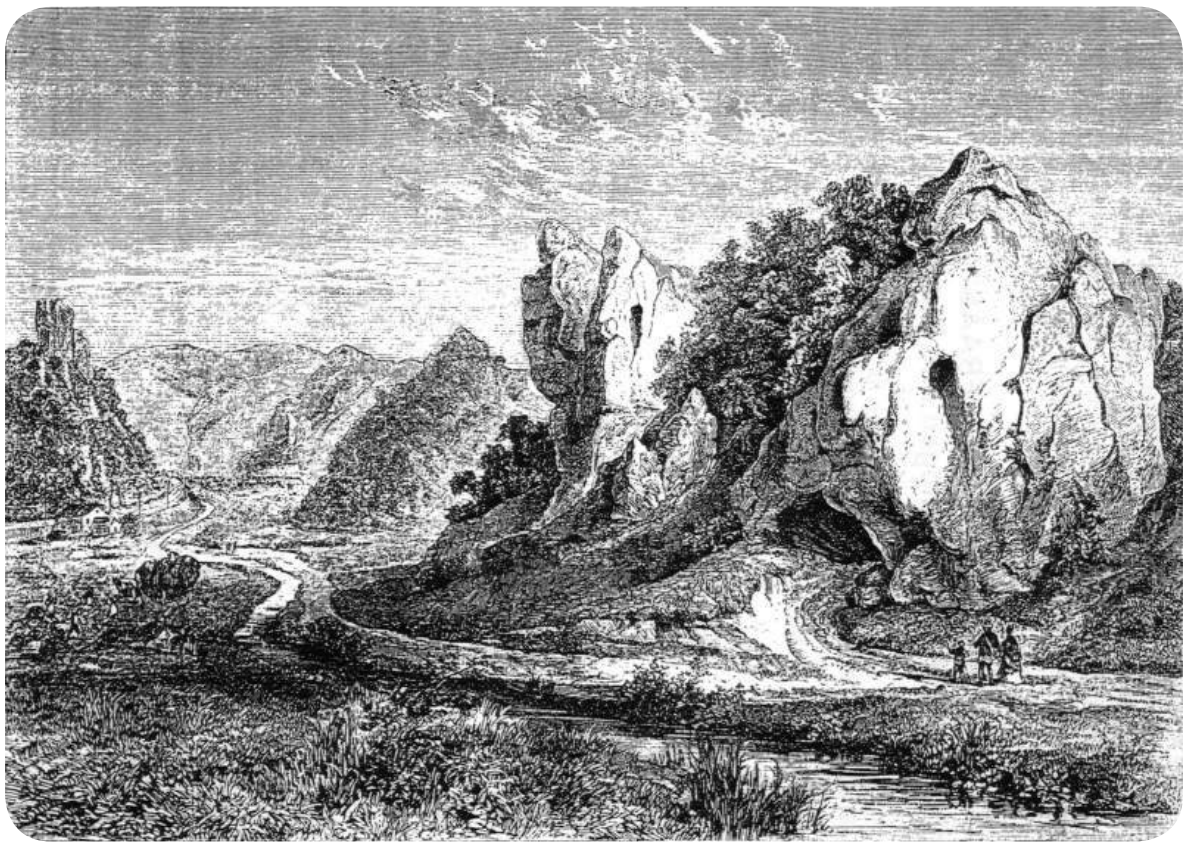
### 1.3.2 THE ARCHITECTURAL ISSUE

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The divine and ideal relationship between nature and humankind was an interconnected living system, in which all had equal rights and responsibilities (Rios, 2013: 200). The prehistoric architectural expression of this condition was **building in a landscape**.

However, as a consequences of the reductionist paradigm of the early 20th century, underpinning Modern Man's ideals, this relationship was turned on its head, as human needs and desires dictated that humans and their built environments hold sovereignty over nature (Rios, 2013: 201). The architectural result can be defined as **building on a landscape**.





