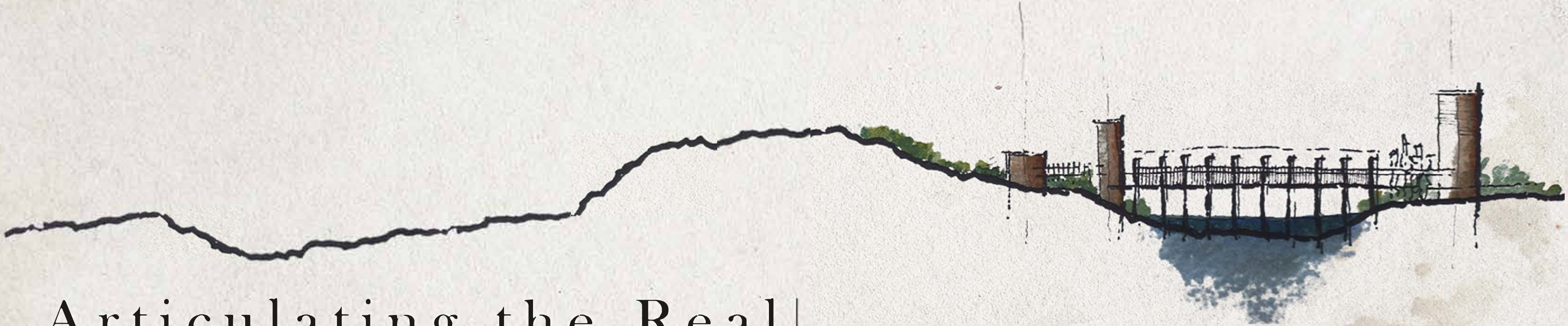

Articulating the Real and the Numinous

A Flood Control and Research Centre at the historic St. Helens Pump Station on the banks of the uMzimkhulu River.

Cara du Plessis | 2018257184

Fig. 1. uMzimkhulu River (author)

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

Fig. 2. Flood Damage (Mbatha, 2022: online)

ABSTRACT

There is potential magic within a hybrid "third space" of science and divination where the past omens and present practises can be tied together by string to aid the current flooding crisis. **How can dialogical forms and orders drawn between the practices of science and divination, articulate and bridge the gap between the real and the numinous, embody the methodologies of the oionistic oracle, and highlight the importance of reading and memorialising past omens in an effort to address the current terrors of flooding?** Past efforts to address the South African flooding crisis have led to many quantitative and scientific approaches that evaluate rainfall, water management and infrastructure but seldom approach the crisis by way of divination, through which a higher realm of information can be tapped into. This dissertation introduces a new way of approaching flooding by designing a Flood Control and Research Centre that highlights the potential within the intertwined relationship between science and divination in an attempt to respectfully articulate the two where the roles of divination and the roles of science meet and work together in a hermeneutic relationship. Further investigation included analyzing the existing context regarding the project theme, testing three different theoretical stances and studying appropriate precedents. This design approach is able to broaden and challenge the dweller's perspective of seemingly opposite practices and provide a paradigm for future flood crisis approaches.

KEYWORDS

Hybridity | Science | Divination | Flooding | Omens

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PROJECT SUMMARY

Program: Flood Control and Research Center, April 2022 Flood Memorial and Flood Capsule

Location: uMzimkhulu River, Port Shepstone, KwaZulu-Natal, South africa

Coordinates: 30°42’20.8”S 30°23’30.5”E

Client: The Council for Scientific and Industrial Research (CSIR), and will seek funding from different investors including governmental organisations and institutes.

Users: Scientific Researchers, Diviners and people of the community who want to understand flood risks, adopt preventive measures, and participate in community-based flood management initiatives.

Theme: A hybrid “third space” of science and divination where the past omens and present practises can be tied together by string in an attempt to aid the current day flooding crisis.

Research Question: How can the articulation of the practices of science and the nature of divination inspire a poetic architectural approach, able to bridge the gap between the real and the numinous, embody the methodologies of the oionistic oracle, and highlight the importance of reading and memorializing past omens in an effort to address the current terrors of flooding?

Aim: To broaden and challenge the dweller’s perspective of seemingly opposite worlds and provide a paradigm that attempts to find possible solutions to the current flood crisis.

Fig. 3. River Bridge (author)

"The laws of man have always superseded those of nature," we say whilst everything is disappearing into murky waters. KwaZulu-Natal is drowning. Trees have found shelter in the shacks of men with their roots hiding in closets, swelling and collapsing houses. Roads are giving way as the ground is parting, concaving, and eating away at itself. Mud is sliding downhill, sweeping away townships where many informal settlements are built on a slope with limited foundations and flimsy dwellings. Inhabitants of KwaZulu-Natal are learning the dialect of fish. All that remains is submerged, highways and low-lying paths and rivers all the same. Before the heavens opened, the streets were saturated with filth. Perhaps before the rain started to fall, nature remembered that the roads and bridges are dirty and then washed them away. We are now left with days without power or fresh water, and with Durban's poorest residents lining up to collect buckets full of burst pipes as they dig through layers of mud to retrieve their few possessions. With hollow tummies, they are now waiting for a dove to bring back a leaf to their ruins, hoping for a new song for the river. Months worth of rain falling in just one day is no small feat. Weather experts say apocalyptic levels of rain were dumped on the region over several days with the water levels in tune with the death toll, on a mission to rise. 443 Lives were lost and more than 40 000 lives were affected by the heavy downpours and floods. We pray the waters have found what they were looking for and that the doves will bring their leaves. (Serumula, 2022: online; adapted by the author)

Fig. 4. Desperate lives after the April 2022 Floods (Ndlovu, 2022: online)

01.1. INTRODUCTION

A South African poet, Rabbie Serumula, wrote "When mother nature speaks, humans are collateral" as a response to the devastating April 2022 floods that took place in and around the coastal area of KwaZulu Natal. According to the Council of Scientific and Industrial Research (CSIR), floods are the most frequently recorded disaster in southern Africa with South Africa experiencing 77 major floods between only 1980 and 2010, costing the lives of at least 1,068 people (CSIR, 2019: online). Research can accentuate the significance of the flood crisis and the threat it poses to society. It is crucial to explore approaches for tackling this pressing issue and providing assistance to those affected. Simply relying on scientific and engineering measures to address the effects of flooding appears to be inadequate in isolation. Therefore, this dissertation introduces a unique perspective by not only looking for answers in science but also delving into the realm of divination and its enduring relevance within ancient and current African practices.

These age-old traditions have stood the test of time, offering invaluable support to communities during times of crisis. By examining the role of divination in the context of the flood crisis, we can uncover alternative insights and potential solutions that may complement existing scientific approaches and contribute to more holistic and community-centred flood management strategies.

This dissertation explores ways of bridging the gap between scientific advancements and traditional wisdom, forging new paths that fuse the best of both worlds. By embracing the insights offered by divination practices, we enrich our understanding of the flood crisis and foster a more compassionate and community-driven response. It is through this interdisciplinary exploration that we have the potential to find innovative solutions and pave the way for a more resilient and inclusive future in managing and mitigating the devastating effects of floods.

The chosen site is located adjacent to the St. Helen's Rock Water Pump Station, positioned nine kilometers upstream from the uMzimkhulu River mouth at Port Shepstone. Its historical significance is notable, given its association with the movements of the Zulu and Mpondo tribes. Additionally, the area encounters annual floods and salinated water control issues, making it an ideal location for testing and research purposes.

In this dissertation, the articulation of science and divination takes centre stage, guiding the structure and narrative. By examining these binary positions or fields, we lay the foundation for a profound understanding of each practice. However, the true essence lies in discovering the moments of connection, where these seemingly divergent realms intertwine and harmoniously engage with each other, giving birth to something hybrid and transformative.

Fig. 5. Divinatory rituals within a river in flood (Aponte, 2012: online)

Theoretically, this ties in with the concepts of magic realism, hybridity, and spiritual design principles, which offer insight into how to address the articulation between the rational and contemporary nature of science and the spiritual and magical nature of divination in an architectural language. Magic realism encourages the incorporation of fantastical elements into the design, bridging the gap between the mundane and the extraordinary. Hybridity facilitates the seamless blending of diverse cultural and architectural influences, acknowledging the coexistence of various belief systems and design approaches. Meanwhile, spiritual design principles emphasize creating spaces that promote a deeper connection with the environment and a sense of transcendence, aligning with the spiritual aspects of divination. By integrating these theories, spaces could be crafted that harmoniously reconcile the complexities of human beliefs and experiences, resulting in a culturally sensitive and emotionally resonant built environment.

How can the hybrid intertwinement of the magic and real, offer design tools for a Flood Crisis Centre, which employs the knowledge innate to, and bridge the gap between, science and divination?

Past efforts to address the South African flooding crisis have led to many quantitative and scientific approaches that evaluate rainfall, water management and infrastructure but seldom approach the crisis by way of divination, through which a higher realm of information can be tapped into.

This dissertation introduces a new way of approaching flooding by designing a Flood Control and Research Centre that highlights the potential within the intertwined relationship between science and divination in an attempt to respectfully articulate the two where the roles of divination and the roles of science meet and work together in a hermeneutic relationship.

This design approach is able to broaden and challenge the dweller's perspective of seemingly opposite practices and provide a paradigm for future flood crisis approaches.

Included in the Flood Control and Research Centre are:

- Research labs
- Water filtration and testing facilities
- Greenhouses
- Auditorium / Nondenominational church
- An adjustable berm
- 2022 April flood memorial
- Flood capsule
- Performance Space
- Ritual pods and
- Services and Offices

Chapter 01

01.2. KWAZULU-NATAL FLOOD-LINE | Project Rationale

Floods are the most frequently recorded natural disaster in southern Africa with the April 2022 KZN floods being the most recent (CSIR, 2019). It is important to reflect on whether or not these events are noteworthy enough to consider being labelled as a crisis. South Africa as a whole has experienced many floods in the past but for the purpose of this study, focus will be put on the historic flooding events of KwaZulu-Natal. This subsection acts as a story map that analyses the current state of flooding in KwaZulu-Natal and the implications that these disasters have on the area. The story map will provide an overview of the most noteworthy deluges known to ever hit the province as well as the number of floods that have happened between the years 1850 and 2022. Only after we stand back and consider the catastrophic effects of these natural disasters can we truly justify not only the importance of action against them but the urgency thereof.

18 56

14 - 16 April
3 Days - 691mm
Named 'THE GREAT FLOOD'.
Several drowned.
(BARNES, 2010)

18 68

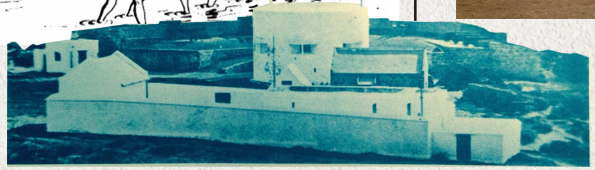
29 - 30August
2 Days - 420mm
Infrastructural damage between £80 000 to £130 000.
(Unknown, 1868)

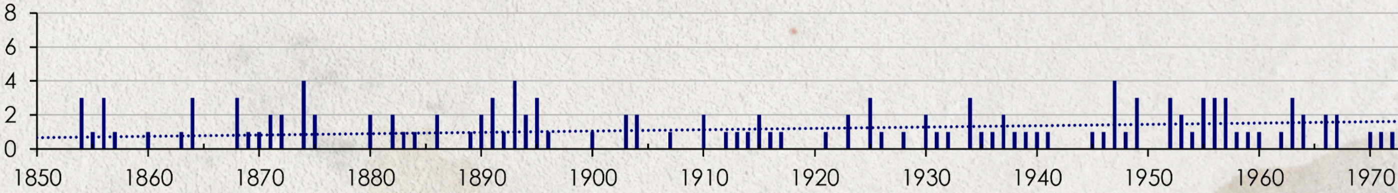
19 05

01 June
15 Hours - 397mm
Between 200 and 300 lives lost.
Railways destroyed.
(Unnown, 1905)

19 08

17 - 19 April
3 Days - 577mm
(Unknown, 1908)





1909

19 - 21 January
3 Days - 634mm
(Unknown, 1909)

1925

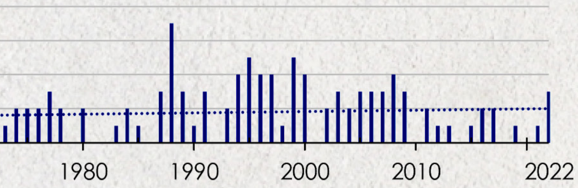
March
9 Days - 1187mm
Damage over £40 000.
Plantations, bridges and Railways destroyed.
(Unknown, 1925)

2019

April
1 Day - 165mm
Loss of 67 lives, mudslides, the collapse of buildings and destruction of infrastructure.
(Giordano, 2019)

2022

April
1 Day - 351mm
443 Lives Lost.
Over 40 000 Displaced.
(Mbatha, 2022)



	Total Years	Total Floods	Per Annum
1850 - 1899	49	53	1.08
1900 - 1979	79	105	1.33
1980 - 2022	42	105	2.5

The statistics used for this story map are taken from a study called "A new flood chronology for KwaZulu-Natal (1836–2022): the April 2022 Durban floods in historical context" and was conducted by S.W. Grab and David J. Nash. In their research, the team meticulously documented a total of 53 significant flood events that occurred between 1850 and 1899, which means they averaged about 1.08 floods per year during that period. Similarly, their records show that from 1900 to 2022, they observed and recorded 210 flood events, averaging approximately 1.72 floods per year. Through their study, **the researchers suggest that the frequency of flooding in Durban has likely doubled** over the course of the past century (Nash, 2023).

One noteworthy finding emphasized by the authors is that their research solidifies the **April 2022 floods as the most devastating natural disaster ever documented in KwaZulu-Natal**. These floods caused an immense loss of lives and had an unprecedented impact on the region's economy. The collective toll of human lives lost and the severe economic consequences have established the April 2022 floods as an unparalleled catastrophe in the history of KwaZulu-Natal.

01.1.1 DISASTER IN NUMBERS

To truly understand the impact of the April 2022 floods, we can delve into the numbers that encapsulate the magnitude of this catastrophic event. By analyzing the flood through a statistical lens, we can gain a deeper understanding of the immense scale of its devastation.

- **Between 200 and 400 mm** – of rainfall was received in parts of KwaZulu-Natal in a 24-hour period, on 11 and 12 April 2022.
- **443** – people known to have lost their lives in KwaZulu-Natal, by 18 April 2022.
- **Approximately 48** – people missing or unaccounted for, by 18 April 2022.
- **About 300** – homes were destroyed by a devastating fire in Langa in the Western Cape.
- **Around 1 000** – people were displaced by a devastating fire in Langa in the Western Cape.
- **Nearly 4 000** – homes were completely destroyed by the floods in KwaZulu-Natal.
- **Over 8 300** – homes were partially damaged by the floods in KwaZulu-Natal.
- **More than 40 000** – estimated number of people displaced by the floods.

- **13 000** – heavy vehicles that the flood damaged
- **Over 270 000** – estimated number of learners affected by the floods.
- **Over 600** – schools were damaged by the floods.
- **16** – schools that cannot be accessed due to damage to connecting roads and bridges, by 18 April 2022.
- **66** – public healthcare facilities affected by the floods.
- **247** – number of rescue operations, by 18 April 2022.
- **100** – additional water tankers deployed in KwaZulu-Natal, by 18 April 2022.
- **Around 1 300** – road repair projects identified by the agencies involved, by 18 April 2022.
- **R1 billion** – that National Treasury has made immediately available to provide relief and to rebuild.

(Issued by: Government Communications)

It is of utmost importance that we recognize and respond to these findings on a human level. The story map presented in this study serves as a poignant reminder of the devastating consequences that flooding has inflicted upon the people of KwaZulu-Natal. It unveils a narrative of lives upended, homes destroyed, and communities shattered by these recurring disasters. By delving into the historical context and comprehending the gravity of recent events, we gain a deeper understanding of the profound urgency that underlies the need for action. The statistics and records become more than mere data points; they represent the stories of individuals and families who have suffered unimaginable losses. With this study, we know that the amount, as well as the intensity of these recurrent floods, are increasing thus highlighting why the topic of this flood crisis isn't just important, it is necessary.

Fig. 6. Aftermath of KZN floods (Soodyal, 2022: online)

01.3. AUTHORS NOTE

Now that we have gained a comprehensive understanding of the significance of the flood crisis and the threat it poses to society, it is crucial to explore approaches for tackling this pressing issue and providing assistance to those affected. This subsection attempts to bring us closer to such approaches by unpacking the contrasting aspects of science (on the left-hand pages) and divination (on the right). By examining these extremes, we lay the foundation for a profound understanding of each practice. However, the true essence lies in discovering the moments of connection, where these seemingly divergent realms intertwine. These special hybrid pages, where science and divination converge, will be visually distinguished by a warm overlay, akin to the one on this very page. This symbolic representation serves as a visual testament, demonstrating how these two seemingly opposite worlds can harmoniously engage with each other, giving birth to something truly magical and transformative.

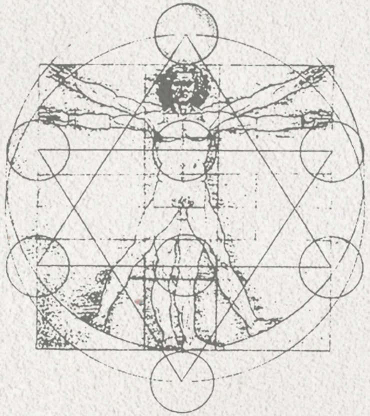
To provide an introduction to the two realms of research, this subsection adopts a structured approach. Firstly, it defines the practices of science and divination, establishing a clear understanding of their respective methodologies and principles. Subsequently, it delves into the topic of floods, examining it through the lenses of both scientific analysis and divinatory perspectives, both in isolation and within the specific context of South Africa. This exploration sheds light on the unique insights and interpretations each field brings to comprehend flood events. Furthermore, the chapter presents two case studies that illustrate the practical application of both science and divination in aiding flood crises.

Fig. 7. Interpretation sketch of Divine power amidst the floods (author)

Science

• sci·ence - [‘sī-ən(t)s]

The systematic and organized knowledge derived from observation, study, and experimentation that is used to explain and understand the natural and physical world. It involves the application of rigorous methods and principles to gather empirical evidence, formulate theories, and make predictions. Science encompasses various disciplines, such as physics, chemistry, biology, and astronomy, and aims to discover and expand our understanding of the universe through evidence-based inquiry (Wilson, 2009).



REASON

OIONISTIC

OBJECTIVE

COLLECTIVE

QUANTITIVE

MASCULINE

LITERAL

PREDICTION

REAL

NATURAL

RATIONAL

OUTWARD OBSERVASION

Methodology:

Relies on tangible evidence, careful observations, experiments, and systematic processes to investigate and explain natural phenomena. Scientists follow specific procedures, gather data, and use logical reasoning to form hypotheses and draw conclusions.

Basis of Knowledge:

Strives to build knowledge based on empirical evidence, objective observations, and explanations that can be tested and validated. It emphasizes reproducibility, peer review, and critical analysis to establish reliable knowledge.

Predictability and Control:

Aims to understand natural phenomena, develop theories, and create models that allow for prediction, control, and manipulation of those phenomena. Scientists seek to uncover cause-and-effect relationships and provide explanations based on natural laws and principles.

Falsifiability:

Holds that hypotheses and theories should be testable and potentially disprovable through experimentation or observation. Scientific claims are subject to scrutiny, revision, and refinement based on new evidence.

Cultural and Historical Context:

Has emerged in the modern era, emphasizing rationality, empirical evidence, and skepticism. It is deeply rooted in the Western scientific tradition and has evolved through centuries of scientific advancements.

Divination

EMOTION

MANTIC

SUBJECTIVE

INDIVIDUAL

QUALITIVE

FEMININE

SYMBOLIC

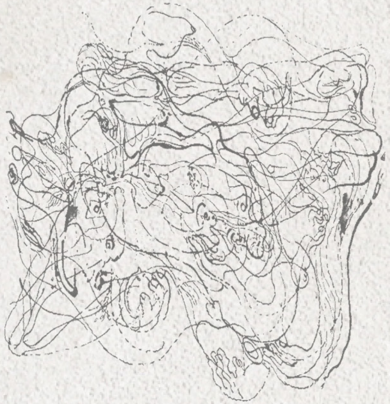
PROPHECY

NUMINOUS

SUPERNATURAL

MAGICAL

INWARD REFLECTION



• div·i·na·tion - [di-və-ˈnā-shən]

The practice of seeking insight, guidance, and understanding through supernatural or spiritual means within the context of culture and tradition. It encompasses various forms, such as the reading of symbols, signs, oracles, or the interpretation of dreams and visions. It often involves rituals, ceremonies, and the use of specific tools or mediums to communicate with ancestral spirits or other divine entities in order to gain wisdom, guidance, and predictions about the past, present, or future (Tedlock, 2001).

