# FUTURE RUIN FOR FYNBOS

Fynbos Interpretation and Regeneration Centre | Berg River Dam | Franschhoek

M. ARCH PROF DISSERTATION 2021
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This document is submitted to the

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in partial fulfillment of a

**Masters in Architecture**

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

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## Declaration of original authorship

The work contained in this dissertation has not been previously submitted at this or any other institution of higher education. To the best of my knowledge, this dissertation does not contain material that has been previously published or written by another person except where due reference is made.

## Acknowledgements

This document is dedicated to those who provided guidance and support as well as those who made this whole journey possible.

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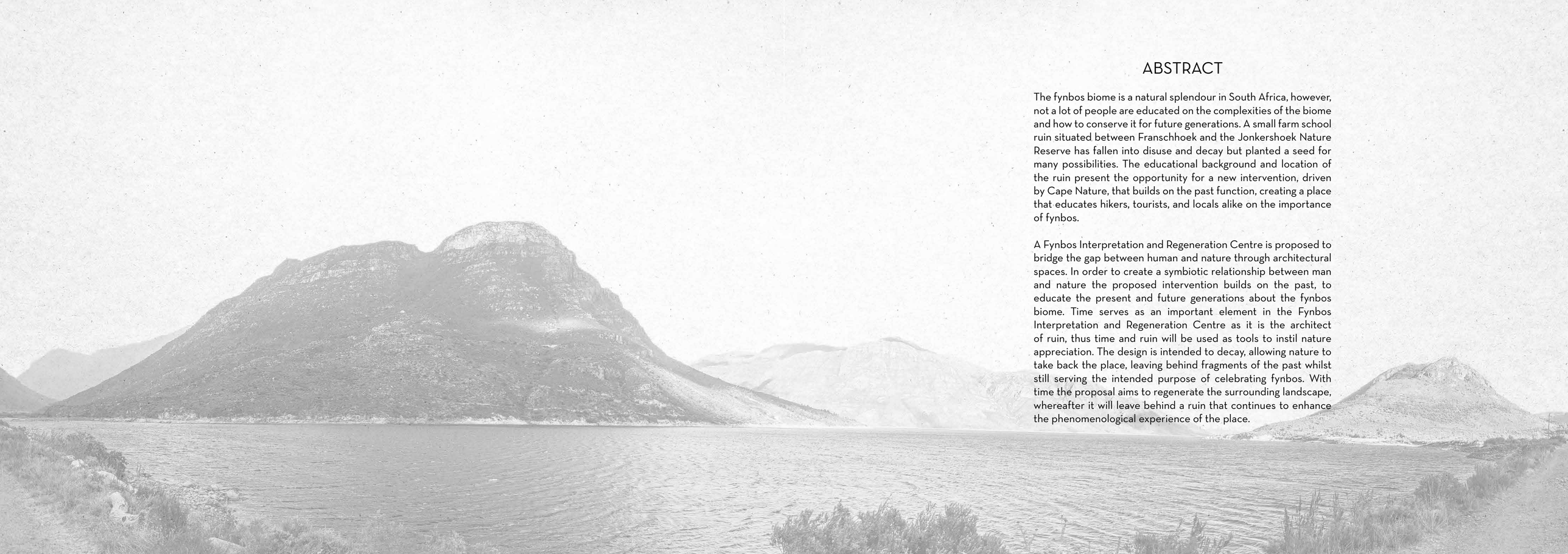


# ABSTRACT

The fynbos biome is a natural splendour in South Africa, however, not a lot of people are educated on the complexities of the biome and how to conserve it for future generations. A small farm school ruin situated between Franschhoek and the Jonkershoek Nature Reserve has fallen into disuse and decay but planted a seed for many possibilities. The educational background and location of the ruin present the opportunity for a new intervention, driven by Cape Nature, that builds on the past function, creating a place that educates hikers, tourists, and locals alike on the importance of fynbos.

A Fynbos Interpretation and Regeneration Centre is proposed to bridge the gap between human and nature through architectural spaces. In order to create a symbiotic relationship between man and nature the proposed intervention builds on the past, to educate the present and future generations about the fynbos biome. Time serves as an important element in the Fynbos Interpretation and Regeneration Centre as it is the architect of ruin, thus time and ruin will be used as tools to instil nature appreciation. The design is intended to decay, allowing nature to take back the place, leaving behind fragments of the past whilst still serving the intended purpose of celebrating fynbos. With time the proposal aims to regenerate the surrounding landscape, whereafter it will leave behind a ruin that continues to enhance the phenomenological experience of the place.

# TABLE OF CONTENTS

# PROJECT FRAMEWORK


Introduce the reader to the overview of the project.


Show the reader what the project wants to achieve and an in-depth investigation of the place it will inhabit.


This part will show explorations into fynbos, theoretical groundings, and precedent studies leading up to the design.


Layout of the design process and the final outcome.


Technical aspects of the design will be shown.


PART ONE
THE INVESTIGATION

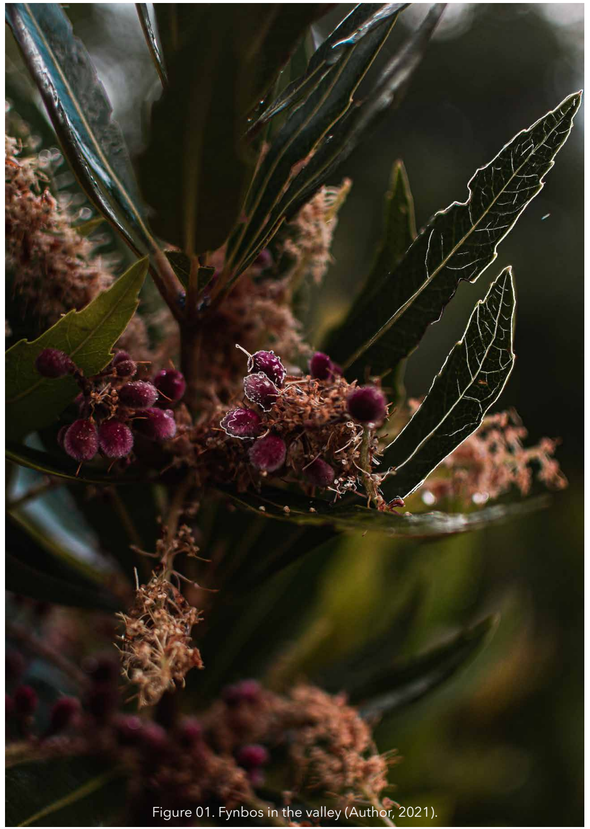


Figure 01. Fynbos in the valley (Author, 2021).

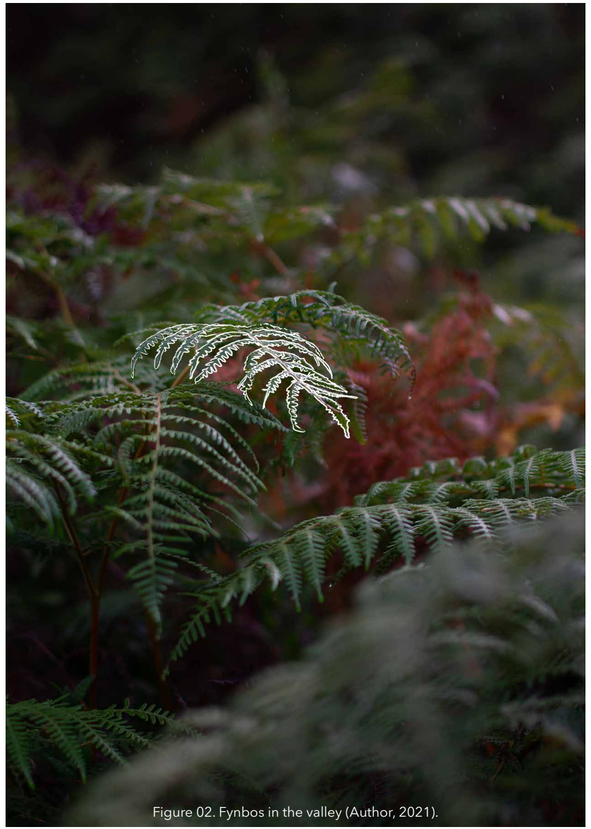


Figure 02. Fynbos in the valley (Author, 2021).



# PROJECT SUMMARY

**Program:** Interpretation Centre, Conservation Laboratory, Restaurant and Eco-tourism.

**Location:** Berg River Dam, Franschhoek, Western Cape, South Africa

**Coordinates:** 33°56′13″S 19°04′31″E

**Client:** Cape Nature

**Users:** Researchers and Tourists who are interested in the fynbos kingdom and its beauty.

**Theme:** Ruin inducing an appreciation of the landscape, conserving fynbos.

**Architectural Theoretical Grounding:** How can the Ruin of the past, present, and future have an influence on the user's appreciation and conservation of the environment?

**Architectural Approach:** Light timber structures will be supported by natural stone walls, forming land art in the form of a future ruin that frames the landscape. These stone walls will provoke an appreciation of the landscape long after the spaces have degraded or been removed.

**Aim:** This thesis hopes to use appropriate ruin-informed architecture as a catalyst to form a symbiotic relationship between human and nature in order to make us understand the vulnerability of fynbos.

Figure 03. Ruin (Author, 2021)



# INTRODUCTION

Fynbos is one of South Africa's valuable treasures that remains vulnerable due to the worlds' constant change. Fynbos directly generates a large amount of income for people and companies within the Western Cape and is also indirectly responsible for tourism estimated at R77 million per year (Turpie, 2003). Many South Africans are not aware of the value or vulnerability of fynbos, allowing it to remain in danger of going extinct.

Therefore, a Fynbos Interpretation and Regeneration Centre is proposed that will use popular types of tourist attractions that are lacking in this specific area to attract tourists and locals, educating them about fynbos and raising funds to allow for the physical protection of the species.

The centre will be situated on an easily accessible piece of land next to the Berg River dam, close to Franschhoek, in the heart of the Cape Floral Kingdom. The site has exceptional views and has easy access to the vast Jonkershoek National Park and all its trails. On the site, there is a small, abandoned building, used in the mid to late 1900s as a farm school before the dam was built in the early 2000s. This little brick structure is completely forgotten but when it was discovered, it and its relationship with the surrounding landscape inspired the development.

The dissertation aims to find an architectural solution that will act as a catalyst in the relationship between human and nature, instilling care for one another, in order to make us understand the vulnerability of fynbos, creating a deeper connection with it, and thus motivating the people to protect the endangered plant life.

# PART TWO

# GROUNDING

Figure 04. Interpretation centre (Author, 2021).



# RESEARCH QUESTION

How can architecture create a symbiotic relationship between the dwellers and nature throughout the passage of time with biophilic design and intentional ruins enhancing the phenomenological experience within the natural landscape?

Figure 05. Future ruin (Author, 2021).

# PROBLEM STATEMENT

Fynbos, a natural splendour in South Africa, more specifically the Western Cape, is under-conserved and under-protected. Similar to the disposition of fynbos a small ruin located between the Jonkershoek Nature Reserve and Franschhoek is left neglected. How can the small ruin, which once was a small farm school, serve as a starting point to develop architecture that can educate and conserve nature? How can architecture draw humans towards nature just like the ruin drew me towards it and the natural splendour that surrounds it? Ultimately, how can ruin as a theoretical theme inform architecture that not only caters for the present but also for the future in order to form a symbiotic relationship between humans and nature?

# AIM

This thesis hopes to use architecture as an instrument to form a symbiotic relationship between human and nature in order to make us understand the vulnerability of fynbos, creating a deeper connection with it, and thus motivating the people to protect the endangered plant life.

Proposed, is a Fynbos Interpretation and Regeneration Centre that will use popular types of tourist attractions that are lacking in this specific area as a tool to attract tourists and locals, educating them about Fynbos and raising funds to allow for the physical protection of the species.

Multiple theoretical standings will be used to develop a building that acts as a catalyst in the relationship between human and nature, instilling care for one another. These theoretical standings will use fynbos and the existing ruin as inspiration in order to apply in the most applicable manner.



# CLIENT

This development will be occupied by a number of different users, ranging from non-profit organisations and researchers that work with the community to private tenants that will rent the restaurant and shop. Cape Nature will be regarded as the client, and they will make use of different investors to fund the development. These investors might include Franschhoek tourism or institutions like universities that will make use of the research facilities. These organisations and institutions will be included in the design process to ensure all the needs are attended to. The income from the tenants and tourist attractions will then be used to fund the conservation of the surrounding fynbos as well as the maintenance of the development.

CapeNature

**www.capenature.co.za**

Figure 06. Logo (CapeNature, 2021: online).

# USER ANALYSIS

**Seasonal users**
Visitors to the Jonkershoek nature reserve for walking, hiking, fynbos tours and mountain biking as well as visitors to the restaurant and interpretation space.

**Permanent Staff**
Local people employed for the management and maintenance of the centre as well as tour guides and rangers who maintain the nature reserve and its tracks. This will also include the staff of the restaurant.

**Researchers**
Semi-permanent users that make use of the amenities provided for the research and conservation of the fynbos. Examples of these users are university students, researchers and non-profit organisations like Fynbos Forum.

# Orientation

## Location

This dissertation is proposed at the entrance of the Jonkershoek Nature Reserve within the Hottentots Holland Mountains, close to Franschhoek, in the Western Cape of South Africa. The Jonkershoek mountains, with their high peaks and deep valleys, form part of the larger Boland mountain range (Hottentots Holland Nature Reserve).

The Eerste, Berg, Lourens and Riviersonderend rivers all have their sources high in these mountains with the Jonkershoek Nature Reserve being one of the country's highest rainfall areas, providing water for Stellenbosch and Cape Town (mc Donald, 1883: 4).


Figure 07. **Location within the Western Cape** (Google earth, 2021: online. Adapted by author).

# Proposed site

The site is situated at the entrance of the Jonkershoek Nature Reserve, on Franschhoek's side. The Jonkershoek Nature Reserve lies between the towns of Stellenbosch and Franschhoek with the better-known part located closer to Stellenbosch.

The site is situated on a piece of land owned by the Berg River dam that was previously home to the builders of the dam and tunnel system. The buildings were temporary however and were removed soon after the completion date.

After the housing was removed the degraded roads and floor slabs were left behind and withstood the test of time. The footprints of the buildings can be seen on satellite imagery (figure 08) to the east of the site but are not visible from the roads as it is covered by plant growth. This means that the site itself is not very sensitive but will be rehabilitated to the standard of the surrounding fynbos.

The specific part of the site where the development will be located sits between this existing footprint and the dam, on a clear piece of land with a small ruin positioned upon it. This ruin dates back further, where it was an old farm school and later oxen stables for forestry.


Figure 08. Proposed site (Google earth, 2021: online. Adapted by author).

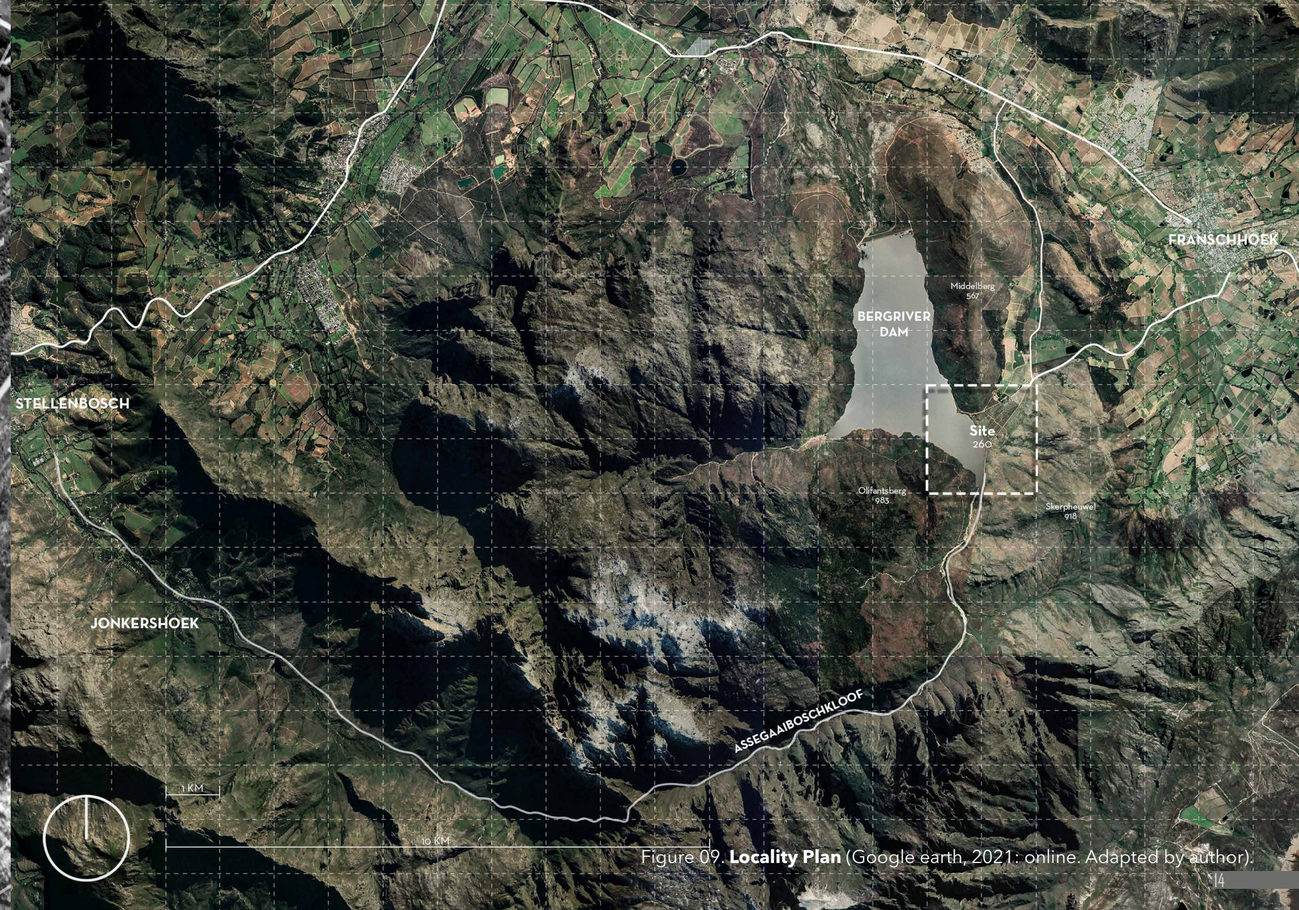



Figure 09. **Locality Plan** (Google earth, 2021: online. Adapted by author).

# History

Franschhoek is famous for its rich history, however, the site upon which the development sits (only Five Kilometres to the South-West) has close to no historical documentation. This does not mean the site has no history, it only means that other means of sourcing had to be implemented, even if it is less reliable.

## Dam

The dam was constructed from July 2004 to July 2007 and was filled to the brim in winter 2008. The dam is a major part of the Berg Water Project, increasing the Cape Town water supply by 20% at the time. The wall was constructed in the northern part of the valley, flooding the whole valley with 130 million cubic metres of water (Moodley, 2009). The flooded land consisted of some farmland, a farmhouse, and nature reserve, purchased by the government to make this project a reality. The majority of the wall consists of rock mined from the riverbed, keeping the cost down whilst making the dam deeper.

## Site

The land surrounding the specific site is currently owned by the dam and is not protected but is surrounded by protected nature reserves. This land is layered with different times and different people placed there for different reasons. The land was mainly unoccupied up until the 1970s when a tunnel (figure 11) was drilled (7.9 Kilometres long) through the mountains to the Theewaterskloof dam wherethrough water can be pumped to supplement either dam (Van Vuuren, 2011: 25). This meant that the land was developed to provide the builders etc. with housing and entertainment facilities. This development was abandoned after the tunnel was completed in 1982 and was then used by forestry for about 15 years (Van Vuuren, 2011: 25). The only visible remains are the concrete slabs from some of the houses seen in figure 12, but if you didn't know it is there you would walk past it as it is surrounded by plant growth. The specific part where the development will be situated, however, has a small brick ruin (figure 14 and 15) that was there a few years before the other developments and outlived them all.

## Ruin

The small brick ruin on site was built in the mid-1900s before the dam was planned and functioned as a small farm school for the farm that was located where the dam now is. After the farms were bought by the government, the school, also part of the land, was abandoned. A few years later, when the government first started with its first large forestry movement, the abandoned school was used as oxen stables. This can still be observed in the ruin in the form of a 13-meter-long trough in half of the building.

Figure 10. Berg river Dam wall (Saaiman, 2016: online).

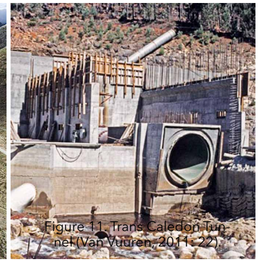


Figure 11. Trans-Caledon tunnel (Van Vuuren, 2011: 22).

Figure 12. Tunnelers housing footprint (Google earth, 2021: online. Adapted by author).

Figure 13. Trough rings (Author,2021).

Figure 14. Existing ruin east wall (Author,2021).

Figure 16. Existing ruin northern space (Author,2021).



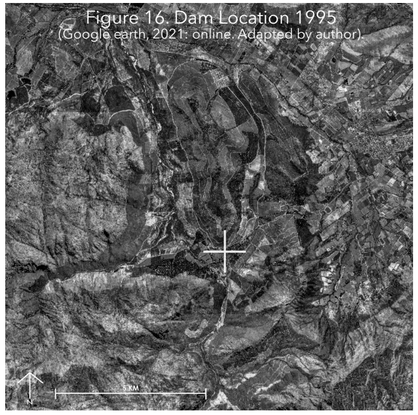


Figure 16. Dam Location 1995 (Google earth, 2021: online. Adapted by author).

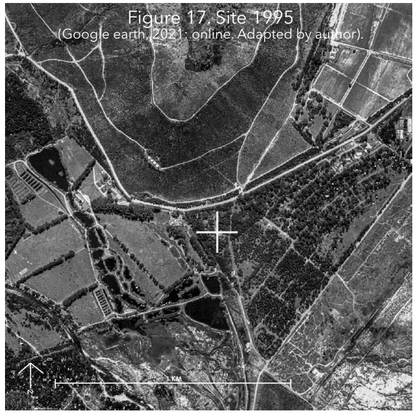


Figure 17. Site 1995 (Google earth, 2021: online. Adapted by author).

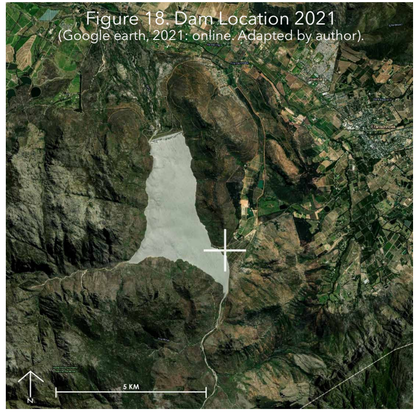


Figure 18. Dam Location 2021 (Google earth, 2021: online. Adapted by author).

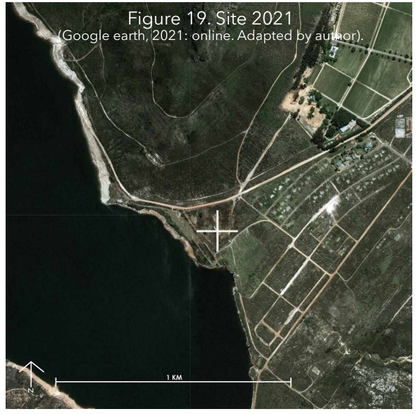


Figure 19. Site 2021 (Google earth, 2021: online. Adapted by author).

# Site Analysis

## Macro

The site is located deep in the Boland Mountain range within the Western Cape. To describe the area, in the summer the low-lying areas feel like French countryside and in the winter this area has weeks of rain, making it look like Scotland, with some snow on the mountain tops.

With the growing interest in hiking, mountain biking and other leisure activities, the Fynbos Interpretation and Regeneration Centre hopes to extend the tourist rich area towards the nature reserve to raise awareness regarding the vulnerability of fynbos.

At the moment, there are no similar developments in the area. Tourists who are interested in these activities must visit the information centre in Franschhoek to find out where trails are located and are then most likely pointed towards the Mont Rochelle hiking trail (figure 20), as it is the only trail with an entrance fee and maintenance. The Berg River and Jonkershoek Nature reserve surrounding it however are currently being developed by locals and mountain biking groups, who are only asking for donations to support their basic costs. Therefore, this is the perfect location for this centre, catering for tourists and locals whilst involving and educating them regarding fynbos conservation.

Within a radius of five kilometres from the site, there are no popular attractions. Just outside the five kilometres radius, however, it is surrounded by one of South Africa's most popular tourist attractions in the shape of Franschhoek, one of South Africa's most popular tourist destinations, with all its cellars, restaurants, and art galleries within and around it (figure 21).

The Jonkershoek Nature reserve is used by many locals as it is easily accessible by car and bicycle, unlike the Mont Rochelle Nature reserve that is difficult to access as it is on top of the Franschhoek pass and doesn't permit cyclists. Tourists are mostly unaware of this area and would love to have easily accessible leisure activities close to their accommodation with other functions that support it like a shop, restaurant, and ablution.

Regarding the local vernacular, the surrounding area has no unified vernacular, the most identifiable is the traditional Cape-Dutch style buildings, few of which is original, and mostly used for housing.


Figure 20. View towards site from Mont Rochelle (Author,2021).


Figure 21. Leisure destinations in facinity (Google earth, 2021: online.Adapted by author).

# Mezzo

The site is encircled by a breath-taking mountain range with valleys stretching in all directions. The most spectacular views are to the west (over the Berg River dam) and the south (into the Jonkershoek Nature Reserve). Apart from the ruin, existing road layout and a few houses in the distance, the only manmade structures are four old reservoirs on the hill to the north (figure 25) and two bridges in the southern valley (figures 23 and 24), although not visible from the site.

Dominant plant species mainly consists of fynbos, which means the vegetation is mainly under 1.5 metres in height with no trees. On the hills and mountains, the vegetation is dryer and in the valley with streams, greener fern type species thrive. The reason for this is that it has more groundwater and is also less prone to veld fires, making the species in the valleys much older. The area also has an abundance of granite rock and gravel with different types of timber including driftwood and burnt wood seen in figures 32 to 34.

Figure 22. Birds eye view drawing of site (Author,2021).

Figure 23. Suspention bridge in valley (Author,2021).

Figure 24. Bridge up Berg River (Author,2021).

Figure 25. Delapitated reserviors on hill next to site (Author,2021).



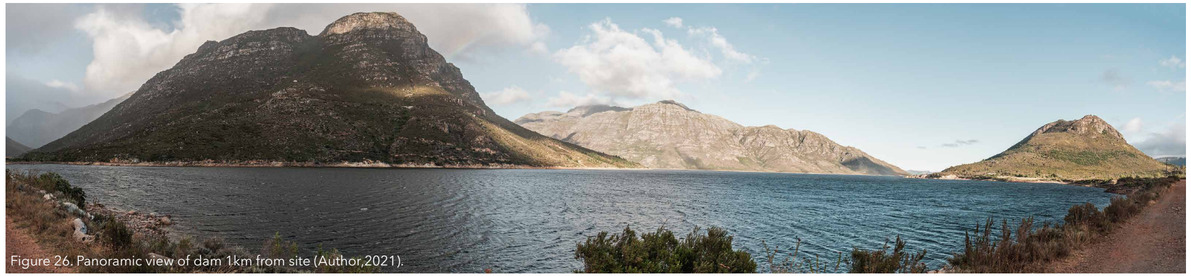


Figure 26. Panoramic view of dam 1km from site (Author,2021).

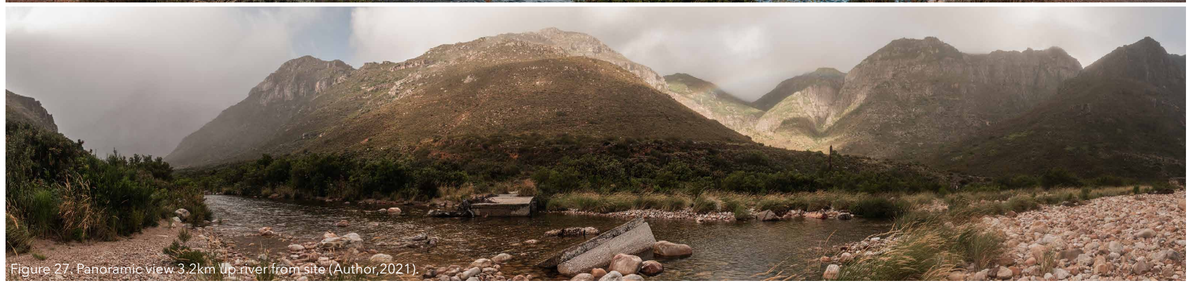


Figure 27. Panoramic view 3.2km up river from site (Author,2021).

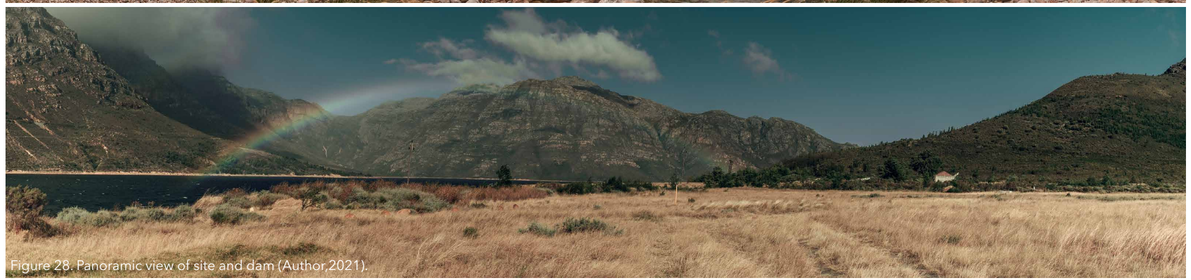


Figure 28. Panoramic view of site and dam (Author,2021).

