AN ARCHITECTURAL RESPONSE TO HOLISTIC HEALING PRINCIPLES:

Towards a natural healing retreat in Kwadukuza, Kwazulu-Natal.

By

NIRDOSH HEMRAJ RAMJIAWAN

221119165

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

Durban 2023

Supervised by:

Juan Solis-Arias

33192

DECLARATION

I declare that this dissertation is my own work unaided work. All citations, references, and borrowed ideas have been duly acknowledged. This document is submitted in partial fulfilment of the requirements for the degree of Master in Architecture in the Faculty of Humanities, School of Built Environment and Development Studies, University of KwaZulu-Natal, Durban, South Africa. None of the present work has been previously submitted for any degree or examination in any other University.

[redacted] [redacted]

....

N H Ramjiawan

05 day of APRIL year 2024 05 day of APRIL year 2024

ACKNOWLEDGMENTS

- My wife, Renisha, your understanding, patience, confidence, love, and constant encouragement to pursue my dreams as well as your unwavering belief in me that has given me the strength to overcome the obstacles of this research.
- My parents for their constant encouragement and support.
- My Supervisor, Mr Juan Arias Solis, Thank you for your unwavering guidance throughout this research journey. Your expertise and support have been invaluable in helping me navigate through the challenges and complexities of this project providing guidance and advice whenever I needed it.
- The Masters academic leaders, Prof. Luckan and Dr Mthetwa, your ability to inspire perfection have been a constant source of motivation.
- The staff at HPH and all respondents who participated in the research questionnaire played a crucial role in providing valuable insights and data for the study. Their active involvement and willingness to share their perspectives greatly contributed to the outcome of the research project.

DEDICATION

This research is inspired by the memory of my Dad.

ABSTRACT

Cancer patients often face stress and anxiety due to the uncertainty of their treatment and the severity of their illness. The built-form environment can have a positive impact on their physiological well-being and their natural healing process, but many modern healthcare facilities are designed mainly for functionality and efficiency, neglecting the empathy and care that patients need. The experience of place and patient emotion is frequently ignored, resulting in healthcare environments that are sterile and homogenous.

This thesis inquiry explores the architectural problem of designing oncology treatment facilities that incorporate the principles of holistic healing and stimulate natural healing for cancer patients. The research explores how the built-form environment can influence not only the physiological well-being, but also the emotional and psychological comfort of cancer patients and investigates patient-centred holistic healing environments that are stimulating and supportive.

The research methodology is qualitative from an interpretivist approach, focussing on the experiences and interpretations of participants. Data collection was done through observation, semi-structured interviews, precedent analysis, and a critical review of published literature.

The research highlights the need for healing environments that prioritize patients' holistic health and additionally their stress and anxiety reduction. Design principles are derived from topical inquiry and architectural investigation, considering the patient-centred experience and psychological well-being of oncology patients. The analysis of these findings develops strategies for improving the patient experience and supporting their emotional and mental well-being in healthcare settings.

TABLE OF CONTENTS Page No

DECLARATION i
ACKNOWLEDGMENTS ii
DEDICATION iii
ABSTRACT iv
CONTENTS v
LIST OF ILLUSTRATIONS x

PART ONE : DISSERTATION DOCUMENT

CHAPTER 1 | BACKGROUND AND RESEARCH METHODOLOGY 1

1.0 IDENTIFICATION OF VARIABLES 2
1.0. 1 Independent variable(s) 2
1.0.2 Dependent variable(s) 2
1.1 INTRODUCTION 2
1.1.1 Background 2
1.1.2 Motivation/Justification of the Study 3
1.2 DEFINITION OF THE PROBLEM, AIMS AND OBJECTIVES 4
1.2.1 Definition of the Problem 4
1.2.2 Aim 5
1.2.3 Objectives 6
1.3 SETTING OUT THE SCOPE 6
1.3.1 Delimitation of Research Problem 6
1.3.2 Definition of Terms 7
1.3.3 Stating the Assumptions 7
1.3.4 Key Questions 8
1.3.5 Hypothesis 8
1.4 CONCEPT AND THEORIES 8
1.4.1 Introduction 8
1.4.1 The Concept of Holistic Healing 9

1.4.2 Spirituality in Holistic Healing 9
1.4.2 The Theory of Environmental Psychology 10
1.4.3 The Theory of Neuroscience 11
1.5 RESEARCH METHODOLOGY 11
1.5.1 Introduction 11
1.5.2 Research Philosophy and Strategy 11
1.5.3 Secondary Data Collection 12
1.5.4 Primary Data Collection 13
1.5.5 Research Materials 15
1.5.6 Research Analysis 15
1.6 CONCLUSION 16

CHAPTER 2 | LITERATURE REVIEW 17

2.0 **INTRODUCTION** 18
2.1 **CHAPTER INTRODUCTION** 19
2.2 **SOUTH AFRICAN HEALTHCARE CHALLENGES** 19
2.2.1 Background 19
2.2.2 A Decentralized Approach 20
2.2.3 Health Adversities 21
2.2.4 Infrastructural Challenges 23
2.3 **CANCER CARE CHALLENGES** 26
2.3.1 Background 26
2.3.2 Infrastructural Barriers To Oncology Care 29
2.4 **THE CONCEPT OF HOLISTIC HEALING :**
MIND BODY SPIRIT CONNECTION 33
2.4.1 Holistic Healing 33
2.4.2 Architecture And Holistic Healing 34
2.4.3 Elements of Holistic Healing Architecture 37
2.4.4 Design Elements to Holistic Healing Environments 38
2.5 **SPIRITUALITY IN HOLISTIC HEALING** 42
2.5.1. Spirituality and Wellbeing 42

2.5.2. Spirituality and Architecture 43
2.6 **THE THEORY OF ENVIRONMENTAL PSYCHOLOGY:**
NATURE AND ARCHITECTURE 48
2.6.1 Nature and Environmental Psychology 48
2.6.2 Stress Reduction Theory 48
2.6.2.1. Introduction 48
2.6.2.2. Stress and its Implications 49
2.6.2.3. Stress Reduction 49
2.6.3 The Attention Restoration Theory 53
2.6.3.1. Introduction 53
2.6.3.2. Mental Attentional Fatigue 53
2.6.3.3. Attention Restoration 54
2.6.4 Sensory Design 56
2.6.4.1. Sensory Perception and Wellbeing 56
2.6.4.2. Architecture and Multisensory Stimulation 57
2.6.4.3. Sense Enhancing Architecture 58
2.7 **THE THEORY OF NEUROSCIENCE:**
PSYCOLOGICAL RESPONSES TO BUILT FORM ENVIRONMENTS 63
2.7.1. Neuroscience and Architecture 63
2.7.2. The Brain, Architectural Experience, And Wellbeing 64
2.7.3. Neuroscience And Psychological Wellbeing 65
2.7.4. Neuroscience, Nature and Architecture 67
2.8 **CONCLUSION** 70

CHAPTER 3 | PRECEDENT STUDIES 74

3.1 **INTRODUCTION** 75
3.2 **KHOO TEK PUAT HOSPITAL** 76
3.2.1 Location Map 76
3.2.2 Justification 77
3.2.3 Analysis 78

3.2.3.1 Holistic Healing Environments 78
3.2.3.2 Nature and Healing, A Holistic Response 79
3.2.3.3 Sensory Variability and Wellbeing 82
3.3 **THE UMKHUMBANE COMMUNITY HEALTH CENTRE** 84
3.3.1 Location Map 84
3.3.2 Justification 84
3.3.3 Analysis 85
3.3.3.1 Holistic Healing Environments 85
3.3.3.2 Nature and Healing, A Holistic Response 88
3.3.3.3 Sensory Variability and Wellbeing 88
3.4 **THE RIVERVIEW ONCOLOGY CENTRE** 90
3.4.1 Location Map 90
3.4.2 Justification 90
3.4.3 Analysis 91
3.4.3.1. Holistic Healing Environments 91
3.4.3.2. Nature and Healing, A Holistic Response 95
3.4.3.3. Sensory Variability and Wellbeing 97
3.5 **CONCLUSION** 97

CHAPTER 4 | CASE STUDY 99

4.1 **INTRODUCTION** 100
4.2 **THE HILLCREST PRIVATE HOSPITAL** 100
4.2.1 Location Map 101
4.2.2 Justification 101
4.2.3 Analysis 101
4.2.3.1 Holistic Healing Environments 101
4.2.3.2 Nature and Healing, A Holistic Response 104
4.2.3.3 Sensory Variability and Wellbeing 108
4.3 **CONCLUSION** 108

CHAPTER 5 | RESEARCH FINDINGS 109

5.1 **INTRODUCTION** 110
5.2 **FINDINGS AND DISCUSSION** 111
5.2.1 **HOLISTIC RESPONSES TO HEALING** 111
5.2.1.1 Participants Interpretation of Healing 111
5.2.1.2 Healing Environment 111
5.2.1.3 Emotional Responses to Healing Environments 112
5.2.1.4 Preference For a Therapeutic Environment 112
5.2.1.5 Psychological Experience of Place 113
5.2.1.6 Well-Being 113
5.2.2 **NATURE AND HEALING** 113
5.2.2.1 Natural Elements 113
5.2.2.2 Biophilic Integration 114
5.2 **SHORTCOMINGS** 114
5.3 **CONCLUSION** 115

CHAPTER 6 | CONCLUSIONS AND RECOMMENDATIONS 116

6.1 **INTRODUCTION** 117
6.2 **CONCLUSIONS OF RESEARCH** 117
6.3 **DESIGN RECOMMENDATIONS** 121
6.4 **CONCLUSION** 126

REFERENCES 127
APPENDICES 135

LIST OF ILLUSTRATIONS

Page

Chapter 1:

Figure 1 : Mind,Body,Spirit diagram (Source : Author, 2023) 2

Chapter 2:

Figure 2: Provision of the process of care (Source: Author, 2023)..... 20
Figure 3: Disease burden of South Africa (Source: Author, 2023)..... 22
Figure 4: Crowding in primary care waiting area (Source: Fenner, 2015:29)..... 23
Figure 5: Long Waiting lines in primary care facilities (Source: Fenner, 2015:29) 23
Figure 6: Rapid urbanization statistics (Source: Todes et al., 2010:335)..... 24
Figure 7: Projected cancer cases (Source, (Cairncross, 2021) adapted by author) 27
Figure 8: Cancer mortality and new cases statistic (Source, Cairncross , 2021:4)
adapted by author 28
Figure 9: Cancer mortality and new cases statistic (Source: Maluleke, 2000:19)
adapted by author 28
Figure 10: Cancer Diagnosis Statistics. (Source: Maluleke, 2000:19) adapted by author 29
Figure 11: Radiotheraphy units in South Africa (Source, van Eeden et al.,2019:27) 31
Figure 12: Mind body interconnection diagram (Source: Author, 2023) 33
Figure 13: Pillars of holistic healing (Source:, Author, 2023)..... 34
Figure 14: Plan of Epidauros (Source: Gesler, 2003: 21) 36
Figure 15: The ruins of Epidauros (Source: Osei, 2014: 35)..... 37
Figure 16: Figures depicting natural light strategies in healthcare settings
(Source: Blom, 2013: 41)..... 38
Figure 17: The shape of the building can encourage natural air flow
(Source: Day, 2002: 96)..... 39
Figure 18: Principles of natural ventilation..... 39
Figure 19: Atriums and foyers integrating large fenestration with views to nature
(Source: Browning et al., 2014:25) 40

Figure 20: Maslow's hierarchy of needs (Source: Ventegodt et al., 2016:1939) 43
Figure 21: Water temple aerial view (Source: Luckoo, 2011:40) 44
Figure 22: Water temple entrance (Source: Dal Co and Ando, 1997:389) 44
Figure 23: Water temple lotus pond blending into natural setting
(Source: Dal Co and Ando, 1997:386) 45
Figure 24: Water temple entrance descent evoking a sense of spirituality
(Source: Dal Co and Ando, 1997:384) 45
Figure 25: Sacred space using natural light and views
(Source: Hauser et al., 2008: 154) 46
Figure 26: Play of light and shadow (Source: Hauser et al., 2008: 48 46
Figure 27: Murano glass impact on pool (Source: Hauser et al., 2008: 111) 46
Figure 28: Light effect over the pool (Source: Hauser et al., 2008: 112) 46
Figure 29: Influence of the environment on the brain and behaviour diagram
(Source: Author, 2023) 48
Figure 30: Areas of respite and contemplation integrated into the healing gardens.
(Source: Ulrich et al., 2019:8) 50
Figure 31: Areas of respite and contemplation integrated into the healing gardens.
(Source: Ulrich et al., 2019:8) 51
Figure 32: Areas of respite and contemplation integrated into the healing gardens. 52
Figure 33: Areas of respite and contemplation integrated into the healing gardens.
(Source: Ulrich et al., 2019:8) 52
Figure 34: Stages of attention flow chart (Source: Author, 2023) 54
Figure 35: Attention restoration priciples (Source: Author, 2023) 55
Figure 36: The five human sense modalities (Source: Author, 2023) 57
Figure 37: The influence of architecture on sensory stimulation
(Source: Author, 2023) 58
Figure 38: The integration of materiality and nature to evoke a sensory experience
(Source: Annemans et al., 2012:4) 59
Figure 39: Maggies centres emphasize natural light and openness
(Source: Annemans et al., 2012:4) 60
Figure 40: The integration of nature into the building is a key feature of Maggies Centres
(Source: Tekin and Urbano Gutiérrez, 2023:12) 60

Figure 41: The indoor garden at the Maggies Centre in Manchester by Foster and partners highlights the sensory evocation (Source: Tekin and Urbano Gutiérrez, 2023:10) 61
Figure 42: Maggies Oldham integrates a direct contact with nature (Source: Tekin and Urbano Gutiérrez, 2023:9) 61
Figure 43: Maggies Leeds Centre demonstrates the building immersed in nature (Source: Filipe, 2020:25) 62
Figure 44: The five human sense modalities (Source: Tekin and Urbano Gutiérrez, 2023:8) 62
Figure 45: Maggies Oldham utilizes an internal atrium creating an inner focus onto nature. (Source: Tekin and Urbano Gutiérrez, 2023:12) 62
Figure 46: Maggies Forth Valley demonstrating the use of natural materials and nature immersion. (Source: Tekin and Urbano Gutiérrez, 2023:12) 62
Figure 47: The human brain diagram (Source: Hollander and Sussman, 2020:52) 63
Figure 48: External factors that influence positive emotions on the brain (Source: Alexander et al., 2020:222) 64
Figure 49: Feather barbs showing non-repeating, non-parallel lines (Source: Robinson and Pallasmaa, 2015:207) 67
Figure 50: Natural patterning on a leaf indicating non-parallel linear patterns (Source: Robinson and Pallasmaa, 2015:207) 67
Figure 51: The Taj Mahal depict hierarchy of top, middle and base (Source: Robinson and Pallasmaa, 2015:182) 68
Figure 52: Curves (Source: Hollander, 2021:69) 69
Figure 53: Detail (Source: Hollander, 2021:66) 69
Figure 54: Gravity showing balance and equilibrium (Source: Hollander, 2021:67) 69

Chapter 3:

Figure 55: Global location Map (Source: Author,2023) 76
Figure 56: Location Map (Source: Google Earth) 76
Figure 57: Image showing central garden and nature integration (Source: Filipe, 2020:40) 78
Figure 58: Areas of respite on roof top garden (Source: Author, 2023) 78

Figure 59: Image showing block placement harnessing prevailing breezes (Source: Filipe, 2020:39) 79
Figure 60: Section and elevation showing wind wall strategy (Source: Yen, 2012:106) 80
Figure 61: Section showing light shelf detail (Source: Yen, 2012:102) 81
Figure 62: Recovery room with views to nature (Source: Author, 2023) 81
Figure 63: Recovery room immersed in natural light and ventilation with views to nature (Source: Yen, 2012:106) 81
Figure 64: Open façade system immersing patients in nature (Source: Blom, 2013:59 2023) 82
Figure 65: Global Location Map (Source:Author, 2023) 84
Figure 66: Location Map (Source:Google Earth) 84
Figure 67: Floor plan highlighting the central spine (Source:https://www.zaiconsultants.co.za/umkhumbane.htm: [accessed 07-11-2023] adapted by author) 85
Figure 68: Floor plan highlighting the privacy gradient (Source: https://www.zaiconsultants.co.za/umkhumbane.htm: [accessed 07-11-2023] adapted by author) 86
Figure 69: Floor plan highlighting the circulation route (Source: https://www.zaiconsultants.co.za/umkhumbane.htm: [accessed 07-11-2023] adapted by author) 86
Figure 70. 9: Human scaled form and shape (Source: Author,2023) 87
Figure 71: Central spine showing heat escape and cool air ingress (Source: Author, 2023) 87
Figure 72: Integration of sunlight in the central spine (Source: https://www.zaiconsultants.co.za/umkhumbane.htm: [accessed 07-11-2023]) 88
Figure 73: Monitor roof and louvres in central spine allowing natural light and ventilation (Source: https://www.zaiconsultants.co.za/umkhumbane.htm: [accessed 07-11-2023]) 88
Figure 74: Section showing volumes and central spine (Source: https://www.zaiconsultants.co.za/umkhumbane.htm: [accessed 07-11-2023] adapted by author) 89
Figure 75: Material variation and gradation of spaces (Source: Sanders, 2011: 134) 89
Figure 76: Global Location Map (Source:Author, 2023) 90

Figure 77: Location Map (Source:Author, 2023) 90
Figure 78: Area analysis plan (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023] adapted by author) 91
Figure 79: Plan showing privacy gradient (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023] adapted by author) 91
Figure 80: Plan showing circulation route (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023] adapted by author) 92
Figure 81: External perspective showing curvilinear forms (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023]) 93
Figure 82: Analysis of nature views from infusion suites (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023] adapted by author) 93
Figure 83: Analysis of waiting area showing natural light and play of volumes (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023] adapted by author) 94
igure 84: Analysis of waiting area radiotherapy bunker experience (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023] adapted by author) 94
Figure 85: Views onto nature from treatment rooms (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023]) 95
Figure 86: Patient support and natural light in patient rooms (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023]) 95
Figure 87: Views to external nature from waiting area (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023]) 96

Figure 88: Waiting lounge area immersed in sunlight (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023]) 96
Figure 89: Natural materials and curvilinear forms (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023]) 96
Figure 90: External facades using curvilinear forms (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023]) 96

Chapter 4:

Figure 91: Global Location Map (Source: Author, 2023) 101
Figure 92: Location Map (Source: Google Earth) 101
Figure 93: Showing materiality and double volume entrance. 101
Figure 94: The resort like waiting area lounge (Source : Author, 2023) 102
Figure 95: Plan showing the resort like entrance foyer and café relationship to the atrium (Source : Author, 2023) 102
Figure 96: The double volume atrium allowing natural light ingress forming a central orientation marker (Source : Author, 2023) 102
Figure 97: Image showing the reception café and outdoor seating (Source : Author,2023) 102
Figure 98: Image showing a typical recovery room with natural light provision (Source : Author, 2023) 103
Figure 99: Image showing external façade treatment ,materiality variation and greenery integration (Source : Author, 2023) 103
Figure 100: Image showing external façade modulation, materiality variation and greenery integration (Source : Author, 2023) 103
Figure 101: Sunlight ingress in the atrium accentuates the direct contact with nature. (Source: Author 2023) 104
Figure 102: Image above showing Sunlight ingress in atrium. (Source: Author 2023) 104

Figure 103: Showing integration of natural systems in Atrium and play of volumes. (Source: Author 2023) 104
Figure 104: Atrium with clerestory windows and volumetric interplay. (Source: Author 2023) 104
Figure 105: Integration of greenery in atrium. (Source: Author 2023) 104
Figure 106: Integration of natural materials in atrium. (Source: Author 2023) 105
Figure 107: Indirect integration of greenery in atrium through pictures of nature. (Source: Author 2023) 105
Figure 108: Direct contact with nature in access passages showing interplay of shadows 105
Figure 109: Access gardens and views to nature from recovery rooms. Sunlight provision into building. (Source: Author 2023) 106
Figure 110: Image showing the natural settng and light ,conditions evoking a sense of spirituality (Source: Author 2023) 106
Figure 111: Image showing the building in its natural context (Source: Author 2023) 106
Figure 112: Image showing areas for social connection along access passages immersed in sunlight (Source: Author 2023) 107
Figure 113: Plan of oncology department on the lower floor (Source: Author 2023) 107
Figure 114: Image showing the chemotherapy healing garden linked to infusion suites (Source: Author 2023) 107
Figure 115: Image showing the chemotherapy healing garden linked to infusion suites (Source: Author 2023) 107
Figure 116: Image showing the roof garden used as a area of respite by patients and staff 107

Chapter 5:

Figure 117: Participants perception of healing (Source: Author, 2023) 111
Figure 118: Graph depicting the participants ideal restorative setting (Source: Author, 2023) 118
Figure 119: Graph depicting current shortcomings as identified by the research participants (Source: Author, 2023) 114

Chapter 6:

Figure 120 : Schematic of café encouraging social interaction (Source: Author,2023) 121
Figure 121 : Schematic of ideal wayfinding routes (Source: Author,2023) 121
Figure 122 : Spirituality element (Source: Author,2023) 121
Figure 123 : Interplay of spatial volumes evoking spirituality (Source: Author,2023) 122
Figure 124: Interplay light and shadow evoking spirituality (Source: Author,2023) 122
Figure 125 : Schematic of a decentralized waiting area (Source: Author,2023) 122
Figure 126 : Schematic showing integration of biophilic elements
(Source: Author,2023) 123
Figure 127 : Schematic showing views to nature and natural light ingress. 123
Figure 128 : Schematic showing prospect and refuge (Source: Author,2023) 123
Figure 129 : Integration of greenery and nature in a radiotherapy suite
(Source: Author,2023) 124
Figure 130 : Integration of atrium with greenery and nature in a radiotherapy suite
(Source: Author,2023) 124
Figure 131 : Integration of atrium with greenery and nature in a chemotherapy suite
(Source: Author,2023) 125
Figure 132 : Schematic of ideal site selection criteria (Source: Author,2023) 126

CHAPTER 1 | INTRODUCTION

1.0 IDENTIFICATION OF VARIABLES

1.0.1 Independent Variable

The Independent variable explored is **Holistic Healing**. The principles of Holistic healing will inform the Dependant variable.

1.0.2 Dependent Variable

The Dependant variable identified is **Architecture.** The product of architecture will be dependent on the principles of the independent variable to promote wellbeing.

1.1 INTRODUCTION

1.1.1 Background

According to the Greek Philosopher, Aristotle, *The Whole Is Greater Than The Sum Of The Parts*. (Shealy, 2016:11)

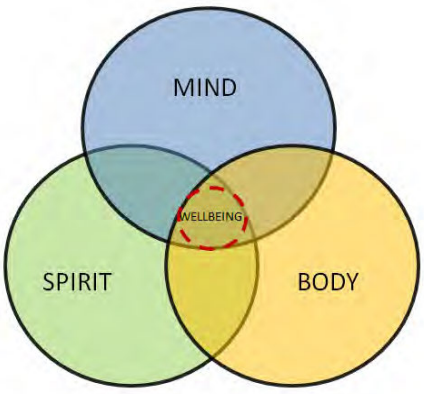


Figure 1 : Mind,Body,Spirit diagram
(Source : Author, 2023)

Holistic healing is, in the quest for wellbeing, healing which considers the person as a whole. Body, mind, spirit, and emotions are collectively considered to achieve wellbeing.

Shealy (2016:11) postulates that the mind, body, and spirit are interwoven and interdependent therefore cannot be considered individually. The Greek philosopher Socrates, between 470– 399 BC, believed in the interconnectedness of the body and mind, emphasizing that true well-being cannot be achieved by solely focusing on physical health. He advocated for a holistic approach to healing, recognizing the importance of addressing both mental and physical aspects for overall wellness and cautioned against isolating treatment to only one part of the body (Ventegodt et al., 2016:1935)

Evidence of holistic healing processes dates as early as the 5th century BC to the Greeks who created healing temples in natural settings incorporating the understanding of the patients' health, independent of mind, and the need for harmony between natural environments. Similarly, the early Romans focused on the public's physical and mental health with their public baths. (Gharipour, 2021:3). Therefore, holistic healing has a long history rooted in ancient civilizations. These early practices recognized the interconnectedness of the mind, body, and environment in promoting overall well-being. Healthcare environments however have evolved over time to prioritize technological advancements and efficiency, often neglecting the importance of holistic healing. As a result, there is a growing recognition of the need to reintegrate holistic approaches into healthcare settings to provide comprehensive care that addresses not only physical ailments but also mental and emotional well-being.

1.1.2 **Motivation / Justification of the study**

The built form directly impacts human behaviour, influencing wellbeing or ill-being based on its design, place experience, and emotional, physical, and spiritual impact. Neglect of empathetic design in built forms can contribute to stress and anxiety. Nijhuis(2017:2) affirms this notion, and links the association between anxiety, uncertainty, and insecurity, to increased levels of stress, as key indicators of poor wellbeing. According to (Periyandavar, 2013:234), the unfamiliar and intimidating atmosphere in healthcare facilities can lead to stress and anxiety due to a design ethos that neglects a patient's psychological and emotional needs. This non-empathetic approach prioritizes functional healthcare delivery, compromising the well-being of patients due to unsupportive and psychologically challenging hospital designs.

The built form however can enhance wellbeing by providing a sanctuary of calm and serenity, rather than promoting stress and anxiety. The oncology environment significantly influences a patient's psychological and physical perceptions, making the design and quality crucial for wellbeing (Periyandavar, 2013:240). By creating meaningful places which consider a holistic approach to design, a state of self-realization could be achieved, one that stimulates an elevated sense of wellbeing, irrespective of illness presence or absence (Sakallaris et al., 2015:40). Holistic healing environments benefit all users, not just the

physically ill, and can lead to positive cognitive, emotional, and psychological benefits (Day, 2002:229). In addition, Sakallaris et al. (2015:41) further affirms that natural healing occurs when the environment is aligned with intent to heal holistically. Therefore, by creating an environment, which considers a patients psychological and spiritual wellbeing as well as their physical health, it is possible to enhance the overall healing process. This approach recognizes the interconnectedness of mind, body, and spirit and acknowledges the importance of addressing all aspects of a cancer patient's well-being to promote optimal healing outcomes.

The research aims to create a holistic spatial design framework that considers the physical, mental, and spiritual aspects of human experience. The research is motivated by the need to create meaningful environments for wellbeing and self-healing.

1.2 DEFINITION OF THE PROBLEM, AIM, AND OBJECTIVES

1.2.1 Definition of the Problem

Stress and its impact on the body, is influenced by the built environment to which patients are exposed, which has an impact on their healing process, hindering their psychological, psychological, and mental wellbeing. Patients can feel helpless and uneasy when faced with an unpleasant environment thereby affecting their experience of place negatively which could result in stress and hinder their recovery (McGinn, 2016:9).

McGinn (2016:8,10) further asserts that the current atmosphere of healthcare facilities tends to be cold, sterile, and institutional, evoking negative feelings that create a stressful environment for the patient and postulates The overall environmental quality of healthcare buildings are fast becoming facilities that focus more on economy of design, efficiency of space and equipment placement rather than considering the experience of the patient and overall environment. Bansi (2017:3) further affirms that buildings have become too techno rationally biased, service and economy obsessed which are a contributing factor towards its occupants' levels of ill-being and negative emotions including stress and anxiety. According to Michalec et al. (2018b:4), oncology patients often report negative experiences in medical settings, including difficulty understanding terminology, distress, and emotional inadequacy.

Patients undergoing treatment for severe illness such as cancer, suffer from stress and anxiety due to the uncertainty surrounding their diagnosis and the potential side effects of their treatments. Michalec et al. (2018a:3,4) further postulates that psychological distress is prevalent in all stages of cancer, affecting one-third to half of the patient population, highlighting the need to consider patient experiences during diagnosis and treatment and posits that emotional distress and anxiety in oncology patients can lead to lower chemotherapy adherence, necessitating a holistic approach to ambulatory care, particularly in cancer infusion centres.

Michalec et al. (2018a:3,4) argue that although healthcare providers emphasize the importance of addressing the emotional needs of cancer patients, there is a lack of design research on cancer infusion facilities, and how the built environment can reduce stress. Understanding how the design of these spaces can contribute to a more calming and supportive environment is pivotal for improving the overall well-being of cancer patients during their treatment journey. This lack of empathy for patients' psychological and emotional wellbeing within healthcare environments, further exacerbates the stress and anxiety experienced by cancer patients. In addition the absence of understanding of holistic healing and its impact on healthcare environments further compounds these issues.

Therefore, the built form should not add to the stress and anxiety already experienced by cancer patients, but instead should aim to alleviate these feelings and create a sense of comfort and tranquillity. According to Ulrich et al. (2019:2), a responsive architecture, incorporating holistic healing processes, natural elements, and sensory perception, can improve patient experiences, reduce stress, and promote healing. McGinn (2016:9) affirms that exposure to nature and natural elements, either outdoors or through viewing it, can reduce stress, fear, and anger by increasing pleasant feelings and postulates that patients tend to heal faster when provided with a view featuring nature features.

1.2.2 **Aim**

The aim of the research is to explore the psychological impact of architecture on holistic healing and wellbeing. The research will focus on the psychological influence of architectural

design on wellbeing and its potential to heal through stimulating environments that evoke holism and in turn enhance the healing process to the immediate patient, family members and support systems.

1.2.3 **Objectives**

The objectives of this research dissertation are:

1. To investigate holistic healing architecture
2. To analyse the relationship between nature, holistic healing, and wellbeing in architecture
3. To explore multi-sensory architecture as a stimulant for holistic healing environments
4. To define architectural design principles that stimulate healing and demonstrate holism through a Proposed Oncology Centre.

1.3 **SETTING OUT THE SCOPE**

1.3.1 **Delimitation of Research Problem**

1. This research dissertation explores healing environments and the potential of architectural design to stimulate healing, excluding patient symptoms and treatment for related health conditions.
2. This research examines stress and anxiety linked to internal environment quality, built environment, and patients' treatment uncertainty, excluding a broader range of stress-related causes.
3. The research focuses on the well-being of patients, families, and support systems. The experience of place of workers, staff, healthcare providers, etc has been excluded from this research.
4. This research primarily focuses on the health and happiness of individuals within a healing environment, ignoring external factors that may affect well-being.
5. The research is limited to the processes that stimulate wellbeing in holistic healing environments. Holistic healing treatments and effects are not considered in this study.

6. Holistic Healing in this research refers to healing that focuses on the person as a whole and the interdependency of the mind, body, and spirit as a complete system.

1.3.2 Definition of Terms

1. **Anxiety:** Feelings of tension, worry and physical changes.
2. **Biophilia:** Humans inert instinct to connect with nature.
3. **Built Environment:** Human-made environments in which humans interact.
4. **Environment:** Space created within the built environment.
5. **Healing:** The process by which the body repairs itself to make sound or whole.
6. **Healing Environment:** A built form environment designed to sustain healing.
7. **Holistic:** Treatment that considers the whole person in terms of the mind, body & spirit.
8. **Ill-being:** The condition of behind deficient in good health, happiness, and prosperity.
9. **Place:** A space with a distinct spirit/character.
10. **Stress:** A state of mental or emotional strain or tension.
11. **Well-being:** The experience of good health, happiness and prosperity.
12. **Support System:** Practical and/or emotional support provided by a network of friends, family, and peers.

1.3.3 Stating the Assumptions

1. The primary assumption made is that all humans have innate healing capabilities and that enhancing the healing process and promoting wellbeing, can be achieved through the built form.
2. Additionally it is assumed that wellbeing is achieved through the harmonic balance and integration of the mind, body, and spirit.
3. Thirdly, holistic healing influences an individual to gain a fuller understanding of their whole self through its influence of making the individual become better attuned with their entire awareness, resulting, in greater self-awareness and self-healing.

4. It is further assumed that architectural design integrating biophilia is accepted by all societal categories as a comforting element.

1.3.4 **Key Questions**

Primary Question

How can the process of holistic healing, inform an architectural design, which stimulates natural healing in cancer patients?

Secondary Questions

1. Where is the relationship between architecture and holistic healing environments in evoking psychological wellbeing?
2. How can multi-sensory variability in the built form stimulate physiological and psychological wellbeing?
3. Could natural elements act as a catalyst to healing in restorative environments?
4. What are the design principles needed to define architectural principles that stimulate healing and demonstrate holism through a proposed healthcare model for oncology?

1.3.5 **Hypothesis**

If the spatial experience of place is carefully considered, integrating a holistic approach and the principles of environmental psychology and neuroscience, it could provide a catalyst for the stimulation of the mind, body, and spirit, in evoking self-healing and have a direct influence on health and wellbeing within its environment.

1.4 **CONCEPTS AND THEORIES**

1.4.1 **Introduction**

This research explores the concepts of holistic healing and spirituality as well as the theories of environmental psychology and neuroscience to understand how place can enhance experiences and stimulate natural healing. It focuses on cancer patients and how environments can influence whole person healing by addressing their physical, emotional,

and spiritual needs. Environmental psychology focuses on nature's influence on architecture and sensory perception, while neuroscience examines psychological responses to architectural experiences. The research aims to define a primary healthcare model for oncology that optimize the therapeutic benefits of nature and architecture, improving patient outcomes and quality of life.

1.4.2 **The Concept of Holistic Healing**

Holistic healing involves balancing all aspects of a patients' wellbeing, including physical, psychological, social, and spiritual aspects, to manage and prevent disease. A patient's homeostatic balance is interrupted, and their capacity to perform daily tasks is negatively impacted, by complex psychological, social, and cultural needs that arise during illness. Holistic care aids patients in dealing with their illness and recovers their balance by attending to their physical, emotional, social, and spiritual requirements and hence improves the patients' quality of life (Jasemi et al., 2017:71). According to Ismalia and Djimantoro (2020:1), cancer patients typically experience anxiety, depression, and fatigue in addition to physical pain. In addition, the diagnosis and treatment of cancer can be stressful experiences that affect every aspect of one's life. Patients often struggle to cope, leading to unaddressed distress, which can negatively impact their quality of life (Chaoul et al., 2014:1). Therefore, an environment that supports patient quality of life holistically by recognizing their psychological and spiritual needs in addition to their physical, could create meaningful spaces that support and promote their healing process.

1.4.3 **Spirituality in Holistic Healing**

Spirituality is defined as the search for meaning and connection to oneself and to something greater. It significantly impacts psychological wellbeing and self-healing in healthcare settings, helping patients cope with severe illnesses, find meaning, and feel more at peace. architects such as Tadao Ando, create holistic spaces that connect the mind and body, encourage deep emotional connections, evoking spiritual essence and promoting a sense of tranquillity.

1.4.2 **The Theory of Environmental Psychology**

Environmental psychology examines the interrelationship between environments and human behaviour. For example, how the environment is experienced by humans and how human behaviour and wellbeing is influenced by the environment. This includes elements that influence environmental behaviour as well as strategies for promoting pro-environmental behaviour (Steg et al., 2012:2).

To create a holistic experience, sensory design is crucial in built forms. This not only creates a tangible connection but also an intangible one. By incorporating sensory design into spatial experiences, healthcare environments can enhance the patients experience and promote wellbeing. Spence (2020:20) postulates that the quality of life can be enhanced through the design of experiences that congruently engage the senses which creates an immersive, engaging, and memorable multisensory experience. By engaging multiple senses, patients are able to fully immerse themselves in the experience, resulting in a deeper connection with their environment.

The Attention Restoration Theory and Stress Reduction Theory, postulates the effect of the immersion in, and exposure to nature on psychological wellbeing and the restoration of cognitive resources in promoting positive outcomes on health and wellness. The Attention Restoration Theory suggests that an individual's attention, a potentially fatigued and depleted resource, can be restored through exposure to natural environments, where cognitive demands are less stressful (Ohly et al., 2016:1). Similarly, Ulrich et al. (2019:3) argues that according to the Stress Recovery Theory, individuals' genetic inclination to nature can lead to stress reduction effects in natural settings. Ulrich et al. (2019:5) further explains that, through the theory of evolution, humans have a propensity towards attaining stress reducing benefits from nature and natural settings which include greenery, natural landscape, water elements etc and argues that stress reducing, and healing settings could be created through introducing prominent nature into the built environment which could harness therapeutic influences.

Day argues that built-in environments designed for human emotions, perceived through the senses, create a supportive environment for wellbeing and further postulates that sensory

design which stimulates sight, hearing, touch and smell could enhance healing (Day, 2002:220). Therefore, the positive engagement of the senses could distract patients from their stress and anxiety which they may be experiencing thereby further enhancing their healing process.

1.4.3 **The Theory of Neuroscience**

The knowledge of human experience of the built environment has of recent been improved upon through findings from Neuroscience in research studies. There has been a paradigm shift brought about by the introduction of the notion of integrating the human brain into the built environment in theoretical and methodological approaches (Karakas and Yildiz, 2020:239). Recent emerging empirical research have demonstrated human neurophysiological responses to architectural factors. Positive psychological functioning, such as social behaviour, and emotional wellness, can be modulated through the built environment's architecture (Coburn, 2017:1526). Emotion, perception, preferences, behaviour, and brain activity are all significantly influenced by architecture. Therefore, Neuroscience could inform the design of healing centres by predicting the responses of the elements of the space on patients in evoking natural healing.

1.5 **RESEARCH METHODOLOGY**

1.5.1 **Introduction**

This section highlights the overall research methodology of the thesis. It includes the overall aims and approach, type of design, sampling selection, primary and secondary data collection methods, with the core focus being to gain insight into the primary research question.

1.5.2 **Research Philosophy and Strategy**

The secondary data analysis consisted of literature reviews and precedent studies, which analysed published journal articles, research papers, theses, and books by prominent authors. These works were publicly available and sourced from reliable sources. The

concepts and theories explored formed the basis for thematic analysis of the data to maintain consistency.

This thesis explores the use of healing environments in architecture to enhance user experience, using a mixed method, interpretivist approach to analyse user experience and emotions of place. Therefore, data was collected and analysed from an interpretivist perspective due to the nature of subjectivity.

Primary data collection methods included an interview style questionnaire with key informants, case study observations, precedent study, and a literature review.

1.5.3 **Secondary Data Collection**

The secondary data analysis will include literature reviews and precedent studies. The literature review will analyse published journal articles, research papers, and theses by prominent authors, sourced from reliable sources. The precedent study will investigate established buildings globally and locally, focusing on the influence of built form on holistic healing. Data collection will be interpretivist, exploring the experience of place and subjectivity. Thematic analysis will be used to analyse questionnaires. The literature review will follow both thematic and textual analysis, with the theoretical framework set out in the literature review as the key influencer.

1.5.3.1 **Literature Review**

This literature review will explore the relationship between holistic healing and the built environment, focusing on factors, themes, and design strategies that can enhance the indoor environment's healing potential. The review will explore how the built environment influences physical, mental, emotional, and social aspects of healing and wellbeing. The thematic analysis will be sourced from books, journal articles, research papers, and theses. The theories and concepts explored in the literature review will focus on the following themes in its analysis:

1. Holistic healing environments, architecture as therapy
2. Nature and architecture, holistic responses

1.5.3.2 **Precedent Studies**

The precedent studies will examine established buildings globally and locally, using publicly available data to analyse their influence on holistic healing. The primary analysis criteria are the built form's role in demonstrating this, with the following buildings chosen for a precedent analysis.

1) The Khoo Teck Puat hospital in Singapore is renowned for its biophilic design, creating an inclusive healing environment that promotes harmony between people and nature. This precedent, applicable to middle to higher income communities, will guide the design of the Oncology Centre for middle- and lower-income communities, focusing on healing intention.
2) The Umkhumbane Clinic in Cato Manor, a patient-centred, non-conventional healthcare facility, serves as an ideal example of social support in middle to lower income communities.
3) Riverview Cancer Centre uses innovative oncology care, incorporating biophilic principles and a supportive environment, recognizing the influence of surroundings and nature on patients' well-being and healing.

The precedent studies will enhance understanding of the theoretical framework's application in context, focusing on design principles and current approaches in public and private facilities. The study aims to assess the quality, strengths, and shortcomings of these environments, guiding future design principles influencing natural healing.

1.5.4 **PRIMARY DATA COLLECTION**

Primary data collection methods will include an interview style format questionnaire, surveying a sample size of 20 key informants which include members of the public, healthcare and built environment professionals. To gain a thorough understanding of how

and what environments can stimulate healing and wellbeing within its context, a case study displaying characteristics relating to research aim of this thesis will be critically observed, which will be conducted at the Hillcrest Private Hospital. The observations will be recorded via sketches, photographs, and field notes.

1.5.4.1 **Questionnaire**

Healthcare professionals and built environment design experts will provide insight into the experience and shortcomings of healing environments. Healthcare professionals will be purposive sampling, with a minimum of five years of practice, while built environment professionals will be expert sampling. Two methods of sampling will be used: purposive and expert methods. Participants will be recruited through collaboration with healthcare institutions and personal networks of professionals. Snowball sampling will be employed to expand participant numbers, ensuring consistency and validity in the data. The study aims to provide valuable insights into the design principles and factors contributing to healing environments.

The exclusion criteria are as follows:

1. Minors
2. Patients currently receiving treatment due to the nature of sensitivity.
3. Any participant who is not directly involved in healthcare environments that could bias the results of the study.

The inclusion criteria are as follows:

1. Built environment Professionals.
    1.1. Experienced in healthcare design.
    1.2. Practising for minimum 5 years
2. Healthcare professionals & Caregivers.
    2.1. Practising for minimum 5 years
    2.2. Actively exposed to healthcare settings
    2.3. Actively involved in patient treatment and recovery.
3. Members of the public.
    3.1. Visited a healthcare facility within the last 5 years.

1.5.5.2 **Case Study**

This thesis will explore the Hillcrest Private Hospital. This case study explores the shift from traditional institutional settings to a patient-focused environment. The hospital's design incorporates environmental psychology principles and architectural elements, aiming to stimulate healing and wellbeing within its context. The case study will be critically observed using sketches, photographs, and field notes to record observations and gain a comprehensive understanding of the hospital's design.

1.5.5 **RESEARCH MATERIALS**

The research materials to be employed in this thesis are the following:

1. Case Study Observations utilizing photographs, field notes and sketches.
2. Interview style questionnaire
3. A literature review of published journal articles and research papers, books, published theses and online data from valid sources.
4. Three precedent studies' analysis with data sourced from published journal articles and research papers, books, published theses and online data from valid sources.

1.5.6 **RESEARCH ANALYSIS**

The research will follow a mixed methods analysis method. The questionnaire schedule will be analysed using thematic and discourse analysis methods. The literature review will follow a thematic analysis. The case study will follow an observational method analysis. The overall concepts of the elements and principles required to create stimulating healing environments will be the key influencer to the data analysis.

1.6 **CONCLUSION**

This chapter emphasizes the importance of an internal environment quality that promotes healing in cancer patients. It focuses on exploring healing environments that enhance the natural healing process, restoring balance in mental, physical, and spiritual aspects. The research methodology outlines the philosophical underpinnings and materials for the study, which will be analysed through a interpretivist lens. The data sources will include various research materials that will be qualitatively analysed to identify the relevant themes and concepts related to the main theories and how they inform the research questions.

The outcome aims to develop design principles for architectural environments that stimulate healing and well-being, demonstrated through an Oncology Centre.

CHAPTER 2 | LITERATURE REVIEW

CHAPTER 02

2.0 INTRODUCTION

The following chapter introduces the literature review which aims to gain insight into the research questions and explore the primary aim of the research. The literature review has been structured to explore the prevalence of psychological challenges faced by cancer patients in the current primary healthcare system and will thereafter explore therapeutic architecture as a responsive design taking into consideration the patients psychological and spiritual wellbeing as a key driver.

Holistic healing through architecture will serve as a concept to be discussed and further analyzed. The exploration and connection of the theories and concepts will create a framework for the design of holistic healing environments.

"Positive environments foster a healthy and balanced lifestyle, but negative environments can adversely affect the mind, body, and soul" (Blom, 2013:14).

2.1 CHAPTER INTRODUCTION

The following chapter examines the state of healing environments in South Africa's middle- and lower-income communities, focusing on the fragmentation and bias towards curative care in the public healthcare system. Primary healthcare centres lack adequate facilities for treating severe diseases like cancer, resulting in a lack of empathy for patients' psychological and spiritual wellbeing. The chapter highlights the challenges faced by cancer patients in accessing high-quality oncology care, highlighting its impact on their psychological health and overall recovery. Additionally, the chapter investigates the concepts of Holistic healing and Spirituality and its integration into architecture exploring the importance of creating environments that promote emotional and spiritual healing alongside physical recovery and the role of mind, body, and spirit in the healing process. Thereafter the theories of Environmental Psychology and Neuroscience expand on the importance of nature in psychological wellbeing and stress reduction. Furthermore, it discusses the role of social support and positive interactions in creating a healing environment that fosters emotional resilience and promotes a sense of belonging among patients and explores the significance of incorporating natural elements such as sunlight, greenery, and views of nature in healthcare settings to enhance patient well-being concluding with an exploration of sensory design in healing environments highlighting its role in promoting relaxation and comfort as therapeutic interventions to enhance patient emotional well-being and enhance healing outcomes.

2.2 SOUTH AFRICAN HEALTHCARE CHALLENGES

2.2.1 Background

Although South Africa has long overcome its controversial past with multiple policies and processes in place to ensure equal opportunities for all of its citizens, the current state of the public healthcare infrastructure is critically impacting the delivery of healthcare services to low-income communities. South Africa’s history has played a critical role in shaping the current issues faced by the current public health care system. The current system is highly fragmented being borne from the principles adopted from a decentralized process and although many benefits of a decentralized system are evident (Maphumulo WT, 2019:1; Ndebele et al., 2022:335). Maphumulo WT (2019:6) further argues that lower-income

communities are disadvantaged by the system which enhances the disparity between low-income communities, in accessing high-quality healthcare. de Villiers (2021:3) supports this notion by stating that the urban planning framework in South Africa has contributed to the lack of accessible public healthcare services in low-income communities. This framework has resulted in a disproportionate distribution of healthcare facilities, leaving many South Africans without adequate access to essential medical services. Additionally, de Villiers (2021:3) highlights the need for comprehensive reforms in urban planning to address these longstanding inequalities and ensure equitable healthcare provision for all citizens.

2.2.2 **A Decentralized Approach**

South Africa's healthcare system is categorized into national, provincial, and local governments. Provincial departments oversee health delivery, while local departments promote and prevent illnesses. Primary care facilities like clinics and community healthcare centres provide the first line of access to formal healthcare for communities. Each province has its own central department responsible for health promotion and prevention (Katuu, 2018:5). These facilities are usually staffed with nurses and intended to provide an initial evaluation of the patient. Primary health care has historically been dominated by nurses,

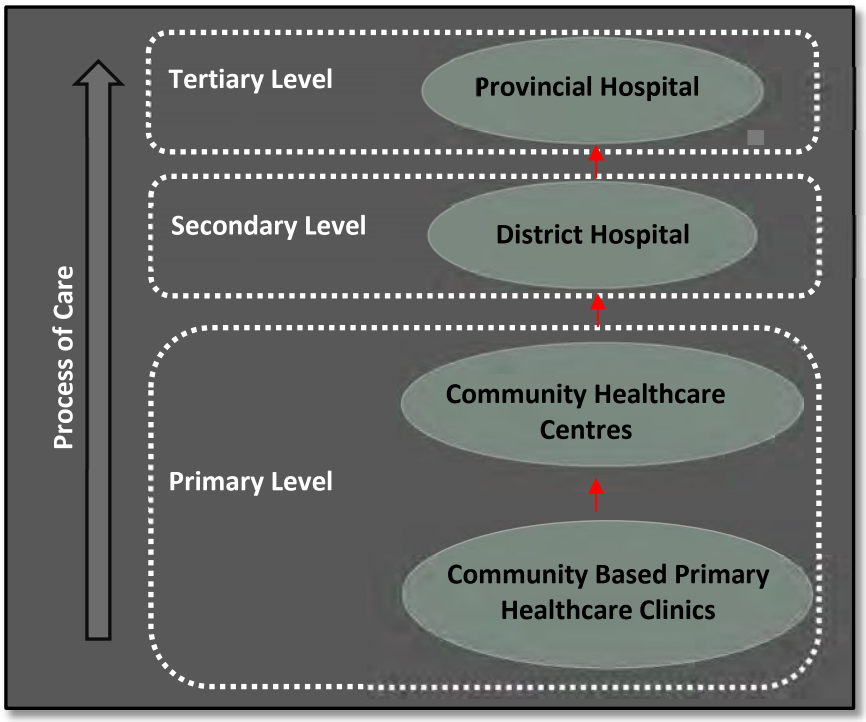


Figure 2: Provision of the process of care (Source: Author, 2023)

particularly in rural places where doctors are hesitant to practice. The overall number of nurses on the nursing register increased by more than 40% between 2003 and 2012 (Mayosi et al., 2014:1348). If additional treatment is needed, patients are referred to the district hospital, a smaller hospital in each province of South Africa. The provincial hospital, larger than the district hospital, offers specialized services and a wider range of services than the district hospital. This process ensures that patients receive the best possible care and treatment (Young, 2016:3,4).

Although research has revealed positive advantages of a decentralized system, for example, local organizations could benefit by gaining strength through the process of decentralization and enter into negotiations with central government organizations thereby increasing resource allocations in favour of previously neglected groups (Maphumulo WT, 2019:6). Sreeramareddy and Sathyanarayana (2019:3) however postulates that governance of decentralized health systems could be detrimental. Unless there is a centrally funded vertical health program, local governments may not be able to adequately fund preventive services. In addition to increased workloads for frontline health workers, integration of services at local levels and expanding their range of services may have other unintended effects leading to low morale and burnout. Maphumulo WT (2019:6) supports the argument by contending that South Africa's healthcare delivery has been affected by the separating of it policy determinants from its policy implementers and control of the system is lost, thereby resulting in inconsistent service delivery, creating a healthcare crisis. This separation has led to a lack of accountability and coordination within the healthcare system, further exacerbating the crisis.

2.2.3 **Health Adversities**

The disease burden of the country further adds to the healthcare crisis identified above. South Africa currently suffers from a quadruple burden of disease which is causing great challenges for an overburdened public health care system. The following table illustrates the burden of disease:

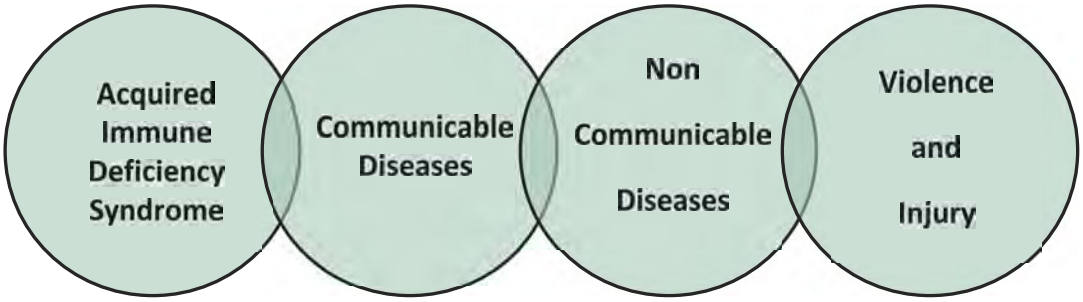


Figure 3: Disease burden of South Africa (Source: Author, 2023)

Chronic non communicable disease, such as hypertensive disease, diabetes and heart disease amongst others, are rapidly increasing in South Africa creating strain on the current health care system. 57.4% of deaths in 2016 was attributed to non-communicable diseases. Communicable diseases are diseases that can be easily spread from one person to another, such as tuberculosis. The prevalence of tuberculosis in South Africa, rose from 300 per 100,000 persons in the early 1990s to more than 600 per 100,000 in the early 2000s, and to more than 950 per 100,000 in 2012 (Mayosi et al., 2014:1345).

In addition, Wand et al. (2023:2) puts forward that South Africa has the highest burden of COVID-19 related comorbidities in Africa, and over two and a half years into the pandemic, these comorbidities continue to negatively impact physical health. Additionally, there is growing evidence of increasing levels of anxiety and depression amongst the population, partly due to social and economic pressures caused by the pandemic. These issues are largely attributed to the pandemic's impact on the continent 's healthcare systems and the overall socio-economic disparities in South Africa. The lack of access to quality healthcare services and limited resources have further exacerbated the already existing health inequalities, leading to a disproportionate burden on vulnerable populations. Furthermore, the pandemic has highlighted the urgent need for comprehensive mental health support and interventions to address the rising mental health crisis in the country. de Villiers (2021:3) argues that, as a result of these colliding epidemics, mortality and morbidity within South Africa, would increase significantly.

2.2.4 **Infrastructural Challenges**

Figure 4: Crowding in primary care waiting area (Source: Fenner, 2015:29)

Figure 5: Long Waiting lines in primary care facilities (Source: Fenner, 2015:29)

Along with the burden of disease, the South African primary healthcare system must also deal with widespread inefficiencies, personnel shortages, differences in skill sets between rural and urban areas, inadequate levels of treatment, and poor patient management, among other structural and systemic issues (de Villiers, 2021:3). Current issues such as crowding (van de Ruit et al., 2020:1), lack of cleanliness, poor waste management and unacceptable physical environments (Maphumulo WT, 2019:2), further adds to an unsupportive environment exacerbating the healthcare crisis of the country. According to (van de Ruit et al., 2020:1), emergency centres in South Africa face major challenges due to overcrowding, high infection rates and chronic diseases which contribute to the high patient acuity. Additionally, rural areas are largely under-served by emergency care because of health disparities. Manyisa and van Aswegen (2017:35) notes that common problems lacking in rural healthcare facilities include a lack electricity, running water, and communication as well as large catchment areas for small facilities. Public facilities are criticized for cramped waiting areas, long lines at pharmacies, and outdated, malfunctioning equipment. These issues make it difficult to maintain and replace these facilities, affecting their ability to meet the demands of their users. Overcrowding as a result, has put further strain on an already overburdened public healthcare system and has led to a lack of resources (Maphumulo WT, 2019:4). de Villiers (2021:3) further affirms that in rural and distant locations, the South African public health system is chronically understaffed and contends that several public healthcare

institutions were identified as lacking capacity to meet the demands and needs of the communities that they serve.

Several primary healthcare facilities are overburdened by an unexpected inflow of people into cities. Rapid urbanization in South Africa, driven by rural residents seeking better employment, is straining the already stressed healthcare system. The influx of illegal immigrants, seeking better prospects and medical treatment, further exacerbates the situation. The constitution mandates access to basic healthcare services for all, including

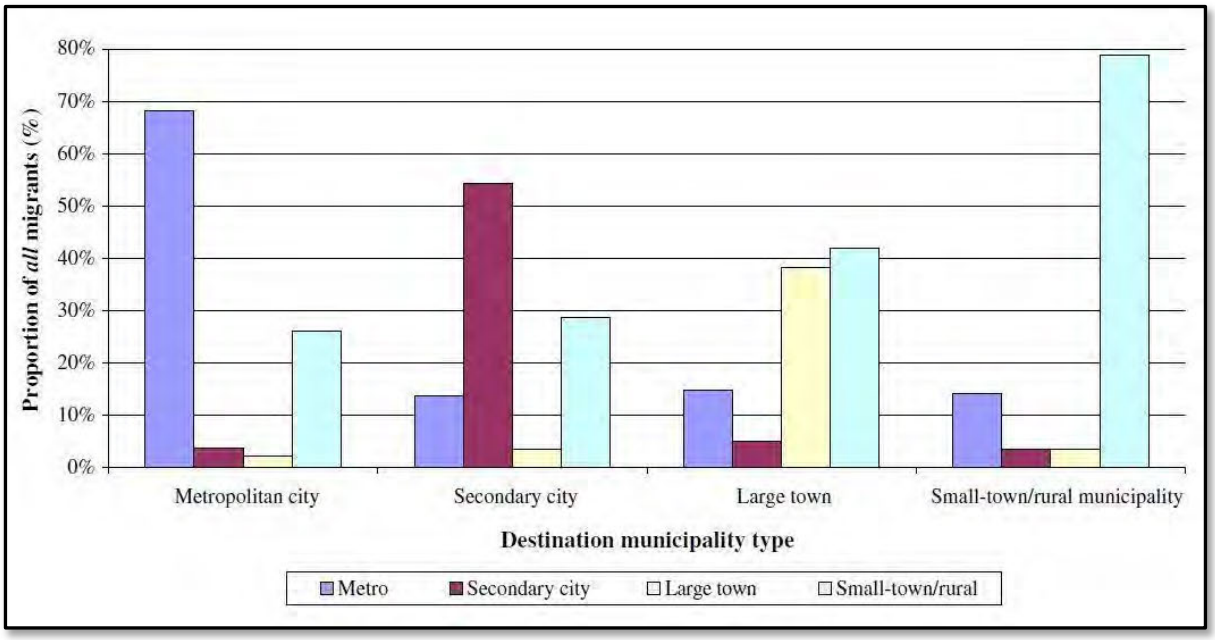


Figure 6: Rapid urbanization statistics (Source: Todes et al., 2010:335)

undocumented immigrants, highlighting the need for improved healthcare systems (Maphumulo WT, 2019:4). In addition, Mayosi et al. (2014:1346) posits factors further adding to an unsupportive environment include underfunding, poor administration, and neglect leaving many state hospitals in a critical state and argues that that the majority of South Africa's public health care infrastructure has deteriorated and become dysfunctional. This deterioration has resulted in inadequate resources, outdated equipment, and a shortage of healthcare professionals, exacerbating the challenges faced by the already burdened healthcare system. Ndebele et al. (2022:343) further affirms this notion by stating that long wait times, low quality healthcare service, outdated and poorly maintained infrastructure, poor disease control and preventive techniques are just a few of the issues that plague public healthcare institutions. Aikman (2019:52) adds to the argument of how well-being in South

Africa's public healthcare system is compromised, by stating that in various hospitals around the country, major adverse events, which are when patients are injured accidentally by an act of commission or omission rather than their underlying sickness or condition, have been reported, with grave issues that potentially jeopardize patient health. Maphumulo WT (2019:2) affirms that due to poor infection prevention and control measures, such as poor waste management, put one in seven patients entering South African primary healthcare facilities, at risk of getting a hospital-acquired infection.

