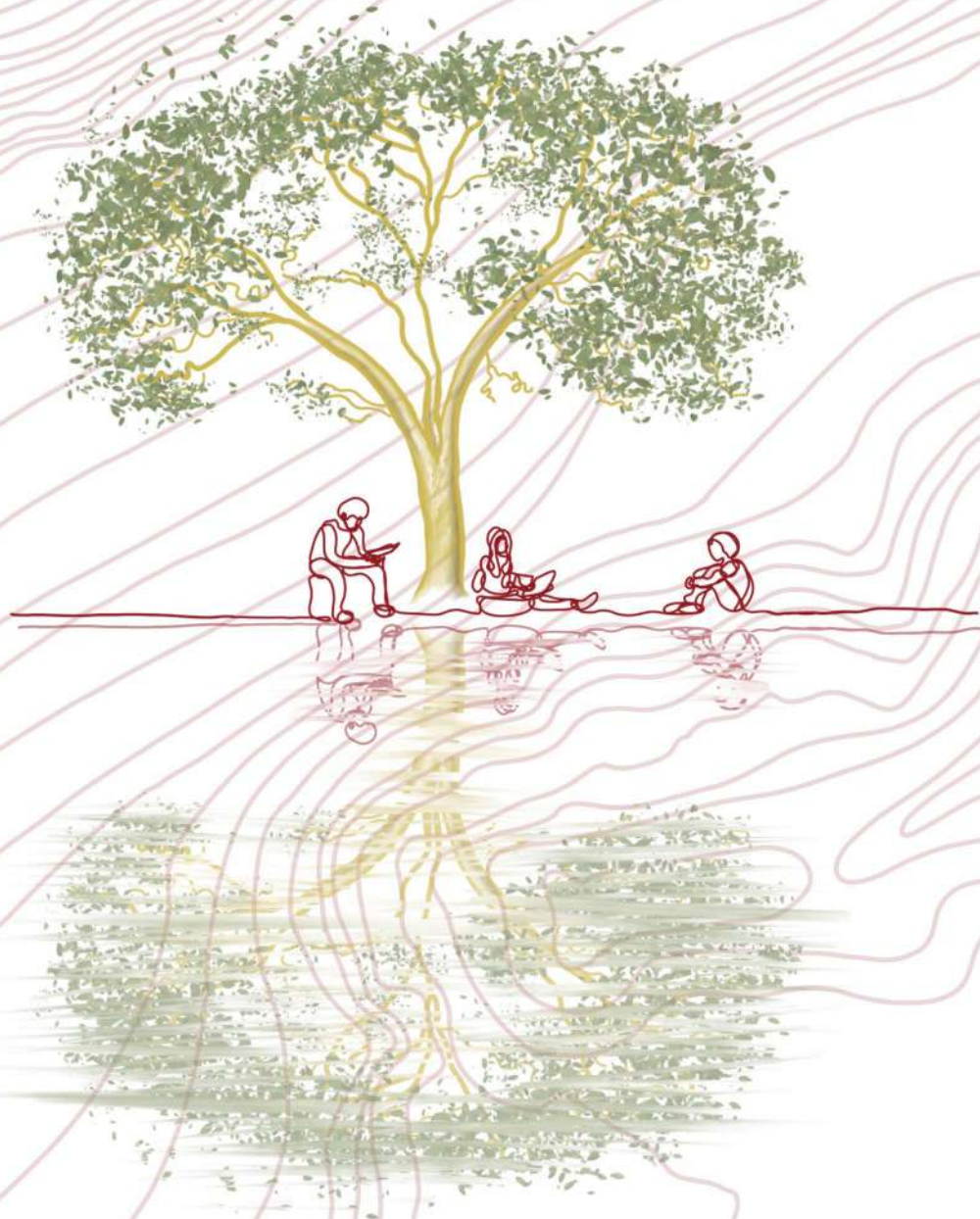




Empowered for **Employment**

A Collaborative Learning and Skills Development Centre in Primrose

Michele Scremin 1884583

Empowered for Employment

A Collaborative Learning and Skills Development Centre in Primrose

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A research report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Architecture (Professional).

Abstract

South Africa currently experiences the highest unemployment rate in the world. Due to the inequitable educational policies of Apartheid, large sectors of the population missed out on basic education and remain ill-equipped for the demands of the labour force. A culture of poverty, crime and social instability prevails. The solution lies in building a bridge to cross this gap and improve opportunities for learning and skills development of the youth and older adults. This will empower them for employment and improve their overall socio-economic prospects. This study investigates the architectural narratives that are relevant to the design of a successful, collaborative adult learning centre that will serve the Makause informal settlement in Primrose. The research is directed through an explorative lens of the sustainability triangle, discussing the social, economic and environmental implications.

Literature reviews of the multi-disciplinary theoretical foundations of adult learning give insight into the unique social, intellectual and physical requirements of adult learners while existential needs are influenced by phenomenological approaches. Appropriate designs of learning spaces are subsequently guided by informed decisions. Economic sustainability is reinforced with financial support of corporate stakeholders and the large waterbody on the site provides environmental opportunities that will benefit both the facility and the community it serves.

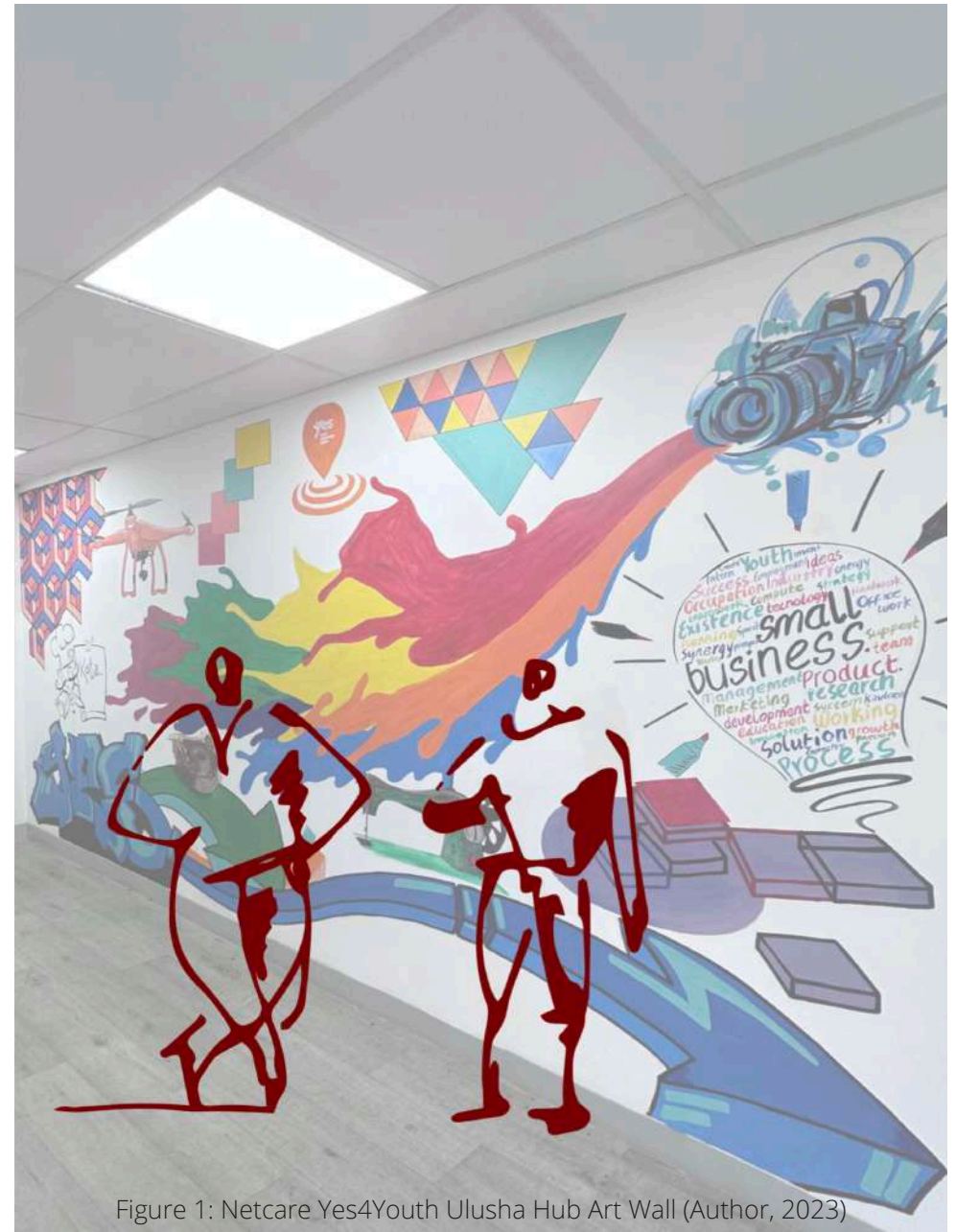


Figure 1: Netcare Yes4Youth Ulusha Hub Art Wall (Author, 2023)

Declaration

I, Michele Scremin 1884583, am a student registered for the degree of Master of Architecture (Professional) in the academic year 2023. I hereby declare the following:

I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original) source is wrong. I confirm that the work submitted for assessment for the above degree is my own unaided work except where I have explicitly indicated otherwise. I have followed the required conventions in referencing the thoughts and ideas of others. I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.

A handwritten signature in black ink, appearing to read 'MScremin.', is displayed within a light gray rectangular box.

Michele Scremin 1884583
15/02/2024

Acknowledgements

Dad, Mom and Mariangela, thank you for accompanying and supporting me on this long and difficult voyage.

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Acronyms and Abbreviations

ALC - Active Learning Classroom

CSI - Corporate Social Investments / Initiatives

E-BOSS - Environmental Biodiversity Open Space System

ELT - Experiential Learning Theory

MRA - Mine Residue Area

IT - Information Technology

YES - Youth Employment Services

Glossary of Terms

Adult Learner: A mature, fully developed individual involved in learning.

Aesthetic: Related to beauty and the appreciation thereof.

Biophilic: An aspiration to interact and connect with nature.

Built Environment: Structures made by humans to accommodate their activities.

Charrette: Used to develop a design in architecture by exploring strategies that will achieve sustainable design solutions.

Cognitive: Related to conscious intellectual activity such as thinking, reasoning and remembering.

Collaboration: Working with others to achieve goals - especially in intellectual activities.

Competence: The ability and knowledge to execute activities to an acceptable standard.

Formal Learning: Learning occurring through a structured educational activity in a classroom and resulting in accredited recognition.

Hapticity: The non-visual (tactile) human experience of architecture.

Heterogeneity: Diversity.

Indigenous: Native to a specific region.

Informal Learning: Learning that is unstructured, incidental and frequently unintentional. It is learning through experience.

Perception: Identification and interpretation of sensory stimulation in order to comprehend presented information of the environment.

Reflection: Serious contemplation.

01

INTRODUCTION

“Knowledge is power. Information is liberating. Education is the premise of progress, in every society, in every family.” (Kofi Annan, 1997)

1.1 Introduction

This proposal will investigate continued adult learning and the development of skills to enable the community to become empowered, employable and to achieve lasting socio-economic well-being. The endeavour to comprehend the multi-dimensional translations of learning contexts and the efforts required to ensure the efficiency of these spaces is complex and will require strategic exploration. The design process must boost the connectivity of the community and the learning facility collaboratively for maximal, mutual benefits. The theoretical framework will be directed through the explorative lens of the sustainability triangle with regards to social, economic and environmental requirements in order to facilitate the successful architectural design of an adult learning and skills development centre.

1.1.1 Background

Rapid population growth, urbanisation and the lasting legacies of Apartheid's educational system has resulted in large sectors of the population who missed out on basic education. The Department of Adult Basic Education and Youth Development (Department of Adult Basic Education and Youth Development, 2015) stated that in South Africa adult education is considered as "personal development for middle classes or literacy and basic education for the poor". This supports the notion that adult learning is adversely entrenched in the existing political, socio-economic and cultural approaches of society – "trapped between meagre attention and resources and overly ambitious expectations" (Torres, 2003).

Most adults in South Africa view education as a necessity for their children, negating their own personal development. They need to be made aware of their learning needs and encouraged to expand their expectations.

1.1.2 Research Problem

Unemployment in South Africa remains the highest in the world and the need for intervention to redress the far-reaching implications of inequality and poverty is perspicuous.

The first quarter of 2022 demonstrated a staggering overall unemployment rate of 32,9% (Stats SA, 2022) while 46,5% of those aged between 15 and 34 years currently have minimal prospects of employment.

"The impact of high levels of unemployment is devastating, resulting in poverty, social exclusion, inequality, crime and social instability" (Kingdon and Knight, 2004). Lack of resources and mounting disillusionment further impacts the socio-economic prospects of South Africa. 18,2 million people live in extreme poverty (Stats SA, 2022).

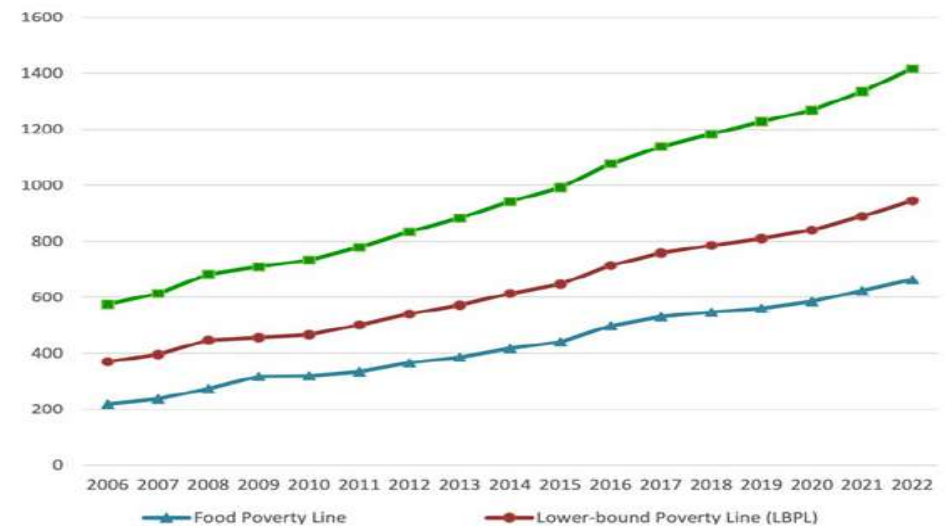


Figure 1.1: National Poverty Lines (Stats SA, 2022)

1.1.3 Motivation

In order to mitigate the ongoing effects of poverty and unemployment it is necessary to empower society with the necessary skills demanded by the labour markets. This will provide opportunities which will enable people to withstand periods of hardship and reinforce their socially participative role in the community. Research on successful, sustainable adult learning programmes in South Africa is limited. The urgent need for further investigations is compelling in order to provide a more precise and comprehensive picture that facilitates the execution of efficient actions.

1.1.4 Intended Methods of Research

The consideration of adult learning theories requires an interdisciplinary approach that impacts the design of the programme and the facility. The research will investigate Andragogy, Transformative Learning and the Experiential Learning Theory. In addition to the social and instructive concepts, one must also explore

the psychological relevance of “Genius Loci” and the phenomenological role of architecture in learning environments. A biophilic approach to the architectural design will conserve the integrity of the environment and the local ecological system.

To ensure economic sustainability, the project will explore the involvement of the corporate community in the form of Corporate Social Initiatives which have the advantage of better resources and low tolerance for corruption.

1.1.5 Secondary Programme:

- Water is essential for the economic improvement and development of a society. Environmental Biodiversity Open Space System (E-BOSS) has identified the lake on the property as a hydro protection zone (Veranthan, 2017) thus highlighting the necessity for its preservation. With the aid of appropriate specialists (engineers) I propose a water treatment initiative that will provide controlled allocations of drinking water to the vulnerable community.

- A small scale on-site fishery is to be established in order to maintain the local fish population of the lake and provide a sustainable protein source for the culinary centre. A related aquaponics facility will ensure the availability of a selection of herbs and vegetables for the students. Leisure facilities will encourage community interest and participation.

1.1.6 Research Aims

This study aims to advance awareness of an architectural, educational and socio-psychological narrative that will guide the design of a collaborative, sustainable learning and skills development centre in Primrose, Germiston. This centre will provide adult development opportunities to enhance employability, promote entrepreneurship and improve the well-being of the community.

1.1.7 Primary Objectives

(Social and Economic)

1. To gain understanding by exploring the adult learning theories relevant to the design of an Adult Learning and Skills Development Centre.
2. To investigate the role of (existential and perceptual) phenomenology in the architectural design of learning facilities.
3. To comprehend the unique characteristics of adult learners.

4. To improve economic sustainability through collaborative corporate involvement.
5. To propose strategies for the successful execution and functioning of the centre.

1.1.8 Secondary Objectives

(Environmental)

1. To investigate the feasibility of water treatment programmes in order to confront ecological, environmental and climatic crises.
2. To explore the viability of small scale fish farming on the waterbody on site.

1.1.9 Research Question

What are the architectural narratives related to the design of a successful, collaborative adult learning and skills development centre?

1.2 Methodology

The research methods employed for this study will involve a **qualitative** method of enquiry. Investigating both primary and secondary data which will be analysed to inform the development of the design programme.

Primary data collection will be conducted in the form of observations, contextual and site analysis, photographs and semi-structured interviews with specialists and stakeholders.

Case studies will be researched online and by participative observation. Understanding is enhanced by observation of day-to-day activities and plays an important role in studies of human behaviour. Participative observations involve informal conversations that serve to inform the researcher about activities, programmes interests and goals. In this way the researcher gets access to useful undocumented information. The cons include the fact that people exhibit reactivity or staged behaviour when they know they are being

observed. This can affect the result of the research.

Conceptual explorations such as charettes to translate symbolic creative concepts into impressive designs.

Secondary Data

South African statistics from census reports will provide important information related to the demographic description of the community involved in the study. Subjects to be reviewed will include the theoretical concepts of adult learning and information relevant to the study. These will be researched using available published literature either online or from instructive printed sources. Precedents and case studies of existing facilities will provide further inspiration. These will be analysed with special reference to the issues explored in the literature reviews



THEORIES AND CONCEPTS

“Education is the kindling of a flame, not the filling of a vessel” – Socrates

2.1 Introduction

The theoretical scope of adult learning is ever-evolving and there are overlapping options of complex criteria which make learning theories difficult to categorise. They do however provide an effective investigative lens and a base of knowledge integral to the design of an adult learning centre. By utilising these learning hypotheses to confront social complexities and the factors that influence the course of learning, one is more equipped to respond to the requirements of adult learners and to empower them for employment.

Early research was carried out by behavioural psychologists. By the middle of the 20th century there was a move to a more humanistic perspective which also became intent on the factors that distinguished adult learners from children. "Individualism, competency and self-development" (Merriam, 2017) was replaced by more holistic approaches that catered to a more social context, human emotions and "spirit in learning".

Andragogy, self-directed learning and transformative learning were considered as the 3 "foundational theories" (Merriam, 2017). These prioritised individual learning but have been criticised for their lack of consideration of socio-political context. Education perspectives questioned the impact of race, gender and class (Merriam, 2017).

Three major issues were identified – an individual remains inextricably intertwined within the socio-cultural and political community that he inhabits; self-direction may be construed as separatism and even selfishness and that the view of learning did not incorporate collective and collaborative impulses.

Theories chosen for this research are; Andragogy, Transformative Learning Theory, Experiential Learning Theory and Phenomenology in Architecture.

LEARNING THEORY	SUB-CATEGORY	ORIGINATORS (YEAR)	APPLICATIONS IN ADULT LEARNING	CRITICISMS + LIMITATIONS
1. Instrumental Learning Theories • Focus on Learners Individual experience	1.1 Behavioural Theories	Thorndike (1911) Pavlov (1927) Skinner (1954)	Students provided with clear protocols and opportunity for feedback.	- Lack of clarity for standardisation of outcomes - No consideration of social aspects of learning
	1.2 Cognitivism	Piaget + Cook (1952) Bruner (1966)	- Good for conceptual material systems - Enables student to recall and understand foundational concepts.	- Based on classroom - not socially constructed. - Underestimates external learning dimensions.
	1.3 Experiential Learning	Kolb (1984)	- Values practice in real-life contexts. - Design learning strategies for theoretical knowledge. - Develop competencies.	- Focused on individual learning development and experience (without considering social context of that experience and its influence of what is learned). Not social context influenced. - Learning more complex than Kolb's representation.
2. Humanistic Theories • Facilitative Theories • Learner centred - promote individual development.	Self-directed learning.	Rogers (1963) Maslow (1968) Knowles (1988)	Applied through technology based simulations. Self-directed, self assessment.	- No consideration of culture, society - No consideration of other forms of learning eg collaborative learning.
3. Transformative learning Theories	Critical Reflection • Conscientisation • Perspective	Mezirow, J (1978,1990,1997) Freire, P	Group discussions - teachers encourage learners to reflect and share.	- Depends heavily on critical reflection - Minimal role of feelings and context - Ignores transformation through unconscious development. - Ignore role of long term and implicit memory (shapes behaviour and attitudes). - Gap between critical reflection and revising perspective (desire to change).
4. Social Theory of Learning Focus on context and community.	4.1 Zone of proximal development	Vygotsky (1978)	Learning through social theories of learning. - Observe behaviour and performance of preceptors and then adopt.	- Ignore mental, emotional state of learners - Ignore differences to genetic, brain and learning abilities - Don't account for biological, neurophysiological, cultural, linguistic and historical factors that shape learners experiences.
	4.2 Situated cognition	Lave and Wenger (1991)		
	4.3 Communities of Practice	Wenger (1998)		
5. Motivational Models	Self-determination theory	Ryan and Deci (2000)	Intrinsic motivation enhanced by meeting needs by reinforcing positive relationships and constructive feedback.	Assessment drives learning.

LEARNING THEORY	SUB-CATEGORY	ORIGINATORS (YEAR)	APPLICATIONS IN ADULT LEARNING	CRITICISMS + LIMITATIONS
6. Reflective Models	6.1 Reflection-on-action	Schon (1987)	Encourage development of reflective practice and learning systems which develop knowledge and skills	• Lack of details on psychological aspects of reflection.
	6.2 Reflection-in-action	Schon (1987)	Enhances competence and learning.	• Lack of clarity.
7. Constructivism	7.1 Cognitive Constructivists	Piaget and Cook (1952)	Constructivists and Kolbs - foundation of Experiential Model • Learning by action • Outcome based	• Epistemological relativism (absolute truth does not exist) exists in relation to cultural, societal or contextual aspects. • Quasi-religious, ideological • Ignores passive learning, memorising and traditional strategies. • Over emphasises role of learning environment.
	7.2 Socio-cultural Constructivism	Vygotsky (1978)		

Figure 2.1: Adult Learning Theory (Mukhalalati and Taylor, 2019)

2.2 Andragogy

A European model developed by Malcolm Knowles in 1968 and described as “the art of science of helping adults learn” (Knowles, M, 1989). He based his research on his assumptions about adult learners.

He claimed that humans mature from states of dependency to more self-directing personalities; adults accumulate experience and knowledge throughout life; time perspectives of adults differ to those of children – younger people think in terms of future application of knowledge whereas in adults it is an application of immediacy (Knowles, M, 1989); adults are directed by “internal motivation” rather than “external motivation” and finally that adults require reason for learning.

Knowles conceded that his theory is more of a “model of assumptions about learning or a conceptual framework that serves as a basis for an emergent theory” (Knowles, M, 1989). His assumptions have, however, been criticised.

Many adults do need an instructor for structured learning while some children are extremely independent. Motivation is not age-related and life experience are not always conducive to efficient learning (Merriam, 2001). The question arises whether Andragogy is so different from pedagogy. Andragogy is considered as the most learner-centred learning theory.

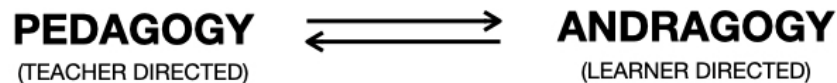


Figure 2.2: Author's Diagram of Pedagogy and Andragogy (2023)

2.3 Experiential Theory

David A Kolb, an American learning theorist, based his work on the research models of John Dewey, Jean Piaget and Kurt Lewin. He proposed his model of experiential learning in 1984. Described as a holistic approach, Kolb's theory differs from the predominantly mental, cognitive theories and the socially deficient behavioural theories. Experiential theory acknowledges the role of cognition, emotion and the environment on learning. It is an approach of active learning with experiential learning and critical thinking as the focus of the learning process (Voukela-tou, 2019).

“Learning is the process whereby knowledge is created through the transformation of experience” (Kolb, 1984).

Kolb (1984) defines learning from the perspective of the experiential learning theory.

A process of adaptation and not one of content or outcomes.

- Knowledge is created and transformed, not acquired or transmitted.
- Learning alters the subjective and objective aspects of experience.
- To comprehend learning, one must comprehend the essence of knowledge.

2.3.1 Kolb's Experiential Learning Cycle and Learning Styles

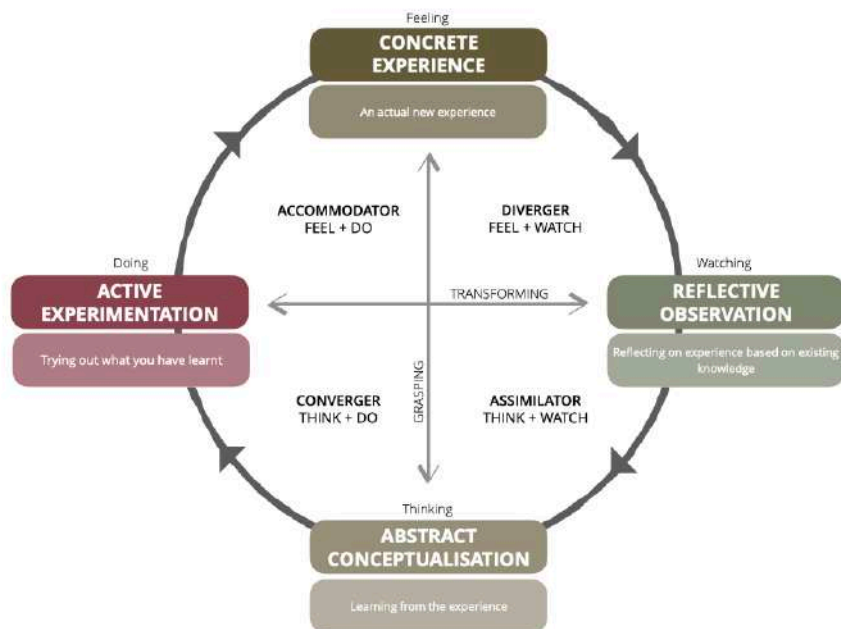


Figure 2.3: Author's Diagram of Kolb's Experiential Learning Cycle and Learning Styles (Adapted from McLeod, 2023; McCarthy, 2010)

When a learner progresses through the four stages of the cycle, effective learning occurs. A "concrete experience" is followed by "reflection and observation" which directs the establishment of "abstract concepts" and conclusions which interrogate a hypothesis and culminate in new experiences (McLeod, S, 2023).

Kolb identified four stages of learning which may be influenced by the educational experience, social environment and the genetic cognitive identity (Kolb and Kolb, 2012).

"Knowledge results from a grasping or transforming experience" (Kolb, D, 1984).

The Experiential Learning Theory describes:

Two dialectically related models of "grasping experience" known as "Abstract Conceptualisation" (AC) and "Concrete Experience" (CE)

And

Two dialectically related models of "transforming experience" which are "Reflective Observation" (RO) and "Active Experimentation" (AE) (Kolb and Kolb, 2012).

These form the basis of the four learning styles. (Cherry, 2022).

The Converger (doing and thinking) – AC – AE (McLeod, 2023).

These people tend to be practical and favour technical applications. They have little affinity for interpersonal situations. They are decisive technological problem solvers.

The Diverger (feeling and watching) CE – RO (McLeod, 2023).

Emotional, sensitive, creative, imaginative, cultural, gather information, group work, brainstorm ideas.

Suitable for the arts.

The Assimilator (watching and thinking) AC – RO

Concise and logical. They appreciate abstract concepts more than practical implementation. Careers of choice would involve mathematics, science and information. For learning they prefer lectures, analytical model exploration and readings. They are not very sociable (McLeod, 2023).

The Accommodator (doing and feeling) CE – AE

Antithesis of the assimilator, they are intuitive, take risks, enjoy challenges. Suited to experiential learning. They are quick to react to the analyses of others and execute actions. Entrepreneurs and salesmen.

2.3.2 Benefits for students

- There is an immediate application of learning to experience.
- Improves motivation.
- Consolidates learning through reflection.
- Adaptable to learning styles.
- Encourages collaborative teamwork.
- Optimises opportunities for employment.

2.3.3 Learning Spaces

Learning spaces have been described as an arrangement of interconnected regions. The classroom is the “microsystem” while co-existing sites such as other faculties, dormitories or family are considered the “mesosystem”. The “exosystem” include formal and informal social arrangements affecting the learner’s environment (Kolb and Kolb, 2012).

The “macrosystem” describes the overall cultural principles of the institution and their perception of the effects of abstract versus practical knowledge in the micro and mesosystems.

Vygotsky (1978) views learning as the interrelationship between the student and the social environment. These spaces are not necessarily physical but also the individual human experience of place.

The Experiential Learning Theory (ELT) describes a learning space as “a holistic framework that orients the many different ways of learning to one another” (Kolb and Kolb, 2012).

A truly immersive learning experience requires “an educational culture that promotes diverse learning spaces and locomotion among them” (Kolb and Kolb, 2012).

The influence of emotions on learning are significant. Anxiety and fear have profound negative effects while positive emotions enhance learning. It is also essential to allocate spaces for reflection and opportunities for expression. For adult learning, “making space for students to take control of and responsibility for their learning can greatly

enhance their ability to learn from experience” (Kolb and Kolb, 2012).

2.4 Transformative Learning Theory

2.4.1 Jack Mezirow (1923-2014) Approach

The transformative learning theory focuses on the life experiences of adult learners and is based on the cognitive processes involved in meaning making. Mezirow (1978) stated that “Learning in adulthood is making sense of our experience and can result in a change in a belief, attitude or perspective”. He described the transformative process – a “disorientating dilemma” challenges an individual to examine their current beliefs. The individual then has to establish new ways of dealing with the dilemma and this will ultimately lead to a change in the belief or attitude into a more inclusive approach which accommodates a wider range of experiences (Mezirow, J, 1978; Merriam, 2017). Mezirow clarified his statement by adding that transformative learning and communication between people is not exclusively related to their personal significant life events (Mezirow, J 1997). It is vital for learners during reflection on previous learning, to decide whether that

learning is valid under current circumstances (Mezirow, J 1997).

Mezirow described the Transformative Learning Theory as constructivist. It is associated with two types of learning. Firstly, instrumental learning, a task orientated and problem solving approach designed to achieve short term objectives and improved performance. Secondly, communicative learning which considers how learners express their feelings, needs and desires. The learner can become critical, autonomous and responsible (Mezirow, J, 1997; Department of Adult Basic Education and Youth Development, 2015) achieving personal transformation (Mezirow, J, 1978; Merriam, 2017).

2.4.2 Paulo Freire (1921 – 1997) Approach

Paulo Freire, a Brazilian educator, reported on the need for transformative learning to confront oppression and encourage social inclusion (Merriam, 2017). He regarded learning as a learner-centred, politicised approach.

The learner is responsible for the accumulation of knowledge and re-legitimization of what is learned to reorganise personal circumstances and transform the world (Department of Adult Basic Education and Youth Development, 2015).

Teaching must be a democratic, political process, inhibiting autocracy through a flow of knowledge and communication between the learner and the teacher. In this way the constructed knowledge is meaningful.

2.4.2.1 Freire's views on Conscientisation and Perspective Transformation

Conscientisation is the process whereby a learner achieves critical awareness and rejects the “culture of silence” which suppresses the critical response of the oppressed (Department of Adult Basic Education and Youth Development, 2015). “The more critically aware learners become, the more they are able to transform society and subsequently

their own reality (Taylor, 1998). Freire contributed to transformative learning using three concepts:

- Knowledge should be a two-way communication and not merely a transference of information from teacher to student. Freire opposed learning by rote and regurgitation.
- Praxis – “moving back and forth in a critical way between reflecting and acting on the world” (Taylor, 1998).
- “Horizontal-student-teacher-relationship” (Taylor, 1998). Secure equality of participants to create a comfortable environment.

According to Taylor, E.W (1998) the circumstances that support Transformative Learning are:

- Optimal learning conditions that foster a sense of security, transparency and trust.
- Instructional techniques that encourage learner-centred approaches to promote learner autonomy, involvement and collaboration.

2.5 Phenomenology

- Activities that promote the exploration of alternative perspectives, problem solving and critical reflection.

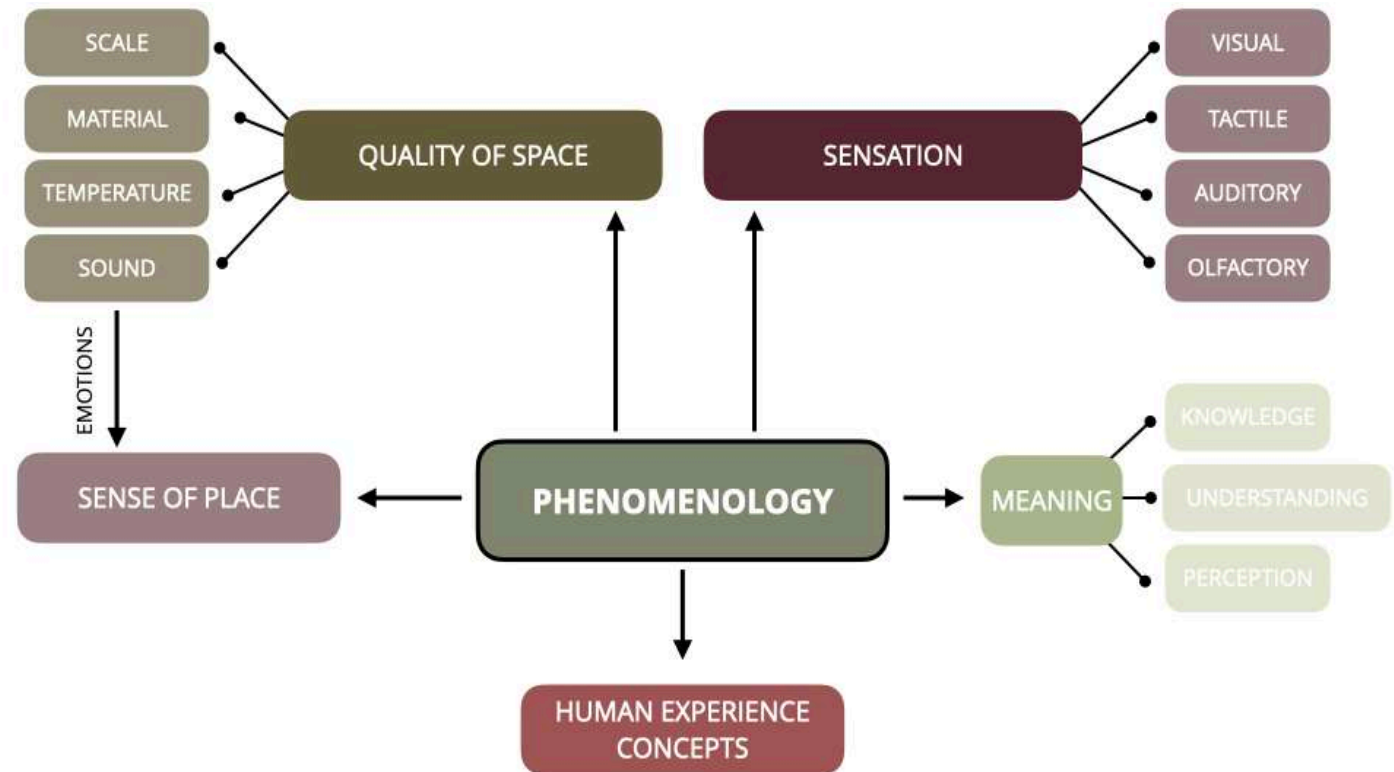


Figure 2.4: Author's Diagram of Phenomenology

Phenomenology is both a philosophical notion of existentialism which explores quintessential human awareness of space as well as a concept of sensory perception through the physical and intuitive experience of phenomena. In contrast to the scientific, rationalistic views of Aristotle who denied any connection between

perception and knowledge and Descartes who described cartesian space as unconnected and separated from human experience, Heidegger (1962) evaluated space in terms of a subject-object relationship. Describing the interaction as “being in the world” he emphasised the importance of meaning and human experience.

Expounding Heidegger and Merleau Ponty's epistemological approach “where lived experiences become a primary source of self-knowing, developing richer authentic perspectives through our emotions, sentiment and memories” (Poon, 2018). Christian Norberg-Schulz developed an architectural hypothesis.

“Architectural phenomenology can be defined as the phenomenological study of architectural experience and meaning as constituted by qualities and features of both the built environment and human life” (Seamon et al., 2016).

While Heidegger considers the “dwelling” a space that feels like home, Norberg-Schulz links the dwelling to the natural environment, the place and the built environment. In his book “Genius Loci: Towards a Phenomenology of Architecture” (1980) Norberg-Schulz refers to the “spirit of place” and describes it as “the concrete manifestation of man’s dwelling and his identity depends on his belonging to places” (Norberg-Schulz, 1980). He maintains that the success of man-made interventions depend on the recognition of the “essence” of the natural environment and the retention of its integrity without the creation of discord and imposition. “Meaning can only be discovered through the lives and worlds that a building is meant to support and reflect” (Seamon D, 1993).

In order to design buildings that support the natural environment harmoniously, we must visualise nature in an architectural narrative, complement it and immortalise it in the built environment. The natural space, the built environment and the people who occupy it collectively form the “Genius Loci”. The role of architecture is “to visualise the “genius loci” and the task of the architect is to create meaningful places where by he helps man to dwell” (Norberg-Schulz, C, 1980). “Architecture does not so much intrude on a landscape as it serves to explain it” (Holl, S, 1989).

Confronting the early modernist principle that “form follows function” humanist architect Herman Hertzberger speculates that the central function of a structure can not dictate the absolute solution to the usage of space. A building may be considered as a framework that allows personal interpretation and grants users an autonomy to decide how they will inhabit it. He designs buildings that provide

“in between” spaces that foster our profound human need for “dwelling” and social interaction.

Phenomenology in architecture intensifies multisensory stimulation. Skilful exploitation of light sources, shadows, colours, spatial dimensions and materiality create unique holistic experiences. Contesting the dominance of “ocularcentrism” in modern architecture, contemplation of tactile, aural and olfactory qualities in designs (Pallasmaa, J, 2012). He encourages architects to “think with their bodies” (Pallasmaa, J, 2009) and to include a promise of the metaphysical experiences of introspection and emotionality in designs – the “inner language” (Pallasmaa, J, 2012). Pallasmaa, J, Holl, S and Perez-Gomez, A have endeavoured to “re-sensualise architecture through materiality and hapticity, texture, and density of space and materialised light” (Pallasmaa, J, 2012).

Many architects use conceptual explorations in the process of planning and design. Pallasmaa considers hand-drawn sketches to be haptic exercises which demonstrate connectivity between the architect and his buildings. Similarly, Steven Holl is known for his watercolours which conceptually capture his ideas on paper before they are processed to designs.

Juhani Pallasmaa describes tactile sensation as the primary sense, present from birth to determine our surroundings. We regard space through our skin and its multi-sensational inter-relationship with movement, temperature and vibration. The senses of taste and smell are equally endorsed in his book “The Eyes of the Skin” (2012) – “The retinal images of contemporary architecture certainly appear sterile and lifeless when compared with the emotional and associative power of the poet’s olfactory imagery. The poet releases the scent and taste concealed in his words” (Pallasmaa, J, 2012).



“Tell me and I forget, teach me and I may remember, involve me and I learn” – Xun Kuang
(Confucius Philosopher)

3.1 The Adult Learner

Learning can be regarded as an integral, continuing lifelong process whereby individuals gain knowledge, experience and skills that facilitate opportunities for transformation and advancement. Factors such as increasing life expectancy, worldwide economic insecurity, influx of refugees, advancing technologies and changing workforce demands have escalated the urgency for continued adult learning. Due to the vast diversity of adult learners, their individual needs and the nature of the learning pursued, defining and describing adult learners is complex. Improved understanding of adult involvement in “formal and informal learning activities, as well as the barriers and incentives to their participation” (Hansman, C and Mott, V, 2010) will enhance educators’ grasp and improve their ability to create prosperous outcomes for their adult students. A socio-cultural perspective of how race, gender, financial well-being, ethnicity, sexual persuasion and physical capabilities affects

individual progress is essential.

Simply stated, adult learners can be described as those engaging in learning enterprises that foster continued change in reasoning, values or conduct (Hansman, C and Mott, V, 2010). Their objective is to achieve improvement and fulfilment in their lives.

3.2 Concepts of Adult Learning

As previously mentioned, Andragogy can be defined as “the art and science of helping adults learn” (Knowles, M, 1980). Knowles suggested several hypotheses regarding the characteristics of adult learners. He stated that, “the psychological definition of an adult is one who has arrived at a self-concept of being responsible for one’s own life, of being self-directing” (Knowles, M, 1980).

Adults are independent and self-directing, drawing from reservoirs of lived experiences. A collaborative and participative environment will encourage their engagement. Self-directed learning furthers the “constructivist and contextual nature of knowledge, reflection, creative problem solving and critical thinking” (Hansman, C and Mott, V, 2010). It is considered a vital skill for the global workforce. Self-directed learning is emancipatory (Merriam, 2001) and is influenced substantially by social context. Learners with varied motivations unite collaboratively to share

experiences and knowledge.

Even though Knowles postulated that adult learners are intrinsically motivated, it appears that the strongest motivational factor is extrinsic. Most are endeavouring to better their vocational opportunities, earning prospects and social status.

Learning is intricately linked to self-esteem and a sense of self-worth. It has been shown that vulnerable communities have a lower rate of participation in learning programmes. This may be due to the anticipated cost of participation. Unfortunately, this has a negative impact on the self-esteem of the impoverished population.

3.3 Designing Social Learning Spaces for Adults

Learning programmes should strive to reverse this by improving accessibility and inviting community involvement.

Adults are practical and result oriented. They have high expectations and require courses that are optimally constructed to meet their needs. They are somewhat change averse which challenges educators to develop programmes that are inclusive of familiar concepts while encouraging exploration of updated ideals.

While the challenges are numerous, the potential for new investigations and developments in the field of adult education is promising. Educators, through veritable practice, critical deliberation, collaborative endeavours and ongoing research, must make every effort to fulfil the needs of present and future adult learners.

Learning can be described as formal, such as that occurring in classrooms or informal which results from fortuitous interchanges between individuals in variable locations. Research has shown that spaces can impact learning experiences positively by encouraging discourse, reconnaissance and collaboration. Conversely, they may arouse subliminal messages of disconnection and laconism. This stresses the importance of effectively designed learning spaces which promote active, experiential and social learning (Oblinger, D, 2006). Increasingly, concepts of learning spaces have altered. They should be flexible and connected, combining formal and informal actions smoothly in an environment that acknowledges the multifaceted processes that lead to learning. The “design is a process and not a product” (Oblinger, D, 2006) and should include input from all the participants. Active learning prioritises building and developing knowledge collectively instead of a unidirectional transmission of

information. The student is positioned at the core of the process (Bickford, D, Wright, D, 2006).

Architects play a vital role in enhancing the positive potential of learning spaces. Activities that support learning “can be translated into design principles that guide tactical decisions” (Brown, M and Long, P, 2006). In order to design a space that optimises learning potential, one must understand the types of learning and teaching undertakings that will be accommodated in that space.

This includes the identification of the educational programmes and any workshop or laboratory specifications required. A comprehensive awareness of the goals of the facility and a clear identification of the client’s needs will ensure an informed design (Brown, M and Long, P, 2006).

Reviewing the learning principles increases awareness of the basic human requirements of physical and psychological convenience. Factors to be considered include cognitive validity, social and emotional reinforcement and physical functionality (Gee, L, 2006). Learning principles encourage “an active construction of knowledge” (Chism, N, 2006). Psychologically, prior experiences and place attachment encourage student involvement. Spaces that offer positive experience, sensory stimulation, communication and opportunities for “rehearsal, feedback application and transfer” endorse learning (Chism, N, 2006). Furthermore, social constructivists emphasise the social context of learning.

The limitations of traditional classrooms are obvious. The atmosphere is clinical, austere and unstimulating. Seating arrangements actively discourage peer interaction. This design supports a transmission theory which stipulates that an instructor at the front of the class will “transfer” instruction to the learners who will “take it in” (Chism, N, 2006). Similarly, the corridors are equally inhospitable, unadorned and silent, discouraging conversation as learners walk to their next “learning space” (Chism, N, 2006).

When reviewing innovative uses of corridors, Herman Hertzberg-er suggested that “you can make nooks and places for people to sit and have tables there so that you can get a learning street” (Dyer, E, 2016).

Inaccessibility of faculty offices furthers the divide between the student and the teacher. Libraries are still solitary, muted spaces contrary to the principles of social theories.