**FIGURE 1.3**

*Building in a landscape: Sketch of Hohle Fels Cave, Germany.*

*(Ancient Wisdom, 2004)*



**FIGURE 1.4**

*Building on a landscape: Ville Radieuse, Le Corbusier, 1933.*  
(Editions Parentheses, 2015)



Consequently nature could no longer sustain resource extraction and buildings could no longer sustain man's rapidly growing and changing needs, leading to redundant buildings. Temperature increases have been noted since 1971 (Intergovernmental Panel on Climate Change (IPCC), 2014: 5). The years between 2001 and 2010 were marked as the warmest decade on record, the pinnacle point of global shock due to the effects of man's unsustainable rate of living and consumption. **Global warming and climate change** (IPCC, 2014: 6) have a huge effect on the health and well-being of cities and their inhabitants. Thus, in the same way that humans have disconnected themselves from nature, resulting in an extractive rather than a reciprocal relationship, so too have humans disconnected themselves from their well-being, extracting from their physical and mental reserves rather than

building reciprocity between mind, body and spirit, which not only leads to multiple **immune disorders and urban diseases** but also to a general lack of psychological wellbeing.

As one of the contributors to this state, the building industry's response was the acceleration of the movement towards sustainability, particularly the green building movement, resulting in **building for a landscape**. Although it largely contributed to technical advantages, it did reduce architecture's possibilities to a set of rules and a checklist to comply with in order to achieve sustainable and 'green' architecture. The result led to homogeneous, standardized typologies (Du Plessis, 2012: 5), creating further separation in an already fragmented relationship between nature and humans.



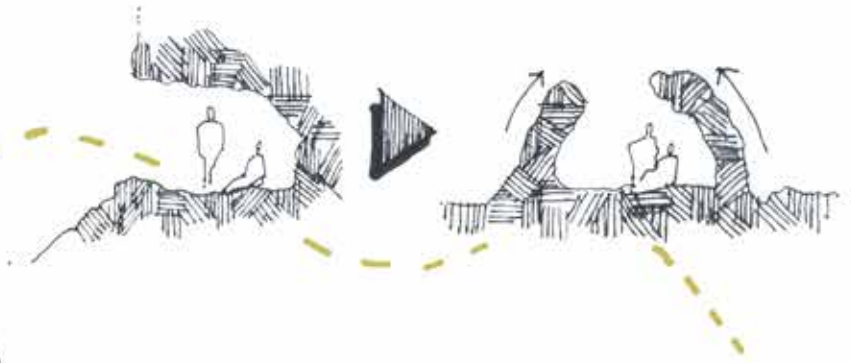
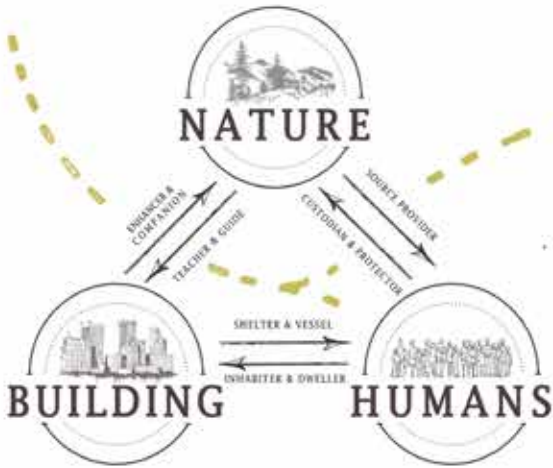
**FIGURE 1.5**

*Building for a landscape: Standard Bank Rosebank, Johannesburg,  
Grosskopff Lombart Huybrechts Architects, 2012.  
(GBCSA, 2013)*





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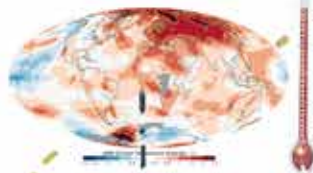
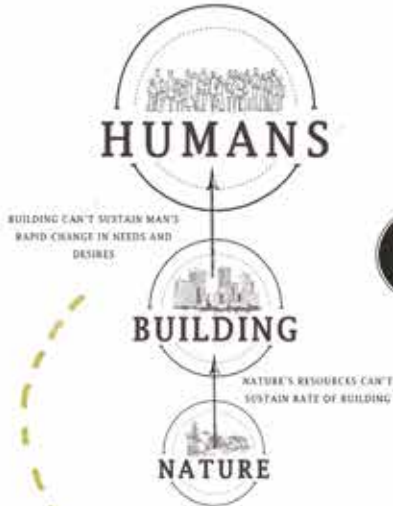
building IN a landscape

