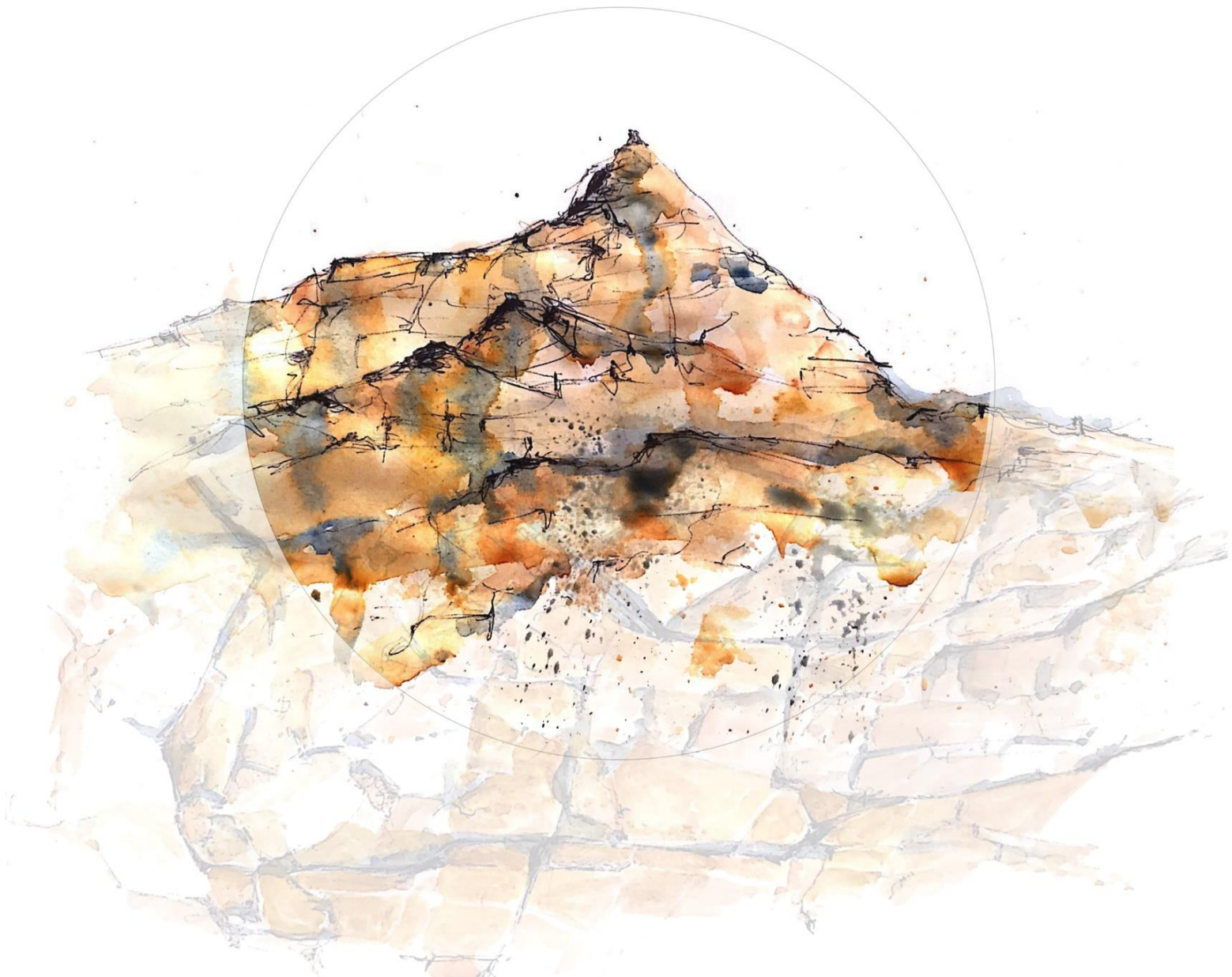


DISCOVERING THE KAROO

THE GENIUS LOCI OF COMPASSBERG, NIEU-BETHESDA

Plant Research Centre &
Landscape Interpretation Centre
Nerina Naude



DISCOVERING THE KAROO

THE GENIUS LOCI OF COMPASSBERG, NIEU-BETHESDA

Plant Research Centre and Landscape Interpretation Centre

This dissertation is submitted in partial fulfilment of the requirements for the degree M.Arch (Prof).

Department of Architecture, Faculty of Natural and Agricultural Sciences,
University of the Free State.

"It is true there are places which stir the mind to think that a story must be told about them. But there are also, I believe, places which have their story stored already, and want to tell this to us, through whatever powers they can; through our legends and lore, through our rumors, and our rites. By its whispering fields and its murmuring waters, by the wailing of its winds and the groaning of its stones, by what it chants in darkness and the songs it sings in light, each place must reach out to us, to tell us, tell us what it holds."

— Mark Valentine

(Valentine, 2010: online)

DECLARATION

The work contained in this dissertation has not been previously submitted to meet the requirements for an award at this or any other institution of higher education.

To the best of my knowledge and belief, this dissertation contains no material previously published or written by another person except where due reference is made.

...

Nerina Naude 2014014100
10 October 2020



Fig 1. View from Compassberg (Louw, 2019: online)

ACKNOWLEDGEMENTS

To my parents and brother, thank you for your endless love and support. To Dirk, for your patience, motivation and positive encouragement. To my friends and peers, thank you for your advice, perspective and for sharing in the process.

To all the lecturers at the University of the Free State that influenced me in my years of studies, thank you.

To God be all the honour and glory.

PREAMBLE

This dissertation is a proposal for a Landscape Interpretation Centre and Plant Research Centre at Compassberg in Nieu-Bethesda, Eastern Cape. The aim of the project is to assist the South African Centre of Social Science Research (CSSR) in protecting and researching the Karoo's biodiversity. In doing so, the project also aims to highlight the unique fauna and flora found at Compassberg that, for most, are undiscovered and undocumented. The focus of this dissertation came from a keen interest in the natural environment, more specifically, in the Karoo. The overarching aim of this proposal is to inspire a greater appreciation and knowledge for the natural landscape at Compassberg. To achieve this, it is necessary to consider the *voice* of the landscape and finding an appropriate architectural response that makes a meaningful contribution to the undiscovered layers of the Karoo.

In this dissertation, the parameters of the research are set out by identifying the challenges and aims of the proposed design. A move towards exploring and grounding these aspects in research, analysis, theoretical review and interpretations was then made to conceptualise the ideas that drove the design. These concepts and formative ideas were then incorporated into an architectural design and technically documented proposal. Finally, evaluation of the dissertation was done through reflection and contemplation regarding the set challenges and aims.

TABLE OF CONTENTS

Introduction (9)

Document Framework (10)

Research Methodology (13)

PART 1

1.1 Project Overview (17)

1.1.1 Brief overview of medicinal plant research in South Africa (18)

1.2 Topology (21)

1.2.1 Challenges Identified (22)

1.2.2 Aims (22)

1.3 Typology (23)

1.3.1 Client (24)

1.3.2 Users (25)

1.3.3 Challenges Identified (26)

1.3.4 Aims (26)

1.4 Morphology (27)

1.4.1 Challenges Identified (27)

1.4.2 Aims (27)

1.5 Tectonics (28)

1.5.1 Challenges identified (28)

1.5.2 Aims (28)

1.6 Research Question (29)

1.7 Summary of the Challenges and Aims (30)

PART 2

2.1 Touchstone (35)

2.2 Formative Conceptual Ideas (37)

2.3 Topology (40)

2.3.1 Macro Context (41)

2.3.2 Meso Context (42)

2.3.3 Micro Context (48)

2.3.4 Precedent Study (56)

- 2.4 Typology (58)
 - 2.4.1 Investigating the Client and Users (58)
 - 2.4.2 Investigating Similar Functional Typologies (59)
 - 2.4.3 Precedent Study (63)
 - 2.4.4 Accommodation List (65)
- 2.5 Morphology (69)
 - 2.5.1 Theoretical Discourse (69)
 - 2.5.2 History of *Genii* (70)
 - 2.5.3 Architectural Theorist (72)
 - 2.5.4 Responses (75)
 - 2.5.5 Precedent Study (76)
- 2.6 Tectonics (79)
 - 2.6.1 Structural Philosophy (79)

PART 3

- 3.1 Design Exploration (82)
- 3.2 Towards a final design (88)
- 3.3 Technical Summary (107)
- 3.4 Plagiarism Report – Appendix A

PART 4

- 4.1 Reflection (130)
- 4.2 References (133)



INTRODUCTION

The design dissertation proposes a **Landscape Interpretation Centre** and a **Plant Research Centre** within the semi-arid context of the Karoo. The proposed scheme discussed in this dissertation is situated at the foot of Compassberg near Nieu-Bethesda, Eastern Cape (see pg_ Situating Investigation).

One of the main intentions of this dissertation is to uncover the different layers of the specific site and to discover the *genius loci* of the landscape. This challenge is addressed through various methods, such as investigating the physical factors of the site, for example; the geology, history and climate. Another part of the investigation includes an exploration of the different human perspectives and emotional connotations to the site and how it influences the proposed scheme.

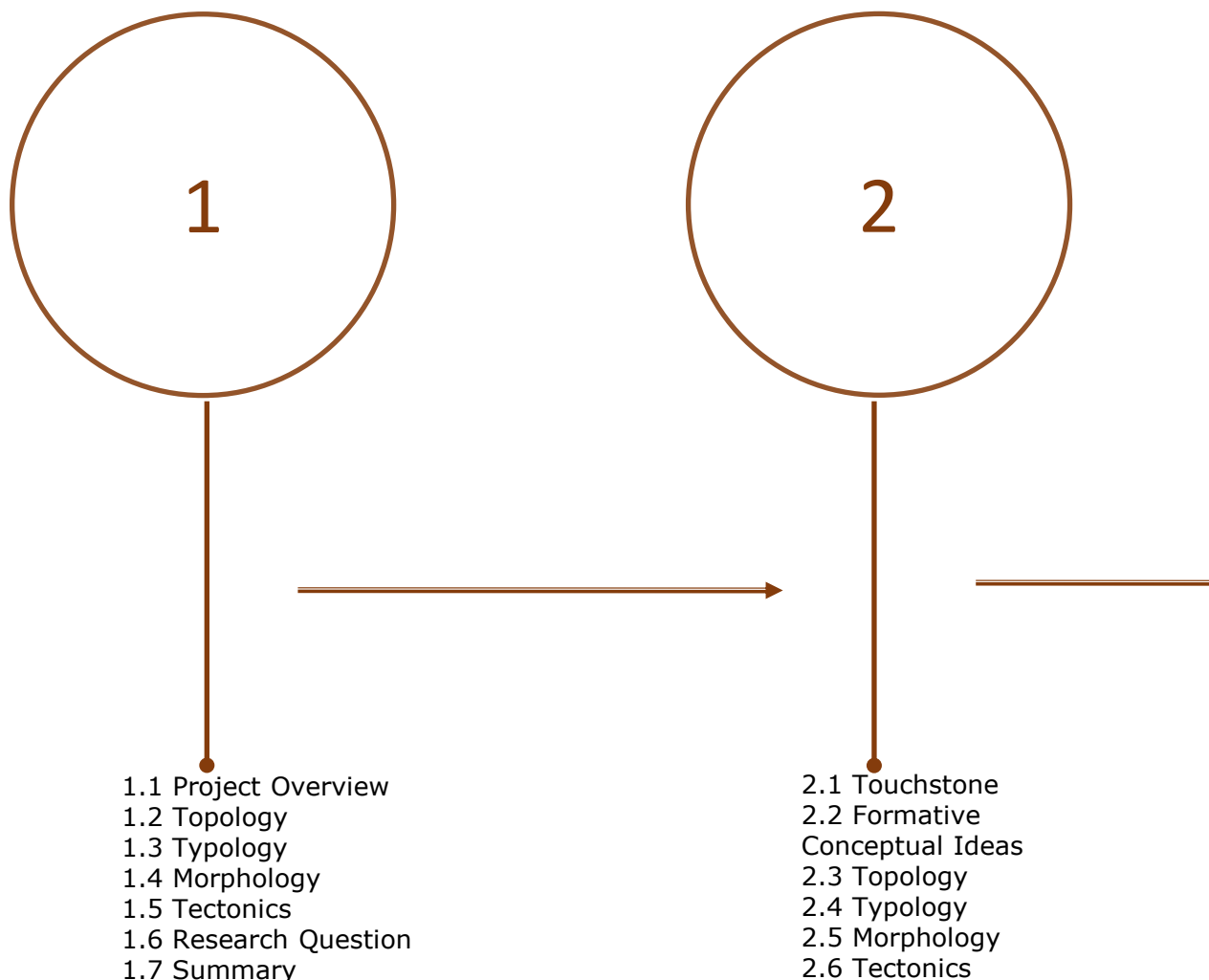
The investigation further aims to address the lack of research done on the unique vegetation at Compassberg. Currently, there are few places dedicated to interpret and document the context of the Karoo. The project aims to address this shortage and provide a place whereby the visitor is encouraged to interact and participate in the uncovering and discovering of the Karoo's fauna and flora.

The Research Centre has supporting functions, such as publicly accessible laboratories and a restaurant to attract more visitors. The Landscape Interpretation Centre will also become an informative journey; through the architecture, the visitor will be educated about the specific site and the processes of the vegetation's usability and origin. The scheme becomes a part of the narrative of the visitor's route. The inclusion of such a route aims to link the visitor's experience with the various functions of the Landscape Interpretation Centre and Research Centre.

DOCUMENT FRAMEWORK

The investigation conducted in this study focuses on discovering the different layers of the Karoo and highlighting the importance of understanding the natural landscape, such as the vegetation in the area. This will be done through the addition of a Plant Research Centre as well as a Landscape Interpretation Centre. A key element of the investigation was to establish a space that would ensure that the visitor is made aware of the significance of their natural surroundings.

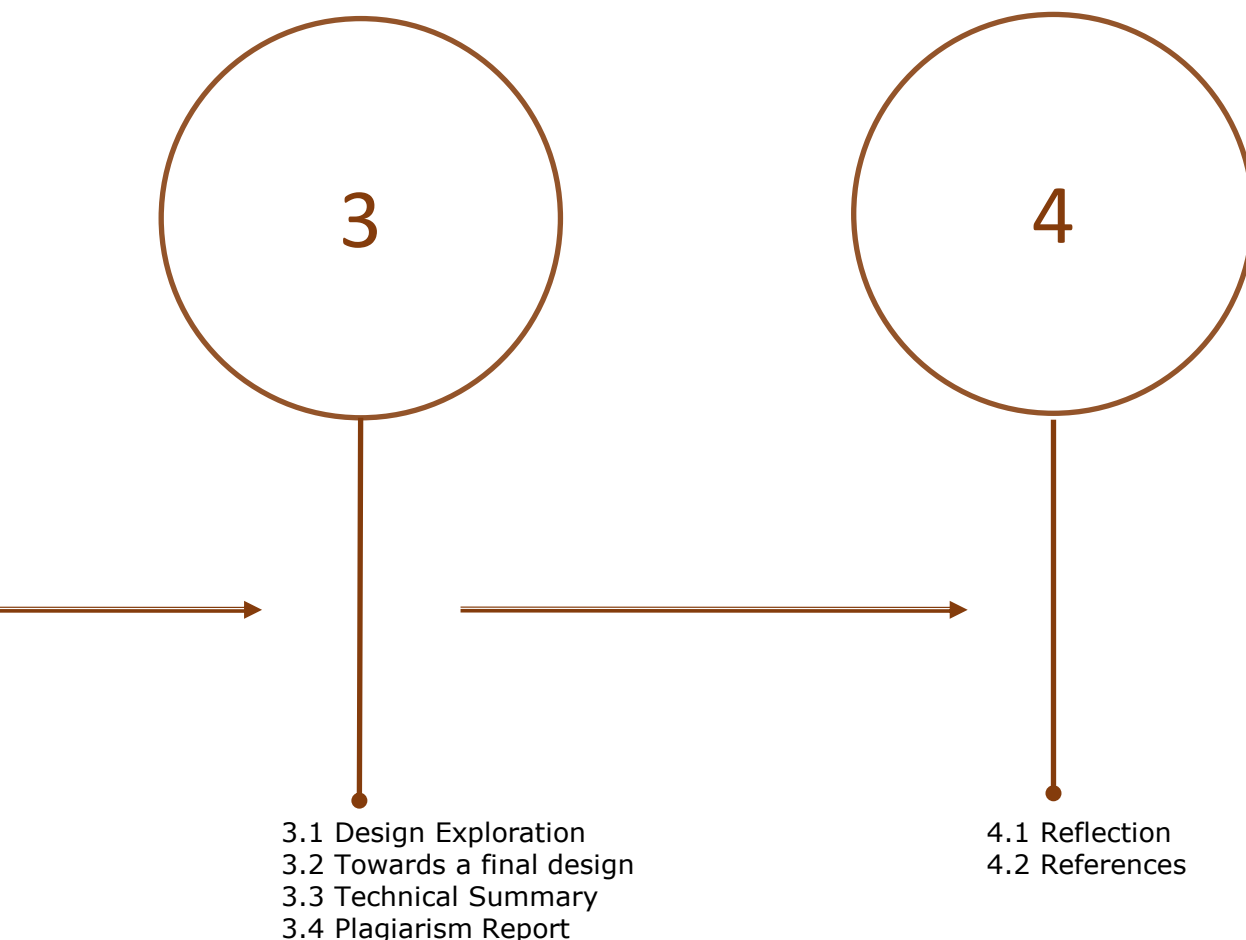
Through the exploration of different typologies similar to those proposed, the investigation in this dissertation was justified. These explorations include precedent studies as well as case studies of buildings whose aim was similar to the proposed scheme. The purpose is to gain an understanding of how this project would function in the natural landscape of Compassberg; how the site could become part of the landscape as well as part of the visitors' experience when visiting Compassberg; and to find a unique approach to designing and developing a solution for the various elements in this scheme by means of applying the theoretical knowledge acquired.



Parts one and two of this dissertation are structured around four subjects as understood through an academic understanding based on architectural knowledge, namely topology, typology, morphology and tectonics. These four subjects are related to bodies of knowledge that influence the logic of type, place, form and construction.

In part three of this dissertation, a design and structural synthesis of the applications of the thoughts derived from parts one and two is presented. This part observes the realisation of the scheme and offers an understanding of the development of both the design and construction.

In conclusion, part 4 reflects on the success of the synthesis and the overall development of this dissertation. This synthesis and final outcome are evaluated against the initial aims as set out in the early stages of the process.



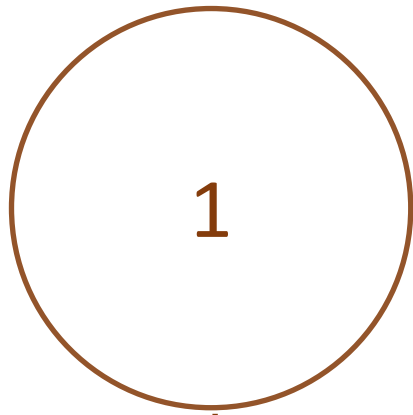
RESEARCH METHODOLOGY

The research for this dissertation is formulated by exploring four main problem statements relating to the architectural discourse; where it is designed; what and for whom it is designed; how the landscape is influenced; and how design concepts and ideas are ultimately constructed. In this exploration, the four problem statements are related to the body of knowledge that influences the logic of type, place, form and construction. Hereafter, the terms typology, topology, morphology and tectonics will be used in this document. To develop the design methodology, specific to the requirements of this project, various sources of insight were identified and explored.

These sources of insight include the following:

- The touchstone, which identified the intuitive essence of the intentions of the project, was created from which certain concepts were developed, and which, in turn, generated a conceptual framework.
- This conceptual framework was used as an analytical tool to make conceptual distinctions and organise ideas.
- These main ideas were investigated in precedent studies and case studies, which were to introduce these ideas in theory.
- Architectural precedent analysis of existing buildings, which introduced literature with regard to the projects; an own analysis; a qualitative analysis explaining how the precedents were understood from a personal point of view.
- Theoretical literature regarding architecture and the meaning of place was analysed and interpreted.
- A site analysis was done by means of recording the quantitative information (existing and interpreted facts and measurements) and interpreting the qualitative aspects (phenomenological experiences) of the site.





- 1.1 Project Overview
 - 1.1.1 Brief overview of medicinal plant research in South Africa
- 1.2 Topology
 - 1.2.1 Challenges Identified
 - 1.2.2 Aims
- 1.3 Typology
 - 1.3.1 Client
 - 1.3.2 Users
 - 1.3.3 Challenges Identified
 - 1.3.4 Aims
- 1. 4 Morphology
 - 1.4.1 Challenges Identified
 - 1.4.2 Aims
- 1.5 Tectonics
 - 1.5.1 Challenges identified
 - 1.5.2 Aims
- 1.6 Research Question
- 1.7 Summary of the Challenges and Aims

1.1 PROJECT OVERVIEW

In this part of the dissertation, the groundwork for the justification of the project- in its physical landscape is illustrated. The challenges and aims are identified based on the site investigation. A trip to Compassberg initiated the idea for this dissertation; therefore the location is the starting point for the research process. I will delve into a part of the research currently conducted in understanding the qualities that Karoo plants have to offer. Thereafter, an overview of the site is presented to provide an understanding of the topological challenges as set out in part 1.2 of this dissertation. Finally, an introduction to the client, who played a significant role in understanding the importance of researching the fauna and flora of the Karoo, is presented, to ultimately formulate a brief and accommodation schedule.



Fig 4. Hiking Compassberg (Baccega 2014: online)

1.1.1

Brief overview of medicinal plant research in South Africa

Very little information has been recorded regarding the uses of the Karoo's succulent plant species (Van Wyk: 2012). Studies usually focus on the plant's possibilities for food and moisture. The almost lack of the ethnobotanical (the study of a region's plants and their practical uses through the traditional knowledge of a local culture and people) records for the Eastern Cape and Northern Cape Karoo regions of South Africa is noteworthy (Archer, 1994). There is available information scattered in general literature (Rood, 1994; Van Wyk, 2012, Gericke, 2000). Some studies focus on the traditional medicinal use of plants by the Nama, Khoi-San and the Khoi-khoi (Thring and Weitz, 2006).

In reaction to this, researchers (Van Wyk, de Wet, Van Heerden, 2016) wanted to identify the most important plants in the Karoo. Their aim was not to accumulate an exhaustive list of all medicinal plants and their uses, but rather, to identify plants that are still used within the surrounding communities. Another aim of the research conducted was to document the dwindling knowledge on medicinal plants.

Their research resulted in a documented total of 86 species of medicinal plants. The documentation includes the scientific name as well as the local name of the plant species. The specific uses for each species, as given by the local communities, are also listed (Van Wyk, de Wet, Van Heerden, 2016).



Fig 5. Khoi-San in the Karoo (Baccega 2014: online)

Medicinal plant usage in South Africa, specifically in the Karoo, is still used to treat a limited number of indications (van Wyk, de Wet, Van Heerden, 2016). Many of the traditional remedies can be considered as general health tonics, that are used for weaknesses and ailments. The plants, sometimes a mixture of different plants, are used to treat stomach, kidney and bladder problems.

Within these research documentations, the researchers also noted that there are constantly new records of plants that are locally important and widely used in their specific areas which have never been recorded in scientific literature (van Wyk, de Wet, Van Heerden, 2016). Examples of such plants, specifically in the Eastern Cape, are *Helichrysum pumilio*, *Abutilon sonneriatum*, *Aloe striata*, *Osteospermum herbaceum*, *Eberlanzia spinosa*, and many more are frequently discovered (van Wyk, de Wet, Van Heerden, 2016).

From this brief overview, a few observations concerning the knowledge and documentation of plant research can be made. From the start, it becomes clear that there is a lack of recorded usage of medicinal plants, especially in the Karoo area. It roots back to the traditional knowledge acquired by the local-people, such as the Khoi-Khoi and the Khoi-San. These methods of using plants as health tonics spread to entire communities and in some cases were only passed down by word-of-mouth, never being documented.

The research of medicinal plant usages can lead to a better understanding of their scientific qualities, surrounding cultures and landscapes.



Fig 6 & 7. *Helichrysum pumilio*/‘wobossie’ on the slopes of Compassberg (Barker, n.d : online)

Fig 8. Nama woman eating ‘liver plant’ (Adorno, 2017 : online)



Fig 9. Aerial photo of hill at the foot of Compassberg (online)

1.2 TOPOLOGY

Topology refers to the spatial organisation of the landscape. In Aristotelian tradition, *topos* referred to the hierarchical structured space, where all beings would find their place (Mendez, 2004: 154).

In architecture, the topology refers to the shape or the surface and the terrain of the site (Mendez, 2004: 154); the quantitative and qualitative phenomena of that specific place. In other words, the various parts of a place and how they interrelate with one another (Norberg-Schulz, 1985: 27).

The site is located in the vast, open and natural landscape of Compassberg, situated on a hill at the foot of the mountain. The specific site is very secluded, and is found in the broader context of Nieu-Bethesda in the Eastern Cape. Even though the site is located in a remote area, there is a gravel road as well as a hikers footpath that leads towards the site.



Fig 10. Compassberg sketch

1.2.1

Challenges Identified

As a remote and natural site, the topological challenge is centred around the preservation of the natural views. There is a need on the site for a connectedness between individuals and nature, in which nature must dominate and the individual must observe.

Furthermore, the challenge is to blend in with the natural landscape. Careful thought will have to be given to the materiality of the proposed scheme.

1.2.2

Aims

The primary aims of this intervention are to understand how the proposed design can respect the natural environment at the site, whilst also relating to the contemporary user. This is to be achieved through a critical investigation into the context. The aim further refers back to the Aristotelian tradition of the word *topos*, to create a structure with which people can identify (Mendez, 2004: 154); the creation of a space on the site from which individuals can benefit and identify within the landscape.



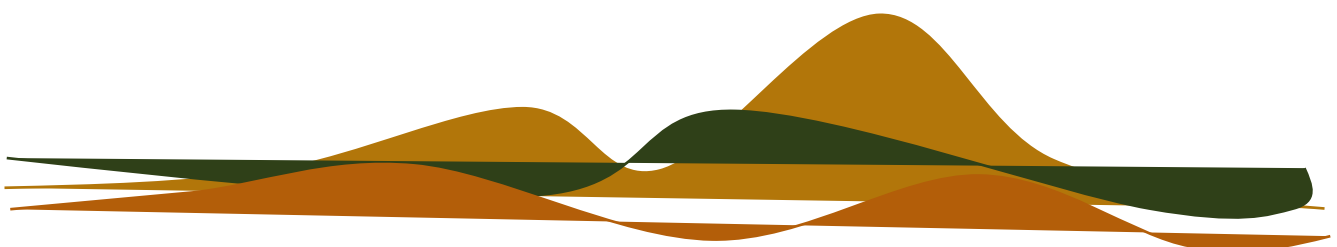
Fig 11. Nature vs man sketch

1.3 TYPOLOGY

Typology refers to the typical function organisation. The term typology is derived from the Greek word *typos*, which means 'type', 'model' or 'matrix' (Mendez, 2004: 158). Norberg-Schulz explains typology as the way in which different modes of dwelling manifests itself (1985: 29). In other words, typology refers to a typical way of dwelling, which includes the different ways that buildings can be organised.

In architecture, the typology refers to the classification of the type of building and is based on existing building types (Mendez, 2004: 158). These types are based on specific functions that must take place within the building. The functions are determined by the needs of the client and users.

The functional typologies of this intervention are a 'research centre' and a 'landscape interpretation centre', both can be classified as 'public institution' functional typologies. Investigating these typologies will lead to different design solutions, in some cases these solutions will prove useful whereas others may not be appropriate to the specific conditions of this project.

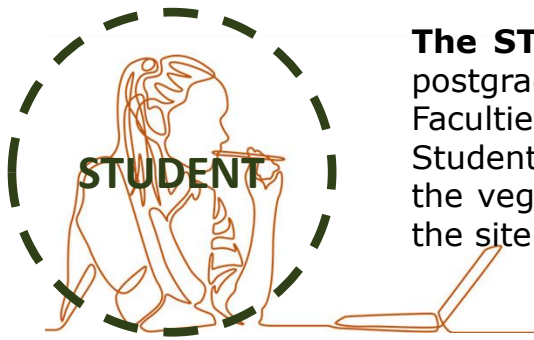


1.3.1

Client

The University of the Free State's Faculty of Science will be working in partnership with the CSSR, the Centre of Social Science Research. One of the CSSR's missions is to explore the interaction of human society and the natural world. They are currently working on a project called The Karoo Predator Project (Conradie, 2017: online). The objective of this project is to understand the ecology and political-economy of predation and to explore ways of protecting biodiversity whilst ensuring sustainable livelihoods (Conradie, 2017: online).

This proposed scheme could be beneficial for both partners because both are interested in a deeper understanding of the functioning of the natural landscape.



The STUDENT: can include, but is not limited to, postgraduate students from the Universities' Faculties of Natural and Agricultural Science. Students would typically be conducting research on the vegetation, geology and geographical factors of the site.



The TOURIST: can include, but is not limited to, the visitor, autodidacts, hikers, members of the U3A program and tourists in the area for the annual Oktoberfest.

1.3.3

Challenges Identified

The Plant Research Centre accommodates staff and visiting researchers, such as the students from the university. The essence of the Research Centre's typology lies within its productivity and efficiency. The goal of research is to learn and acquire knowledge (Steyn, 2017: 32). To facilitate a learning environment, a certain level of privacy is required. Therefore the Plant Research Centre will have areas that are closed off and exclusive; it restricts participation from the outside and only allows for selected individuals to enter, providing a space that is free from distractions and allowing the researcher to focus on the efficiency of the work being conducted.

However, the challenge lies within the incorporation of the public. A Landscape Interpretation Centre is also proposed, resulting in a different typology.

The Landscape Interpretation Centre's typology is a space that is open and accessible to the visitors. There is a notion of inclusiveness, inviting public involvement and interaction with the building (Steyn, 2017: 32).

The typological challenge lies in the fusion of these different typologies while still staying true to each individual character.

1.3.4

Aims

One of the most important aims of this project is the successful creation of meaningful architecture, where one can dwell, orientate and identify oneself within the Compassberg landscape. The project further aims to unify the contrasting typologies of the Landscape Interpretation Centre and the Plant Research Centre, so that these typologies will become part of the journey of appreciating and discovering the Karoo.

1.4 MORPHOLOGY

The morphology refers to the built form and structure of the building, the spatial quality of the architecture (Mendez, 2004: 100). It refers to the fact that architecture becomes a physical phenomenon with a shape, materials and textures. It is the physical response towards the 'voice' of the place-; the 'how' of the architectural response (Norberg-Schulz, 1985: 26).

1.4.1

Challenges Identified

The natural landscape of Compassberg has a very unique character because of its vastness and remoteness. The form of the new proposed structure must not overpower the existing landscape, but should contribute to the landscape. Therefore, the primary challenge, in terms of form-giving, is to find a balance between the natural and the manmade; introducing a new morphological voice that is relevant to the surroundings of Compassberg.

1.4.2

Aims

Morphologically, the project aims to communicate the essence of the various functions on site as well as fit into the cosmic landscape. The cosmic landscape refers to Christian Norberg-Schulz' categories of different landscapes. A cosmic landscape is categorised by its few, simple phenomena, such as the monotonous barren ground and the vault-like cloudless sky (Norberg-Schulz, 1996: 45).

1.5 TECTONICS

Tectonics refers to the structure of the building and relates to morphology as a physical building. This consists of the physical connections between various materials and elements. The structural details are derived from the abovementioned understanding of topology, typology and morphology.

1.5.1

Challenges Identified

The structural approach to a building at a secluded site must be carefully considered. Basic tasks, such as the transportation of materials onto the site, are difficult. The choice of elements and materials should make ethical and structural sense in terms of this project.

Similar to the morphological challenges and aims, the tectonics or structural resolution of the project needs to assist in creating a building that balances the natural landscape and the manmade.

1.5.2

Aims

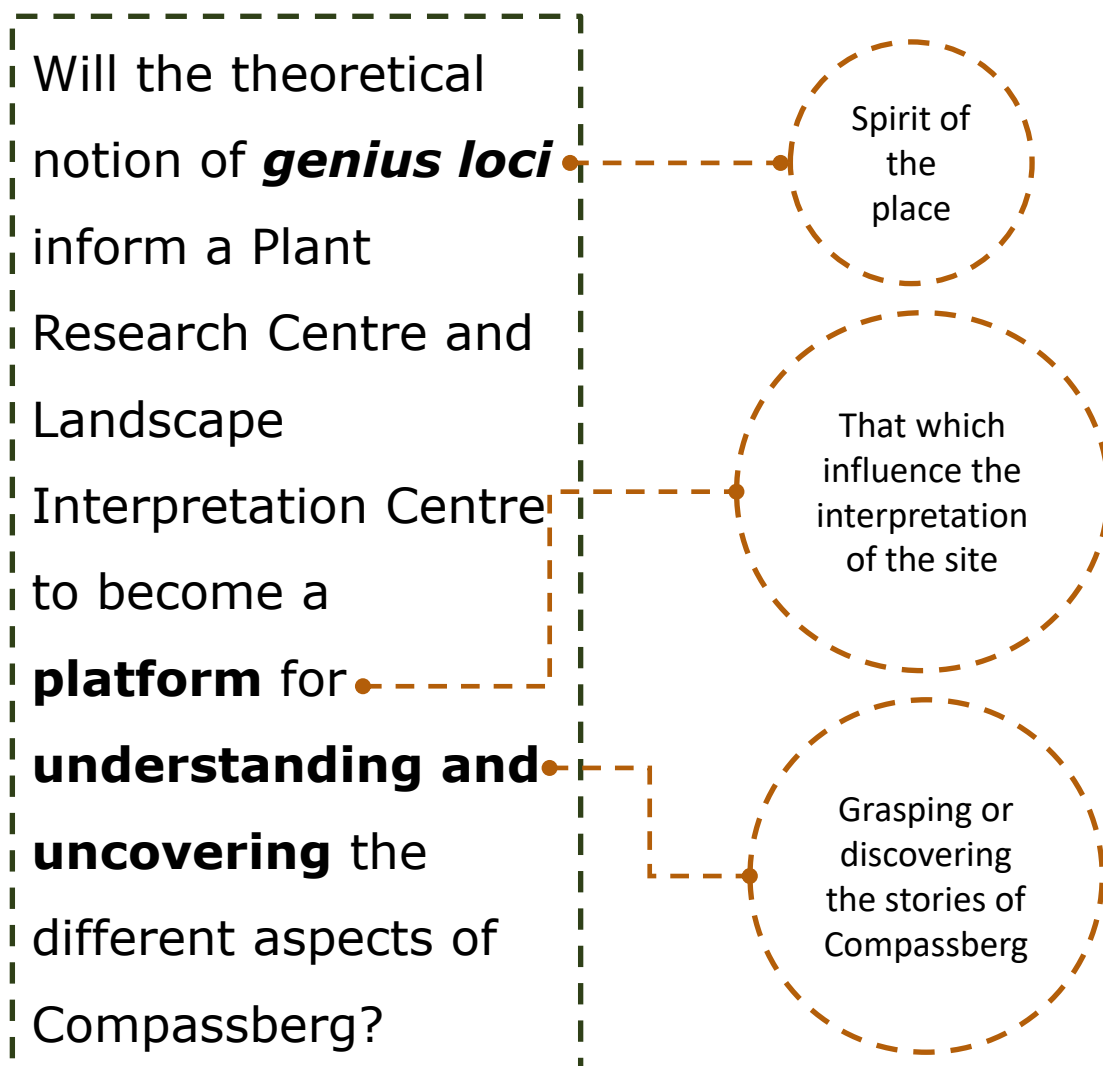
With reference to the previously mentioned aims, the aim for the construction of the structure is to reflect the existing elements in the context and to add value to the surrounding natural landscape.

1.6 RESEARCH QUESTION

After identifying the challenges and aims of the topology, typology, morphology and tectonics of the site, certain parameters for the investigation can be conducted.

A deep understanding of a place plays an important role in the way that individuals will interpret that place. This raises the question of whether a Plant Research Centre and Landscape Interpretation Centre will provide a platform for understanding the spirit of the place. Will the discovery of the character of the place create a meaningful space in which the visitor will be enabled to understand and attach their own meaning to the place?

This centre will focus on combining the actual research process with the narrative of the visitor, by proposing a route through the centre, which becomes part of the journey to uncover the different layers of the place.



1.7 SUMMARY

Topology: The understanding of responding ethically towards the natural elements of the landscape, the history and culture found at the site and within its larger context.

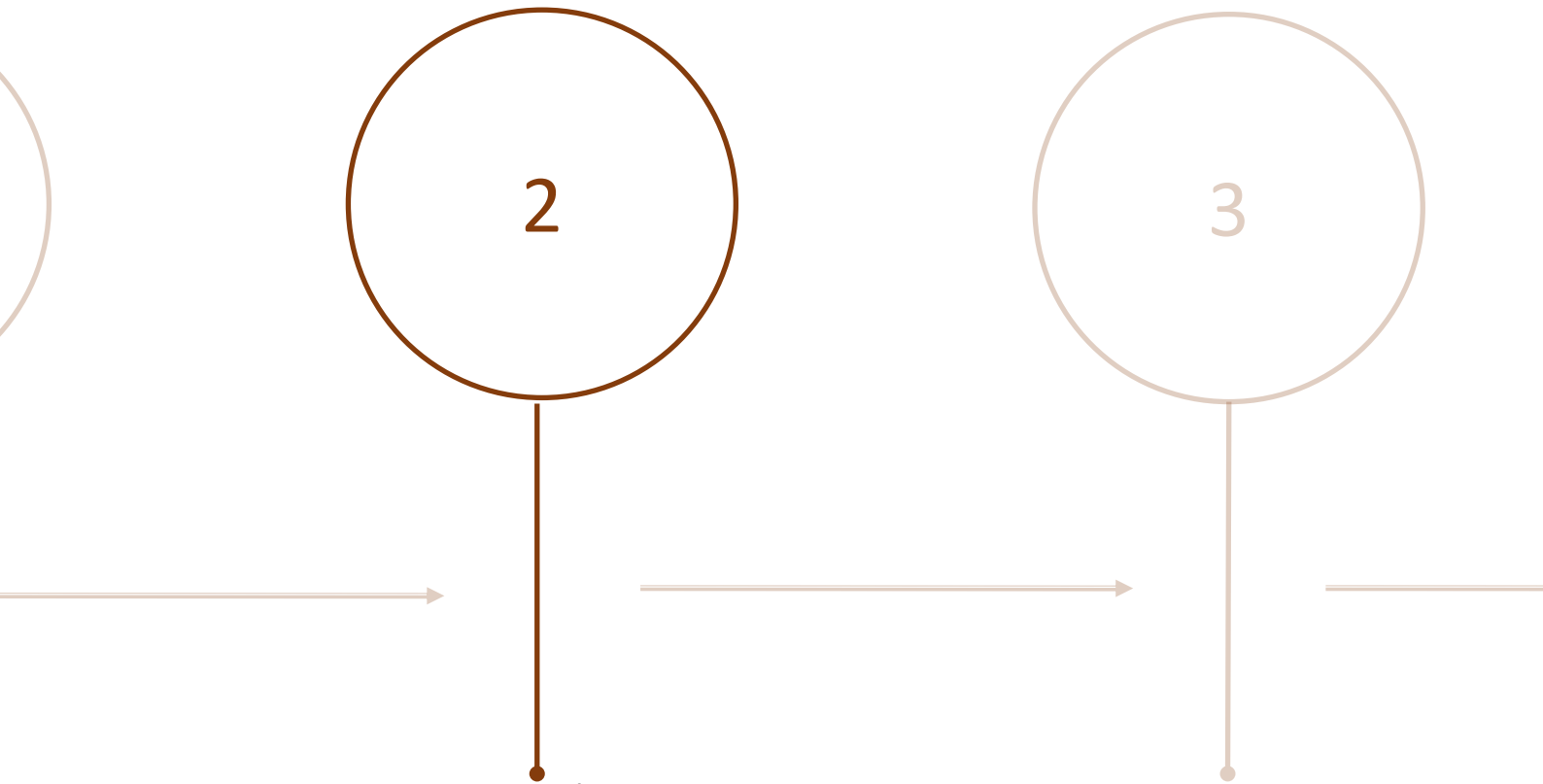
Typology: the project aims for the different typologies with seemingly conflicting programme requirements to work in unison. For the building to work and function as a whole, the exclusive nature of a research centre and inclusive nature of an interpretation centre must be addressed.

Morphology: the design aims to present an architectural form that 'connects' with the surrounding landscape by finding the balance between nature and man.

Tectonics: the structural resolution of the project aims to indicate an approach to an architecture that does not dominate the natural landscape, but rather adds to it.



Fig 12. Compassberg in the winter (Bruwer, 2014: online)



- 2.1 Touchstone
- 2.2 Formative Conceptual Ideas
- 2.3 Topology
 - 2.3.1 Macro Context
 - 2.3.2 Meso Context
 - 2.3.3 Micro Context
 - 2.3.4 Precedent Study
- 2.4 Typology
 - 2.4.1 Investigating the Client and Users
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 - 2.5.4 Responses
 - 2.5.5 Precedent Study
- 2.6 Tectonics
 - 2.6.1 Structural Philosophy

OVERVIEW

In order to address the design problems and challenges indicated in the previous part, ideas are presented and aimed at the ideal solution. The ideas are focused on guiding the design process to achieve certain aims. These ideas are initiative and the overall design solution should, therefore, not necessarily be evaluated solely against these ideas and concepts.

To begin this process a touchstone was created as an abstract interpretation of the core ideas of the project. The touchstone is used as a point of reference and was used to develop the conceptual ideas. These conceptual ideas address an overall challenge presented in the scheme and are not concerned with the intricate details and restrictions.

2.1 TOUCHSTONE

A touchstone is a design tool against which the design and the design development can constantly be measured. It is meant to capture the essence of a design and illustrate, in an abstract manner, the conceptual thinking that drives it.



The natural landscape is a significant part of this dissertation. Which raises the question; what does this intervention hope to achieve regarding the landscape's natural beauty and history?

The answer: to uncover the different layers of its beauty and uniqueness, while staying true to the spirit of the place. In other words, paying homage to the physical, as well as the emotional aspects of the site.

The touchstone indicates a framing of that which is already there.

This is shown in the way that the natural rocks are exposed in layers of glass boxes.

The stacking of the rocks inside of the glass boxes is a suggestion of the learning process or the discovering process:

During a visit to the site, I realized that the footpath that leads to the top of the mountain eventually ends, which means that the hikers must find their own path up the mountain. Previous hikers marked the 'best' route by staking rocks, also known as a cairn, or a waymark. This is a process of learning and passing down knowledge to help and educate others.

Therefore, the project aim is twofold:

1. Researching/discovering the surrounding landscape.
2. Respecting the natural landscape.



2.2 FORMATIVE CONCEPTUAL IDEAS

Mimicry

The art of imitating something: This concept is based on the biodiversity of the landscape, the archaeology and the material culture found in the area. Norberg-Schulz defines these aspects as the *concrete phenomena* or the physical factors that are present at the site (Norberg-Schulz, 1996: 9).

Critical Reflection:

By mimicking certain objects at the site, the architecture could become part of the landscape or an extension of the physical site. The concept indicates the importance of listening to the existing context of Compassberg.

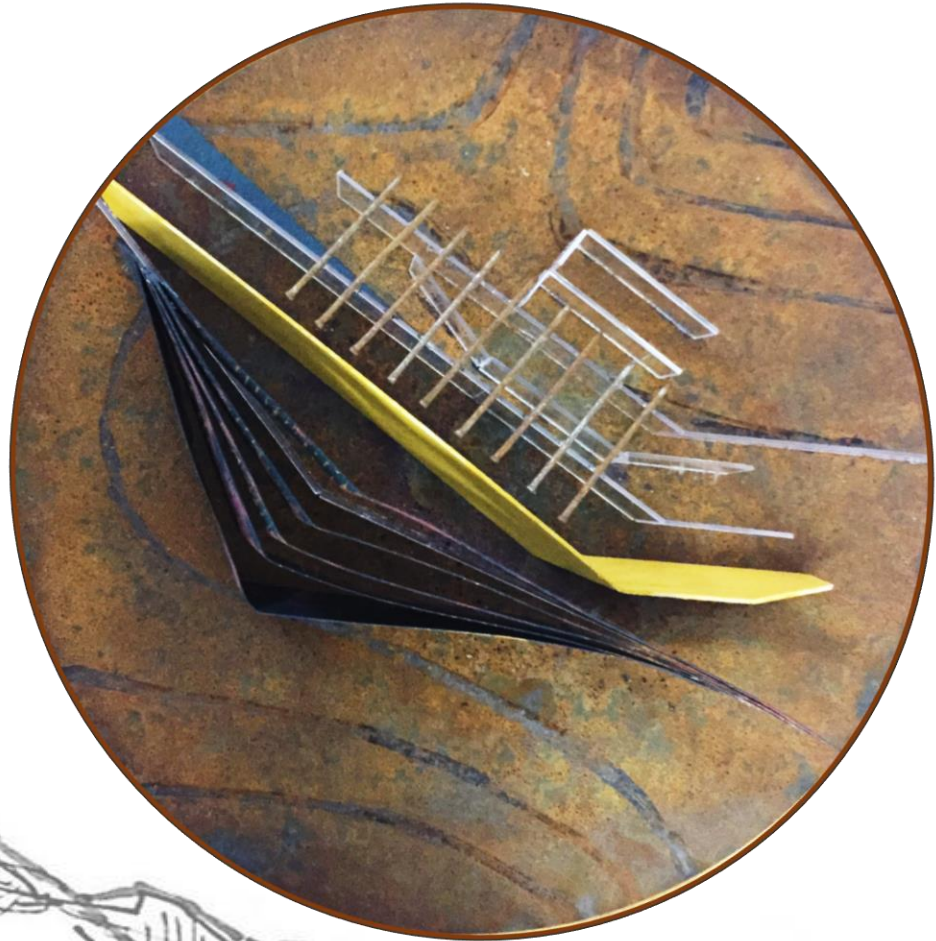


Covering

The second concept is based on the climate of the Karoo. Another important aspect of the site is the arid, semi-desert zone. This harsh climate makes shade a very important element within the design. Therefore, focus is given to the way that the building is wrapped and sheltered.

Critical Reflection:

Karoo architecture is known for its big terrace/‘stoep’ areas, the traditional ways of shading could influence the way that the proposed building is sheltered.