Methodology:

Involves mystical or supernatural practices, like interpreting signs, symbols, or supernatural communication, to gain insights or predictions about the future or hidden aspects of reality.

Basis of Knowledge:

Relies on personal experiences, intuition, spiritual beliefs, or traditional wisdom passed down through generations. The knowledge gained through divination is often subjective, dependent on specific contexts, and not easily subject to external verification.

Predictability and Control:

Focuses more on obtaining insights, guidance, or predictions about the future or hidden aspects of reality. It is often seen as a means to connect with spiritual or supernatural realms and is less concerned with predicting or controlling natural events.

Falsifiability:

Involves subjective interpretations, personal beliefs, or cultural practices that are not easily subject to falsification. The interpretations and predictions derived from divination may not be verifiable or falsifiable through empirical means.

Cultural and Historical Context:

Has a diverse historical and cultural context. It is often tied to spiritual or religious practices and reflects a wide range of belief systems, cultural traditions, and ways of understanding the world.

In scientific terms, a flood can be described as an event where water surpasses its normal boundaries, resulting in the submergence of typically dry areas. This occurrence arises from the overflow of water onto the land surface, primarily caused by factors such as intense rainfall. The genesis of floods involves intricate interactions between meteorological, hydrological, and geological elements. When there is exceptionally heavy or prolonged precipitation, the soil's capacity to absorb water can be overwhelmed, leading to the accumulation of surface runoff and subsequent flooding. Additionally, the melting of snow in mountainous regions contributes to heightened river flow downstream, thereby fostering flood occurrences. It is worth noting that various other factors, including dam failures, alterations in land usage, and coastal storms, can also play significant roles in both the incidence and severity of floods (AMS, 2017).

SCIENTISTS:

- analyze the complex interactions between precipitation, evaporation, infiltration, runoff, and river systems to understand the causes and impacts of flooding.
- use a variety of tools and techniques to investigate floods, like employing rain gauges, weather radar, and satellite imagery to monitor rainfall patterns and predict potential flood events.
- run stream gauges and river monitoring stations that provide data on water levels, flow rates, and discharge in rivers and streams.
- use mathematical models and computer simulations that simulate flood events and understand the behavior of water in different environments.
- analyze historical flood data, assess vulnerability in flood-prone areas, and develop flood forecasting and warning systems to minimize the risks associated with flooding.
- explore ways to manage and control floods, such as through the construction of flood control structures, land-use planning, and the restoration of natural floodplains.
- investigate the effects of climate change on flood patterns, considering factors such as rising sea levels, changing precipitation patterns, and increased intensity of storms.

In the realm of divination, floods are often perceived as significant natural occurrences imbued with profound spiritual implications and messages. They are regarded as powerful manifestations of spiritual forces and energies, symbolizing a disruption in the equilibrium between the physical and spiritual realms. Within this context, floods are believed to arise from divine intervention or the influence of spiritual energies seeking to communicate with human beings. Interpreted through the lens of divination, a flood represents concepts such as purification, cleansing, or renewal. It signifies the potential necessity for individuals or communities to embark on a spiritual metamorphosis or release accumulated negative energies and emotions. Divination acknowledges the interconnectedness that exists between humans, nature, and the spiritual realm. As a result, the understanding of a flood surpasses its mere physical manifestation and delves into the spiritual and metaphysical dimensions (Bwambale, et al., 2018).

DIVINERS:

- engage in rituals and ceremonies to establish a connection with the spiritual realm and seek guidance related to floods.
- employ a range of divination tools to gather information and interpret the significance of floods. Diviners may cast or manipulate these objects, observing their patterns or positions to derive meaning and insights.
- skilled in interpreting symbols and signs like changes in animal behavior, cloud formations, wind patterns, or unusual occurrences in the landscape as potential indicators of impending floods
- through trance or altered states of consciousness, may communicate with ancestral spirits, receiving messages, warnings, or advice related to floods and their potential impact on the community.
- draw on the rich oral traditions and accumulated knowledge passed down through generations. These oral traditions provide insights into historical flood events, their causes, and the strategies employed by previous generations to cope with them.
- actively engage with the local community to gather information and experiences related to floods by listening to the stories, observations, and concerns of community members.

In the context of South Africa, specific organizations are actively engaged in studying floods, collecting data, conducting research, and devising strategies to mitigate their impact. These institutions are pivotal in advancing our understanding of floods and implementing effective flood management practices. This section focuses on highlighting some notable flood research centers within South Africa that contribute significantly to this field.

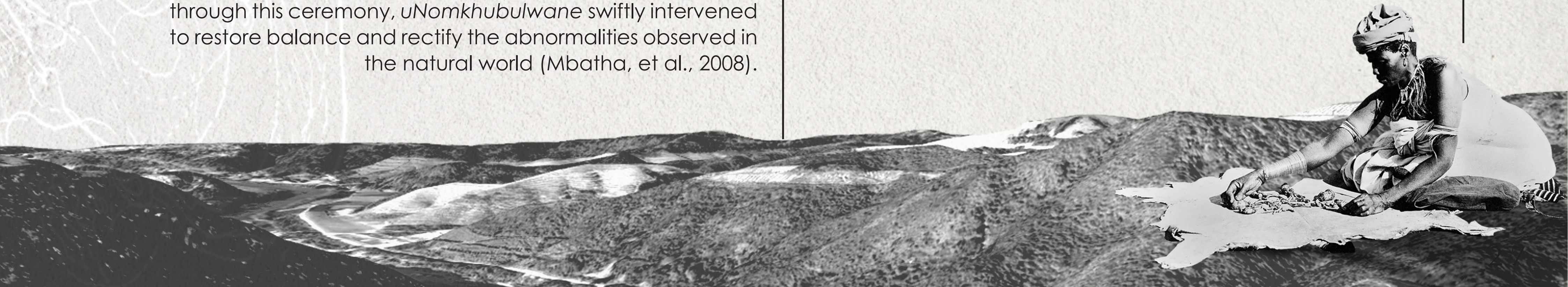
Council for Scientific and Industrial Research (CSIR)

The CSIR is one of South Africa's leading research institutions, and it has a dedicated Water Research Center that focuses on various aspects of water resources management, including flood research. Their scientists and engineers conduct studies on flood modelling, flood risk assessment, and flood management strategies. One of their ongoing projects is the CSIR coastal flood risk viewer which consists of an interactive web-based tool to visualise the extent of coastal flooding in specific areas (CSIR, unknown).

While divination is not typically associated with active research like in the scientific realm, there are certain rituals present in African cultures that engage in the exploration of spiritual and metaphysical aspects related to floods. South African diviners explore the meaning and different interpretations of floods by engaging in different ceremonies and rituals. Following are some of the most notable rituals used in southern Africa.

Zulu Tribe – Kwazulu - Natal

Floods, plagues, and other natural calamities are often perceived as manifestations of ancestral anger. In response, diviners undertake journeys to sacred waterfalls, rivers, and dams to conduct prayers and traditional rituals. The indigenous Zulu people, with their profound understanding of seasonal changes, possessed the ability to anticipate any irregularities. These predictions were rooted in the rich knowledge systems passed down by their ancestors. When weather anomalies were foreseen by elders, the community would organize and carry out the *uNomkhubulwane* ceremony, honouring the Zulu deity of rain. It is believed that through this ceremony, *uNomkhubulwane* swiftly intervened to restore balance and rectify the abnormalities observed in the natural world (Mbatha, et al., 2008).



South African Weather Service (SAWS)

SAWS has the important task of keeping an eye on weather patterns throughout South Africa. They provide essential information and issue warnings regarding heavy rainfall that could potentially result in floods. The dedicated research teams at SAWS meticulously study meteorological data, rainfall patterns, and the effects of climate change. By doing so, they continuously improve flood forecasting capabilities and early warning systems to ensure the safety and well-being of communities (SAWS, 2023).

University of KwaZulu-Natal (UKZN) - Centre for Water Resources Research (CWRR)

CWRR consists of dedicated researchers who delve into various facets of water resources, including the intricate realm of floods. The CWRR explores flood hydrology, meticulously analyzes flood frequency, creates detailed maps to identify flood risks and delves into effective flood management practices. The invaluable research conducted by CWRR at UKZN plays a pivotal role in expanding our understanding of water resources and bolstering the resilience of communities in the face of floods (CWRR, 2023).

Pedi Tribe - Northern Sotho

Rain prevention rituals are conducted by both the *moroka*, a rain specialist, and ordinary villagers, particularly during significant events like weddings. In ancient times, people used the forehead skin of a cow, known for its strength against thorn pricks, to create shoes that were believed to deter rain. However, modern practices have replaced cow skin with conventional shoes. During ceremonies, an older or middle-aged woman carries a shoe on her back as a symbolic rain deterrent. As long as the shoe remains on her back, rain is believed to be kept at bay. Once the ceremony concludes, and the shoe is removed, rain often begins to fall, as if responding to the removal of the protective charm (Ashiley, 2019).

Mpondo Tribe – Eastern Cape

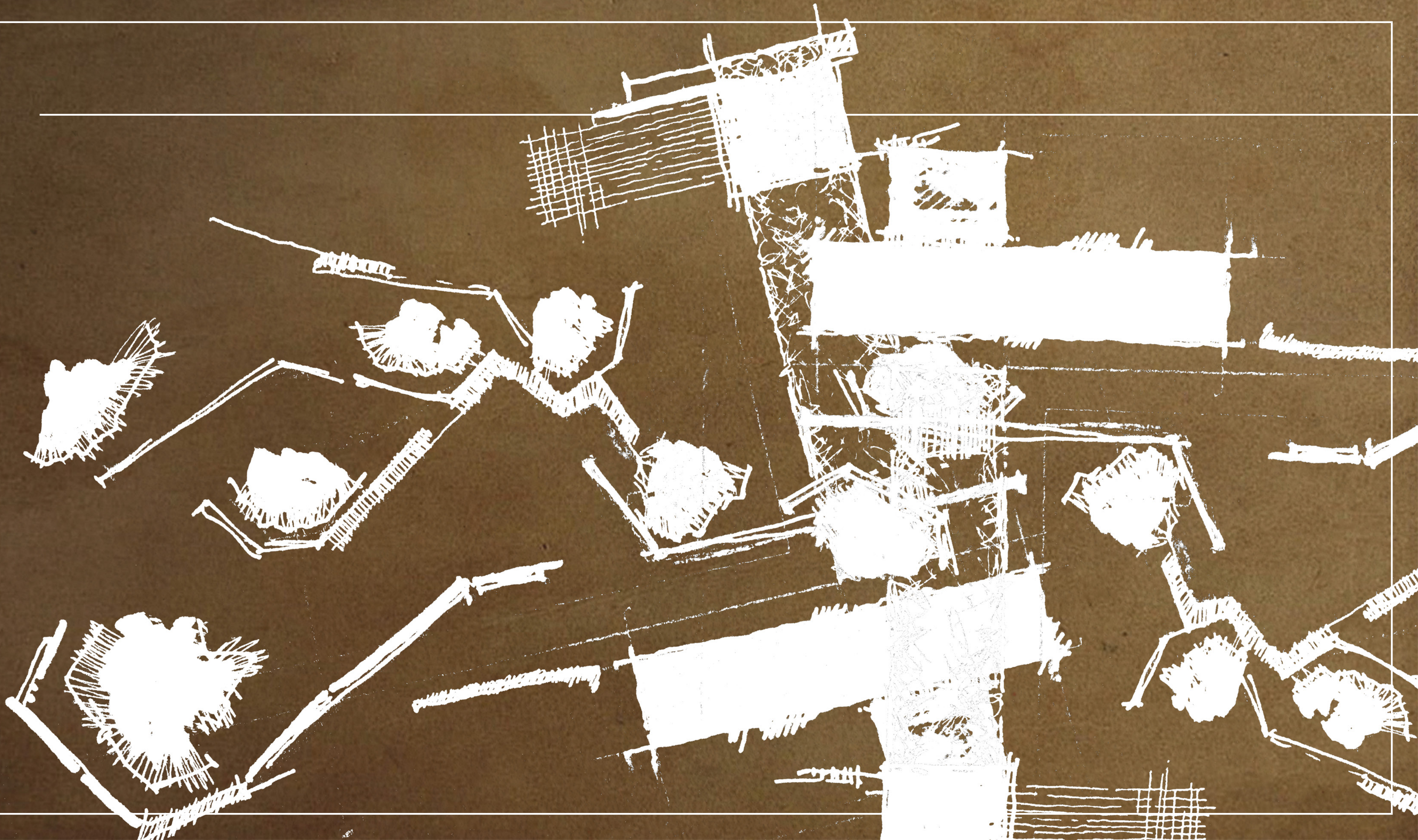
When faced with dark clouds, strong winds, and heavy rain, the Mpondo people employ a collective approach to ward off floods. They emerge from their dwellings, raising their voices in shouts and drumming. The chants "*Sichotho bhek'eMbo*" (Go to the place of Mbo) and "*Yiya kwa Myalwana*" (Go to the place of Myalwana) resound, harmonizing with the rhythmic beats of the drums. These songs serve to redirect the storm away from their community. By sending the storm elsewhere, the Mpondo community rejects the presence of floods, ensuring their safety and well-being. Each member of the community embraces their own preventive measures to counter a harsh rainy season, reinforcing their resilience against such natural calamities (MCETYWA, 2001).

This information proves to us that there is currently active participation of organizations in South Africa dedicated to flood research, data collection, and the development of mitigation strategies. These institutions play a vital role in advancing our knowledge and implementing effective flood management practices, contributing significantly to the field of flood research within the country. Through their efforts, we gain a deeper understanding of water resources and bolster the resilience of communities facing flood-related challenges.

These organizations offer valuable insights into the current state of flood research in South Africa, shedding light on the technological advancements available in the region. However, it is crucial to recognize that solely relying on scientific and engineering measures may not sufficiently address the complex effects of flooding. This subsection subtly underscores the lack of a more subjective and phenomenological perspective on the current approaches to the understanding of floods.

These rituals demonstrate the deep-rooted connection between spirituality and the natural world within South African cultures. While divergent from scientific research, they provide alternative perspectives and insights into the human relationship with floods. Acknowledging and understanding these rituals can contribute to a more comprehensive and holistic approach to flood management, combining scientific knowledge with cultural wisdom.

Exploring and respecting diverse cultural practices enriches our understanding of floods and enables us to develop more inclusive and effective strategies to mitigate their impact. By bridging the gap between traditional rituals and scientific research, we can foster a deeper appreciation for the interconnectedness of humans and nature, fostering resilience and well-being in the face of natural calamities.



01.4.3 PRACTICAL APPLICATION

The integration of divination and science poses significant challenges due to the fundamental disparities in their epistemologies and methodologies. Divination leans on subjective interpretations, intuition, and spiritual convictions, whereas science emphasizes empirical evidence, systematic observation, and testable hypotheses. Nonetheless, there are some aspects within each practice that may complement each other and may offer a realistic insight into the possibility of successfully intertwining these two disciplines.

An example of this includes how the traditional knowledge of diviners can be used to interpret signs from nature, such as animal behaviour or weather patterns, to forecast potential flooding events which can then be interpreted by scientific hydrologists into modern flood prediction and early warning systems. This exchange of information can also be reciprocated, for scientists can offer climate information, seasonal forecasts, and early warning signs about flooding to diviners. This valuable data can enhance diviners' comprehension of natural phenomena and empower them to make well-informed decisions during and after flood events.

To further draw closer to a realistic and appropriate implementation of practises this dissertation will examine three relevant case studies that give insight into how the world of divination and the world of science can harmoniously collide to try to address pressing issues. These three case studies include ***The Cape Underground Water Rush*** in 1891, ***OPEN MINDS Urban Futures Exhibition*** in 2000 and the ***Integrating Indigenous Knowledge in Climate Risk Management Project*** in 2010.

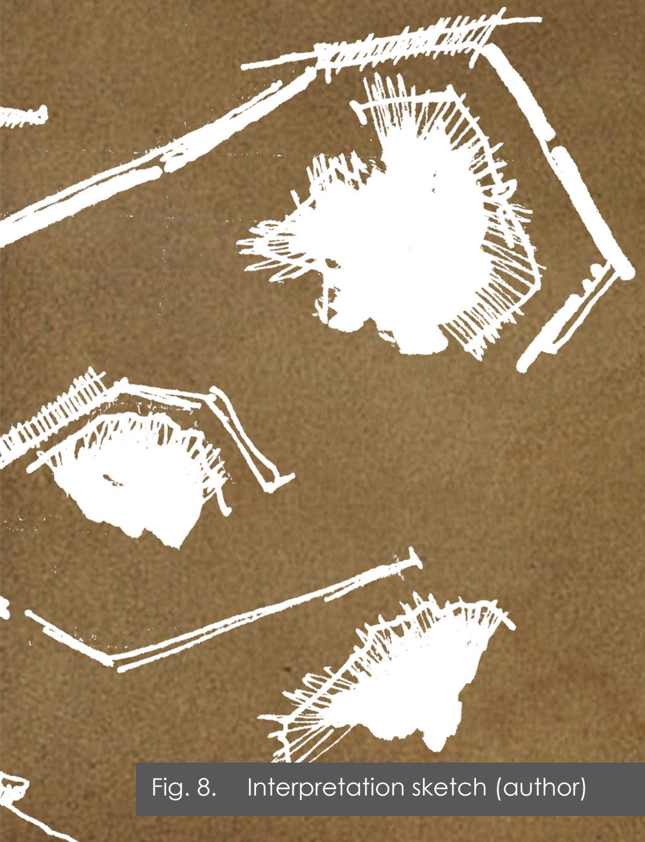


Fig. 8. Interpretation sketch (author)

a) The Cape Underground Water Rush

In "The Supernatural State: Water Divining And The Cape Underground Water Rush, 1891-1910," Dr L. van Sittert challenges the notion that Western science is inherently superior to traditional African beliefs and practices. The common perception of Western science as rational and other knowledge as irrational or superstitious is deemed overly simplistic. To support his argument, he delves into the practice of water divining in southern Africa as a compelling example.

Water divining is a cherished traditional practice used to locate underground water sources like wells, aquifers, or underground streams. In southern Africa, both Western settlers and indigenous people relied on skilled water diviners to find precious water sources to use for their crops and livestock.

During the late 1800s in the dry landscape of the Cape Colony, the government actively sought methods to discover more underground water. Scientific techniques, including geological studies and engineering, were utilized to identify potential water sources. However, many settlers and farmers in the region remained sceptical of solely relying on Western experts and chose to place their trust in the local water diviners.

Initially, the government discouraged the use of water divining, but its effectiveness was eventually recognized. As private companies took over the task of locating water sources in the mid-1900s, the government began supporting and officially adopting water divining alongside scientific studies as a valuable approach to searching for water.

This exploration beautifully showcases the intertwining of both scientific rigour and cultural wisdom in addressing the issue of water shortages. The journey to bring together these seemingly binary practices was not without its challenges, as stereotypes regarding divinatory practices abounded. However, the convergence of Western settlers and indigenous water diviners showcased the power of diverse knowledge systems coming together to tackle challenges and fostered a shared understanding of our relationship with the natural world (Sittert, 2004).