## Types of plants

Figure 29. Fynbos up valley (Author,2021).

Figure 30. Fern up valley (Author,2021).

Figure 31. Dead fynbos on site (Author,2021).

## Materials

Figure 32. Burnt tree stump on site (Author,2021).

Figure 33. Eroded rock up valley (Author,2021).

Figure 34. Pebples next to river (Author,2021).




**Figure 35. Site Analysis** (Google earth, 2021: online.Adapted by author)

## Weather

The western evening sun lowers over the dam but fortunately, the very late bright sun is cut off early by the mountains, making for an extraordinary sunset, especially on a cloudy day. The area has a pretty average temperature but is one of the country's highest rainfall areas with an average of up to 3 000mm in the nearby mountains (Diamond, 2014).

## Wind:

Strong Summer - SE
Hot Summer - NE
Cold Winter - NW
Very Cold Winter - SW

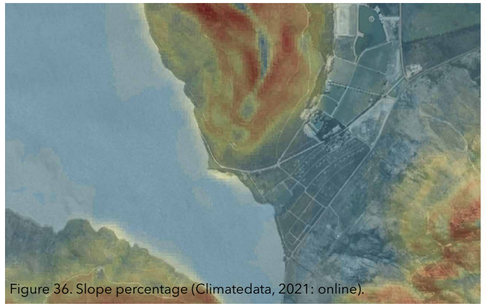



Figure 36. Slope percentage (Climatedata, 2021: online).

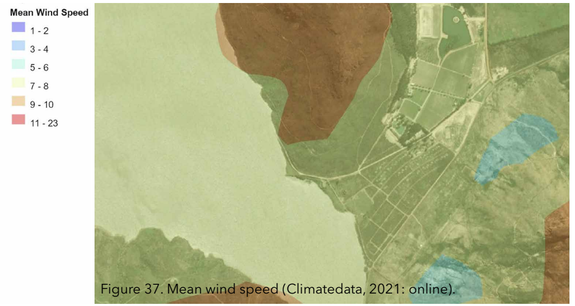



Figure 37. Mean wind speed (Climatedata, 2021: online).

Figure 38. Climate (Climatedata, 2021: online).

| | January | February | March | April | May | June | July | August | Septem-ber | October | Novem-ber | Decem-ber |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Avg. Temperature °C | 19.9 °C | 20.1 °C | 18.6 °C | 15.7 °C | 12.8 °C | 10 °C | 9.4 °C | 9.7 °C | 11.2 °C | 13.9 °C | 15.8 °C | 18.4 °C |
| Min. Temperature °C | 14.1 °C | 14.5 °C | 13.4 °C | 11 °C | 8.8 °C | 6.3 °C | 5.3 °C | 5.5 °C | 6.6 °C | 8.8 °C | 10.3 °C | 12.8 °C |
| Max. Temperature °C | 26.5 °C | 26.7 °C | 24.9 °C | 21.3 °C | 17.5 °C | 14.3 °C | 14 °C | 14.3 °C | 16.2 °C | 19.4 °C | 21.7 °C | 24.7 °C |
| Precipitation / Rainfall mm | 27 | 25 | 28 | 65 | 88 | 128 | 116 | 97 | 68 | 52 | 49 | 31 |
| Humidity(%) | 61% | 62% | 63% | 66% | 72% | 75% | 75% | 77% | 75% | 70% | 65% | 62% |
| Rainy days (d) | 4 | 3 | 4 | 5 | 7 | 8 | 8 | 8 | 6 | 6 | 5 | 4 |
| avg. Sun hours (hours) | 10.2 | 9.6 | 8.7 | 7.7 | 6.6 | 6.1 | 6.2 | 6.0 | 6.9 | 8.3 | 9.4 | 10.2 |



## Design Reactions

The thick stone walls aid in the control of temperature, acting as a thermal mass for the hot summer days and cold winters whilst also blocking some of the strong winds. All the spaces are completely openable and customisable, allowing for a ventilating breeze through the spaces on a summer day, whereas, the glass facades can be closed off with the screens raised, warming the interior on a winter's day.

Figure 39. North facing interpretation centre
(Author, 2021)

On the northern sides, the screens have horizontal timbers that stop most of the sunlight when closed and allow some filtered light to enter when opened, giving unobstructed views of the natural landscape.

Figure 40. West facing side of restaurant
(Author, 2021)

The western facade of the restaurant gives beautiful views over the dam but is very exposed in the afternoon. a Folding screen system is developed to open the facade completely during the day, providing some shade whilst being able to completely close off in the afternoon.

Figure 41. West facing research lab
(Author, 2021)

The western facade of the research labs has a thick stone wall as thermal mass, but to include the beautiful view of the dam, two large sliding windows open to the west with big screens that can be closed if the afternoon sun is a hindrance.

Figure 42. Trail Network (Google earth, 2021: online. Adapted by author)


Contour 14KM
Skerpheuwel loop 19KM
Dam 18KM
Mast Climb 20KM

These are different hiking trails that are comprised of existing trails maintained by the locals, routed in different ways to experience different areas and different amounts of difficulty. The trails are routed to start and finish at the Fynbos Centre, enabling you to connect 2 or more trails to increase length and difficulty. These are only the maintained routes, but when you are guided in a tour group the trails explore the deeper parts of the valleys, including ponds and waterfalls.

**Contour**

Distance: 14km
Difficulty: 4/10
Duration MTB: 1 hour
Duration Hiking: 2.5 - 3 hours

Easy and fast with views of the dam and diverse flora.

**Mast Climb**

Distance: 20km
Difficulty: 7/10
Duration MTB: 2 - 3 hours
Duration Hiking: 4 – 5 hours

Steep climb for a 360 view of the dam and surrounding farms.

**Dam**

Distance: 18 km
Difficulty: 6/10
Duration MTB: 1.5 - 2 hours
Duration Hiking: 3 - 4 hours

Flat profile but sharp steep climbs with beautiful views of dam and wildlife.

**Skerpheuwel Loop**

Distance: 19km
Difficulty: 9/10
Duration MTB: 2 - 3 hours
Duration Hiking: 4 - 5 hours

Sharp climb and rough terrain with panoramic views, streams and a waterfall.

5KM



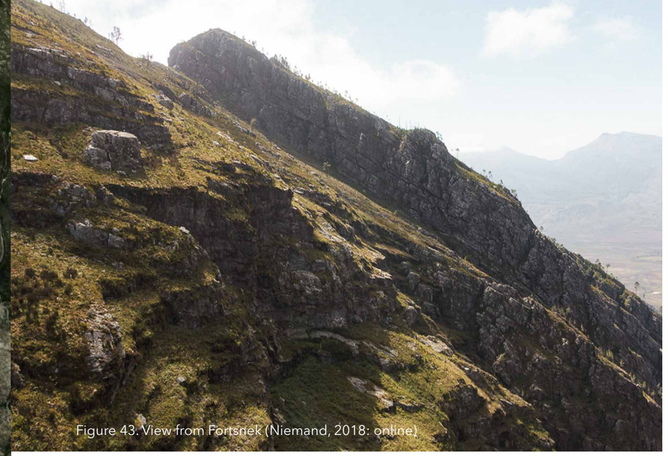


Figure 43. View from Fortsnek (Niemand, 2018: online)

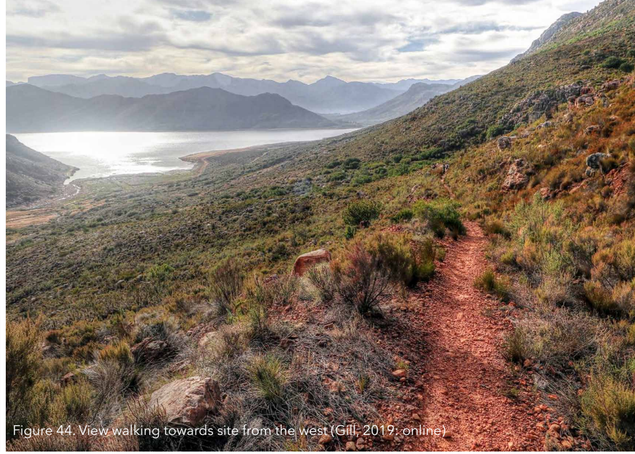


Figure 44. View walking towards site from the west (Gill, 2019: online)

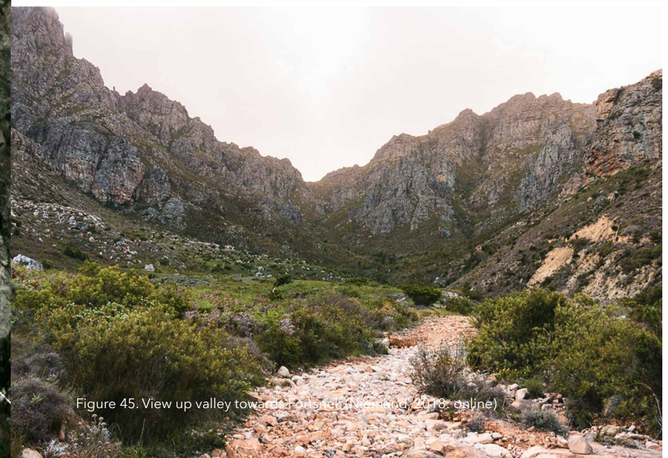


Figure 45. View up valley towards Fortsnek (Niemand, 2018: online)

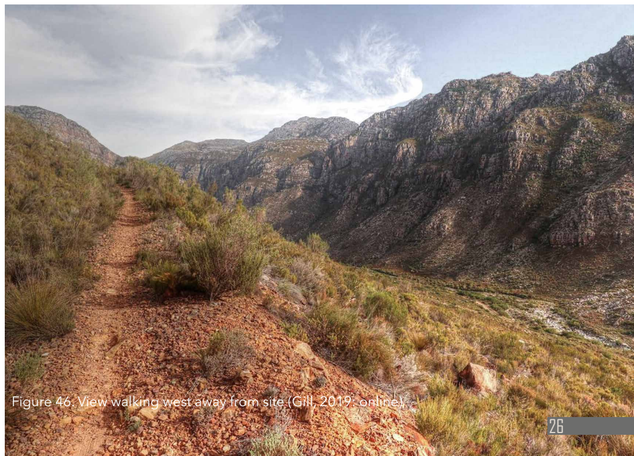


Figure 46. View walking west away from site (Gill, 2019: online)

# Micro

The immediate context on site consists of fynbos, some alien species including a few trees, and the ruin. When the trees are removed there is a 360-degree view of the landscape, including the dam that is visible from the ruin.

The ruin consists of two external walls (one with a gable), one internal wall, a floor slab, and a watering trough. The inner side of the walls consists of a timber structure with single stretch bond brick infill, whereas the outside is cladded with English bond bricks that seem to have been added later. The ruin is a layering of textures and materials, a result of many additions over time with different amounts of degradation. The colour and shape of the ruin are slowly changing to that of the surrounding nature, mimicking it in some places and being consumed by it in other.

Conclusion

The site analysis creates a deeper understanding of the site and its influences, informing applicable conceptual developments and theoretical approaches that will inform the design response.

Figure 47. Drawing of ruin mimicing mountain (Author,2021).

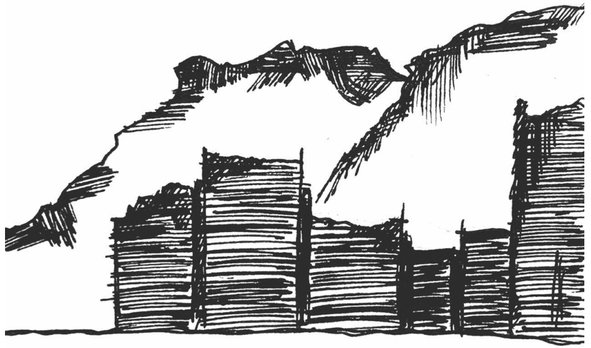




Figure 48. Existing ruin (Author,2021).

Figure 49. Exiterior wall (Author,2021).

Figure 50. Existing ruin (Author,2021).

Figure 52. Internal wall (Author,2021).

Figura 51. Existing ruin south view (Author,2021).

Figure 53. Existing ruin edge left by roof sheating (Author,2021).

# PART THREE

# EXPLORATION

# Fynbos

The Cape fynbos is a wonder of the world with more than 7000 species crammed into 46000 square kilometres (Cowling, Paterson-Jones, and Richardson, 2000: 12), yet it is unnoticed by many. This is somewhat understandable, as it seems uninviting from a distance, but when you get close there is a rich variety of flowers and plants. It is extremely important that awareness is raised for fynbos as it remains in danger of extinction. Many people, animals and insects rely on fynbos daily, thus it must be preserved for future generations.

Figure 54. Fynbos on site (Author,2021).

Figure 55. Site plant growth (Author,2021).



Figure 56. ***Stoebe plumosa*** (Author,2021)

Figure 57. ***Anthospermum aethiopicum*** (Author,2021)

## Ground Coverage

As the site was previously developed it is not very rich in fynbos growth. It contains some alien plants and trees that need to be removed as they can spread easily and use much of the needed water. There is some fynbos on the site, although they are not that endangered. It consists of many Stoebe plumosa (slangbos) a shrub that is common and grows up to 1 metre tall as well as Anthospermum aethiopicum (seeroogbossie) growing up to 2 metres tall. Both species are used in fynbos bouquets (Manning, 2007).

Figure 58. Site from entrance (Author,2021).

# Touchstone

One of the early steps in the development of this dissertation was to explore and express what the essence of the site is. This exercise ensures that the most important aspects of the place are taken into account to reach the most appropriate product. In the case of this dissertation, this exploration was done before the function of the development was decided. This means that the findings impacted the end result dramatically.

When visiting the site, the beauty of the place fills an overwhelming part of one's thoughts, also being the reason why the location was so intriguing. One realises that this is a rare spectacle that very few people are fortunate to experience. But when you look closer and do some research, you realise that the Fynbos kingdom is very sensitive and needs great attention to protect it from endangered species and human activity.

This touchstone mimics the rehabilitation process of Fynbos and experiments with the involvement of humans in the process. The touchstone shows a foreign shape (alien species), and when the pully (human as catalyst) gets turned, the alien species are opened and removed in order to reveal the green plant (indigenousness species) underneath. After the alien species is removed it forms its own entity whilst allowing the indigenous species to thrive. This experiments with the idea that the alien species can be used in the development, thus protecting the Fynbos, in high contrast to what it previously was.

This shows that fynbos is already influenced by human but is also in desperate need of the human help to protect and rehabilitate it in order to preserve it for future generations.

Figure 59. Touchstone (Author,2021).

Figure 60. Touchstone detail (Author,2021).

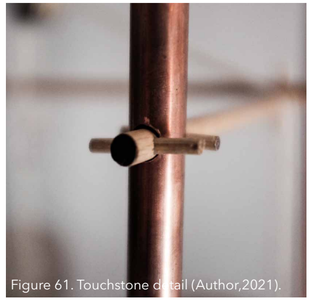


Figure 61. Touchstone detail (Author,2021).



Figure 62. Touchstone closed (Author,2021).

Figure 63. Touchstone open (Author,2021).

The three concepts investigate different elements from the surrounding landscape, seeing how it will impact the design in some cases and will be able to guide and influence it.

## Concept 1: Ephemerality | Ruin Ecology and Time

The existing ruin with its layers gives a sense of temporality, embracing the fact that some things last and others don't. This means that there is a relationship between ruin and time that most will see as negative. How can the idea of ephemerality be implemented to create a symbiotic relationship between ruin and time? 'An Anticipatory Theory of Ruin Ecology' is an idea by Jason Rhys Parry, that investigates the idea of building ruins for endangered species to thrive (Parry, J: online). This can change the way architects look at ruins, not as a negative, but as another opportunity to make a positive impact after the building has been abandoned. As fynbos is a very sensitive species, it is unlikely that a man-made object will enhance the growth thereof. Thus, a future ruin must be implemented in another way, using it to enhance the landscape to make the dwellers appreciate it more whilst attempting to make the development as sensitive as possible to prevent any harm to the existing fynbos.

Figure 64.(Author,2021).

Figure 65.(Author,2021).

Figure 66.(Author,2021).

IN-BETWEEN | TENSION | RUIN | ECOLOGY | TIME



## Concept 2: The Scab and the Scar

The scab and the scar refer to the process fynbos goes through in the case of fire. Fire plays an important role in the germination of fynbos enabling it to grow again, whilst most alien species doesn't (Reserve, K: online). The scab is the immediate result of the fire, with ash, burnt timber and a grey landscape, whereas the scar, burnt timber logs and blackened rocks, is only a reminder of the scab that once was but have recovered fully. These elements all indicate the process of regeneration, serving as a reminder of what once happened just like a ruin would. How can the new development mimic this process? aiding in the rehabilitation process of fynbos and maybe serve as a reminder (scar) in the form of a ruin.

Figure 67.(Author,2021).

Figure 68.(Author,2021).

Figure 69.(Author,2021).

REHABILITATION | FIRE | BALANCE | HEALING | GROWTH

Concept 3: Fluidity | Harmonious Connections with Nature

Fluidity as a concept can play a big role in the architectural approach and its applicability regarding the surroundings. Fluidity means that there must be harmonious connections between nature, with all its elements, and the architecture. The most important will be fynbos and the views, but other elements like wind, water and fire will also play a part in these connections just like they influence fynbos itself. This results in an architectural approach that reacts to the specific site, taking factors like wind, water and fire into account whilst incorporating fynbos and views into the design decisions.

Figure 70.(Author,2021).

Figure 71.(Author,2021).

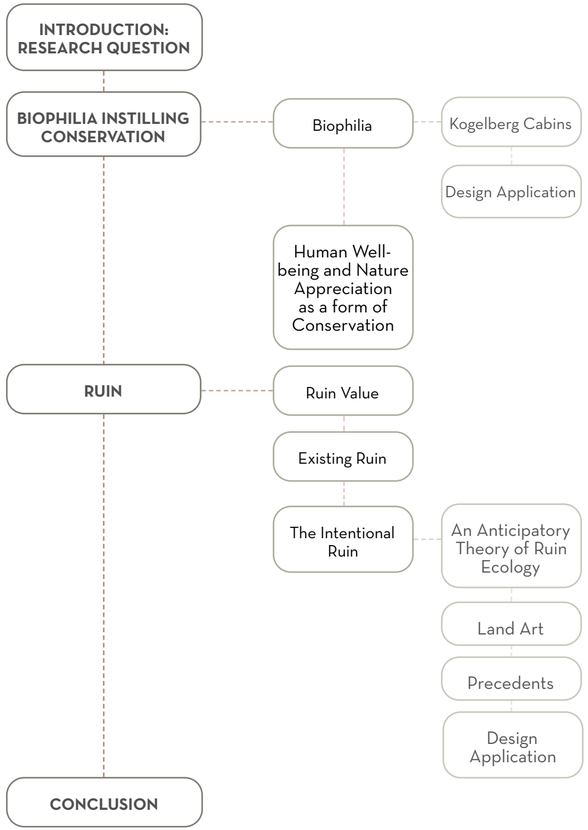
Figure 72.(Author,2021).



These concepts formed part of the original reaction to the site, introducing ideas and objectives that can be considered throughout the development whilst also introducing other points of interest that will be explored and augmented as a theoretical grounding. To enhance the phenomenological experience in the place, ruin and fluidity will be explored further, in the form of Biophilia. Applying these aspects will hopefully create a symbiotic relationship between human and nature, instilling a conservationist mentality.

Figure 73. Intentional ruin framing view up valley (Author,2021).






# Theoretical Grounding

Fynbos is currently preserved by different organisations in different parts of the fynbos kingdom, sending people into the 'veld' cutting down all the alien trees and plants, trying to protect the fynbos. This is labour intensive practice that is very necessary, but how can the public be educated regarding the vulnerability of Fynbos to protect it for future generations?

This thesis hopes to use architecture as an instrument to form a symbiotic relationship between human and nature to make us understand the vulnerability of Fynbos, creating a deeper connection with it, and thus motivating the people to protect the endangered plant life.

This goal seeks to use a more non-physical approach to conservation, attracting more people thus getting the word out. The development will use different theoretical and practical approaches to instil care for fynbos into the dwellers whilst using it to fund and support physical conservation.

*How can architecture create a symbiotic relationship between the dwellers and nature throughout the passage of time with biophilic design and intentional ruins enhancing the phenomenological experience within the natural landscape?*

First, biophilic design and human well-being will be discussed together with their influence and impact on nature appreciation. Thereafter, applicable precedents will be discussed together with the impact the approach has on the design.

# Biophilia instilling Conservation

How can a biophilic design approach aid in the creation of place and space that shape symbiotic relationships between human and nature? It seems ironic to have a building that is used to appreciate and support nature. Understandably, physical shelter is needed for different functions, but how can the design approach enhance the phenomenological experience within a natural landscape whilst also providing physical/functional spaces?

## Biophilia

*"We will never be truly healthy, satisfied, or fulfilled if we live apart and alienated from the environment from which we evolved.*
*- Stephen R. Kellert*

Biophilia is a natural attraction we, as human beings, have to nature. It is the reason we as humans are likely to feel better when surrounded by nature and feel depressed in a harsh man-made landscape. Biophilic design is when designers and architects incorporate nature in their work, hoping to contribute to the wellbeing and health of their occupants. Terrapin Bright Green, a design consulting firm from New York wrote a report named, '14 Patterns of Biophilic Design: Improving Health and Well-Being in the Built Environment' that discusses the benefits of biophilic design (Browning, 2014: online). They state that it can be categorised into different groups:

a. Nature in the Space: Direct, physical presence of nature.
b. Natural Analogues: Mimicry of shapes and patterns from nature.
c. Nature of the Space: Spatial configuration in nature.

As the development is located within nature, 'nature in space' and 'nature of space' will be most applicable (Browning, 2014: online).

a. Nature in Space forms seven of the 14 patterns namely:

1. Visual connection with nature: views
2. Non-Visual Connection with Nature: Audio and haptic
3. Non-Rhythmic Sensory Stimuli: predicted connection
4. Thermal & Airflow Variability: Changes in temperature, humidity, airflow and natural materials
5. Presence of Water: See, hear or touch
6. Dynamic & Diffuse Light: Fluctuating intensities of light and shadow
7. Connection with Natural Systems: seasonal changes

c. Nature of Space addresses the diverse spatial constructions in nature, like the ability to see into the distance, or to play with the safe and the unknown danger (Browning, 2014: online).

These patterns of biophilic design can all be used in the development to contribute to the phenomenological experience. Kogelberg Cabins, a local, context-relevant, precedent is also used for construction integrated biophilic design to achieve the same effect.

### Kogelberg Cabins

The Kogelberg cabins (figure 74) is situated on a similar type of site with fynbos receiving primary attention. KLG uses biophilic design approaches to enhance the guest's experience through their experience with nature. Some of these approaches are:

- Raised walkways to lower impact on fynbos whilst letting it grow right up to the edge.
- SA Pine cladding that age with time to integrate with nature.
- Natural pool and ponds with running water.
- Large openable facades with sweeping views of nature.

Figure 74. View from living room of Kogelberg cabin (Abdel, 2020: online).



Figure 75. Dynamic & Diffuse Light (Author,2021).

Figure 76. Presence of Water (Author,2021).

### Design Application

The development includes almost all of the 'Nature in Space patterns of biophilic design' patented by Terrapin Bright Green. The spaces of the proposed development are positioned in such a way to allow for the most visual connection with nature possible, using big glass facades with screen systems in front. The screen system and windows can be opened to allow nature to creep inside whilst also allowing for natural ventilation and diffused light (figure 75). The walkways are also raised above the fynbos, weaving from space to space allowing for views in all directions of the fynbos and the mountainous landscape. A system is also planned for wastewater treatment, this, together with the rainwater drainage will run through the development towards the dam with natural ponds throughout as seen in figure 76.

These elements of biophilic design will enhance the dweller's experience of nature whether it is conscious or sub-conscious.

## Human Well-being and Nature Appreciation as a form of Conservation

Biophilic design takes major leaps towards human well-being and nature appreciation, but can it be used as a tool to conserve fynbos? The last thing we want to lose is someone/something we love and appreciate. This means that if architecture is able to make you love nature, you are more likely to protect it. If the public forms this connection with fynbos, there are many ways in which it will take a step towards fynbos conservation. It can be financially (donating to research and rehabilitation/conservation organisations), physically (forming part of projects or just lowering your impact), and even just spreading the word.

### Conclusion

Using biophilic architecture as a design approach can help to instil care into the everyday dwellers, strengthening their relationship with fynbos, but how can this strategy be guaranteed to enhance the phenomenological experience within the natural landscape far into the future, when the building and its functions are no longer in use, or has been dilapidated or destroyed?

*What is a Ruin?*

*"...the irreparable remains of a human construction that, by a destructive act or process no longer dwells in the unity of the original, but may have new unities that we may enjoy."*

*-Robert Ginsberg (Ginsberg, 2004: 284)*

*"To us, the ruin allows you to see the past, as well as your present condition, and what you're going to be - you can see all those three at the same time."*

*- Yves Marchand (Macdonald, 2014: online)*

Figure 77. Imaginary View of the Grand Gallery of the Louvre in Ruins (Hubert,1796).



Figure 78. Building in decay (Riley,2018: online).

Figure 79. Scottish ruin decayed to basic form (Robertson, 2018:online).

# RUIN

The existing ruin on site is a simple example of a ruin that displays a timeline of the site, allowing a dweller to see the past, the present and what will be. This ruin is a small example, as many other ruins show the real power of ruins to enhance the phenomenological experience within a place. How can a new development be designed to enhance the present experience as well as the future experience when the rest has fallen away? Can a ruin be seen as a form of biophilia, instilling nature appreciation? To establish how a ruin can play a part in enhancing the phenomenological experience, you first have to determine why we find them beautiful in the first place.

## Ruin Value

*"Ruins are attractive because they're not just things that have survived, but they also point towards something."*
*-Brian Dillon*

A ruin can be regarded as one of those information boards you see in a botanical garden, giving information about the plants at its feet. A ruin does the same, giving us information about the surrounding's past, it can be more mysterious, but that makes it even more exciting. Brian Dillon also said, "the true value of a ruin is in its ability to allow us to move across time." But how can a ruin achieve this effect?

Decay, especially in buildings (figure 78), can create an atmosphere with layers of identity that is embedded within it (Bruins, 2017: 5). These layers are in the shape of different attributes (rusted equipment, overgrown plants, and stained walls) that reveals the ruin's voyage through time (Bruins, 2017: 5). This means that dereliction is not beautiful on its own, but because it allows our mind to wander and explore, thus making it beautiful.

What can make a ruin valuable is the fact that it can sometimes enhance a natural landscape, which is extremely ironic, yet fascinating. Presumably, the following two factors play a major role in this. First is the effect of contrast, where one appreciates one thing more because there is something, in high contrast, from which it echoes. Secondly, one gets respect for nature when it dominates a ruin, showing its real power that one can so easily overlook.

Then there is another type of ruin, one relating to a structure that has decayed to its basic form, with a harmonious relationship with nature (figure 79). Marco Casagrande stated, "Ruin is when man-made has become part of nature." This is when dereliction has progressed so far that the basic form of the building (the more monolithic parts made from stronger materials) are starting to form part of nature. The ruin does not seem like a neglected building but like a beautiful addition to the landscape.

## Existing Ruin

The existing ruin is the only beacon on the site and was one of the significant inspirations behind the origin of this project, together with the fynbos and the all-encompassing natural landscape. It is in the transition between dereliction and a valuable ruin. The existing ruin is the narrator of a story telling us about the relationship people had with the surrounding landscape in the past, with different layers dating back to different times. These layers of the ruin can tell us about its history without any physical information. The existing ruin has some beauty and also value, not financial, but emotional.

## Conclusion

This outlook on ruin value and dereliction makes us conscious about the buildings we design in the present and makes us think twice about what it will be like in the future and the stories it will tell. Buildings are rarely designed with their future ruin in mind, it is designed to meet the current goals and functions. Albert Speer, Hitler's personal architect was aware of this and started to implement it into his designs. His goal however was to have the building convey a message after it has fallen into despair, as a result of war most likely, and resulted in large concrete structures. Jason Parry however explored the same idea but instead argued that this future ruin should be designed in such a way that it can allow non-human species to thrive after it has been abandoned. How can a future 'intentional' ruin be implemented to enhance the phenomenological experience of the dwellers and instil the desire to conserve nature?

Figure 80. Existing ruin in transition (Author,2021).

## The Intentional Ruin

Knowing that ruin can enhance the phenomenological experience and instil nature appreciation, how can the new development implement a future, 'intentional' ruin to last into the future, while more ephemeral parts fade over time?

### An anticipatory theory of ruin ecology

This idea by Jason Parry explores the possibility that architects must start to design buildings with the future of the building in mind, especially when it turns to ruin. More specifically, he looks at the idea of designing it in a way to accommodate endangered non-human species to thrive after the building is abandoned (Parry, 2020: online).

This can be a good way to ensure the future conservation of fynbos after the building is not in use anymore, but as fynbos is very sensitive, other approaches must be tested. Fynbos is not likely to inhabit a ruin, but one can ensure the future of fynbos on-site by being as sensitive as possible. But how can this idea be reinterpreted in a different way to assist fynbos in the future?

How can the future ruin continue to have a positive impact on fynbos and not just eliminate its own negative impact? As ruin can instil an appreciation of nature and enhance the experience in nature, an intentional ruin can be implemented in such a way to achieve it. What is an intentional ruin and how can it be used as a biophilic tool to preserve fynbos?

Figure 81. Existing ruin in transition (Author,2021).



Figure 82. Sea level - Richard Serra (Lubbersen,2014: online. Adapted by author).

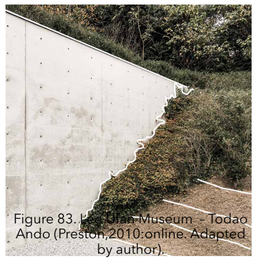


Figure 83. Lee Ufan Museum - Todao Ando (Preston,2010:online. Adapted by author).