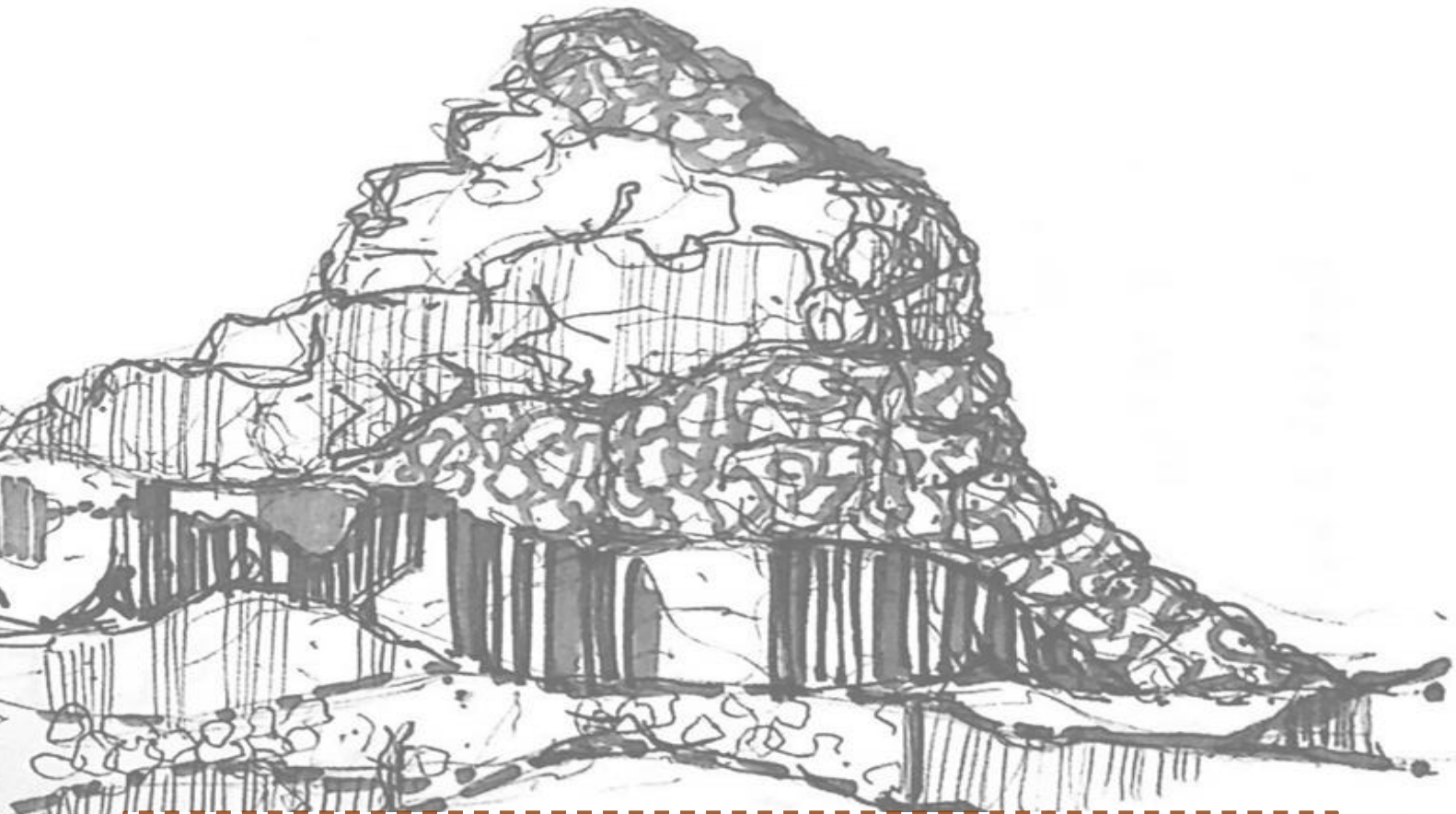




Journeying

Narrating: a series of related events through storytelling and travelling. The last concept is inspired by the storytelling of the different aspects of the site.

Critical Reflection: This approach raises the question; how will the proposed scheme tell the story of the landscape and become part of the journey of the visitor?



Summary

Through this exploration, it becomes clear that there is not one ideal approach: rather, there are valuable ideas, which could all, in combination, influence the design approach.

2.3 TOPOLOGY

The following topological investigation is a quantitative and qualitative analysis of the site. It includes looking at the broader, macro context of the site, such as the surrounding towns. As well as the journey leading towards the site. The purpose of this analysis is to gain an understanding of the voice and character of the site in order to propose an appropriate design response.

Situating the Investigation:

The chosen site, Compassberg, is situated in the Eastern Cape, Nieu-Bethesda. The site has many unique qualities. It has layers of untold stories within its history and geology. There are those (Valentine, 2010: online) who believe that all places have a story that wants to be told. Some places have a story stored within its context. The rationale of this scheme is to translate the untold and undiscovered stories of Compassberg.



Fig 13. Compassberg in the distance (Naude 2019: online)

2.3.1 Macro Context

site location

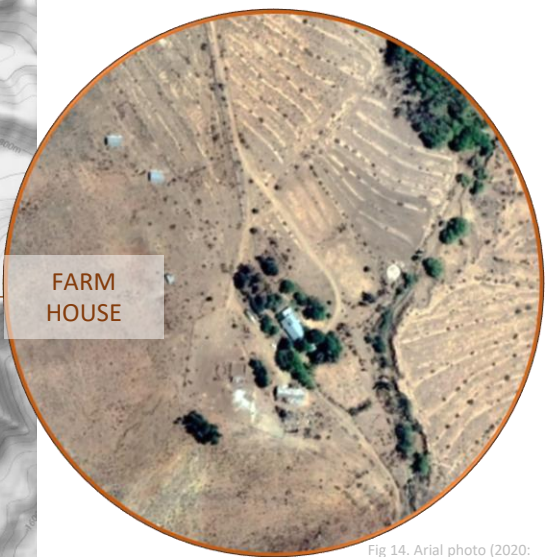


Fig 14. Aerial photo (2020: online)

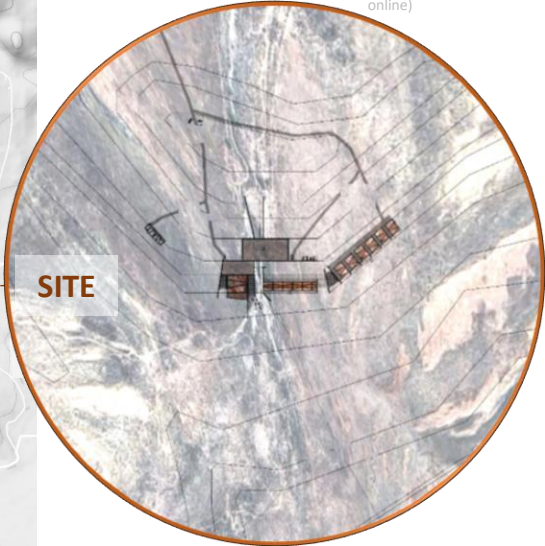
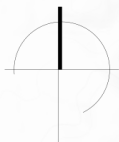


Fig 15 View from Compassberg (own)



Fig 16. Aerial photo (2020: online)



2.3.2 Meso Context

site plan

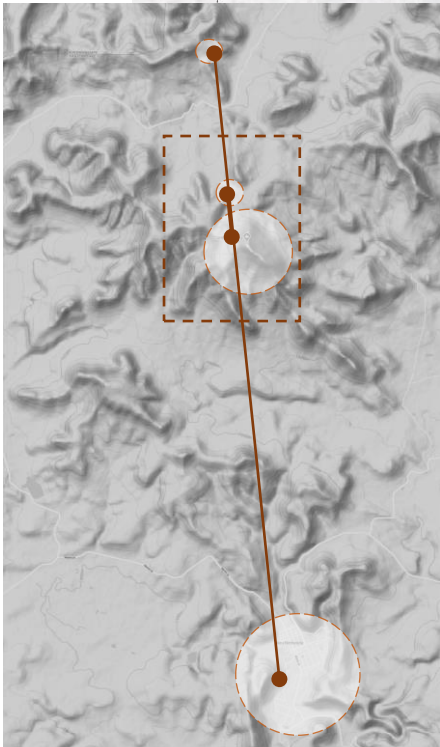
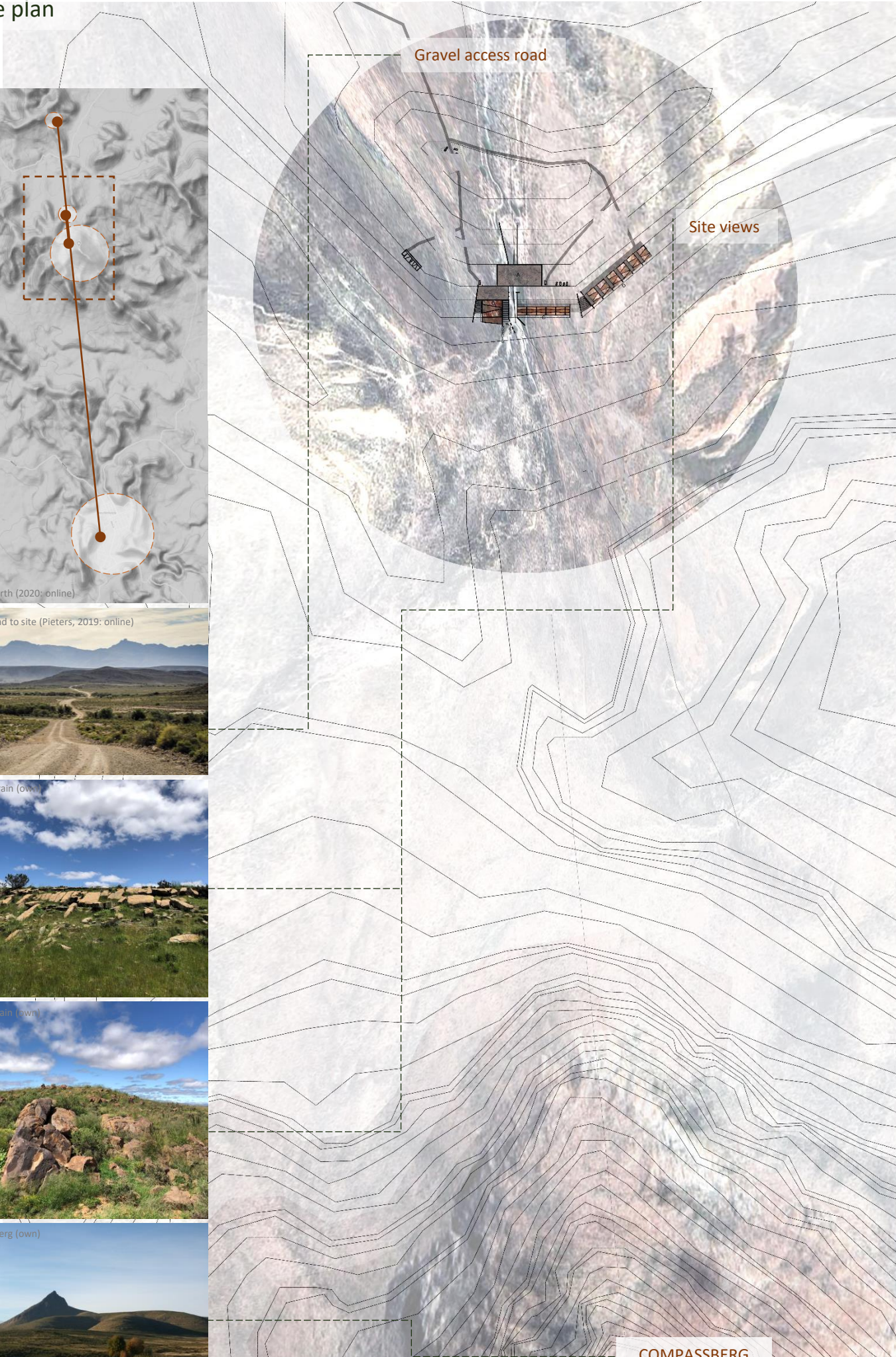


Fig 17. Google earth (2020: online)



Fig 18. Gravel road to site (Pieters, 2019: online)



Fig 19. Site after rain (own)



Fig 20. Site after rain (own)



Fig 21. Compassberg (own)

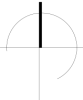
COMPASSBERG



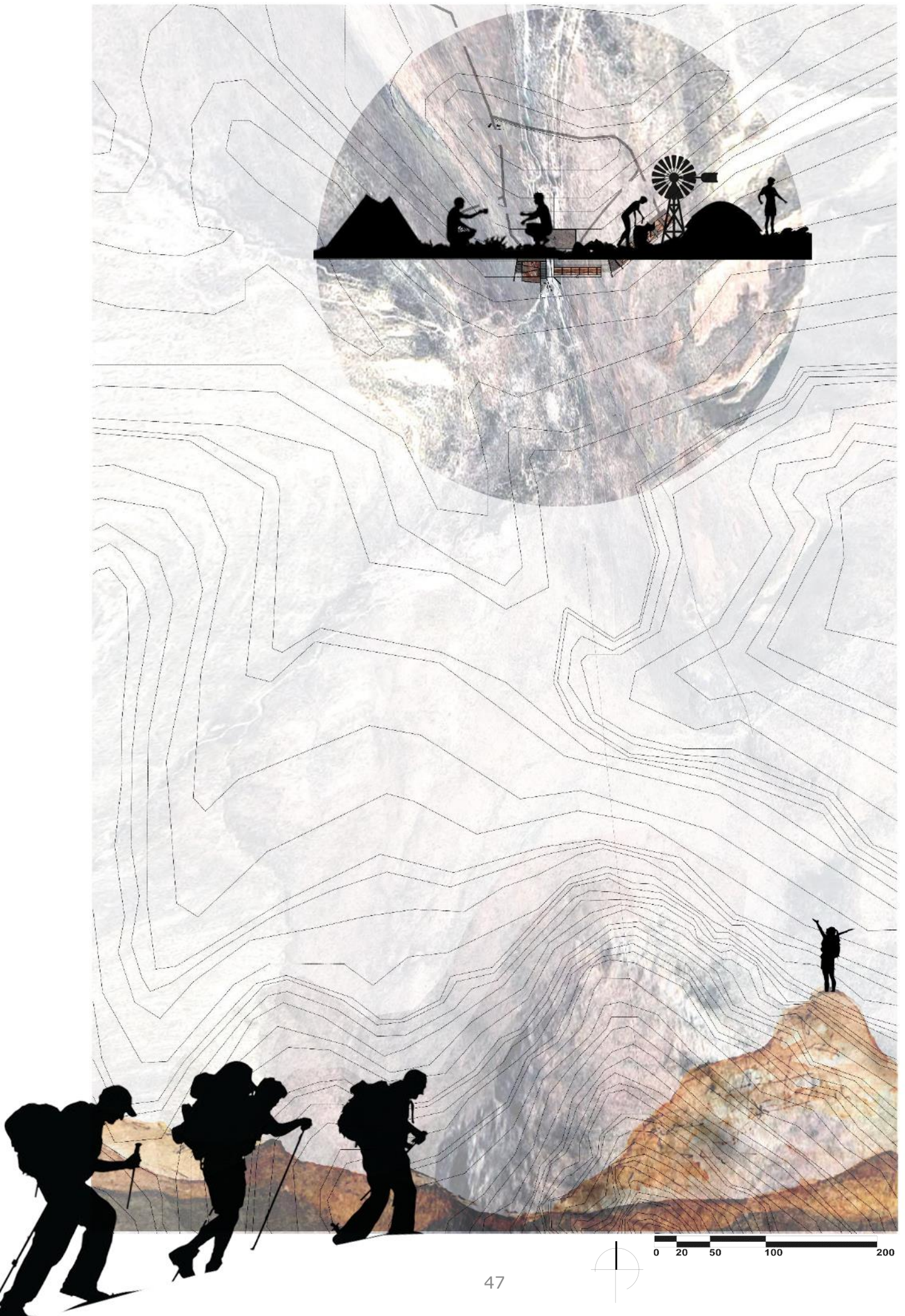
VIEW OF COMPASSBERG:



SITE



CURRENT USE OF SITE:



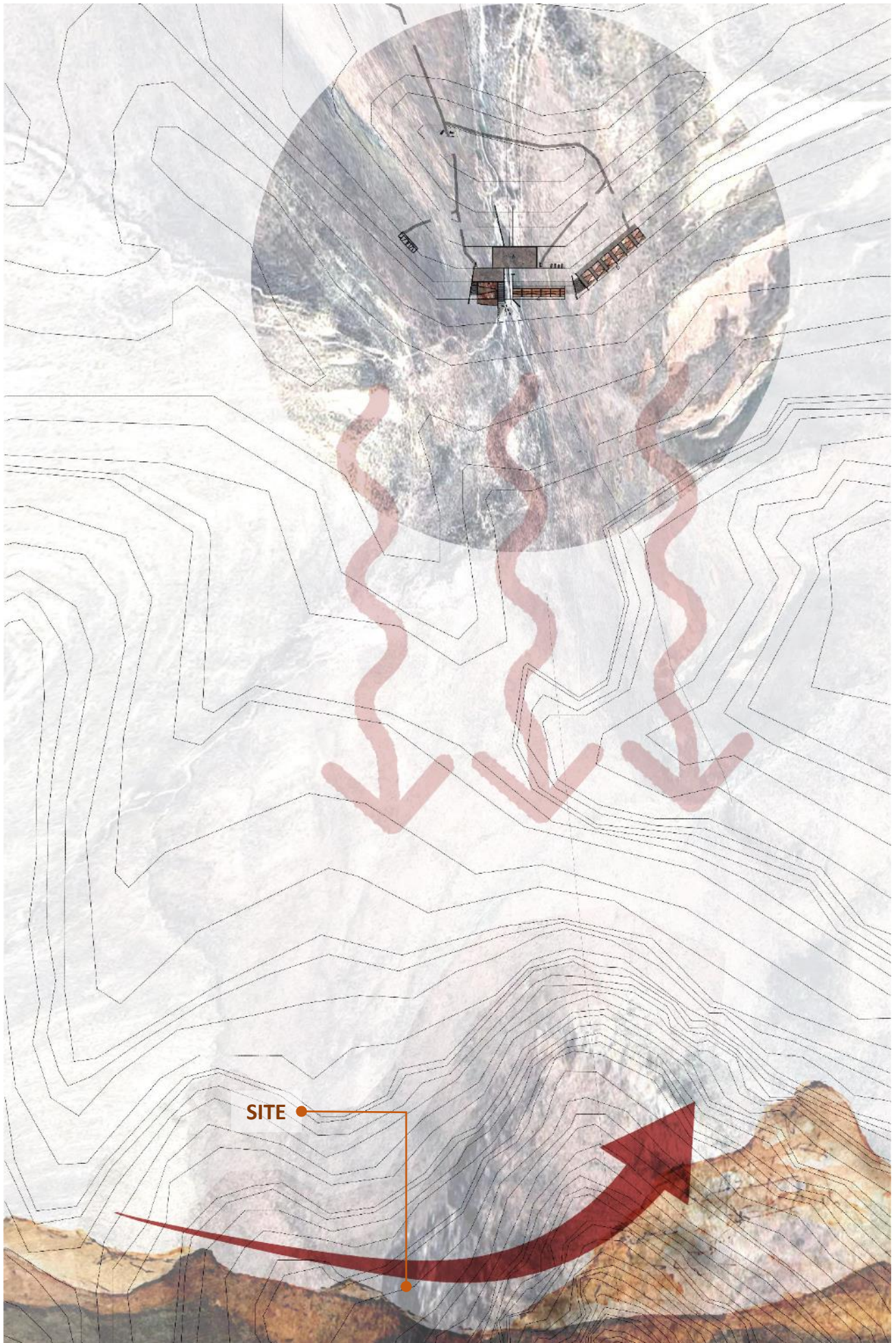
VEGETATION DENSITIES:



0 20 50 100 200

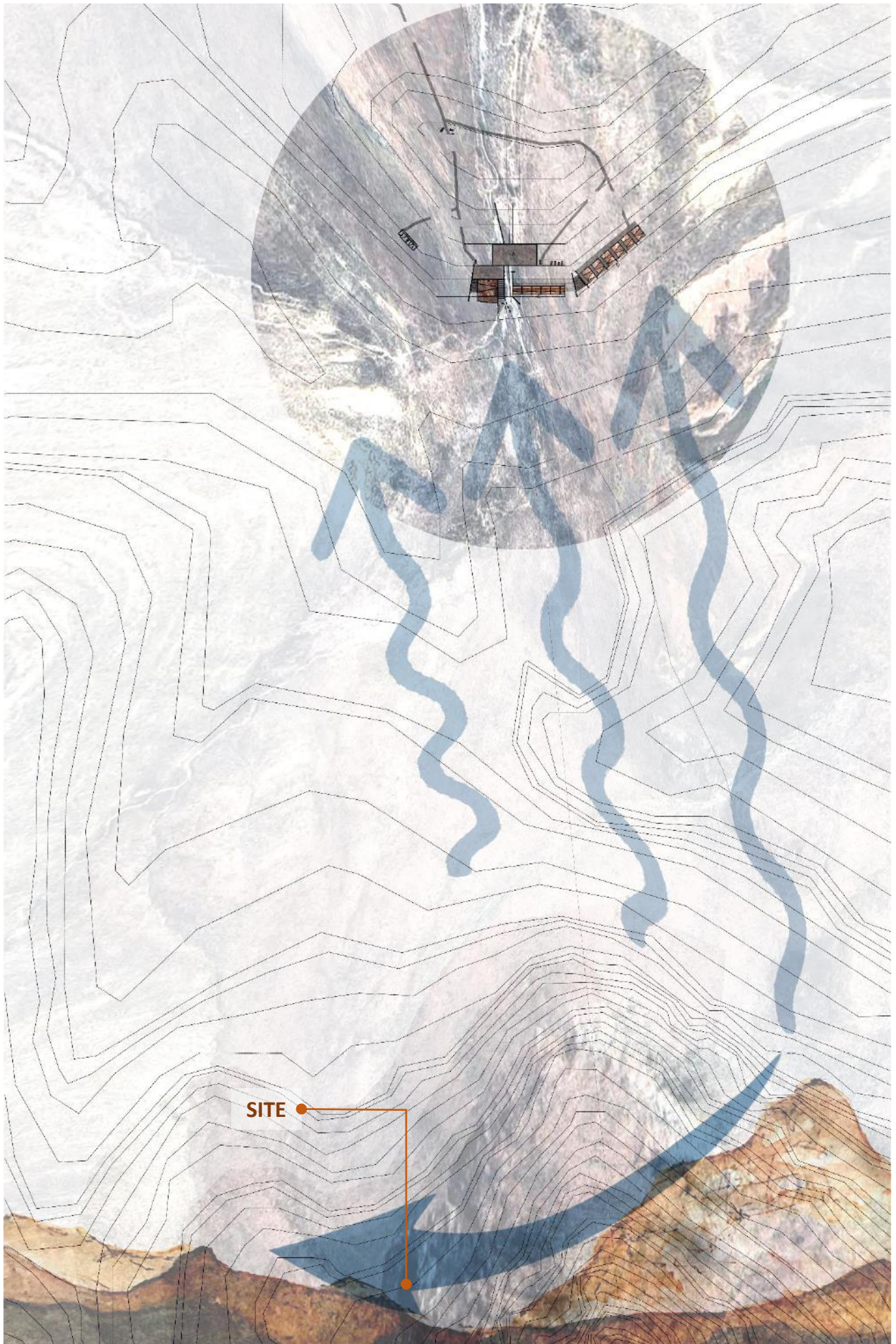
DAY WIND:

Anabatic Winds – warm winds moving upward from the site to the mountain.



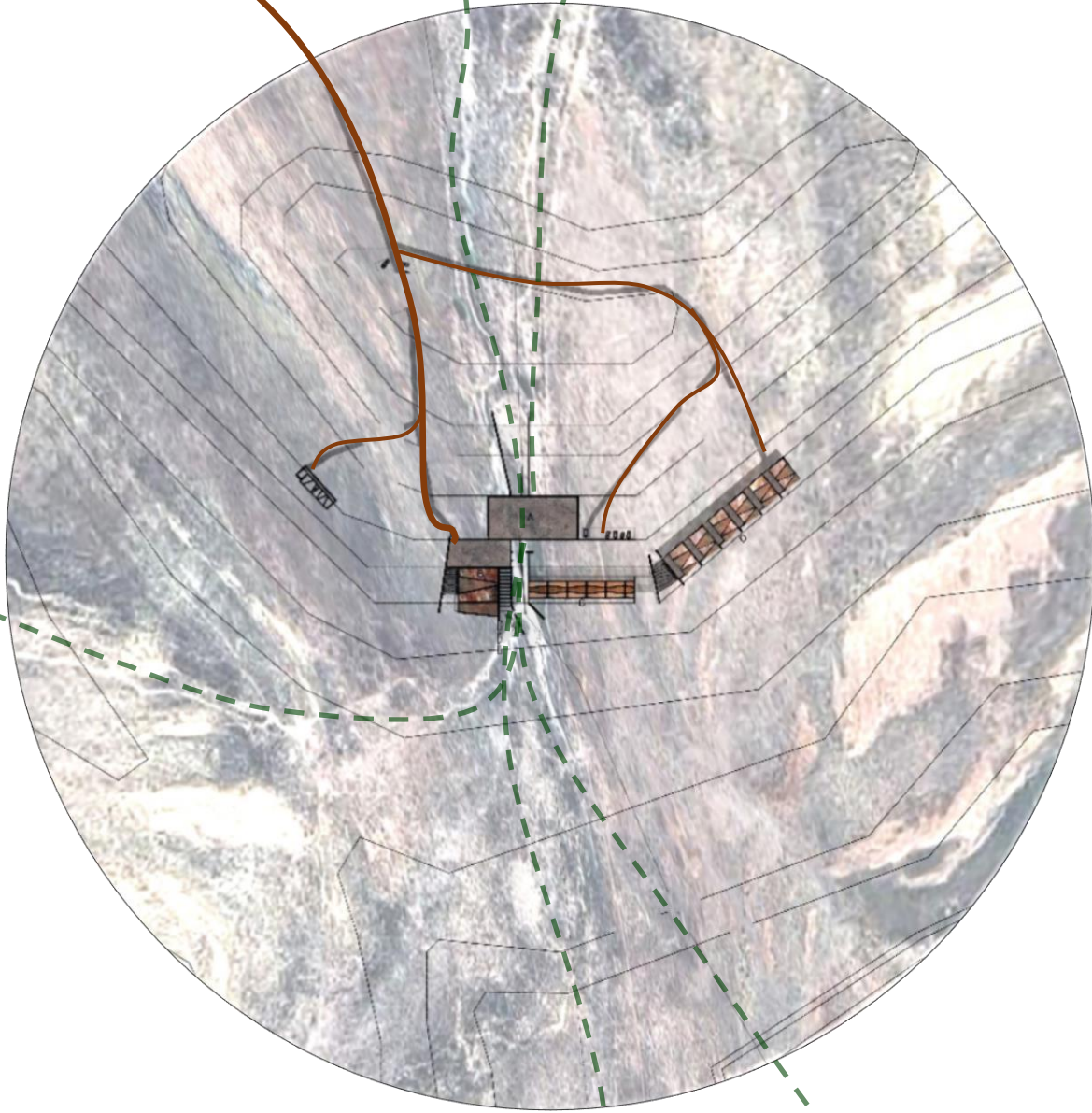
NIGHT WIND:

Katabatic Winds – wind carrying high-density air from the mountain top to the site below.



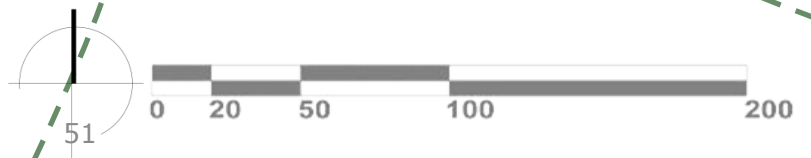
2.3.3 Micro Context

ROADS:



Existing Hikers Footpath

Vehicular Gravel Road



VEGETATION vs ROCKY AREA:

Vegetated area

Site - Existing camping spot scattered with rocks

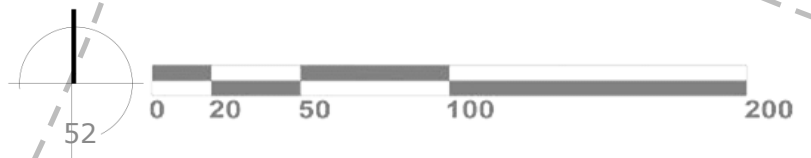
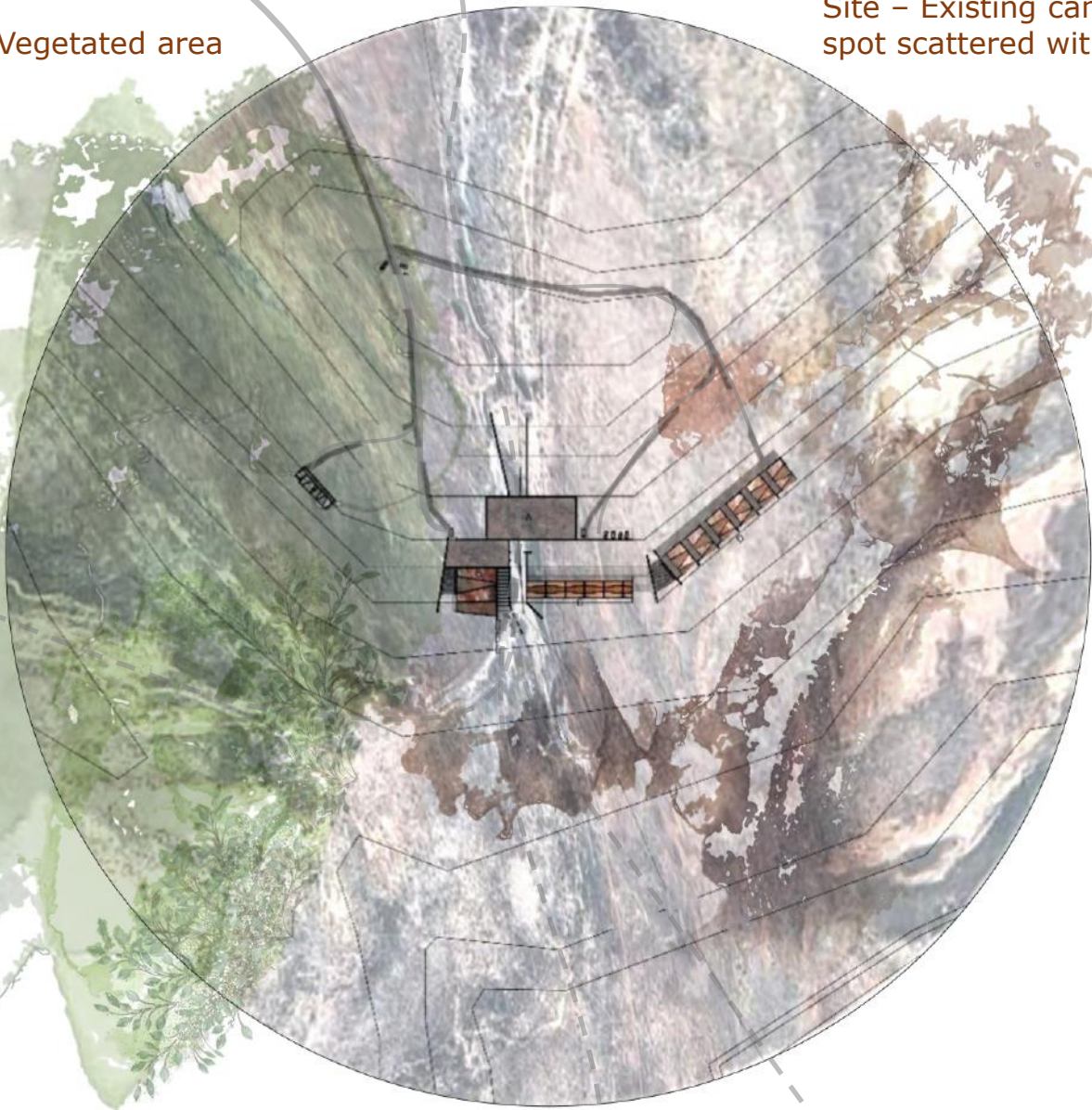




Fig 22. Compassberg (Krog, 2019: online)

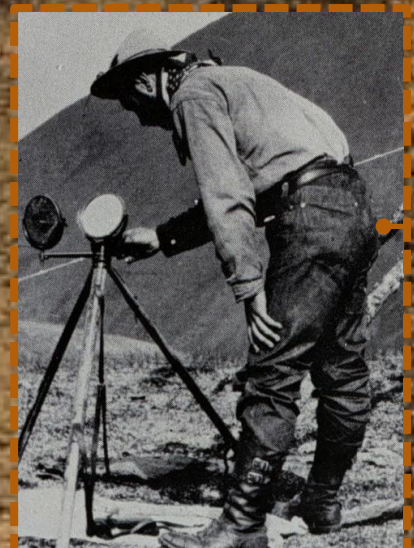


Fig 23. Heliograph (n.d: online)

Climate

The term “*Karoo*” originated from the San people. In their native language, *Karoo* means *land of great thirst* (Murray, 2015: 4; Gabie, 2014: 51; Pienaar, 2009: 78). The Karoo is still associated with its vastness and arid climate.

Compassberg in a semi-desert zone has an average altitude of approximately 1200m above sea level. Due to this central high-plateau, the summer temperatures reach above 40 degrees Celsius (Murray, 2015: 6).

The annual rainfall is 400mm, mainly occurring during the summer months of November, December and January (Murray, 2015: 6). It is very uncommon to have winter rainfall within this area. The rain is brought by the humid sea winds and falls on the weather side of the mountain slopes, causing the lee side of the mountain to stay mostly dry (Murray, 2015: 7; Pienaar, 2009: 26).

Compassberg

Compassberg is the highest peak in the Sneeuberg range; it resembles a compass needle towering 2 502 meters above sea level (Clarke, 2006: online).

The mountain harbours a diversity of fauna and flora. One of the unique, endemic animal species includes the *insecta* known as the Compassberg Skolly (*Thestor compassbergae*) (Clarke, 2006: online). It is a butterfly, found only on the slopes of this mountain.

The locals of Nieu-Bethesda tell stories of South African troops that used Compassberg as a message point during the Anglo Boer War. The troops sent messages to the Cockscomb mountain near the coast using heliographs (Van den Heever, 2020).

• A Heliograph, (Fig 23) is a device that was used to send signals, by which sunlight was reflected on a rotatable mirror (Riddle, 2012: 14).

Archaeology:

The Nieu-Bethesda area is rich in archaeological history, some of the oldest fossil bones in South Africa were found in the area (Fig 24). The Kitching Fossil Exploration Centre in the town of Nieu-Bethesda showcases fossils estimated to be 253 million years old (Becker, 2020: online).



Fig 24. Fossil bones found in Nieu-Bethesda (Kroch, n.d: online)

Geology:

Compassberg is composed of iron-ore bearing rocks. The iron-ore first formed over 1.8 billion years ago (Pettersen, 2013: 7). The oceans contained an abundance of iron. Only when the first organisms that were capable of photosynthesis came to existence, did the iron start to dissolve. The iron combined with the oxygen released from these organisms and formed iron formations (Pettersen, 2013: 7); Compassberg being one of many results of these formations (Harnmeijer, 2003: online). The rusty red colour of the rocks as well as the unique needle-like peak of the mountain is a result of the chemical reaction of iron combining with water and oxygen (Pettersen, 2013: 11).

The iron-ore's quality is influenced by the percentage of iron found within the rocks (Pettersen, 2013: 19). Deposits with less than 30 percent iron are not used for commercial purposes. Another quality that influences the usability of the iron within the rocks is the other constituents also found in the rocks (Pettersen, 2013: 19). Compassberg rocks are not mined and cannot be used for commercial purposes due to the nature of the composition of the rocks.



Fig 1. View from Compassberg (Louw, 2019: online)



Fig 25. Iron-ore bearing rocks (Smith, n.d: online)

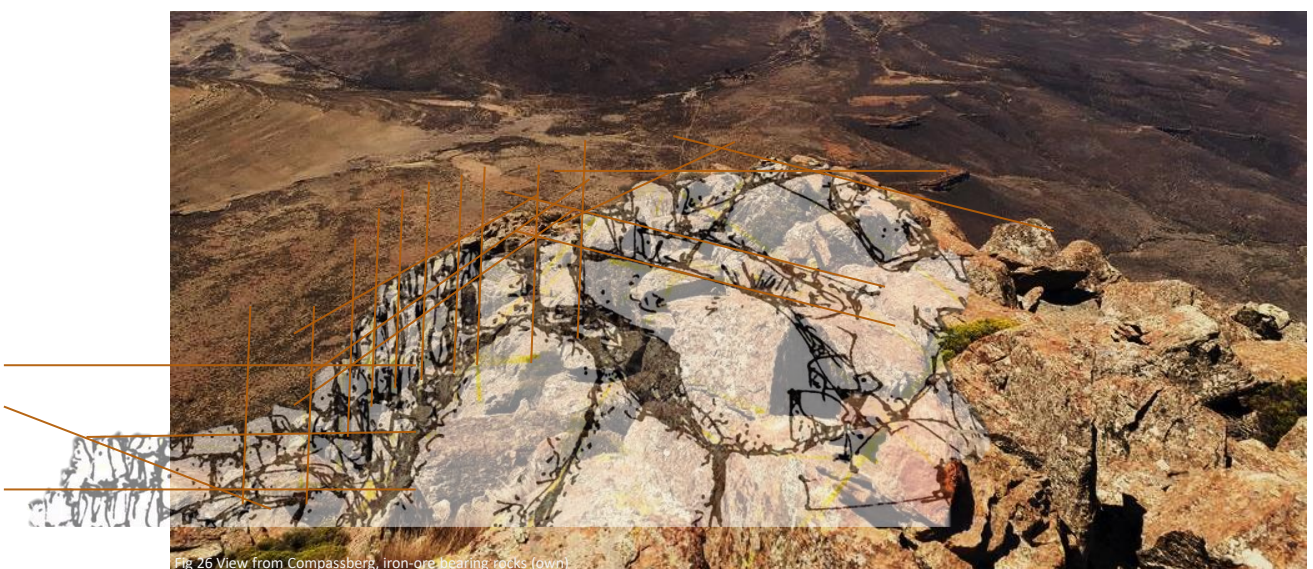


Fig 26 View from Compassberg, iron-ore bearing rocks (own)



Fig 27. *Bijlia cana* (Germishuysen, 2013: online)

Flora:

These specific geological conditions and the arid climate of Compassberg resulted in a distinctive vegetation. The plants in this area have unique water storing qualities because of the harsh temperatures and little rainfall (Satyendra, 2015: Online).

Some of the endemic succulent plant species include (Hoffman, Gillson and West, 2016):

- *Brunsvigia Grandiflora*
- *Brunsvigia Radulosa*
- *Kniphofia Acraea*
- *Kniphofia Ifafa*
- *Kniphofia Stricta*



Fig 28. *Brunsvigia Grandiflora* (Satyendra, 2015: online)

The Karoo has the richest succulent flora in the world (Hoffman, Gillson and West, 2016). Some of these plant species can only grow in these specific geological conditions. This site harbours such endemic succulent flora.



Fig 29. *Brunsvigia Radulosa* (plantinfo, n.d: online)

The type of plants found in this area are often used for folk medicine and as commercial therapeutic medicine (Hoffman, Gillson and West, 2016).



Fig 30. *Kniphofia Acraea* (Rooyen, 2017: online)

In an interview with a Khoi-San tribe member, Gabie, who authored *Khoisan Ancestry And Coloured Identity*, discussed the connection between the native individual and the Karoo. When Gabie asked what the Khoi-San tribe meant when they referred to 'apteek' the member answered with:

"A person can walk for miles without finding a single plant. Our eyes are not trained enough to always spot a plant. In the dry season like now, it's hard because there is no leaf to show you where the plant is. I can sometimes overlook a plant, but the porcupine can find it. He can go into the darkest hour of the night, into holes, where nobody can find the growing plant, and he eats it. That medicine that is under the ground, he digs it up from underneath the ground. This is the best medicine that a human being can find. The plant has all the cures in it. That is the *apteek*." (Gabie, 2014: 62)



Indigenous people gained their knowledge through direct contact and experience in the natural world (Barnhardt and Kawagley, 2005: 11). The Khoi-San engage with fauna and flora by using classificatory systems, using their own meteorology, physics, chemistry and earth science; 'knowing one's inner world.'

The Khoi-San member describes his observation of the porcupine, what it represents and the importance of knowing how to seek out medicinal plants in times of drought. This transmission of knowledge, such as the treatment of particular ailments are shaped by and derived from human participation with their respective environment (Gabie, 2014: 52; Barnhardt and Kawagley, 2005: 12).



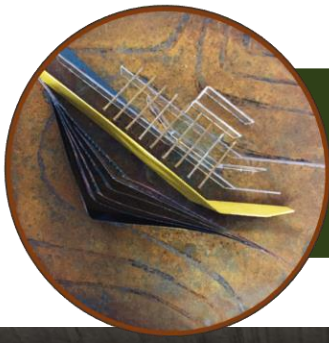
Fig 32. 'Karoo Bos' (Naude, 2019: online)

Conclusion:

The various aspects of the site discussed above, presented the opportunity to highlight the layers of **history** and **uniqueness** by proposing a **Landscape Interpretation Centre**.

The lack of places allocated for **documenting and researching** the qualities that the **vegetation** has to offer, presented another opportunity to propose a **Plant Research Centre**. Furthermore, the abovementioned interview by Gabie (2014: 52) highlights the importance of researching the fauna and flora at the specific site. It is necessary that the researcher not only use modern ways of learning, but that they should also engage with the natural environment to obtain optimal knowledge of the surrounding biodiversity.

2.3.5 Precedent Study



**Covering &
Topological
Precedent**

Sancaklar Mosque

Büyükcçekmece,
Istanbul
Emre Arolat Architects



In architecture, topology refers to the natural and artificial features of a site. It is the surface terrain of the site (Mendez, 2004: 153).

The Sancaklar Mosque is embedded in the landscape, only the stone roof and minaret are visible from certain areas around the perimeter. The Mosque aims to create secluded private spaces. This is achieved as the outside world is left behind when one moves through the landscape, down the hill and in between the walls that lead to the entrance of the mosque (Mairs, 2015: online). "The project constantly plays off of the tension between manmade and natural" (Mairs, 2015: online).

The Mosque has pieces of stone that are set into the sloping landscape with tufts of grass sprouted around the stonework. These steps lead down to the sunken building. The Mosque is built to blend in with the topography of the landscape (Mairs, 2015: online). **Similar to what the proposed scheme aims to achieve.**

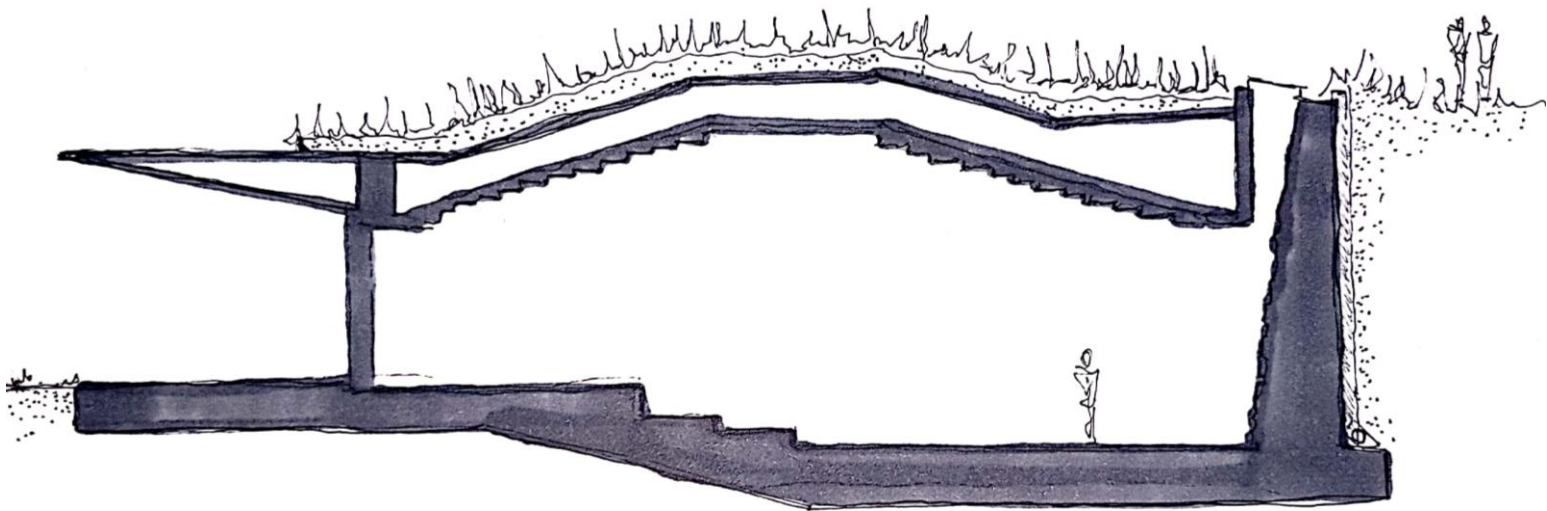


Fig 34. Sancaklar Mosque

COVERING CONCEPT

The covering concept, as previously mentioned, refers to the way that the building is sheltered and protected from the outside world. Lessons learned from this precedent indicate that the sheltering or covering of a building plays an important role when the aim of the building is to blend in with its natural surroundings.

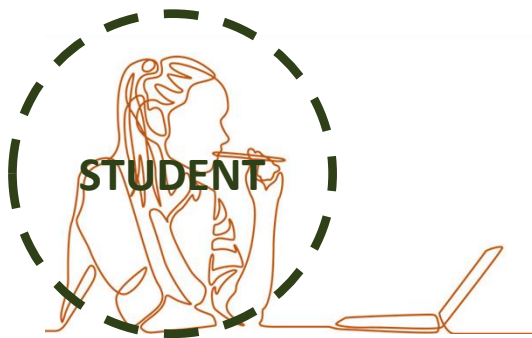
2.4 TYPOLOGY

In this chapter, the nature of each typology present in the scheme will be investigated as it relates to the functional programme. The processes and activities proposed for the scheme will be illustrated as supportive information to the accommodation list.

1.4.1 Investigating the client and users

As mentioned previously, the client for this proposal is the University of the Free State's Faculty of Science and the Centre of Social Science Research (SSU). Part of the SSU's mission statement is to understand and protect the natural world by looking at the way society interacts with the environment. Proposing a centre dedicated to explore and highlight the importance of the environment of Compassberg will add to the SSU's mission and aims.

Intended Users:



Students:

Interested in researching and engaging with the surrounding biodiversity.

Amount: 1-10



Tourist and visitors:

Interested in exploring and appreciating the site.

Event Goers:

Attending events hosted by the Centres.

Amount: 1-100

Expanded Staff:

During seasons where visitors and students are limited, a permanent staff member will act as the following:

- Tour guide,
- Receptionist (for the admin purposes such as giving visitors accommodation keys),
- Tuck shop worker and
- General upkeep and cleaning staff.

During such seasons (refer to pg. 26) the facilities such as the restaurant and plant retail store will be closed.

In the peak seasons, as well as for organised events, the following staff will be available (could differ for the specific event or season):

2- Tour guides

1- Receptionist

2- Retail employees, one selling products and one acting as a dispenser.

1- Research personnel (excluding the students)

5- Kitchen staff and servers

1- Tuck-shop worker

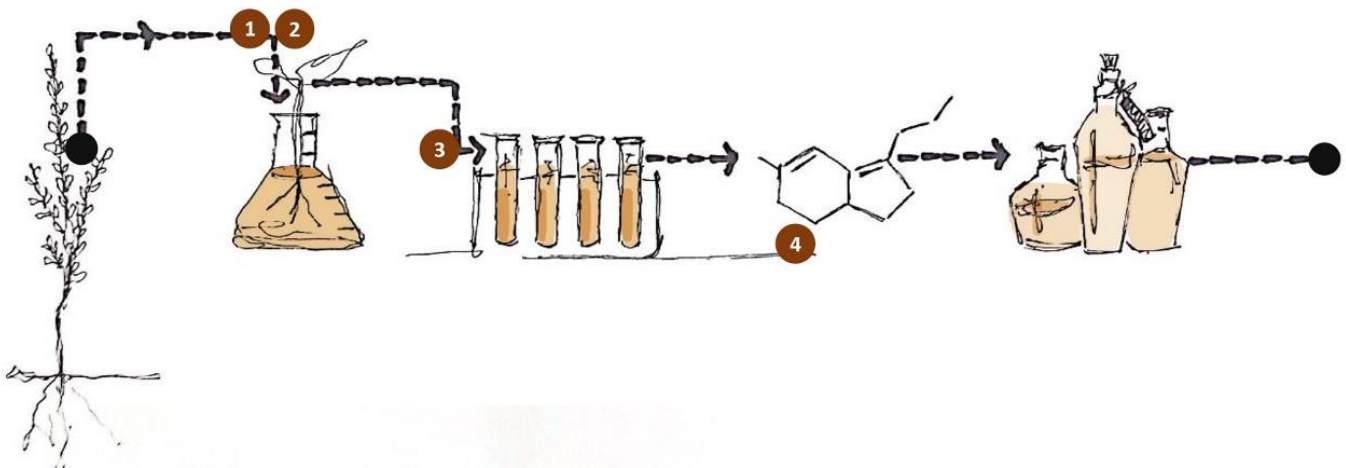
1- Cleaning staff

1.4.2

Investigating similar functional Typologies

Investigating the built example of a research centre or laboratory and how it functions serves as a background for setting-out an accommodation list and understanding how such a typology should be organised. It further establishes what technical and functional requirements need to be investigated in the technical report.