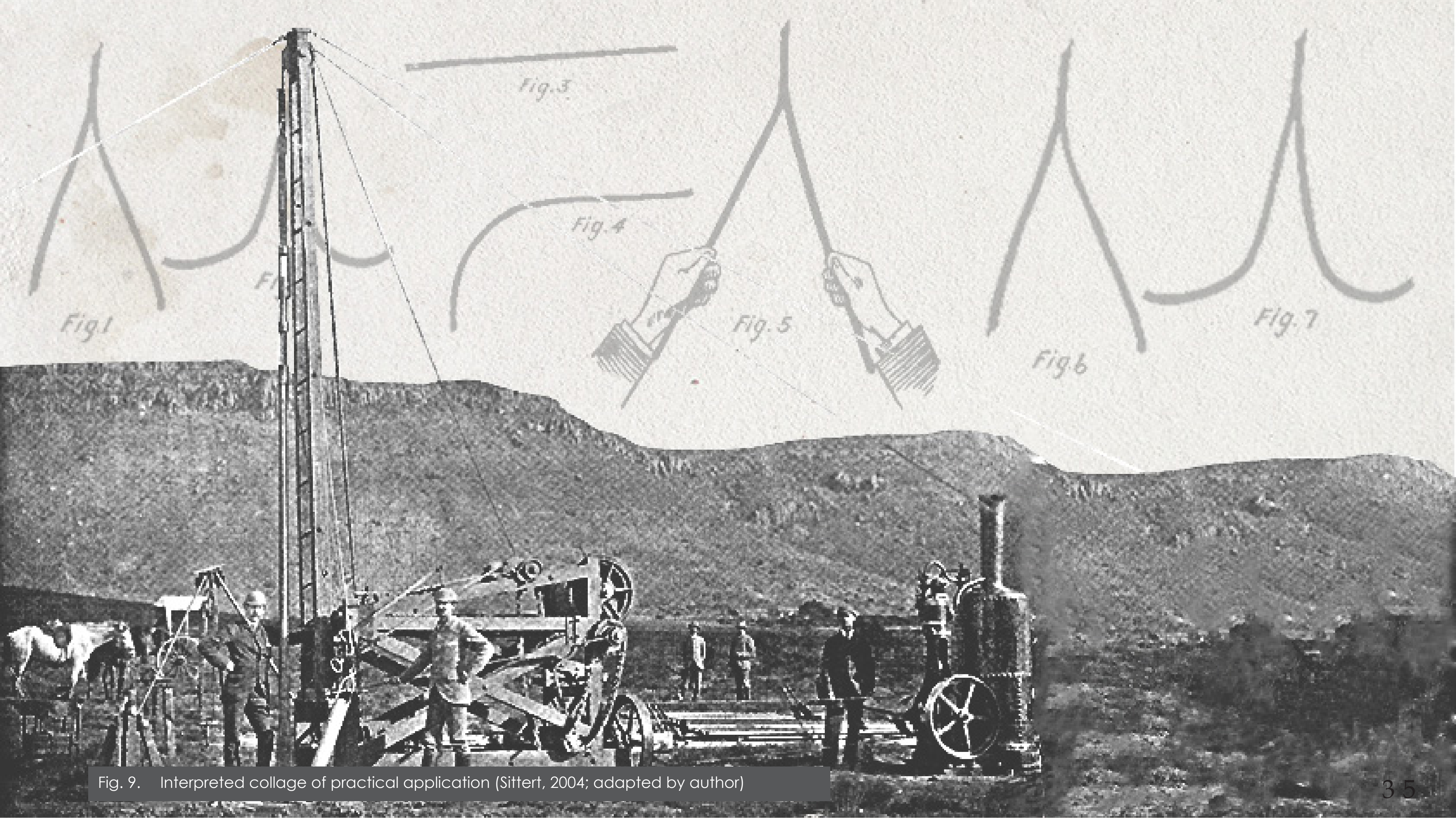


Fig. 9. Interpreted collage of practical application (Sittert, 2004; adapted by author)

b) OPEN MINDS Urban Futures Exhibition

In his article titled "Traditional African divination systems as information technology," André Croucamp, a South African exponent of divination, introduces a unique approach to a thinking skill technique, inspired by traditional African divination systems. The application of this technique by Open Minds Workshop has proven to be highly effective in tackling diverse challenges discussed during the workshops.

These workshops break down any divinatory tool into three fundamental principles:

1. Select a collection of symbolic objects, (these are often rooted in a long history of divination practices.)
2. Generate a random arrangement or pattern among these symbolic objects, (such as the throwing of the bones.)
3. Interpret the pattern and relationship between the objects to derive meaning.

Croucamp argues that this process indicates that divination is more akin to technology rather than primarily a system of belief or attitude. The workshop thus refers to it as a 'ritual technology' and in turn asks, "**What if we reconsidered 'throwing the bones' as a kind of information technology that accesses and organizes information?**"

During this exploration, a problem-solving technique was devised that integrates critical and creative thinking. This approach empowered problem solvers to effectively handle information within intricate systems. The remarkable success of this technique garnered an invitation to create a participative educational installation at the Urban Futures Exhibition in 2000 and has been used in a variety of settings including scenario planning, innovation workshops, cultural diversity workshops, conflict management and workshops that explore possible futures.

The success of the workshop proves how hybrid activities involving both the scientist and the diviner can change one's perspective into valuing alternative perceptions and open up the user to a constant process of redefining things. The participants likely experienced a profound shift in their thinking, recognizing that there is more than one way to interpret events and phenomena. The scientist's empirical and evidence-based methods blended with the diviner's intuitive and spiritual insights, presenting a multifaceted picture of truth. This newfound appreciation for alternative perceptions opens up avenues for personal growth and intellectual development (Croucamp, 2008).

Fig. 10. Interpreted collage of practical application (Croucamp, 2008; adapted by author)

c) Integrating Indigenous Knowledge in Climate Risk Management Project

Led by the IGAD Climate Prediction and Application Centre (ICPAC), this project aimed to "enhance the resilience of vulnerable communities to the negative impacts of climate variability and adapt to climate change through integration of indigenous knowledge (IK) and modern-day climate risk management science." Starting in September 2008, the project sought to leverage the strengths of both forecasting systems by establishing connections between them.

Admittedly this project does not define the difference between indigenous knowledge and divination but rather acknowledges that "IK knowledge of weather and climatic conditions are reflected in indigenous spiritual beliefs and symbols". This suggests that most of the IK gathered from the community was based on divinatory practices and that when they refer to IK they include divination as a source of information.

Bringing together scientific consultants and Nganyi indigenous knowledge forecasters (diviners), the project focused on building reconciliations between the two forecasting systems. The IK forecasters relied on observations of plants, animals, and stars to derive their forecasts, while the consultants collected data from both indigenous and modern-day scientific sources.

Over eight seasons, reconciled forecasts were spread through local communication channels such as chief barazas and churches. The project's success received positive feedback from both parties involved, leading the Kenya Meteorological Department to commit additional resources to support its continuation after September 2010.

This case study is important because it specifically deals with weather forecasting and demonstrates the potential of combining traditional forecasting methods with modern technological advancements.

On the one hand, traditional weather forecasting methods, often rooted in indigenous wisdom, have been passed down through generations and are deeply connected to local ecosystems and natural cycles. On the other hand, modern meteorological technologies harness sophisticated instruments, satellites, and computer models to analyze vast amounts of data from across the globe. Examining the integration of indigenous weather knowledge with cutting-edge meteorological techniques sheds light on the valuable insights that can be gained from the synergy of different approaches (Ogallo, 2010).

Fig. 11. Interpreted collage of practical application (Ogallo, 2010; adapted by author)

01.5. ESTABLISHING THE PROJECT

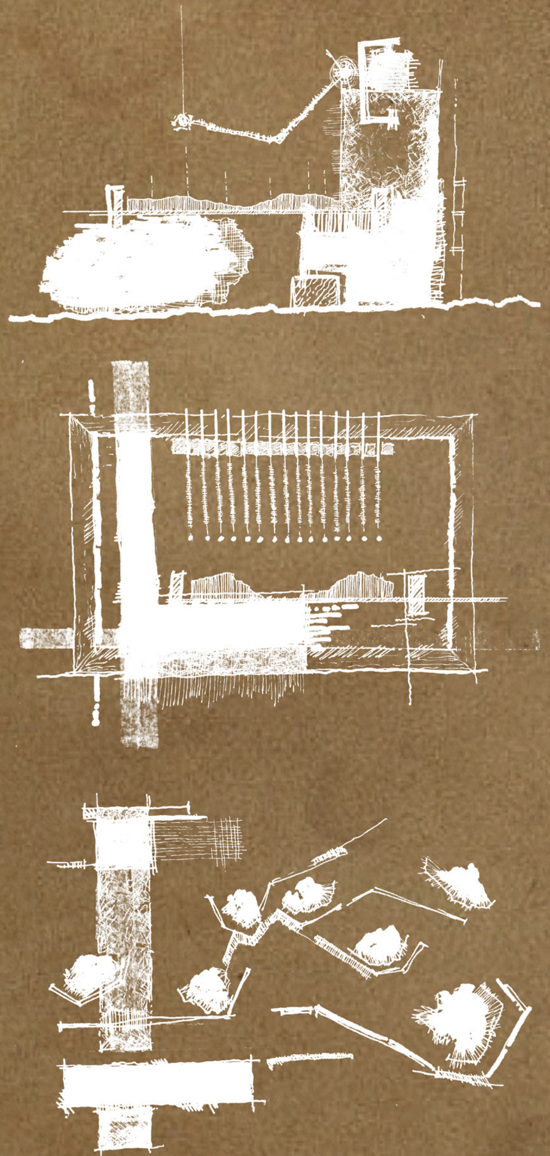
a) PROJECT ESSENCE (Touchstone)

Knowing that the implementation of these practices is realistic and appropriate it is necessary to start defining the project and to move closer to an architectural solution. In the initial stages of developing this dissertation, a crucial step involved delving into and articulating the essence of the thesis. This exercise guarantees that the project's fundamental elements are carefully considered and synthesized into a visual representation of the project's core essence. These essential aspects are explored through the act of poiesis, wherein the art of creation becomes a genuine exploration into the investigation.

In the case of this dissertation, the exploration delved into the relationship between two seemingly polar opposites. The essence lies within the articulation or meeting point between science and divination where the roles of divination and the roles of science interact in a hermeneutic relationship and thus is what the touchstone represents.

As a base, the touchstone rests upon a rock taken from the intended site, the Mzimkhulu River. This signifies the importance of stability within the floodplains and represents the presence of the flood crisis. On top of the rock rests the abstract interpretation of a science-based flood model where scientists use technology to determine the intensity of a predicted flood. Suspended above that is the hands of the diviner holding coal, a symbolic representation of what potential this relationship has. These hands are held by the forces above which are unexplainable through laws of nature and beyond scientific understanding.

When freed the coal drops onto the flood model and leaves behind markings of interaction. These markings are the essence of what the project tries to achieve, the meeting point of two completely different worlds in pursuit of creating something of profound significance. It is a realm where divination imparts an impact on science, and, in turn, science enriches the ancient African practices of divination.



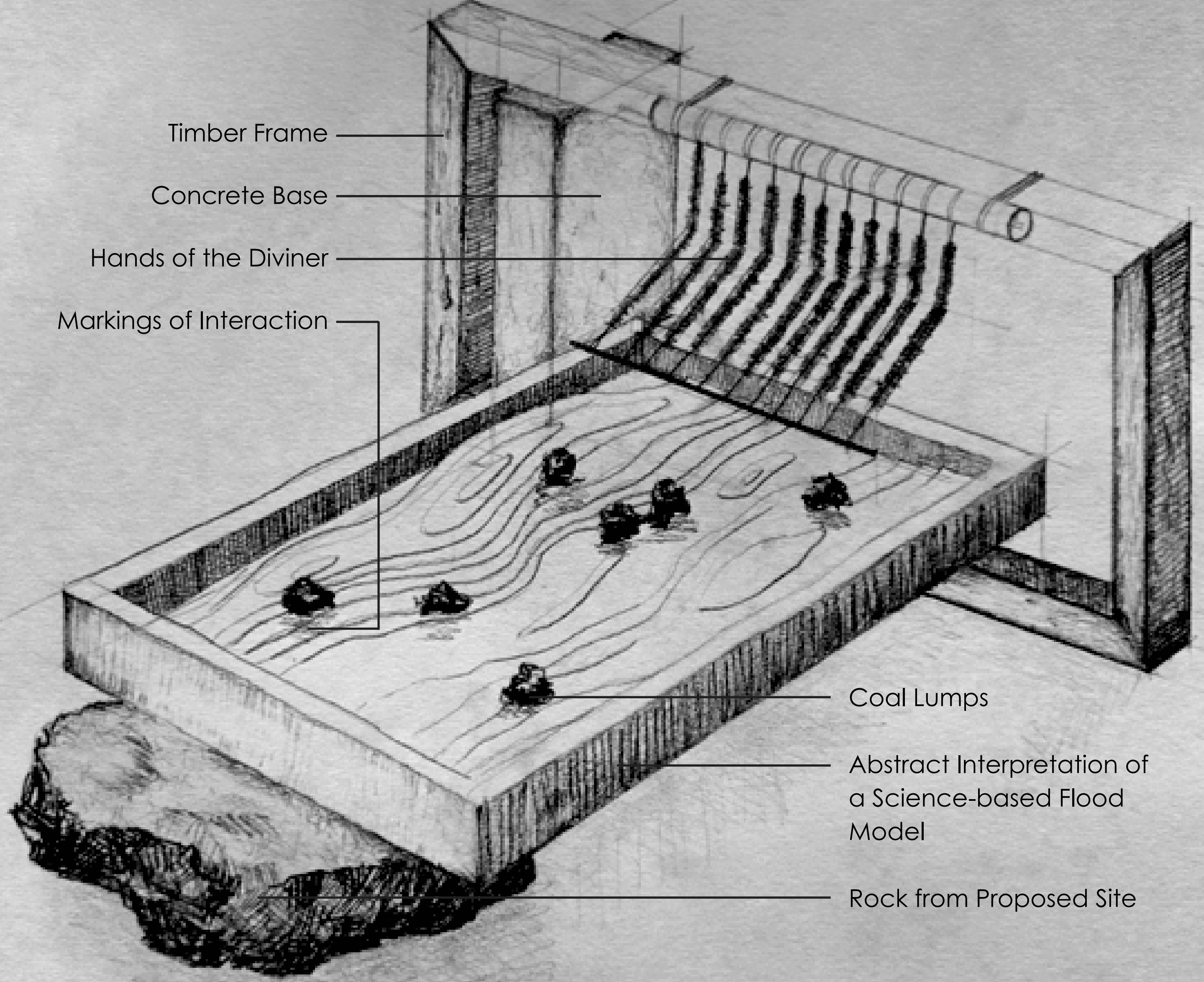


Fig. 12. Sketches, diagram and photos of built touchstone (author)

b) AIM

This thesis hopes to use architecture as an instrument to explore and demonstrate how the hybrid intertwinement of science and divination can offer insight into new ways of thinking and creating innovative solutions to address the flood crisis in South Africa.

Proposed, is a Flood control and research centre that sits on the banks of the uMzimkhulu River and articulates moments of connection, where these seemingly divergent realms intertwine and harmoniously engage with each other, giving birth to something hybrid and transformative.

Multiple theoretical standings and concepts will be investigated to create design tools that craft spaces that harmoniously reconcile the complexities of human beliefs and experiences, resulting in a culturally sensitive and emotionally resonant built environment.

c) CLIENT

This development will cater to various users, including non-profit organizations, diviners, and scientific researchers who collaborate with the community and surrounding environment, as well as private tenants who can rent the auditorium and performance space.

The Council for Scientific and Industrial Research (CSIR) will act as the client and seek funding from different investors. These investors may include the Ugu district municipality, the South African Weather Service (SAWS), or universities that will utilize the research facilities. These organizations and institutions will be actively involved in the design process to ensure all their needs are met. The income generated from grants, contract research, training, and consultancies will be utilized to finance the flood research and building maintenance.

d) USER ANALYSIS

Occasional users

- Local residents and community members who seek information, participate in workshops, and attend scientific and divinatory events related to flood management and mitigation.
- Experts and researchers from various disciplines, including environmental science, hydrology, anthropology, and African studies, who visit the centre for collaborative research projects and knowledge exchange.
- People interested in learning about flood control, African divination, and sustainable practices, visiting the centre for educational tours and the experience of the April 2022 flood memorial.
- University students who attend research training and prospective diviners who attend divinatory training.

Semi-Permanent Staff

- Assistants and technicians who support ongoing research projects in the centre's labs and greenhouse, focusing on flood-mitigating plants and scientific experimentation.
- Trained individuals who conduct ceremonies and rituals in the ritual huts, offering guidance and insights through African divination practices.
- Contract-based researchers that lead short-term projects.

Permanent Staff

- Core researchers and scientists leading long-term projects focused on flood control, mitigation strategies, and sustainable practices, using the research labs and greenhouse.
- Librarians and Archivists that are responsible for managing the library's resources, and curating relevant materials on both scientific research and African divination.
- Facility Managers that are in charge of the maintenance and operation of the flood control features, such as the controllable berm and flood capsule, ensuring their functionality and safety.
- Administrative Staff that are responsible for managing the day-to-day operations, including scheduling events, maintaining records, and coordinating activities across different user groups.

1.6. UNPACKING THE RESEARCH QUESTION

How can dialogical forms and orders drawn between the practices of science and divination,

articulate and bridge the gap between the real and the numinous,

embody the methodologies of the oionistic oracle, and

highlight the importance of reading and memorialising past omens in an effort to

address the current terrors of flooding?

The goal of this thesis that involves exploring and demonstrating how the hybrid intertwinement of science and divination can offer insight into new ways of thinking.

The acknowledgment and celebration of the differences between science and divination, and articulating them accordingly. This articulation links with the first theoretical concept.

The inductive art of the uninspired and the sane oracle who inquires purely from human reasoning and investigates possible patterns. This links to the second theoretical concept.

The signs with prophetic significance that portends an exceptionally notable or disastrous event that should be preserved for future prophecies This links to the third theoretical concept.

Floods are the most frequently recorded natural disaster in southern Africa with the April 2022 KZN floods being the most recent. This is the current state of the site and its surrounding context.

Fig. 13. Linocut art of when science and divination meet (Canva, 2023)

01.7 CONCLUSION

The meandering motif serves as a journey to discover why further investigation into the flood crises is not only important but necessary. This section explained the winding course used to arrive at an established research question by explaining the current KwaZulu-Natal flood line, identifying the two realms of research and establishing the project with its essence, aim, client and user analysis. With this information, it is now possible to introduce and analyze the site by interpreting, analyzing and evaluating histories and theories within the context of science and divination. This investigation can guide this thesis to an appropriate and just architectural response within the complex natural environment.

Chapter 02

APPROACHING THE SITE

02.1. INTRODUCTION

Due to the nature of this dissertation and the constant back and forth between two different realms of research, this chapter adopts a structured approach to introducing the proposed site. Firstly, it is neccessary to orientate and define where the site is located and give a broad historical overview of the area. Subsequently, the chapter respectively taps into the Real and the Numinous and provides a parallel narravtive between an objective and a subjective analysis of the site. The objective investigation of the Real will run on the left hand pages and the subjective investigation of the Numinous will run on the right. Furthermore, the chapter presents two structural precedent studies that allign with possible solutions for the Real and two design precedents that evoke sacred experiences of the Numinous. Lastly the chapter will venture into a profound exploration through the realm of poiesis, where creating a touchstone becomes a visual representation of a connection between the tangible reality and emotional experiences.

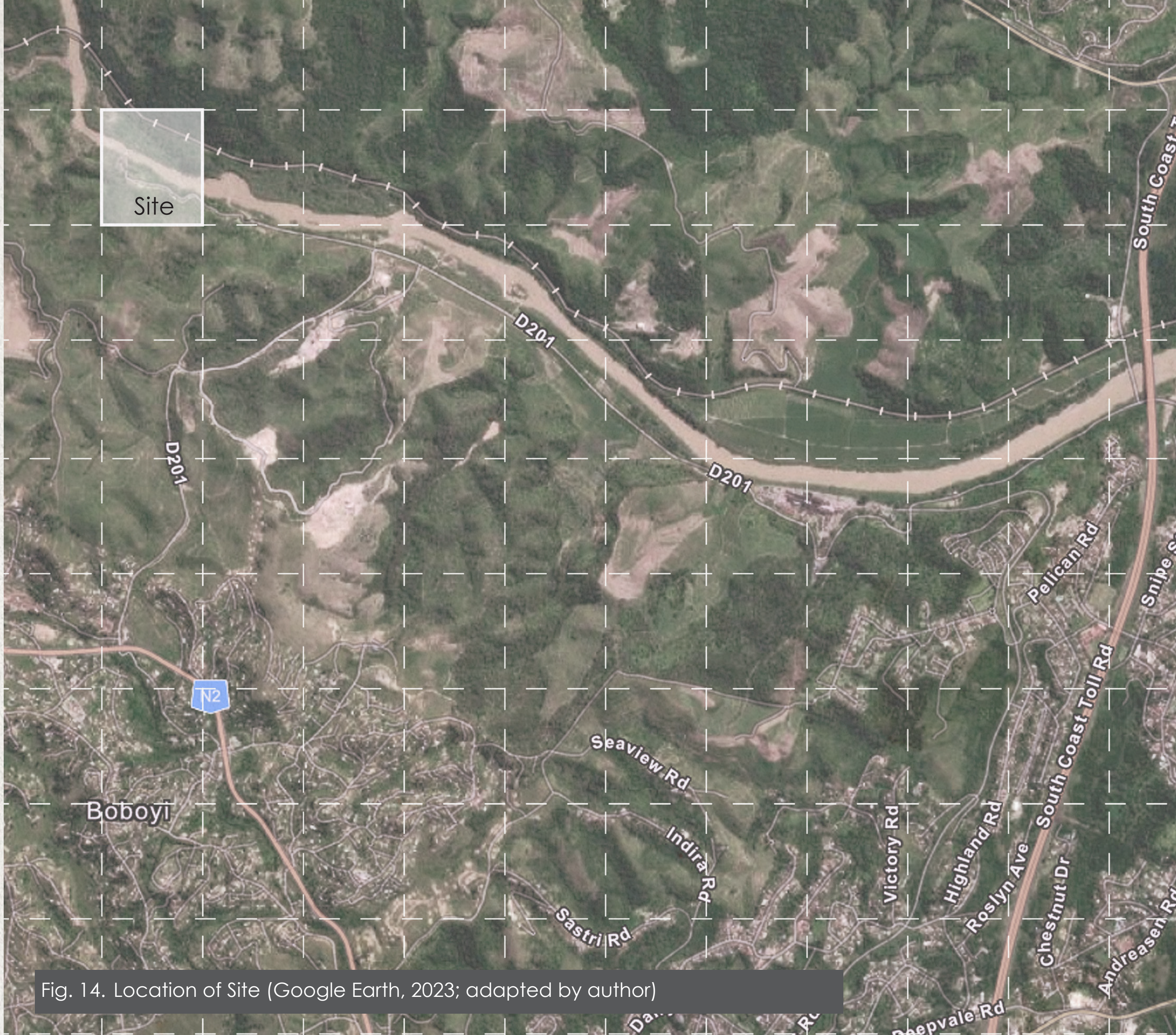


Fig. 14. Location of Site (Google Earth, 2023; adapted by author)

02.2. ORIENTATION

02.2.1 LOCATION

This dissertation is proposed on the banks of the uMzimkhulu River which flows in a southeastern direction from its source near the Lesotho border towards the Indian Ocean. The river mouths 9 km downstream from the site between Umtentweni and Port Shepstone, located on the Hibuscus Coast in KwaZulu-Natal, South Africa. Port Shepstone serves as the main economic hub on the Hibuscus Coast and sits approximately 120 kilometres south-southwest of Durban, one of the largest cities in South Africa (KwaZulu-Natal Top Business, 2015).