Traditional designs may not be ideal for adult learners who tend to be more reliant on social peer networks and information databases. One must thus acknowledge the importance of active learning – learning that is facilitated by discussion and reflection.

In order to consider the learners’ personal metacognition, designs must include spaces that encourage self-assessment (Brown, M and Long, P, 2006). Equally important is the availability and accessibility of administrative and faculty support for students requiring guidance and mentorship.

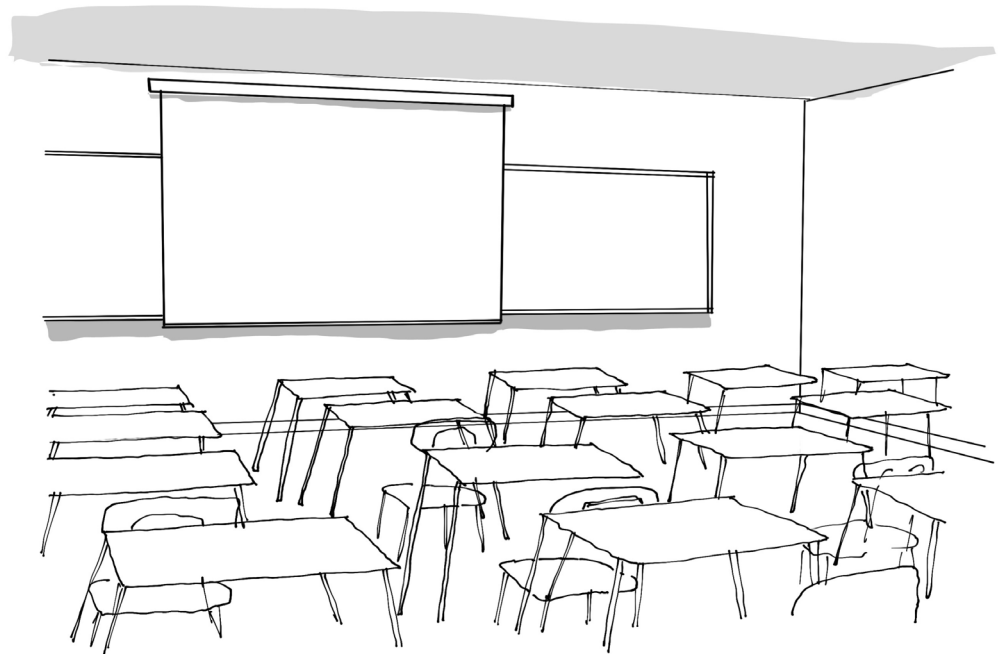


Figure 3.1: Traditional Classroom (Adapted from Learning Spaces – Challenging Traditional Assumptions and Rethinking Learning Spaces)

3.3.1 Attributes of Active Learning Classes

Humans are social beings. Social interactions, discussions, debates and groupwork require rooms that are easily reconfigurable and furnished with chairs and tables that are light-weight and moveable to allow for flexible arrangement (Brown, M, Long, P, Chism, N, 2006). **Flexibility and adaptability** are thus advisable. Demountable wall systems allow cost-saving conversions when teaching requirements and room sizes change. The goal is to achieve “student-centred integrated active learning spaces using flexible design and an innovative use of technology tools” (Whiteside, A and Fitzgerald, S, 2006). Traditionally emphasised “front of classrooms” are replaced by

open collaborative spaces that encourage interaction and even facilitate movement of both the students and the instructors (Bickford, D, Wright, D, 2006). Adaptability also supports variable instructional and learning approaches catering to individual learning styles and further advancing effectual learning (Oblinger, D and Lomas, C, 2006).

When considering *furniture* for adult learners, one must be cognisant of the fact that adult learners have variable body sizes. Programmes must be facilitated in inviting and comfortable spaces. Round tables allow learners to face each other in an environment that is collaborative and fosters a sense of community (Whiteside, A, Fitzgerald, S, 2009).

Ergonomically, one should consider more than just comfortable furniture. It also involves the interaction of the human with the environment. A good flow between areas, adequate access to essential tools and adjustable

furniture configurations are important contemplations (Gee, L, 2006).

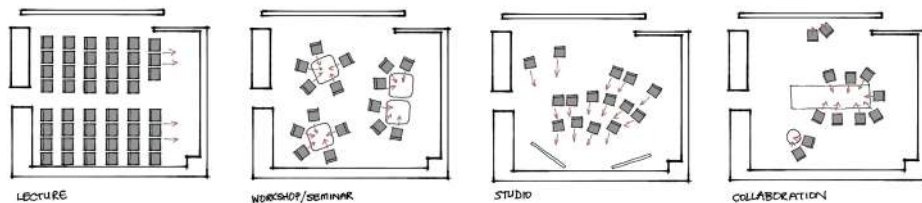


Figure 3.2: Furniture arrangement in the same space (Adapted from Learning Spaces – Human-Centred Design Guidelines)

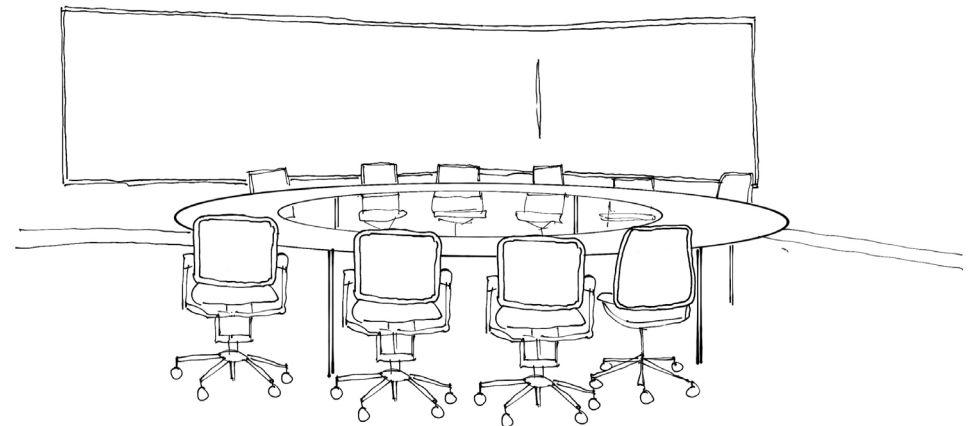


Figure 3.3: Round Table arrangement (Adapted from Learning Spaces - Seriously Cool Places: The Future of Learning - Centred Built Environments)

Students and instructors have contrasting views on favourable **classroom size and layout**. The students prefer larger, open spaces while instructors generally prefer the control that smaller spaces offer (Whiteside, A, Fitzgerald, S, 2009). The arrangement of round tables in the ALC is less formal and promotes easier participation than the grid pattern table arrangement of traditional classrooms.

In the **Studio Classroom** moveable furniture that allows reconfiguration as well as the lack

of an obvious “front of room” (Bickford, D and Wright, D, 2006) encourages active learning methodologies that direct collaboration. Adaptable presentation enhancements and mobile marker boards allow for changing demands and number of participants. The use of glass doors and windows creates improved connection to the outside nurturing a more transparent and congenial learning space.

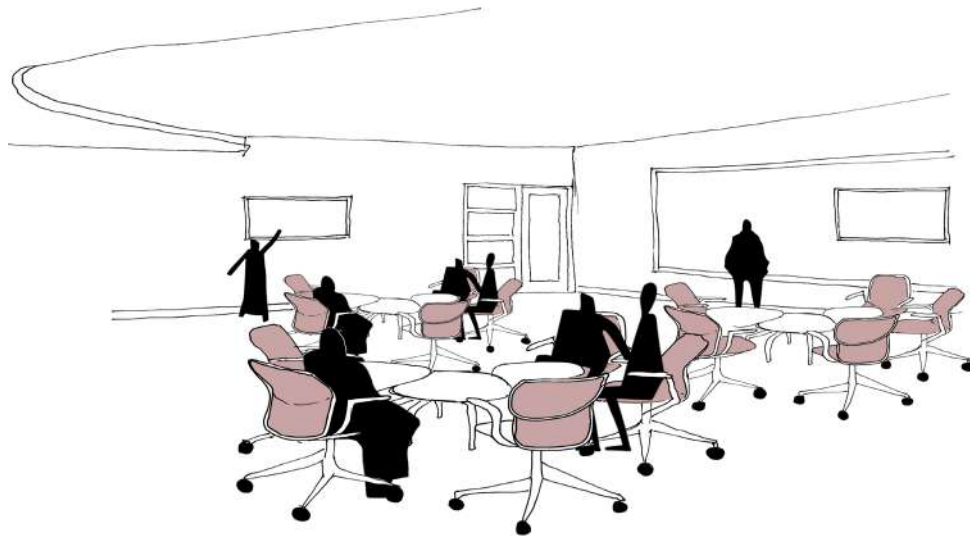


Figure 3.4: Studio Classroom (Adapted from Learning Spaces – Community: The Hidden Context for Learning)

When considering the physical aspects of learning spaces, one must examine the effects of light, temperature, sound, air quality and the physical proximity of the learners to nature.

Light has the most significant impact on educational progress. Lighting in learning spaces should incorporate an illuminating source of natural light boosted by controllable artificial lighting. Low quality artificial lighting may cause headaches and impaired visual acuity. “Full spectrum fluorescent lamps with ultraviolet supplements had better attendance, achievement and growth” (Barret, P et al, 2015). Indirect lighting should provide the dominant source as direct light can cause unfavourable glare and shadows. Natural light imparts positive effects on learning by “reducing stress and elevating mood” (Gee, L, 2006).

The **temperature** of classrooms must be maintained at a favourable level. Studies have shown that the performance of learners improved when the temperature

was reduced from 25°C to 20°C (Barret, P et al, 2015).

Good classroom **acoustics** positively affects speech acumen, understanding and memory. External and internal noise such as nearby traffic or loud adjoining rooms may impair concentration and retention. These effects seem more marked in children than in adults.

It is also important to monitor **air quality**. High levels of CO₂ have negative impacts on learning. Learner performance improves in rooms with adequate ventilation, high volumes and large openable windows.

The response to the stimulatory elements of nature is subliminally positive. Spaces and textures that imitate the natural environment enhance feelings of content and security. **Connection to nature**, if possible is a favourable design element.

In addition, **multisensory stimulation** has been shown to positively influence memory and information retention. This can be achieved by simply painting learning spaces in colours that are known to enhance learning. White walls with a feature wall of colour promotes stimulation (Barret, P et al, 2015). Subtle changes in the shapes of rooms can create sensual variety, pique interest and invite exploration. Circles imply collaboration and interaction while curves and corners provide nooks for reflection. Spaces should provide opportunities that are unexpectedly fortuitous, sparking novel innovations and connections (Gee, L, 2006).



Figure 3.5: Jack and Mary Dewitt Family Science Centre (CMBA Architects, 2018)



Figure 3.6: Jack and Mary Dewitt Family Science Centre (Adapted from CMBA Architects, 2018)

Connectivity between areas of formal and informal provides **visual accessibility** that may be energising and cognitively beneficial. The innovative use of glass allows for interconnected flexible learning experiences. Hands-on workshops, traditional classrooms, small and large group rooms and social spaces can co-exist harmoniously in aesthetic designs united by wide inviting corridors.

Acknowledging the importance of informal learning spaces has precipitated a shift in design to accommodate social learning (Brown, M and Long, P, 2006). **Decentredness** involves the consideration of the whole campus as a learning opportunity. Herman Hertzberger suggested that educational facilities should mimic a small city “In a city you have small places; large places; all sorts of secluded and semi-secluded places; you have vistas and you have all sorts of activities” (Dyer, E, 2016).

Re-evaluating the flow of spaces in order to maximise the learning capacity of the facility is important in the design process (Chism, N, 2006).

Technology has an increasingly significant impact on current learning. Today's learners possess a variety of technological devices.

These are potentially educational tools with capabilities beyond just for recreation and entertainment (Brown, M, and Long, P, 2006).

Uses include "course content dissemination", "classroom and field recording" and "study and revision support" (Brown, M and LONG, P, 2006). Facility resources can be redirected towards investing in applications that complement the coursework (Brown, M and Long, P, 2006).

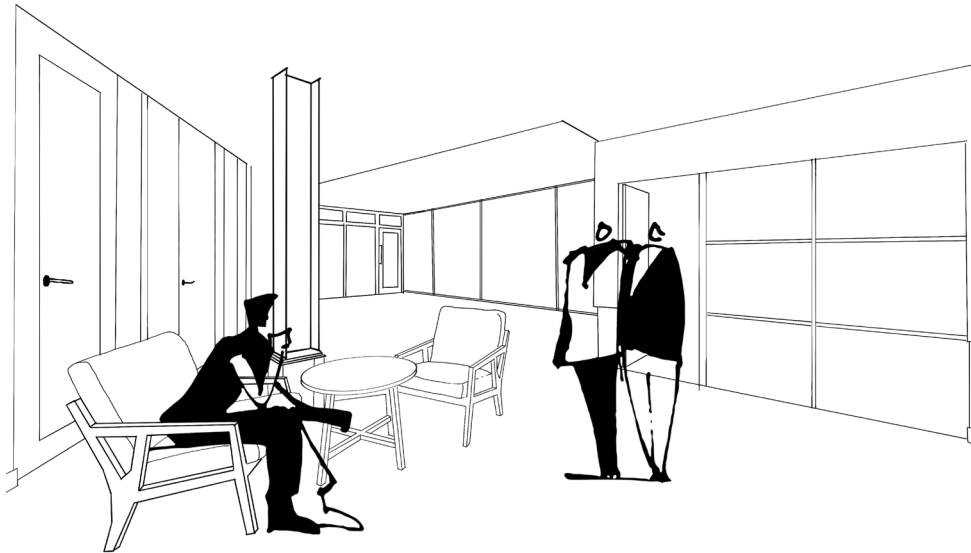


Figure 3.7: Breakout space (Adapted from Leo Hoang, 2023)

Support Desks that offer students help with technology, information retrieval or cognitive skills. "Information fluency" – have become frequent features in modern educational facilities (Oblinger, D and Lomas, C, 2006).

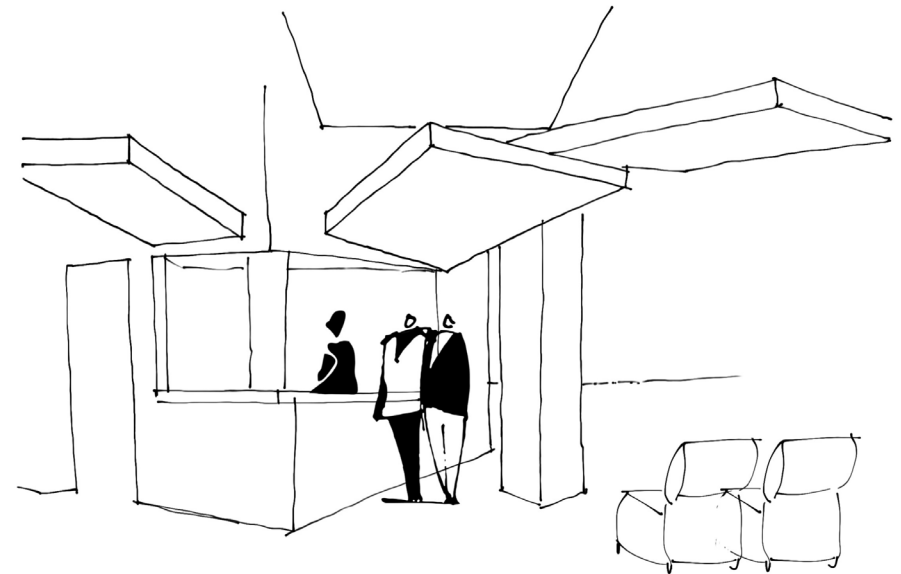


Figure 3.8: Support Desk (Adapted from Learning Spaces – Human-Centred Design Guidelines)

3.4 The Importance of Community in Learning

It is vital to consider the community when planning spaces of learning. Although learning is predominantly individual, its context is social and involves multiple people. “A community is a group of people with a common purpose, shared values and agreement on goals” (Brickford, D and Wright, D, 2006). The community has significant motivational power over its members. Meaningful interactions foster mutual understanding and lead to enhancement of learning, communal mean-making stimulation and mentorship. It is thus apparent that in order to create spaces that encourage learning, one must replicate the concept of successful communities where the members create and share knowledge through optimal interaction both within and outside classroom contexts.

The physical environment should provide connectivity between the learners and the community visitors. Multicultural inclusivity improves participation. Spaces may exhibit cultural artefacts

that resonate with the local community, tell their story and give insight into their society.

It is imperative that educational centres are accessible and serviced with adequate public transport and parking. Safe walkways must provide good pedestrian flow between the community and the facility. Architectural and landscape design must create an atmosphere that conveys transparency, safety and geniality in order to encourage community engagement. Recreational spaces and the availability of formal and informal opportunities for the community's artistic endeavours further inspires involvement. On-site employment and student-run enterprises also serve to expose the learners to entrepreneurial adroitness that will prove invaluable to their future.

3.5 Economic Sustainability

"Businesses cannot be successful when the society around them fails" (Paul Polman, Former CEO Unilever).

3.5.1 Thinking Beyond Profit

Many companies assist vulnerable communities by contributing time and economic support to projects that offer educational and employment opportunities. This "strategic philanthropy" (Hess, Rogovsky and Dunfee, 2002) aims to be mutually beneficial to both the community it aids and the business investor facilitating the programme. The teaching of necessary skills and improving levels of education ultimately allows for the recruitment of a trained, dependable labour force.

Motivation for these corporate social initiatives (CSI) are "the competitive advantage factor", the "new moral market place factor" and the "comparative advantage factor" (Hess, Rogovsky and Dunfee, 2002).

The "competitive advantage factor" refers to an improved reputation and image. This has generated some concerns amongst

the shareholders of companies who fear the influence of corruption and the possibility that these drives are measures of tax evasion. This has led to the introduction of legislative bills and comprehensive disclosure specifications. It has been assessed that donating time and knowledge to a venture has fewer implications for conflict and misuse. It is also a fact that "long lasting community involvement programmes are more likely to improve the image of the corporation than after-profit cash contributions" (Hess, Rogovsky and Dunfee, 2002).

The "New Market Place factor" (Hess, Rogovsky and Dunfee, 2002) encourages businesses to strive for more than just the 'bottom line' and job creations. Companies have a "moral pressure" (Hess, Rogovsky and Dunfee, 2002) to improve the well-being of the poor.

This is increased by the demonstrable evidence of social upliftments offered by competing firms. "As more firms comply with social reporting standards, stakeholders will gain a better understanding of the community involvement programmes undertaken by firms and their competitors" (Hess, Rogovsky and Dunfee, 2002). This establishes an opportunity for firms to improve their image and endorse their competitive advantage. Peer pressure is thus a driving force of philanthropy.

Private enterprises have a "potential comparative advantage" (Hess, Rogovsky and Dunfee, 2002) over governments and non-profit organisations. Using their resources they can exert a complementary force in response to poverty.

Factors that promise success of CSIs are a connection to the core values and competencies of a company. It is important to establish "clear objectives and means of measurement" (Hess, Rogovsky and Dunfee, 2002). The key goal is sustain

ability. It is challenging to measure the impact or success of a CSI and the informative indicators, namely job creation and improved socio-economic situation are continuously revised.

The emergence of strategic corporate social initiatives has evolved considerably. Companies are assigning resources to social projects and gaining an edge over their rivals. On a positive note, the mutual benefits and effectiveness have resulted in more highly-developed and sustainable CSIs.

3.6 Environmental Sustainability

Environmentally sustainable building design is an important factor to consider in order to address South Africa's environmental challenges and to promote the responsible use of resources. Active and passive design strategies will be implemented within the Learning and Skills Development Centre to ensure energy and water efficiency.

The correct orientation of the building is a vital design decision in facilitating a more energy efficient design. The building will be orientated to the north to utilise the sun's heat and light in spaces that require adequate natural light. The strategic placement of windows and the use of overhangs will help control incoming light. The east and west facades of the building will have louvre screens in order to manipulate the incoming light. Vertical louvers will be used on the east and west, and horizontal louvers and overhangs will be used on the north. The planting of deciduous trees along the north facade will help block some of the hot summer sun and keep the internal environment cool and pleasant. In winter, as the trees lose their leaves, the sun's rays will be able to pass through and warm the space.

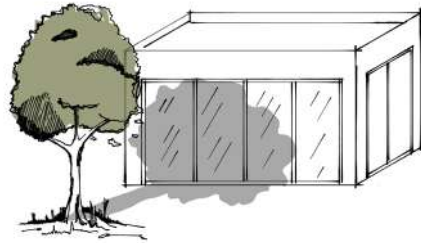


Figure 3.9: Deciduous tree in summer providing shade to interior space (Author, 2023)

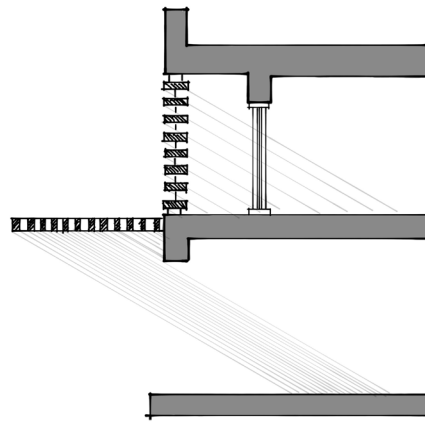


Figure 3.10: Horizontal louvre systems (Author, 2023)

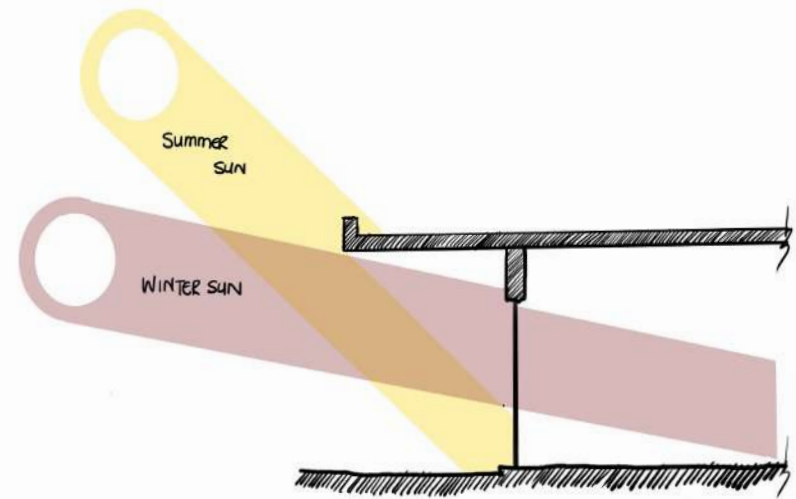


Figure 3.11: Overhang manipulating incoming summer and winter sun (Author, 2023)

Windows and openers are to be carefully considered and planned in order to utilise the prevailing winds for more energy efficient cooling methods. The site experiences predominantly northerly winds. The use of opening windows on either side of the building will facilitate cross ventilation. High level windows and multi-level void spaces will allow stack ventilation to occur.



Figure 3.12: Section showing Cross-ventilation (Author, 2023)

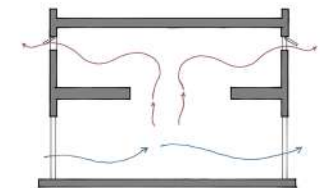


Figure 3.13: Section showing Stack-ventilation (Author, 2023)

A sloped roof design will facilitate favourable surfaces for solar harvesting. Solar energy collected will be used as a more sustainable energy source within the building. The option of energy efficient LED lighting will ensure the reduction of the building's energy consumption. Water runoff from the roof and all artificial surfaces will be collected and filtered to use in and around the building. The harvested rainwater will be used for site irrigation and for the flushing of toilets. The installation of green roofs reduces heating and some of the costs associated with ventilation and air conditioning.

The choice of building materials is also an important decision to contemplate. Materials with good thermal mass properties will help maintain internal temperature conditions and thereby limit the need for artificial temperature regulation. The sustainable use of materials such as bricks, concrete and rammed earth, from the site's clay rich soils, are all viable options to investigate.

Do experiences with nature promote learning?

Recent studies have produced compelling evidence that interactions with nature “boost academic learning, personal development and environmental stewardship” (Kuo, M, 2019).

Green Infrastructure

Urbanisation and degeneration are processes that are impacting vulnerable ecosystems, exacerbating the effects of climate change and reducing the resilience and sustainability of areas. It has thus become critical to examine infrastructural proposals and the associated investment and environmental impacts thereof.

‘Green Infrastructure’ is defined as, “A network of natural or man-made environmental features that deliver ecosystem services within the built environment, through natural or ecological as well as man-made infrastructure” (Gulati, M and Scholtz, L, 2020).

It includes the consideration of “infiltration, evapotranspiration and rainwater harvesting” (Gulati, M and Scholtz, L, 2020); preservation and restoration of the natural environment and “site-specific features such as bioretention, trees, green roofs, road verges and permeable sidewalks” (Gulati, M and Scholtz, L, 2020).

Enhancing the natural environment of urban centres improves the health and promotes the socio-economic well-being of communities. It also encourages the revival of deteriorating neighbourhoods and delivers improved recreational options to residents.

Active and passive design strategies will be implemented within the Learning and Skills Development Centre to ensure energy and water efficiency.

3.6.1 Water Treatment Initiative

An interview with a water specialist engineer was conducted to explore the viability and technical requirements for the water treatment facility as well as the aquaponics facility.

Topics discussed were as follows:

- Estimated volume of the lake
- Cost effective solutions to extract water from the lake
- Acceptable standard for drinking water in South Africa
- Rainfall of the area and run-off - estimating how much water re-enters the lake on a yearly basis. This allowed me to calculate how much water can be removed without compromising the water level substantially.

The first topic of discussion was a cost-effective way of pumping water out of the lake. An intake system will be required. The depth of this intake will have to be carefully considered. It cannot be too close to the surface of the water, otherwise floating debris such as rubbish and float-

ing organic matter may obstruct it.

The intake cannot be too deep either, as this will place the intake amongst thick sediment that has sunk to the deeper parts of the lake. These sediments may block and adversely affect the efficiency of the intake.

Traditionally, intake points are protected by a series of permeable cages. A cage with larger openings of roughly 70mm is the first barrier. This prevents any larger material being sucked into the intake.

The further away the cage is, the lower the pressure. Therefore larger debris is less likely to be pulled towards the intake point. Within the larger permeable cage, is another cage with a finer mesh with 3mm openings. This stops any debris that has penetrated the first barrier from entering the intake.

Once again, the closer the barrier is to the intake, the higher the pressure will be on floating debris. Therefore the possibility of an obstruction is increased.

A depth of about 1 meter below the water's surface was suggested for the intake point, as this would then be below any floating objects and avoid substances such as oil from being drawn in.

With expected changing water levels, a cost-effective method to maintain the recommended 1 meter depth was discussed. The intake point will be attached to a floating buoy by a cord 1 meter in length. A counterweight will also be attached to maintain the depth so that the intake can not float to the surface. The connection of the intake pipes will have a bending pipe joint to allow for vertical movement. As the water level rises or drops, depending on the season, so would the floating buoy. The cord would ensure that a depth of 1 meter below the water's surface is maintained.

The next step in the process is the initiation of filtration.

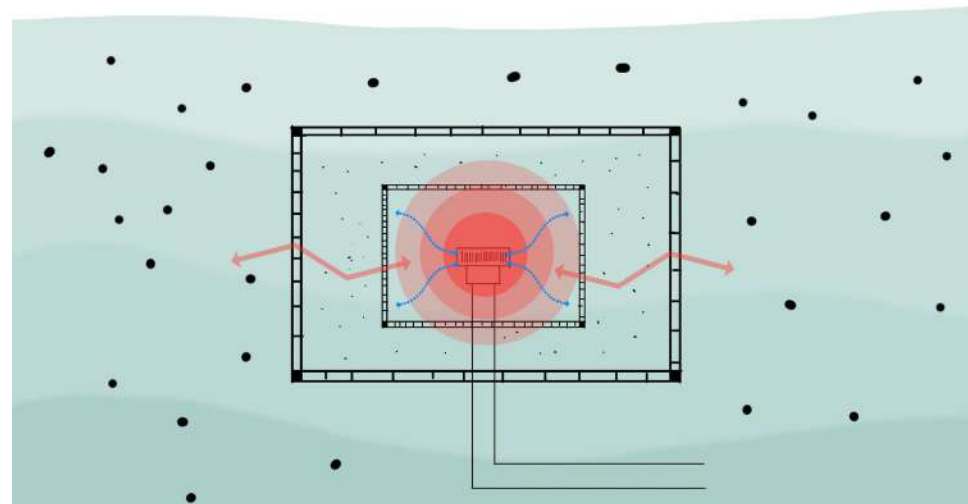


Figure 3.14: Intake point with surrounding barrier (Author, 2023)

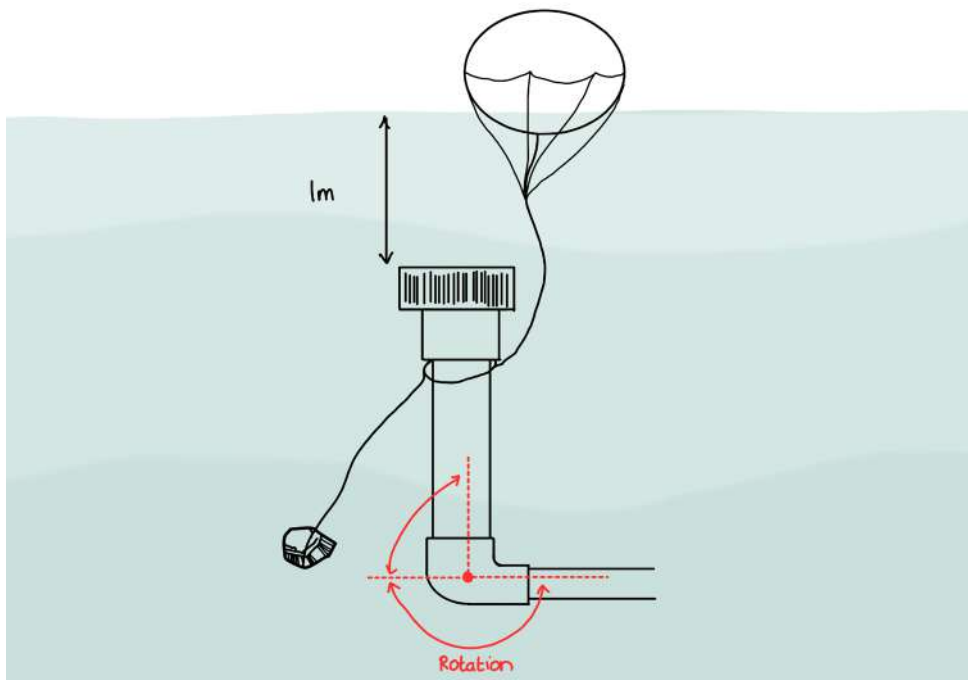


Figure 3.15: Cost Effective Depth Control (Author, 2023)

Substances that are unwanted are identified and the quality of the water analysed.

Some of the factors include:

- pH and dissolved metals
- Dissolved O₂
- Solids that range in size from 30um to 100mm
- Micro-organisms
- Nitrogen and phosphorus

The use of reed-beds as a natural form of filtration was discussed, however the current water quality suggests

that this type of filtration is not required. Reed-beds also utilise a large amount of area, which is a factor that needs to be considered.

Once the water has been pumped up from the lake, it is then passed through a sand filter. This filter has gaps of roughly 0,5mm. This water may then be used for flushing of toilets, site irrigation and in the aquaponics centre.

The next step in the filtration process is a UV treatment tube. The water passes through a tube and is exposed to high levels of UV light which helps disinfect the water. The water is then moved to a mixing tank where a peroxide solution is added, and the water is further disinfected. The water needs to be mixed to ensure there are no pockets of concentrated peroxide solution. Subsequently, the water then passes through another two filters. One being 100um and the other 35um. This removes any clay particles. The final step is to pass the water through a carbon column for further disinfection. After this step, the water is potable.

Aquaponics and the viability of implementing it was also discussed. It will be an extremely viable option to implement on the site. The utilisation of the lake water, with the nutrients from the existing fish life in the lake, eliminates the need for any additional fish tanks. The process of aquaponics uses minimal water

and results in maximum crop yield. The crops also remove nitrates and phosphorus from the water which is then returned back to the lake.

3.6.2 Aquaponics

Aquaponics is the combined process of hydroponics and aquaculture. Hydroponics involves the growing of plants without the need for soil while aquaculture is the cultivation of fish (North, 2016).

Hydroponics and aquaponics are similar processes, but aquaponics has the added feature of fish tanks. Tilapia and brown trout are two possible freshwater fish species that can be used in aquaponics (North, 2016).

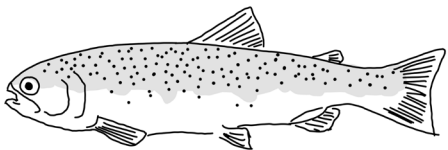


Figure 3.16: Freshwater Brown Trout
(Author, 2023)

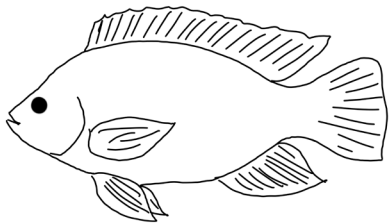


Figure 3.17: Freshwater Nile Tilapia
(Author, 2023)

The process of aquaponics involves the following steps:

- The fish are fed with typical fish food or lettuce.
- The water of the fish tanks is then pumped and filtered to remove any large waste products. This water is pumped to the growth beds.
- Bacteria in the growth beds convert the ammonia and nitrites from the fish waste to nitrates (plant food).
- The plants absorb the necessary nitrates to grow.
- The clean water then escapes the growth beds and is collected in a collection tank.

- This clean water is then pumped back to the fish tanks and the process is repeated.

The produce grown in the aquaponics centre will be used within the culinary centre. Some of the following vegetables and herbs can be grown in a small-scale aquaponics garden: lettuce, rocket, mint, spring onions, leeks, radishes and spinach. Produce such as cabbage, cucumber, tomatoes, broccoli and cauliflower require a more advanced and larger aquaponics system (North, 2016).

There are multiple benefits to aquaponic farming to consider:

- Eliminates the need for fertiliser.
- Less water is required. Research has shown that aquaponic farming uses 1/10th of the water required for typical garden growing (North, 2016).
- Less space is needed for a higher yield.
- The water within the aquaponics is in a closed system, helping to reduce water usage and costs.

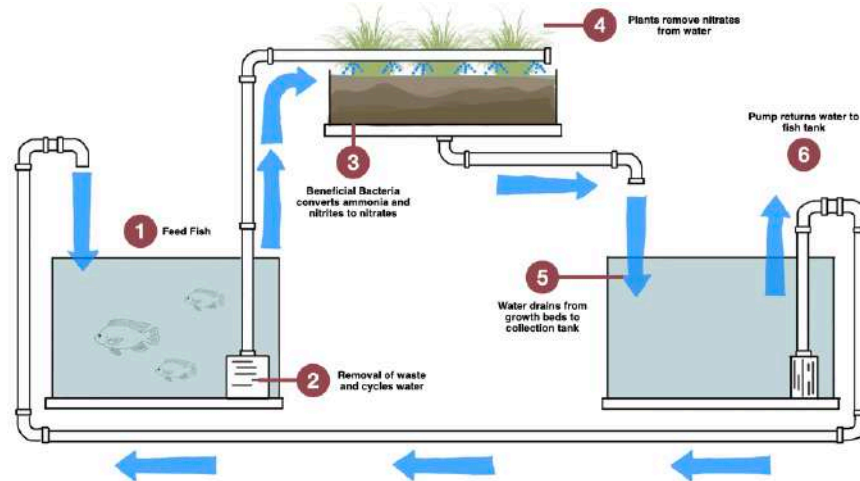


Figure 3.18: Process of Aquaponics (Adapted from Getty Images)

n4

DESIGN BRIEF

“The designer does not begin with some preconceived idea. Rather, the idea is the result of careful study and observation, and the design a product of that idea.” – Paul Rand

4.1 Design Brief

The proposed design is a collaborative learning and skills development centre in Primrose. The architectural challenge will be to create a sustainable structure that provides a nurturing learning environment that is representative of the community it serves and delivers aesthetic features that show progress, ecological conservation and a sense of community satisfaction and pride. The site chosen is in close proximity to major transport routes such as the N3 highway and Johannesburg's railway route. There is an abundance of newly developing industrial estates in the area, therefore making a skills development centre a vital commodity to provide a trained labour force.

The programme will serve to uplift the socio-economic opportunities of the community and alleviate the problems of unemployment and lack of a skilled workforce. The facility will provide spaces for adult learning, after school support for grade 11 and 12 learners, workshops

and lecture theatres for artisanal skills and a culinary teaching facility focussing on general cooking skills, baking and confectionery services. An aquaponic garden will provide an accessible sustainable source of herb and vegetable produce for the culinary programme. To further enhance sustainability, the design must be flexible and be able to adapt to changing expectations of the community and the involved business stakeholders.

The chosen site has a large waterbody that has been classified as a hydro-protection zone by E-BOSS. Preservation and improvement of the water is vital. As mentioned previously the waterbody is to be utilised for sustainable measures such as, a water purification facility for the centre and the Makause community. An inland fishery will maintain local fish populations and provide a sustainable protein source to the culinary centre.

In order to develop the programming schedule multiple steps were taken. Corporations were asked as to which skills the corporate partners required.

Precedent studies helped in deciding secondary programmes. Finally, SANS was used in order to gain an approximate population and thus square meterage for the spaces.

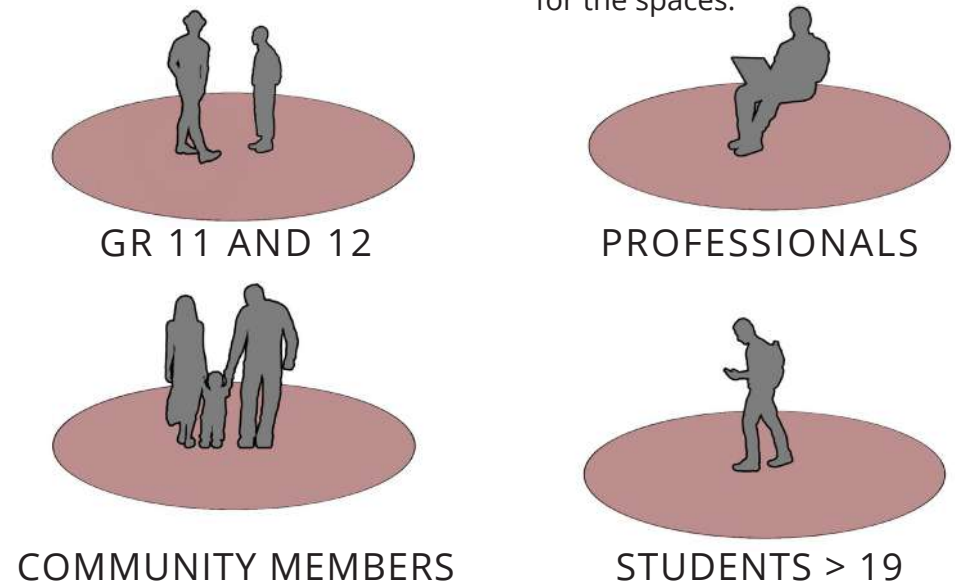


Figure 4.1: Proposed Users (Author, 2023)

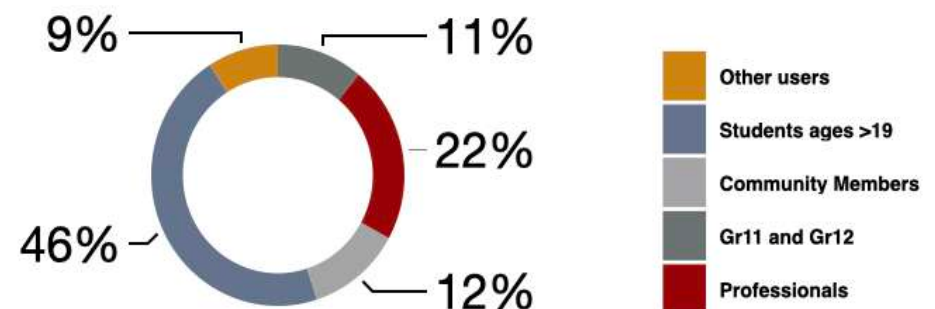


Figure 4.2: Percentage of Different User Groups (Author, 2023)

Learning and Skills Development Centre						
Area and Programme Schedule						
Room	Area (sqm)	Count	Total Area	Occupancy Class	Time Use (hrs)	No. of Users
Entrance Foyer						
Reception	40-50	1		A1	8 hours	50
Waiting Area	20	1		A1	8 hours	20
Information Area	Desk in reception	1		N/A	8 hours	
Display Area	20	1		C1	8 hours	2
Security Office	15	1		G1	24 hours	2
Storage Room	10	1		N/A	8 hours	
			115			74
Water Treatment Facility						
Raw Water Intake	25-50	1		D4	24 hours	
Pre-treatment Room	50-100	1		D4	24 hours	
Filtration Room	25-50	1		D4	24 hours	
Disinfection Room	25-50	1		D4	24 hours	
Product Water Storage	50-100	1		D4	24 hours	
Laboratory	50	1		A3	8 hours	10
Maintenance Room	25-50	1		N/A		
Storage Room	25	1		N/A		
			425			10
Aquaponics Centre						
Fish Tank Room	50-100	1		A3	24 hours	20
Growth Room	100-150	1		A3	24 hours	30
Filtration Room	25-50	1		D4	24 hours	
Pump Room	25-50	1		D4	24 hours	
Control Room	25	1		N/A	24 hours	
Storage Room	25	1		N/A		
			400			50
Recruitment Centre						
Reception	30	1		A1	8 hours	30
Interview Office	25	1		G1	8 hours	2
Recruitment Agent Office	15	1		G1	8 hours	1
Server Room	10	1		D4		
Storage Room	10	1		N/A		
			90			33
Administration						
Reception	30	1		A1	8 hours	30
Private Offices	10	10		G1	8 hours	7
Open Workstations	50-100	1		G1	8 hours	7
Meeting Rooms	20	3		G1	8 hours	4
Breakroom	25-50	1		A1	8 hours	50
Storage Room	10	1		N/A		
IT Room	15	1		G1	8 hours	1
			365			99
Healthcare						
Nurse Office	15	1		E2	8 hours	2
Bathroom	5	1		N/A		
Treatment Room	15	1		E2	8 hours	2
			35			4
Culinary Centre						
Teaching Kitchens	50-75	2		A3	8 hours	30
Demonstration Kitchens	50-75	2		A3	8 hours	30
Dining Area	50-100	2		A1	8 hours	100
Baking and Pastry Lab	50-75	2		A3	8 hours	30
Storage Room	25	2		N/A		
Cold Storage Room	25	2		N/A		
Classrooms	50	2		A3	8 hours	20
			850			210

Site Information		
Site Area (sqm)	167 896,19	
Lake Area	73 431,10	
Usable Area	94 465,09	
Height Zone	B - 5 Storeys	
Coverage	70%	66 125,56
F.A.R	2,4	
Zoning	Educational	

Grade 11 & 12 Centre						
Multipurpose Room	100	1		A3	8 hours	20
Computer Room	50-100	1		A3	8 hours	20
Tutoring Rooms	20	3		A3	8 hours	12
Lounge Area	25	1		A1	8 hours	25
Kitchenette	15	1		A1	8 hours	15
Study Pods in Open Area	50-75	1		A3	8 hours	15
Games Room	50	1		A1	8 hours	50
Outdoor Space	50-100	1		N/A	8 hours	
			525			157
Solar Harvesting Facility						
Solar Panel Area	100-150	1		D4	24 hours	
Electrical Room	25-50	1		D4	24 hours	
Control Room	25	1		D4	24 hours	
Battery Storage Room	25-50	1		D4	24 hours	
Maintenance & Repair	25-50	1		D4	8 hours	
Storage Room	25-50	1		N/A		
			375			
Workshops						
Artisanal Workshop	75-100	3		A3	8 hours	60
Material Storage	25-50	3		N/A	8 hours	
Outdoor Training Area	75-100	3		A3	8 hours	60
			750			120
Learning Spaces						
Classrooms	50	6		A3	8 hours	60
Laboratories	80-100	3		A3	8 hours	60
Library	100-150	1		A3	8 hours	30
Computer Room	50-100	2		A3	8 hours	40
Auditorium	400-500	1		A3	8 hours	100
Multipurpose Room	100	1		A3	8 hours	20
			1550			310
Fishery						
Hatchery Room	50-100	1		A3	24 hours	20
Nursery Room	50-100	1		A3	24 hours	20
Grow Out Ponds	50-100	4		A3	24 hours	80
Feed Preparation Room	25-50	1		A3	8 hours	10
Storage Room	25-50	1		N/A		
			400			110
Gym						
Open Plan Gym Space	100-150	1		A2	8 hours	150
Lockers and Ablutions	25	2		N/A	8 hours	
Changerooms	30	2		N/A	8 hours	
			205			150
Refuse Area						
Refuse Yard	50	1		N/A	8 hours	
			50			
Service Staff						
Breakroom	25-30	1		A1	8 hours	30
Kitchenette	15	1		A1	8 hours	15
Ablutions	20			N/A		
			65			45
Ablutions						
Male Bathrooms	Based on SANS Requirements for Education Facility			N/A		
Female Bathrooms	Based on SANS Requirements for Education Facility			N/A		
Parking						
Parking based on SANS Requirements for Educational Facilities						
HVAC						
Plant Room	150	1		D4	24 hours	
Total Area			6350	Total Number of Users		1372

Figure 4.3: Area Programme (Author, 2023)

05

S I T E

“Architecture is bound to situation. And I feel like the site is a metaphysical link, a poetic link, to what a building can be.” – Steven Holl

5.1 Primrose History and Context

Established in the early 1900s, Primrose was mainly a residential area that catered to the gold rush of Johannesburg in 1886.