First, the technical and scientific processes of the specific research is investigated in order to find an appropriate built example that does similar research to that which is proposed.



Researching plant culture for its medicinal properties:

First, researchers propagate plants from small amounts of starting tissue. This is used to create multiple identical plants, in order to preserve and protect the existing biodiversity, aiming to understand not harm the natural landscape (Isaacs, 2018: online).

This starting tissue includes the pollen, shoot nodes and leaves of the plant, which is then taken to the laboratory.

Within the laboratory, it is important to disinfect, this process includes a washing room or station, where relevant equipment is cleaned and all surface debris is removed. Products such as bleach are used to ensure all bacteria and fungi are killed (Isaacs, 2018: online).

The callus, which is a mass of undifferentiated tissue that is capable of producing more tissue types, is then induced (Isaacs, 2018: online). This goes through various scientific steps, which eventually leads to the multiplication of the plants. These plants can then be further researched and developed into appropriate products, such as medicinal products and cosmetic products.

Built Example:

Sainsbury Laboratory at Cambridge in the United Kingdom
By Stanton Williams Architect

The Sainsbury Laboratory functions as a research laboratory where the diversity of plant species are investigated and catalogued. The research laboratories provide a stimulating environment for research and collaboration.

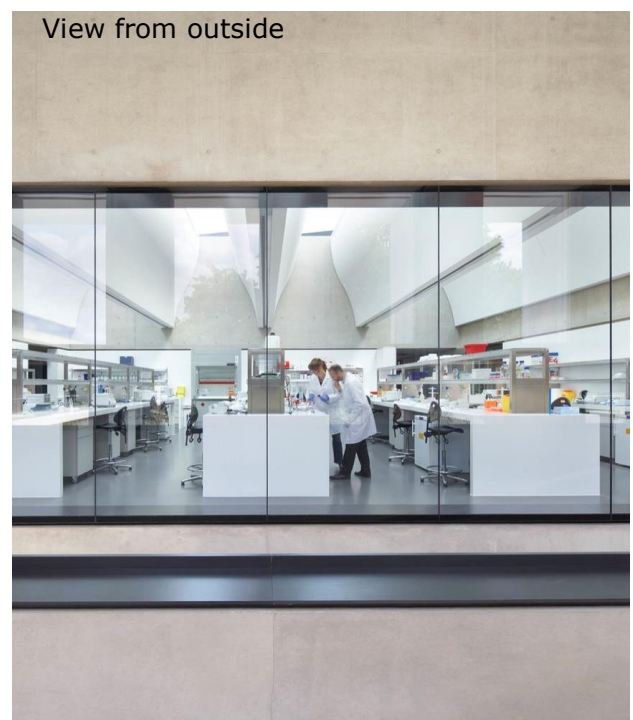
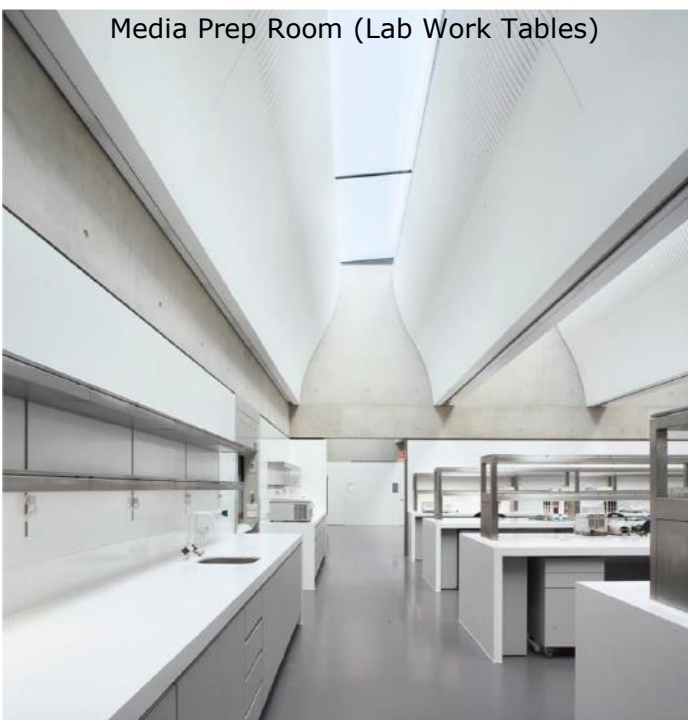
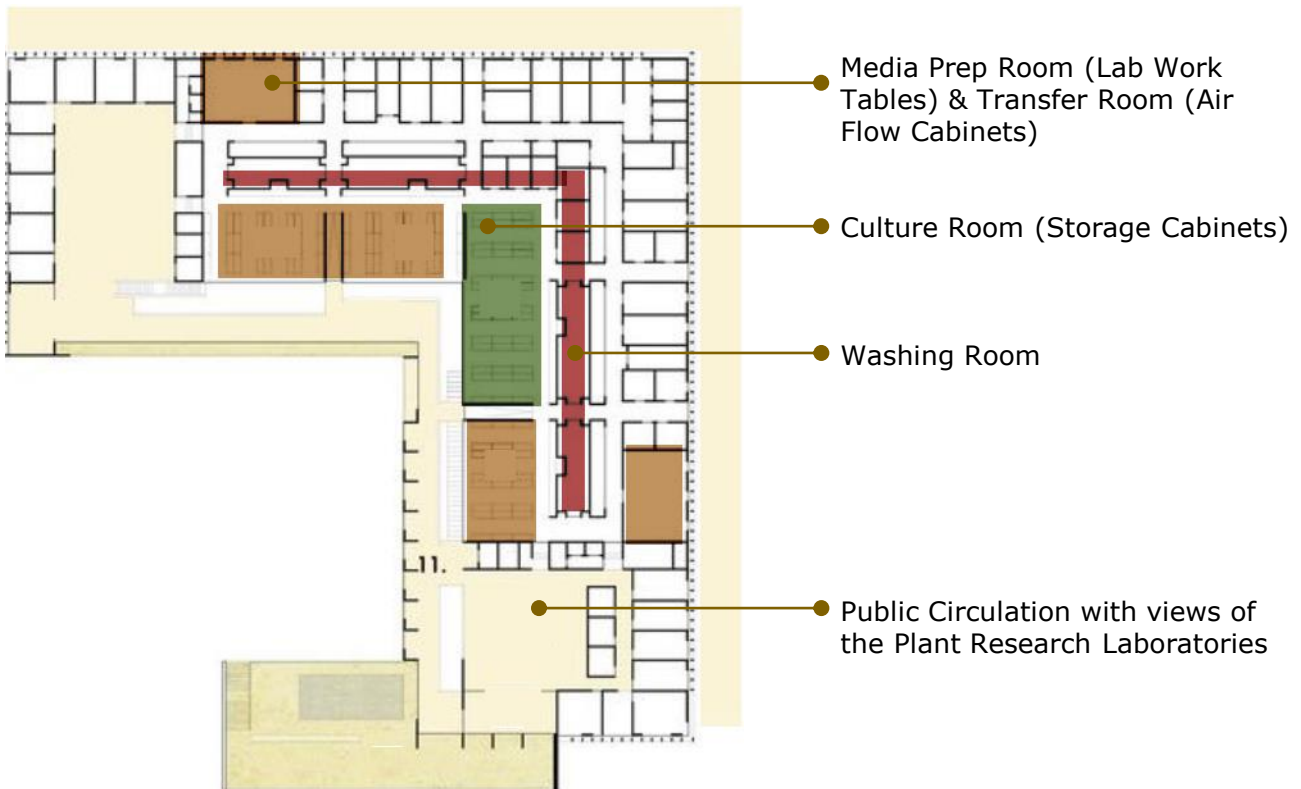
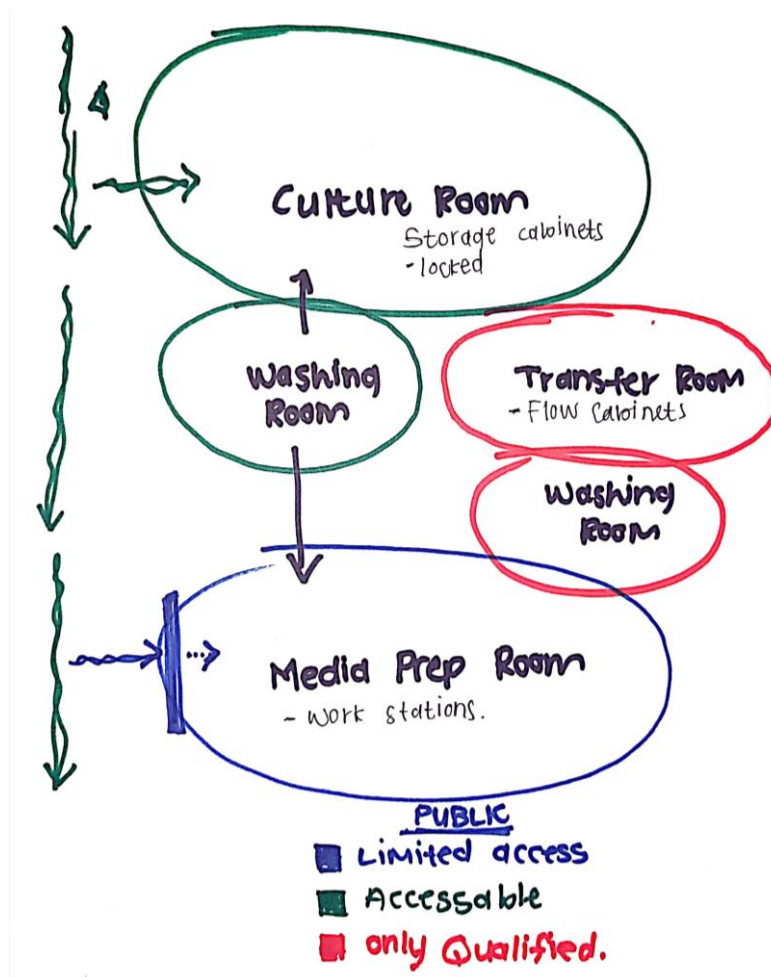


Fig 35, 36 & 37 Sainsbury Laboratory (Hufton & Crow, 2011: online)

The specific type of the proposed Research Centre:

After the investigation of the built example, an informal meeting with a Microbiologist, at the University of the Free State, was set up (Steyn, L: 2020). The Microbiologist assisted in the functional programme for a laboratory that aims to be inclusive at some parts and exclusive at other parts.

The Microbiologist pointed out which functions within the lab should be kept private and only allow entrance for certain individuals, and which parts could allow for public participation. (Steyn, L: 2020)



1.4.3

Precedent Study



**Mimicry &
Typological
Precedent**

Twyfelfontein Visitors Centre

Twyfelfontein World
Heritage Rock Art Site.
Namibia, Erongo Region
Nina Maritz Architects



Fig 38. Twyfelfontein Centre (du Preez, 2007: online)

The Twyfelfontein Visitor Centre aims to educate tourists on the geology and importance of the history of the surrounding area (Maritz, 2007: online). The centre educates the visitor on the rock engravings that originated from the San 'bushmen' of Southern Africa.

The archaeological theory subscribed to in this case is that the trance dance, a preparatory cleansing ritual performed before hunting and a vehicle for rain-making, provided the *raison d'être* for the engravings (Maritz, 2007: online). The Centre educates the visitor on the importance of the history of the rock engravings. Before the Centre was erected, the lack of knowledge caused the tourists to damage the fragile site (Maritz, 2007: online).

This Visitors Centre in Namibia was inspired by the local landscape forms and rock engravings in the surrounding area (Maritz, 2007: online). This can be seen in the materiality used within the construction of the Centre. The construction is minimalistic: local red sandstone is used in gabions, which reflect the natural landscape. Untreated steel, clay bricks and reed ceilings further imitate the landscape.

The way in which this visitors centre uses materiality can also inform the development of the abovementioned concept of mimicry.

Typological lessons learned:

This precedent is similar to the proposed scheme. Both sites are in secluded areas with similar arid climates. Furthermore, when setting out the functions of the Landscape Interpretation Centre, knowledge can be gained from Twyfelfontein's aim to educate tourists on the importance of the site.

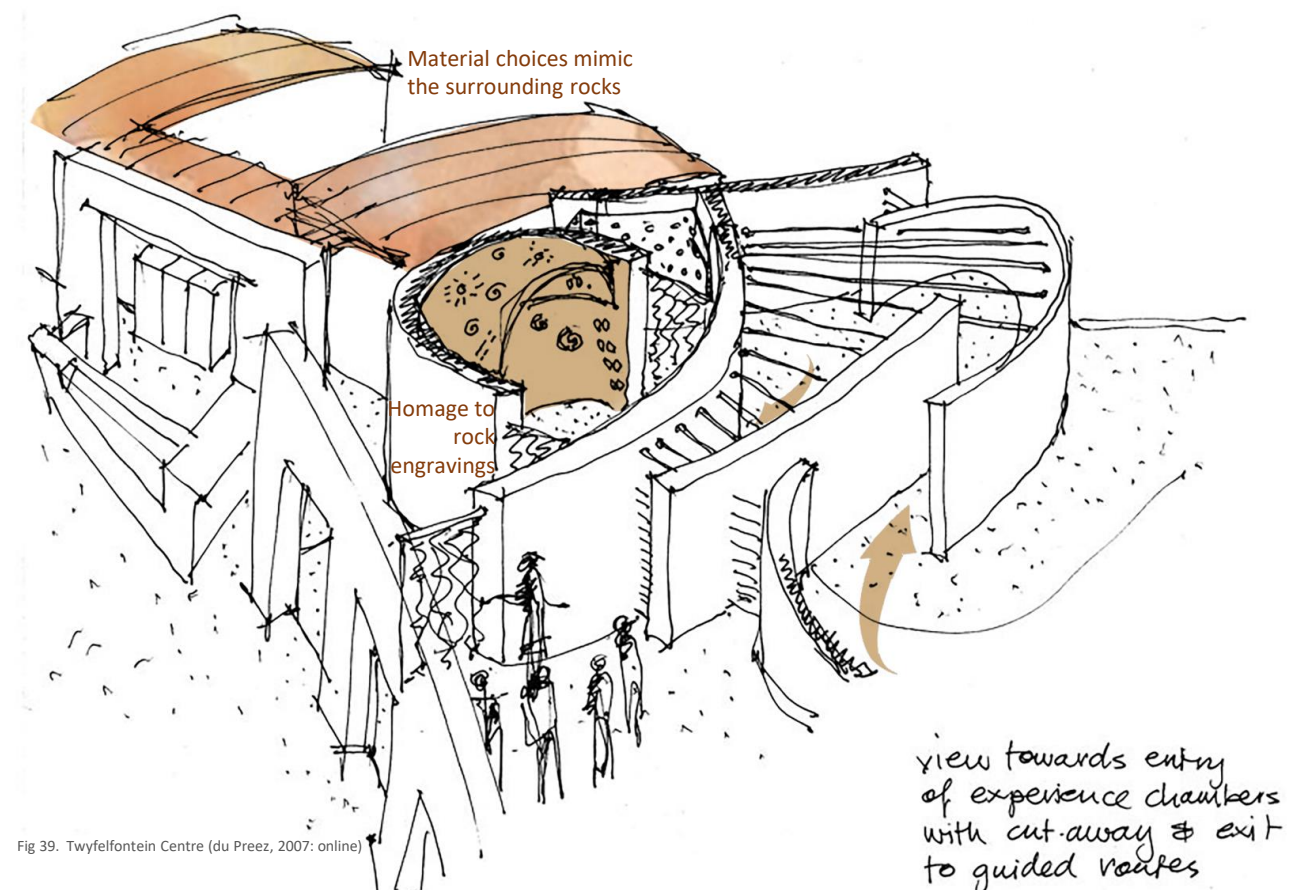


Fig 39. Twyfelfontein Centre (du Preez, 2007: online)

The following accommodation list comprises the different functions that are included in the final design outcome. The programme was established from the functions necessary through the analysis done in the previously mentioned precedent and case studies.

The accommodation schedule for this project is divided into three major categories: The Plant Research Centre and all its related functions, including laboratories and microscope rooms; the Landscape Interpretation Centre, with functions including a restaurant, retail and managing offices; and overnight accommodation for visitors and students who are conducting research.

Functions relating to the Plant Research Centre include the laboratories, which is divided into a media prep room, transfer room, culture room as well as various washing stations.

For the Landscape Interpretation Centre, functions such as a restaurant with all the relevant supporting functions, a retail store- selling products derived from the Plant Research Centre, managing offices, water points with a view of the mountain and open-air auditoriums will be included.

The overnight accommodation will cater for students as well as visitors. The students will be conducting research for long periods of time, therefore the student accommodation will include an ensuite bathroom and small living area. The visitors overnight units will provide accommodation for families, including an ensuite bathroom, as well as a living space and private braai area.

Function	Description	Size (m ²)
Plant Research Centre		670 m²
Culture Room	6 - Horizontal Laminar Flow Cabinets	
Transfer Room	20 - Chemical Storage Cabinets	
Washing Room		
Multifunctional Room	Seats 20 people	
Media Prep Room	6 - Lab Work Tables	
Toilets (female)	1-toilet & 1-disabled toilet, 1-hand basin	
Toilets (male)	1-urinal & 1-disabled toilet, 1-hand basin	
Storage	Dry storage & fridges for cold storage	
Retail for plant products		306 m²
Office/Reception	3-Desks	
Retail	8-Display tables	
Storage	Dry Storage	
Dispensary products		
Toilets (staff – unisex)	1-toilet, 1-hand basin	
Restaurant		828 m²
Seating	15-Tables	
Bar	7-Seats	
Toilets (male)	1-toilet, 2-urinal & 1-dis. toilet, 4-hand basins, 4-showers, locker storage	
Toilets (female)	3-toilets & 1-disabled toilet, 4-hand basins, 3-showers, locker storage	
Kitchen		
Office		

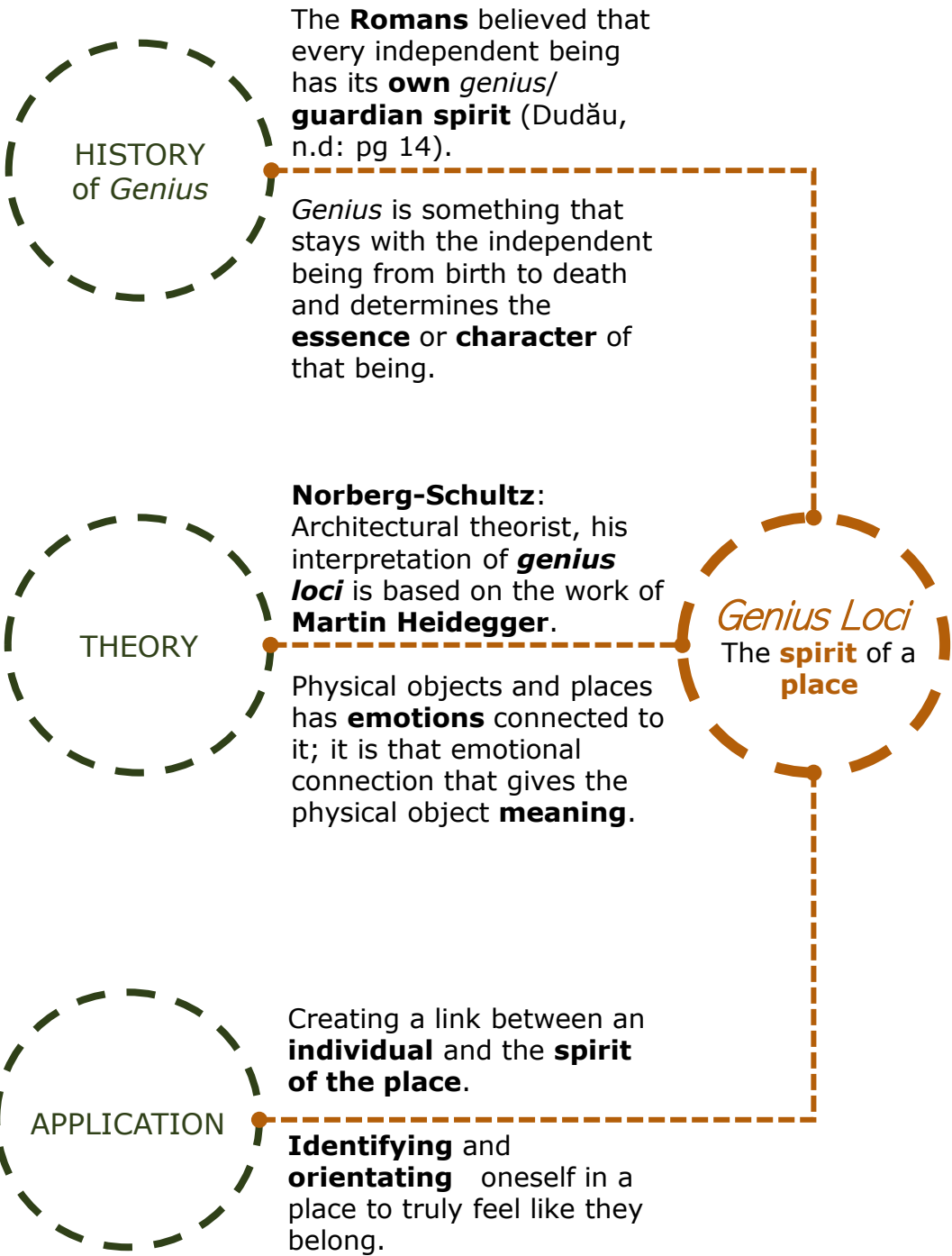
Function	Description	Size (m ²)
Staff area		
Staff toilets	2	
Storage	Dry storage & fridges for cold storage	
Tuck-shop		
Open-Air Auditorium		
Outside seating		
Student Accommodation units (5 units)		237 m²
- Bedroom		
- Toilet	1-toilet, 1-hand basin, 1-shower	
- Living		
- Kitchenette		
Multi functional		
Public Braai area	Braai & seating	
Open-Air Auditorium		
Overnight accommodation (6 units)		510 m²
- Main bedroom		
- Bedroom (2)		
- Toilet	1-toilet, 1-hand basin, 1-shower	
- Living		
- Kitchen		
- Braai area		

Function	Description	Size (m ²)
Permanent staff accommodation		147 m²
- Main bedroom		
- Bedroom (2)		
- Study		
- Toilet	1-toilet, 1-hand basin, 1-shower	
- Living		
- Kitchen		
- Braai area		
Total		2698 m²

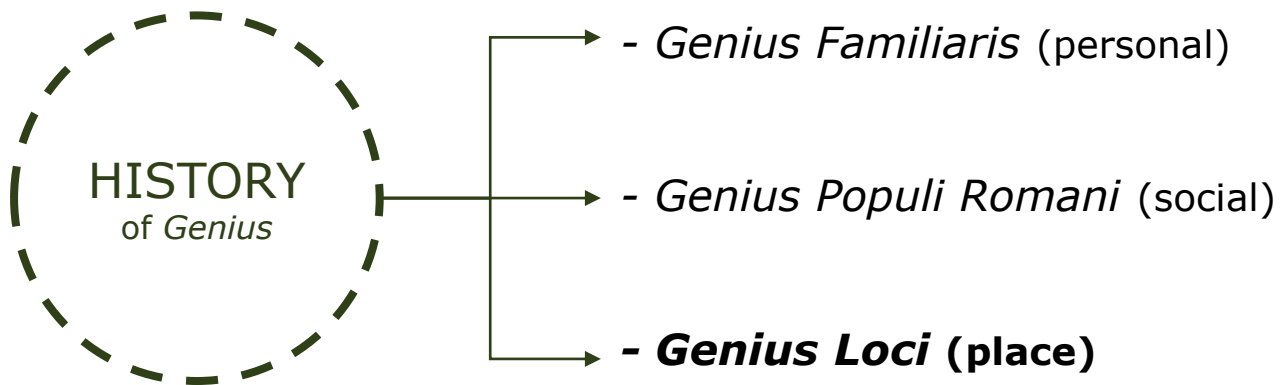
2.5 MORPHOLOGY

1.5.1 Theoretical Discourse

The following theoretical discourse aims to provide a theoretical foundation for what the proposed design could be. To achieve a new and particular approach for the proposed design, the concept of *genius loci* has been investigated. Issues relating to ideas around this concept are explored to further understand the theoretical topic and to ground the design in research and the existing literature.



1.5.2 History of *genii*

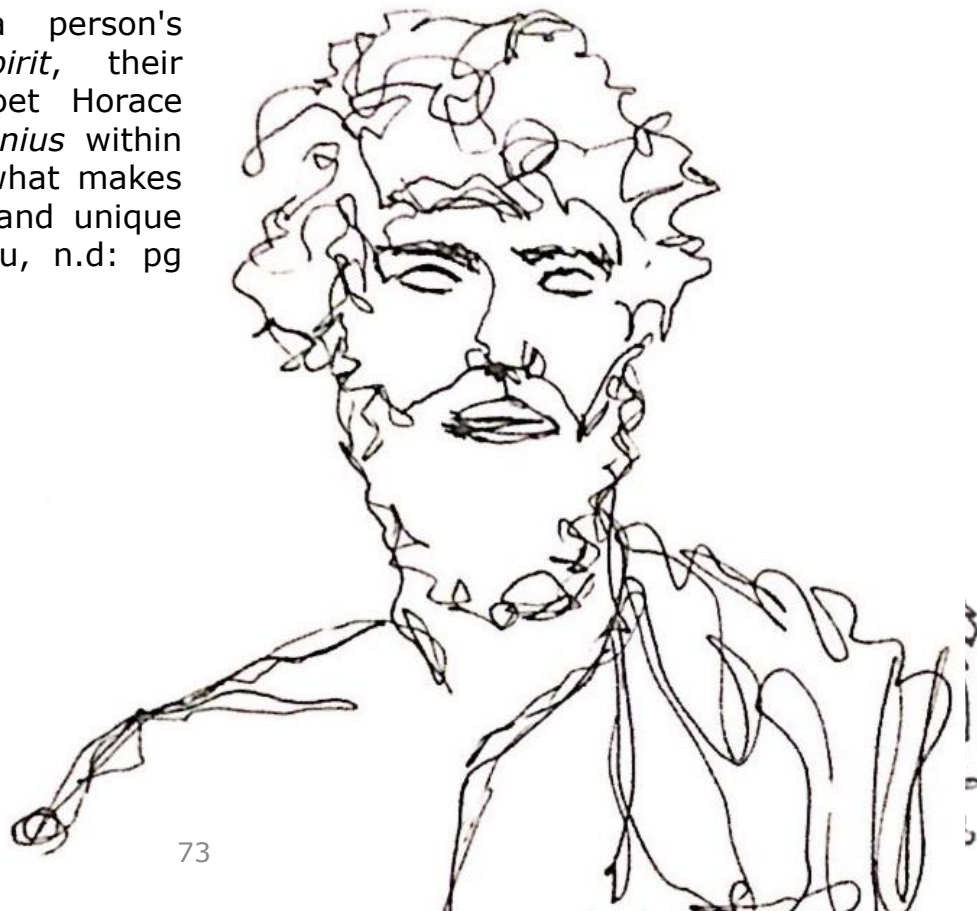


Genius also known as '*spirit*', is a Roman concept:

The Romans believed that every independent being has its own *genius/guardian spirit*. This spirit is what gives life to the person or to the place (Norberg-Schulz, 1996: 18). It is something that stays with the independent being from birth to death and determines the essence or character of that being (Norberg-Schulz, 1996: 19). It is what that being aspires to be. The elders in the Roman culture referred to *genius* as the natural spirit of each person, but also of a place (Dudău, n.d: pg 14). The following section will explain the different *genii*:

- *Genius Familiaris* (personal):

Genius concerned a person's unique *guardian spirit*, their '*higher self*'. The poet Horace explained that the *genius* within every person knows what makes that person different and unique (Das, 2014: 5; Dudău, n.d: pg 14).



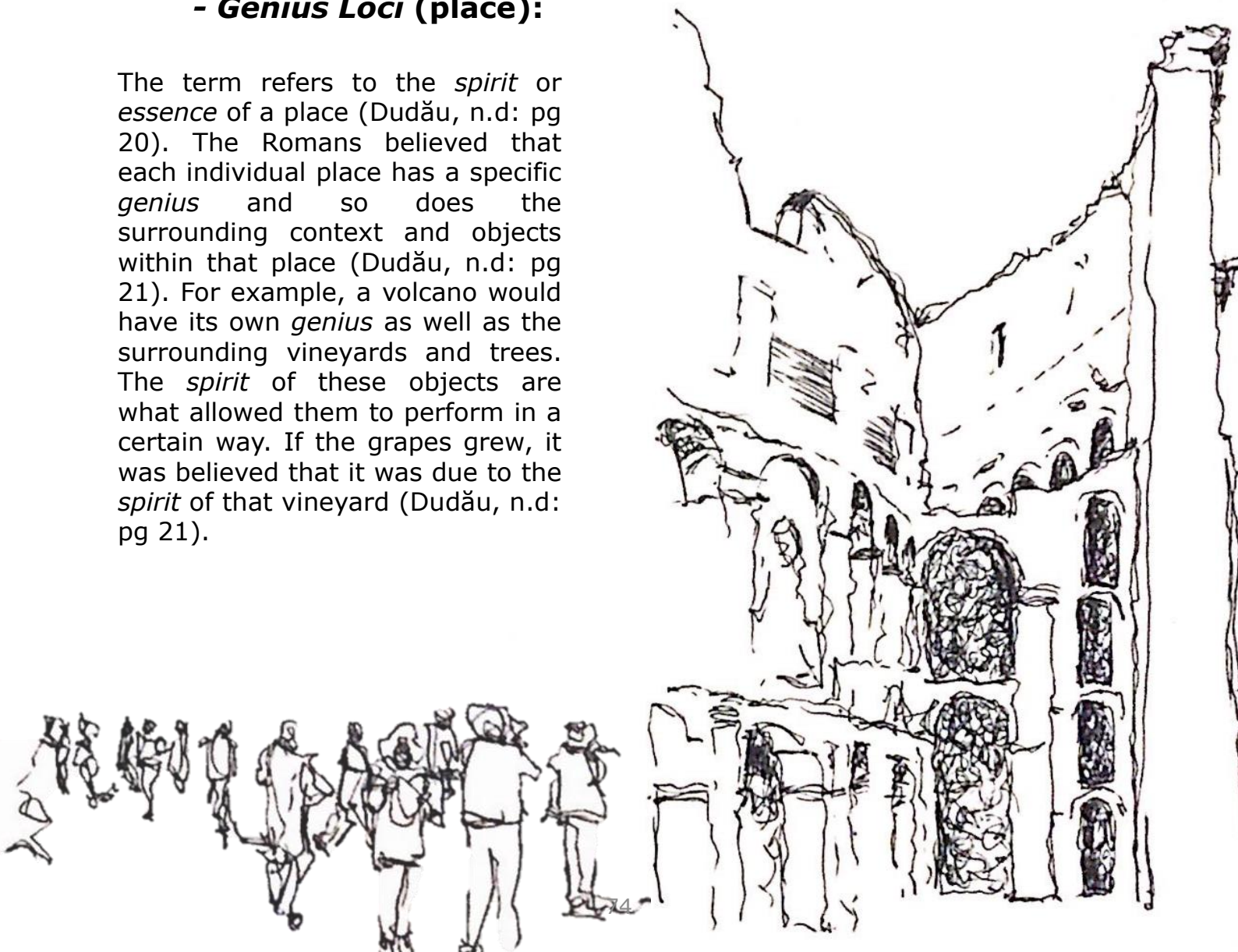
- *Genius Populi Romani* (social):

This phrase dates back to the 19th century legal system and rituals of Rome. Directly translated it would mean the '*spirit of the Protectress*' (Dudău, n.d: pg 18). Similar to every being having its own guardian spirit, so does the overall health and well-being of the Roman People, a *protector* of their community (Dudău, n.d: pg 18).



- *Genius Loci* (place):

The term refers to the *spirit* or *essence* of a place (Dudău, n.d: pg 20). The Romans believed that each individual place has a specific *genius* and so does the surrounding context and objects within that place (Dudău, n.d: pg 21). For example, a volcano would have its own *genius* as well as the surrounding vineyards and trees. The *spirit* of these objects are what allowed them to perform in a certain way. If the grapes grew, it was believed that it was due to the *spirit* of that vineyard (Dudău, n.d: pg 21).

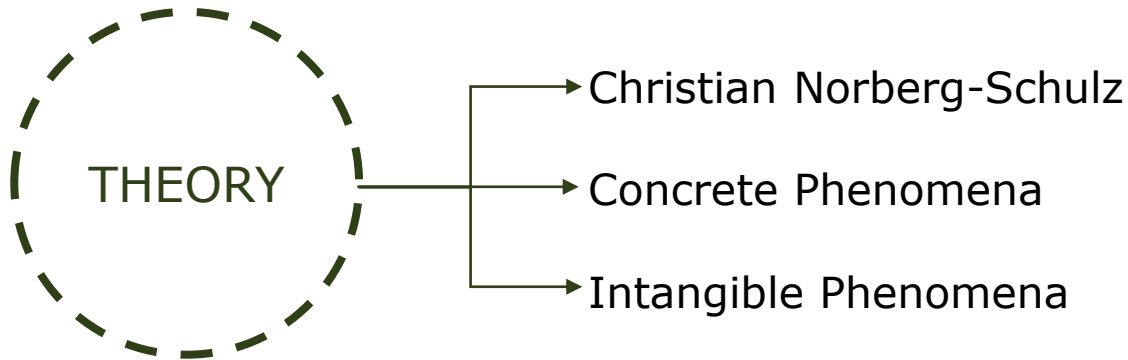


Conclusion

Genius was an important part of the Roman culture. Most of the major undertakings and events within their lives were connected to the different *genii*. Their character, as well as their health and livelihood were based on them and their surroundings having their own natural spirit.

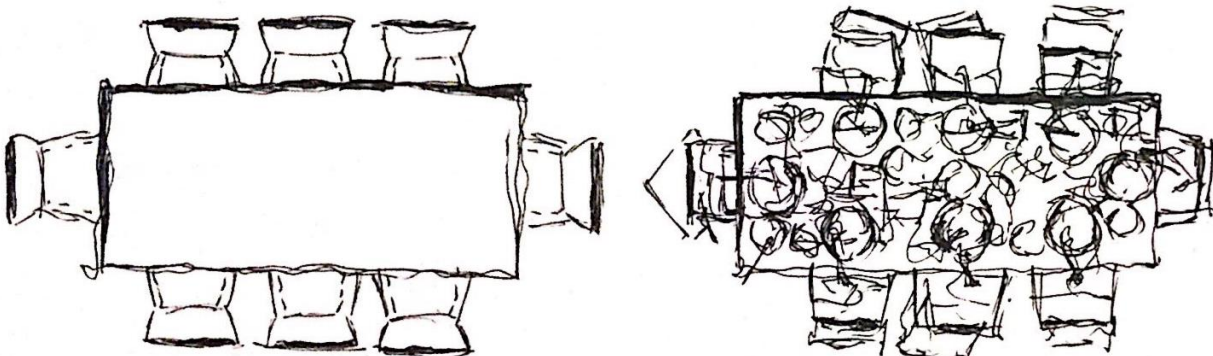
1.5.3

Architectural Theorist



Christian Norberg-Schulz is a Norwegian architectural theorist. Norberg-Schulz' interpretation of *genius loci* is based on the work of Martin Heidegger (1889-1976). Norberg-Schulz focuses primarily on Heidegger's essay, *Building, Dwelling, Thinking* (Habib, 2011: 2). In Heidegger's essay, he explores *gestalt* psychology, otherwise known as perceptual psychology, as well as phenomenology (Habib, 2011: 2). A deep interest in- and understanding of phenomenology can be seen in Norberg-Schulz book, *Genius Loci: Towards a Phenomenology of Architecture* (1979).

Norberg-Schulz refers to phenomenology as the "return to things", in other words the emotions that one connects to physical things. It is that emotional connection that gives the physical object meaning (Norberg-Schulz, 1996: 8). For example, an everyday object such as a table would be defined as a piece of furniture that provides a platform at which to eat, write or work (Webster, n.d. Online). However, when the table is laid, it becomes a place where people can gather, it gives a specific character to a room. A table laid for a Christmas feast would have certain emotional connections to it.



Everyday, local elements such as the table are concretised, making the general object visible and meaningful. **The poetry in the everyday, concrete things is what uncovers the meaning in the life-world** (Norberg-Schulz, 1996: 10).

This explanation of the “return to things” is seen in the poem that Heidegger interprets and that Norberg Schulz discusses in his book:

A Winter Evening:

When snow falls against
the window, Long sounds
the evening bell...
For so many has the table
Been prepared, the house
set in order.

From their wandering,
many
Come on dark paths to this
gateway. The tree of grace
is flowering in gold Out of
the cool sap of the earth.

In stillness, wanderer, step
in:
Grief has worn the
threshold into stone. But
see: in pure light, glowing
There on the table: bread
and wine.



Fig 39. Karoo Winter (Smith, n.d: online)

“When snow falls against the window,
Long sounds the evening bell...”

Heidegger explains that the title, *a winter evening*, is familiar and relatable. It is a day and a season that can be understood (Norberg-Schulz, 1996: 10). The character of the type of winter evening is formed by the mention of snow falling against the window. Not only does the reader realise that the poem is set on a cold evening but the mention of a window informs the reader that there is an inside and outside space. The window also becomes an object that can be named and envisioned, a familiarity, this makes the manmade object a physical element. The inside space could become an envisioned safe and warm space, protected from the cold evening on the outside (Norberg-Schulz, 1996: 10).

The same exploration can be conducted throughout the rest of the poem, a physical and relatable object is given meaning when its character is further explored.

**But see: in pure light, glowing
There on the table: bread and wine.**

At the end of the poem, the inside space is also given a character. A table is laid, with bread and wine, indicating that the inside space is a place where people will come together (Norberg-Schulz, 1996: 11). It becomes the centre that defines the inside space, giving meaning to the winter evening.

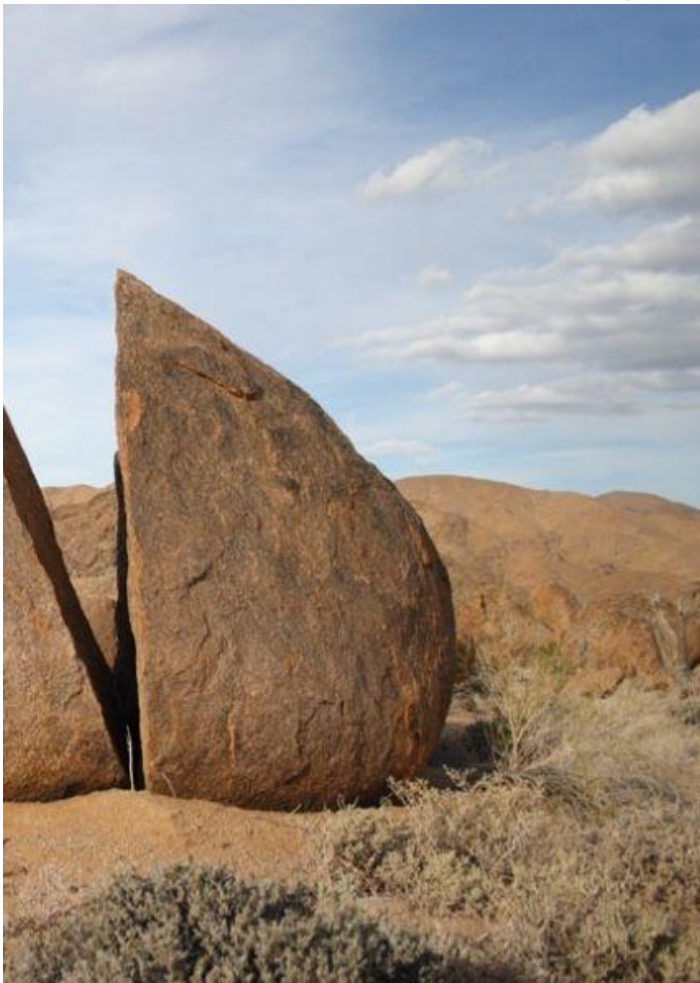


Fig 40. Karoo rocks (Loock, 2015: online)

Identifying the spirit of a place:

The meaning of the word *place* becomes more than just an abstract location (Norberg-Schulz, 1996: 11). It is a totality made up out of different parts; together these parts create an environmental character, which is the essence of the place, the *genius loci* (Norberg-Schulz, 1996: 12). The landscape has different layers and each layer adds to the character of the place.

Concrete phenomena:

A place consists of concrete phenomena or physical aspects. This can include people, animals, fauna and flora, geology, etc (Norberg-Schulz, 1996: 9).

Intangible phenomena:

A place also consists of intangible phenomena or the feelings and emotions connected to the place. Without that emotional connection to a place, it would be meaningless (Norberg-Schulz, 1996: 9).

APPLICATION

Norberg-Schulz identifies phenomenology's potential to make a place meaningful (Norberg-Schulz, 1996: 14). He reintroduces the concept of *genius loci*, explaining that meaningful places can be designed when the *spirit* of that place is identified; when the character of the place is returned to the landscape (Norberg-Schulz, 1996: 14).



Fig 41. Night in the desert (Bauermeister, n.d: online)

The challenge lies with how a person will **identify and orientate** themselves in a place. To truly feel like they belong, a person must be able to gain an existential foothold within the landscape. They should feel like they are "friends" with the landscape, enjoying what that environment has to offer. Understanding the character of the place, it becomes part of the experience (Norberg-Schulz, 1996: 14).

The author and poet Linda Lapin wrote in her book, *The Soul of Place*, that the *genius loci* of a place is like a voice (Lapin, 2015: 7). Every place has a story that it wants to tell, it is what makes that place unique. Lapin explains that the soul or spirit of the place can be revealed if one only listens (Lapin, 2015: 7).

She uses the example of the green hills and golden wheat fields from the ramparts of an old Etruscan Town. The landscape is not only beautiful, but meaning lies within its beauty (Lapin, 2015: 8). The spirit of a place lies within the biological, chemical and cosmic layers operating within that site (Lapin, 2015: 8). These different layers affect the behaviour and psychology of the population living there. Lapin explains that a human's creativity and feeling of being is dependent on the *spirit* of their habitat. When there is a successful link between a person and the spirit of the place, the person will be able to identify and orientate within that landscape (Lapin, 2015: 9).

2.5.4

Precedent Study



**Journeying &
Morphological
Precedent**

BUKKEKJERKA

Norwegian Scenic
Route Andøya.
Northern Norway
Morfeus arkitekter



Fig 42. Bukkekjerka (Gonzalez, 2018; online)

The morphology refers to the form and structure of the building; the spatial quality of the architecture (Mendez, 2004: 100).

The story of the Bukkekjerka site:

The characteristics of the site are the rock formations of “Bukkekerka”, between the road and the sea, where nature has carved out an altar and a pulpit. Over the years, the site was used as an open-air church service that attracted people from all over the district. The site is filled with stories of the Sami people that went there to worship (Gonzalez, 2018: online). The *genii* of the site is related to the various personal experiences in the natural landscape. The physical rock formations and its natural surroundings became meaningful when the visitors connected certain memories and experiences to it.

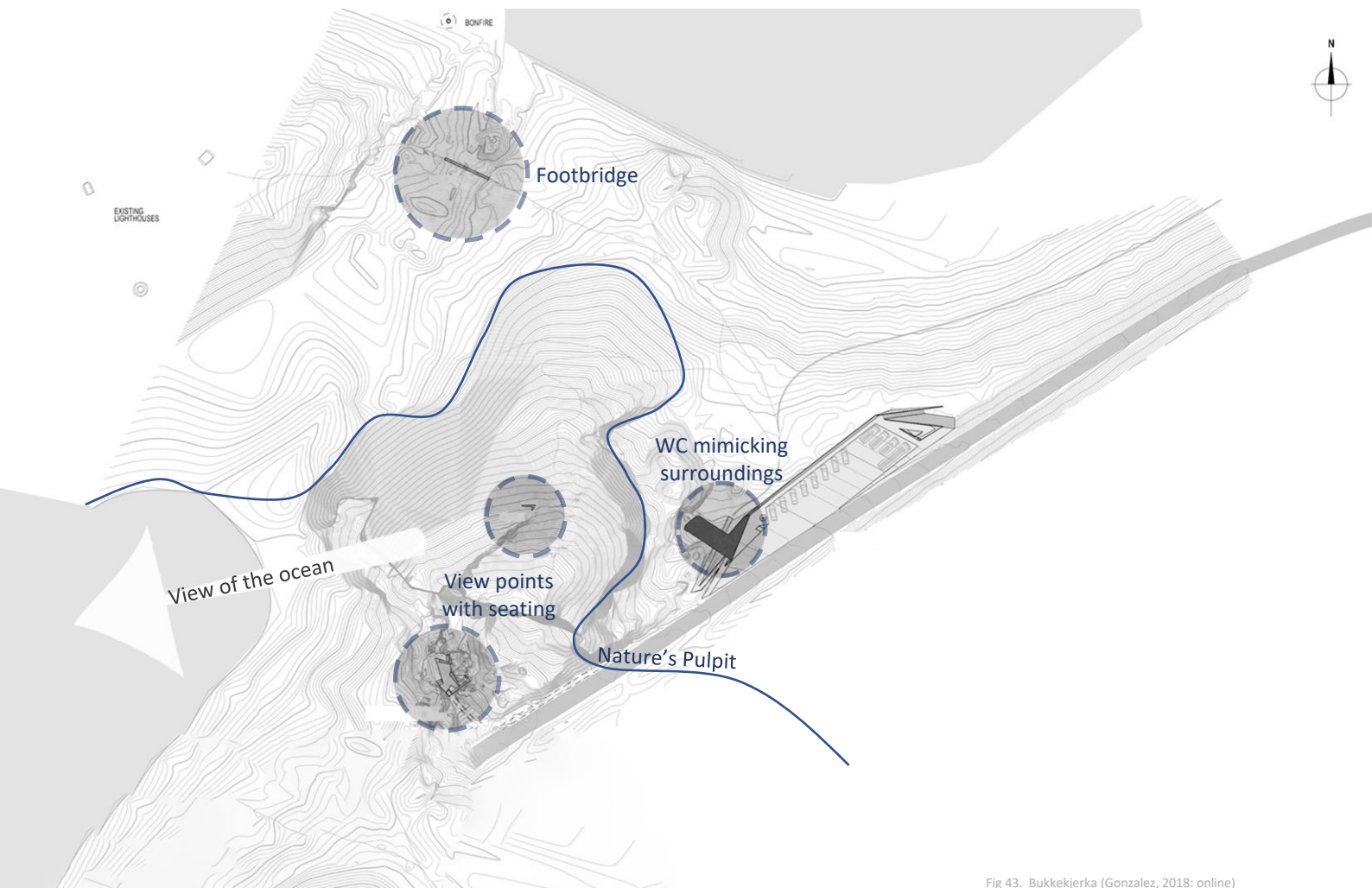


Fig 43. Bukkekjerka (Gonzalez, 2018: online)

This precedent can also be applicable to the conceptual development of JOURNEYING:

Journeying refers to the process of travelling and storytelling.