02.2.2 PROPOSED SITE

The chosen site is adjacent to the St. Helen's Rock Water Pump Station, nine kilometres upstream from the uMzimkhulu River mouth at Port Shepstone. The site is nestled 500m from where the uMzimkhulu and Mzimkhulwana Rivers meet and lies at the foot of two undeveloped hills. The specific site stretches over the uMzimkhulu River and the land is owned by the Ugu municipality and currently houses the St. Helen's Rock Pump Station that feeds water to the nearby off-channel storage/ balancing Dam. The surrounding lands consist of industrial practices and private farms that grow a mix of sugar cane and macadamia trees.

02.3. HISTORICAL OVERVIEW

02.3.1 THE RIVER BORDER

In his thesis, titled "The Interaction Of African Traditional Religio-Medical Practice And Western Healing Methods," S.A.M. Mcetywa conducted extensive research into the lives and historical background of the Mpondo people. According to his findings, the land traditionally inhabited by the Mpondo people extended from the Tugela River in the north to the Mbhashe River, encompassing the uMzimkhulu River region, including the proposed site for this project (MCETYWA, 2001).

After the Battle of Blood River in 1838, some Voortrekkers settled in Natal, spreading their presence between the Tugela and uMzimkhulu Rivers. This new settlement posed a significant threat to the British colony and led to the establishment of a political relationship between Faku, the Mpondo king, and the British Cape government. This relationship culminated in the signing of the Maitland Treaty of 1844 (Mbhodiya, 1995). Notably, this treaty reinforced the uMzimkhulu River as a definitive border between the Mpondo state and the Natal Colony.

This holds great significance because the river came to embody and symbolize a stark division between African indigenous customs and Western influences.

The colonial governments of the Cape and Natal refferred to the territory between the uMzimkhulu and uMthavuna Rivers as a region that was considered to "belong to nobody." In other words, it was regarded as outside the jurisdiction of these "civilized" British states and, therefore, lacking in formal law and order. This region was designated as "No Man's Land" and was often associated with paganism, highlighting how Western practices often perceived African traditions.

The uMzimkhulu River remained a Mpondoland/Natal border until the 1860s when Natal expanded southwards, imposing the uMthavuna River as a new border (MCETYWA, 2001). This change was part of a broader effort to disassemble the Mpondo Kingdom's unity and further expand the Natal Colony's riches. The area came to be called Alfred County, and later Port Shepstone.

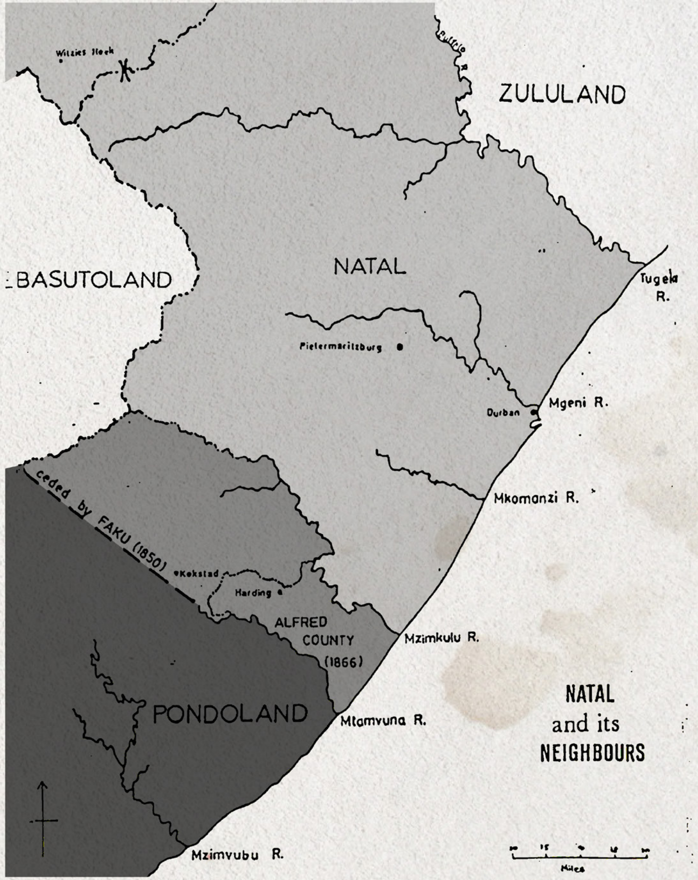


Fig. 15. Movement of the border from light to dark grey (Mbhodiya, 1995; adapted by author)

02.3.2 PORT SHEPSTONE

By the year 1868, Alfred County was a typical frontier society: it was remote and lacked social cohesion. The population lived scattered and isolated lives, residing in wattle and daub huts, subsisting by cultivating small plots of mealies and engaging in hunting. In this sparsely populated region, only five stores existed, and the nearest school was a daunting 80 kilometers away in uMzinto, as was the closest medical practitioner. During this period, the sole mode of transportation was by ox-wagon (Mbhodiya, 1995).

The Aiken brothers had migrated from Ifafa, where they managed a sugar plantation. The brothers demonstrated a knack for business and was engaged in trade involving sugar, tea, lime, and marble. Recognizing that the economic prospects of Alfred County would not flourish by the reliance on ox-wagon transport, the brothers embarked on a venture to develop coastal transport between Durban and Port Shepstone. They achieved this by blasting open the uMzimkhulu River mouth and transforming it into a functional port (Mbhodiya, 1995).

Following the successful establishment of the port in 1880, Port Shepstone swiftly evolved into the largest and busiest center within the county. The creation of this port and harbor played a pivotal role in facilitating the participation of Africans in commercial activities, subsequently leading to the growth of African villages and boroughs (Mbhodiya, 1995).

Despite years of coastal trade, the maritime facilities remained neglected and ill-equipped to withstand the challenges posed by natural disasters, progressively deteriorating over time. Eventually, the government introduced a railway system, marking the end of coastal shipping services. After extensive surveys and deliberations, Port Shepstone preceded to construct a bridge over the uMzimkhulu River and on September 2, 1907, the first steam train traversed what was then Natal's largest bridge (measuring 300 meters in length) (Mbhodiya, 1995). Today, the town no longer relies on the railway network but has flourished sufficiently to become the primary economic hub along the Hibiscus Coast.

Fig. 16. Port Shepstone post cards (Anon., n.d.)

02.4. ANALYSING THE SITE

02.4.1 REPORT OF THE REAL

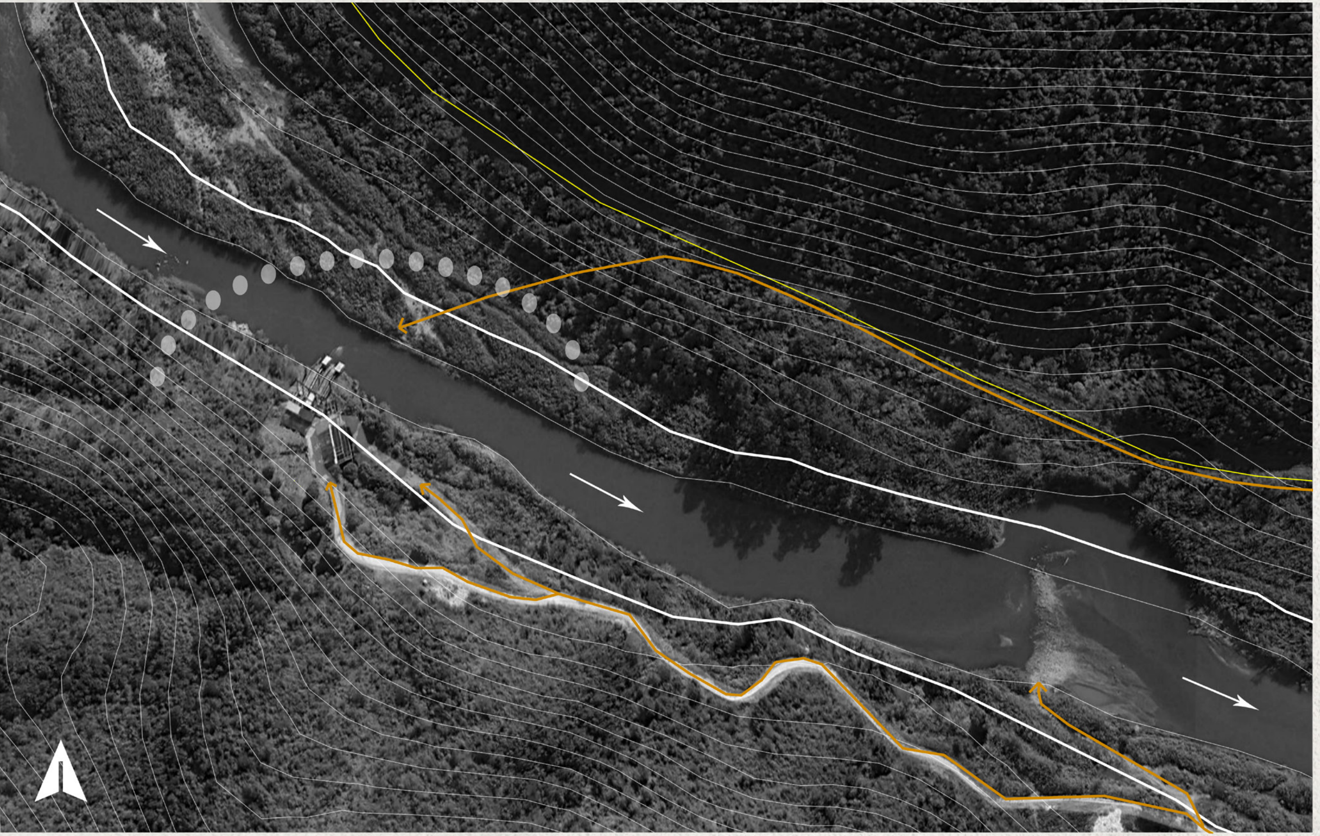


Fig. 17. Real Site Analysis (Google Earth, 2023; adapted by author)

As expressed throughout the previous chapters, there is an intricate relationship between the abstract and concrete, the symbolic and the literal and the numinous and the real. This chapter delves deeper into the discussion of the real as it engages in a discourse that is both technical and creative - a discourse that knits together the technical issues related to a possible design, on a more detailed level, with the practicalities that make it a reality. To truly comprehend the intricacies of the real, it is imperative to unveil the constraints and limitations imposed by the current site conditions. This initial step is able to then lead into a comprehensive examination of structural precedents, followed by a profound exploration through the realm of poiesis, where creating a touchstone becomes the true venture into the investigation.

02.4.2 REPORT OF THE NUMINOUS

Past efforts to address the South African flooding crisis have led to many quantitative and scientific approaches but seldom approach the crisis by way of divination, through which a higher realm of information can be tapped into. As defined before, divination is the practice of seeking insight through spiritual means within the context of culture and tradition. It centres itself around personal experiences, intuition, or traditional wisdom and stories passed down through generations. The knowledge gained through divination is often subjective, dependent on specific contexts, and not easily understood but rather felt. To fully embrace this side of research it is important that this thesis itself not only accept the Western scientific way of research but also adapt to a subjective and phenomenological way of analyzing the site. This can be done by changing the tone of this subsection to a personal first-person narrative and engaging in my own experiences and memories as well as the experiences and memories of others.

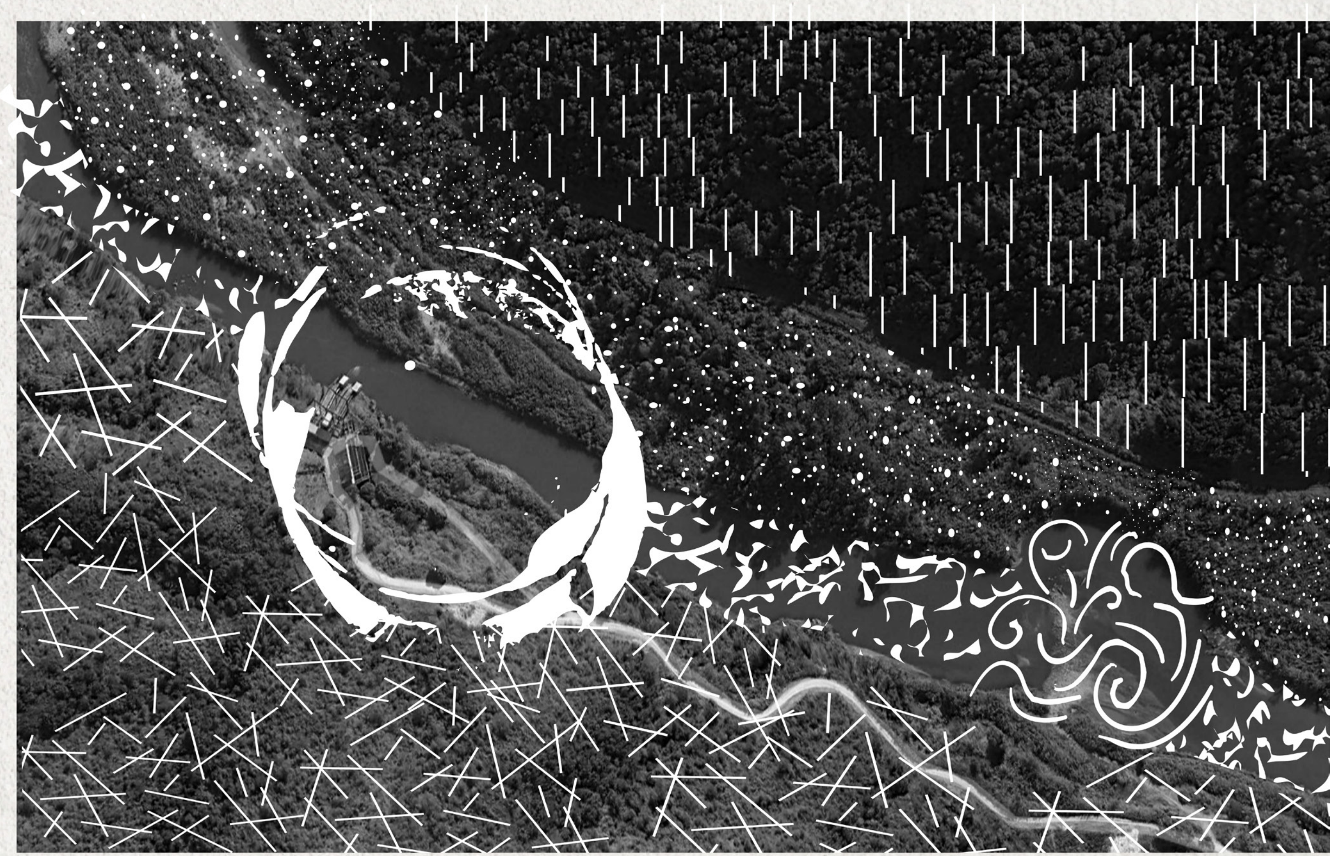


Fig. 18. Numinous Site Analysis (Google Earth, 2023; adapted by author)

a) Unveiling Limitations of the Site

Topography and structure

The vicinity exhibits a blend of distinctive geographical features, including the presence of steep valley slopes, hilly terrain primarily found within the drier, broader river valleys, and undulating plains shaped by natural divides (Desai, 2022). The local vegetation encompasses a varied landscape characterized by a mosaic of grasslands and forests, although it is assumed that the forested areas are more extensive and densely packed (Desai, 2022). Specifically, the site in question spans across the Umzimkhulu River, which measures approximately 44 meters in width. On the northern bank, there is a gradual 8° ascent leading to a hill that stands at approximately 248 meters in elevation. Conversely, the southern bank features a steeper 20° incline leading to a hill with an elevation of around 109 meters.

Climate

The designated project falls under the Köppen Climate Classification subtype "Cfa," which denotes a Humid Subtropical Climate (Desai, 2022). This climatic classification is marked by consistently high temperatures and uniform precipitation throughout the year, except for sporadic instances of flooding. While there are fewer rainy days, summers tend to be relatively wetter than winters. Most of the rainfall during this period is a result of convectional thunderstorms, and the presence of tropical cyclones further intensifies the amount of rainfall during the warm season (Meteoblue, n.d.).

Figure. Climate (Weatherbase, 2021: online).	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Avg. Temp High (°C)	26	26	25	24	23	21	21	21	21	22	23	25	23
Avg. Temp (°C)	23	23	23	21	19	17	16	17	18	19	20	22	19
Avg. Temp Low (°C)	20	20	20	17	15	12	12	13	15	16	18	19	16
Rainfall (mm)	121	126	148	82	60	31	38	49	87	114	123	127	1105
Humidity (%)	82	82	82	78	75	68	71	71	76	79	81	83	77
Rainy Days (d)	12	12	15	19	25	24	26	22	20	15	13	12	215
Avg. Sun hours (h)	14.3	13.6	12.6	11.7	11	10.6	10.8	11.5	12.3	13.3	14.1	14.6	12.5

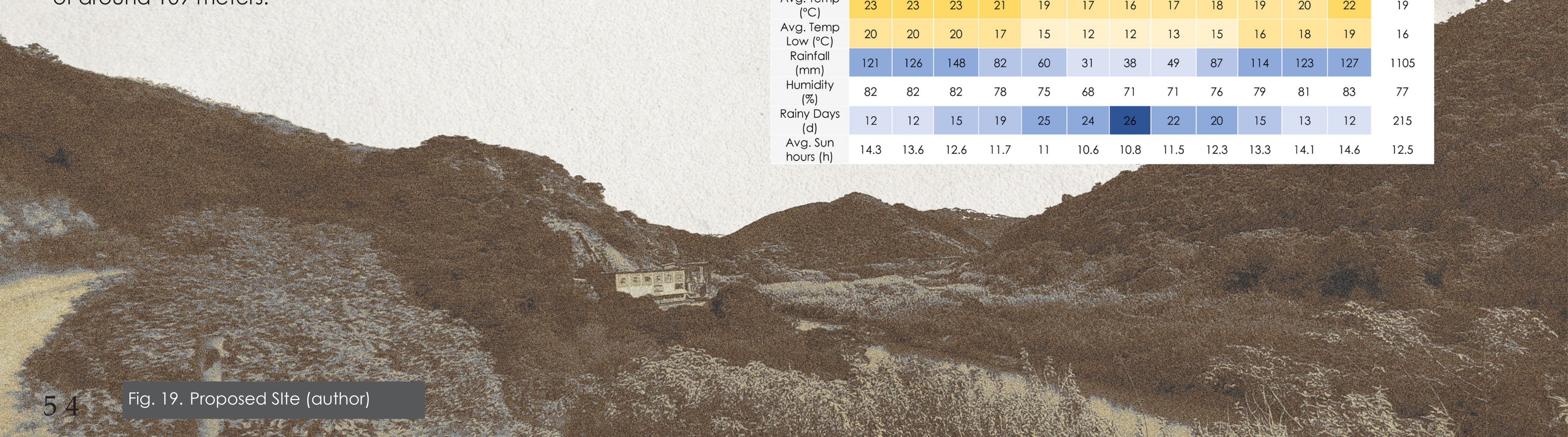


Fig. 19. Proposed SIte (author)

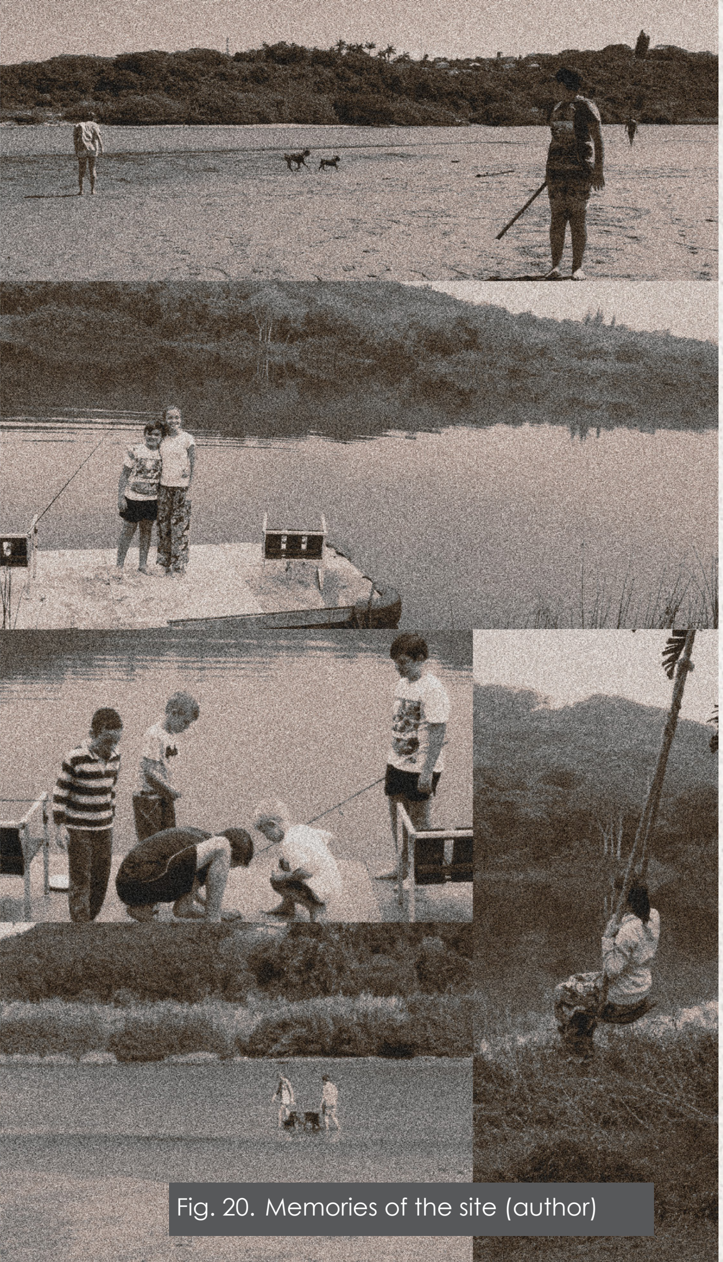


Fig. 20. Memories of the site (author)

a) Engaging with Self-lived Experiences

Autoethnographic statement

Exploring Port Shepstone through the lens of autoethnography resonates deeply with me, as it provides an opportunity to delve into the very core of my identity and upbringing. Through this mode of inquiry, I not only gain a rich perspective on my proposed site but also engage with the most fundamental aspect of my being – the part of me that was nurtured in the very heart of Port Shepstone.