Once a thriving town, it has now undergone urban degeneration and decay. Currently, Primrose lacks uniqueness and recreational opportunities for the predom-

inantly young population that reside in the nearby informal settlements. Allowing the community to share in the beautiful views afforded by the large waterbody

on the site and the establishment of sustainable recreational activities thereon, will create a “unique identity and branding strategy which will enhance Primrose’s image” (Veranthan, 2017)

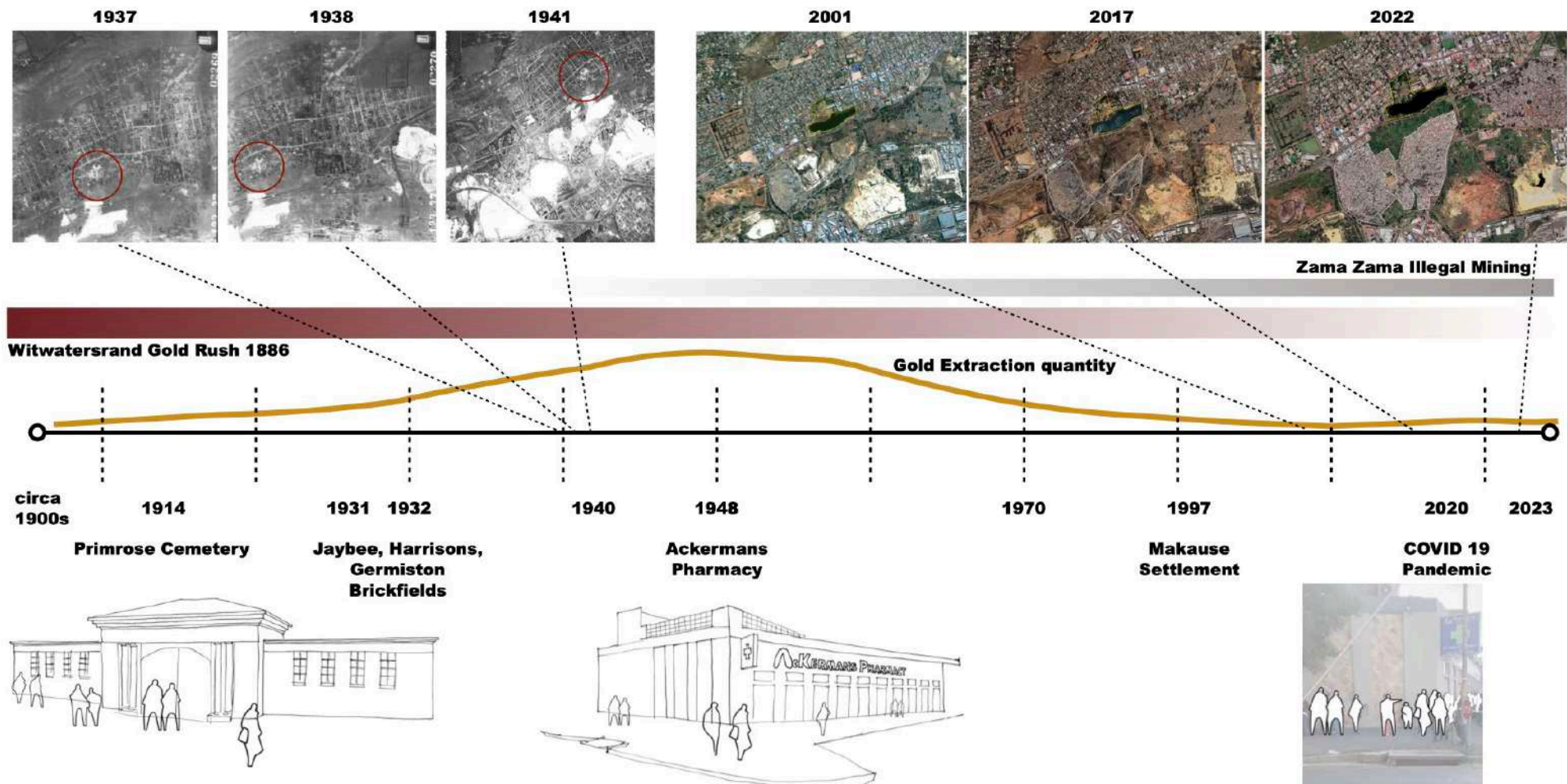


Figure 5.1: Timeline of Primrose (Author, 2023) Satellite Imagery sourced from <http://www.cdngiportal.co.za/CDNGIPortal/> and Google Earth Pro



Figure 5.3: Map showing Areas of interest to the site (Author, 2023)

Site Address: 72 Rietfontein
Road
Site Area: 167 896,19m²
Lake Surface Area: 73 431,10m²
Erven: 3008-3014
Height zone: B – 5 Storeys

Coverage: 70%
Floor Area Ratio: 2,4
Zoning: Educational

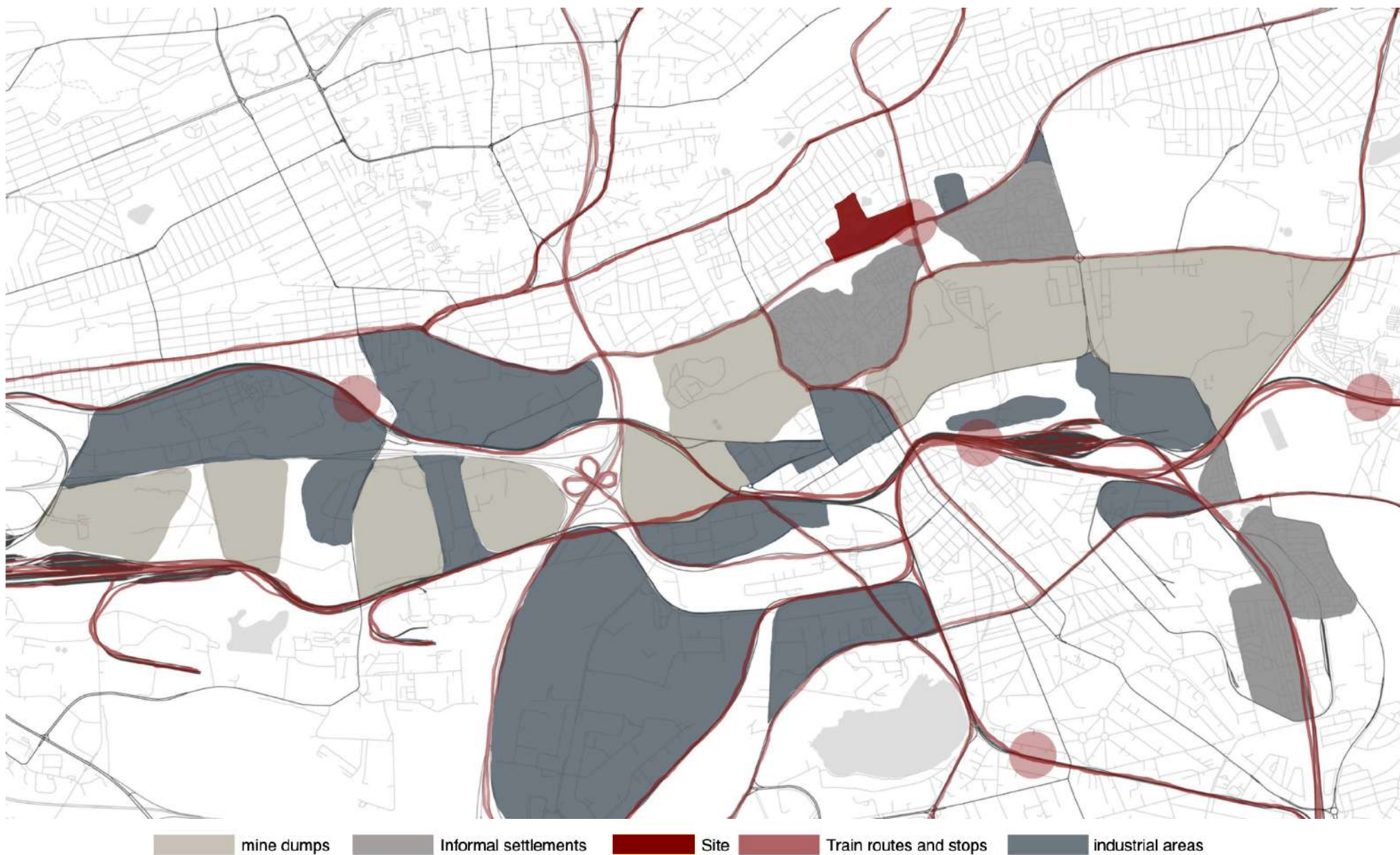


Figure 5.4: Map showing different Zoning Areas close to the site (Author, 2023)





mine dumps informal settlements Industrial Site Bus Stops Taxi Ranks Schools / Education Facilities

Figure 5.5: Map showing different Zoning Areas and Transport close to the site (Author, 2023)

The chosen site is in close proximity to the Makause Informal Settlement. It is easily accessible on major transport routes and lies within 3km of the newly developed S+J Industrial Estate. This promises new employment opportunities for trained and skilled workers. There is a large naturally occurring waterbody with the potential for conservation and leisure. The potential of the site has already been identified in the Draft Primrose Precinct Plan prepared by the Spatial Planning Division of the Ekurhuleni Metropolitan Municipality.

As can be seen in figure 5.6, there is a clear empty zone between Germiston, Edenvale and Jeppestown. This is ultimately the reason why the site was chosen as there is a distinct lack of training facilities in Primrose.

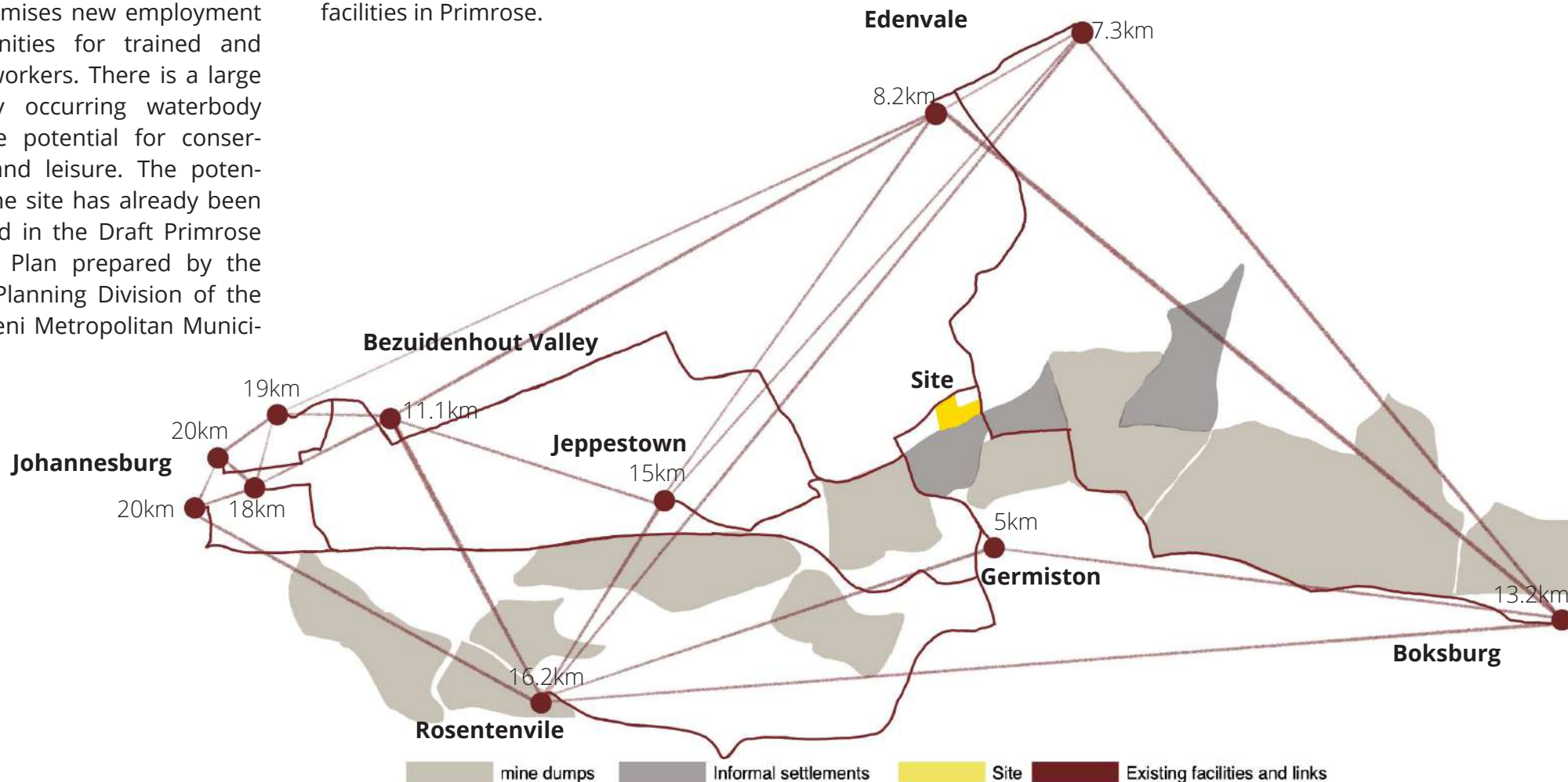


Figure 5.6: Map Showing Distances of other training facilities to site (Author, 2023)



Figure 5.7: Zoning Categories of surrounds (Adapted from Google Earth Pro 2022)

5.2 Makause Informal Settlement

Situated directly across Main Reef road lies the **Makause Informal Settlement**. Located in ward 21 of Primrose in Germiston, Makause was established originally as an interim shelter for retrenched mineworkers from neighbouring mines. The exact timeline of its establishment is ambiguous, varying between the mid 1980s and the 1990s. The abandoned site they occupied was known as Driefontein Farm (Tissington, K, 2014). Today, “Makause houses the poorest of the poor and unemployed, who have nowhere else to go” (De Waal, M, 2012).

The number of residents is currently estimated to be between 10,000 and 20,000 people living in very close proximity to each other on 60 hectares of dolomite ground. Most of the inhabitants are migrant workers from other provinces of South Africa and neighbouring countries such as Mozambique, Zimbabwe, Malawi and Lesotho (James, 2013).

The land is privately owned by two corporations namely Rose Acres Development and Harrigan Properties (Tissington, K, 2014). DRD Gold still possesses servitude rights over portions of the property.

Living conditions are extremely poor and it is often the site of death and devastation. A very minimal “legal” water supply was installed in 2008 but the community decided that they “won’t wait for the government” and using their “own initiative connected to pipes running through the settlement” (De Waal, M, 2012). Electricity connections are few and primarily illegal. Most people use candles, paraffin, primus stoves and some generators. In addition to the significant risks of environmentally induced diseases such as cholera, typhoid and more recently, COVID and the inadequate supply of drinking water (James, 2013), Makause is also categorised as a Mine Residue Area (MRA) and exhibits detrimental geotechnical issues.

Numerous sinkholes and mine-shafts have proved life threatening to residents.

In spite of all the negative factors, the Makause residents have repeatedly resisted efforts to relocate them. This is due to the fact that the area is richly supplied with major transport routes and they have walkable access to multiple employment and social opportunities in the surrounding industrial and commercial areas of Germiston and Bedfordview.

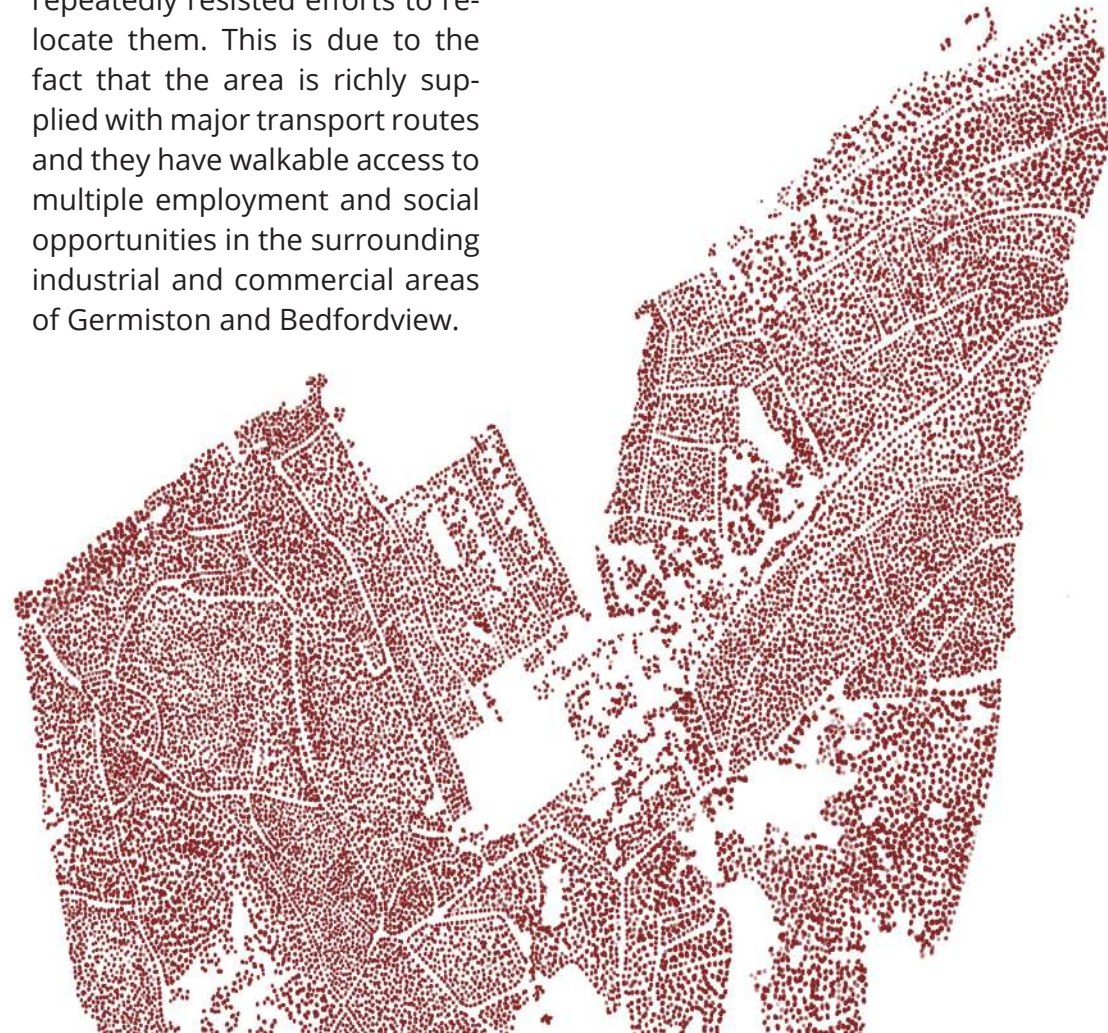




Figure 5.8: The Makause Informal Settlement (Matthew Kilt, 2023)



Figure 5.9: Aerial Image of the extent of the Makause Informal Settlement in June 2001 (Adapted from Google Earth Pro)



Figure 5.10 : Arial Image of the extent of the Makause Informal Settlement in June 2013 (Adapted from Google Earth Pro)



Figure 5.11: Aerial Image of the extent of the Makause Informal Settlement in June 2017 (Adapted from Google Earth Pro)



Figure 5.12: Arial Image of the extent of the Makause Informal Settlement in June 2022 (Adapted from Google Earth Pro)

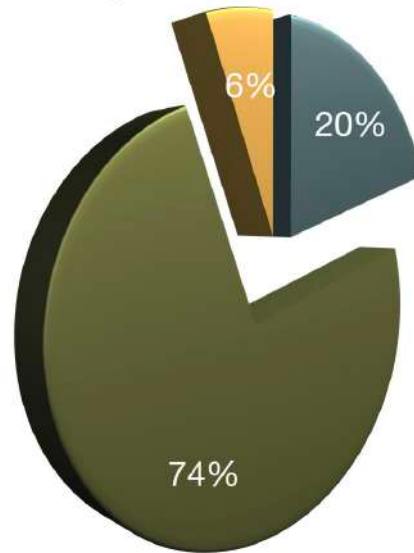
5.2.1 Situational Analysis

According to the Primrose: Urban Design Precinct Plan, 74% of the population of Primrose (including Makause) is between the ages of 18 and 60. Youth unemployment rate for the first quarter of 2022 was 63,9% for those aged 15-24 years and 42,1% for those aged 25-34 years. Of the people that are employed, most fall into the lower income group. Only 33% of the people have matric and 2% have some form of tertiary education. 5,3% of the Makause inhabitants have no schooling (Stats SA, 2013). The indisputable link between educational levels and unemployment emphasises the urgent need for an educational intervention.

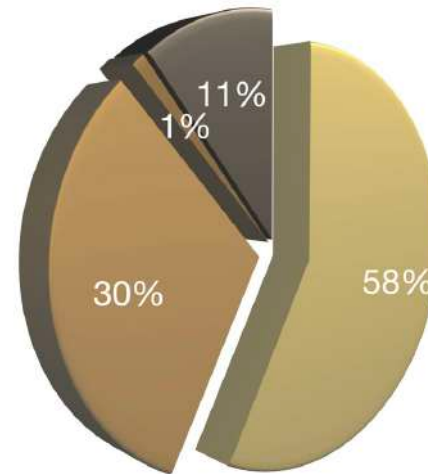
Disturbingly, Stats SA 2022 notes that there was an increase in “out-of-school” children in 2020, most citing reasons of ill health, disability, poor economic conditions and poor academic achievements. The “distance-learning” of the COVID era had devastating effects on vulnerable communities. Attendance of educational facilities amongst the 18-24 years

age group increased in 2021 but an obvious lag was observed in lower socio-economic groups.

Age Distribution in Primrose



Income Groups



2%
TERTIARY EDUCATION

● Under 18 ● Between 18 - 60 ● Over 60 ● Low Income ● Middle Income ● High Income ● Unspecified

Figure 5.13: Statistics Figures for Primrose (Adapted from Primrose Precinct Draft Plan, 2017)



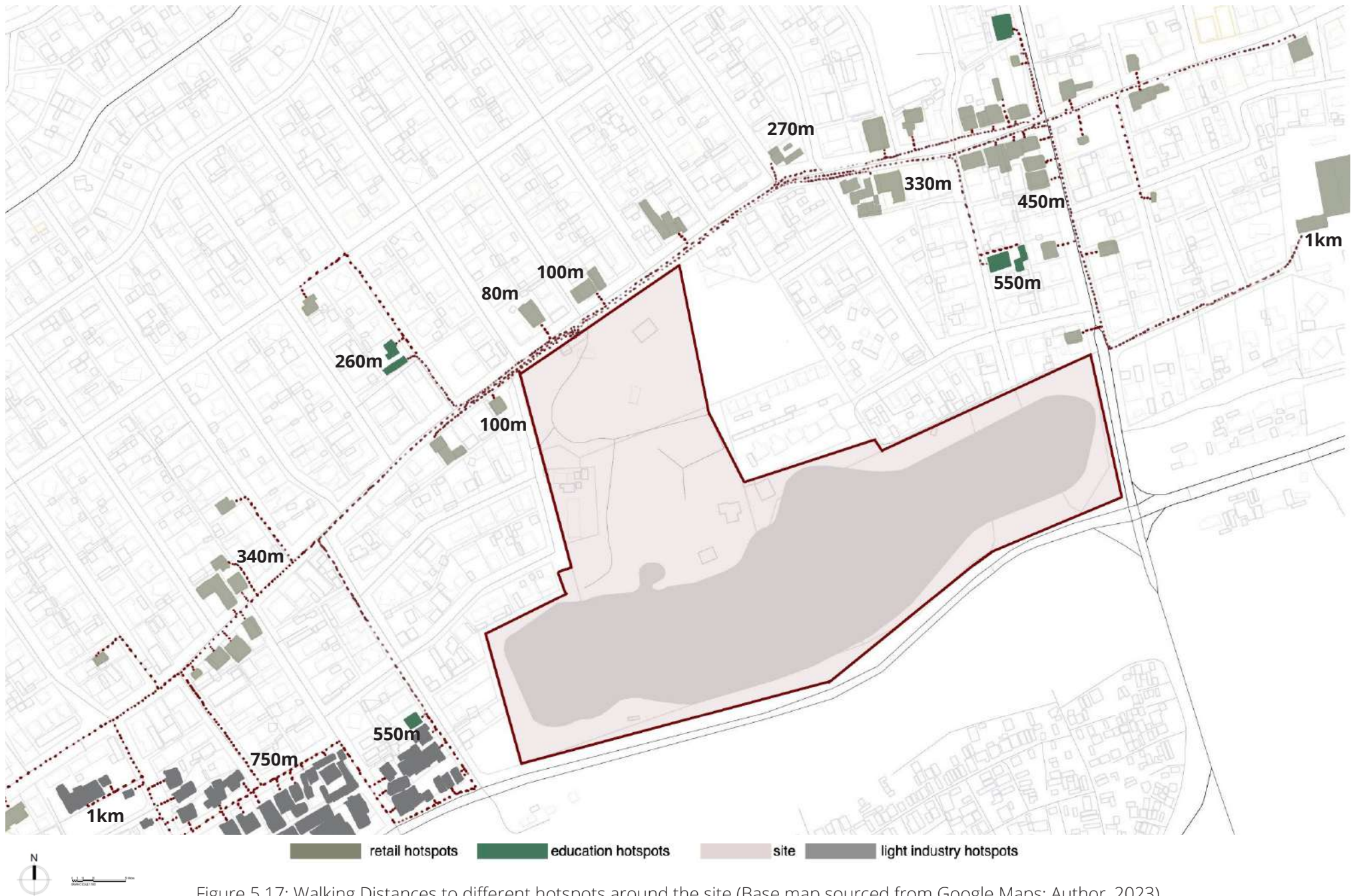
Figure 5.14: Statistics Figures for Primrose (Adapted from Sats SA, 2013)



Figure 5.15: Abstract map showing highest concentration of no schooling (Adapted Primrose Precinct Plan, 2017)



Figure 5.16: Abstract Map showing highest concentrations of tertiary education (Adapted Primrose Precinct Plan, 2017)



5.3 Proposed Site

There are existing structures on the site: a make-shift mechanical workshop, a chapel, an events centre and a rubble pile that can be used in the construction of the centre. The existing workshop will be used as an initial building training site where students will be taught how to construct and demolish a building. The materials from the warehouse will then be used in the construction of the new facility. The site has an already built access-control gate with pedestrian turnstiles and well-established perimeter walls. The chosen site has an interesting history associated with it. It was previously Primrose Brickworks, later BRICKOR. The excavation of the clay rich soils of the site caused underlying groundwater to break through the surface and flood the quarry, creating the thriving lake ecosystem that is there today (MKhabela, 2021).

The 28 meter deep lake is now considered one of the top locations for fishing in the Germiston area (Waters Edge Estate, 2002). The topography of the area varies greatly. To the north of the site lies primrose ridge, a geographical division between Bedfordview and Primrose where indigenous flora and fauna can be found. The topography of the site itself is relatively flat, with it gently flowing down towards the water's edge. Beneath the water's surface, the topography changes drastically. The quarry has multiple areas of varying depths, the deepest being 28m.

The current users of the site include staff from the existing warehouse, residents that travel through the site to enter the Water's Edge Estate, grounds staff for the upkeep of the property, fishing club members and the security staff.

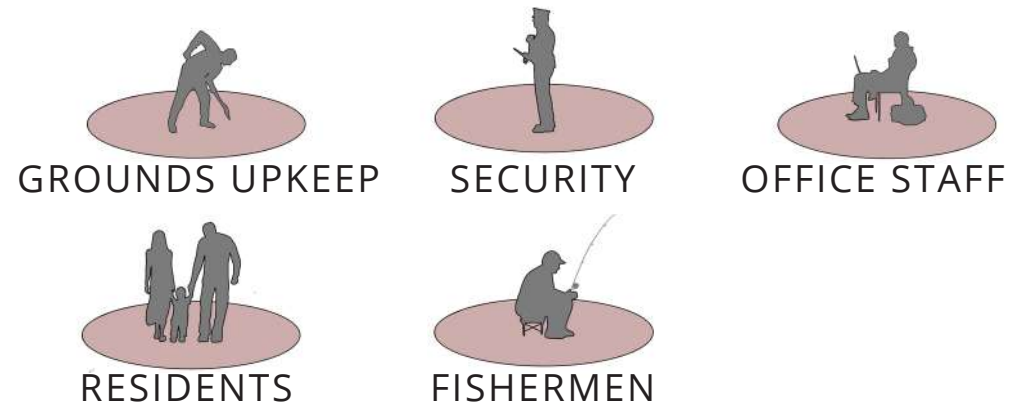


Figure 5.18: Existing User Groups (Author, 2023)

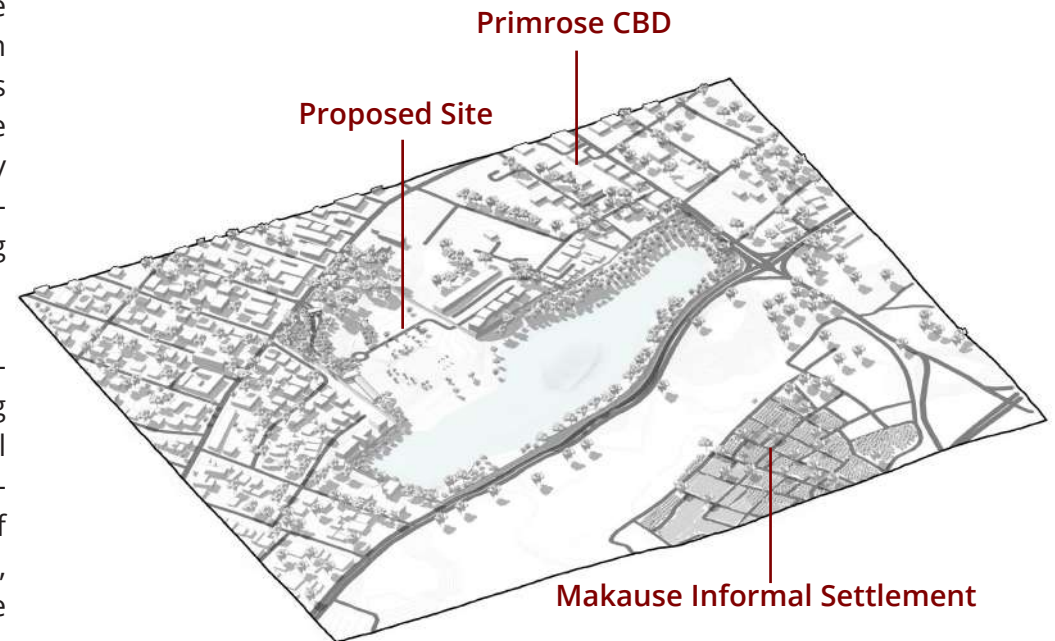


Figure 5.19: Site and Immediate Context (Author, 2023)



Figure 5.20: Site Section (Author, 2023)

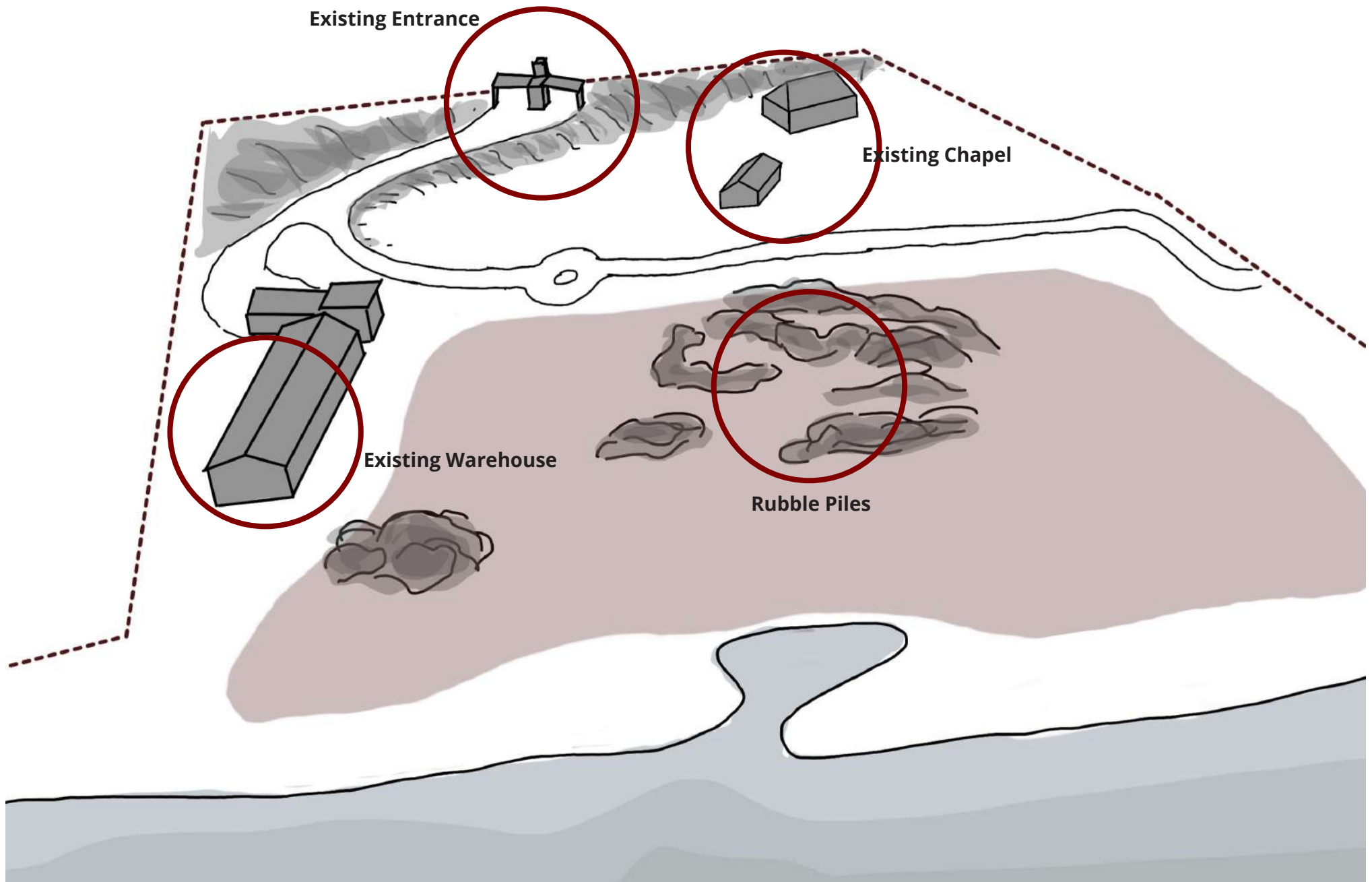


Figure 5.21: Existing Buildings on site (Author, 2023)



Figure 5.22: Existing Rubble pile on site (Author, 2023)



Figure 5.23: Existing Warehouse (Author, 2023)



Figure 5.24: Existing Access Control (Author, 2023)



Figure 5.25: Existing Chapel (Author, 2023)

5.3.1 Flora of Proposed Site

The site is one of Primrose's last green spaces. There is a large array of vegetation on site, but the majority of the mature trees are non-indigenous and invasive species. Black wattle trees, willow trees and palm trees are all found on the site, none of which are indigenous to South Africa. These tree species are to be removed and replaced with naturally occurring vegetation. This will increase the biodiversity of the area.



Tree Key



Figure 5.26: Existing Vegetation Site Plan (Author, 2023)



Figure 5.27: Existing Trees on Site (Author, 2023)

5.3.2 Reintroduction of Indigenous Plant Species

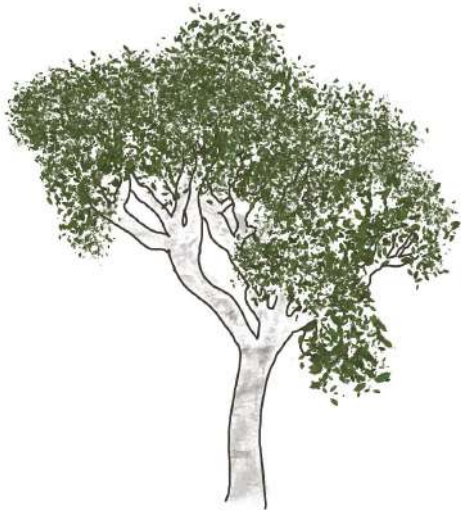
Similar to the biodiversity methods initiated by the Green School South Africa, I propose the re-introduction of indigenous tree species.

Tree species that are naturally occurring in the Linksfield Ridge Nature reserve will be chosen for re-introduction.

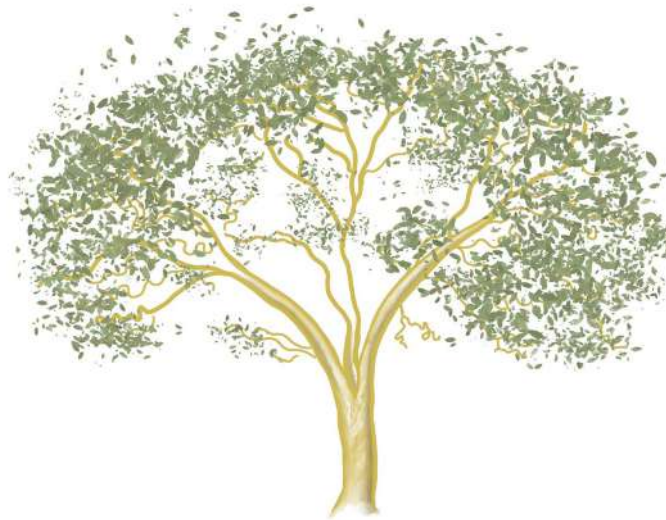
The Linksfield Ridge Nature Reserve is less than 5km away from the site, thus ensuring the selected trees can survive in the area.



Figure 5.29: Distance from the Proposed Site to the Linksfield Ridge Nature Reserve (Adapted from Google Earth Pro, 2022)



Highveld Cabbage Tree



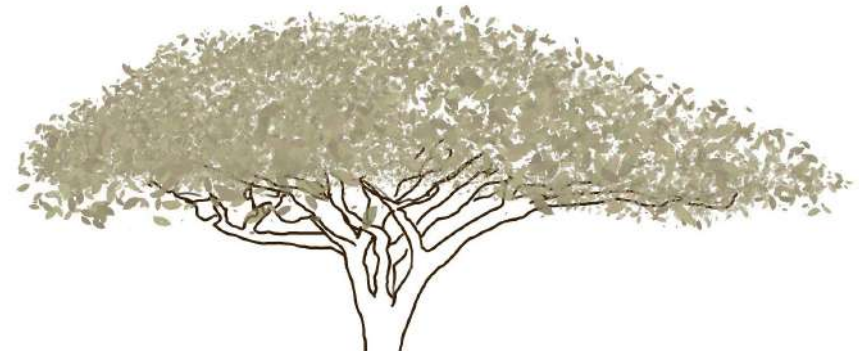
Acacia Xanthophloea (Fever Tree)



False Olive



Camel Thorn



Umbrella Thorn Tree

Figure 5.28: Sketches of Indigenous Highveld Trees located within the Linksfield Ridge Nature Reserve (Author, 2023)

5.3.3 Design Aims

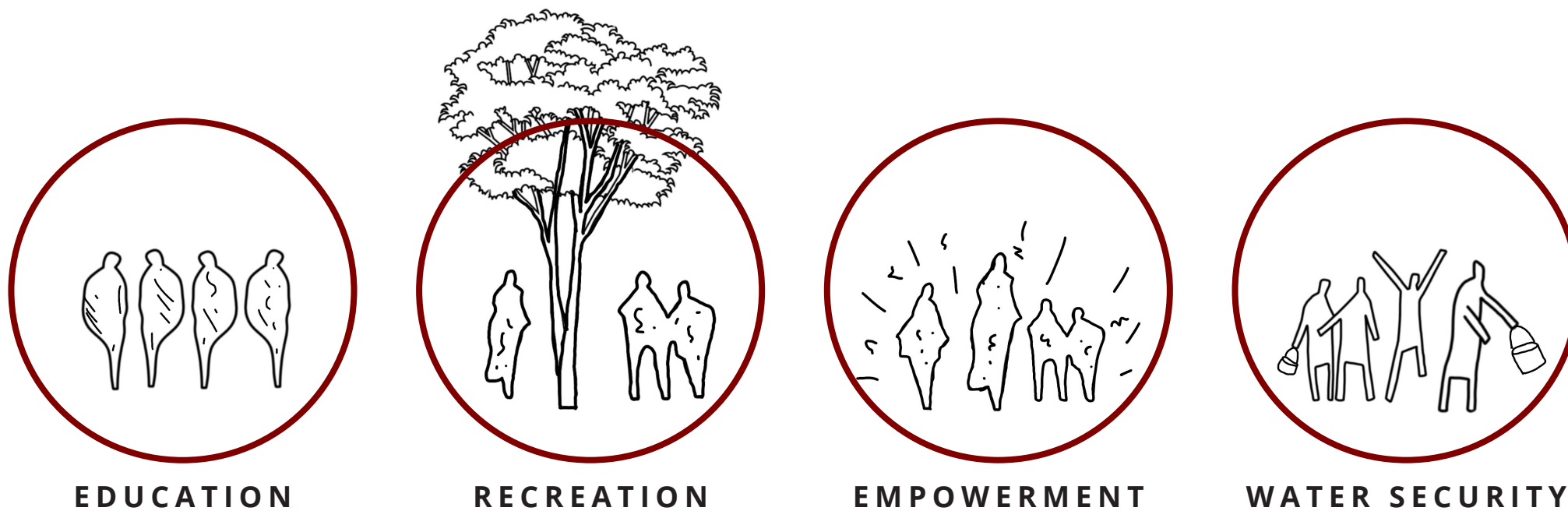
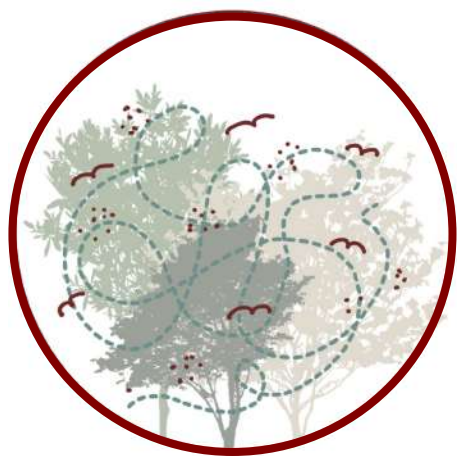
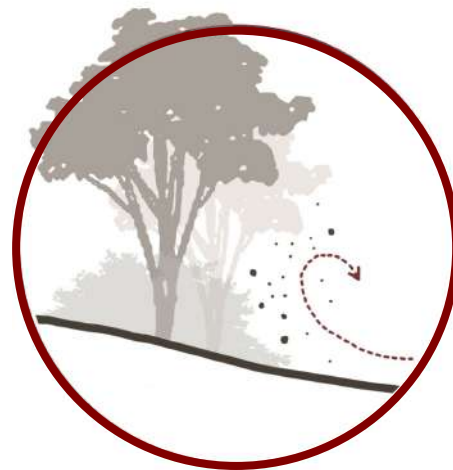


Figure 5.30: Design Aims (Author, 2023)

5.3.4 Ecological Site Aims



BIODIVERSITY



AIR IMPROVEMENT



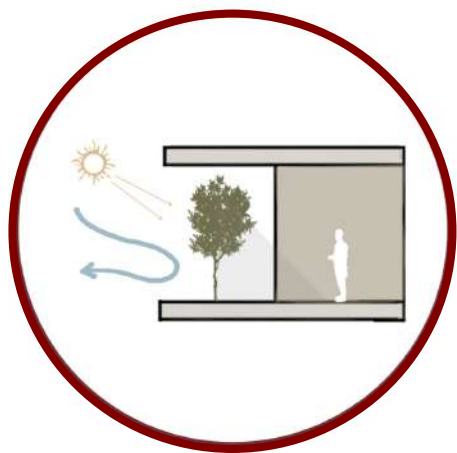
SOIL REMEDIATION



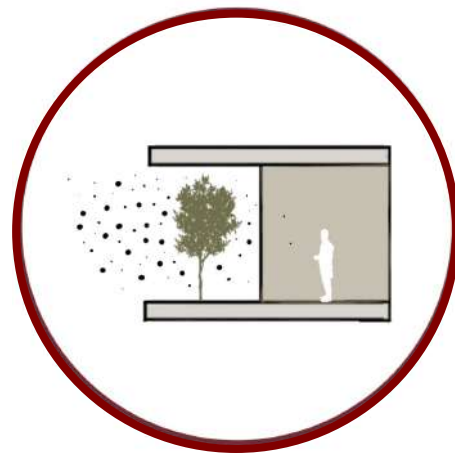
**URBAN HEAT
IMPROVEMENT**

Figure 5.31: Ecological Site Aims (Author 2023)

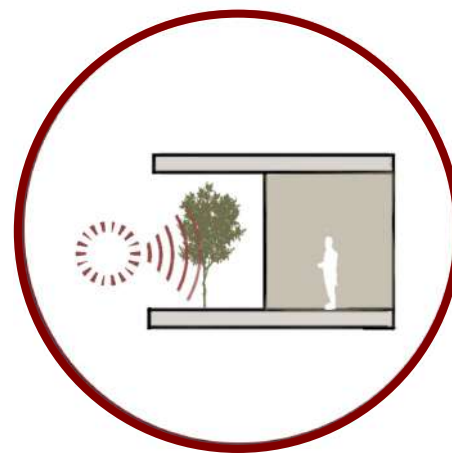
5.3.5 Biophilic Design Implimentation



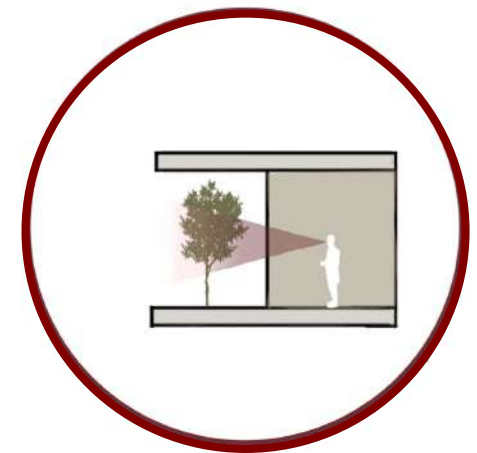
THERMAL COMFORT



AIR QUALITY



NOISE ABSORPTION



BIOPHILIC DESIGN

Figure 5.32: Biophilic Design Implementations (Author 2023)



CASE STUDIES AND PRECEDENTS

“What is today supported by precedents will hereafter become a precedent” – Tacitus



Figure 6.1: Precedent and Case Study Location Map (Author, 2023)

6.1 Ubuntu Centre – Precedent

Field Architecture

2010

Bethelsdorp, South Africa

The Ubuntu centre, designed by Field Architecture, aims to serve a variety of community upliftment programmes such as; healthcare, education and improved food security. The centre provides the latest technology and services to at-risk children from the surrounding local communities. The services provided are free, easily accessible and all within the one facility.