Figure 84. Lee Ufan Museum - Todao Ando (Preston,2010:online. Adapted By author).

Figure 85. Benesse House Museum - Todao Ando (Martin,2020:online. Adapted by author).

### Intentional ruin

The process of designing a structure with some elements that fade away over time, and others that last during ruin. Those elements that last over periods of ruin are planned in such a way that it can exist as an independent element in the distant future, not imposing on the landscape, but enhancing the phenomenological experience thereof.

To achieve the care instilling effect, the intentional ruin needs to be planned carefully in order to enhance the dweller's experience in the present (when the building is operating) and in the future (when only the ruin remains). This means that it needs to be positioned in such a way that it complements the site and its views without the physical spaces, and the physical spaces need to be placed along this intentional ruin in such a way that the spaces make sense in the present. The intentional ruin must function as a form of land art and in order to understand the way land art can enhance our phenomenological experience of a place, the work of Richard Serra will be analysed. More specifically the project of "Sea Level", one of his more obscure works (figure 82).

### Land Art

Sea level - Richard Serra
Lee Ufan Museum & Benesse House Museum – Todao Ando

Sea level is a work of art done by Richard Serra in 1996 in Zeewolde, Netherlands. It consists of two concrete walls built to the height of sea level that is on the other side of the dike. Out of context, the wall is extremely simple, but it still achieves some basic effects that can be seen in popular works of architecture like the Lee Ufan Museum, by Tadao Ando (figure 83-85). The placement of the walls has a big influence on your observation of the surrounding landscape. In both these examples, the placement of the walls is perpendicular to the slope of the site, this enables the wall to extenuate the slope and to give you a completely new perception of the site. Another significant result of the walls (seen in Benesse House Museum – Todao Ando) is its ability to enhance the view of a landscape by framing a specific view, placing the view in contrast with the walls. This contrast can also be created between the walls and the vegetation at its feet.

Exploring Richard Serra's land art and the land art-like work of Tadao Ando, it is clear that land art in the shape of a future ruin will be able to enhance the experience of the site, instilling an appreciation of Fynbos in the dwellers visiting the site in the years to come.

## Precedents

Youfangping Village Landscape Design (figure 86-87) and Hylla Cloud Nature Experience Centre (figure 88-90) were analysed to investigate how an intentional ruin can be integrated within a design. This building was not designed as future ruins but was identified as it presents the possibility. Both these projects make use of thick natural stone walls as the foundation for the lighter structure that rises from it. Using local rock has the ability to instantly make it more site-specific and natural, whilst it can be used for structure and insulation. Youfangping Village Landscape Design places the stone walls perpendicular to the contours, like Todao Ando, with the space reaching out to the vast mountain views like an ocean pier. The stone wall gives a welcoming materiality whilst it places the light structural system above in contrast to it, making it feel in harmony with nature through its porousness. Hylla Cloud Nature Experience Centre uses thick stone mounds to shape the spaces within and on the outside, supporting a natural roof structure that floats over it. These stone mounds are positioned in such a way that it blends the inside and outside into one space whilst providing shelter. This project is purposely designed as a nature appreciation site and achieves just that.

As seen in Figures 86 and 88, both these projects were deconstructed to show how the building might look if it has fallen into ruin. The findings are interesting and seemed to enhance the phenomenological experience of the place.

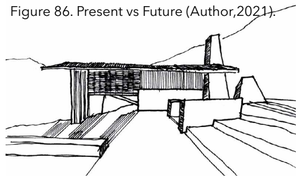
## Design Application

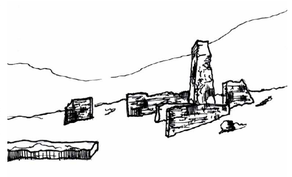
The Fynbos Centre will use natural stone walls to form an intentional ruin that can instil nature appreciation for years to come. It will use tactics learnt from the investigation of the above project to place the ruin in a way to frame the surrounding landscape whilst using it for structural and practical purposes. The walls (especially the ones moving towards the dam will accentuate the contours, frame the view towards the landscape, and support a biophilic designed timber structure that stretches to the water. The figures on the right-hand page show the intentional ruin in the present and the future.

## Conclusion

These theoretic approaches and examples can be used to inspire this dissertation from the start to the finish, ensuring that an applicable development is designed to create a symbiotic relationship between the dwellers and nature throughout the passage of time. Biophilic design and intentional ruins will drive this project and the choices made in order to enhance the phenomenological experience within the natural landscape, thus preserving fynbos.

Figure 86. Present vs Future (Author,2021).





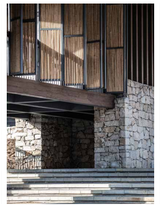
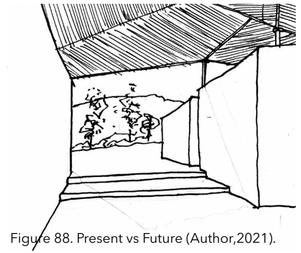


Figure 87.(ADEA, 2017: online)

Figure 88. Present vs Future (Author,2021).



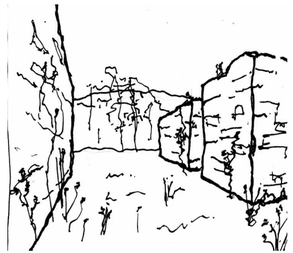


Figure 89. Stone walls (Shuang, 2020: online).

Figure 90.(Shuang, 2020: online)



Figure 91. View from interpretation centre (Author,2021).

Figure 92. View from interpretation centre after decay (Author,2021).

Figure 93. View from research facilities (Author,2021).

Figure 94. View from research facilities after decay (Author,2021).

# Precedents

## Youfangping Village Landscape Design

Architect: ADEA
Location: Xi'an, China
Year: 2017

### Site

Similar to the proposed site, Youfangping (a small village) is surrounded by numerous mountains and watersides, serving as a summer resort for a large number of people from the surrounding cities. However, through the seasons when tourists disappear, a problem arises. Most people are left behind and the labour force starts to drain dramatically.

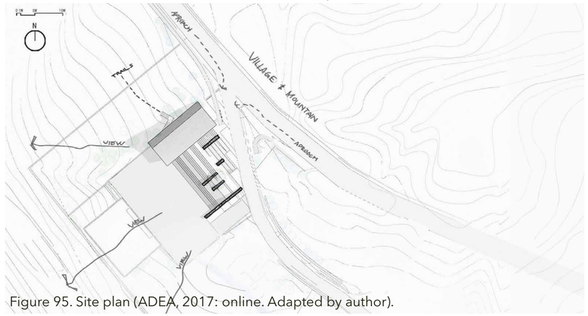



Figure 95. Site plan (ADEA, 2017: online. Adapted by author).

Figure 96. Birds' eye view (ADEA, 2017: online).

### Materiality

The façade of the pavilion is constructed with rough stone, rooting it into the mountain landscape, with steel structures mounted onto it. The thesis development will also seek to make use of natural stone from the area, creating strong mounds on which lighter structures can be mounted.

Figure 97. Side view (Author,2021).

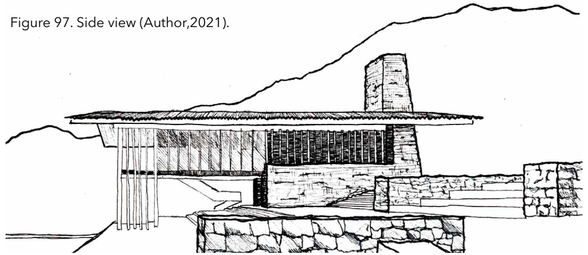


Figure 98. Landscaping (ADEA, 2017: online).

### Function

The design aims at providing villagers with a reason to return and arousing visitors' nostalgia (ADEA, 2017: online). They attempt this with functional public spaces for gathering and communications. Most of the development consists of open stone landscaping sloping over the site whilst a transparent semi-indoor structure is erected on the side, providing space for gathering and mountain viewing.



### Structure

The façade of the pavilion is constructed with rough stone, rooting it into the mountain landscape, with steel structures mounted onto it. The rear of the building is level with the ground whilst the front is lifted above the ground, providing a plinth for viewing as well as more cover underneath. On the side of the pavilion, a staircase connects it to the surrounding fields and trails, forming an interconnected system with the traditional village lifestyle. The pavilion makes use of traditional bamboo screens to create an adaptable semi-open connection between the pavilion and the square.

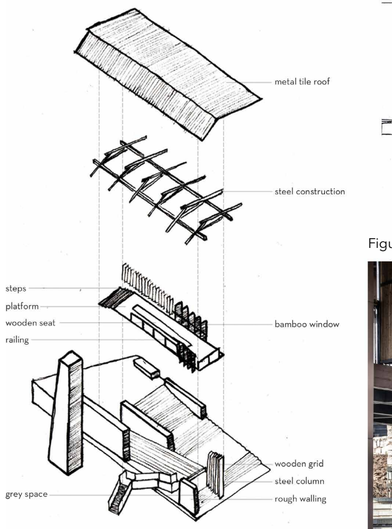



Figure 99. Exploded isometric (Author,2021).

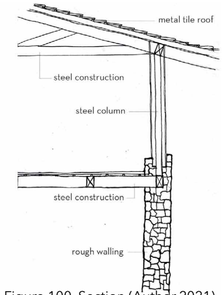



Figure 100. Section (Author,2021).

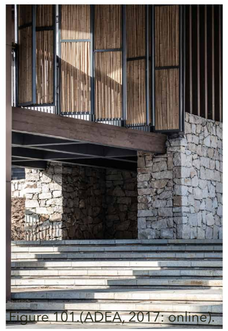


Figure 101.(ADEA, 2017: online).

### Theoretical Approach

In this project, one can see the potential for a future ruin. If the structural system is removed or dilapidated, the natural stone walls left behind will still provoke an appreciation of the landscape in the form of land-art. The stone walls will accentuate the slope of the site, and when the dweller is amongst it, it will frame the landscape in a dramatic/romantic manner.
To achieve this effect in the thesis, modular systems will be used, supported by natural stone walls framing the landscape and creating a future ruin in the form of land art.

Figure 102. Present vs future (Author,2021).

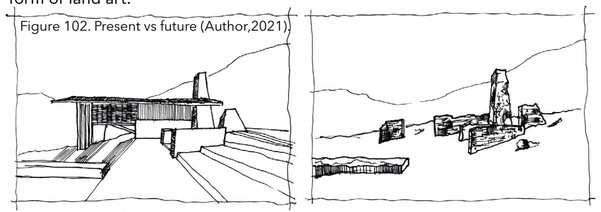
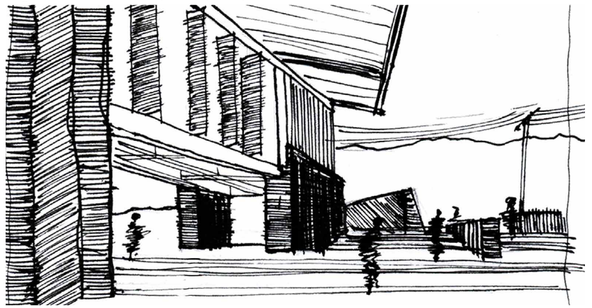


Figure 103. Perspective (Author,2021).



### Conclusion

This thesis will use the Youfangping Village Landscape Design in terms of materiality, but mainly for formgiving and the theory of ruin ecology. The way the natural stone walls lay on the site and how the enclosure may deteriorate will provoke an appreciation of the landscape for centuries.

# Hylla Cloud Nature Experience Center

Architect: gad
Location: Lijiang, China
Year: 2020

## Site

The Cloud centre, also known as the “Red House”, is located on a moderate slope leading up to Mount Zhishan. Its views look up into the mountains on the outside and the other, it overlooks the village and countryside (Shuang, 2020: online).

Figure 104. Entrance view (Shuang, 2020: online).

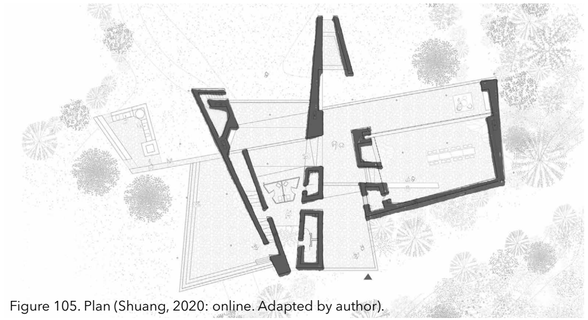


Figure 105. Plan (Shuang, 2020: online. Adapted by author).

## Function

In contrast with the traditional buildings, the “red house” has no present rules for its use. The architect believes that the user should be able to decide the buildings use. The boundary between the spaces and nature are blurred, allowing the users to choose how they want to view nature. The building was designed with a better view of the mountains in mind, saying “how can I photograph the mountains better?” (Shuang,2020: online). The building only separates the resting, activity, bathing and storage rooms from each other, allowing the user to do with it what they prefer. The lounge area can be used as a bar, venue, retail centre or café, all depending on your needs.

Figure 106. View (Shuang, 2020: online).

Figure 107. Inside-outside space (Shuang, 2020: online).

## Theoretical Approach

In this project, one can see the potential for an [un] intentional. If the structural system is removed or dilapidated, the natural stone walls left behind will still provoke an appreciation of the landscape in the form of land-art.

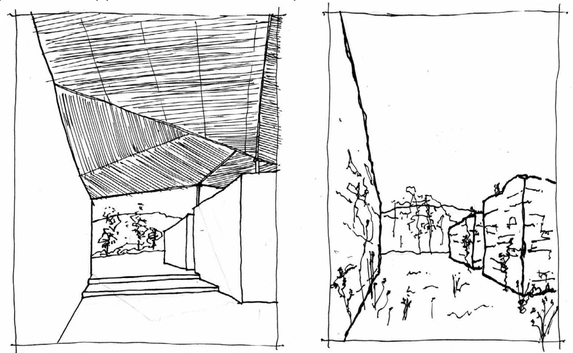


Figure 108. Present vs future (Author,2021).



## Materials

The floors and walls all consist of a red natural stone, only produced in the region. It forms a strong contrast with the view of the wild landscape, with a timber roof hovering over the spaces, supported by a steel structure. The architects took local materials and made something that is not local. In the end, the architect used simple materials and unsophisticated methods to make it a modern building that conforms to the local spirit, interacts with nature, and has a sense of design and feel (Shuang, 2020: online).

Figure 109. Circution (Shuang, 2020: online).

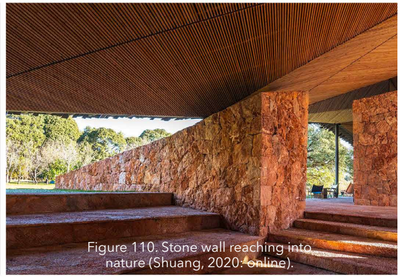


Figure 110. Stone wall reaching into nature (Shuang, 2020: online).

Figure 120. View of open facade (Shuang, 2020: online).

## Structure

The thick walls and floor are both constructed with local red stone, with well-articulated steel columns scattered around to support the random-shaped roof structure. The roof structure is formed with purpose-made steel beams, supporting timber ceiling insulation, waterproofing and timber chips used as cover.

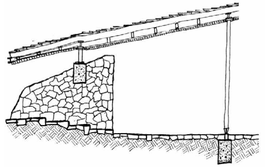


Figure 121. Section (Author,2021).

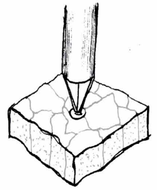


Figure 122. Column articulation (Author,2021).

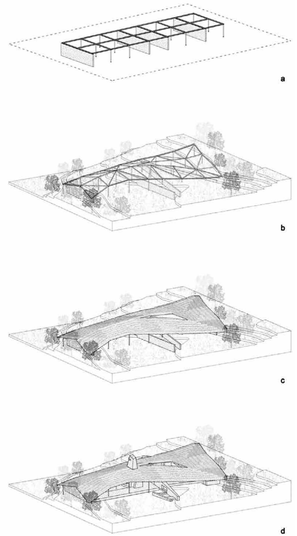



Figure 123. Structure isometric (Shuang, 2020: online).

## Conclusion

The materiality and the inside-outside threshold of this project will apply in the thesis project, with the thick stone walls providing protection, materiality and framing the landscape using local materials. The thick walls of this project will also enhance the experience of the user after it is dilapidated.

# Kogelberg Cabins

Architect: KLG Architects
Location: Kleinmond South Africa
Year: 2020

## Site

Located in the Kogelberg nature reserve, this site is very similar to the thesis site, surrounded by spectacular landscape and fynbos.

## Function

The design seeks to present the visitors with an overnight cabin that connects them with nature. Each opens up to its own private view with porous facades blending with the plant growth.

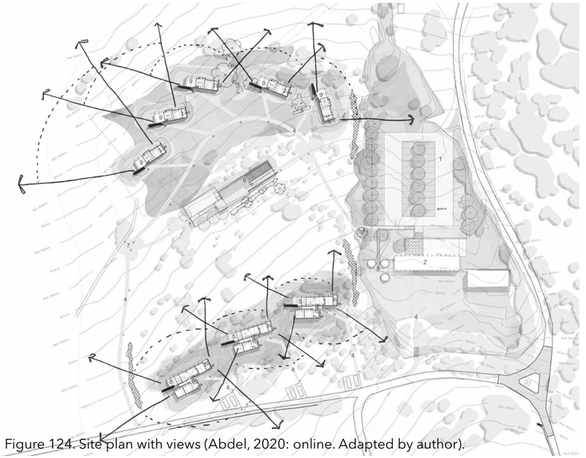


Figure 124. Site plan with views (Abdel, 2020: online. Adapted by author).

## Theoretical Approach

The Kogelberg makes use of a biophilic design approach to enhance the user's experience of nature and also to ensure the development is as sensitive as possible. Timber shading devices (figure 128) gives dynamic light, changing through the day whilst natural pools and ponds (figure 125 and 130) are constantly running in the background, attracting all kinds of animals and birds. Large sliding doors enable the dwellers to drag nature inside with the fynbos at the building's feet whilst providing panoramic views of the mountains.

Figure 125. Natural pool (Abdel, 2020: online).

Figure 126. View into landscape (Abdel, 2020: online).



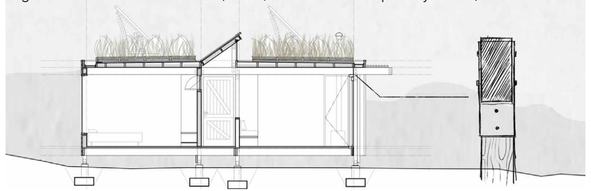
## Structure

Pine was used as it is lightweight and fade to the colour of the landscape over time. The cabins and the walkways are raised from the ground to limit the impact on the fynbos, insects and snakes. The cabins are insulated with high grade insulation and makes use of thick gabion walls for thermal cooling and insulation. The structure is a simple column beam structure that makes for easy construction and gives a sense of lightness on the landscape.

Figure 127. Section (Abdel, 2020: online).

Figure 128. Gabion wall with tectonic shading (Abdel, 2020: online).

Figure 129. Section and structure (Abdel, 2020: online. Adapted by author).



## Sustainability

Indigenous grass species is planted on the roof, making use of roof trays that allows for easy maintenance whilst providing thermal qualities. The planted roof trays make for a softer roof line in contrast to the surrounding mountains whilst making the building almost disappear from a higher perspective. Then they also make use of enviro-loos to lower water usage and each cabin has its own solar panels.

Figure 130. Planted roofs (Abdel, 2020: online).

Figure 131. Side elevation (Abdel, 2020: online).

## Conclusion

This project can be used for many reasons in the thesis as it is in a similar context and provides many examples of biophilic design with the construction solutions to achieve them. It is also a good example of a off grid system that might also be implemented in the Fynbos Interpretation and Regeneration Centre.

# PART FOUR

## DESIGN SYNTHESIS

Part four will show the process of the design from the first reactions to the final design outcome. The design will react on the theoretical stances whilst providing all the necessary accommodations.

To simplify the essence design approach, a new intentional ruin in the form of heavy, permanent, stereotomic walls and light timber structures must be developed, integrated with the existing ruin, to enhance the phenomenological experience.

# Accommodation List

| | |
|---|---|
| **Reception** | **85m²** |
| **Fynbos Shop** | **90m²** |
| Storage | 14m² |
| **Guide's Office** | **160m²** |
| Office | 12.5m² |
| Office/lounge | 19m² |
| Storage | 13m² |
| Boardroom | 35m² |
| Meeting space | 60m² |
| **Research Facilities** | **225m²** |
| Lab | 100m² |
| Office | 93m² |
| Bathroom | 10.5m² |
| Storage | 10.5m² |
| **Interpretation Space** | **350m²** |
| Space 1 | 90m² |
| Space 2 | 80m² |
| Space 3 | 110m² |
| **Restaurant** | **680m²** |
| reception | 20m² |
| Dining | 200m² |
| Lounge | 40m² |
| Bar | 26m² |
| Cellar | 6m² |
| Male wc | 12m² |
| Female wc | 12m² |
| Kitchen | 150m² |
| Dry storage | 10m² |
| Cold storage | 10m² |
| Office | 5.5m² |
| Staff wc and lockers | 16m² |
| Kantine | 13m² |
| Service yard | 210m² |
| **Ablution** | **80m²** |
| Mens | 36m² |
| Ladies | 34m² |
| Sauna | 5m² |
| Massage room | 7m² |

Figure 132. Conceptual collage (Author, 2021).

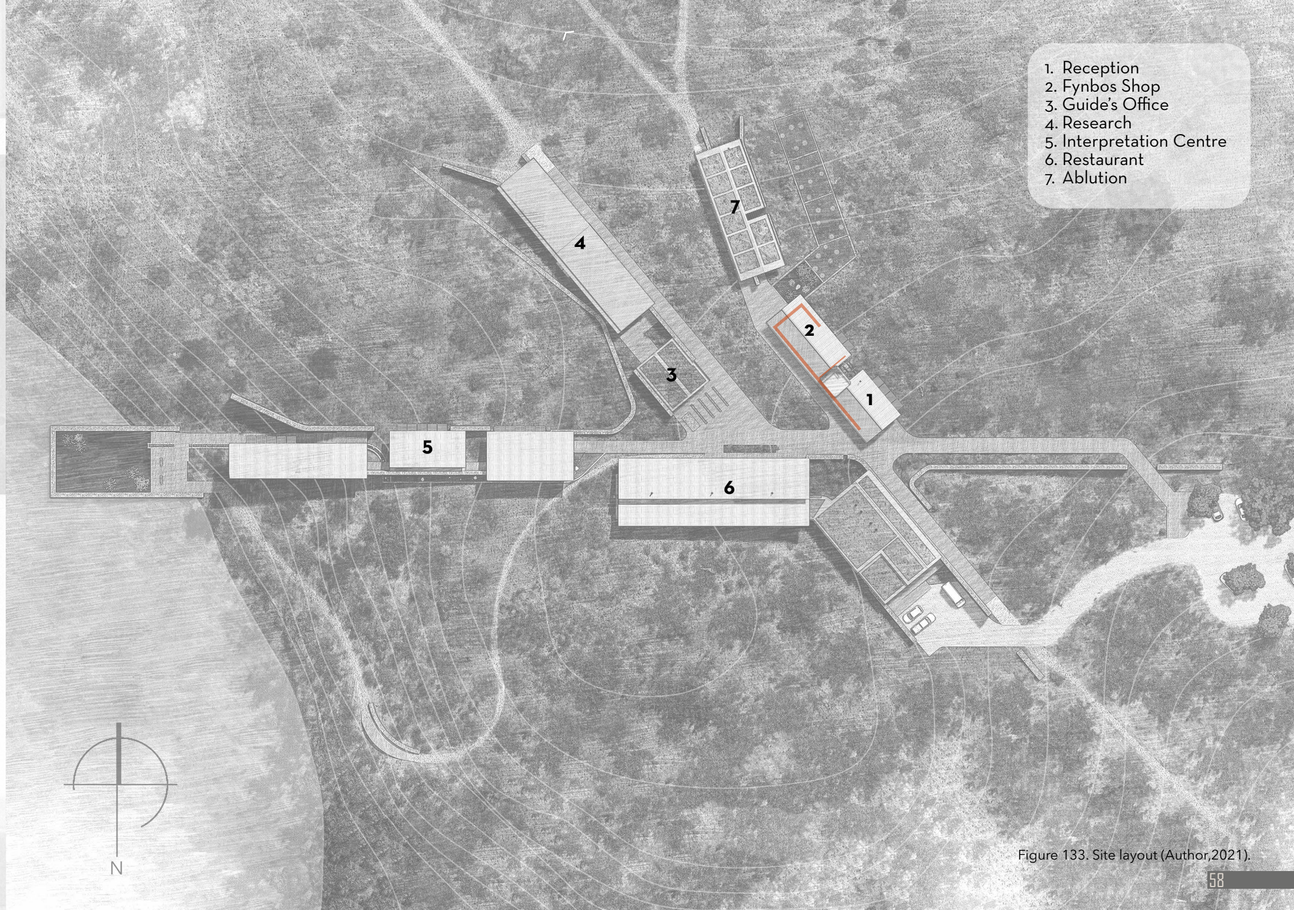



Figure 133. Site layout (Author,2021).

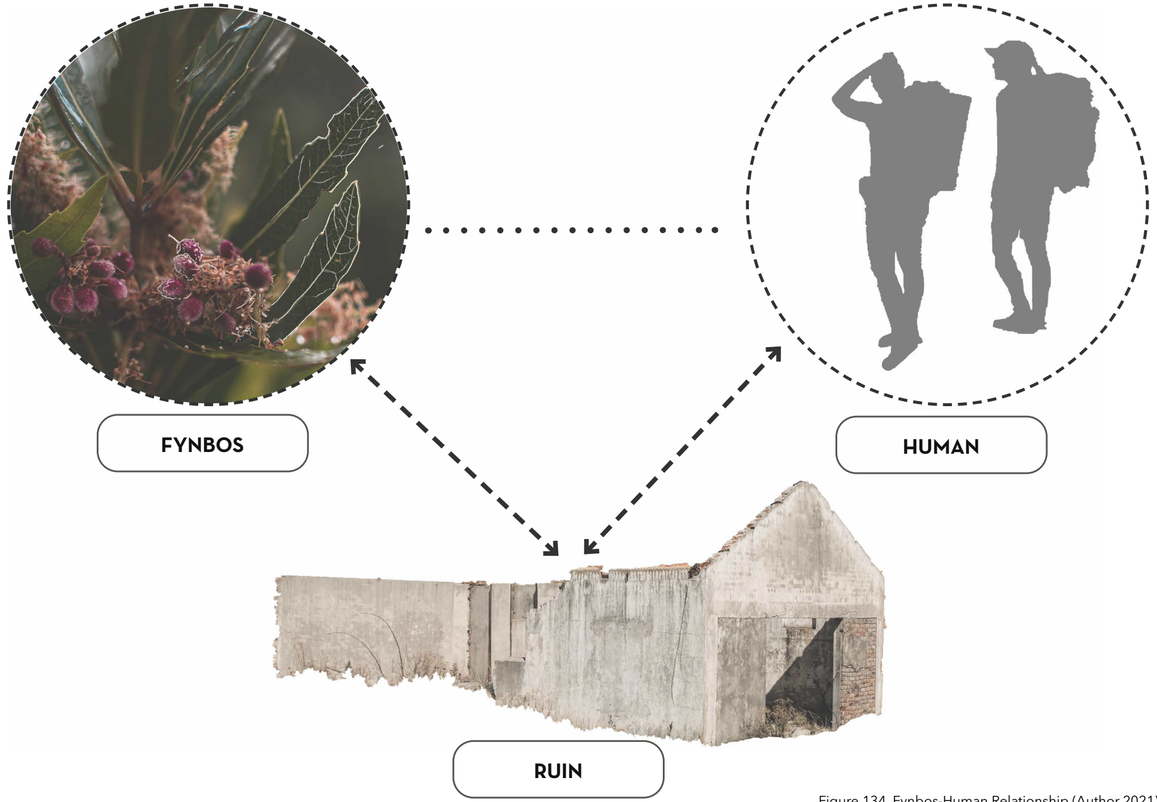



Figure 134. Fynbos-Human Relationship (Author,2021).



INSPIRE CONSERVATION

INTERPRETATION SPACES

PHYSICAL CONSERVATION

RESEARCH FACILITIES

RESERVE RANGERS

RAISE FUNDS

HIKING TRAILS

GUIDED TOURS

MTB TRAILS

FYNBOS SHOP

RESTAURANT

FYNBOS PICKING

Figure 135. Function (Google earth, 2021: online. Adapted by author).

# Design Development

The first reactions to the site were to investigate how the connection between the existing ruin and the new development will be handled. The existing ruin will be kept intact exactly as it is, whilst adding a new structure within it (possibly the entrance or a point of hierarchy). Then the intentional ruin's position on the site was experimented with, using it to frame different views of the surrounding landscape and nature at its feet. Two main axes was then determined, one moving from east to west directly between the ruin and the dam, and the other parallel to the ruin serving as the start and finish lines of the different hiking and biking trails.

It was decided that the spaces will be timber structures lifted from the ground, supported by the stone walls (intentional ruins) and concrete footings, that can be removed in the distant future if needed (figures 142-144). There was then experimented with different formgivings (figure 145) that take inspiration from the vernacular Cape Dutch styles. It was then decided that these forms are too harsh for the natural landscape and that a tectonic timber structure will be more sensitive and adaptable to the natural surroundings and climate.