02



building ON a landscape

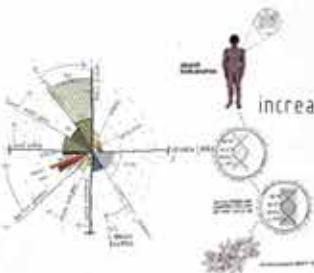
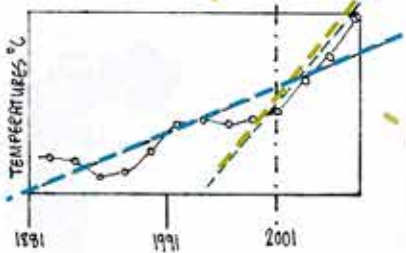
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DISCONNECTED CONDITION

04

2001  
GLOBAL WARMING TURNING POINT



internal effects  
increase in urban illnesses

external effects  
compromised living environment



building FOR a landscape



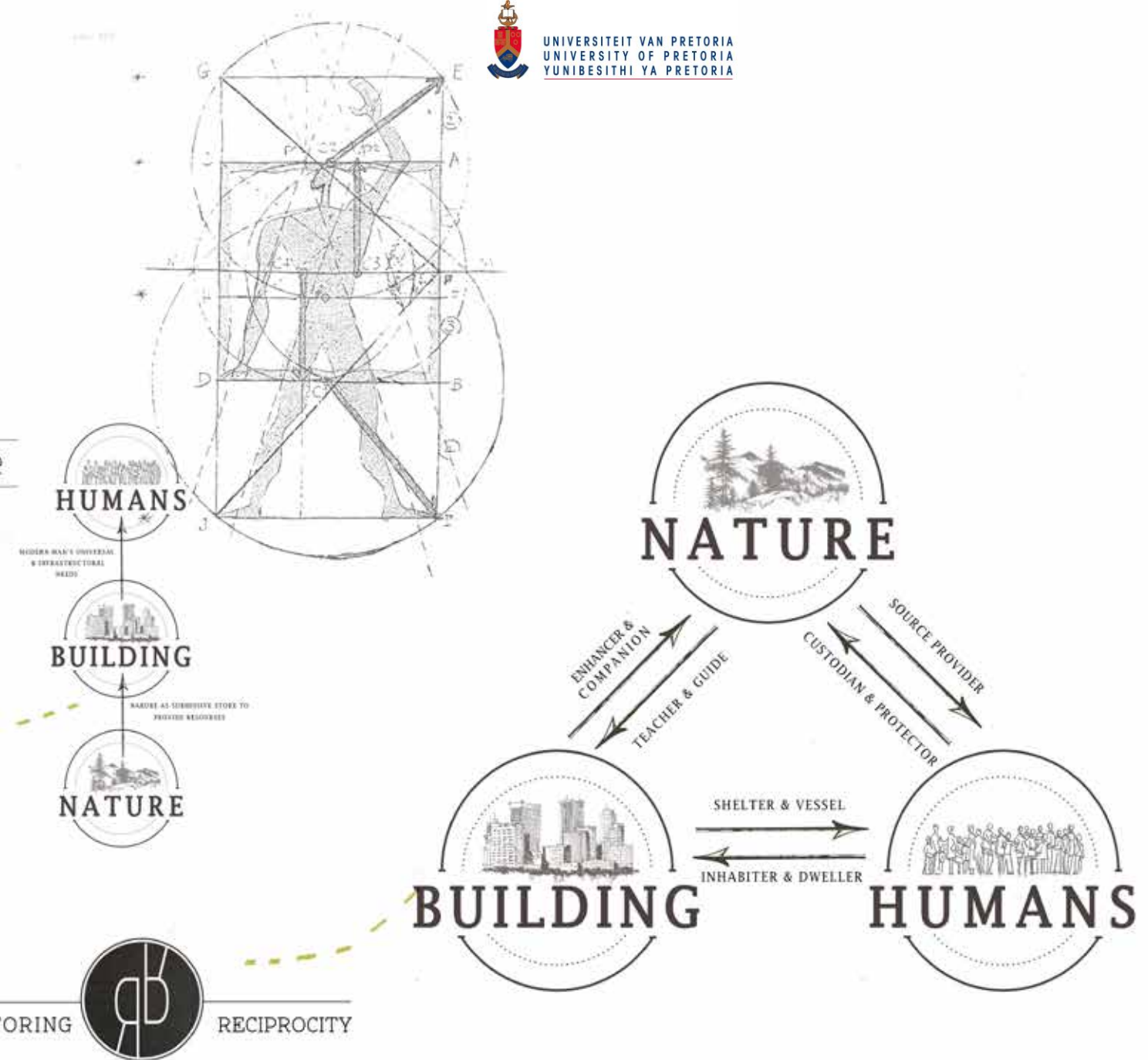


FIGURE 1.6

*Diagram illustrating architectural intention as building as a landscape.*

*(Author, 2016)*

It thus becomes necessary to explore new means of how architecture can **restore reciprocity** between nature and humankind on **equal terms**, especially for people whose health is compromised instead of improved by nature. The possibility arises to not only explore building in a landscape, on a landscape or even for a landscape, but to consider designing a **building to function AS a landscape**. By investigating the notion of expressing the physical and intangible