Programmatically, the centre has a multipurpose gathering space, an empowerment and career centre as well as computer facilities. The centre also has a adequately equipped HIV and TB testing clinic that has helped thousands of people from the community. Food security is another main driver for the centre. The sustainable roof top garden has provided thousands of students with healthy, organic meals.



Figure 6.2: Ubuntu Centre (Jess Field 2010)

The use of angled concrete forms solidify the Ubuntu Centre's concept of unity and support. One can rely on the centre when needed. The angled forms also pique one's interest as one passes by. Walkways are taken through the solid geometry of the building, maintaining already existing community pathways. This aids the community engagement and makes the community the priority. Ultimately, the centre has been a success.

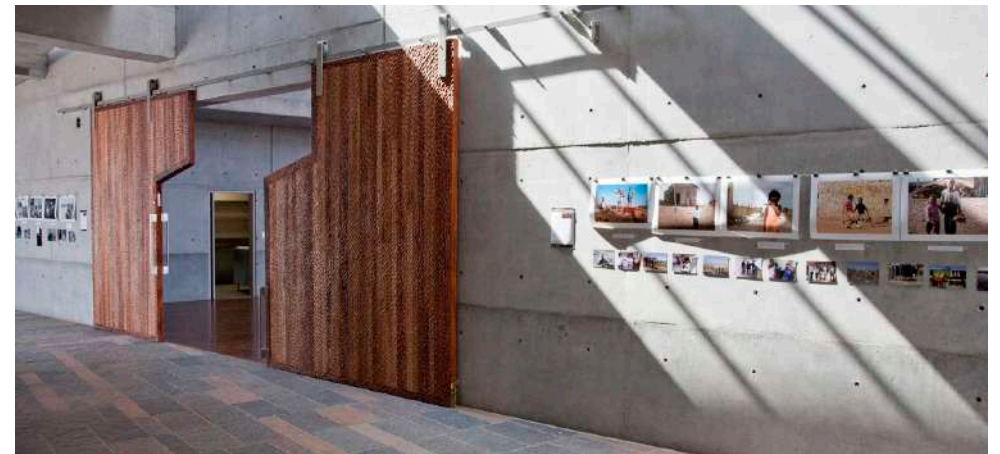


Figure 6.3: Sliding Internal Doors (Jess Field 2010)

The high volumes create open, airy, bright and pleasant spaces. The use of expansive glass walls allow large amounts of sunlight to flood into the space. The incoming sunlight is however passively controlled through the use of horizontal timber louvres.

Key Take-aways to consider when designing:

- Good use of volume to create feelings of inspiration and heightened interest. Creates an open, breathable space.
- Good amount of sunlight, but still controlled.
- Good use of materials that fit in with the local vernacular
- Private spaces may need to be enhanced for adult learners.
- Collaborative, student-centred learning styles.

The Ubuntu Centre successfully incorporates the desired requirements of security, sustainability, accessibility and community engagement in a facility that is both aesthetically pleasing and interesting.

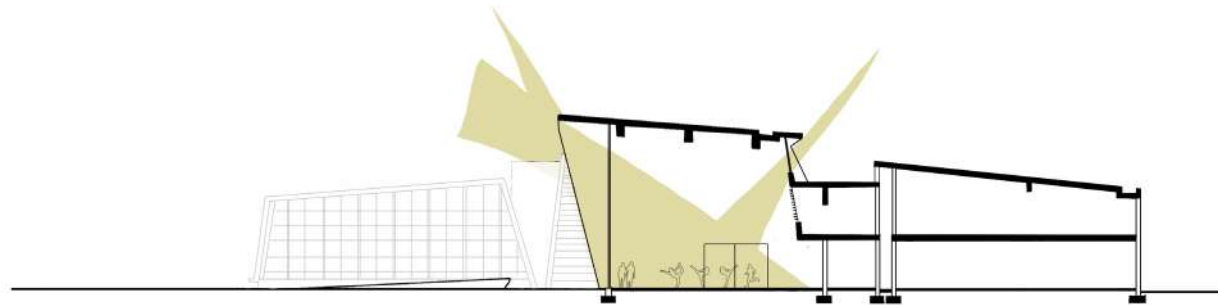


Figure 6.4: Author's Sketch showing incoming natural light (Adapted from Field Architecture, 2010)

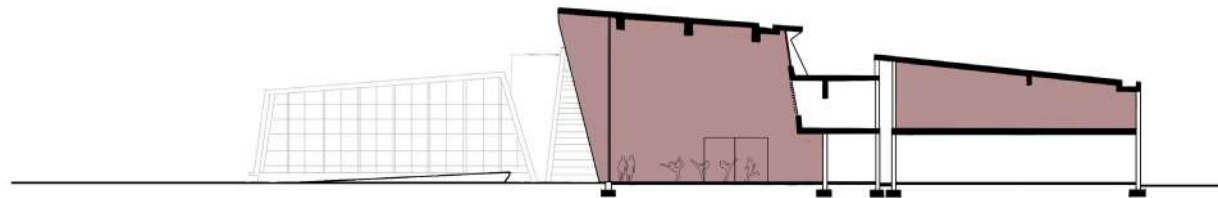


Figure 6.5: Author's Sketch showing volumetric quality (Adapted from Field Architecture, 2010)

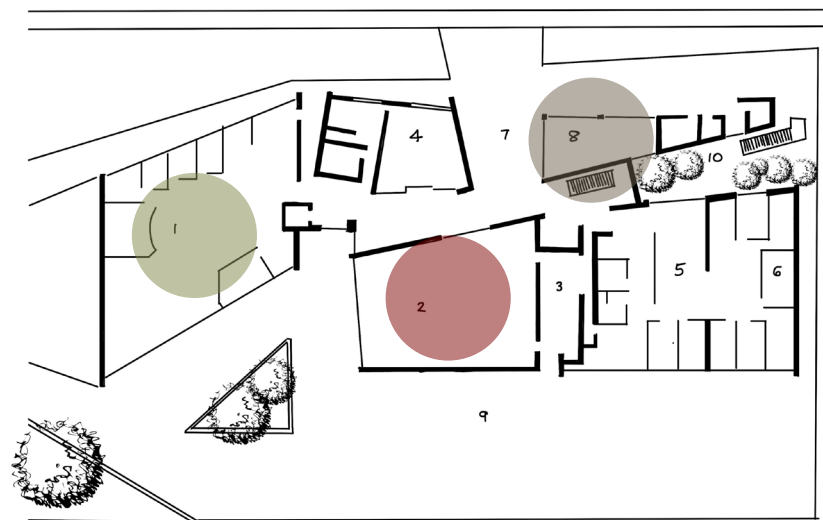
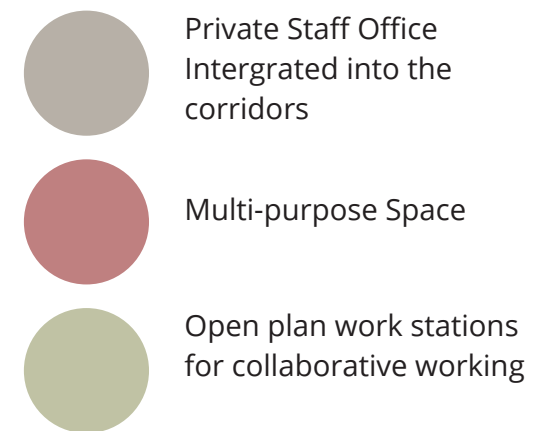


Figure 6.6: Author's Sketch (Adapted from Field Architecture, 2010)



6.2 Sarnsara Learning Centre – Precedent

Architects 49
Ban Pong, Thailand
2020

The islands create private reflective spaces.

The Sarnsara learning centre is situated on a large environmentally rich site with a large water body. The centre's main aims of collaboration, connectivity and connection are all evident in the architecture and its close proximity to nature. The centre's open design fosters and aids the exchange of different ideas of its users.

Externally, one is greeted to an unassuming entrance gate that forms part of the natural landscape. Terraced brick platforms recreate the natural contours and form the landscape architecture of the site. Within the property are multiple meandering pathways which allow visitors and students of the centre to experience the natural environment and brings out their adventurous sides. Within the boundaries of the lake are two small islands that are connected to the pathways by bridges.

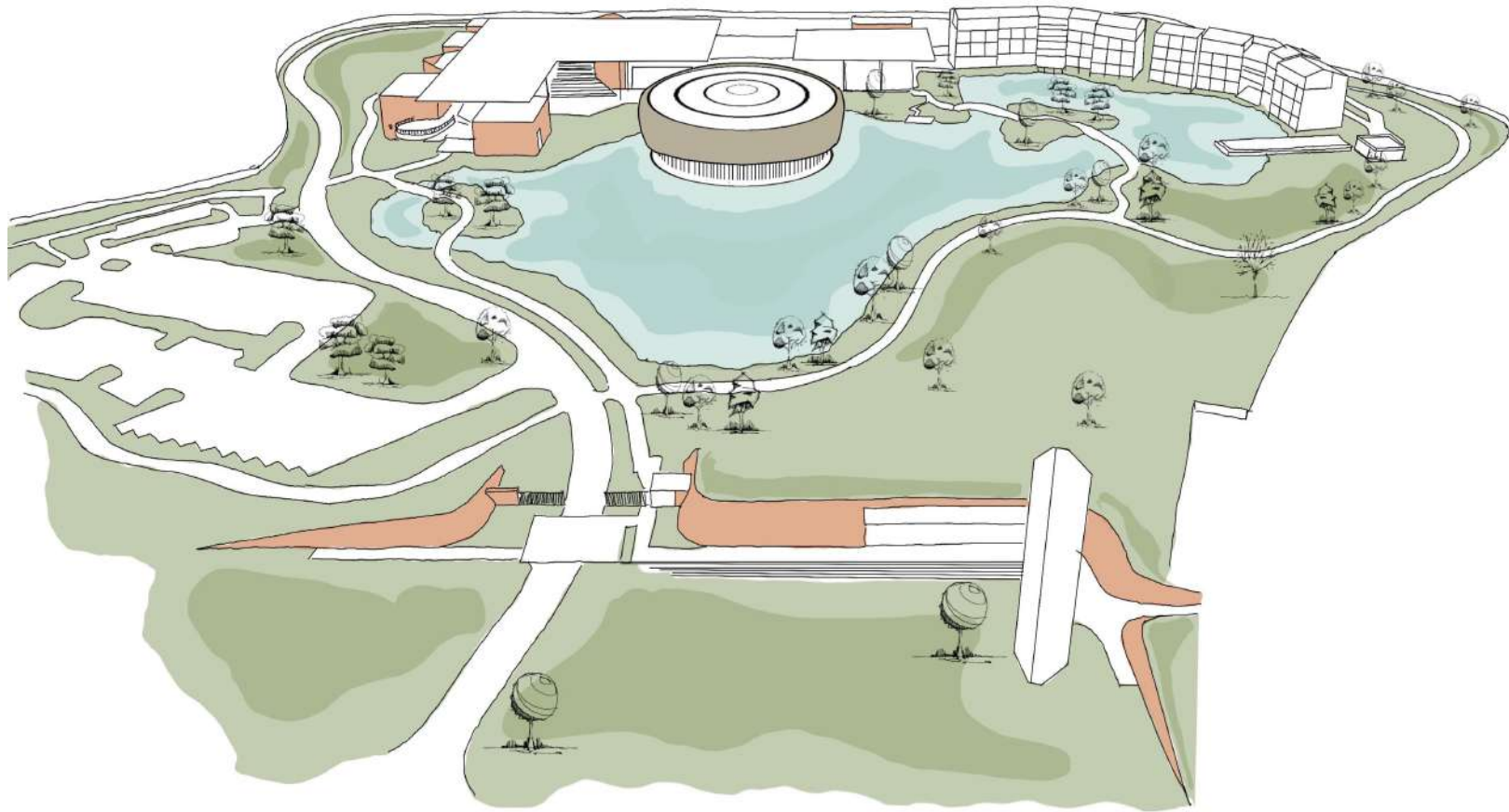


Figure 6.7: Author's Sketch Showing Building in the Natural Environment (Adapted from Nattakit Jeerapatmaitree, 2020)

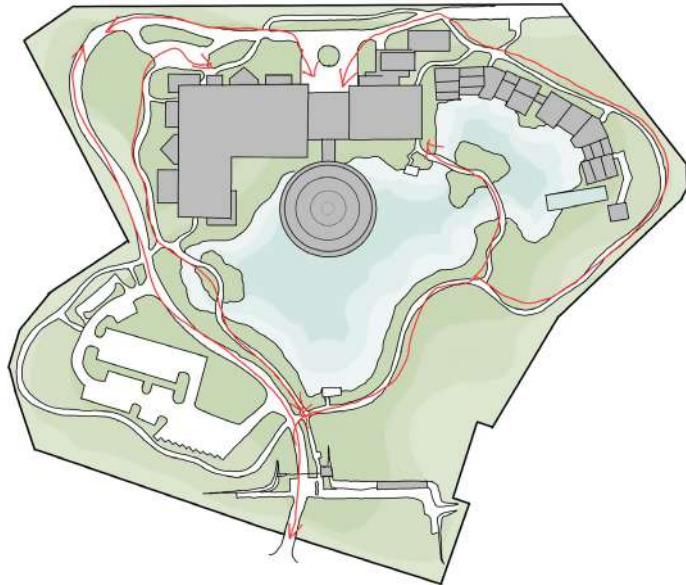


Figure 6.8: Author's Sketch showing pathways around the site (Adapted from Nattakit Jeerapatmaitree, 2020)

The building positions itself delicately between the vegetation and the lake. The landscape and natural environment is allowed to merge with the envelope of the building, further enhancing the concept of connection. The auditorium extends out from the main building and seems to cantilever over the water's surface. The ground floor of the centre is open and the natural elements are allowed to pass through. The materials that have been used are hardy and would not be affected when exposed to water.

The idea of phenomenology has also been implemented into the design of the centre. Soft curved edges help guide users through the building. The circular arrangement of the auditorium and the external passageways allow the users to be immersed into nature. Rows of steel columns support the curved raw timber ceiling of the auditorium and interesting shadows are created. The columns also act as a transparent barrier between the building and the water.

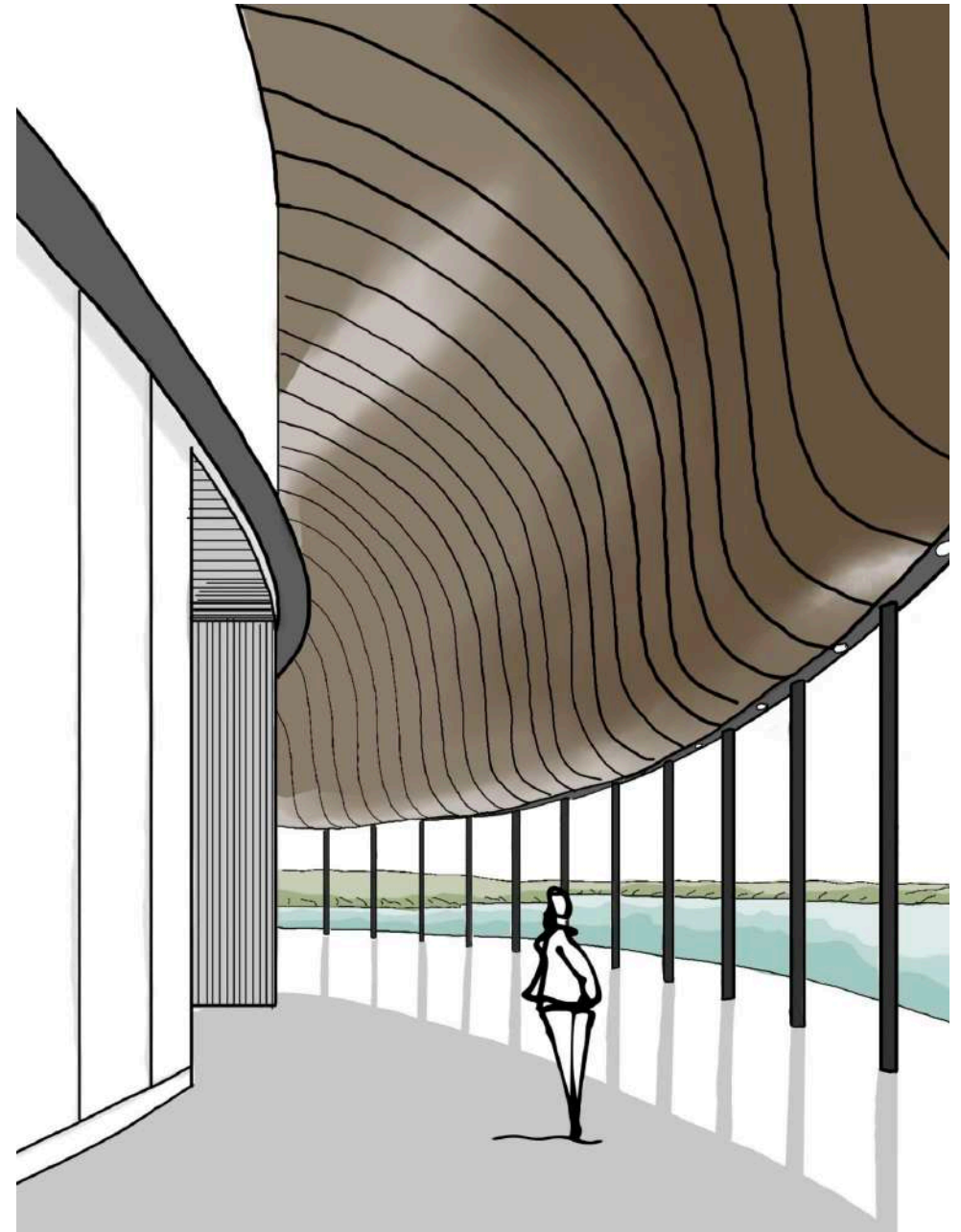


Figure 6.9: Author's Sketch Showing Phenomenological qualities (Adapted from Nattakit Jeerapatmaitree, 2020)

The architectural programme of the building includes seminar rooms, meeting rooms, discussion rooms and workshops. The main building materials used are red bricks, timber, steel and glass. The building minimises the use of concrete and utilises pitched roofs that extend over the building's footprint. Solar panels are also located on the pitched roofs. The bricks have also been in unique configurations that create interesting facades and shadows. The retaining walls on the site have also been made from terraced bricks. This method of bricklaying creates softer edges and emulates the natural landscape.

Key Take-aways to consider when designing:

- Curves inspire learning.
- Interesting brickwork.
- Environment-friendly use of materials that minimise the impact of the building on the environment.
- Phenomenologically inspired architecture.
- Traditional behavioural

learning styles as well as collaborative, social, student-centred approaches.

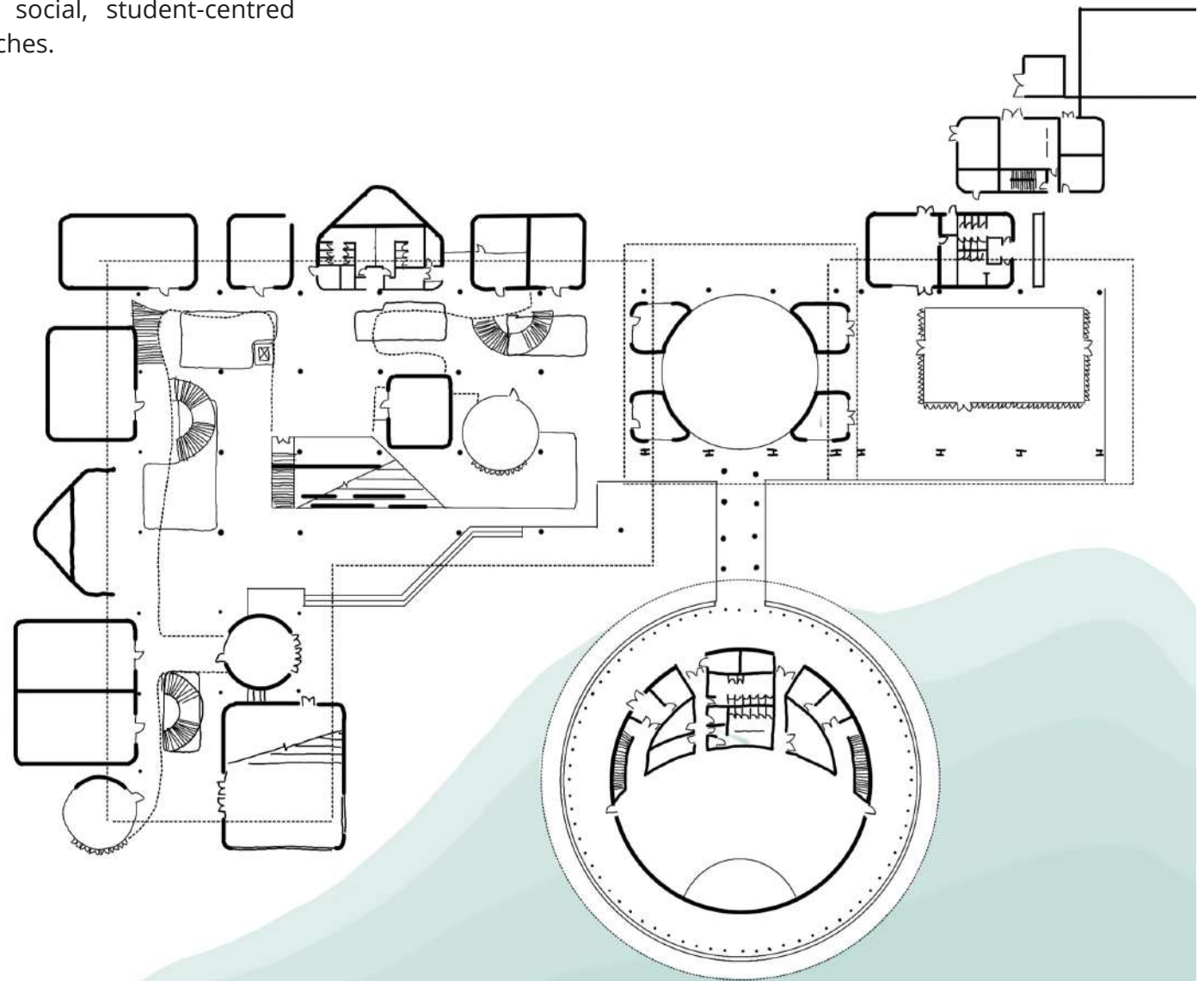


Figure 6.10: Author's Sketch of Building footprint in relation to the water line (Adapted from Architects 49, 2020)



Figure 6.11: Landscape meets Building (Nattakit Jeerapatmaitree, 2020)



Figure 6.12: Building in close proximity to the lake (Nattakit Jeerapatmaitree, 2020)

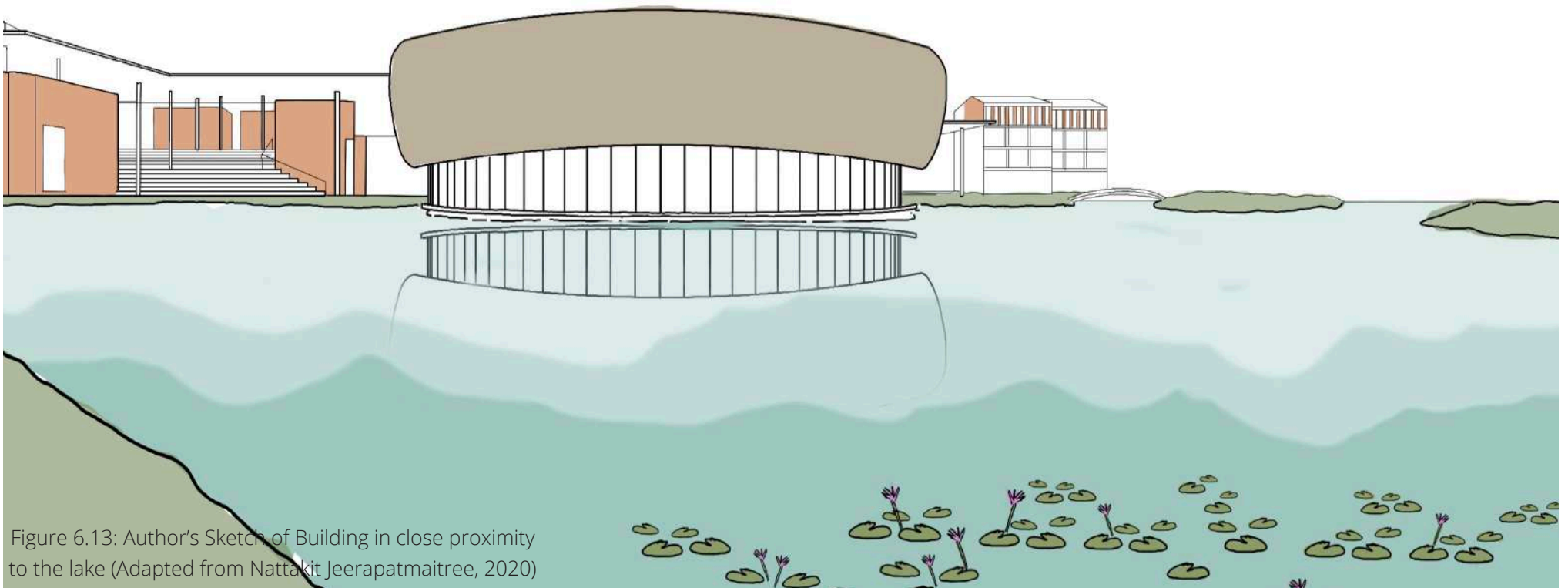


Figure 6.13: Author's Sketch of Building in close proximity to the lake (Adapted from Nattakit Jeerapatmaitree, 2020)

6.3 Deakin Trade Training Centre – Precedent

Architects 49
Ban Pong, Thailand
2020

As one passes by the Deakin Trade Training Centre, the first thing one will see are bright flashes of colour through the surrounding trees. Unique exciting architectural forms created by metal cladding, pique interest and excitement. The training centre draws architectural inspiration from old Australian sheds and blends it with the use of modern materials and bright colours.

The training centre aims to create an efficient learning environment for the trades. As well as being visually engaging, the centre is also adaptable and functional.

A central spine of high level glass windows flood the main entrance hall with natural light. The learning spaces all branch off of the main passage. In doing so, it creates the opportunity for students to collaborate and share ideas with each other.

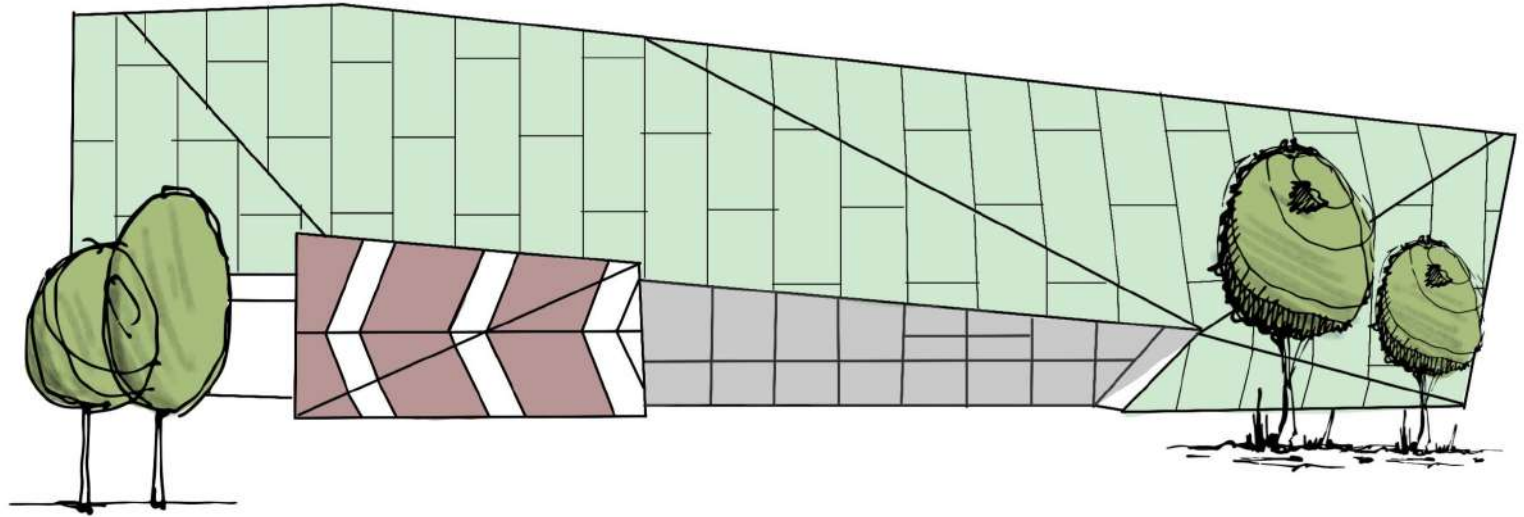


Figure 6.14: Author's sketch (Adapted from Zachary Couyant, 2013)

The educational programmes offered at the centre have been designed and chosen to improve the employability of its students. Courses offered are; building and construction, mechanics, culinary training.

Key Take-aways:

- Natural lighting.
- Internal cross-visibility.
- Very well organised and simple space planning.
- Interesting use of modern materials to honour old warehouse architecture.
- Collaborative
- Experiential learning

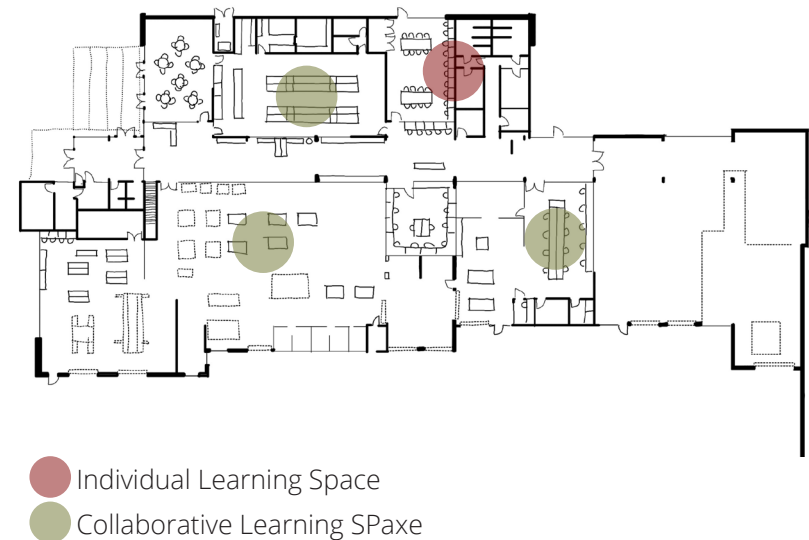


Figure 6.15: Author's sketch of Plan (Adapted from Y2 Architecture, 2013)

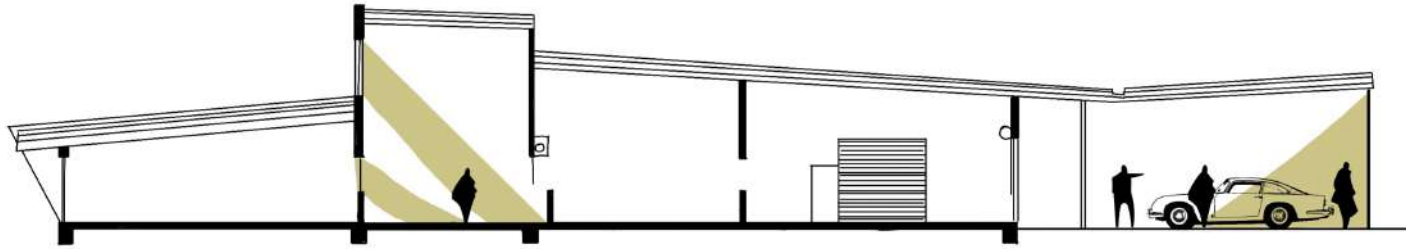


Figure 6.16: Author's sketch showing volumetric quality (Adapted from Y2 Architecture, 2013)

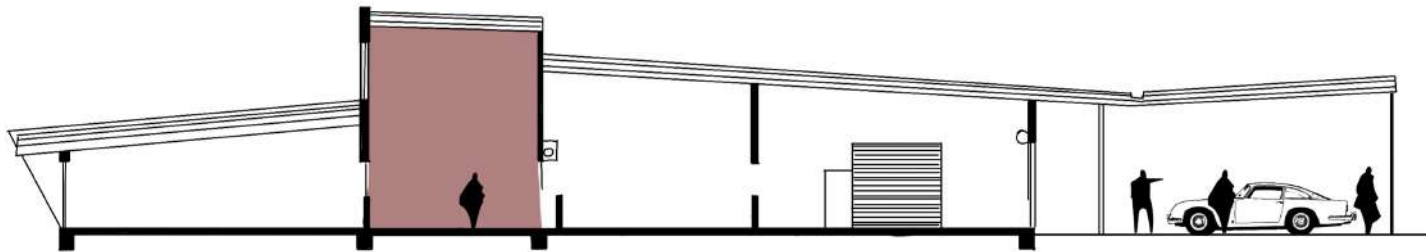


Figure 6.17: Author's sketch showing natural sunlight (Adapted from Y2 Architecture, 2013)



Figure 6.18: Interior Mechanical Workshop (Zachary Couyant, 2013)



Figure 6.19: Interior Cullinary School (Zachary Couyant, 2013)

6.4 The Innovation Centre, Parklands College Secondary School - Precedent

Dhk Architects

2020

Cape Town, South Africa

Respecting the evolving and ever-changing methods of education, the Innovation Centre at Parklands College is embracing technology as the new norm. The school is now a pioneer for technologically based learning in South Africa. The school aims to build its students up to an exceptional level of competence and improve their skills. The school's design aims to foster many types of learning methods, with technology being the driving force (dhk Architects, 2021).

A main design factor behind the centre was collaboration. The architects tested a variety of different spatial configurations with the school. Different configurations were utilised according to the level of stimulation required. Their final conclusions saw that groups of integrated spaces, varying in size, were the most successful.



Figure 6.20: The Innovation Centre (Dave Southwood, 2020)

These spaces were also often connected to or in close proximity with circulation routes. This enhanced the concept of collaboration and created the opportunity for the circulation spaces to become extensions of the classrooms (dhk Architects, 2021). The flexibility of the spaces, is further enhanced through the use of moveable furniture.

This allows the various spaces to be used for different needs.

Architecturally, the building is successfully minimalistic in its design. The building is created from two rectangular forms connected by a glass atrium, which forms the heart of the centre.

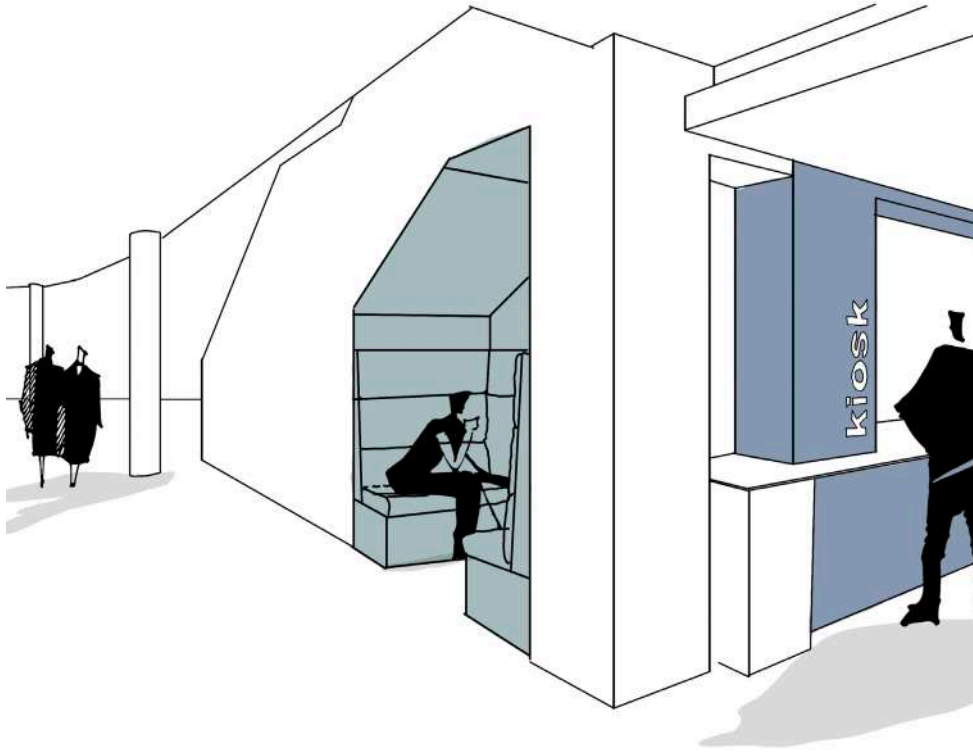


Figure 6.21: Collaboration space in a passage way (Adapted from Dave Southwood, 2020)

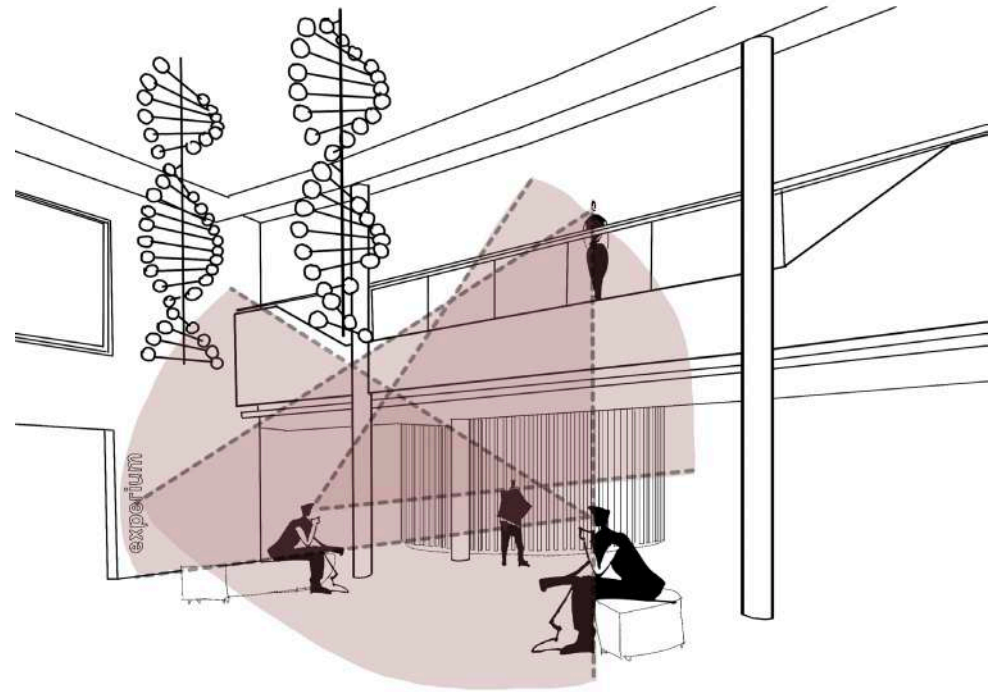


Figure 6.22: Visibility across levels within a void space (Adapted from Dave Southwood, 2020)

To enhance the maintenance of efficient learning, natural light, air quality, acoustics and internal temperatures were all incorporated. The manipulation of incoming light was achieved through the use of changing reveals and large overhangs. The centre also incorporates technology into its sustainability measures. Each large space has automatically opening windows, which open depending on the carbon dioxide levels measured. This method of passive cooling reduces the requirements for artificial cooling methods which use large amounts of energy. The rooms that face north and south have been constructed using predominantly brick and concrete. This ensures thermal comfort is achieved (dhk Architects, 2021).

Internally, timber slatted walls and ceilings have been used. These design elements add a modern yet warm and homely feeling to the space.

The large adaptable spaces were put to good use post COVID-19. Teachers could adapt the sizes of their classrooms to maintain social distancing.

The architectural programme of centre includes; collaboration rooms, meeting pods, adaptable classrooms, a robotics lab and a variety of different workshops.

Key Take-aways:

- Pioneer for technological implementations.
- Sustainable implementations.
- Adaptable and flexible spaces accommodate collaborative and traditional learning styles.
- Active and passive systems enhance comfort of the students.
- Experiential learning.



Figure 6.23: Timber Elements (Dave Southwood, 2020)

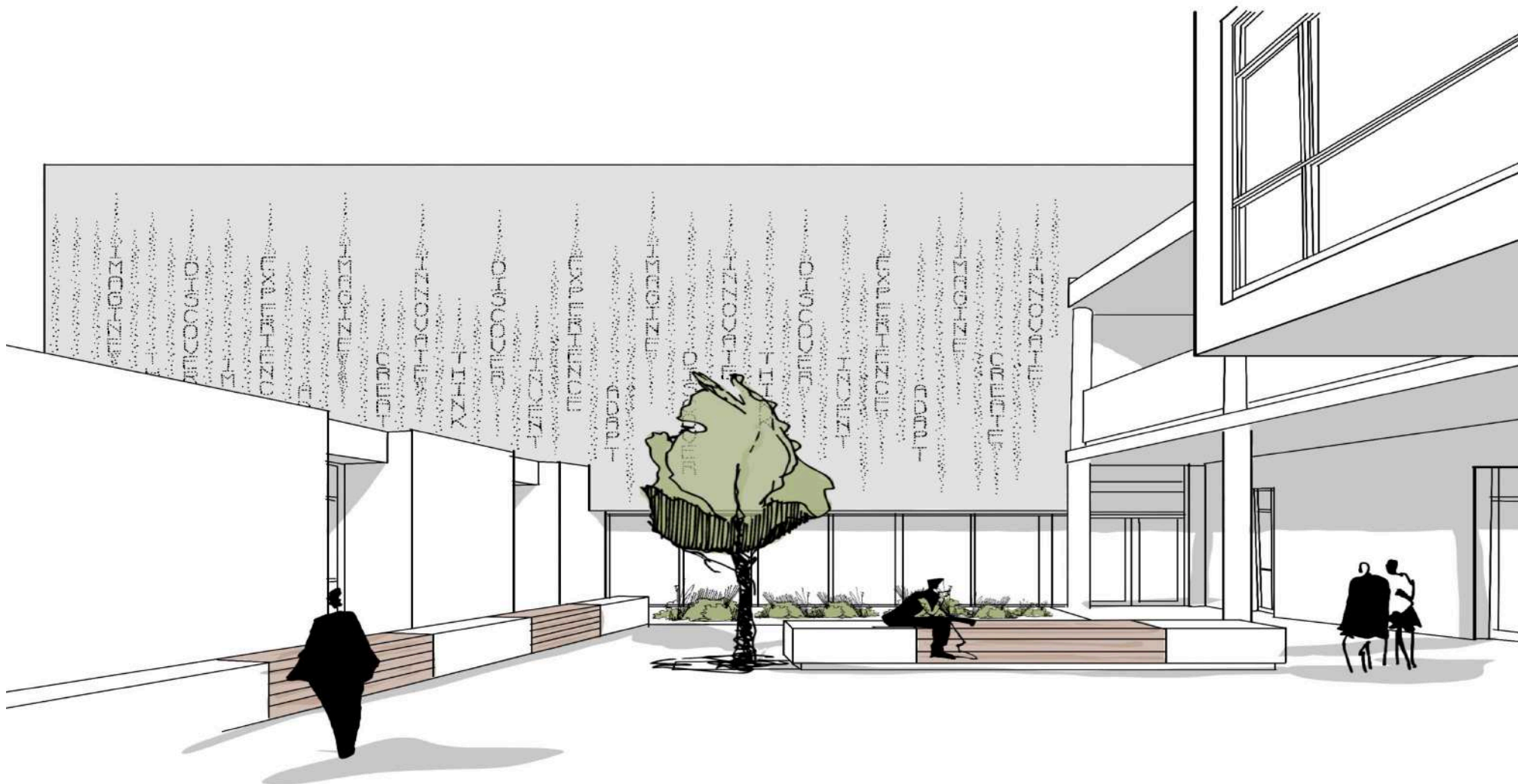


Figure 6.24: Outdoor courtyard space (Adapted from Dave Southwood, 2020)

6.5 Green School South Africa – Case Study

GASS Architecture Studio

2021

Paarl, South Africa

The Green School South Africa is an educational facility that ranges from playschool to high school. The school takes on the responsibility of having a positive impact on the environment rather than simply reducing the negative associated impacts.