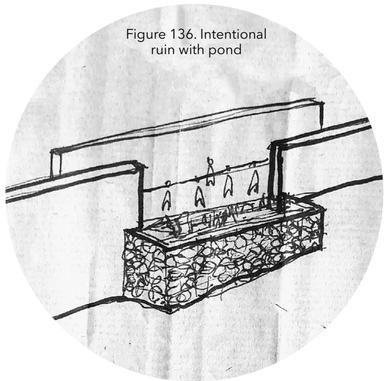


Figure 136. Intentional ruin with pond

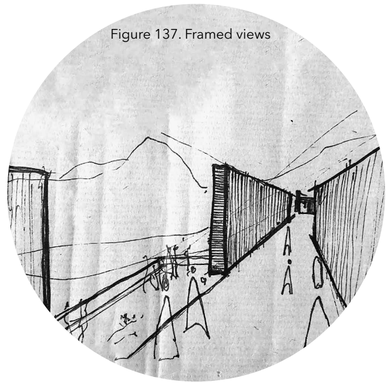


Figure 137. Framed views

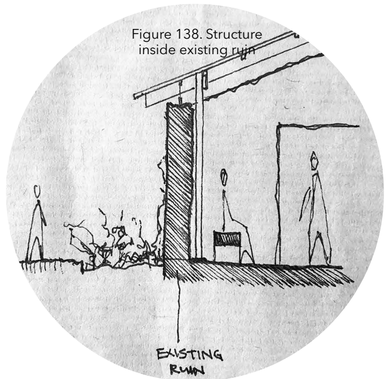



Figure 138. Structure inside existing ruin

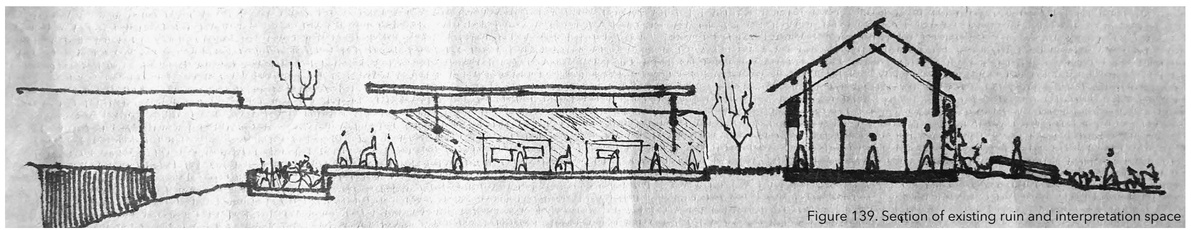


Figure 139. Section of existing ruin and interpretation space



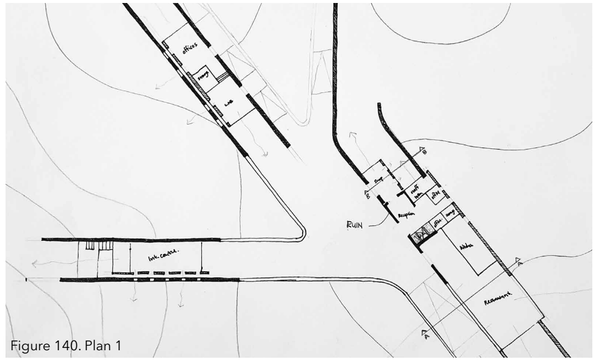



Figure 140. Plan 1

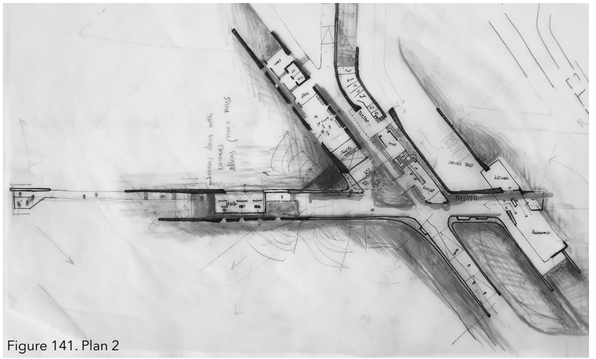


Figure 141. Plan 2

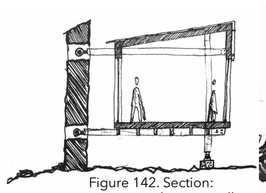


Figure 142. Section: connection with stone wall

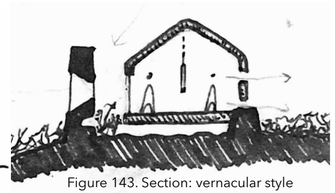


Figure 143. Section: vernacular style

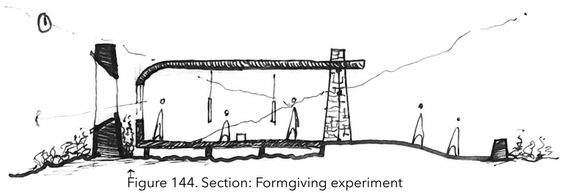


Figure 144. Section: Formgiving experiment

Figure 145. Formgiving experimentations

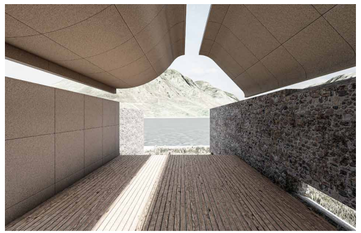


Figure 146. Connections with nature

The plan was then shifted to create an axis from the entrance straight towards the dam where the interpretation centre reaches over the water, creating an architectural promenade through it. The eco-tourism and research facilities are then attached to this axis, parallel to the existing ruin.

The type of structure used was then also determined, using strong timber column-beam structure on piles, with a lighter timber roof structure and screens. This allows the spaces to be adaptable to the climate whilst being sensitive to the surrounding plant growth.

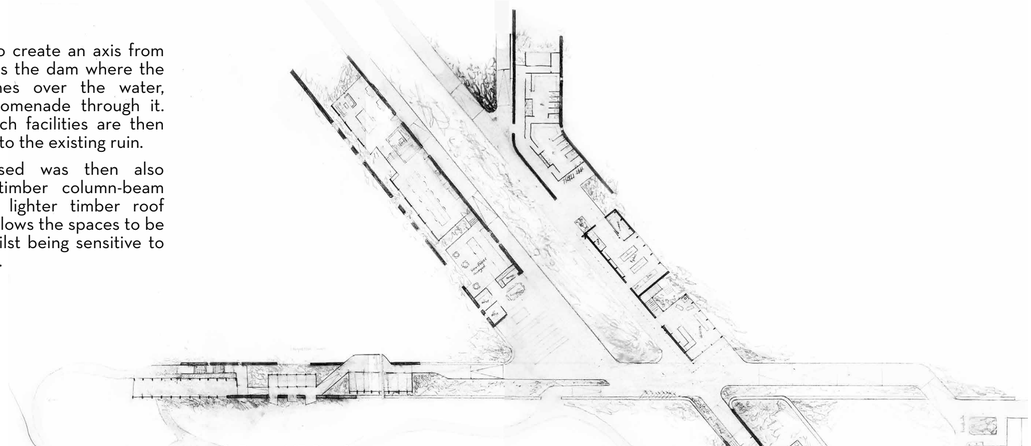


Figure 147. Plan 3

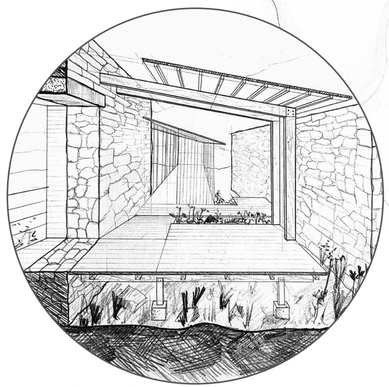


Figure 148. Interpretation centre section

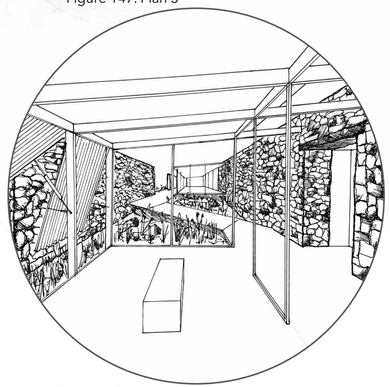


Figure 149. Interpretation centre perspective

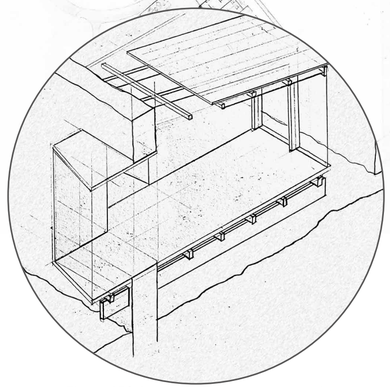


Figure 150. Interpretation centre isometric



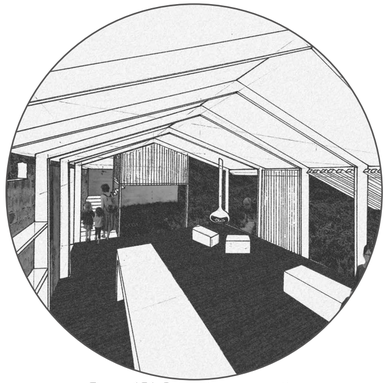


Figure 151. Reception perspective

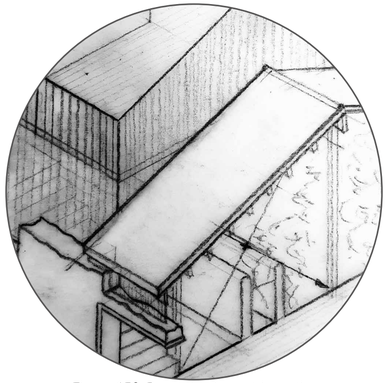


Figure 152. Reception isometric section

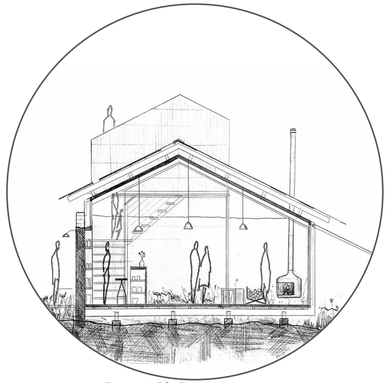


Figure 153. Reception section

Figure 154. Model: interpretation centre

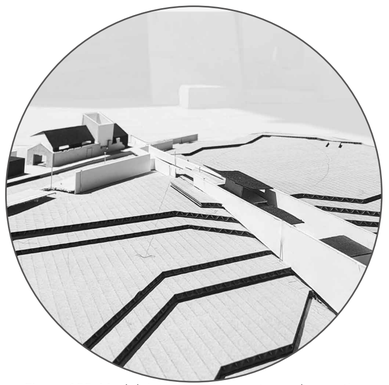


Figure 155. Model: interpretation centre and reception

Figure 156. Model: reception and walkway

Before the spaces were developed further, the intentional ruin was placed on the site to determine if it sits right and will be able to function as its own entity. This also made it clear that the walkways need to be adaptable to the site in order to move through it without cutting the earth. It was also decided that the walls will rather be tapered to the top, making it seem more sensitive whilst still giving the wanted effect.

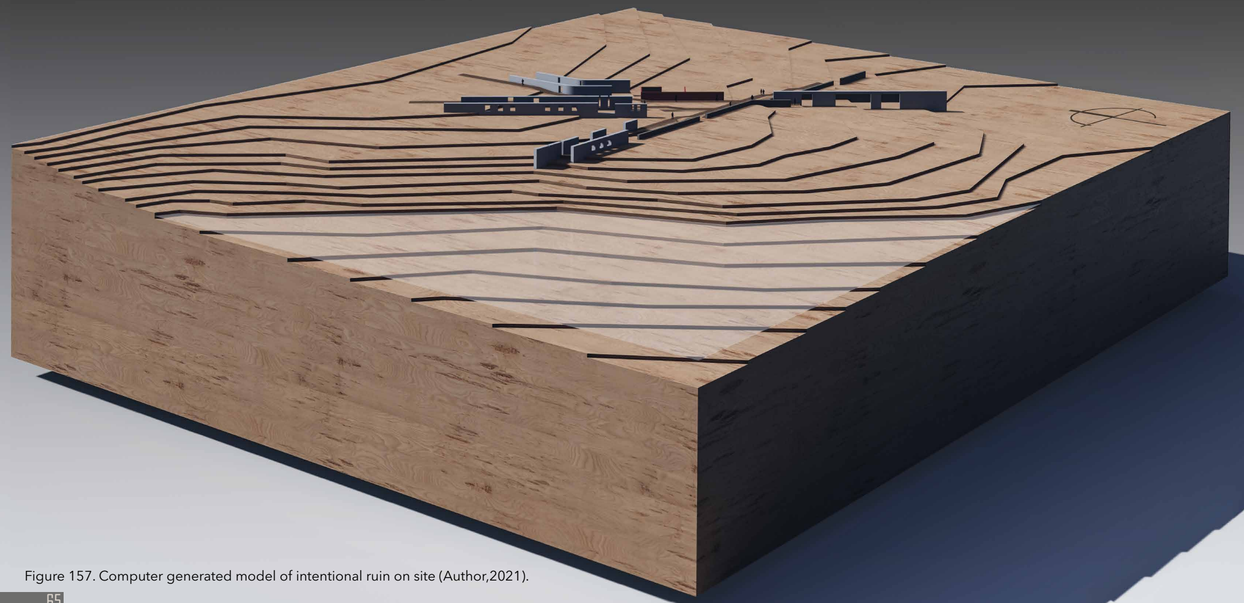


Figure 157. Computer generated model of intentional ruin on site (Author,2021).



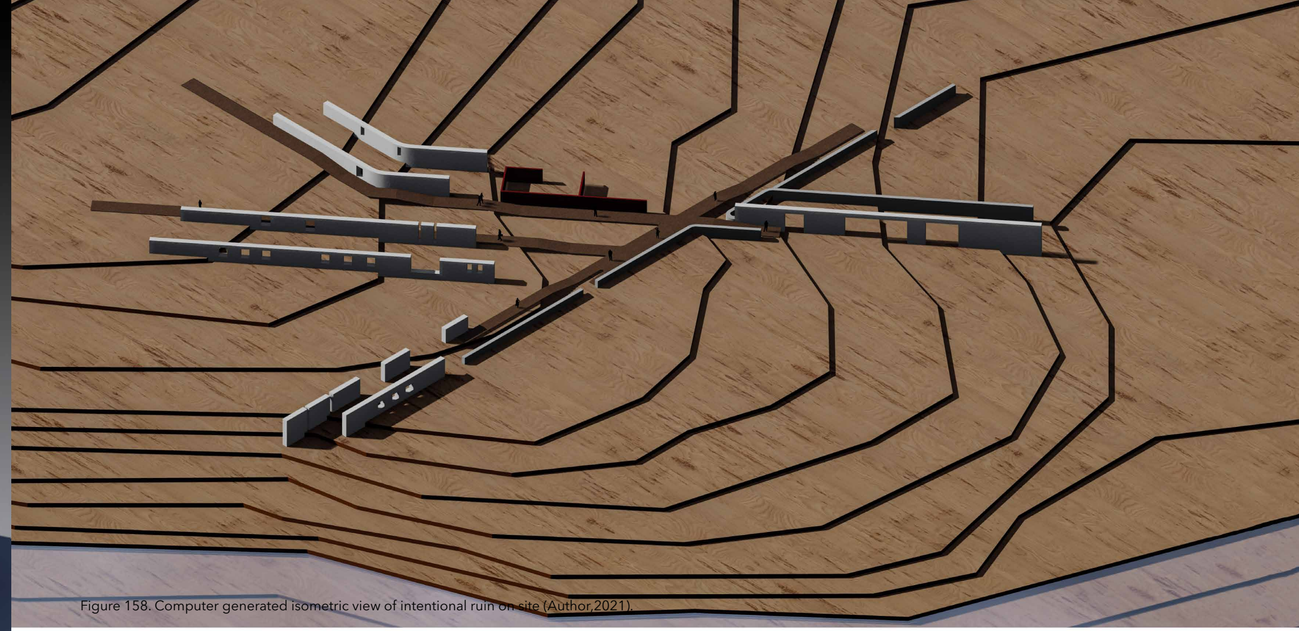


Figure 158. Computer generated isometric view of intentional ruin on site (Author,2021).

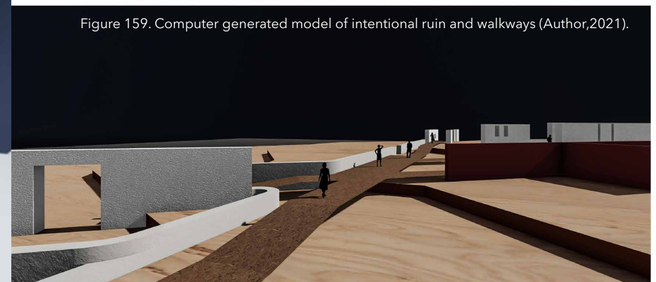


Figure 159. Computer generated model of intentional ruin and walkways (Author,2021).

Figure 160. Computer generated model of intentional ruin and walkway on site (Author,2021).

The walkways are a very important aspect of the development as they will be the binding element and must be used as a tool to enhance the experience of fynbos and the surrounding landscape. The walkways will consist of a simple timber boardwalk that hovers over the fynbos, and weaves between the intentional ruin and the spaces, providing views in every direction. In some places, the walkway will be supported by the stone wall whilst placing the fynbos between the walkway and the wall in other places. Where the boardwalk meets the trails, there is a cobblestone threshold that maintains a consistent connection between the two.

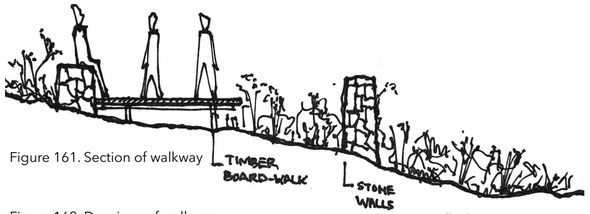



Figure 161. Section of walkway

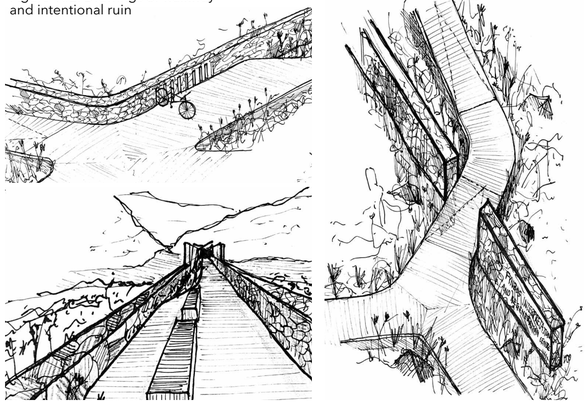


Figure 162. Drawings of walkway and intentional ruin

Figure 163. Isometric render of walkway-trail transition (Author,2021).

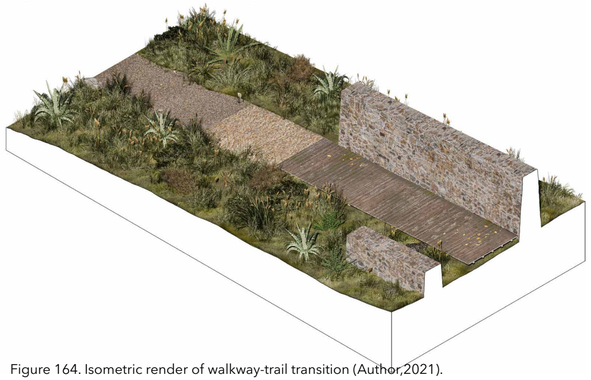


Figure 164. Isometric render of walkway-trail transition (Author,2021).



Figure 165. Section render of walkway-trail transition (Author,2021).

Figure 166. Render of walkway-trail transition (Author,2021).

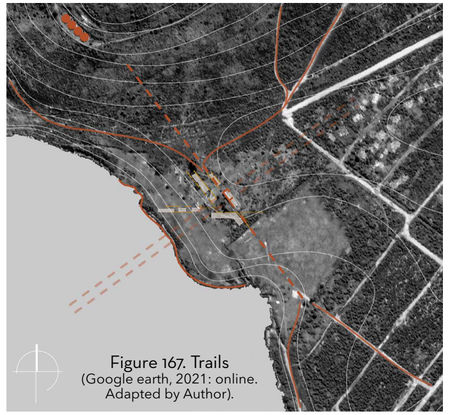


Figure 167. Trails
(Google earth, 2021: online. Adapted by Author).

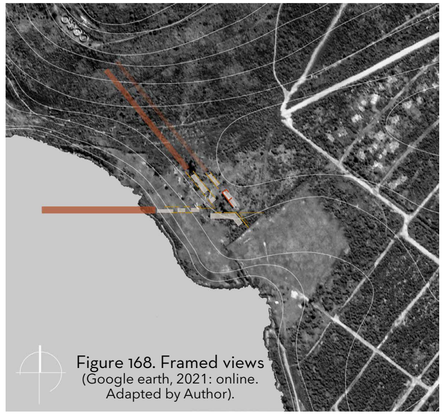


Figure 168. Framed views
(Google earth, 2021: online. Adapted by Author).

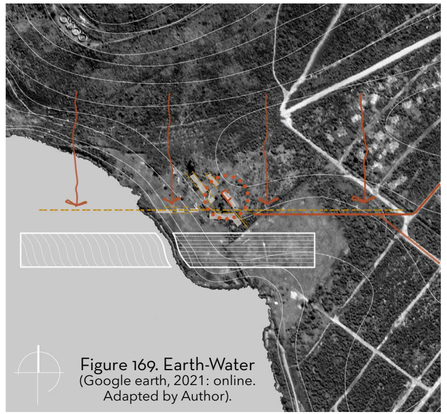


Figure 169. Earth-Water
(Google earth, 2021: online. Adapted by Author).

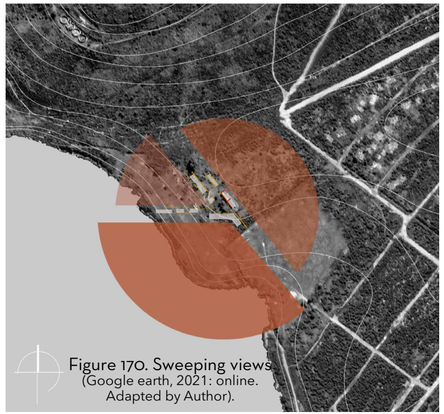


Figure 170. Sweeping views
(Google earth, 2021: online. Adapted by Author).



As the layout of the development was still lacking in some areas and unjustified in other, the influential elements on site were analysed to determine the ideal layout. The only physical object on the site is the existing ruin. It is positioned 50 degrees of the north axis, with its two points, pointing towards the hiking and biking trails. This axis was then claimed to contain the eco-tourism functions as well as the research facilities. This axis is then linked to an East-West axis, running straight from the entrance, past the existing ruin, through the interpretation spaces towards the dam. This axis can be seen as the goal of achieving nature conservation, served by the other axis to achieve success.

As this axis moves towards the dam, the intentional ruin walls are accentuated by the dropping contours, like the work of Richard Serra and Todao Ando. This radial plan with the existing ruin at its centre presents sweeping views in some directions whilst the points reaching out into nature will frame other views. It also allows the fynbos to reach into the development, including it in every space. From a practical standpoint, the east-west axis minimises the western sunlight whilst still providing spectacular views. This axis is also ideal for the placement of solar panels. The north-south axis incorporates the ruin into the development, allowing the hiking trails to run along with it.

Figure 171. Layout model (Author,2021).

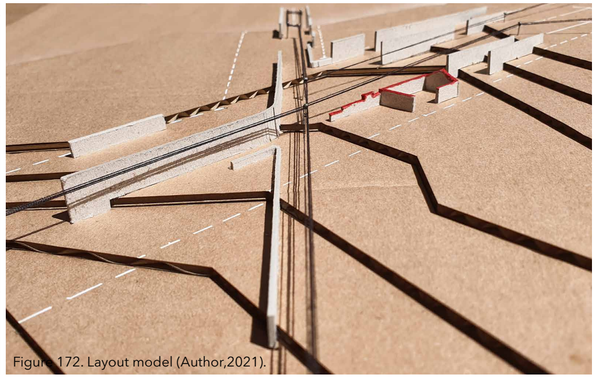


Figure 172. Layout model (Author,2021).

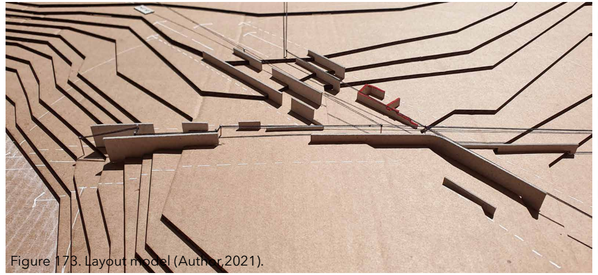


Figure 173. Layout model (Author,2021).

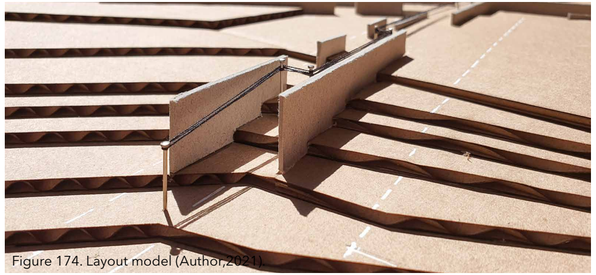


Figure 174. Layout model (Author,2021).