qualities of nature within a building, the building would no longer be viewed as the prominent antagonist, but rather as the **mediator** to restore the reciprocity between the compromised landscape and the compromised health and well-being of man.





**FIGURE 1.7**

*The discarded landscape that the West Urban Framework focuses on.  
(Author, 2016)*



### 1.3.3 THE URBAN ISSUE

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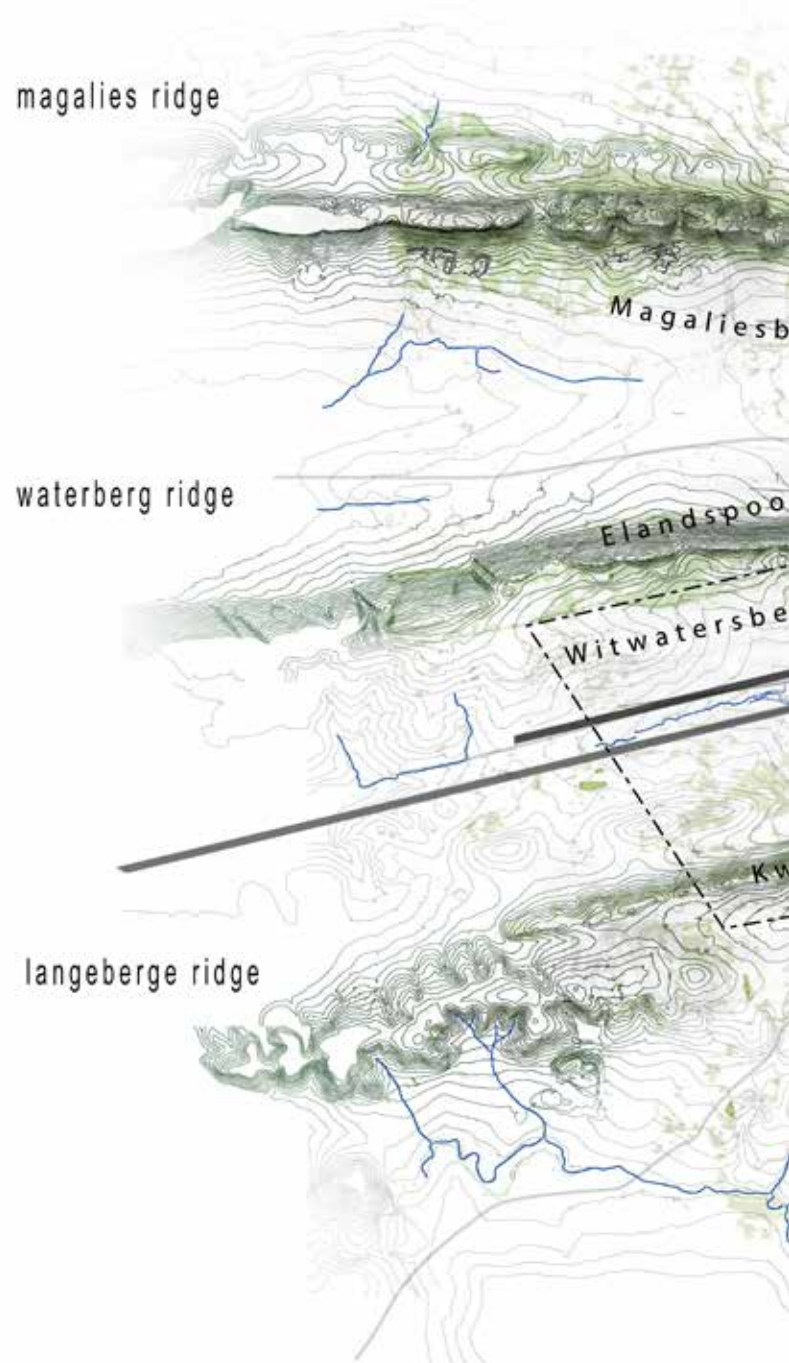
The development of the modernist city, focused on zoning principles, severely influenced territorial management and urban planning choices, contributing to blue and green **ecosystemic dilapidation**. According to Berman (2011:2), the metropolises of Gauteng are particularly exposed to the risks that contribute to climate change, energy scarcity and processes of decay. These present hazards to the health of our cities and their inhabitants by contributing to the rise and creation of urban diseases.