This site, similar to the Compassberg site, has a natural beauty with dramatic landscapes. The aim of the Bukkekjerka building was to highlight the different aspects of the site. The facility consists of a variety of elements that are spread out on the landscape. These elements help uncover the inherent qualities of the place. The aim was that these elements were gradually

experienced, encouraging the visitor to further explore and experience the beauty of the place by journeying through the site (Gonzalez, 2018: online).

The structure of Bukkekjerka is built to fit into the terrain. Concrete slabs, inspired by the mountain contours, were folded to fit into the landscape. One-way mirror glass was used so that the visitor may enjoy the view in private from the inside of the building. From the outside, the windows reflect the landscape. Materials such as polished, acid-resistant steel are used and further reflect the surrounding landscape (Gonzalez, 2018: online).

One way window mimicking surroundings

Seating – 360° views



Fig 44 & 45. Bukkekjerka (Gonzalez, 2018: online)

Conclusion

Genius Loci is made of different layers, some visible and tangible material layers and others invisible and personally experienced layers. These different layers each bring an important aspect to the significance of understanding the site situated at Compassberg. As seen with the traditional Roman culture, the *genius* influenced their understanding of how a place, society and person operate.

An understanding of what it means to engage with the various layers of a site could influence an appropriate architectural response that aims to be meaningful; a space where individuals will feel like they belong and understand the significance of the site.

2.6 TECTONICS

1.6.1

Structural Philosophy

Tectonics refers to the art of constructing a building. It is not merely for the structure to fulfil the functional requirements, but to strengthen the conceptual thoughts expressed in the morphology of the design. The structural details will offer an opportunity to physically express the meaning of the morphology that is proposed.

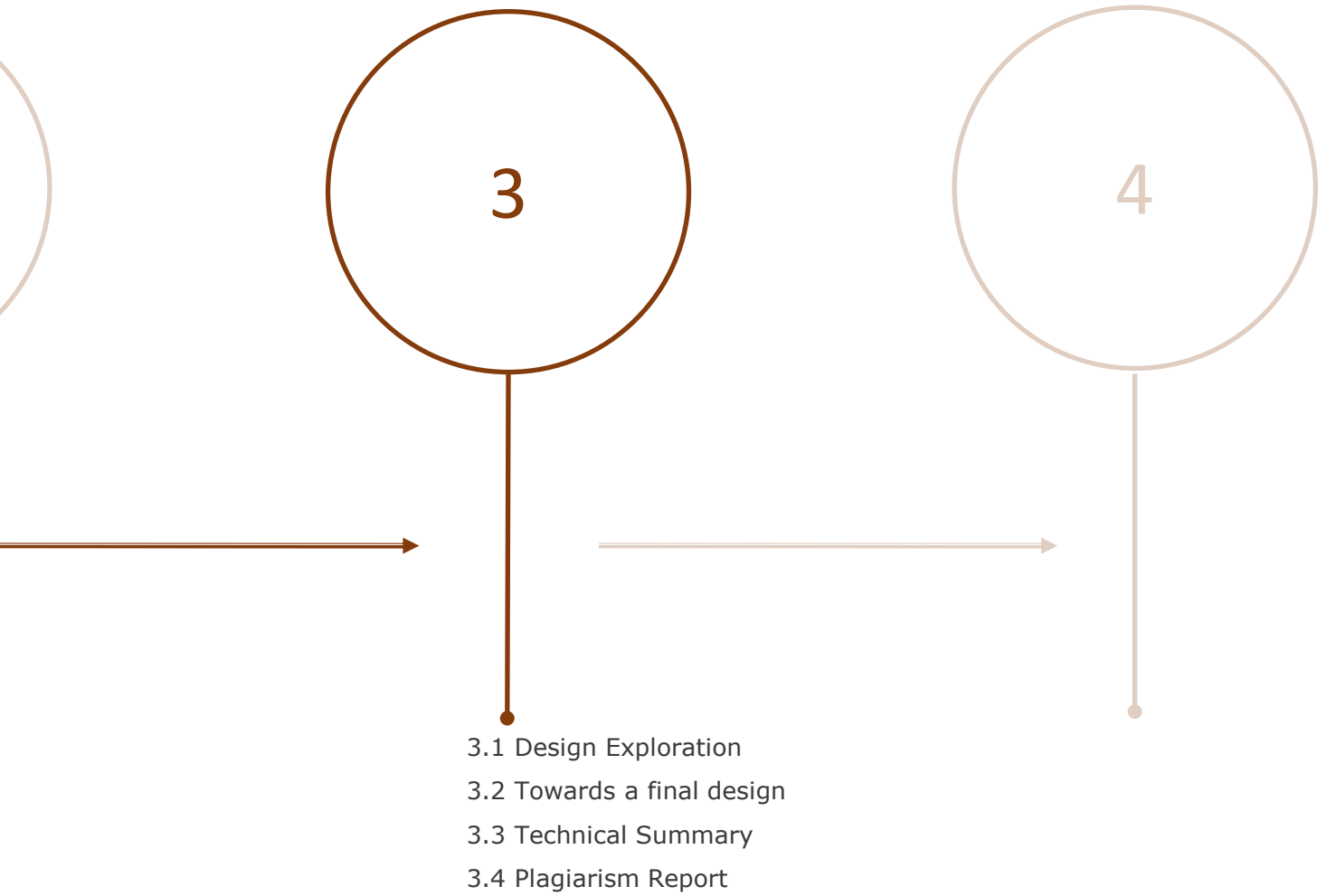
The detail becomes an important aspect of the design; it can serve as a poetic expression of the overall intention of the design. In this project, the morphology is primarily concerned with highlighting the natural landscape. The form-giving is centred around the connection of the man-made objects and the existing natural landscape, and the architectural articulation of this connection. Therefore, the structural philosophy of this intervention is concerned with the connection that supports the morphological conceptual approach.

These details can be applied on different scales. In some cases, small material connections will appropriate the morphological concepts and in other cases large material connections will be made.

This will be achieved through detailing the manmade and natural elements. The approach to this structural philosophy will be indicated in the following part, the design synthesis will be discussed in conjunction with the technical synthesis. Thereafter, a brief summary will be given of the technical details discussed.



Fig 46. Nieu-Bethesda dirt road (Aldean, 2011: online)

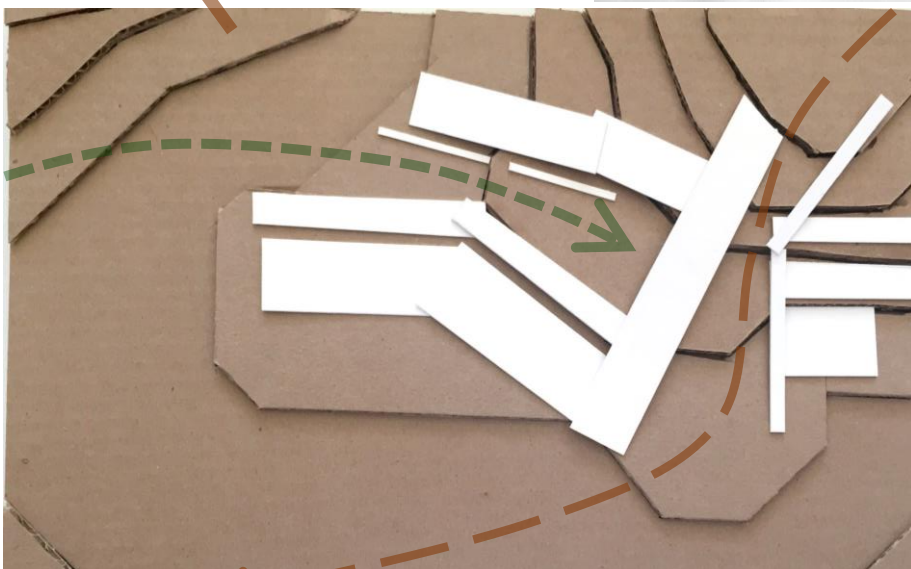
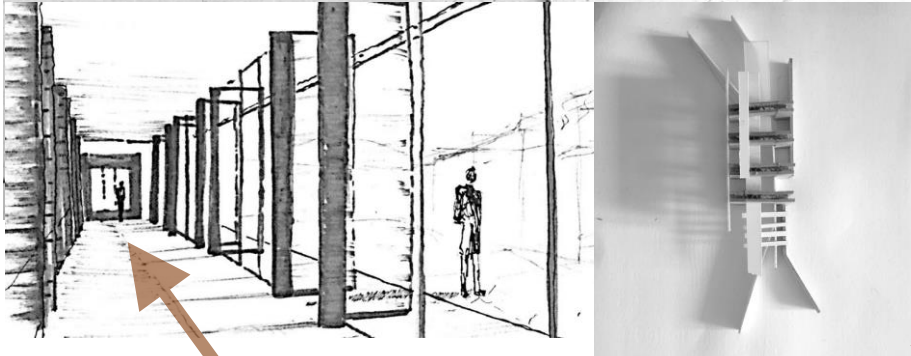
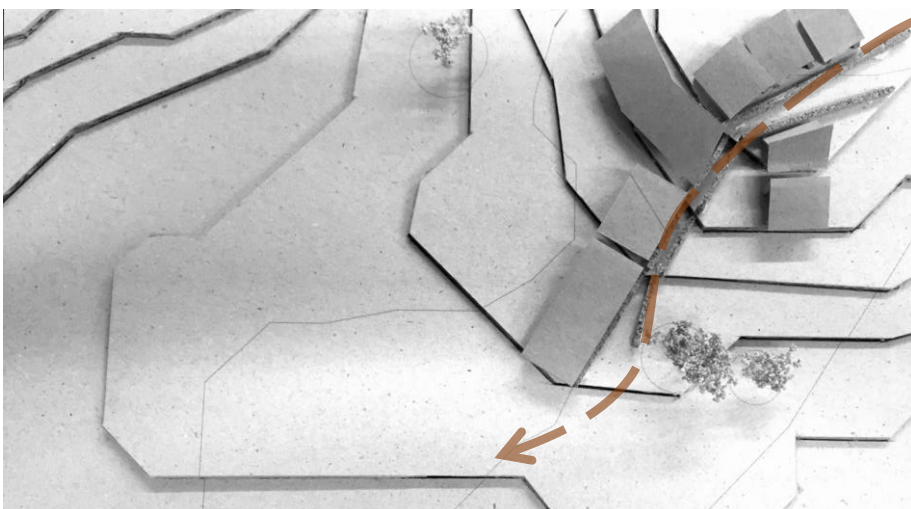


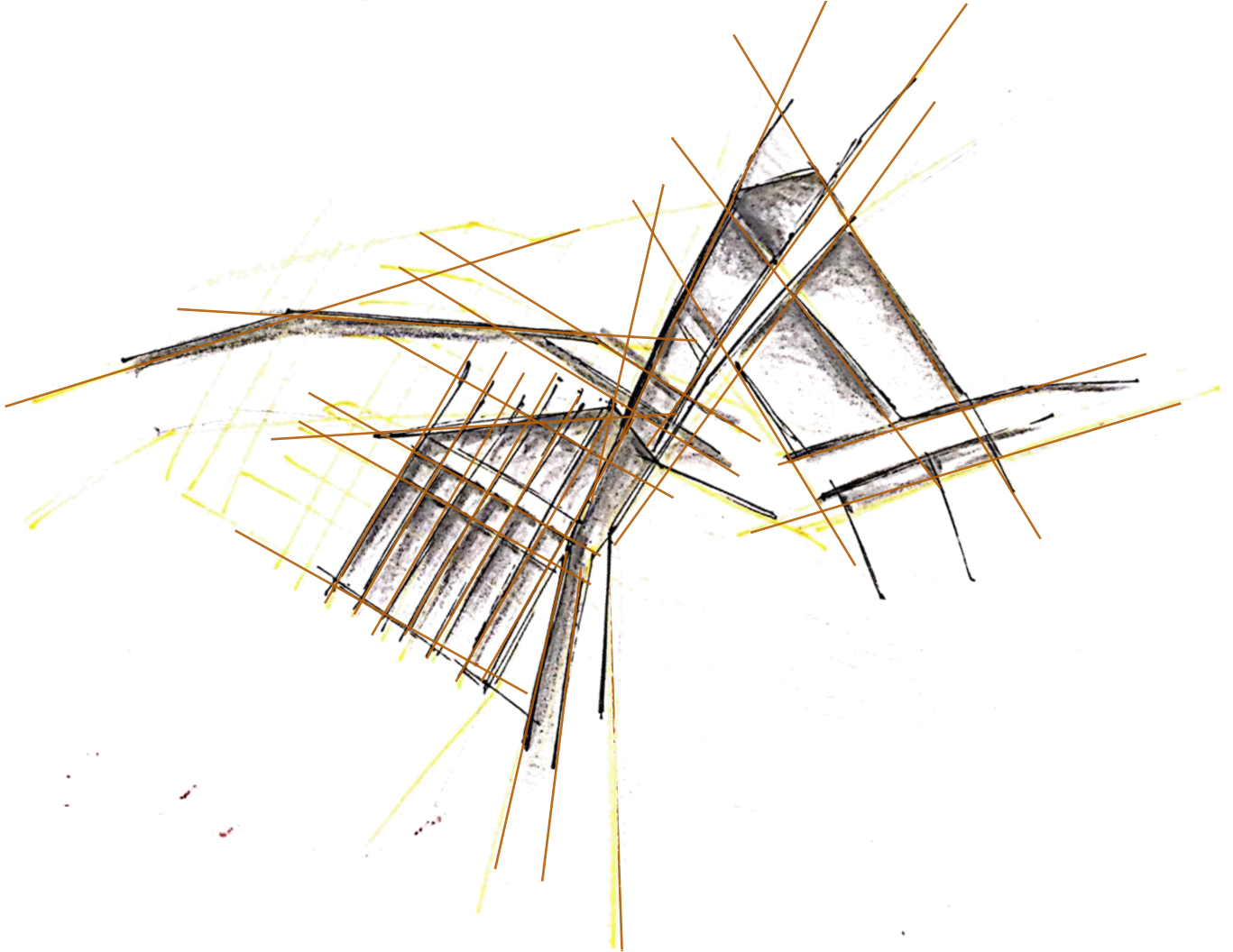
3.1 Design Exploration

The initial design ideas came from the following thought process:

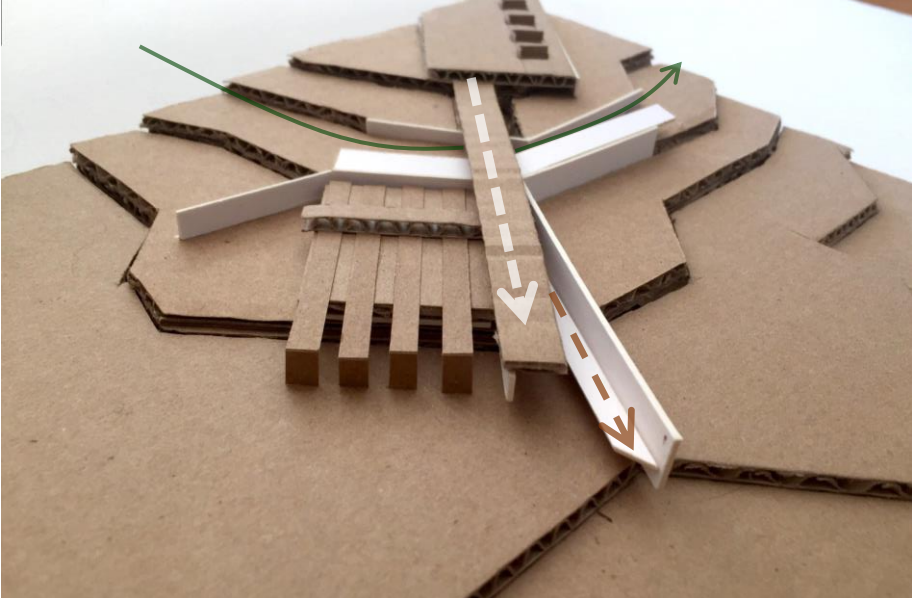
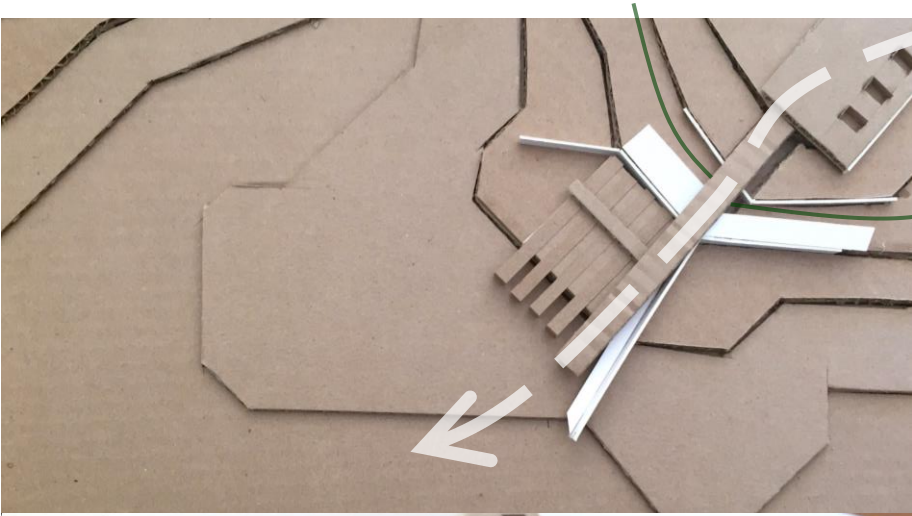
Phase One

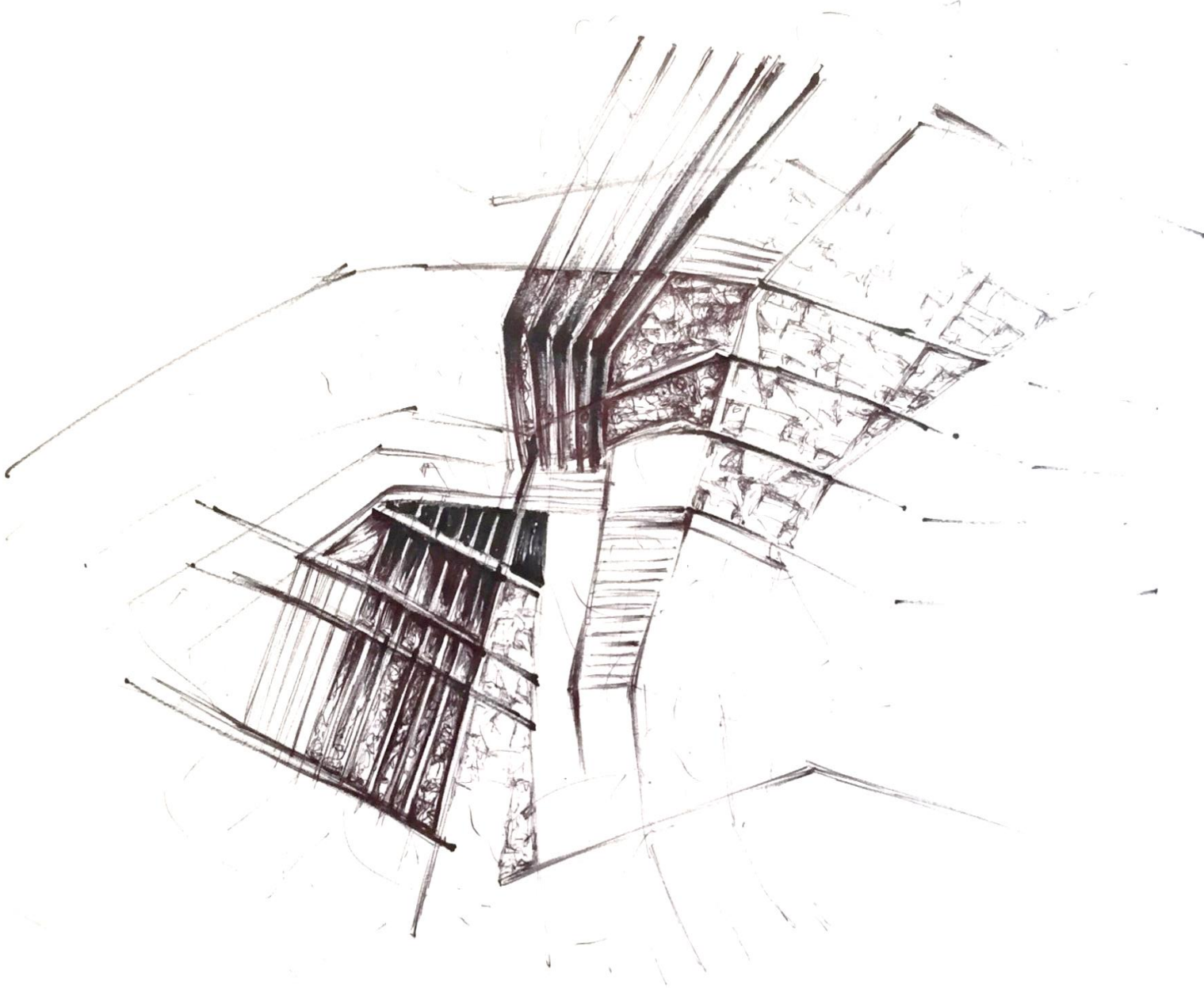
The first design phase involves a combination of sketches and 1:500 models:

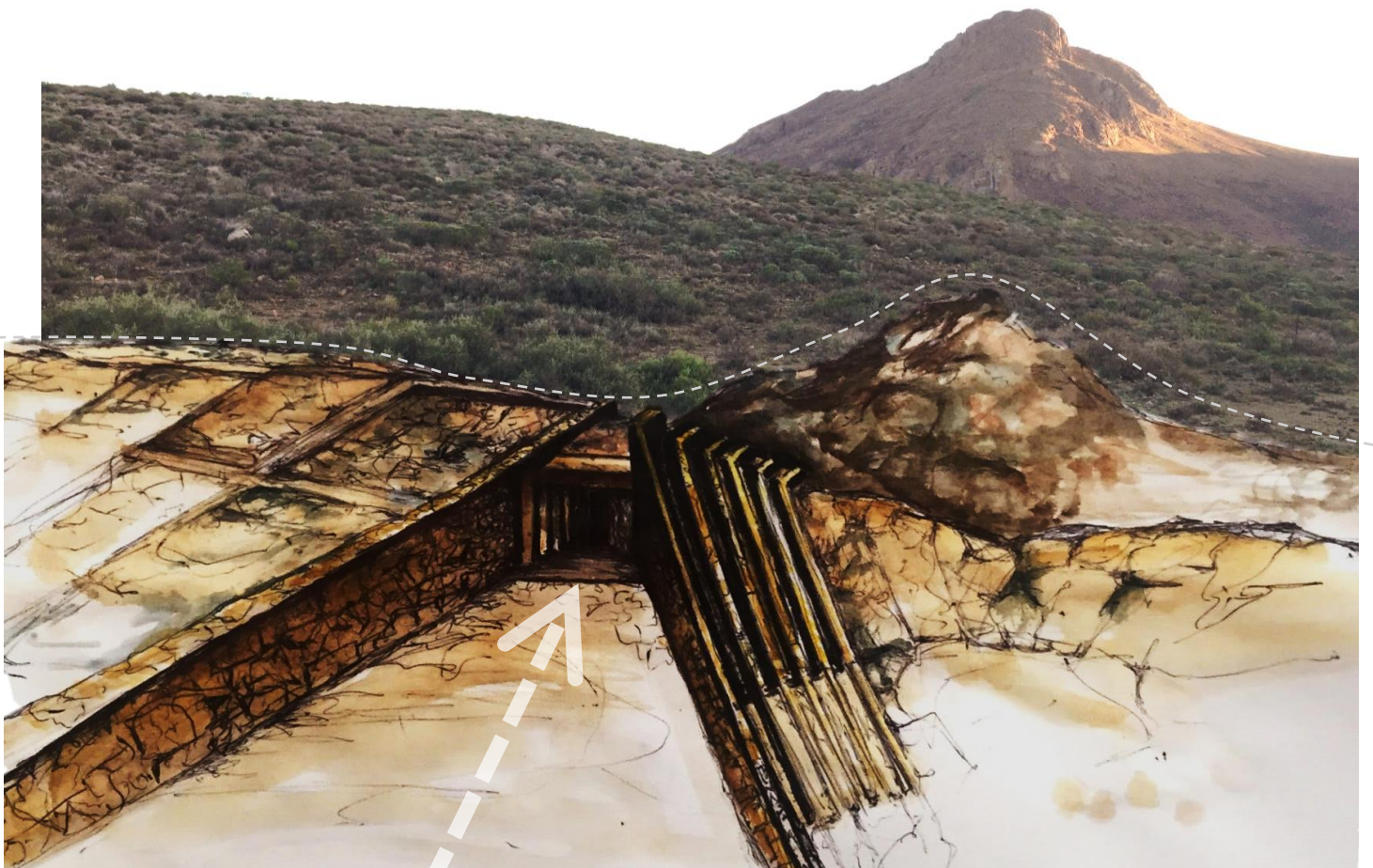
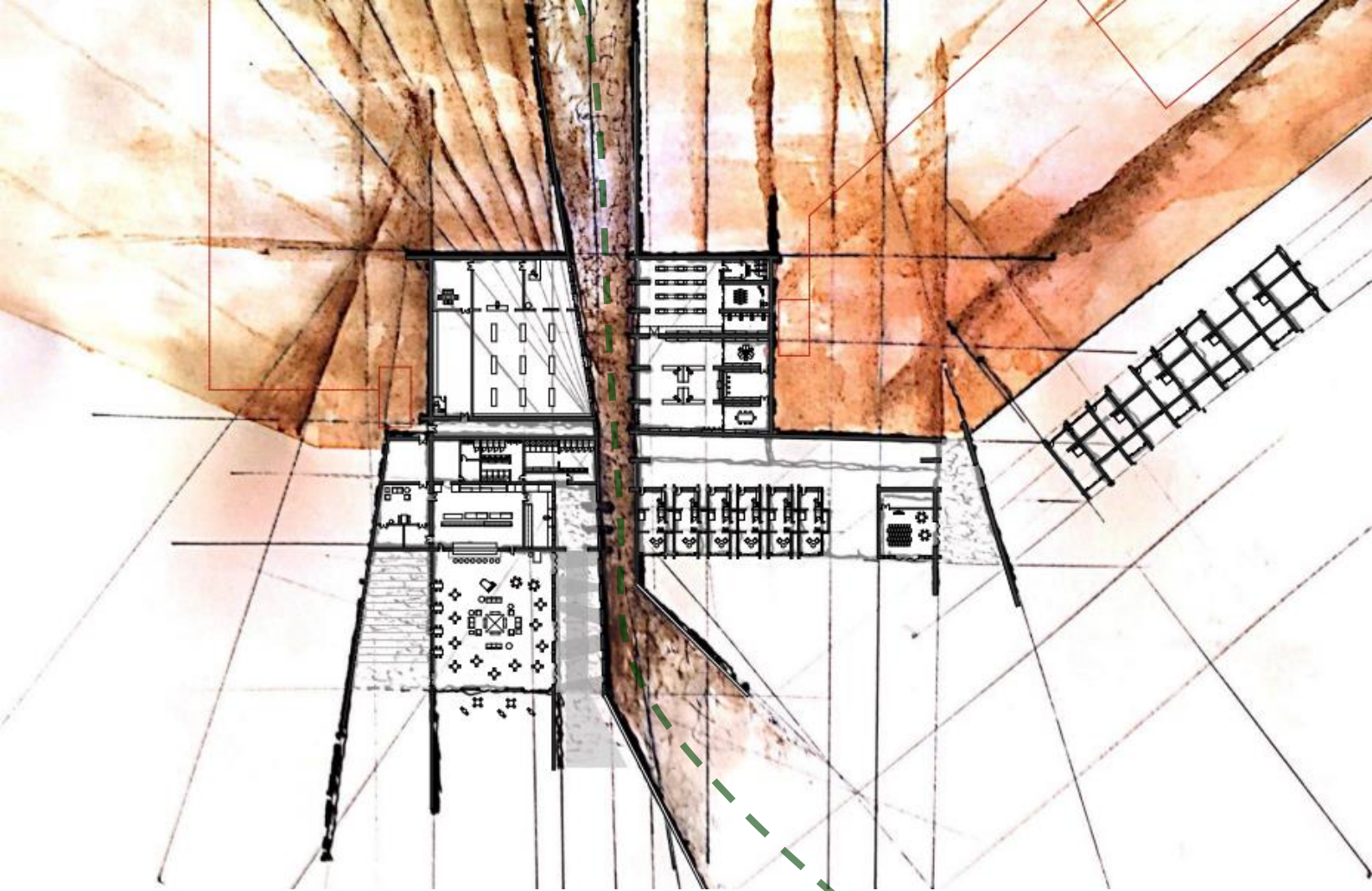




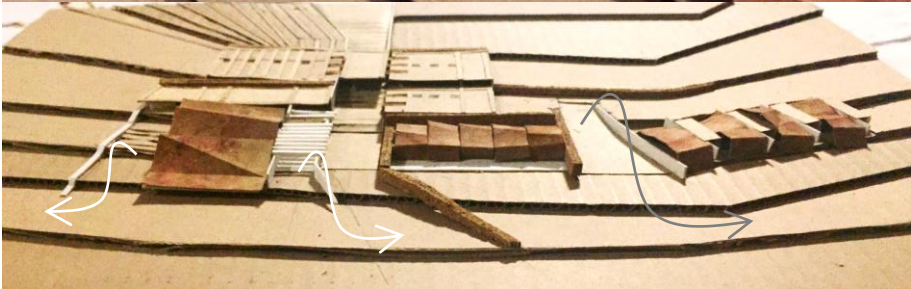
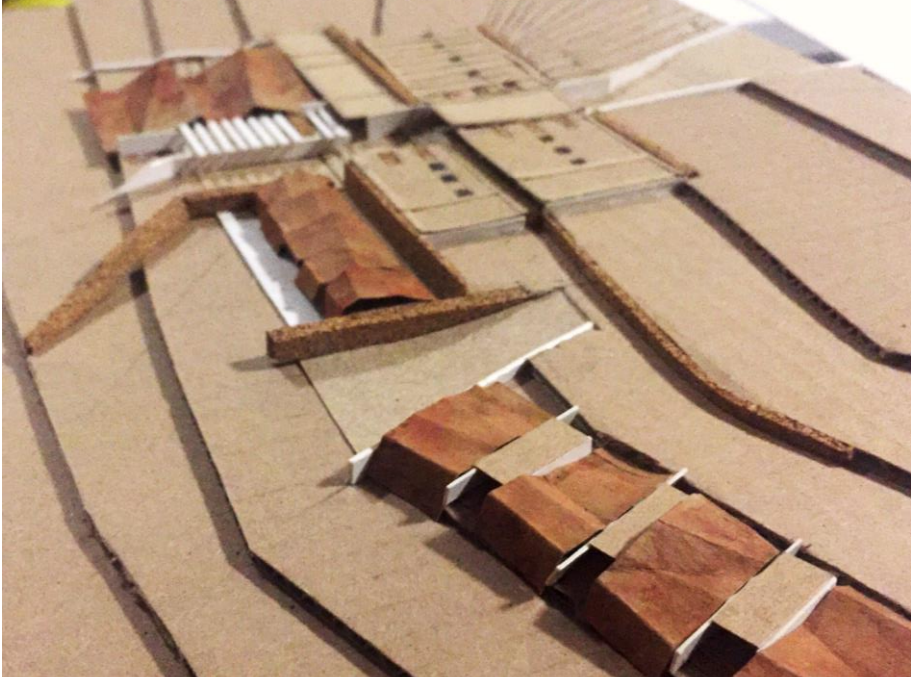
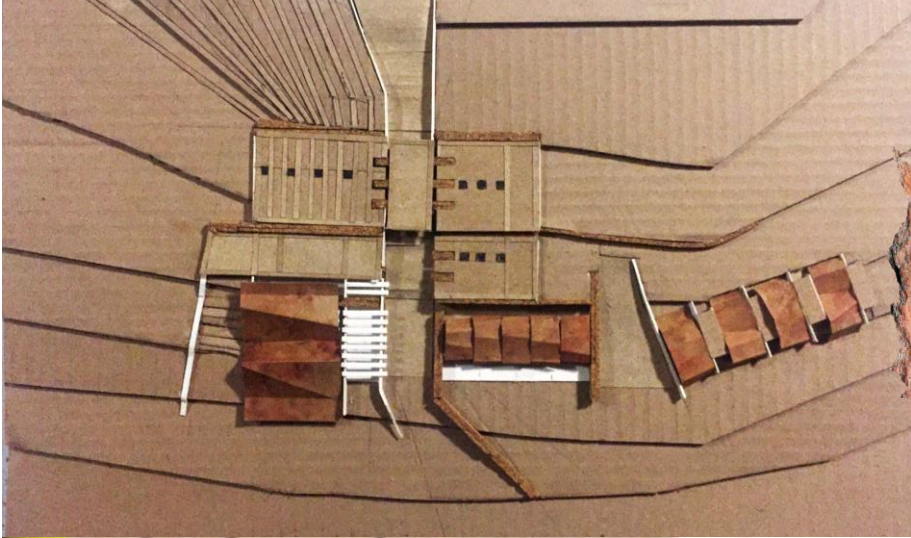
Phase Two







Phase Three



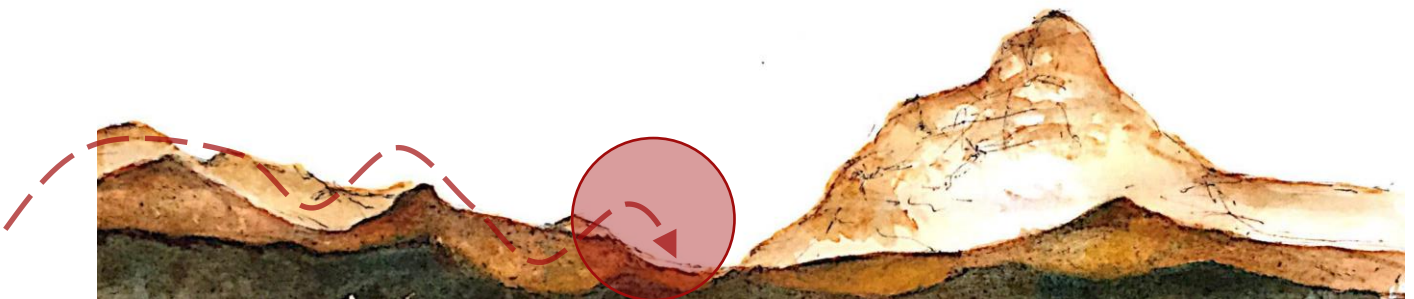
3.2 Towards a Final Design

Approaching the SITE

Referring to the Concept of **Journeying** and the emotional connections to a place:

What are the different experiences related to the site?

- At the top of the mountain is a steel container with a booklet and a pen, within this booklet are the written personal experiences of the hikers who had made it to the top of the mountain. Some of the stories include a short description of their journey or their encounters during their climb.
- Further interviews were conducted with the locals of the surrounding area, as well as regular visitors to the site to determine the various emotions related to Compassberg.



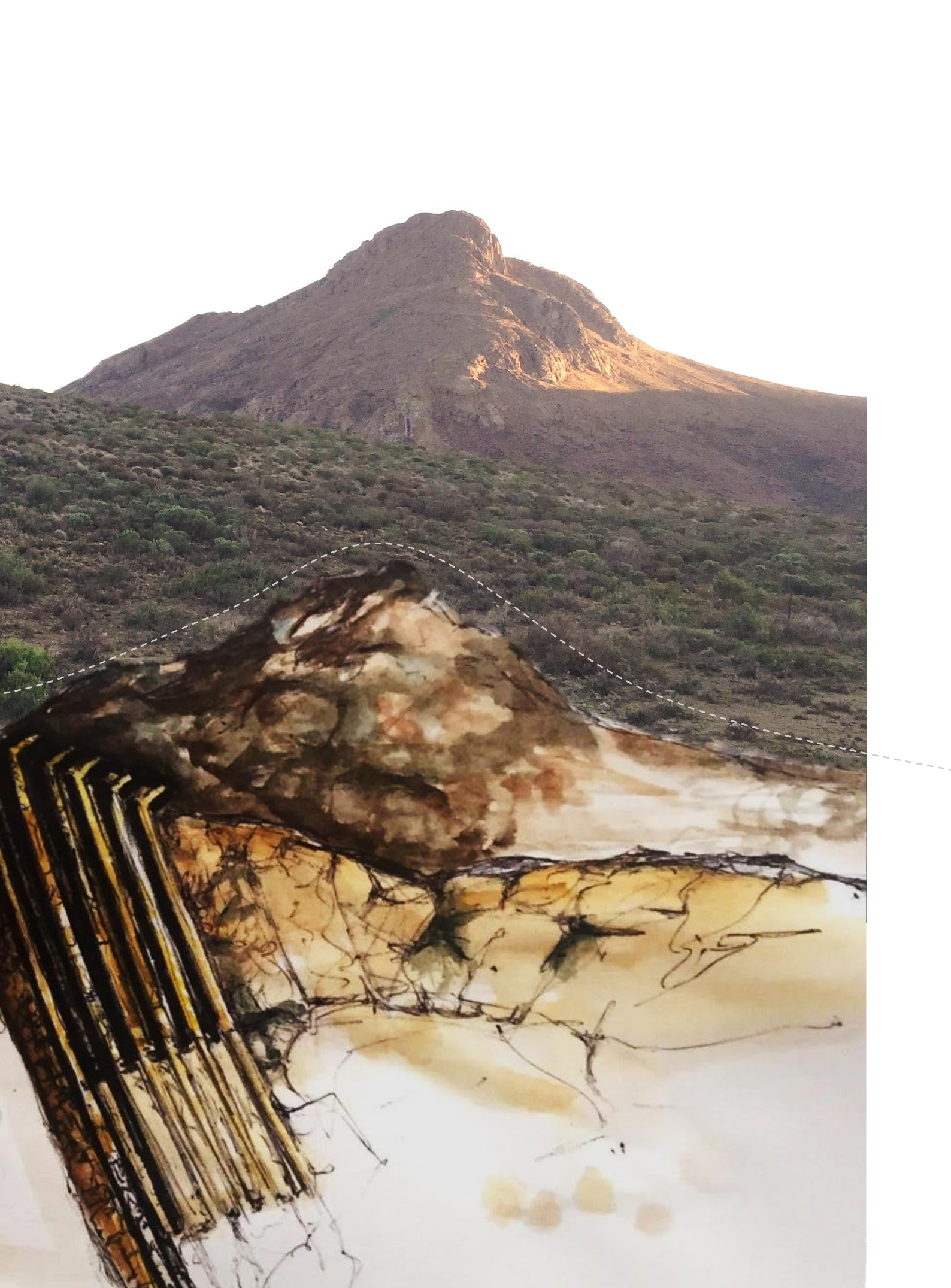
The hikers explained that during their journey towards Compassberg they were constantly aware of the needle-like peak of the mountaintop. The mountain's height in comparison to the surrounding hills caused Compassberg to always be visible and to appear closer than it was.

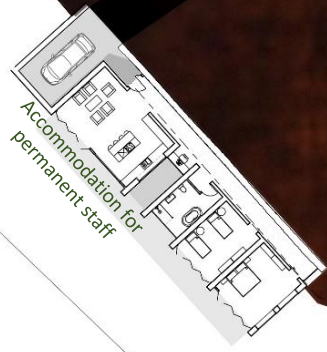
The hikers were under the impression that the foot of the mountain would be just over the next hill, but when they descended that hill another hill lay ahead and the process repeated itself. Hill after hill was climbed and descended in this vast semi-arid landscape; it made the hikers wonder when they would finally reach the last hill that led to the foot of Compassberg.

The site is situated where the existing gravel road ends. Parallel to the gravel road is the hiker's footpath that continues over the hill and up to the mountain.

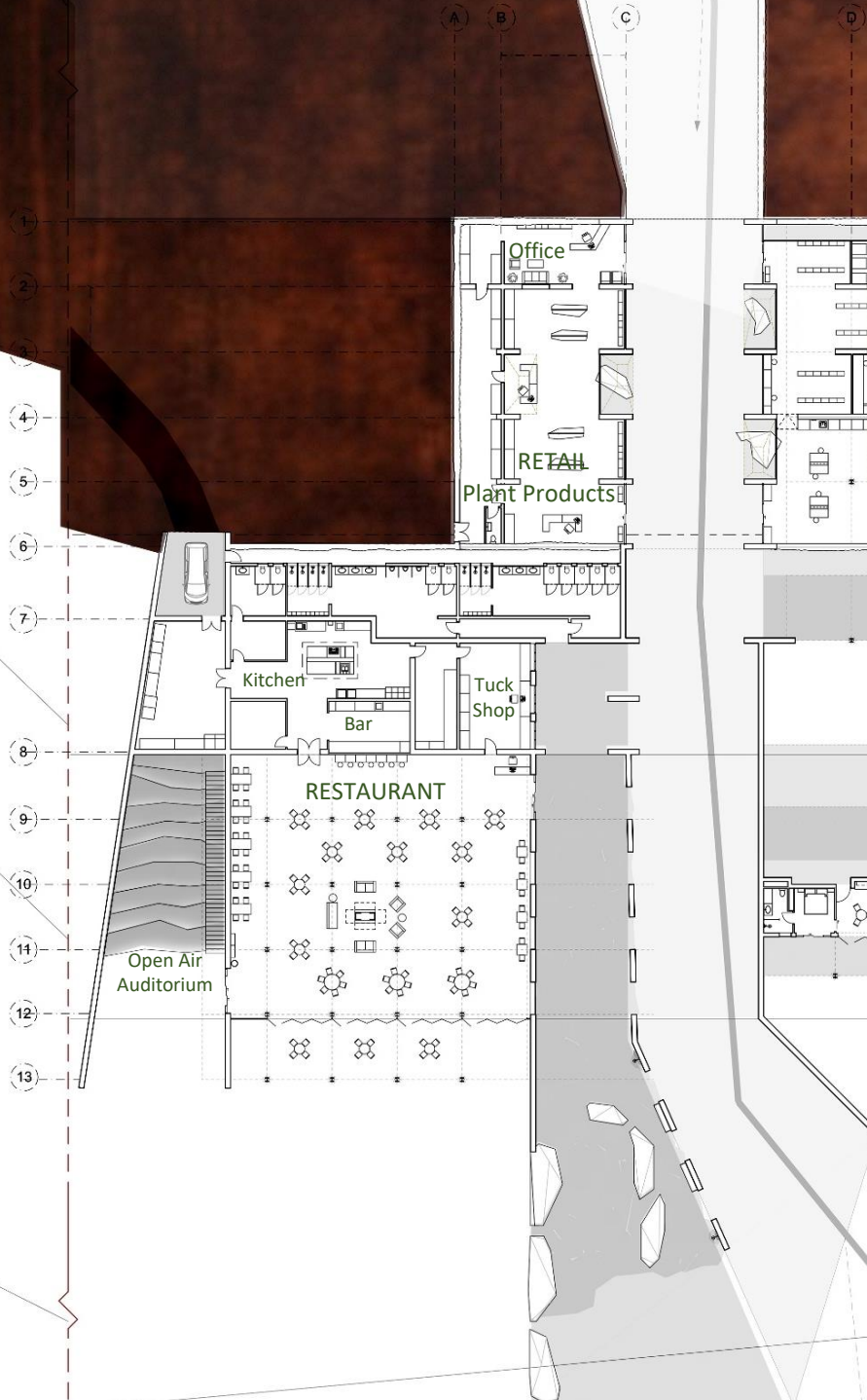
The proposed entrance of the Landscape Interpretation Centre and Plant Research Centre becomes part of the journey of the existing footpath. Instead of going over the hill, the entrance is a tunnel-like path that leads the visitor through the final hill.