2.3 CANCER CARE CHALLENGES

2.3.1 Background

Cancer is a major global health issue, with 14.4 million diagnoses and 8.8 million deaths reported in 2015. The World Health Organization predicts a 70% increase in new cases over the next two decades. Cancer is an emotional, stressful, and traumatic event. It not only affects the physical well-being of individuals but also takes a toll on patients' mental and emotional health(Michalec et al., 2018:3). Michalec et al. (2018:3) further emphasizes the importance of considering patient experience during cancer diagnosis and treatment, as significant psychological distress is common across all stages of the disease, impacting one-third to one-half of the patient population. Ismalia and Djimantoro (2020:2) affirms the notion of a high level of anxiety and emotional distress experienced by cancer patients on a daily basis due to the illness. Therefore, physical treatment combined with mental and psychological consideration is essential for treating cancer. This approach acknowledges the interconnectedness of physical and mental well-being, recognizing that addressing both aspects is crucial for providing comprehensive care to cancer patients.

In 2020, the number of cancer incidents worldwide was estimated at 19.3 million, with the mortality rate peaking to almost 10 million cases. Globally, the disease has been ranked among the top causes of morbidity and premature mortality with South Africa experiencing 108,168 new cancer cases in 2020 creating a 20.7% risk factor of developing cancer before the age of 75 (Chitha et al., 2022:1). Worldwide, cancer accounts for about 1 in 6 deaths, with low- and middle-income countries accounting for 70% of cancer-related deaths. (Ismalia and Djimantoro, 2020:2). The most prevalent cancers are preventable or potentially curable if diagnosed early however rural areas face a high cancer mortality rate due to late presentation, comorbidities, and limited access to early detection and treatment services. South Africa's cancer care services are limited by poorly developed pathways, late presentation, uneven care distribution, shortages of specialized workforce, outdated equipment, lack of standardized budgets, and poor implementation of existing skills and programs (Chitha et al., 2022:1).

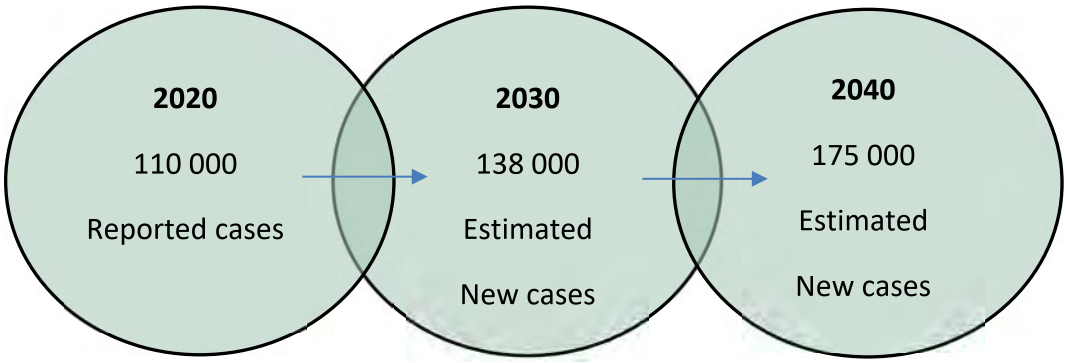


Figure 7: Projected cancer cases (Source, (Cairncross, 2021) adapted by author)

In 2020, South Africa reported over 56,000 cancer-related deaths, accounting for a quarter of all premature noncommunicable disease deaths. This adds to the country's already strained burden of disease. Building an infrastructure to facilitate cancer prevention measures and care provision in lower- and middle-income communities is crucial for effective cancer control. The illustration above depict the projected new cases of cancer incident by year 2040 as identified by Cairncross (2021:3). Chita however argues that despite the new realities of cancer survival and treatment complexity, cancer care delivery has failed to adapt and evolve accordingly and emphasizes the need for a more patient-centred approach that takes into account the unique challenges and complexities faced by cancer patients and further postulates that cancer mortality in South African rural areas is attributed to late disease presentation, comorbidities like HIV, and limited access to early detection and treatment services. Furthermore, due to differences in the distribution of resources, access to specialized medical facilities, and healthcare infrastructure, the incidence of cancer varies greatly among South Africa's nine provinces, making it difficult for patients to receive high-quality care. These factors highlight the need for focused interventions and resource allocation (Chitha et al., 2022:2,3).

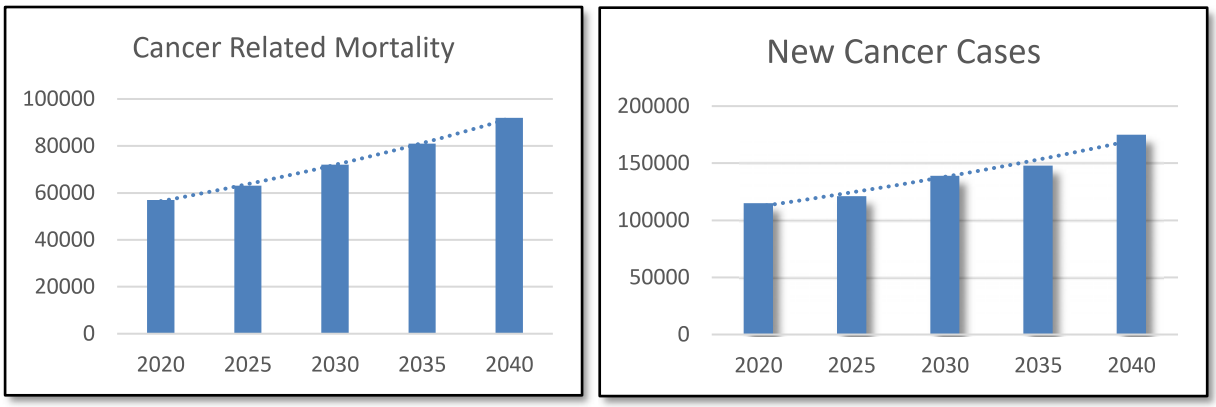


Figure 8: Cancer mortality and new cases statistic (Source, Cairncross , 2021:4) adapted by author

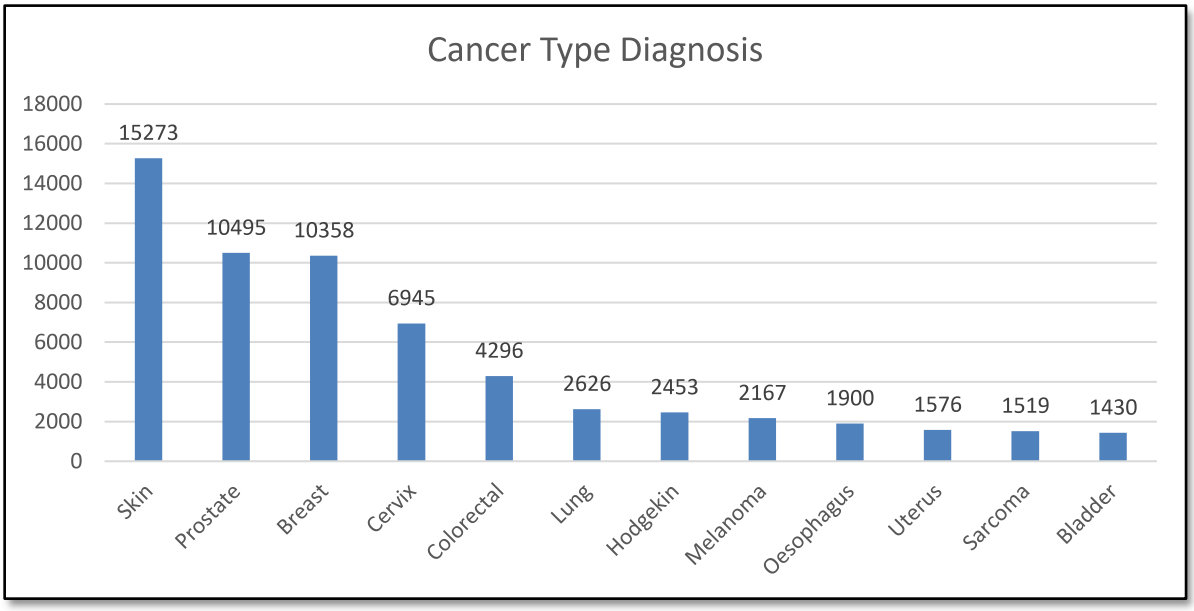


Figure 9: Cancer mortality and new cases statistic (Source: Maluleke, 2000:19) adapted by author

In order to address the increasing cancer burden and also to work towards the United Nations Sustainable Development Goals, South Africa has implemented a number of cancer control initiatives which includes the National Cancer Strategic Framework (for 2017–2022) introduced at a national policy level in parallel with various other cancer prevention measures. In an effort to reduce population-level exposure to the carcinogen, legislation restricting tobacco use and smoking has been passed. These legislations include banning smoking in public places and increasing taxes on tobacco products as well as campaigns that raise awareness about smoking risks and cancer. Over the past two decades, childhood immunizations against hepatitis B and human papillomavirus have been introduced, potentially reducing the prevalence of hepatocellular and cervical carcinomas. Early cervical

cancer detection and screening programs are also being implemented, and policymakers are recognizing the need for disease-specific guidelines (Cairncross, 2021:4).

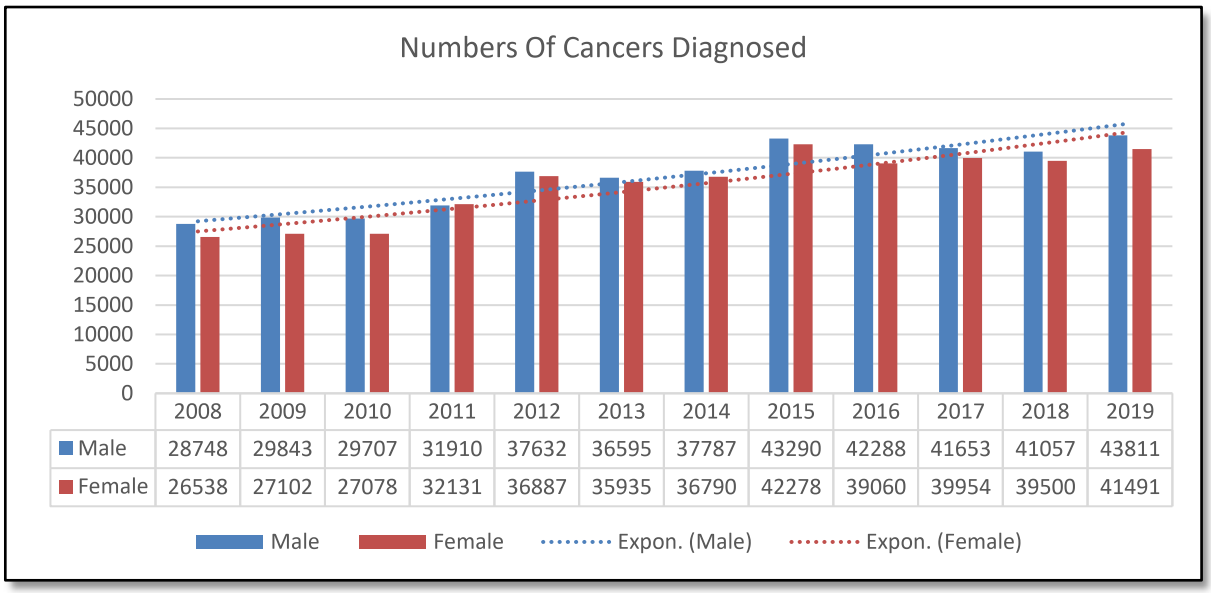


Figure 10: Cancer Diagnosis Statistics. (Source: Maluleke, 2000:19) adapted by author

2.3.2 Infrastructural Barriers To Oncological Care

Chitha et al. (2022:3) postulates that access to public cancer services is generally poor and inequitable in low- and middle-income countries, such as South Africa and argues that most of South Africa's cancer treatment facilities are situated in urban areas within academic institutions, making them inaccessible to rural and semi-rural communities. Cairncross (2021:4) affirms that public cancer care facilities in rural areas face quality disparities compared to urban facilities due to inadequate equipment, resources, and knowledge. This is further affirmed by van Eeden et al. (2020:1) who validates the disparity between modern private healthcare facilities and public healthcare facilities, as well as postulates the high number of skilled oncology specialists in the private sector, further hinders the provision of quality oncology care in public facilities. Of South Africa's two hundred radiation oncologists, only approximately 20% are employed within the public health sector thereby creating a shortage of skilled oncology specialists available at public healthcare facilities (van Eeden et al., 2020:5).

South Africa offers cancer treatment through both public and private health sectors, with most oncology services in the public sector being provided by nine academic health centres

affiliated with nine universities. Rural and semi-rural communities, relying on public healthcare services for cancer treatment, face significant travel distances to these urban-based facilities due to the vast healthcare disparity (Cairncross, 2021:4,5). As a result, Chitha et al. (2022:3)postulates that cancer services in non-academic centres, primary care facilities, and rural areas are underdeveloped due to lack of infrastructure, resources, and expertise for quality, safe, and accessible radiotherapy, chemotherapy, palliative care, and surgical services.

Edwards and Greeff (2017:5) further highlight the challenges cancer patients face in accessing quality oncological care, including long travel distances, logistical difficulties, lack of information, food, and resources.

Lower- and middle-income communities often rely on governmental services, requiring them to travel long distances for cancer treatment. For example, Rob Ferreira Hospital patients from Mpumalanga, travel more than 400 kilometres to Pretoria for quality cancer treatment. Similarly, the Nelson Mandela Academic Hospital, in the Eastern Cape, requires patients to travel more than 200 kilometres to East London for therapeutic cancer treatment. Both of these projected distances do not account for the travel time from their home to the intermediate hospital Chitha et al. (2022:3). Such inequitable access to healthcare access can lead to poor treatment, delayed diagnoses, inadequate management, and exacerbating health disparities among socioeconomic groups, causing them to neglect necessary medical care. Cairncross (2021:5) and Edwards and Greeff (2017:5) argue accessibility, geographic location, socioeconomic status, and health insurance as barriers to cancer diagnosis. They also highlight lack of awareness and education at the public and primary care level. Other factors include poverty, malnutrition, stigma, and superstition, which contribute to late diagnosis and increased mortality. Additionally, lack of social support and low cancer awareness among low- and middle-income communities further hinder progress. Cairncross (2021:5) affirms the persistent issue of insufficient awareness and education at the population and primary healthcare level, particularly in rural areas, which significantly impacts patient treatment outcomes. This lack of awareness and education often leads to delayed diagnosis and ineffective management of diseases, resulting in poorer health outcomes for individuals living in these areas.

A further barrier as postulated by Edwards and Greeff (2017:5), is resource allocation leading to low cancer suspicion, delays in diagnosis, and ineffective referral to tertiary care due to inadequate awareness among public healthcare workers.

In addition, specialized teletherapy equipment used in radiotherapy treatment for cancer, are located within the urban locations mentioned above, rendering it challenging for semi-rural communities to access. The diagram below depicts the 83 units that the country currently provides:

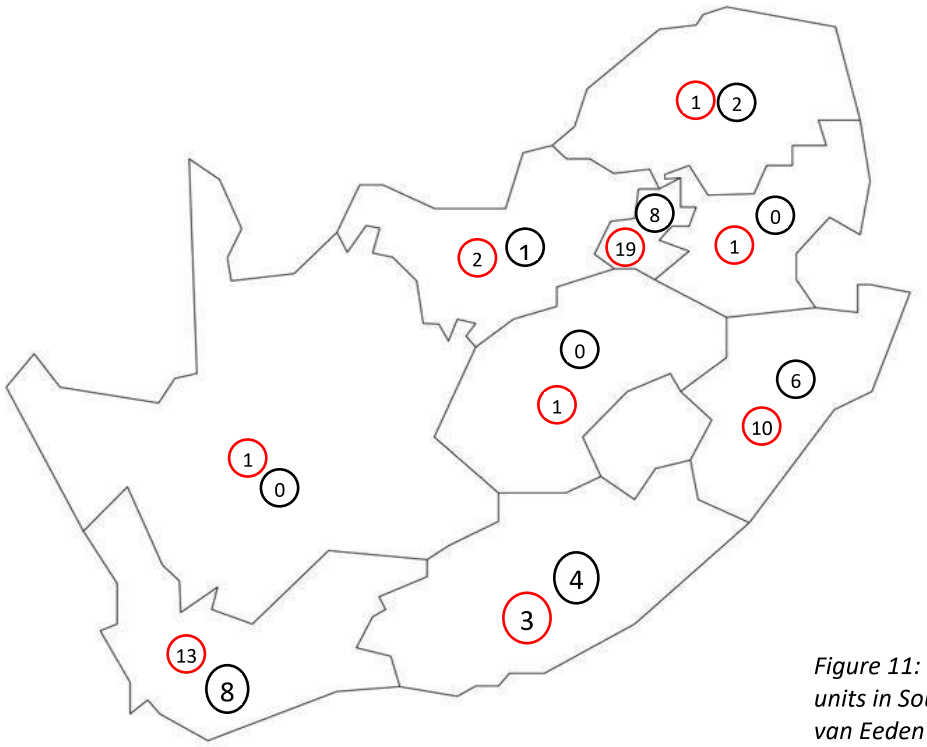


Figure 11: Radiotheraphy units in South Africa (Source, van Eeden et al.,2019:27)

The country has approximately 83 teletherapy units, 64 of which are located in three of its nine provinces. The remaining two provinces each have one radiotherapy facility, and neither has a state facility, while 17 units are shared amongst the four other provinces. Moreover, radiotherapy units are mainly located in large cities, therefore patients in rural areas do not have as much access (van Eeden et al., 2020:6). This disparity in access to radiotherapy facilities between urban and rural areas highlights the need for improved healthcare infrastructure in remote regions.

Edwards and Greeff (2017:4) affirm the challenges faced by cancer patients, such as emotional distress, lack of social support services, physical and treatment challenges, poor

services, poor knowledge, staff training, testing delays, referral backlogs, and transportation issues and recommends diagnosing and referring clinical levels of distress, standardizing care, and implementing distress screening as a standard for cancer care. By addressing these challenges, cancer patients can receive the necessary emotional support and access to social services, improving their overall well-being. In addition, Edwards and Greeff (2017:6) recommends better patient-centred care, staff upskilling, better coordination of transport services, and better financial support systems as support to cancer care. Public health awareness programs, such as cancer education in schools are also suggested to address these issues. Edwards and Greeff (2017:7) further argues the importance of addressing the lack of knowledge and misinformation that can contribute to cancer stigma, as well as for encouraging cooperation and including traditional leaders and healers in public cancer care and calls for strategically placed diagnostic centres, centralized testing equipment, and mandatory psychosocial support services in all cancer care units to ensure that individuals have access to timely and accurate cancer diagnosis and treatment. The psychosocial impact of traveling to tertiary oncology treatment units, particularly for rural patients, necessitates the need for public-private partnerships to provide cancer services closer to patients' homes.

2.4 THE CONCEPT OF HOLISTIC HEALING : MIND BODY SPIRIT CONNECTION

2.4.1 Holistic Healing

DuBose et al. (2016:44) relates the concept of health to the definition postulated by the World Health Organization which posit health as not just being free of disease of infirmity, but also considers a state of complete mental, physical, and social well-being with the goal of achieving optimal functioning of all of the parts that make up the whole. This definition draws parallels to holistic healing which Drury and Hunter (2016:1) posit as the interconnectedness of the mind and body which emphasizes the healing of the whole person, mind, body and spirit rather than concentrating solely on the treatment of physical conditions. The goal of holistic healing is to achieve a harmonious healing balance between body, mind, and spirit to achieve health for the whole individual. Therefore, in the pursuit for optimal health, holistic healing processes of the mind, body, and spirit are considered essential. By addressing the individual as a whole and not just focusing on physical symptoms, holistic healing aims to promote overall well-being and balance in all aspects of a person's life. Day (2002:229) further affirms and highlights the importance of harmony and balance in achieving wholeness. Each part plays a crucial role within an integrated system, and failure of one affects others, necessitating a harmonious balance between all parts to achieve a holistic sense of well-being. Cortright

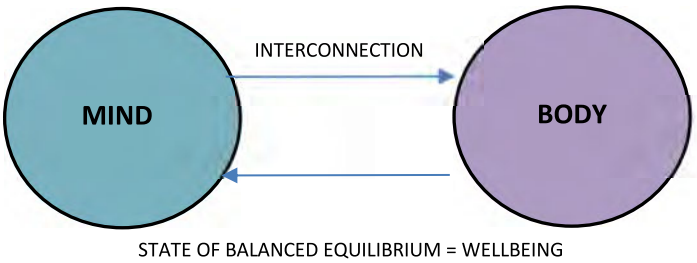


Figure 12: Mind body interconnection diagram
(Source: Author, 2023)

(2021:37) emphasizes the significance of psychological health in maintaining a balanced system, and the goal of healing is to strengthen and sustain the mind and body. The stronger and more stabilized the mind and body, the greater the influence on well-being. Therefore, the reunification of that which has become fragmented or damaged, is the desired goal of holistic healing which is the constant maintenance of the relationship between the triad of the mind, body and spirit, to cohesively function in harmony as a whole.

DuBose et al. (2016:44) argues that healing is a pathway towards a holistic recovery of mind, body, and spirit, even when a cure isn't possible and emphasizes the importance of harmony and equilibrium in restoring physiological balance as well as psychological, and spiritual needs. Holistic healing, according to various definitions, focuses on interconnection, cohesion and harmonic balance between the human triad of mind, body, and spirit, aiming to return to a state of wholeness and balance. This approach recognizes that healing is not solely about addressing physical symptoms, but also involves addressing emotional and spiritual well-being. It acknowledges the interconnectedness of all aspects of a person's being and seeks to restore harmony in all areas of life.

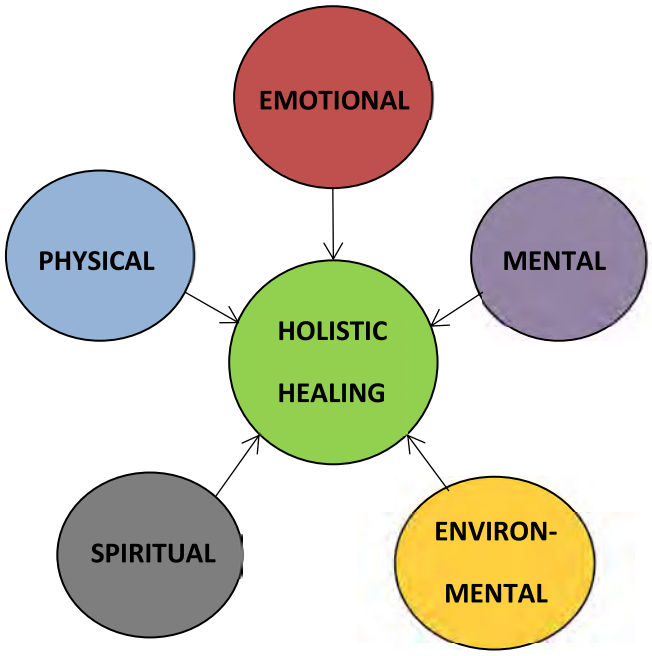


Figure 13: Pillars of holistic healing (Source:, Author, 2023)

2.4.2 **Architecture and Holistic Healing**

A healing environment can be defined as a place where the process of healing of the mind, body, and spirit, can naturally occur (McCullough, 2010:45). The design of built-form environments can promote holistic healing by balancing physical, emotional, cognitive, and spiritual well-being. Venolia (1988:10) suggests that an individual's daily environment significantly impacts their emotional state, either enhancing or diminishing it. The built environment can influence mental, physical, and emotional wellbeing, while disharmonious environments can exacerbate stress. Thus, thoughtful and well-designed built-form environments can create a dialogue between architecture and holistic healing.

Sakallaris et al. (2015:44) affirms that healing environments have the capacity to promote mental, physical, and spiritual cohesion, as well as healing intentions and interactions. Healing environments create a connection to their positive energies. This connection can lead to improved mental well-being and overall emotional resilience. Additionally, Venolia (1988:11) suggests that a healing environment can also promote a sense of calm and relaxation and connects to positive influences of the environment, which can further contribute to emotional well-being stressors. The process of healing is one which requires time and an environment which evokes calm, serenity and a sense of safety. DuBose et al. (2016:44) suggest that the process of wholeness realization can occur in familiar settings such as natural environments with exposure to nature and natural processes. Gesler (2003:2) reiterates the association between an environment and healing and postulates that place and healing are not independent elements but complementary to each other and suggests that in creating a healing sense of place, there are four contributing environments, which are as follows:

1. Natural Environment

Gesler (2003:8) postulates the belief in nature as a healer and suggests that nature and outdoor environments can improve spiritual, mental, and physical healing. He suggests that being away in remote, isolated environments can be beneficial. Humans have a predisposition to nature due to their evolutionary context (Ulrich et al., 2019:3). Additionally, studies have shown that exposure to nature can reduce stress levels, improve cognitive function, and enhance overall mood, further supporting Gesler's postulation.

2. Built Environments

Gesler (2003:11) asserts that an individual's environment significantly influences their mood, emotions, and behaviour, suggesting that a built environment should foster positive trust and confidence among its users as well as create of meaning and a sense of belonging. He emphasizes the importance of designing spaces that promote social interaction and connection, as this can contribute to overall well-being and mental health stimulating the senses and enhancing the symbolic power of design.

3. Symbolic Environments

Gesler (2003:12) suggests that meaningful environments, such as landscapes, can enhance holistic healing by integrating symbolic representations of societal objects. These representations express cultural values, societal behaviour, and individual actions. Gesler suggests that symbolism in healing mediates the connection between biophysical and socio-cultural worlds, resulting in healing through a symbolic pattern of words, feelings, and values. By incorporating symbolism into healing practices, individuals are able to tap into deeper layers of meaning and significance. This allows for a more comprehensive and holistic approach to healing that goes beyond the physical aspects of well-being. Symbolism also serves as a bridge between individuals and their cultural heritage, fostering a sense of belonging and connection that can contribute to overall healing and well-being.

4. Social Environment.

Gesler (2003:13) proposes the therapeutic community concept which plays a crucial role in promoting social support. The therapeutic community concept emphasizes the importance of fostering a sense of belonging and mutual support among individuals. By providing a safe and inclusive space for individuals to share their experiences and receive support, the therapeutic community helps to break down barriers and promote understanding between different

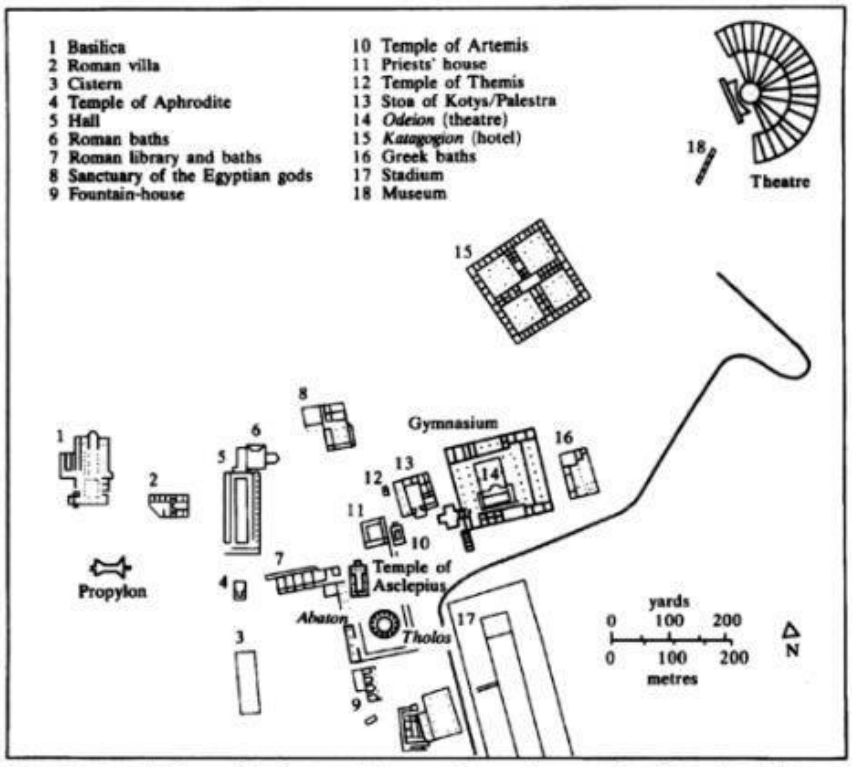


Figure 14: Plan of Epidauros (Source: Gesler, 2003: 21)

social groups.The Greek temples of Asclepius, dating back to the 6th century, embody Gesler's holistic healing principles. Located near the ocean, they maximize sunlight and natural breezes, integrating nature and human senses. The proximity to the ocean stimulates visual and olfactory perceptions, while the surrounding wildlife and sounds stimulate auditory senses. The temples served as healing sanctuary for travellers, offering treatments like purification baths, physical exercise, dancing, art, music, and spiritual enlightenment. This concept fostered social links and a therapeutic community, enhancing social support and promoting positive psychological wellbeing (Gesler, 2003:21).

Figure 15: The ruins of Epidauros (Source: Osei, 2014: 35)

2.4.3 **Elements Of Holistic Healing Architecture**

Ulrich et al. (2019:6) suggests that architectural interventions in holistic healing environments, such as integrated accessible gardens and large windows, can improve wellbeing. These spaces provide respite for individuals to escape and self-reflect, enhancing stress reduction and promoting self-healing, as the connection to nature is well-known. Evidence of this association can be seen as far as the early 1800s to Florence Nightingale during which time she discovered that certain design elements integrated into a healing environment could make it more therapeutic. For example, during her work on healthcare at the time of the Crimean war, she discovered that introducing natural light and ventilation to the recovery rooms in the hospital wards, increased patients mortality rates significantly (Gesler, 2003:1). Similirly, a number of researchers have identified design elements that contribute towards holistic healing environments as follows. Ulrich et al. (2019:2) emphasizes the importance of incorporating nature and green spaces into healthcare environments, as they have been shown to reduce stress and promote faster recovery. Additionally, Gesler

(2003:3) highlights the significance of integrating the mind, body and spirit through thoughtful design which evoke healing. Venolia (1988:166) adds that elements such as place energy and form could similarly contribute to a calming and soothing healing environment.

2.4.4 **Design Elements to Holistic Healing Environments**

1. Light

All life is dependent on the light of the sun. Life would seize to exist without it.
(Day, 2002:200). Venolia (1988:53) postulates the therapeutic value of natural light and emphasizes its importance to human wellbeing by regulating stress and fatigue as well as

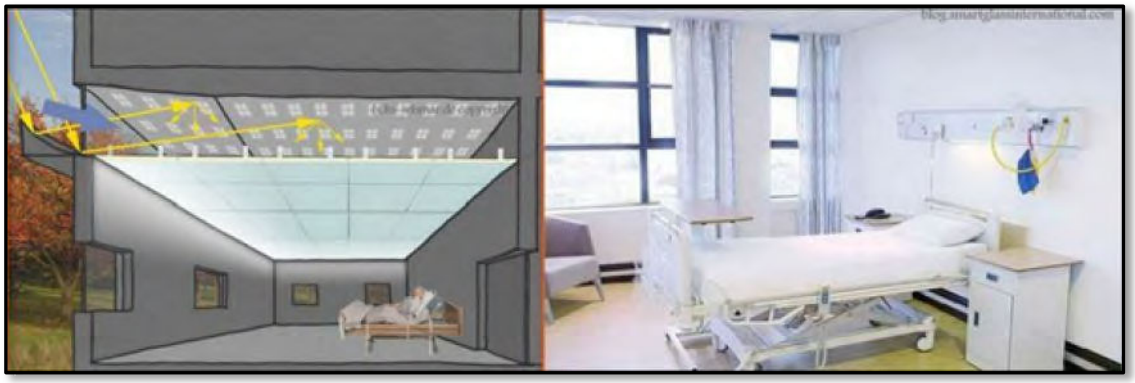


Figure 16: Figures depicting natural light strategies in healthcare settings (Source: Blom, 2013: 41)

producing immunologic responses and blood circulation and further posits natural light as an external source of information as it regulates the circadian rhythm and prevents disorientation**.** Day (2002:206) suggests that the visual stimulation of light from different directions, combined with directional balance, positively impacts human health, as it is a crucial aspect of wellbeing and further adds that natural light positively impacts mood and physical wellbeing, enhancing mood, social, physiological, and psychological health, and highlights humans' dependency on it.

2. Air

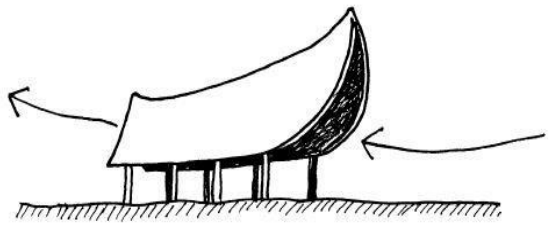


Figure 17: The shape of the building can encourage natural air flow (Source: Day, 2002: 96)

Individuals prefer natural ventilation over processed air due to its quality, movement, flow, sensory stimulation, and visual appeal, despite the environment's apparent invisibility. This preference for natural ventilation is driven by the desire for fresh and clean air, which can have a positive impact on overall health and well-being. Additionally, natural ventilation allows for a connection to the outside environment, creating a sense of openness and connection to nature (Kellert et al., 2008:7).

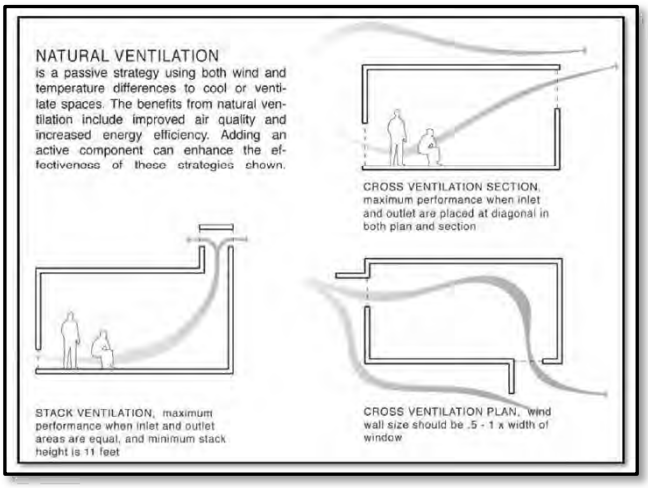


Figure 18: Principles of natural ventilation (Source: Blom, 2011: 47)

The human body is highly sensitive to changes in air quality. In an unbalanced environment such as that caused by an increase in carbon dioxide levels, individuals lose concentration, and without fresh air fatigue sets in. Additionally, prolonged exposure to poor air quality can also have detrimental effects on respiratory health, exacerbating conditions such as asthma or allergies (Moodliar, 2011:145).

3. Access to Views And Nature

Exposure to green spaces enhances the ability to recover from stressful events, as it helps moderate and reduce arousal and negative thoughts, thereby reducing the psychological and physiological symptoms of stress (Sullivan, 2014:1).

Research shows that near-nature interactions lead to immediate benefits such as enjoyment, relaxation, and reduced stress, while also affecting physical well-being and increasing satisfaction levels (Kaplan and Kaplan, 1995:172).

Gavarkovs (2016:3) suggests that exposure to natural environments and nature-related images significantly enhances attentional and cognitive performance. This could be attributed to the restorative effects of nature, which can help reduce mental fatigue and improve overall well-being.

Nature-related contact can improve healing and recovery from illness and major surgical procedures, including direct contact and symbolic depictions. People living near open spaces report fewer health and social problems, regardless of residence, education, or income. Even limited vegetation, such as grass and trees, can enhance coping and adaptive behaviour (Kellert et al., 2008:4).

Figure 19: Atriums and foyers integrating large fenestration with views to nature (Source: Browning et al., 2014:25)

4. Orientation

The cardinal directions, East, West, North, and South, have universal cultural significance. The East symbolizes new beginnings, the West represents order, North represents inner focus, and South represents warmth and growth. A harmonious healing environment should harness and utilize these energies (Venolia, 1988:169).

5. Place Energy

Place energy is the subconscious essence of a place, influencing reactions, feelings, and emotions. It contributes to a positive holistic healing environment. Key elements like orientation, light, colour, sound, symbol, material, form, climate, vista, and electromagnetism influence place energy, which can evoke self-healing when integrated into built form (Venolia, 1988:173).

6. Form

The built environment's shape can significantly impact an individual's experience. Venolia (1988:176) suggests that rectilinear shapes are rare in nature and are often softened by contour lines. Rounded forms harness more positive energies, while rectilinear shapes accumulate inactive energies. Organic forms, on the other hand, create a sense of wholeness and continuity.

2.5 SPIRITUALITY IN HOLISTIC HEALING

2.5.1 Spirituality and Wellbeing

Spirituality is the way people find meaning and purpose, experiencing their connectedness to themselves, others, and the sacred. It is an innate human quality that manifests itself in behaviours, attitudes, and customs. Spirituality includes religion, arts, humanism, and cultural beliefs. In addition to helping patients define wellness during cancer treatment and survival, spirituality can help patients cope with illness and find meaning and peace during their illness and treatment journey. Studies have shown that patients with high levels of spiritual well-being report more enjoyment in life, higher levels of meaning, and peace, even amidst cancer-related symptoms. Research has shown that spiritual well-being among cancer patients is linked to reduced depression, improved quality of life in the final stages of life, and resilience against hopelessness and a desire for an early death. Spirituality may impact patient quality of life and adjustment by providing a context for hope and meaning (Puchalski, 2012:49,50). Physical perception is universal and interacts with the mind, cradling emotions. It is unscripted and reacts to space configuration and constraints. Associational perception is location-specific and requires pre-conditioning, familiarity, or knowledge. It establishes spiritual relationships and cultural awareness. A healthy balance of these three is necessary for communication. By including these elements, architectural spaces can provide patients with emotional and spiritual nourishment (Raghani et al., 2022:251). Therefore, architecture can create a dialogue between healing and the human experience. By carefully considering the design elements that promote emotional and spiritual well-being, architecture can facilitate a connection between individuals and their surroundings. This dialogue allows for a deeper understanding of oneself and the world around them, ultimately contributing to a sense of healing and quality of life for patients undergoing treatment for cancer. Architecture has the ability to evoke emotions and create a sense of spirituality, which can be particularly beneficial for cancer patients who often experience high levels of stress, anxiety and uncertainty. Hence exploring spirituality within the built form is essential for evaluating an environment promoting self-healing and positive wellbeing. Spirituality, often associated with divinity, heavenliness, and holiness, is defined as the pursuit of a deeper sense of purpose and aliveness in life (Raghani et al., 2022:254). Brown et al. (2013:108) adds that spirituality may influence how people make decisions,

resolve issues, and deal with life's challenges and asserts spirituality as a coping mechanism for adverse life events. For example, an individual's spirituality can influence their ability to cope with severe illness, such as a diagnosis of cancer, and find meaning as well as feel more at peace during the illness. Sena et al. (2021:4) emphasizes the importance of spirituality in times of crisis and stress, highlighting its positive impact on physical, mental, and social health. Spirituality is a complex and multifaceted aspect of human experience, consisting of philosophical, experiential, and behavioral aspects. Philosophical aspects involve the search for meaning, purpose, and truth, while experiential and emotional aspects involve feelings of hope, love, connection, inner peace, consolation, and support. Behavioral aspects involve expressing one's internal spirituality and unique personal views. Therefore, spirituality plays a crucial role in stress relief and healing, fostering self-control and positive wellbeing. This chapter explores the influence of spirituality in architecture, highlighting how architecture can be designed to enhance spiritual experiences and support the emotional and psychological needs of patients.

2.5.2 **Spirituality and Architecture**

Raghani et al. (2022:250) highlights the impact of built form on users' spiritual and emotional wellbeing, arguing that the architectural environment significantly influences users, who adapt and modify it to suit their needs. This passive relationship stimulates the mind and nurtures emotions. The user's pre-conditioned associational perception of the environment, whether through familiarity or location-based memories, creates a spiritual relationship with the place, potentially evoking spiritual, emotional, and psychological wellbeing. Birch and Sinclair (2013:81) provides further motivation for the quest for spiritualty in the built form by referring to Abraham Maslow's hierarchy of needs which is represented as a pyramid of hierarchical levels based on the five tiers of human needs. The five basic needs being physiological, safety, love, esteem, and self-actualization. The lower needs in the hierarchy

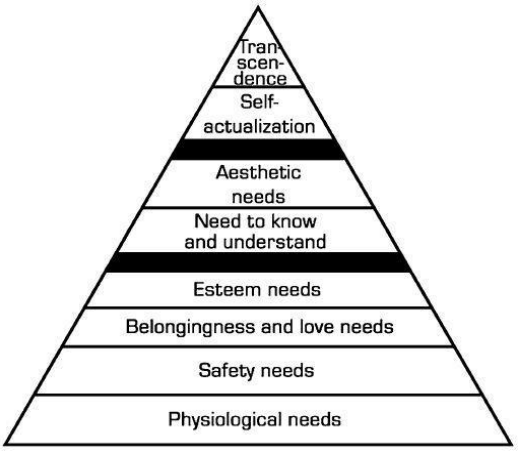


Figure 20: Maslow's hierarchy of needs (Source: Ventegodt et al., 2016:1939)

need to be satisfied before higher needs can be addressed with the key assertion that once a need is met, a more significant higher order need emerges achieving dominance. Maslow later determined a sixth and final tier called self-actualization or transcendence, resulting from individuals' peak experiences. He defined transcendence as :

"*the very highest and most holistic, inclusive levels of human consciousness, behaving and relating, as ends rather than means, to oneself, to significant others, to human beings, other species, nature, and the cosmos*" (Maslow et al., 1993:269).

Maslow's concept of transcendence draws distinct parallels to spirituality, which refers to a higher level of consciousness towards oneself, others, and the cosmos. This self-transcendence leads to "peak experiences" where individuals gain awareness from a higher

Figure 21: Water temple aerial view (Source: Luckoo, 2011:40)

Figure 12: Water temple entrance (Source: Dal Co and Ando, 1997:389)

perspective, increasing overall wellbeing. Maslow believes that the ultimate human need is the quest for transcendence, which can be fostered through architecture. Architects like Tado Ando create holistic spaces that connect to the mind and body by creating peak experiences within their architectural forms. His minimalist approach evokes the spiritual essence of a place, reducing space tension and allowing individuals to experience deep emotional connections. His work, particularly in the Water Temple, demonstrates an experiential journey into the place, demonstrating the importance of transcendence in human life (Luckoo, 2011:40).

Figure 23: Water temple lotus pond blending into natural setting (Source: Dal Co and Ando, 1997:386)

Figure 22: Water temple entrance descent evoking a sense of spirituality (Source: Dal Co and Ando, 1997:384)

The temple consists of two parts. The main entrance guide space leads to a circular water pond, while the semi-buried space forms the temple shrine. The arrival to the main pond is through a long, curved passage of high, white concrete walls, along a foot path of white gravel and grass, all of which are open to the sky. Visitors are lead on a journey to the pond through the path where the solid concrete wall labyrinth is representational of protecting the visitors from the external chaos while the white stone floor with grass provide a peaceful calming effect (Zhang, 2011:59). The foot path leads to a circular reflection pond which is bisected by a descending staircase to the temple shine below. The pond is embellished by water lilies and lotus blossoms. The lotus symbolizes creation and enlightenment in Buddhism and the source of all life in Indian cosmology. Water symbolizes cleansing and the descent through the bisecting staircase through the water represents a purification process of the human spirit into the shrine and creates an experiential journey for the visitor. (Luckoo, 2011:40). Ando used abstract shapes applied to contemporary architecture to represent human emotions through their symbolic forms. Infinity, perfection, and endlessness are symbolized by the circular form (Zhang, 2011:59). Following the steep and dark descent down the staircase from the naturally lit pond, visitors are then overwhelmed to find the shrine emersed in a bright red light lit from behind (Luckoo, 2011:40). The warm natural light emanates from west-facing windows and intensifies the vermilion red color of the inner sanctum during sunset. The west light was used to light the shrine as it is symbolic of the origin of Buddha which located to the west of Japan (Zhang, 2011:59).

Peter Zumthor's Therme Vals is another example of how light is symbolically integrated into architecture to create spirituality. The emotional experience of light is demonstrated through four distinct effects.

Figure 25: Sacred space using natural light and views (Source: Hauser et al., 2008: 154)

1. The use of low-intensity natural light in spaces can create a sacred and divine experience, enhancing tranquility and spirituality, and enabling individuals to connect with their inner selves on a deeper level.

Figure 26: Play of light and shadow (Source: Hauser et al., 2008: 48

2. The ingress of natural light through architectural features to create visual effects in colour and play of light and dark adds depth and dimension to the environment.

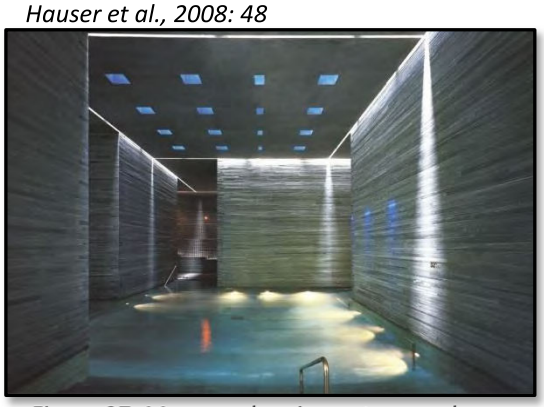


Figure 27: Murano glass impact on pool (Source: Hauser et al., 2008: 111)

3. A religious experience of death and resurrection is symbolized through the emersion of natural light through the ceiling of the main pool which has 16 square pieces of Murano installed on a grid pattern allowing blue light to flow through and reflect off the pool creating an illusion of the panels floating symbolizing the boundary between reality and dream.

Figure 28: Light effect over the pool (Source: Hauser et al., 2008: 112)

4. Light emanating from the pool creates a womb like effect and its illumination which contrasts the dark internal environment, creates a visual and theatrical effect of water mist rising above the surface of the water (Jung et al., 2021:98-111).

In both examples, the architects have demonstrated how spirituality can be integrated into the built form to create an experiential journey by evoking the human senses and emotions in creating a self-awareness and connectedness to a higher state. By incorporating elements such as natural light and geometry, the architects have successfully crafted spaces that transcend their physical boundaries. These designs invite individuals to reflect, meditate, and find solace in the harmonious blend of architecture and spirituality. Spirituality plays a vital role in enhancing patients' psychological well-being by providing a sense of purpose, meaning, and connection to something greater than themselves. It allows individuals to explore their inner selves by finding solace in times of adversity and cultivating a sense of peace and contentment. Integrating spirituality into architectural design can create a balance between physical and metaphysical realms, enhancing the overall psychological well-being of individuals. This integration of spirituality can lead to a profound sense of tranquillity, purpose, and fulfilment, ultimately contributing to overall psychological well-being.

2.6 THE THEORY OF ENVIRONMENTAL PSYCHOLOGY:NATURE AND ARCHITECTRE

2.6.1 Nature and Environmental Psychology

Environmental psychology explores the connection between environments and human behaviour, focusing on how humans perceive and are influenced by the environment, including factors influencing environmental behaviour and strategies for promoting pro-environmental behaviour, with research showing positive impacts of direct nature encounters (Steg et al., 2012:2). Additionally, anecdotal evidence, evolutionary theory, and empirical studies suggest that exposure to nature, even for brief periods, can have therapeutic effects on well-being and stimulate healing, both physically and psychologically (McMahana and Estes, 2015:507). The biophilic hypothesis suggests that humans' evolutionary connection to natural elements and systems, influenced by their inert affiliation with nature, contributes to their intuition for the healing and restorative effects of nature (Kellert et al., 2008:3).

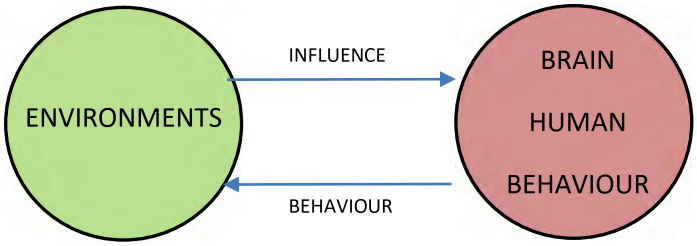


Figure 29:Influence of the environment on the brain and behaviour diagram (Source: Author, 2023)

2.6.2 The Stress Reduction Theory

2.6.2.1 Introduction

Roger Ulrich's Stress Reduction Theory (SRT) suggests that urban environments can hinder stress recovery, while natural environments promote the same process. The theory explores stress as a hindrance to healing and emphasizes stress recovery through natural elements. It questions the distinction between common environments that promote recovery and those that hinder or reverse it. It is therefore necessary to understand stress and its causes and effects (Ulrich et al., 2019:1-21).

2.6.2.2 **Stress and Its Implications**

Stress is an individual's physiological, psychological, and behavioural response of a threat to their well-being and is a common characteristic throughout life. It can be internal, causing anxiety, pain, depression, and negative emotions, or external, influenced by the environment. This research aims to explore the impact of the natural environment on stress and its impact on wellbeing.

Day (2002:113) affirms the qualities of the environment as having either a harmonious or disharmonious resonance with humans thereby controlling stress levels accordingly. A disharmonious environment fosters stress and anxiety affecting our mental and physical states while a harmonious environment radiates within our spirit and creates a wholeness and balance within us thereby reducing stress levels and illness.

Day (2002:181) further postulates, supported by a plethora of research, that stress directly causes illness emergence, affecting the body's ability to fight disease and causing latent ailments by affecting hormones. Stress negatively impacts human well-being, affecting the body, mind, and spirit. Physical settings affect people on a daily basis either by increase stress or aiding in coping with it (Berto, 2014:1). Stress and cancer are complex and interconnected, with chronic stress potentially predisposing patients to depression and increasing cancer mortality risk due to the stress associated with diagnosis and treatment (Weber and O'Brien, 2017:504). Therefore, understanding the role of the natural environment in stress reduction and overall well-being is crucial for promoting healthier buildings which can contribute to improved mental and physical health outcomes. Day (2002:113) suggests that the environment's characteristics have a symbiotic relationship with humans, enabling stress control and affecting overall well-being. Understanding this can help create oncology environments that promote relaxation and reduce stress, promoting wholeness and healing.

2.6.2.3 **Stress Reduction**

The World Health Organization highlights stress as a significant global health risk in urban daily life, emphasizing the need to promote stress recovery in urban areas, where over half the world's population lives (Corazon et al., 2019:1).

Berto (2014:1) postulates that exposure to natural environments can help individuals cope with stress and mental fatigue. Compared to urban settings, natural environments provide greater physiological, emotional, and attention restoration, enabling individuals to replenish their cognitive resources. In addition to reducing physiological stress symptoms, natural environments tend to elicit greater calming responses. Additionally, they mitigate the detrimental impacts of stress by elevating positive feelings and lowering depressive states. Viewing nature can also help recover cognitive performance associated with stress, particularly in attention tasks. Therefore, urban environments should prioritize restoration, considering the numerous benefits of contact with nature.

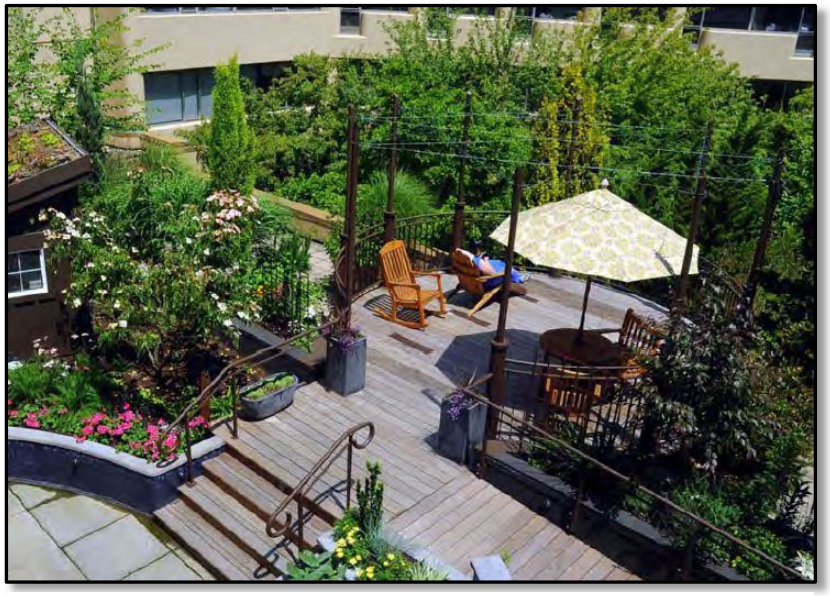


Figure 30: Areas of respite and contemplation integrated into the healing gardens. (Source: Ulrich et al., 2019:8)

The Stress Recovery Theory (SRT), maintains the argument that humans, as a genetic remnant of evolution, derive stress reduction benefits from certain nature content and settings, for example, exposure to vegetation, flowers, and water amongst other natural elements and systems (Ulrich et al., 2019:3). Berto (2014:394) further supports the argument by stating that exposure to natural scenes enhances positive emotions, reduces stress effects, and improves mood state. Natural environments offer protection from environmental stressors, contributing to physiological, emotional, and attention restoration compared to urban environments. The Stress Recovery Theory suggests that designing healthcare facilities with prominent nature can utilize evolutionary therapeutic influences, leading to more stress-reducing and healing settings. These therapeutic influences can include natural light, views of green spaces, and access to outdoor areas. Incorporating

these elements into healthcare facilities has been shown to improve patient outcomes and enhance overall well-being. These natural elements can include features such as gardens, water bodies, and large windows that allow for ample sunlight and views of greenery. Incorporating these elements into healthcare facilities has been found to improve patient outcomes, reduce anxiety levels, and promote overall well-being (Ulrich et al., 2019:3). Ulrich et al. (2019:3) further postulates that that observing nature, particularly trees, plants, and flowers, can significantly aid in psychological and physiological stress recovery.

Sullivan and Kaplan (2016:7) affirms this notion by stating that contact with certain types of natural settings may enhance recovery from stressful events as per the principles of the Stress Reduction Theory (SRT). Natural places produce a relatively fast emotional reaction at a subconscious level that can be measured through physiological pathways. Physiological responses to various kinds of landscapes have been measured in the last decade and generally found that the more vegetation in urban areas, the greater the reduction of stress (Sullivan and Kaplan, 2016:7).

Ulrich et al. (2019:4) posits that exposure to nature can potentially "immunize" an individual's psychological response to a subsequent stressor and their research indicates that being in natural environments can enhance feelings of relaxation and restoration, leading to a more resilient psychological state when faced with potential stressors.

Figure 31 : Respite areas in nature provide patients and staff an escape from the clinical environment (Source: Ulrich et al., 2019:8)

Ulrich et al. (2019:4) further posits that well-designed gardens in hospitals have been found to reduce stress and enhance emotional well-being among family, patients, and staff. These gardens provide a peaceful and calming environment that allows individuals to escape from the clinical setting and connect with nature. Research has shown that spending time in these gardens can also improve recovery rates and overall patient satisfaction.

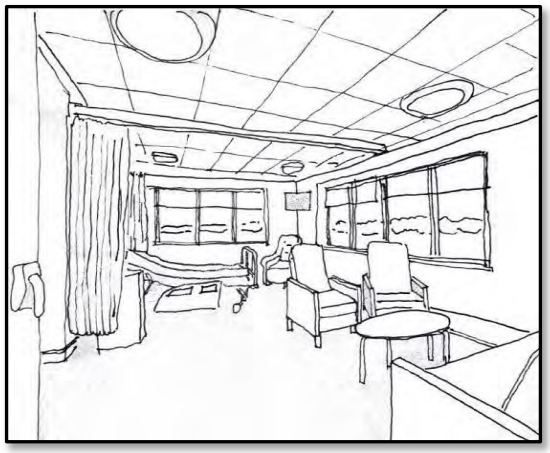


Figure 32: Patient recovery and treatment rooms with integration of natural elements and views to nature
(Source: Author, 2023)

The SRT research above indicates that nature exposure can significantly reduce stress and improve overall well-being, making it a crucial factor in oncology settings. In addition to reducing stress, nature exposure has also been found to enhance mood and promote a sense of relaxation, which can be particularly beneficial for patients undergoing cancer treatment. Furthermore, incorporating nature into oncology settings can create a more holistic approach to healthcare that recognizes the importance of addressing emotional and psychological needs alongside physical ones.

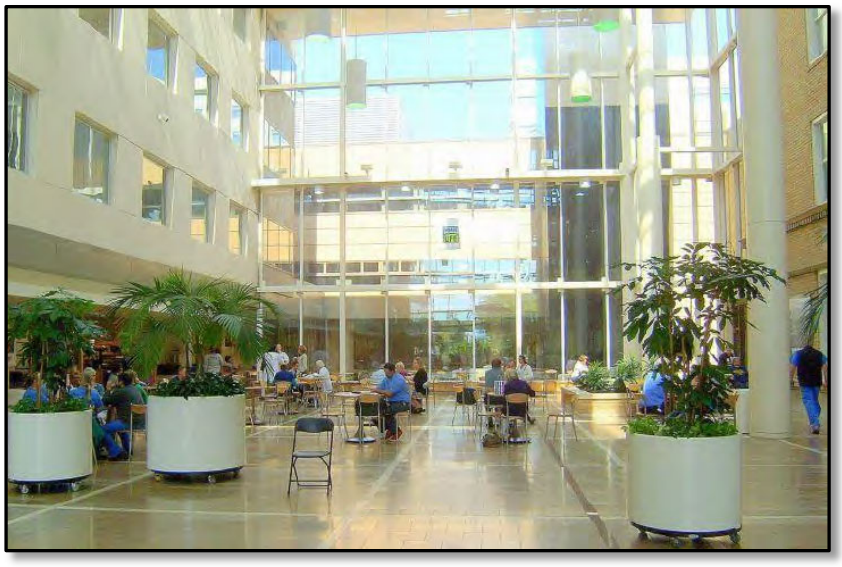


Figure 33: Courtyards with natural light ad sunlight provide patients with social support and social interaction
(Source: Ulrich et al., 2019:8)

2.6.3 **The Attention Restoration Theory**

2.6.3.1 **Introduction**

Unlike the SRT which argues the restoration of physiological stress through natural settings over urban environments, the Attention Restoration Theory (ART) proposes the potential of nature to restore attentional recovery of mental fatigue. Directed attention, or voluntary attention, is the ability to focus on a task that requires effort. An individual may suffer from attention fatigue if there is little or no intrinsic motivation to concentrate on a specific stimulus or task. The ART proposes that spending time in nature and natural environments has the restorative benefit of replenishing this depleted cognitive resource.