In doing so, the school supports the “Living Building Challenge” (GASS Architecture Studios, 2021), making it a pioneer for sustainability on the African continent.



Figure 6.25: Green School South Africa (Weiland Gleich – ARCHIGRAPHY, 2021)

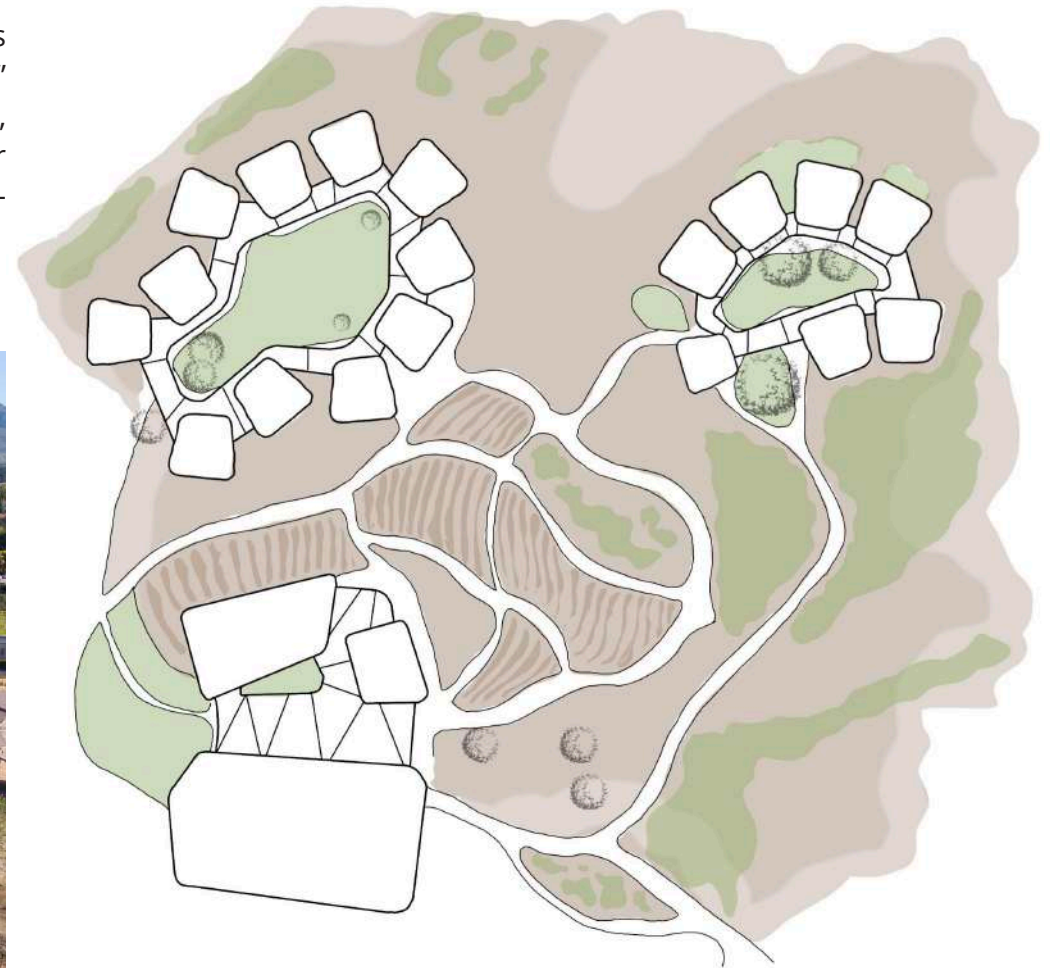


Figure 6.26: Author's Sketch showing extent of natural environment (Adapted from Weiland Gleich - ARCHIGRAPHY, 2021)

In order for a building to meet the standards of the “Living Building Challenge”, it needs to ensure the following measures are adhered to:

1. Less than 10% of the projects building materials can come from more than 500km away from the site.
2. Extremely limited use of concrete.
3. Red listed materials are not to be used.
4. If possible, available onsite building materials are to be used.

The site that the school is located on has clay rich soils. This clay was then used in the building as floors, rammed earth walls and clay bricks.

Biodiversity was another extremely important driver for the Green School. The reintroduction of the previously abundant Renosterveld was carried out. Other plant species were collected from no more than 20km away from the site, ensuring that they were suitable to the area.

The topography of the site was manipulated in order to improve surface water absorption. The natural drainage channels on the site are used as habitats for many different flora and fauna species, thus improving the biodiversity of the area.

A vast area of the site has been used for agriculture. The fruits and vegetables gardens have agricultural educational purposes. There is also a dedicated bee hive area, where the local bee population can pollinate the indigenous flowers.

The architecture of the Green School takes inspiration from the local Paarl Berg Boulders. The clusters of buildings are arranged according to their specific program requirements. The programmes offered include; classrooms for children of different age groups, multipurpose spaces, administrative rooms, dining halls, kitchens, libraries and an art and music studio.

The different building groups are all connected by winding natural pathways. These pathways create interest and a sense of adventure for the students and visitors. To maintain a clear visual connection to nature, the use of large, overpowering walls has been avoided.



Figure 6.27: Rammed Earth Walls (Weiland Gleich – ARCHIGRAPHY, 2021)

Key Take-aways to consider when designing:

- Pioneer for environmental sustainability.
- Material sustainability.
- Landscaping for effective surface water runoff.
- Biodiversity.
- Innovative use of on-site clay.
- All forms of learning styles are incorporated into adaptable, flexible spaces.

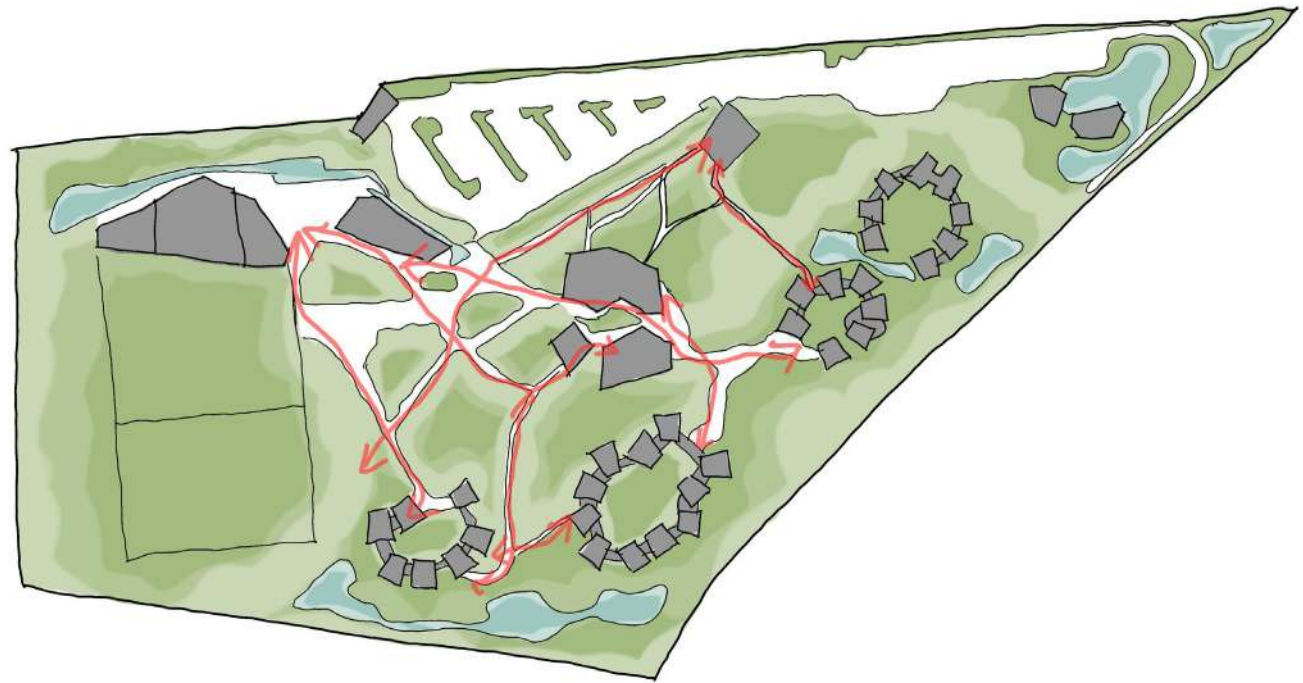


Figure 6.28: Author's Sketch showing the different walking routes in the campus (Adapted from GASS Architecture Studios, 2019)

Stack Ventilation

Cross Ventilation

Cross Visibility

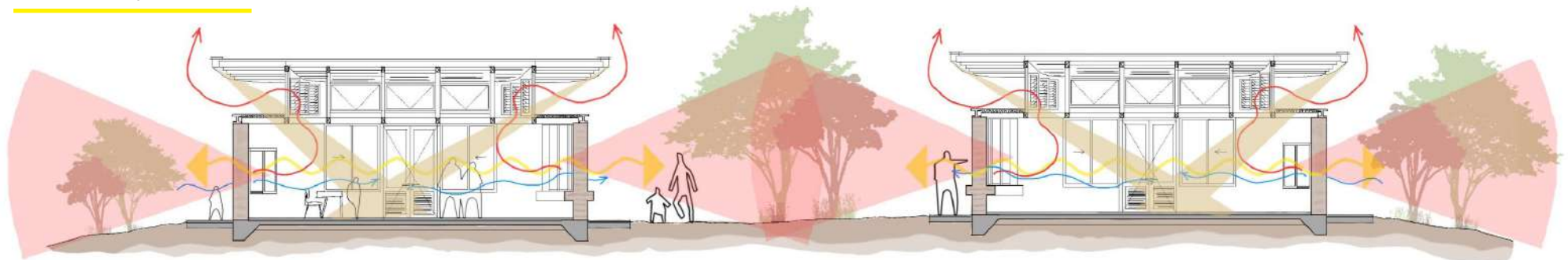


Figure 6.29: Author's Sketch depicting the sustainable design measures implemented within the classrooms (Adapted from GASS Architecture Studios, 2021)

6.6 Netcare Yes4Youth Ulusha Hub – Case Study

MDS Architecture
2021

Alexandra, South Africa

Date of Visit: 18 May 2023

The Ulusha Hub was collaboratively initiated as a Corporate Social Initiative between Netcare and the Youth Employment Service (YES). Further corporate support is offered by Nedbank, Bulcan and Air Liquide. The project intention is to promote sustainable entrepreneurship and skills development in Alexandra enhancing the youths' prospects of employment.

Upon arrival at the Ulusha Hub, one is greeted by colourful shipping containers, mature trees and friendly staff and students. A central reception is the first port-of-call to visitors. The reception has glass that allows natural sunlight to stream in and walls displaying the colourful talents of local artists. The floors are a wood-look vinyl, giving a homely, warm atmosphere to the space. Within the reception, there is a publicly accessible tablet with a database of all the trained stu-

dents. This makes it easy for sponsors or corporate companies to find youth who have been trained in specific departments.



Figure 6.30: Hub Entrance (Author 2023)

The administration room is directly linked to the reception area. Here, there is space allocated for IT, Finance, Marketing and Human Resources. The staff managing these posts are all youth from Alexandra. This exposes them to a wide variety of skills needed. There is a mini-boardroom that has large windows with views of Alexandra as well as a staff kitchen.

Next to the reception is a training laboratory, fitted with computers which students can access for the theoretical and instructive components of their courses. Courses offered include: a culinary academy offering chef and catering courses as well community nutritional lectures; a textiles centre; a drones academy, a ceramics enterprise and a content creation studio. All members of staff and students are also trained in the Microsoft suite.

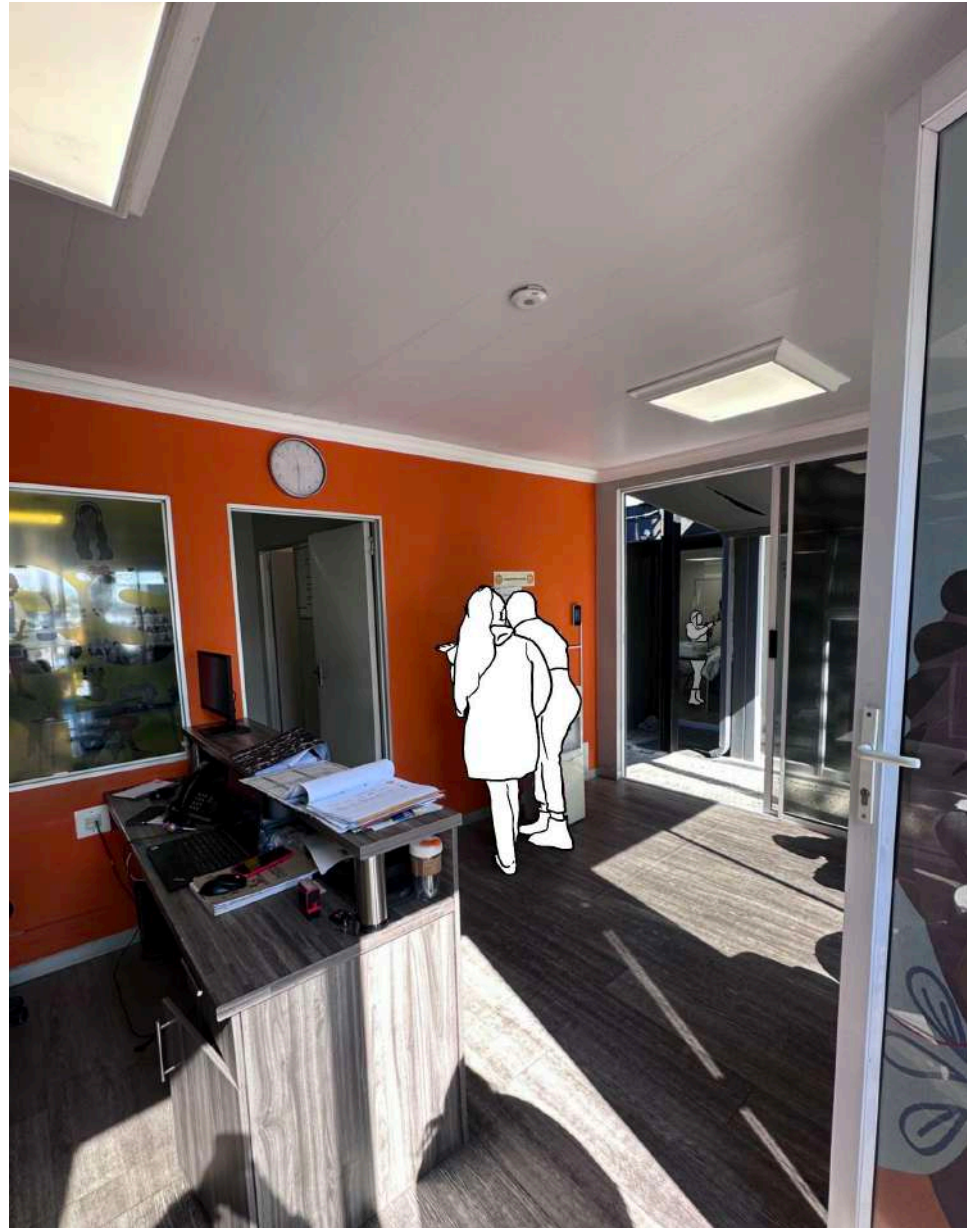


Figure 6.31: Hub Reception (Author 2023)

Within the textile centre bed-sheets, pillowcases, baby blankets and incubation covers are all made for Netcare. The staff are all Alexandra community members.

There are different stations in the textile centre, the first is cutting, then assembly, quality control and finally the finished products are sent to Netcare facilities.



Figure 6.32: Textiles Centre (Author 2023)

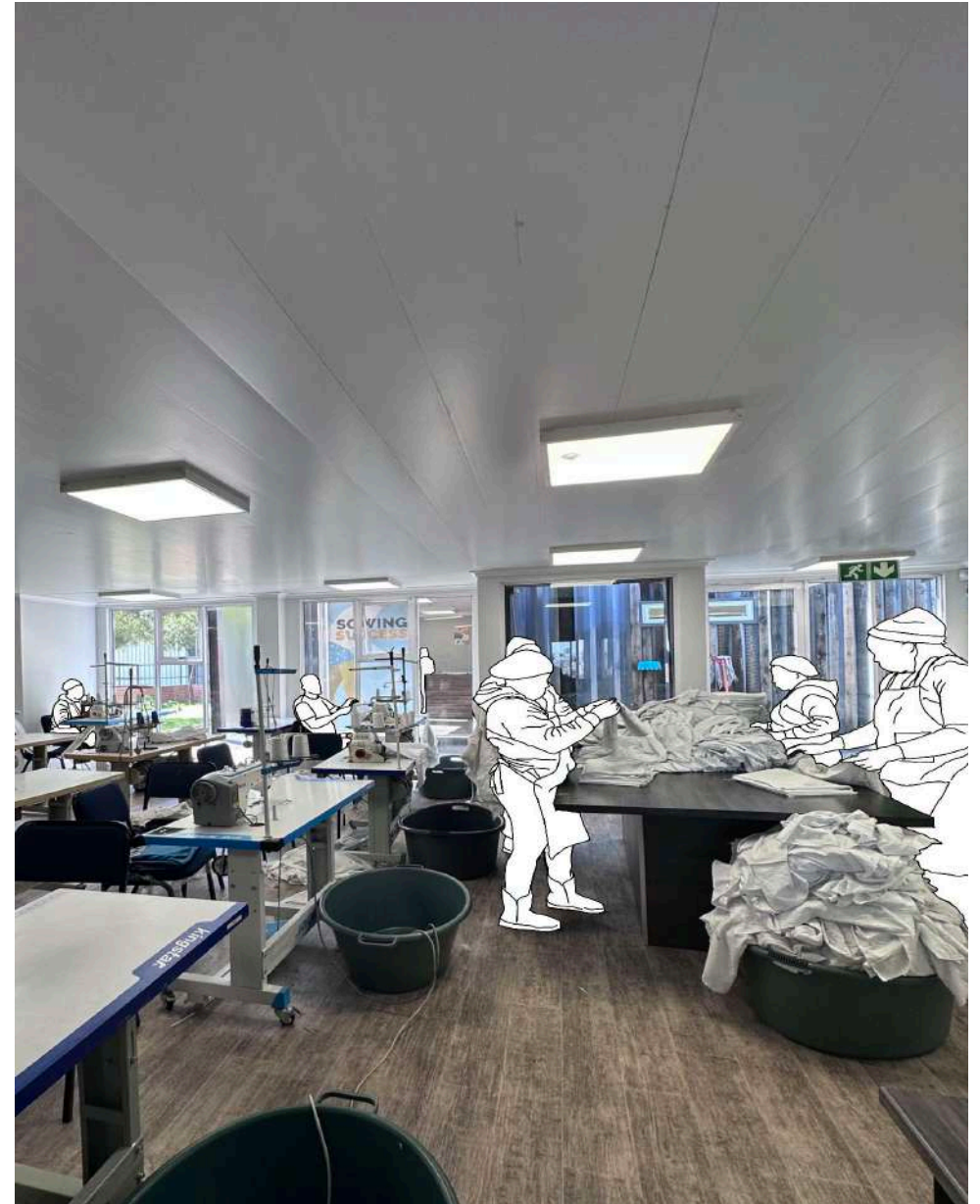


Figure 6.33: Textiles Centre (Author 2023)

The ceramics centre is where creativity is allowed to flourish. There are multiple different methods being used like moulds, the traditional wheel and kilns. To ensure productivity during loadshedding, the moulds are used. Once the power has been restored, the wheel and kilns are used. The materials are donated to the centre by Netcare and any money raised through the selling of the products, goes back to the artists.

Another course offered is fashion design. Students are required to design and manufacture their creations which are then displayed in a fashion show. On the upper level of the centre is the culinary school and content creation studio. A chair lift makes the upper floor accessible to people of all abilities

Within the culinary kitchen, students are taught to make different meals each day. These meals are then sold to people in the hub and to the general public in the Alexandra Mall.

In the kitchen, each student has their own station. The outdoor rooftop deck directly next to the kitchen, which is used for events.

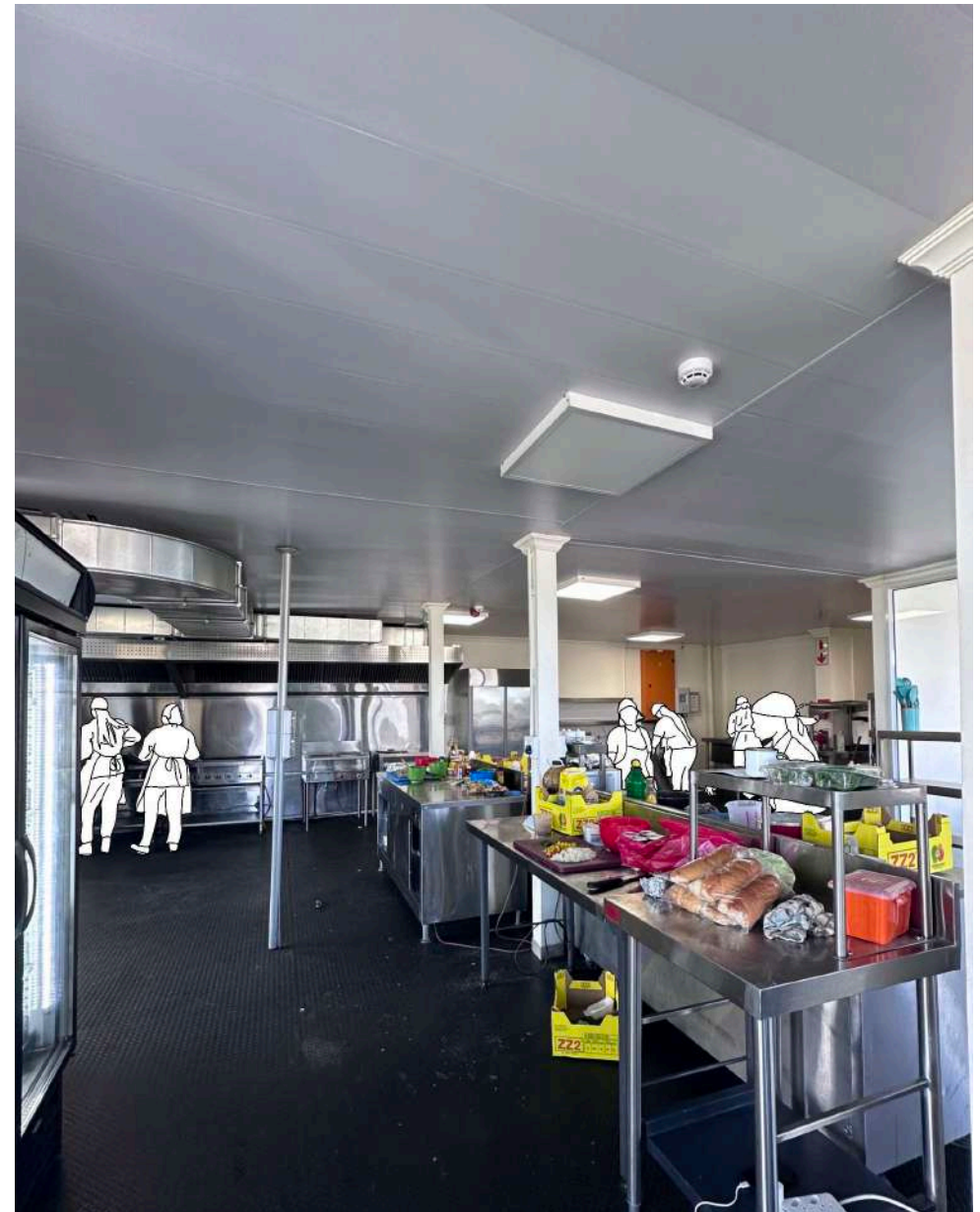


Figure 6.34: Culinary Centre (Author 2023)

In the content creation centre, video, photography and graphic design courses are offered. The programme duration is 12 months and the students are required to attend weekly lectures. Experts in photography and videography are also invited to come and host training sessions. Training sessions typically last 2 hours and are hosted both online and in person.

The number of students that the centre can afford depends on the budget granted by the sponsors. A callout for applications is then distributed to the local community, and those who have potential and the drive to learn are selected to participate.

To ensure that some of the trained youth are employed after the course ends, there is an absorption process. Some of the students are employed by the respective sponsors. All students have their portfolios sent out into the professional field to increase their exposure and improve their likelihood of employment.

Business oriented students are identified. Once the training has ended, these students are trained further in business development.

Within the centre, there is also a space for local community members to run their small businesses. This empowers local entrepreneurs who in turn can employ other community members.

Key Take-aways to consider when designing:

- Corporate Social Initiative
- Sustainable construction - shipping containers.
- Entrepreneurship development
- Community participation and empowerment.
- Collaborative
- Self-directed learning.



Public



Private

Individual Route taken on the day of visit

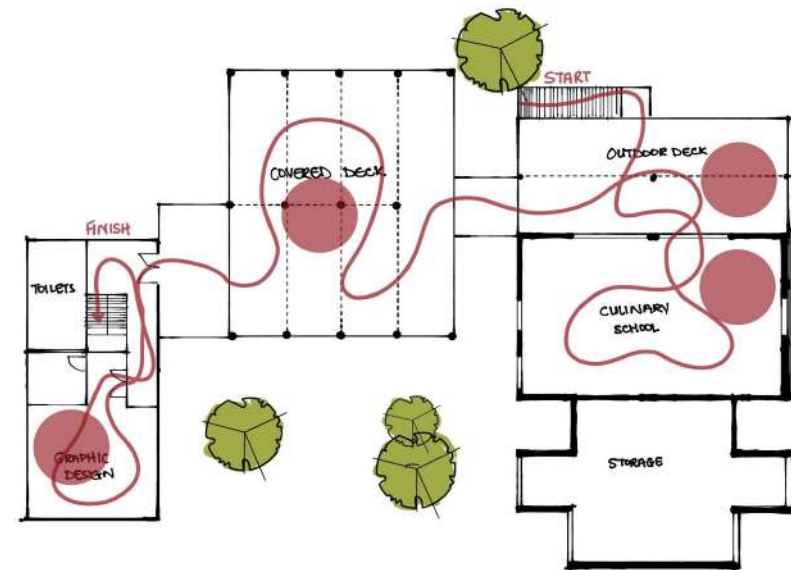


Figure 6.35: Estimated First Floor Plan Adapted from site visit (Author, 2023)

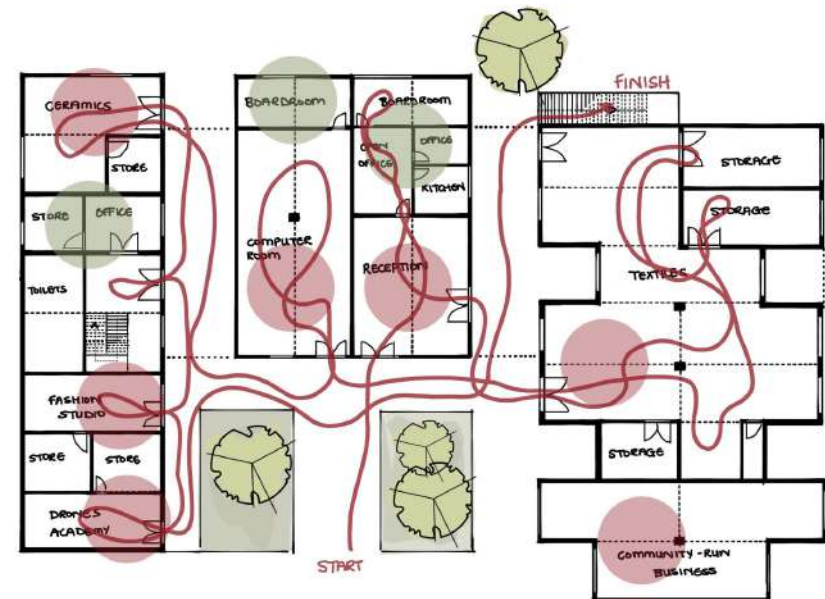


Figure 6.36: Estimated Ground Floor Plan Adapted from site visit (Author, 2023)



INFORMING DESIGN THROUGH RESEARCH



"We cannot solve our problems with the same thinking we used when we created them." –
Albert Einstein

7.1 Design Guidelines

My project occupies a context surrounded by urban disintegration, educational disparity and social exclusion. In order to counter these challenges, I have researched the conceptual theories, reviewed the literature and studied the precedents related to the unique social, intellectual, physical and existential requirements of adult learners in order to inform my design.

The architecture must create a complex, heterogeneous spatial context that accommodates individual learner requirements as well as the facility's diverse functions: a place of instruction and learning; a place of enterprise and a place of social opportunity.

Having realised that the distinction between the concepts is often ambiguous and that no single theory favours all the adult requirements and learning styles, I have opted to combine elements of teacher-centred and learner-centered methods.

The intention is to create a facility that offers an effectual context for learning. Learning may be regarded as a social, synergistic interaction requiring adequate feedback, reciprocation, communication and reflection (Scott, M, 2021). In my design I have considered both formal and informal methods of instruction.

7.1.1 Accessibility

Learning facilities must be inclusive and offer accessibility to diverse users - able-bodied and disabled (Scott, M, 2021). Lifts and ramps secure wheelchair access.

7.1.2 Flexibility

I have included classrooms that favour the traditional teaching methods for formal learning as prescribed by the Behavioural theorists as well as those with more collaborative and social arrangements. The latter encourage participation and interaction between the learners and the surrounding spaces. These rooms are pervious and adaptable with folding doors that can

facilitate altering room sizes and provide continuity with adjacent areas. Mobile furniture and round tables are easily configured to suit learning programmes (Whiteside, A and Fitzgerald, s, 2009). Learners face each other, wherever possible, to boost communication. Some of the classrooms have walls that are curved and windows with variable designs in order to create interest and inspire aesthetic appreciation in the adult learners. Large floor to ceiling windows will ensure that adequate natural light floods the interior. High level windows will also enhance the illumination and ventilation. The circulation of the participants in the classroom allows active engagement and access to educational/technological tools. (Gee, L, 2006)

Student-centred Active
Learning Classrooms

Teacher-centred Active
Learning Classroom

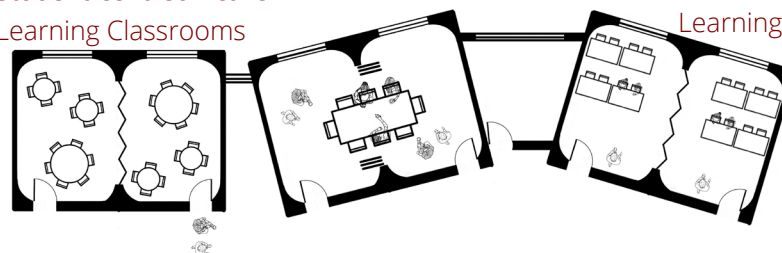


Figure 7.1: Flexibility and Adaptability within the classroom space (Author, 2023)

7.1.3 Adaptability

Learning strategies and the environments that support them are constantly evolving. My design allows the incorporation of adaptability to counter fast-paced changes in technology and programme demands (Mineiro, G, 2018).

7.1.4 Multifunctionality

To prevent underutilisation of spaces, formal locations may be used to satisfy informal requirements (Taylor et al., 2000). The library presents a collaborative area that may offer a site for exhibitions and intimate gatherings. The restaurant can serve a multifunctional purpose and provide a facility for presentations, demonstrations and even limited theatrical performances.

7.1.5 Collaborative Learning Spaces

Every part of my facility is planned to enhance the learning experience.

Collaborative learning is inspired by theories such as Experiential- 'hands-on' - Learning and Transformative - critical thinking - Learning. These suggest that adult learning is social and student-centred. Learning is created rather than transmitted from facilitator to learner. Knowles's model of Andragogy states that adults are self-directing (Knowles, M, 1989) but acknowledges that it is still the duty of the instructor to organise the activities that will enable efficient learning outcomes.

Challenging traditional designs, the corridors are wider and planned to include multiple areas for social opportunities that encourage and continue the un-programmed informal learning process. Visual access and connectivity to nature is once again

afforded by the large windows.

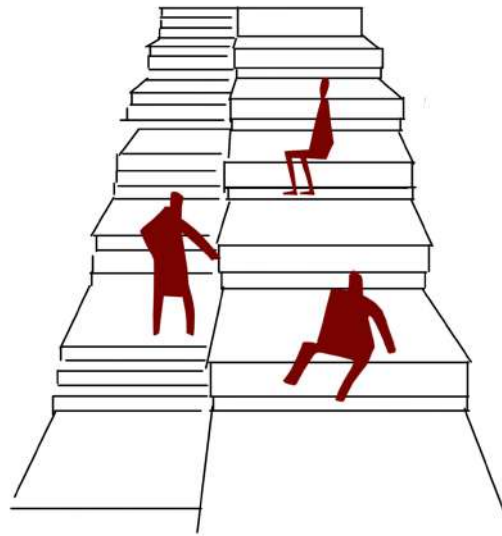


Figure 7.2: Collaboration Staircase
(Author, 2023)

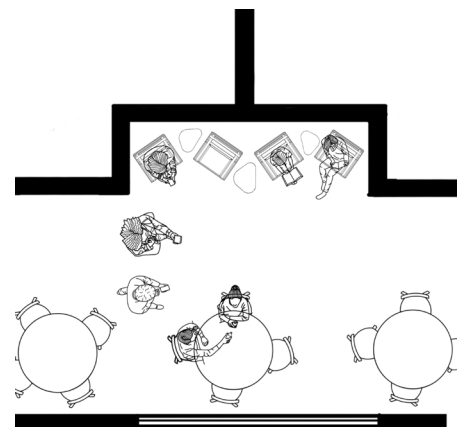


Figure 7.3: Collaboration Spaces in the hallway (Author, 2023)

The concept of the “muted” library will be altered during further design development and evolve into a more collaborative space that includes areas for group interactions while still facilitating spaces of quiet, solitary study. Furthering the variable methods of obtaining knowledge, the large staircase provides a focal point of social interaction and convenient seating.

Transparency creates visual continuity and allows learners an informative perspective of adjacent spaces encouraging shared experiences (Mineiro, G, 2018). By looking through the glass interfaces, learners can observe interesting procedures in the workshops. This creates a forum for appreciating and being inspired by other learners' work.

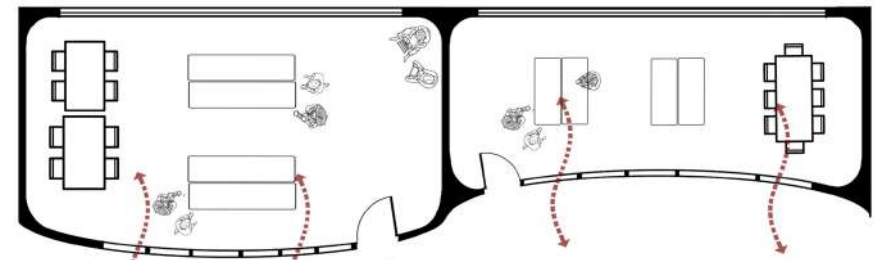


Figure 7.4: Transparent Walls between the workshops and passage way
(Author, 2023)



Figure 7.5: Collaboration Pods in the passage way
(Author, 2023)

In more formal learning spaces, the use of frosting on the windows limits views and offers the learners more privacy while still allowing adequate light transmittance.

7.1.6 Vertical Dimensions

By employing the use of a roof void, I have increased the vertical dimensions of the upper level. This has improved the transmittance of natural light into the learning spaces, enhancing their aesthetic quality while suggesting a more relaxed atmosphere of informality. The high-level windows assist in the ventilation and cooling of these areas. Ceiling heights, shapes and materiality affect the human experience of a space - higher ceilings invite participation and boost creative thinking. Walls can be used to exhibit learners' work and educational posters (Taylor et al., 2000).

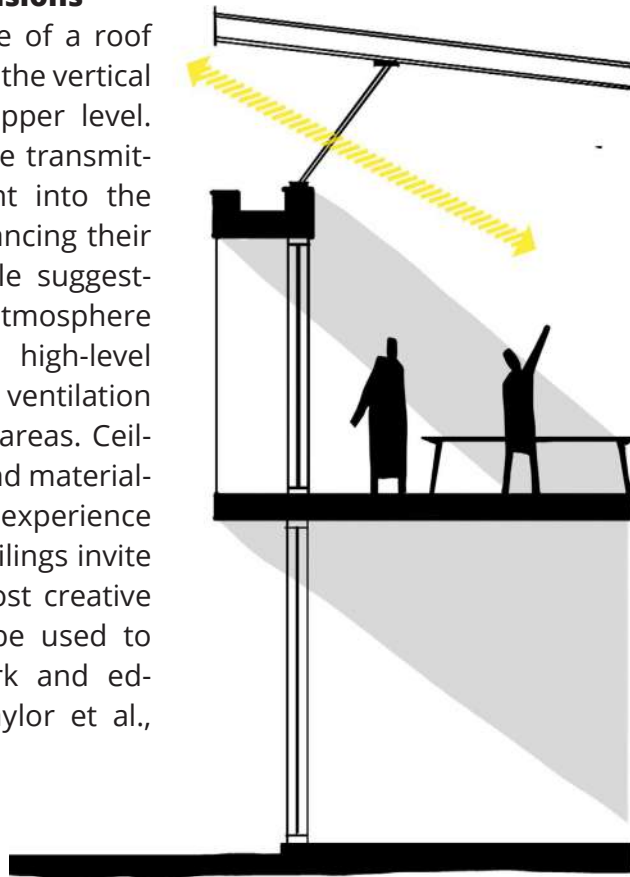


Figure 7.6: High-level window letting in natural light into the classroom
(Author, 2023)

7.1.7 Expanding Learning Environment

Considering areas outside the building to expand and complement the learning environment (Taylor et al., 2000), I have planned for the inclusion of an outdoor classroom to further stimulate the senses of the learners and induce memorable learning experiences. Connectivity between interior and exterior learning spaces is established



Figure 7.7: Outdoor Classroom
(Author, 2023)

Covered exterior passage ways exhibiting innovative brick designs that accentuate the interplay of light and shadows add interest and smoothen the transition between the interior and exterior (Taylor et al., 2000).

7.1.8 Optimise Learners' Access, Usage of Facility and Sense of Place

Traditionally there was a marked separation of the administrative offices from the learning areas. This accentuated the unbalanced relationship of power and authority that compromises the principles of collaborative learning designs. My facilitator offices are positioned in places that are convenient and within easy access of the learner, fostering a relationship of co-operation and mutual respect (Chism, N, 2006). Strategically located support desks assist learners with any challenges that they may encounter (Oblinger, D and Lomas, C, 2006).



Figure 7.8: Offices dispersed amongst classrooms
(Author, 2023)



7.1.9 Environmental Infrastructure

Despite the degeneration of the adjacent areas, the adult education centre is located in a beautiful green space. A large waterbody surrounded by nature provides an environment that is relaxed and inviting. A bridge connects the Makause community to the facility, granting them an access that offers a multisensory experience of light, colour, reflection and pleasure. The rewarding experience leads the users to a promise of future competency.

An optimally designed landscape favouring indigenous vegetation will further enhance the environmental benefits. Research has shown that contact or views of nature improves academic achievements, enhances mental and physical health, fosters collaboration and evokes a sense of wellbeing. Meandering walkways further increase chances of social interaction and exchange of knowledge.

7.1.10 Sustainable Design and Construction

It is important to:

- Mitigate the effect of the construction on the environment.
- Plan spaces that will function with conservative energy expenditure.
- Use materials with “sustainability credentials” (Scott, M, 2021).

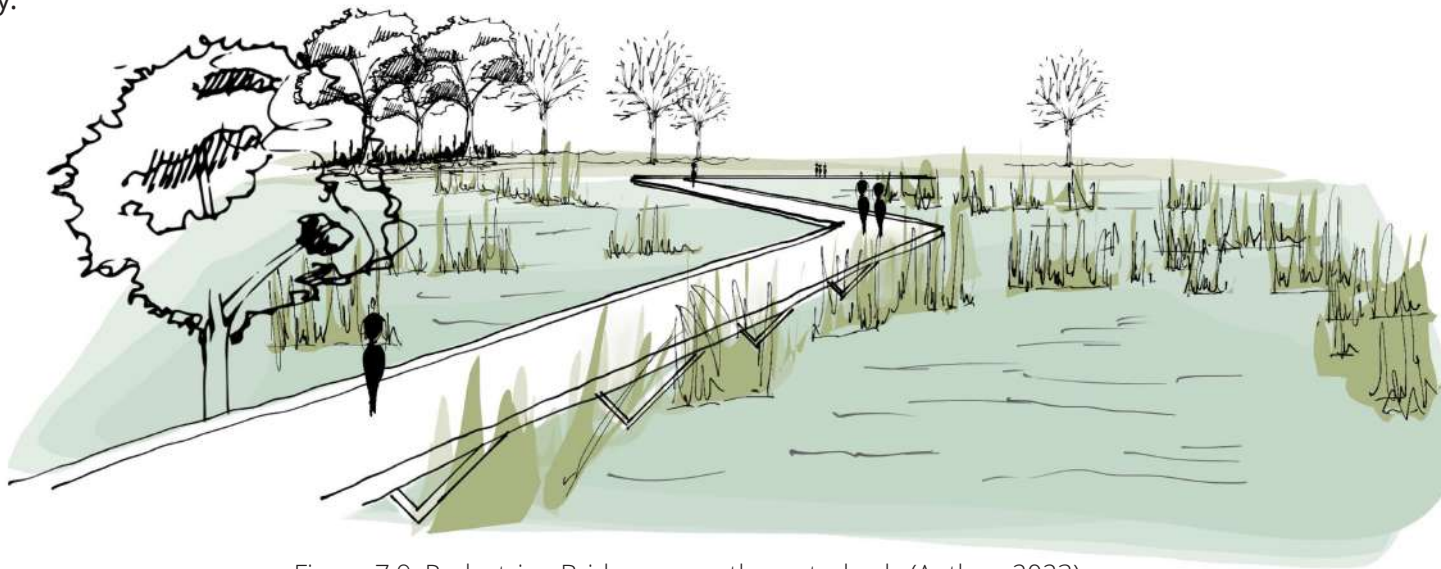


Figure 7.9: Pedestrian Bridge across the waterbody (Author, 2023)



“People ignore design that ignores people” – Frank Chimero

8.1 Design Charrette - Conceptual Explorations

The abstract collage allowed the exploration and experimentation of materials and architectural qualities that I want to implement into a successful skills development centre.

Architectural qualities that create spaces which are conducive to learning will be explored and developed. Light, texture, ventilation, acoustics and temperature are all aspects that need to be considered when designing successful and comfortable spaces. The materials and objects used within the collage are all materials that I want to add to the centre. Each material explores different qualities such as reflection, colour, texture, light and shadow. The descriptive terms within the collage are used to give the reader a broader understanding of the spaces that I want to create. The newspaper extracts are from the local Primrose News highlighting some of the biggest issues in the area.