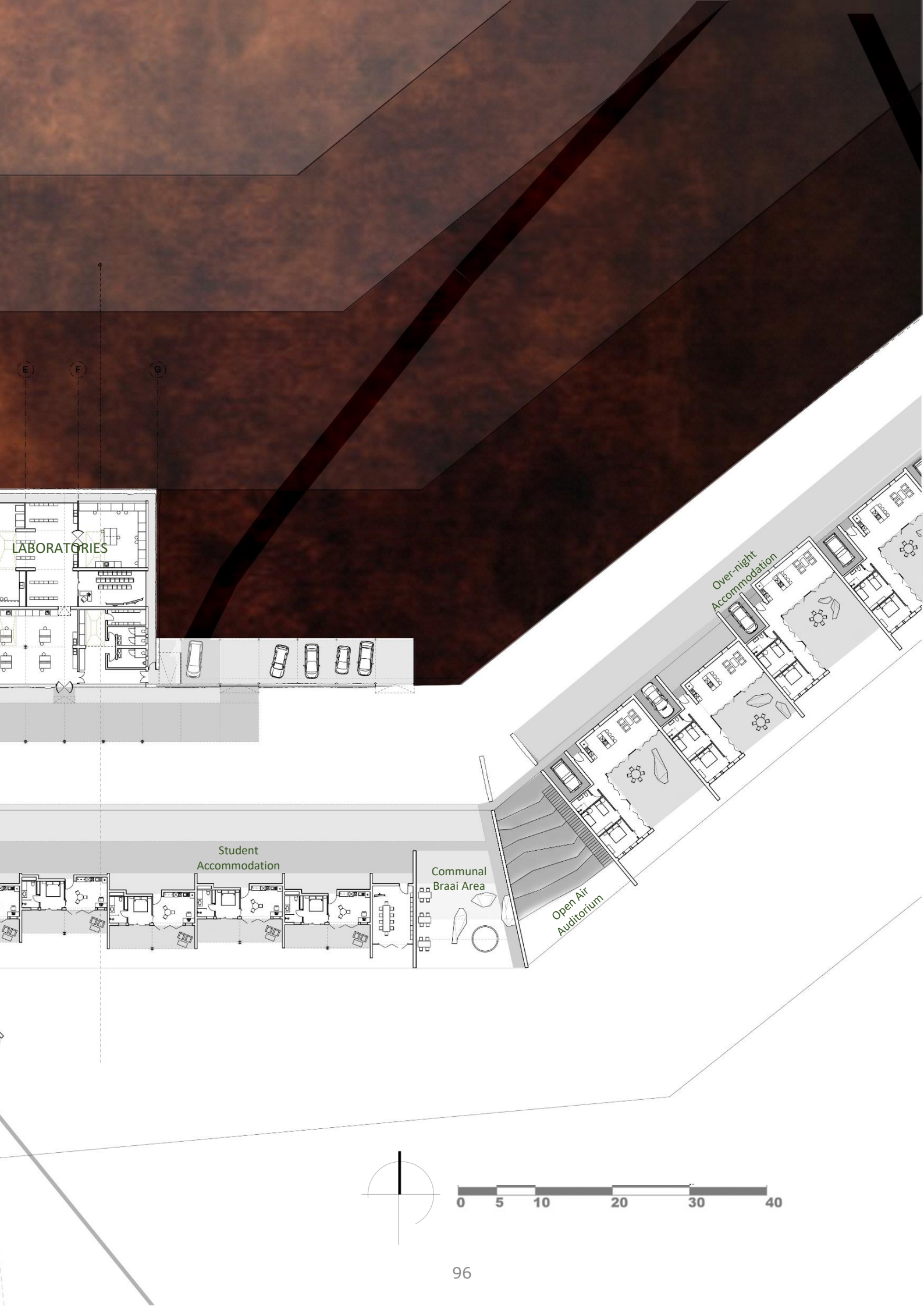






Entrance





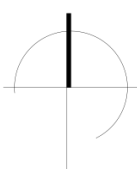
LABORATORIES

Student Accommodation

Communal Braai Area

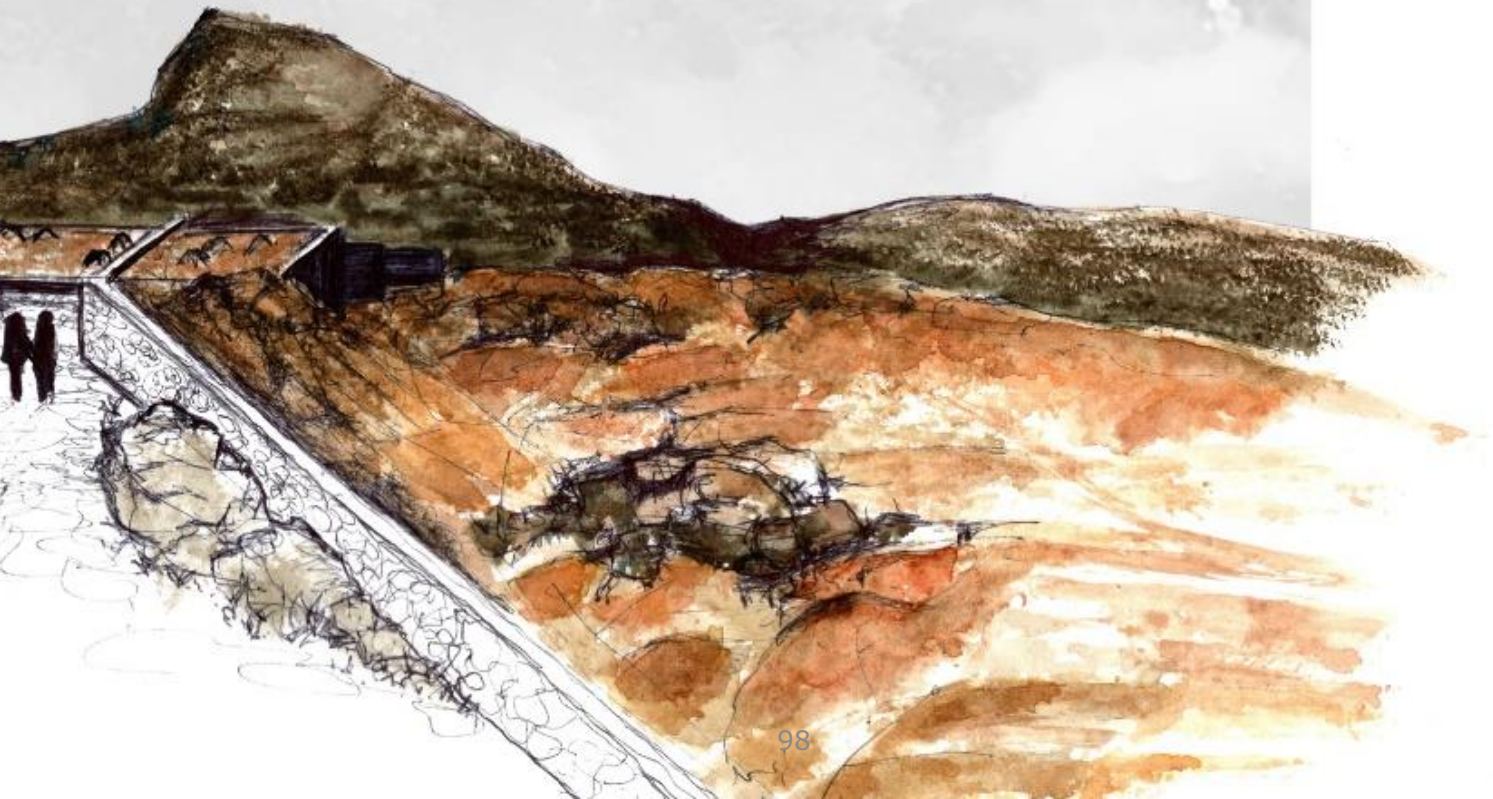
Open Air Auditorium

Over-night Accommodation



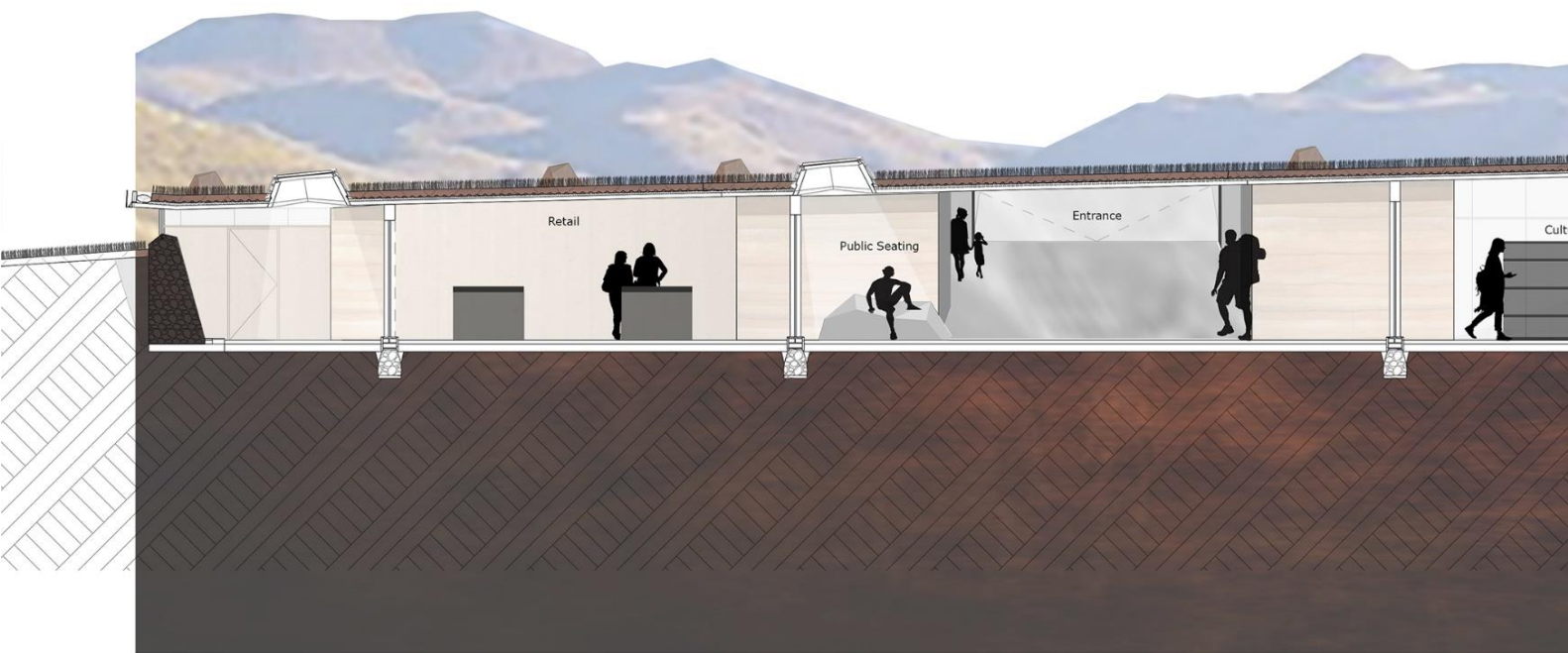
ENTRANCE



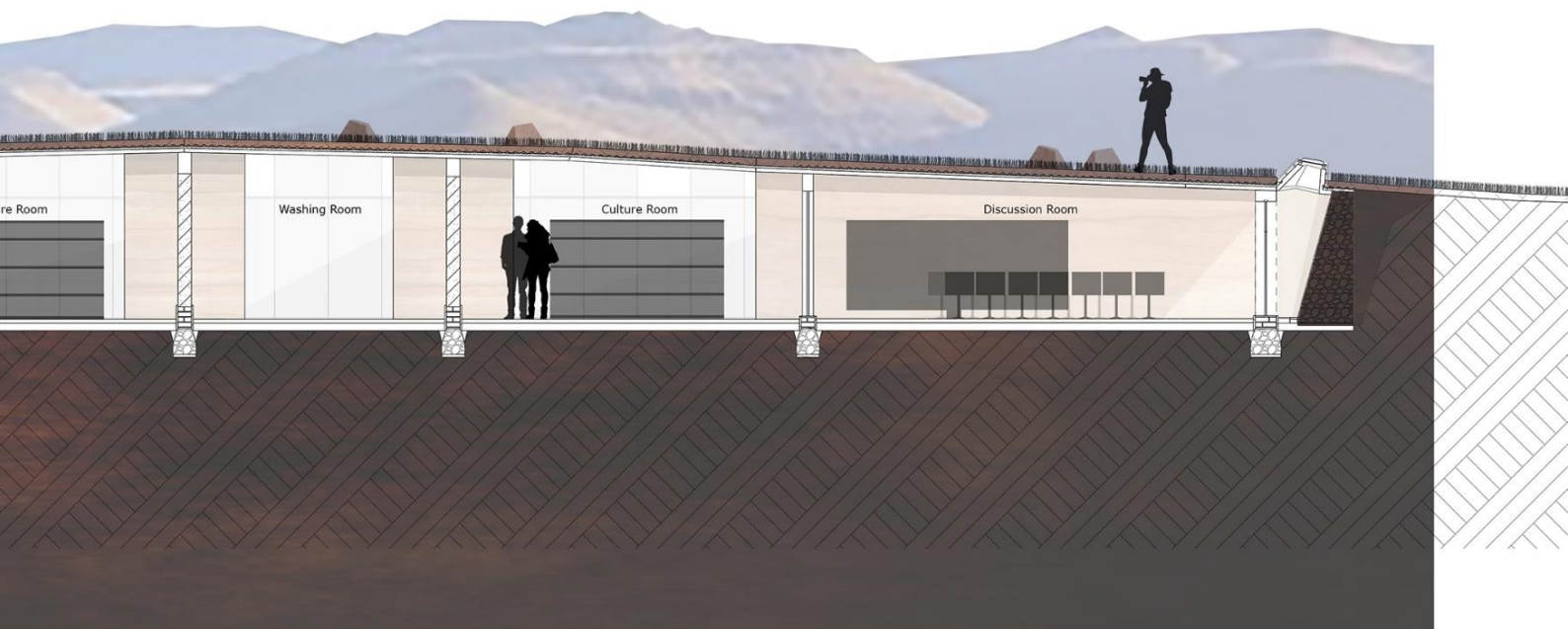
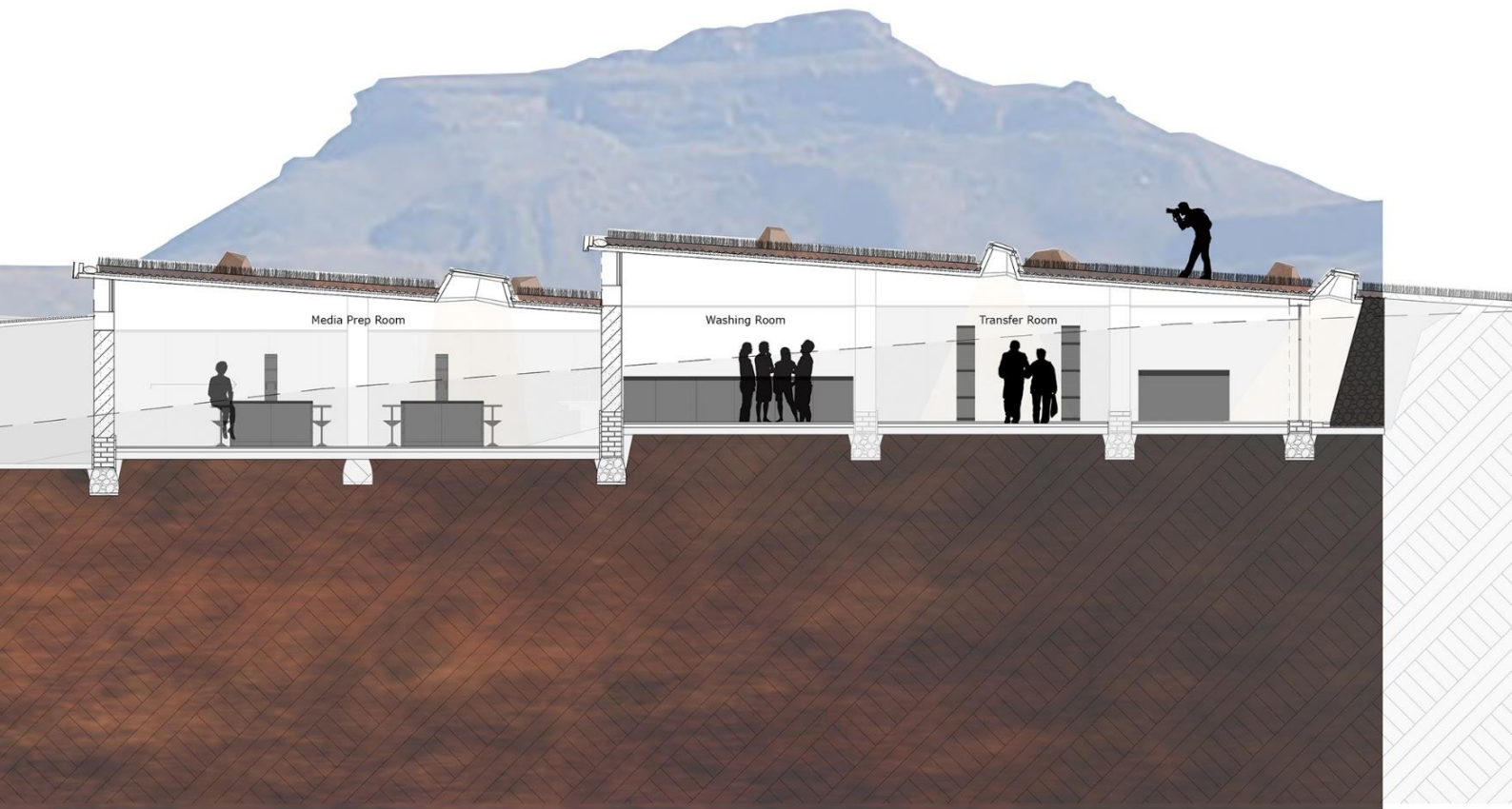




SECTION A

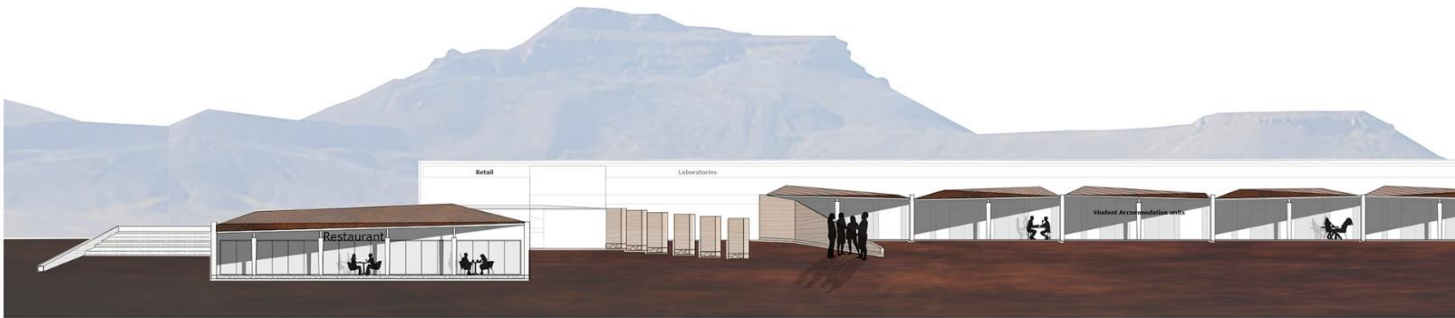


SECTION B

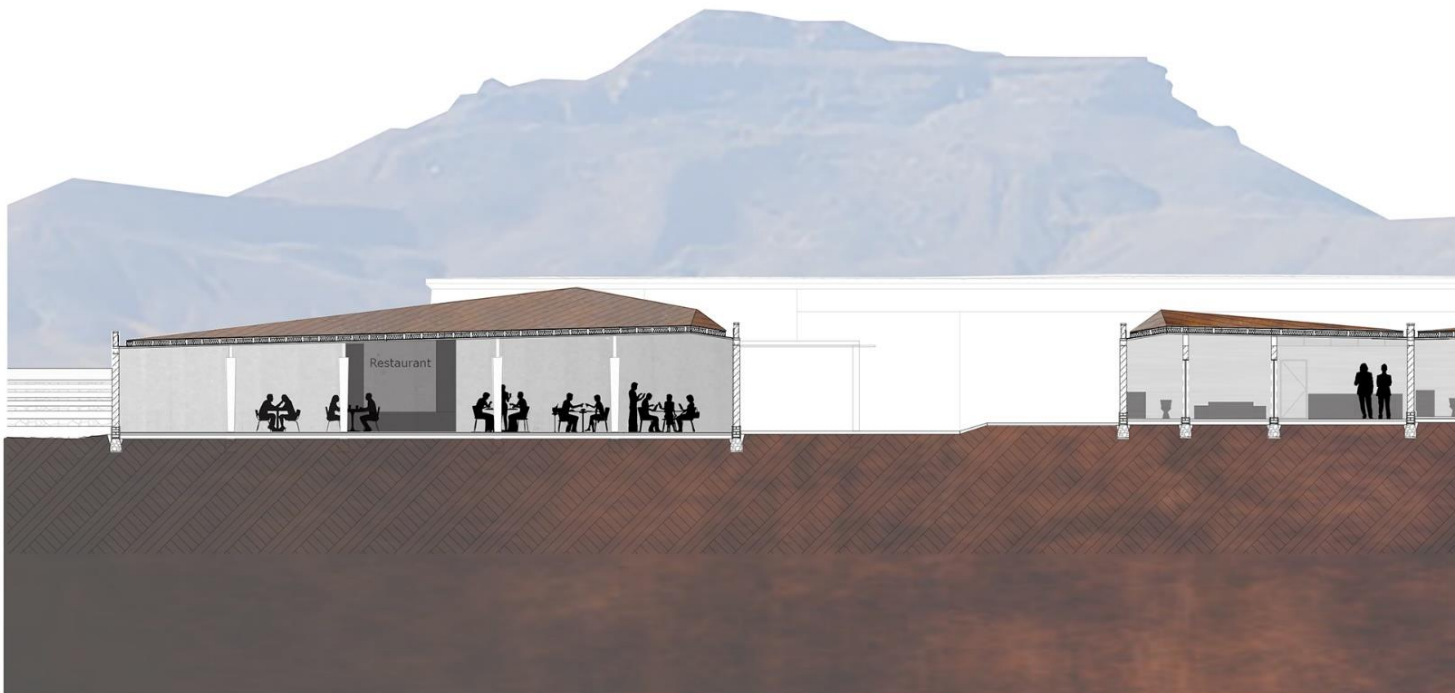




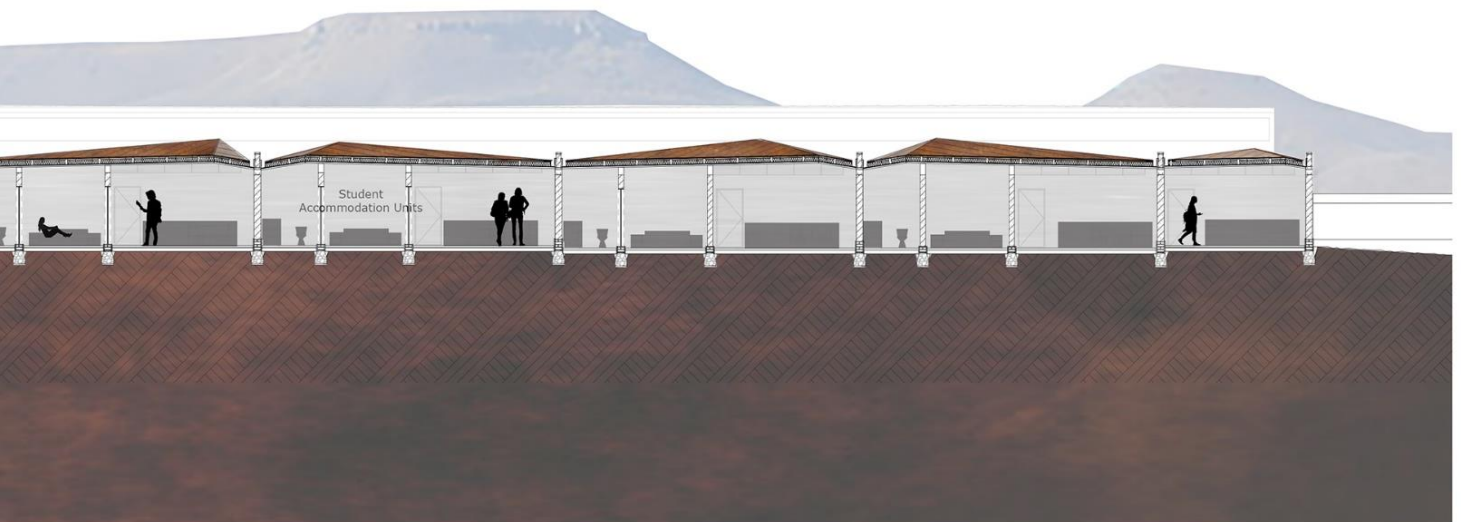
EAST ELEVATION



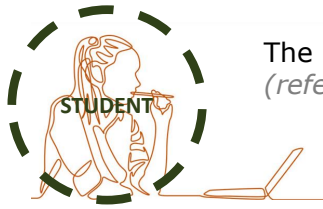
SOUTH ELEVATION



SECTION C



PLANT LABORATORIES



The plant research is the most effective during raining seasons
(refer to pg 26 & 59).

BEFORE RAIN

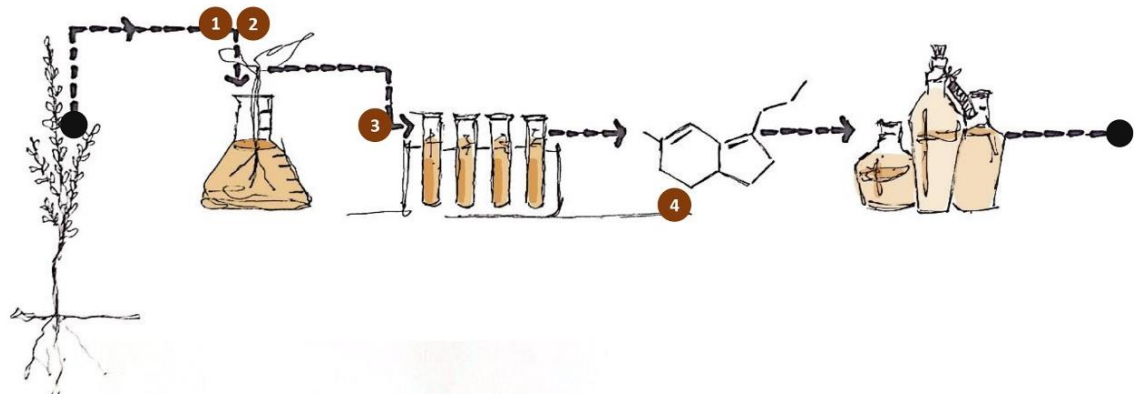


"-after rain it brings forth new life. Bright splashes of colour demand attention. Tiny florets appear on dry wooden stems, fleshy leaves cradle clumps of yellow petals beneath the protection of thorny bushes. The Karoo is one of the few places where the mesembryanthemum *Bijlia cana* flowers. Daisies seem to grow out of solid rock, making one wonder how their roots find purchase and seek out water. Prehistoric, leathery leaves spread across barren land, send forth flowers and seed as swiftly as possible, then dry back into obscurity until the next rains." *Anonymous (Karoo tales: online)*

AFTER RAIN



PLANT LABORATORIES



After the visitor enters the tunnel, the Research Laboratories are on the left-hand side. This is where the plant research is done. The first encountered laboratory is used for the isolation and structure elucidation (Culture Room) of the plants, and the second laboratory (Media Prep Room) is where the researcher conducts the processes of investigating the qualities of the plants.



Semi-public (closed when necessary):
Propagate plants from small amounts of starting tissue. Then, disinfect/clean relevant equipment.



- 1 WASHING ROOM
- 2 MEDIA PREP ROOM

Public:
Plant growth and multiplication (locked & controlled storage units).

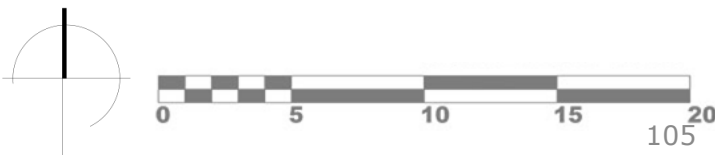


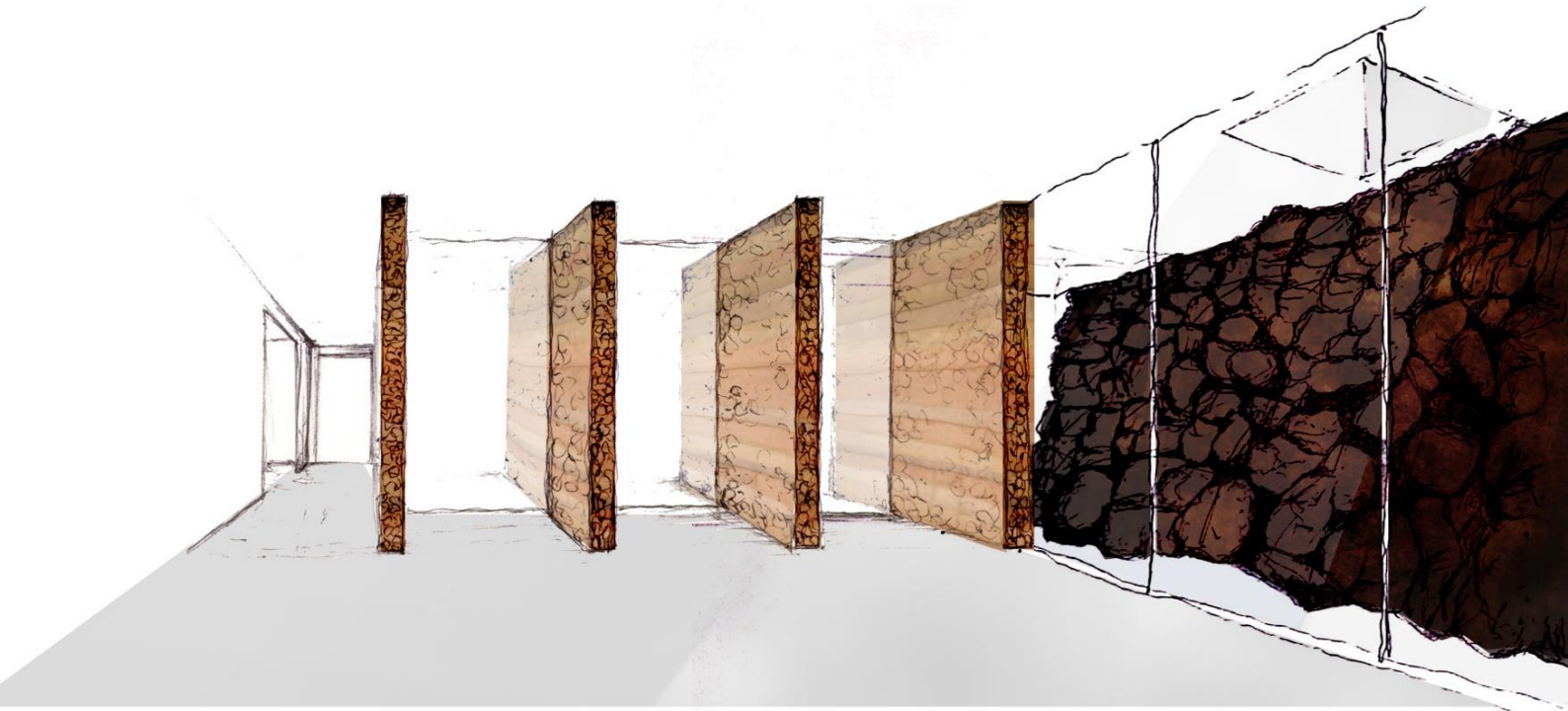
- 3 CULTURE ROOM

Private:
Controlled research (closed-off, only allow students to enter).

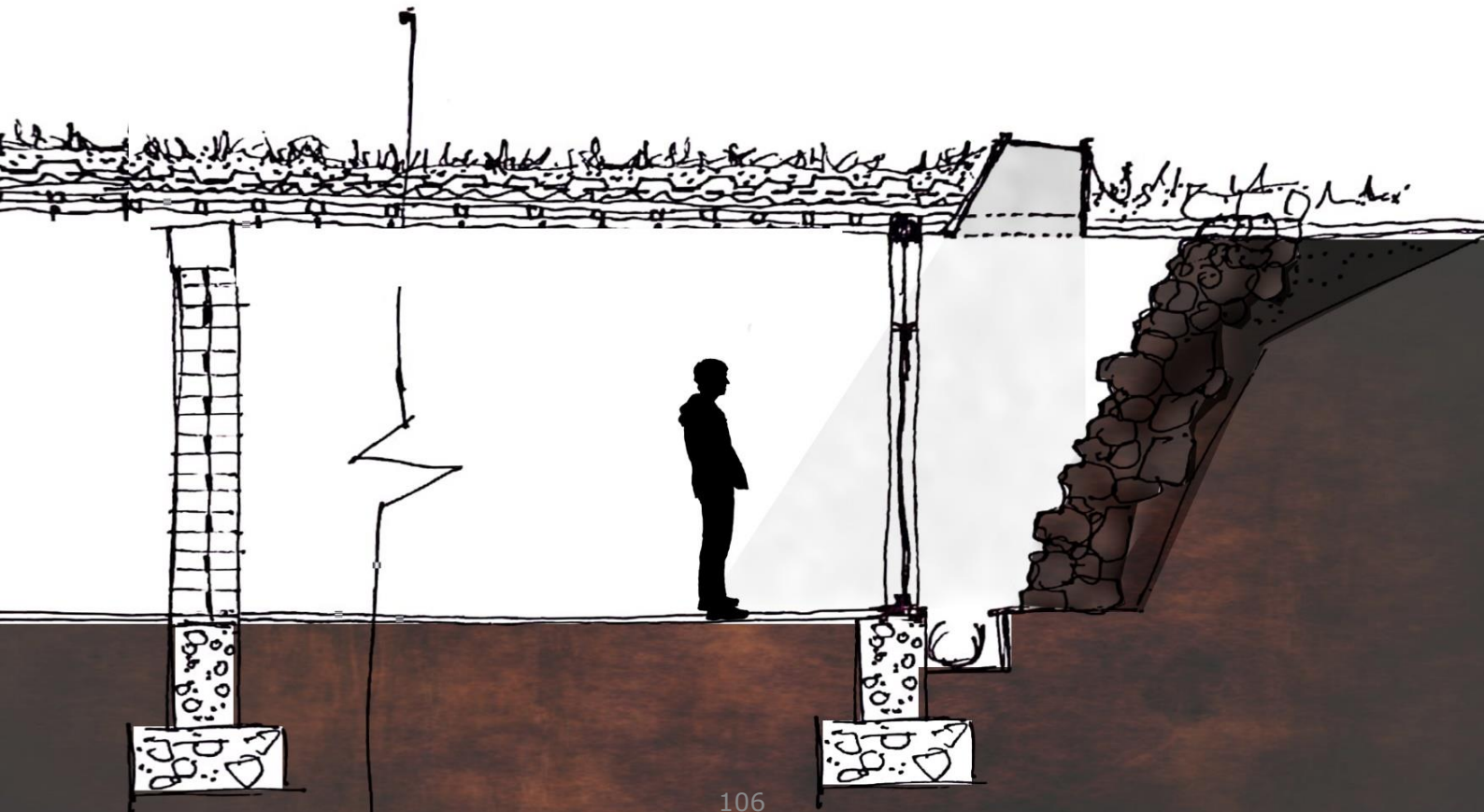


- 4 TRANSFER ROOM

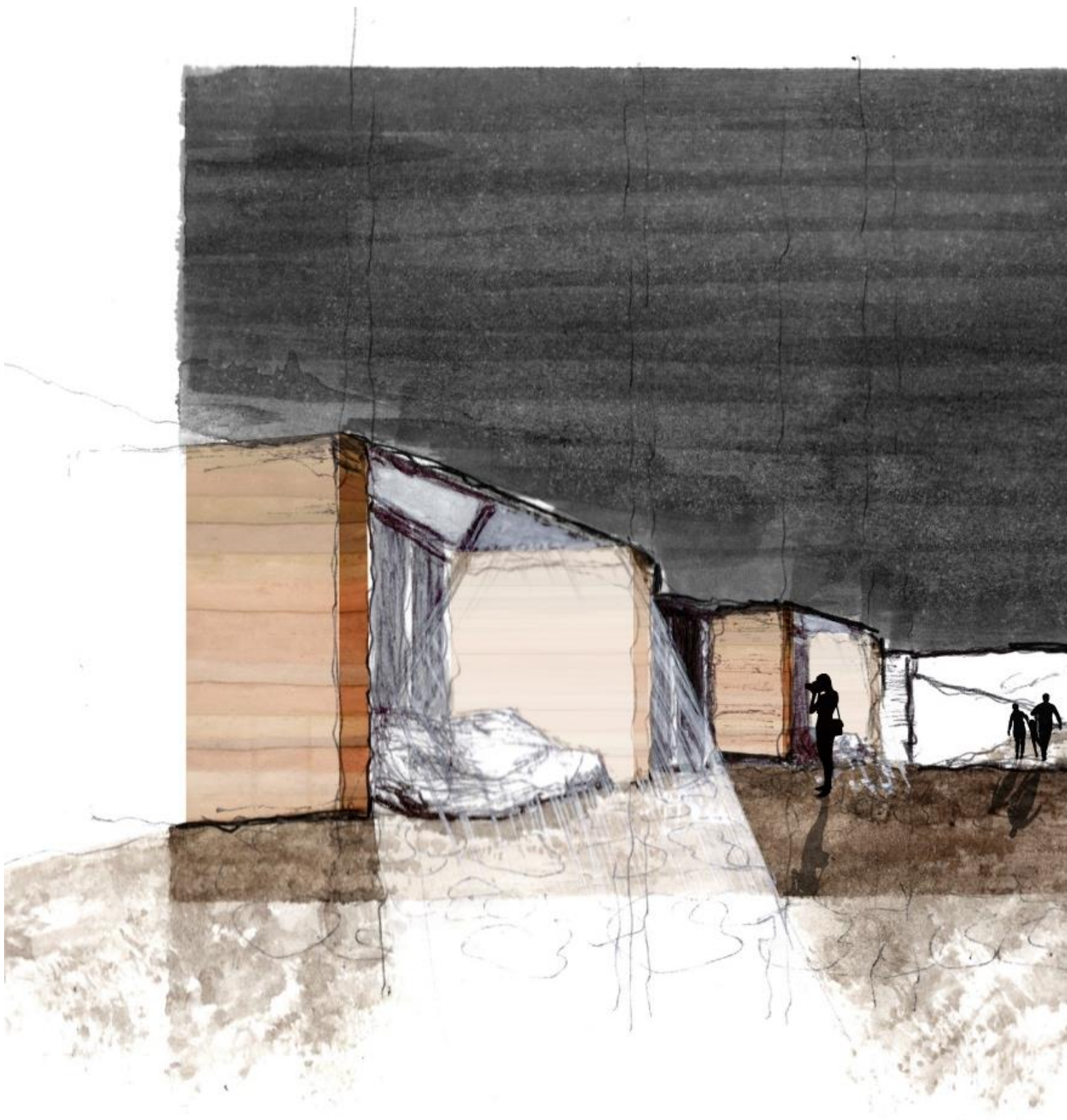




CULTURE ROOM



SECTION



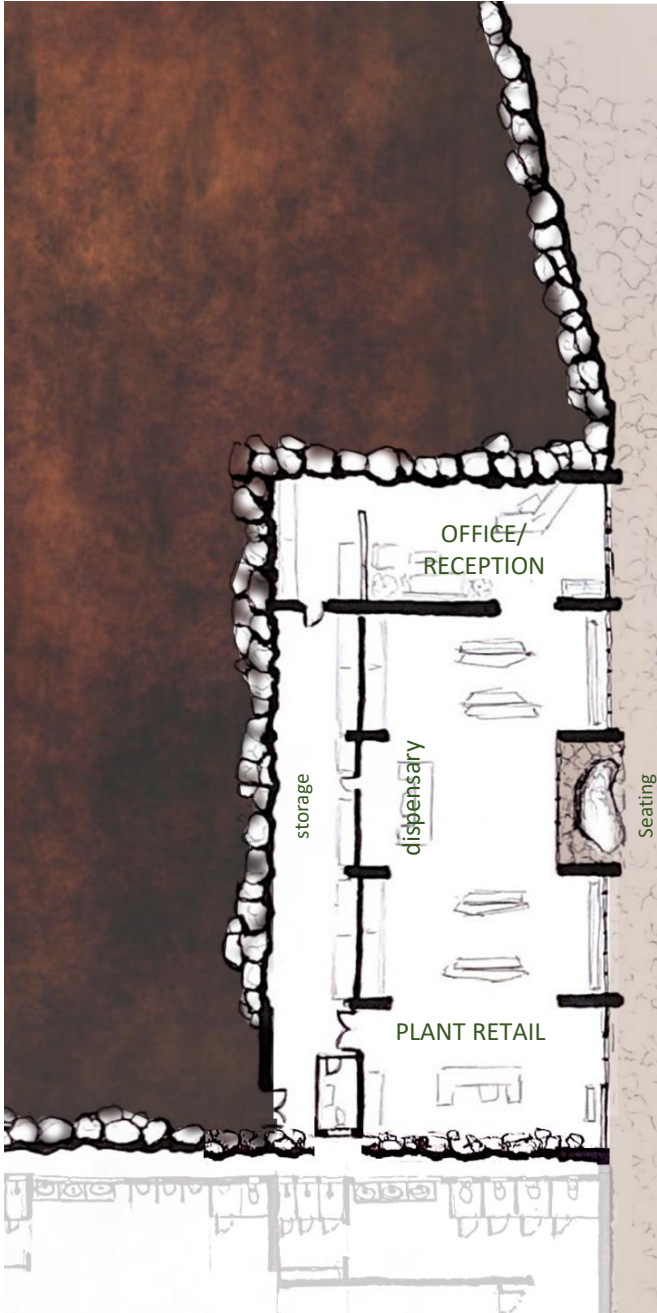


RETAIL

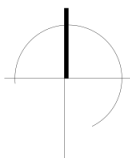
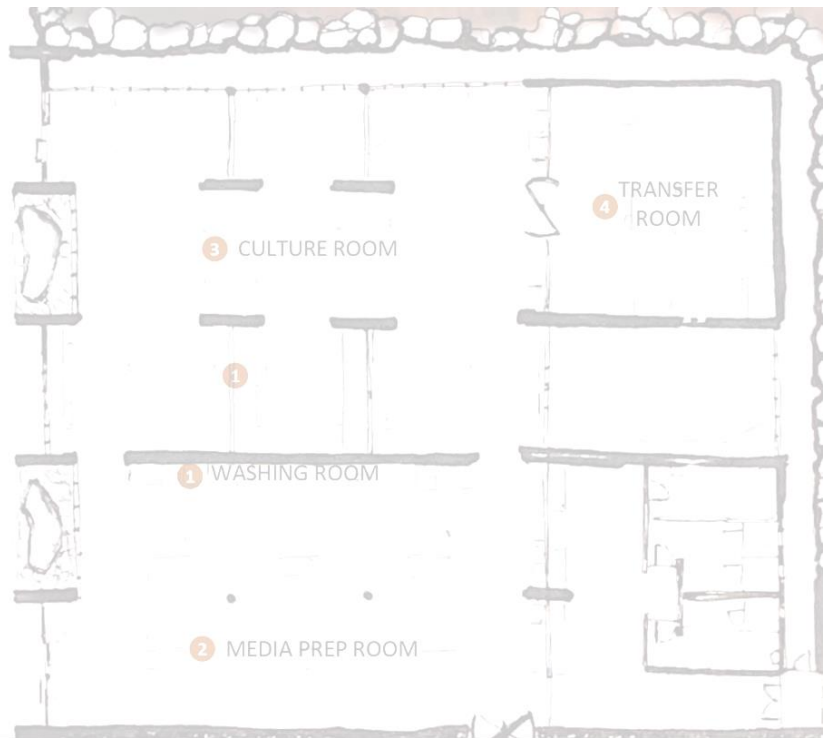


The retail space will sell the products that resulted from the research done in the laboratories. These will include products that are certified and allowed to be sold commercially, such as essential oils, therapeutic medicines and cosmetic products.

The office/reception includes services such as the booking of a guided tour or the retrieval of keys for the visitors that are staying overnight



Seating
(view inside retail
space & labs)



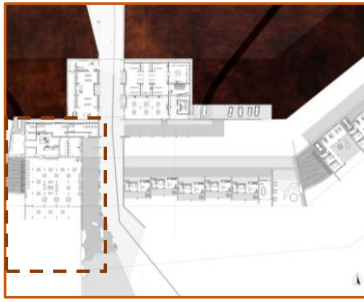
RETAIL

Section through tunnel



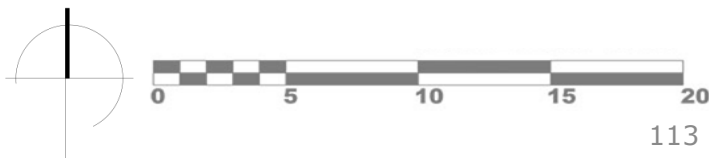
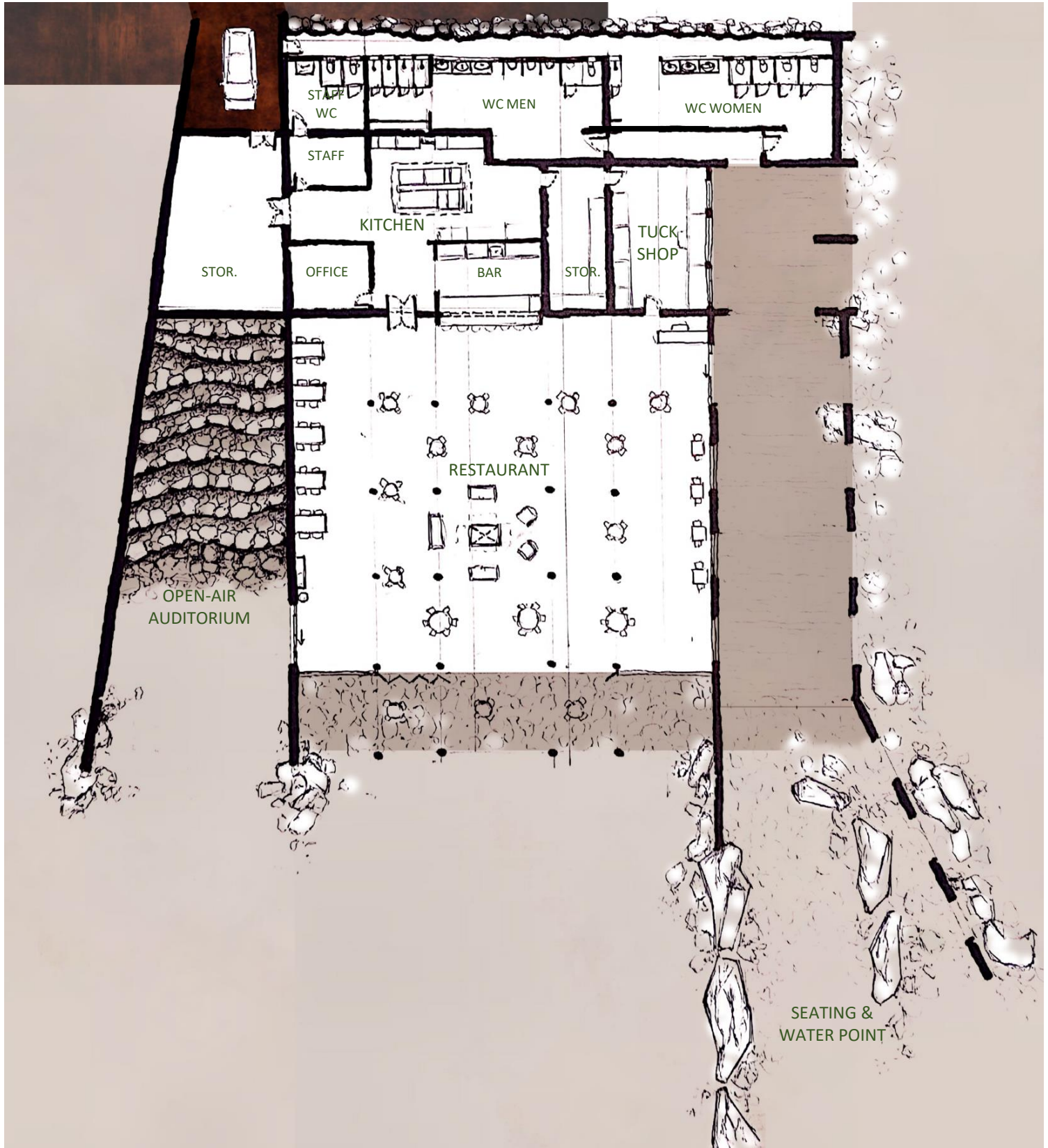


RESTAURANT



"So we gather, baskets in hand, chatting away, pouncing upon the plenty and celebrating what the Karoo has to offer. To greet friends not seen for several long days, smile at visitors and enjoy their delight at the variety of jams and olives and biscuits and rusks. To tap the beat as musicians frolic through boeremusiek. To taste the cinnamon sprinkled on a pancake."

- Anonymous (Karoo tales: online)



RESTAURANT

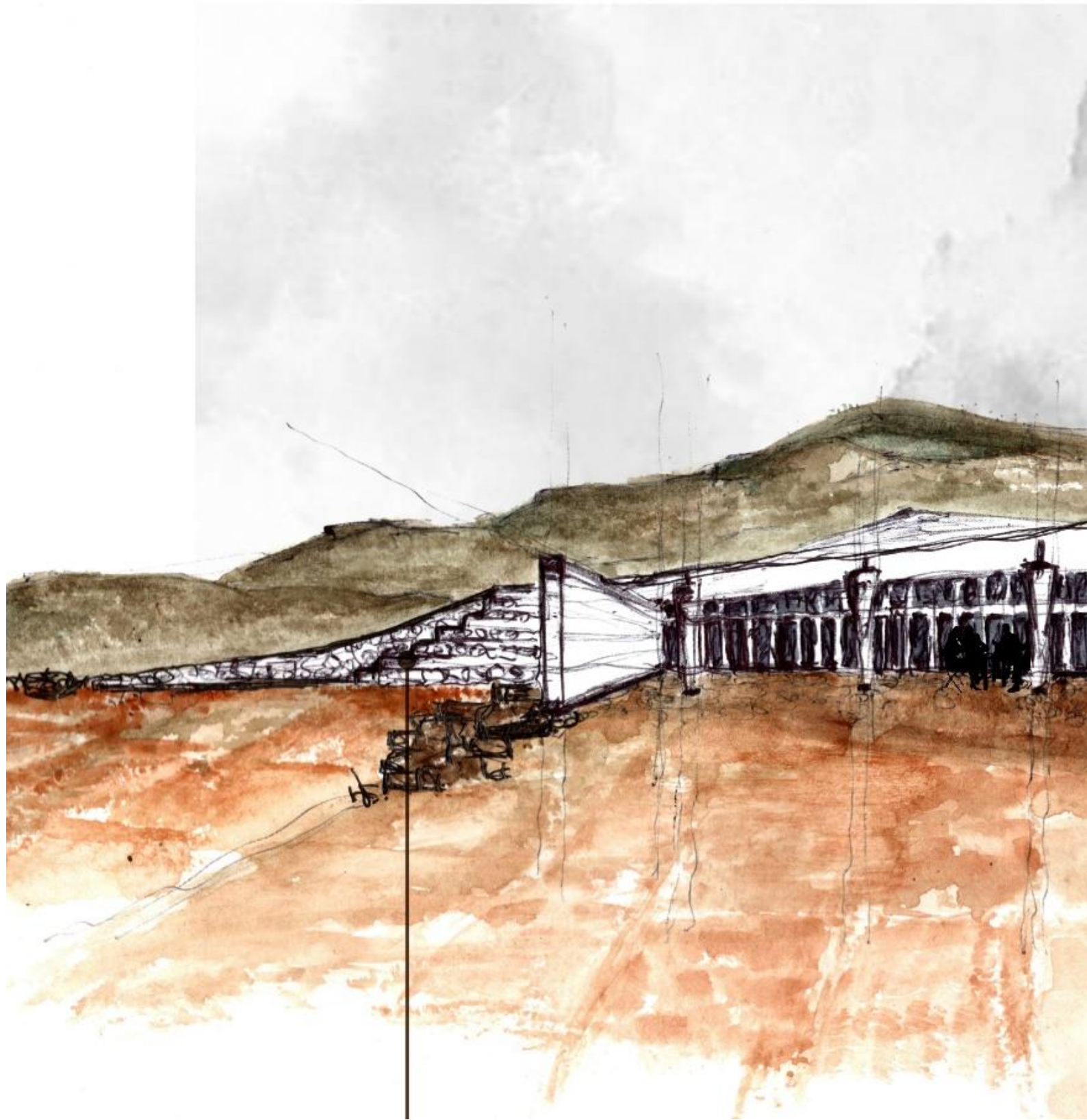


- A tuck shop that will be open during most of the year; selling products that are not easily perishable.
- Public seating and water points.
- Public bathrooms with showers and storage units, these can be used by day visitors who would like to store some of their belongings before they set out to climb the mountain.
- A restaurant that will be open during peak visiting times or for booked events.
- The restaurant leads to an open-air auditorium with telescopes. This can be used for lectures or stargazing.