Figure 175. Plan 4 with fynbos landscaping

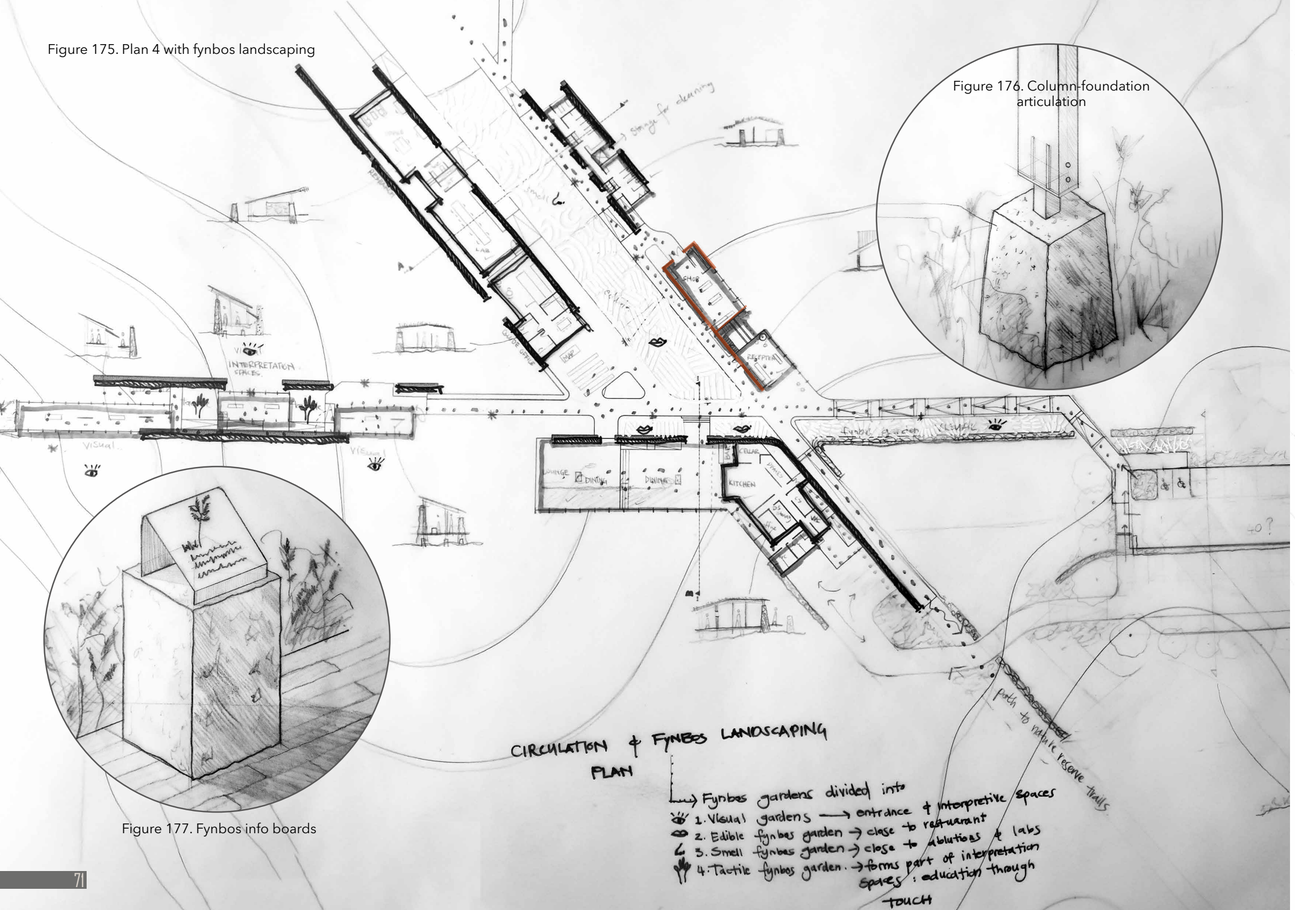



Figure 176. Column-foundation articulation



Figure 177. Fynbos info boards



Figure 178. Roof plan with formgivings

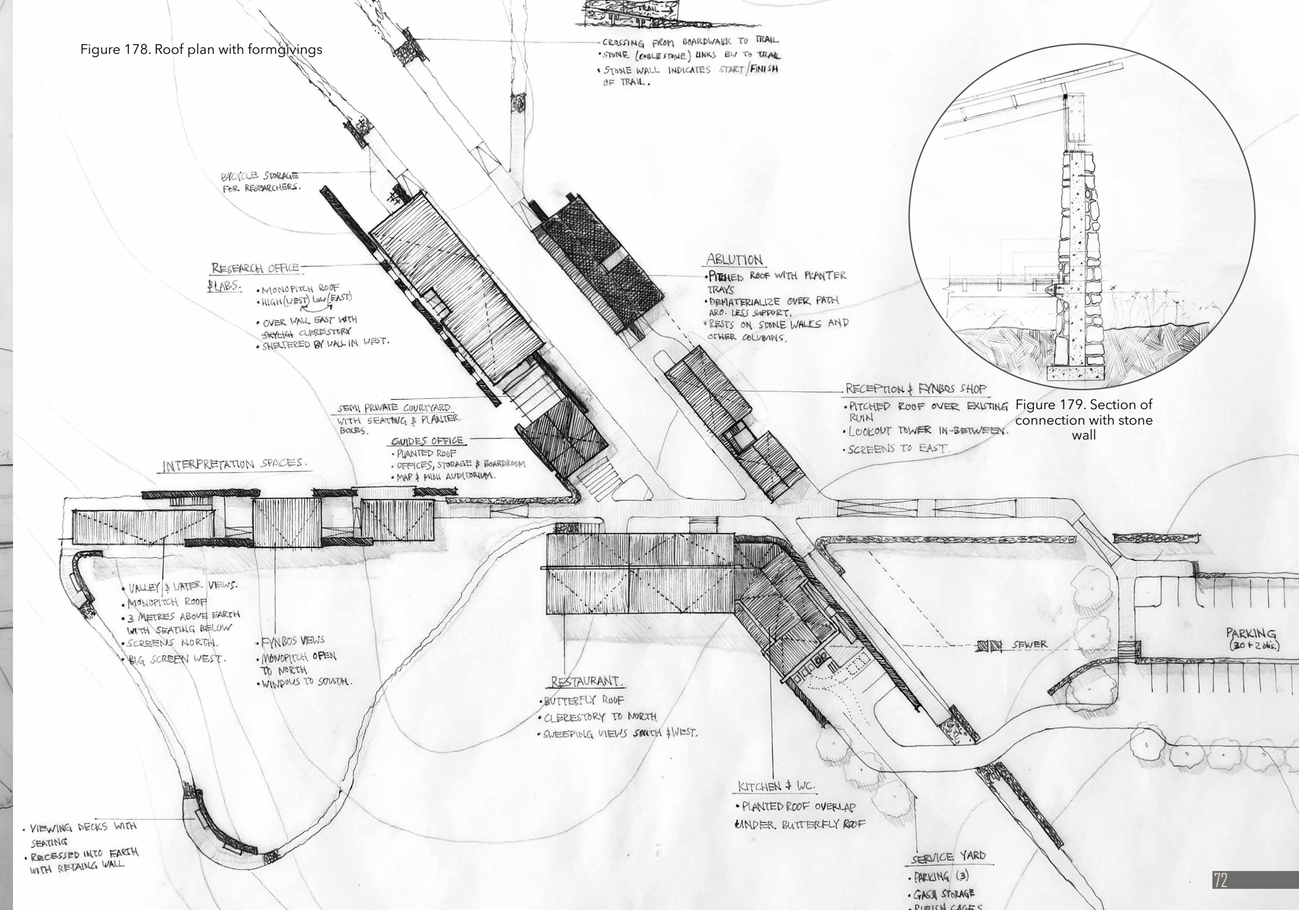
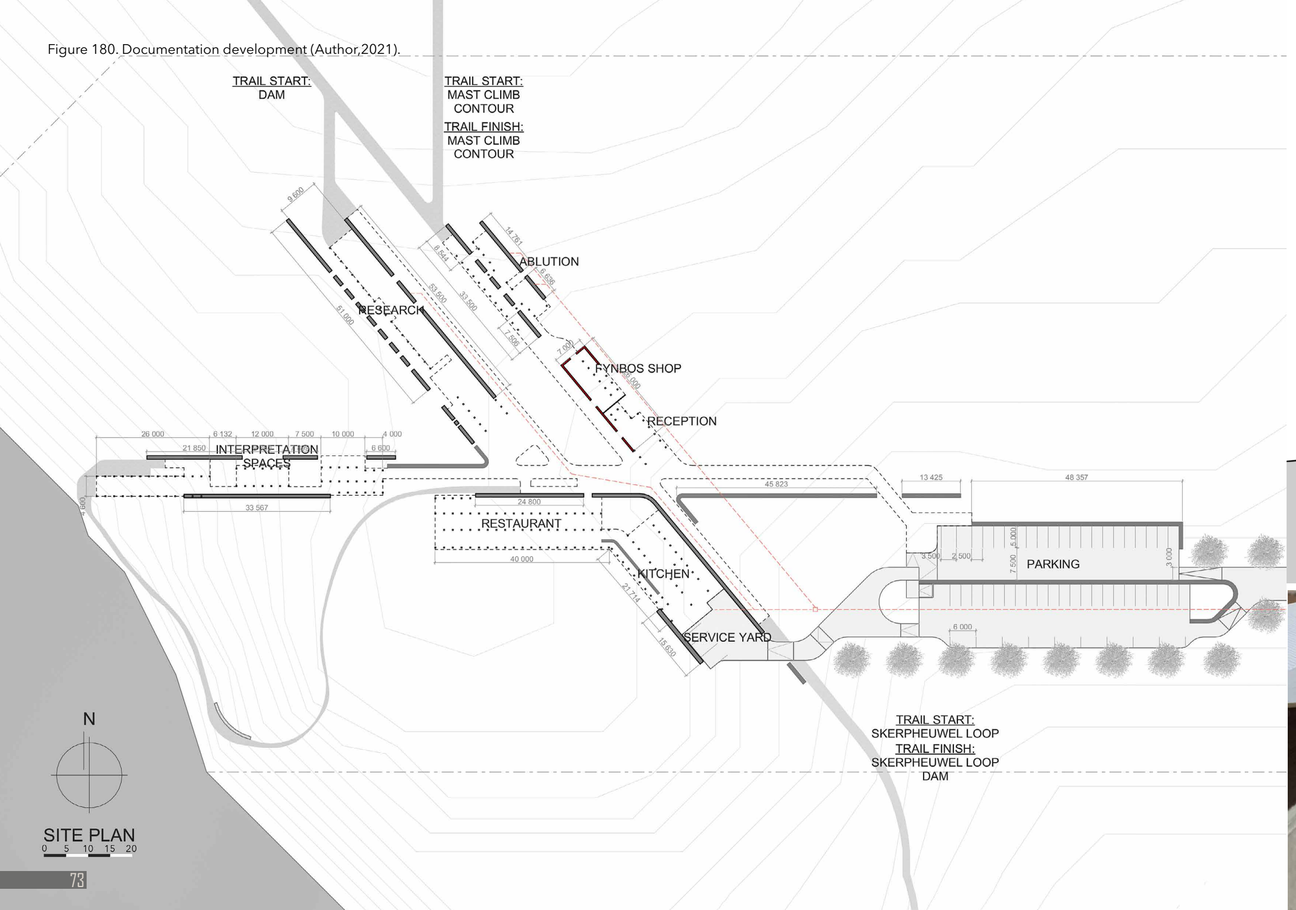



Figure 179. Section of connection with stone wall

Figure 180. Documentation development (Author,2021).





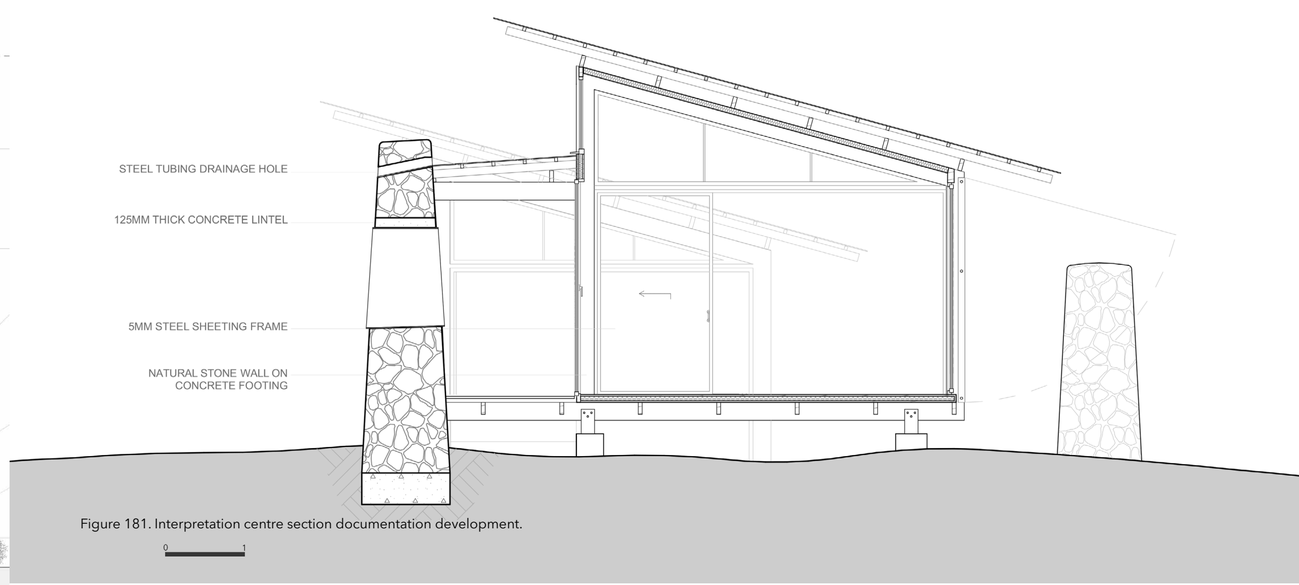




Figure 181. Interpretation centre section documentation development.

0 1

Figure 182. Model

Figure 183. Model: Interpretation space


Figure 184. Section: Research office and Ablution documentation development

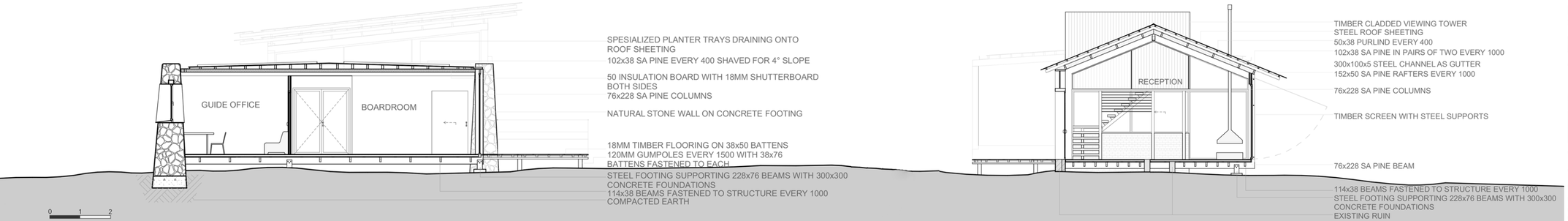



Figure 185. Section: Guide office and Reception documentation development



Figure 186.(Author,2021).

Figure 187.(Author,2021).

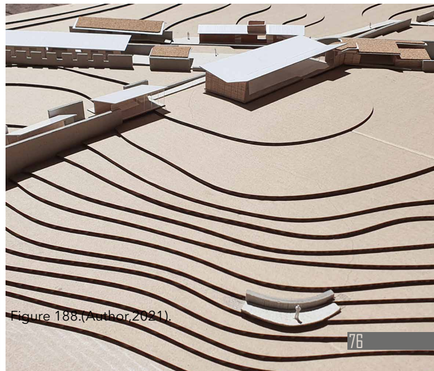


Figure 188.(Author,2021).

Figure 189. Reception and Restaurant

Figure 190. Restaurant

Figure 191. Render: Interpretation centre

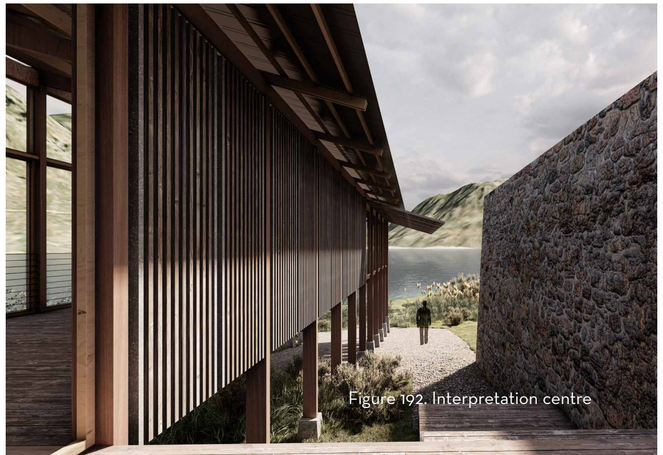


Figure 192. Interpretation centre



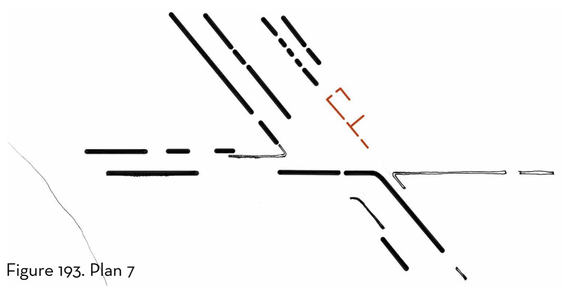


Figure 193. Plan 7

The intentional ruin consists of straight stone walls that accentuate the natural landscape and frame different views, but how can it be developed further to be less rigid whilst still enhancing the dweller's experience.

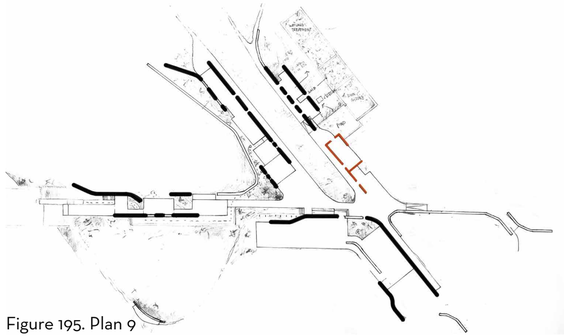


Figure 195. Plan 9

As the first attempts at a more curved approach seemed a bit extravagant, some of the curves and angles were simplified slightly. A water system was also incorporated for sustainability and biophilic design reasons with a natural 'tide' pool connecting the development with the dam. For the next step, to open the centre of the development more to nature and provide better views, the ablution was tilted slightly away from the research facilities.

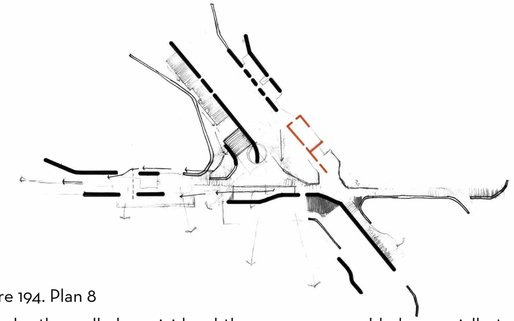


Figure 194. Plan 8

To make the walls less rigid, subtle curves were added, especially to the endpoints. This allows the spaces to open up to the landscape, making for better views. The inside corners were also changed from a simple radius into two different curves. This makes it look less forced.

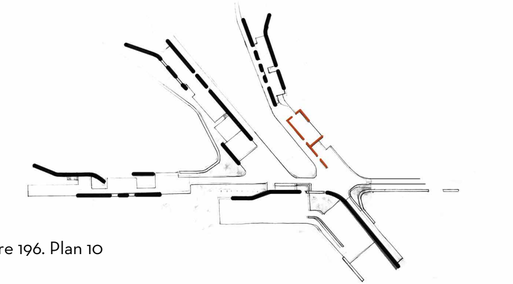


Figure 196. Plan 10

Conclusion

This development guided the design in the right direction through many trials and errors. The final design will be shown next, whereafter a technical synthesis will follow, explaining the more practical and technical aspects.

# Final Design

This is the final design for the Fynbos Interpretation and Regeneration Centre planned next to the Berg River Dam in Franschhoek, Western Cape, South Africa.

Figure 197. Interpretation Centre and Tide Pool



Figure 198. Site Plan

1. Entrance
2. Reception
3. Fynbos Shop
4. Restaurant
5. Kitchen
6. Research Lab
7. Research Office
8. Guide's Office
9. Interpretation Centre
10. Ablution
11. Parking
12. Service Yard
13. Water Treatment
14. Dam
15. Tide Pool

N

Figure 199. Proposed Development



Figure 200. Future Ruin

Figure 201. Proposed Development (view from south)



Figure 202. Proposed Development (view from northern hill)


Figure 203



Figure 204. Entrance View of Reception

Figure 205. Reception



Figure 206. Fynbos Shop (existing ruin) and Natural Pond

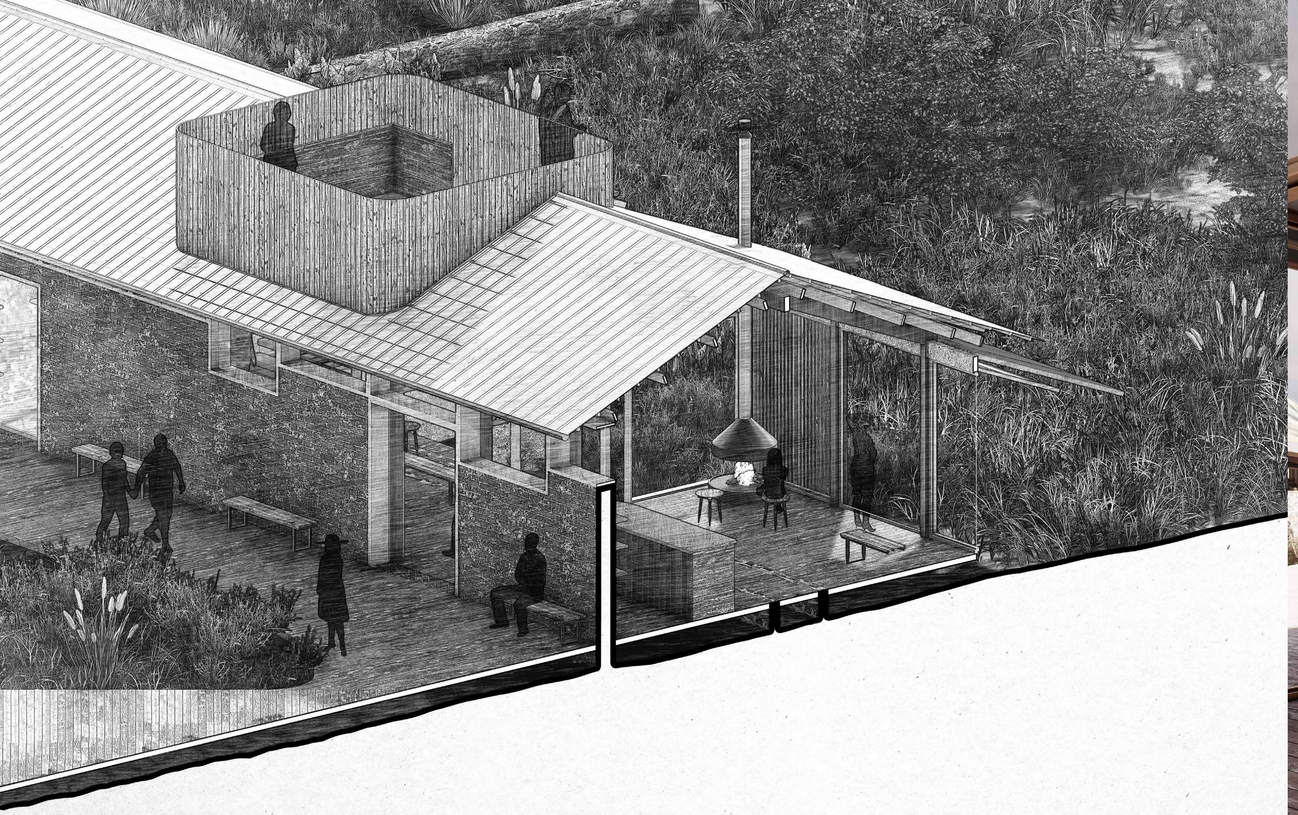


Figure 207. Reception Section AA



Figure 208. Reception

Figure 209. Reception Viewing Tower Section BB



Figure 210. Viewing Tower and Fynbos Shop


Figure 211.

N

INTERPRETATION SPACES
GROUND FLOOR PLAN

10 METERS

1. Interpretation space 1
2. Interpretation space 2
3. Interpretation space 3
4. Tide pool
5. Restaurant
6. Guide's office

Figure 212. Interpretation Space 3 Section DD



Figure 213. Interpretation Centre and Tide Pool

Figure 214. Interpretation Space 3 and Tide Pool

Figure 215. Interpretation Space  3

Figure 216. Interpretation Space 3

Figure 217. Interpretation Space 2

Figure 218. Interpretation Space  2 and 3 Section EE

Figure 219. Interpretation Space 1 and Restaurant



Figure 220. Interpretation Space 1

NORTH ELEVATION OF INTERPRETATION SPACES Figure 221.

2 METERS

SOUTH ELEVATION OF INTERPRETATION SPACES Figure 222.

2 METERS

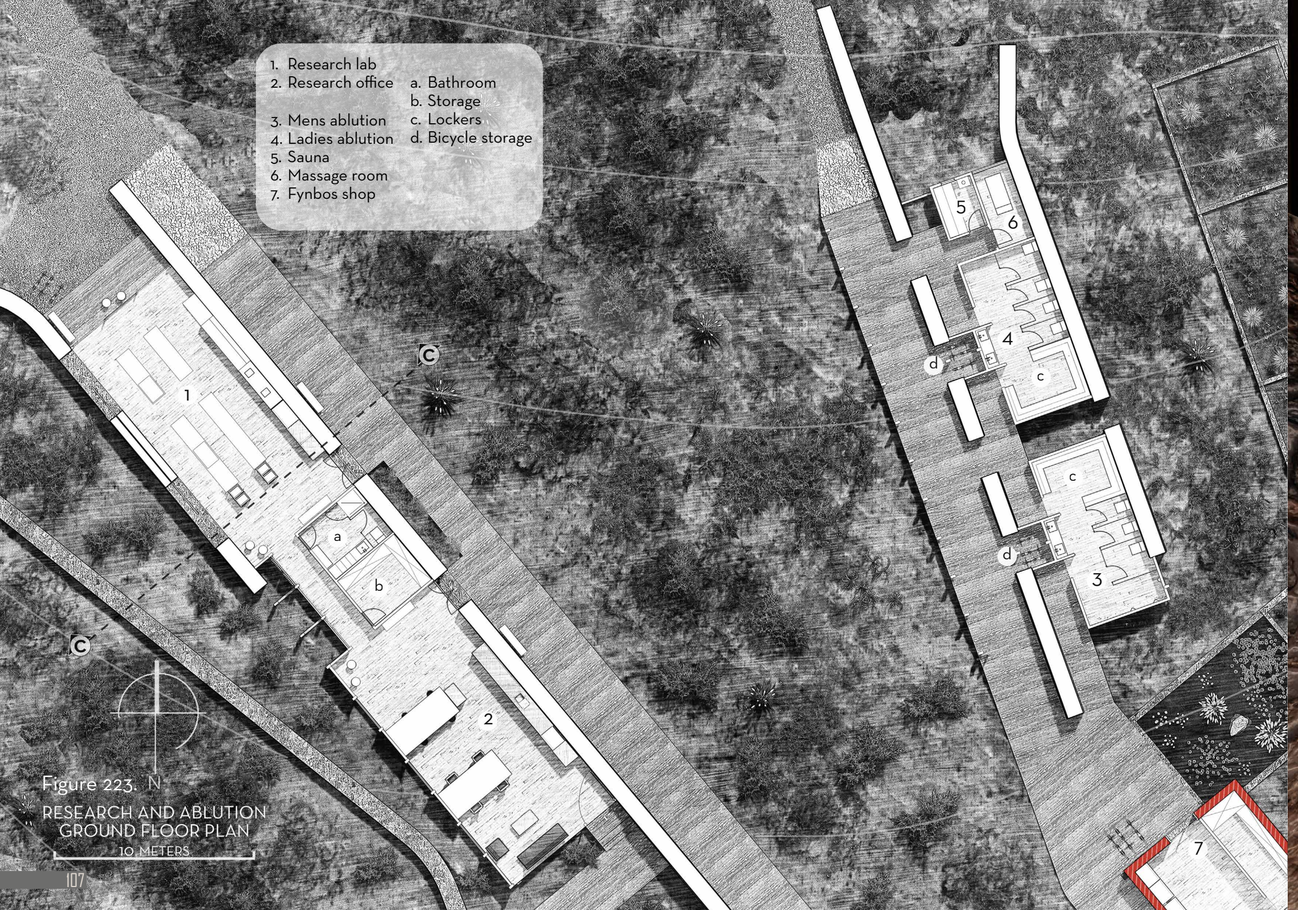



Figure 223. RESEARCH AND ABLUTION GROUND FLOOR PLAN



Figure 224. Research Lab

Figure 225. Research Office



Figure 226. Research Lab

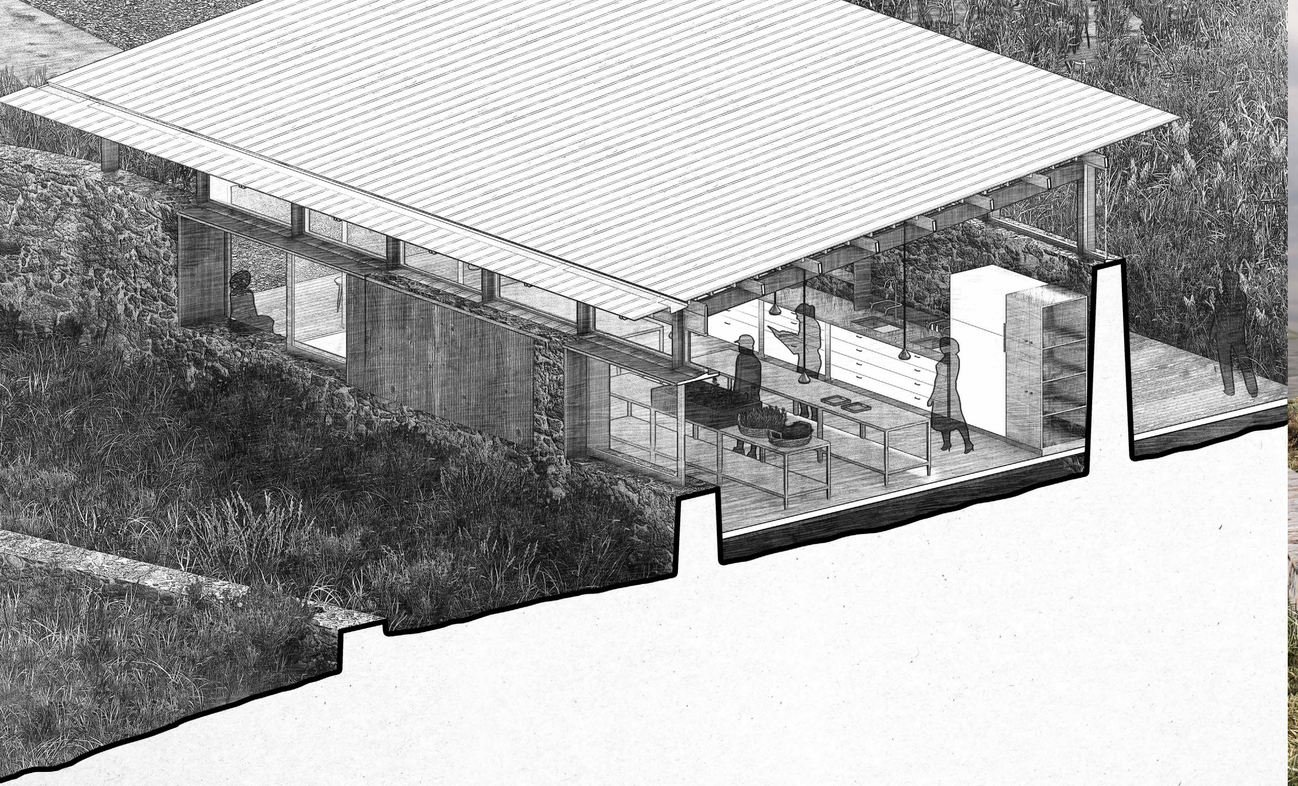


Figure 227. Research Lab Section CC



Figure 228. Research Lab Western Facade

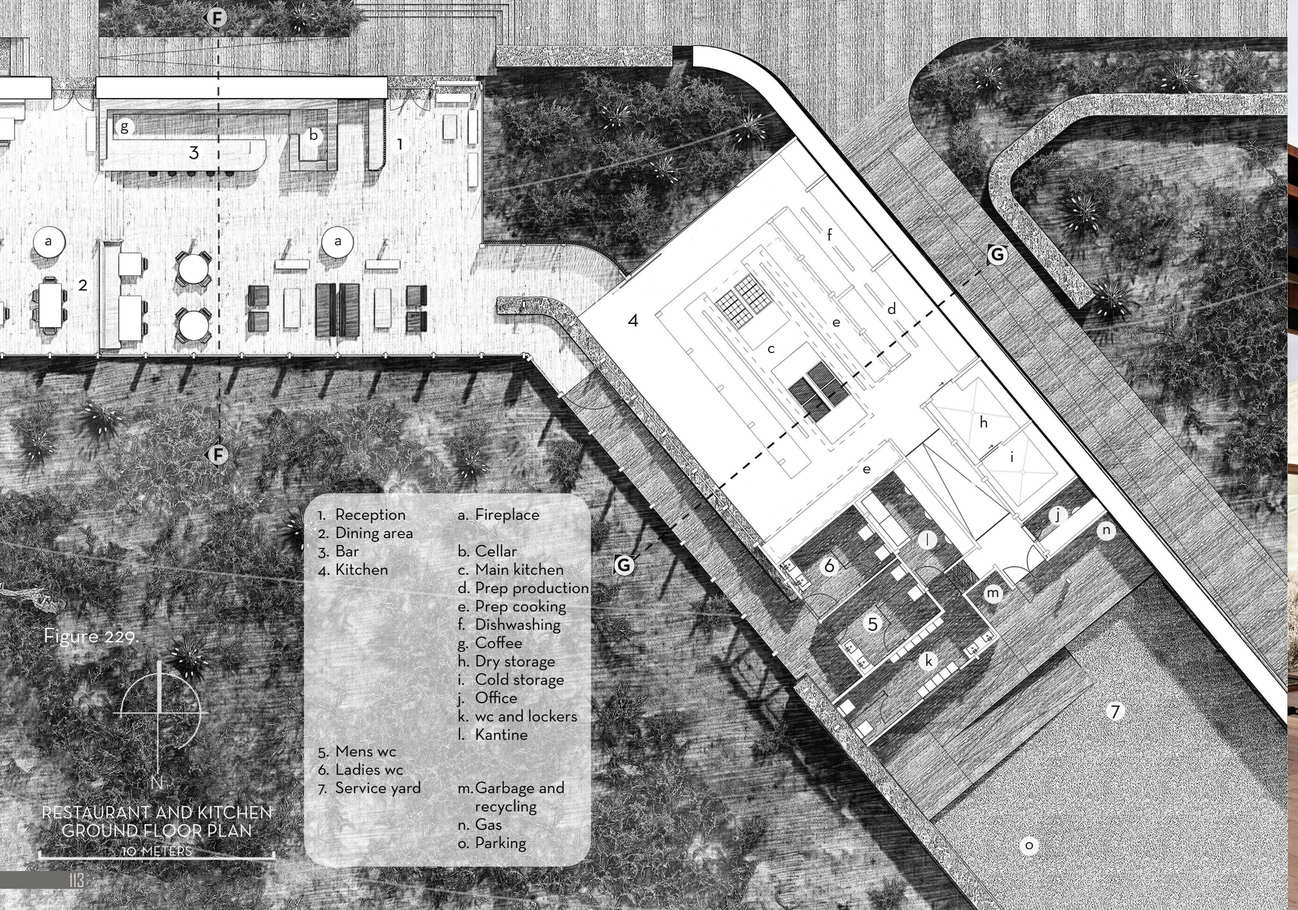



Figure 229.