2.6.3.2 **Mental Attentional Fatigue**

Mental fatigue is a state of brain exhaustion resulting from depleted energy and cognitive levels, often triggered by stress from daily life demands or challenging events like a cancer diagnosis. It occurs when individuals concentrate on tasks without intrinsic motivation, suppressing distractions. Poor decision-making and low self-control are linked to negative well-being and health issues. The Attention Restoration Theory suggests that mental fatigue is a symptom of prolonged stress, suppressing cognitive reasoning and causing emotional distress (Kaplan and Kaplan, 1995:178).

Kaplan and Kaplan (1995:180) define mental fatigue as consisting of direct and indirect attention. Indirect attention is spontaneous, capturing an individual's emotional response, while direct attention is deliberately directed and controlled, requiring effort to suppress distractions and focus on tasks without intrinsic motivation. Focusing self-consciously is crucial for attention, especially in the context of cancer diagnosis and treatment. This can lead to cognitive demands and mental attentional fatigue, which negatively impacts a patient's well-being and quality of life. This fatigue can result in physical, emotional, and cognitive exhaustion, affecting their overall quality of life (Weber and O'Brien, 2017:1). Therefore, the increased demands on direct attention from external stimuli cause exhaustion of the brain’s cognitive resources, compromising wellbeing. Kaplan proposes the curative solution to attentional recovery as spending time in a natural environment, such as

nature, which requires less cognitive resources hence is more conducive to cognitive rest and recovery (Ohly et al., 2016:306).

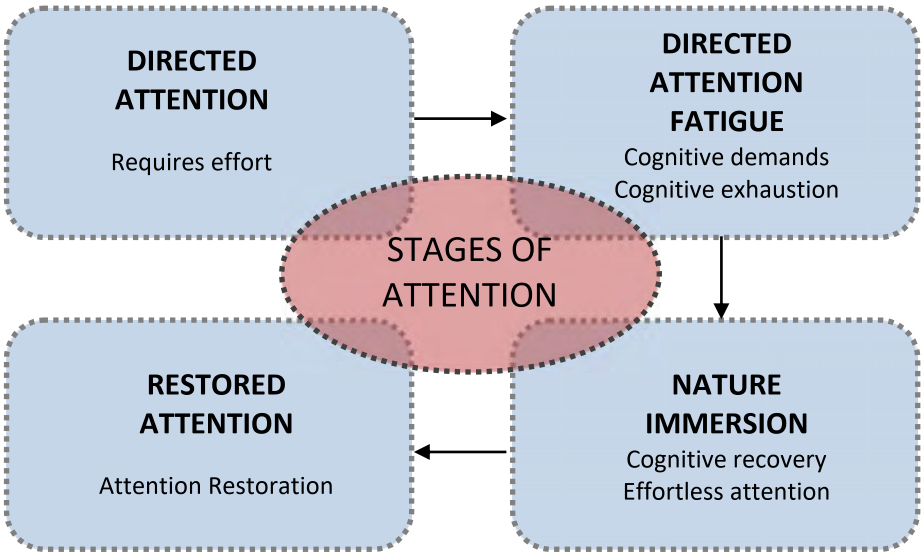


Figure 34: Stages of attention flow chart (Source: Author, 2023)

2.6.3.3 **Attention Restoration**

The Attention Restoration theory(ART), developed by Stephen and Rachel Kaplan in the late 1980s, puts forward the concept that an individual's direct attention is a resource that could be fatigued and depleted and hypothesizes that this resource could be restored through exposure to nature and natural environments, where the demand on cognitive resources is less thereby enabling attentional recovery (Ohly et al., 2016:306). Kaplan's theory suggests that nature exposure can improve mental fatigue and concentration, while the ART suggests that it helps the brain regain and replenish its capacity for directed attention through more effortless brain function. To benefit from this theory, certain criteria as identified by Kaplan and Kaplan (1995:189) must be met which are described below.

1) <u>Being Away :</u>

   Kaplan suggests that individuals should feel a sense of escape from everyday stresses, habitual activities, and routines to create detachment from stress elements. This can include escape from negative distractions, content causing psychological stress, such as illness treatment, and any activity or aspect requiring mental effort.

2) Extent :

Kaplan's concept of extent is derived from the sense of escape, referring to the feeling of being immersed in a "whole other world." This sense of being away is reinforced by the perception of being in an environment that encourages exploration and inquiry, reinforcing the idea of escape.

3) Fascination :

The environment should evoke a sense of fascination, capture attention effortlessly without ignoring other stimuli, offer opportunities for reflection and contemplation, and be connected to a larger framework that engages high-level human motivation.

4) Action and compatibility :

Kaplan emphasizes the significance of integrating environment patterns with user preferences to create a relaxing and apprehensive environment, citing the stimulation of human cognitive activity by both environmental and human patterns.

Involuntary attention is encouraged through the combination of these factors encouraging recovery and restoration of direction attention. Numerous studies have been conducted on this theory, and a solid body of empirical data indicates that exposure to natural environments improves attentional and cognitive function both when one is in them and when one is just looking at pictures of them (Gavarkovs, 2016:3).

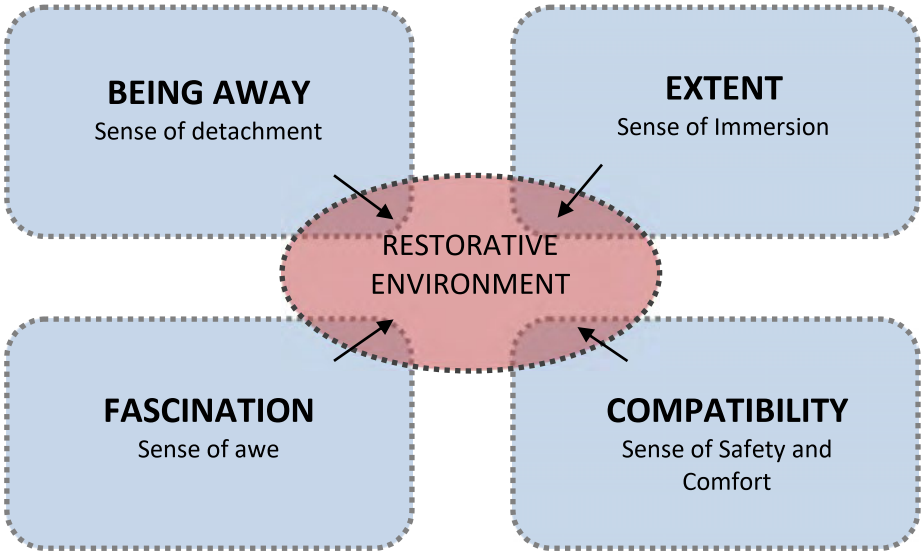


Figure 35: Attention restoration principles (Source: Author, 2023)

2.6.4 **SENSORY DESIGN**

2.6.4.2 **Sensory Perception and Wellbeing**

Osei (2014:9) postulates that through sensory design, an individual's attitudes, behaviours, and overall wellbeing are influenced by their total sensory experience. Sensory design is an occupant-centred approach, where the quality of life and experience for occupants are improved through the arrangement of sensory stimuli in built environments resulting in a healthier mind and body. It involves not only the physical sensations that are felt, but also emotional and cognitive responses that arise from those sensations.

Reeves (2011:17) affirms the influence of sensory stimuli on individuals psychological wellbeing stating that sensory information, including sounds, tastes, smells, touches, and images, impacts emotional and behavioural aspects of human behaviour. Each sense contributes to a person's experience, taking on special meanings based on past experiences and memories, and processing them for appropriate responses. Additionally, architectural atmospheres can impact users' emotions and feelings through their design and internal environment. The built form and quality of the atmosphere dictate use and mood, influencing the overall wellbeing of the user. Kajee (2019:22) postulates that integrating a positive experience of place through the senses, has direct physiological effects as well as mood influences. Osei (2014:9) affirms that sensory stimuli in built forms can enhance the occupant's experience, improving their quality of life and promoting a healthier mind and body and postulates sensory perception as the influence of well-being through a total sensory experience or an awareness through the senses and is the interpretation of the experience of sensation based on memory and lived experience.

Pallasmaa (2012a:41) postulates the notion of positive interaction with the built environment involving a multisensory experience and argues that qualities of architecture such as scale material and space, are all sensed and evaluated equally by the visual, muscular, skeletal auditory, olfactory, skin and tongue sense organs allowing individuals to fully immerse themselves in their surroundings and engage with the built environment on a deeper level and emphasizes holistic sensory engagement in enhancing the understanding of space and architecture contributing to individuals emotional and psychological well-being. Pagliano (2012:6) affirms the significance of multi-sensory stimulation for personal wellbeing, survival, and connection to humanity, highlighting how sensory interactions shape perceptions and

identities. Osei (2014:10) further postulates the senses as a holistic system that gather information from the environment and further affirms the senses, being smell, touch, taste, hearing, and vision, which interact with the brain via signals, providing cues for exploration and interpreting the environment, enabling humans to perceive and respond to stimuli from various directions and depths. According to Appel-Meulenbroek and Danivska (2021:158,160) overstimulation of the senses can have negative well-being benefits, such as increased stress levels, whereas little or no stimulation can lead to boredom and argues that sensory stimuli such as sound, smell, sight, and touch has been known to create feelings of contentment happiness and spiritual upliftment. Sensory stimuli in the built form can enhance the occupant's experience, improving their quality of life and promoting a healthier mind and body.

2.6.4.1 **Architecture and Multisensory Stimulation**

The use of the physical environment as a healing place may be significantly enhanced by the positive engagement of the human senses, especially sight, hearing, smell, and touch (DuBose et al., 2016:49). Day (2002:111) argues that built environments designed for human emotions, perceived through the senses, create a supportive environment for wellbeing. Reghukumar (2019:98) affirms this notion adding that architectural experience involves a dialogue between the mind, body, and built environment, involving all senses beyond sight, including warmth, texture, smell, and sound. These sensory experiences contribute to the overall perception and understanding of a space allowing patients to connect with their surroundings on a deeper level. Spence (2020:5) suggests that individuals subconsciously experience

Figure 36: The five human sense modalities (Source: Author, 2023)

sensory cues from the built environment, which can have physiological and psychological effects on their health and well-being. These sensory cues can include elements such as scale, materiality, and form. In addition, multi-sensory stimulation within the built form can have

an effect on social and emotional well-being as well as cognitive levels. For example, the brain perceives built form sensory stimuli holistically, including peripheral stimuli like colour or nature views, as they help restore attention and general emotions. As mental attention span diminishes due to fatigue, these stimuli provide welcome breaks from focus (Appel-Meulenbroek and Danivska, 2021:158). Annemans et al. (2012:2) adds that feelings are influenced by impressions individuals get from their surroundings as architecture is experienced through the senses. These impressions can range from the visual aesthetics of a building to the acoustics and ambiance of a space.

2.6.4.4 **Sense Enhancing, Healing Architecture**

Theart (2010:11) argues that humans have become visually dominant, disconnected from their surroundings due to the mediating role of vision in the experience world. (Spence, 2020:2) supports this argument, citing Finnish architect Pallasmaa's view of visual dominance as occulurcentrism. Pallasmaa (2012b:19) criticizes the western cultures ocular bias for the neglect of the non-visual senses as explored by philosophers such as Rene Descates and argues that the western worldview disconnects individuals from the world, leading to a visual-dominated environment lacking emotional involvement. (Spence, 2020:2) supports this,

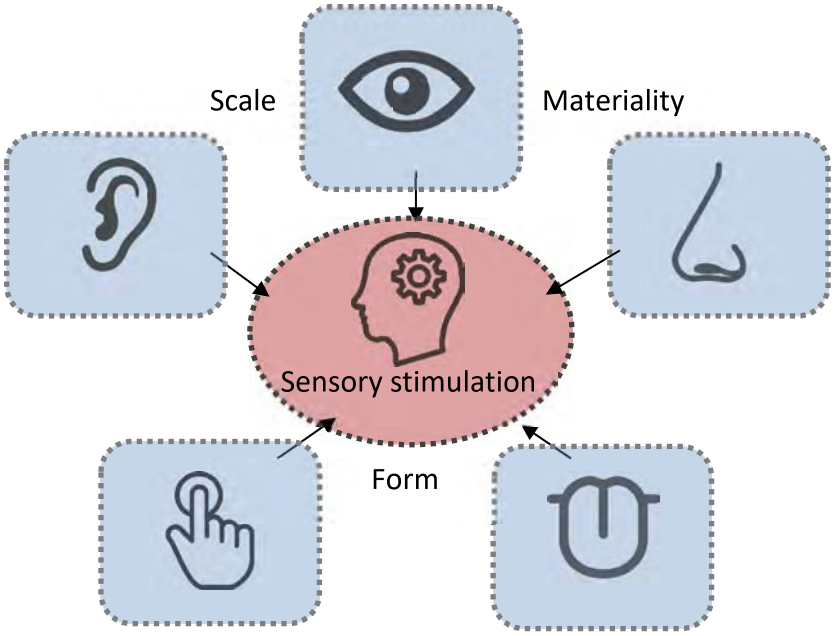


Figure 37: The influence of architecture on sensory stimulation
(Source: Author, 2023)

stating that humans have allowed sight and sound to dominate design imagination, and people in architecture and design develop and produce for the visual sense.

Pallasmaa (2012a:71) however argues that the timeless challenge of architecture is to create embodied, existential metaphors that embody and structure human existence in the world. Therefore, he postulates the need for building designers to move away from an ocularcentric focus and integrate a holistic architecture that integrates sensory engagement and connection. Cancer care environments could benefit from the integration of sensory stimulation, as demonstrated by the principles of the Maggie's centres, (Spence, 2020) which prioritize creating spaces that promote emotional well-being and provide a sense of comfort and tranquillity for cancer patients while demonstrating a non occulacentric architecture.

Figure 38: The integration of materiality and nature to evoke a sensory experience (Source: Annemans et al., 2012:4)

By incorporating elements such as natural light, natural colours, and tactile materials, these environments aim to enhance the overall healing experience and contribute to a more holistic approach to cancer care. Tekin et al. (2022:10) expands on the psychological benefits of sensory integration in Maggie's Centres on cancer patients. Their study found that integration of daylight significantly improves emotional wellbeing, with light and spaciousness being key architectural contributors to the healing experience and appealing to the visual sense. These elements provide relaxation and stimulation, making patients feel good psychologically. The presence of abundant daylight and bright space creates a non-institutional feeling, promoting

pleasant thoughts and welcoming effects. Sunlight also helps staff be aware of time and seasonal changes, reducing their stress. Exposure to daylight additionally promotes peace, calmness, and stress reduction, making it a crucial aspect of the healing environment.

Figure 39: Maggies centres emphasize natural light and openness (Source: Annemans et al., 2012:4)

Figure 40: The integration of nature into the building is a key feature of Maggies Centres (Source: Tekin and Urbano Gutiérrez, 2023:12)

Maggie's Centres utilize natural elements to evoke a multisensory experience, with the gardens providing the focus. In the midst of trying to survive, patients found watching living plants refreshing and motivating. Additionally, some plants transformed the centre's atmosphere every day as they reflected seasonal changes thereby adding to the sensory experience. Additionally, Tekin et al. (2022:10) postulates that the smell of the garden in the Centre, combined with the breeze, create a strong connection between the outside and the inside. The scent of plants calmed and meditated cancer patients, especially those who felt vulnerable due to treatments. The fragrance also aroused curiosity and lifted spirits. Smell's most important property was its ability to bring back memories, making patients feel safe and secure. Maggie's Centres prioritize silence over hearing voices, enhancing the auditory experience through sound-attenuating design features. Interviewed designers created a noise-proof atmosphere through greenery, double-glazed curtain walling systems, and integrated asymmetric acoustic panels. Common sounds in the gardens include moving tree leaves, rain, birds singing, bees and bumblebees, and chickens crowing. These sounds create

a lively environment, making the centres feel alive and uplifting for cancer patients (Tekin et al., 2022:10).

Figure 42: Maggies Oldham integrates a direct contact with nature (Source: Tekin and Urbano Gutiérrez, 2023:9)

Maggie's architecture uses warm and soft materials to create a welcoming, homely, and safe atmosphere, distinguishing it from typical healthcare environments. The tactile qualities of materials, especially wood, provide a welcoming touch to the centres. Wood is welcomed by many patients for its warmth and natural feeling, setting their mind at ease(Tekin et al., 2022:13)

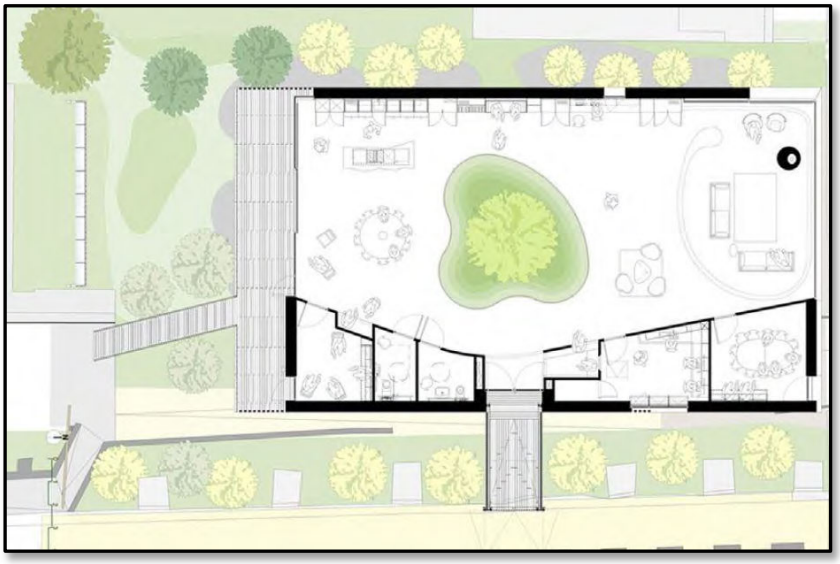


Figure 41: The indoor garden at the Maggies Centre in Manchester by Foster and partners highlights the sensory evocation (Source: Tekin and Urbano Gutiérrez, 2023:10)

Figure 43: Maggies Leeds Centre demonstrates thee building immersed in nature (Source: Filipe, 2020:25)

Figure 44: The five human sense modalities (Source: Tekin and Urbano Gutiérrez, 2023:8)

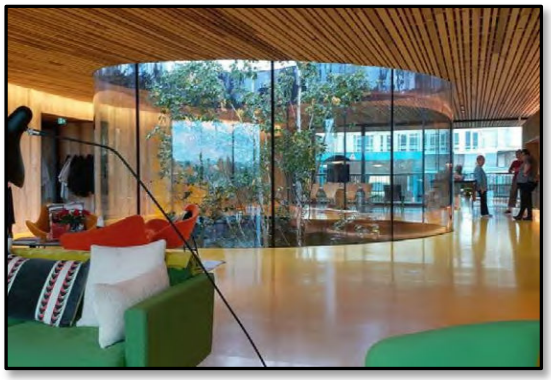


Figure 45: Maggies Oldham utilizes an internal atrium creating an inner focus onto nature. (Source: Tekin and Urbano Gutiérrez, 2023:12)

Figure 46: Maggies Forth Valley demonstrating the use of natural materials and nature immersion. (Source: Tekin and Urbano Gutiérrez, 2023:12)

2.7 THE THEORY OF NEUROSCIENCE : PSYCOLOGICAL RESPONSES TO BUILT FORM ENVIRONMENTS

2.7.1 Neuroscience and Architecture

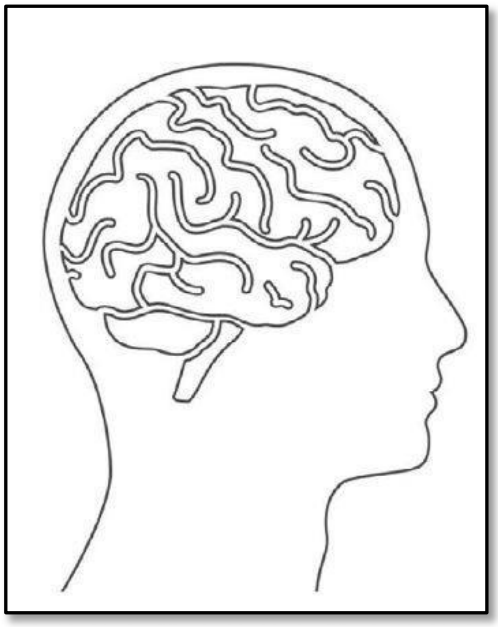


Figure 47: The human brain diagram
(Source: Hollander and Sussman, 2020:52)

Neuroscience in architecture focuses on understanding the impact of built environment features on human mental function and behaviour. Researchers use testing methods to study how the built environment influences information acquisition, organization, and utilization. Neuroscience principles can guide the design of holistic healing environments, integrating environmental stimuli to minimize physiological, mental, and emotional effects, evoking psychological responses and facilitating healing and restoration.

The "neuroarchitectural process" uses biomedical studies to develop design hypotheses, principles, and decisions. This "inside-out" perspective is often overlooked in design, as it relates built form to human function and how physical stimuli influence psycho-physiological responses and outcomes. This approach allows built forms to be related to human function, revealing their influence on physio-psychological reactions and behavioural outcomes (Kanaani and Kopec, 2019:269). Neuro-architecture aims to integrate the human brain into the built environment, creating an intelligible entity that provides cognitive equality, potentially leading to a new level of adaptative support for humans (Karakaş and Yıldız, 2020:239). Robinson and Pallasmaa (2015:215) suggests that evolution has created a visual brain with specific and tuneable organizational properties for representing environmental statistics. Simple visual pattern types, used in architectural design, mirror these statistics and create a sense of order by tapping into the brain's existing neuronal substrates.

2.7.2 **The Brain, Architectural Experience and Wellbeing**

Neuroscientists emphasize the importance of understanding the brain's basic functioning for understanding positive psychological responses and wellbeing. The human brain comprises various areas responsible for motor output, vision control, and sensory experiences, including navigating new environments. Neurons are the primary brain cells, consisting of around two hundred producing tens of thousands of connections. These cells enable humans to perceive and think through their interactions and connections. Human experience and environmental interaction can influence the increase or decrease of neural connections, affecting the total number of neurons in a specific brain region. Neuroplasticity suggests that the brain can restructure itself through repetitive activity or environmental stimulation, affecting cognition, human function, emotions, and psychological wellbeing by adapting to learning, misuse, or injury, and forming new networks based on daily experiences. Throughout life, the brain undergoes neurogenesis, the growth of new cells, and forms new connections allowing the brain to adapt and learn from new experiences (Kanaani, 2015:275). (Alexander et al., 2020)

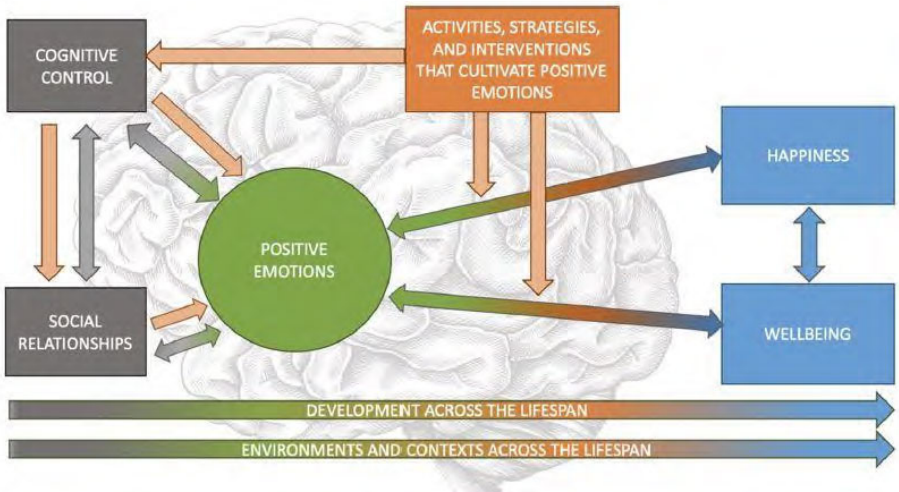


Figure 48: External factors that influence positive emotions on the brain (Source: Alexander et al., 2020:222)

Alexander et al. (2020:235) affirms the effects and influence of the built form structures in the environment on the human brain and behaviour and postulates that behaviour and the brain can be altered and influenced through architectural design. (Kanaani and Kopec, 2019:275) further affirms the effects of the exposure to built environment settings and its effect on altering brain plasticity, thereby exerting an influence on the experience of the

environment itself. (Bower et al., 2019:2) asserts that enriched environments influence the brain's structure and function, leading to molecular changes and reorganization of connections. This balance between mind and external environment is crucial, and understanding this relationship is vital for creating a comfortable therapeutic environments for cancer care.

Mallgrave (2010:192,193) posits that emotion plays a crucial role in maintaining homeostatic balance in the body, influencing brain activity organization, and that well-designed architecture fosters functional harmony in the human psyche, thereby positively influencing behaviour while uninspiring ones contribute to functional disequilibrium in individuals' biological organisms.

2.7.3 **Neuroscience and Psychological Wellbeing**

Research indicates that the built environment directly impacts the health and wellbeing of individuals, societies, economies, and ecosystems worldwide. Human health relies on society's ability to manage the interaction between human activities and the environment in ways that promote health without threatening the natural systems. Neuroarchitecture, at the intersection of sciences, medicine, humanities, and arts, offers conceptual frameworks and methods to consider human desires, preferences, and perceptions. Understanding neural science provides a platform for communication and collaboration between architects and neuroscientists. Neuroarchitecture can translate current knowledge of clinical and neural mechanisms into principles that can enhance wellbeing through enriched environments (Kanaani and Kopec, 2019:258).

Cho and Kim (2017:102) expands on the integration of neuroscience and wellbeing by stating that human emotions influence how people behave in an environment with pleasant environmental settings being preferred. They argue that when individuals are exposed to pleasant environmental settings, such as natural landscapes or aesthetically pleasing surroundings, their emotions tend to be more positive. Eberhard (2009:xiv) affirms this notion and postulates that the brain's behaviour is influenced by genes, while changes in the built form environment can modulate the function of genes and ultimately the structure of the brain, thereby affects behaviour as a result. This suggests that the impact of environmental

settings on emotion and behaviour goes beyond just immediate psychological effects. Additionally, Eberhard's postulation implies that creating and maintaining pleasant environmental settings can potentially have long-term effects on individuals' brain structure and overall well-being. Conversely, Bower et al. (2019:2) argues that emotions can directly impact health by affecting the immune system's inflammatory response and indirectly altering health-related behaviours, thereby diminishing wellbeing. Negative emotional states can influence disease aetiology, reduce social interaction, physical activity, and healthcare compliance hence it is imperative to maintain pleasant environmental settings to evoke a sense of positive wellbeing.

Kanaani and Kopec (2019:278-281) further postulates visual perception and its relation to psychological wellbeing. Visual perception relies on complex systems processing information about shape, colour, movement, location, spatial organization, and memory recall. Visual illusions reveal the brain's computational rules, with brightness and contrast conveying more information than colour. Vision science provides a comprehensible source of information to guide design, with lighting, brightness, contrast, depth perception, and subconscious visual priming influencing perception. Architectural openings, material reflections, colour pallets, and lighting systems can meet a broader range of needs. These psychological needs include creating a sense of spaciousness, promoting relaxation, and enhancing healing. By understanding these principles, architects can strategically manipulate these elements to create environments that optimize human experience and well-being. In addition, the benefits of providing natural light and its effect on wellbeing through the human visual system. The visual system regulates multiple physiological systems in the brain, mind, and body, synchronizing with the time of day or year. Light and darkness activate a complex system of genes and proteins, controlling activity, alertness, attention, performance, learning, mood, and vigilance. The supra-chiasmatic nucleus serves as the brain's "master clock," synchronizing neural, endocrine, and exocrine functions, modulating sleep-wake cycles, body temperature, and metabolic processes. In a dark environment, human rhythms run slightly longer than twenty-four hours. Exposure to night-time light disrupts the natural rhythm of the body, potentially leading to health issues such as breast cancer and metabolic disorders. The American Medical Association has linked this to circadian disruption, and research has focused on the carcinogenic effect of melatonin suppression. therefore the provision of

natural light is crucial for overall mental wellbeing and cognitive functioning and healing process for cancer patients (Kanaani and Kopec, 2019:278-281).

2.7.4 **Neuroscience, Nature and Architecture**

According to Sussman, the human brain has developed from an evolutionary context in which there are certain inert associations that can be recognised effortlessly. For example, repetitive parallel lines are a feature that does not occur naturally in nature therefore it requires greater cognitive resourcing from the brain when processing such imagery (Sussman and Hollander, 2014:184). Robinson and Pallasmaa (2015:207) however postulates that the organizational characteristics of the visual cortex of the brain are shown to facilitate perceptual sensitivity to colinear or nearly colinear relationships within random line segments in human psychophysical experiments and further posit that in the natural world, there are many examples of visual patterns with statistical regularity between adjacent contour orientations, such as repeating lines in colinear, curvilinear, parallel, and radial patterns such as fields of grass, waves in the ocean, leaf veins, tree branches, palm frond leaflets, and feather barbs. The researchers hypothesize that man-made designs adopting this principle provide positive benefits for its users.

Similarly, humans have an inherent preference for curves over straight or sharp lines. (Sussman and Hollander, 2014:181) argue that jagged and sharp forms typically evoke feelings of pain and sadness while curves elicit feelings of happiness and elation. From an evolutionary context, sharp or pointed shapes usually depicted some form of threat for example thorns, animal tusks, horns or teeth therefore the primal instinct for survival was to

Figure 49: Feather barbs showing non-repeating, non-parallel lines (Source: Robinson and Pallasmaa, 2015:207)

Figure 50: Natural patterning on a leaf indicating non-parallel linear patterns (Source: Robinson and Pallasmaa, 2015:207)

flee from such forms or threats leaving the modern human brain primed with this inert preference (Sussman and Hollander, 2014:184).

Another instance of inert geometry that is simple to recognize and does not demand a lot of the brain's cognitive resources, is bilaterally symmetric forms. This is because bilateral symmetry is commonly found in nature, such as in the human body, and the human brain has evolved to effortlessly recognize and process these familiar patterns. This efficiency allows the conservation of cognitive resources for more complex tasks or stimuli that require deeper analysis. Bilaterally symmetric forms usually display a definite hierarchy in their composition which consists of a top, middle and base which the brain associates to the form of a human body with its head, body and feet (Sussman and Hollander, 2014:181).

Figure 51: The Taj Mahal depict hierarchy of top, middle and base and bilateral symmetry (Source: Robinson and Pallasmaa, 2015:182)

Hollander and Sussman (2020:58) further affirms the significance of subtle geometric shapes in built environments for natural healing in promoting psychological wellbeing and a sense of safety postulating that geometric shapes should be subtle and avoid tension, fear, or anxiety and that a healing environment should not be mentally exhausting and should induce feelings of safety and comfort through geometric simplicity. Health effects are influenced by perceived complexity, which individuals have evolved to seek for survival. This complexity allows individuals to interpret the healing quality of their environment through the mental processing of information. Hollander and Sussman (2020:60) posits that, the findings of what geometrical and visual features constitute healing environments, are supported by biophilia,

consilience, and neuroscience, and through these findings defines the biophilic index as a scientific approach to creating specific environments that can reduce stress and evoke natural healing. The biophilic index takes into account the innate human connection to nature and emphasizes the importance of incorporating natural elements into healing environments. This scientific approach only acknowledges the impact of natural surroundings on individuals psychological state supports humans innate need for connection with the natural world.

Hence Hollander and Sussman (2020:60) proposes the ten components of the biophilic index as illustrated below:

The Ten Components of the biophilic index:

1. **Sunlight**: from different directions.
2. **Color**: variety and combinations of hues.
3. **Gravity**: equilibrium and balance with respect to vertical axis.
4. **Fractals**: multiple nested scales.
5. **Curves**: on various scales.
6. **Detail**: intended to attract attention.
7. **Water**: visual and audible.
8. **Life**: Establishing a connection between humans and nature by incorporating living plants, animals, and other people.
9. **Representations of nature**: naturalistic ornamental, sculpture, reliefs, paintings.
10. **Organized Complexity:** Symmetry and connections to organize components. Fractals exhibit subdivisions across scales, from street width to street trees and ornaments.

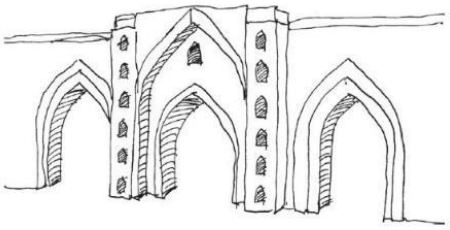


Figure 52: Curves (Source: Hollander, 2021:69)

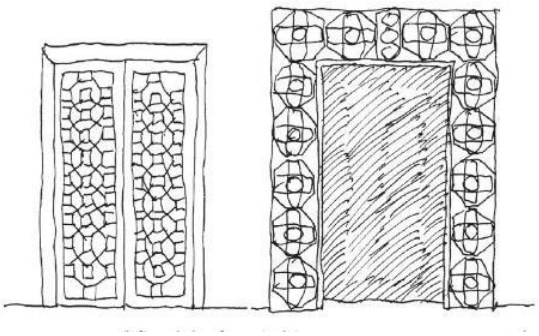


Figure 53: Detail (Source: Hollander, 2021:66)

Figure 54: Gravity showing balance and equilibrium (Source: Hollander, 2021:67)

2.8 CONCLUSION

This chapter has highlighted some of the challenges faced by South Africa's public primary healthcare system, including infrastructural issues, service fragmentation, staff shortages, maintenance issues, and cash-flow problems. The research further emphasizes the current state of healthcare in lower- and middle-income communities as not conducive to healing, posing a threat to their physical and mental health, and highlights the negative perception of a healing environment, which is essential for promoting well-being and reducing hospital stays. Challenges faced by oncology patients, including fatigue, fear, and emotional vulnerability, therefore an optimal healing environment, surrounded by elements that facilitate holistic healing which can mitigate these challenges and promote wellbeing is crucial for oncology patients. Creating a healing environment that addresses the physical, emotional, and psychological needs of patients can help alleviate their symptoms and enhance their overall well-being. Some of the elements that can contribute to an optimal healing environment include natural lighting, comfortable and soothing surroundings, access to green spaces, and a social support structure. Spirituality enhances psychological well-being by providing purpose, connection, and inner peace. Integrating spirituality into architectural design balances physical and metaphysical realms, promoting overall psychological well-being. The chapter further emphasizes the benefits of nature for mental health and wellness, highlighting the negative effects of urban environments that can cause exhaustion and stress. The integration of nature and natural elements into built forms can significantly influence psychological wellness and holistic well-being. The research has revealed that exposure to greenery and views of nature reduces stress levels and promotes relaxation. Prioritizing these aspects in healing environments can lead to improved emotional well-being and faster recovery rates. In addition, the literature review emphasizes the importance of integrating human senses into the built form, fostering a positive connection between the mind and body. Cancer treatment such as chemotherapy and radiotherapy can impact taste and smell, necessitating sensory design for an inclusive environment. By incorporating elements that engage the senses, such as soothing scents and visually appealing surroundings, healthcare facilities can create a more inclusive environment for patients undergoing cancer treatment. This sensory design approach not only helps address the challenges posed by chemotherapy and radiotherapy but also enhances the overall healing experience for all individuals, promoting a sense of comfort and well-being.

The chapter concludes with neuroscience findings, highlighting the biophilic index as a scientific method for designing environments that reduce stress, fostering positive psychological responses and contributing to overall human well-being by utilizing humans' innate affinity for biophilic elements. Similarly, humans have an inherent preference for curves over straight or sharp lines. The chapter reveals that jagged and sharp forms often evoke pain and sadness, while curves evoke happiness and elation, and in evolutionary contexts, sharp or pointed shapes often represented threat. Therefore, incorporating curved elements into the built environment can create a more soothing and pleasant atmosphere, promoting a sense of calmness and relaxation.

The chapter further highlighted the relationship of the selected theories and concepts in relation to cancer and holistic healing. Holistic healing approaches recognize that health and well-being involve more than just physical symptoms. When it comes to cancer, holistic approaches consider the whole person—mind, body, and spirit. These approaches include alternative therapies such as acupuncture, meditation, and nutritional counselling to support the body's natural healing abilities. By addressing all aspects of a person's health, holistic healing can help improve quality of life and overall well-being during cancer treatment. These approaches can also help reduce stress, anxiety, and side effects of conventional cancer treatments. Incorporating holistic healing into a comprehensive treatment plan can provide patients with a more well-rounded approach to managing their health. From a psychological perspective, holistic healing can also help patients feel more empowered and in control of their treatment journey, leading to a greater sense of well-being and resilience. By focusing on the mind-body connection, holistic healing can enhance the body's ability to heal itself and promote overall wellness.

The Attention restoration theory and Stress reduction theory relates to holistic healing by addressing the psychological aspect of a patient’s wellbeing. These theories suggest that exposure to natural environments can improve cognitive function and reduce stress levels, ultimately promoting overall health and healing. This approach recognizes the interconnectedness of the mind and body in achieving optimal wellness. Cancer patients are subject to immense stress and fatigue due to the nature of illness therefore it is crucial to address both mental and physical health in their treatment journey. The principles of the ART and SRT integrated into oncology settings can provide a more holistic approach to patient

care, potentially leading to better treatment outcomes and quality of life by providing the patient with distracting elements which naturally ease their anxiety by gently distracting them from their current situation and allowing them to focus on something more calming and relaxing. Additionally, incorporating these elements can also help cancer patients build resilience and coping skills to better navigate the emotional challenges that come with their diagnosis and treatment. It can provide a sense of control and empowerment during a time when they may feel helpless.

Similarly, the integration of sensory design within oncology settings can also improve patient satisfaction and overall healing experience, leading to better outcomes and adherence to treatment. Sensory design can complement the ART and SRT by providing a patient with gentle distractions and a shifted focus away from their anxiety and discomfort by providing a stimulated environment that promotes relaxation and calmness. DuBose et al.(2016:49) supports this notion by stating that sensory design can significantly enhance the healing potential of healthcare settings by integrating positive engagement of human senses. Hence sensory design can contribute to a more positive patient experience and potentially improve treatment outcomes in oncology settings through the integration of sense enhancing architecture. Spence5 affirms this notion by postulating the restorative effects of sensory stimulation through colour and nature on attention restoration and emotions. Therefore sensory integration withing the oncology settings could create a more positive emotional experience for patients and have cognitive benefits enhancing psychological wellbeing.

Neuroscience in architecture uses biomedical studies to develop design hypotheses, principles, and decisions through understanding how the brain responds to different environments and stimuli. This interdisciplinary approach aims to create spaces that enhance well-being, healing, and overall quality of life for patients. The integration of the findings of neuroscience integrated into oncology settings could have a significant impact on patient outcomes, as it could lead to the creation of environments that reduce stress and anxiety, ultimately improving the overall experience of cancer treatment. This approach however is often overlooked in traditional oncology design creating a research gap which could benefit from further research. This approach has the potential to revolutionize patient care. By incorporating neuroscience into oncology settings, patient outcomes and treatment can be

improved from a holistic approach. This innovative approach has the potential to not only enhance the physical healing process but also address the emotional and psychological aspects of cancer treatment. By prioritizing patient well-being through neuroscience-informed design, healthcare facilities can create a more supportive and therapeutic environment for patients facing cancer. Kanaani and Kopec (2019:269) support this notion stating that this method enables the connection between built forms and human function, revealing their impact on physiological and psychological reactions and behavioural outcomes.

By integrating spirituality within oncology design , healthcare facilities can further enhance the holistic approach to cancer treatment, providing patients with a sense of comfort and peace during their healing journey. This approach acknowledges the importance of addressing the spiritual needs of patients in addition to their physical and emotional well-being. It recognizes that a patient's spiritual well-being can play a significant role in their overall healing process. Research has shown that incorporating spirituality into healthcare design can lead to improved patient outcomes and satisfaction. (Raghani et al., 2022: 251). Creating oncology settings that integrate spirituality connects patients to a greater sense of meaning, place and the sacred , which can positively impact their mental and emotional state as they navigate through their treatment journey.

CHAPTER 3 | PRECEDENT STUDIES

CHAPTER 03 | PRECEDENT STUDIES

3.1 Introduction

The precedent studies in the following chapter explores and critically analyses built form typologies which display key characteristics and elements of the theories and concepts reviewed in the previous chapters and how these theories and concepts are utilized within the building typology to stimulate and promote wellbeing and natural healing. The study aims to provide a comprehensive understanding of how these theories have been successfully translated into tangible built environments, promoting wellbeing and natural healing in oncology environments and additionally considers the impact of the design interventions on patient outcomes and experiences, aiming to establish a link between architectural design and healing processes in healthcare settings. The selected buildings are as follows:

3.2.3.3 The Khoo Teck Puat hospital provides general and acute care services, integrating with Yishun Community Hospital for sub-acute and rehabilitative care. The hospital's design incorporates biophilic elements, featuring a central green lung for natural ventilation and panoramic natural views. This design approach not only enhances the overall healing environment but also promotes a sense of tranquillity and connection with nature for patients and their families.

3.2.3.3 The Cato Manor Community Health Centre in Umkhumbane, eThekwini, has 16 outpatient beds including a Medical Outpatient Unit, Midwives Obstetrics Unit, Pharmacy/Dispensary, Emergency Referral Unit, Physiotherapy Department, and a dentistry Referral Unit. As a provincial primary health care facility, it serves a region with high unemployment rates and poor socioeconomic conditions, primarily serving low-income and middle-income households., serving low-income and middle-income households. The CHC aims to address the needs and challenges of its surrounding communities.

3.2.3.3 The Riverview Health Cancer Centre is a comprehensive cancer care facility offering radio therapy, chemotherapy, surgical and diagnostic treatment, outpatient clinic, inpatient facility, and communal meeting venues. It provides high-quality oncology care in a supportive environment, offering counselling, support groups, and integrative therapies to enhance patients' well-being during their cancer journey.

The theoretical framework used to analyse the precedent studies will be based on the following criteria:

1. **Holistic Responses to Healing Environments:**

   Investigating the effect of the healing environment on the psychological wellbeing of individuals through a comprehensive approach that considers physical, emotional, and spiritual factors. This research aims to provide insights into how different environmental elements can contribute to overall health and healing outcomes.

2. **Nature and Healing:**

   Exploring how natural elements integrated into the healing environment can positively impact individuals' mental and physical health. This research seeks to understand the restorative power of nature and how it can be harnessed in healthcare settings to promote healing and wellbeing. The goal is to develop evidence-based design strategies for incorporating nature in healthcare spaces.

3. **Sensory variability and wellbeing:**

   This research aims to investigate how incorporating a variety of sensory experiences in healthcare environments can enhance overall wellbeing and patient outcomes. By understanding the impact of sensory stimuli on individuals, design strategies can be developed to create more holistic healing spaces.

3.2 **PRECEDENT 1** – THE KHOO TECK PUAT HOSPITAL

3.2.1 **Location Map**

Figure 55: Global location Map (Source: Author,2023)

Figure 56: Location Map (Source: Google Earth)

Architect	**CPG Consultants & RMJM Consultant**
Total Size	105 000sqm
Year	2010
Building Program	 Healthcare  Integrated care areas  Clinical support
Location	90 Yishun Central Singapore, 768828, Singapore

3.2.2 **Justification**

1. The KTPH creates a holistic healing environment by integrating biophilia in an immersed environment influencing patients' mood, emotions, and cognition. It offers social support provisions that complement medical treatment, improving the quality of life and well-being of its patients.
2. The building's design responds to its location by promoting natural ventilation, allowing 70% of the floor area to be cooled by natural breezes (Blom, 2013:58).
3. KTPH challenges the traditional image of hospitals as sterile, impersonal spaces, offering a relaxing, resort-like environment where patients, families, and visitors can enjoy nature's beauty.
4. The researcher acknowledges that the context and resources of the KTPH are different from those of a low-income community but contends that the principles and strategies of biophilic design can be adapted and applied to create a similar healing intention and therefore derive a set of guiding principles for designing an Oncology Centre in a low-income setting, based on the lessons learned from the precedent.

3.2.3 ANALYSIS

3.2.3.1 Holistic Healing Environments

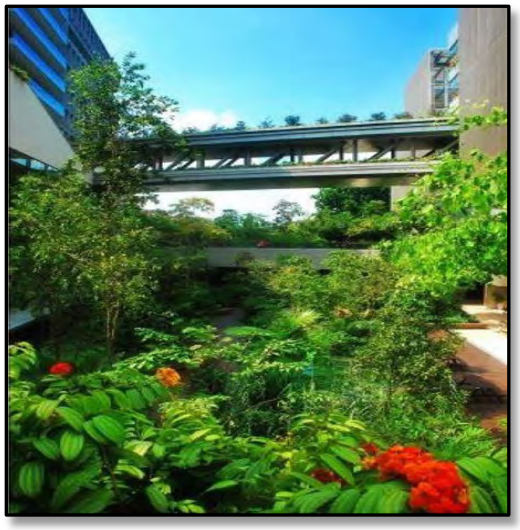


Figure 57: Image showing central garden and nature integration (Source: Filipe, 2020:40)

The KTPH features a central garden with abundant greenery, creating a forest-like atmosphere, which promotes soft fascination, gentle distractions, and a sense of being away and emersed in a natural environment. The design incorporates natural elements such as lush greenery, natural light and natural ventilation, to create a serene, calming environment, promoting relaxation and mental rejuvenation. The use of subtle nature-inspired patterns and textures enhances the forest-like ambiance, affording patients a nature immersed environment and direct connection with nature which creates a sense of awe and soft fascination and additionally provides gentle distractions and natural conditions for the recovery of exhausted cognitive resources and stress reduction as identified in the literature review further enhancing the mental rejuvenation of patients.

The hospital further offers further provision for social support serene environment with landscaped alcoves, seating areas, terraces, and breakout spaces for patients, staff, and families. These spaces provide calming views of nature and promote opportunities for

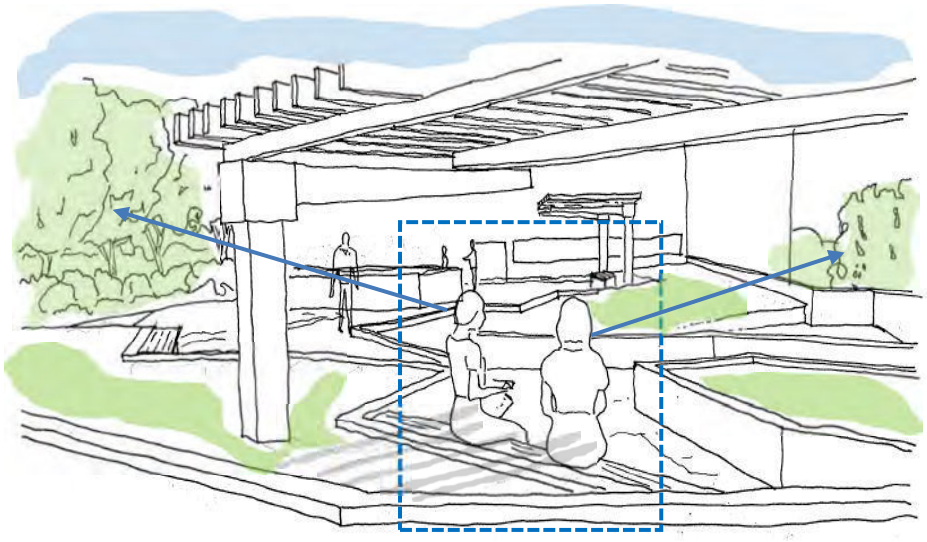


Figure 58: Areas of respite on roof top garden (Source: Author, 2023)

humane communication between patient and clinician in a non-clinical environment and additionally provide a peaceful retreat for patients to find respite and solace from the clinical hospital atmosphere. These features foster a sense of relaxation and distraction from the patient's treatment and illness stimulating a holistic approach to healthcare where the psychological state of the patient is considered in addition to their physical recovery (Filipe, 2020:43).

The provision of community roof gardens is another strategy employed to keep patients gently distracted. These gardens are designed for patients and the surrounding community therefore creates a sense of place and opportunities for social interaction and support for the patients further providing for psychological support (Blom, 2013:58,60).

3.2.3.2 Nature and Healing, A Holistic Response

The presence of natural vegetation allows patients to experience a direct contact with nature at the building, The integration of natural ventilation, natural light and presence of water, further enhance this experience when circulating the building. The orientation and placement of the blocks of the building, are done such that the building is able to capture the prevailing natural airflow and strategies implemented on the facades of the building, channel the natural breezes throughout the building. The building adapts to the site's climatic conditions, with a V shape forming a central landscaped court that captures prevailing north winds. This allows natural breezes to flow through the building and courtyard, providing natural ventilation and air circulation for treatment and recovery wards. The building also offers views of the natural pond and distant landscaping. This design ensures a comfortable and efficient environment for the patients enhancing the direct contact with nature.

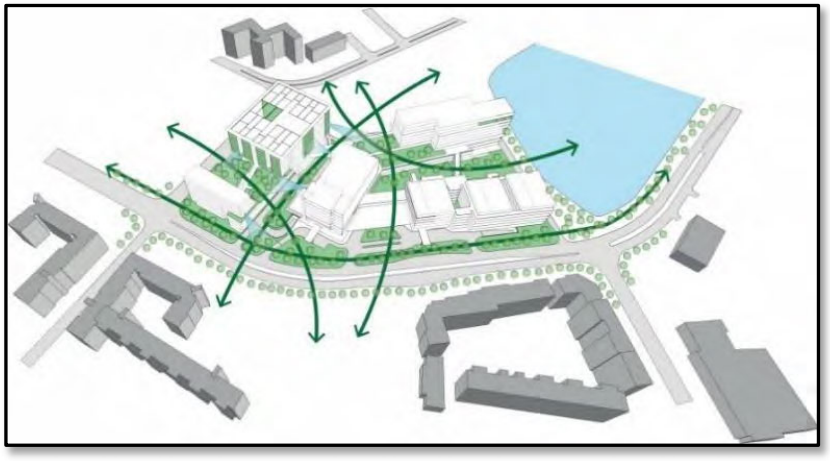


Figure 59: Image showing block placement harnessing prevailing breezes (Source: Filipe, 2020:39)

The building's façade utilizes a permeable system for natural ventilation, light, and views, while controlling shading and glare. Vertical fins channel incoming breezes into the subsidized wards, maximizing ventilation. Engineers used a 'wind wall' system to increase wind pressure and induce natural breezes. The architects also considered aspect ratios and a shallow plan design for optimal ventilation efficiency. The design of the building prioritizes patient wellbeing and uses a patient-centred approach to create an emotional connection with the patient and environment. Glass louvers are used as the primary skin, allowing captured breezes to penetrate passages and wards, enhancing the patient's sense of hapticity. The louvers also integrate biophilic architecture aspects of natural ventilation and daylighting, allowing cool breezes to reduce mechanical cooling and allowing natural light to enter interior spaces, creating a pleasant and healthy environment for patients. This patient-centred design ensures a comfortable and efficient environment (Blom, 2013:61).

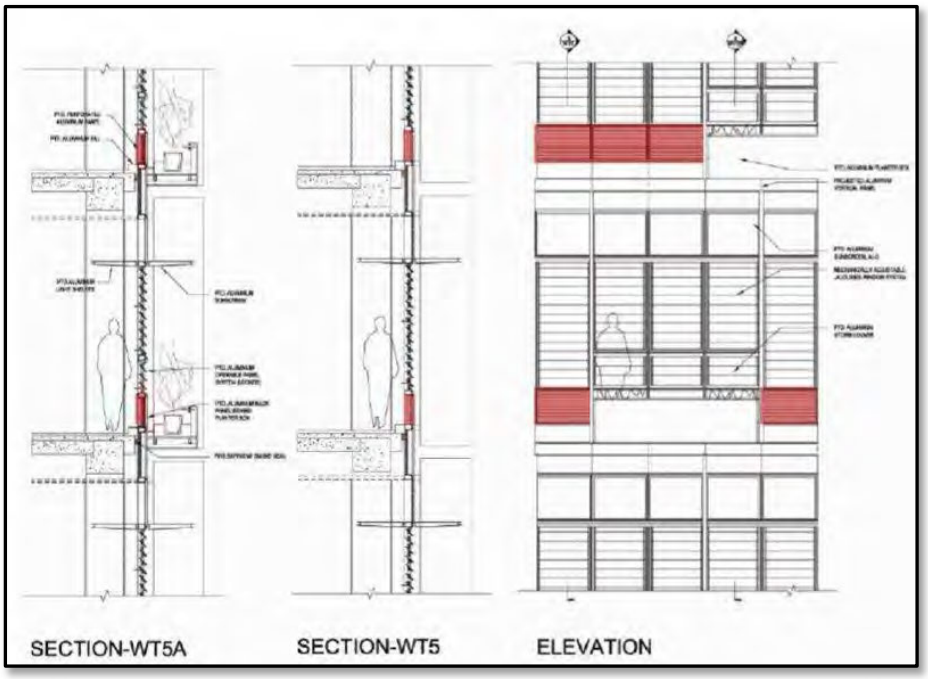


Figure 60: Section and elevation showing wind wall strategy (Source: Yen, 2012:106)

The use of light shelves further enhances the ingress of natural light into the building. The building uses natural light to direct it into the building, further supporting the direct connection to nature. Glass louvers enhance the visual contact with nature from wards and recovery rooms, allowing natural light to reflect off the building's surface and internal ceilings (Yen, 2012:101).

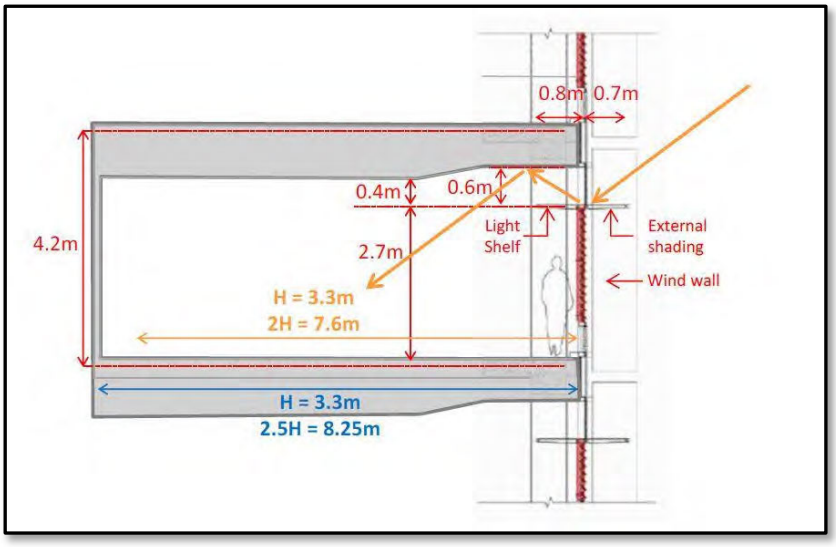


Figure 61: Section showing light shelf detail (Source: Yen, 2012:102)

The building's architects have strategically designed recovery rooms with natural light and views onto nature, aiming to enhance the holistic healing environment. This approach has been proven to reduce patient reliance on pain medication and shorten recovery periods (Kellert et al., 2008:92). The architects' strategy is a key factor in promoting patient wellbeing. Contact with nature is found to improve cognition, lower human stress levels, give strength to the body and soul, and increase greater emotional wellbeing(McMahan and Estes, 2015:1). Additionally, exposure to nature reduces stress is also seen to increase overall happiness and creativity and expedites the healing process (Browning et al., 2014:4)

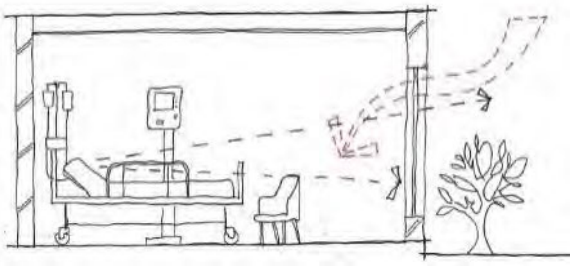


Figure 62 above: Recovery room with views to nature (Source: Author, 2023)

Figure 63 left: Recovery room immersed in natural light and ventilation with views to nature (Source: Yen, 2012:106)

The architects aimed to integrate the physical environment's impact on a patient's mental health, considering not only the body's physical illness but also the mind and spirit's psychological and spiritual wellbeing. Large full height windows and integrated window planters and outdoor gardens provide patients with a view of greenery while fixed glass louvers integrated into the windows provide natural ventilation to the recovery rooms. The visual connection to nature is further enhanced through an open façade system which augments the sense of transparency and nature immersion (Blom, 2013:58).

Figure 64 left: Open façade system immersing patients in nature (Source: Blom, 2013:59 2023)

The entrance atrium is designed with full height glazing and a skylight allowing external views onto natural elements reinforcing the connection to nature. Views to the adjacent pond and the introduction of a water elements within the central garden with integrated plants and animals such as birds, butterflies, and fish, create a micro ecosystem withing the building strengthening the patient's bond to nature (Filipe, 2020:43).

3.2.3.3 Sensory Variability and Wellbeing

The building uses biophilic principles, including greenery and water, to enhance the sensory experience. The calming atmosphere, scents from the flora and fauna, and tactile qualities of soft grass and smooth tree trunks improve wellbeing for patients, visitors, and staff. The 'V' shape block placement allows natural breezes to permeate, while sunlight, which penetrates the central garden, supports mental health by promoting serotonin production.