"But it is at night that the spirits of the Bushmen fill the Karoo. When a million stars arch in splendour across the firmament I am reminded of their belief that they were children of the stars. Each pinprick of light in the blue-black sky the essence of a beautiful child who lived in harmony with the earth. Sit quietly beneath those stars and listen for the crackle of the fire, the click of conversation and laughter, and rejoice in a blessing from gentle people, custodians of the earth and keepers of the Karoo."

- Anonymous (*Karoo tales: online*)





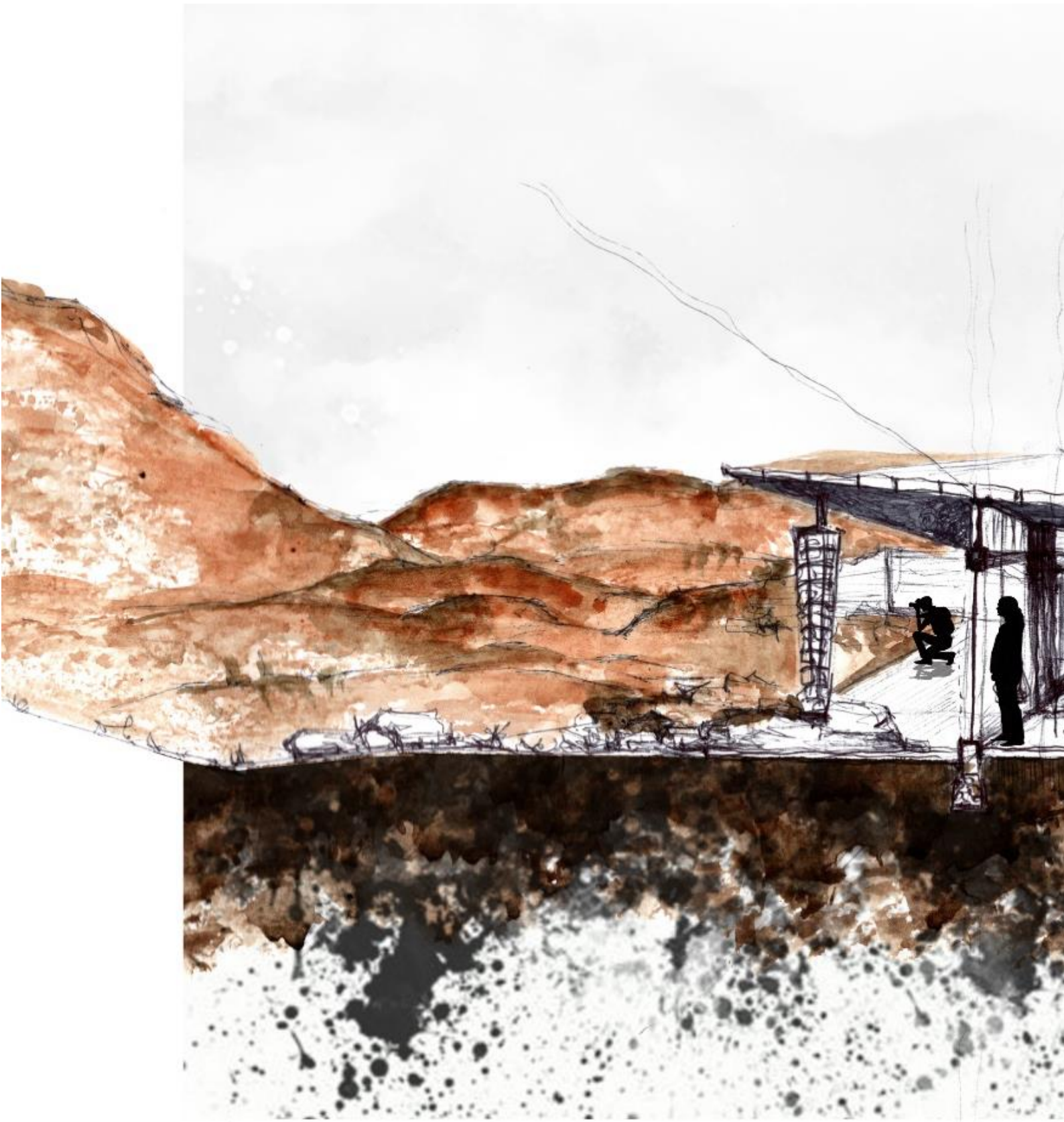


STUDENT ACCOMMODATION



The accommodation is equipped for students that will be doing research for long periods of time. Therefore, the unit will have a kitchenette, ensuite bathroom and small relaxation area. It is placed closest to the laboratories for easy access. A small conference room is also included, providing a space where the students can gather and have group discussion and daily planning.







OVERNIGHT ACCOMMODATION



"In the evenings a cooling breeze sweeps down from Compassberg, rustling the leaves and stirring the air, while the rocks still hold the heat of the day- To sit on its hills and watch a fiery sunset."

- Anonymous (Karoo tales: online)





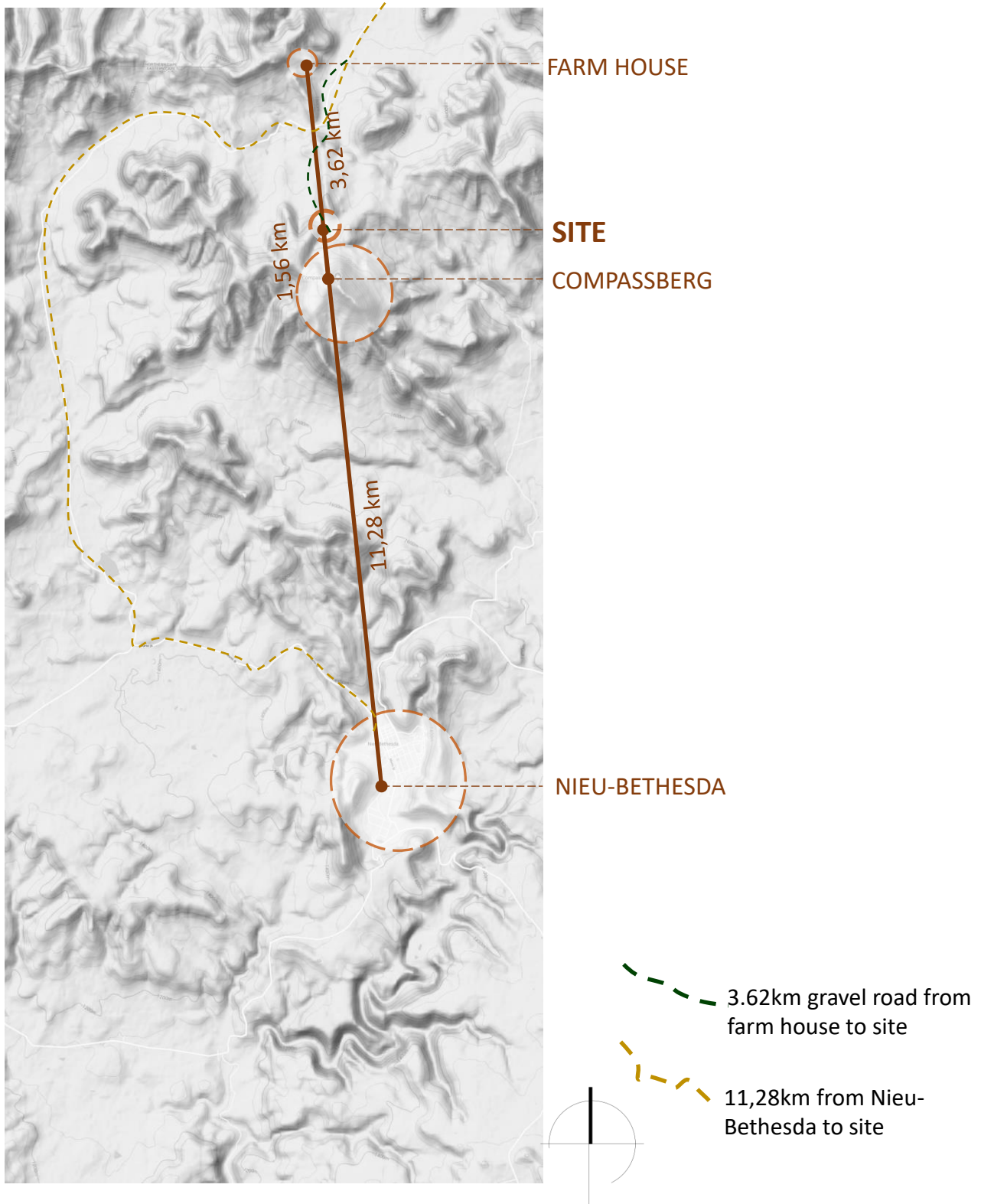


3.3 Technical Summary

The technical summary of this scheme is done to understand how the building and design features on site are resolved in a technical manner. The information relevant to this topic is summarised to make it easier to follow, however, information regarding the technical resolution is given in the previous chapter, 3.2 Design Synthesis. In parts where the technical resolution has been made, reference will be made to the applicable part. Some information in the following chapter may also repeat what has already been said. This technical synthesis, in conjunction with the technical design documentation as Addendum 1, will form the bulk of the work for the Construction module of the year.

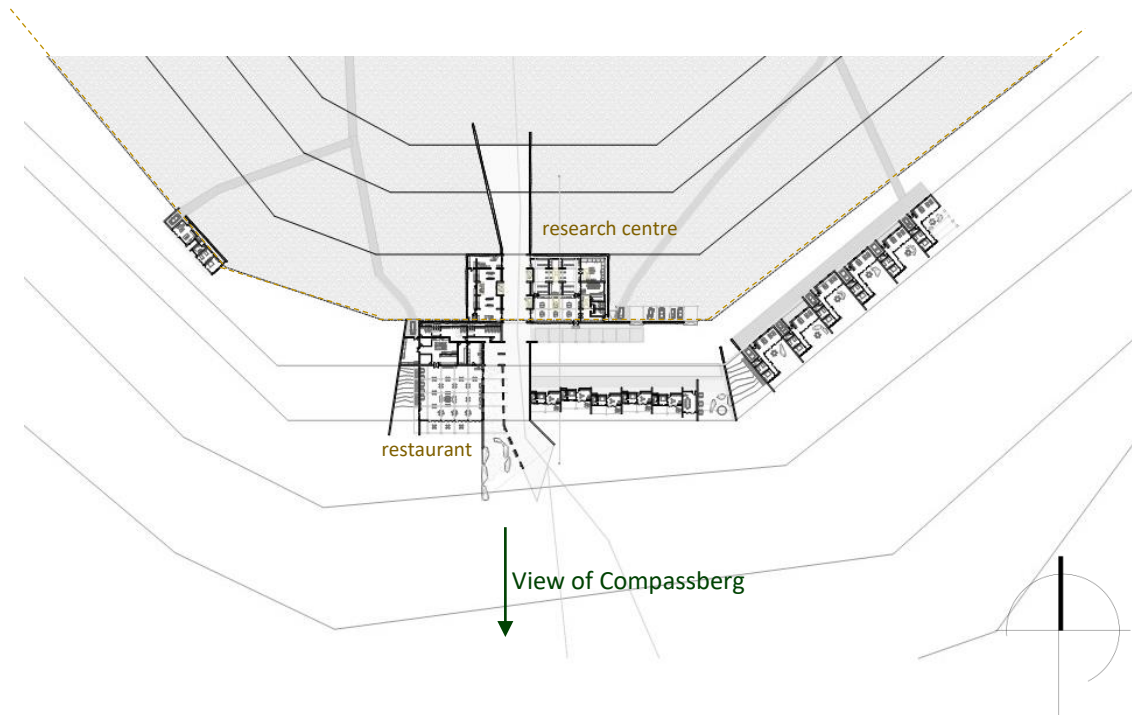
Site:

In chapter 2.4 of this dissertation, the site, with all its challenges and attributes, is illustrated and studied for a better understanding of the applicable context. The site is located at Compassberg, near the town Nieu-Bethesda in the Eastern Cape. The site was the main influence for the design dissertation and led to the function of the proposed dissertation as a Plant Research Centre and Landscape Interpretation Centre. The remote area is only accessible through a gravel road or a hiker's footpath. A windmill and borehole is available at the site.



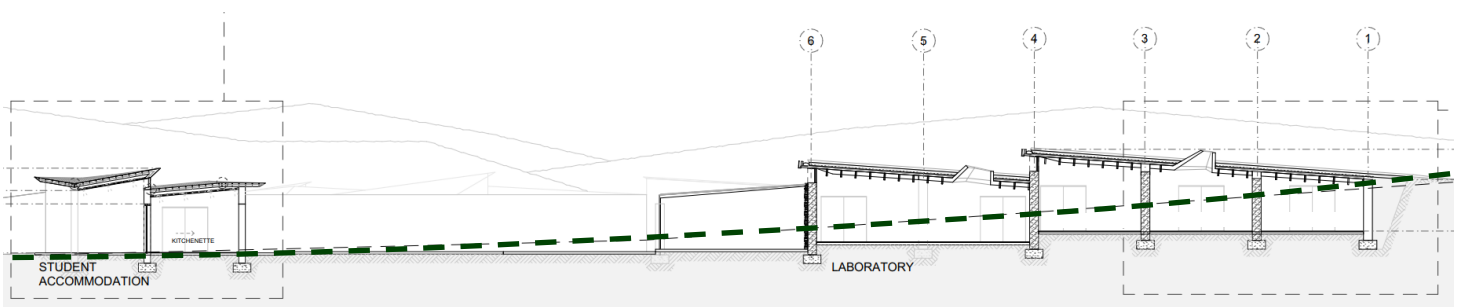
Site Planning:

The site is situated on the south facing side of a hill, seeing that the view of Compassberg is towards the South. This is where the research centre is embedded into the landscape, by cutting into the ground.



Thereafter, the slope becomes gradual and the rest of the building, such as the restaurant and accommodation units are above ground.

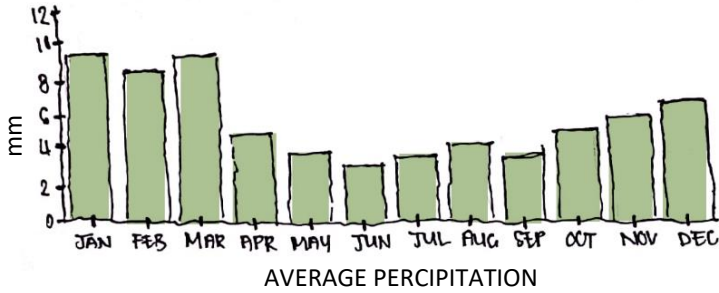
Because of the slope of the site, the stormwater runoff will follow the natural slope. The rainwater discharge from the roof will be used on site as far as possible. In case of flash floods, the excess will be channelled away from the buildings to the surrounding fields. These channels will collect and convey the water away from the walkways and hard surfaces towards the open fields.



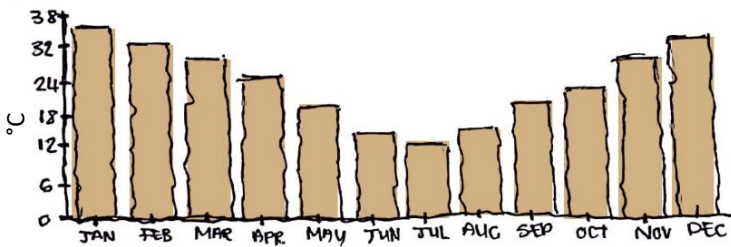
Climate:

The Karoo climate is best known to be harsh as it can vary from very hot summers to very cold winter months.

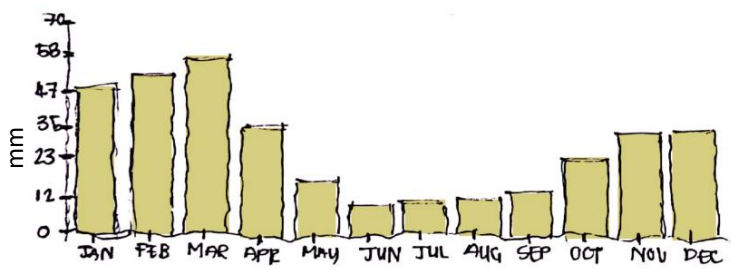
Nieu-Bethesda is a summer rainfall area, with a generally dry climate and a lot of sunshine (World Weather and Climate Information, s.d: online). The sheltering of the building needs to be addressed appropriately to protect the visitors from the extreme climates.



AVERAGE PERCIPITATION



AVERAGE TEMPERATURE



AVERAGE RAINFALL

Climatic designing considerations:

The Research Centre has very specific requirements regarding climatic conditions because certain phases of the plant research require controlled conditions. The design must incorporate a means of regulating the extreme temperatures and the airflow as far as possible. This must be done in an energy efficient way.

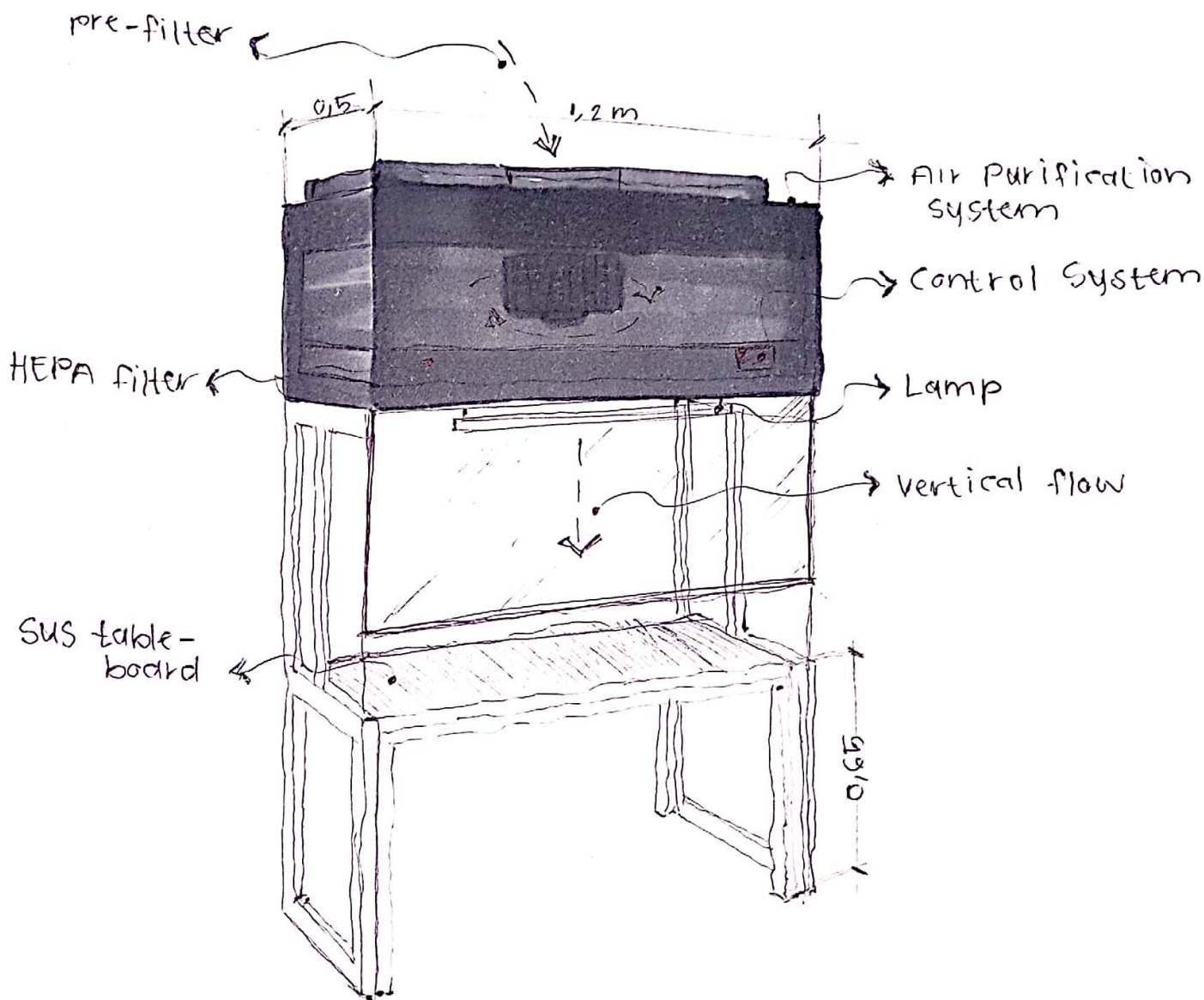
Ventilation and Lighting:

During an interview with a Microbiologist, (refer to pg. 62) the biologist pointed out that the only area for this specific laboratory that needs to be controlled in terms of ventilation and privacy is the Transfer Room. This room must be able to seal off, the windows and doors should be able to close properly. There is no need for a secondary mechanical ventilation system in this room due to the fact that the equipment there has a mechanical system intact that filters the natural air.



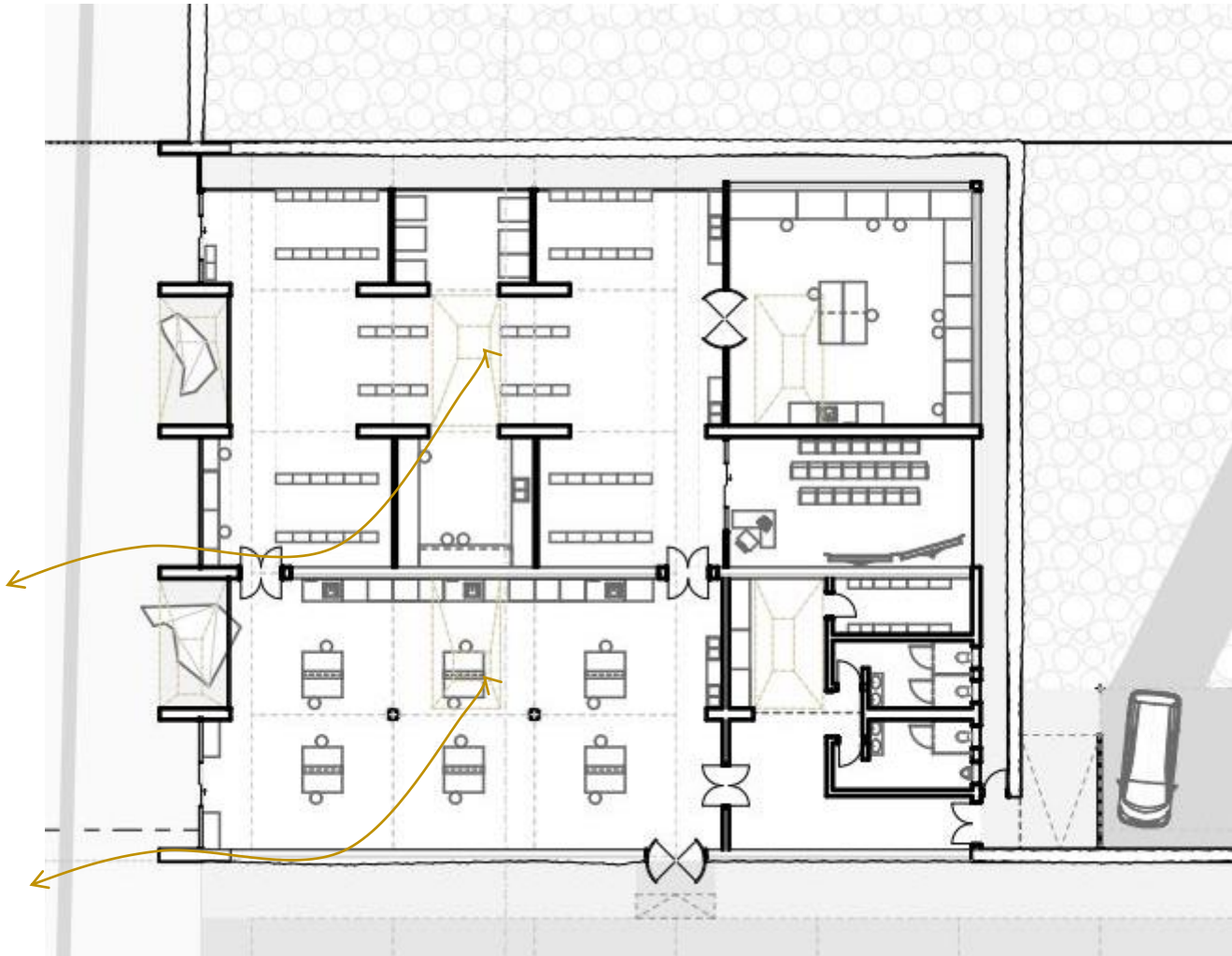
PLANT RESEARCH CENTRE

Transfer Room functional requirements:

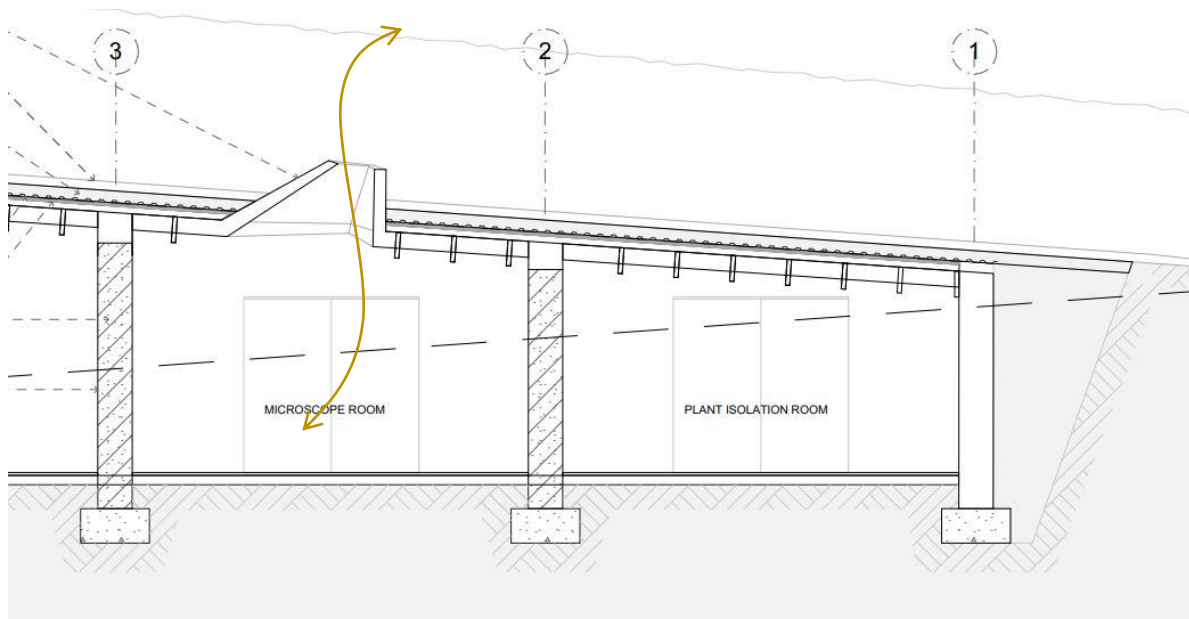


Horizontal Laminar Air Flow Cabinets are used within the Transfer Room. These cabinets receive air from above that changes direction and is processed across the work in a horizontal direction. The constant flow of filtered air provides material and product protection.

Ventilation, regarding the rest of the underground buildings, makes use of cross ventilation as well as stack ventilation. Light shafts, with UV-protection glass, are placed throughout the research centre to allow for natural sunlight as well as ventilation. The minimum stack height is 3.4 meters.



PLANT RESEARCH CENTRE
STACK VENTILATION

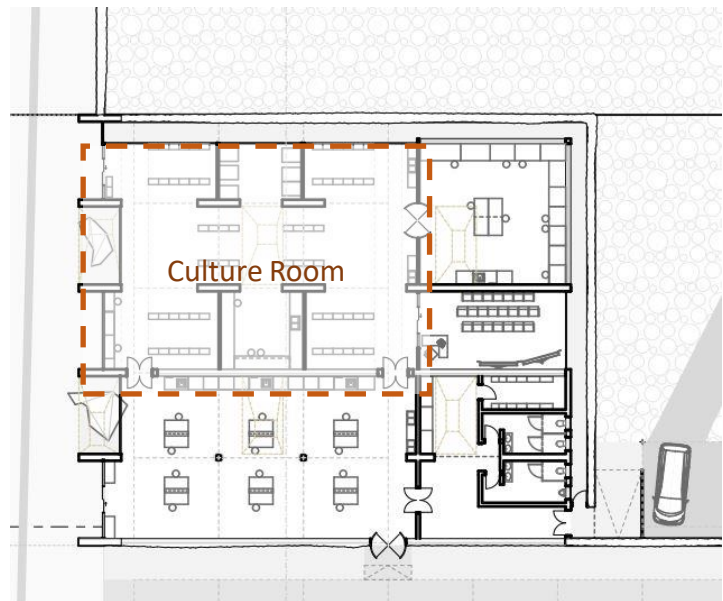
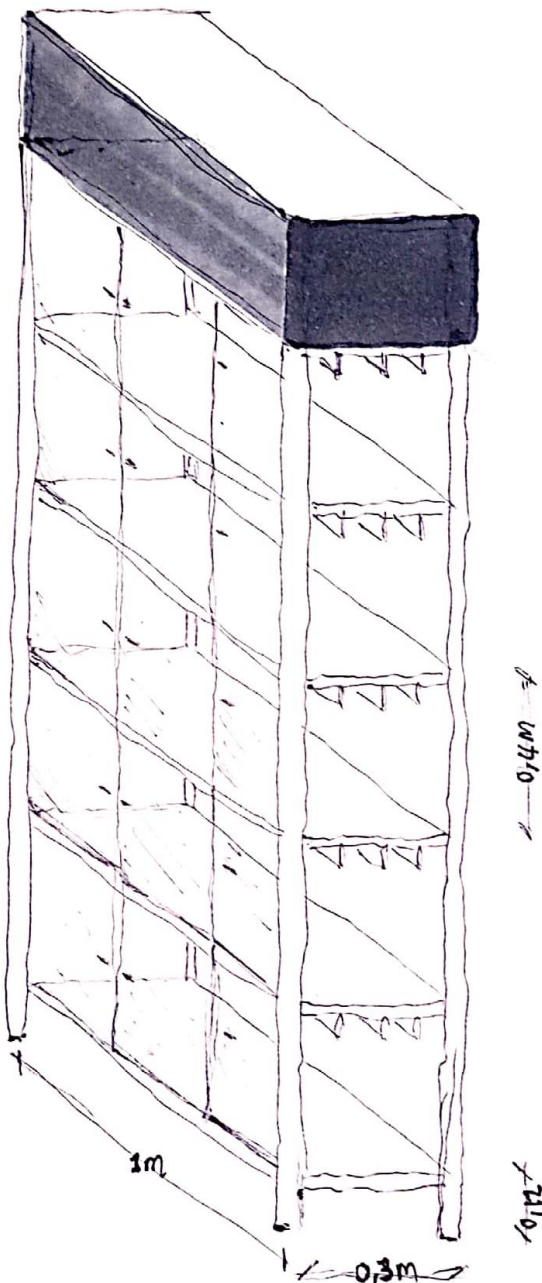


Culture Room functional requirements:

With most laboratories, natural sunlight must be blocked off from the interior, but in this dissertation the natural sunlight poses no threats to the research processes; in the instances where controlled light is necessary, equipment that controls the temperatures and light qualities is used.

Tissue Culture Chambers are used in the Culture Room:

These chambers provide a generous growth area for the plant multiplication process. The standard growth area is 3.4m^2 with insulated lamp trays and humidity sensors. The light intensity within the chambers can be adjusted and programmed.



Form and Function:

The primary functions of this scheme are the Research Centre with its relating functions as well as the Interpretation Centre with its relating functions. Secondary to this would be the overnight accommodation units.

The form and function of this project relates back to the conceptual explorations (refer to pg. 37); the Research Centre and Interpretation Centre become a part of the visitors' journey in exploring and uncovering the Karoo. The different functions are divided into various parts that are spread out on the landscape. The aim is that these different parts are gradually experienced as the visitor journeys through the building

These functions are differentiated by the use of materiality and structure. The first encountered part is the Research Laboratories and Retail Store which is cut into the ground.



Following these parts are the Landscape Interpretation Centre and the overnight accommodation units, which are above ground. The primary structure for both these centres are parallel load bearing walls with strip foundation. A secondary structure of columns is used.

Earth Construction:

Because the site is situated in a remote area, earth construction is mainly used.

This construction consists of raw earth materials transformed into building materials (Schmidt and Pinheiro, 2013: 484). The parallel load bearing walls are a combination of rammed earth walls in certain areas and compressed earth bricks (CEB) in others.

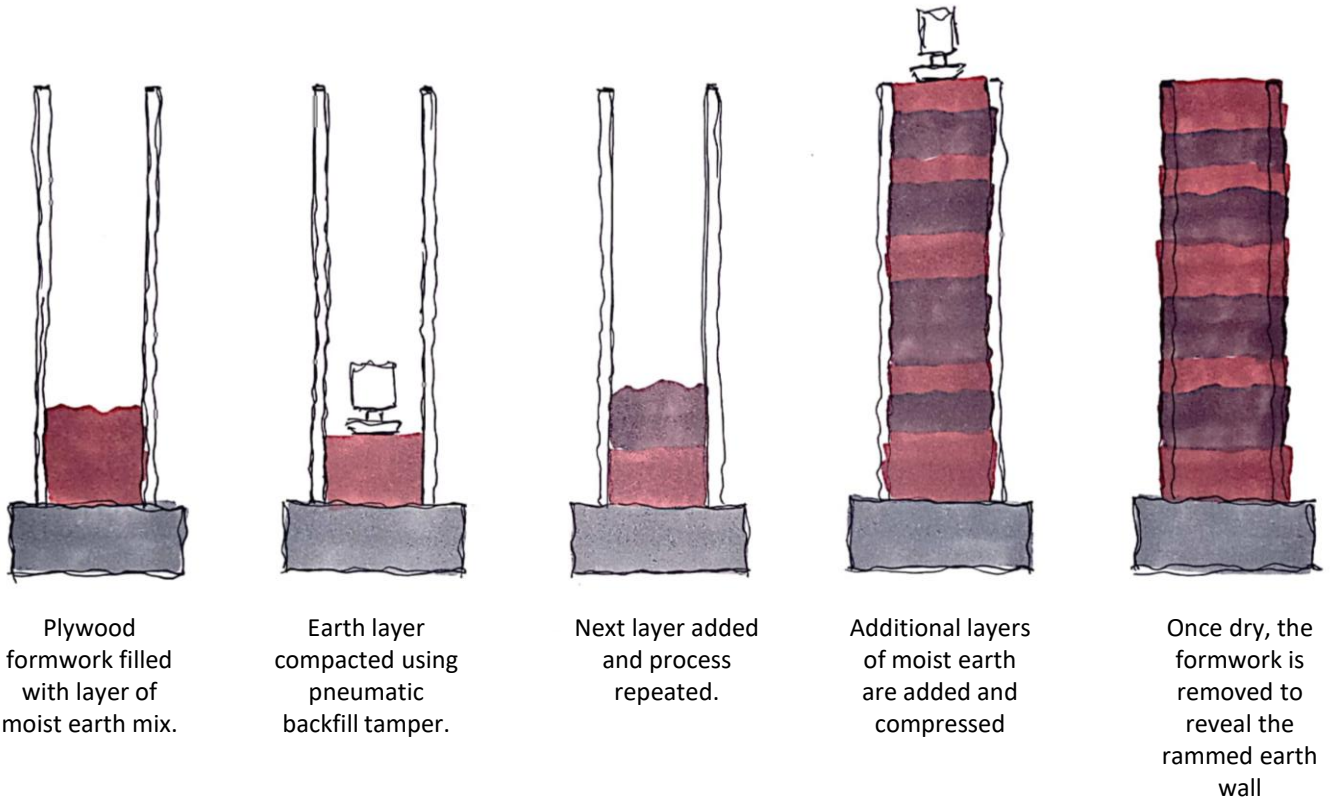


Fig 47. Rammed Earth Walls (PKBN, 2016: online)

CEB refers to a modern way of molded raw earth. Soil is combined with sand, gravel and clay substances that are compacted in stabilised bricks (Schmidt and Pinheiro, 2013: 486). CEB's surface can be protected by using wall finishes such as lime-wash or natural paints that are free of hardening mineral compounds or polymers, allowing the wall layer to breathe. It is important that no moisture is trapped in the core earth wall and its outer plaster layer (Schmidt and Pinheiro, 2013: 486). Therefore, the lime-plaster finish is a method where the outer layer is water-resistant, well-burnished and densified, creating smooth outer finishes with natural ochres as the colour effect.

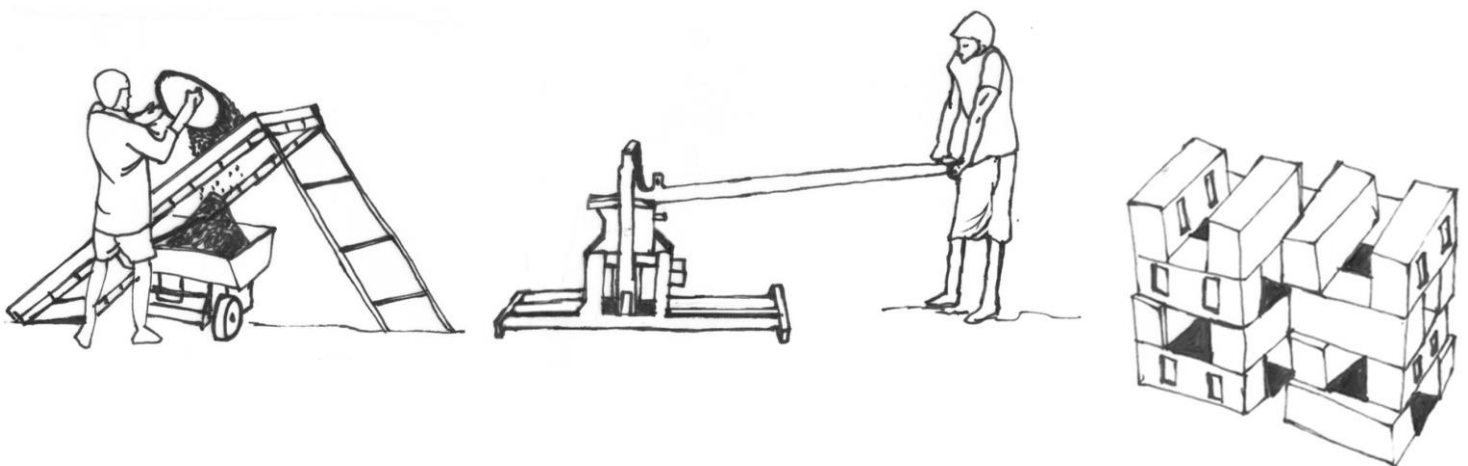
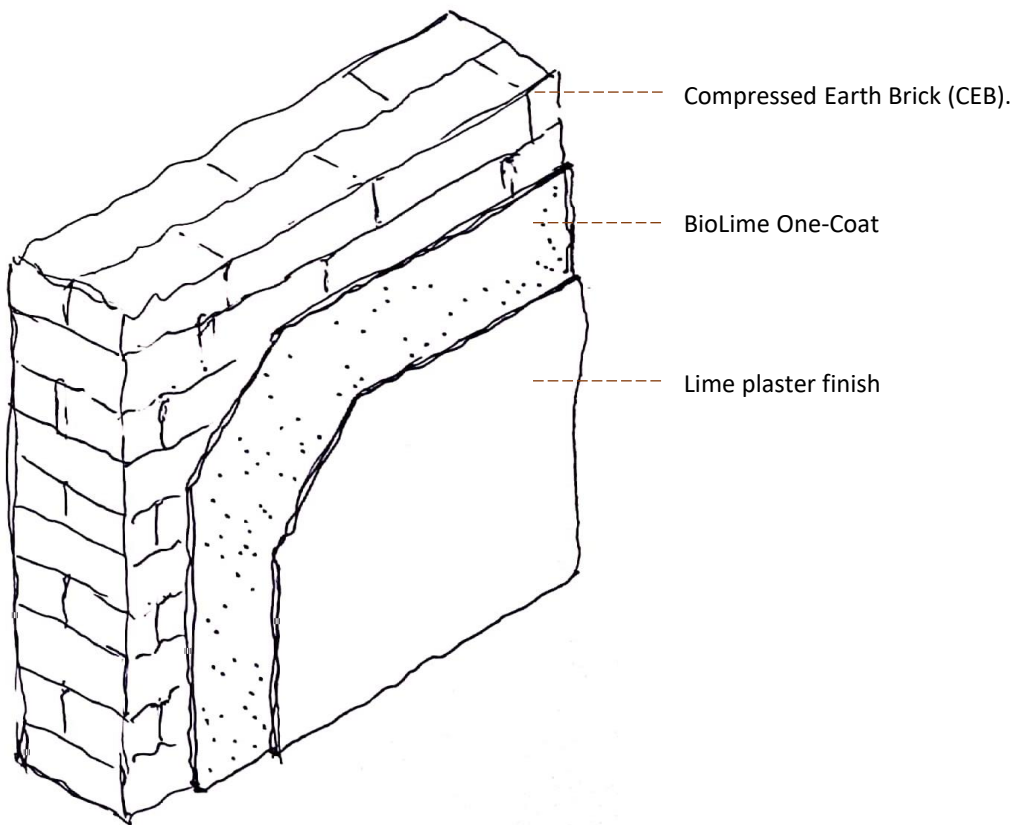
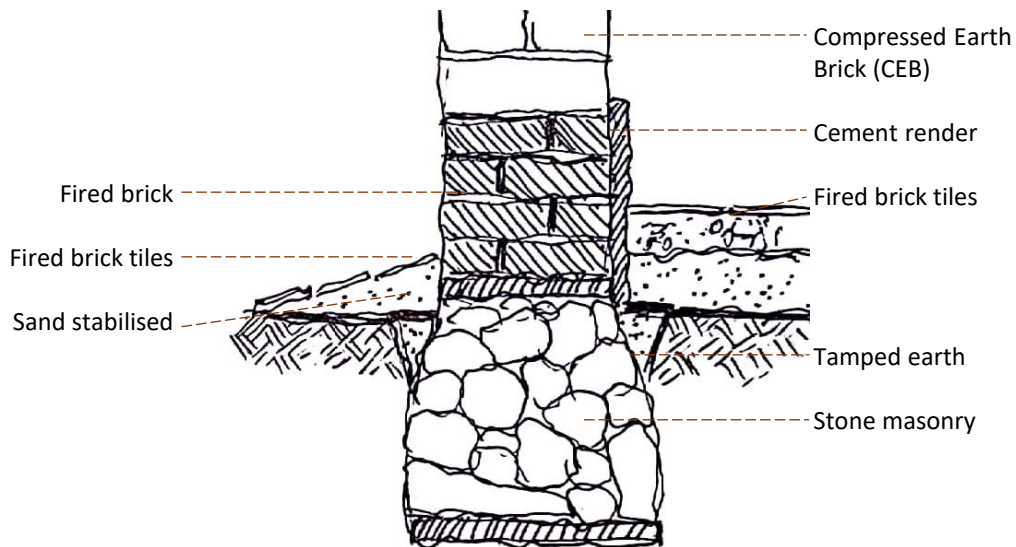
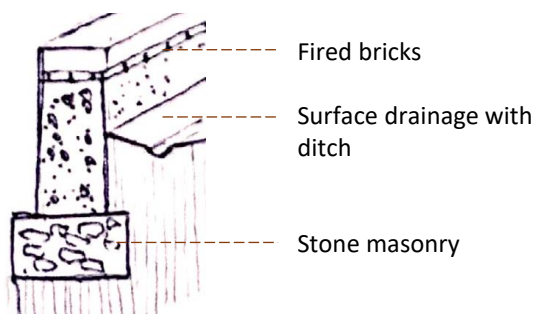


Fig 48. CEB (Made in earth, 2015: online)

To minimise the use of concrete, a solid base-course material such as stone, found on site, is used for the strip foundation as well as the retaining wall. These materials are less sensitive to water and spread the weight bearing forces into the ground.



It is important for earth construction to be protected from water, therefore firm, sloped aprons will be used on the exterior of the building as a drip layer, where water can drip and discharge.



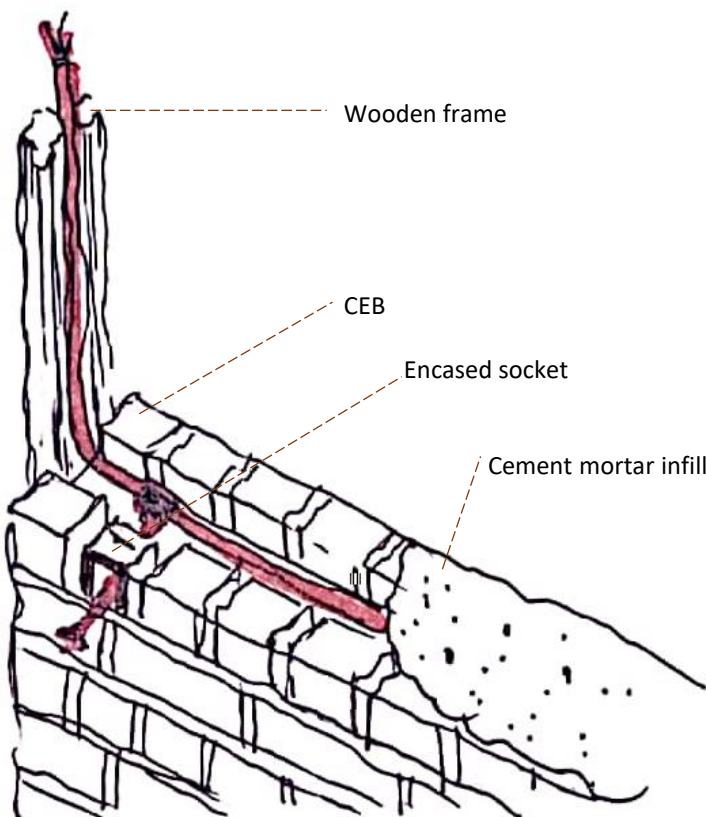
In areas where the walls and floor areas are more exposed to moisture fired bricks, stone or cement is used.

Services:

General services such as the planning, placement and installation of technical services form a part of the design outset. The services will be fitted into the walls during construction.