My life story is intricately intertwined with this coastal town. I took my first breath in a hospital nestled within Port Shepstone's CBD and attendend all phases of my education there. Until five years ago, before embarking on my architectural studies in Bloemfontein, this was the sole canvas on which the tapestry of my experiences was woven.

I have vivid memories of the uMzimkhulu River and the times we used to spend at its mouth. I remember how the river sand used to stick between our toes and how my childhood dogs used to sprint across the dunes and shallow waters chasing my brother and I. We never dared going deeper for we knew how strong the river flows.

My mind drifts back to the family drives we undertook inland, tracing a road that mirrored the river's course. The winding nature of the route often left me feeling queasy, but the sight of the river always left me in awe. Its waters, tinged with a rich, earthy brown, only visible in glimpses between the greenery hugging the road and the river.

I hold fond memories of crossing the low-level bridge, where my dad would ask the drivers of sugar cane trucks parked alongside to spare two extra pieces. As we savoured the sugarcane's sweetness, we would take turns casting our fishing lures into the river's depths, a ritual that etched lasting impressions in my mind.

In those days, I would count the utility poles that lined the railway as we traversed the great uMzimkhulu bridge, a simple measure of how much distance remained before we completed our journey across. Today, I hardly notice when we pass that bridge, for I have grown tall enough to gaze out at the vast expanse of the open ocean or the meandering course of the river, a testament to the passage of time and my own growth.

Site Amidst the Floods

The Umzimkhulu River ranked as the second-largest river in KwaZulu-Natal (KZN), wields formidable force during flood events. The region is particularly prone to flooding, primarily owing to its hilled topography and meteorological factors like severe thunderstorms and tropical cyclones. When the river overflows during floods, it inundates adjacent land areas. To mitigate the impact of flooding, it's essential that all structures are strategically positioned beyond the 100-year flood line, which is a topographic delineation representing the highest elevation likely to be reached during a storm with a recurrence interval of 100 years. In this context, the 100- and 50-year flood lines are traced thoughtfully, following the 5m and 2.5m contour lines.

Ecological Existence in the Umzimkhulu

According to data derived from the Freshwater specialist study conducted by Ecotone in a neighbouring site, a significant portion of the region falls under the classification of "Critical Biodiversity Area 3." This designation implies that there are essential species still inhabiting this area, and their presence must be duly considered during the construction process (EKZNW, 2010). Up to this point, extensive research has identified a total of 343 indigenous plant and tree species, including endemics and rare specimens, some of which are presently listed as endangered or vulnerable on the South African National Biodiversity Institute's (SANBI) red list of native plants. In terms of the local fauna, the area is estimated to support more than 347 different species within and around the project site, with 14 of them currently categorized as endangered or vulnerable (Desai, 2022).

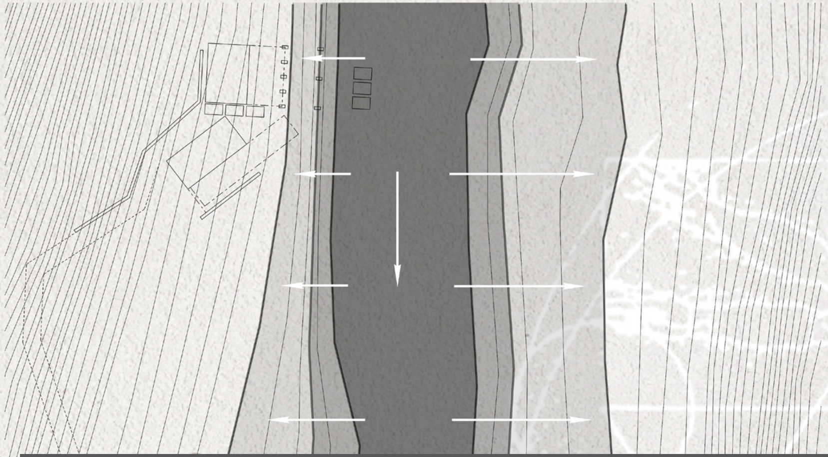


Fig. 21. Position of the flood lines (author)

Willow Spike-thorn

Pondo rock lemon

Natal Prickly Pea

Oribi Spear-leaf Conebush

Kloof frog

KwaZulu Dwarf Chameleon

Lanner Falcon

Blue Duiker

Fig. 22. Endangered and Vulnerable Species (SANBI, 2020)

b) Unveiling Energies of the site

Fig. 23. Participating in the SiteDAte (author)

The SiteDAte

For a long time, the site has only existed in my memories as I haven't visited the River in years. In an effort to re-establish a connection with this place, I embarked on an alternative approach to "site analysis" by undertaking a SiteDAte. This concept, introduced by Dr H. Auret, involves " Taking the measure of regions of concern through sympoiesis amid the letting-be of poetic thinking inspired by the deliquescent capacities of care."

The SiteDAte represents a subjective exercise that prioritizes the enlightening interaction with the site. In this approach, I am not the sole source of meaning; instead, I become a co-participant in the creation of meaning alongside the site itself. This method allowed me to engage with the site at a profound level of experiential mystery and provided me with the opportunity to tap into the site's energies.

b) Existing Infrastructure

St. Helen Pump Station

Embedded within the Umzimkhulu River's banks, approximately 9 kilometres upstream from Port Shepstone, the St. Helen's Rock Pump Station plays a great role in supplying the Bhobhoyi Water Works, which serves the greater Port Shepstone area and extends as far as Margate (SAICE, 2013). The Pump station is the only existing structure present on the direct site and was blasted and anchored into a virtually sheer granite slope section in the early 1970s (SAICE, 2013). However, after nearly four decades of operation, the station faced significant challenges due to the declining water levels in the river, rendering the pumps incapable of reaching the water source. To address this issue, in 2010, the Ugu District Municipality initiated a comprehensive three-year project to overhaul and double the facility's raw water pumping capacity (SAICE, 2013). The team of engineers responsible for the station's rehabilitation and expansion achieved remarkable success, earning a prestigious SAICE award in 2013 (SAICE, 2013). To gain a comprehensive understanding of the St. Helen's Rock Pump Station, it is essential to delve into the operational processes within the station. This provides an overarching view of the station's components:

Low-lift trolley
Water is drawn up by pumps mounted on a fabricated steel, rail-mounted trolley, enclosed in a steel-framed structure with aluminium cladding.

Settling channels
The water is conveyed from the low-lift pump station to the first pair of settling channels through a network of pipelines. Here, the initial phase of sand and grit removal from the raw water takes place. Simultaneously, the second pair of settling channels is engaged in a similar process, supplying water to the high-lift pump station.

High-lift pump station
Housed within the high-lift pump station are the requisite suction pumps and an intricate pipe-work system. These components work in concert to facilitate the efficient transport of water from the pump delivery flanges to the corresponding flanges in the valve chamber, ultimately ascending the mountain towards the treatment facility.

Low-lift winch house
Control of the trolley is managed by a winch mounted on a common base plate, capable of safely lifting the trolley, even when the rising main is filled with water. The winch house serves the dual purpose of safeguarding the winch equipment and providing a dedicated space for pump maintenance.

Gantries and cranes
The station is equipped with various gantries and cranes, essential for servicing and lifting heavy motors associated with the low-lift pump station.

Fig. 24. Process of the pump station (author)

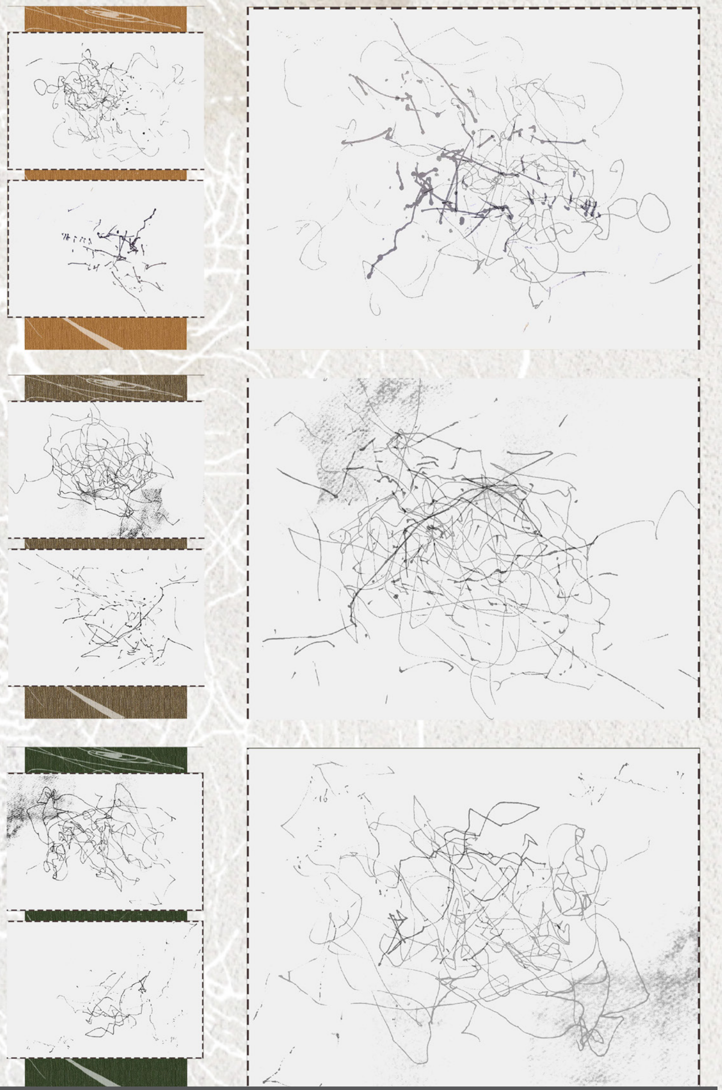


Fig. 25. Findings and representation of site energies (author)

Methodology and Findings

The pendulum serves dual roles, finding utility in both scientific inquiry and divination practices. In the realm of science, it is a tool for investigating motion, while in the context of divination, it assumes the role of a communication tool with the spiritual realm. Within the framework of this project, I inverted the pendulum's traditional use and tried to draw closer to the energies of the tangible and the mystical.

To capture the essence of the tangible, I employed the first device—a wooden structure that houses an inverted pendulum, delicately suspended above the flowing river waters within the site. Here, the water itself becomes the palpable energy source, guiding the suspended pen across the paper that rests atop the device. This interplay between water and pen translates the tangible energy of the site into discernible marks.

Conversely, to tap into the mystical, I employed the second device—a pen affixed to a wooden dowel, loosely held and balanced in my hand. In this setup, the device also adopts the characteristics of an inverted pendulum, allowing the upper part of the dowel to move freely, responding to the intangible energies of the atmosphere.

These subtle energies are channelled through me, thus guiding the pen as it gracefully glides across the paper beneath the device.

It is only through the layering of these markings that I achieve the convergence of energies—a coalescence that yields what may appear as random data. Here, I enabled the site to communicate with me through the lens of the spiritual world, forging an act of sympoiesis—a collaborative creation between the site, the energies it harbours, and my human perspective.

While the markings themselves were not incorporated into the subsequent design development phase, this exercise nonetheless facilitated a deep connection with my site and allowed me to immerse myself in its essence. This process is essential for gaining a comprehensive understanding of the landscape before embarking on design explorations.

Site Accessibility

The southern bank of the site is readily accessible by any vehicle, as it connects to a well-maintained 4.5-kilometre dirt road. This dirt road serves as the primary route to reach the current pump station and remains in excellent condition. However, accessing the northern bank of the site presents some challenges. A haulage dirt road, which parallels the nearby train tracks, has become partially overgrown over time (Joubert, 2022). Therefore, before reaching the site, this access route will require clearing. Historically, the northern bank was accessible by driving over a sand berm. However, due to recurring flooding, the berm has been eroded, altering the landscape and rendering this route unusable (Desai, 2022). Fortunately, the existing pump station on the site provides essential sewage and water services necessary for construction and the additional structures planned for the site. Moreover, electricity for powering the station and all its pumps is supplied from the existing Port Shepstone NB129 network (SAICE, 2013). This electrical supply is expected to be adequate for the proposed construction project.

Fig. 26. Site access roads (Google Earth,2023; adapted by author)

Local vernacular

Concerning the architectural style prevalent in the local area, there is no singular vernacular. However, it's important to highlight that along the river there is a notable presence of manufacturing facilities characterized by an industrial architectural style. One prominent example of this is the St Helens Pump Station itself, where big concrete and steel structures are prominent with the incorporation of adobe brick elements. Additionally, other industrial facilities in the surrounding area, such as Idwala Carbonates, Natal Portland Cement Simuma, Kulucrete Concrete Products, and Illovo Sugar-Umzimkulu Mill, also adhere to this industrial design ethos. These complexes employ a combination of sturdy steel and concrete structures to house their various production processes.

Fig. 27. Industrial architectural language around site (Google Earth, 2023)

Local Voices
I have lived personal experiences within the site and cherish my memories of it. While I hold a unique perspective, I recognize that the site's meaning varies for others. Grasping and understanding every unique viewpoint is impossible, yet through engaging in storytelling rituals, I can broaden my perspective without the need for full comprehension. By inviting willing participants to share their memories and stories, I delve into their narratives. This subjective exploration allows me to see through their lenses, revealing insights about the site not found in any books or articles.

John Graham, 44
Local for 15 yrs

"I try to go most weekends (to ski boat club, a local fishing spot) … I wake up early and head down to the launches, I live nearby there… It's great to watch the local fishermen prepare their boats and gear, like I used to. There's like an unspoken respect among them, that I always enjoy… We always exchange stories of fish that got away and to catch up. It reminds me of the days I was fit enough to go out there." (Graham, 2023)

Leah Malan, 18
Local for 18 yrs

"I remember my dad wanting to go visit a very cute little lookout point close there. He said he and his friends used to go there all the time after school and that he wanted to show us how it looked like... My dad decided to take us to the lighthouse by the river mouth as like a little detour... My mom told me about the harbour that used to be there and I remember thinking how cool it would be if it was still there today." (Malan, 2023)

Ayesha Stevens, 52
Local for 7 yrs

"Sunday and Saturday morning markets at Duggies are my favourite... Last week, I found this beautiful second hand antique mirror... Stunning, stunning, stunning frame, it suites my dining room set I have at home. I tried to negotiate with Mrs. Thompson until we agreed on a price. Lucily I saw a scratch on like one of the sides and she gave me R100 off… That mirror hangs in my living room now, my poor husband had to hang it by himself." (Stevens, 2023)

c) The Berm Narrative

As previously mentioned, the Umzimkulu River flows southeast from the Lesotho border towards the Indian Ocean, ultimately entering through an estuary at Port Shepstone. Within this estuary, a dynamic interface between freshwater and saltwater exists, giving rise to complex ecological processes driven by the meeting of the seasonally-dependent flood pulse and the daily tidal pulse. This interface between freshwater and saltwater is commonly referred to as the "saltwater wedge" (Turton, 2022).

Under ideal ecological conditions, the saltwater wedge naturally moves up and down the river with the flow of tides and changing seasons. During wetter seasons, the strong river flow pushes the saltwater wedge out to sea, creating a 'Moses line', which is a visible line between fresh- and saltwater (Turton, 2022). Conversely, during drier periods, reduced river flow fails to push the saltwater out effectively, causing it to disperse further upstream within the estuary.

The uMzimkulu River's saltwater wedge has been disrupted due to sand dredging carried out for concrete production purposes (Turton, 2022). This disruption has driven the saltwater wedge approximately ten kilometres upstream, significantly impacting the water supply for the entire Ugu District Municipality because the elevated salinity levels near the pump station have rendered the water non-potable.

To mitigate this issue, the municipality implemented a solution involving the construction of an earth berm. This berm has built-in one-way valves to enable the passage of freshwater downstream while preventing saltwater intrusion upstream towards the pump station (Turton, 2022). In a 2021 study conducted by Professor Anthony Turton, it was revealed that the municipality had previously authorized the construction of no fewer than eight such berms at two different locations downstream of St Helens Rock. Regrettably, all these berm construction attempts proved unsuccessful, primarily due to recurrent river flooding, and were ultimately unable to effectively deter saline intrusion (Turton, 2022).

Utilizing satellite data, Turton demonstrated that not only were the constructed berms washed away by the force of the river in flood but they also had a substantial adverse impact on the riverbanks themselves. In the subsequent visual representations, one can observe how the river's course and banks were substantially altered as a result of these berm construction endeavours and their subsequent failures.

Thabo Dlamini, 32
Local for 5 yrs

"I have to wake up early, early to grab a taxi from close to the highway. They stop 20mins away from where I stay in Mzimakwe. There is a lot of us that walk from that side to get to town... On the weekends the taxis are a lot busier because everyone wants to get to Port Shepstone for shopping… Sometimes we have to take another route because the water overflows that one low bridge when it rains. I don't like going when it is raining." (Dlamini, 2023)

Dawn du Plessis, 82
Local for 20 years

"My husband and I used to run a resort there in Umtwalume called Koelwaters. I remember the one time, it didn't stop raining for 6 days straight. It was terrible… The waters streamed in through the houses. There was ovens, dead cows, fridges and everything just floating by our feet. Shame, my husband and I had to celebrate our 25 year anniversery with a bottle of champagne in knee deep water running around the resort." (Plessis, 2023)

Nomsa Dayi, 39
Local for 39 yrs

"I grew up in Murchinson and even went to high school there. I remember walking with my friends who lived close to me to school every morning. Joh, but there was always this one hill that made me sweat in the mornings, especially in summer. I was always confused about how it got so hot and humid so early in the morning when the sun had not even been up for more than an hour… Walking back home was much better because most of the way was downhill." (Dayi, 2023)

James Richardson, 26
Local for 18 yrs

"I grew up there in Port Shepstone… When I was real small I worked there (Luckys, local fishing shop) packing bait in the freezer… Me and my old man have launched in the mouth a few times and it was rough when the river was narrow. But on the NE to SW wind change the river gets slightly wider its seems almost hospitable... I fished the river and caught a lot of small garricks and grunters there." (Richardson, 2023)

Fig. 28. Historical satelite data of the built berms in the uMzimkhulu River (Google Earth, 2023)

Fig. 29. Interpretation of a numinous experience on site (Unsplash, 2023; adapted by author)

02.5. PRECEDENTS

02.5.1 Structural

MoSE Project, Venice,
Alberto Scotti

Site

Venice, the ‘city of water,’ has been made more vulnerable to flooding due to the effects of global warming. In November 2019, Venice experienced its most severe flooding since 1966, submerging more than 80% of the city (Verdict Media Limited, s.j.). The MoSE project is strategically positioned at the entry points of the Lido, Malamocco, and Chioggia ports, marking the locations where the lagoon meets the expanse of the open ocean (Verdict Media Limited, s.j.).