Figure 230. Restaurant Reception and Lounge

Figure 231. Restaurant Section FF



Figure 232. Restaurant Lounge

Figure 233. Restaurant South Facade



Figure 234. Restaurant and Kitchen South Facade

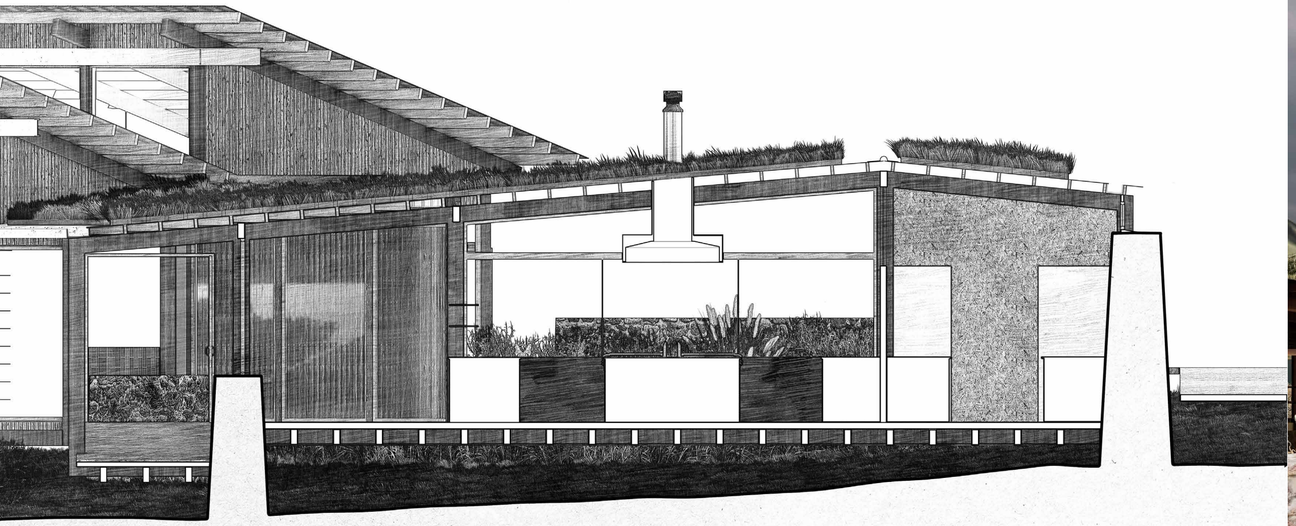


Figure 235. Kitchen Section GG



Figure 236. Restaurant North Facade

Figure 237. Restaurant: East Facade



Figure 238. Restaurant West Facade

NORTH-EAST ELEVATION Figure 239.

2 METERS

NORTH ELEVATION OF RESTAURANT Figure 240.

1 METER

# Future Ruin

Figure 241.

Figure 242.

# Final Model

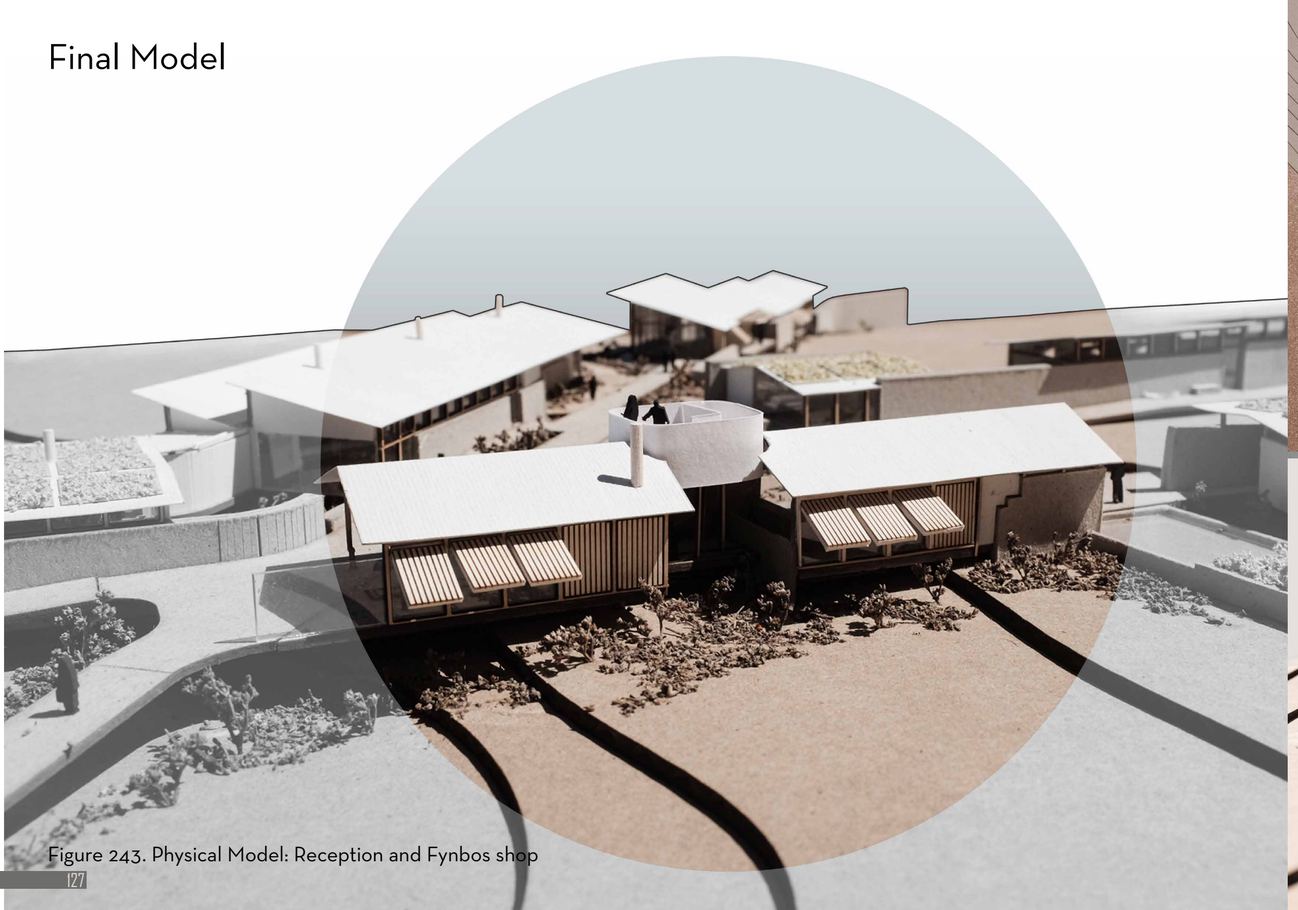


Figure 243. Physical Model: Reception and Fynbos shop



Figure 244. Physical Model: Top View

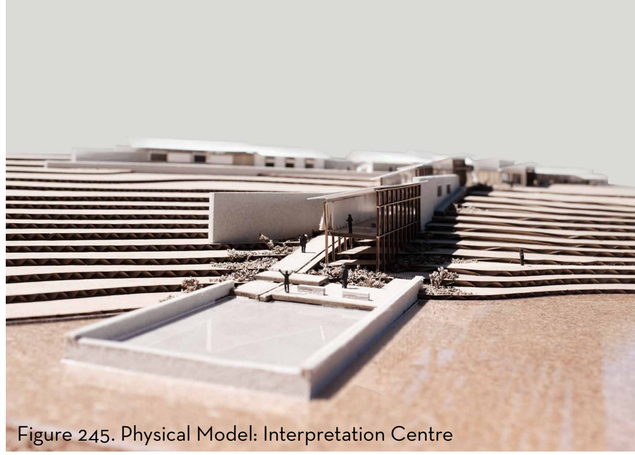
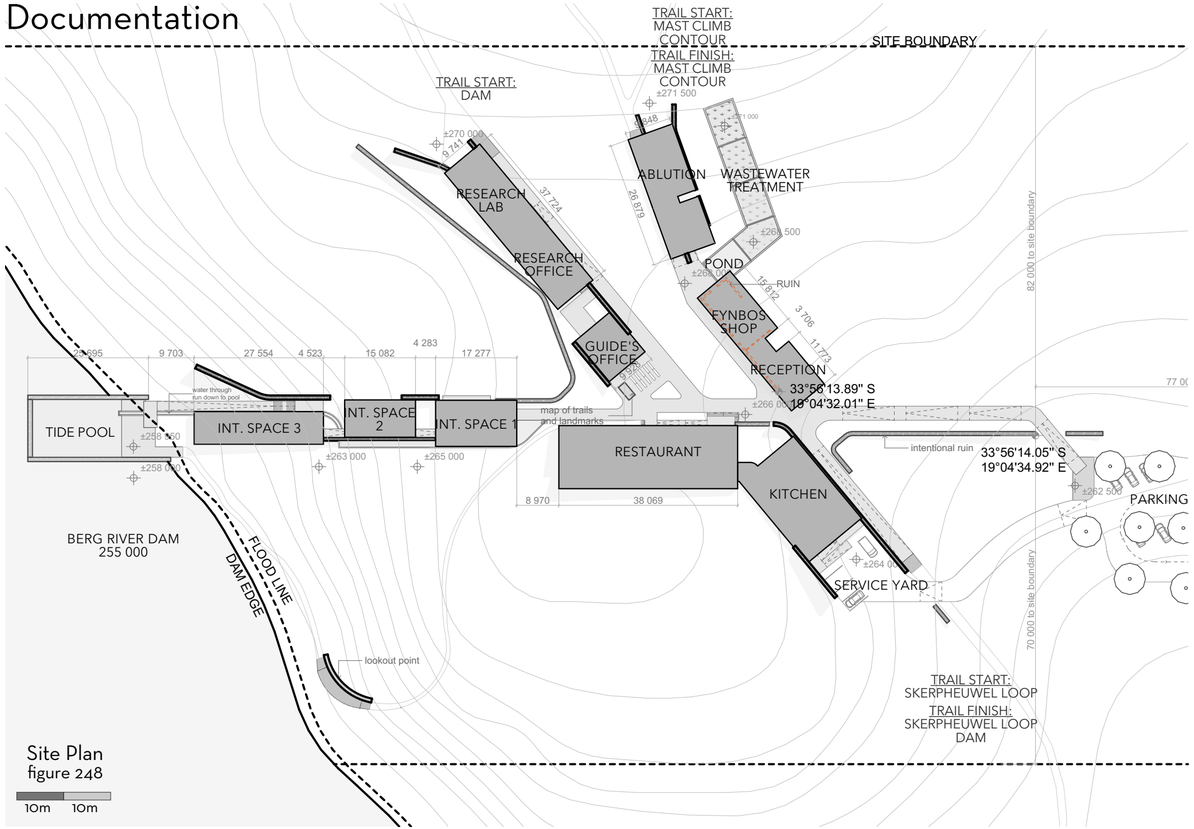


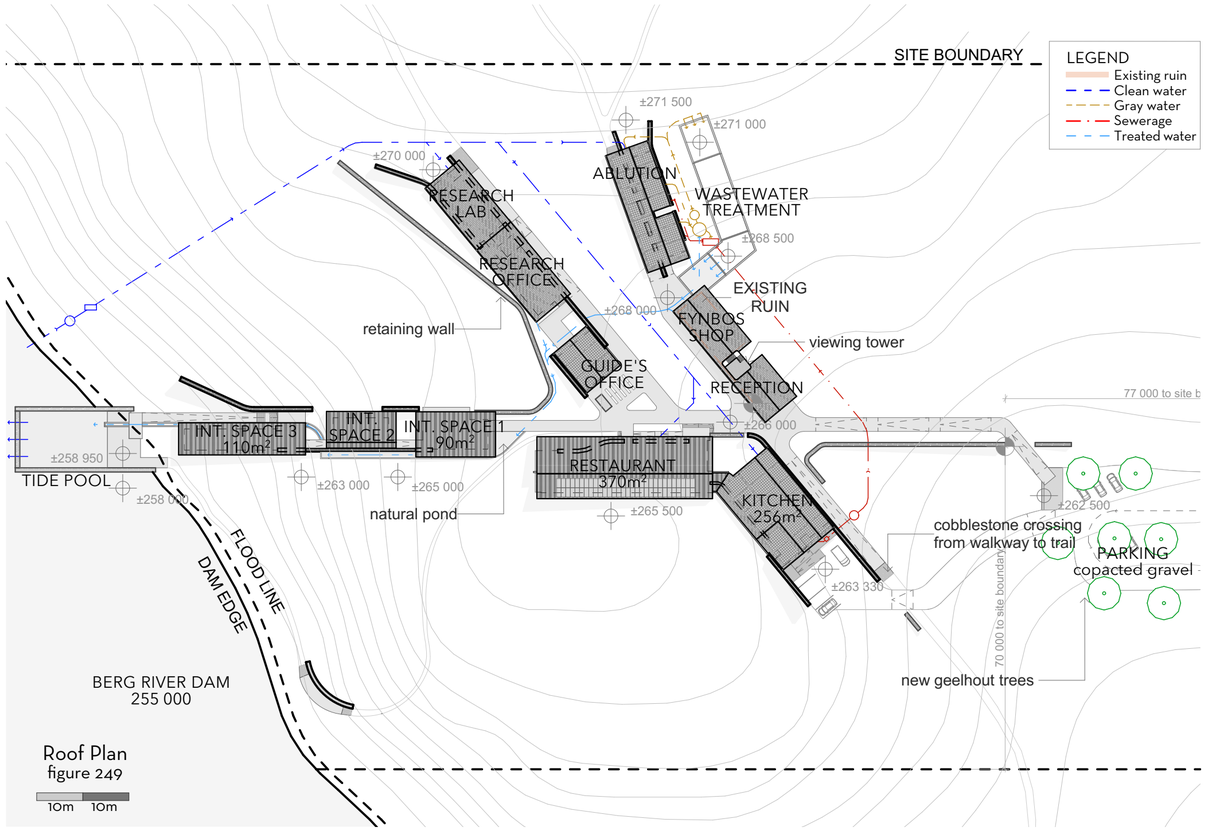
Figure 245. Physical Model: Interpretation Centre

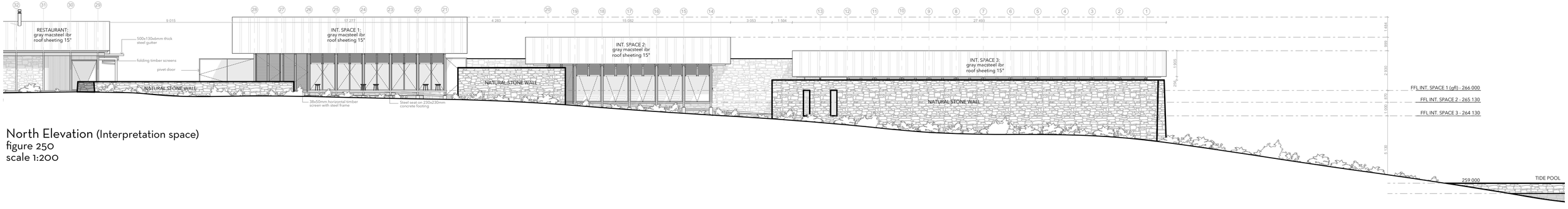
Figure 246. Physical Model: Research Facilities

Figure 247. Physical Model: North view

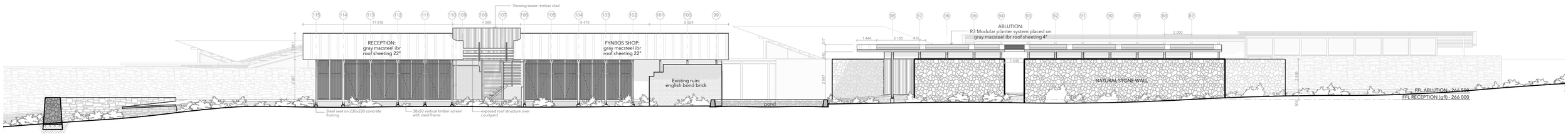
# Documentation



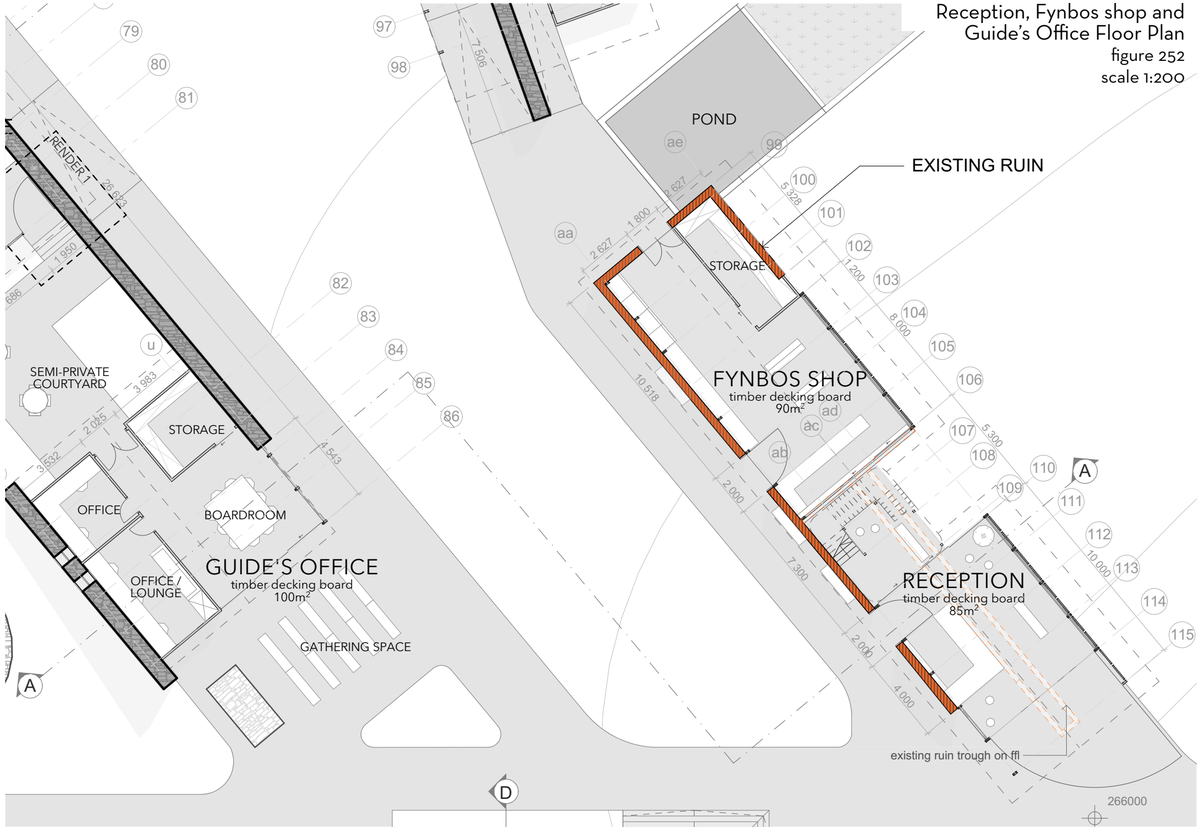





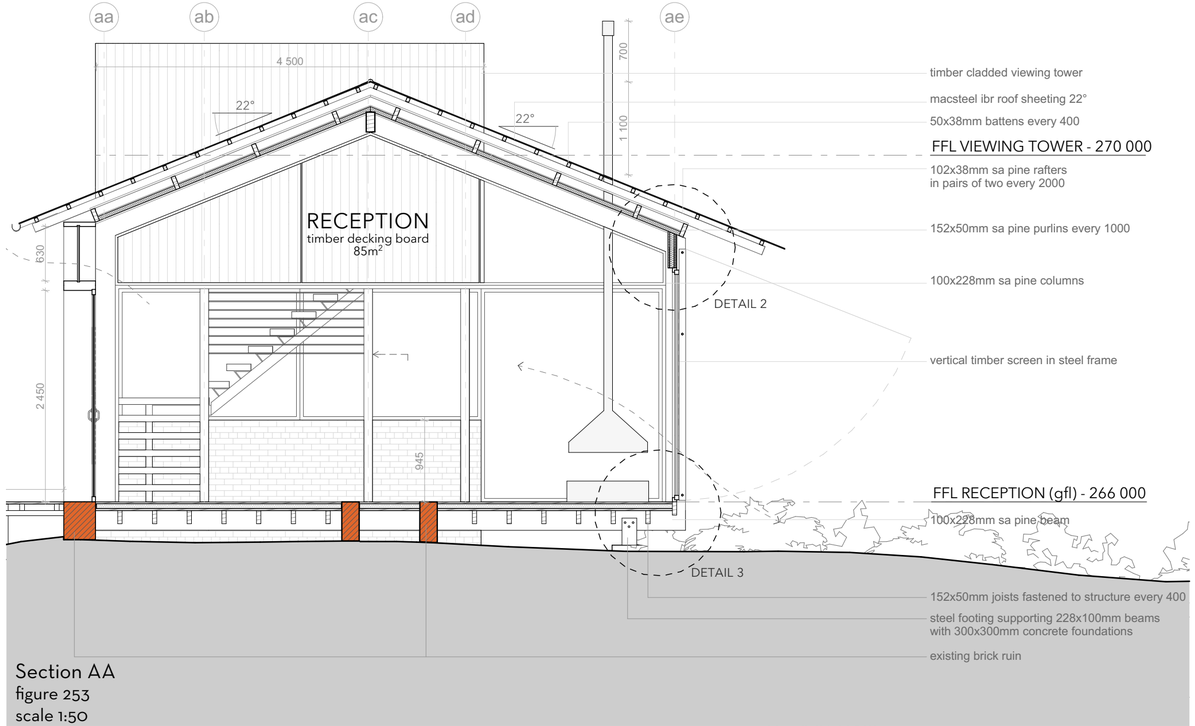

North Elevation (Interpretation space)
figure 250
scale 1:200



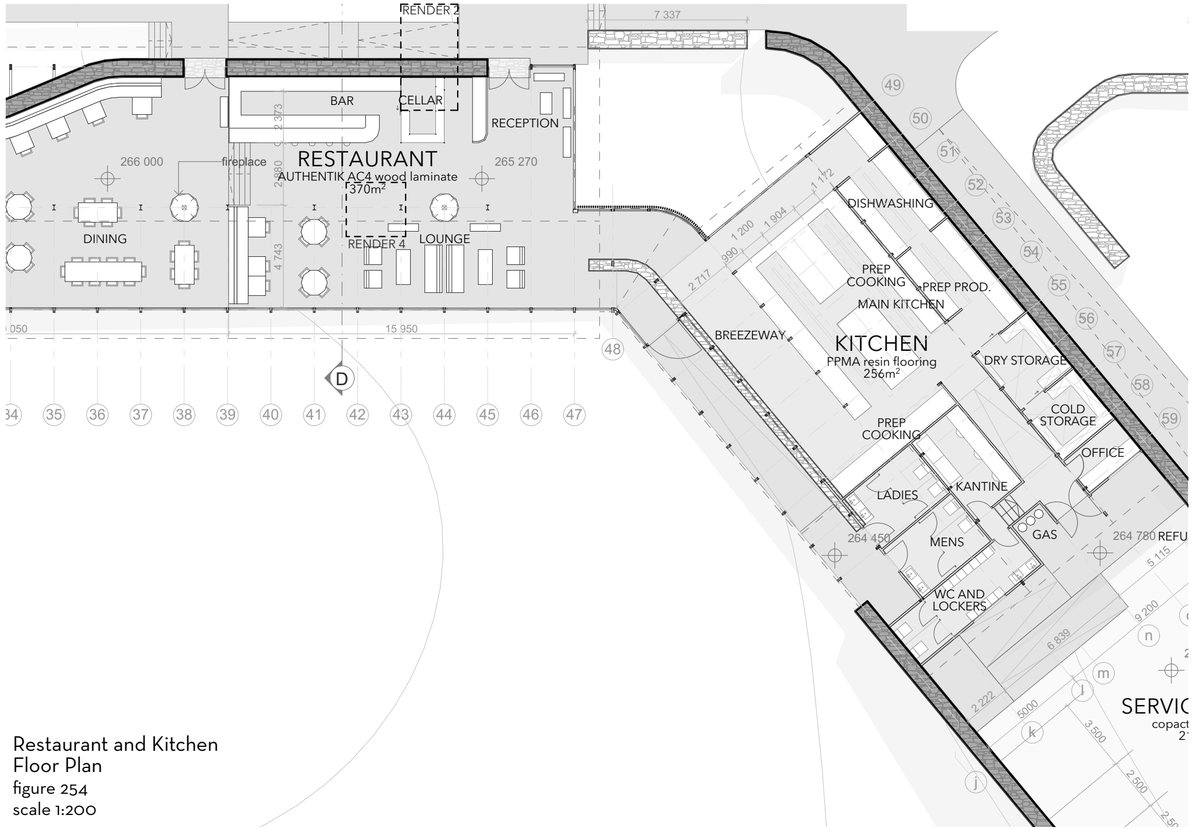

East Elevation (Reception, Fynbos shop and Ablution)
figure 251
scale 1:200




Reception, Fynbos shop and Guide's Office Floor Plan
figure 252
scale 1:200

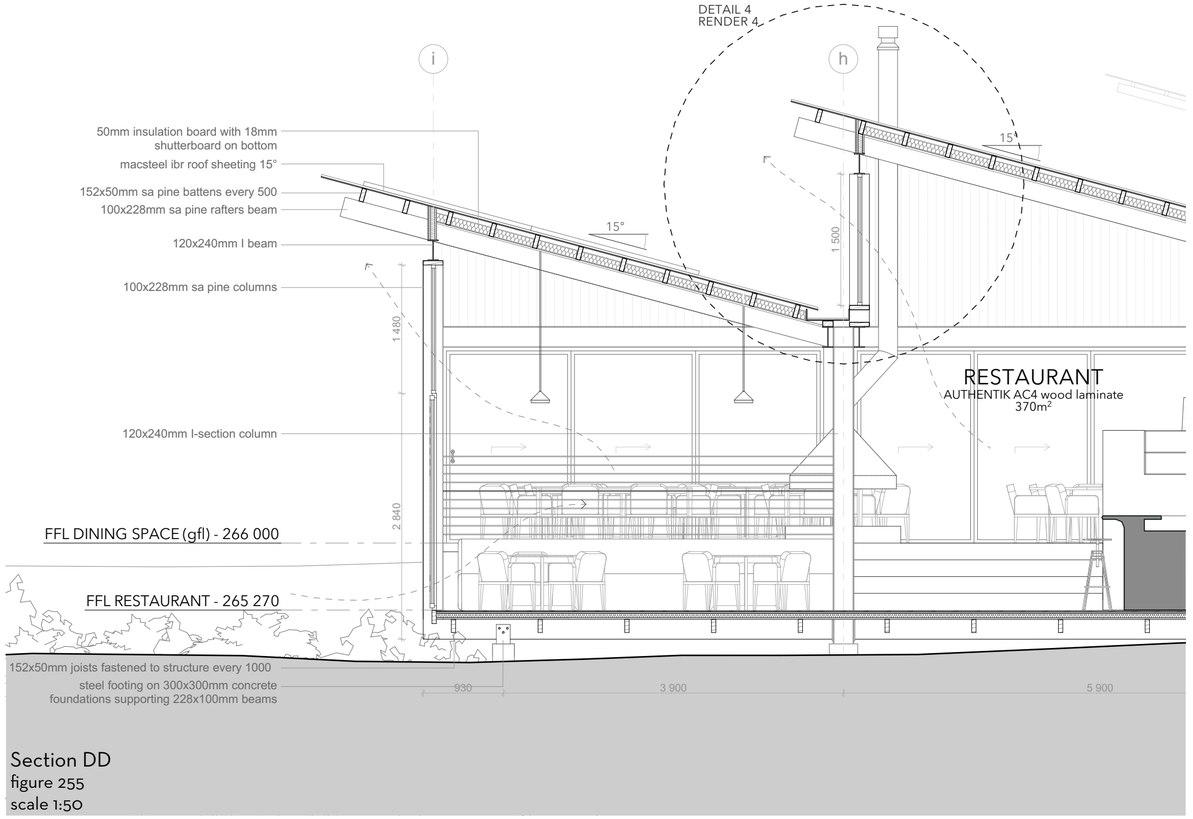



Section AA
figure 253
scale 1:50




Restaurant and Kitchen
Floor Plan
figure 254
scale 1:200





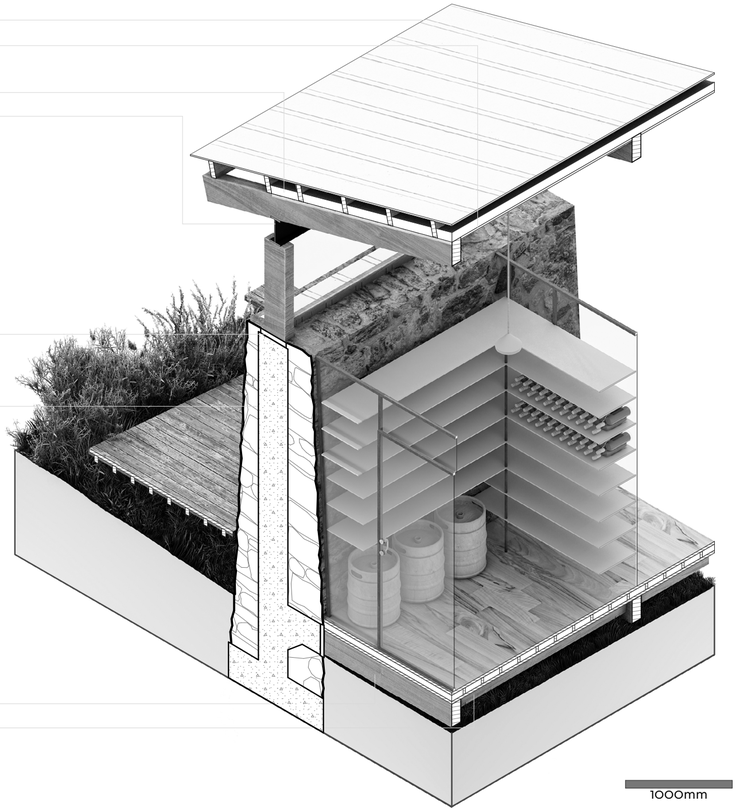

Section DD
figure 255
scale 1:50

Macsteel ibr roof sheeting 22°
12.5mm plasterboard fastened to purlins

50mm insulation board
120x240mm I-beam

steel plate casted into concrete column/foundation to attach timber structure
concrete column casted with foundation to support timber structure