The electricity challenges relate to the attachment of the wiring to the earth wall surfaces. In areas where the electrical systems are integrated into the walls it will be indicated in advance and the placement of these systems will occur during the wall construction.

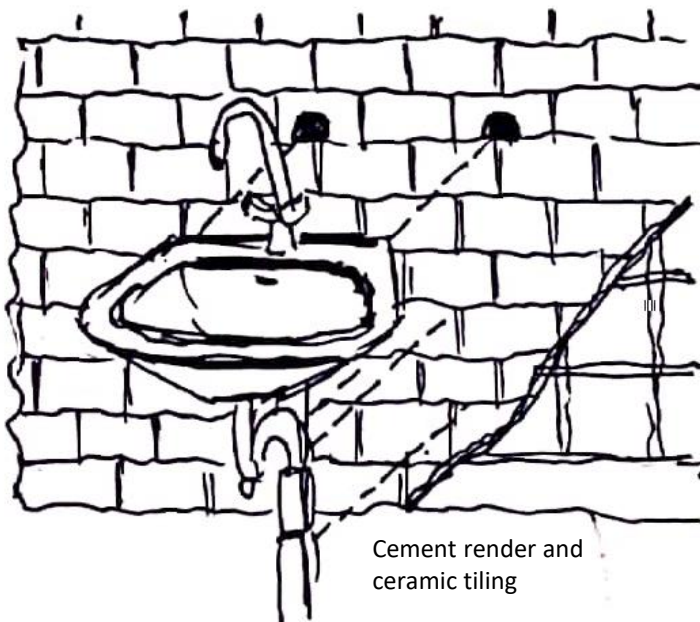
Electrical casings run vertically in the wooden frames and horizontally along the hollow blocks



For the plumbing services, the water supply lines and drainage runs will be integrated into the thickness of the floor below slab level. For pipes that run through the walls, a protective pipe sleeve will be added.

The Bathroom and Kitchen areas should be well ventilated due to the presence of damp. The walls that are closest to basins, showers and other similar fittings will be tiled for water resistance.

Blocks with integrated piece of wood



The Roof Structures:

A planted roof is proposed for the Plant Research Centre and the retail space that is embedded into the landscape.

A planted roof refers to roofs that employ vegetation in a growing manner, in this instance the vegetation is used to partially cover the structure.

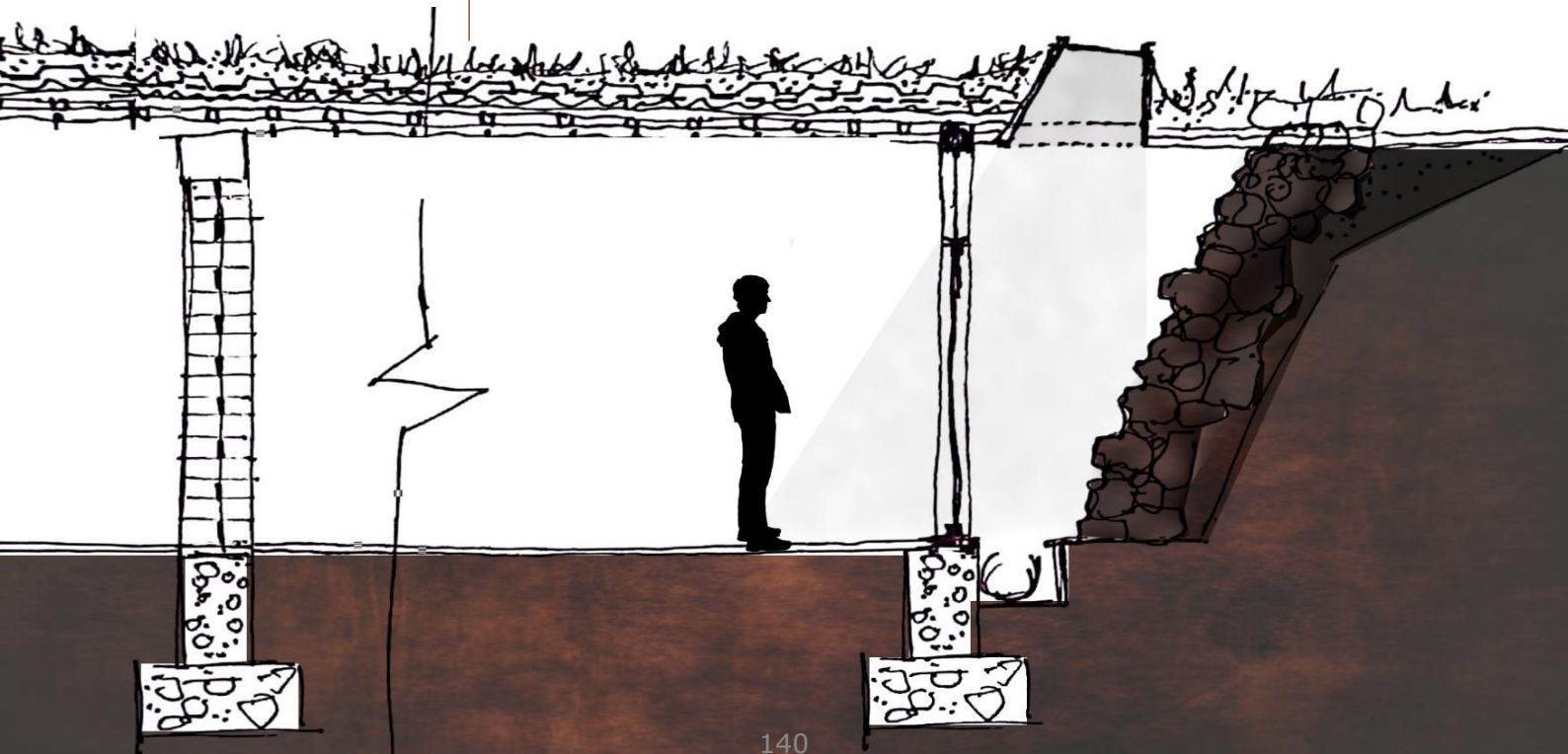
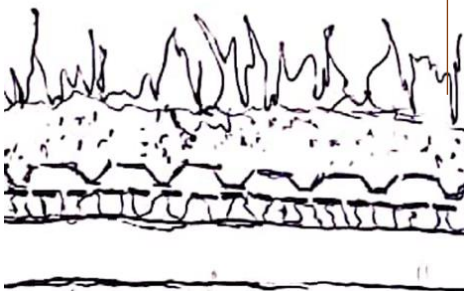
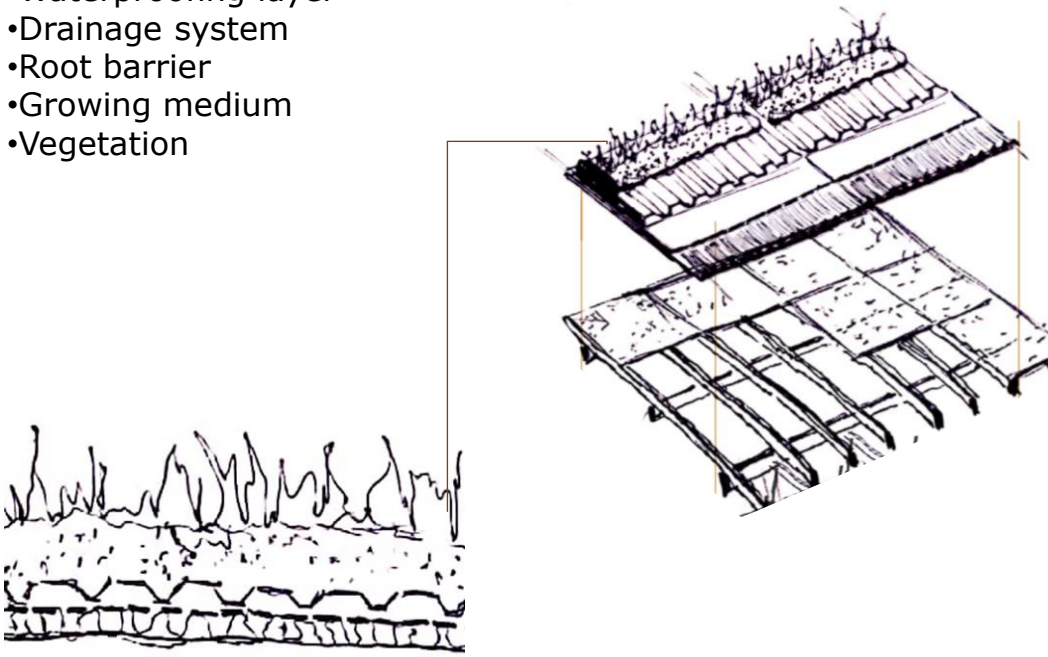
A system of layers is placed over the roof to support the growing medium and the vegetation.

The following elements are included:

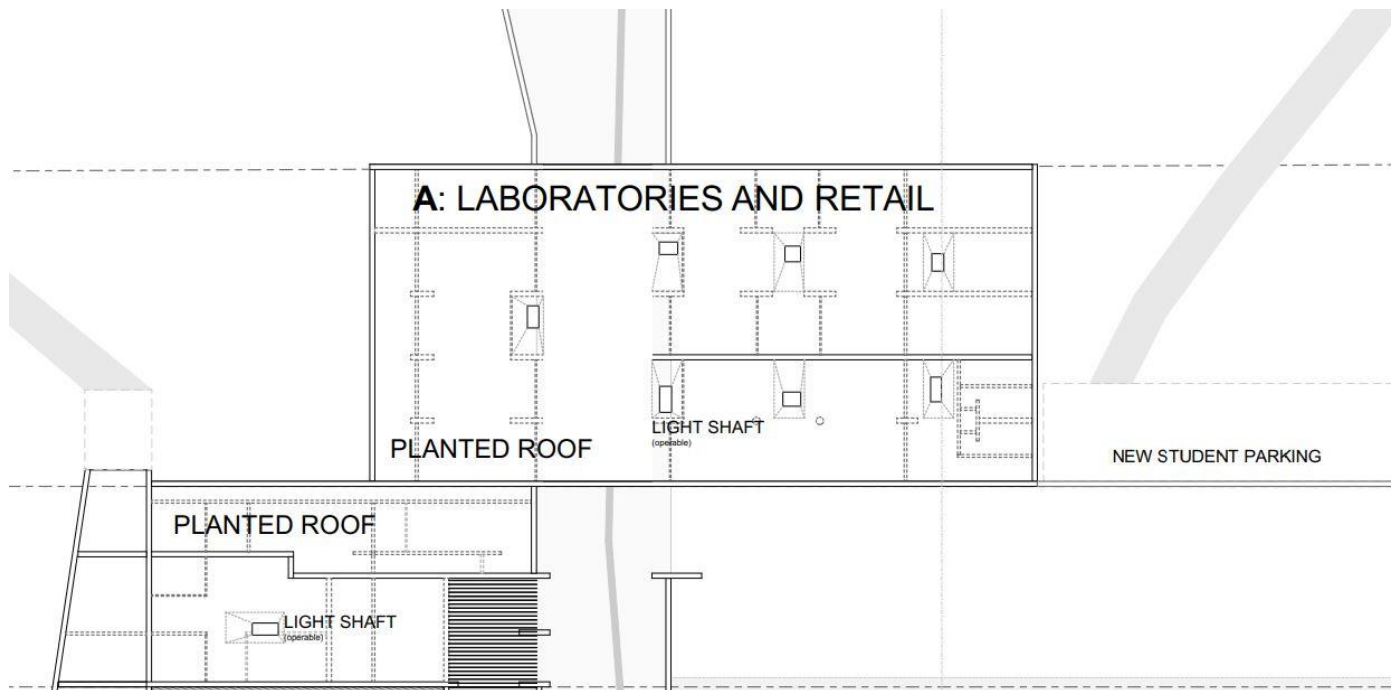
- Waterproofing layer
- Drainage system
- Root barrier
- Growing medium
- Vegetation

- Vegetation 'karoo bos'
- 70mm soil
- Delta m520p drainage material over 2 layers 250 micron dpm
- 40mm 'sondor' foam insulation over hessia

- Plywood sheets
- Joists
- Bearers



An extensive green roof will be used, with a shallower soil depth than that of an intensive green roof. Plywood will be used instead of concrete, because of the remoteness of the site.



Extensive roof characteristics (Schmidt and Pinheiro, 2013: 486):

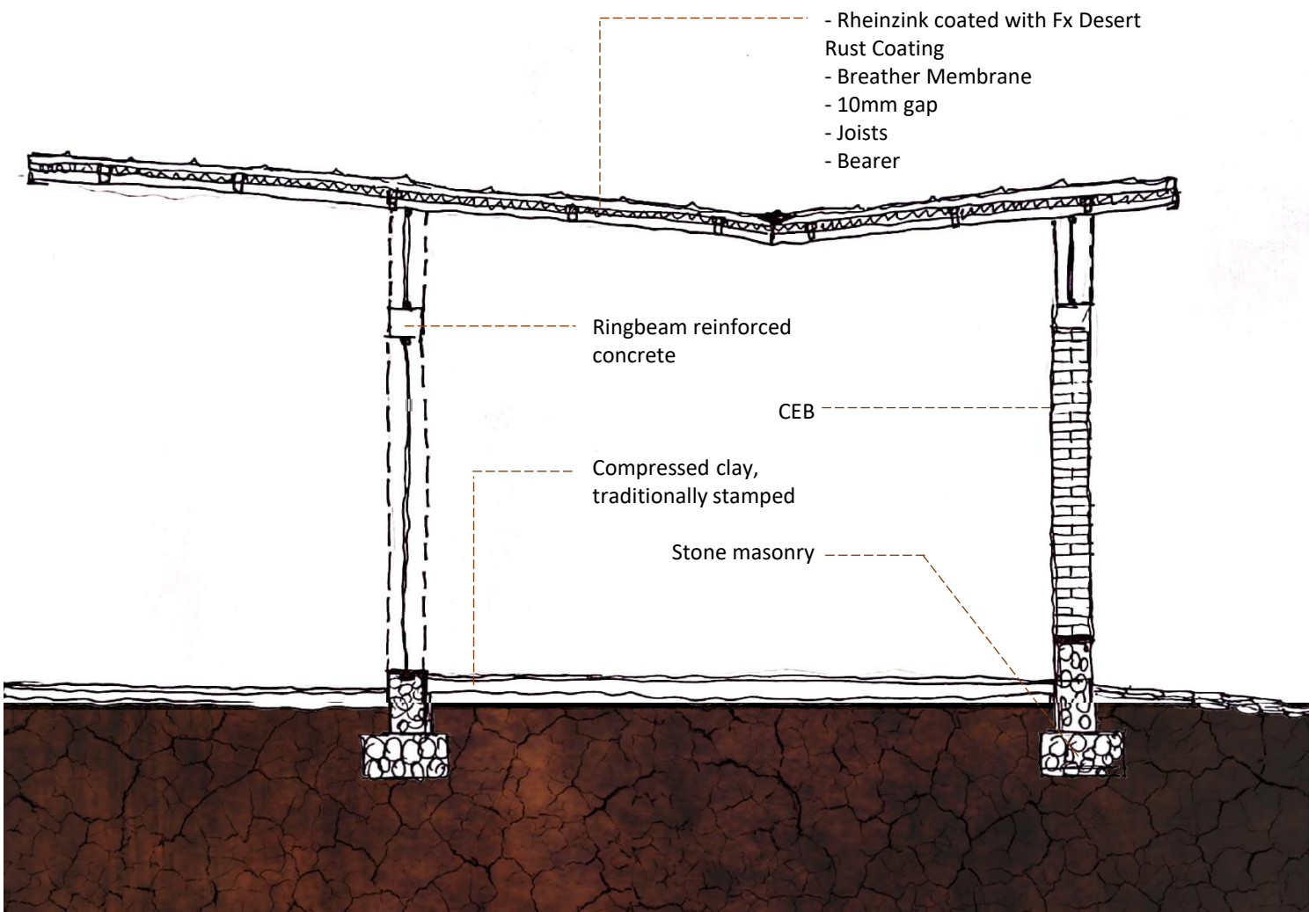
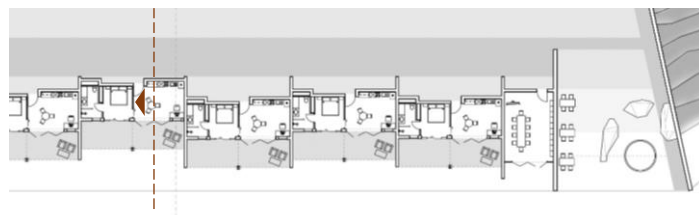
Structural Substrate	Light: Standard roof weight bearing parameters 70-170kg per m2
Substrate Depth Shallow	Shallow < 300mm
Plant Selection	A variety of 'veldgrass' and 'karoo bos' is used
Maintenance	Low- Weeding
Cost	Lower than that of the intensive green roof

One of the benefits of the planted roof is its ability to reduce sound within the structure. This is useful for the research centre where the reduction of exterior noise will add to the desired character of a learning environment.

For the Landscape Interpretation Centre and the overnight accommodation units, a Rheinzink roofing system will be implemented.

The usage of Rheinzink aims to mimic (refer to pg. 37) the surrounding landscapes such as the shape of the mountains and the colour and character of the iron-ore bearing rocks. This resulted in a folded roof shape.

Rheinzink offers long lasting products with low maintenance. A panel profile with a standing seam option, coated in FX Desert Rust coating will be used for this project. The desert coating has a very specific aesthetic appeal, giving the impression that the roof is rusting; but unlike Cor-Ten steel, no maintenance is needed in terms of paving and other elements that can be stained by the rust on the steel.



STUDENT ACCOMMODATION
SECTION C

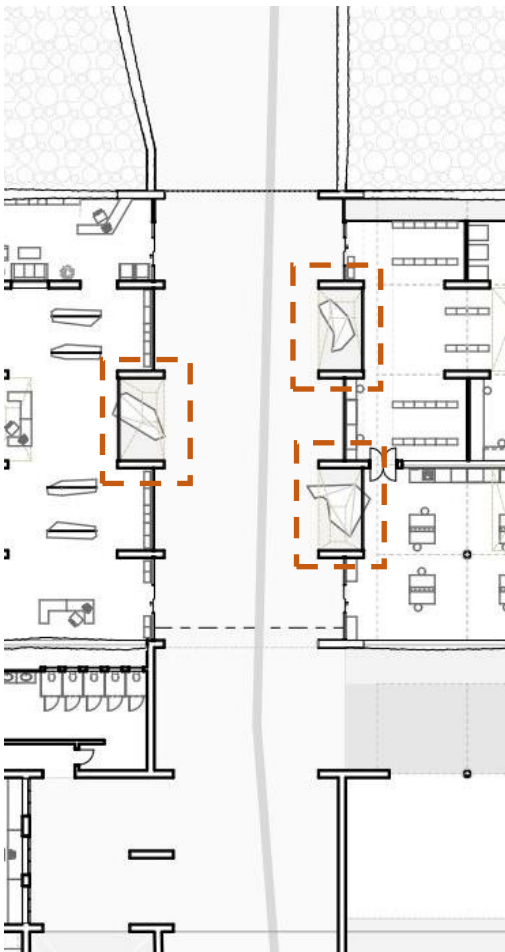
Detailing:

As the site is primarily intended for public use, circulation becomes a main element. Accessibility is an important aspect to bear in mind. The walkways consist of surfaces such as clay bricks and traditionally stamped clay. The edge strips at the terraces are made from the natural stone found in the area. Ramps are available throughout the scheme with surfaces made from traditionally stamped clay for a smooth, easily accessible surface.

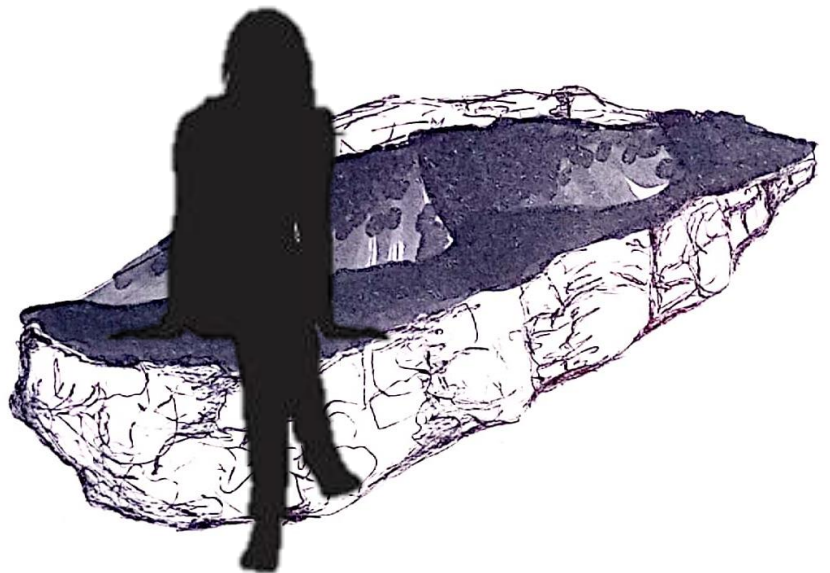
The grade is filled with natural gravel and stone at the rainwater conductors and taps at the waterpoints.

The public furniture used throughout this scheme is made of robust and natural materials. These materials include the stone found in the area as well as concrete. The public furniture is added to accommodate the visitors who are hiking and exploring the site, providing them with spaces where they can rest and enjoy the views.

These concrete and stone benches are arranged around the footpath that leads through the building. The accommodation units and open-air auditoriums also have similar seating arrangements.



PLANT RESEARCH CENTRE
ENTRANCE & SEATING

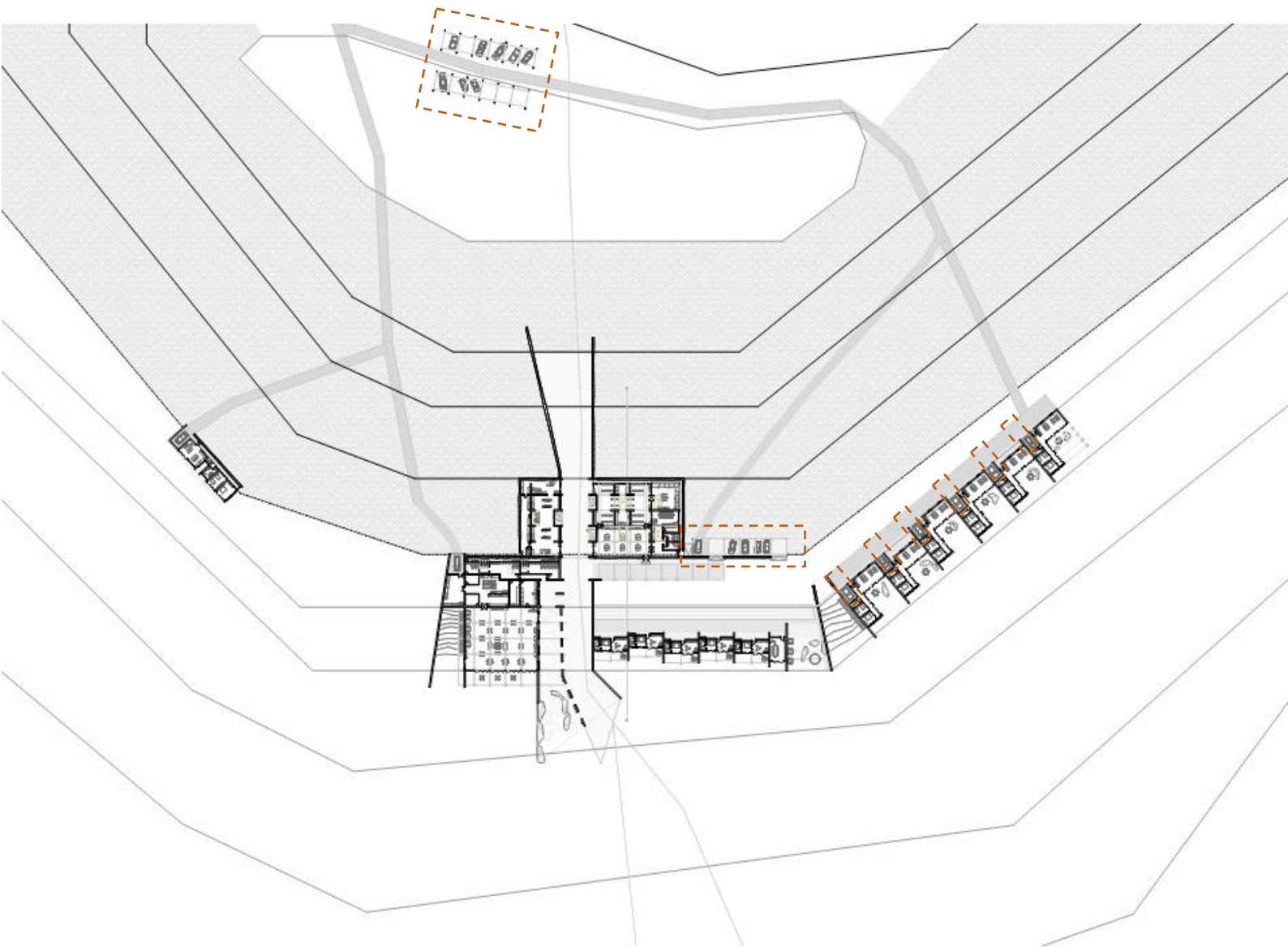


Parking details:

Covered parking is spread throughout the site, accommodating approximately 30 cars. The first encountered parking, mainly used by day visitors, makes use of printed shading nets. These nets are printed to blend in with the natural surroundings.

Close to the student accommodation units as well as the Laboratories is another parking area for approximately 7 cars, with the same printed shading nets, specifically used by the students conducting research at the site.

There are also individual parking spots available at the tourists' overnight accommodation units; parking one car at each respective unit. The same goes for the parking at the housing for the permanent staff member towards the west of the site.



3.4 CONSTRUCTION DRAWINGS

For reference see Appendix A
(drawings at a reduced scale)

3.5 PLAGIARISM REPORT

- Certification of Proofread
- Plagiarism Report

Appendix B



Fig 47. Nieu-Bethesda hills (van Heerden, n.d. online)



4

- 4.1 Reflection
- 4.2 References

4.1 REFLECTION

This reflection on the project and the process of construing a solution to the challenges set out in part one, comes from a personal point of view. It is intended to both serve as an explanation of my personal challenges and the difficulties I faced throughout the design process, but more so to evaluate the final design outcome by measuring it against the aims of this dissertation.

I had difficulties with really engaging in the design process from early on in this project. This was partly due to the issues I had with the site. I knew very early on that I wanted to use Compassberg as a site, but it took numerous attempts before settling on an appropriate intervention that would hopefully capture and educate the user of the uniqueness of the site.

It is from this thought of respecting the natural landscape that the design processes developed. I set out to understand all of the different layers of the site and explored each aspect hoping that one of the site's unique qualities would reveal an intervention that could only be used at the specific site.

From this exploration, I discovered that a combination of the site's conditions, such as the climate and the geology, resulted in very unique vegetation that can only be found in this area. Excitedly, I thought that this would be the perfect grounds for proposing a plant research centre. However, I was made aware of the fact that such a centre does not necessarily have to be at the specific site, it could be in the closest town. I realised my mistake and set out once again to find the appropriate response to the site.

Through my investigation, I discovered that the unique plants found in this area are used as folk medicine. I learnt that the research of medicinal plants is slowly but surely fading out, even though folk medicine is still used today. The locals that make use of these medicinal methods emphasised the importance of being in the area where the plant is (refer to pg_) in order to find these plants and understand how they can be used. This discovery became grounds for situating a plant research centre that focuses on the plant's medicinal qualities, at the specific site.

Furthermore, the precedent studies revealed that a visitor can be educated about a site's uniqueness through architecture. In some cases, it was in the way that the architecture was explored and in other cases it was in the material use, highlighting the different aspects of the site. This discovery led to the second part of the design proposal; a Landscape Interpretation Centre.

After I knew what I wanted to propose at the site, the planning and detailing started, which presented many more challenges, however, they could have been resolved in different ways.

Although, to me the most exciting feature of this design has to be the ideas that derived from the conceptual exploration of journeying. It was an exciting process to listen and read about different experiences at the site and then incorporate these experiences into the design development; features such as the existing footpath becoming a part of the intervention and the natural stone-like seating detailed throughout the design, derived from this investigation.

I am, therefore, pleased with the overall result of this project. In saying this, I do not disqualify any shortcomings, design flaws and misinterpretations. Personally, this year with all its challenges regarding the Covid virus really made this dissertation a difficult task, but I feel that what I have done, regardless of the rifts Covid caused, is something to be proud of. The challenge and aims have certainly been dealt with in one way or another. The question of whether the solution to these challenges has been addressed in a well-orchestrated manner is still open for evaluation.

The Karoo...

where the dust settles on my skin
where the wind calls my name,
where my heart beats to every footfall
where the open road spills into the sky above
where the grassy plains wave
where the mountain looms at the end of the road
where my soul aches to live
and yearns to lie down and die
where the windmills crank their weary song
where the stars flash morse code from life far
away in the universe
where roads lead everywhere and nowhere
where people's faces are etched with the winds of
change
where magic and mystery walk hand in hand
down valley roads, glancing over their shoulders,
beckoning me with secretive glances
where sacred ibises are hurled against the
majesty of the blue sky
where wise men seek the light
where each step is a dance of karoo magic
**where the spaces in between are filled by
heaven**
where the earth is mine

where my soul finds its rest

where peace is in every breath

where I inhale and

know I've come home

(Helen Lockhart, 2013: Online)

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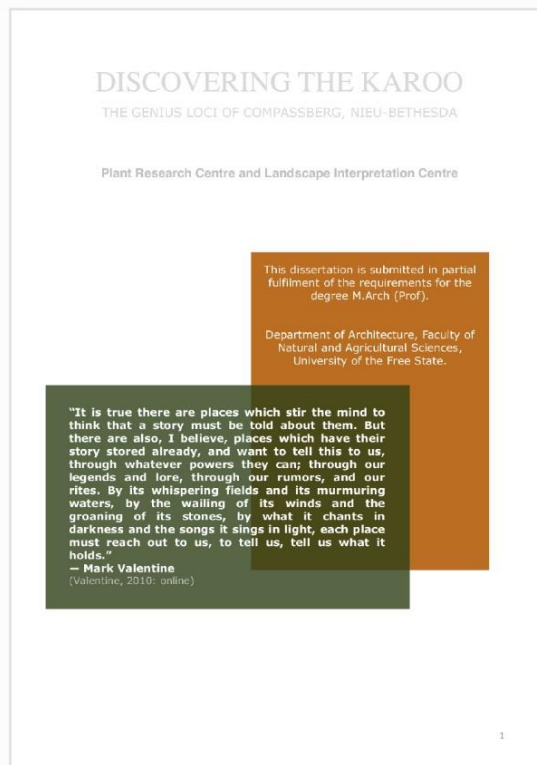


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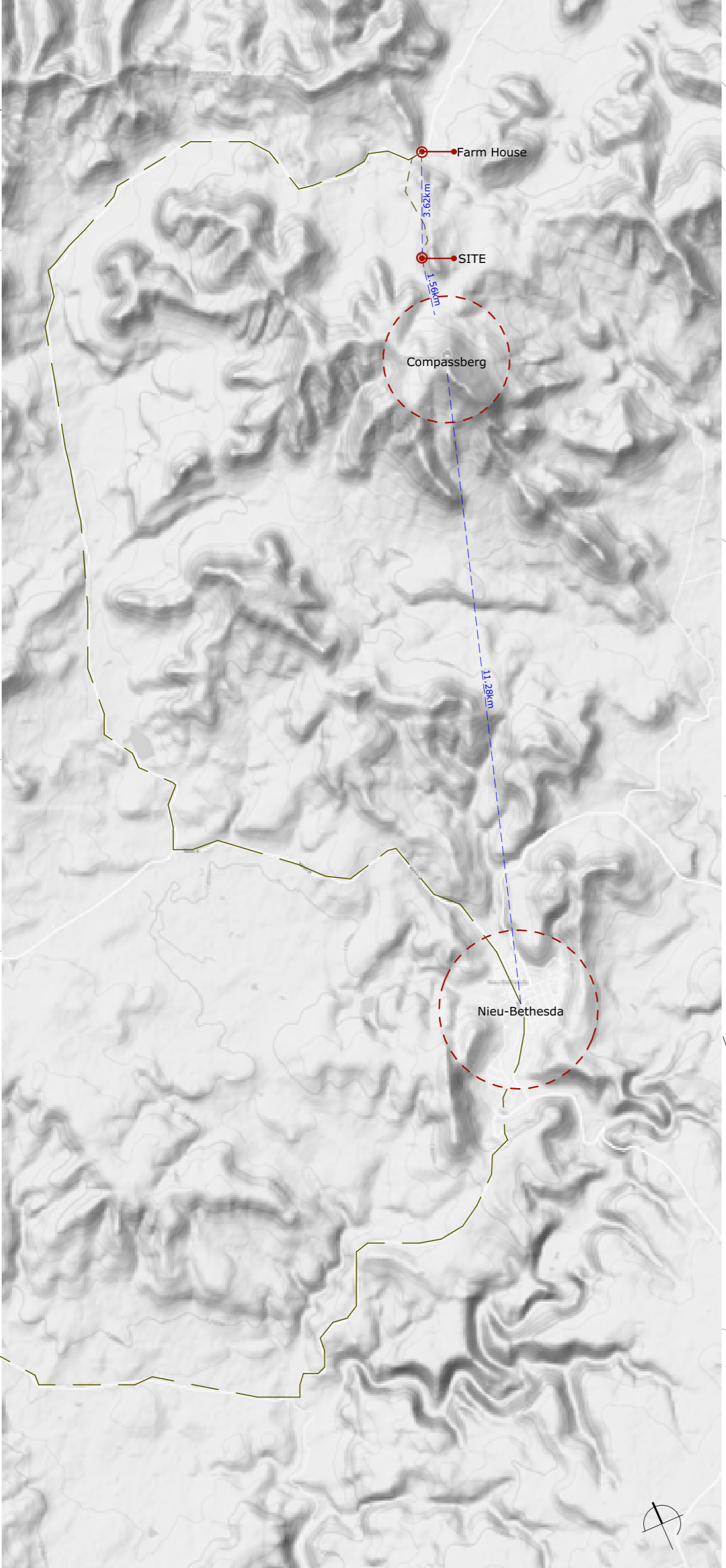
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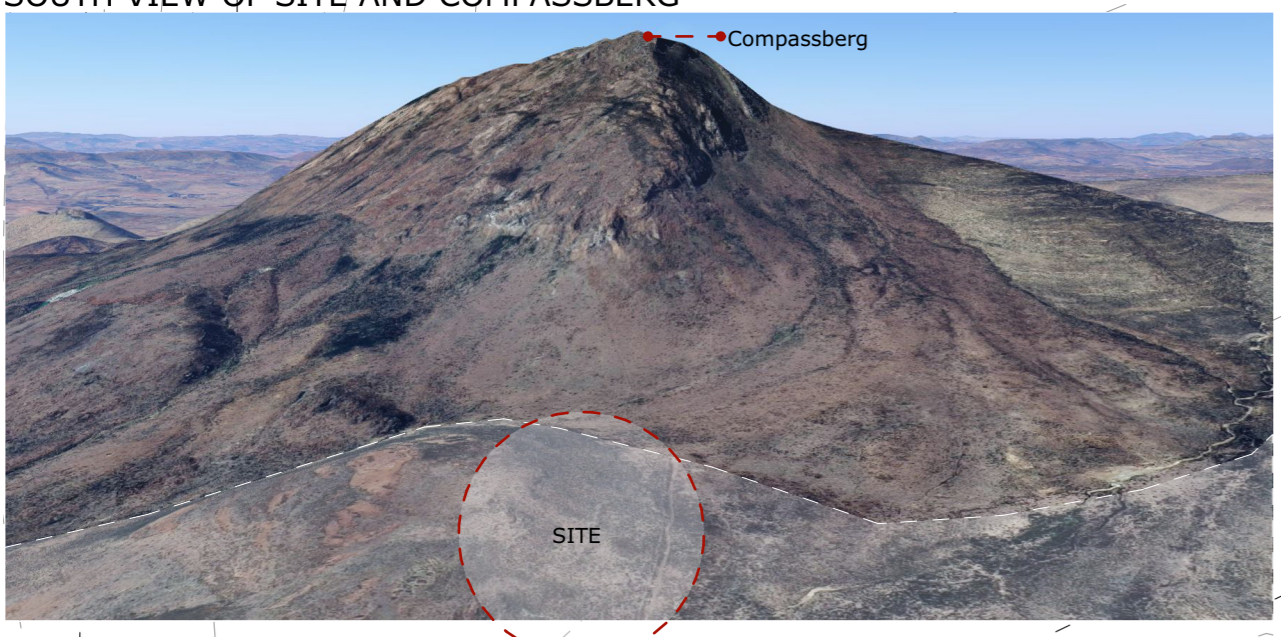


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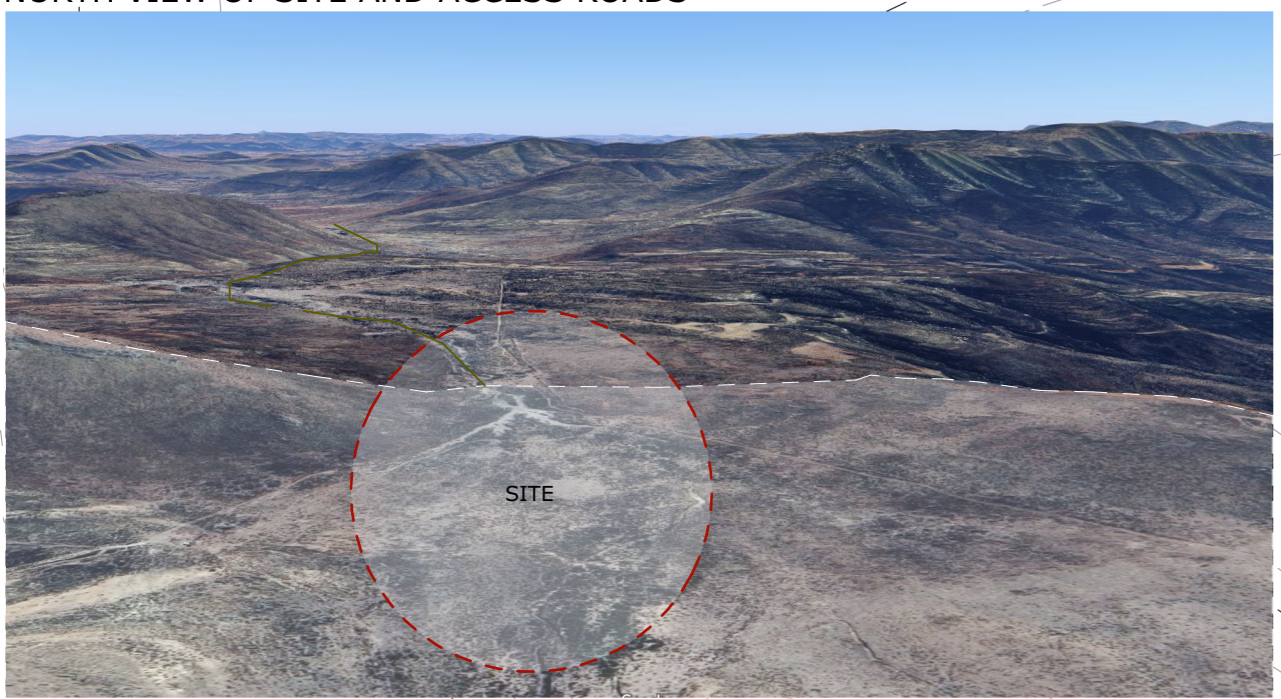
BROAD OVERVIEW OF COMPASSBERG AND ACCESS ROADS



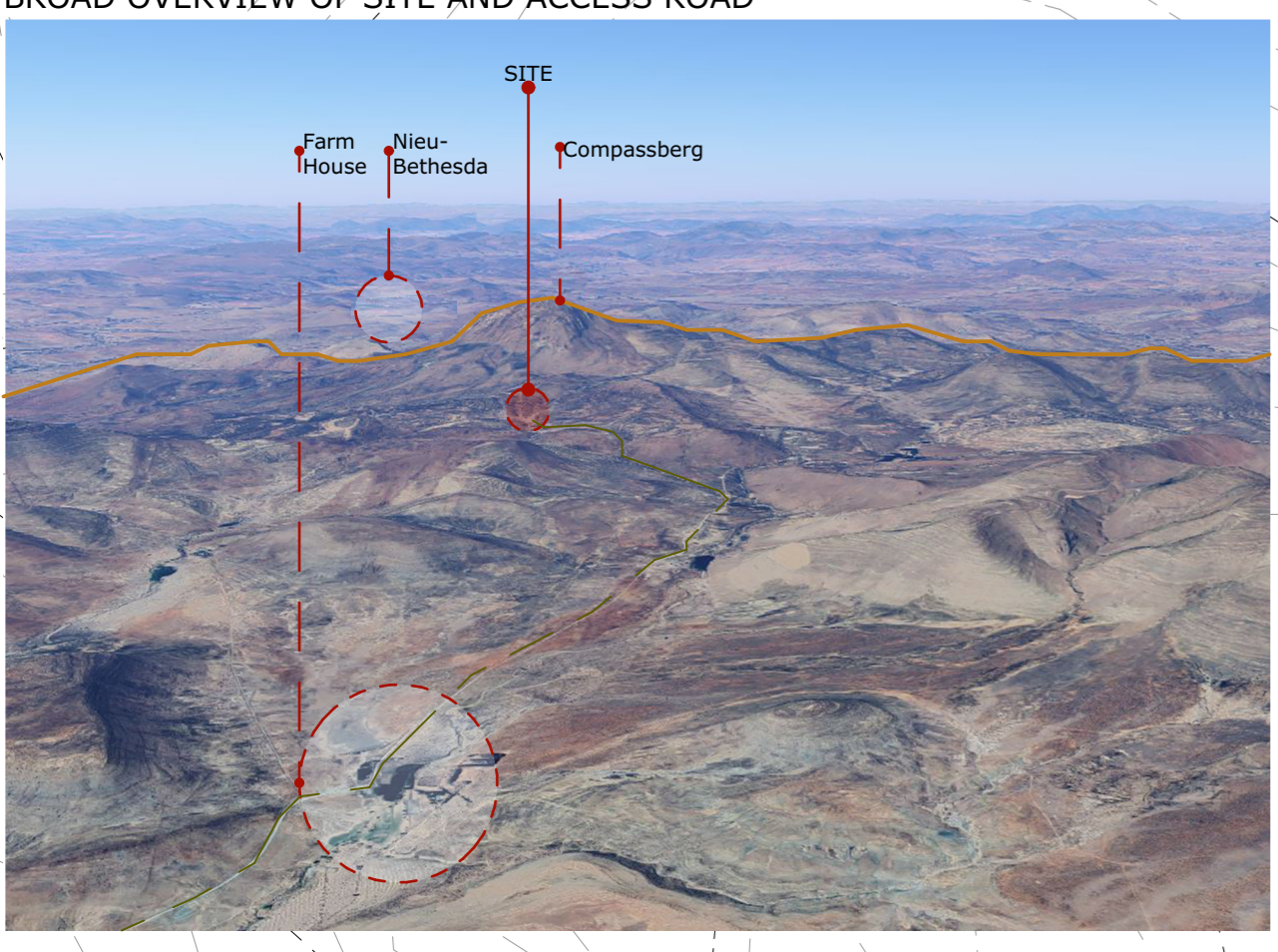
SOUTH VIEW OF SITE AND COMPASSBERG



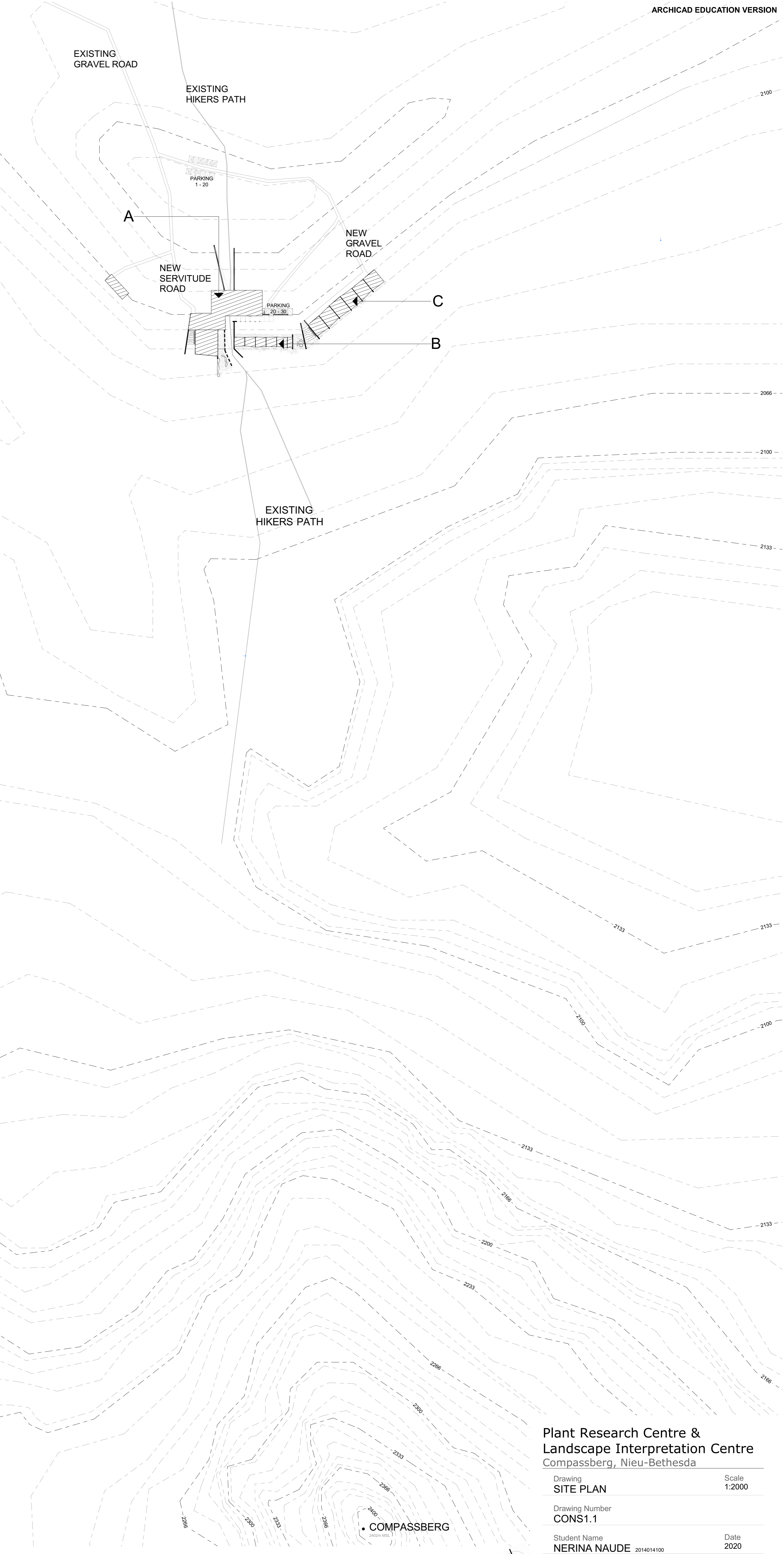
NORTH VIEW OF SITE AND ACCESS ROADS



BROAD OVERVIEW OF SITE AND ACCESS ROAD



SITE PLAN
SCALE: 1:2000



Plant Research Centre & Landscape Interpretation Centre
Compassberg, Nieu-Bethesda

Drawing **SITE PLAN** Scale 1:2000

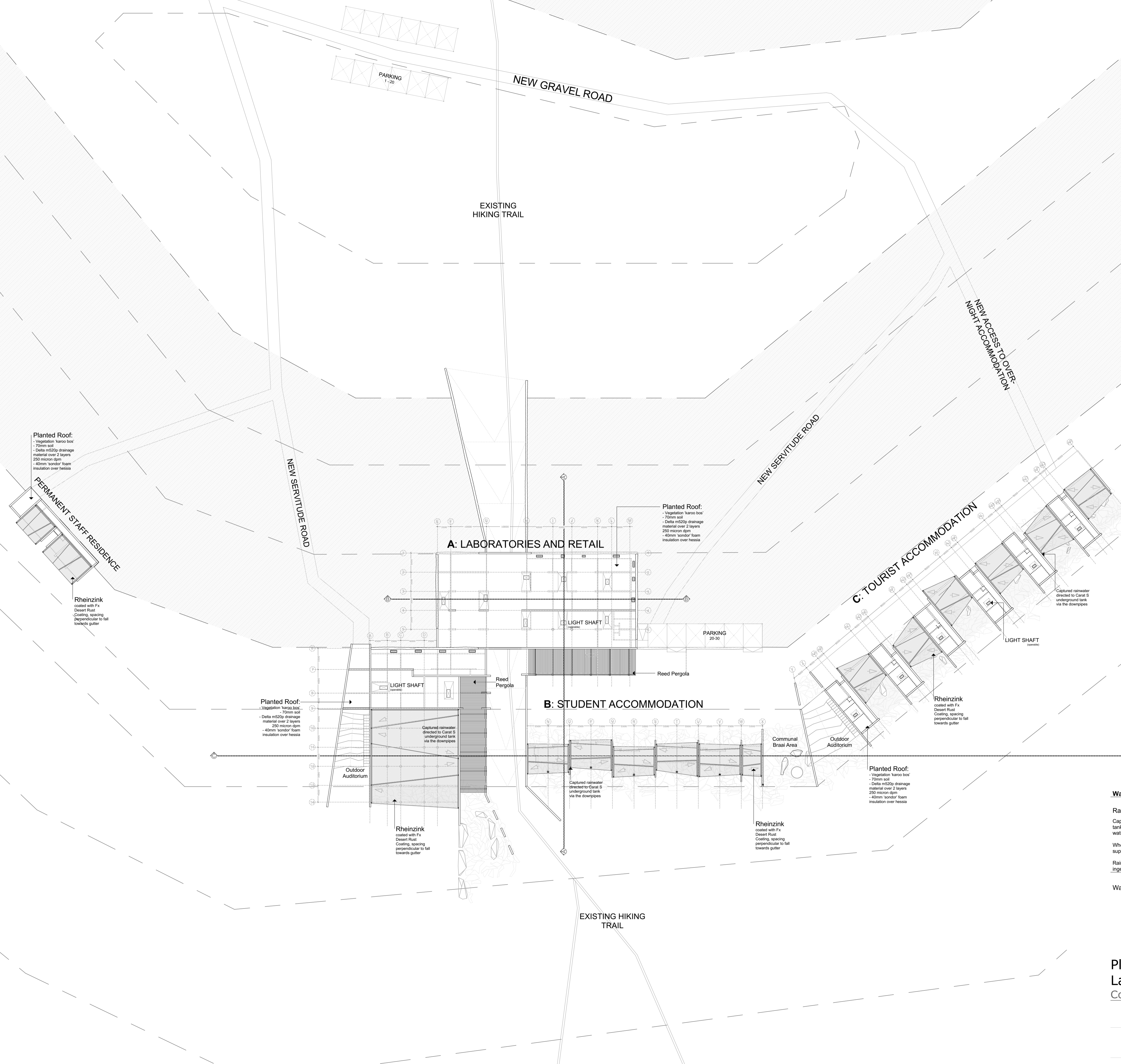
Drawing Number **CONS1.1**

Student Name **NERINA NAUDE** 2014014100 Date 2020

University of the Free State, Department of Architecture



ROOF PLAN
SCALE: 1:500



Water Solution:

Rainwater harvesting - Carat S tank:
Captures rainwater and directs it to the underground Carat S tank where it is filtered by an integrated system. Harvested water is drawn from below the surface.