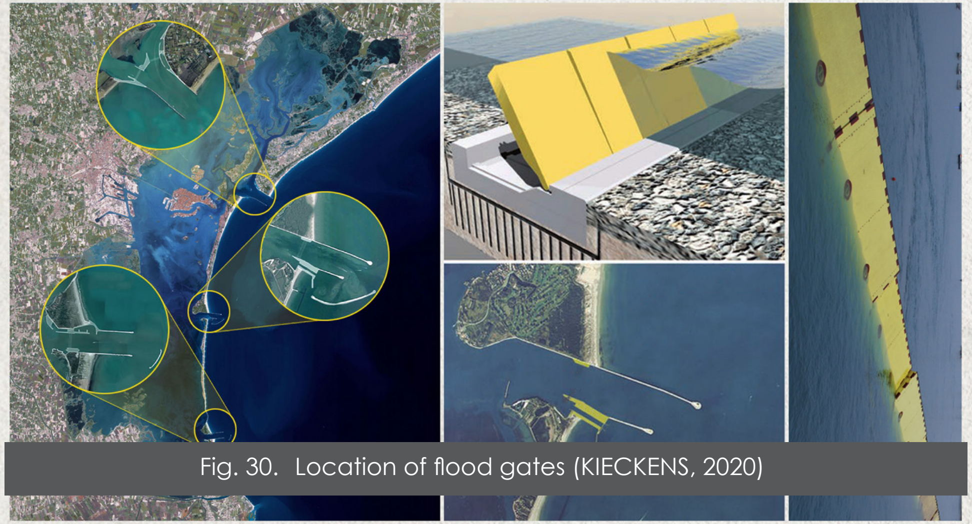


Fig. 30. Location of flood gates (KIECKENS, 2020)

Function

The MoSE project stands as an innovative flood-barrier system, featuring a series of barriers composed of independently movable floodgates. These gates possess the unique capability to temporarily isolate the lagoon from the sea, thereby safeguarding Venice from the destructive and recurrent tidal events that threaten the city. In anticipation of exceptionally high tides, these barriers rise temporarily, effectively obstructing the surging Adriatic Sea from entering the lagoon (Verdict Media Limited, s.j.).

Operation

During periods of inactivity, the floodgates are fully submerged in water, nestled within their designated housings at the lagoon’s bottom (Verdict Media Limited, s.j.). When the forecast predicts an impending high tide that poses a flooding risk, compressed air is introduced into the sluices of the floodgates. This influx of air displaces the water within the floodgates. As the water exits the sluice gates, the floodgates start rotating around the axis of the hinges, due to buoyancy they rise up to emerge and block the flow of the incoming tide in the lagoon (Verdict Media Limited, s.j.). It’s crucial to note that the sluice gates remain operational only for the duration of the high-water event. Once the tides subside, and equilibrium is restored between the lagoon and the sea water level, the sluice gates are refilled with water and return to their recessed positions within their housings (Verdict Media Limited, s.j.).

Materials and Construction Elements

Floodgate: Each gate is made up of a hollow metal box-like structure bound by two hinges to the housing box.

Housing Box: These are concrete components featuring ballast sections filled with water or concrete that constitute the base of the defence barriers. Housing boxes serve as the enclosures for the mobile floodgates and house the systems essential for their operation. Furthermore, they are interconnected by tunnels that facilitate technical inspections and maintenance.

Foundations: The mobile gates, positioned at the inlet channel's bed, are grounded by extended steel and concrete pilings measuring 500mm in diameter and 20m in length, securely driven into the lagoon bed (Verdict Media Limited, s.j.).

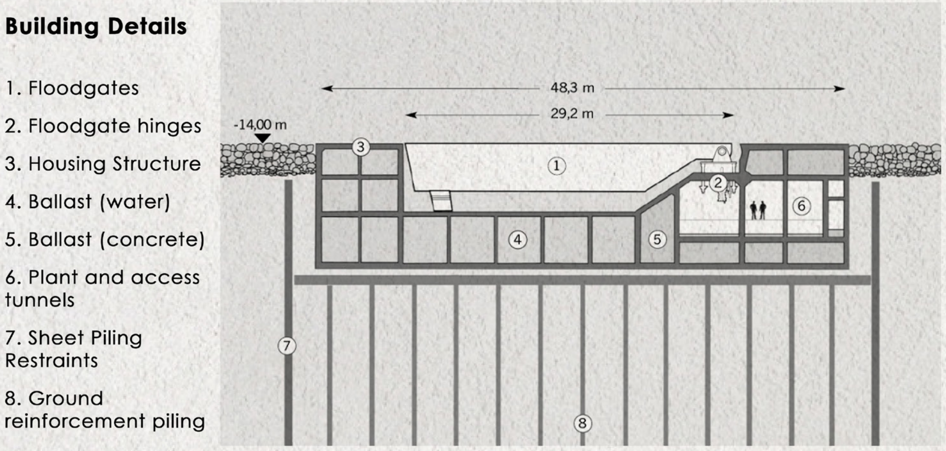


Fig. 31. Floodgate section (KIECKENS, 2020; adapted by author)

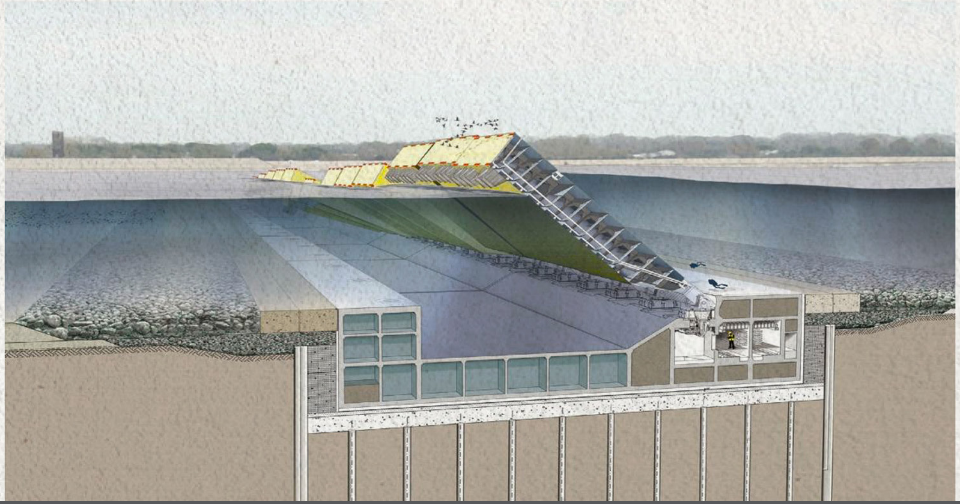


Fig. 32. Floodgate section (PETRONI, 2020)

Conclusion

While the scale of the MoSE project surpasses that of this proposed project, the operational principles governing the floodgates could potentially offer valuable insights aimed at addressing saline intrusion in the Umzimkulu River. By adopting a system of independent hollow sections featuring one-way valves and compressed air regulation, this thesis could explore the application of buoyancy-based principles to establish a barrier between fresh and saltwater. This avenue warrants further investigation as a potential solution to the challenge of saline intrusion in the Umzimkulu River.

02.5.1 Structural

Allmannajuvet Rest Area and Museum, Sauda, Norway, Peter Zumthor

Site

Allmannajuvet is a picturesque ravine nestled alongside the Storelva River in Norway. It resides within a tranquil, forested region along the Norwegian County Road, situated between the town of Sauda and the village of Hellandsbygda. Historically, this site was home to a substantial zinc mine, which commenced operations in 1881 but later ceased production in 1899 due to fluctuating zinc market prices and the formidable costs of extraction (ArchDaily, 2016).

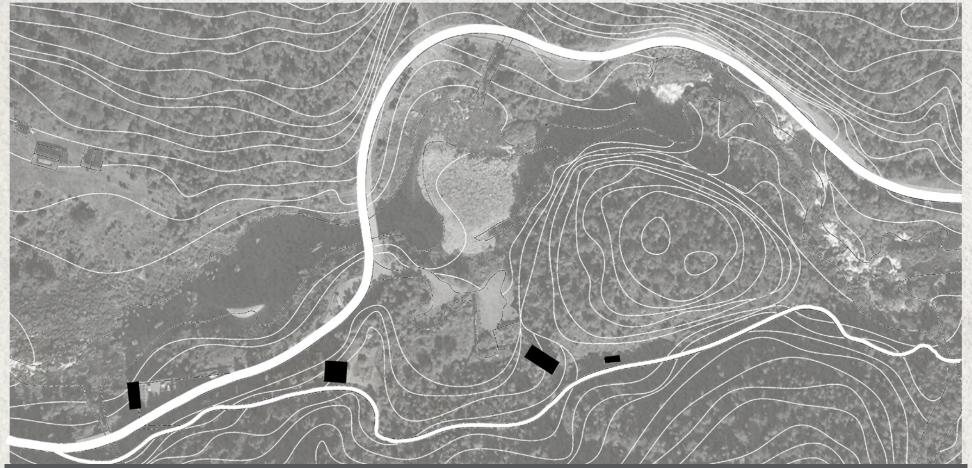
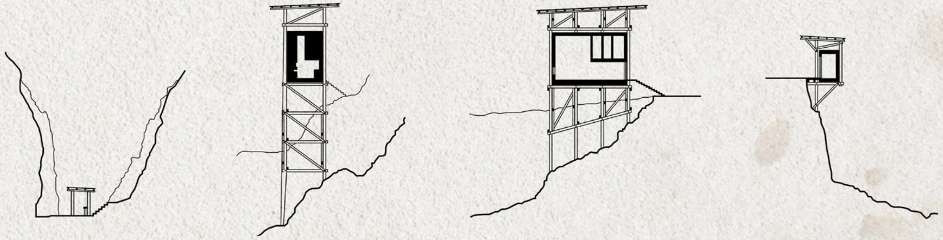


Fig. 33. Site plan and sections (Amoretti, 2019; adapted by author)

Function

The overarching objective of this project is to bolster tourism in the area by shedding light on its rich mining heritage (ArchDaily, 2016). The project's design encompasses a museum building, a café, restroom facilities, and parking amenities, all interconnected by a network of pathways and staircases. Visitors are offered the opportunity to explore the remnants of the old mine, allowing them to gain insights into the challenging conditions endured by industrial labourers of 19th-century Norway.



Theoretical Approach

The project embraces a simple aesthetic, employing rational, box-like structures that appear as tectonic watchtowers gracefully perched on the rugged terrain. These black boxes are supported by timber frameworks and draw inspiration from the industrial structures that once occupied this site. Renowned for his meticulous attention to detail, architect Zumthor employs the theory of precision to create structures that contrast with the untamed natural surroundings. In doing so, he uses precision as a tool to evoke the human experiences of long-extinct miners in the harsh world of 19th-century industry.

Structure

Connected by narrow riverside paths, each structure possesses its own distinct character. The café and micro-museum stand as freestanding pavilions in the landscape, with the black box-like structures elegantly suspended by a timber support system and firmly anchored into the rocky terrain using steel base joints. In contrast, the lower ablution block is thoughtfully integrated and affixed to the side of an existing stone bridge, appearing as though it has been delicately clipped into place. Despite their individuality, these structures share a common architectural language characterized by pine frames and black plywood walls. These dark, seamless walls mimic the appearance of substantial, introverted masses, with cracks of glazing, all elevated within timber cages that elevate them above the rugged and unforgiving terrain below.

Fig. 34. Floating boxes in the landscape (Amoretti, 2019)

Materials

The timber structures are crafted from creosote-coated laminated pine frames, resting upon steel base plates securely bolted to the stone. The black boxes feature plywood walls coated with jute burlap and black tar, creating a visually seamless effect akin to a monolithic mass. This effect intriguingly contrasts with the white snow that blankets the region. To establish a symbolic connection with the project's geological and geographical origins, various forms of zinc are integrated into the structures. Examples include corrugated zinc cladding for the roofs, doors adorned with sturdy zinc panels, and door handles forged from raw zinc. In Zumthor's own words, "The physical substance of what is built has to resonate with the physical substance of the area." (ArchDaily, 2016)

Conclusion

This architectural precedent is noteworthy for its ability to evoke an industrial architectural style through simple structures and the use of materials, even though it doesn't serve an industrial function. The lifted and articulated masses create the illusion of floating structures that distance themselves from the challenges posed by the harsh natural conditions such as floods and snow, which could be relevant when considering solutions for the Umzimkulu River. Additionally, the innovative utilization of locally sourced materials adds a commendable dimension to the project's design and construction.

02.5.2 Design

Steilneset Memorial for the Victims of the Witch Trials, Norway, Peter Zumthor

Overview

The Witches of Finnmark Memorial, created by artist Louise Bourgeois and architect Peter Zumthor, pays tribute to 91 victims of a 17th-century witch hunt in Vardo, Norway. Situated at Steilneset, the site of most of the witch burnings, it comprises two main elements. First, there's a glass cube designed by Zumthor housing Bourgeois' sculpture "The Damned, The Possessed and The Beloved." This sculpture features a flaming chair encircled by oval mirrors, conveying themes of burning and aggression. Second, Zumthor designed a 125-meter-long wooden and fabric structure with an illuminated window for each of the victims who were burned at the stake. This part of the memorial focuses on the lives and emotions of the victims. Zumthor described the collaboration as a fusion of his linear approach and Bourgeois' more symbolic and emotional interpretation, resulting in a powerful and meaningful memorial. (HOFMEISTER, 2013)

Phenomenological Interpretation

I imagine feeling a profound sense of anticipation and curiosity as I approach this "line and dot" in the landscape. The Steilneset Memorial sits perched up on the beautifully rocky Norwegian landscape barely touching the coastline. Although I have never visited this site I can close my eyes and see myself there looking over toward this long off-white cocoon suspended in a timber frame contrasting with this stark black glass box. I can almost feel the gravel getting stuck into the soles of my shoes and hear the movement of the ocean in the distance.

I imagine that when I step inside this long structure the atmosphere will change entirely from a lightweight feeling of mystery and wonder to being enveloped in an atmosphere of solemnity and reflection. This is due to the juxtaposition of two completely different environments created between inside and outside. Almost as if I am transported and traversing the boundaries between the tangible and the intangible, the physical and the spiritual. The architecture, designed by Peter Zumthor in collaboration with the artist Louise Bourgeois, skillfully navigated the complex narrative of the 17th-century witch trials. Each step I take through the long corridor ignites a sensory journey, with the suspended lights illuminating the texts and glimpses of the Norwegian Sea through the small windows. The interplay of light and shadow, the creaking wooden floor beneath my feet, and the soft murmur of the sea outside create a multisensory sacred experience.

I imagine as I continue to explore the memorial, I become increasingly aware of the emotional weight of the history the architecture sought to convey. The names and stories of those accused of witchcraft showcased on delicate panes carry a poignant reminder of the injustices of the past. After a 122m walk through the corridor, I am transported back to the outside, where I have successfully transcended the confines of time and place.

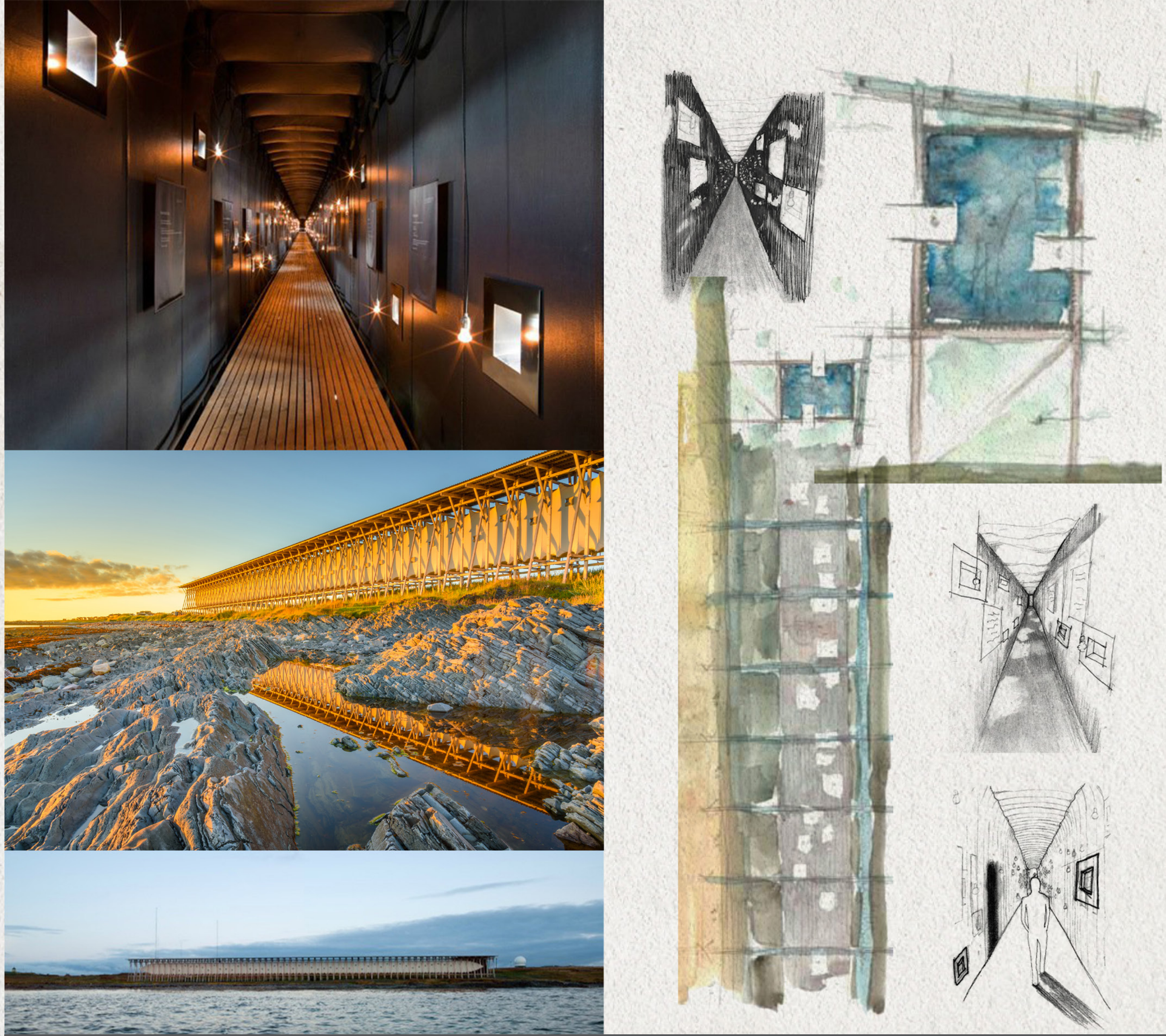


Fig. 35. Final design and interpreted design (HOFMEISTER, 2013)

Conclusion

The Steilneset Memorial is not merely a structure but a vessel for remembrance and contemplation. It has the power to evoke emotions, provoke thoughts, and serve as a bridge between the past and the present. This feeling of transcendence and evoking emotion is what this thesis tries to draw closer to. It is those feelings that bring us closer to the other-worldly and connect us through lived experiences.

02.5.2 Design

Mortensrud church, Oslo
Jensen & Skodvin Architects

Overview
Mortensrud Church, situated in the scenic borough of Søndre Nordstrand, Oslo, Norway, is a striking example of modern ecclesiastical architecture. Nestled atop a forested hill, it shares its surroundings with towering pine trees. The church complex is comprised of two primary elements sharing a central courtyard space: the church building itself, positioned to the north, and the church hall, situated towards the south. The church structure consists of an elongated rectangular floor plan, topped by a pitched roof. Its design incorporates robust slate walls, which not only provide structural integrity but also blend with the natural woodland colours, creating a seamless transition between the building and context. Additionally, the generous use of glass surfaces on the exterior reflects the surrounding trees, further making the structure disappear. (JSA, 2004)

Phenomenological Interpretation
I visualize how I would drive through the thick pine forest on my way to visit the Mortensrud Church that lies nestled in between the trees. The church extends an invitation by reaching out its paved walkways towards my feet. To reach the front entrance, I stroll upward along the hill's contour, my footsteps echoing softly on the path.

Upon arrival, a simple yet elegant façade greets me. The stone walls, meticulously piled and sturdy, converge seamlessly with the expansive glass panels that frame the wooden double doors and reflect the breathtaking surrounding context. Even before entering, the choice of materials becomes apparent, offering a tactile connection to the surroundings.