100x228mm sa pine beam
152x50mm joists fastened to structure every 400

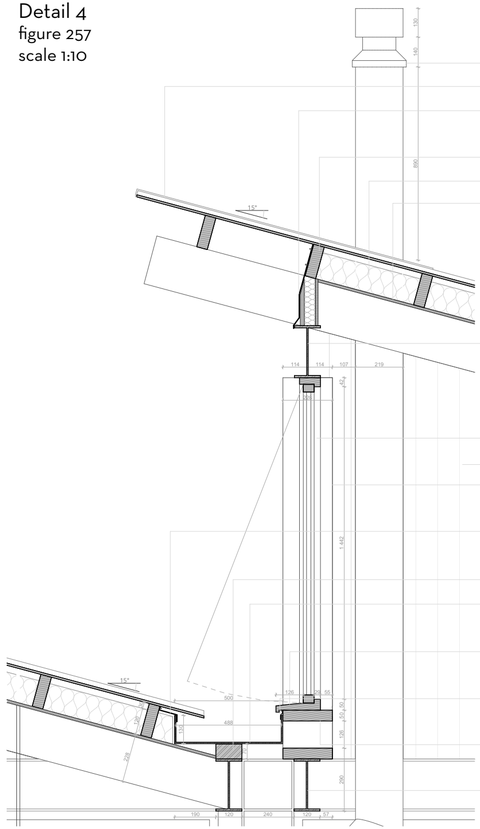


1000mm

Render 2
figure 356



Detail 4
figure 257
scale 1:10



chimney, 220mm outside, 200mm inside diameter
macsteel ibr roof sheeting 15°
flashing bolted to purlin covering wall/I-beam connection
152x50mm sa pine battens every 400
100mm insulation board
12.5mm plasterboard nailed to bottom of battens

240x120mm I-beam

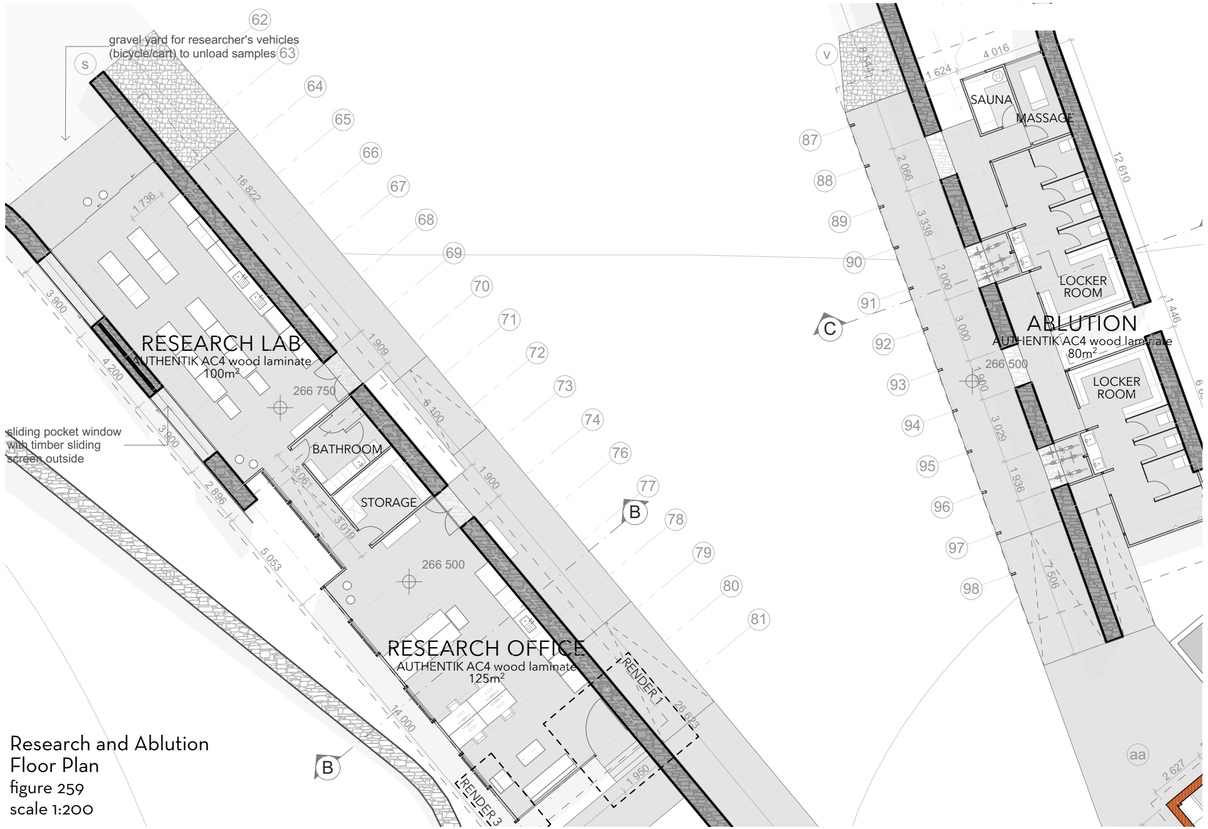
timber top hung window
timber cladding
100x228mm sa pine column

flashing fastened to batten folded over insulation and gutter edge
70x120 timber spacer between I-beam and gutter
500x130x6mm steel channel gutter

timber top hung window frame sill hanging over gutter
flashing fastened to timber beam folded over gutter edge
152x50mm sa pine on side streaching between columns to support windows
240x120mm I-beam welded to I-section columns (render 4)

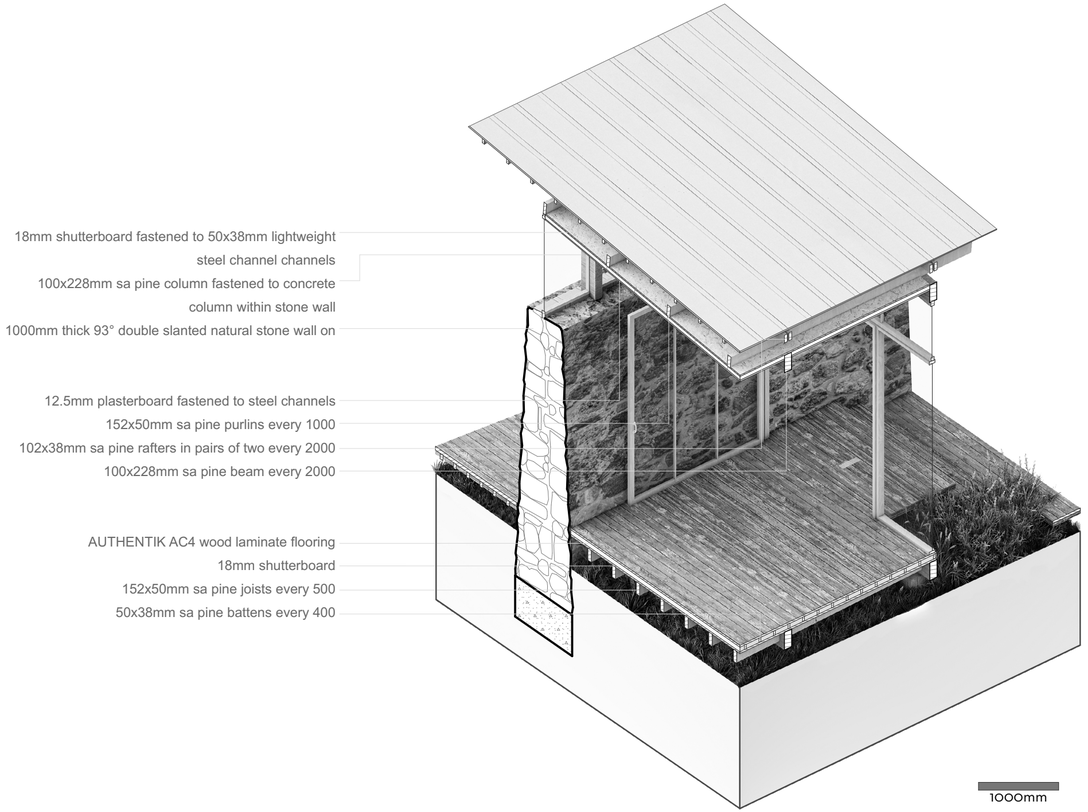
Render 4
figure 258

1000mm

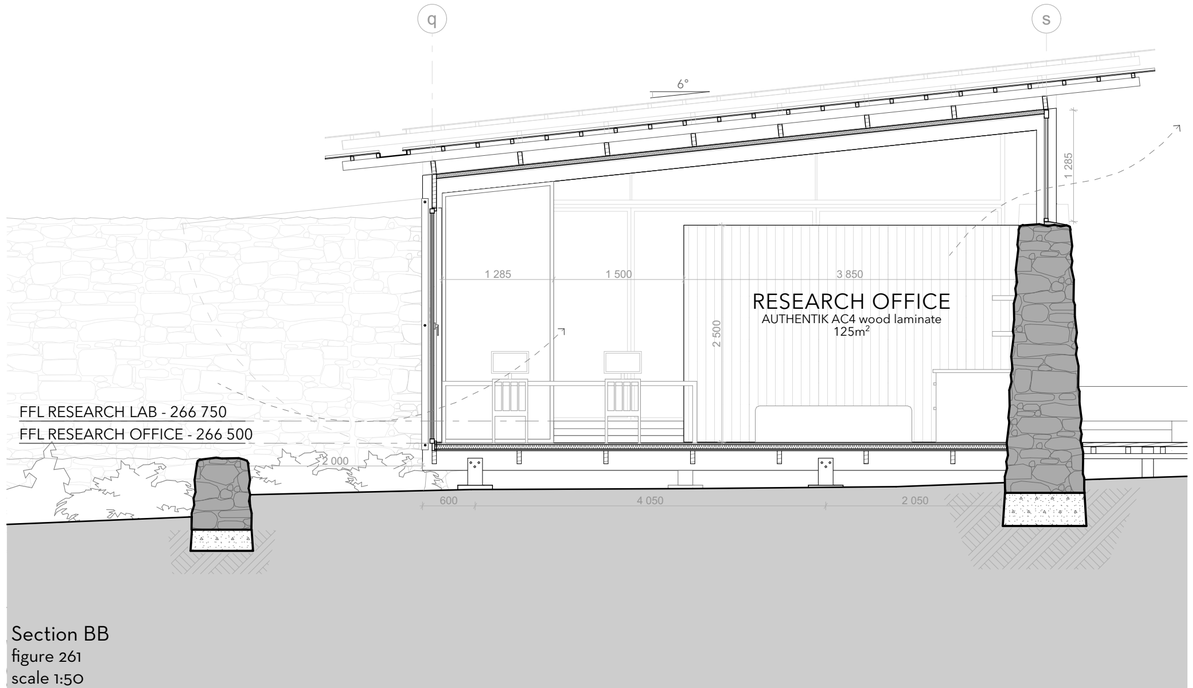



Research and Ablation
Floor Plan
figure 259
scale 1:200



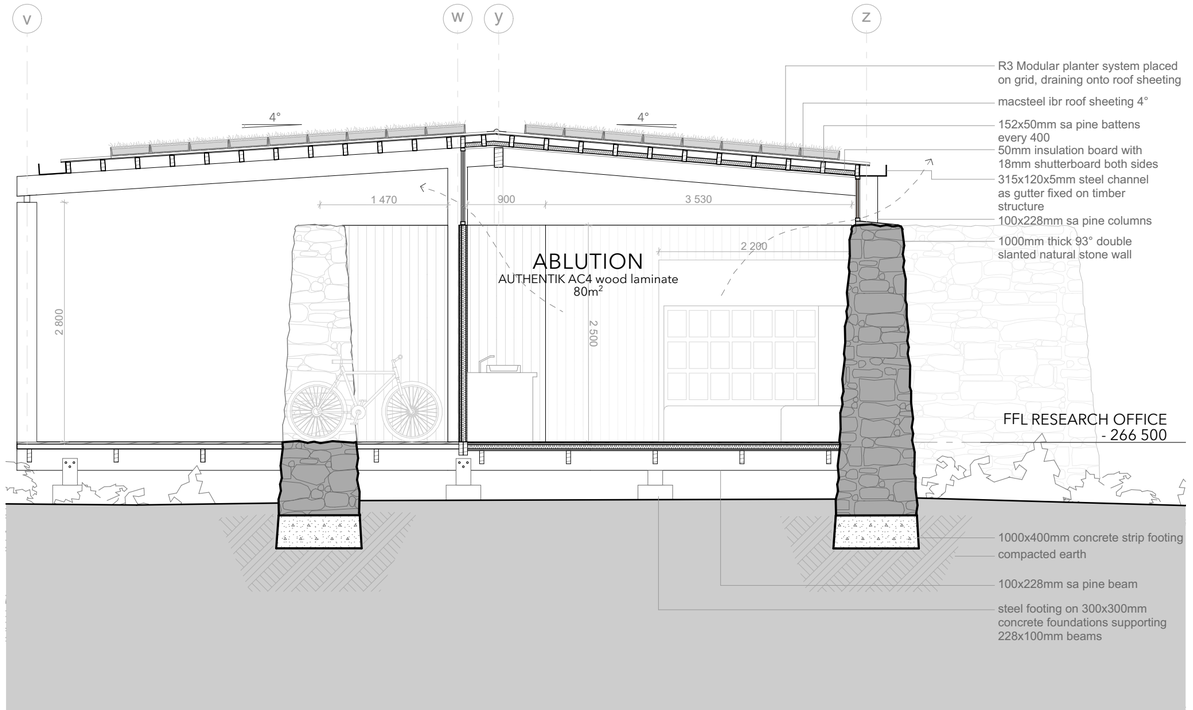



Render 1
figure 260

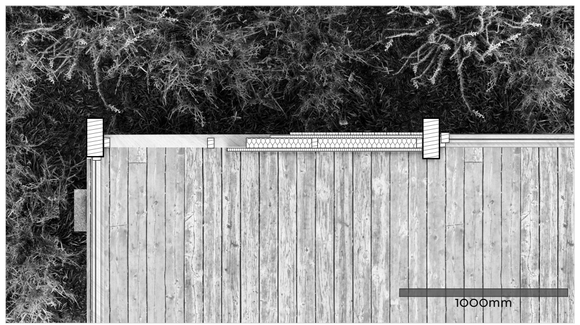


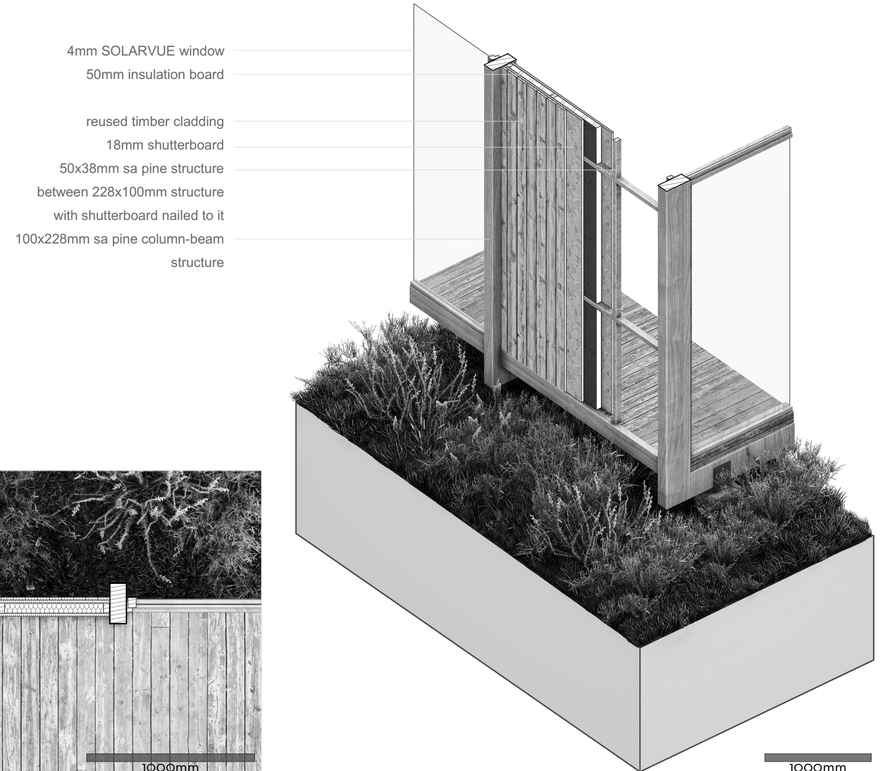

Section BB
figure 261
scale 1:50





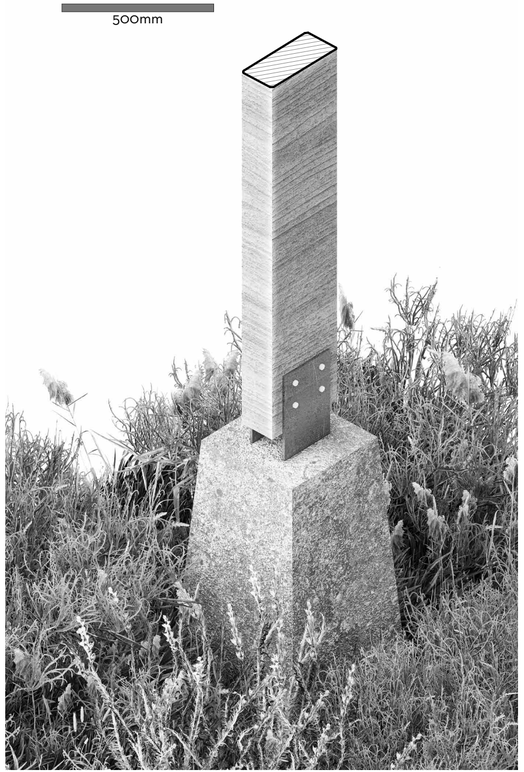
## Render 3
figure 262



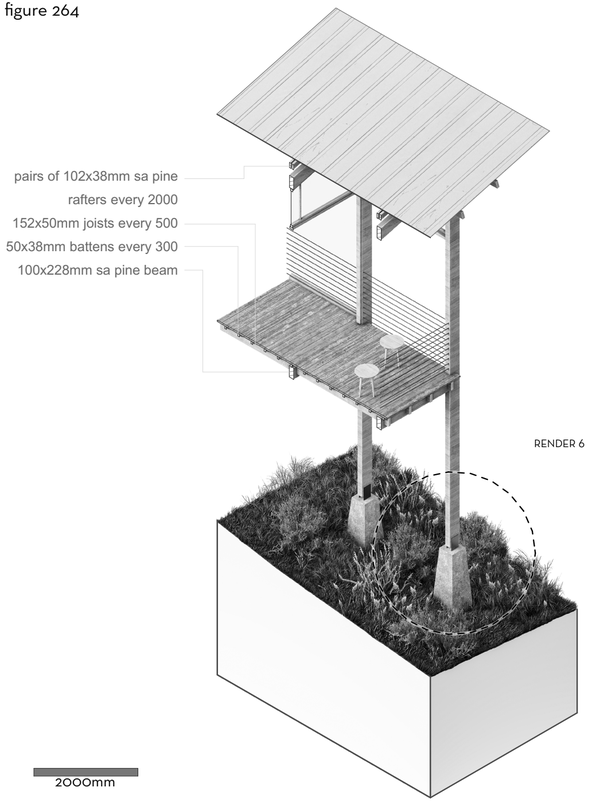



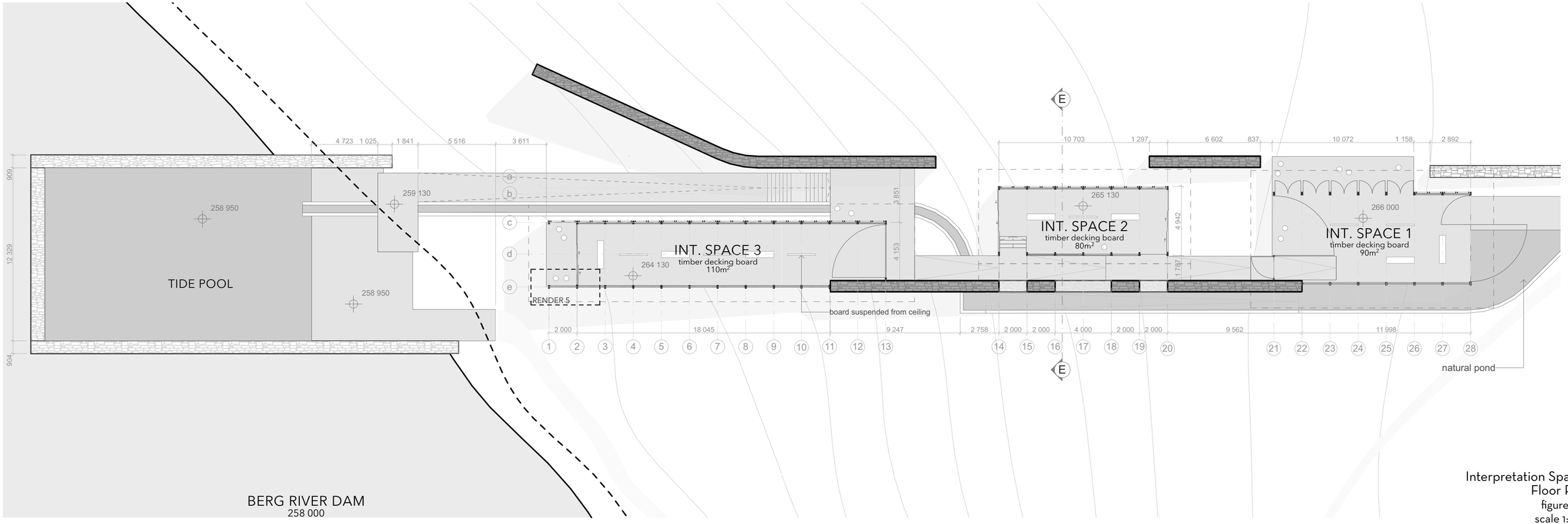



## Render 6
figure 263

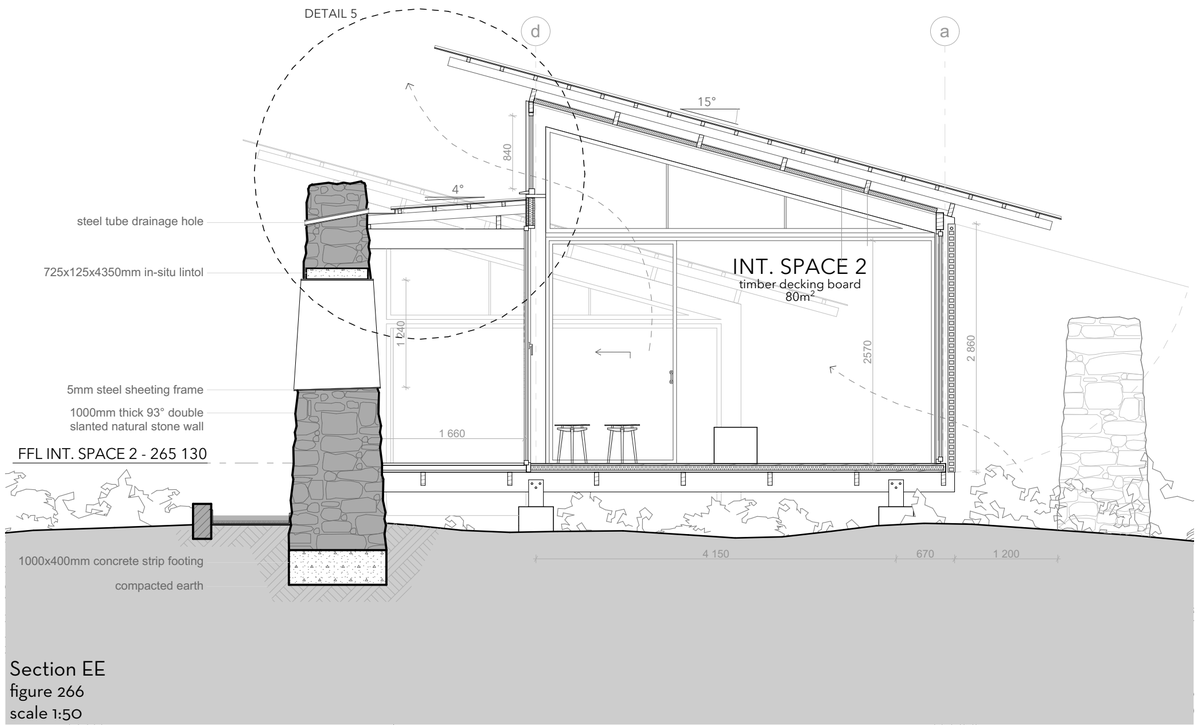



## Render 5
figure 264






Interpretation Spaces
Floor Plan
figure 265
scale 1:200




Section EE
figure 266
scale 1:50



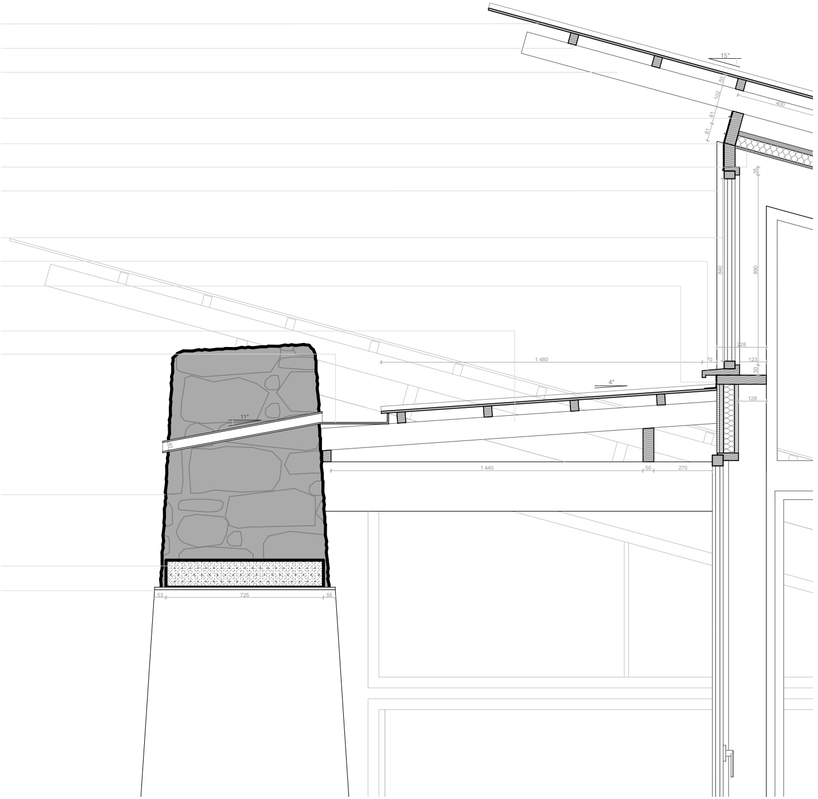
macsteel ibr roof sheeting 15°
50x38mm sa pine battens every 400
102x38mm sa pine rafters in pairs of two every 2000

152x50mm sa pine purlins every 1000
flashing bolted to purlin covering beam-window connection
12.5mm plasterboard fastened to purlins
100x228mm sa pine column-beam structure

timber top hung window
window sill overhang
flashing fastende to beam to cover wall-roof sheeting
connection
102x38mm sa pine rafters every 2000
300x50x6mm steel channel as gutter with square steel tubing
welded to one side for drainage through wall

1000mm thick 93° double slanted natural stone
wall on 1000x400mm concrete footing

725x125x4350mm in-situ lintol
8mm steel frame placed in stone wall
extending 15mm past wall edge



Detail 5
figure 267
scale 1:10

# PART FIVE

## TECHNICAL SYNTHESIS

## Introduction

The design requires two different types of construction methods to achieve the wanted objectives. One is a heavy natural stone wall that will require hard labour (discussed later) and the other is a timber frame structure that can be manufactured off-site and assembled on site. Following, the technical aspects of the development will be discussed, including construction methods, environment, functionality, and sustainability.