When the system is empty, it switches to the main water supply.

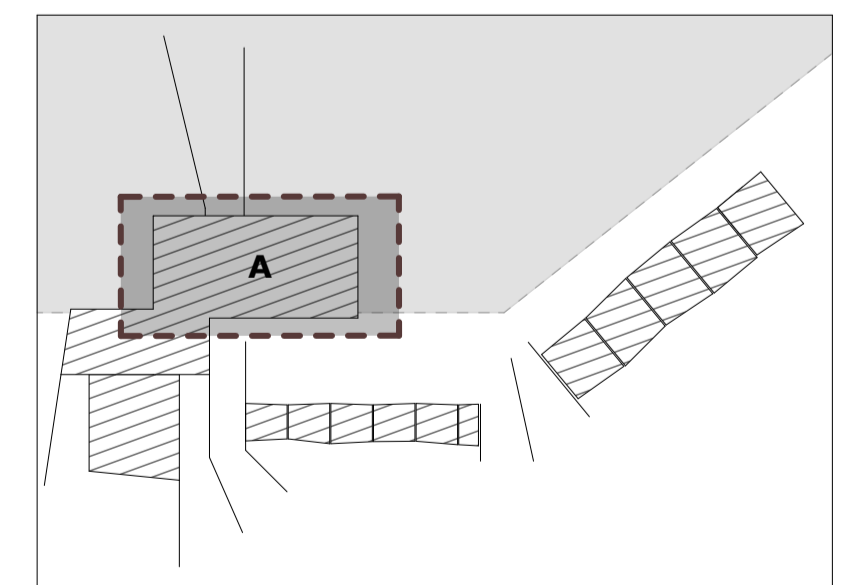
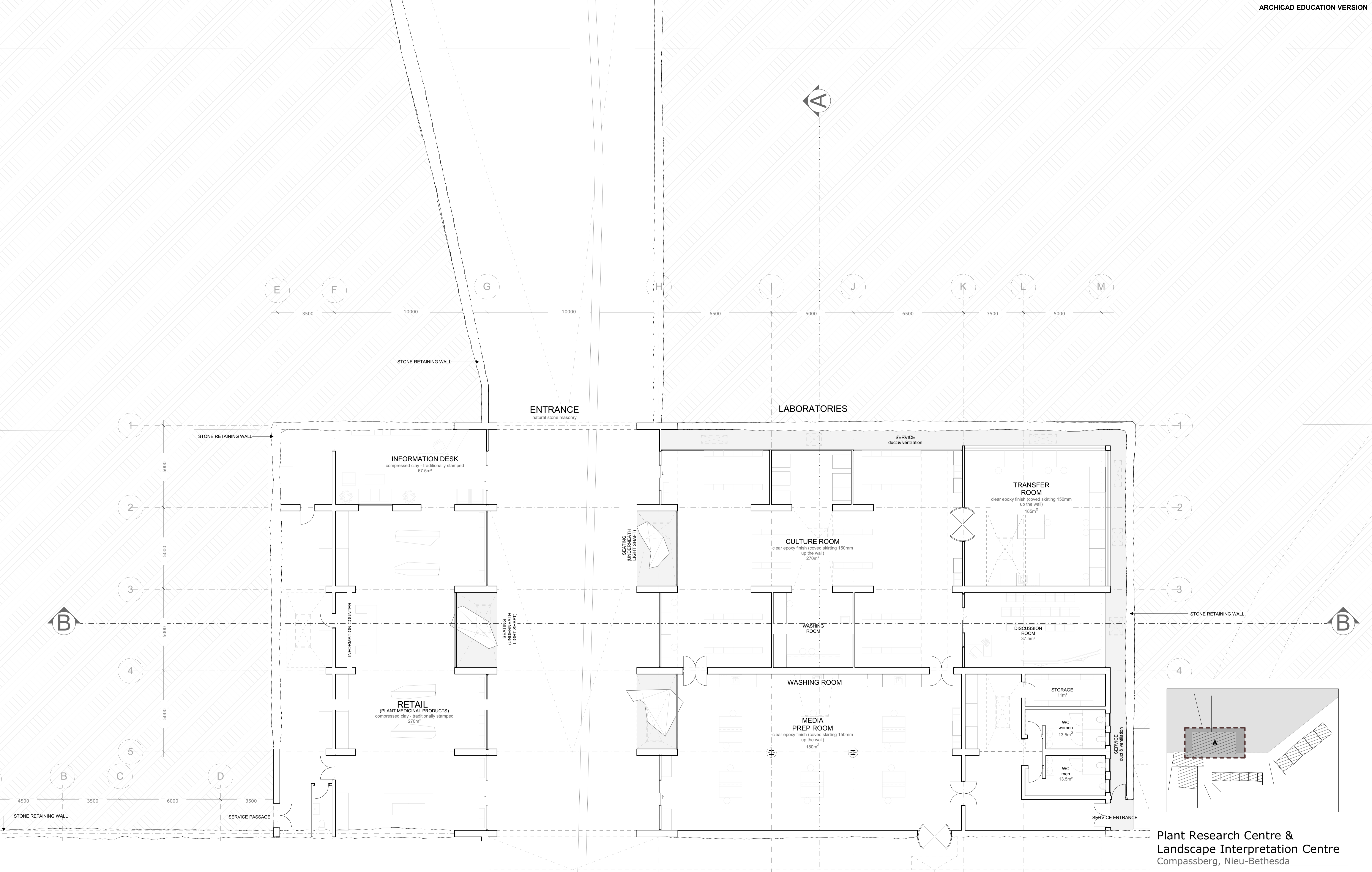
Rainwater can be used in all applications where water is not ingested.

Wastewater - one2clean tank

Plant Research Centre & Landscape Interpretation Centre
Compassberg, Nieu-Bethesda

Drawing ROOF PLAN	Scale 1:500
Drawing Number CONS1.2	
Student Name NERINA NAUDE 2014014100	Date 2020
University of the Free State, Department of Architecture	





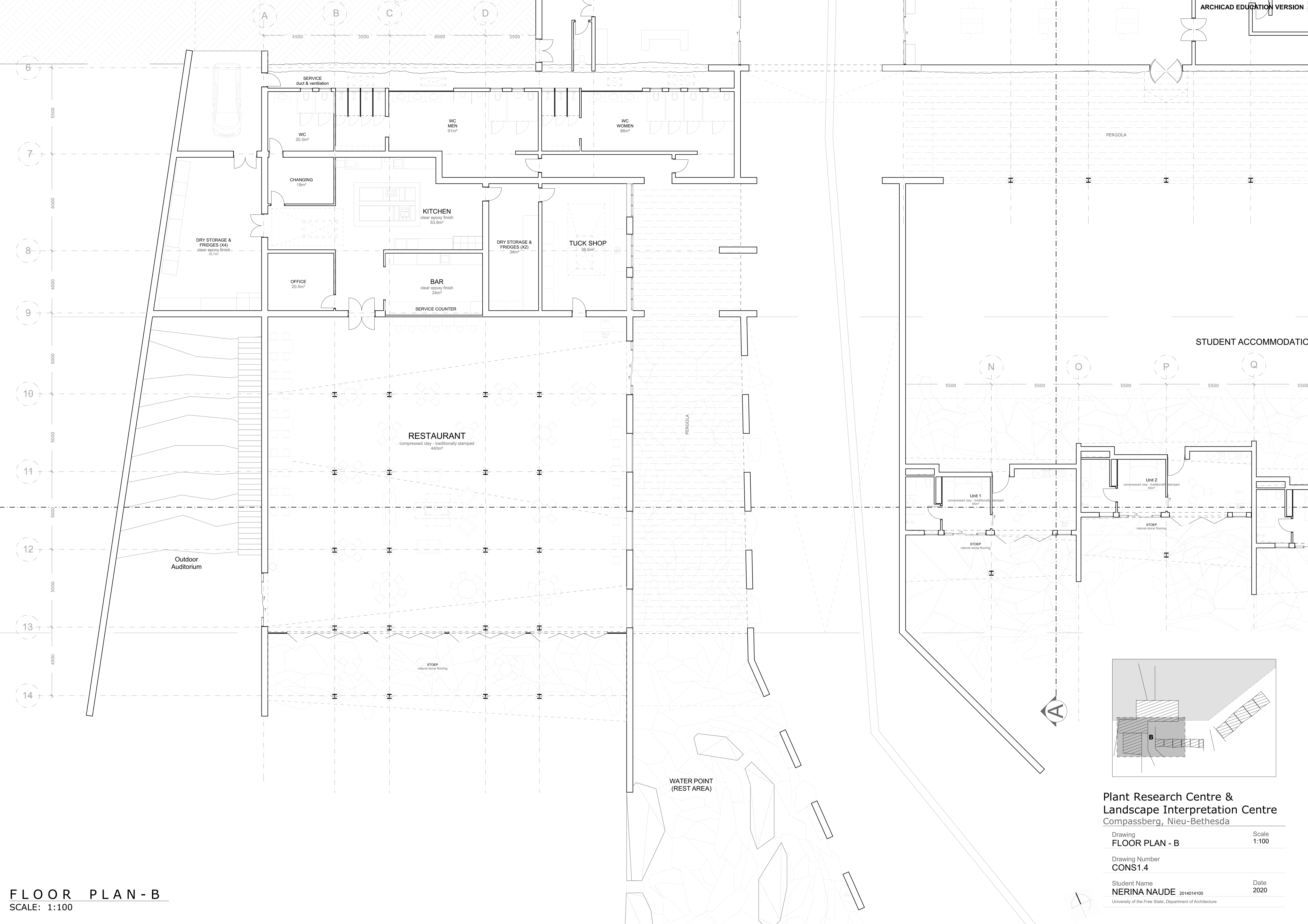
Plant Research Centre & Landscape Interpretation Centre
 Compassberg, Nieu-Bethesda

Drawing
FLOOR PLAN - A Scale
 1:100

Drawing Number
CONS1.3

Student Name
NERINA NAUDE Date
 2020

University of the Free State, Department of Architecture



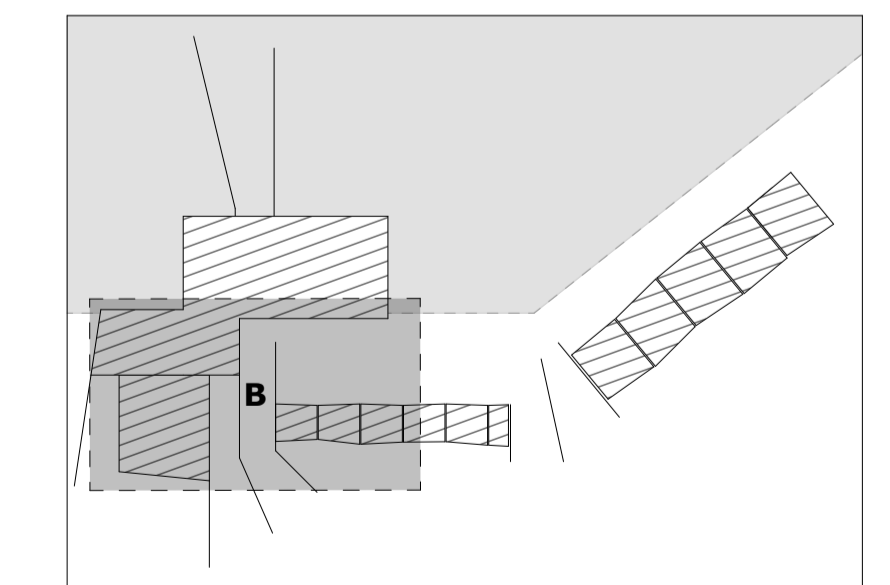
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A B C D

FLOOR PLAN - B
SCALE: 1:100

STUDENT ACCOMMODATION

N O P Q

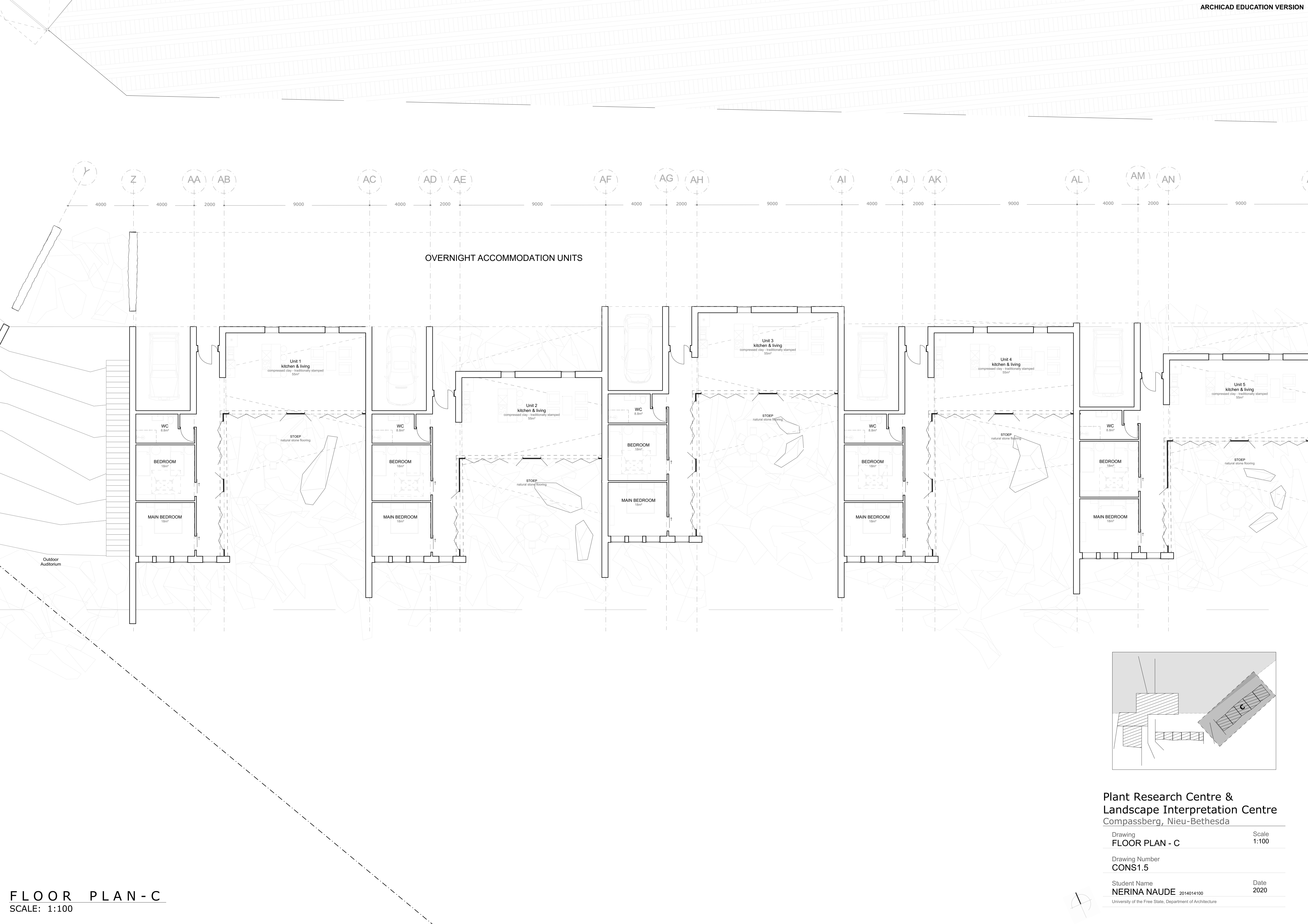


Plant Research Centre & Landscape Interpretation Centre
Compassberg, Nieu-Bethesda

Drawing FLOOR PLAN - B Scale 1:100

Drawing Number CONS1.4

Student Name NERINA NAUDE 2014014100 Date 2020
University of the Free State, Department of Architecture



OVERNIGHT ACCOMMODATION UNITS

Unit 1
kitchen & living
compressed clay - traditionally stamped
55m²

Unit 2
kitchen & living
compressed clay - traditionally stamped
55m²

Unit 3
kitchen & living
compressed clay - traditionally stamped
55m²

Unit 4
kitchen & living
compressed clay - traditionally stamped
55m²

Unit 5
kitchen & living
compressed clay - traditionally stamped
55m²

WC
8.8m²

BEDROOM
15m²

MAIN BEDROOM
18m²

WC
8.8m²

BEDROOM
15m²

MAIN BEDROOM
18m²

WC
8.8m²

BEDROOM
15m²

MAIN BEDROOM
18m²

WC
8.8m²

BEDROOM
15m²

MAIN BEDROOM
18m²

WC
8.8m²

BEDROOM
15m²

MAIN BEDROOM
18m²

STOEP
natural stone flooring

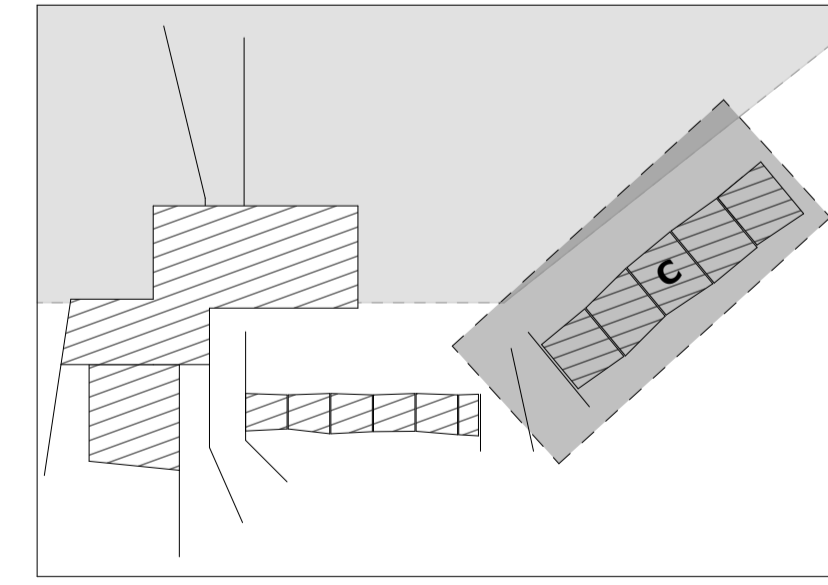
STOEP
natural stone flooring

STOEP
natural stone flooring

STOEP
natural stone flooring

STOEP
natural stone flooring

Outdoor Auditorium



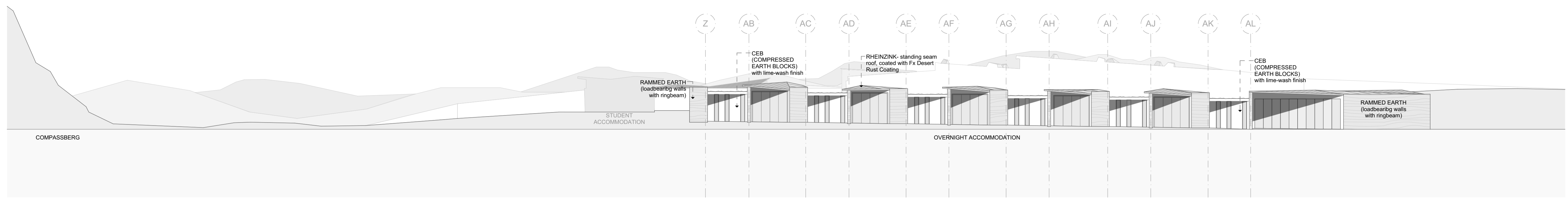
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Drawing FLOOR PLAN - C Scale 1:100

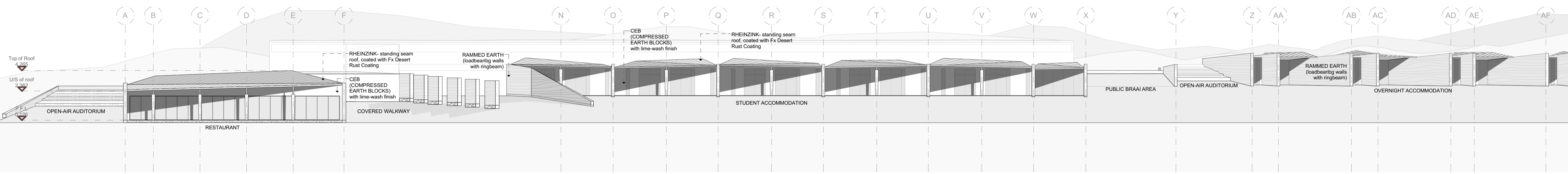
Drawing Number CONS1.5

Student Name NERINA NAUDE 2014014100 Date 2020
University of the Free State, Department of Architecture

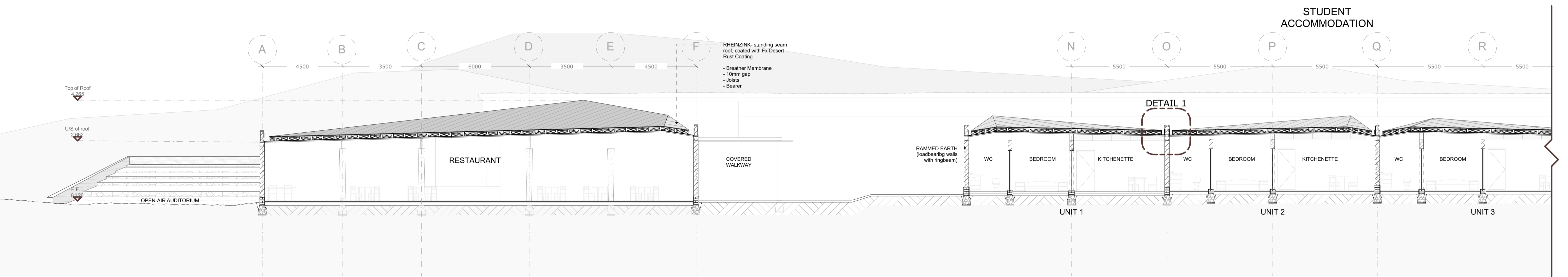




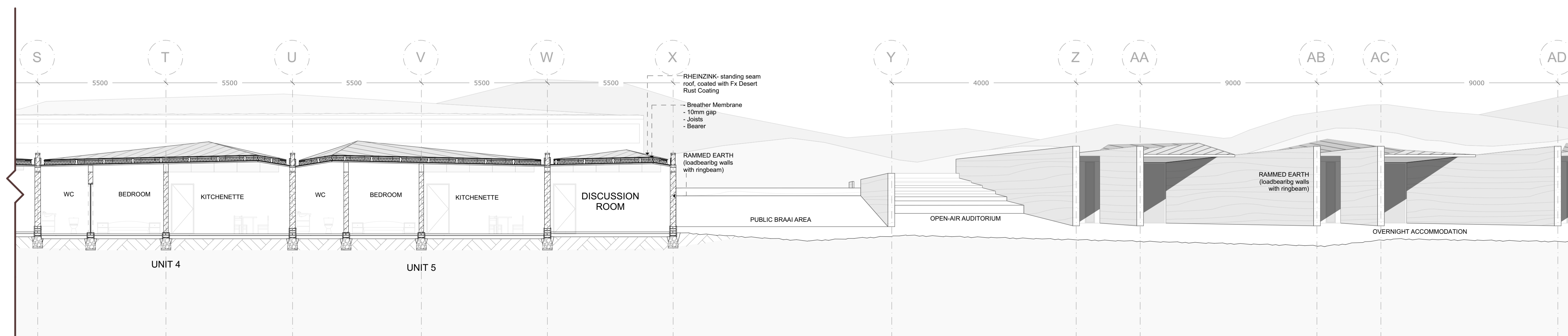
EAST ELEVATION
SCALE: 1:200



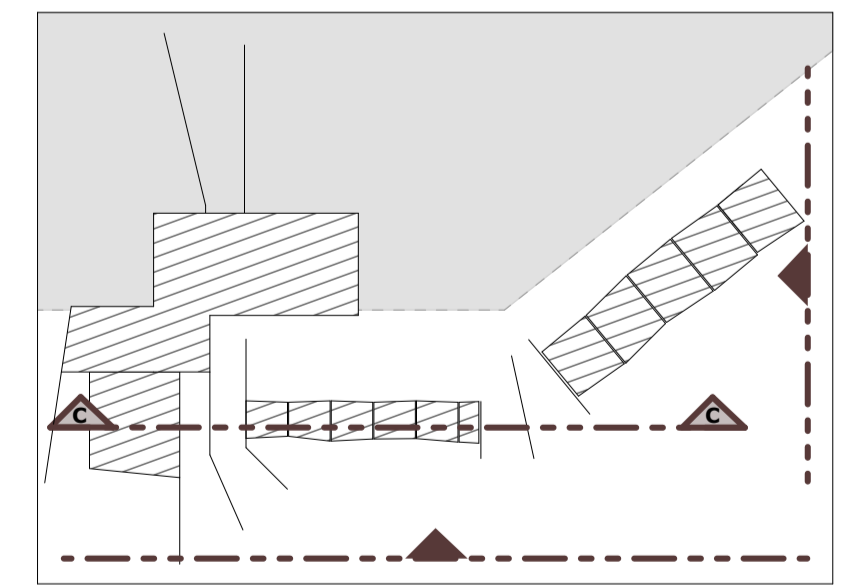
SOUTH ELEVATION
SCALE: 1:200



SECTION C
SCALE: 1:100

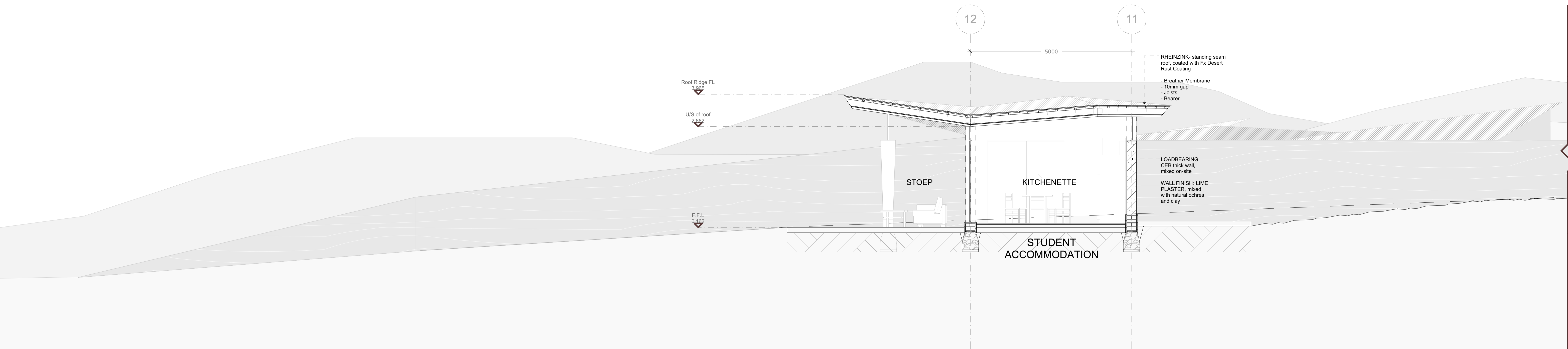


SECTION C (CONT.)
SCALE: 1:100

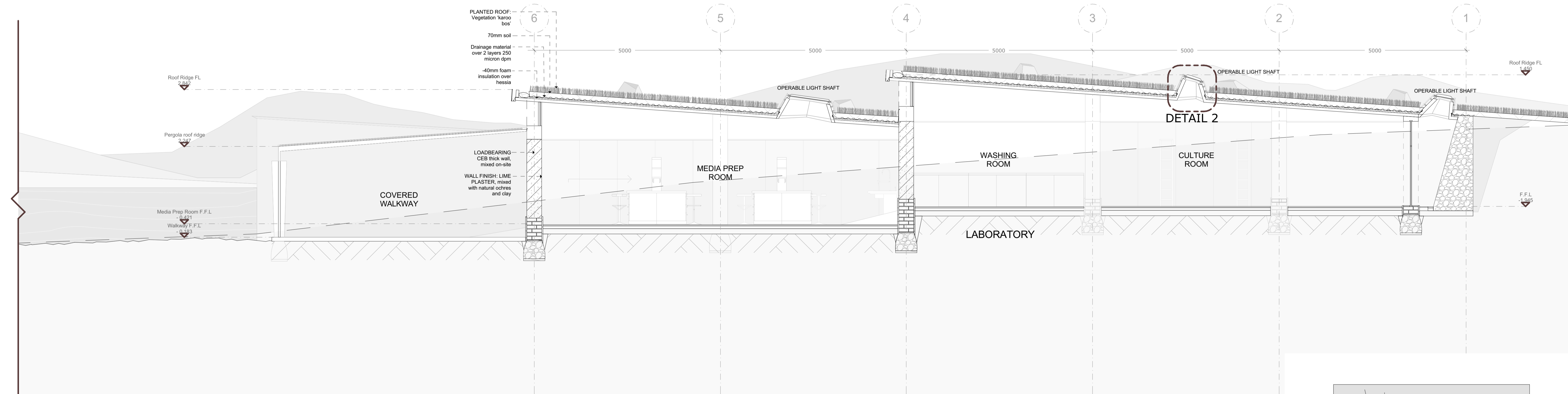


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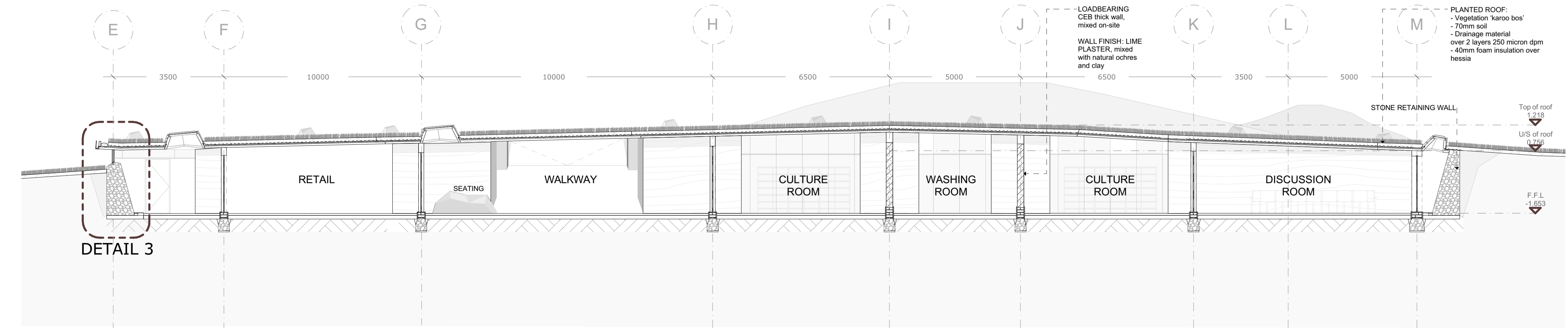
Drawing	Scale
SECTIONS & ELEVATIONS	
Drawing Number	
CONS1.6	
Student Name	Date
NERINA NAUDE 2014014100	2020
University of the Free State, Department of Architecture	



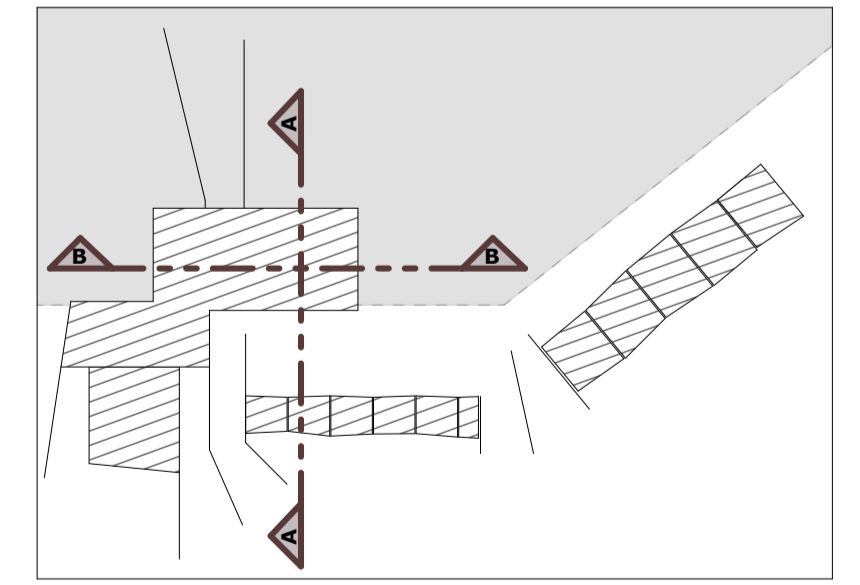
SECTION A
SCALE: 1:50



SECTION A (CONT.)
SCALE: 1:50

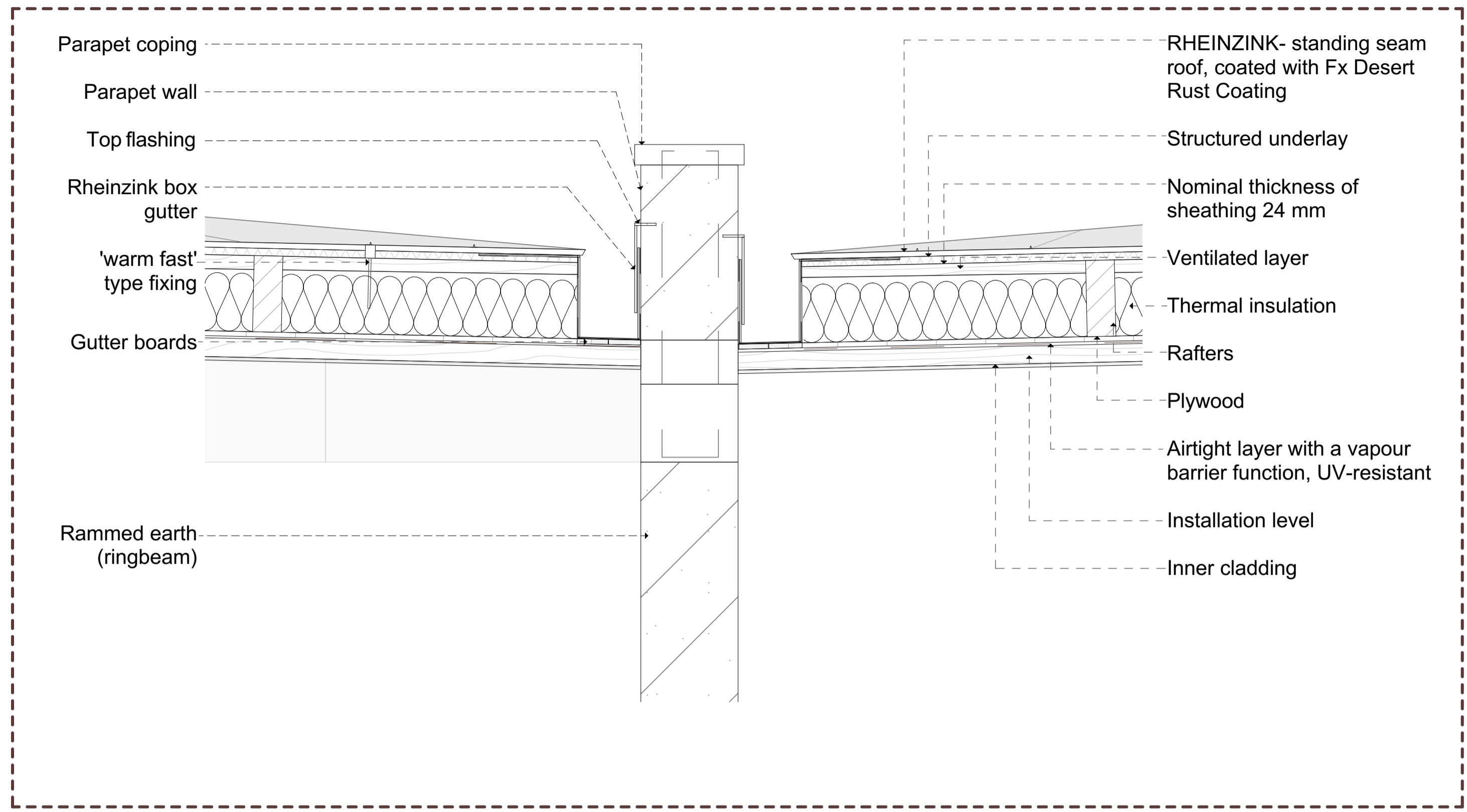


SECTION B
SCALE: 1:100

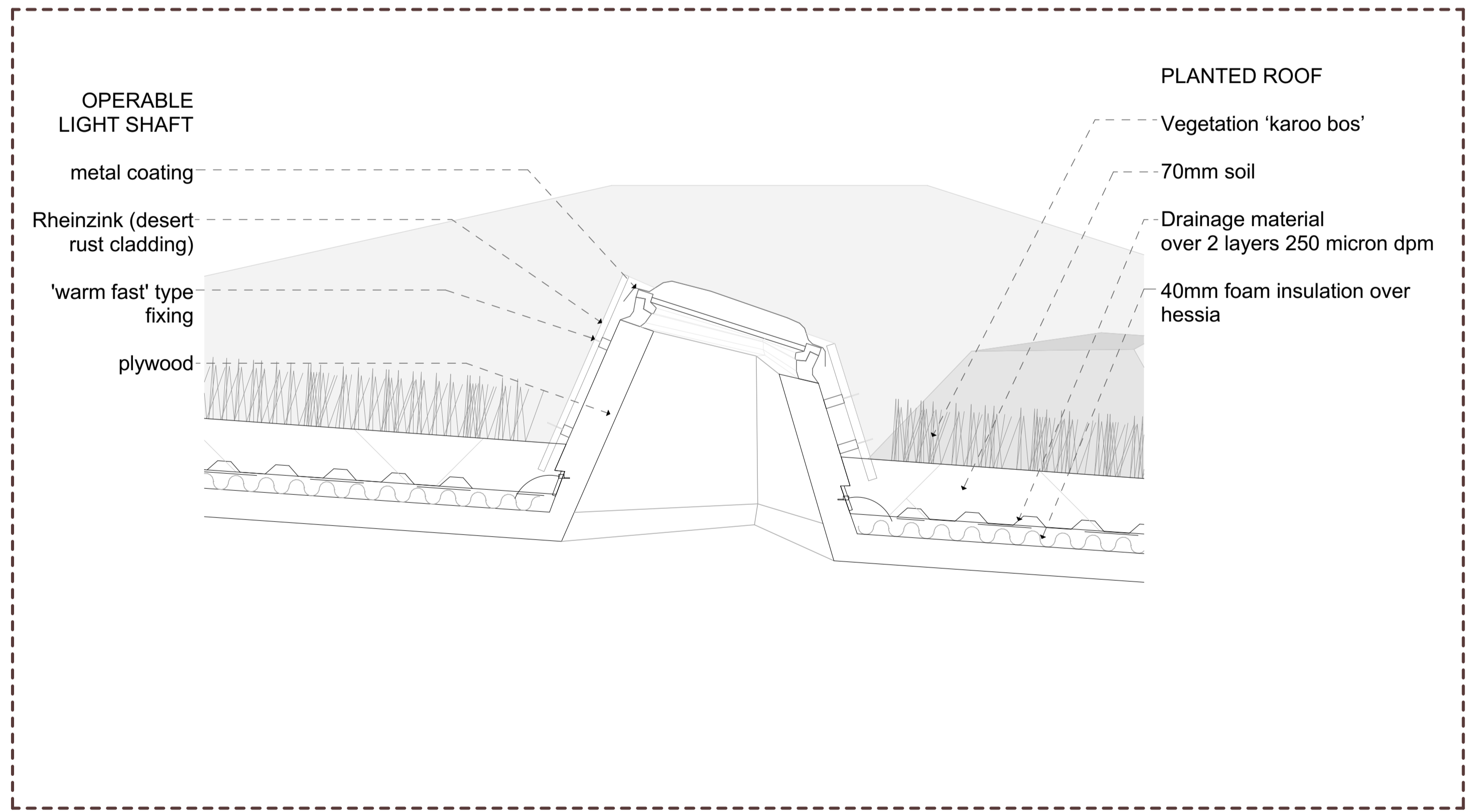


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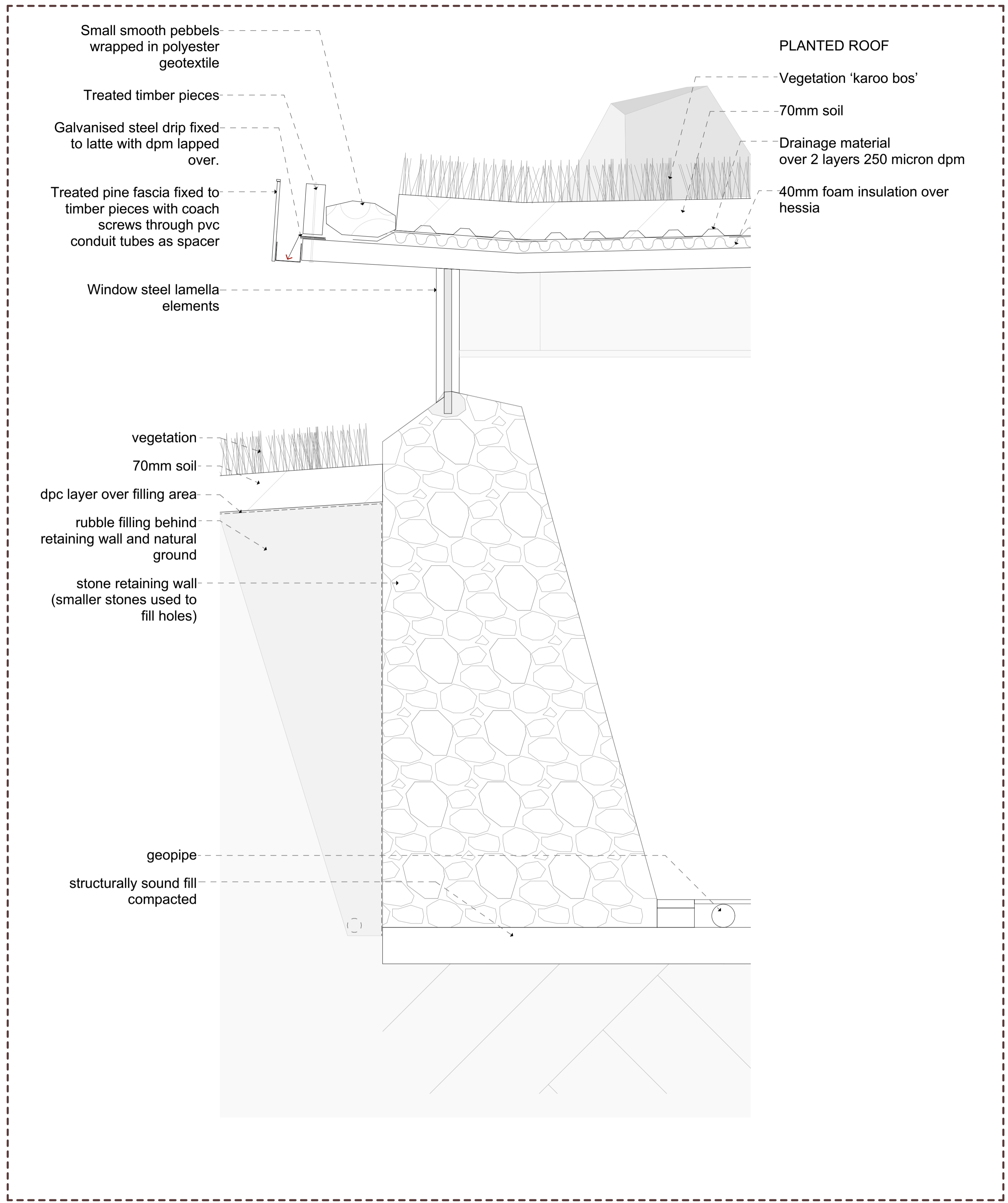
Drawing	Scale
SECTIONS A & B	
Drawing Number	
CONS1.7	
Student Name	Date
NERINA NAUDE 2014014100	2020
University of the Free State, Department of Architecture	



DETAIL 1
SCALE: 1:10



DETAIL 2
SCALE: 1:10



DETAIL 3
SCALE: 1:10