The vision of the Urban Framework is directed towards **The Discarded Landscape of the West** and aims to address the unsustainable and problematic developmental trend towards the east of Pretoria, which has resulted in an **unbalanced city**. The dissertation will tie into the larger vision by attempting to address and restore the ecological conditions predominant in the West. The landscape is therefore viewed as the most prominent medium for urban analysis.

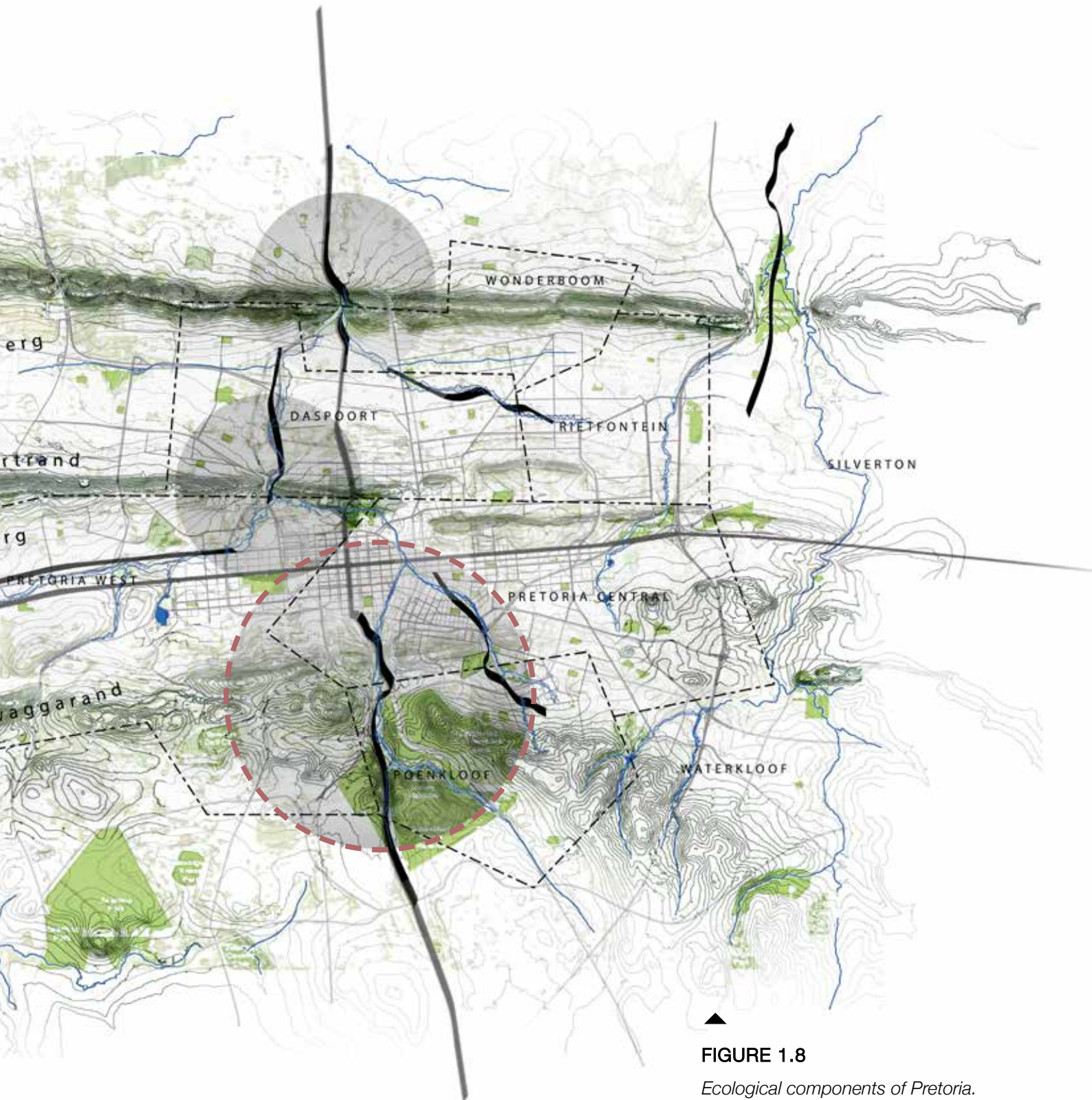
## 14 SITE CHOICE

To find the most appropriate site to achieve **ecological regeneration**, ecological components present within the city of Pretoria were mapped. These include rivers, ridges, hills, nature reserves, green open space and post- industrial brownfield sites (Van der Walt, 1967: 16). The **South Berea Precinct**, forms part of the southern entry gateway into Pretoria. This area was chosen as the most appropriate as it is located on the barrier line of where the West and East seem to be separated, providing an opportunity to ensure a reciprocal relationship between man and nature to be established through design initiatives.

The site is located within 400m walking distance from the Pretoria Gautrain Station, and is positioned in a natural 'basin' that has the potential to contain energy. However, a Mercedes Benz dealership is currently facing the piece of open land that presents huge opportunities to form part of a larger **ecological corridor** if the dealership were to be relocated. The site lies near the periphery of Nelson Mandela Drive, a main transport artery connecting the southern and northern areas of Pretoria. The Apies River, which runs adjacent to the road, can be integrated into the vision for **ecological reclamation**.







**FIGURE 1.8**

*Ecological components of Pretoria.*

*(Author, 2016)*









**FIGURE 1.9**

*Site of investigation in South Berea.  
(Author, 2016)*

# 1.5 THE INTENTION OF THE DISSERTATION

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The objective of the dissertation is, firstly, to acknowledge that the **qualities of nature** provide an appropriate instrument to generate psychological and physiological well-being of people living in urban environments. Thus the aim is to explore how architectural design can be derived from the **positive qualities of nature**. This would contribute to creating a habitat that promotes **resilient health** in both nature and humans that would not only be perceived as the absence of illness, but can be expanded to include a state of general well-being.