Figure 268. Construction type (Author,2021).

## Environment and Micro-climate

### Site conditions and challenges

The site has no physical challenges, but it is preferred that the earth is damaged as little as possible in the construction process. After the construction is completed, the surrounding landscape will be completely rehabilitated to a better standard than it was prior to construction. The development is designed in such a way that the plant growth will be completely untouched through everyday use.

Site accessibility

The site is easily accessible with any vehicle, but as it is separated from municipal services, it will have to be self-sufficient. To make provision for this, a sustainable off-grid approach will be taken for electricity, water and sewerage.

## Form and Function

All the spaces will make use of the same two-metre interval timber structure but will have different dimensions based on the specific functions. The size of the columns and beams will all stay the same but will have more support for heavier spaces. In the restaurant (figure 270), steel beams are also used as a result of the scale.

Figure 269. Column and beam structure (Author,2021).

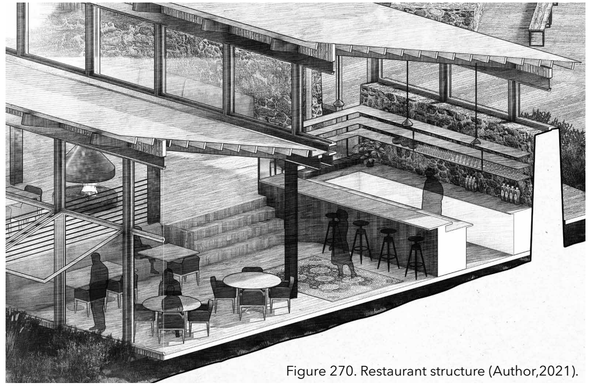


Figure 270. Restaurant structure (Author,2021).



## Circulation

### Hiking and Biking

As the development is the centre for the surrounding hiking and biking trails, the circulation consists of pretty wide boardwalks that guide the dwellers across the development without harming the landscape. There is also allocated storage for bicycles.

Figure 271. Walkway-trail transition (Author,2021).

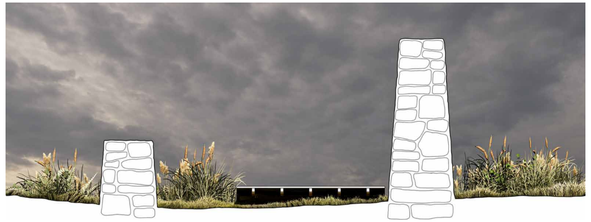


Figure 272. Walkway section (Author,2021).

### Cars

The main parking is located about 50 meters from the development (figure 273), being a casual gravel space with scattered 'Geelhout' trees for shade. The parking will fit about 40 cars with two disabled parking spaces. Then there is a service yard for the kitchen that can be accessed from the main parking. It has three large parking spaces with space for a delivery van.

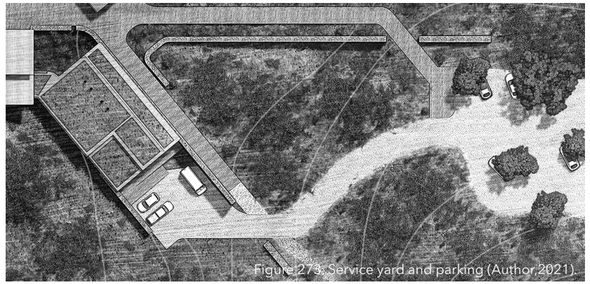


Figure 273. Service yard and parking (Author,2021).

## Structural overview

The natural stone walls are the more permanent element and will be constructed first. It will be labour intensive and will use rock from the trans-Caledon tunnel (figure 274) 1200m away.

The timber structures are raised above the ground, supported by the stone walls and concrete footings, and can be manufactured off-site, minimising activity on the site. This Structure will also give the possibility to remove the spaces if it is no longer used.

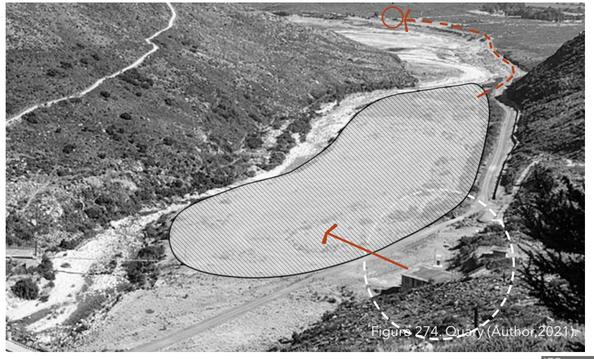


Figure 274. Quary (Author,2021).

# Structural detailing

## Foundations

The site has a shallow rock base, and as a result thereof, the 300mm x 300mm concrete footings can be casted directly on it. The stone walls are tapered to the top and as a result thereof, the base width will differentiate slightly. A concrete strip foundation will be casted for the stone walls as it is structural in some places and there will be columns inside the wall where it supports the timber structures. Where the columns or the beams is supported, there is custom steel footings that bolt through the timber and is set into the concrete footing

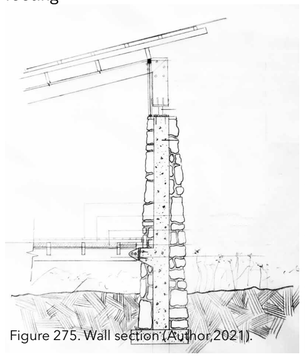


Figure 275. Wall section (Author,2021).

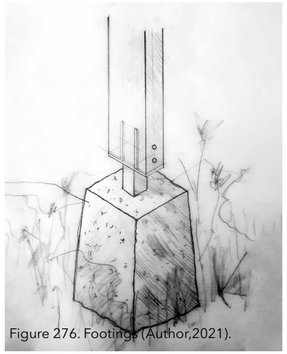


Figure 276. Footings (Author,2021).

Figure 277. Footings (Author,2021).

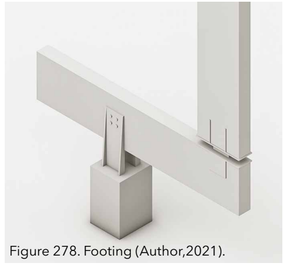


Figure 278. Footing (Author,2021).

## Column and beam structure

The primary structure will consist of 76x228mm glued beam frames sitting on custom steel footings. Then there will be 34x114mm floor beams inside the frame, supporting the floor and also 152x50mm rafters supporting the roof.

## Flooring

Most of the development will make use of a 21mm thick boarded floor, whereas the restaurant dining area and research facilities will have a smoother timber board finish and the kitchen a tile floor. The flooring will be consistent from outside to inside, but on the inside, the planks will sit on an 18mm thick shutter board.

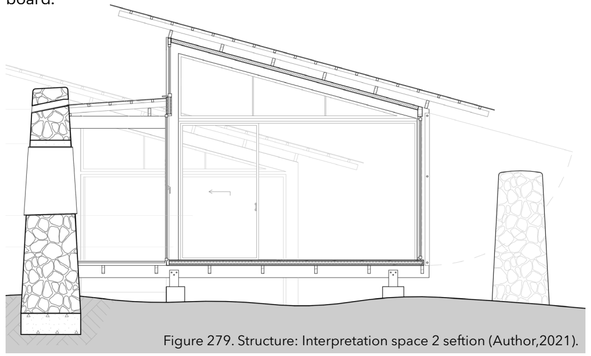


Figure 279. Structure: Interpretation space 2 seftion (Author,2021).

Figure 280. Interpretation space 2 roof structure (Author,2021).



## Walls

All the walls will be non-loadbearing, used as infill between the frame structure. The wall will have 50mm x 38mm studs with shutterboard on the inside and the outside and insulation infill. On the outside, a damp-proof membrane will be placed on the shutterboard and will be cladded with natural timber.

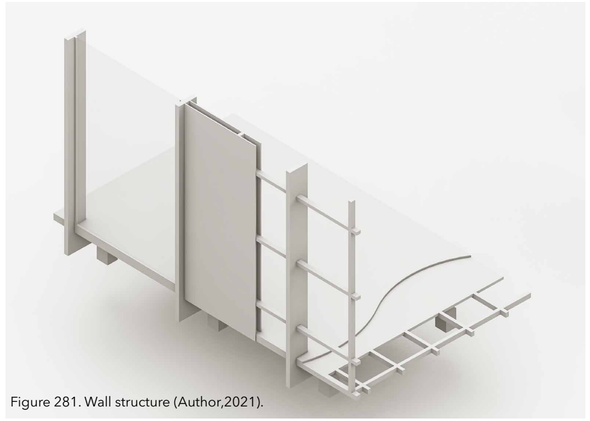


Figure 281. Wall structure (Author,2021).

## Glass

Where the timber frames are filled with glass, in most cases it will be a window or door that will allow for natural ventilation. On all the sides where solar gain is a concern, timber screens are placed in front of it. 4mm SOLARVUE glass will be used as the openings are large and needs to be somewhat insulative.

## Roofing

Different roofing systems are used throughout the development. Where the roof is zinc only, a double roof system is used to articulate the roof from the frame. This is to create an aesthetic overhang whilst allowing for natural insulation/ventilation. Where planted roofs are used, the rafters are placed 400mm apart with the sheeting on top.

## Screening

A screen system is developed to protect the building but enables it to open up completely. The screens consist of 38mm x 76mm steel frames with 38mm x 76mm timber infill, connected with steel tubing, pulled open from the top with an electric pully system. In the north (figure 283) the screen has horizontal shading and in the west and east vertical (figure 284-285).

Figure 282. Screening system (Author,2021).

Figure 283. Screening system (Author,2021).

As some of the best views are to the west, the western facades have dense timber screens but can be opened completely during the earlier hours to allow for spectacular views.

Figure 284. Western screening (Author,2021).

Figure 285. Western screening (Author,2021).

# Sustainability

## Water

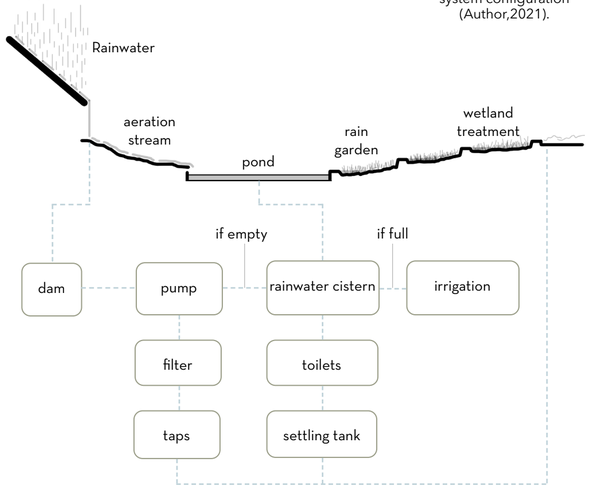



Figure 286 Water system configuration (Author,2021).

## Wastewater treatment

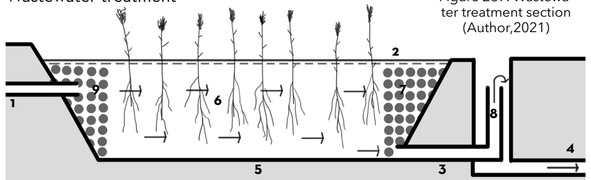



Figure 287. Wastewater treatment section (Author,2021)

1. inflow
2. water level
3. drainage pipe
4. outflow
5. inpermeable layer
6. filtration material
7. outflow collection zone
8. outflow structure with water level adjustment
9. inflow distribution zone with large stones

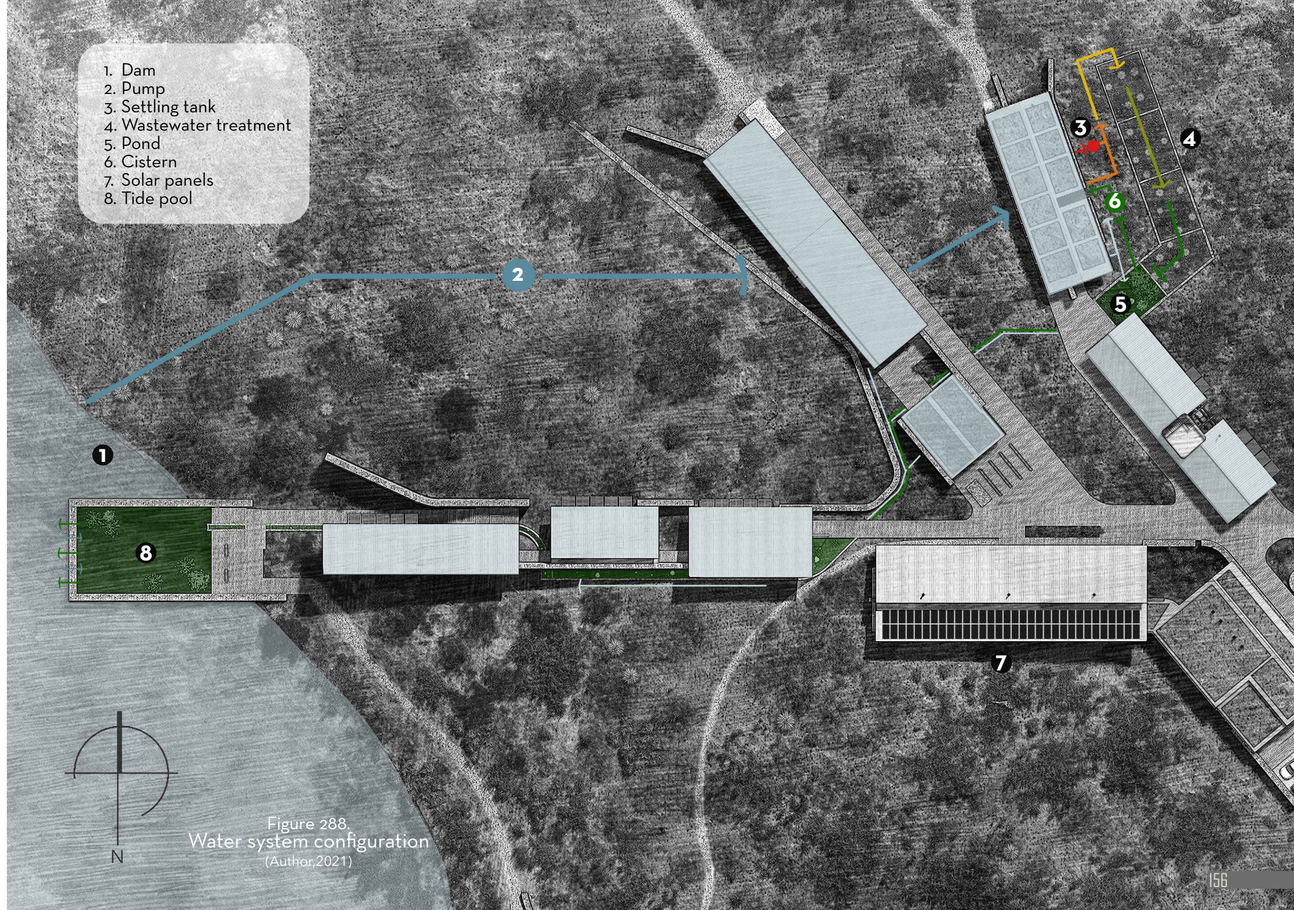



Figure 288.
Water system configuration
(Author,2021)

## Solar

The southern part of the restaurant's roof is home to 60 solar panels to provide the centre with electricity. This roof was chosen as it faces north and is not visible from any side. The following specifications are needed to go off-grid:

Solar Panels: 60 x 450W panels (3 arrays of 20 panels in series)

Inverter: 3 x 5.5KW inverters in parallel

Batteries: 4 x 100AH LiFePO4 28V (15.36KWh storage)

Annual $CO_2$ emission reduction: 40 000kg

## Planted Roof

The R3 modular planter system (figure 289), produced by Greensquared will be used to create planted roofs on the ablution, guides office and kitchen. The planters have dimensions of 455mm x 455m x 100mm and weigh 20kg when filled and saturated. This system is ideal as it is easy to install and service.

- Locally manufactured
- Roots grow from one planter to another
- Water and nutrients are shared
- Made from recycled and recyclable polypropylene plastic
- Excellent drainage and airflow below the planters
- Water reservoirs for retaining water (Greensquared,2021: online)

Figure 289. R3 planter units (Greensquared,2021: online).

## Site Rehabilitation

After the construction is complete, the site will be rehabilitated, removing all the old roads except the one that will be used as the entrance.

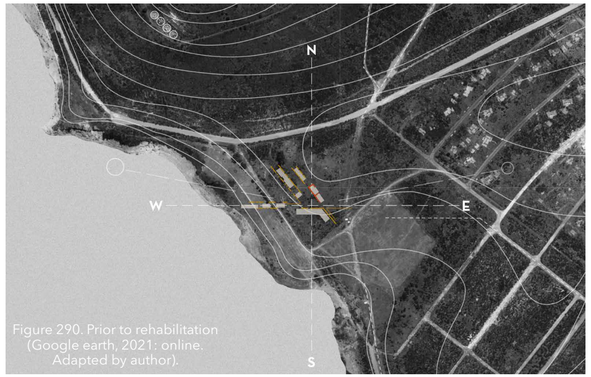



Figure 290. Prior to rehabilitation (Google earth, 2021: online. Adapted by author).

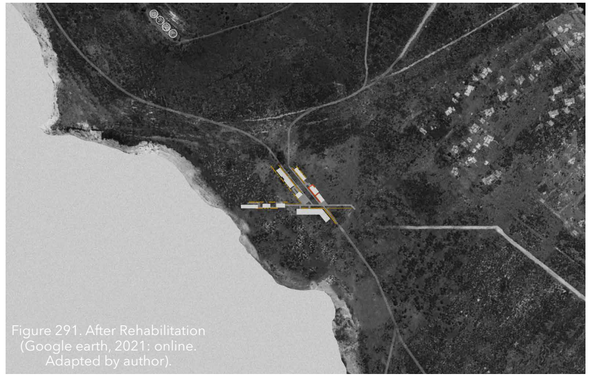


Figure 291. After Rehabilitation (Google earth, 2021: online. Adapted by author).



## Future Ruin Stone Quarry

The seven-meter-wide tunnel (figure 293 and 294) was drilled in the 1970s to pump water from the Theewaterskloof dam to the Berg River Dam and the rock was distributed close by. This development proposes to use this rock instead of a new quarry, thus rehabilitating the landscape in the process of building the intentional ruin.

Figure 292. (Bock, 2017: online. Adapted by author).

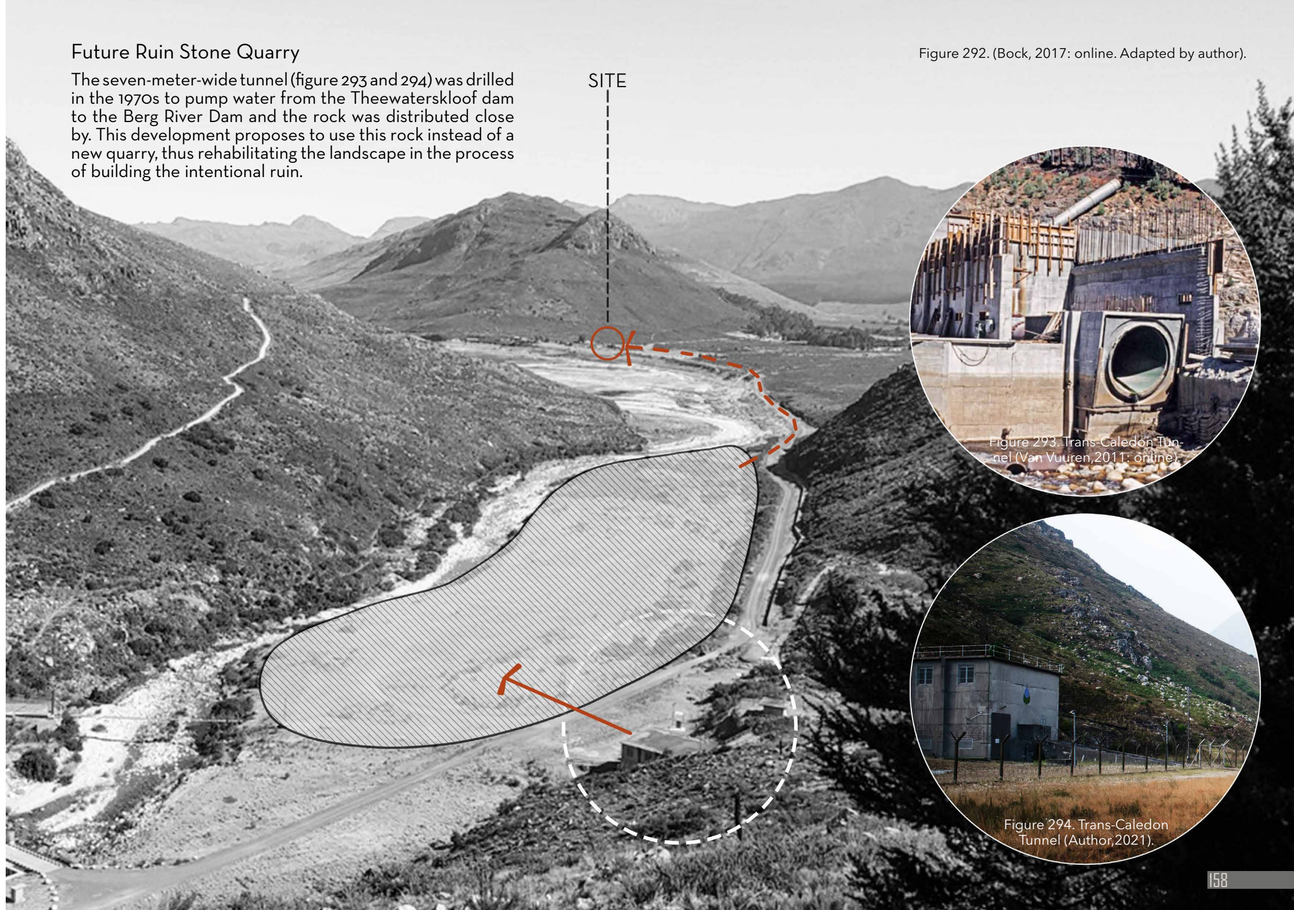





Figure 293. Trans-Caledon Tunnel (Van Vuuren,2011: online).



Figure 294. Trans-Caledon Tunnel (Author,2021).

# Amenities

## Kitchen amenities

| **c- Kitchen** |
|---|
| Stainless steel tables with cooling cabinet |
| Stainless steel tables with freezing cabinet |
| Gas stove |
| Oven |
| Gas fry top |
| Wood fire cooker |
| Extractor fans/chimneys |
| Sinks |
| Heated shelves |
| **d- Prep production** |
| Stainless steel table with cooling cabinet |
| Stainless steel table with freeze cabinet |
| Heavy duty sink |
| **e- Prep cooking** |
| Stainless steel table with cooling cabinet |
| freezer |
| Induction cooking range |
| Microwave oven |
| Sink |
| Oven |
| |
| |

| **f- Dishwashing** |
|---|
| Pot sink |
| Pot rack |
| Stainless steel tables with waste bins |
| Industrial dishwashers |
| Dryer |
| Glass rack |
| Plate rack |
| **h - Dry storage** |
| Stainless steel storage racks |
| **i- Cold storage** |
| Stainless steel storage racks |
| Stainless steel rolling racks |
| **Bar** |
| Fridge |
| Freezer |
| Ice cube machine |
| Ice crusher |
| Sink |
| Basin |
| Dishwasher |
| Drying rack |
| Keg cooling system |
| Beer taps |
| Espresso machine |
| Coffee grinder |

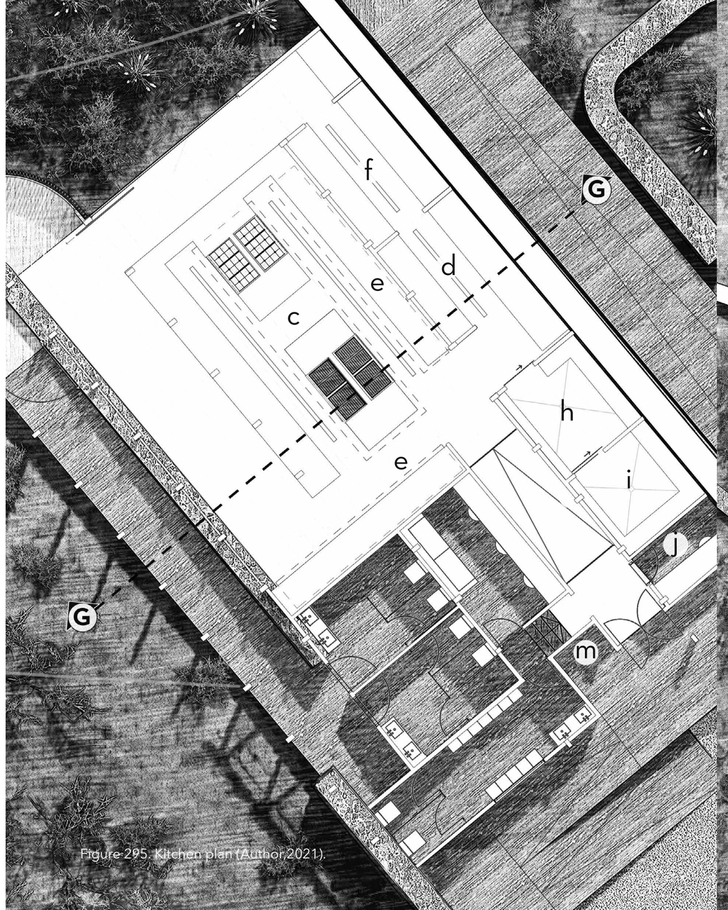
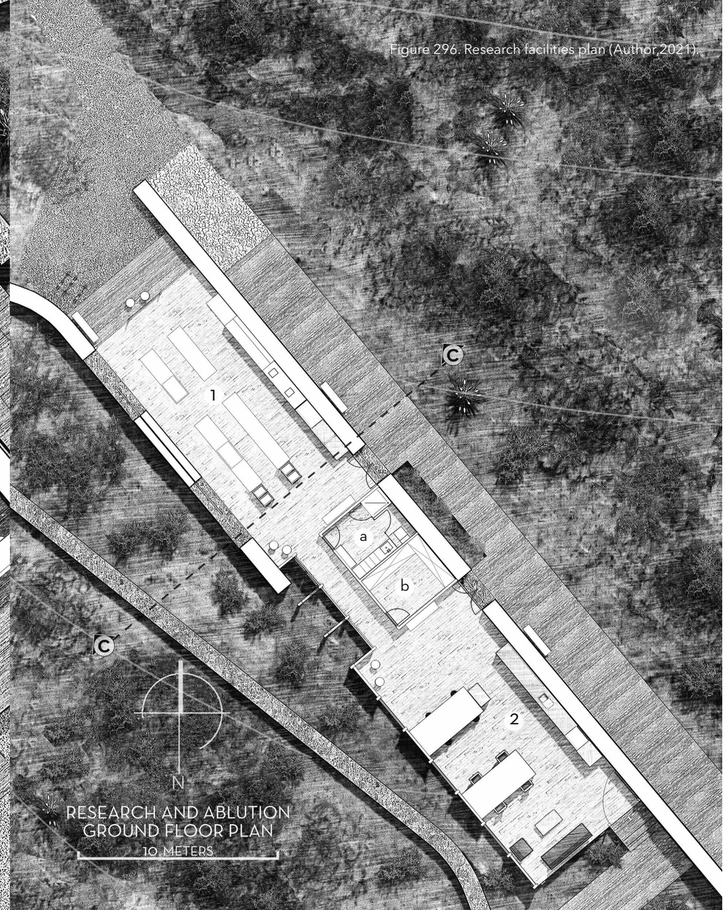



Figure 295. Kitchen plan (Author,2021).



Figure 296. Research facilities plan (Author,2021).




## Research Amenities

| **1. Research Lab** |
|---|
| Stainless steel tables |
| Sorting buckets |
| Buckets with irrigation |
| Trolleys |
| -20˚C freezer |
| 4˚C fridge |
| Double sink |
| Lightbox |
| Fluorescent microscope |
| Stereomicroscope |
| Plate reader |
| Water purification system |
| Storage cabinet |
| |
| |

| **2. Research Office** |
|---|
| Desks |
| computers |
| Fluorescent microscope |
| Stereomicroscope |
| Basin |
| Fridge |
| Microwave |
| Kettle |
| **a. WC** |
| Lockers |
| Toilet |
| Shower |
| Basin |
| **b. Storage** |
| Stainless steel storage racks |

# PART SIX

# CONCLUSION

# Conclusion

The site analysis set out in part 2 created a deeper understanding of the complexities of the site allowing me to expand on the design possibilities. The functions and extent of the project were however still very unclear at this stage. Part 3 developed a conceptual framework that allowed me to start thinking theoretically about the design and how to incorporate ruin as a theoretical discourse. It was very clear from the start that the ruin was an important element on site, therefore the theoretical discourse needed to build on the atmospheric quality already existing in the present ruin to create a ruin for the future. The theoretical grounding helped me to link the theme of ruin with biophilia and the intended design. The grounding broadened the design possibilities towards a final proposal which was further strengthened by the precedent analysis. All the different parts finally came together in the design synthesis that encapsulated all the thoughts and concepts. This part was however not smooth sailing and the design development process was challenging. The layout of the scheme gave many problems initially with orientation and formgiving. However, with time it started to flow, creating spaces that finally allowed nature to become one with the architecture. With the final design proposal, the design elements, theoretical ideas, and structural solutions all started to come together to generate architecture that creates a symbiotic relationship between human and nature. Part 5 further contributed to the way the architecture respects and works with nature. Designing with intentional ruin in mind created a structure that could work with time gracefully, creating a heightened appreciation for nature over many years.



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