This holistic healing therapeutic environment promotes emotional well-being and mental health through sensory design. Plants emitting natural fragrances are positioned on the upper levels, stimulating the olfactory sense and creating a direct link to nature. These fragrances transport patients and staff to serene outdoor settings, fostering a deeper connection with

the natural world. The sounds of leaves, birds, and water stimulate auditory, gustatory, and olfactory senses, while vibrant colours and scenic views captivate visual and tactile senses. Therapeutic gardening activities at the community gardens allow patients to touch and feel textures, enhancing their overall experience.

The wind wall, glass louver facades and open façade system allow the natural breezes to be felt on the patients' skin while the warmth of the sun while the warmth of the sun enhances comfort and haptic sensation.

3.3 **PRECEDENT 2** - THE UMKHUMBANE COMMUNITY HEALTH CENTRE

Architect	**ZAI Architects, Robert Johnson Architect and Associates**
Total Size	4 230sqm
Year	2003
Building Program	Healthcare; Integrated care areas; Clinical support
Location	25 Kalanden Road, Westridge, Durban, South Africa, 4001

3.3.1 **Location Map:**

Figure 65: Global Location Map (Source:Author, 2023)

Figure 66 : Location Map (Source:Google Earth)

3.3.2 **Justification**

1. The Umkhumbane Community Health Centre's design differs from conventional clinic models by focusing on a human-centred approach, using a comfortable and recognizable scale for its patients, rather than large, solid volumes or deep floors. The building has a unique wayfinding system using a double volume "spine" as a navigational tool for patients and visitors.
2. The avenue internal street design concept in the clinic promotes a non-stereotypical design, featuring a shaded avenue for relaxation, natural light, and ventilation.
3. The innovative clinic design and social support approach demonstrate a patient-centred approach to healing, enhancing care quality and healing outcomes by providing a comfortable environment for patients.

3.3.3 **Analysis**

3.3.3.1 **Holistic Healing Environments**

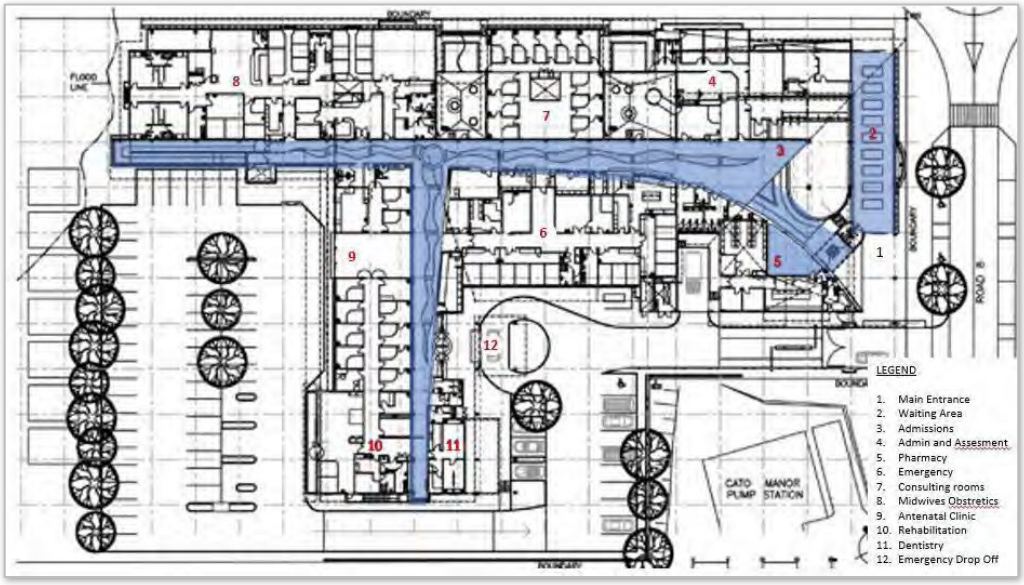


Figure 67 : Floor plan highlighting the central spine (Source: https://www.zaiconsultants.co.za/umkhumbane.htm: [accessed 07-11-2023] adapted by author)

The central spine design concept provides a comfortable space for patients and staff, offering shaded corridors for respite where patients can rest, and staff can take breaks. The design incorporates natural elements such as natural light and ventilation, creating an environment that promotes healing and relaxation. Treatment rooms facing and backing onto the spine enhance safety and security by allowing easy access and visibility for staff, while also providing a calming view for patients preventing attention fatigue and anxiety.

A relief and change from the sterile atmosphere often found in healthcare facilities is provided by the interior wall inclination, which contrasts with the standard right angle in building designs to create a rhythm and movement (Reddy, 2017:33).

Privacy Gradient and zoning

The spine acts as the public zone with the semi-private zones creating a buffer between the sensitive private patient zones and the public zone. This design approach ensures that patients can easily move between different areas of the building while maintaining their privacy and comfort during treatment and consultations. In addition, the spine provides efficient circulation to the treatment areas improving efficiency and convenience enhancing the patient experience.

Figure 68: Floor plan highlighting the privacy gradient (Source: https://www.zaiconsultants.co.za/umkhumbane.htm: [accessed 07-11-2023] adapted by author)

Circulation

The spine acts as a central hub connecting different areas of the building and allows for easy navigation enhancing the overall patient experience by promoting a sense of unity and accessibility within the facility. The main entrance features a curved wall, creating an abstract space leading into a central circulation spine. A clear and unmistakable patient circulation route was a priority for the architect. A solution to this concern was conceived in the form of the concept of a "shopping mall" for healthcare services which would be strategically grouped and positioned with access from the main circulation "spine" (Reddy, 2017:33).

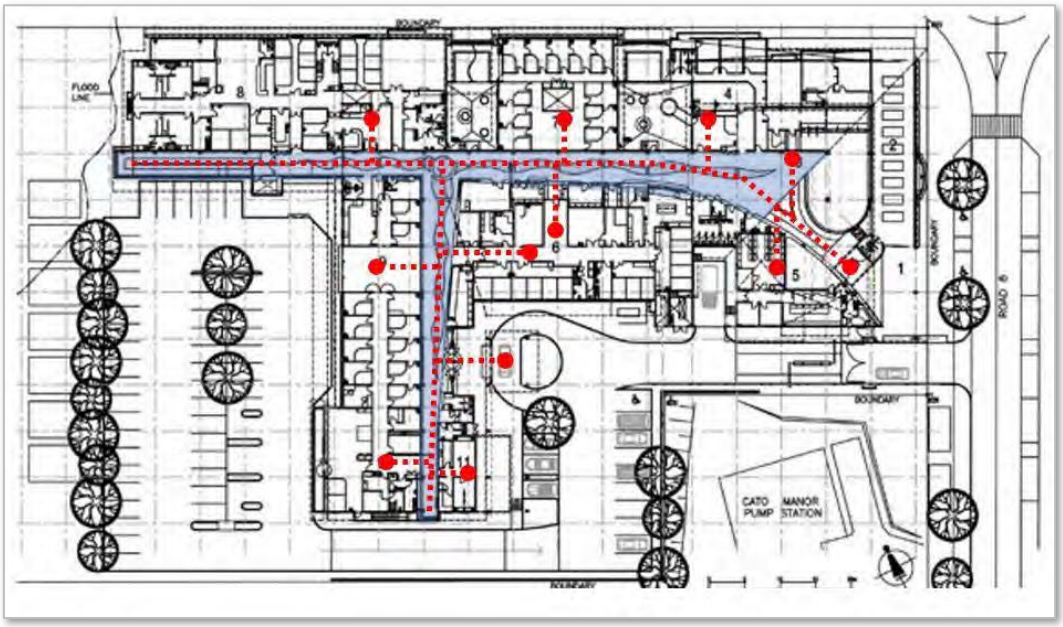


Figure 69: Floor plan highlighting the circulation route (Source: https://www.zaiconsultants.co.za/umkhumbane.htm: [accessed 07-11-2023] adapted by author)

Domestic Scale and Building Form

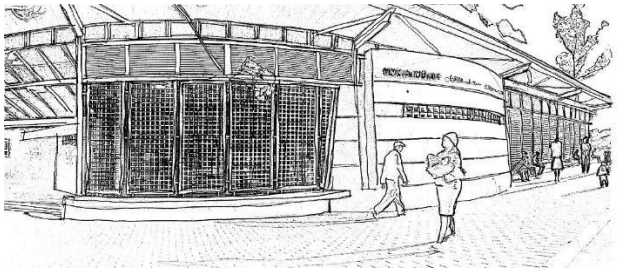


Figure 70. 9:Human scaled form and shape (Source: Author,2023)

The buildings two level form create a scale that is familiar amongst patients and visitors, providing a sense of comfort and ease as they navigate through the facility. The form of the building and internal street concept promotes a sense of community and connectivity, encouraging interaction and collaboration among patients, staff, and visitors.

The main entrance features a curved wall, creating an abstract space leading into a central circulation spine. Influenced by biophilic elements and nature, curvilinear forms are perceived as non-threatening. Vertical curved steel columns along the spine further accentuate the curvilinear form, emulating a ribcage evoking a sense of organic life, dynamism, protection, and enclosure. The design aims to balance natural, organic and geometric elements promoting calmness and natural healing The central spine's vertically inclined walls and oblique plan form create a space with omitted parallel lines, resulting in a gradation of space and a divergent spatial experience (Reddy, 2017:33).

Materiality

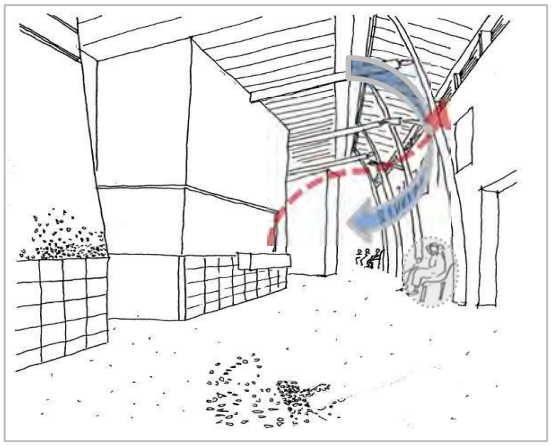


Figure 71: Central spine showing heat escape and cool air ingress (Source: Author, 2023)

The building features concrete floors and a mosaic pathway, contrasting plastered and brick walls. Supported by steel columns with aluminium and glass elements, it creates an open, light atmosphere. The primary materials reflect its functionality and aesthetic appeal, enhancing the sensory-focused interactive experience and serving as gentle distractions. The raw concrete floor design evokes the warmth and authenticity of natural stone, while its rigidity and unidirectional nature minimize its visual impact on the healing environment, avoiding distracting or overwhelming stimuli.

3.3.3.2 **Nature and Healing, A Holistic Response**

Natural Light, Sunlight and Ventilation

The spine of the building is surrounded by natural light and ventilation through large span mono pitch roofs, forming a centre monitor. The roof allows for passive air movement, allowing warmer air to rise and dissipate, while controlled north sunlight enters through the monitor clerestory windows, providing a soft, diffused lighting effect. Direct sunlight from the landscape courtyard creates a connection to nature with its play of light and shadow.

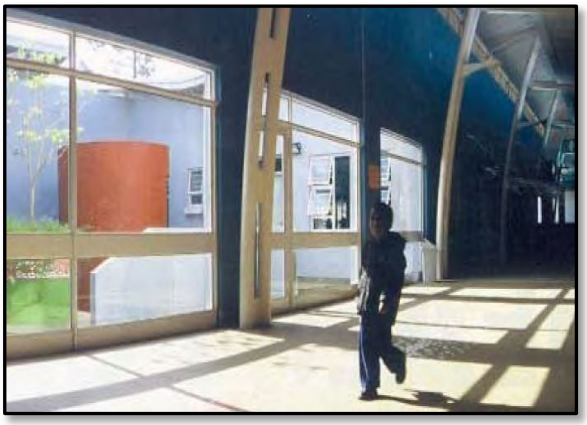


Figure 72: Integration of sunlight in the central spine (Source: https://www.zaiconsultants.co.za/umkhumbane.htm: [accessed 07-11-2023])

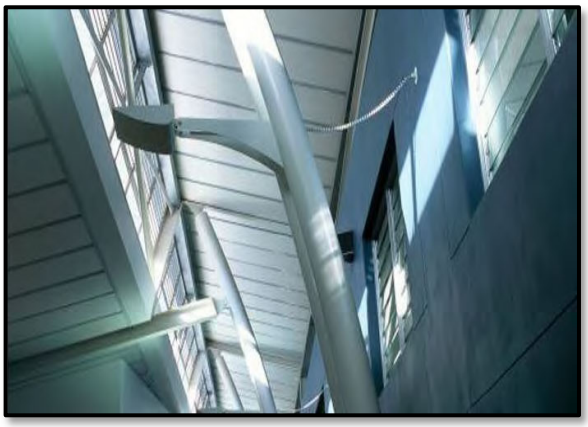


Figure 73: Monitor roof and louvres in central spine allowing natural light and ventilation (Source: https://www.zaiconsultants.co.za/umkhumbane.htm: [accessed 07-11-2023])

North-easterly breezes pass through the building's entryway and circulate through the circulation route, naturally ventilating it (Reddy, 2017:33).

3.3.3.3 **Sensory Variability and Wellbeing**

Volumetric Interplay

The interplay of spatial volume enhances the experience of the patient, allowing them to feel more immersed in their surroundings thereby by detracting from monotony preventing sensory boredom and appealing to the auditory sense, with larger volumes reflecting echoes from lower volume areas and adjacent walls. This creates an emotional connection with the patient and place, allowing direct interaction with the space and stimuli. The architects have integrated spatial volumetric variability in a building by creating contrast between double

volume spine and single volume treatment areas. The double volume spine provides a stimulating environment for patients and staff, enhancing the healing experience and functionality, while single volume treatment areas offer privacy and a sense of calm thereby catering to different needs and promotes a balanced building atmosphere.

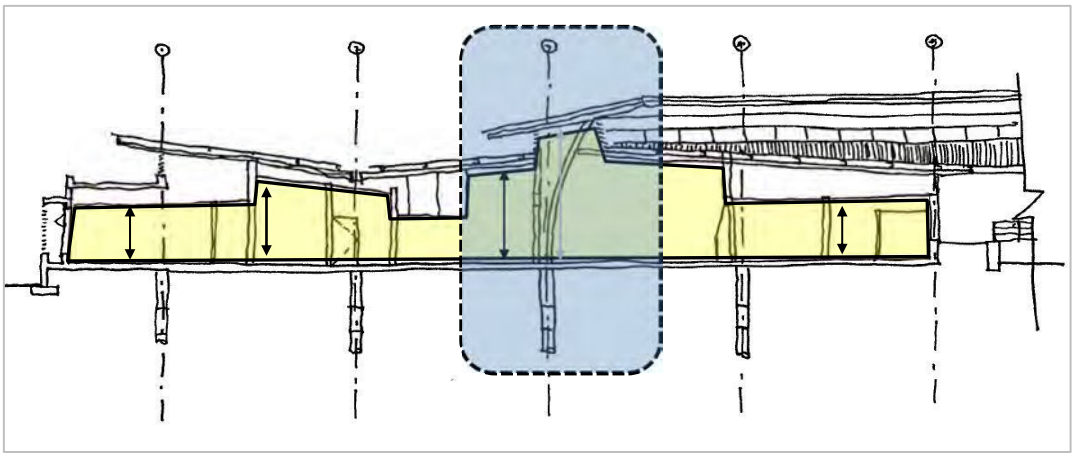


Figure 74: Section showing volumes and central spine (Source: https://www.zaiconsultants.co.za/umkhumbane.htm: [accessed 07-11-2023] adapted by author)

Materiality

Figure 75: Material variation and gradation of spaces (Source: Sanders, 2011: 134)

The use of brick and plaster, along with mosaic patterning on the concrete floor, creates a sense of tactility and visual interest. The eye runs along the patterns, focusing on the alternating laid patterns up the textured walls, roof steel sheeting, and curved ribcage columns. The cold texture of steel and the warm texture of brick and concrete create a unique visual experience, evoking different emotions and sensations. The smoothness of steel conveys modernity, while the roughness of brick and concrete exudes strength and stability.

3.4 **PRECEDENT 3** – THE RIVERVIEW HEALTH CANCER CENTRE

Architect	**BKT Architects, LLC**		
Total Size	4 645sqm		
Year	2017		
Client	Meridian Health		
Building Program	Healthcare	Integrated care areas	Clinical support
Location	6 Westfield Road, Noblesville, Indiana, USA, 46060		

3.4.1 **Location Map**

Figure 76: Global Location Map (Source:Author, 2023)

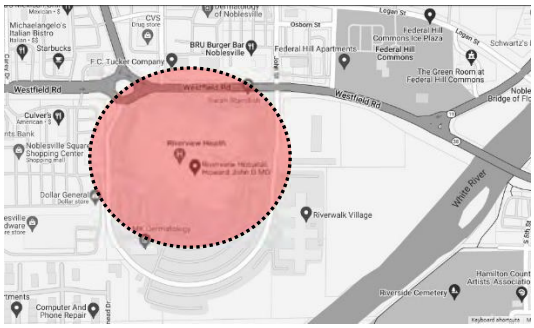


Figure 77: Location Map (Source:Author, 2023)

3.4.2 **Justification**

1. Riverview Oncology centre focuses on innovative oncology care, incorporating biophilic principles and a supportive environment that reflects optimal healing design principles, acknowledging the influence of surroundings and nature on patients' well-being and healing.
2. The treatment suites, designed using biophilic principles, provide a soothing environment with natural elements, natural views, and daylight, fostering a sense of community and social support.
3. The precedent example demonstrates the application of empathetic design principles to create a more comfortable and supportive environment for oncology patients and their families.

3.5 **ANALYSIS**

3.4.3.1 **Holistic Healing Environments**

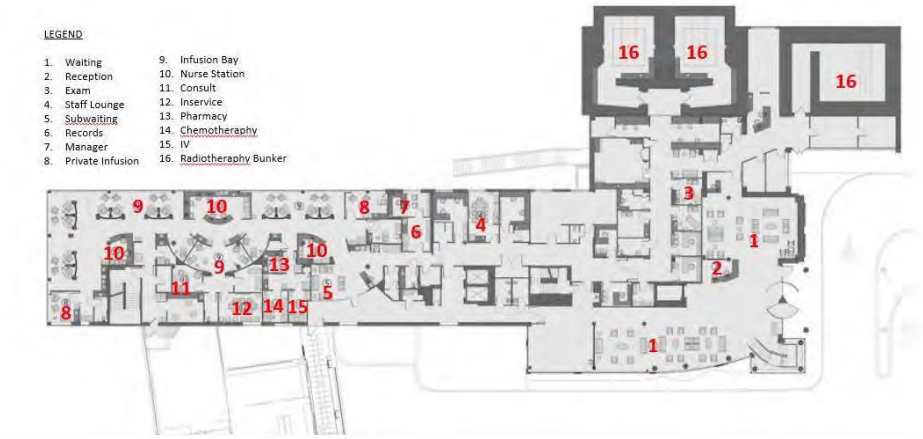


Figure 78: Area analysis plan (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023] adapted by author)

Privacy Gradient and Zoning

The approach to the privacy grading of the accommodation takes into consideration a patient centred humanistic and empathetic response. This means that the grading is not solely based on the physical condition of the accommodation, but also on how well it meets the emotional and psychological needs of the patient thereby creating an environment that promotes healing and comfort, while also respecting the individuality and dignity of each patient.

Figure 79: Plan showing privacy gradient (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023] adapted by author)

Private infusion rooms are provided for patients who require seclusion and privacy during their treatment while still maintaining a connection to the external natural environment. Radiation therapy bunkers are situated away from the semi-public areas to enhance privacy. Semi-private areas are grouped together and do not cross link with semi-public areas. This careful separation ensures that patients in semi-private areas have a more intimate and personalized experience, while still benefiting from the support of a shared space.

Circulation

The circulation route separates semi-public and private zones, enhancing patient privacy and comfort. It facilitates efficient staff and visitor flow, minimizing disruptions in patient areas. The design of these routes is carefully considered to ensure ease of navigation and accessibility and minimizes the distance and travel time between the reception, waiting rooms and treatment zones thereby enhancing the overall patient experience mitigating confusion and anxiety for patients, in addition to optimizing the workflow for staff members.
The facility's multiple entrances enhance patient and visitor accessibility by offering multiple options to patients arriving for different treatments as patients can easily access the specific department, they need without having to navigate through the entire facility. Additionally,

Figure 80: Plan showing circulation route (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023] adapted by author)

visitors who may not be familiar with its layout can easily find their way to their intended destination.

Scale And Nature Connection

Figure 81: External perspective showing curvilinear forms (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023])

The three-story facility offers a familiar scale for patients and visitors, reducing feelings of being overwhelmed and creates a reassuring environment as it provides a comfortable and familiar environment for patients and visitors. Natural shape and form elements are incorporated into the design, such as large windows that let in ample natural light and views of the surrounding greenery. This connection to nature promotes a sense of calm and healing, enhancing the overall well-being of patients and visitors. The infusion suites are designed to have an outlook to the surrounding greenery and adjacent river , allowing patients to feel connected to nature while receiving treatment. This natural view not only provides a soothing atmosphere but also serves as a distraction from the medical setting, helping patients relax and feel more at ease during their infusion sessions.

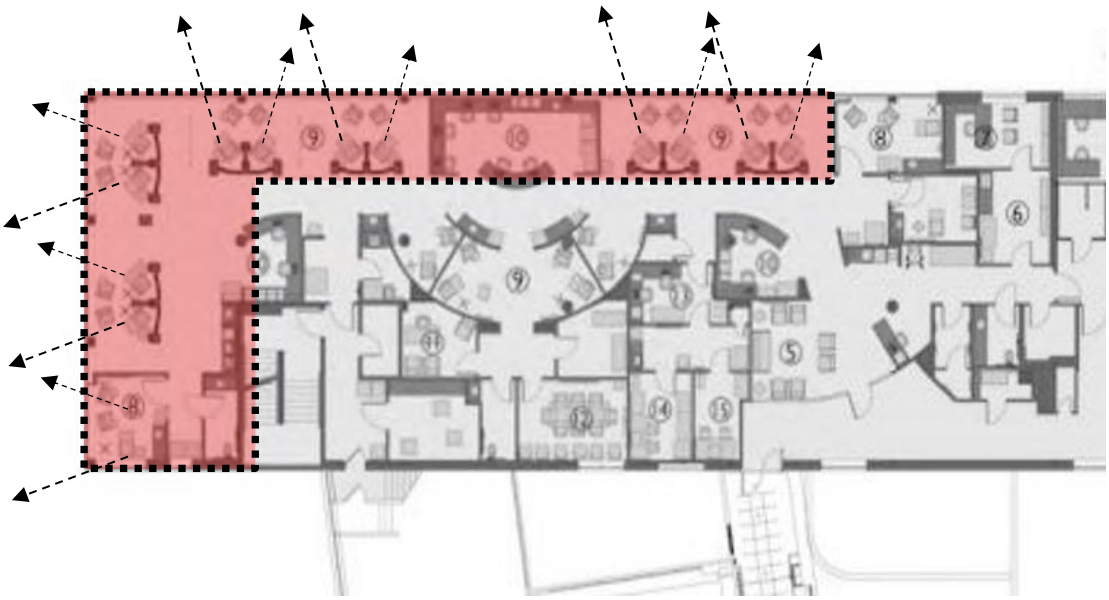


Figure 82: Analysis of nature views from infusion suites (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023] adapted by author)

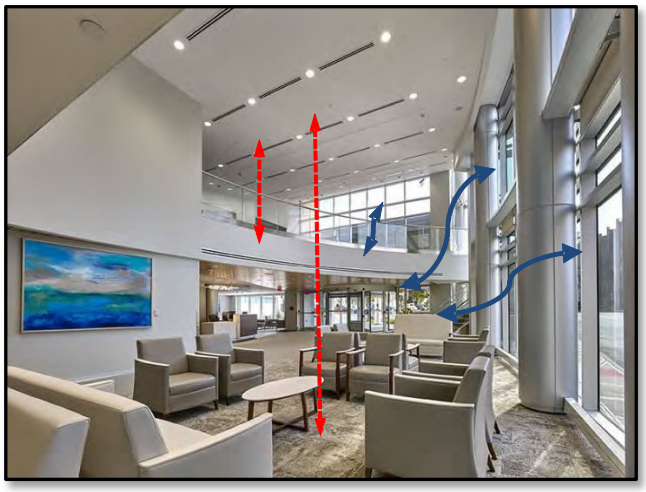
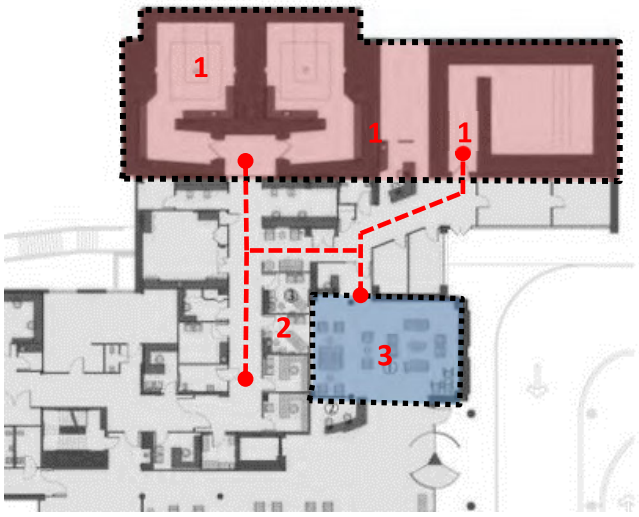


Figure 83: Analysis of waiting area showing natural light and play of volumes (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023] adapted by author)

The facility integrates a mezzanine lobby, double volume floor, double volume glazing panels, and landscaping for natural light and connection to the environment. The design uses natural materials, organic shapes, and large windows to enhance patient well-being and create a harmonious atmosphere that promotes healing. The mezzanine lobby provides a welcoming and spacious entrance, while the double volume floor and glazing panels allow for an abundance of natural light, creating a bright and uplifting environment. Additionally, the incorporation of homelike comforts in the lounge areas, further enhance the overall patient experience.

Bunker Experience



1 – RADIOTHERAPHY BUNKERS
2 – PATIENT TREATMENT AREA
3 – PATIENT WAITING AREA

Figure 84: Analysis of waiting area radiotherapy bunker experience (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023] adapted by author)

An adverse criticism, however, is the design and location of the radiation therapy bunker. The psychological effects of spending hours alone in a room with a machine which emits high-energy beams at the body, are one of the difficulties of radiation therapy. Throughout the therapy sessions, the patient could feel uneasy, lonely, or afraid. To mitigate these negative emotions, architectural design could create a dialogue between the built environment and

the natural elements, such as light, sound, and vegetation, that can have a positive impact on the mood and health of the patients and promote well-being and comfort. For example, the route to and from the bunker housing the linear accelerator, could be improved by adding peaceful and relaxing natural components such an atrium with greenery and natural light. This would not only provide a visually pleasing environment but also contribute to reducing stress and anxiety levels for both patients and staff as well as provide the patient with a positive distraction. These interventions could improve the patient's mood and quality of life during radiation therapy.

3.4.3.2 **Nature and Healing, A Holistic Response**

The Oncology Centre connects to nature by incorporating biophilic design principles such as natural light, sunlight, natural materials and views. The recovery rooms reinforce a patient centred resort like design integrating natural views creating a sense of connectedness to nature. The views of the adjacent river further reinforce the sense of connectedness to nature.

Large windows allow the ingress of natural light and sunlight into treatment and recovery rooms while creating a view to the surrounding nature. These elements enhance the patient's psychological wellbeing by providing a distraction from the illness and treatment. Research has shown that exposure to nature and natural views can have a positive impact on patients' mental health, reducing stress and promoting relaxation. Sunlight enters the building through the large glazing panels integrated into the wating area lounges , providing a bright and inviting atmosphere for patients and visitors. The natural light not only enhances the aesthetic appeal of the space but also creates a sense of openness and connection to the outdoors.

Figure 85: Views onto nature from treatment rooms (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023])

Figure 86: Patient support and natural light in patient rooms(Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023])

The project utilized earth tones and natural materials to create a stress-reducing environment for cancer caregivers and patients. The use of wood elements creates a calming atmosphere, promoting tranquillity and well-being. Earth tones enhance the connection to nature,

Figure 87: Views to external nature from waiting area (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023])

Figure 88: Waiting lounge area immersed in sunlight (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023])

fostering a healing environment that supports the emotional and psychological needs of cancer patients.

The use of curvilinear elements on the external form of the building reinforces the connectedness to nature and the natural occurring patterns. These curvilinear elements mimic the shapes found in the surrounding landscape, creating a harmonious relationship between the built environment and its natural surroundings.

Figure 89: Natural materials and curvilinear forms (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023])

Figure 90: External facades using curvilinear forms (Source: https://www.bktarchitect.com/portfolio/riverview-oncology-center/: [accessed 07-11-2023])

3.4.3.3 **Sensory Variability and Wellbeing**

The lobby area features double volume glazing, allowing sunlight to create shadow patterns that stimulate haptic and visual sensory modalities. The warmth of sunlight is felt through the skin's haptic capabilities, creating a connection to nature. The dynamic and ever-evolving atmosphere of the shadow changes depending on the time and season, making the space visually captivating and engaging. The building's varying volumetric heights create a multisensory experience, engaging visitors and patients through visual volume interplay and auditory stimulation. The echo and reverberation of sound enhance spatial perception, allowing curiosity and exploration. This dynamic acoustic experience adds an emotional and memorable connection to the space.

3.5 **CONCLUSION**

The Khoo Teck Puat hospital is a healthcare facility that challenges conventional norms by incorporating nature and natural light into a restorative environment. It focuses on the 3 pillars of holistic healing, promoting physical activity and social interaction. The design strategy includes a forest-like environment, enhancing natural ventilation and creating a comfortable microclimate for patients and visitors. The Umkhumbane Community Healthcare Centre uses form and materiality to create sensory variability, engaging the human senses and fostering a deeper connection between occupants and their environment. The clinic also prioritizes the integration of daylighting, allowing for a more pleasant and soothing atmosphere that positively impacts the well-being of patients and staff. The domestic scale promotes a dialogue between architecture and holistic healing environments, creating a sense of comfort and familiarity for patients, while natural materials enhance the connection between the built environment and nature.

The Riverview Oncology Centre adopts a non-stereotypical design approach to create a spa-like atmosphere for patients, reducing stress and anxiety. This aesthetic appeal and functionality of the built form also enhance the healing process, making it more conducive to healing. The integration of nature into a building creates a calming, serene environment that enhances its stress-reducing potential, promoting well-being and self-healing. Patients feel

surrounded by natural elements, creating a relaxing and therapeutic environment. The architects have created a restorative environment that positively impacts patients' mental and emotional states, reducing stress, promoting relaxation, and enhancing overall wellbeing. This approach demonstrates the relationship between architecture and holistic healing environments in promoting psychological wellbeing through the use of natural elements and sensory stimulation to create a more comfortable and effective healing environment further contributing to the overall therapeutic experience for patients.

The holistic healing environment, encompassing physical, psychological, and social aspects, enhances well-being and recovery in healthcare settings, as demonstrated by the three precedent examples which explore the impact of nature on healthcare, the non-conventional approach to healthcare architecture, and the significance of social support and exposure to biophilic elements in cancer treatment, highlighting the positive effects on patients' psychological wellbeing, quality of life, and spiritual well-being. These studies emphasize the need for interventions that address the holistic needs of individuals, particularly in oncology settings, where patients often experience high levels of stress and emotional distress.

CHAPTER 4 | CASE STUDY

4.1 INTRODUCTION

The selected case study aims to gain insight to the primary research questions and aim. The inquiry investigates the impact of psychological factors on health outcomes and recovery, highlighting how architectural design can enhance these factors by creating stimulating, supportive, and restorative environments.

The case study was conducted at the Hillcrest Private Hospital which is an inpatient facility providing specialized healthcare services in 23 medical and surgical disciplines. It offers various units including oncology, casualty, surgery, inpatient, outpatient, emergency, trauma, paediatrics, ICU, and high care. The hospital features pause areas and a cafe for visitors and staff. The building is a 2-storey brick structure with a hipped roof, decorated with face brick and natural stone materials designed as a lodge concept. The ground floor features a triple volume atrium reception area with natural light and sunlight, and patient and treatment rooms with external views of the surrounding landscape.

The theoretical framework used to analyse the case study will be based on the following criteria:

1. Holistic Responses to Healing Environments
2. Nature and Healing
3. Sensory variability and wellbeing.

4.2 THE HILLCREST PRIVATE HOSPITAL

Architect	**BVA Architects**
Total Size	5 300sqm approximate
Year	2011
Building Program	 Medical, Surgical, Oncology  Integrated care areas  Clinical support
Location	471 Kassier Road, Assagay, Durban, Kwazulu-Natal,3610

4.2.1 **Location Map:**

Figure 91: Global Location Map (Source: Author, 2023)

Figure 92: Location Map (Source: Google Earth)

4.2.2 **Justification**

1. The building is a restorative space that promotes holistic healing by incorporating biophilic elements and patient-centred design principles. The design prioritizes patients' psychological wellbeing and spirituality, resembling a resort setting, enhancing its holistic healing environment.
2. The building promotes empathetic healing by offering social connections, support, and a comfortable environment for patients, families, and staff to interact and share experiences. The building fosters a sense of community and belonging among the different groups of people who use the facility.
3. The building's natural setting offers a healing experience through nature's calmness, providing valuable guidance for research questions.

4.3 **Analysis**

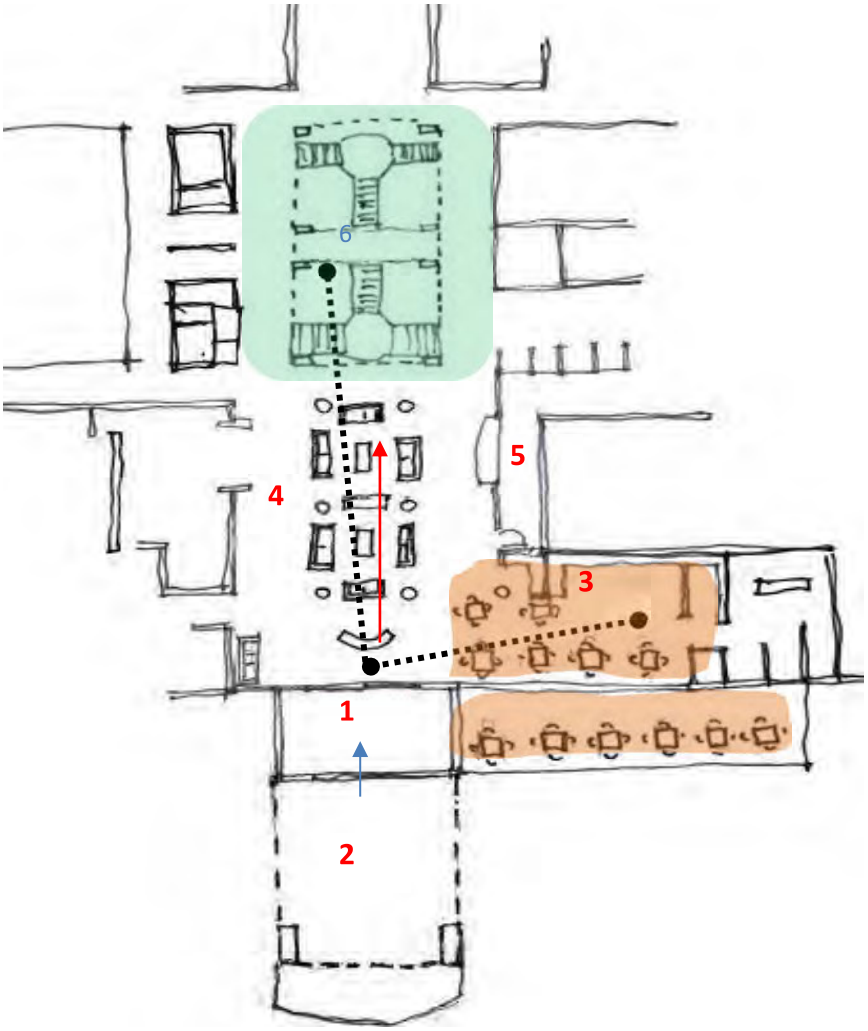
4.2.3.1 **Holistic Healing Environments**

The Hillcrest Private Hospitals main entrance is a double volume design that creates a spacious and welcoming atmosphere. Research suggests that high volumes can enhance psychological wellbeing. The building features a café-style coffee shop, which serves a dual function. The open

Figure 93 Above : Showing materiality and double volume entrance.

plan design triggers human scent, sight, and auditory receptors to respond to the coffee and café scents, triggering stored memories and

Figure 94 Above : The resort like waiting area lounge (Source : Author, 2023)



1 - MAIN ENTRANCE

2 - DOUBLE VOLUME PORTE COCHERE

3 - COFFEE SHOP

4 - LOUNGES

5 - RECEPTION

6 - ATRIUM

Figure 95 Left : Plan showing the resort like entrance foyer and café relationship to the atrium (Source : Author, 2023)

positive emotions. This provides an ideal distraction for patient anxiety and stress, enhancing the overall experience. Additionally, the cafe serves as a social connection hub where patients can receive support from each other or have informal consultations with their care givers in a

Figure 96: The double volume atrium allowing natural light ingress forming a central orientation marker (Source : Author, 2023)

Figure 97: Image showing the reception café and outdoor seating (Source : Author,2023)

non-stereotypical environment. The integration of entrance lounges and reception areas creates an informal lounge atmosphere, allowing patients to feel like resort guests rather than hospital patients, fostering an emotional connection and positive patient behaviour.

Figure 98: Image showing a typical recovery room with natural light provision (Source : Author, 2023)

The hospital features a distinctive ward design with private and executive suites, as well as semi-private 2 to 4 bed suites, aiming to create a homely atmosphere for healing. Treatment and recovery rooms feature natural views and outdoor areas, promoting patient comfort and well-being. Research shows exposure to nature reduces stress and improves healing outcomes.

The façade treatment of face-brick creates textural patterns and a sense of tactility, stimulating the haptic sense and visual interest in the brick design. This design allows the eye to run along the façade, shifting focus along its alternating patterning variation, preventing sensory boredom and allowing the texture to be sensed and felt.

Figure 99 far left: Image showing external façade treatment ,materiality variation and greenery integration (Source : Author, 2023)

Figure 100 left: Image showing external façade modulation, materiality variation and greenery integration (Source : Author, 2023)

4.2.3.2 **Nature and Healing, A Holistic Response**

The central circulation core, connected to lounge areas, features a triple volume atrium reception area with natural light and sunlight, serving as a wayfinding marker and creating a dynamic atmosphere. This design enhances visitor experience by guiding them through the space, engaging different sense modalities, and serving as an orientation device. It also integrates a visual and physical connection to nature, allowing patients to associate with the natural circadian rhythm.

Figure 1 Figure 101: Sunlight ingress in the atrium accentuates the direct contact with nature. (Source: Author 2023)

Figure 102: Image above showing Sunlight ingress in atrium. (Source: Author 2023)

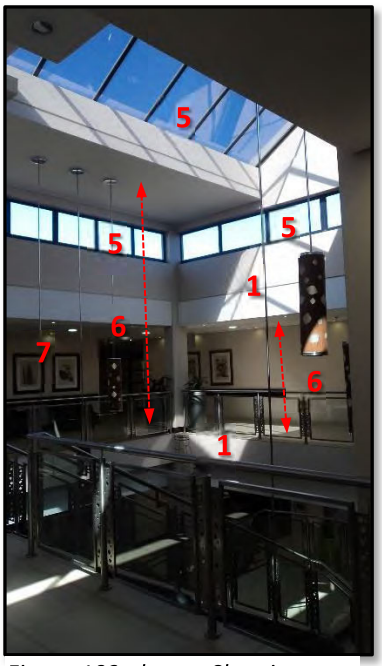


Figure 103 above: Showing integration of natural systems in Atrium and play of volumes. (Source: Author 2023)

1 SUNLIGHT PENETRATION
2 TIMBER FLOOR
3 NATURAL STONE
4 GREENERY INTERGRTION
5 CLERESTORY SUNLIGHT
6 VOLUMETRIC INTERPLAY
7 PICTURE FRAMES OF NATURE

Figure 104 top left – Atrium with clerestory windows and volumetric interplay. (Source: Author 2023)

The atrium's integration of landscaped elements and greenery enhances the connection to nature, creating a sense of outdoor comfort. This gentle emersion is calming and relaxing, while the facility's artwork links indirectly to nature, providing positive distractions.

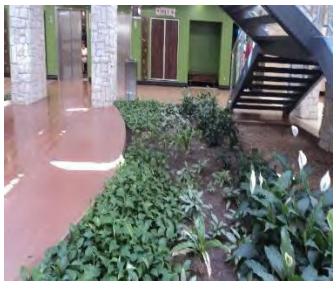


Figure 105: Integration of greenery in atrium. (Source: Author 2023)

Figure 106: Integration of natural materials in atrium. (Source: Author 2023)

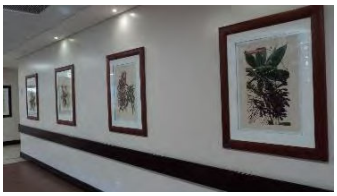


Figure 107: Indirect integration of greenery in atrium through pictures of nature. (Source: Author 2023)

The building incorporates nature into its design, offering patients a unique patient care experience. Natural elements such as stone clad columns and timber floor enhance the connection to nature creating a harmonious and tranquil atmosphere. The stone clad columns provide a sense of grounding and stability, while the timber floor adds warmth. Together, these elements evoke a seamless integration with the surrounding environment, inviting patients to feel grounded and connected with nature.

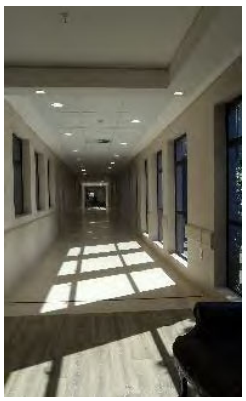
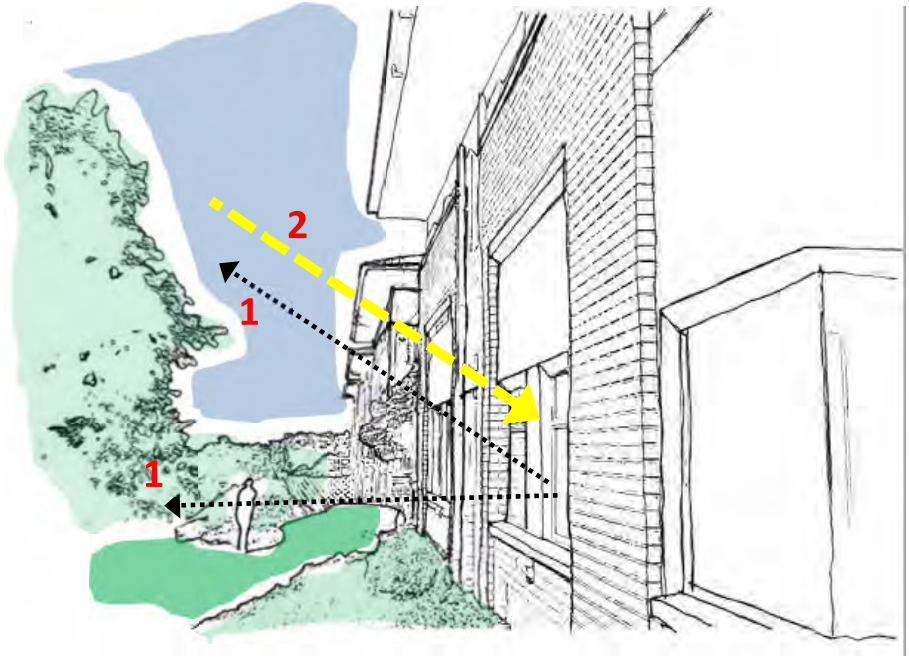


Figure 108: Direct contact with nature in access passages showing interplay of shadows (Source: Author 2023)

The landscaped gardens provide visual and physical access to nature, reducing the need for artificial lighting and ventilation as these simultaneously allow the ingress of natural light and sunlight into key areas of the building. The naturally lit circulation system creates a healthier environment with sunlight ingress, while access to outdoor areas offer social interaction, respite, and reflection. The design features comfortable seating, shaded areas, and lush greenery.



1. Views out onto nature from treatment and recovery rooms

2. Natural Light and sunlight ingress to key areas

Figure 109: Access gardens and views to nature from recovery rooms. Sunlight provision into building. (Source: Author 2023)

Figure 110: Image showing the natural settng and light ,conditions evoking a sense of spirituality (Source: Author 2023)

The site design provides a serene retreat from daily routines and stressors, incorporating natural scenery and views. The building emphasizes being emersed in nature, with healing gardens for patients to escape treatment anxiety and socialize, offering a psychological and social interactive space.

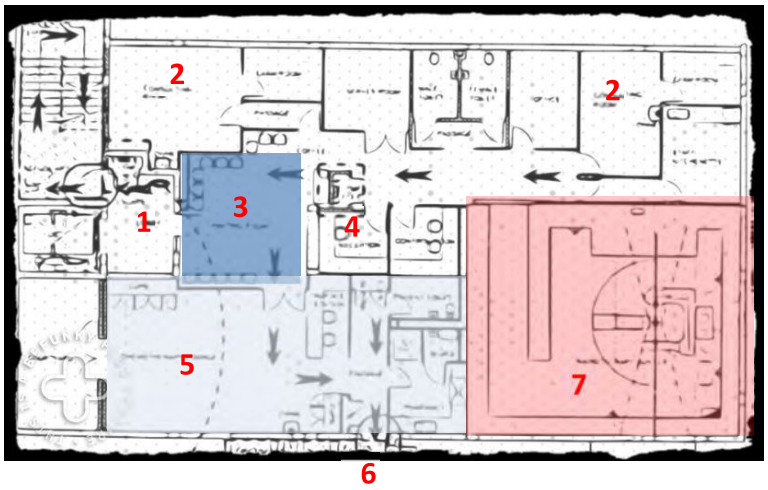
The building's spirituality is enhanced by its natural conditions, including changing light and surface topography. The dynamic backdrop of the sky creates a sense of wonder and awe for visitors, as they observe the interplay of light and shadows on the building's surfaces.

1 - VIEWS TO NATURE AND DISTANT PROSPECT. EXPANSIVE VIEWS OF SKY AND NATURAL LIGHT CONDITIONS
2 - DOMESTIC SCALED ROOF DESIGN
3 - HUMAN SCALED 2 STOREY HEIGHT
4 - WATER ELEMENT
5 - VOLUMETRIC INTERPLAY

Figure 111: Image showing the building in its natural context (Source: Author 2023)

The hospital's oncology department, located on the lower level, offers radiation therapy to cancer patients, however, this location has limitations, including limited access to nature and the external world, lack of patient privacy in the reception area which is open to the waiting area, and a lack of natural light and ventilation. These issues can lead to feelings of isolation and stress among patients and staff.

Figure 112: Image showing areas for social connection along access passages immersed in sunlight (Source: Author 2023)



1 – SUB FOYER
2 – EXAM AND CONSULTATION
3 – WAITING AREA
4 - RECEPTION
5 – INFUSION SUITE
6- ACCESS TO OUTDOOR GARDEN
7 – RADIATION THERAPHY BUNKER

Figure 113: Plan of oncology department on the lower floor (Source: Author 2023)

The chemotherapy infusion suites offer patients access to an external recovery garden, enhancing their well-being and healing. The layout fosters a sense of support among patients, allowing them to socialize and cope with challenges during treatment. This positive feature contributes to their overall well-being.

Figure 114: Image showing the chemotherapy healing garden linked to infusion suites (Source: Author 2023)

Figure 115: Image showing the chemotherapy healing garden linked to infusion suites (Source: Author 2023)

Figure 116: Image showing the roof garden used as a area of respite by patients and staff (Source: Author 2023)

4.2.3.3 **Sensory Variability and Wellbeing**

The central atrium features a spatial hierarchy with the clerestory as the dominant volume, allowing for an innovative interplay of shadows and sunlight penetration. Sunlight shadows change throughout the day, creating a sense of time and rhythm for users, offering a unique experience at different times of the day. The dynamic interaction of light and shadow in the space enhances the patient's sensory experience by creating an ever-changing and captivating environment.

The use of natural materials like timber floors and stone cladded columns in a space creates a connection to nature, evoking visual and haptic senses through their form, texture, and materiality, thereby enhancing the overall aesthetic appeal. The building features sun-lit areas, providing thermal variability felt through the skin's haptic sense, and shaded areas, offering patients private areas of contemplation and self-reflection. This creates thermal variability and provides respite and reflection.

4.3 **CONCLUSION**

The Hillcrest Private Hospital enhances mental health by incorporating nature and its experiences, which has been proven to reduce depression and anxiety. The hospital's design includes interventions like nature integration and sensory stimulation, providing a supportive environment with gentle distractions and cognitive engagement. The non-stereotypical, resort-like setting allows patients to relieve anxiety through gentle distractions. The building's scale and tiled roof create a homely feel, addressing patients' psychological needs and adding comfort to an institutional clinical environment.

CHAPTER 5 | RESEARCH FINDINGS

CHAPTER 5 | RESEARCH FINDINGS

5.1 **INTRODUCTION**

This chapter analyses empirical data from the interview questionnaires which were designed to gather insights from key informants who possess expertise and experience in healthcare spaces. The 20 participants were carefully selected based on their extensive knowledge and involvement in the field and were selected across three categories:

1. Healthcare professionals who are immersed in a healthcare environment daily. The category was subdivided into professional practising doctors and professional nurses. Doctors with over 20 years of practice include general practitioners, neurosurgeons, gastroenterologists, and senior scientists involved in HIV research. Nurses, selected from a case study site, have at least 5 years of practice and are actively involved in patient care.
2. Built environment design experts who have extensive experience in healthcare facilities design. Respondents in this category includes architects and a professional health technologist, who have worked on healthcare facilities and have knowledge of primary healthcare design.
3. Members of the public who have required medical attention, been actively exposed to healthcare environments and who have previously been admitted to a healthcare facility.

The questionnaire examines the psychological impact of healing environments on respondents, testing literature review findings, and identifying shortcomings in existing spaces, identifying self-healing potential elements in built form. The analysis will be categorized as follows:

1. Holistic Responses to Healing Therapeutic Healing Environments
2. Nature and Healing
3. Shortcomings

5.2 FINDINGS AND DISCUSSION

5.2.1 HOLISTIC RESPONSES TO HEALING

5.2.1.1 Participants Interpretation Of Healing

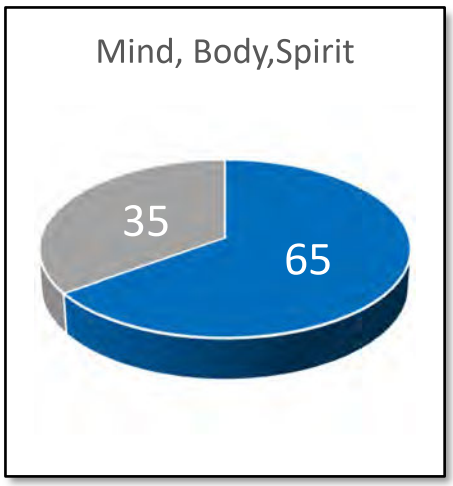


Figure 17: Participants perception of healing (Source: Author, 2023)

The researcher surveyed participants regarding their perception of healing and their preferences for an ideal environment. 65% agreed that a balance between the mind, spirit, and body is essential for holistic healing. This highlights the interconnectedness between mental, spiritual, and physical well-being. A comprehensive approach addressing all aspects of an individual's being is crucial for optimal health outcomes. Factors contributing to healing and overall wellbeing include safety, comfort, and a healthy environment that integrates spirituality.

5.2.1.2 Healing Environment

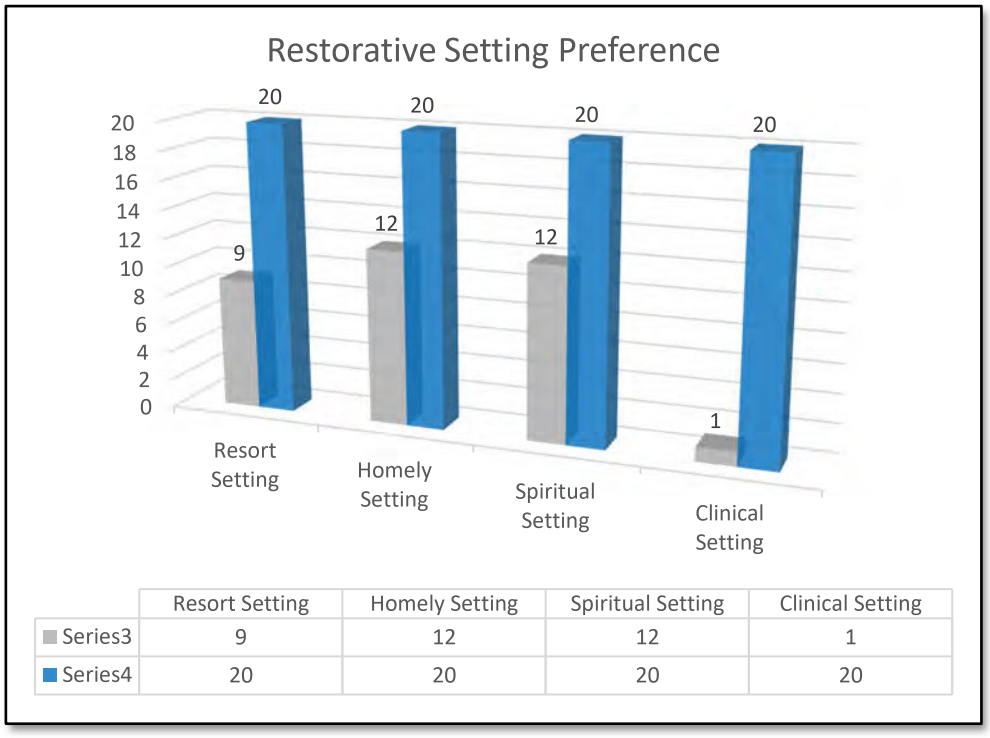
The participants were asked to explain their ideal setting for healing. Their responses emphasized the importance of incorporating biophilic elements to create a soothing and calming atmosphere that promotes healing. They believed that access to natural light and ventilation not only enhances the overall ambiance but also contributes to improved air quality and a sense of connection with the outdoors. Additionally, the presence of greenery and views to nature was seen as essential for reducing stress, promoting relaxation, and fostering a sense of tranquillity in the healing environment. Ease of access, comfort and a homely non-sterile environment were additionally identified as rejuvenating. They also highlighted the significance of a comfortable and homely non-sterile environment, which created a sense of warmth and tranquillity that further contributed to the overall rejuvenation experience.

5.2.1.3 **Emotional Responses To Healing Environments**

A common theme amongst respondents in response to emotional barriers in existing healthcare environments, was identified as difficult wayfinding which caused feelings of fear and anxiety. Additionally, participants expressed frustration with complicated floor layout design, leading to confusion and a sense of being lost. This not only heightened their stress levels but also hindered their ability to navigate the healthcare facility efficiently.

5.2.1.4 **Preference For A Therapeutic Environment**

Participants agreed that physical environments can increase stress and anxiety, and identified their ideal healing environment as a homely, resort-style spiritual setting. Traditional clinical settings evoked fear and a prison-like atmosphere, hindering relaxation and healing. They desired comfortable spaces that promote social interaction and support from healthcare professionals and patients. Responses are shown in the following graph.



	Resort Setting	Homely Setting	Spiritual Setting	Clinical Setting
Series3	9	12	12	1
Series4	20	20	20	20

Figure 118: Graph depicting the participants ideal restorative setting (Source: Author, 2023)

5.2.1.5 **Psychological Experience Of Place**

The study found that confusing navigation, lack of natural light, and ventilation caused disorientation, frustration, and increased anxiety among participants, while also contributing to a sense of claustrophobia and unease.

5.2.1.6 **Wellbeing**

The following elements were found to have a positive influence on participants psychological and emotional wellbeing:

- access to nature
- natural daylight and sunlight
- external views onto nature
- sensory design integration (taste, touch, smell, sight, hearing)
- Considering the patients experience of place.
- Built form features and elements that attract the eye and cause interest.
- positive distractions

5.2.2 **NATURE AND HEALING**

5.2.2.1 **Natural Elements**

70% of respondents believe biophilic elements like natural light, fresh air, and greenery are beneficial for healing environments and therapeutic, enhancing physical and mental well-being. They believed that the presence of natural elements helped reduce stress and anxiety levels, promoting a sense of calmness and relaxation. Moreover, participants mentioned that having access to biophilic elements created a connection to nature, which enhanced their overall mood and created positive emotions.

5.2.2.2 **Biophilic Integration**

Respondents noted feelings such as calmness and relaxation after experiencing a recovery room with a view of nature. Nature distracted participants from any discomfort or anxiety they may have been feeling, improving their recovery experience. As well as restorative elements, participants identified the following as beneficial to psychological wellbeing. During the recovery process, participants expressed that being able to see and connect with nature reduced stress and promoted relaxation. In their view, these elements led to mental health improvement and tranquillity.

5.2 **SHORTCOMINGS**

Respondents in healthcare environments identified shortcomings like lack of natural light, limited outdoor space access, and lack of greenery. They emphasized the need for natural light, open spaces, and incorporating plants and natural materials to create a soothing atmosphere during recovery and recovery.