Secondly, the aim is to establish **good health as a social right** of every citizen but specifically for people suffering from illnesses that make them unable to enjoy and experience nature or perhaps, even more importantly, for everyday people who don't have the capital or time to access conventional treatment facilities. Finally, it is to shift the idea that urban diseases such as asthma, allergic rhinitis, food allergies and eczema are not purely conditions that needs to be **managed**, but to seek **ultimate healing** through **alternative means** and therefore shift the disconnected condition of **humans versus nature** to a reciprocal relationship of **humans with nature** (Mang, 2009: 5).

It becomes the task of this dissertation to identify what the positive qualities of natural landscapes are and explore how these can be reinterpreted through spatial and architectural qualities. The notion that a building can encourage an affiliation between man and nature is based on extensive theoretical research, which includes the concepts of **Regenerative Architecture, Bioremediation, Biophilia** and **Biomimicry**. These theories will be investigated and adapted at different scales to create a theoretical design framework.

## 1.5.1 THE DISSERTATION QUESTION

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If the fundamental meaning of a landscape is that it is a spatial structure, an open entirety in which diversity and differences are embedded and where coherence could be generated (McHarg, 1992:31), does it become necessary to explore **how a building can adopt similar meanings?**

How can architecture seek to encapsulate these meanings and become a **healing habitat** in order to restore the reciprocal relationship between nature and humans?

## 1.5.2 RESEARCH QUESTIONS

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What qualities of nature could be adopted into the vocabulary of designing buildings, where the organization and composition of architectural space can be perceived as an **alternative ecosystem**? (Borasi & Zardini, 2012: 251)

How can environmental changes, instead of being perceived as threats and restricting design, unlock the potential regeneration of urban landscapes and establish new, **adaptable and responsive cities** for the future?