Stepping inside, I feel an immediate shift in the atmosphere. The light begins to dim, and the ceiling descends, marking the front gathering space as a transition into something more profound.

Like a lost soul within the darkness, a ray of light comes to fetch me as a glass-lined hallway starts to guide my path forward, leading me toward the grandeur of the sanctuary.

I am suddenly overwhelmed by space and light and stand in awe as I try to make sense of this interior. A seemingly floating dry stacked stone wall, a magical feat, hovers in the air. It is meticulously designed to filter light and cast enchanting patterns into the space. It created a play of shadows and lights, making me intensely aware of the presence of light itself. Suddenly, I am transported to the heart of the forest, gazing skyward through the pine branches. Light filters through in a similar manner, but within the church, it seems almost motionless. However, with time, I realize that the light evolves with the sun's journey, and the entire space transforms as the day progresses. The church itself becomes a symbol of the ephemerality of the present moment.

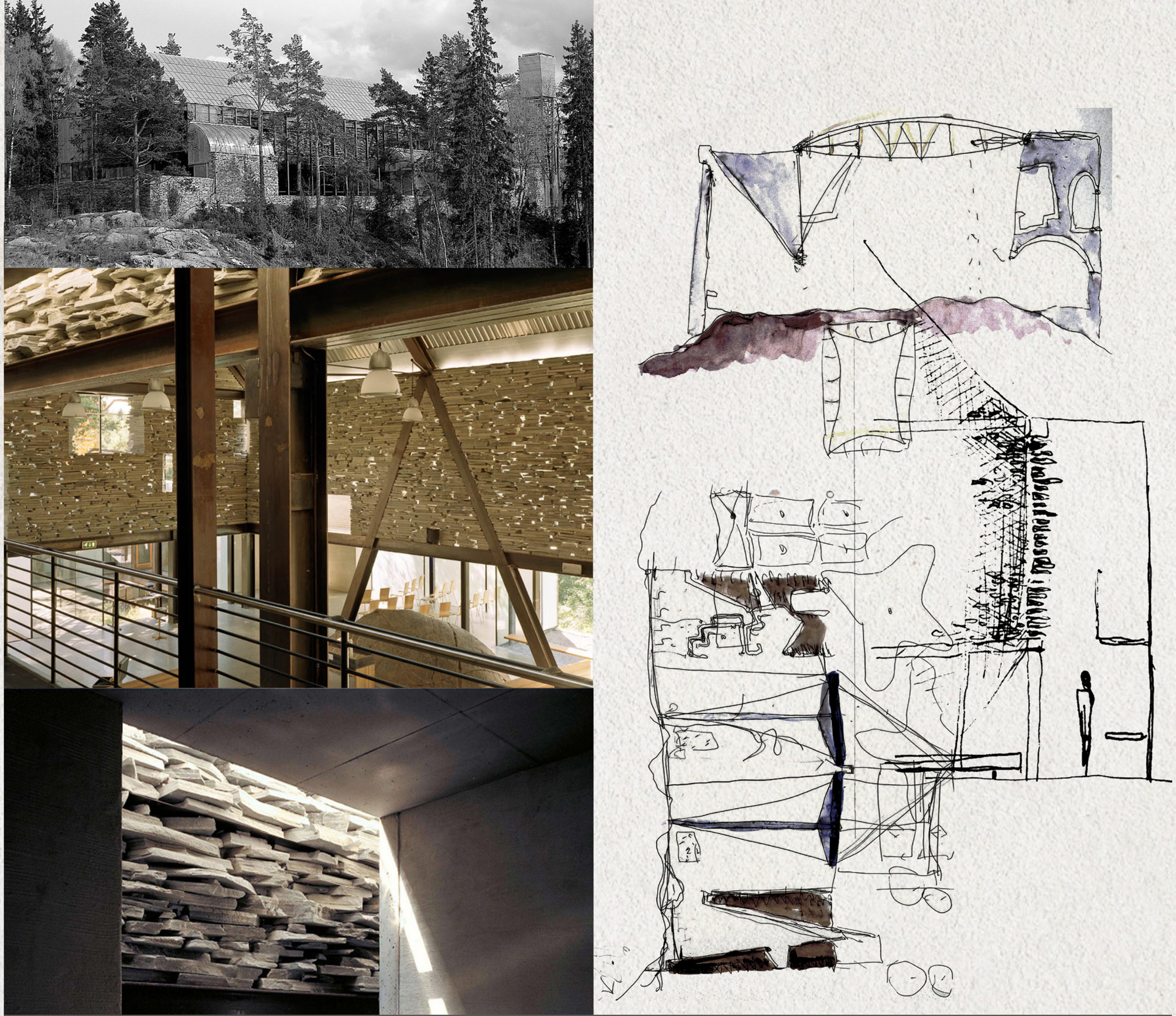


Fig. 36. Final design and interpreted design (JSA, 2004)

Conclusion

In this architectural narrative, I found complexity and purpose in the unique layering of materials and experiences. Mortensrud Church's design seemed to embrace the richness of the interplay of light and used it to create transition spaces that could transcend the visitor. Each moment unfolds as a testament to the careful orchestration of space and illumination. It is a sensory journey that allows connection not only with the physicality of the architecture but also with a realm that is sacred. It is this feeling of the numinous that I am trying to capture with the spaces of my own design.

02.6. STRUCTURAL TOUCHSTONE

The structural touchstone represents an exploration into potential structural solutions, achieved through the act of poiesis and the art of making. The touchstone became the first endeavour to materialize the articulation of the real and the numinous by constructing a unique "magic third space". Due to this, the touchstone stands as a pivotal milestone in this project's development. The primary objective here was to employ a strict scientific process, that addresses the berm narrative, to craft a space with the capacity to evoke profound phenomenological and sacred lived-in experiences. Embracing an industrial design aesthetic, the touchstone accentuates the intricate interplay between the concepts of the Real and the Numinous.

REAL

Beneath the bridge-like structure lies an independently controlled berm system, operating on principles akin to those employed in the MoSE Project. When saline levels in the river are low, the berm modules rest on the riverbed, filled with water. However, as saline levels rise, these modules are activated by pumping in compressed air, expelling water from within them. Subsequently, they pivot on their hinged axes and rise. This exploration not only offers a potential solution to saline intrusion but also serves as a means to minimize alterations to the riverbanks during flood events.

NUMINOUS

The numinous dimension of the project comes to life when considering the personal experience of a user on the bridge. Each berm module is intricately linked to its individual screen system, inspired by forms derived from the conceptual model. As these modules move independently, the accompanying screen systems mirror their motion, fostering an engaging interplay between the river below and the bridge above. From the user's perspective, these screens appear to move on their own, transitioning from fully vertical positions that obscure the user's view with reduced light, to fully horizontal orientations that allow an expansive view of the surrounding environment. This connection between the tangible reality and the emotional experience forms the essence that this thesis seeks to explore and embody.

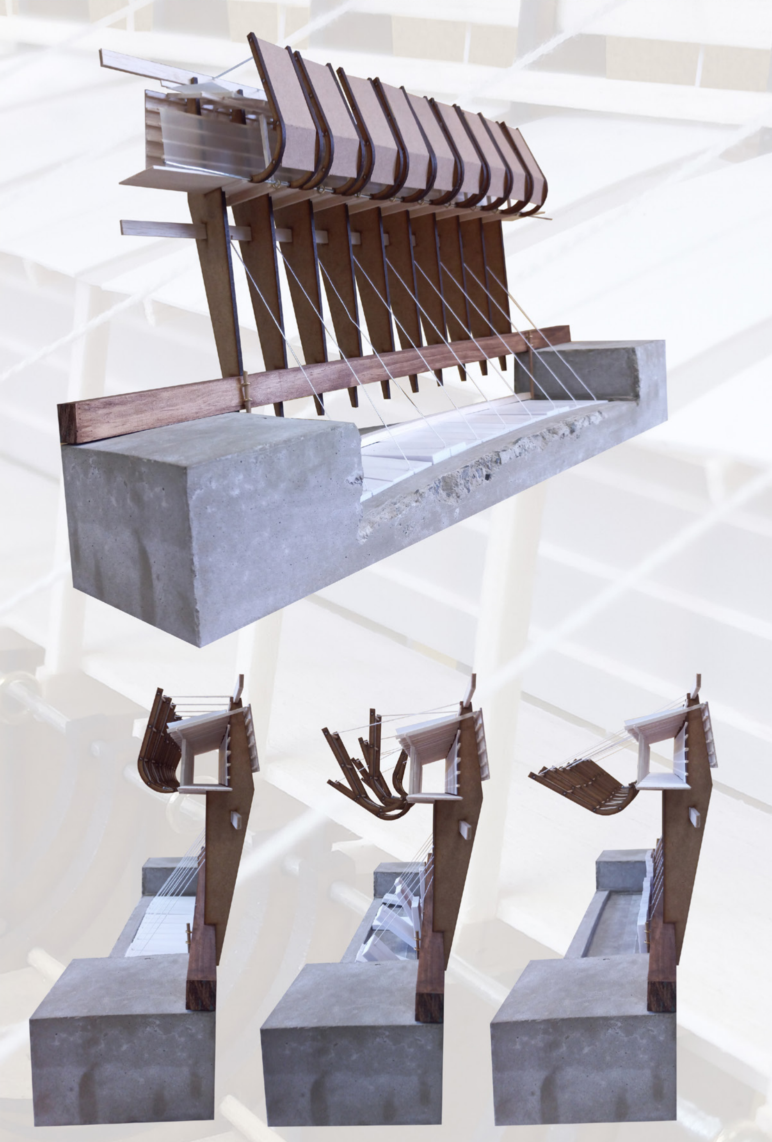


Fig. 37. Closed and open bridge (author)

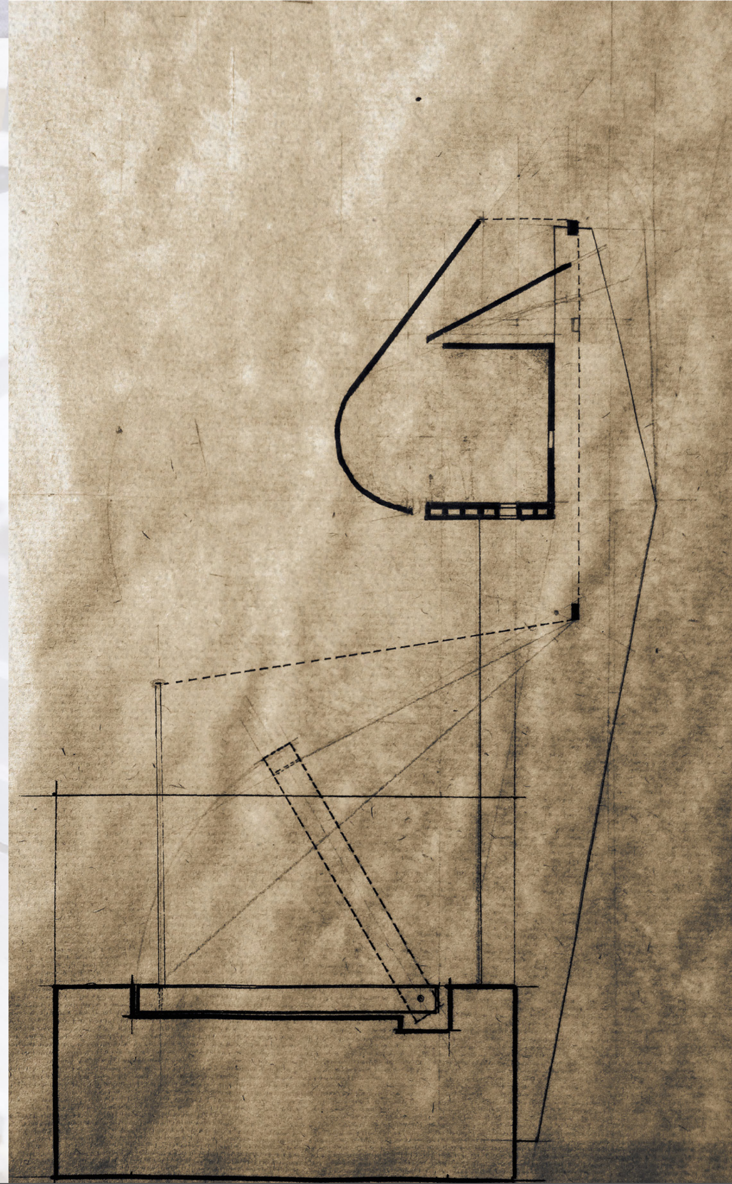


Fig. 38. Process sketch (author)

Chapter 03

THEORETICAL DISCOURSE

03.1. INTRODUCTION

With the establishment of the research question and the contextualization of the site within its histories and complex dynamics of the real and the numinous, it is now possible to evaluate different theoretical possibilities that could inspire an appropriate architectural approach that attempts to explore and demonstrate how the hybrid intertwinement of science and divination can offer insight into new ways of thinking and creating innovative solutions to address the flood crisis in South Africa.

The following chapter ventures into the exploration through the act of poiesis of three different theoretical concepts namely: bridging the gap, the oionistic oracle, and reading the omens. These concepts are the starting points of which architectural translations can be drawn from and developed within the design of the building. After fully understanding the concepts and their architectural counterparts, this chaper is then able to explore different architectural theories that ground and resonate with the concpets to further draw closer to design guidelines and an appropriate design intent.

To visually illustrate the structure of this chapter and its interconnected theoretical underpinnings, a theoretical framework is presented on the following page. It serves as a graphic representation of the links between these diverse theoretical aspects. In the sections that follow, each tier will be individually discussed, allowing for a comprehensive exploration of their implications and contributions to the overarching architectural endeavour.

03.2. THEORETICAL FRAMEWORK

FLOOD CONTROL AND RESEARCH CENTRE

Using architecture as an instrument to explore and demonstrate how the hybrid intertwinement of science and divination can inspire fresh perspectives and innovative solutions for tackling South Africa's flood crisis.

TIER 1

CONCEPTS

The exploration of different aspects and perspectives of connecting science and divination or ways that these seemingly opposite practices overlap.

BRIDGING THE GAP

This concept focuses on **admitting and celebrating the differences** between science and divination as offering unique roles of insight and articulating them accordingly.

- Celebration
- Articulation
- Connect
- Bridge

THE OIONISTIC ORACLE

Highlights the inductive art of **the uninspired and the sane oracle** who inquires purely from human reasoning into the future by observing and investigating possible patterns.

- Patterns
- Reflect
- Reason
- Rational

READING THE OMENS

Omens are **signs with prophetic significance** that portend an exceptionally notable or disastrous event that is thought to tell something about the future.

- Prophecy
- Source
- Memory
- Narrative

TIER 2

ARCHITECTURAL TRANSLATION

Translating the concepts' essence into spaces where different modes of living occur.

CONNECTING THE NODES

Spaces that connect the different functions, spaces of articulation, and the in-between spaces.

- 2022 Flood Memorial
- Berm / Bridge
- Flood Capsule

HABITAT OF THE ORACLE

Spaces, where the oracle (scientist or diviner) takes centre stage, and either preaches their knowledge or broadens it, spaces of reflection and pondering.

- Research Labs
- Auditorium / Nondenominational Church
- Performance Space
- Ritual Huts

SOURCES OF INFORMATION

Spaces where information is derived from. The spaces where observation takes place or history is revisited to make predictions for the future.

- Greenhouse
- Hydro-library
- Audio Pods

TIER 3

THEORETICAL GROUNDING

The exploration of different architectural theories that support and resonate with the concepts further draws closer to design guidelines.

HYBRIDITY

Facilitates the seamless blending of diverse cultural and architectural influences, acknowledging the coexistence of various belief systems and design approaches.

SACRED GEOMETRY

Utilizes geometric principles thought to embody harmony and create a sense of balance and order in the design, which can evoke spiritual responses in the visitors.

MAGIC REALISM

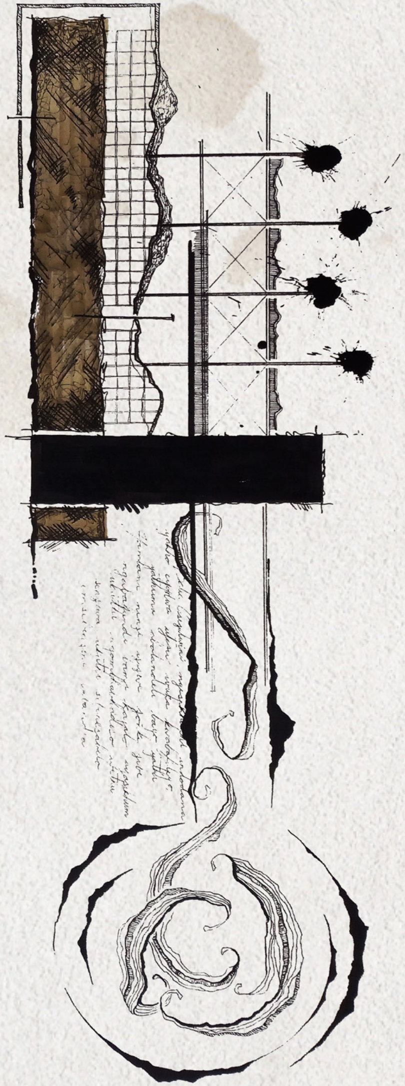
Encourages the incorporation of fantastical elements into the design, bridging the gap between the mundane and the extraordinary.

03.3. CONCEPTS

It is now possible to evaluate different theoretical concepts that could inspire an appropriate architectural approach for the brief. Given the contrasting characteristics of science and divination, these consepts serve as an exploration of different aspects and perspectives of connecting science and divination or ways that these seemingly opposite practices overlap.

These concepts work toward uniting two seemingly opposing realms, blending their contradictory attributes. In the process, they introduce ideas and guidelines that can steer the project’s progress. Simultaneously, they offer additional avenues of exploration that lead to different theoretical groundings. This is done through the act of poiesis where the art of making is the true venture into the investigation. By creating reflection drawings, building models and artistically intervening with the materials, this exercise not only introduces theoretical concepts but also explores different morphological possibilities.

03.3.1 BRIDGING THE GAP



This concept centers on the acknowledgment and celebration of the differences between science and divination, recognizing the unique roles each plays in offering insight and articulating them accordingly. It emphasizes that the bridge signifies a shared objective between the two practices, namely, the endeavor to predict the future and comprehend the past. While science employs a systematic methodology, formulates hypotheses, and subsequently tests predictions, divination involves channeling ancestors from a spiritual realm in a mystical attempt to convey subjective truths. Science adheres to structured, linear cause-and-effect relationships that are explicable, while divination operates within non-linear, meaningful interrelationships that defy scientific explanation. In this way, the concept underscores the diverse approaches taken by these practices while emphasizing their common ground in the pursuit of understanding time and events. This appreciation for their coexistence within the architectural framework allows for a holistic exploration of both scientific and spiritual dimensions.

Fig.39. Reflection Sketch (author)

Fig.40. Concept Model (author)

03.3.2 THE OIONISTIC ORACLE

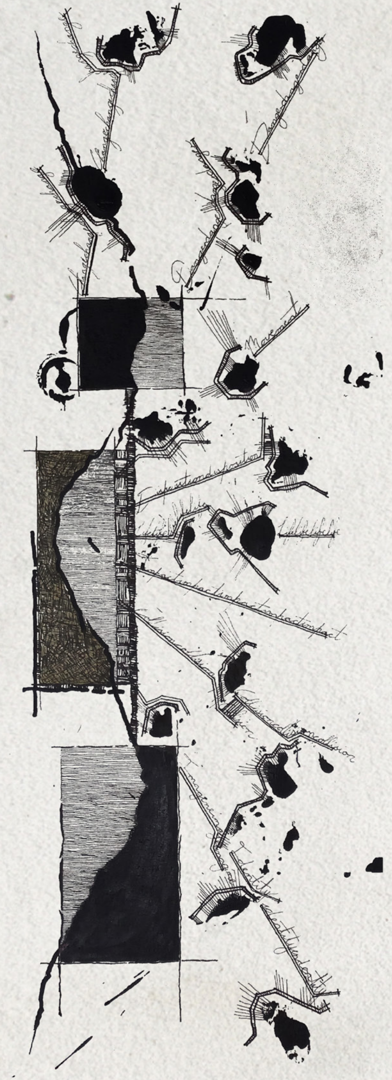


Fig.41. Reflection Sketch (author)

Highlights the inductive art of the uninspired and the sane oracle who inquires purely from human reasoning into the future by observing and investigating possible patterns. For the scientist observes the seemingly random data looking for literal connections between the configurations. The diviner beholds the seemingly random casted lots and interprets meaning into the connected patterns as symbolic conveyed messages. The diviner perceives these connections as profound and pertinent, while the scientist relies on visual measurement and detection. In the realm of architecture, this concept accentuates how the architect can assume the role of an oionistic oracle as part of their design methodology. The site, in this context, unfolds as a woven tapestry upon which a multitude of diverse data points are cast, eagerly awaiting interpretation by the oracle. This approach reflects the intricate interplay between scientific observation and divinatory interpretation, underscoring their relevance in architectural design and the site's potential as a canvas for this creative fusion.