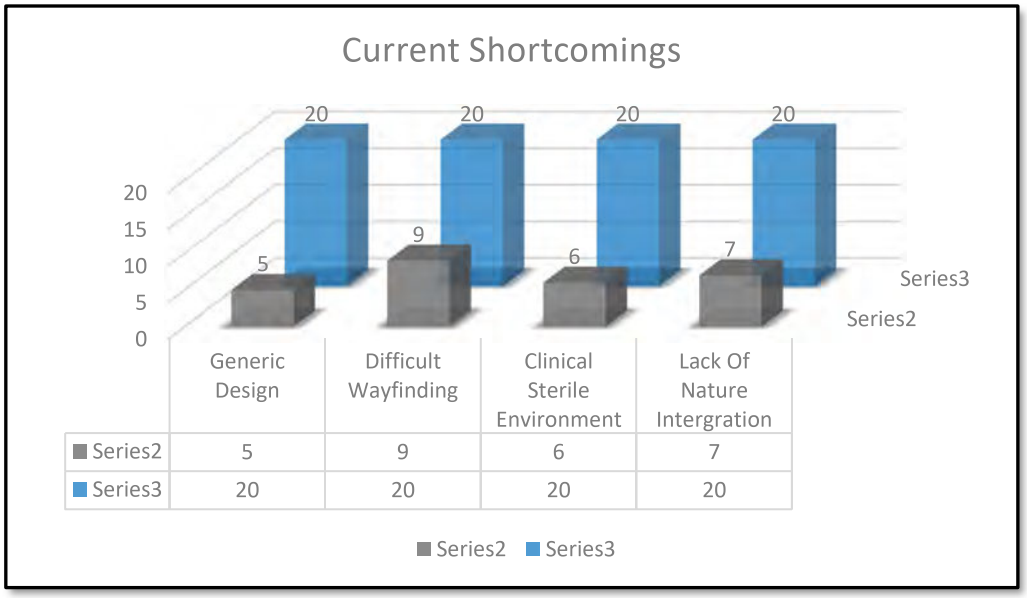


Figure 119: Graph depicting current shortcomings as identified by the research participants (Source: Author, 2023)

5.3 **CONCLUSION**

Holistic healing environments prioritize ease of wayfinding and integration of nature with natural light and ventilation. These elements enhance patient well-being, support recovery, and create a soothing atmosphere. Incorporating nature also reduces stress levels and accelerates healing times. Healthcare layouts with long dark passages and a clinical institutional feel can evoke negative emotions, while a homely, spiritual, and resort-like atmosphere can elicit positive emotions and be considered therapeutic and rejuvenating. To create healing environments, prioritize ease of navigation and incorporate natural elements like light and ventilation. This approach can enhance patient experience.

CHAPTER 6 | CONCLUSIONS AND RECOMENDATIONS

CHAPTER 6 | **CONCLUSIONS AND RECOMMENDATIONS**

6.1 **INTRODUCTION**

This chapter extracts design guidelines for an Oncology Centre that prioritizes holistic healing principles. It emphasizes the importance of creating a calming environment that promotes relaxation and emotional well-being. The concept of holistic healing and theories of Environmental Psychology and Neuroscience provide a strong foundation for understanding the relationship between the environment and human well-being. By integrating these concepts with primary and secondary data research, principles promoting holistic healing can be developed. The research objectives are addressed by revisiting research questions and drawing conclusions based on the analysis and findings. A critical analysis and summarization of findings form the foundation for establishing guiding design principles.

6.2 **CONCLUSIONS OF RESEARCH**

The research indicates that healthcare environments play a crucial role in holistic healing for oncology patients. Current models often overlook patient psychological well-being and holistic healing processes in radiation therapy settings. Integrating these approaches can improve patient outcomes and healing. By incorporating holistic principles, a comprehensive, patient-centred approach can be created, promoting holistic healing for oncology patients.

Based on the primary and secondary data collection and analysis, the following conclusions are drawn:

Cancer diagnosis can significantly impact mental health, leading to stress, depression, and anxiety, affecting treatment and recovery (Gil et al., 2012:362). Lower- and middle-income cancer patients face additional challenges, and stigma can exacerbate these issues. The outcomes of cancer treatment depend on various factors, including the patient's psychological condition. Therefore, reducing stress during recovery is crucial to create a holistic healing environment that considers the patient's mind, body, and spirit.

Holistic healing is a holistic approach that focuses on physical health, mental, emotional, and spiritual harmony for overall well-being. Healthcare design should consider spirituality to create environments that support physical healing, promote tranquillity, and foster spiritual growth. Sensory design, particularly in oncology settings, can significantly influence holistic healing by incorporating positive stimuli like nature, integration, tactility, materiality, natural light, shadow, and calming sounds. Neuroscience helps understand brain interconnections and feedback systems, relating built forms to human function and behavioural outcomes. Architectural elements like lighting, spatial layout, and materials impact brain activity and cognitive processes, guiding architects in creating therapeutic healing environments.

The precedent study presents three natural environments, showcasing their responsiveness to human behaviour, and highlights shortcomings in radiation therapy treatment environments. It emphasizes the need for a more patient-centred approach, creating a comfortable and supportive environment for patients.

The case study explores the use of a non-stereotypical medical facility atmosphere to create a holistic healing environment for cancer patients. It highlights the benefits of incorporating nature into oncology wards, as natural elements like plants, sunlight, and outdoor garden views can reduce stress, improve mood, and aid in healing. The study also highlights the importance of integrating the mind, body, and spirit for healing. Current healthcare facilities face shortcomings such as difficult wayfinding, a clinically sterile environment, lack of nature, and a generic layout.

The research has revealed insight into the research questions by highlighting the following:

Where is the relationship between architecture and holistic healing environments in evoking psychological wellbeing?

The relationship between architecture and holistic healing in evoking psychological wellbeing is complex and multifaceted. The research has revealed that integrating nature into the built form can have positive effect on psychological wellbeing. For example, as per the attention restoration theory and stress reduction theory, a nature immersed environment can restore exhausted cognitive resources as well as have stress reducing benefits by simply viewing and

engaging with nature. The natural distraction provided by a window in a recovery room, provides a direct connection to nature for patients fostering hope and optimism with physiological benefits of reduced recovery times and lesser reliance on pain medication. (Ulrich et al., 2019:3). This highlights the importance of integrating biophilic design principles in healthcare settings to enhance patients outcomes and overall wellbeing.

How can multi-sensory variability in the built form stimulate physiological and psychological wellbeing?

Multi-sensory variability in built forms can enhance physiological and psychological well-being by engaging multiple senses simultaneously. Architects and designers can create holistic environments with natural light, spatial volume, and tactile materials, promoting relaxation, reducing stress, and improving patient outcomes. Architecture's qualities, including scale and space, are sensed, and evaluated by various sense organs, allowing patients to fully immerse themselves in their surroundings. This holistic sensory engagement enhances their understanding of space and architecture, contributing to their emotional and psychological well-being, and emphasizes the importance of sensory engagement in architecture. Furthermore, the integration of sensory elements in architecture can also enhance memory and cognitive function, creating a more impactful and memorable experience for patients and visitors. (Reghukumar; 2019:98)

The use of natural light, colours, and tactile materials in cancer care environments enhances the healing experience and promotes a holistic approach. The integration of daylight improves emotional wellbeing, while light and spaciousness provide relaxation and stimulation through sense enhancing architecture, thereby enhancing a patients' psychological well-being.

Could natural elements act as a catalyst to healing in restorative environments?

Natural environments offer physiological, emotional, and attention restoration, reducing stress symptoms, eliciting calming responses, and enhancing cognitive performance, particularly in attention tasks.

The research has revealed that designing healthcare facilities with natural elements, such as natural light, green spaces, and outdoor access, can enhance patient outcomes and overall well-being through evolutionary therapeutic influences such as natural light, views of green spaces, and access to outdoor areas. These elements have been shown to reduce stress,

anxiety, and pain while promoting faster healing times and overall satisfaction with care therefore improving patient outcomes and overall well-being. Therefore natural elements integrated into the built form could act as a catalyst to natural healing processes, creating a more holistic and healing environment for patients. By incorporating these elements into healthcare design, facilities can better support the physical and emotional needs of patients, ultimately leading to improved health outcomes.

What are the design principles needed to define architectural principles that stimulate healing and demonstrate holism through a proposed healthcare model for oncology?
The design principles needed to define architectural principles that stimulate healing and demonstrate holism through a proposed oncology centre, should incorporate natural elements and biophilic integration, such as green spaces and natural lighting, to create a calming environment for patients. The layout should be easy to navigate and minimize stress, prioritizing multi-sensory stimulation for patient recovery. Social support considerations, such as comfortable seating areas and private spaces, can further contribute to the calming atmosphere. Key themes include creating a supportive environment, integrating multi-sensory stimulation, creating a sense of disengagement and a sense of being away, and addressing key findings like stereotypical archetypes, complicated wayfinding, shapes and forms, and biophilic integration.

Therefore the research objectives have been adequately achieved, demonstrating the effectiveness of the proposed methodology and providing valuable insights into the research aim of exploring the psychological impact of architecture on holistic healing and wellbeing. The findings of this study can be used to inform future architectural designs aimed at promoting wellness and healing in cancer care environments. Additionally, the results highlight the importance of considering psychological factors in architectural planning to enhance overall wellbeing for individuals. Furthermore, this research highlights the need for collaboration between architects and healthcare professionals to create environments that prioritize the mental health of patients.

6.3 **DESIGN RECOMMENDATIONS**

The recommendation is to adopt a patient-centred design approach in healthcare design, prioritizing patients' psychological, physiological, and spiritual needs. This approach ensures facilities and services align with patients' holistic well-being, promoting healing and comfort. It aims to create environments that cater to patients' emotional and spiritual needs, enhancing their overall experience. The recommendations are as follows:

Figure 120 : Schematic of café encouraging social interaction (Source: Author,2023)

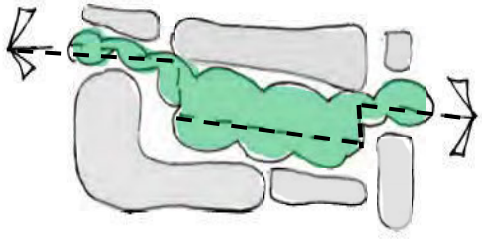


Figure 121 : Schematic of ideal wayfinding routes (Source: Author,2023)

Figure 122 : Spirituality element (Source: Author,2023)

- Social Support

Social support areas, including communal spaces and shared amenities, can foster community and patient connections by encouraging sharing experiences, learning from others, and promoting a sense of belonging and empowerment.

- Wayfinding

To a central orientation element like landmarks or a central circulation spine which incorporates natural lighting and open spaces for visual cues, enhances wayfinding. Dark passages and complex floor plans should be avoided.

- Spirituality

The building design should incorporate spiritual elements like volumetric interplay and light and shadow play to create a serene atmosphere, enhancing the spiritual experience for patients. The use of natural materials and organic forms can further enhance this ambiance. Play of light and shadow to create a captivating and dynamic visual experience.

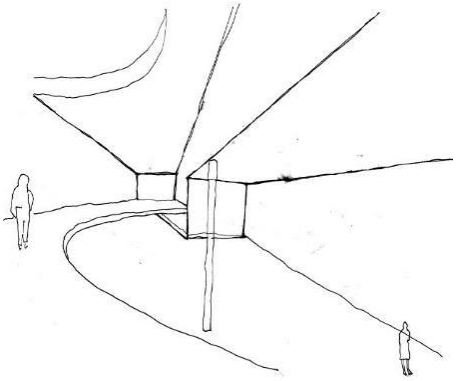


Figure 123 : Interplay of spatial volumes evoking spirituality (Source: Author,2023)

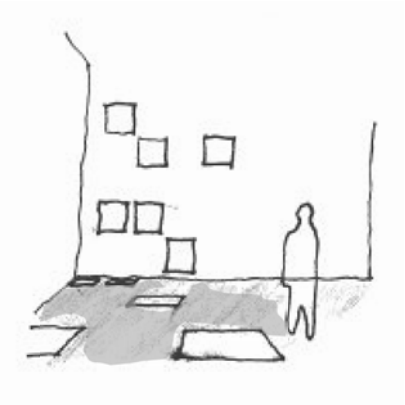


Figure 124: Interplay light and shadow evoking spirituality (Source: Author,2023)

- Natural shapes and forms.

Provide natural shapes and forms and avoid parallel lines and bilateral symmetry.

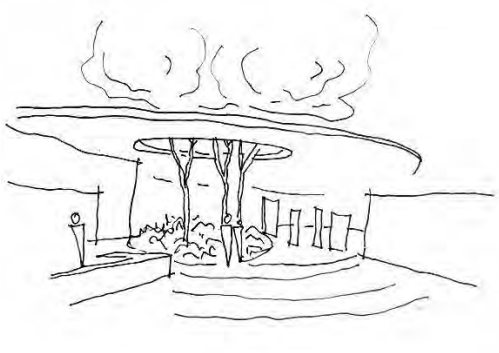


Figure 125 : Schematic of a decentralized waiting area (Source: Author,2023)

- Decentralized waiting and breakaway areas

A design approach combining privacy and social connections in decentralized waiting and breakaway areas for patients aimed to provide a holistic healing experience.

- Biophilic elements.

Biophilic design principles, such as natural light, greenery, ventilation, and views, can create a calming, healing environment, reducing stress and improving mood. Green courts and healing gardens provide social support, relaxation, and physical activity.

Forms that exploit natural prevailing breezes, specifically South West and North East, promote natural ventilation, maximizing fresh air flow and creating a comfortable indoor environment.

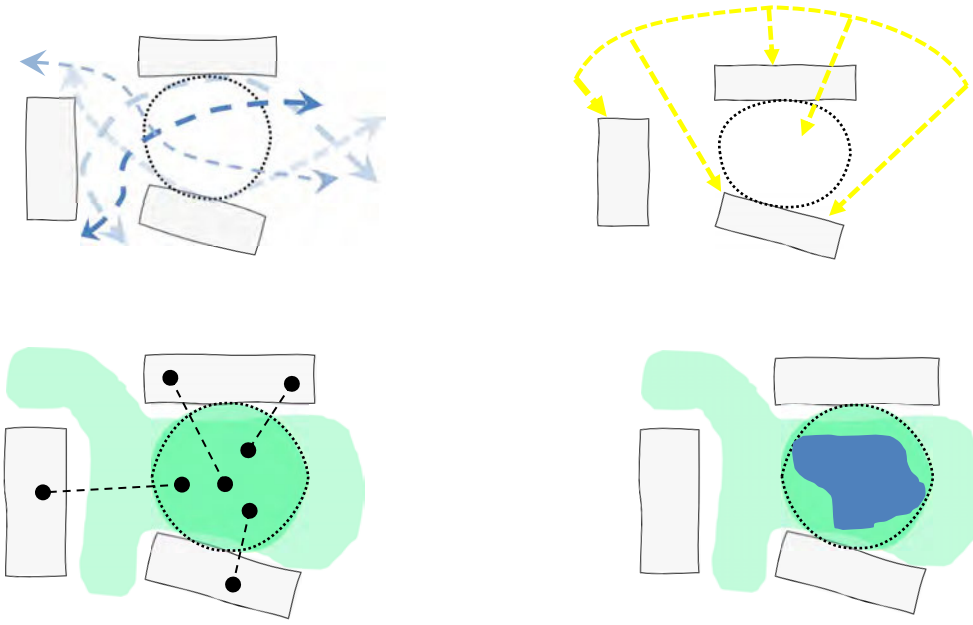


Figure 126 : Schematic showing integration of biophilic elements (Source: Author,2023)

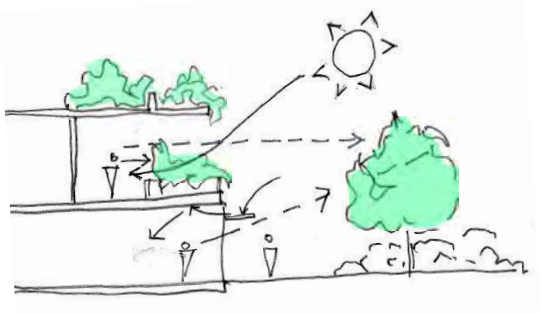


Figure 127 : Schematic showing views to nature and natural light ingress.
(Source: Author,2023

Form and orientation that respond to natural climatic conditions maximizing natural light and sunlight. The use of nature and greenery creates an immersive environment, offering natural distractions and a sense of isolation, effortlessly captivating the senses.

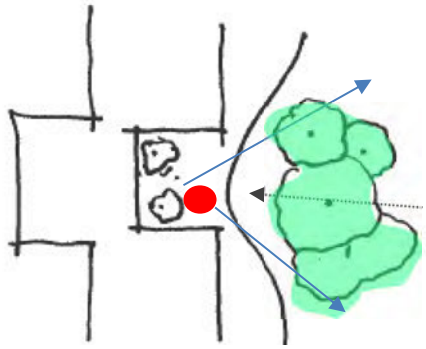


Figure 128 : Schematic showing prospect and refuge (Source: Author,2023)

- Prospect and Refuge

Provide areas of prospect and refuge that create spaces of respite and retreat which allow patients and staff to relax and cope with the stress and anxiety faced.

Comfortable elements to encourage people to seek refuge and enjoy the surrounding environment.

- Scale

  Domestic scaled forms that encourage familiarity and comfort

- Radiation therapy

  By incorporating elements of nature in the layout design such as greenery and natural light, patients can feel a sense of tranquillity and connection to the outdoors during their

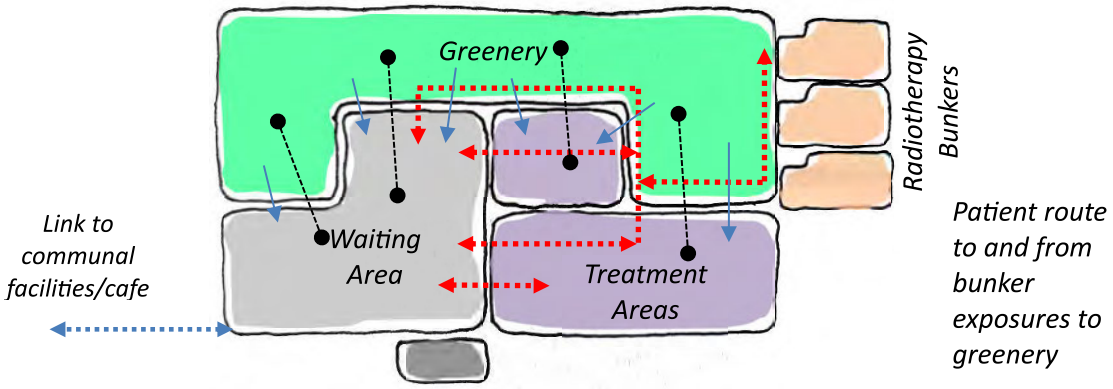


Figure 129 : Integration of greenery and nature in a radiotherapy suite (Source: Author,2023)

journey. This integration can help alleviate any feelings of anxiety or stress, promoting a more positive and soothing experience for patients undergoing radiotherapy.

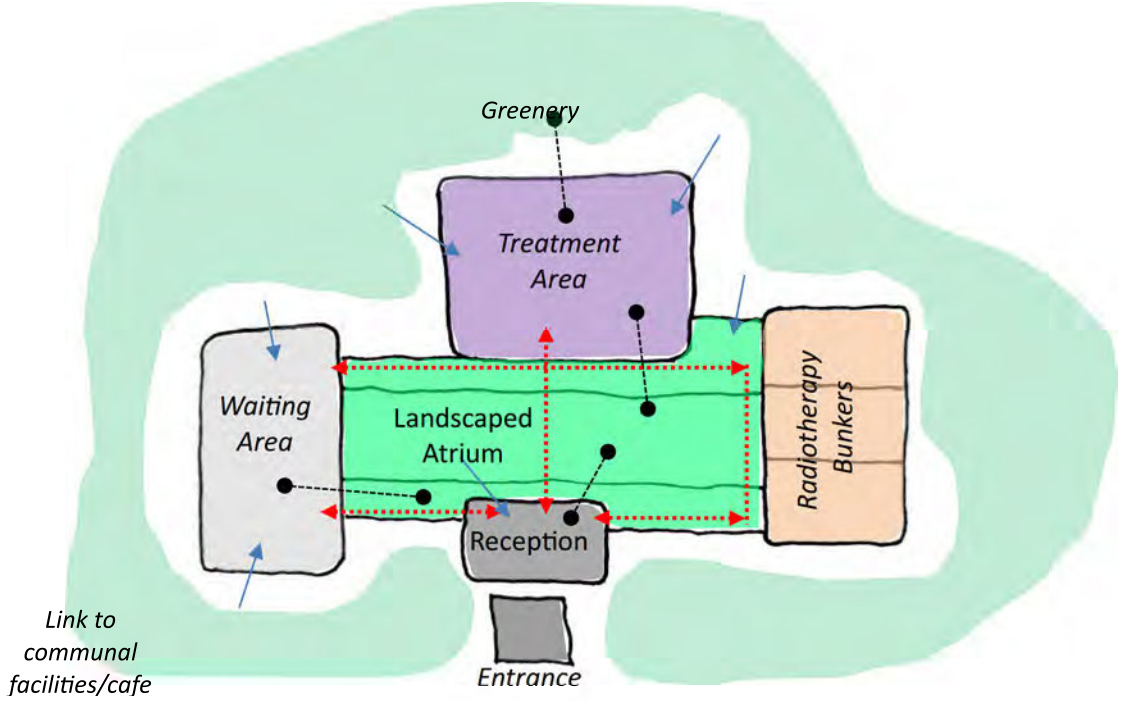


Figure 130 : Integration of atrium with greenery and nature in a radiotherapy suite (Source: Author,2023)

- Chemotherapy

  Chemotherapy wards should be North-oriented, offering natural light, ventilation, and natural views. They should be a spa-like setting with communal and private zones, healing breakaway gardens, and communal spaces.

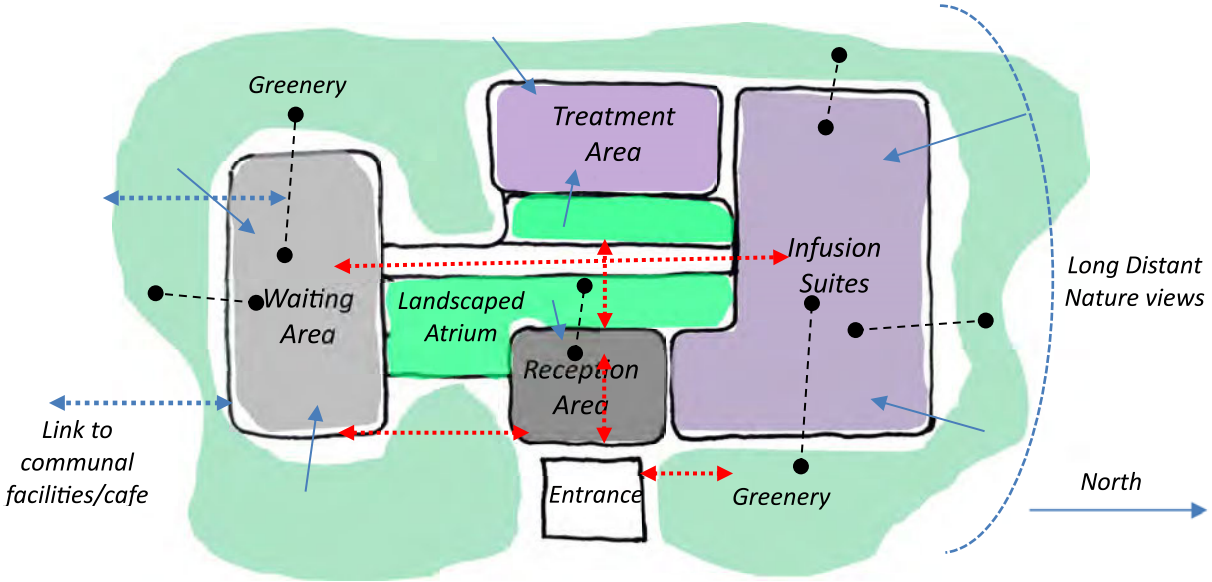


Figure 131 : Integration of atrium with greenery and nature in a chemotheraphy suite (Source: Author,2023)

This design improves patient well-being, mood, and recovery. Decentralizing nursing stations improves patient care and treatment delivery efficiency, reducing stress and anxiety.

- Home-like comforts

  Patients should be provided with home-like comforts, including social privacy, physical comfort, and personalization through lighting, temperature, noise, furniture, and entertainment options.

- Provide a resort like atmosphere by incorporating soothing and calming elements.

- Site selection criteria should consider the following therapeutic qualities:
  - Trees and greenery on and surrounding the site
  - scenic views out onto nature and natural landscapes
  - access to sunlight
  - open space
  - calm and inviting atmosphere.
  - public access for social interaction

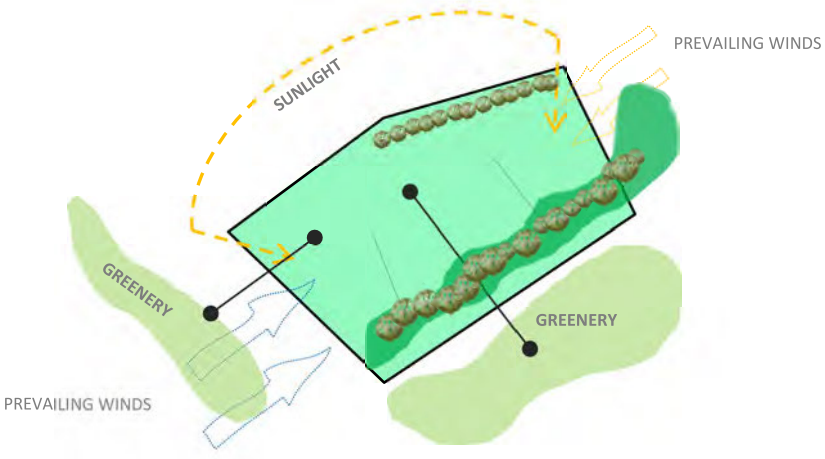


Figure 132 : Schematic of ideal site selection criteria (Source: Author,2023)

6.4 CONCLUSION

In designing oncology environments that evoke holistic healing, the above research-derived suggestions could be used as guidelines while considering individual information, restrictions, and study findings. These guidelines should not be considered rigid rules, but rather flexible principles that can be adapted to specific contexts and individual requirements. In addition, oncology environments should be evaluated regularly, and feedback should be sought from patients, caregivers, and health professionals to ensure their effectiveness in promoting holistic healing. The research has highlighted the need for ongoing collaboration between architects, healthcare professionals, and patients to create oncology environments that prioritize patient comfort and well-being. In addition, the results of the study emphasize the importance of including natural elements in a design to enhance psychological well-being and reduce stress levels among patients.

REFERENCES | LIST OF REFERENCES

REFERENCES

Books

- Appel-Meulenbroek, R. & Danivska, V. 2021. *A Handbook of Theories on Designing Alignment between People and the Office Environment,* London, Routledge.
- Cortright, B. 2021. *Holistic Healing for Anxiety, Depression, and Cognitive Decline,* USA, Psyche Media.
- Dal Co, F. & Ando, T. 1997. *Tadao Ando Complete Works,* London, Phaidon.
- Day, C. 2002. *Spirit & Place : Healing Our Environment, Healing Environment,* Oxford, Architectural Press.
- Gesler, W. M. 2003. *Healing Places,* USA, Rowman & Littlefield.
- Gharipour, M. 2021. *Health and Architecture, the History of Spaces of Healing and Care in the Pre-Modern Era,* Delhi, Bloomsbury Publishing.
- Hollander, J. B. & Sussman, A. 2020. *Urban Experience and Design: Contemporary Perspectives on Improving the Public Realm,* New York, Taylor & Francis.
- Kanaani, M., Kopec, D 2015. *The Routledge Companion for Architecture Design and Practice,* New York, Routledge.
- Kaplan, R. & Kaplan, S. 1995. *The Experience of Nature: A Psychological Perspective,* New York, Cambridge University Press.
- Kellert, S.,Heerwagen, J. H. & Mador, M. 2008. *Biophilic Design the Theory, Science, and Practice of Bringing Buildings to Life,* Canada, Wiley.
- Mallgrave, H. F. 2010. *The Architect's Brain : Neuroscience, Creativity, and Architecture,* West Sussex, U.K., Wiley.
- Maslow, A. H.,Maslow, B. G. & Geiger, H. 1993. *The Farther Reaches of Human Nature,* USA, Penguin Publishing Group.
- Mccullough, C. 2010. *Evidence Based Design for Healthcare Facilities,* USA, Sigma Theta Tau International.
- Pagliano, P. J. 2012. *The Multisensory Handbook: A Guide for Children and Adults with Sensory Learning Disabilities,* London, Routledge.

- Pallasmaa, J. 2012. *The Eyes of the Skin : Architecture and the Senses,* United Kingdom, Wiley.
- Robinson, S. & Pallasmaa, J. 2015. *Mind in Architecture Neuroscience, Embodiment, and the Future of Design,* USA, The MIT Press.
- Shealy, C. 2016. *Blueprint for Holistic Healing,* USA, ARE Press.
- Steg, L.,Van Den Berg, A. E. & De Groot, J. I. M. 2012. *Environmental Psychology: An Introduction,* USA, Wiley.
- Sullivan, W. 2014. Attention Restoration and Stress Reduction: Two Mechanisms Underlying the Health Benefits of Exposure to Green Spaces. *ACES (A Community on Ecosystem Services) conference.* Washington, D.C.
- Sussman, A. & Hollander, J. 2014. *Cognitive Architecture: Designing for How We Respond to the Built Environment,* New York, Routledge.
- Ventegodt, S.,Kandel, I.,Ervin, D. & Merrick, J. 2016. Concepts of Holistic Care. *Healthcare for People with Intellectual and Developmental Disabilities.* Switzerland: Springer.

Journal Articles / Research Papers

- Aikman, N. 2019. The Crisis within the South African Healthcare System: A Multifactorial Disorder. *South African Journal of Bioethics and Law,* 12**,** 52.
- Alexander, R.,Aragón, O.,Bookwala, J.,Cherbuin, N.,Gatt, J.,Kahrilas, I.,Kästner, N.,Lawrence, A.,Lowe, L.,Morrison, R.,Nusslock, R.,Mueller, S.,Papadelis, C.,Polnaszek, K.,Richter, S.,Silton, R. & Styliadis, C. 2020. The Neuroscience of Positive Emotions and Affect: Implications for Cultivating Happiness and Wellbeing. *Neuroscience & Biobehavioral Reviews,* 121.
- Annemans, M.,Audenhove, C.,Vermolen, H. & Heylighen, A. 2012b. What Makes an Environment Healing? Users and Designer About the Maggie's Cancer Caring Centre London. *8th International Design and Emotion Conference.* London.
- Berto, R. 2014. The Role of Nature in Coping with Psycho-Physiological Stress: A Literature Review on Restorativeness. *Behavioral sciences (Basel, Switzerland),* 4**,** 394-409.

- Bower, I.,Tucker, R. & Enticott, P. 2019. Impact of Built Environment Design on Emotion Measured Via Neurophysiological Correlates and Subjective Indicators: A Systematic Review. *Journal of Environmental Psychology,* 66.
- Cairncross, L. 2021. Cancer on the Global Stage: Incidence and Cancer-Related Mortality in South Africa. *The Asco Post* [Online].
- Chaoul, A.,Milbury, K.,Sood, A.,Prinsloo, S. & Cohen, L. 2014. Mind-Body Practices in Cancer Care. *Current oncology reports,* 16**,** 417.
- Chitha, W.,Swartbooi, B.,Jafta, Z.,Funani, I.,Maake, K.,Hongoro, D.,Godlimpi, L.,Mnyaka, O.,Williams, N.,Buthi, L.,Kuseni, S.,Zungu, C.,Sibulawa, S.,Mavimbela, A.,Giwu, O.,Mabunda, S. & Essel, V. 2022. Model of Delivery of Cancer Care in South Africa's Eastern Cape and Mpumalanga Provinces: A Situational Analysis Protocol. *BMJ open,* 12**,** e058377.
- Cho, M. & Kim, M. J. 2017. Measurement of User Emotion and Experience in Interaction with Space. *Journal of Asian Architecture and Building Engineering,* 16**,** 99-106.
- Coburn, A., Vartanian, O., & Chatterjee, A. 2017. Buildings, Beauty, and the Brain: A Neuroscience of Architectural Experience. *Journal of Cognitive Neuroscience,* 29 (9)**,** 1521-1531.
- Corazon, S.,Sidenius, U.,Poulsen, D.,Gramkow, M. & Stigsdotter, U. 2019. Psycho-Physiological Stress Recovery in Outdoor Nature-Based Interventions: A Systematic Review of the Past Eight Years of Research. *International journal of environmental research and public health,* 16.
- De Villiers, K. 2021. Bridging the Health Inequality Gap: An Examination of South Africa's Social Innovation in Health Landscape. *Infectious Diseases of Poverty,* 10**,** 19.
- Drury, C. & Hunter, J. 2016. The Hole in Holistic Patient Care. *Open Jounal Of Nursing,* 6.
- Dubose, J.,Macallister, L.,Hadi, K. & Sakallaris, B. 2016. Exploring the Concept of Healing Spaces. *HERD: Health Environments Research & Design Journal,* 11**,** 43-56.
- Eberhard, J. 2009. Brain Landscape: The Coexistence of Neuroscience and Architecture. *Brain Landscape: The Coexistence of Neuroscience and Architecture***,** 1-280.

- Edwards, L. & Greeff, L. 2017. Exploring Grassroots Feedback About Cancer Challenges in South Africa: A Discussion of Themes Derived from Content Thematic Analysis of 316 Photo-Narratives. *Pan African Medical Journal,* 28.
- Gavarkovs, A. 2016. Nature-Based Physical Activity Advertising: Recommendations Based on Attention Restoration Theory and Psychoevolutionary Theory. *Western Undergraduate Research Journal Health and Natural Sciences,* 6**,** 1-9.
- Ismalia, R. & Djimantoro, M. I. 2020. Creating Healing Environment in Cancer Rehabilitation Centre: A Comparison Study. *IOP Conference Series: Earth and Environmental Science,* 426**,** 1-9.
- Jasemi, M.,Valizadeh, L.,Zamanzadeh, V. & Keogh, B. 2017. A Concept Analysis of Holistic Care by Hybrid Model. *Indian J Palliat Care,* 23**,** 71-80.
- Katuu, S. 2018. Healthcare Systems: Typologies, Framework Models, and South Africa's Health Sector. 23**,** 134-148.
- Manyisa, Z. & Van Aswegen, E. 2017. Factors Affecting Working Conditions in Public Hospitals: A Literature Review. *International Journal of Africa Nursing Sciences,* 6.
- Maphumulo Wt, B. B. 2019. Challenges of Quality Improvement in the Healthcare of South Africa Post-Apartheid: A Critical Review. *Curationis***,** 1-9.
- Mcmahan, E. A. & Estes, D. 2015. The Effect of Contact with Natural Environments on Positive and Negative Affect: A Meta-Analysis. *The Journal of Positive Psychology,* 10**,** 507-519.
- Michalec, S.,Dickinson, J. I.,Sullivan, K.,Machac, K. & Cline, H. 2018b. Cancer Treatment Facilities: Using Design Thinking to Examine Anxiety and the Patient Experience. *Journal of Interior Design,* 43**,** 3-20.
- Ndebele, N.,Mlambo, V. H.,Molepo, J.,Za & Leo, S. 2022. The South African Health Sector and the World Health Organization South Africa's Health Sector and Its Preparedness for the National Health Insurance (Nhi): Challenges and Opportunities. 334-350.
- Ohly, H.,White, M. P.,Wheeler, B. W.,Bethel, A.,Ukoumunne, O. C.,Nikolaou, V. & Garside, R. 2016. Attention Restoration Theory: A Systematic Review of the Attention Restoration Potential of Exposure to Natural Environments. *Journal of Toxicology and Environmental Health, Part B,* 19**,** 305-343.

- Periyandavar, M. 2013. The Impact of the Physical Environment on Patient's Psycho-Social Perception. *EAEA-11 conference 2013*, 233-241.
- Reghukumar, A. 2019. Sense and Sensitivity in Architecture – the Use of Five Senses in Space Making. *International Research Journal of Architecture and Planning,* 4, 97-101.
- Sakallaris, B. R.,Macallister, L.,Voss, M.,Smith, K. & Jonas, W. B. 2015. Optimal Healing Environments. *Global Advances in Health and Medicine,* 4, 40-45.
- Spence, C. 2020. Senses of Place: Architectural Design for the Multisensory Mind. *Cognitive Research: Principles and Implications,* 5, 46.
- Sreeramareddy, C. & Sathyanarayana, T. 2019. Decentralised Versus Centralised Governance of Health Services. *Cochrane Database of Systematic Reviews*.
- Tekin, B. H. & Urbano Gutiérrez, R. 2023. Human-Centred Health-Care Environments: A New Framework for Biophilic Design. *Frontiers in Medical Technology,* 5.
- Todes, A.,Kok, P.,Wentzel, M.,Zyl, J. V. & Cross, C. 2010. Contemporary South African Urbanization Dynamics. *Urban Forum,* 21, 331-348.
- Ulrich, R.,Cordoza, M.,Gardiner, S.,Manulik, B.,Fitzpatrick, P.,Hazen, T. & Perkins, S. 2019b. Icu Patient Family Stress Recovery During Breaks in a Hospital Garden and Indoor Environments. *HERD: Health Environments Research & Design Journal,* 13, 1-20.
- Van De Ruit, C.,Lahri, S. A. & Wallis, L. A. 2020. Clinical Teams' Experiences of Crowding in Public Emergency Centres in Cape Town, South Africa. *African Journal of Emergency Medicine,* 10, 52-57.
- Van Eeden, R.,Tunmer, M.,Geldenhuys, A.,Nayler, S. & Rapoport, B. L. 2020. Lung Cancer in South Africa. *J Thorac Oncol,* 15, 22-28.
- Wand, H.,Vujovich-Dunn, C.,Derrick, K.,Moodley, J.,Reddy, T. & Naidoo, S. 2023. Geospatial Variations in Socioeconomic Conditions and Health Outcomes in Covid-19 Era: Insights from South Africa (2020–2022). *GeoJournal,* 7, 1-17.
- Weber, D. & O'brien, K. 2017. Cancer and Cancer-Related Fatigue and the Interrelationships with Depression, Stress, and Inflammation. *J Evid Based Complementary Altern Med,* 22, 502-512.

Theses

- Bansi, V. 2017. *Exploring the Role of Healing Spaces in the Metaphysical and Physical Realm. Towards a Place for Meditation in Durban.* Masters, UKZN.
- Blom, M. 2013. *Biophilic Architecture and Its Influence on Human Behaviour and Well-Being.* Masters, UKZN.
- Filipe, E. S. M. 2020. *An Exploration of the Interior Design Process Focusing on the Intrusion of Biophilic Design in the Interiors of a Healthcare Facility to Promote Patient Wellbeing: A Case Study.* Honors, Independent Institute of Education: Vega School.
- Kajee, A. 2019. *Addressing Adolescent Healthcare Environments through Responsive Architecture: A Youth and Community Health Centre for Durban.* Masters, University of Kwazulu-Natal.
- Luckoo, V. S. K. 2011. *Spiritual Practice and Its Influence in Architecture: The Design of a Meditation Centre in Chatsworth.* Masters, University of Kwazulu-Natal.
- Mcginn, R. 2016. *Natural Healing: Physical and Spiritual Healing (in a Powerful and Nurturing Setting).* Master of Architecture, North Dakota State University.
- Moodliar, M. 2011. *The Incorporation of Nature into Architecture as a Healing Aid: A Hydrotherapy Health Centre.* Masters, University of Kwazulu-Natal.
- Osei, Y. 2014. *Exploring Sensory Design in Therapeutic Architecture.* Masters, Carleton University.
- Reddy, S. 2017. *Using Biophilic Design as a Tool for Restorative Architecture, toward a Wellness Centre in Durban.* Masters, University of Kwazulu-Natal.
- Reeves, H. 2012. *Humans Perception and the Built Environment: A Proposed Autism Life Learning Centre for Durban.* Masters, UKZN.
- Sanders, A. 2011. *Biophilia in Architectural Design: A Healthcare and Community Centre for Mpumalanga, Durban.* Masters, University of Kwazulu-Natal.
- Theart, C. 2010. *Sensory Architecture_ Beyond Appearances the Relationship between the Senses and Space.* Masters, University of Pretoria.
- Van Nijhuis, J. 2017. *Healing Environment and Patients' Well-Being.* Masters, Wageningen University.
- Yen, T. S. 2012. *The Practice of Integrated Design: The Case Study of Khoo Teck Puat Hospital, Singapore.* Masters, University of Nottingham.

- Young, M. 2016. *Private Vs. Public Healthcare in South Africa.* Honors, Western Michigan University.

Government Documents

- Maluleke, R. 2000. Cancer in South Africa. *In:* AFRICA, S. S. (ed.). South Africa: Statistics South Africa,.

APPENDICES | ATTACHMENT OF APPENDICES

Appendices
APPENDIX A: INTERVIEW/QUESTIONAIRE SCHEDULE

The following survey helps better understand the relationship between psychological and emotional wellbeing and architectural factors that contribute to the holistic healing process. Please answer all questions honestly, in full and to the best of your ability. Please do not write your name on the schedule.

Profession(Mark with an X):

__Built Environment Professional __Health Care Professional __Holistic Healing Professional

Number of years of experience in the field of expertise:_____

1. What has been your experience with healing environments in particular, KwaZulu-Natal's primary health care system?

2. What are some of the shortcomings in the design of healing environments in particular, KwaZulu-Natal's primary health care system?

3. What is your interpretation of healing? In your opinion, is cohesion between mind body and spirit important for the healing process.

4. Please describe your ideal healing environment

5. Describe your last interaction with a healthcare environment and expand on how the environments made you feel psychologically and emotionally. Elaborate on the design of the environment and its influence on your psychological wellbeing and how it made you feel rather than the reason for being in the environment.

6. What kind of places or architectural environments do you feel are conducive to a therapeutic environment?

		Tick here
1	Resort style setting	
2	Clinical lab like setting	
3	A homely welcoming setting	
4	A spiritual rejuvenating setting	

7. How does the above choice make you feel emotionally?

8. Do you feel that a physical environment or building design in a healthcare setting could add to a person's stress and anxiety? (Mark with an X) Please elaborate.

__Disagree __Neutral __Strong Agreement

9. In your opinion, could the introduction of nature and natural elements (sunlight, daylight, air, landscaping etc) benefit healing environments and create a therapeutic calming place?

		Tick here
1	Disagree	
2	Neutral	
3	Strong Agreement	

10. In your personal experience, how would you feel emotionally and psychologically in a recovery or treatment room that has an external view of nature and a connectedness to the natural world as compared to one that has no views and no connection to the external world.

11. What are some of the factors within a building environment that contribute to your stress levels when entering and finding your way through an unfamiliar building for the first time?

12. What are the elements that could be incorporated into the building design or what kind of environment could alleviate stress and naturally promote healing?

13. Is a person's psychological and emotional experience considered in the healing process or in the design of spaces that heal? If yes, please expand.

14. Can architectural design or architectural spaces affect wellbeing and healing? If yes, please expand.

15. Which of the following is vital to improve a person's psychological state of wellbeing withing a healthcare setting? (Mark with an X)

		Tick here
1	Natural Ventilation	
2	Natural Light	
3	Sunlight	
4	Views of nature / integration of nature	
5	Having a sense of safety and security	
6	Being able orientate and identify with the place	
7	Having a sense of homeliness to the place	

16. In your experience, what are some of the design solutions that patients have responded positively to, that could be implemented which could improve a person's psychological health and wellbeing in terms of providing a therapeutic and healing environment where and a person feels relaxed and spiritually enriched.

_____

_____

_____

17. Please rate the following elements of the built form in a healthcare setting in terms of its influence on stress levels. (Tick according to the rating scale below)

1. Extremely Stressful
2. Very Stressful
3. Moderately Stressful
4. Less Stressful
5. Not Stressful

		1	2	3	4	5
A	Institutional type environment with a typical lab like clinical setting					
B	An environment that creates a homely appeal					
C	Wayfinding in current healthcare environments ie the ease or difficulty of finding our way around					

D	Large volumed areas with little or no natural light or sunlight					
E	Crowded spaces and waiting areas					
F	Treatment and waiting areas that have a view out onto nature and landscaping.					
G	The circulation distance travelled by patients / users					

18. In your professional opinion. Rate the following in terms of its influence on patients psychological and emotional wellbeing. (Tick Negative / positive effect)

		Positive	Negative
A	Having access to nature		
B	Architectural design that takes advantage of natural daylight and sunlight		
C	Architectural design that provides views to the outside and onto nature		
D	That considers and incorporates stimulation of the 5 human senses (tase, touch, smell, sight, hearing)		
E	Considering the patients experience of place		
F	Built form features and elements that attract the eye and cause interest		
G	Built form features and elements that create positive distractions		

19. What elements of the built form do you, in your personal experience, find calming?

_____

_____

_____

20. What elements of the built form do you, in your personal experience, find stressful? Eg. Dark long passages, dimly lit areas etc.

_____

_____

_____

COLLEGE OF HUMANITIES: MASTERS RESEARCH
HSSREC CONSENT FORM

TO BE SIGNED BY THE PARTICIPANT AT THE START OF EACH INTERVIEW /QUESTIONAIRE

One copy of the form to be left with the respondent; one copy to be signed by the respondent and kept by the researcher.

Dear Participant,

I, Nirdosh Hemraj Ramjiawan (Student number: 221119165),
am currently a Masters candidate studying at the
University of KwaZulu-Natal, Howard College Campus, Durban.

I am currently undertaking research on a project entitled:

An Architectural Response To Holistic Healing:
Towards an Alternative Healing Facility in Kwadukuza, Kwazulu-Natal

The aim of the research is to explore the psychological impact of architecture on Holistic healing and Wellbeing. The research will focus on the influence of architectural design on the brain and psychological wellbeing and its potential to heal through stimulating environments that evoke holism and in turn enhance the healing process.

I am interested in interviewing you so as to share your experiences and observations on the subject matter.

Please note that:

- The information that you provide will be used for scholarly research only.
- Your participation is entirely voluntary. You have a choice to participate, not to participate or stop participating in the research. You will not be penalized for taking such an action.
- Your views in this interview will be presented anonymously. Neither your name nor identity will be disclosed in any form in the study.
- The questionnaire will take about 30 minutes.
- The record as well as other items associated with the interview will be held in a password-protected file accessible only to myself and my supervisors. After a period of 5 years, in line with the rules of the university, it will be disposed by shredding and burning.
- If you agree to participate, please sign the declaration attached to this statement (a separate sheet will be provided for signatures)

I can be contacted at:

- **Student Contact Details:** Nirdosh Hemraj Ramjiawan
  School of the Built Environment and Development Studies, at the University of KwaZulu-Natal, Durban. Howard College Campus
  Programme of Masters in Architecture.
  Tel: 083 393 7433; **Email**:221119165@stu.ukzn.ac.za

My Supervisor's contact details are as per below:

- **Supervisor:** Mr Juan Solis.
  School of the Built Environment and Development Studies.
  University of KwaZulu-Natal, Durban. Howard College Campus
  Tel: 031 260 2304; **Email:** solis@ukzn.ac.za

The Humanities and Social Sciences Research Ethics Committee contact details are as follows:

- University of KwaZulu-Natal, Research Office,
  Tel: 031 260 4557 / 8350 / 3587; **Email**: HSSREC@ukzn.ac.za

Thank you for your contribution to this Research.

DECLARATION

I……
(full names of participant)

hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I declare that my participation in this study is entirely voluntary.

I understand that I am at liberty to withdraw from the project at any time, should I so desire.
I understand the intention of the research.
I hereby agree to participate.

I consent / do not consent to have this interview recorded (if applicable)

……..
SIGNATURE OF PARTICIPANT

……
DATE

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

DATE: 5 December 2021

To whom it may concern

Mr. Nirdosh Ramjiawan, a Masters' student in the School of Built Environment and Development Studies, programme of Master of Architecture, formally requests permission to interview staff and conduct observational studies in your institution/department/facility, and use the data collected on his Masters' Research Project entitled:

An Architectural Response To Holistic Healing Processes
Towards an Alternative Healing Facility in Northern Natal**,**

The findings will be shared with the institution if requested after the study has been completed.

Thank you and Kind regards

Mr. Juan Solis-Arias
Academic Supervisor
School of Built Environment and Development Studies
Email : solis@ukzn.ac.za
Tel number : 031 260-2304

Approved By

Name : ……

Signature : ……

Date : ……

Institution Stamp

PART TWO | DESIGN REPORT

Contents

Page

CHAPTER 1 | INTRODUCTION 142
1.1 INTRODUCTION 142
1.2 PROJECT DESCRIPTION 142
1.3 THE NOTIONAL CLIENT 143
1.4 DETAILED BRIEF AND ACCOMMODATION SCHEDULE 143
1.4.1 SCHEDULE OF ACCOMODATION 144
1.5 CONCLUSION 145
CHAPTER 2 | SITE SELECTION, SURVEY AND ANALYSIS 146
2.1 INTRODUCTION 146
2.2 SITE OPTIONS 147
2.3 SELECTED SITE 154
2.3.1 HISTORICAL BACKGROUND 154
2.3.2 DESCRIPTION OF EXISTING SITE CONDITIONS 154
2.3.3 SITE PICTURES 155
2.3.4 SITE CONTEXT 155
2.4 SITE ANALYSIS 156
2.4.1 MACRO SITE ANALYSIS 156
2.4.2 KEY LINKAGE ANALYSIS 156
2.4.3 MESO SITE ANALYSIS 157
2.4.4 MICRO SITE ANALYSIS 159
2.5 CONCLUSION 159
CHAPTER 3 | DESIGN DEVELOPMENT AND RESOLUTION 160
3.1 DESIGN DRIVERS AND PRINCIPLES 160
3.2 CONCEPTUAL SPATIAL DIAGRAM AND CONCEPTUAL THINKING 160
3.3 CONCEPTUAL APPROACH 162
3.4 CONCEPTUAL BUILDING LAYOUT 164
3.4.1 BUILDING ORIENTATION 164
3.4.2 CENTRAL ATRIUM AND SOCIAL SPINE 165
3.5 SITE LAYOUT 167
3.5.1 ZONING & PRIVACY GRADIENT 167
3.5.2 SOCIAL SUPPORT 168
3.6 CONCEPTUAL DESIGN RESPONSE 169
3.6.1 NON-TRADITIONAL STEREOTYPE 169

3.6.2 EMPHATHETIC RESPONSE 170
3.6.3 RADIATION THERAPY EXPERIENCE 172
3.6.4 CHEMOTHERAPY EXPERIENCE 173
3.6.5 SOCIAL INTERACTION AND PLACES OF RESPITE 174
3.6.6 NATURE IMMERSION 175
3.6.7 PATIENT EMPATHY 177
3.7 FINAL DESIGN DRAWINGS 178

LIST OF ILLUSTRATIONS

Page

Part 2 – Design Report

Figure 133 : Site selection diagram (Source: Google earth, adapted by author) 137
Figure 134 : Site 1 theoretical analysis(Source: by author) 138
Figure 135: Site 1 contextual analysis(Source: by author) 138
Figure 136 : Site 2 theoretical analysis(Source: by author) 150
Figure 137 : Site 2 contextual analysis(Source: by author) 150
Figure 138 : Site 3 theoretical analysis(Source: by author) 152
Figure 139 : Site 3 contextual analysis(Source: by author) 152
Figure 140 : Savannah like prospect from the site
(Source: by author) 155
Figure 140 : Savannah like prospect from the site
(Source: by author) 155
Figure 142 : Long Distant expanding views from the site
(Source: by author) 155
Figure 143 : A: Kwadukuza Private Hospital-1 (Source: by author)
Figure 144 : B : North Coast Primary School- 5 (Source: by author) 155
145 : C: Kwadukuza Police Station - 17
(Source: by author) 155
Figure 146 : D : Kwadukuza Peoples Park - 18 (Source: by author) 155
Figure 147 : E: General Justice Gizenga Mpanza Regional Hospital-6
(Source: by author) 155
Figure 148: F: Kwadukuza Mall – 8 (Source: by author)..... 155
Figure 149 : Macro site analysis diagram (Source: by author) 156
Figure 150 : Key linkage analysis (Source: by author) 156
Figure 151 : Movement, connectivity and circulation diagram (Source: by author) 157

Figure 152 : Immediate site context diagram (Source: by author).....157

Figure 153 : Sensory analysis diagram (Source: by author).....158

Figure 154 : Green space analysis diagram (Source: by author) 158

Figure 155 : Micro site analysis diagram (Source: by author) 159

Figure 156 : Design drivers diagram (Source: by author) 160

Figure 157 : Conceptual spatial diagram (Source: by author) 161

Figure 158 : Fragmented, focussed clinics with linking connective tissue

(Source: by author) 162

Figure 159 : Focussed clinics linked by atrium and circulation spine (Source: by author)...163

Figure 160 : Development of form diagram (Source: by author).....163

Figure 161 : Site plan depicting the conceptual building layout (Source: by author) 164

Figure 162 : Perspective highlighting the central spine (Source: by author) 166

Figur163 : Perspective showing the transparent spine roof (Source: by author) 166

Figure 164 : Floor plan highlighting the waiting and resting lounges along the spine (Source: by author).....166

Figure 165 : Site plan (Source: by author) 167

Figure 166 : Privacy grading of the site (Source: by author) 168

Figure 167 : Coffee shop and reception lounges at the double volume main entrance atrium evokes sensorial stimulation (Source: by author) 169

Figure 168 : Coffee shop and reception lounges at the double volume main entrance atrium evokes sensorial stimulation (Source: by author) 169

Figure 169 : Rest and waiting areas outside the koi pond at the spine atrium (Source: by author) 169

Figure 170 : View of central atrium ayurvedic café opening out onto the koi pond, highlighting interplay of spatial volume, integration of nature and light and shadow effects (Source: by author) 170

Figure 171 : Floor plan highlighting the assisted care patient route (Source: by author) ... 170

Figure 172 : Floor plan highlighting the central spine and wayfinding

(Source: by author) 171

Figure 173 : View of central spine highlighting its nature immersion and sensory awareness as well as patient and visitor resting lounge (Source: by author) 171

Figure 174 : Floor plan of radiotherapy bunkers (Source: by author) 172

Figure 175 : Floorplan of chemotherapy ward (Source: by author) 173

Figure 176 : Chemotherapy ward highlighting direct contact with nature and spa like ambiance (Source: by author) 174

Figure 177 : Place of contemplation, respite and socialization for patients on the sensory roof gardens (Source: by author) 174

Figure 178: Figure 179 : Place of contemplation, respite and socialization for patients on the sensory roof gardens (Source: by author) 174

Figure 179 : Place of contemplation, respite and socialization for patients on the sensory roof gardens (Source: by author) 175

Figure 180 : View of vegetated roof and green facade walls emulating a nature immersed building (Source: by author) 175

Figure 181 : View out of treatment areas in support clinic, through hanging gardens (Source: by author) 175

Figure 182 : View of nature from typical inpatient recovery room (Source: by author) 176

Figure 183: View from blood donor chair in support clinic (Source: by author) 177

Figure 184: Outpatient residence entrance (Source: by author) 177

CHAPTER 1 | INTRODUCTION

1.1 **INTRODUCTION**

This report documents Part Two of the study - the process of designing a specialist Oncological care healing retreat with integrated holistic healing principles. It follows on from Part One, which provides the background research and recommendations on the topic:
‘An architectural response to holistic healing principles'. This report aims to illustrate the research findings on the selected typology. The building will be designed to provide a serene and supportive environment for individuals undergoing oncological treatment. By integrating holistic healing principles into the architectural design, the space aims to promote and support not only physical, but emotional, and spiritual well-being for patients. Additionally, the report will explore how design can enhance the overall healing process and improve patient outcomes. Finally, it will demonstrate the integration of biophilic elements such as natural light, green spaces, and natural ventilation into the building's design.

1.2 **PROJECT DESCRIPTION**

The project consists of an oncological care healing retreat for middle to lower income communities within Kwadukuza and surrounding communities. The provision of oncology services within Kwadukuza is challenged by logistical issues and disparity in healthcare provisions leaving patients with vast travel distances to access quality public oncological facilities. The heavy strain on oncology resources associated with high stress and anxiety levels of patients is exacerbated by the limited number of public oncologists available in the area, leading to long wait times for appointments and treatments. This can result in delays in diagnosis and care, impacting patient outcomes and overall satisfaction with the healthcare system. The purpose of the Oncology retreat is to provide facilities and equipment for radiotherapy and chemotherapy treatment as well as alternative therapies such as acupuncture and ayurvedic treatment to support the physical and emotional well-being of cancer patients as well as counseling and support groups to help patients manage their stress and anxiety levels. By offering a comprehensive holistic approach to cancer care, the facility

aims to alleviate some of the burdens faced by individuals dealing with cancer and improve their overall quality of life by managing their stress and anxiety levels.

1.3 **THE NOTIONAL CLIENT**

The notional client for the project, to be referred to as 'the client', is The National Department of Health, South Africa. The National Department of Health (NDoH) is the executive department of the South African government responsible for health matters.

In addition to continuously enhancing the health care delivery system by putting an emphasis on equity, access, efficiency, quality, and sustainability, the National Department of Health aims to improve health status through the prevention of illness and disease and the promotion of healthy lifestyles. The National Development Plan (NDP) outlines nine long-term health goals for South Africa, with five focusing on population health and four on health system strengthening. By 2030, South Africa aims to increase life expectancy to at least 70 years, improve TB prevention and cure, reduce maternal, infant, and child mortality, reduce non-communicable disease prevalence, reduce injury, accidents, and violence, complete health system reforms, provide primary healthcare teams, and ensure universal healthcare coverage.