To what extent does **Sick Building Syndrome** (SBS) perpetuate illness (Borasi & Zardini, 2012: 253), and how can technical advantages be implemented to ensure healthy built environments from inception, without reducing the architectural potential?

## 1.5.3 DELIMITATIONS

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It is not the aim of the dissertation to propose an alternative therapeutic function for health clinics, but rather to explore how architecture can support **healthy place-making strategies** in order to leave

a legacy of tremendous **biological wealth** for the environment as well as city inhabitants.

It is crucial to note that the dissertation does not propose an architecture that imitates nature, nor to seek out to embed nature within architecture, but rather to **critically reflect, rethink, and reinterpret natural qualities within architectural form** and design.

The complex nature of the entire program causes the scheme to become too large to execute thoroughly in a single dissertation: Thus a **central part of the program** that will be identified in the research process will be selected to be resolved up to detail level, whereas the remaining parts will be resolved up to an urban level.

## 1.5.4 ASSUMPTIONS

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It is assumed that the current Mercedes Benz dealership on the site will be **relocated** to a more appropriate location, as there are six other Mercedes Benz dealerships within 10km from the site. Furthermore, the building is of a prefabricated and typological nature, and it is thus assumed that components can easily be dismantled and reused at another location.



## 1.6 DEFINITIONS

# OF TERMS & CONCEPTS

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### RESTORING RECIPROCITY

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The repairing of a relationship between two or more entities that is in a state of disconnection, to allow for **mutual exchange of benefits** to take place for equal gain [Oxford Dictionary of English].

and responsibilities towards one another (Rios, 2013: 200).

### BUILDING ON A LANDSCAPE

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The architectural result of the consequences of the **reductionist paradigm** of the early 20th century, underpinning **Modern Man's ideals**, where human needs and desires dictate that humans and their built environments hold sovereignty over nature (Rios, 2013: 201).

### URBAN DISEASES

---

Diseases previously viewed as “diseases of affluence” that have become more general and in many cases intensified for populations in urban environments, due to increased exposure to pollution, smog, fine dust, biotechnology, genetic manipulation and increasing ambient temperatures (Borasi & Zardini, 2012: 20). These diseases include **allergies, rhinitis, eczema** and **asthma**.

### BUILDING FOR A LANDSCAPE

---

The architectural notion of the 21st century to reduce the impact of the building industry on our natural environment, defined as the “**green building movement**”. Although it largely contributes to technical advantages, it does reduce architecture's potential, resulting in homogeneous and standardized typologies (Rios, 2013: 206).

### BUILDING IN A LANDSCAPE

---

The prehistoric **architectural expression of the divine relationship** between humankind, nature and building which embodies a state of harmony where all three entities have equal rights



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## BUILDING AS A LANDSCAPE

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**T**he notion that investigates how a **building can be constructed to function as a landscape**, adopting attributes and qualities from nature, but without necessarily bringing nature into the design, in order to restore the relationship between the compromised landscape and compromised health and well-being of man.

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## REGENERATIVE DESIGN

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**R**egenerative design is distinguished from the term ‘sustainability’ in that it does more than merely meet the minimum requirements of ecological, social and economic responsibility, but seeks to **add more value, significance and life** than that which has been removed (Du Plessis, 2012: 4).

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## BIOREMEDIATION

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**T**he practices of bioremediation are embedded in a **restorative paradigm** where the primary purpose is to return a natural system with its inherent self-organizing capability to its natural state (Batista & Matos, 2013: 116).

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## BIOPHILIA

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**A**s coined by the Harvard biologist Edward O. Wilson, biophilia is “the genetic basis for the human predilection towards the natural world” (Wilson, 1986:15). It includes architectural principles that harness qualities from the natural world to allow for **humans to affiliate themselves with nature**.

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## BIOMIMETICS

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**B**iomimetics looks to nature as inspiration for human design and development (Kellert & Calabresi, 2008: 35). It finds inspiration in **natural shapes, forms and analogies** and **appropriately imitates** them in order to produce built environments that suggest a clear and visually pleasing connection to nature.

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## BIOMIMICRY

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**B**iomimicry is the bridge between biology and design that provides the path to measuring the **beneficial services** provided by the local ecosystem to influence the built environment to do at least as well as it does (Benyus, 2002: 7).