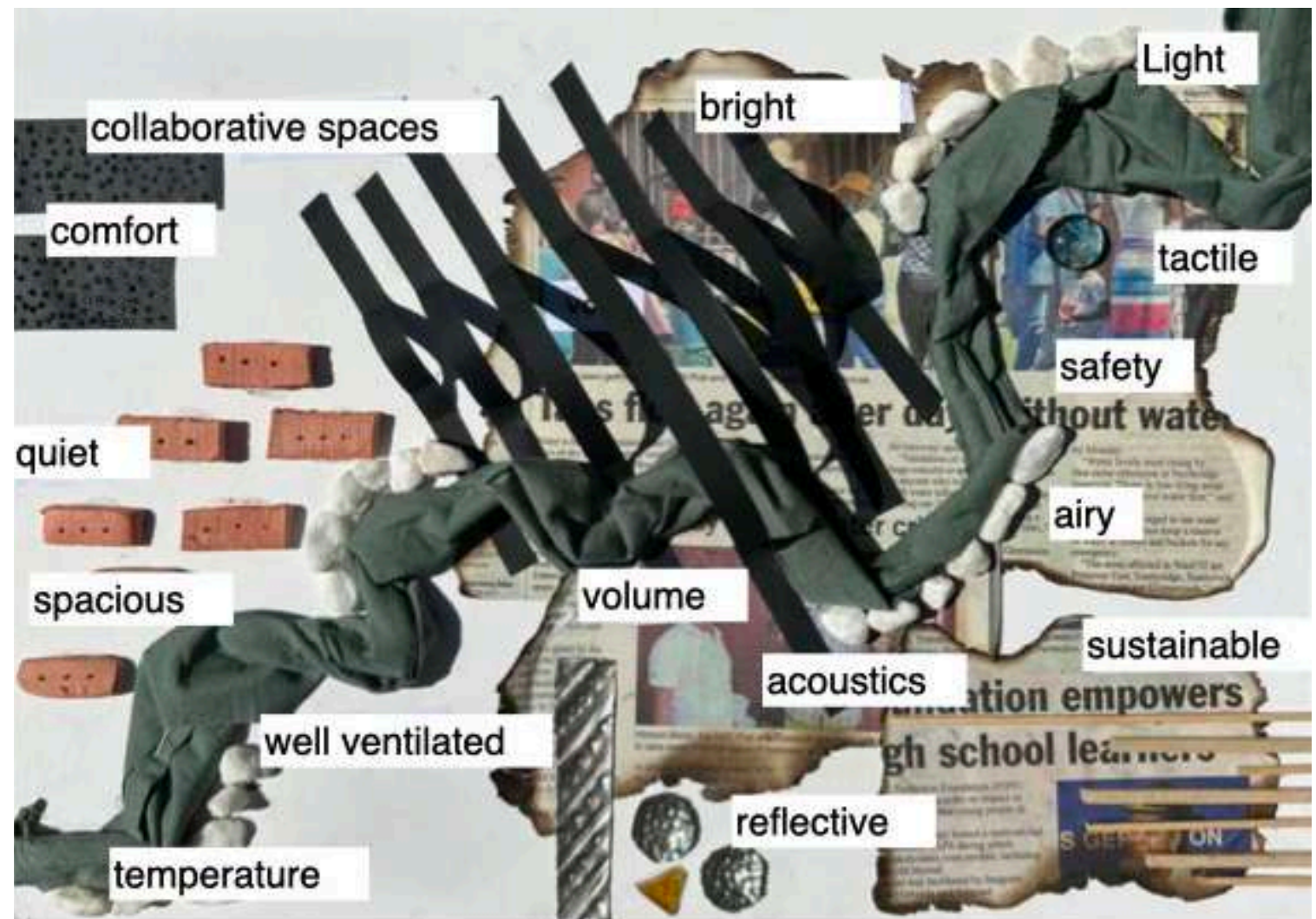


Figure 8.1: Abstract Collage Design Charrette (Author, 2023)

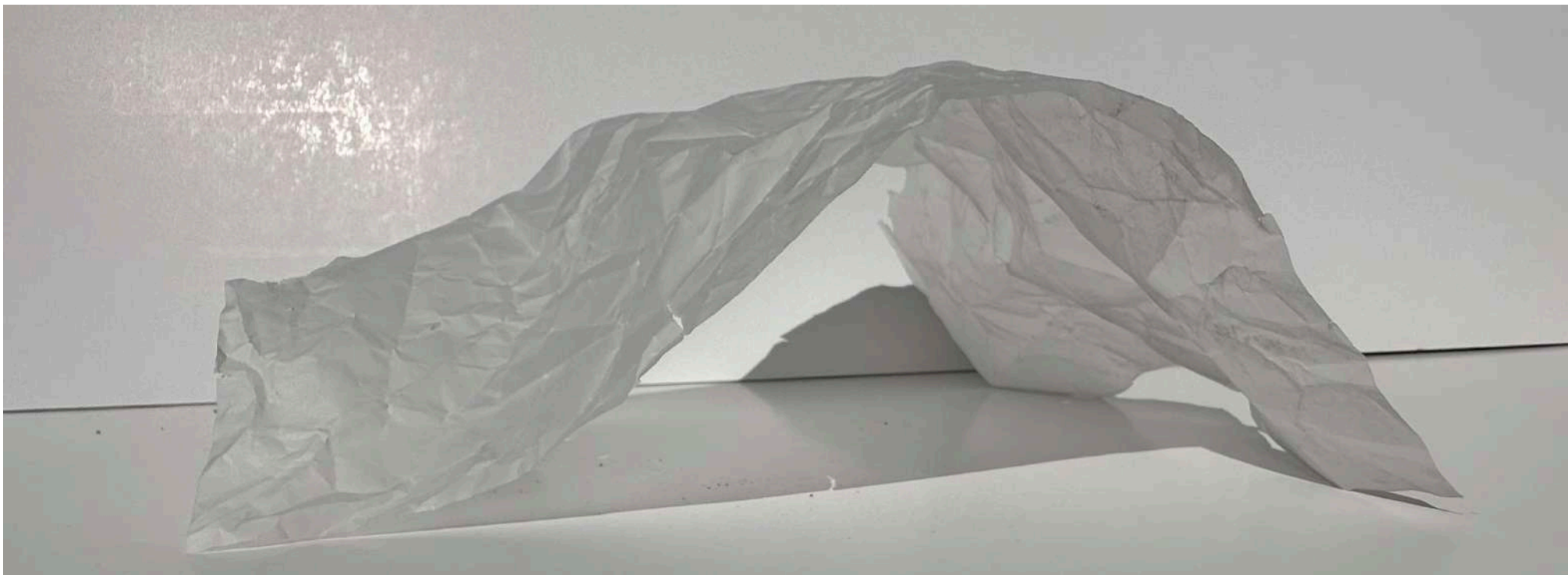


Figure 8.2: Manipulated Paper exploring architectural form and volume (Author, 2023)

The perception of volume can make people feel many different emotions. Large volumes can evoke a sense of grandeur, awe and inspiration.

These architectural qualities are extremely beneficial in the design of educational facilities.

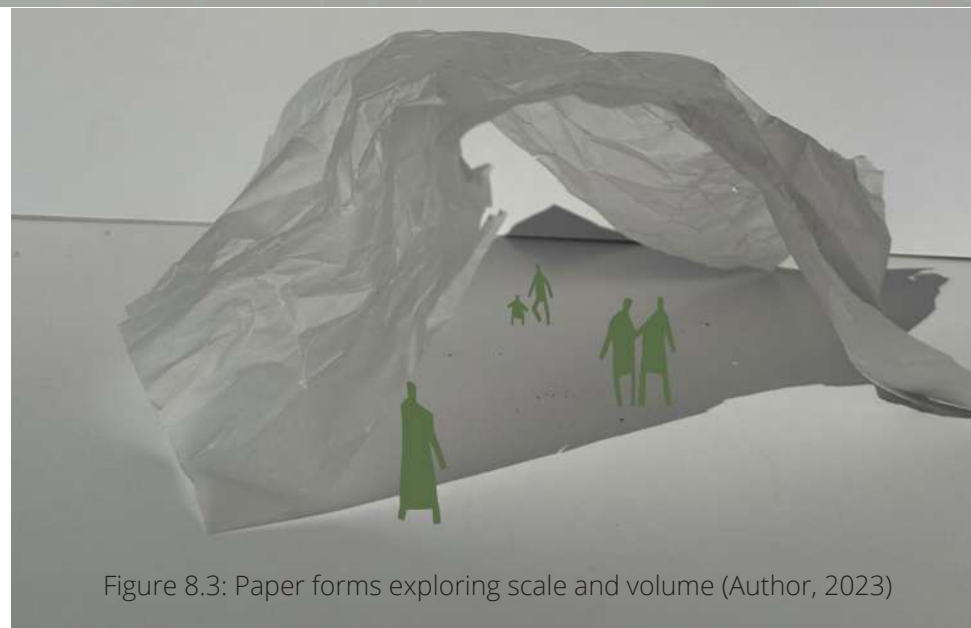


Figure 8.3: Paper forms exploring scale and volume (Author, 2023)



Figure 8.4: Exploration of form and volume on site model - exploring roof form (Author, 2023)

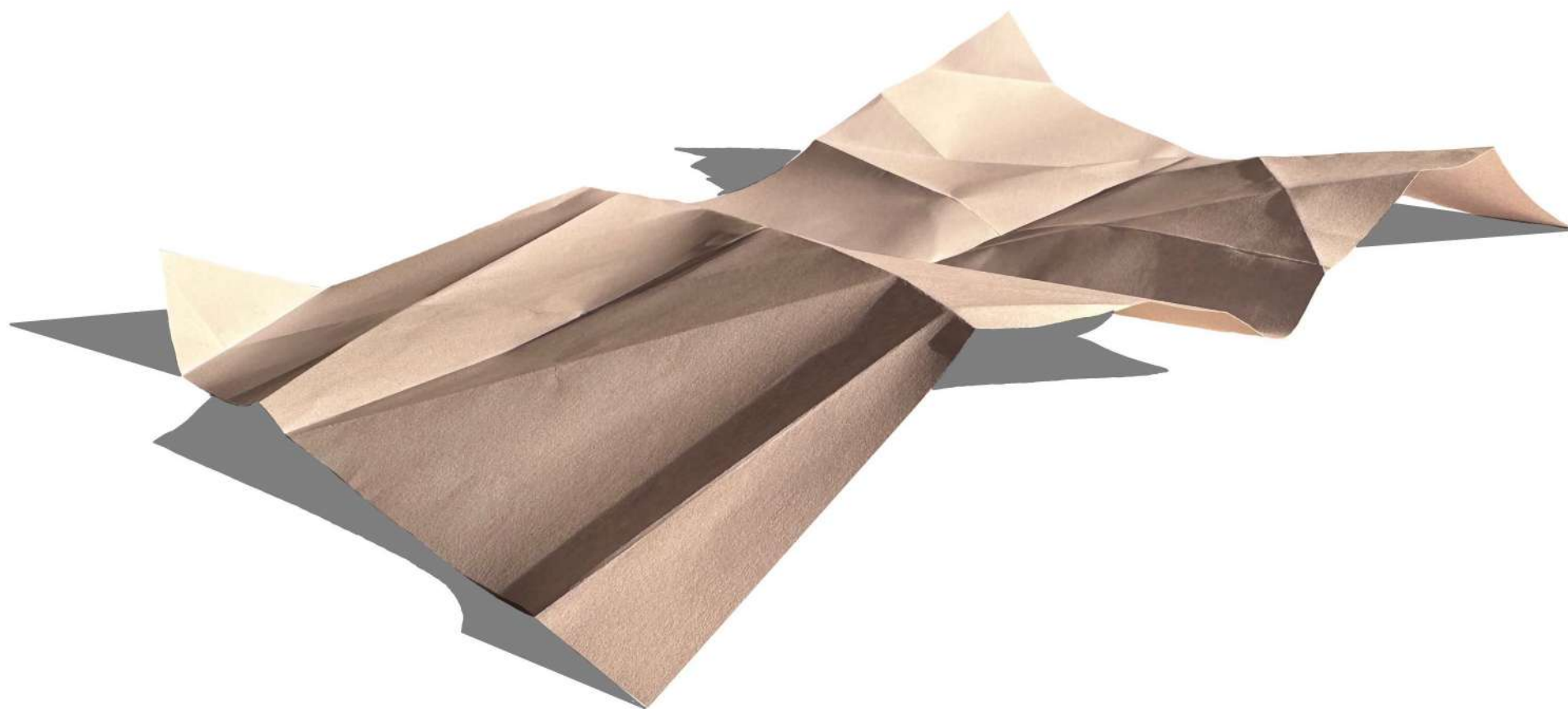


Figure 8.5: Paper exploring developing roof form (Author, 2023)

As previously mentioned, multi-sensory stimulation enhances user appreciation of the built environment. Skillfully manipulating light, shadows, spatial dimensions and materiality results in unique holistic experiences.

The Lattice Brick Wall Exploration to be developed on the west facade.

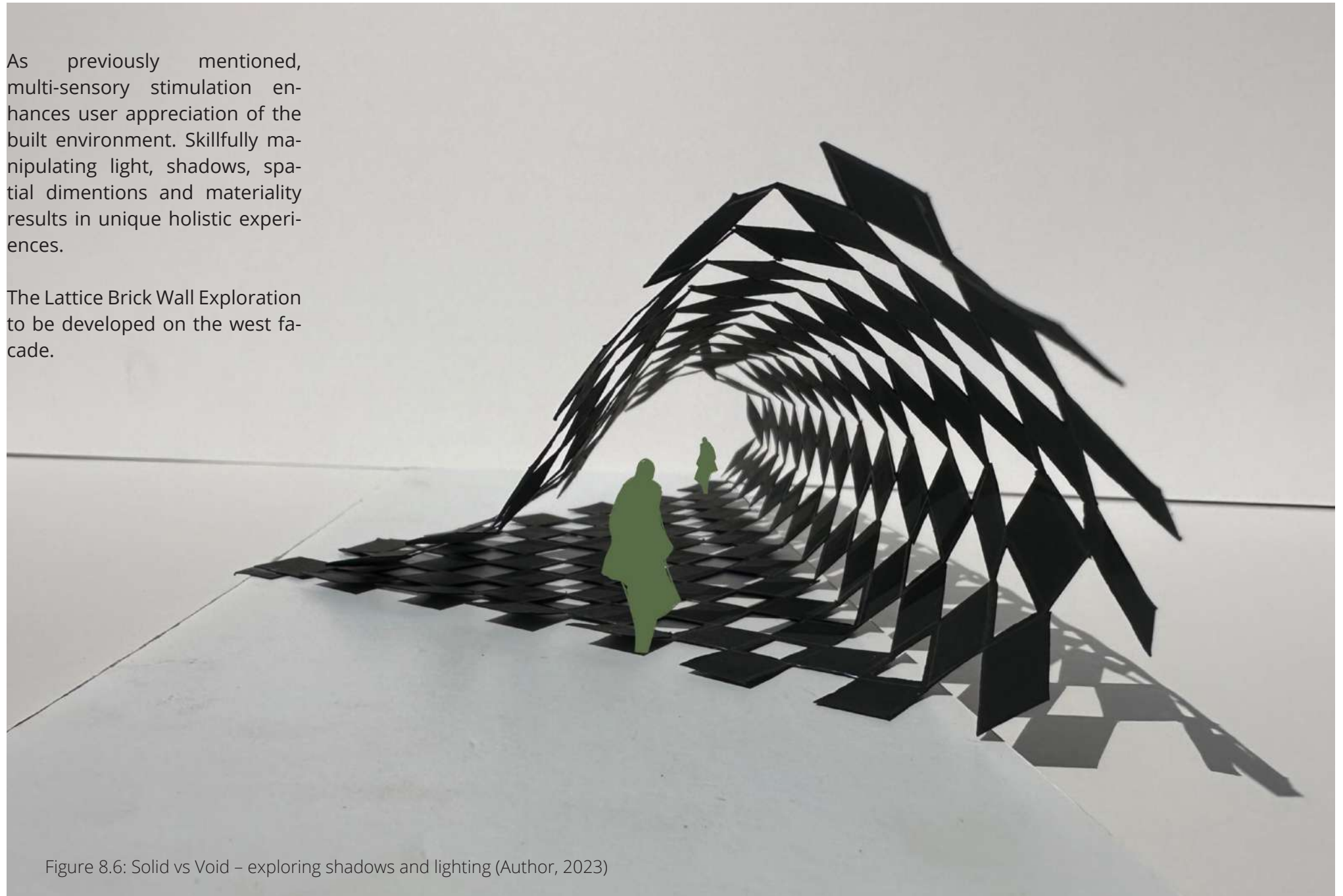


Figure 8.6: Solid vs Void – exploring shadows and lighting (Author, 2023)

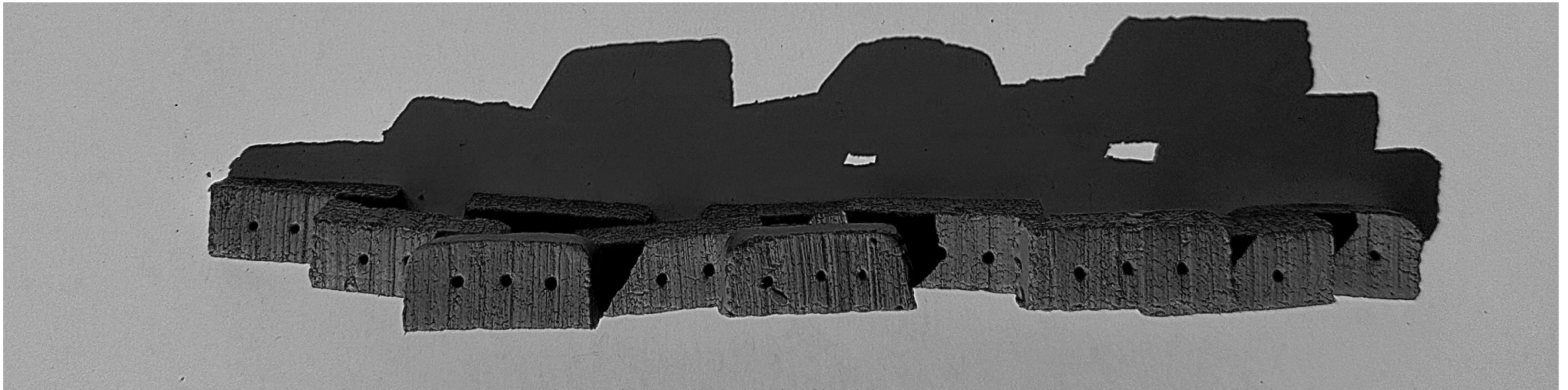


Figure 8.7: Exploring shadows as a result of brick laying patterns (Author, 2023)

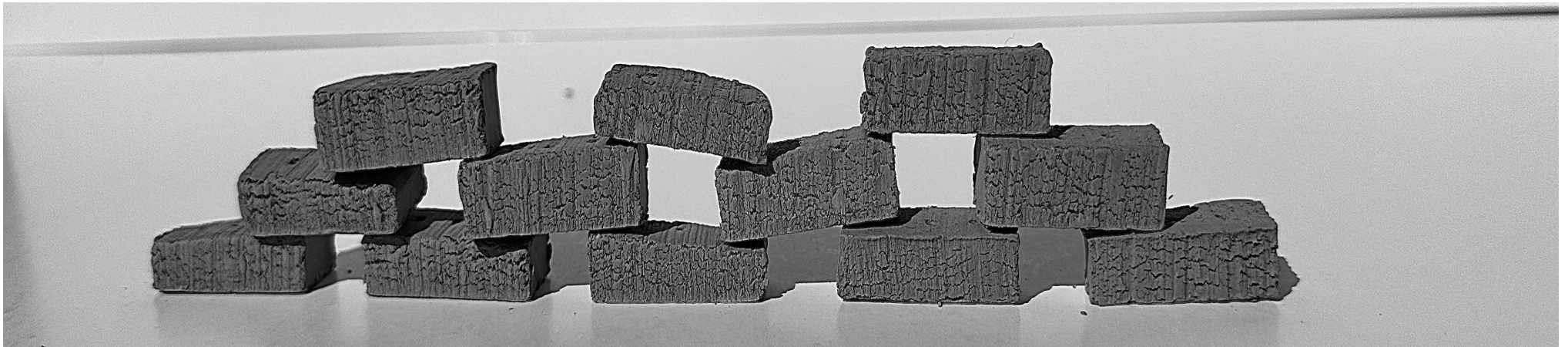


Figure 8.8: Exploration of clay brick laying patterns and the limitations (Author, 2023)

The limitations and potentials of brick as a building material were explored in order to achieve the goal of the brick lattice wall.



Figure 8.9: Exploration of shadows created by brick lattice wall on site model (Author, 2023)

Shadows create optically intriguing environments that stimulates the human perceptions and creates a dynamic space for learning.

Reflections of the waterbody.



Figure 8.10: Heat Manipulated plastic exploring reflection and light (Author, 2023)



Figure 8.11: Heat Manipulated plastic exploring reflection and light (Author, 2023)

Reflection and reflective elements can play both a functional and aesthetic role in architecture. The use of natural light in education spaces facilitates improved learning. Reflective elements may also add visual interest to the building due to the changing natural lighting throughout the day. Replicating images, the formed plastic represents ethereal reflections in the waterbody on the site.

The “Allure of Water” has always fascinated phenomenologist Steven Holl who has stated that water is for him “like air because it’s a basic element” (Holl, S, 2020). Its reflective properties cause it to be dynamic - always changing according to the time of day, the season and at night, the moon. Refracted light rays bounce off the surface creating unique manifestations of colour that inspire spiritual connection and result in rewarding human experiences. Water and light create the “poetic” qualities lauded by phenomenologists. Benches with views of the lake offer calm, safe places to reflect and recharge. To celebrate the beauty of the lake and the natural environment, I aim to include subtle elements of reflection in my design in order to heighten the users’ sense of place and belonging.



Figure 8.12: Steven Holl Reflection Pool (Paul Warchol, 2020)

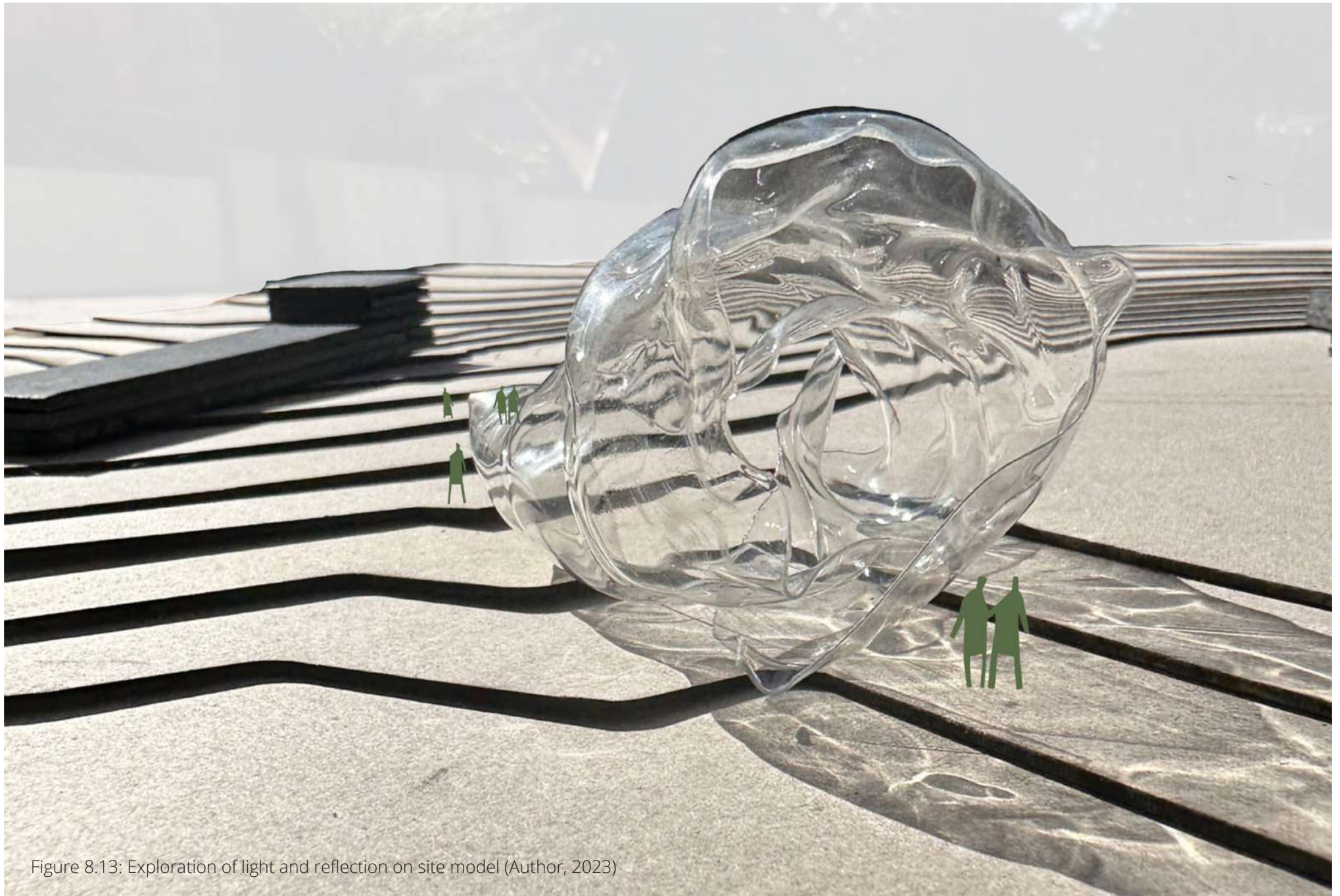


Figure 8.13: Exploration of light and reflection on site model (Author, 2023)



Figure 8.14: Exploration of materials, textures and patterns (Author, 2023)





Figure 8.15: Exploration of materials to be used in gabbion retaining walls in design (Author, 2023)

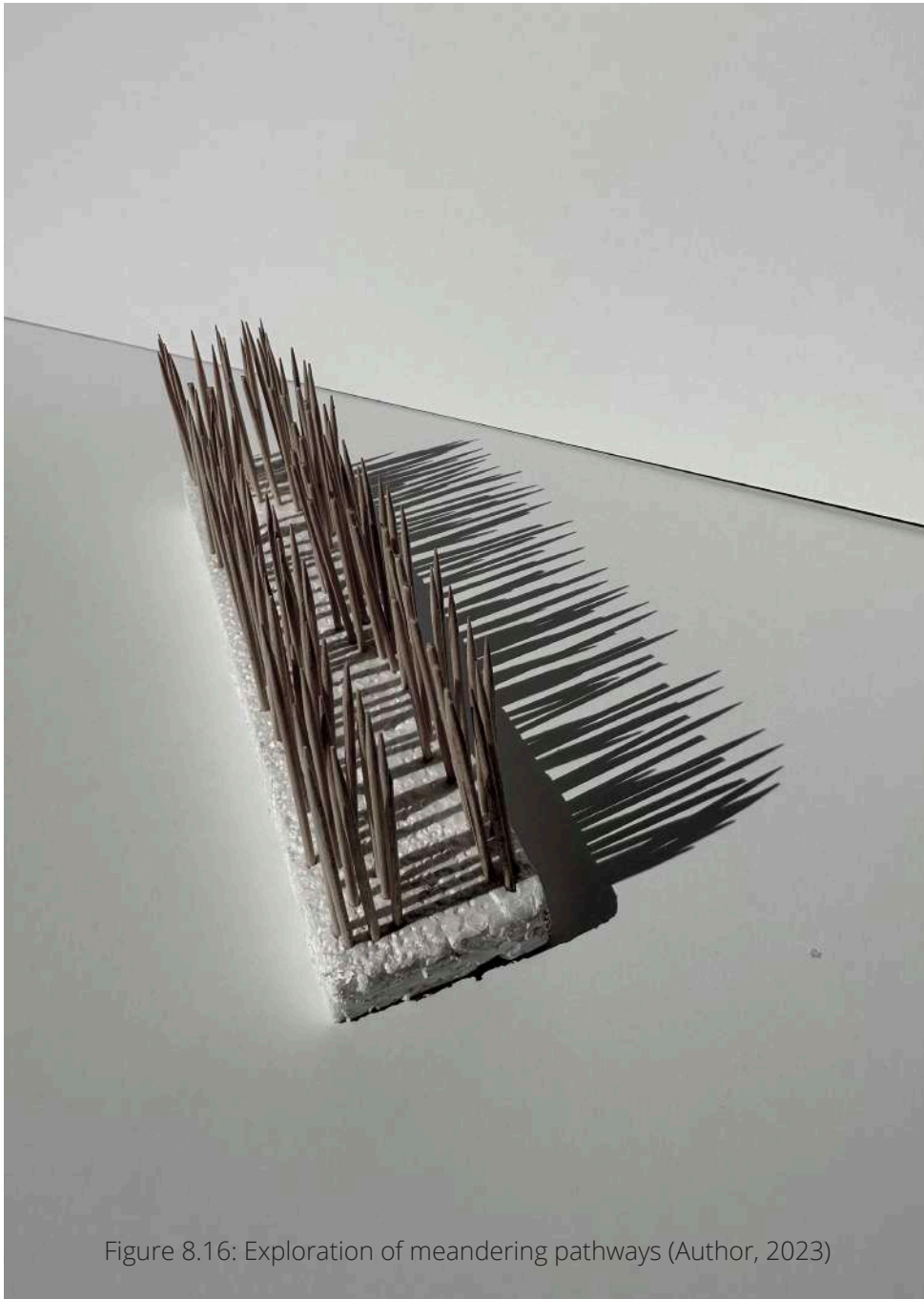


Figure 8.16: Exploration of meandering pathways (Author, 2023)

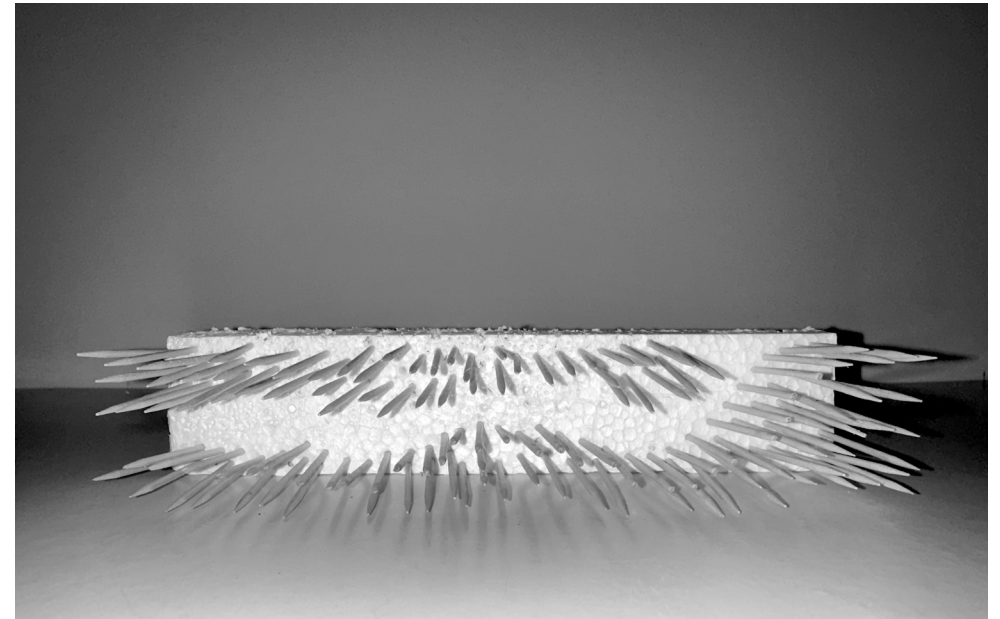


Figure 8.17: Exploration of meandering pathways (Author, 2023)

Meandering pathways will allow the students spaces for self-reflection and relaxation.

8.2 Site Dividers

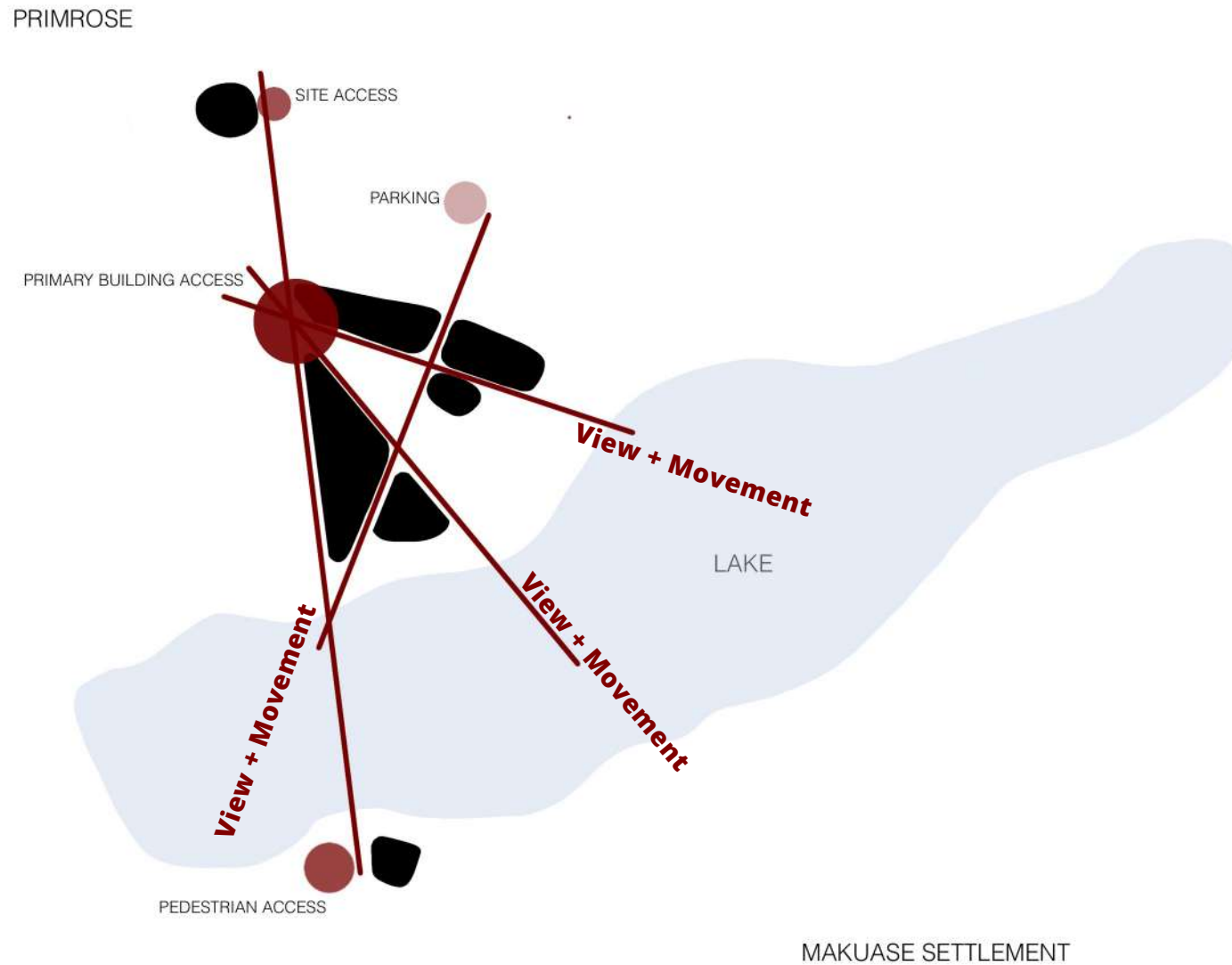


Figure 8.18: Site Dividers and resulting programme spaces (Author, 2023)

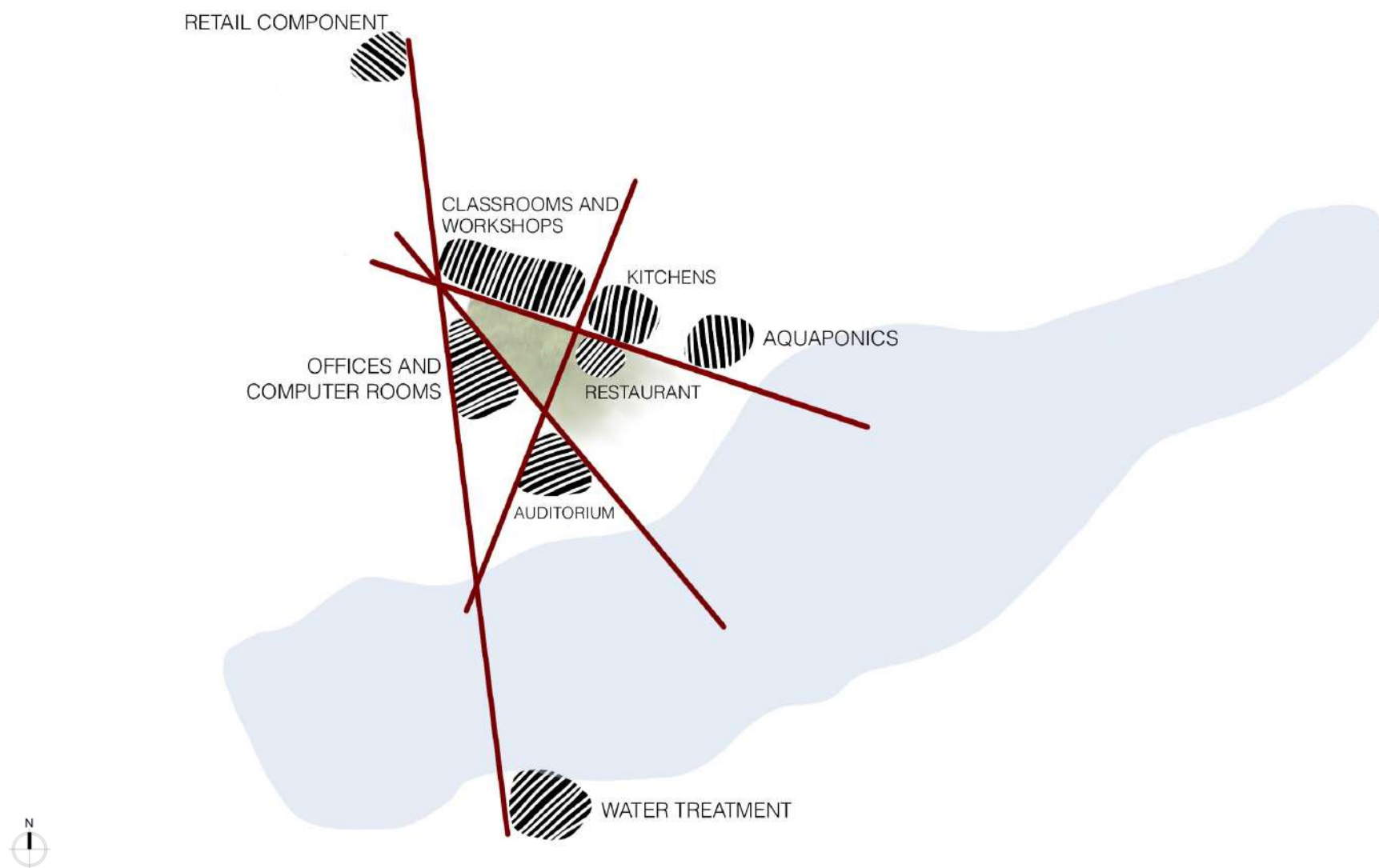


Figure 8.19: Site Dividers and Programme (Author, 2023)

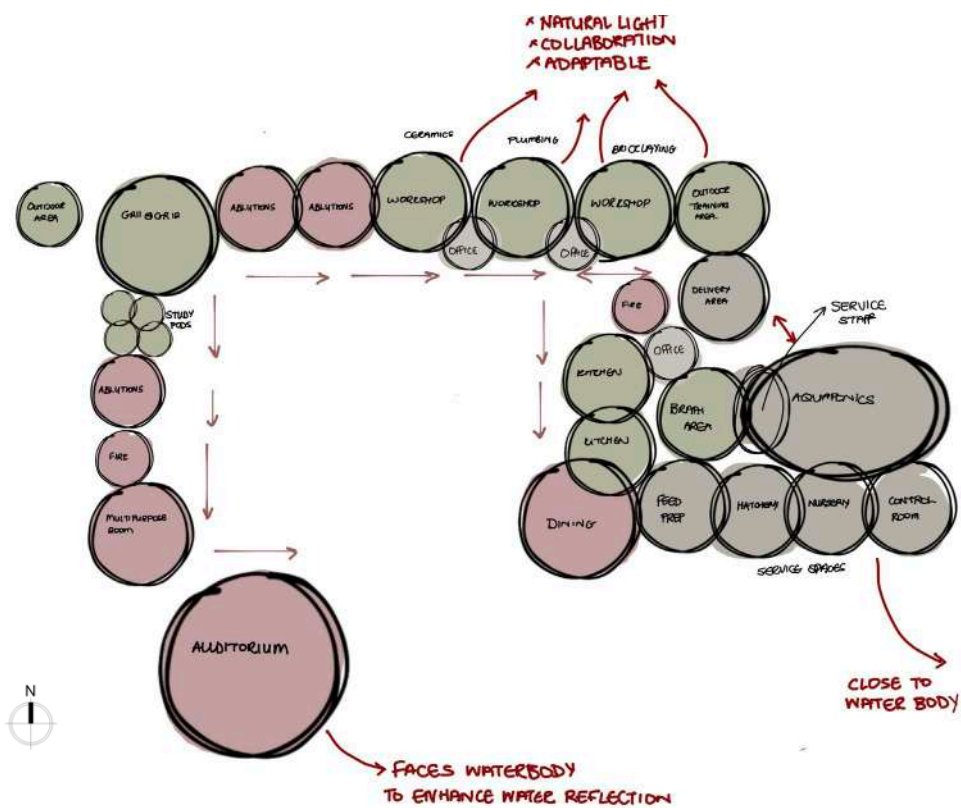


Figure 8.20: Lower Ground Floor Space Planning (Author, 2023)

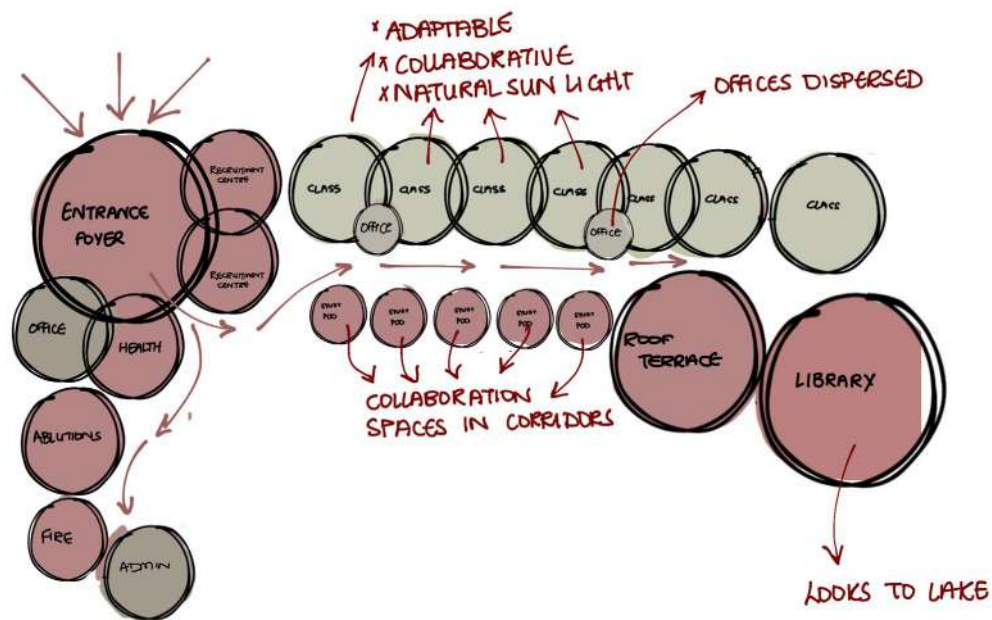


Figure 8.21: Upper Ground Floor Space Planning (Author, 2023)

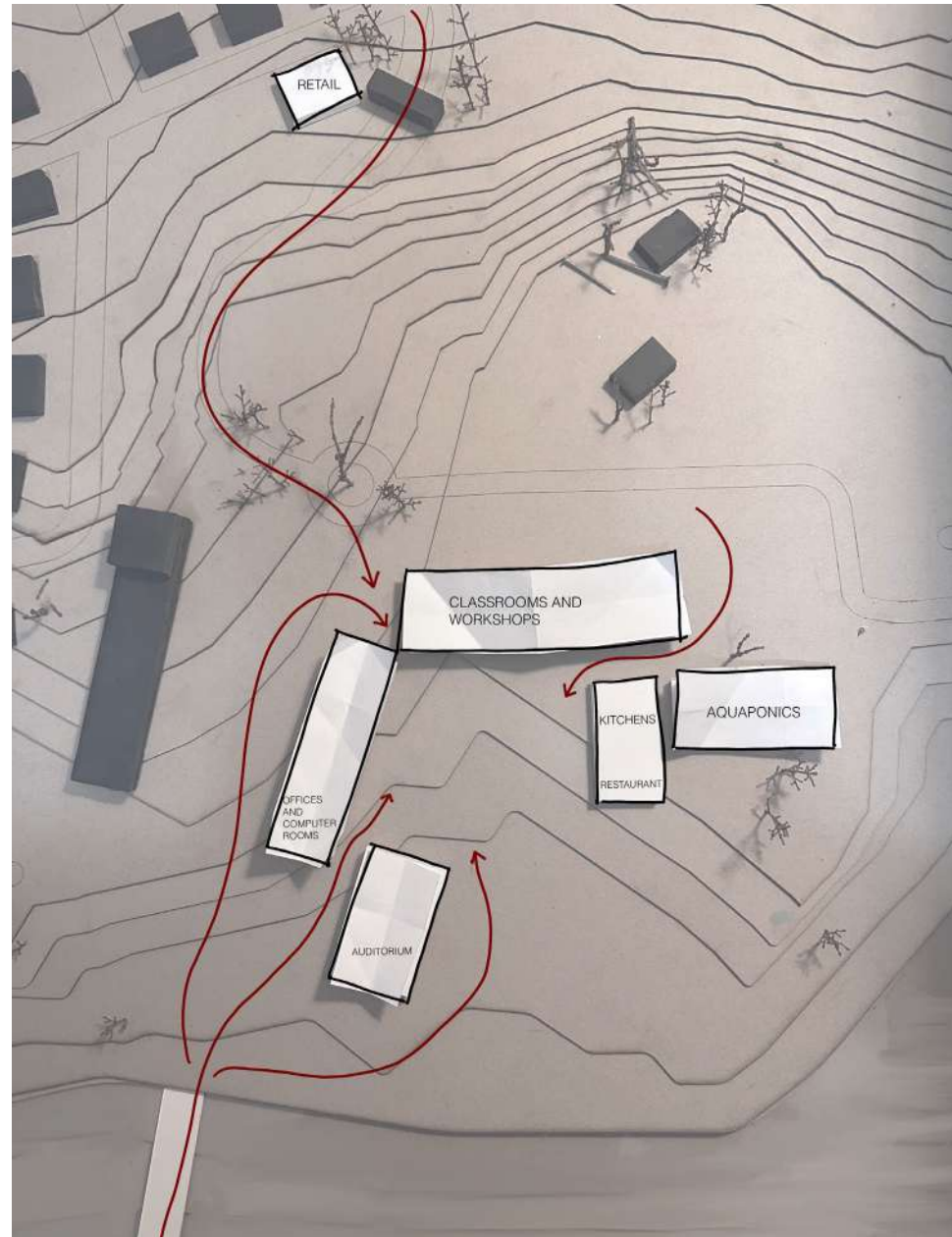


Figure 8.22: Model Massing Programme Exploration (Author, 2023)

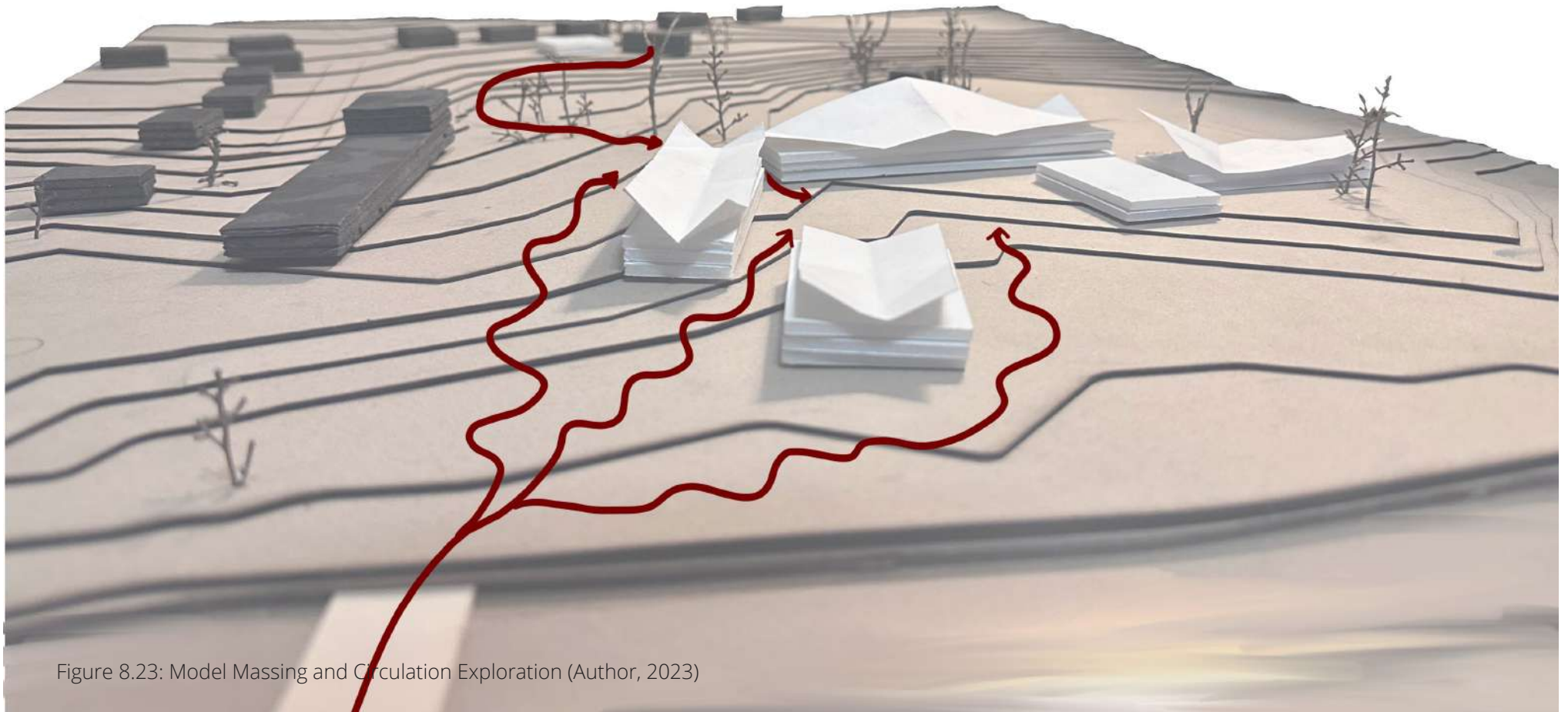


Figure 8.23: Model Massing and Circulation Exploration (Author, 2023)

8.3 Preliminary Building Design

The larger context plan shows the extent of the site and its surroundings. The Makause informal settlement lies to the south of the site. An access point will need to be provided for the community members to access the site on foot.