1.4 **DETAILED BRIEF AND ACCOMMODATION SCHEDULE**

The Cancer Strategic Framework aims to address the growing health and socio-economic concern of cancer in South Africa, focusing on preventable measures such as vaccination, lifestyle changes, early detection, and timely treatment to reduce the burden of deaths, disability, and financial strain on the South African population. In order to fulfill the requirements and demands of the Kwadukuza community, and in keeping with the Cancer Strategic Framework, the client has requested that the facility provide the following schedule of accommodation:

1.4.1 **SCHEDULE OF ACCOMODATION**

	ACCOMODATION	SQM	NO.OFF.	TOTAL
ENTRANCE LOBBY	LOBBY	220	1	220
	WAITING LOUNGE	100	1	100
	VENDING AREA	15	1	15
	RECEPTION	50	1	50
	CAFE	150	1	150
	CIRCULATION CORE	270	1	270
	ABLUTIONS	65	1	65
	ADMISSIONS	10	1	10
	PHARMACY	60	1	60
	ACCOMODATION	SQM	NO.OFF.	TOTAL
ADMIN	OFFICES	40	1	40
	STAFF ABLUTIONS	20	1	20
	TEA KITCHEN + LOUNGE	20	1	20
	STATIONARY STORAGE	10	1	10
	RECORDS/FILING	10	1	10
	ACCOMODATION	SQM	NO.OFF.	TOTAL
RADIOLOGY & RADIATION THERPHY	RECEPTION	10	1	10
	WAITING LOUNGE	54	1	54
	XRAY SUITE	35	1	35
	CONTROL ROOM	10	1	10
	CHANGE ROOMS	6	1	6
	CT SCAN	40	1	40
	CONTROL ROOM	10	1	10
	CHANGE ROOMS	6	1	6
	ULTRASOUND	20	1	20
	PATIENT WC	4	1	4
	REPORTING ROOM	6	1	6
	RADIOLOGISTS OFFICE	20	1	20
	CONSULTATION	10	1	10
	INTERVIEW LOUNGE	25	1	25

	ACCOMODATION	SQM	NO.OFF.	TOTAL
SUPPORT CLINICS & INPATIENT	RECEPTION	36	1	36
	WAITING LOUNGE	20	1	20
	DEMATOLOGY	70	1	70
	CARDIOLOGY & REHAB	100	1	100
	GASTROENTEROLOGY	110	1	110
	DENTISTRY EXAM	90	1	90
	WOUND CARE	110	1	110
	HEMATOLOGIST	50	1	50
	NUTRITIONAL SERVICES	150	1	150
	BLOOD DONATION	100	1	100
	INPATIENT WARD	850	1	850
	ACCOMODATION	SQM	NO.OFF.	TOTAL
HOLISTIC CENTRE	WAITING AREA	150	1	150
	COUNSELLORS	170	1	170
	PHYSIOTHERAPHY	535	1	535
	SAUNA/STEAM TREATMENT	250	1	250
	HEALING GARDEN	2500	1	2500
	YOGA	20	1	20
	REIKI MASSAGE	108	1	108
	ACCUPUNCTURE	108	1	108
	AYURVEDA TREATMENT	535	1	535
	TRADITIONAL HEALING	45	1	45
	SOCAL INTERACTIVE SPACES	150	1	150
	ACCOMODATION	SQM	NO.OFF.	TOTAL
COMMUNITY CENTRE	RECEPTION	10	1	10
	WAITING LOUNGE & INFO CENTRE	40	1	40
	SMALL CONFERENCE ROOM	45	1	45
	LARGE CONFERENCE ROOM	110	1	110
	MULTIMEDIA ROOM	25	1	25
	MULTIPURPOSE ROOM	140	1	140
	SOCIAL SUPPORT CENTRE	200	1	200

	ACCOMODATION	SQM	NO.OFF.	TOTAL
CHEMOTHERAPHY	SUB WAITING LOUNGE	50	1	50
	EXAM ROOM	15	1	15
	PROCEDURE ROOM	25	1	25
	BLOOD DRAW & TESTING	20	1	20
	MOULD WORKSHOP	20	1	20
	BRACHY THERAPHY BUNKER	35	1	35
	RECOVERY ROOM	84	1	84
	RADIOTHERAPHY BUNKER	52	2	104
	CHANGE AREA	4	2	8
	WAITING AREA	25	1	25
	STAFF SUPPORT AREA	63	1	63
	BOARDROOM	35	1	35
	ONCOLOGIST OFFICE	15	1	15
	TREATMENT PLANNING	20	1	20
	ACCOMODATION	SQM	NO.OFF.	TOTAL
	RECEPTION	6	1	6
	WAITING LOUNGE	28	1	28
	ADMIN OFFICES	0	1	0
	FILE STORE	7,5	1	7,5
	INTERVIEW ROOM	12	1	12
	BLOODS DRAW	12	1	12
	BLOOD LAB	12	1	12
	CONSULTING ROOM	12	1	12
	EXAM ROOM	16	1	16
	PROCEDURE ROOM	30	1	30
	OPEN INFUSION AREA	240	1	240
	PRIVATE INFUSION AREA	12	2	24
	NURSES STATION	24	1	24
	CYTOTOXIC ROOM	18	1	18
	SUPPORT AREA		1	0
	BEVERAGE LOUNGE	46	1	46
	EMERGENCY SHOWER	6	1	6
	DISPOSAL ROOM	6,4	1	6,4
	STORE ROOM	5,4	1	5,4
	CLEANERS ROOM	5,4	1	5,4
	DIRTY ROOM	3	1	3
	PATIENT ABLUTIONS	30	1	30
	STAFF AMENITIES		1	0
	TEA KITCHEN + LOUNGE	15	1	15
	BOARDROOM	20	1	20

	ACCOMODATION	SQM	NO.OFF.	TOTAL
SUPPORT CLINICS & INPATIENT	RECEPTION	36	1	36
	WAITING LOUNGE	20	1	20
	DEMATOLOGY	70	1	70
	CARDIOLOGY & REHAB	100	1	100
	GASTROENTEROLOGY	110	1	110
	DENTISTRY EXAM	90	1	90
	WOUND CARE	110	1	110
	HEMATOLOGIST	50	1	50
	NUTRITIONAL SERVICES	150	1	150
	BLOOD DONATION	100	1	100
	INPATIENT WARD	850	1	850
	ACCOMODATION	SQM	NO.OFF.	TOTAL
HOLISTIC CENTRE	WAITING AREA	150	1	150
	COUNSELLORS	170	1	170
	PHYSIOTHERAPHY	535	1	535
	SAUNA/STEAM TREATMENT	250	1	250
	HEALING GARDEN	2500	1	2500
	YOGA	20	1	20
	REIKI MASSAGE	108	1	108
	ACCUPUNCTURE	108	1	108
	AYURVEDA TREATMENT	535	1	535
	TRADITIONAL HEALING	45	1	45
	SOCAL INTERACTIVE SPACES	150	1	150
	ACCOMODATION	SQM	NO.OFF.	TOTAL
COMMUNITY CENTRE	RECEPTION	10	1	10
	WAITING LOUNGE & INFO CENTRE	40	1	40
	SMALL CONFERENCE ROOM	45	1	45
	LARGE CONFERENCE ROOM	110	1	110
	MULTIMEDIA ROOM	25	1	25
	MULTIPURPOSE ROOM	140	1	140
	SOCIAL SUPPORT CENTRE	200	1	200

1.5 **CONCLUSION**

In conclusion, the facility will present itself as the first public Oncology care facility in Kwadukuza, which not only provides Oncology services and treatment but also provides cognitive restoration within a facility aimed at reducing a patients stress and anxiety and improving their overall well-being and quality of life during their treatment journey.

CHAPTER 2 | **SITE SELECTION, SURVEY AND ANALYSIS**

2.1 **INTRODUCTION**

The selection of the possible sites explored, was based on findings acquired through the literature review and precedent study. Each site was evaluated against a set of criteria derived from the research. A rating scale method formed the basis of the site selection analysis.

Three options for the site, in and around KwaDukuza, were selected and analysed against the following criteria:

The site analysis primary criteria was as follows:

1. Sense Of Disengagement: Feeling of isolation and being away

2. Prospect: Distant natural views

3. Restorative Environment: Prescence of calm. Feeling of safety and security.

4. Positive Distractions: Soft fascination and gentle distractions

5. Connection With Natural Systems : Physical access to nature, flora, fauna, interplay of natural light, provision of green open space

Additionally, the sites were assessed against a set of secondary criteria as follows:

1. Proximity to Local Communities And Existing Healthcare Facilities

2. Responsiveness to Climate

3. Accessibility

The final site selection will be based on a comprehensive evaluation of these criteria.

2.2 **SITE OPTIONS**

Considering the major and secondary site criteria, the following three site choices were evaluated for the project's location. The project's requirements and constraints were thoroughly assessed, leading to a final decision on the most suitable location that met all necessary criteria.

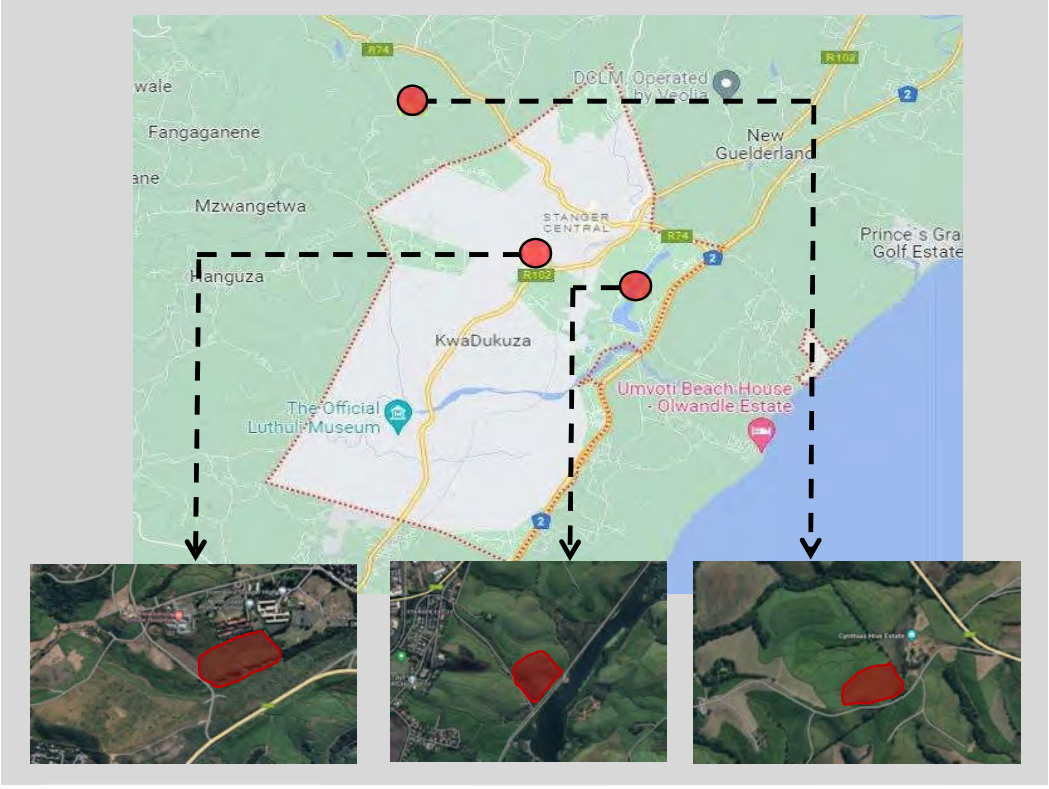


Figure 133 : Site selection diagram
(Source: Google earth, adapted by author)

Site 1 : Link Road Site

Site 2 : Sappi Lakes Site

Site 3: Hive Estate Site

Site 1

THEORETICAL ANALYSIS

Figure 134 : Site 1 theoretical analysis(Source: Google earth adapted by author)

CONTEXTUAL ANALYSIS

Figure 135: Site 1 contextual analysis(Source: Google earth adapted by author)

LEGEND

Primary Road

Secondary Road

Public Transport Route

Prevailing Winds

Flora/Fauna buffer

Prospect

Views to Nature

Water Prescence

RATING SCALE

PRIMARY CRITERIA

PROSPECT

SENSE OF DISENGAGEMENT

POSITIVE DISTRACTIONS

RESTORATIVE ENVIRONMENT

CONNECTION WITH NATURAL SYSTEMS

SECONDARY CRITERIA

PROXIMITY TO LOCAL COMMUNITIES

RESPONSIVENESS TO CLIMATE

ACCESSIBILITY

Site 1 – Link Road Site	
Location	The site is located on the XX boarder of Kwadukuza on Link Road which is immediately off the Aterial route the R102. The site occurs adjacent the Kwadukuza private hospital and primary school
Orientation	The site is a linear, pentagonal shaped site with its longest axis Orientated in a South west and North East direction
Topography	The site consists of a sloping terrain forming a valley towards the bottom of the site
Accessibility	The site has vehicular and pedestrian access as well as public transport access.
Natural Surroundings	The site ha existing trees along the valley and bordering the neighbouring sites with green open fields
Context	The site is located in the existing healthcare and educational zone between the CBD and local communities.
Advantages	▪ Links to existing healthcare facilities both public and private ▪ Large green spaces ▪ Good prospect and expanding natural views ▪ Orientation allows for capturing of natural prevailing winds ▪ Close proximity to local communities ▪ Accessed via public transport
Disadvantages	▪ Poor condition of access road

Site 2

THEORETICAL ANALYSIS

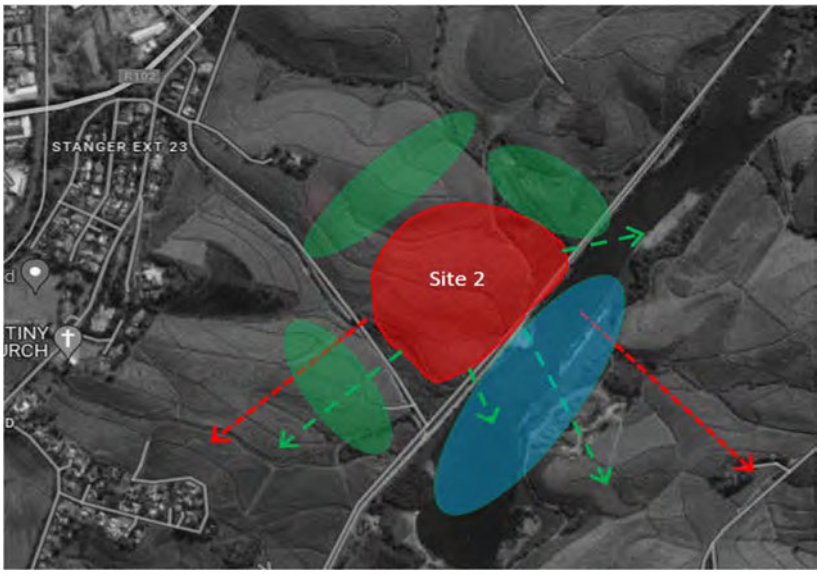


Figure 136 : Site 2 theoretical analysis(Source: Google earth adapted by author)

CONTEXTUAL ANALYSIS

Figure 137 : Site 2 contextual analysis(Source: Google earth adapted by author)

LEGEND

Primary Road

Secondary Road

Public Transport Route

Prevailing Winds

Flora/Fauna buffer

Prospect

Views to Nature

Water Prescence

RATING SCALE

PRIMARY CRITERIA

PROSPECT

SENSE OF DISENGAGEMENT

POSITIVE DISTRACTIONS

RESTORATIVE ENVIRONMENT

CONNECTION WITH NATURAL SYSTEMS

SECONDARY CRITERIA

PROXIMITY TO LOCAL COMMUNITIES

RESPONSIVENESS TO CLIMATE

ACCESSIBILITY

Site 1 – Link Road Site	
Location	The site is located on the XX boarder of Kwadukuza along the access route to the Sappi Mill and boarders the lake. The site occurs adjacent the Kwadukuza private hospital and primary school
Orientation	Similar to site 1, the site is a linear shaped site with its longest axis Orientated in a South west and North East direction
Topography	The site consists of a sloping terrain with a steep gradient falling towards the access road and lake
Accessibility	The site has vehicular and limited pedestrian access with no or limited public transport access.
Natural Surroundings	The site has existing trees and open fields
Context	The site is located in the existing farming and commercial zone with access to local communities.
Advantages	▪ Links to existing healthcare facilities both public and private ▪ Close proximity to lake ▪ Good prospect and expanding natural views ▪ Orientation allows for capturing of natural prevailing winds
Disadvantages	▪ Access road is noisy providing access to commercial vehicles. ▪ No direct public transport access ▪ Undeveloped surrounding site therefore uncertainty of future development

Site 3

THEORETICAL ANALYSIS

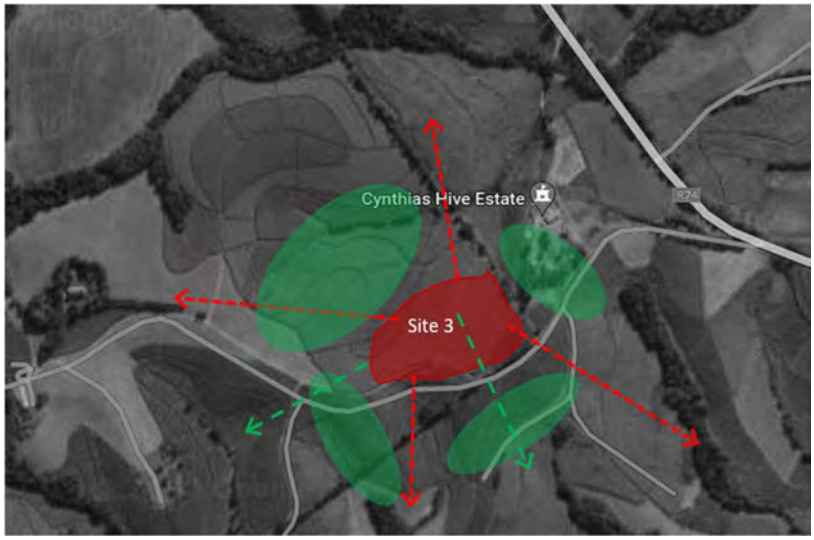


Figure 138 : Site 3 theoretical analysis(Source: Google earth adapted by author)

CONTEXTUAL ANALYSIS

Figure 139 : Site 3 contextual analysis(Source: Google earth adapted by author)

LEGEND

Primary Road

Secondary Road

Public Transport Route

Prevailing Winds

Flora/Fauna buffer

Prospect

Views to Nature

Water Prescence

RATING SCALE

PRIMARY CRITERIA

PROSPECT

SENSE OF DISENGAGEMENT

POSITIVE DISTRACTIONS

RESTORATIVE ENVIRONMENT

CONNECTION WITH NATURAL SYSTEMS

SECONDARY CRITERIA

PROXIMITY TO LOCAL COMMUNITIES

RESPONSIVENESS TO CLIMATE

ACCESSIBILITY

Site 3 – Link Road Site	
Location	The site is located on the North Western boarder of Kwadukuza off the R74 West.
Orientation	The site is a linear shaped site with its longest axis. Orientated in a North and South direction
Topography	The site consists of a flat terrain
Accessibility	The site has vehicular and limited pedestrian access as well as no public transport access.
Natural Surroundings	The site has existing trees and is bordered by farming sites and sugar cane fields.
Context	The site is located in the existing farming zone.
Advantages	▪ Creates a sense of isolation and disengagement. ▪ Good access to nature
Disadvantages	▪ Accessed via dirt road. ▪ No public transport access. ▪ Poor proximity to local communities

2.3 **SELECTED SITE**

Site 1 was selected as the most suitable site for the project. The site sits to the south western edge of the Kwadukuza CBD and currently consists of a green open field bordered by a private hospital to the North west and public schools to the north. The east is bound by a secondary road which accesses the main R102 access road.

The main site is broadly divided into three zones through its existing vegetation , a naturally formed amphitheatre and a green open space.

The typical weather conditions in Kwadukuza consist of the humid subtropical climate which is characteristic of high humidity, long hot summers with rainfall and mild winters. The average annual highest temperature is 31.9°C (89.4°F), and 10.8°C (51.4°F) being the average lowest.

2.3.1 **HISTORICAL BACKGROUND**

KwaDukuza, founded in 1820 by King Shaka, was named after the capital's labyrinth of huts. After Shaka's assassination in 1828, the city was burned down. In 1873, European settlers re-built the town and named it Stanger, after surveyor-general William Stanger. The town was later re-named to KwaDukuza in honour of King Shaka.

2.3.2 **DESCRIPTION OF EXISTING SITE CONDITIONS**

The selected site is a green open field which is currently unoccupied and zoned as educational. The topography of the site consists of a sloping terrain with a gradient falling from the north to the south forming a valley towards the bottom of the site and thereafter rising up to a savannah pinnacle point forming a natural vista. To the immediate right of the site is an open field zoned as a reserve which consists of green open fields with sparsely populated trees and distant rolling hills.

The left of the site consists of a green open field with the Kwadukuza Private Hospital and North Coast Primary School located to the Northern boundary of the site.

Access to the site is via the existing Link Road which connects to the main arterial rout the R102.

2.3.3 **SITE PICTURES**

Figure 140 : Savannah like prospect from the site
(Source: by author)

Figure 141 : View into the site
(Source: by author)

Figure 142 : Long Distant expanding views from the site
(Source: by author)

2.3.4 **SITE CONTEXT**

Figure 143 : A: Kwadukuza Private Hospital-1
(Source: by author)

Figure 144 : B : North Coast Primary School- 5
(Source: by author)

Figure 145 : C: Kwadukuza Police Station - 17
(Source: by author)

Figure 146 : D : Kwadukuza Peoples Park - 18
(Source: by author)

Figure 147 : E: General Justice Gizenga Mpanza Regional Hospital-6 (Source: by author)

Figure 148: F: Kwadukuza Mall - 8
(Source: by author)

2.4 **SITE ANALYSIS**

The site analysis explores the site from a macro to micro level highlighting key nodes and connections such as, accessibility and major traffic routes, activity zones, local and formal surrounding communities, existing healthcare commercial and retail facilities. the site was further analysed from a meso level which included movement, connectivity and circulation, immediate site context, sensory analysis and greenspace analysis as well and explore links to key landmarks such as the CBD, existing healthcare facilities and informal communities.

2.4.1 **MACRO SITE ANALYSIS**

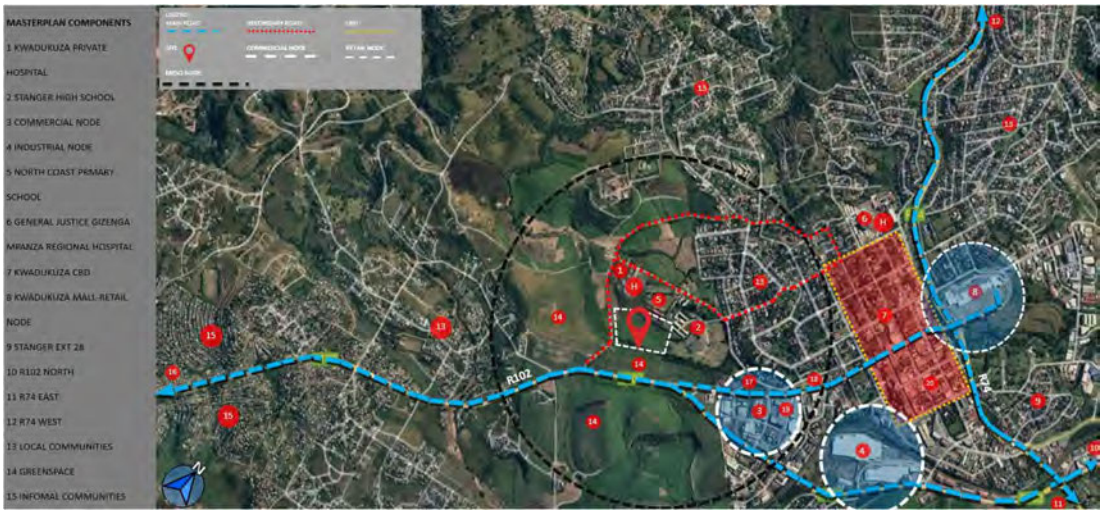


Figure 149 : Macro site analysis diagram (Source: Google earth adapted by author)

2.4.2 **KEY LINKAGE ANALYSIS**

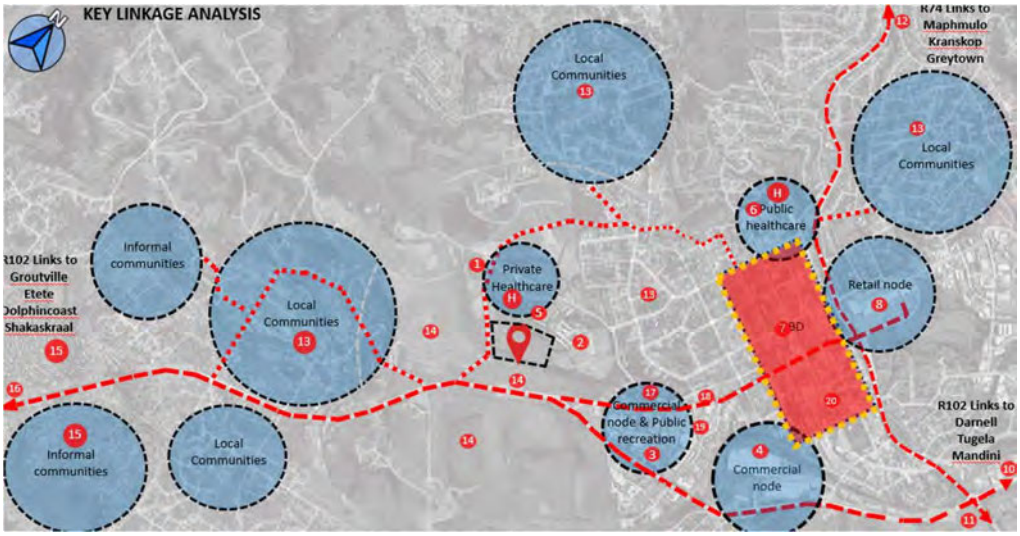


Figure 150 : Key linkage analysis diagram (Source: Google earth adapted by author)

2.4.3 **MESO SITE ANALYSIS**

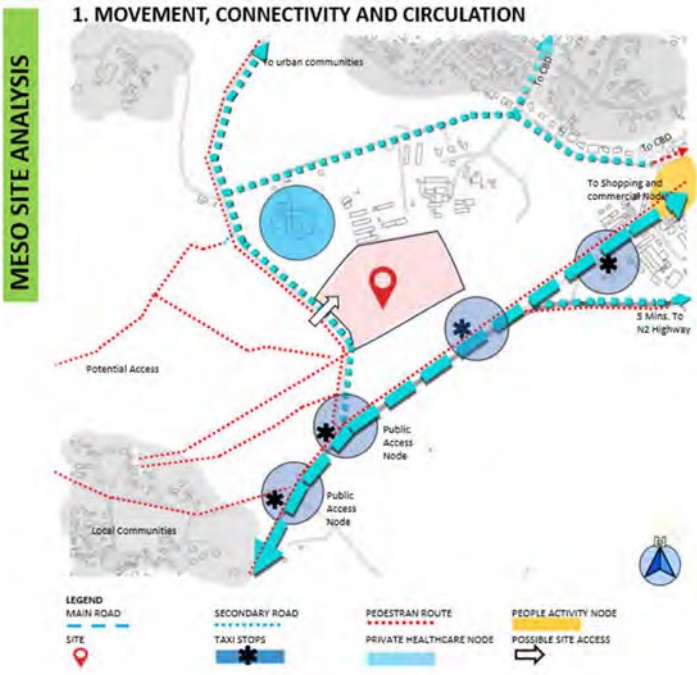


Figure 151 : Movement, connectivity and circulation diagram (Source: by author)

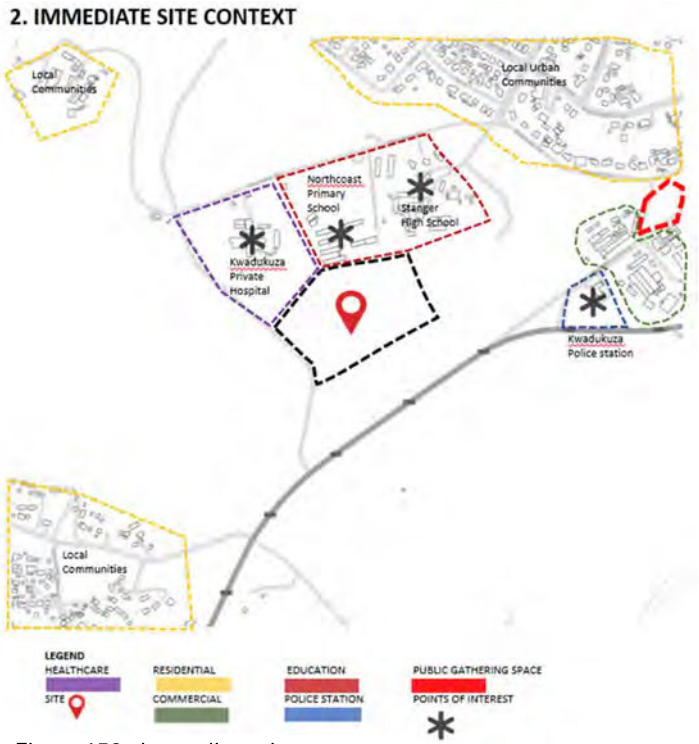


Figure 152 : Immediate site context diagram (Source: by author)

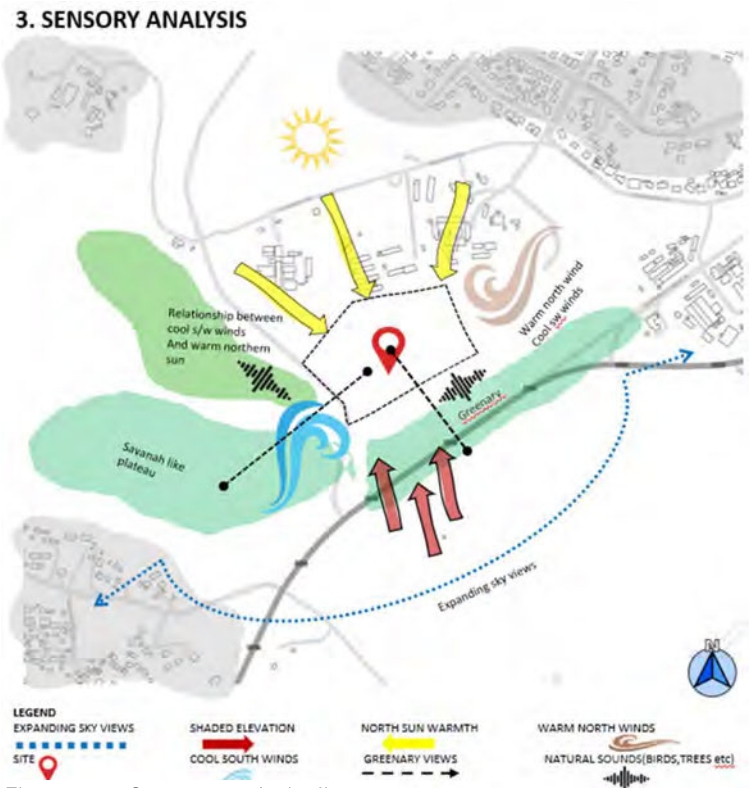


Figure 153 : Sensory analysis diagram
(Source: by author)

Figure 154 : Green space analysis diagram
(Source: by author)

2.4.4 **MICRO SITE ANALYSIS**

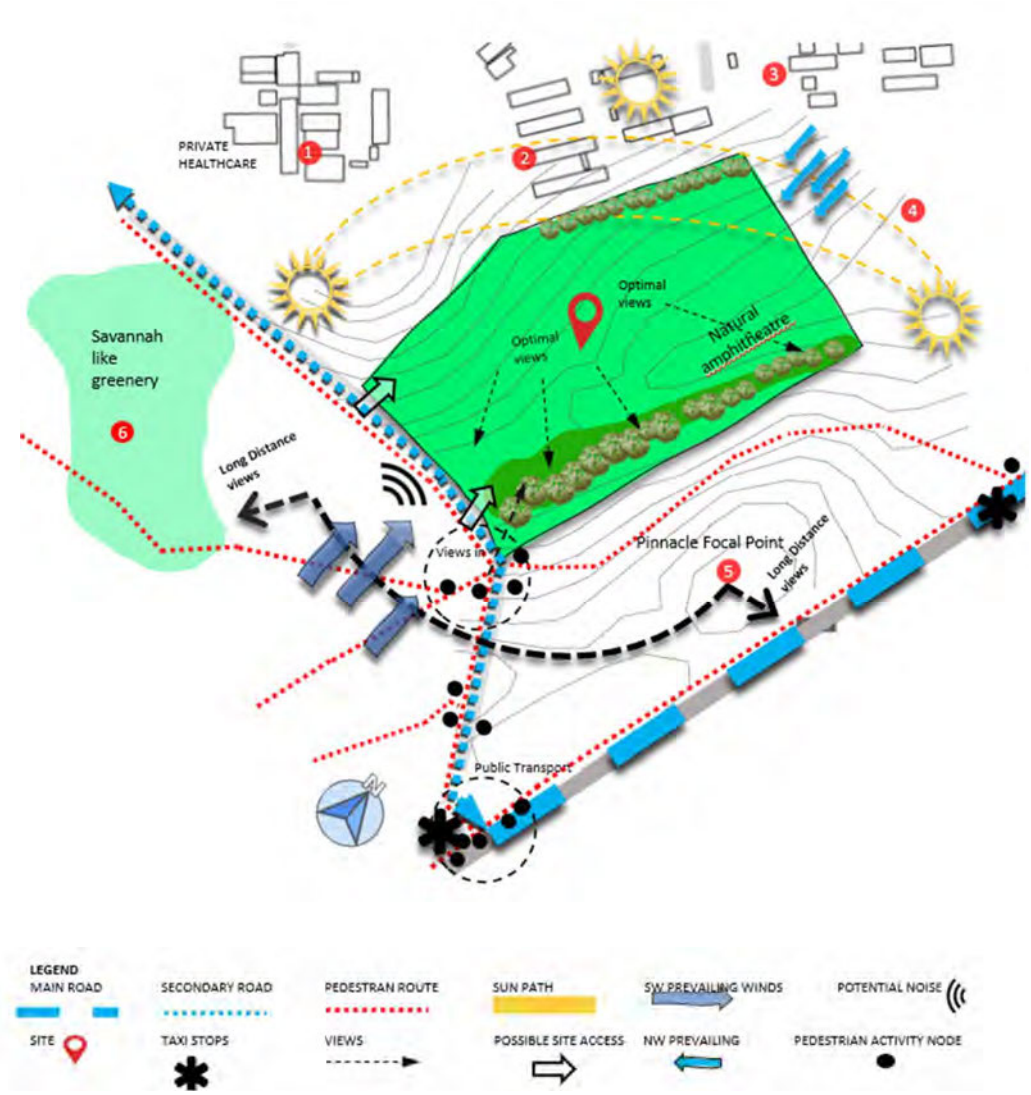


Figure 155 : Micro site analysis diagram
(Source: by author)

2.5 **CONCLUSION**

In conclusion, The Link Road site was chosen due to its suitability for future development, proximity to local communities, public transportation, and existing healthcare facilities. The new facility will support these facilities, making it an ideal location for the project. The design process from inception to conceptualization of the final design is illustrated in the following chapter.

CHAPTER 3 | DESIGN DEVELOPMENT AND RESOLUTION

3.1 **DESIGN DRIVERS AND PRINCIPLES**

The research focuses on design drivers drawn from the primary and secondary research which includes biophilic principles, sensory design, cognitive restoration, empathetic and psychological responses, and a human-centered approach. Key themes include creating a supportive environment, integrating multi sensory stimulation, creating a sense of disengagment, providing spatial comfort, and addressing key findings such as stereotypical archetypes, complicated wayfinding shapes and forms, and biophilic integration.

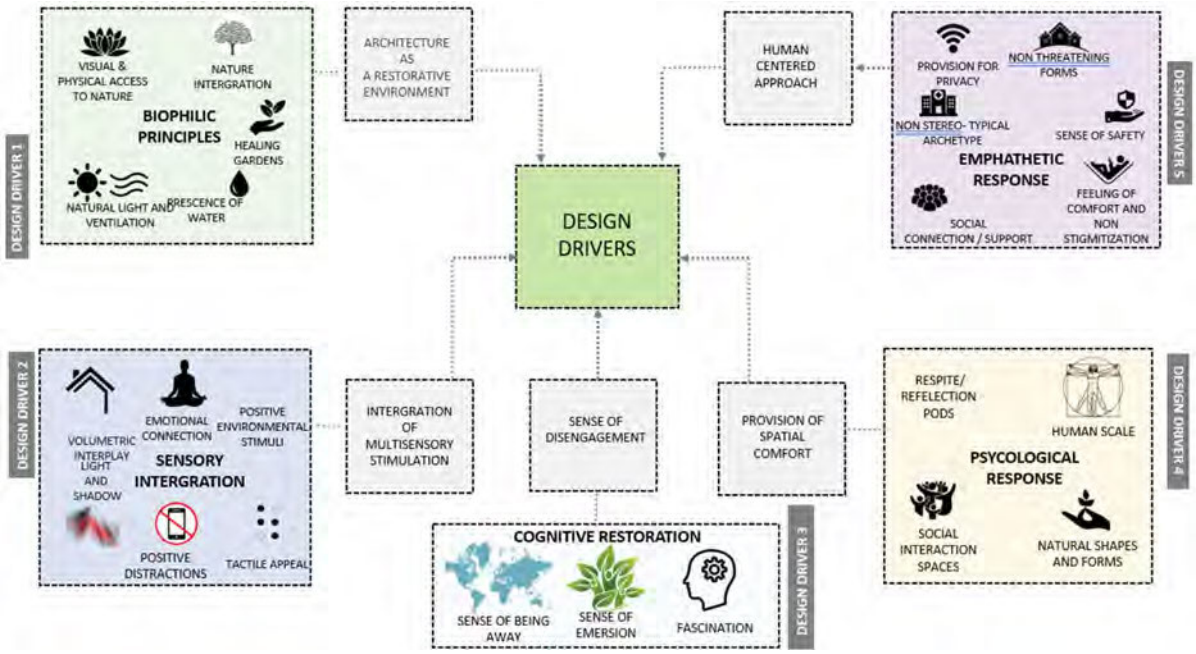


Figure 156 : Design drivers diagram (Source: by author)

3.2 **CONCEPTUAL SPATIAL DIAGRAM AND CONCEPTUAL THINKING**

Clustering of spaces takes into consideration patient privacy during treatment as well as patient empathy and comfort. By grouping similar spaces together, patients can feel more at ease and supported throughout their healthcare experience which also aids in wayfinding and short travel distances between different areas of the facility. This design approach can also

improves staff efficiency by streamlining workflows and reducing the need for unnecessary movement within the healthcare environment. To this end, the building is grouped into a clinical centre, holistic centre, community centre and a spiritual centre all accessed through a central atrium which acts as a central orientation element in the facility . This central atrium not only provides a clear path for patients and staff to navigate the different areas of the facility, but also creates a welcoming and calming atmosphere for all who enter. In addition, the central atrium creates an axial link to the facility and the existing private hospital and pedestrian node.

The building is set back within the site allowing for more green space and landscaping around the building, enhancing the overall resort like concept , with vegetation and mature trees used to buffer the facility from surrounding noise and maintain privacy for patients and visitors. Additionally, the natural surroundings create a calming atmosphere conducive to healing and relaxation.

Figure 157 : Conceptual spatial diagram (Source: by author)

The clustering of spaces and design response includes a metaphoric, site and theoretical response which includes following natural patterns in nature and creating an emotional connection to nature. Further considerations include ease of wayfinding, natural light and

ventilation and Central atrium and connective tissue spine encourages placemaking and people gathering enhancing the social connectedness.

CLUSTERING OF SPACES

NATURAL PATTERNS IN NATURE – DESIGN RESPONSE

METAPHORIC RESPONSE

- NATURAL PATTERNS OCCURING IN NATURE
- EMOTIONAL CONNECTION TO NATURE

SITE RESPONSE

- SUN PATTERN
- PREVAILING WIND DIRECTION
- NATURAL LIGHT
- PRIVACY LEVELS OF SITE
- EXISTING NATURE AND TOPOGRAPHY
- NATURE VIEWS

THEORETICAL RESPONSE

- AVOID SHARP EDGES AND FORMS
- INTERGATE BIOPHILIC INTERGRATION
- WAYFINDING
- EMPATHETIC APPROACH

3.3 **CONCEPTUAL APPROACH**

Cancer refers to any one of a large number of diseases characterized by the development of abnormal cells that divide uncontrollably and have the ability to infiltrate and destroy normal body tissue. In contrast to disease that breaks down tissue, Architecture can be thought of as a connective tissue that brings people together and promotes healing. A central spine acts as a unifying element that connects a patient to non clinical spaces such as a café or outdoor areas of respite which provide social support, and communal areas which encourage movement and exploration connecting to areas that stimulate the mind, body and spirit.

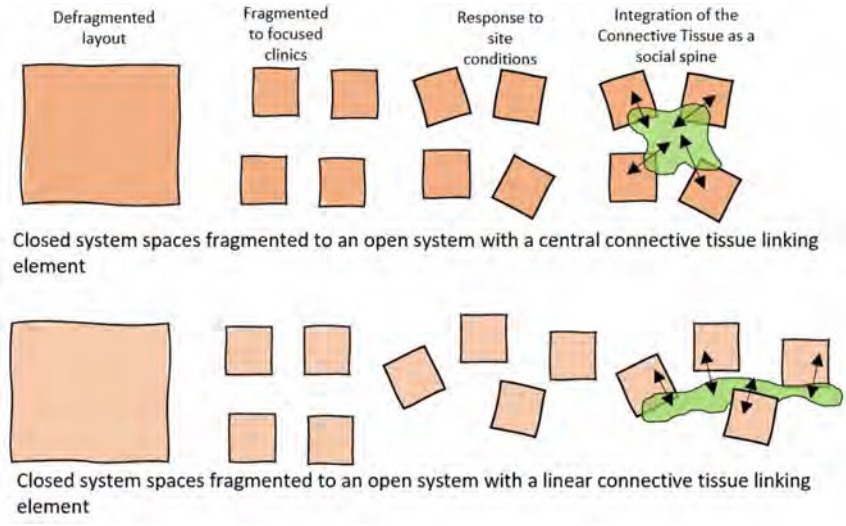


Figure 158 : Fragmented, focussed clinics with linking connective tissue (Source: by author)

Further enhancing the non stereotypical architype, is the fragmenting the typical monoblock hospital design into focused clinics and linking these clinics through a connective tissue which acts as a social and circulation spine. This approach allows for a more personalized and specialized experience for patients, as well as creating a more dynamic and interactive environment within the healthcare facility. By breaking down the traditional monoblock structure, it also opens up opportunities for greater flexibility in design and functionality.

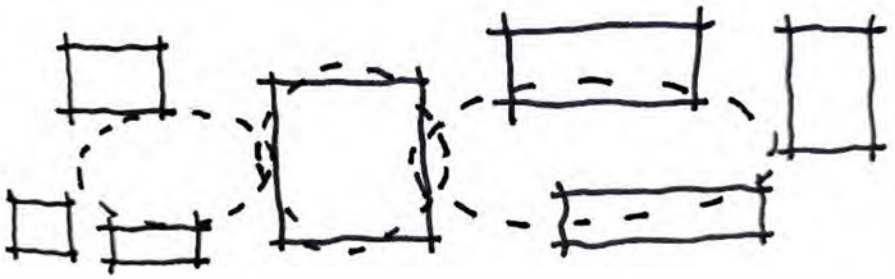


Figure 159: Focussed clinics linked by atrium and circulation spine (Source: by author)

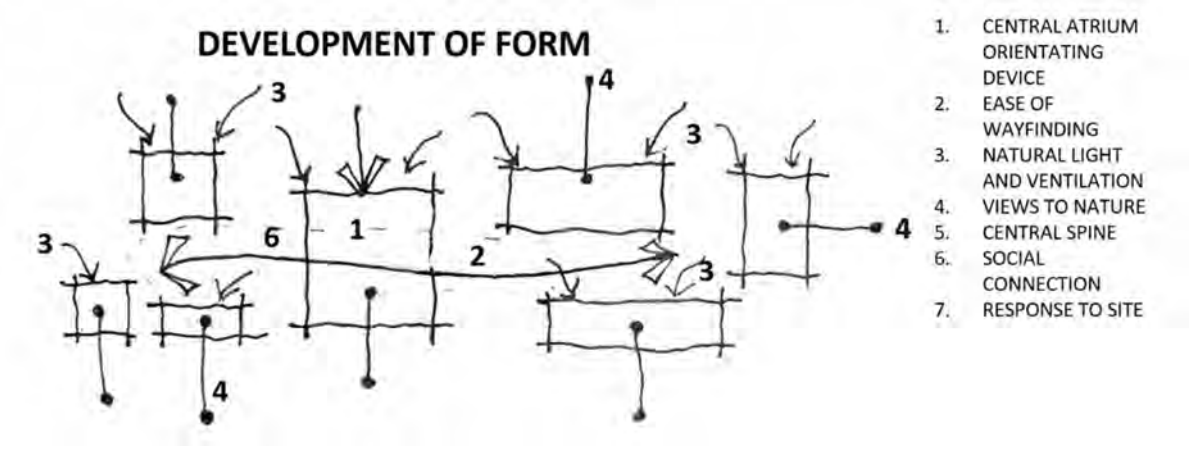


Figure 160 : Development of form diagram (Source: by author)

3.4 **CONCEPTUAL BUILDING LAYOUT**

The concept of the oncology centre breaks away from conventional healthcare facility norms of a clinicical environment comprising of intimidating forms, complicated wayfinding, long dark passages and a lack of natural light and ventilation. This facility is designed to put the experience of the patient first and establish a place of wellness as opposed to illness provides the following features which detracts from the stereotypical healthcare environment to promote self healing.

Figure 161 : Site plan depicting the conceptual building layout
(Source: by author)

3.4.1 **BUILDING ORIENTATION**

The orientation of the forms takes into consideration the prevailing natural winds with the forms orientated such that the building captures the prevailing winds through the central spine and distributes its thought out the wards naturally ventilating the building when needed.

In addition, the East to West axial orientation captures north light and provides the building with natural daylight, resulting in less reliance on artificial light.

The orientation of the inpatient towers allows for expansive views to the park like gardens and natural vista beyond, while the circulation spine allow users access to natural light within the treatment zones. This not only enhances the overall patient experience but also promotes healing by connecting patients to the outdoors through prioritizing natural light and views to nature. The integration of nature into the recovery and treatment environment has been shown to reduce stress and improve recovery outcomes.

3.4.2 **CENTRAL ATRIUM AND SOCIAL SPINE**

The Central atrium and connective tissue spine encourage placemaking and people gathering enhancing the social connectedness. This promotes interaction and fosters a sense of community among patients and visitors. Additionally, the circulation spine simplifies wayfinding for patients, visitors and staff by creating a clear hierarchical circulation system which is intuitive and apparent from the point of entry. Further enhancing the sensory and biophilic engagement is the use of a transparent roof over the spine which creates an awareness of one's environment as well as a connectedness to nature by allowing controlled sunlight and natural light to penetrate the spine. Lower single storey forms are located on the northern side of the building with the intention of allowing sunlight to enter the circulation spine.

The canopy structure is seamlessly integrated with the transparent covering, flooding the space with diffused natural light and sunlight to key areas affording patients the opportunity of shaded and sun lit options. Central atriums and skylights are design features typically found in hospitality & retail projects with the purpose of placemaking and activating public gathering spaces therefore by implementing these strategies, the conventional healthcare design approach is challenged to a more sensorial experience.

The design also prioritizes family involvement in care by providing visitor seating in the wards as well as within the circulation spine which allows visitors to explore the amenities of the facility while waiting for the patient.

Figure 162 : Perspective highlighting the central spine (Source: by author)

Figur163 : Perspective showing the transparent spine roof (Source: by author)

Figure 164 : Floor plan highlighting the waiting and resting lounges along the spine (Source: by author)

3.5 **SITE LAYOUT**

The layout responds to the natural conditions of the site by following the contours of the site for efficiency and minimal site disturbance as well as placement of forms enable natural prevailing breezes to ventilate the circulation spine enhancing the biophilic and sensory engagement for the patient. In addition, the building orientation allows for harvesting natural daylight to all clinical and treatment areas, resulting in less reliance on artificial light.

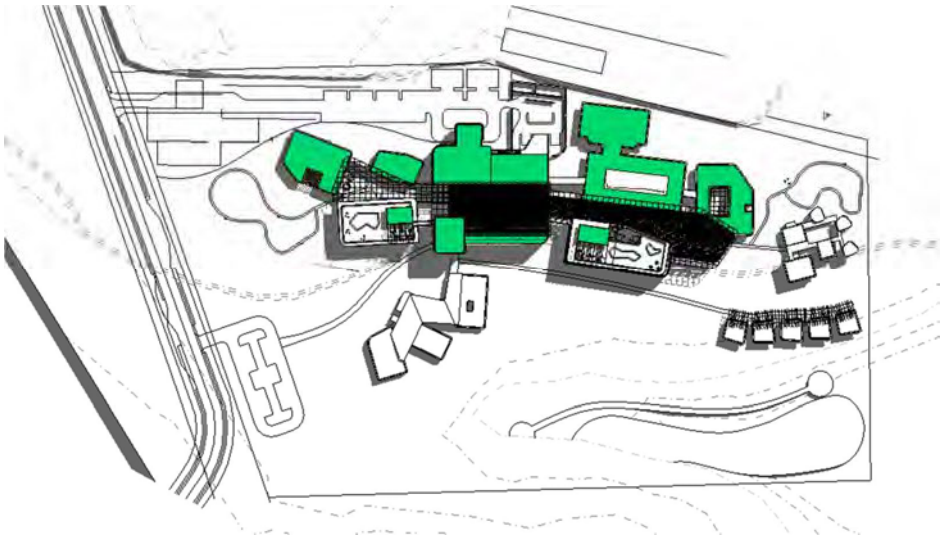


Figure 165 : Site plan (Source: by author)

3.5.1 **ZONING & PRIVACY GRADIENT**

The connective tissue spine consolidates key program blocks through a light-filled transparent atrium optimizing the path of travel and simplifying wayfinding for patients and visitors, links the central hub to a clinical centre which accommodates the chemotherapy clinic, radiation therapy clinic, diagnostic clinic and an inpatient ward to a holistic centre which provides alterative theraphies such as ayurvedic treatment, traditional healing Reiki and acupuncture hydrotherapy. A spiritual center extends the clinical centre giving patients family visitors and staff an area of respite calm and tranquility should there be a need to escape the treatment zone as well as the private meditation pods allow clinicians to engage with patients in a non formal environment.

The clinical centre is placed on the most private zone of the site allowing patients the comfort of their privacy during treatment and consultations. All treatment zones are provided with views to the gardens enhancing the biophilic connection and relaxation.

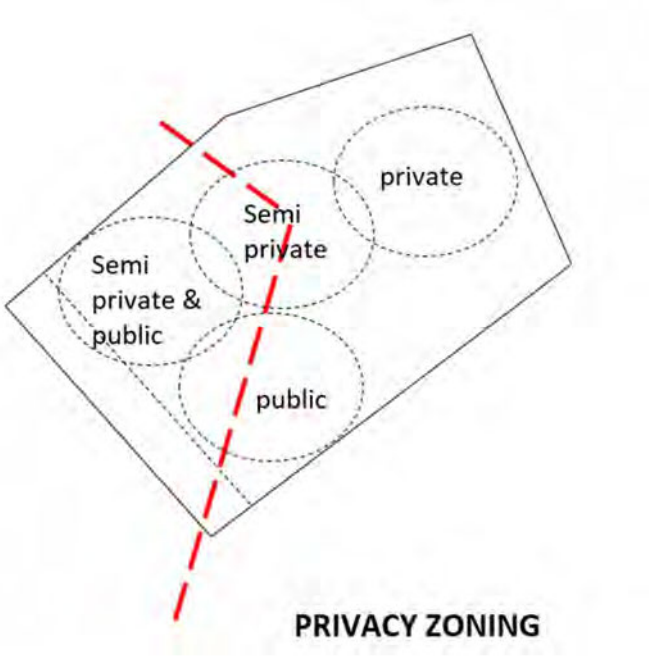


Figure 166 : Privacy grading of the site (Source: by author)

3.5.2 **SOCIAL SUPPORT**

The community centre links to the pedestrian node, providing a central gathering place for patients to socialize and participate in various activities. This helps foster a sense of community and connection, promoting a more cohesive and supportive environment. The community centre provides facilities for public awareness campaigns such as conferencing venues and a multipurpose hall. Public awareness of cancer was found to be lacking in lower income communities resulting in late stage presentation of the disease. The patient support and counselling centre is based on the concept of the Maggies care centres, allows patients to interact and support each other in a relaxed and safe environment. This type of support system can greatly improve the emotional well-being of individuals facing cancer, as they can share experiences and advice with others going through similar challenges. Additionally, the centre offers educational resources and workshops to empower individuals with knowledge about cancer prevention and treatment options.

3.6 **CONCEPTUAL DESIGN RESPONSE**

3.6.1 **NON-TRADITIONAL STEREOTYPE**

Figure 167 : Coffee shop and reception lounges at the double volume main entrance atrium evokes sensorial stimulation (Source: by author)

The scented aromas of the coffee shop café immediately arouse the senses as one walks into the entrance atrium and the inviting allure of the reception lounges with the gift shop enhances the resort like atmosphere allowing patients positive distractions from their stress and anxiety and acts as a welcoming gesture to all visitors. The space is further enhanced by clerestory windows, allowing natural light to flood the interior, creating a sense of openness and tranquillity further enhancing sensory engagement.

The design elements in the café and reception area contribute to a calming environment that promotes healing and relaxation for patients and visitors.

Figure 168 : Coffee shop and reception lounges at the double volume main entrance atrium evokes sensorial stimulation (Source: by author)

Figure 169 : Rest and waiting areas outside the koi pond at the spine atrium (Source: by author)

Figure 170 : View of central atrium ayurvedic café opening out onto the koi pond, highlighting interplay of spatial volume, integration of nature and light and shadow effects (Source: by author)

The double and triple volumes leading from the main entrance lounges to the atrium and connective tissue spine create a sense of awe and grandeur, drawing patients and visitors in with their scale and design. These architectural elements also serve to enhance the flow of foot traffic throughout the space, ensuring a seamless and engaging experience enhancing wayfinding. The sound of the water feature koi pond resonates the triple volume stimulating the auditory sense, acts as a wayfinding element through the sound of the prominent flowing water. The combination of visual and auditory stimuli in the space helps to create a holistic sensory experience that contributes to the overall well-being of those in the environment.

3.6.2 EMPHATHETIC RESPONSE

1 - Assisted Patient Reception

2 – Patient passage

3 – Radiation therapy

4 - Chemotherapy

Path of travel

Figure 171 : Floor plan highlighting the assisted care patient route (Source: by author)

Non ambulatory and critical care patients are offered access to the facility via the critical care ward which has a separate direct link to the treatment zones. The path of travel is private and shorter allowing patients a comfortable efficient transit to treatment emphasizing patient empathy and privacy. This direct access also helps to reduce the risk of potential delays in receiving necessary medical care, ensuring that non ambulatory patients can quickly and easily reach the treatment they need reducing discomfort and inconvenience. Additionally,

the separate link helps to maintain a sense of dignity and respect as well as privacy for these patients during their time at the facility.

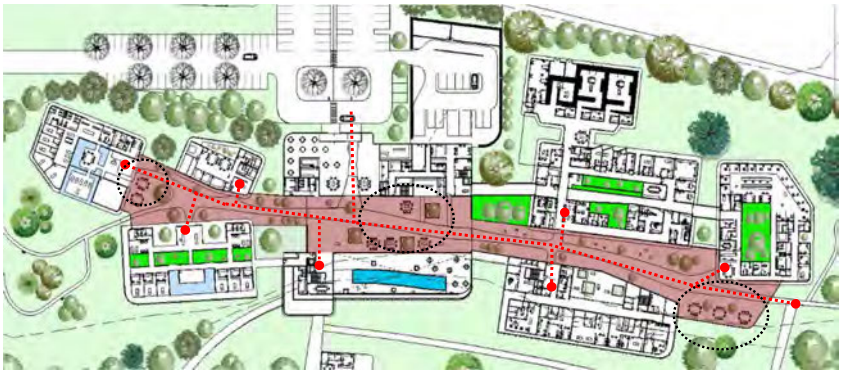


Figure 172 : Floor plan highlighting the central spine and wayfinding (Source: by author)

The path of travel through the spine from one area to the other creates an experiential journey for the patient as they are exposed to natural therapeutic elements which stimulate the natural healing process allowing them to feel relaxed, peaceful and full of hope. Nature integrated into the spine allows it to live and breathe creating vibrancy and a sense of liveliness.

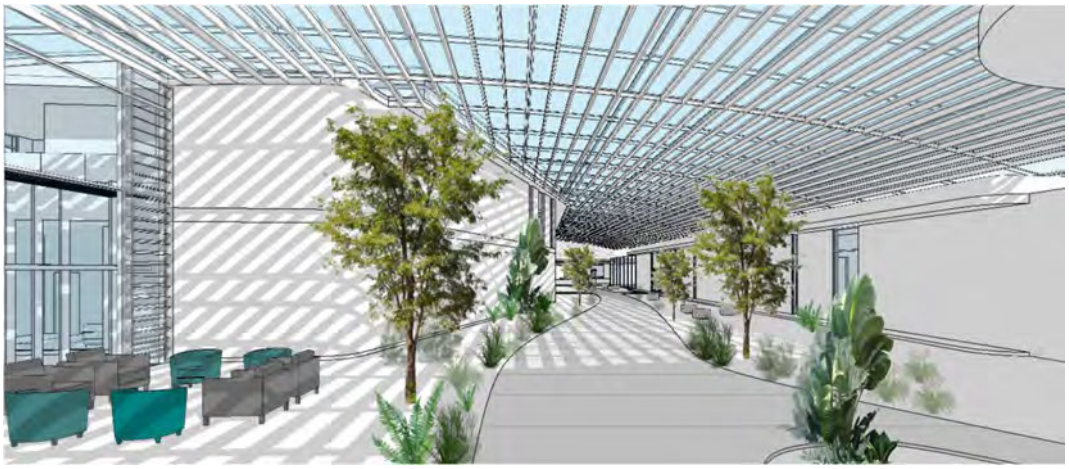


Figure 173 : View of central spine highlighting its nature immersion and sensory awareness as well as patient and visitor resting lounge (Source: by author)

The concept of a central atrium as a central hub or nucleus which links to a connecting spine or connective tissue, acts as a social spine and place of gathering for socializing, encourages social interaction and breaks the mould of traditional public healthcare norms which neglect patient empathy and their psychological state of mind. Additionally, resting lounges along the circulation spine provide patients with a comfortable and calming environment to relax and recharge before or after their appointments, further enhancing the overall patient experience and promoting a sense of well-being. This design approach aims to prioritize patient comfort

and mental well-being by simplifying wayfinding, recognizing the importance of holistic care in healthcare settings.

3.6.3 **RADIATION THERAPY EXPERIENCE**

1 - Radiotherapy bunker
2 - Landscaped Garden
3 - Radiotherapy Sub lounge
4 - Treatment area
5 – Brachytherapy bunker
4 – Brachytherapy recovery ward

Figure 174 : Floor plan of radiotherapy bunkers (Source: by author)

The precedent research and case study further revealed the traditional approach to radiation therapy environments which are usually cold harsh environments due to placement in basements and lower levels leaving an unpleasant patient experience. By separating the bunker from the treatment zone through a naturally lit sub lounge, patients are afforded an opportunity to recover and regroup after radiation treatment which is usually a stressful experience leaving patients disorientated and fatigued. This design intervention not only improves the overall patient experience but also contributes to a more healing and comfortable environment for patients undergoing radiation therapy by providing a connection to nature and the outdoors thereby reducing feelings of isolation and anxiety. Additionally, the sub lounge allows for patients to engage in relaxation techniques and social interaction, further enhancing their emotional and mental health throughout their radiation therapy journey. Further enhancing the connection to nature and non-stereotypical healthcare environment, is the recovery ward for the brachytherapy procedures which is a transparent glass walled ward which creates the illusion of an open pavilion immersed in a forest like landscaped garden allowing patients to feel connected to the outdoors while still receiving necessary medical care, promoting a sense of calm and well-being during their

recovery. Additionally, the natural light and greenery in the ward can help reduce stress and anxiety, contributing to a more positive healing experience for patients.

3.6.4 **CHEMOTHERAPY EXPERIENCE**

1 – Landscaped Garden
2 – Patient refreshment lounge
3 – Private Infusion Suite
4 – Semi Private Infusion Suites
5 – Communal Infusion Suites
6 – Internal Atrium

Figure 175 : Floorplan of chemotherapy ward (Source: by author)

Further enhancing the resort like atmosphere is the spa like ambiance and layout of the chemotherapy ward, reinforcing the non-stereotypical healthcare setting by providing patients with a sense of relaxation and comfort during their treatment in a non-clinical like environment and creates the illusion of being in a day spa receiving pampering treatment rather than chemotherapy. The open plan layout offers various privacy options from private infusion to semi private and communal infusion. All infusion bays are orientated with a view of the garden with east sunlight being prioritised. Internal infusion bays are provided for light sensitive patients. An internal atrium enhances the connection to nature with a social lounge and coffee and beverage area looking out onto it , allowing patients to feel more at ease and supported during their treatment. Additionally, the atrium mitigates long dark passages by providing natural light. The design of the chemotherapy ward aims to create a healing environment that promotes both physical and emotional well-being for patients through a spa like environment and nature integration which provides a welcome distraction for patients.

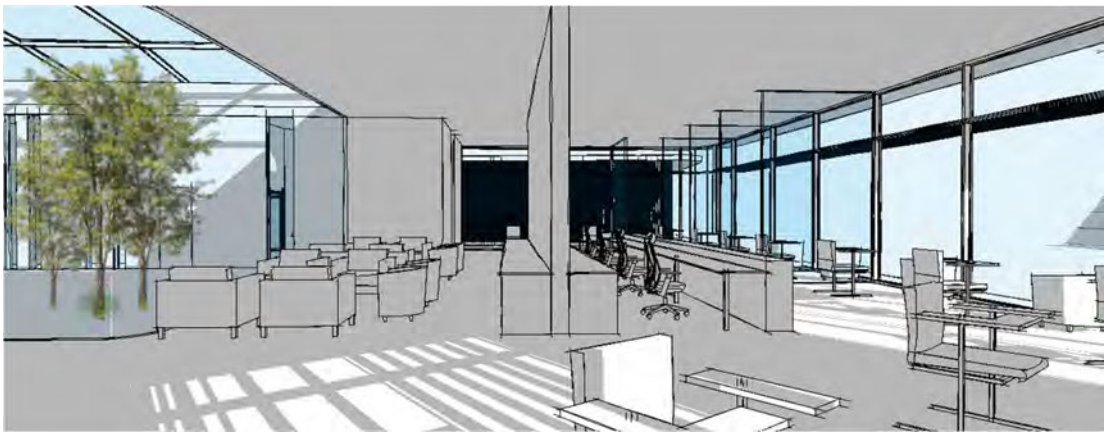


Figure 176 : Chemotherapy ward highlighting direct contact with nature and spa like ambiance (Source: by author)

3.6.5 **SOCIAL INTERACTION AND PLACES OF RESPITE**

The social hub on the inpatient and holistic centre roof gardens offers shared public amenity spaces for patients and families to rest, pray, and support each other while waiting for treatment or escaping stress. Waiting lounges along the connective spine promote social activity among patients, visitors, and care staff, fostering connection during recovery.

Figure 177 : Place of contemplation, respite and socialization for patients on the sensory roof gardens (Source: by author)

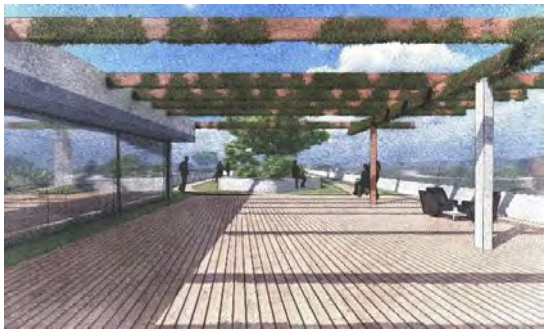


Figure 178 : Place of contemplation, respite and socialization for patients on the sensory roof gardens (Source: by author)

Figure 179 : Place of contemplation, respite and socialization for patients on the sensory roof gardens (Source: by author)

3.6.6 **NATURE IMMERSION**

Green facades and a forest like setting create an immersed in nature ambiance with the benefits of cognitive resource restoration by creating a sense of isolation and being away in nature. This type of environment has been shown to reduce stress levels and improve overall well-being, making it an ideal space for self-healing and rejuvenation.

Figure 180 : View of vegetated roof and green facade walls emulating a nature immersed building (Source: by author)

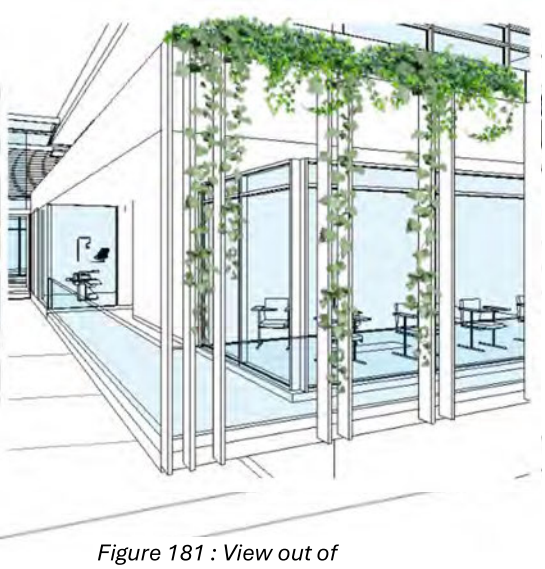


Figure 181 : View out of treatment areas in support clinic, through hanging gardens (Source: by author)

The inpatient ward provides treatment for non-ambulatory patients as well as critical care, and bariatric patients. Additionally, a child friendly ward is provided. The orientation and design of the patient rooms in the inpatient ward allows for natural light and ventilation as well as expansive views of nature enhancing the natural healing quality of the space. The literature review in the previous part shows that viewing nature from a recovery room, immediately improves recovery rates and lessens a patients' reliance on pain medication. The natural light filtering through the windows, further promotes a sense of tranquillity and well-being and helps create a healing environment that supports both physical and emotional recovery through the connectedness to nature. Similarly, treatment areas within the support clinics are orientated such that patients have a view to nature and connection to the natural surrounding environment. For example, when donating blood, the donor chairs are orientated facing the garden allowing patients to relax and enjoy the calming presence of nature while drawing blood which creates a gentle distraction and improves their overall experience at the clinic.

Figure 182 : View of nature from typical inpatient recovery room (Source: by author)

Figure 183 : View from blood donor chair in support clinic (Source: by author)

3.6.7 **PATIENT EMPATHY**

Patients travelling long distances who may require treatment for 7 to 10 consecutive days, are affording the opportunity of residing at the lodge type outpatient residences which offer comfortable accommodation and convenient access to medical facilities. This option allows patients to focus on their treatment without the stress of commuting back and forth daily which the literature review revealed, added to the patients stress and anxiety.

Figure 184 : Outpatient residence entrance (Source: by author)

3.7 **FINAL DESIGN DRAWINGS**

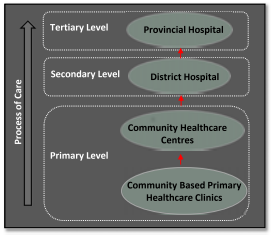
The following attachments illustrate the final design drawings of the proposed oncology centre.

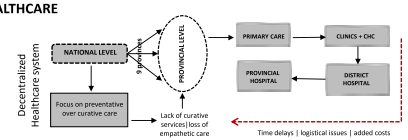
AN ARCHITECTURAL RESPONSE TO HOLISTIC HEALING PRINCIPLES : Towards a natural healing retreat in Kwadukuza, Kwazulu - Natal

RESEARCH PROBLEM

Patients often face **stress and anxiety** due to the uncertainty of their treatment and the severity of their illness. The **built-form** environment can have a positive impact on their **physiological well-being** and their **natural healing** process, but many modern healthcare facilities are designed mainly for functionality and efficiency, neglecting the **empathy and care** that patients need. The experience of place and **patient emotion** is frequently ignored, resulting in healthcare environments that are **sterile and homogenous**. Cancer patients in particular are subject to immense **psychological stress** due to nature of illness and uncertainty of outcome. The need to further understand the influence of **holistic healing** in **architecture** considering a patients emotional and psychological wellbeing is imperative to stimulate a **supportive stress reducing healing environment.**

SOUTH AFRICAS CURRENT APPROACH TO PUBLIC HEALTHCARE





HEALTH ADVERSITIES AND CHALLENGES

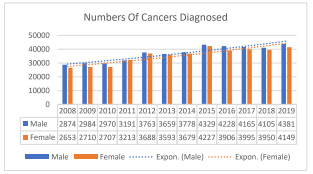
Quadruple burden of disease

Quadruple burden of disease|Fragmented decentralized system|**Disparity between quality of care levels**Cleanliness issues|Poor waste management |**Overcrowing**

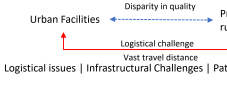
CANCER CARE CHALLENGES

PSYCHOLOGICAL CHALLANGES

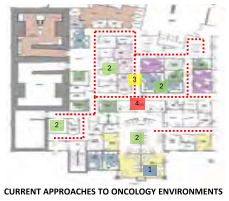
Patient stress and anxiety
Stigma of disease
Psychosocial stress
Socio-economic challenges
→ Negatively influences recovery rate and health outcomes



INFRASTRUCTURAL BARRIERS TO ONCOLOGICAL CARE



Logistical issues | Infrastructural Challenges | Patient Stress and Anxiety



CURRENT APPROACHES TO ONCOLOGY ENVIRONMENTS

RESEARCH AIM, OBJECTIVES, RESEARCH QUESTIONS

RESEARCH AIM

To **explore** the **psychological** impact of **architecture** on **holistic healing** and wellbeing and its potential to **heal** through stimulating environments that evoke holism and in turn enhance the **healing** process to the immediate patient, family members and support systems.

PRIMARY QUESTION

How can the **principles** of **Holistic Healing** inform an architectural design which stimulates **natural healing** in cancer patients?

OBJECTIVES

1. To explore Holistic Healing in architecture.
2. To explore multi-sensory variability in the built form in stimulating physiological and psychological wellbeing.
3. To investigate natural elements as a catalyst in restorative environments
4. To explore the impact of architectural design on the brain in stimulating psychological wellbeing
5. To define Holistic Healing principles that inform a natural healing architecture.

SECONDARY QUESTIONS

1. Where is the relationship between holistic healing and architecture in evoking psychological wellbeing?
1. How can multi-sensory variability in the built form stimulate physiological and psychological wellbeing?
1. Could natural elements act as a catalyst to healing in restorative environments?
1. What are the Holistic Healing principles needed to inform architecture that stimulates natural healing.

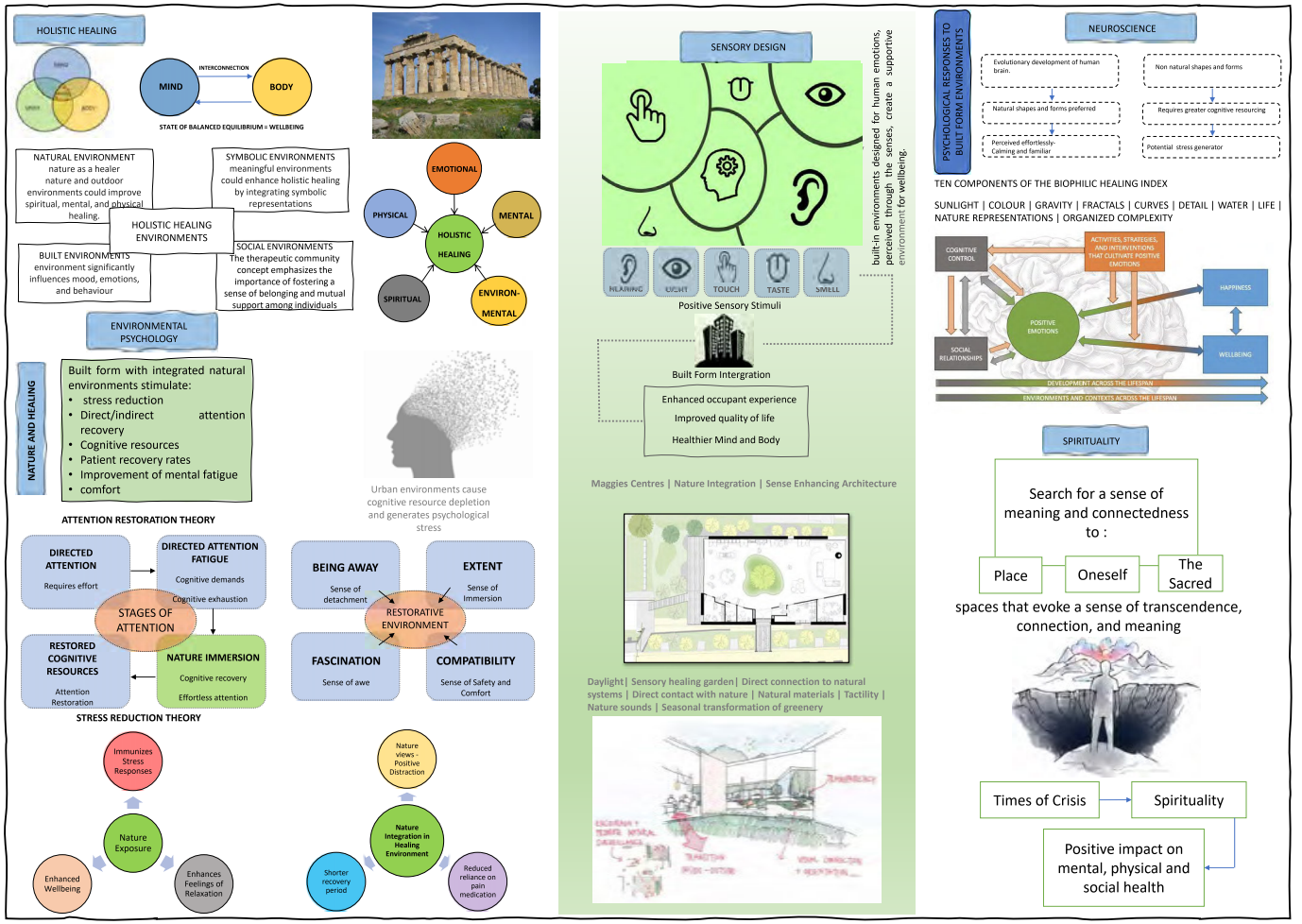
THEORETICAL FRAMEWORK

Holistic healing considers the whole person by including their mind, body & spirit.

The interrelationship between human behavior and environments.

the impact of architecture on human behavior and the brain

LITERATURE REVIEW SUMMARY KEY POINTS



NIRDOSH RAMJIAWAN : 221119165

AN ARCHITECTURAL RESPONSE TO HOLISTIC HEALING PRINCIPLES : Towards a natural healing retreat in Kwadukuza, KwaZulu - Natal

PRECEDENT ANALYSIS

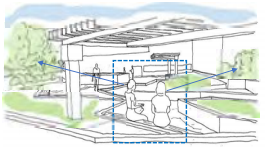
HEALING THROUGH NATURE INTERGRATION

PRECEDENT 1 - KHOO TECK PUAT HOSPITAL

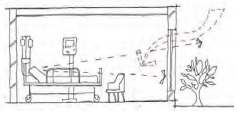
PROGRAM

THEORETICAL CONNECTIONS

- EMOTIONAL CONNECTION DEVELOPED THROUGH SENSORY STIMULATION
- WELLBEING THROUGH FORM & MATERIALITY
- COGNITIVE RESTORATION THROUGH BIOPHILIC IMMERSION
- STRESS REDUCTION THROUGH PSYCHOLOGICAL DISTRACTION

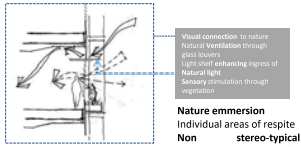


Areas Of Respite | social Interaction | Nature Intergration

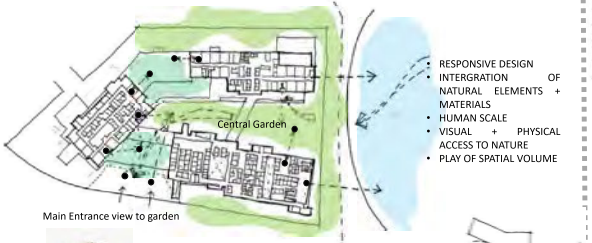


JUSTIFICATION

- Visual + physical access to nature
- Integration of Nature
- Non stereotypical hospital design.
- Responsive design
- Restorative environment
- Sensory stimulation



Nature emmersion
Individual areas of respite
Non stereo-typical environment for consulting



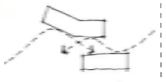
- RESPONSIVE DESIGN
- INTERGRATION OF NATURAL ELEMENTS + MATERIALS
- HUMAN SCALE
- VISUAL + PHYSICAL ACCESS TO NATURE
- PLAY OF SPATIAL VOLUME

Main Entrance view to garden

FINDINGS

SENSORY INTERGRATION

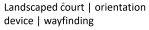
Sensory Design



Pedestrian route

Form opens to internal landscaped environment | immersion into nature

Forms that exploit natural prevailing breezes



Landscaped court | orientation device | wayfinding

HEALING THROUGH HUMAN CENTERED APPROACH

PRECEDENT 2 UMKHUMBANE CHC

PROGRAM

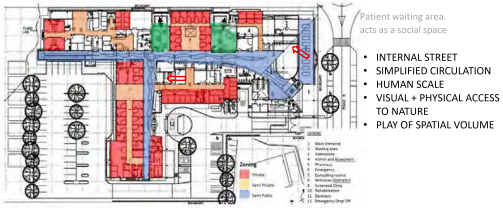
THEORETICAL CONNECTIONS

- FAMILIARITY THROUGH HUMANSCALE
- PSYCHOLOGICAL CONNECTION THROUGH VOLUMETRIC FORMS
- EMOTIONAL CONNECTION THROUGH SENSORY STIMULATION
- WELLBEING THROUGH FOM AND MATERIALITY

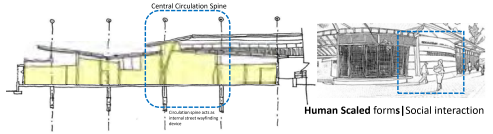
Interplay of **spatial volume** | Ingress of natural light | **Natural** Ventilation Egress of stale dense **air** Main spine – **orientation** device

Justification

- Human-centered approach
- Comfortable and recognizable scale avoiding solid volumes or deep floors.
- Unique wayfinding system using a double-volume "spine" as a navigational tool.

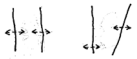


- INTERNAL STREET
- SIMPLIFIED CIRCULATION
- HUMAN SCALE
- VISUAL + PHYSICAL ACCESS TO NATURE
- PLAY OF SPATIAL VOLUME

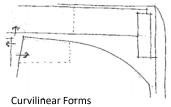


Human Scaled forms | Social interaction

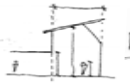
FINDINGS



SENSORY ENGAGEMENT – GRADATION OF SPACE

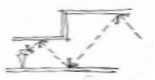


Curvilinear Forms
Wayfinding+orientation
Privacy Gradient



PLAY OF SPATIAL VOLUME

HUMAN SCALE



Auditory engagement through volume | echoes

Materiality

HEALING THROUGH EMPATHETIC APPROACH

PRECEDENT 3 THE RIVERVIEW ONCOLOGY CENTRE

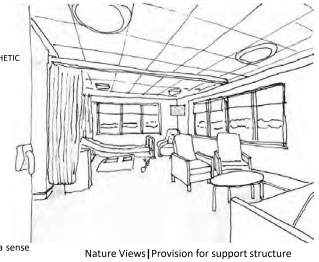
PROGRAM

THEORETICAL CONNECTIONS

- WELLBEING THROUGH EMPATHETIC APPROACH
- PSYCHOLOGICAL SUPPORTIVE ENVIRONMENT
- SUPPORTIVE ENVIRONMENT THROUGH BOPHILIC INTERGRATION

Justification

- innovative oncology care THROUGH biophilic principles
- natural elements, natural views, and daylight, fostering a sense of social support.
- empathetic design for oncology patients and their families.



Nature Views | Provision for support structure

Nature Intergration | Volumetric interplay

Spa-like environment | Views to **nature**

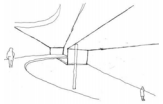
1 : Radiotheraphy bunker
2 : Patient prep area
3 : Patient waiting area

Lack of connection to the external world and nature.

FINDINGS

Nature views and intergration

Play of sunlight and shadow



Interplay of spatial volumes | sensory engagement

CASE STUDY

HEALING THROUGH SENSE OF COMMUNITY

CASE STUDY THE HILLCREST PRIVATE HOSPITAL

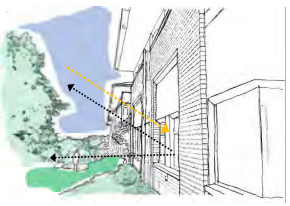
PROGRAM

THEORETICAL CONNECTIONS

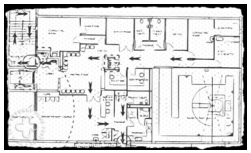
- SENSORY ENGAGEMENT
- TACTILITY THROUGH NATURAL MATERIALS
- INTERGRATION NATURAL ELEMENTS
- FAMILIARITY THROUGH NON THREATENING FORMS

Justification

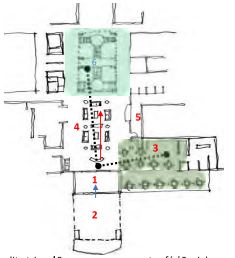
- Promotes Holistic Healing By Intergratingbiophilic Elements
- Promotes Empathetic Healing By Offering Social Connections, Support
- Fosters A Sense Of Community
- Natural Environment



Views to nature | Materiality | Natural Light and sunlight



Oncology Centre Plan



Sunlit atrium | Sensory engagement café | Social interaction

Natural light to treatment rooms

Natural Setting | Domestic Scale | Materiality

FINDINGS

Sunlight | Natural light | prevailing breezes | views to nature | natural ventilation

Central orientation atrium as wayfinding element | resort-like atmosphere | social connectedness | Home-like comforts

Human scaled form

DESIGN DRIVERS

DESIGN PRINCIPLES

BIOPHILIC PRINCIPLES

Forms to exploit natural prevailing breezes

Integration of natural ventilation | Thermal airflow variability

Form opens to internal landscaped environment | emersion into nature

Interactive roof top gardens

Landscaped court | Social spaces | non typical foyer

Wind wall to capture prevailing breezes

Sunlight | Natural light | prevailing breezes | views to nature | natural ventilation

Landscaped spine / court | orientation device | wayfinding

SENSORY STIMULATION

Façade tactile variability | materiality

Auditory engagement through spatial volume

Interplay of spatial volumes | sensory engagement

Create areas Of respite and reflection

Play of shadow and light

Human Scaled forms.

Alcoves with landscape Screen for private areas

RESEARCH FINDINGS

EMPHATHETIC RESPONSE

PSYCOLOGICAL RESPONSE

- Social support
- Wayfinding
- Spirituality
- Natural shapes and forms
- Decentralized waiting areas
- Biophilic integration
- Prospect and refuge
- Scale
- Home like comforts
- Non Stereotypical archetype

Sunlight and Natural light

Water integration

Greenery and views to nature

Windflow and natural ventilation

AN ARCHITECTURAL RESPONSE TO HOLISTIC HEALING PRINCIPLES : Towards a natural healing retreat in Kwadukuza, KwaZulu - Natal

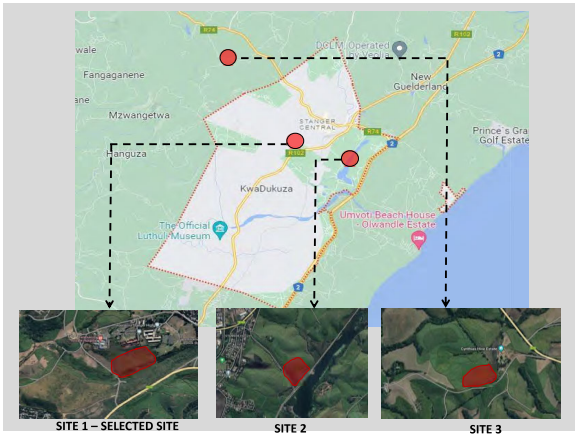
SITE SELECTION

PRIMARY CRITERIA

1. **SENSE OF DISENGAGEMENT**
Feeling of isolation and being away
2. **PROSPECT**
Distant natural views
3. **RESTORATIVE ENVIRONMENT**
Prescence of calm. Feeling of safety security.
4 .**POSITIVE DISTRACTIONS**
Soft fascination and gentle distractions
5. **CONNECTION WITH NATURAL SYSTEMS**
Physical access to nature, flora, fauna, interplay of natural light, provision of green open space

SITE SELECTION - SECONDARY CRITERIA

1. **PROXIMITY TO LOCAL COMMUNITIES EXISTING HEALTHCARE FACILITIES**
2. **RESPONSIVENESS TO CLIMATE**
3. **ACCESSIBILITY**



PUBLIC ONCOLOGY ANALYSIS

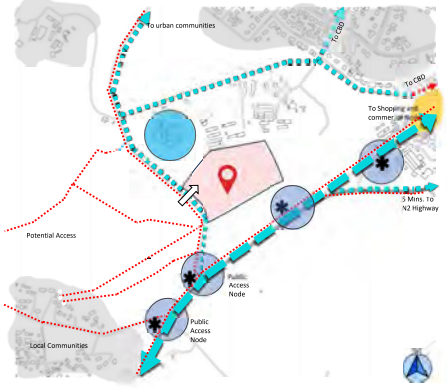
PUBLIC HEALTHCARE FACILITIES 100km RADIUS FROM KWADUKUZA

Addington Hospital, South Beach Durban – 75,5km
Appelbosch Hospital, Greytown - 65km
Catherine Booth Hospital –72,7km
Clairwood Hospital – 87km
Dr Pixely Ka Lsaka Seme Hospital – 70km
Ekuhlengeni Psychiatric Hospital – 97km
Eshowe Hospital – 80km
General Justice Mpanza Gizenga Hospital – 1km
Inkosi Albert Luthuli Hospital – 82,2km
King Edward Hospital – 86km
King Dinizulu Hospital – 76km
Mahathma Gandhi Hospital – 64km
Oswindiweni Hospital – 63km
RK Khan Hospital – 95km
St Aidens Hospital – 75,6km
St Marys Hospital – 91km
Wenthworth Hospital – 89km

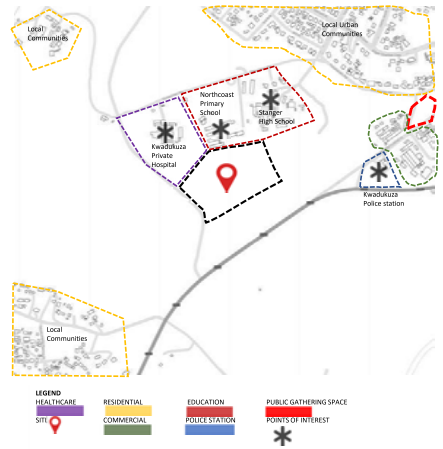
- Oncology services offered

MESO SITE ANALYSIS

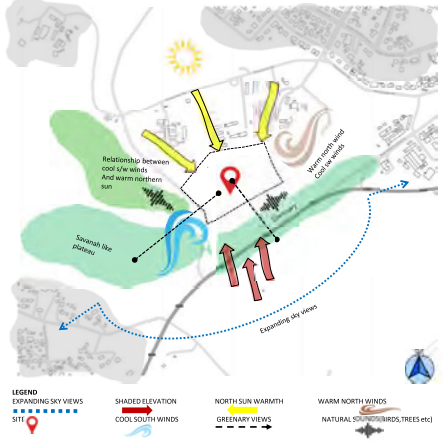
1. MOVEMENT, CONNECTIVITY AND CIRCULATION



2. IMMEDIATE SITE CONTEXT



3. SENSORY ANALYSIS



4. GREENSPACE ANALYSIS

MACRO SITE ANALYSIS

MASTERPLAN COMPONENTS

1 KWADUKUZA PRIVATE HOSPITAL
2 STANGER HIGH SCHOOL
3 COMMERCIAL NODE
4 INDUSTRIAL NODE
5 NORTH COAST PRMARY SCHOOL
6 GENERAL JUSTICE GIZENGA MPANZA REGIONAL HOSPITAL
7 KWADUKUZA CBD
8 KWADUKUZA MALL-RETAIL NODE
9 STANGER EXT 28
10 R102 NORTH
11 R74 EAST
12 R74 WEST
13 LOCAL COMMUNITIES
14 GREENSPACE
15 INFOMAL COMMUNITIES
16 R102 SOUTH

PHOTOGRAPHIC ANALYSIS

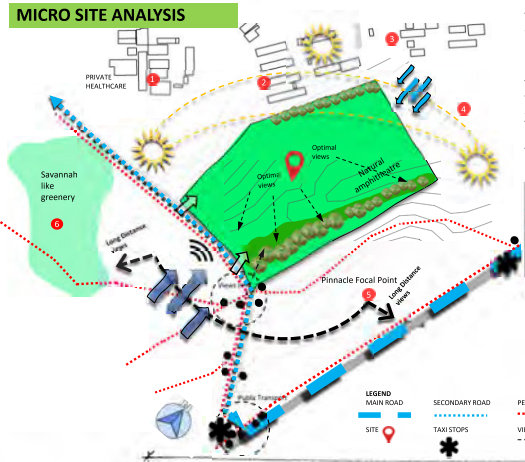

View into site


Long distance view from site

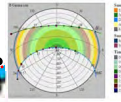

Savanah like view from site

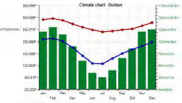

Condition of existing Link Road

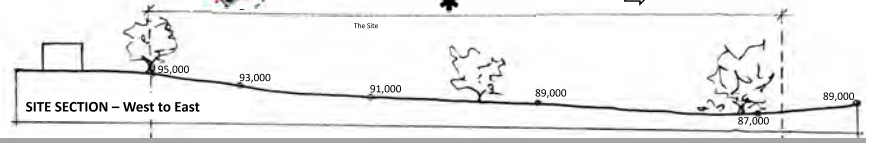
MICRO SITE ANALYSIS



The site sits to the south western edge of the Kwadukuza CBD and currently consists of a green open field bordered by a private hospital to the North west and public schools to the north. The east is bound by a secondary road which accesses the main R102 access road.
The main site is broadly divided into three zones through existing vegetation , a naturally formed amphitheatre and a green open space.
The humid subtropical climate is characteristic of high humidity, long hot summers with rainfall and mild winters.
The average annual highest temperature in KwaDukuza is 31.9°C (89.4°F), and 10.8°C (51.4°F) being the average lowest


KWADUKUZA SOLAR CHART


KWADUKUZA AVERAGE PRECIPITATION AND TEMPERATURE



KEY LINKAGE ANALYSIS

KEY LANDMARKS


15. Informal communities


8. Retail Node


7. CBD


18. COMMUNITY RECREATION


6. PUBLIC HEALTHCARE

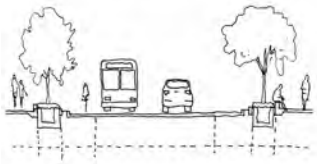

4. COMMERCIAL NODE

AN ARCHITECTURAL RESPONSE TO HOLISTIC HEALING PRINCIPLES : Towards a natural healing retreat in Kwadukuza, KwaZulu - Natal

URBAN RESPONSE APPROACH

URBAN RESPONSE STRATERGIES

1. Facilitate social interaction
2. Site responsiveness, responding to specific local conditions inclusive of built form, topography and natural site conditions including nature views and landscaping
3. Identity, creating a strong sense of identity through the built form
4. Connectivity - links to surrounding local community extending geographic reach through a connected organizational fabric through formalized walking path that links the informal local communities to the pedestrian node
5. Urban Integration, enhancing connectivity to the CBD
6. Safety and Accessibility, integrating a pedestrian friendly, lit sidewalk interface from the R102 and along the Link Road to Theunisen Road.
7. Walkability, enhanced walking paths
8. Enhance public transport infrastructure and access
9. Revitalize existing access road integrating pedestrian friendly sidewalks, landscaping and public transport drop off and pick up points
10. Formalise connectivity between Link Road and Theunissen Road to enhance accessibility to the CBD and public hospital (Stanger Hospital)
11. Link to private hospital enhancing connectivity and collaboration
12. Exploit natural conditions of the site by preserving green open areas
13. The integration and extension of green zones
14. Creating a strong sense of place



STREET REVITALIZATION INTERGRATING SEGREGATION OF SIDEWALK AND INTRODUCING BIOPHILIC ELEMENTS ENHANCES A SENSE OF PLACE

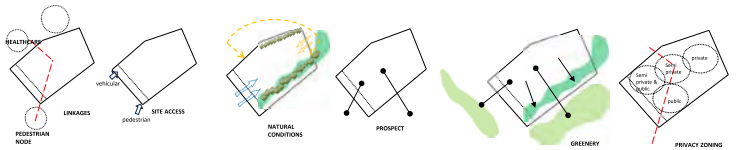
SEGREGATION OF THE SIDEWALK FROM ROAD INTERFACE USING GREENERY ENHANCED THE CONNECTION TO NATURE AND PATIENT SAFETY. SEATING ALONG THE SIDEWALK PROVIDE AREAS OF REST

TRAFFIC CALMING INITIATIVES INCLUDING SAFE PEDESTRIAN CROSSINGS AND SIGNAGE AT KEY POINTS AND INCREASING PEDESTRIAN VISIBILITY

INTERGRATION OF FORMAL PUBLIC TRANSPORT SHELTERS ENHANCES PATIENT SAFETY AND ACCESSIBILITY

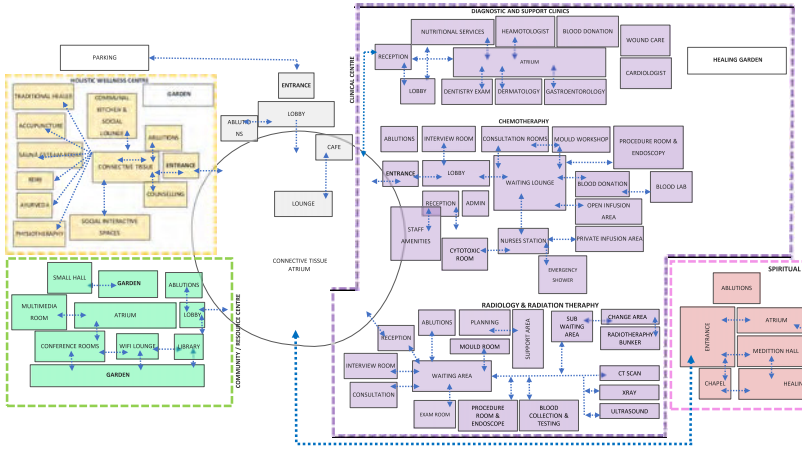
ENHANCED PEDESTRIAN ACCESS WALKING PATH INTERGRATING RESTING BENCHES INCREASES PATIENT EMPATHY AND WALKABILITY

SITE CONSIDERATIONS



SCHEDULE OF ACCOMODATION

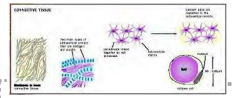
SITE FORMING AND SPATIAL RELATIONSHIP



CONCEPTUAL THINKING

Cancer refers to any one of a large number of diseases characterized by the development of abnormal cells that divide uncontrollably and have the ability to infiltrate and destroy normal body tissue.

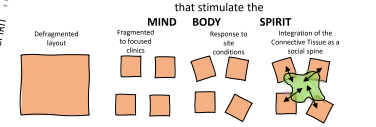
THE CONCEPT OF A CONNECTIVE TISSUE



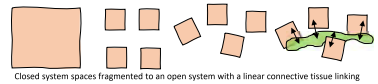
CONNECTIVE TISSUE AND THE BUILT FORM

In contrast to disease that breaks down tissue, Architecture can be thought of as a connective tissue that brings people together and promotes healing. A central spine acts as a unifying element that connects a patient to non clinical spaces such as a café or outdoor areas of respite which provide social support, and communal areas which encourage movement and exploration connecting to areas that stimulate the

MIND BODY SPIRIT



Closed system spaces fragmented to an open system with a central connective tissue linking element



Closed system spaces fragmented to an open system with a linear connective tissue linking element

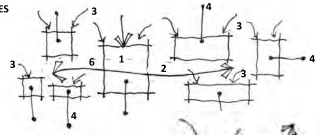
CLUSTERING OF SPACES
NATURAL PATTERNS IN NATURE – DESIGN RESPONSE

METAPHORIC RESPONSE
- NATURAL PATTERNS OCCURING IN NATURE
- EMOTIONAL CONNECTION TO NATURE

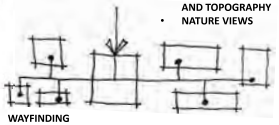
SITE RESPONSE
- SUN PATTERN
- PREVAILING WIND DIRECTION
- NATURAL LIGHT
- PRIVACY LEVELS OF SITE
- EXISTING NATURE AND TOPOGRAPHY
- NATURE VIEWS

THEORETICAL RESPONSE
- AVOID SHARP EDGES AND FORMS
- INTERGATE BIOPHILIC INTERGRATION
- WAYFINDING
- EMPATHETIC APPROACH

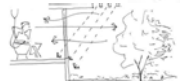
DEVELOPMENT OF FORM



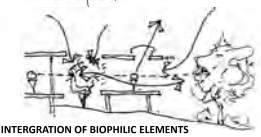
1. CENTRAL ATRIUM ORIENTATING DEVICE
2. EASE OF WAYFINDING
3. NATURAL LIGHT AND VENTILATION
4. VIEWS TO NATURE
5. CENTRAL SPINE
6. SOCIAL CONNECTION
7. RESPONSE TO SITE



WAYFINDING
Clear hierarchical circulation system, intuitive and apparent from point of entry

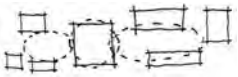


EMOTIONAL CONNECTION TO NATURE
Nature connectedness is associated with lower levels of poor mental health; lower depression, lower anxiety levels and elevated purpose in life



INTERGRATION OF BIOPHILIC ELEMENTS
Direct and indirect connection to nature. Natural light | Sunlight | Natural ventilation | Nature views

NATURAL LIGHT & VENTILATION
Prioritize natural light and finding views to nature. Natural shapes and forms



CENTRAL ATRIUM AND SOCIAL SPINE
Central atrium and connective tissue spine encourages placemaking and people gathering enhancing the social connectedness.

IMMERSED FOREST LIKE ENVIRONMENT
The concept of a living, breathing healthcare facility which constantly changes according to the seasons recognizing that the ever-evolving system that must adapt to the ever-changing demands of the community it serves by providing outdoor areas with the purpose of improving the healing experience

CONCEPTUAL DESIGN PROCESS

BUILDING ORIENTATION
building orientation captures the prevailing winds and harvests natural daylight, resulting in less reliance on artificial light and providing natural ventilation when needed.

BUILDING ENVIRONMENT AND EDGE RESPONSE
Park-like setting, set back from major traffic, with vegetation and mature trees used to buffer the facility from surrounding noise and maintain privacy.


KWADUKUZA ONCOLOGY CENTRE
1. ENTRANCE DRIVEWAY
2. GATEHOUSE
3. PUBLIC AND PATIENT PARKING
4. KWADUKUZA PRIVATE HOSPITAL
5. PATIENT AND STAFF PARKING
6. ENTRANCE DROP OFF PICK UP ZONE
7. ENTRANCE ATRIUM
8. ACUTE PATIENT AND EMERGENCY ENTRANCE
9. CIRCULATION SPINE
10. HOLISTIC CENTRE
11. CLINICAL CENTRE
12. SPIRITUAL CENTRE
13. HEALING GARDEN
14. COMMUNITY CENTRE
15. LINK TO PATIENT PUBLIC TRANSPORT ZONE
16. OPEN GLANDSCAPED GARDEN
17. PATIENT PUBLIC TRANSPORT DROP OFF/PICK UP
18. BIRD WATCHING PLATFORM
19. BOARDWALK
20. ATTENUATION BASS DAM
21. AMNULATORY OUTPATIENT RESIDENCES
22. NORTH COAST PRIMARY SCHOOL
23. LINK TO KWADUKUZA PRIVATE HOSPITAL
PUBLIC TRANSPORT STOP
PUBLIC TRANSPORT STOP
LINK ROAD

HOLISTIC CENTRE

1. HYDROTHERAPHY RECEPTION
2. PATIENT ABLUTIONS AND CHANGE ROOM
3. PATIENT BEVERAGE LOUNGE AND RELAXATION AREA
4. CLEAN UTILITY
5. DIRTY UTILITY
6. JACUZZI
7. FLOATATION POOL
8. SAUNA
9. STEAM THERAPHY
10. AYURVEDIC THERAPHY RECEPTION
11. SUB WAITING AREA
12. STAFF REST AREA
13. CLEAN UTILITY
14. DIRTY UTILITY
15. LAUNDARY
16. INTERVIEW ROOM
17. DEMONSTRATION KITCHEN
18. PATIENT ABLUTIONS AND CHANGE AREA
19. AYURVEDIC TREATMENT AND MASSAGE
20. PANCHKARMA ROOM
21. YOGA AREA
22. CONFERANCE ROOM
23. ALTERNATIVE THERAPHY RECEPTION AND DISPLAY
24. ACCUPUNCTURE TREATMENT ROOM
25. TRADITIONAL HEALER
26. REIKI MASSAGE ROOM
27. WATER ELEMENT
28. ACCESS TO HEALING GARDEN

HEALING GARDEN

CENTRAL ATRIUM

29. CENTRAL ATRIUM
30. CAFE / COFFEE SHOP
31. GIFT SHOP
32. RECEPTION LOUNGE
33. RECEPTION AREA
34. ACCOUNTS AND SUPPORT
35. FILE STORAGE
36. STAFF ABLUTION
37. PHARMACY
38. PATIENT AND VISITOR ABLUTIONS
39. DELIVERY BAY
40. STORAGE AREA
41. AMBULANCE BAY
42. ACUTE PATIENT HOLDING ROOM
43. NON AMBULATORY PATIENT WAITING LOUNGE
44. LINK TO TREATMENT AREAS
45. STAFF MEETING ROOM
46. FACILITIES AND MAINTENANCE MANAGEMENT OFFICE
47. SERVICE CORE
48. DOUBLE VOLUME ATRIUM
49. CIRCULATION SPINE
50. PATIENT AND VISITOR DROP OFF / PICK UP
51. ACUTE AND NON AMBULATORY PATIENT PARKING
52. HEALING GARDEN
53. STAFF AND PATIENT PARKING
54. VISITORS AND PATIENT PARKING
55. LINK TO KWADUKUZA PRIVATE HOSPITAL
56. MEDICAL AND GENERAL WASTE
57. LOADING BAY
58. ACUTE AND EMERGENCY RECEPTION

CLINICAL CENTRE

RADIATION THERAPHY
1. RECEPTION
2. STAFF REST LOUNGE
3. STAFF ABLUTIONS
4. PATIENT & FAMILY WAITING AREA
5. INTERVIEW ROOM
6. CONSULTING ROOM
7. ULTRASOUND EXAM
8. CHANGE ROOM
9. REPORTING ROOM
10. CONTROL ROOM
11. CT SCAN EXAM ROOM
12. XRAY EXAM ROOM
13. RADIOLOGIST OFFICE
14. ONCOLOGIST OFFICE
15. STAFF MEETING ROOM
16. TREATMENT PLANNING AREA
17. MOULD ROOM
18. PATIENT PROCEDURE ROOM
19. BLOOD DRAW
20. BLOOD COUNT AREA
21. PATIENT EXAM ROOM
22. PATIENT ABLUTIONS
23. MAMMOGRAM SUB WAITING & BEVERAGE AREA
24. MAMMOGRAM EXAM
25. CLEAN UTILITY
26. DIRTY UTILITY
27. MEDICAL WASTE STORE
28. ACUTE PATIENT HOLDING
29. STAFF AND ACUTE PATIENT ACCESS PASSAGE
30. RADIATION THERAPHY SUB WAITING LOUNGE
31. RADIATION THERAPHY BUNKER (LINAC ACCELARATOR)
32. BRACHYTHERAPHY BUNKER
33. PATIENT RECOVERY ROOM
34. NURSES STATION
35. ATRIUM

SUPPORT CLINIC

36. DENTAL EXAM
37. LOBBY
38. PATIENT ABLUTIONS
39. DENTAL EXAM RECEPTION
40. PROCEDURE ROOM
41. DENTIST OFFICE
42. STORE ROOM
43. CLEAN UTILITY
44. DIRTY UTILITY
45. STAFF WC
46. STAFF TEA KITCHEN
47. BLOOD DONATION RECEPTION
48. WAITING LOUNGE AND BEVERAGE STATION
49. BLOOD DRAW AREA
50. BLOOD STORAGE
51. CLEAN UTILITY
52. DIRTY UTILITY
53. STAFF WC
54. STAFF TEA KITCHEN
55. CARDIOLOGIST RECEPTION AND WAITING LOUNGE
56. EXAM ROOM
57. CONSULTING ROOM
58. WOUND CARE RECEPTION NURSES STATION
59. TREATMENT AND EXAM ROOM
60. SLUICE ROOM
61. GASTROENTOROLOGIST RECEPTION
62. FILE STORE
63. DERMATOLOGIST RECEPTION & WAITING AREA
64. HEAMOTOLOGIST RECEPTION AND WAITING AREA
65. PATIENT AND FAMILY WAITING LOUNGE
66. CIRCUALTION ATRIUM SPINE
67. ACCESS TO HEALING GARDEN
68. ACCESS TO PATIENT RESIDENCE

CHEMOTHERAPHY

70. RECEPTION
71. WAITING LOUNGE
72. FILE STORAGE
73. STAFF MEETING ROOM
74. STAFF REST ROOM
75. ACUTE PATIENT HOLDING BAY
76. CYTOTOXIC AND MEDICAL WASTE STORE
77. GENERAL WASTE STORE
78. STORE ROOM
79. INTERVIEW ROOM
80. CONSULTING ROOM
81. BLOOD DRAW STATION
82. PARAPLEGIC WC
83. PATIENT ABLUTIONS
84. EXAM & PROCEDURE ROOM
85. BLOOD COUNT ROOM
86. ONCOLOGIST OFFICE
87. PRIVATE ACUTE TREATMENT BAY
88. EMERGENCY PATIENT SHOWER AND WC
89. SLUICE ROOM
90. ANTE ROOM
91. CYTOTOXIC CLEAN ROOM
92. CYTOTOXIC WORK ROOM
93. OPEN INFUSION SUITE
94. CENTRAL NURSES STATION
95. REMOTE NURSES STATION
96. PATIENT BEVERAGE LOUNGE
97. ATRIUM

98. GENERAL WAITING AREA

SPIRITUAL CENTRE PLAN

COMMUNITY CENTER PLAN

PATIENT RESIDENCES

COMMUNITY CENTRE

1. FROM PATIENT DROP OFF AND PICK UP POINT (TAXI,UBER)
2. ENTRANCE
3. SECURITY OFFICE
4. INTERNET AND INFO CAFE
5. SMALL CONFERENCE
6. MEDIUM CONFERENCE
7. LARGE CONFERENCE
8. MULTIPURPOSE HALL
9. STORE ROOM
10. GROUP SUPPORT
11. GROUP LOUNGE
12. TEA KITCHEN
13. GREEN HOUSE
14. ATRIUM
15. STUDY
16. ABLUTIONS

SPIRITUAL CENTRE

1. PRAYER CHAPEL
2. MEDITATION HALL
3. ABLUTIONS
4. PRIVATE MEDITATION PODS / INFORMAL CONSULTATION
5. YOGA PAVILION
6. HEALING GARDEN
7. REFLECTION GARDEN

BLOOD DONATION CLINIC
View to nature | Natural light and ventilation

OUTDOOR YOGA AREA
Immersed in nature| Psychological restoration

PATIENT RESIDENCES
1. BOARDWALK
2. ENSUITE
3. LIVING AREA
4. PATIO

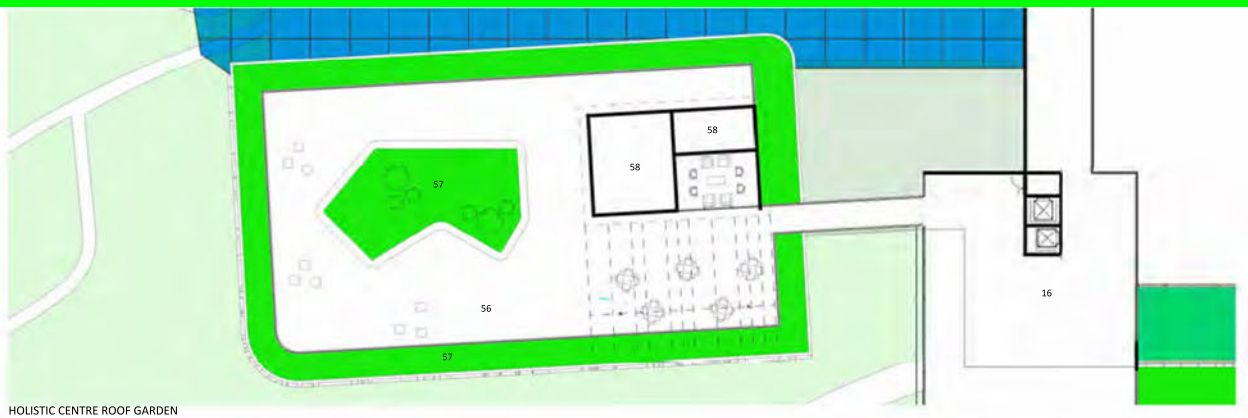
TYPICAL PATIENT RECOVERY ROOM
views to nature |natural light and ventilation | provision for patient support and social interaction

CHEMOTHERAPY CLINIC
Nature intergration | Views to nature

PATIENT ROOF HEALING GARDEN
Nature and healing

CHEMOTHERAPY CLINIC
Play of East facing sunlight

HOLISTIC CENTRE FIRST FLOOR PHYSIOTHERAPY



HOLISTIC CENTRE ROOF GARDEN

MAIN ATRIUM FIRST FLOOR PLAN

SUPPORT CLINIC ROOF GARDEN

INPATIENT WARD

FIRST FLOOR CLINICAL AND HOLISTIC CENTRE

1. PHYSIOTHERAPHY RECEPTION AND SUBWAITING AREA
2. PATIENT CONSULTATION
3. ACUTE PATIENT THERAPHY AREA
4. GENERAL PATIENT TREATMENT AREA
5. HAND THERAPHY AREA
6. VOICE THERAPHY AREA
7. PATIENT MSSAGE THERAPHY
8. PATIENT ABLUTION
9. PHYSIOTHERAPIST OFFICE
10. STORE ROOM
11. CLEAN UTILITY
12. DIRTY UTILITY
13. STAFF REST AREA
14. STAFF ABLUTION
15. ATRIUM

CENTRAL ATRIUM

16. CIRCULATION CORE
17. SERVICE CORE
18. DOUBLE VOLUME
19. CLINICAL PSYCHOLOGY RECEPTION AND SUBWAITING AREA
20. CONSULTING ROOM
21. GROUP THERPHY ROOM
22. PSYCHOLOGIST OFFICE
23. STAFF REST AREA
24. STAFF ABLUTION
25. FILE STORE
26. NUTRITIONAL SERVICES RECEPTION, LOUNGE AND DISPLAY AREA
27. CONSULTING ROOM

ADMINISTRATION AREA

28. CHIEF EXECUTIVE OFFICER OFFICE
29. MEDICAL MANAGER OFFICE
30. NURSING MANAGER OFFICE
31. HUMAN RESOURCE OFFICE
32. CHIEF FINANCIAL OFFICER OFFICE
33. ADMINISTRATION SUPPORT STAFF
34. STAFF REST AREA AND LOUNGE
35. RECORDS ROOM
36. PRINT ROOM
37. STAFF ABLUTIONS
38. CLEANERS OOM
39. STORE ROOM

INPATIENT WARD

40. VISITORS LOUNGE
41. ABLUTIONS
42. SERVICE PASSAGE
43. STAFF REST AREA
44. CLEAN UTILITY
45. DIRTY UTILITY
46. NURSES STATION (RATIO 1/4)
47. FILE ROOM
48. SLUICE ROOM
49. MEDICAL AND GENERAL WASTE
50. STANDARD SINGLE PATIENT ROOM
51. MULTIPLE PATIENT ROOM
52. ACUTE PATIENT ROOM
53. CHILD FRIENDLY PATIENT ROOM
54. ATRIUM OPEN TERRACE

ROOF GARDEN

55. PATIENT AND VISITOR LOUNGE
56. OPEN SEATING AREA
57. SENSORY PLANTERS
58. HVAC SERVICES
59. SERVICES DUCT

LOWER GROUND FLOOR SERVICES AND STAFF FACILITIES

1. PEDESTRIAN ENTRANCE FOYER AND SECURITY POINT
2. CIRCULATION CORE
3. ABLUTIONS
4. HOT WATER STORAGE TANK
5. MEDICAL WASTE STORAGE
6. CENTRAL LAUNDARY
7. SERVICE CORE
8. SECURITY OFFICE
9. CHIEF OF SECURITY
10. SERVER
11. TEA KITCHEN
12. HEALTH SHOP
13. HAIR DONATION SALON RECEPTION AND WAITING AREA
14. WIG WORKSHOP
15. WIG CONSULTATION
16. WIG FITTING
17. PATIENT AND VISITOR BEVERAGE STATION & DISPLAY AREA
18. MAKE UP STATION
19. HAIR STATION AND WASH
20. STORE ROOM
21. AYURVEDIC HEALTH CAFE
22. KITCHEN PREPERATION AREA
23. KITCHEN DRY STORE
24. KOI POND
25. ALFRESCO DINING AREA
26. CENTRAL KITCHEN
27. COLD STORE
28. DRY STORE
29. CANTEEN SERVERY
30. STAFF CANTEEN
31. STAFF LOUNGE
32. STAFF YOGA AREA AND GYM
33. STAFF LOCKERS
34. STAFF ABLUTIONS AND CHANGE AREA
35. DOCTORS PRIVATE SHOWER
36. WATER STORAGE TANKS
37. HVAC EQUIPMENT
38. ELECTRICAL SERVICES

SECTION THROUGH ENTRANCE, ATRIUM, SPINE AND SPINE ATRIUM

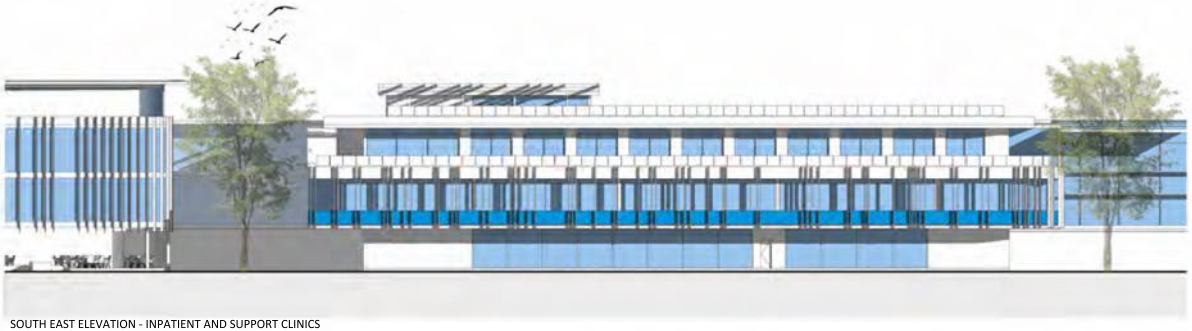
LANDSCAPED PERGOLA PATH TO PATIENT RESIDENCES
nature immersed experience