The proposed water treatment facility will be placed at this location along the Main Reef road street edge and will create public interest. A small retail component, which will sell crafts made in the centre, will be located along Rietfontein Road and invite community curiosity.

The main learning and skills development centre is located in the centre of the site to accommodate those arriving in cars from the north and those arriving on foot from the south. This area of the site is relatively flat, with the exception of some existing rubble piles. By locating the building here, most of the rooms are afforded views of the lake.



Figure 8.24: Context Plan (Author, 2023)



Figure 8.25: Site Plan (Author, 2023)

There is a variety of invasive tree and plant species on the site that will need to be removed. These include black wattle and willow trees. Indigenous plants will be planted, improving the biodiversity of the area. Flood lines associated with the lake needed to be considered when deciding how close the building would sit to the water.

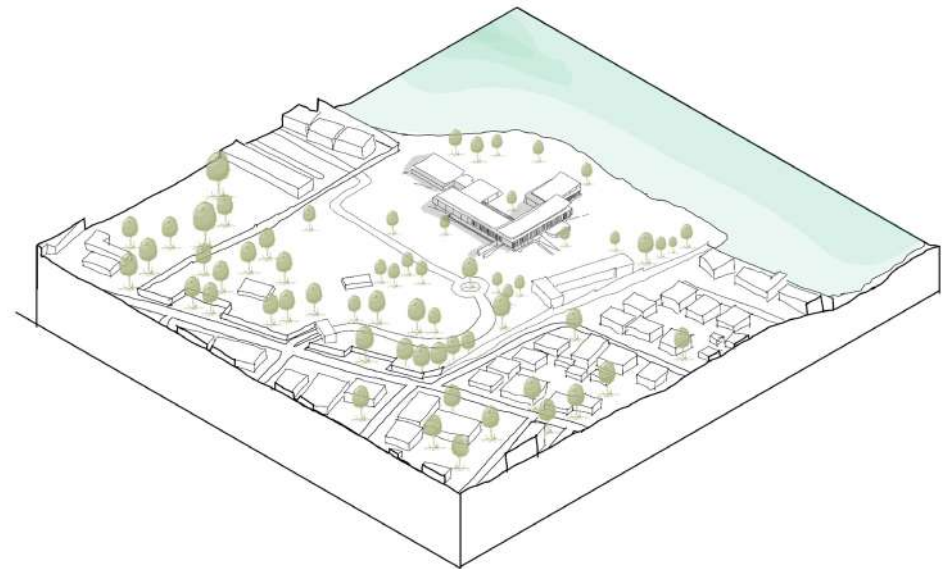


Figure 8.26: Axonometric of the building in its surrounding context (Author, 2023)

The roof of the training centre is made from corrugated sheeting and steel support members. The use of sheet metal and steel pays homage to traditional warehouse construction. The roofs are sloped and orientated to the north to allow for the placement of solar panels. Flat concrete roofs will be used for roof gardens so as to minimise the number of artificial surfaces exposed to the sun. These roof gardens are accessible and allow the students areas for self-reflection and relaxation. Minimal concrete will be used for roofing, as to keep the embodied energy of the building low.

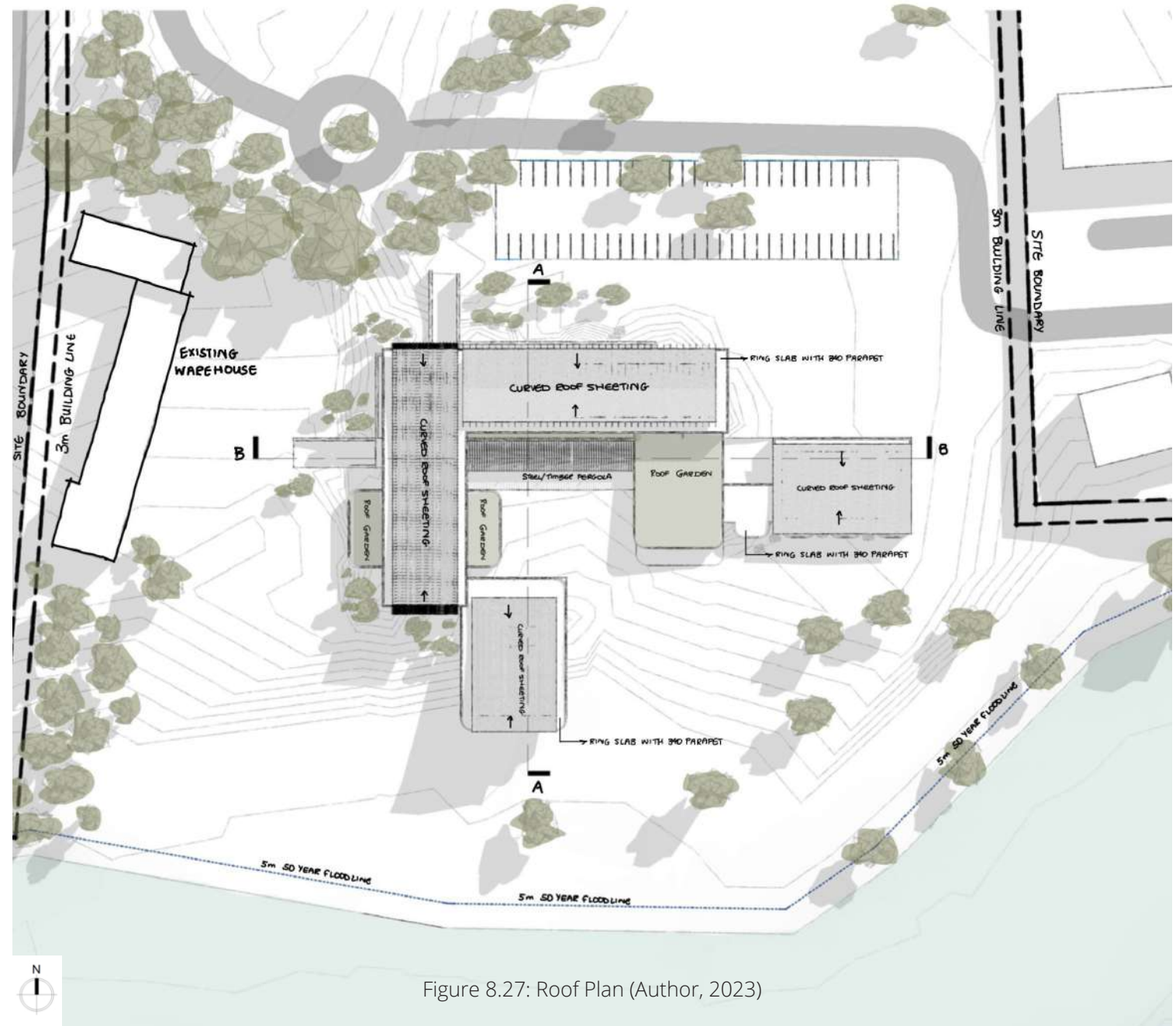


Figure 8.27: Roof Plan (Author, 2023)

It is advisable to treat the west elevation with sun screening. A brick lattice wall stretches across the west facade. This element creates interest for pedestrians walking past the building. The west side of the auditorium also requires sun shading, therefore vertical timber-look slating is used. The roof structure curves to the north and the south to allow natural light to flood into the volume spaces within the building. The auditorium cantilevers away from the main building. Inside, giving the users an unobstructed view of the lake.

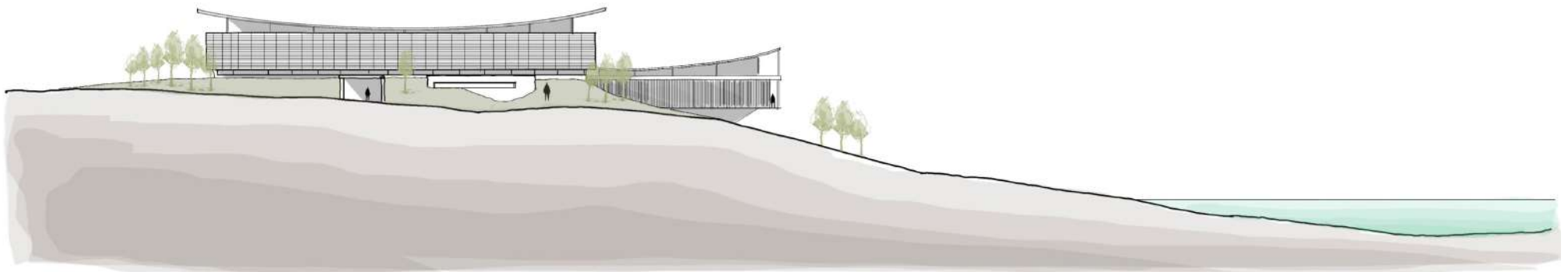


Figure 8.28: West Elevation (Author, 2023)

Section AA has been taken through the central courtyard and the auditorium. Natural lighting is an important factor to consider in the design process. Windows to the north allow sunlight into the building. The void spaces allow light entering on the first floor to flood the lower level as well. High level windows also facilitate stack ventilation. Horizontal louvre sliding screens have been used on the north facade to allow for the manipulation of incoming sunlight in the learning spaces.

Section BB has been taken through the main entrance of the building. The brick lattice wall along the west facade creates interesting shadows within the double volume entrance foyer.



Figure 8.29: Section AA (Author, 2023)

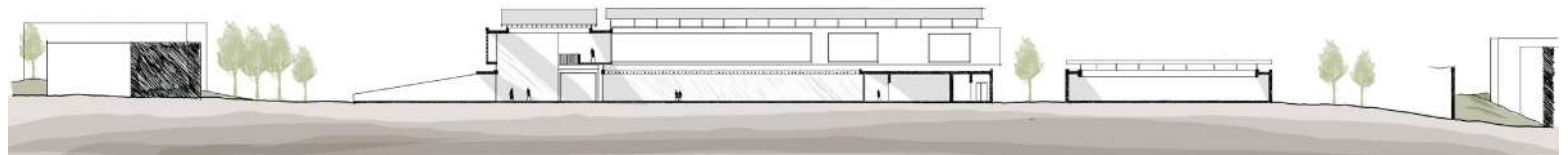


Figure 8.30: Section BB (Author, 2023)

The ground floor of the building has been buried into the landscape. This was done to honour the site's quarry history. On the ground floor, one can find an open plan library, reception, auditorium, classrooms, a gym, aquaponics centre, culinary centre and informal study pods. The classrooms are divided by stackable doors so as to allow for adaptability to account for changing learning styles. The courtyard of the building allows for all spaces to have a view of the lake.



Figure 8.31: Ground Floor Plan (Author, 2023)

The first floor is made up of the remaining classrooms, along the north to allow for adequate natural lighting, workshop spaces, computer rooms and private administrative offices. The roof garden is accessed from the workshop. The double volume spaces let light through to the ground floor.

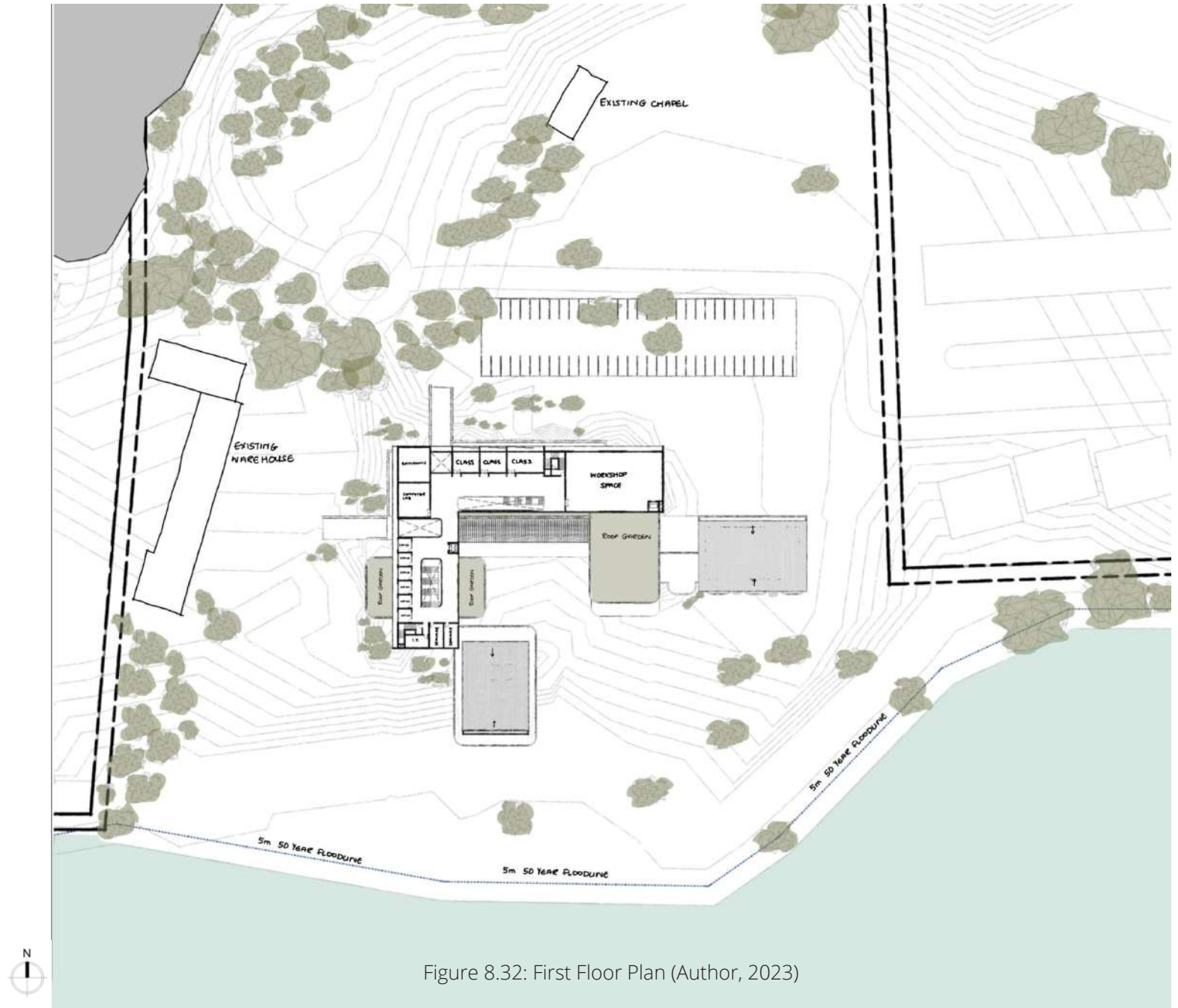


Figure 8.32: First Floor Plan (Author, 2023)

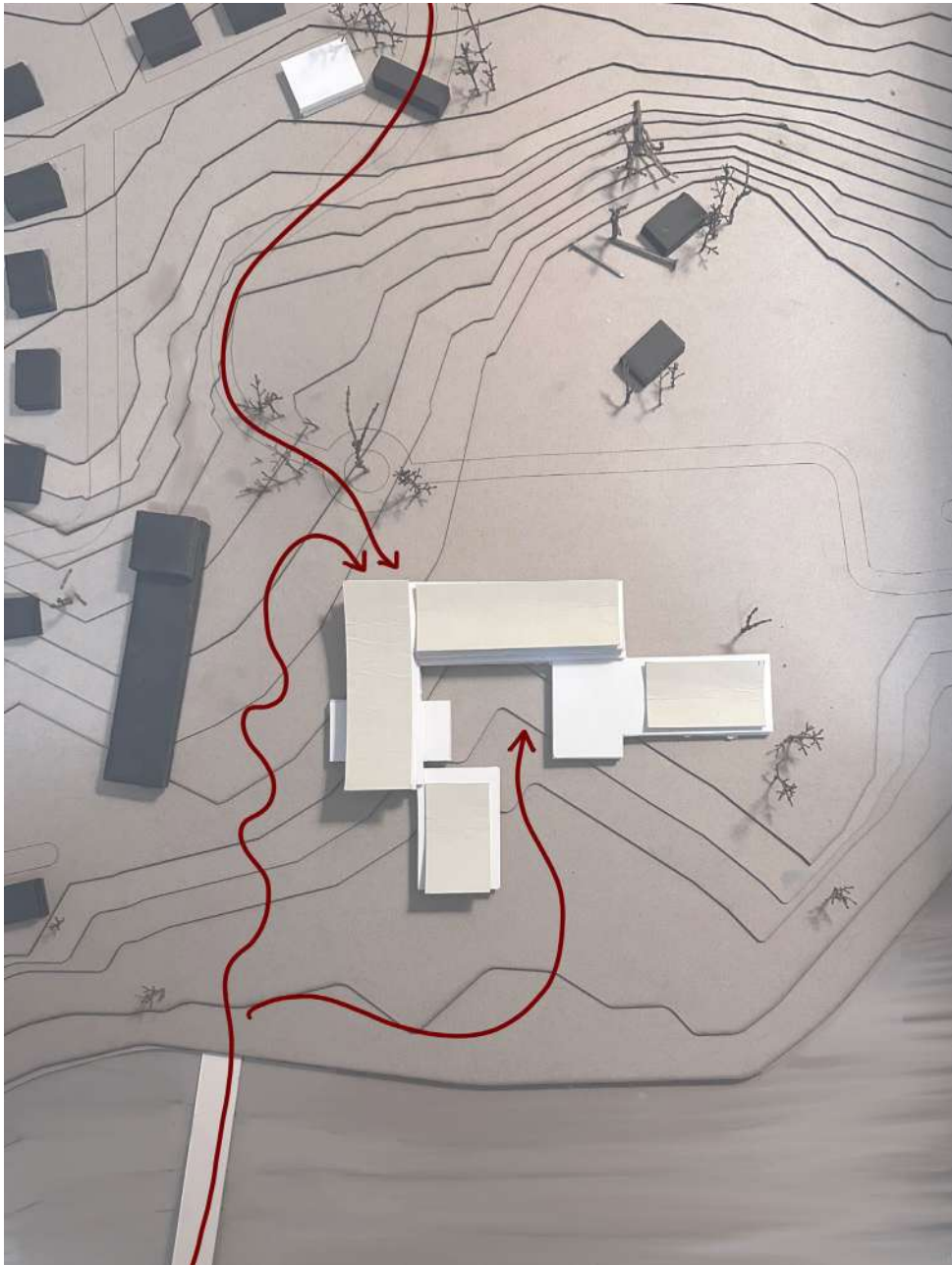


Figure 8.33: Preliminary Design Model with Circulation Routes, Top View (Author, 2023)

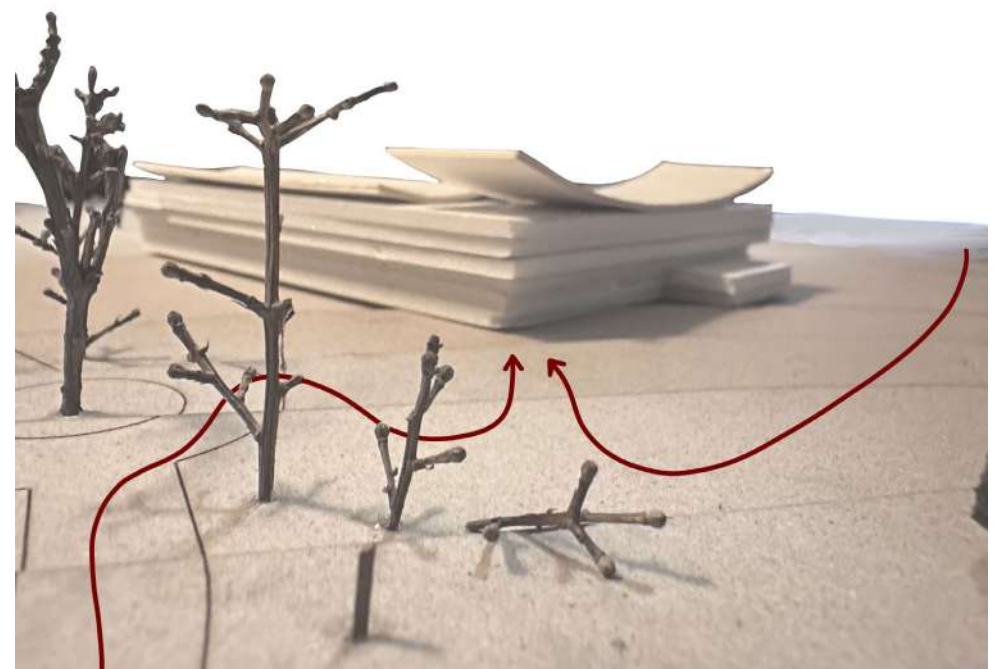


Figure 8.34: Preliminary Design Model with Circulation Routes, North West (Author, 2023)

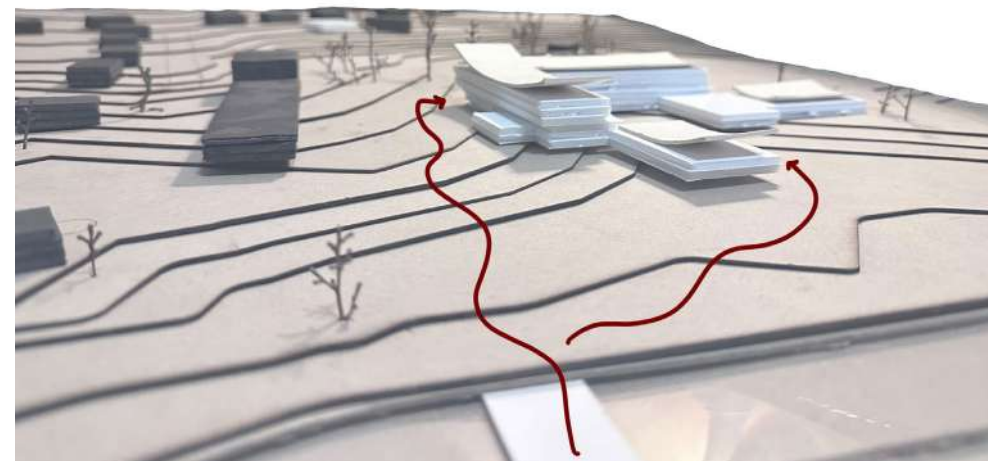


Figure 8.35: Preliminary Design Model with Circulation Routes, South West (Author, 2023)

8.4 Preliminary Technical Design Exploration

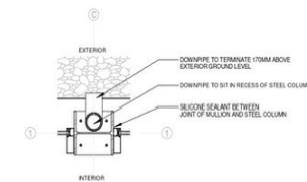
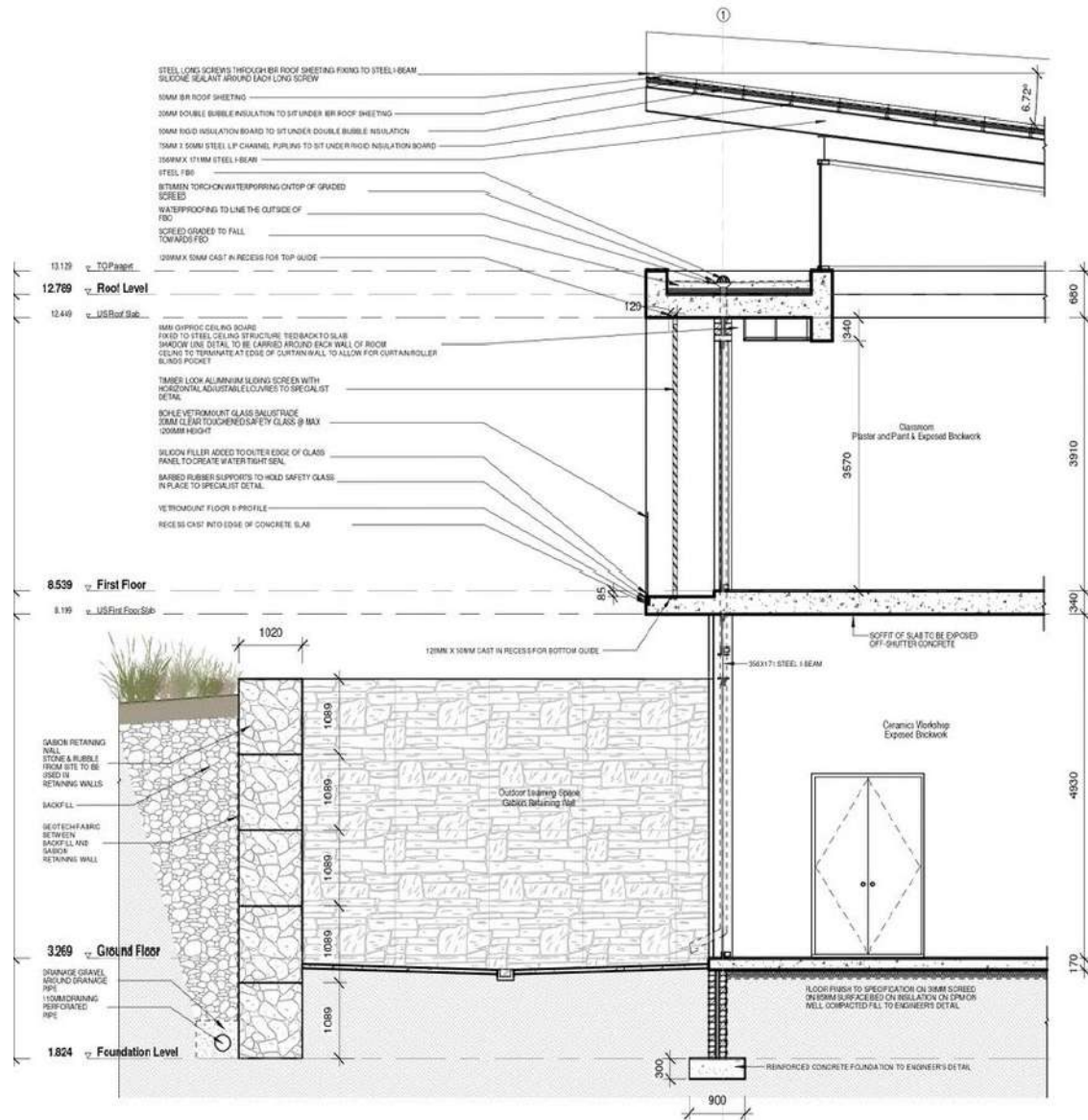


Figure 8.37: Downpipe and H-Column Detail
(Author, 2023)

Figure 8.36: Typical Section of Workshop and Outdoor Classroom with Gabbion Retaining Walls (Author, 2023)

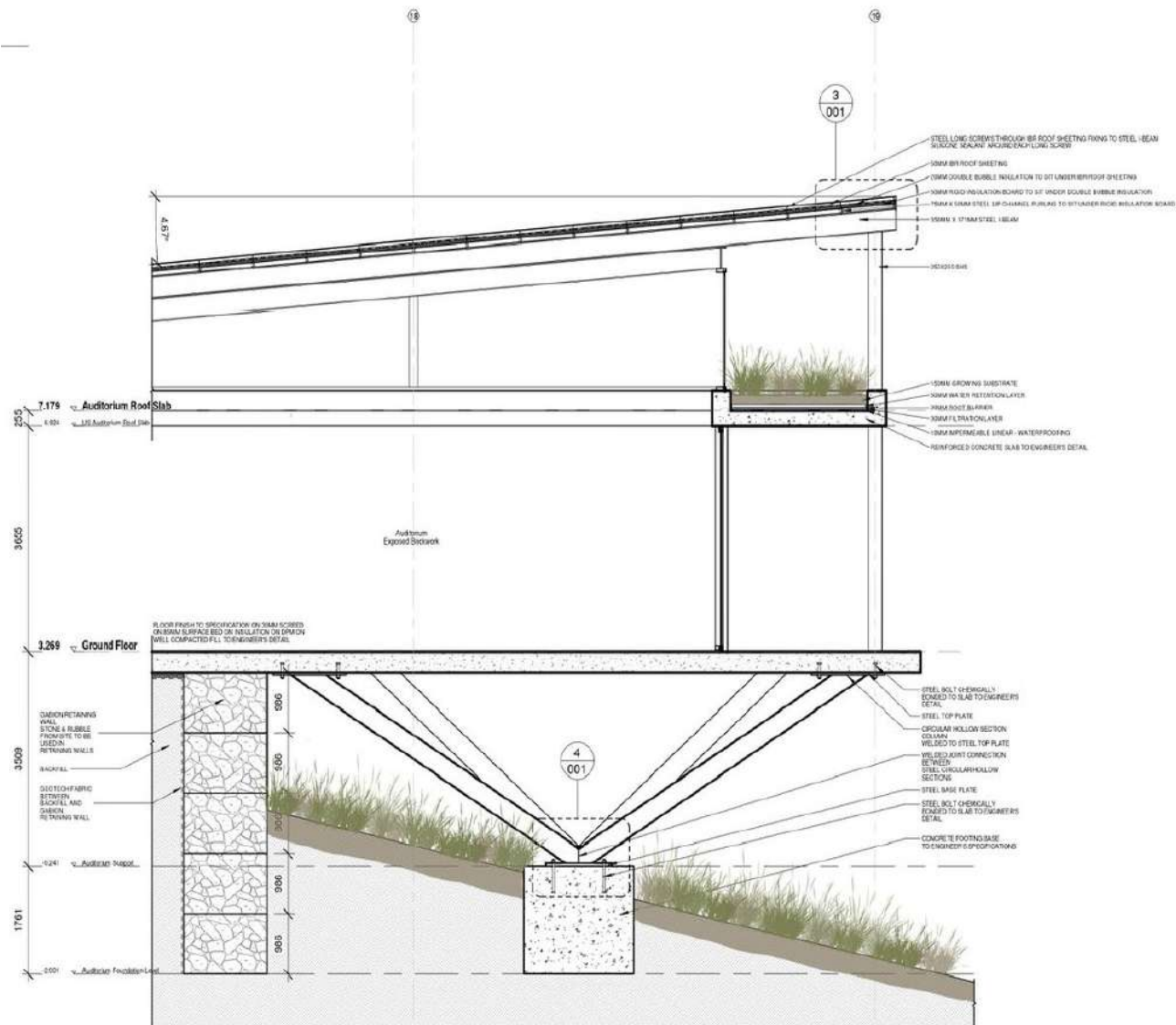


Figure 8.38: Section of Cantilever Auditorium (Author, 2023)

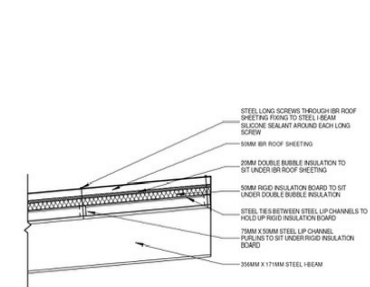


Figure 8.39: Roof Callout Detail (Author, 2023)

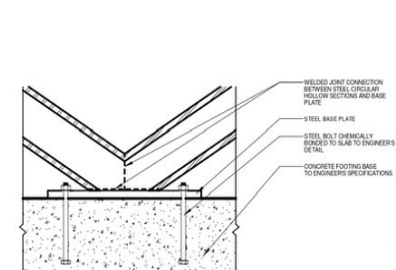


Figure 8.40: Cantilever Fixing Callout Detail (Author, 2023)

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VIABILITY REPORT

“Success is a project that’s always under construction” – Pat Summitt

9.1 Viability Report and Why?

This document introduces a definitive investigation of the Client Proposal's viability, examining and describing the assets and liabilities. Ultimately, putting together a conclusive analysis for all collaborators and stakeholders.

9.1.1 Executive Summary

The proposed design is a collaborative learning and skills development centre in Primrose, Germiston. The architectural challenge will be to create a sustainable structure that provides a nurturing learning environment that is representative of the community it serves and delivers aesthetic features that show progress, ecological conservation and a sense of community satisfaction and pride. The chosen site is 72 Rietfontein Road, Primrose, and it is in close proximity to major transport routes such as the N3 highway and Johannesburg's railway routes. There is an abundance of newly developing industrial estates in the area, therefore making a skills development centre a vital commodity to feed into the labour force. The programme will serve to uplift the socio-economic opportunities of the community and alleviate the

the problems of unemployment and lack of a skilled workforce. The facility will provide spaces for grade 11 and grade 12 learners, workshops and lecture theatres for artisanal skills and a culinary teaching facility focussing on general cooking skills, baking and confectionery services. An aquaponic garden will provide an accessible sustainable source of herb and vegetable produce for the culinary programme. To further enhance sustainability, the design must be flexible and be able to adapt to changing expectations of the community and the involved business stakeholders. The chosen site has a large waterbody that has been classified as a hydro-protection zone by E-BOSS. Preservation and improvement of the water is vital. As mentioned previously the waterbody is to be utilised for sustainable measures such as,

a water purification facility for the centre and the Makause community. An inland fishery to maintain local fish populations and to provide a sustainable protein source to the culinary centre.

9.2 The Client and Stakeholders

The proposed Learning and Skills Development Centre will be a **Corporate Social Initiative (CSI)** between **multiple entities**, ensuring a successful and economically stable project.

9.2.1 The Client

The client is the owner of the property therefore there is no cost associated with purchasing the property. The client is nearing retirement age and wants to give back to the community in which he grew up in. The client will pay for 80% of the construction of the project.

9.2.2 The Stakeholders

- **Retail Supermarket** - a retail supermarket group will form part of the client team. This company will fund the interior fit out for the culinary centre. They will also provide funds for staff (Instructors and support staff). They will provide the equipment necessary in commercial teaching kitchens. Once the students are trained, they will have trained staff to hire within their commercial stores. The meals prepared

by the students and produce grown in the aquaponics garden will be sold at the commercial store locations. The retail supermarket will fund 4% of the construction of the project.

- **Hospital Group** - the hospital group owns the property that the Makause Informal Settlement is located on. The group has a direct link to the community and wants to improve the lives and socio-economic class of the people in the area. They will fund the School Development programme and the Business Initiative programme. Ultimately the hospital group's goal is to improve the socio-economic class of the Makause community, enabling community members to change from their position of poverty to one of economic stability. The hospital group will fund 8% of

the construction of the project.

- **Retail and Pharmacy Group** - the retail pharmacy group has been located in the area for many years and has a direct link to the community. They will fund the adult education department through computers, resources and equipment required. The retail and pharmacy group will fund 4% of the construction of the project.

- **Industrial Company** - the industrial group is located in close proximity to the site. They will fund the artisanal Instruction courses. This will incur costs related to equipment, instructor and support staff salaries and materials. The group will then have the option to hire the trained students.

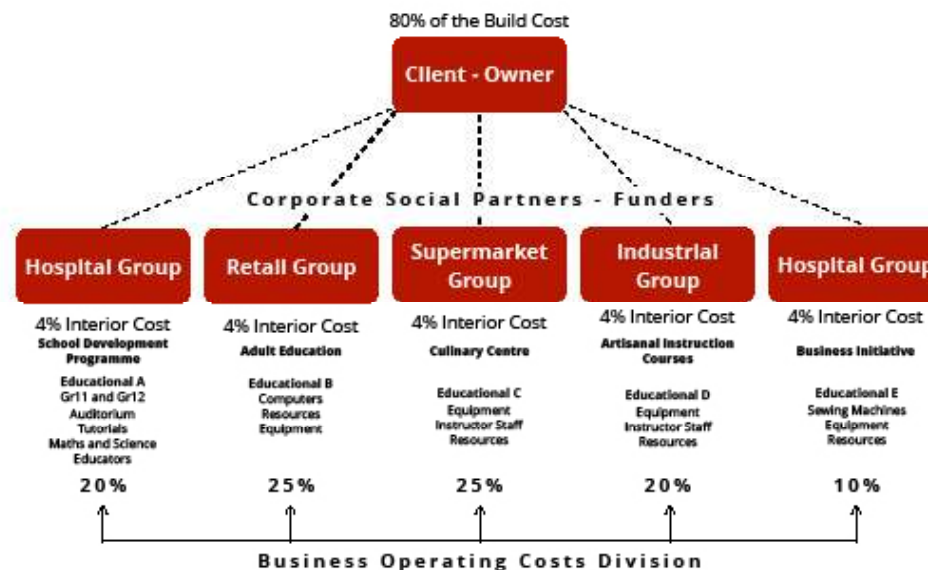


Figure 9.1: Breakdown of Partners (Author, 2023)

9.3 The Project Brief

The Learning and Skills Development Centre will provide spaces for grade 11 and grade 12 learners, workshops and lecture theatres for artisanal skills and a culinary teaching facility focussing on general cooking skills, baking and confectionery services. An aquaponic garden will provide an accessible sustainable source of herb and vegetable produce for the culinary programme. The waterbody on the site needs has been classified a Hydro-Protection zone, therefore protection and improvement are vital. A water purification facility for the centre and the Makause community. An inland fishery to maintain local fish populations and to provide a sustainable protein source to the culinary centre.

9.3.1 Site Selection

The chosen site is **72 Rietfontein Road**, Primrose Germiston, South Africa (See Appendices for attached SG Diagrams). Currently, Primrose lacks uniqueness and recreational opportunities for the predominantly young population that reside in the

nearby informal settlements. The chosen site is in close proximity to the **Makause Informal Settlement**. It is easily accessible on major transport routes and lies within 3km of the newly developed S+J Industrial Estate. This promises new **employment opportunities** for trained and skilled workers. There is a large naturally occurring **waterbody** with the potential for conservation and leisure. The potential of the site has already been identified in the Draft Primrose Precinct Plan prepared by the Spatial Planning Division of the Ekurhuleni Metropolitan Municipality. The site is one of Primrose's last green spaces. There is a large array of vegetation on site, however the majority of the mature trees are non-indigenous and are invasive species. Black wattle trees, willow trees and palm trees are all found on the site, none of which are indigenous to South Africa. These tree species are to be removed and replaced with naturally occurring vegetation. In doing so increasing the biodiversity of the area.

There are existing structures on the site: a make-shift mechanical workshop, a chapel, an event centre and a rubble pile that can be used in the construction of the centre. These existing buildings are not considered as heritage buildings as none of them are older than 60 years. Thus, the project would not require any documentation or approval for the buildings to be demolished. The site has an already built access-control gate with pedestrian turnstiles and well-established perimeter walls. The chosen site is made up of **multiple erven**. ERF numbers are **3007, 3008, 3009, 3010, 3011, 3012 and 3013**. Each ERF has been zoned as **Residential 3**. The erven have to be **consolidated** and **rezoned** to **Educational** for site's zoning to be appropriate for the construction of the Learning and Skills Development Centre. A cadastral survey would have to be done. Once a consolidation application is approved by the council, a survey of the land will have to be done by a registered land surveyor.

The land surveyor must then submit his draft SG Diagram to the SG Office for approval. Upon approval of the consolidated SG diagram by the surveyor general, the relevant Conveyancing Attorneys will assist the property owner to register the title to the subject consolidated property by means of a certificate of consolidated title. The rezoning process includes the submission of applications to the local municipality, who in-turn refer to relevant parties such as neighbours for possible objections. This may delay the approval of the application.