Patient sensory roof gardens offers patients and clinical staff a place of refuge, contemplation and social interaction
Blooming plants provide a reminder of hope. Seasonal changes, colours and scents provide sensory engagement and detracts from experiantial monotony

MAIN ENTRANCE ATRIUM WITH COFFEE SHOP OF RECEPTION LOUNGE
Creating a resort like non stereotypical atmosphere | Natural light and interplay of volumes.
Evokes Sensory engagement and gentle distractions | Encourages social interaction

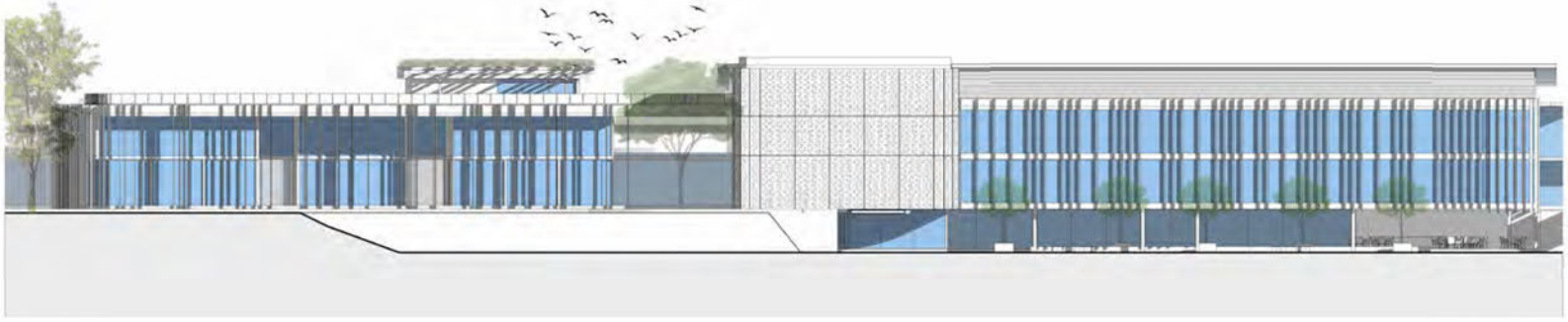
Healing gardens | Gentle distractions | Respite and refuge from stressful stimuli
| Place of santuary and sensory stimulation

SECTION THROUGH RADIATION THERAPY, INPATIENT AND SUPPORT CLINICS
Scale 1:200



SOUTH EAST ELEVATION - INPATIENT AND SUPPORT CLINICS
Scale 1:200

NORTH EAST ELEVATION - CLINICAL CENTRE
Scale 1:200



SOUTH EAST ELEVATION - ATRIUM AND HOLISTIC CENTRE
Scale 1:200

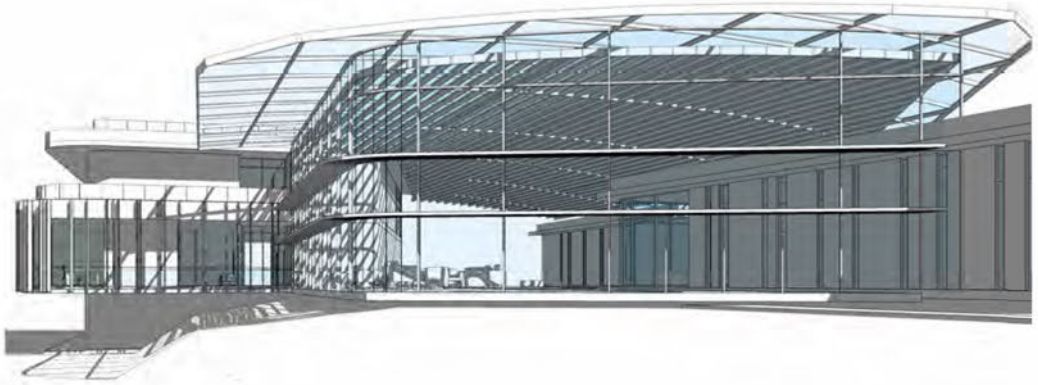
SOUTH EAST ELEVATION - AYURVEDIC CENTRE
Scale 1:200

NORTH WEST ELEVATION - ATRIUM AND HOLISTIC CENTRE

Scale 1:200

SOUTH EAST ELEVATION - SPIRITUAL CENTRE

Scale 1:200



CLINICAL CENTRE CIRCULATION SPINE

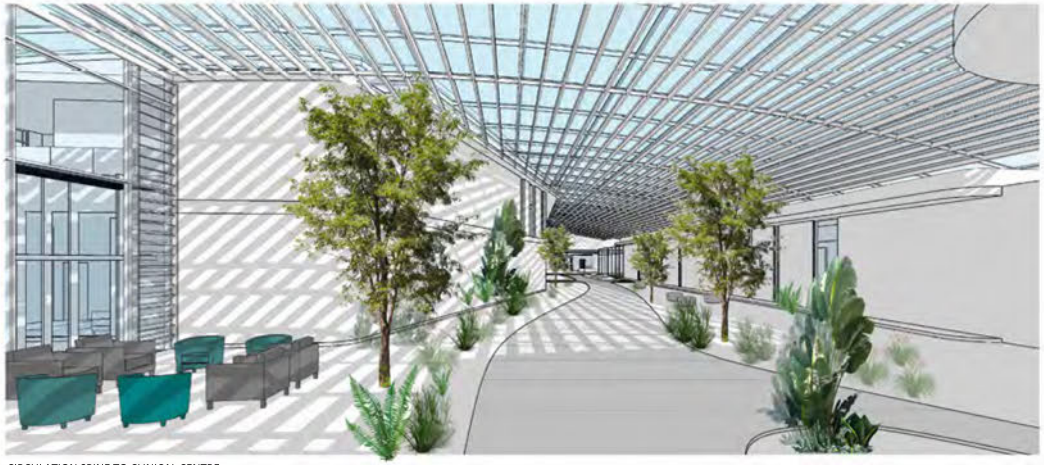
VIEW ONTO CLINICAL SUPPORT TREATMENT AREAS

View to nature | Natural light & ventilation

MAIN ENTRANCE PORTE COCHERE

LOWER GROUND FLOOR
Social interaction spaces| Koi pond (Koi symbol of strenght and courage)

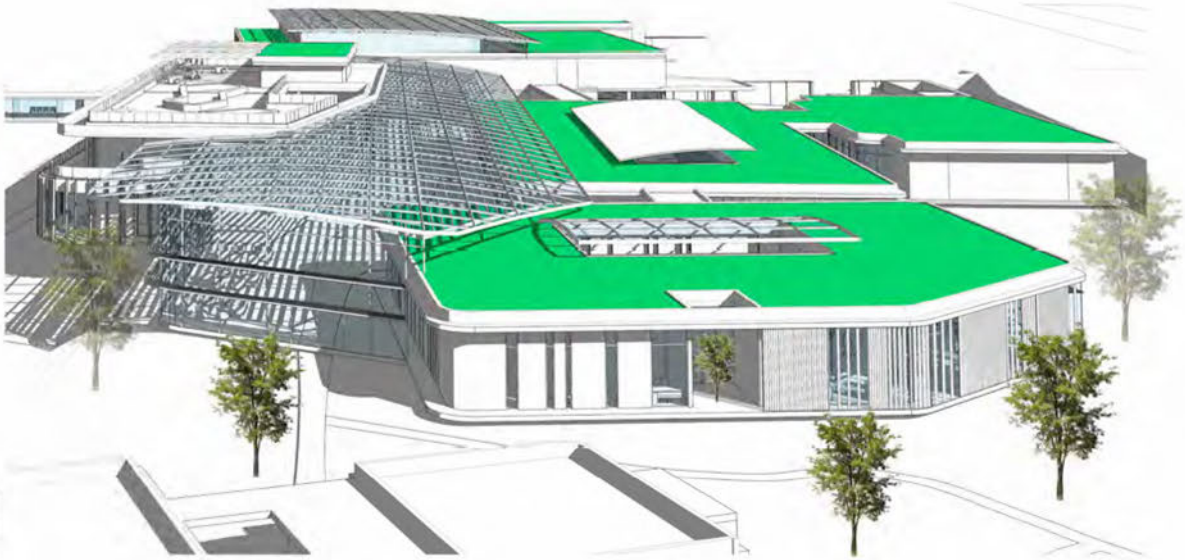
LOWER GROUND FLOOR AYURVEDIC HEALTH CAFE
Social interaction spaces| Nature intergration | Play of light and shadow



CIRCULATION SPINE TO CLINICAL CENTRE
Healing nature| Forest like path | Sensory stimulation | Ease of wayfinding | Sense of fascination and awe

CIRCULATION SPINE OUTSIDE RECEPTION ATRIUM
Social interaction spaces| Nature intergration | Sensory stimulation | Ease of wayfinding

MAIN ENTRANCE



CLINICAL CENTRE
Circulation spine | Natural light and ventilation

INPATIENT AND SUPPORT WARD
Green walls - living breathing building | Immersed landscaping | Natural light and ventilation

PEDESTRIAN APPROACH
Forest like path| Building in nature | Sense of being away

PEDESTRIAN APPROACH NIGHT VIEW
Entrance illumination lantern represents as a Beacon of hope

CIRCULATION SPINE TO HOLISTIC CENTRE
Healing nature| Forest like path | Sensory stimulation | Ease of wayfinding | Sense of fascination

WALL FINISH
Clinical areas
2 no. coats of low sheen washable PVA emulsion paint to SABS 1586and anti bacterial properties, applied on plastered surface primed and with 1 no. coat undercoat to SABS 681 grade1, in accordance to manufacturer's instructions.
Xray suite
2 no. coats of low sheen washable PVA, emulsion paint to SABS 1586 applied on Barite plastered brickwork wall surface primed with 1 no. undercoat in accordance with manufacturer's instructions. Barite must be plaster grade barium sulphate, and plaster mix 1:5 cement : barite by weight applied in 6-7mm thick layers to a final thickness of 15mm.
Service areas
High gloss epoxy enamel wall coating applied up to 2400mm height on cleaned plaster and suitably primed and applied by specialist in strict accordance to manufacturer's specification, The rest of wall to receive emulsion paint on plastered wall
FLOOR FINISH
Clinical areas
2.0mm thick x 2m wide x 20m fully flexible, non-directional heavy-duty vinyl sheeting manufactured to specification EN 649 laid in approved adhesive and joints hot seam welded with approved welding rod in compliance to SABS 070. (Spread with a notched trowel to manufacturers installation specifications), laid on 38mm cement screed. Colour and pattern to architects approval.
Wet areas
600mm x 600mm x 9mm thick porcelain tiles in matt non slip finish laid to approved pattern using approved adhesive and grout in strict accordance to manufacturer's recommendations. All to be manufactured and installed in strict compliance to the latest SABS approved standards. Colour and end finish to architects approval.
Service areas
2mm thick medium gloss finish self-levelling epoxy laid to strict manufacturer's specifications on cleaned and primed 40 mm thick cement sand screed in strict compliance with manufacturer's instructions and to the latest SABS approved. Colour, pattern and aggregate size to architects approval.
FLOOR SLAB
200mm concrete surface bed with steel reinforcing
laid continuous on a 250micron damp proof membrane layer
on a 50mm sandblinding layer on consolidated well compacted
and poisoned soil.

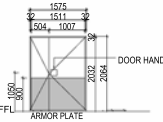
SANWARE SPECIFICATION

MEDICAL BASIN & MIXER
Vitreous China 510x400mm semi-rounded medical basin to comply with SABS 497 fitted with:
• Chrome Plated Wall Type Elbow Action Medical Mixer, With ¼ Turn Ceramic Head Parts,
• Bent Inlet Connections,
• Wall Flanges And Fixed Straight Outlet,
• Chrome Plated 32 Mm Standing Overflow Tube
• Chrome Plated Bottle Trap,
• Chrome Plated Waste Supplied With All Necessary Pipe Connections.
All brackets and fixing accessories in strict accordance to the manufacturer's specifications.

PARAPLEGIC FRIENDLY BASIN
Vitreous China 510x400mm semi-rounded medical basin to comply with SABS 497 fitted with:
• Chrome Plated Wall Type Elbow Action Medical Mixer, With ¼ Turn Ceramic Head Parts,
• Bent Inlet Connections,
• Wall Flanges And Fixed Straight Outlet,
• Chrome Plated 32 Mm Standing Overflow Tube
• Chrome Plated Bottle Trap,
• Chrome Plated Waste Supplied With All Necessary Pipe Connections.
All brackets and fixing accessories in strict accordance to the manufacturer's specifications.

VANITY BASIN
Ceramic fireclay size 580 x 510 mm rectangular self-rimming vanity basin to comply with *SABS 497* in one taphole configuration supplied without overflow and fitted with;
• 1 No. Chrome Plated basin mixer-one hole, with cast swivel outlet,
• Pop-up waste assembly,
• Mounting kit andangle valves, 400mm long flexible inlets and
• Chrome Plated bottle trap supplied with all necessary pipe connections.
Basin mounted on cabinet or vanity
PARAPLEGIC FRIENDLY WC
Vandal resistant Paraplegic WC pan manufactured from polymer concrete (composite) and polished to a smooth silky finish and fitted with flush-valve, including suitable extended activation lever including all necessary accessories and supplied with all pipe connections and fixtures as per manufacturer's specifications and applicable SABS standards.
WC
Vitreous china 90o outlet, top inlet closed rim back-to-wall pan to comply with SABS 497. Fitted complete with exposed top inlet flush-valve complete with all necessary fittings to manufacturer's specification and applicable SABS standards.
URINAL
Vitreous china size 415x315x275mm wall hang bowl urinal to comply with SABS 497. Supplied with suitable 38mm CP domical grating, CP top inlet spreader and two hanger brackets and fitted with exposed flush-valve, and suitable bottle trap chrome finish as per manufacturer's specifications and applicable SABS standards.
SINK
Stainless steel 1000 x 457mm inset single end bowl with recessed drainage ledge and folded edges. Bowl to be fitted to kitchen cupboard , Grade 304 (18/10) Stainless Steel sink to comply with SABS 906 fitted with: Approved Sink mixer- wall type, chrome plated swivel Outlet, adjustable and supplied with suitable assesories in accordance to manufacturer's specifications. Rough brass. Sink installation height = 900mm AFFL.

TYPICAL INTERNAL DOORS



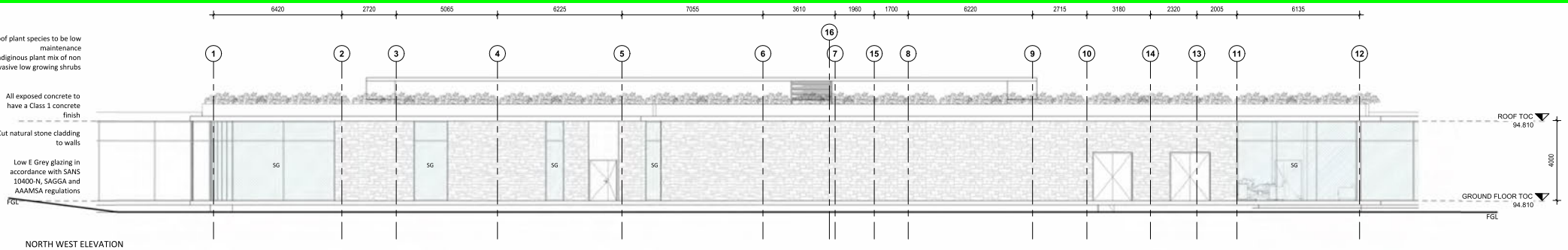
DOOR DESCRIPTION	PURPOSE MADE 2032 X 1511 X 44MM SOLID CORE MDF FLUSH PANEL ONE & HALF DOOR WITH HARDWOOD EDGE COVER STRIPS ON SIDES AND HARDWOOD REBATE MEETING STILES IN CENTRE.
DOOR FINISH	PREPARE DOOR, PAINT WITH UNIVERSAL UNDERCOAT AND 2 COATS OF NON-DRIP WATER BASED ENAMEL ACCORDING TO MANUFACTURERS SPECIFICATIONS WITH SPONGE ROLLERS. COLOUR: TO BE CONFIRMED BY ARCHITECT
FRAME	STANDARD 1.2MM PRESSED DOUBLE REBATED GALVANIZED MILD STEEL FRAME FOR 2032 X 1511 X 44MM DOOR. WALL THICKNESS AS SHOWN. SUPPLY FRAME WITH 1 & 1/2 PAIR OF 100MM STEEL HINGES/OPENING SECTION.
FRAME FINISH	REPAIR FACTORY PRIMER COAT, PAINT UNIVERSAL, UNDERCOAT AND FINISHED WITH TWO COATS NON-DRIP WATER BASED ENAMEL OR EQUAL APPROVED POLYURETHANE ALKYD SEMI GLOSS ENAMEL.
IRONMONGERY & FURNITURE	HANDLES - 1X SET LEVER HANDLE ON 170X170 PLATE WITH CYLINDER CUTOUT(STAINLESS STEEL GRADE 304) LOCK - 1X CYLINDER SASH LOCK 1X 66MM EN PIN EURO PROFILE DOUBLE CYLINDER MASTER KEYED (SATIN NICKEL) DOOR STOP - 2X FLOOR MOUNTED HALF ROUND STAINLESS STEEL DOOR STOPS FLUSH BOLT - 1X 153MM FLUSH BOLT WITH HEEL - 1X 305MM FLUSH BOLT WITH HEEL AMORPLATE - 1SET DOOR WIDTH AMORPLATE W X 900 X 1.2MM TO INCLUDE REBATE KIT.

BUILDING CLASSIFICATION - E2
FD - 2 hour class B fire door
VP - 110 Diameter HDPE vent pipe

FE - Fire Extinguisher 2x4,5kg
FHR - 30m Fire Hose Reel
FIRE CUPBOARD DETAIL

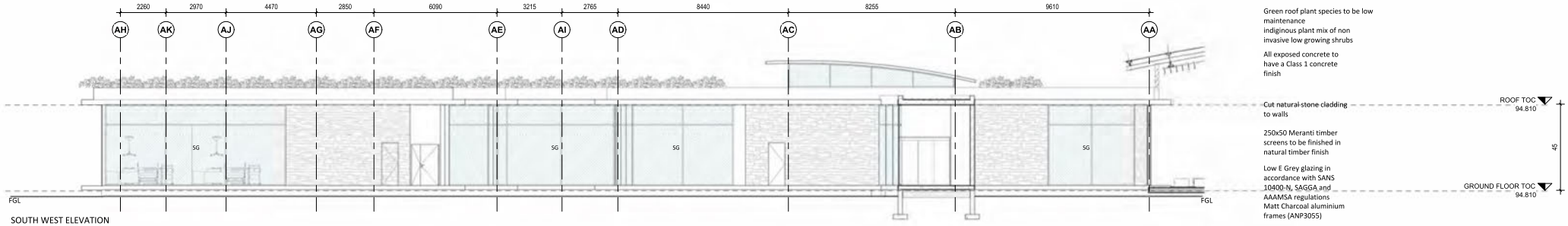
GROUND FLOOR PLAN
RADIOTHERAPY WARD

Scale 1:100



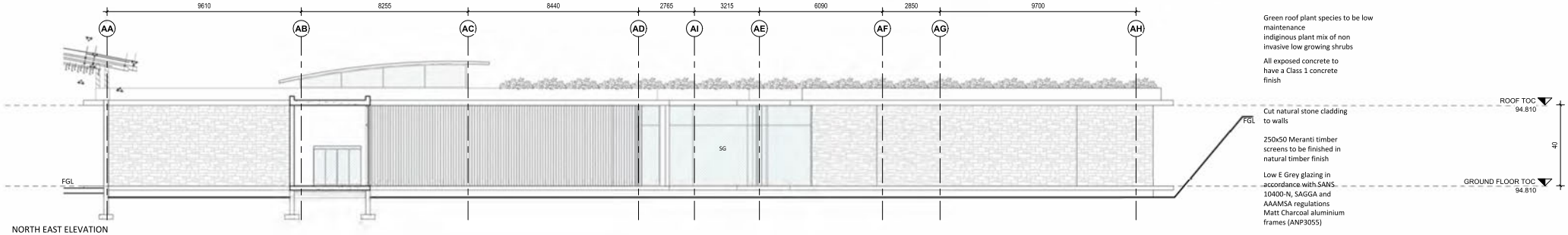
NORTH WEST ELEVATION

Scale
1:100



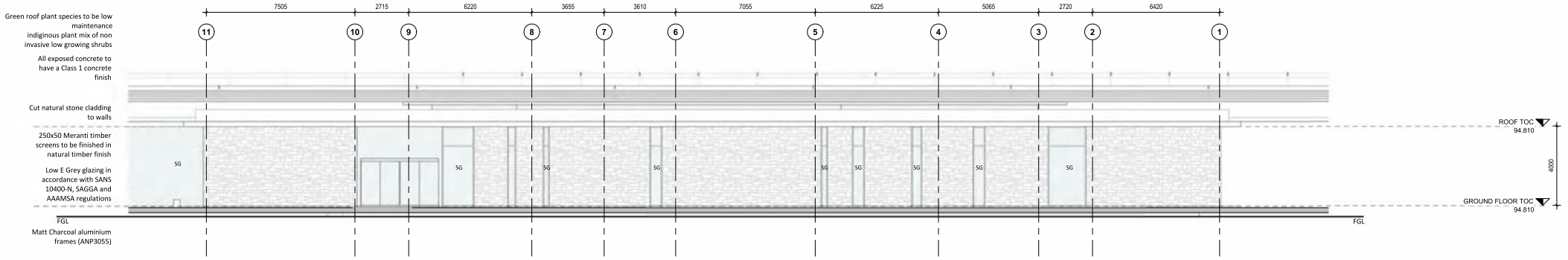
SOUTH WEST ELEVATION

Scale
1:100



NORTH EAST ELEVATION

Scale
1:100



SOUTH EAST ELEVATION

Scale
1:100

RADIATION THERAPY CLINIC ELEVATIONS

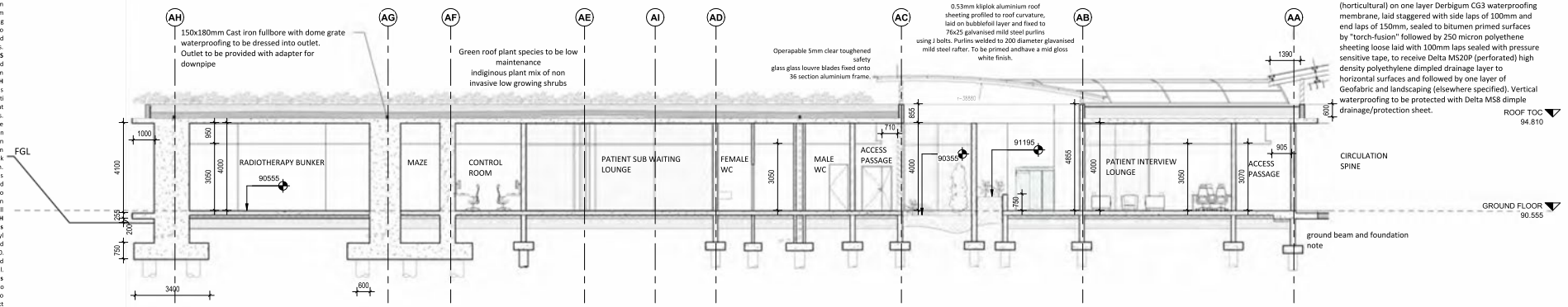
ROOF
Vegetated green roof sub layers on waterproofing layer on minimum 20mm screed laid to a 1:80 fall to fullbore outlets. Fullbore to be provided at minimum 1/100sqm. 255mm steel reinforced power floated concrete slab incorporating hardeners strictly in accordance to the structural engineer's specifications. All to be manufactured and installed in strict compliance to the latest SABS approved standards.

SUSPENDED CEILINGS
1200x600 ceiling tiles on suspended system

WALL FINISH
Clinical areas
2 no. coats of low sheen washable PVA emulsion paint to SABS 1586and anti bacterial properties, applied on plastered surface primed and with 1 no. coat undercoat to SABS 681 grade1, in accordance to manufacturer's instructions.
Xray suite
2 no. coats of low sheen washable PVA, emulsion paint to SABS 1586 applied on Barite plastered brickwork wall surface primed with 1 no. undercoat in accordance with manufacturer's instructions. Barite must be plaster grade barium sulphate, and plaster mix 1:5 cement : barite by weight applied in 6-7mm thick layers to a final thickness of 15mm.
Service areas
High gloss epoxy enamel wall coating applied up to 2400mm height on cleaned plaster and suitably primed and applied by specialist in strict accordance to manufacturer's specification, The rest of wall to receive emulsion paint on plastered wall

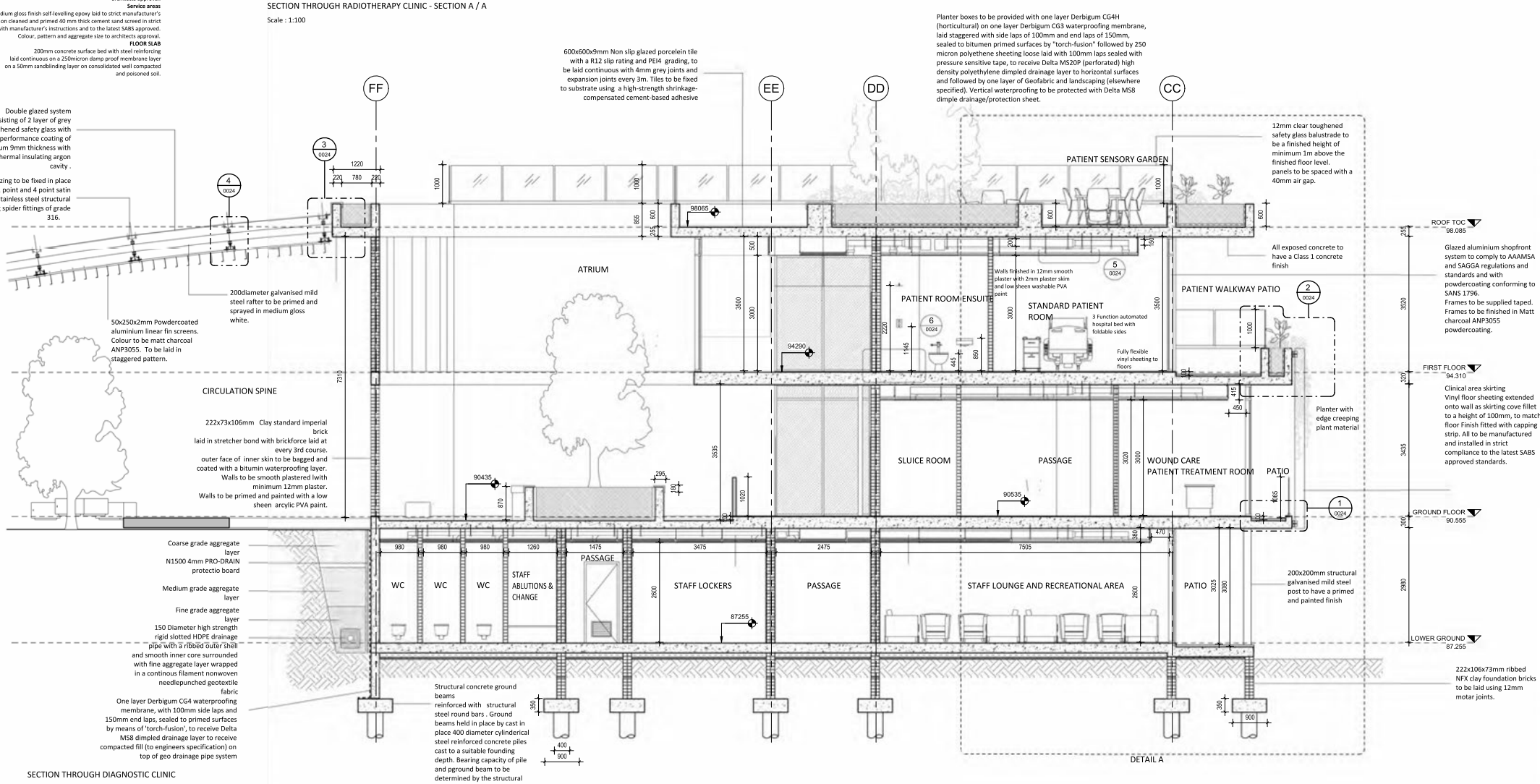
FLOOR FINISH
Clinical areas
2.0mm thick x 2m wide x 20m fully flexible, non-directional heavy-duty vinyl sheeting manufactured to specification EN 649 laid in approved adhesive and joints hot seam welded with approved welding rod in compliance to SABS 070. (Spread with a notched trowel to manufacturers installation specifications), laid on 38mm cement screed. Colour and pattern to architects approval.
Wet areas
600mm x 600mm x 9mm thick porcelain tiles in matt non slip finish laid to approved pattern using approved adhesive and grout in strict accordance to manufacturer's recommendations. All to be manufactured and installed in strict compliance to the latest SABS approved standards. Colour and end finish to architects approval.
Service areas
2mm thick medium gloss finish self-levelling epoxy laid to strict manufacturer's specifications on cleaned and primed 40 mm thick cement sand screed in strict compliance with manufacturer's instructions and to the latest SABS approved. Colour, pattern and aggregate size to architects approval.

FLOOR SLAB
200mm concrete surface bed with steel reinforcing laid continuous on a 250micron damp proof membrane layer on a 50mm sandblinding layer on consolidated well compacted and poisoned soil.



SECTION THROUGH RADIOTHERAPY CLINIC - SECTION A / A

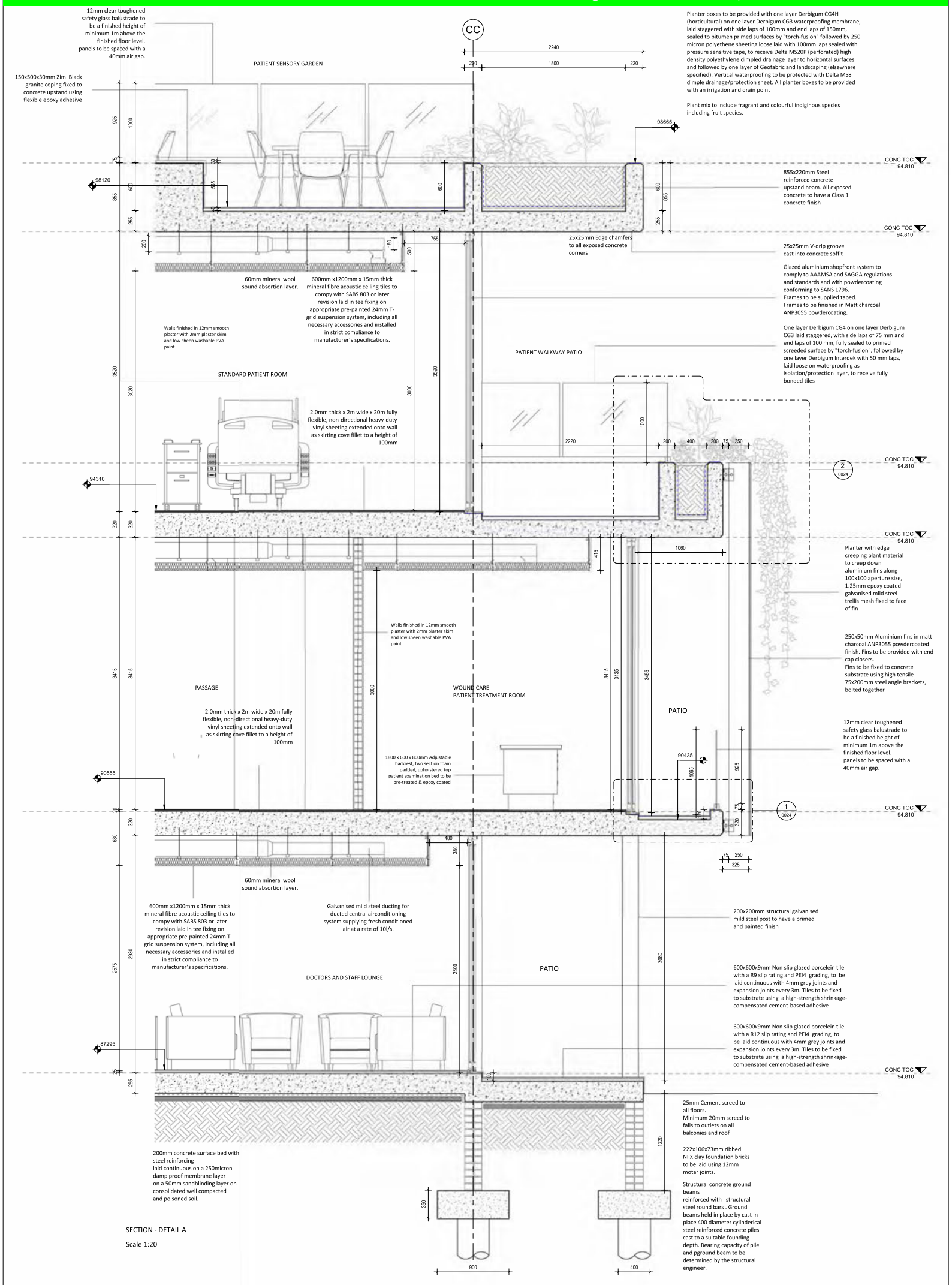
Scale : 1:100



SECTION THROUGH DIAGNOSTIC CLINIC

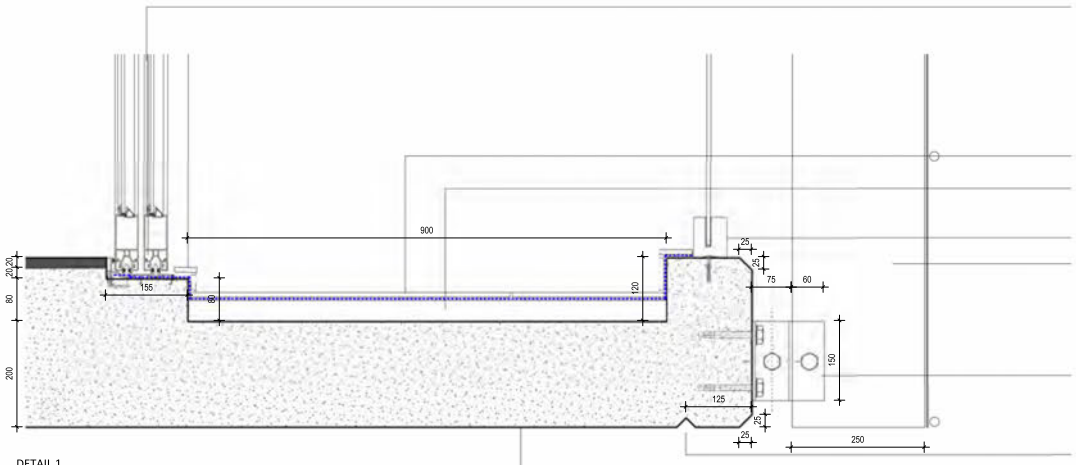
Scale : 1:100

DETAIL A



SECTION - DETAIL A

Scale 1:20



Glazed aluminium shopfront system to comply to AAAMSA and SAGGA regulations and standards and with powdercoating conforming to SANS 1796. Frames to be supplied taped. Frames to be finished in Matt charcoal ANP3055 powdercoating.

600x600x9mm Non slip glazed porcelein tile with a R12 slip rating and PEI4 grading, to be laid continuous with 4mm grey joints and expansion joints every 3m. Tiles to be fixed to substrate using a high-strength shrinkage-compensated cement-based adhesive

Minimum 25mm thick cement sand screed laid to 1:80 gradient towards patio drain.

Aluminium glass balustrade channel to be powdercoated in matt charcoal ANP3055. Channel fixed to concrete beam using high tensile stainless steel fixing screws with plugs

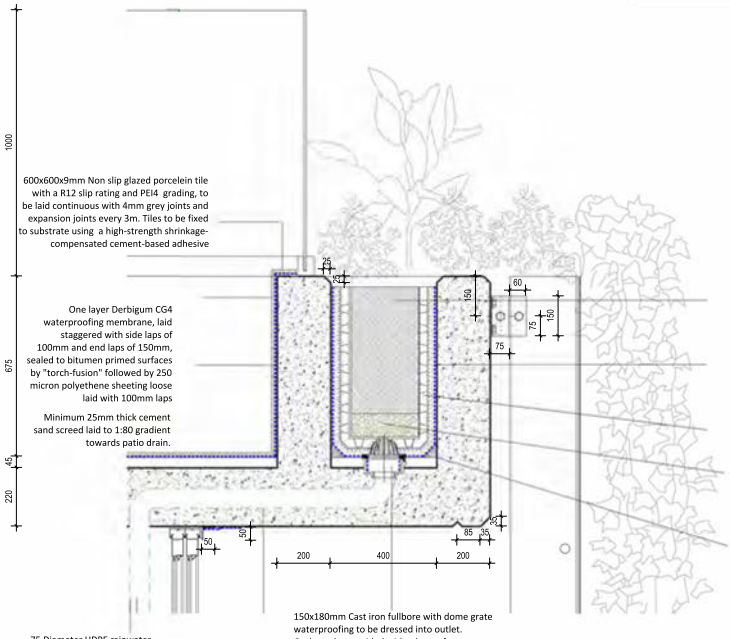
250x50mm Aluminium fins in matt charcoal ANP3055 powdercoated finish. Fins to be provided with end cap closers. 100x100mm apeture size epoxy coated galvanised mild steel mesh to face of fin.

Fins to be fixed to concrete substrate using high tensile 75x200mm steel angle brackets, bolted together using high tensile stainless steel fixing bolts, nuts and washers. Bolts fixed to concrete substrate using rawl bolts.
25x25mm V-drip groove cast into concrete soffit to be 125mm away from edge of slab

All exposed soffits, edges and sides of concrete to have a Class 1 concrete finish

DETAIL 1

Scale 1:5



600x600x9mm Non slip glazed porcelein tile with a R12 slip rating and PEI4 grading, to be laid continuous with 4mm grey joints and expansion joints every 3m. Tiles to be fixed to substrate using a high-strength shrinkage-compensated cement-based adhesive

One layer Derbigum CG4 waterproofing membrane, laid staggered with side laps of 100mm and end laps of 150mm, sealed to bitumen primed surfaces by "torch-fusion" followed by 250 micron polyethene sheeting loose laid with 100mm laps

Minimum 25mm thick cement sand screed laid to 1:80 gradient towards patio drain.

475mm layer of fertilized soil mix suitable for propergation of plant mix

One layer Derbigum CG4H (horticultural) on one layer Derbigum CG3 waterproofing membrane, laid staggered with side laps of 100mm and end laps of 150mm, sealed to bitumen primed surfaces by "torch-fusion" followed by 250 micron polyethene sheeting loose laid with 100mm laps sealed with pressure sensitive tape, to receive Delta MS20P (perforated) high density polyethylene dimpled drainage layer

Dimpleboard drainage and retention layer

80mm layer of fine aggregate material of no bigger than 12mm as a filter medium

Dome grate of fullbore to be covered in geotextile fabric.

50x50 screeded corner fillet to receive waterproofing layer

75 Diameter HDPE rainwater downpipe with welded joints to connect to building stormwater management system

150x180mm Cast iron fullbore with dome grate waterproofing to be dressed into outlet. Outlet to be provided with adapter for downpipe

DETAIL 2

Scale 1:5

600x600mm porcelain tiles as per architects specs laid with 4mm joints with light grey grout

4mm ABE Duraflex + membrane applied in strict accordance to the manufacturer's instructions

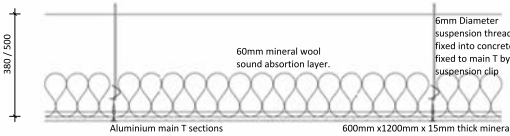
Mosaic tiles as per finishes schedule and laid on min 25mm screed to fall to outlet
tile to be to 1:100 falls into shower

Silicone bead all around applied in strict accordance to the manufacturer's instructions

Shower floor drain with stainless steel grating cast into concrete. Waterproofing to be dressed into outlet

DETAIL 6

Scale 1:5



DETAIL 5

Scale 1:5

Profiled extruded aluminium sheeting to form capping and closer.
Capping to be positived bixed to concrete substrate using high tensile stainless steel screws and plugs.

80mm layer of fine aggregate material of no bigger than 12mm as a filter medium

Dome grate of fullbore to be covered in geotextile fabric.

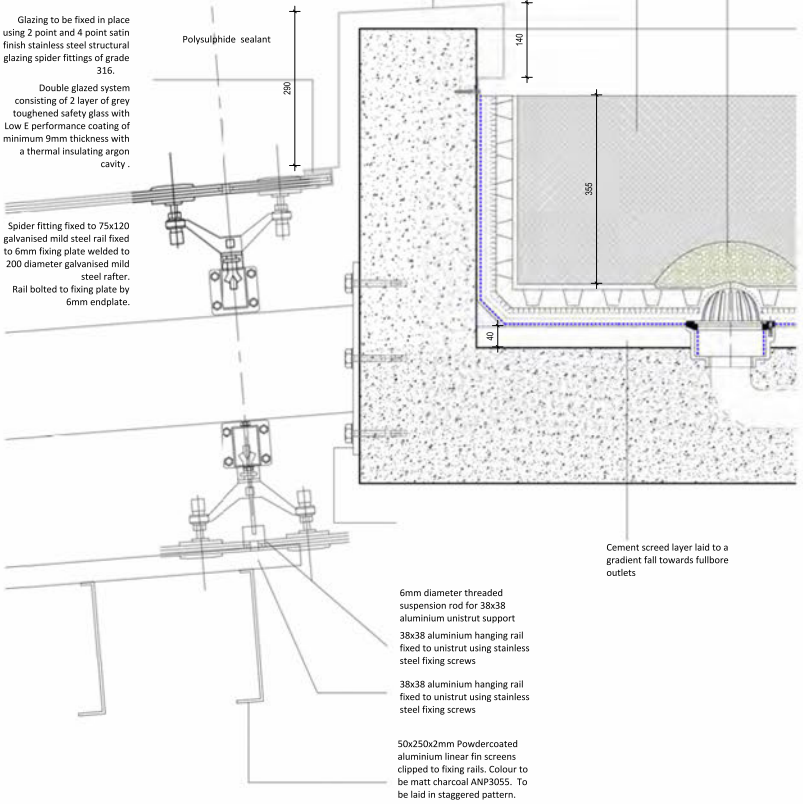
355mm layer of fertilized soil mix suitable for propergation of plant mix

Glazing to be fixed in place using 2 point and 4 point satin finish stainless steel structural glazing spider fittings of grade 316.

Double glazed system consisting of 2 layer of grey toughened safety glass with Low E performance coating of minimum 9mm thickness with a thermal insulating argon cavity .

Spider fitting fixed to 75x120 galvanised mild steel rail fixed to 6mm fixing plate welded to 200 diameter galvanised mild steel rafter.
Rail bolted to fixing plate by 6mm endplate.

Polysulphide sealant



Cement screed layer laid to a gradient fall towards fullbore outlets

6mm diameter threaded suspension rod for 38x38 aluminium unistrut support

38x38 aluminium hanging rail fixed to unistrut using stainless steel fixing screws

38x38 aluminium hanging rail fixed to unistrut using stainless steel fixing screws

50x250x2mm Powdercoated aluminium linear fin screens clipped to fixing rails. Colour to be matt charcoal ANP3055. To be laid in staggered pattern.

DETAIL 3

Scale 1:5

Glazing fixed in place by4 point satin finish stainless steel structural glazing spider fittings of grade 316.

Double glazed system consisting of 2 layer of grey toughened safety glass with Low E performance coating of minimum 9mm thickness with a thermal insulating argon cavity .

Spider fitting fixed to 75x120 galvanised mild steel rail fixed to 6mm fixing plate welded to 200 diameter galvanised mild steel rafter.
Rail bolted to fixing plate by 6mm endplate.

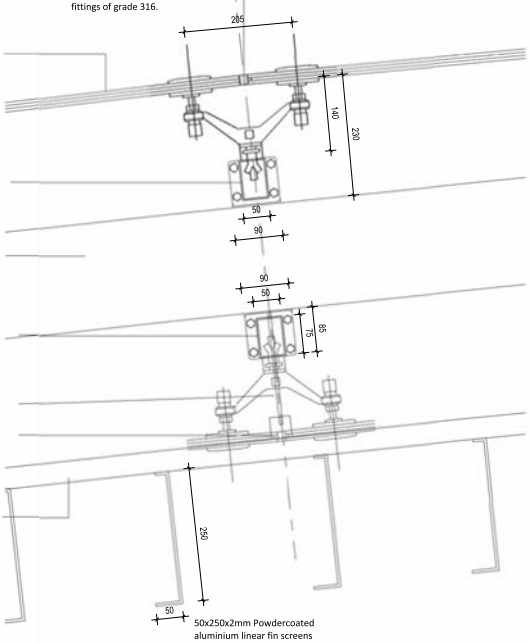
200diameter galvanised mild steel rafter to be primed and sprayed in medium gloss white.

75x120 galvanised mild steel rail fixed to 6mm fixing plate welded to 200 diameter galvanised mild steel rafter.

6mm diameter threaded suspension rod for 38x38 aluminium unistrut support

38x38 aluminium hanging rail fixed to unistrut using stainless steel fixing screws

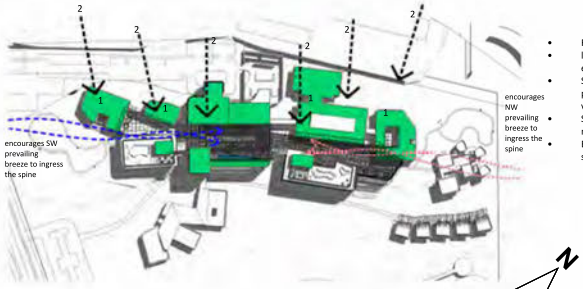
38x38 aluminium hanging rail fixed to unistrut using stainless steel fixing screws



50x250x2mm Powdercoated aluminium linear fin screens clipped to fixing rails. Colour to be matt charcoal ANP3055. To be laid in staggered pattern.

DETAIL 4

Scale 1:5



PASSIVE SITE LAYOUT DESIGN STRATERGIES

- Form response to orientation
- lower form on northern elevation to encourage winter sun into spine
- SW to NE orientation to capture prevailing winds therby naturally ventilating the wards
- Shorther axis on W and E facades to minimise solar heat gain
- Builing along contours to minimise site impact

Sustainability Statement

1. PASSIVE DESIGN STRATEGIES:
- Orientation where the footprint of the building allows Northern sun ingress in cold seasons and Southern shading to treatment and recovery areas
- Large overhangs are predominantly introduced to reduce summer sun ingress.
- Natural light provided to all treatment and recovery areas
- Cross Ventilation encouraged through the spine due to SW / NE orientation which provides fresh air ventilation to clinical areas.

The use of thermal mass walls through out the facility using solid clay bricks, regionally sourcced, allows thermal radiation during cold seasons
- The use of solar screening on north and west facade to prevent harsh direct sun light from the late afternoon while still allowing in passive light into the wards.

The use of high performance thermal insulation as well as double glazed performance glass reduces the buildings heat load and reliance on mechanical cooling.

Material selection lifecycle include long lifespan duable materials which require minimal maintenance such as locally sourced composite timber screens, aluminium windows and class 1 concrete

Landscaped vegetated green roofs keeps the building insulated.

2. ACTIVE DESIGN STRATEGIES:

Supplementary Power Supply

Solar photovoltaic panels to be used as an alternative power supply, generates clean, renewable energy

Low wattage high efficiency LED electrical fittings to be used through out

All hot water pipes to be thermally insulated to prevent energy loss.

Solar power for external lighting to reduce energy demand.
- High-performance insulation, windows, and building envelope to minimize heat loss and gain.

Water Efficiency

Flushmaster toilet flushvalve prevents excessive wastage of water.

Flow restricting and efficient shower heads providing 7 litres per minute

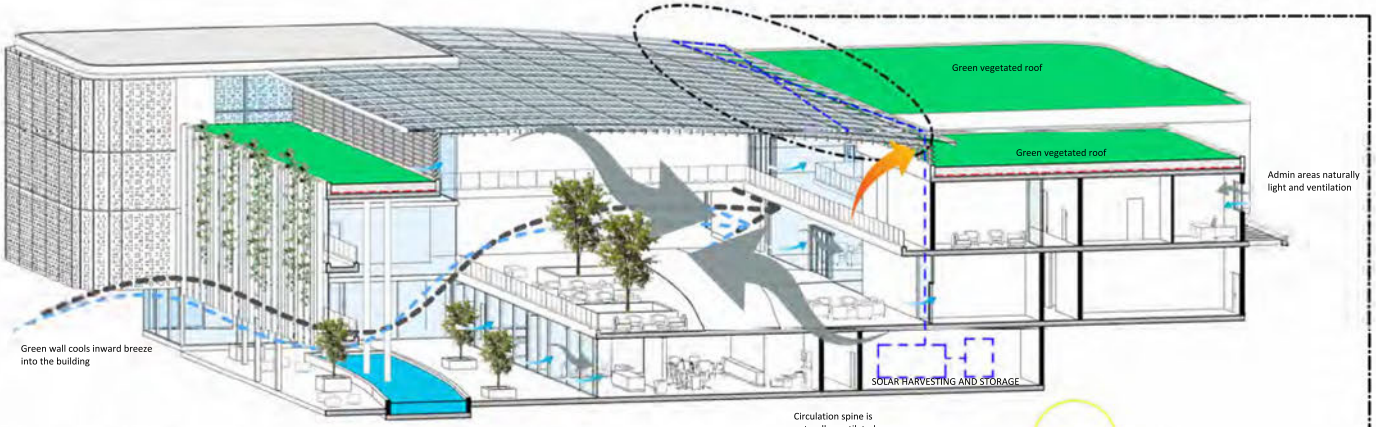
3. ECO-FRIENDLY MATERIALS:
- Composite recycled plastic screens; as well as pergolas are manufactured from recycled materials as well as the use of locally sourced material thereby maintaining environmental sustainability.
- Use of clay brick: recyclable, entirely Earth-friendly, without releasing toxic landfill chemicals
- Aluminium: enviromently friendly metals and recyclable
- Timber: Renewable Resource, Recyclable and Biodegradable. Lightweight with insulating properties, reducing energy consumption for heating and cooling.

4. ADAPTABILITY AND RESILIANCE:
- Use of clay brick: robust, stable and durable
- Use of concrete: increased durability, longevity, enhanced safety, reduced outside noise and energy savings
- Finishes: Natural stone, concrete and composite timber allows for easy maintenance as well as little to no maintaince maintaining durability.
- Aluminium door and window framing; throughout. weather resiliant, corrosion resistant and long lifespan.

5. RESOURCE CONSERVATION:
- Rainwater harvest : Mitigates stormwater runoff, minimizing soil erosion, decentralized water collection and use of filtration purifier for usable water.
- Site: approach of the building on the natural landscape is designed to match the natural slope of the site to allow for minimal excavation of fill.
- Lighting: The use of light control and motion sensors will be implemented. The use of low voltage, low demand LED fittings will be implemented.
- Water: Flow restricting and aerated faucets 5 litres per minute.

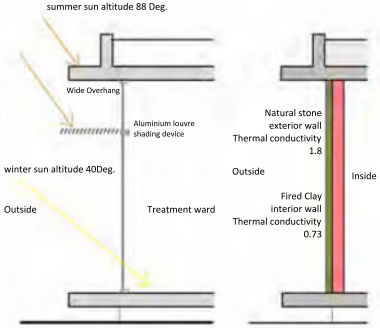
Greywater recycling systems treat and reuse water from basins and showers for irrigation or other non-potable applications.

Access to natural ventilation
Heat dissipation
Access to natural light



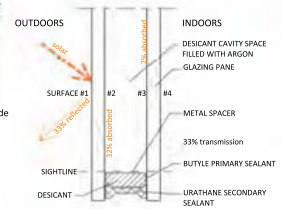
TYPICAL SECTION

Circulation spine is naturally ventilated and has natural light

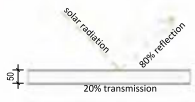


PASSIVE SOLAR CONTROL

THERMAL MASS WALLS



HIGH PERFORMANCE LOW E THERMAL DOUBLE GLAZED GLASS



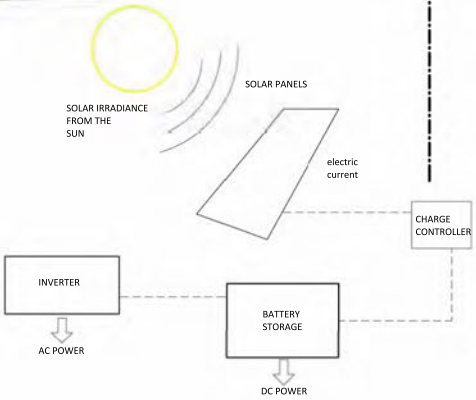
HIGH PERFORMANCE ROOF THERMAL INSULATION

Low-flow shower and taps reduce water consumption without sacrificing performance.

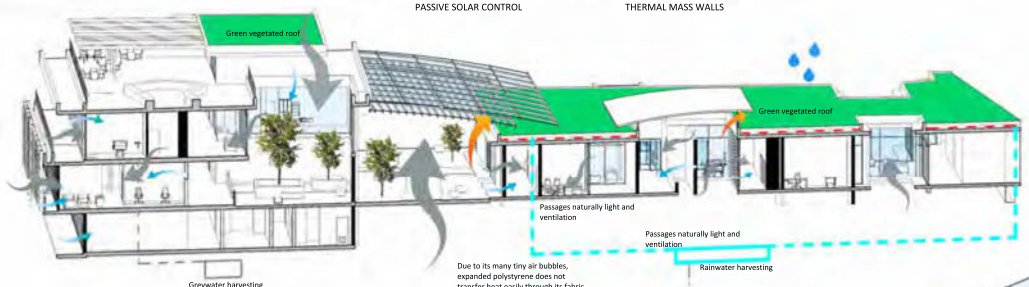
Low voltage high efficiency LED light fittings that maintain required lux levels reducing energy demand

High effficiency on demand flush valves reduces water wastage and conserves resources

ACTIVE RESOURCE CONSERVATION STRATERGIES



SOLAR PANELS INTERGRATED INTO MAIN SPINE CANOPY

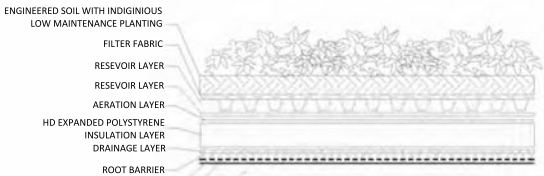


TYPICAL SECTION THROUGH CLINICAL WARD, SPINE & RADIATION THERAPHY

- Day lighting
- Vegetated green roof
- Green ventilated facade
- Natural ventilation
- Solar shading
- Solar harvesting
- Rainwater collection and storage
- Grey water collection and treatment

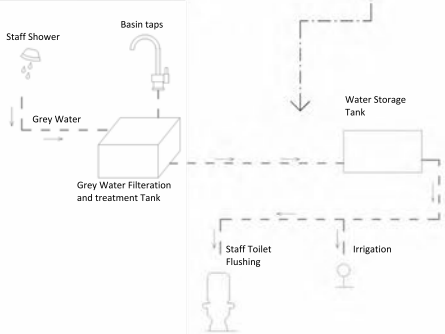
Due to its many tiny air bubbles, expanded polystyrene does not transfer heat easily through its fabric. These foam boards have a low thermal conductivity or K-Value of 0.032 (W/mK).

Application Board Thickness - 50mm
Thermal Reduction - 80%
Application - Inverted Roof
Installation to all roof slabs

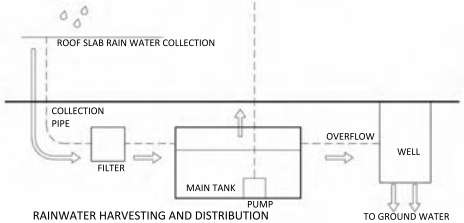


GREEN ROOF DETAIL

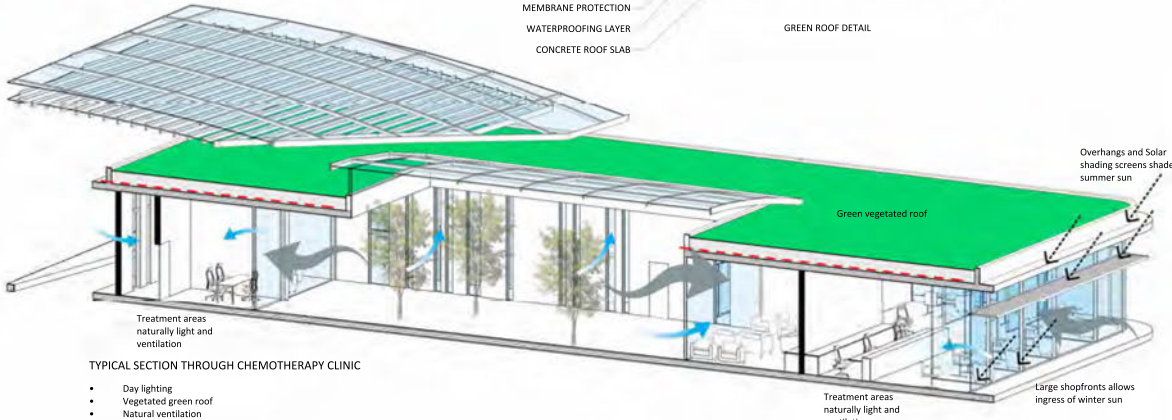
Green roofs provide insulation, absorb stormwater and create habitats for local wildlife.
Green roofs reduce building energy use by cooling roofs and providing shading, thermal mass and insulation.



GREY WATER HARVESTING AND DISTRIBUTION



RAINWATER HARVESTING AND DISTRIBUTION



TYPICAL SECTION THROUGH CHEMOTHERAPY CLINIC

- Day lighting
- Vegetated green roof
- Natural ventilation
- Solar shading
- Regionally sourced materials
- High performance Low E double glazed glass