Site Information		
Site Area (sqm)	167 896,19	
Lake Area	73 431,10	
Usable Area	94 465,09	
Height Zone	B - 5 Storeys	
Coverage	70%	66 125,56
F.A.R	2,4	
Zoning	Educational	

Figure 9.2: New Site Information post consolidation (Author, 2023)

9.4 The Target Market

Primrose's population is largely made up of people between the ages of 18 to 60. 74% of the population lies within this age group (Stats SA). 55% of the population is unemployed and 98% of the population do not have higher education qualifications (Stats SA). The lowest levels of higher education (post matric) is located within the Makause Informal Settlement. This is directly linked to the economic status of the people living in the informal settlement. 58% of the population is categorised as low income, 30% as middle income and 1% as high. The remaining 11% is unspecified (Stats SA). After identifying the appropriate stakeholders, the next step is to analyse a viable target market and user group. As mentioned, the users intend to be Grade 11 and 12s,

and unemployed youth from the Makause Informal Settlement.

9.5 Implementation Construction Methodologies

The materials that will be used in the project will be locally produced such as brick, concrete, steel and timber. The materials do not need to travel great distances to get to the site, therefore the transportation costs are reduced. Stone and timber from the site will be used within the construction process of the building. Stone and rock excavated will be used as stone cladding, therefore eliminating the need to source and import stone. There is an abundance of non-indigenous trees that can be used as timber, if the timber has the correct structural properties. Due to the clay rich soils of the site, the use of this material is extremely viable. The soil will be used for rammed earth walls, screed floors and clay bricks. Building plans need to be approved by the relevant council office, ensuring that the building complies with SANS and SABS. There is a fee associated with this process. An Environmental Impact Assessment will have to be done

as there is a large water body on the site. A building contract is to be established between the client and the main contractor outlining the fees, the scope and the construction timeline. Other procedures involved are; Occupational Health and Safety, Electrical Compliance, Plumbing and drainage carried out by a registered plumber and fire safety compliance. Each one of the procedures will have an associated fee. The size of the property allows for the storage of empty containers and materials without affecting any ongoing programme on the site. The size of the property is also large enough as to not make any sound disturbances to the neighbouring properties.

9.6 Contractual Methodologies

There is a large waterbody on the site with a fish population. Therefor the National Water Act, 36 of 1998 needs to be looked at. There are also indigenous trees and plants on site therefor the National Environmental Management Biodiversity Act, 10 of 2004 regulated under provincial legislation. Authorisations, licenses or permits to be obtained before water can be taken/used from the water body. Owner of the land needs to take all reasonable measures to prevent any pollution from occurring, continuing or recurring. This process would be carried out by the Department of Water and Sanitation. Other environmental legislation that needs to be considered is the National Environmental Management Act and the Waste Act. A geotechnical report will have to be done to determine soil conditions on the site. A Land Use Rights certificate will be required, confirming that the property is suitable for the construction of a training centre.

Important Contracts to Consider for the Safety of all involved Parties:

- **The Professional Consultants Services Agreement (PROCSA) and Matrix** ensures a defined and agreed process between the client(s) and the professionals.
- **South African Institutes of Architects Client-Architect Agreement (SAIA)** is a standardised contractual document between the architect and the client(s) that ensures a professional relationship through the construction period of the project.
- **Joint Building Contracts Committee (JBCC)** - provides contractual documentation outlining the framework for contract administration and project management. It offers relevant contracts such as **The Principle Building Agreement** which covers the professional relationship between the client and the main contractor. **The Nominated/Selected Subcontractor Agreement** outlines

the responsibilities of the subcontractor in relation to the main contract.

9.7 The Professional Team

The design and construction of a sustainable Learning and Skills Development centre is a highly intricate project that will require different skilled professionals throughout each stage of the project. The professionals required are to ensure the overall viability and success of the project is achieved. These professionals include:

- **Architect** (as Principle Agent)
- **Town planner** - required for ERF consolidation.
- **Land Surveyor** - required for a land survey and to draw the new SG Diagrams.
- **Environmental Assessment Practitioner** - assess any potential risks as well as benefits associated with the project and provides specialised advice on ways to mitigate any adverse environmental effects.
- **Interior Designer** - required to design interior fit out for each department
- **Landscape Architect** - required in order to make the building fit in with the existing natural landscape, and to decide on indigenous plant species that will thrive in Primrose's climate.
- **Water Treatment Specialist** - to best design and implement water treatment and harvesting method from the natural waterbody.
- **Aquatic Biologist** - to best design and implement the inland freshwater fishery for the culinary centre. Appropriate local fish species to be decided by the aquatic biologist.
- **Quantity Surveyor**
- **Geotechnical Engineer** - the site has clay rich soils, a geotechnical survey will need to be done to decide on the best foundation design for the soil

- **Structural and Civil Engineer** - design and supply correct documentation for required structural support according to the geotechnical report provided.
- **Electrical Engineer** - implementing solar harvesting system.
- **Mechanical Engineer** - required to determine the most sustainable method for ventilating the building, minimising the use of artificial cooling methods.
- **Main Contractor** - ensures the financial planning and stability of the construction of the project

The following table shows the different professionals and specialists that form part of the design and construction teams for the success of the project. The table also shows when and in what stages each professional is required.

1	2	3	4a	4b	5	6
Architect	Architect	Architect	Architect	Architect	Architect	Architect
Land Surveyor	Quantity Surveyor	Quantity Surveyor	Quantity Surveyor	Quantity Surveyor	Quantity Surveyor	Main Contractor
Town Planner		Environmental Assessment Practitioner	Interior Designer	Interior Designer	Interior Designer	
		Aquatic Biologist	Landscape Architect	Landscape Architect	Landscape Architect	
		Interior Designer	Engineers	Engineers	Engineers	
		Landscape Architect		Main Contractor	Main Contractor	
		Engineers				
		Water Treatment Specialist				

Figure 9.3: Professionals Involved in the different stages (Author, 2023)

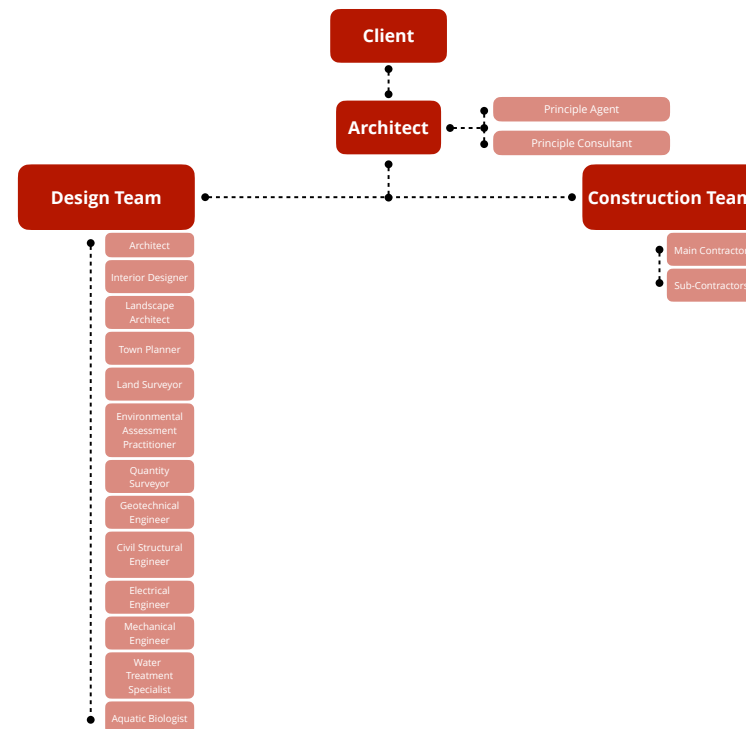


Figure 9.4: Professionals Involved in the construction process (Author, 2023)

9.8 Financial Viability

Building Costs Estimate: (AECOM Africa Cost Guide, 2022)

Learning and Skills Development Centre			
Room	Total Area (m2)	Rate/m2 (excl VAT)	Total Cost
Reception/Foyer	115	R19 500	R2 242 500
Water Treatment Facility	425	R7 600	R3 230 000
Aquaponics	400	R7 600	R3 040 000
Recruitment Centre	90	R11 500	R1 035 000
Administration Offices	365	R11 500	R4 197 500
Healthcare	35	R31 300	R1 095 500
Culinary	850	R10 550	R8 967 500
Gr11 and 12 Centre	525	R9 800	R5 145 000
Solar Harvesting Facility	375	R7 600	R2 850 000
Workshops	750	R23 000	R17 250 000
Learning Spaces	1550	R9 800	R15 190 000
Fishery Facility	400	R7 600	R3 040 000
Gymnasium	205	R23 000	R4 715 000
Support Staff Offices	65	R11 500	R747 500
Plant Room	150	R7 600	R1 140 000
Parking	1500	R850	R1 275 000
Total Estimated Cost (excl. VAT)			R75 160 500

Figure 9.5: Development Costs (Author, 2023)

A rough estimated cost for the project is calculated in the table above. The estimated development cost is R75 160 500 (excluding professional fees).

9.8.1 Operational Costs

Operating Costs Per Month			
Department	Teaching Staff Salary	Support Staff Salary	Materials
School Development Programme	R40 000,00	R7 000,00	R4 000,00
Adult Education Programme	R10 000,00	R7 000,00	R4 000,00
Artisinal Instruction	R40 000,00	R7 000,00	R8 000,00
Culinary Centre	R15 000,00	R7 000,00	R8 000,00
Business Initiative	R15 000,00	R7 000,00	R4 000,00
Totals	R120 000,00	R35 000,00	R28 000,00
Total Operating Costs			R183 000,00

Figure 9.6: Operating Costs (Author, 2023)

The previous table shows a rough estimate of expected operating costs for each department of the Learning and Skills Development Centre. Some expected costs are seen as being staff salaries (Instructors and support staff), and the costs associated with materials. These would be stationery, internet costs, materials such as artisanal materials. The total estimated operating costs are R183 000.

9.8.2 Income

Income Generated Per Month	
Department	Amount Earned
Artisinal Products	R10 000,00
Culinary Centre	R50 000,00
Business Initiative	R15 000
Monthly Stipends	R22 500,00
Existing Fishing Club Membership	R40 000,00
Office Rentals	R50 000,00
Total	R187 500,00

Figure 9.7: Monthly Income (Author, 2023)

The above table shows the rough expected income that will be generated per month. The selling of artisanal crafts produced will bring in roughly R10 000. The selling of fresh produce from the aquaponics garden and meals prepared in the culinary centre will be R50 000. The business initiative will generate R15 000 by selling textiles, like bed-sheets and pillowcases. Monthly stipends paid to the centre by each stakeholder will generate R22 500 a month. The existing fishing club on the site currently has 200 registered members. A membership fee of R2500 a year is charged. This equates to roughly R40 000 a month. Lastly, there will be office space available to rent. This will generate an expected R50 000 a month. Overall, R187 500 will be generated per month. The amount generated a month is more than the expected running costs. Therefore, the centre's stakeholders will be making a small profit as well as the additional benefits mentioned previously.

9.8.3 Professional Fees

Professional Fees	
Complexity	High
Cost Bracket	8
Value of Works Range	R40 000 001,00 R130 000 000,00
Primary Fee	R4 625 768,63
Secondary Fee	R40 000 001,00
Additional %	10,90%
Total Professional Fee	R8 458 263,02

Figure 9.8: Professional Fee (Author, 2023)

The table above gives a breakdown of the expected professional fees associated with the project value. The work being done is considered as High Complexity, according to table 3 in Guideline for Professional Fees in terms of Section 34 (2) of the Architectural Profession Act, 2000 Act 44 of 2000.

Development Cost (Excluding Land Development Cost)		
Building Cost	Professional Fee	Total
R75 160 500,00	R8 458 263,02	R83 618 763,02

Figure 9.9: Total Development Costs (Author, 2023)

Distribution of Professional Fees				
Work Stages	Fee %	Fee Portion	Cumulative %	Cumulative Fee
1	2%	R169 165,26	2%	R169 165,26
2	15%	R1 268 739,45	17%	R1 437 904,71
3	20%	R1 691 652,60	37%	R3 129 557,32
4a	10%	R845 826,30	47%	R3 975 383,62
4b	20%	R1 691 652,60	67%	R5 667 036,22
5	30%	R2 537 478,91	97%	R8 204 515,13
6	3%	R253 747,89	100%	R8 458 263,02

Figure 9.10: Distribution of Professional fee (Author, 2023)

The previous table shows the percentage of the professional fee that is required to be paid to the relevant professionals at each work stage of the project.

The above table, in correlation to the funding breakdown, gives a more detailed breakdown of the portions of the development costs that each stakeholder and the client will be paying. The client will be paying R66 895 010,42 (80%) of the cost, the supermarket group will be paying R3 344 750,52 (4%) of the cost, the retail group and the industrial company will each be paying 4% of the cost. Finally, the hospital group will be paying R6 689 501,04 (8%) of the cost.

Distribution of Development Costs		
Contributor	Percentage	Amount
Client	80%	R66 895 010,42
Supermarket	4%	R3 344 750,52
Retail	4%	R3 344 750,52
Industrial Company	4%	R3 344 750,52
Hospital Group	8%	R6 689 501,04
	100%	R83 618 763,02

Figure 9.11: Distribution of Development costs (Author, 2023)

9.9 Viability Conclusion

The client's proposal is reasonable, achievable and viable. The building will receive adequate funding for the construction process and has feasible amounts to cover the expected operational costs to ensure long term economic success and viability. Primrose is experiencing a high level of industrial development, therefore increasing the demand for a skilled labour force. The Makause informal Settlement has large amounts of unemployed youth. As mentioned above, 98% of Primrose's population does not have tertiary education qualifications, thus the need and demand for a Learning and Skills Development Centre is irrefutable. The client's proposal introduces an exciting and important programme that aims to revitalise Primrose whilst solving one of South Africa's largest issues. The project's viability is thus multi-faceted, as there is the need to uplift the Makause community as well as Primrose's image.

10

PART 2 : FINAL DESIGN DRAWINGS

“We shape our buildings; thereafter they shape us.” – Winston Churchill



Figure 10.1: Context Plan (Author, 2023)

Designing an adult learning centre for a community that exhibits socio-cultural and ethnic diversity is a complex endeavour. Additional consideration of the numerous adult learning theories, further complicates the task. I have phenomenologically attempted a holistic approach that integrates the concepts of “Genuis Loci” or “Spirit of place” with the more technical sustainable design principles in order to create a facility that is both functional and meaningful.



Figure 10.2: Site Section (Author, 2023)

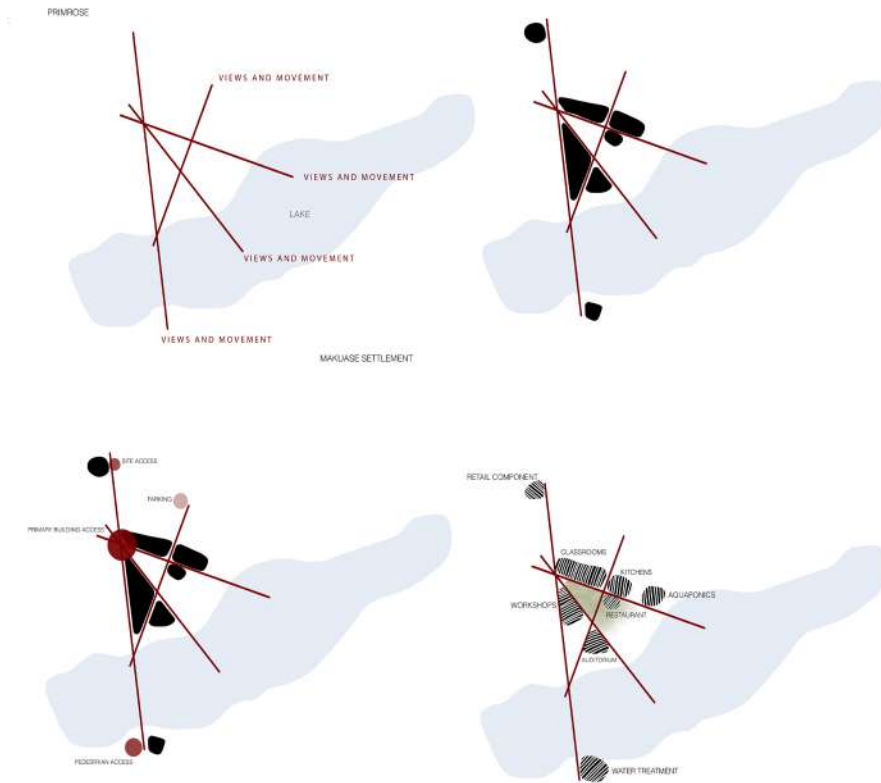


Figure 10.3: Site Dividing Factors (Author, 2023)

In order to place the programming on the site, I used views and access routes as dividers. This ultimately guided the location of the massing. The Ceramics store is placed at the main entrance to the site along Rietfontein road which engages with the Primrose CBD. This enterprise offers not only economic benefits but also an opportunity for creativity and artistic expression inspired their own cultures. The classrooms face north in order to access natural light. The workshops face west to relate to the existing warehouse. The aquaponics centre and Kitchens have been placed closer to the waters edge to facilitate access to the nutrient rich water. The auditorium has uninterrupted views of the lake. Finally the water treatment facility is located on the other side of the lake making it easily accessible to the makause community.

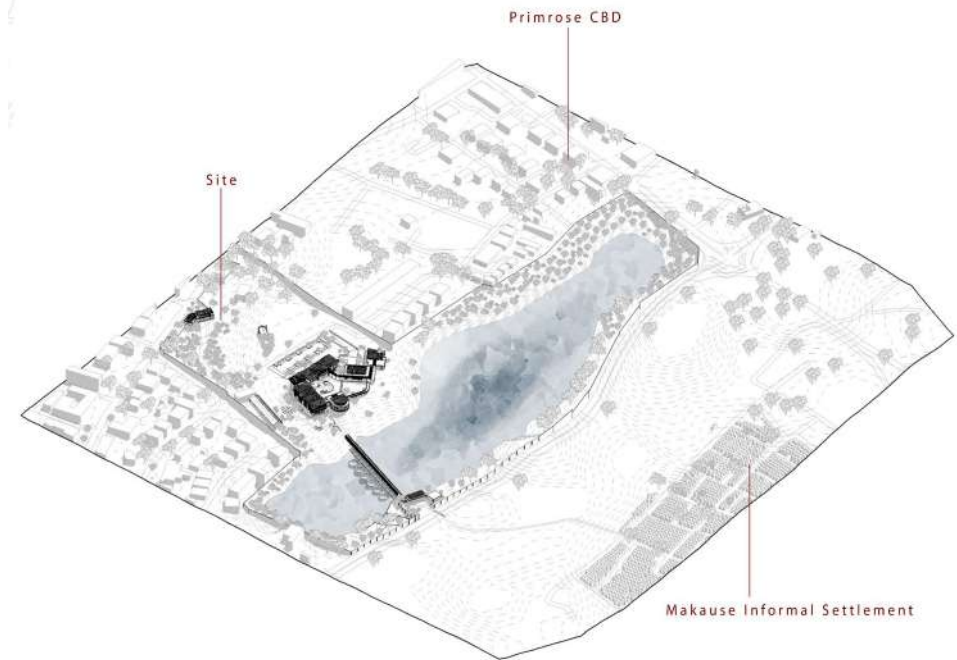


Figure 10.4: Site Axonometric with Points of Interest (Author, 2023)



Figure 10.5: Site Plan (Author, 2023)

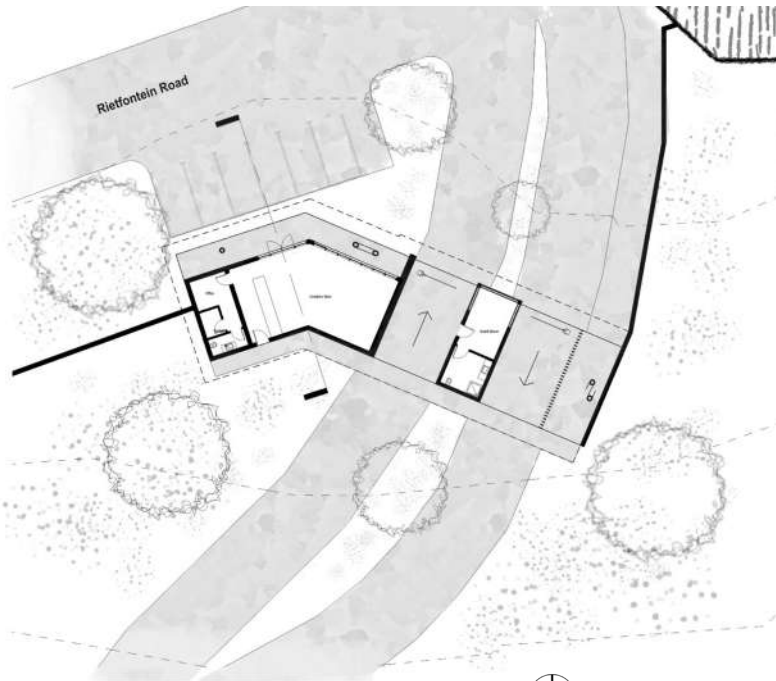


Figure 10.6: Retail Plan (Author, 2023)



Figure 10.8: Retail North Elevation (Author, 2023)



Figure 10.9: Water Treatment North Elevation (Author, 2023)

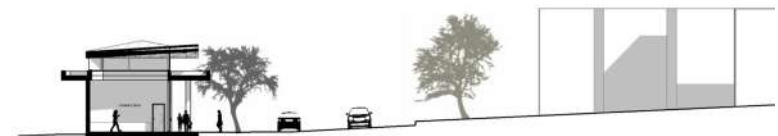


Figure 10.10: Retail Section (Author, 2023)



Figure 10.11: Water Section (Author, 2023)

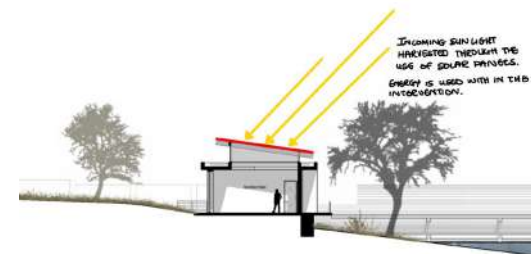


Figure 10.11.1: Water Section with passive system (Author, 2023)

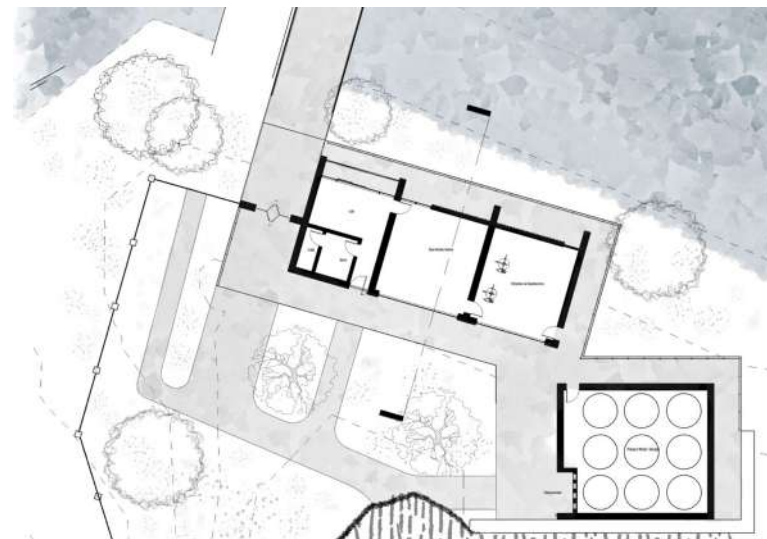


Figure 10.7: Water Treatment Plan (Author, 2023)

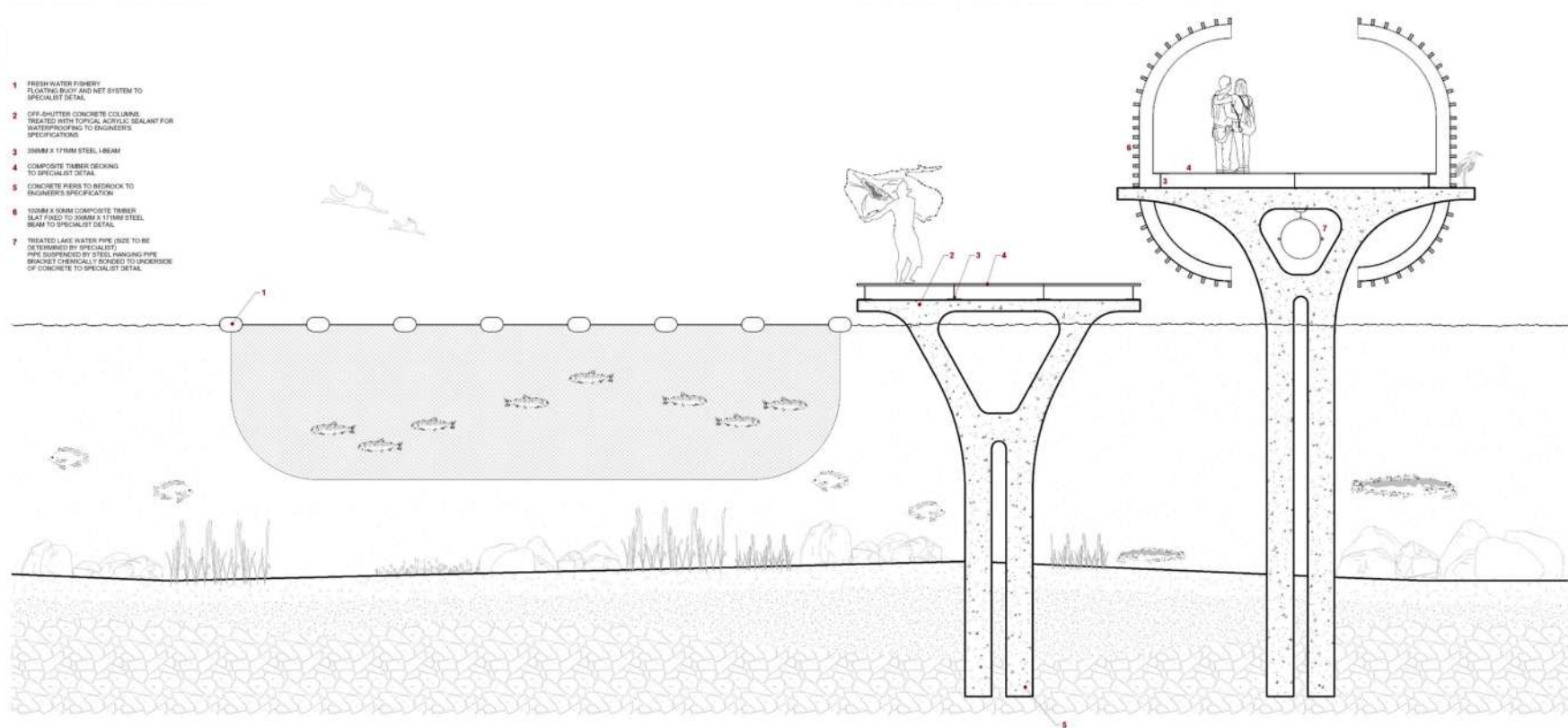


Figure 10.12: Bridge Detail Section (Author, 2023)



Figure 10.13: Water Treatment Centre (Author, 2023)

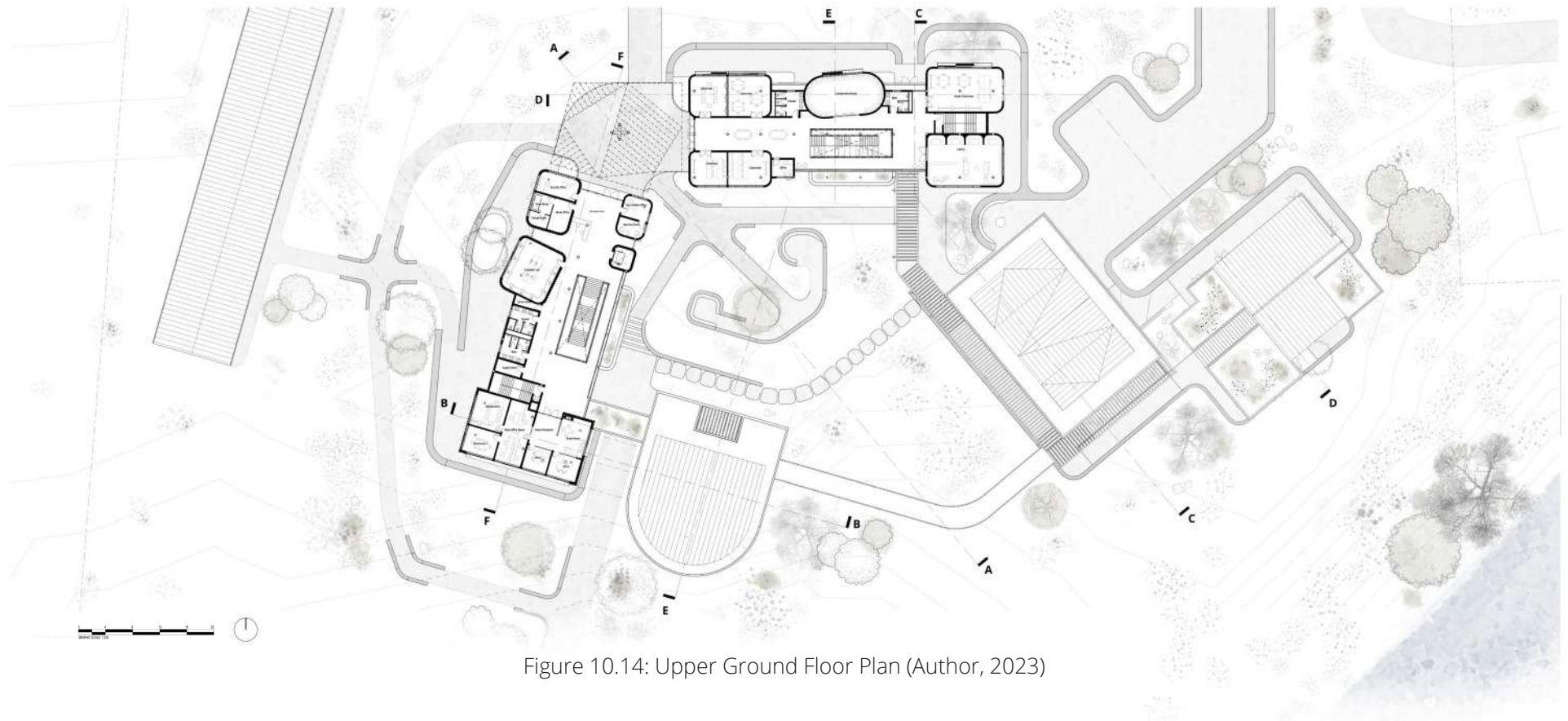


Figure 10.14: Upper Ground Floor Plan (Author, 2023)

One enters the Learning and Skills Development Centre on the upper ground level. The landscape gently berms up and the building seemingly floats on top of it as seen in Sectional Elevation AA. Upon arrival one can either enter the right wing or the left wing of the building. The upper right wing of the building is made up of a variety of learning areas catering to different learning styles.

I have included classrooms that favour the traditional teaching methods for formal learning as prescribed by the Behavioural theorists as well as those with more collaborative and social arrangements. The latter encourage participation and interaction between the learners and the surrounding spaces. These rooms are pervious and adaptable with folding doors that can facilitate altering room

sizes and provide continuity with adjacent areas.

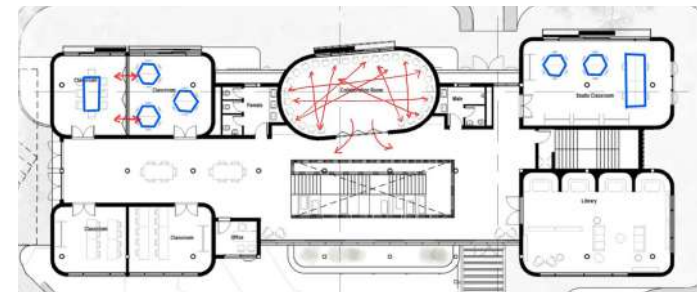


Figure 10.15: Flexibility and Adaptability highlighted on Upper Ground plan (Author, 2023)

Challenging traditional designs, the corridors are wider and planned to include multiple areas for social opportunities that encourage and continue the unprogrammed informal learning process. Visual access and connectivity to nature is once again afforded by the large windows. Traditionally there was a marked separation of the administrative offices from the learning areas.

This accentuated the unbalanced relationship of power and authority that compromises the principles of collaborative learning designs. My facilitator offices are positioned in places that are convenient and within easy access of the learner, fostering a relationship of cooperation and mutual respect.



Figure 10.16: Sectional Elevation AA (Author, 2023)



Figure 10.17: North Elevation (Author, 2023)

The promise of a multisensory experience invites the user through the central outdoor covered entrance which unites the two wings of the building. Tantalising aromas from the culinary centre and distant views of the lake pique the curiosity of the passersby.

Innovative brick and pergola designs accentuate the interplay of light and shadows, smoothening the transition between the exterior and interior. The user is guided through either the left wing or the right wing.



Figure 10.18: Upper Ground Floor Main Entrance (Author, 2023)



Learners face each other, wherever possible, to boost communication. Some of the classrooms have walls that are curved and windows with variable designs in order to create interest and inspire aesthetic appreciation in the adult learners. Large floor to ceiling windows will ensure that adequate natural light floods the the interior. High level windows will also enhance the illumination and ventilation. Incorporating views of nature and the use of natural materials evokes a sense of connectivity and well-being. Biophilic designs enhance cognitive function, creativity and learning.

Figure 1.19: Collaboration Room (Author, 2023)



Users need to take one of the two staircases, the lift or the sloping natural landscape to access the lower ground floor. Learning facilities must be inclusive and offer accessibility to diverse users - able-bodied and disabled. Lifts and ramps secure wheelchair access. The lower ground floor has been partially submerged to honour the site's excavation history.

The right lower ground floor wing is made up of the Gr 11 and 12 centre and tutor rooms as well as collaborative informal study pods within the passage way. Furthering the variable methods of obtaining knowledge, the large staircase provides a focal point of social interaction and convenient seating - Hertzberger's 'Learning Street'.

To access the restaurant, users will need to pass by the kitchens which have large windows that allow people to see through. Transparency creates visual continuity and allows learners an informative perspective of adjacent spaces encouraging shared experiences.

By looking through the glass interfaces, learners can observe interesting procedures in the kitchens. This creates a forum for appreciating and being inspired by other learners' work. The restaurant has an outdoor dining area which overlooks the lake. The bathrooms have been strategically placed within the aquaponics centre to guide users through the space as they go on a journey and learn about the process.

The left wing of the lower ground floor is made up of the artisanal workshops as well as a secondary entrance which caters to pedestrians coming from the makause informal settlement. While not detracting from the approachability, a sense of security and meaning is further improved by enclosing the facility within defined boundaries. Clear Vu fencing maintains visual access and encourages community involvement.



Figure 10.21: Informal Pods and Collaborative Staircase (Author, 2023)

A bridge connects the Makause community to the facility, granting them an access that offers a multi-sensory experience of light, colour, reflection and pleasure.



Figure 10.22: South View to Main Building (Author, 2023)



Figure 10.23: West Elevation (Author, 2023)



Figure 10.24: East Elevation (Author, 2023)

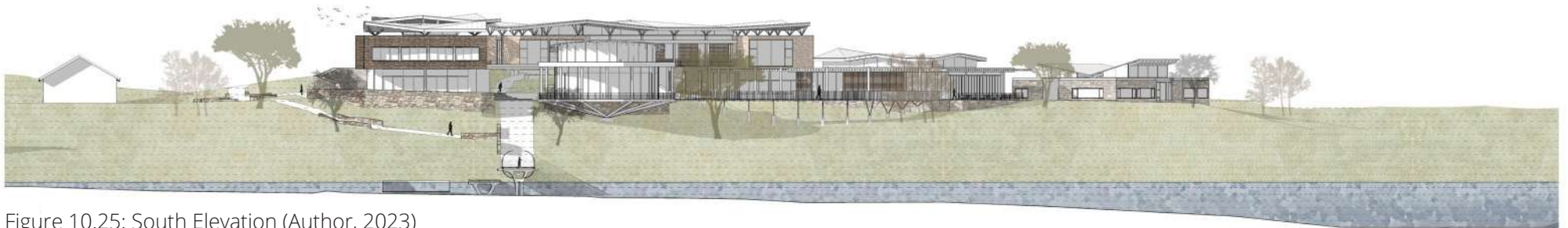


Figure 10.25: South Elevation (Author, 2023)



Figure 10.26: Section BB (Author, 2023)



Figure 10.27: Section CC (Author, 2023)



Figure 10.28: Section DD (Author, 2023)



Figure 10.29: Section EE (Author, 2023)

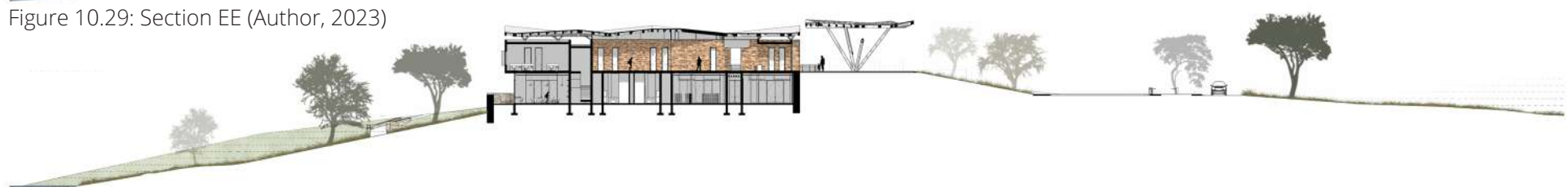


Figure 10.30: Section FF (Author, 2023)

By employing the use of a roof void, I have increased the vertical dimensions of the upper level. This has improved the transmittance of natural light into the learning spaces, enhancing their aesthetic quality while suggesting a more relaxed atmosphere of informality.

Ceiling heights, shapes and materiality affect the human experience of a space - higher ceilings invite participation and boost creative thinking.

Stack ventilation is allowed to take place within the central double volume spaces. Overhangs and sliding timber louvre

screens are also utilised in order to manipulate and control the incoming sunlight. The central courtyard is protected from predominant northerly winds.



Figure 10.31: Passive Design Strategies (Author, 2023)



Figure 10.32: Auditorium (Author, 2023)

The Auditorium is located in the centre of the landscaped courtyard. It has uninterrupted views of the lake to the south. From the outside, the expanses of glass reflect the changing seasons and the beauty of nature.



Figure 10.33: Sectional Perspective (Author, 2023)



Figure 10.34: Braai Boma (Author, 2023)



Figure 10.35: Outdoor Workshop Classroom Extension (Author, 2023)

Considering areas outside the building to expand and complement the learning environment, I have planned for the inclusion of an outdoor classrooms and a boma braai area to further stimulate the senses of the learners and induce memorable learning experiences.

Connectivity between interior and exterior learning spaces is established. The transition from the safety of the indoor classrooms to the more intriguing outdoors enhances the enjoyment of the learners.

An optimally designed landscape favouring indigenous vegetation will further enhance the environmental benefits and respect the natural heritage of the area. Research has shown that contact or views of nature improves academic achievements, enhances mental and physical health, fosters collaboration and evokes a sense of wellbeing.

Overall the facility is designed to evoke a sense of home. A place that pays homage to the history of the site, respectfully complementing the natural terrain and representing a sustainable symbol of hope for the

Makause community.



Figure 10.36: Roof Structure Axonometric (Author, 2023)

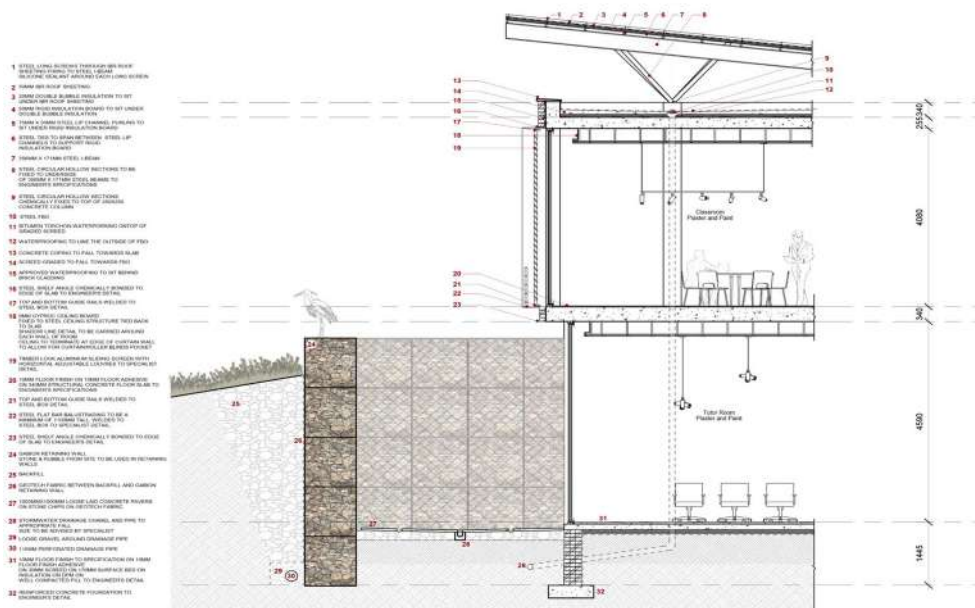


Figure 10.37: Typical Classroom and Tutor Room Detail Section (Author, 2023)

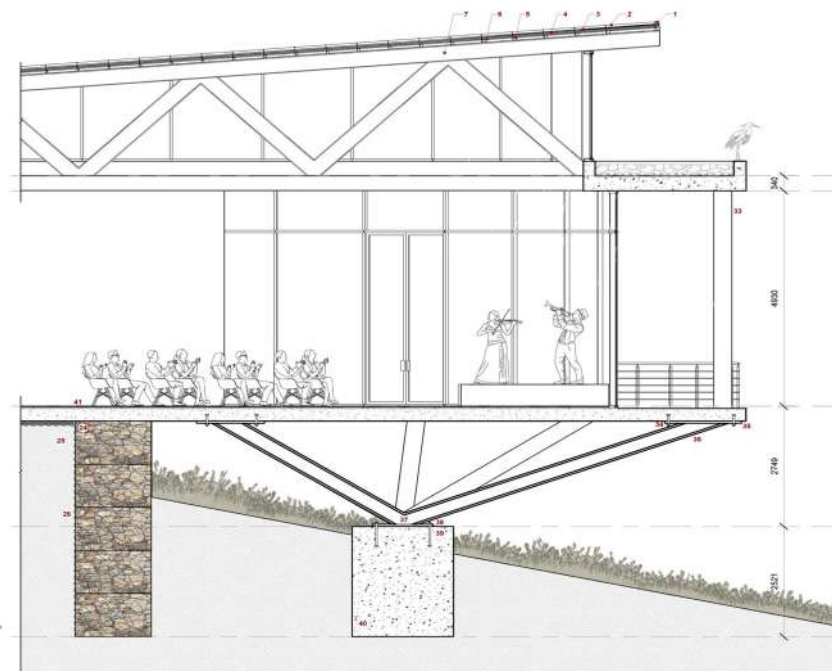


Figure 10.38: Auditorium Detail Section (Author, 2023)

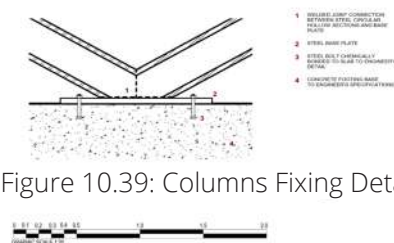


Figure 10.39: Columns Fixing Detail (Author, 2023)

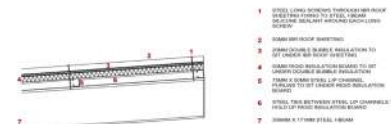


Figure 10.40: Roof Detail (Author, 2023)

The biophilic design of the courtyard offers areas of quiet reflection and rejuvenation. Meandering walkways further increase chances of social interaction and exchange of knowledge. This area can also accommodate cultural art exhibitions and events.



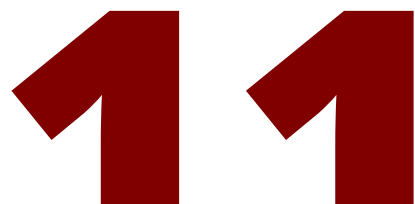
Figure 10.41: Central Courtyard (Author, 2023)



Figure 10.42: South East Overall Model View (Author, 2023)



Figure 10.43: Northwest Overall Model View (Author, 2023)



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APPENDIX

Appendix



SCHOOL
OF ARCHITECTURE
PLANNING

19 May 2023

Faculty of Engineering and the Built Environment:

Ethics clearance letter:

Dear Michele Scremin

Student number (1884583), this letter confirms that your ethics application has been cleared. Your clearance/protocol number: SOAP025/04/2023

A handwritten signature in black ink, appearing to read "Lerato Nkosi".

Yours sincerely

Lerato Nkosi

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