Fig.42. Concept Model (author)

03.3.3 READING THE OMENS

Omens are signs with prophetic significance that portends an exceptionally notable or disastrous event that is thought to tell something about the future. Both practices highlight the importance of past events and their influences in predicting the future. Scientists objectively analyse past documented events by researching articles, journals and books where diviners go through processes of subjectively finding meaning in passed down stories from previous generational oral traditions. This juxtaposition emphasizes the preservation of historical narratives, encapsulating them for the purpose of future prophecies, predictions, and as a tribute to those impacted by past omens and the remembrance of significant events. The site, rich with its own narratives, boasts a long history of omens and recurrent floods, eagerly awaiting interpretation. These narratives serve as a vital link between the past and the future and bridge the realms of memory and foresight.

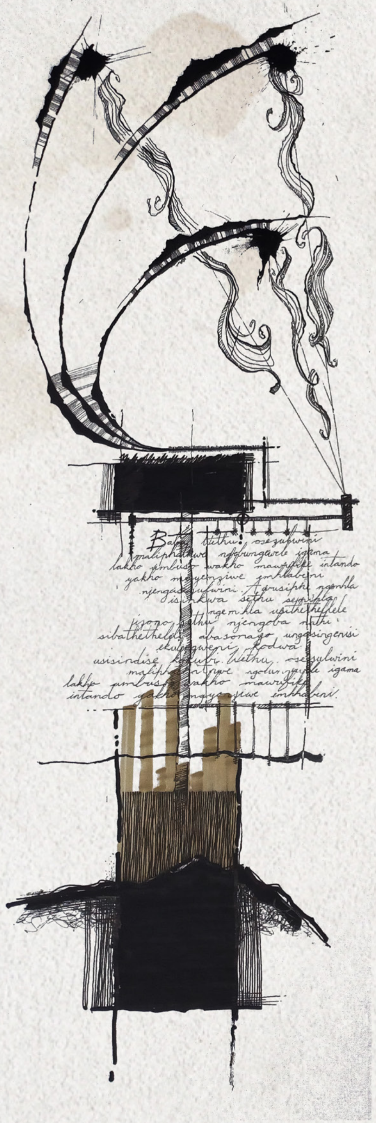


Fig.43. Reflection Sketch (author)

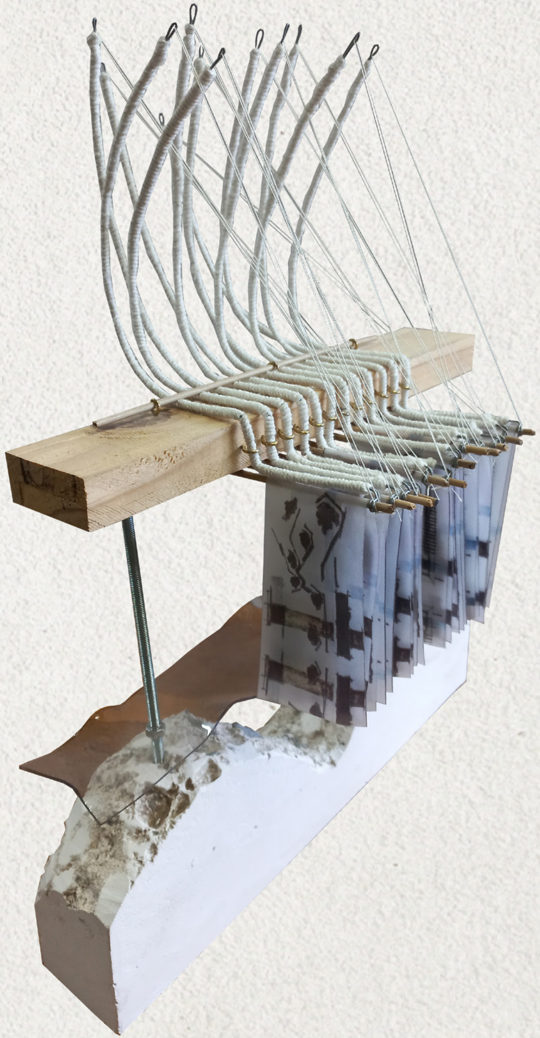


Fig.44. Concept Model (author)

03.4. ARCHITECTURAL TRANSLATIONS

Architecturally, these before-mentioned concepts can be translated into different types of spaces where specific versions of experiences occur. While all these concepts converge on the articulation of the real and the numinous, they inevitably lead to distinct ways of inhabiting and utilizing spaces within a building. In essence, these concepts serve as architectural blueprints, shaping the various functions that the building will ultimately accommodate. Each concept guides the creation of spaces tailored to specific modes of living and experiencing, thereby contributing to the overall diversity and richness of the architectural design.

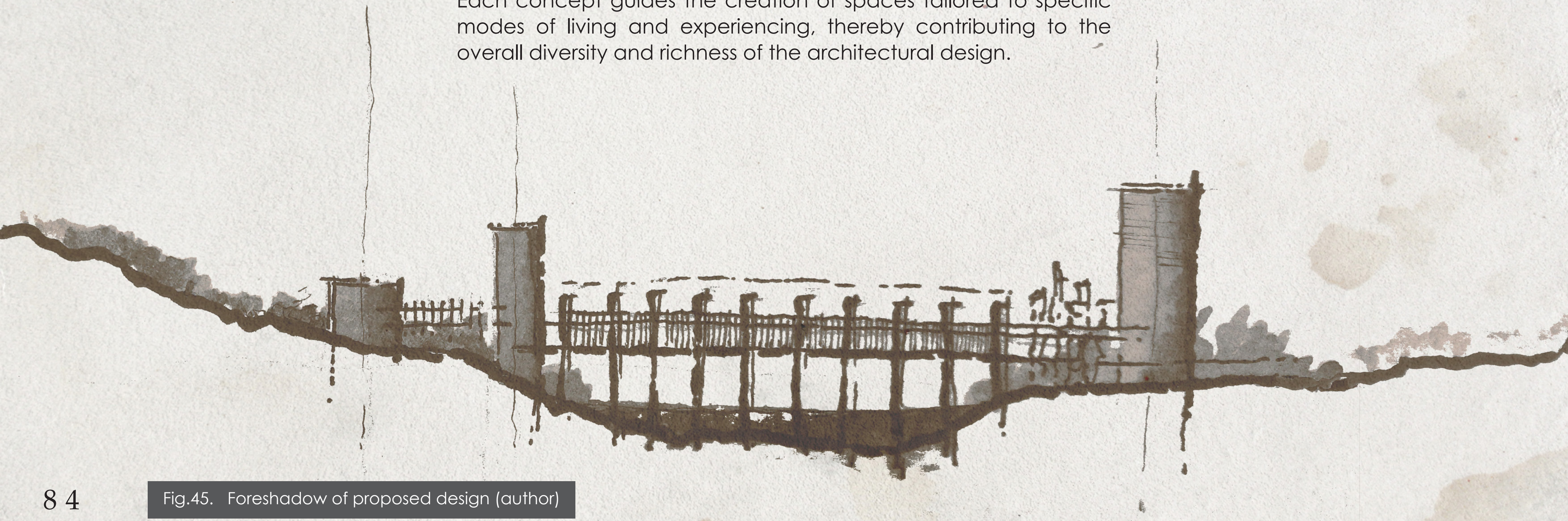


Fig.45. Foreshadow of proposed design (author)

03.4.1 Connecting The Nodes

Bridging the gap translates to spaces that serve as connectors between different functions, seamlessly linking them within the architectural framework. These spaces of articulation act as the vital junctions where transitions occur, facilitating the flow of occupants and activities from one function and space to another. They are the architectural in-between spaces that mediate between the distinct realms created by science and divination, offering a harmonious and fluid experience as one moves between them.

Associated functions within the Flood Control and Research Center:

- 2022 Flood Memorial
- Berm / Bridge
- Flood Capsule

03.4.2 Habitat of the Oracle

The Oionistic Oracle translates to spaces that pivot around the central role of the oracle, whether they are a scientist or a diviner. In these spaces, the oracle takes center stage, serving as the focal point for the spreading of knowledge or the expansion of it. These areas are designed to facilitate discourse and intellectual exchange, where the oracle both engages with others by sharing their insights or broadens their own wisdom. Moreover, these spaces also cater to moments of reflection and contemplation and provide a sanctuary for individuals to ponder the profound implications of their research.

Associated functions within the Flood Control and Research Center:

- Research Labs
- Auditorium / Nondenominational Church
- Performance Space
- Ritual Huts

03.4.3 Sources of information

Reading the Omens translates to spaces that serve as the primary sources of information and knowledge acquisition within the architectural design. These spaces are where observation takes place, or history is revisited with the intent of making predictions or prophecies for the future. They represent the analytical heart of the building, facilitating the process of data collection, analysis, and interpretation. They are also repositories of collective memory, where the stories of the past are archived and memorialized, ensuring that the knowledge derived from history continues to guide contemporary decision-making.

Associated functions within the Flood Control and Research Center:

- Greenhouse
- Hydro-Library
- Audio Pods

03.5. THEORETICAL GROUNDING

Having identified various spatial typologies derived from concepts where science and divination intersect, the next imperative inquiry is to discern their physical manifestations and appropriate design approaches. This subsection invokes architectural theory and external perspectives that resonate with and substantiate these concepts, thus advancing toward the formulation of precise design guidelines.

In theoretical terms, these concepts are aligned with the notions of hybridity, sacred geometry, and magic realism. These theoretical frameworks provide valuable insights into navigating the articulation between the rational and contemporary aspects of science and the spiritual and mystical dimensions of divination within the architectural realm. Their integration into the discourse augments the understanding of how architectural language can bridge these seemingly disparate domains. These insights, coupled with relevant precedents, collectively converge to bring the document closer to its ultimate objective: addressing the research question comprehensively.

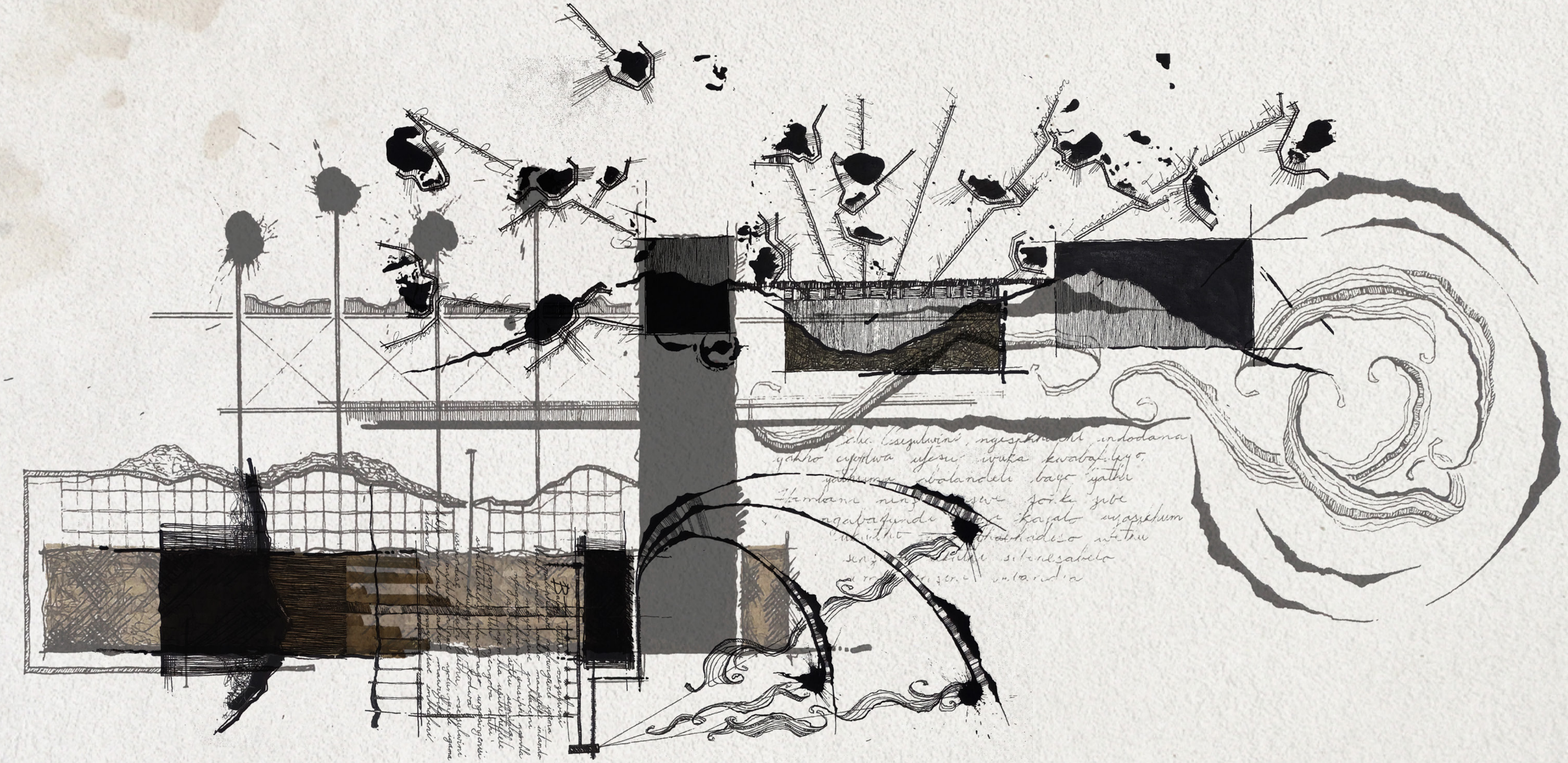


Fig.46. Amalgamation of concepts (author)

03.5.1 HYBRIDITY

In her article titled "Hybridity, Third Spaces, and Identities in Ursula Le Guin's Voices," Fiona Covarr delves into Homi Bhabha's concept of hybridity and the third space as expressed in his postcolonial writings. Hybridity, as defined by Covarr, signifies the adaptation of one's identity to the social and political milieu by either amalgamating or rejecting elements from the cultures that constitute it (Covarr, 2015). A third space, on the other hand, represents a space inhabited by oppressed or colonized communities that stands apart from both their own culture and that of their oppressors or colonizers, serving as a platform for negotiating between the two (Covarr, 2015).

It's worth noting that Covarr explores these notions within the realm of literature rather than architecture. While hybridity initially entered architectural discourse through the writings of postmodern theorists like Charles Jenks and Robert Venturi, their focus predominantly revolved around eclectic hybridity within postmodern aesthetics (Covarr, 2015). This often resulted in postmodern stylistic architecture that paid little heed to social discourses and identity concerns.

This subsection endeavors to adapt Bhabha's concept of hybridity into an architectural framework, aiming to foster an interweaving of cultural values and practices arising from the convergence of distinct cultural groups, such as science and divination, into a "third space". The goal is to employ architectural hybridity as a means to initiate a dialogue between established architectural conventions and the marginalized narratives of African diviner spaces. Prominent examples of this approach can be observed in the architectural works of Diébédo Francis Kéré, the recipient of the 2022 Pritzker Architecture Prize (Louw, 2021).

Kéré's architectural designs create spaces of novel identity, celebrating sustainable indigenous techniques that had fallen into disuse due to 70 years of French colonialism while also integrating Western knowledge into the construction process (Louw, 2021). Kéré himself characterizes his work as a synthesis or a "third way," merging a Northern education in ecological building with a socio-cultural rootedness in Burkina Faso (Louw, 2021). He perceives his role as a bridge, connecting the technological culture of the North with the traditional culture of the South.

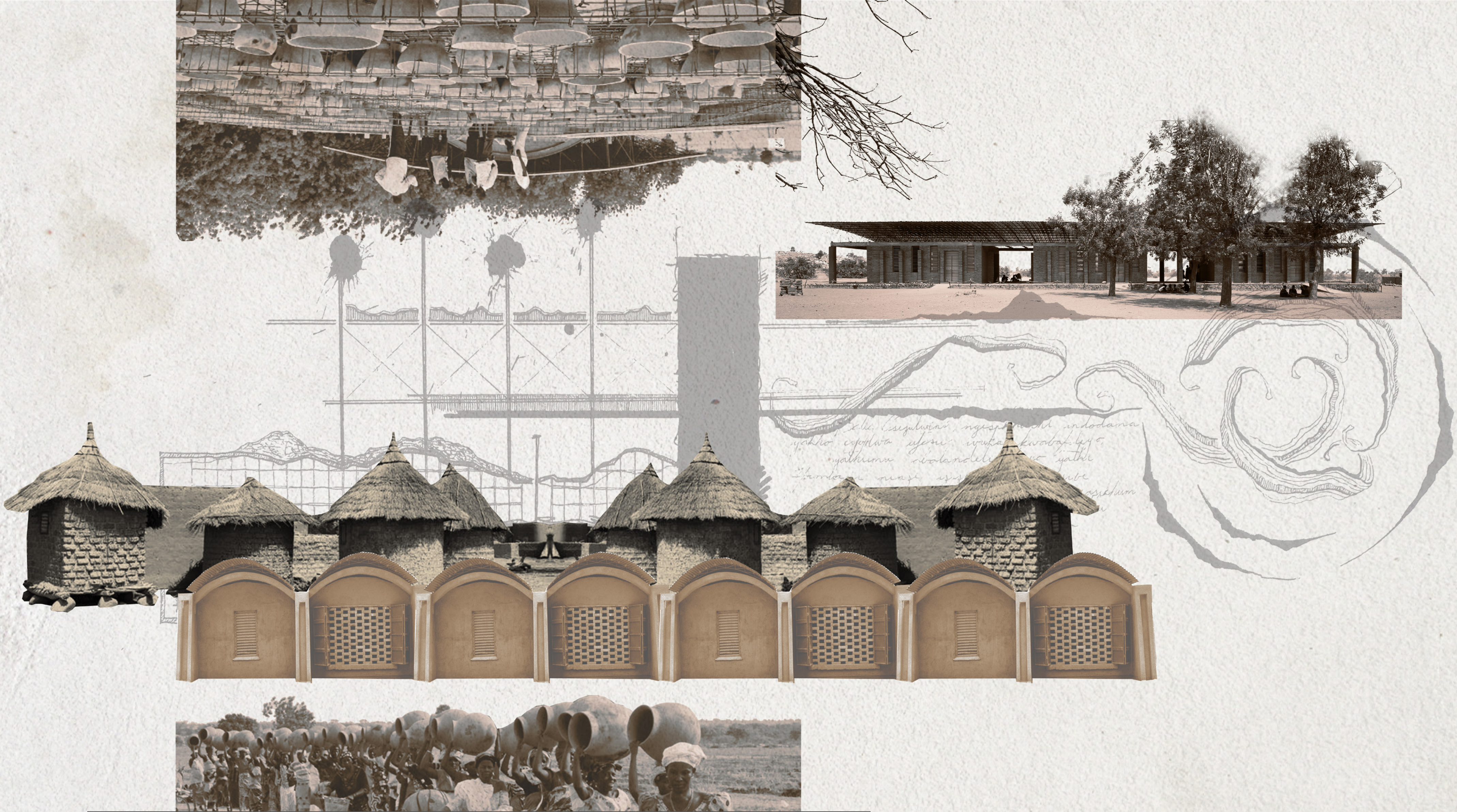


Fig.47. Hybridity of Western knowledge and Indigenous systems (Louw, 2021; adapted byauthor)

03.5.2 SACRED GEOMETRY

In their article titled "Sustainable City Geometries: Sacred Geometry of Ritual Space, Architecture, and City Landscape in Kandy, Sri Lanka," Wasana De Silva and Nisal Amarakoon delve into the intricacies of spatial relationships within ritual spaces. They define sacred geometry as " the place where mind and matter, the spiritual and the physical, the manifest and unmanifest, the bound and boundless meet... Sacred geometry by means of proportions, and harmonious relationships, establishes the links between the human world with the divine world." (WASANA DE SILVA, 2020)

While geometry traditionally falls within the domain of mathematics, Ron Eglash, an American scientist, argues that certain sacred geometries within the African context are not mere happenstance or intuitive constructs but rather design motifs rooted in cultural customs and societal structures.

Eglash particularly references fractals, intricate geometric shapes with fractional dimensional attributes, which manifest in the urban layouts of numerous indigenous African societies. (Eglash, 1999)

In essence, the existence of sacred geometries transcends the analytical examination of points, lines, and planes; it also encapsulates the influence of human rituals and phenomenological routines. These sacred geometries and mathematical proportions serve as reminders of the "divine reality," a realm beyond sensory perception, but also encourage rituals that engage the body in understanding the world and its surroundings through active embodiment. From an architectural perspective, this approach incorporates geometric principles that are believed to instill a sense of equilibrium and order in design, thereby eliciting spiritual responses and fostering ritualistic and routine performances.

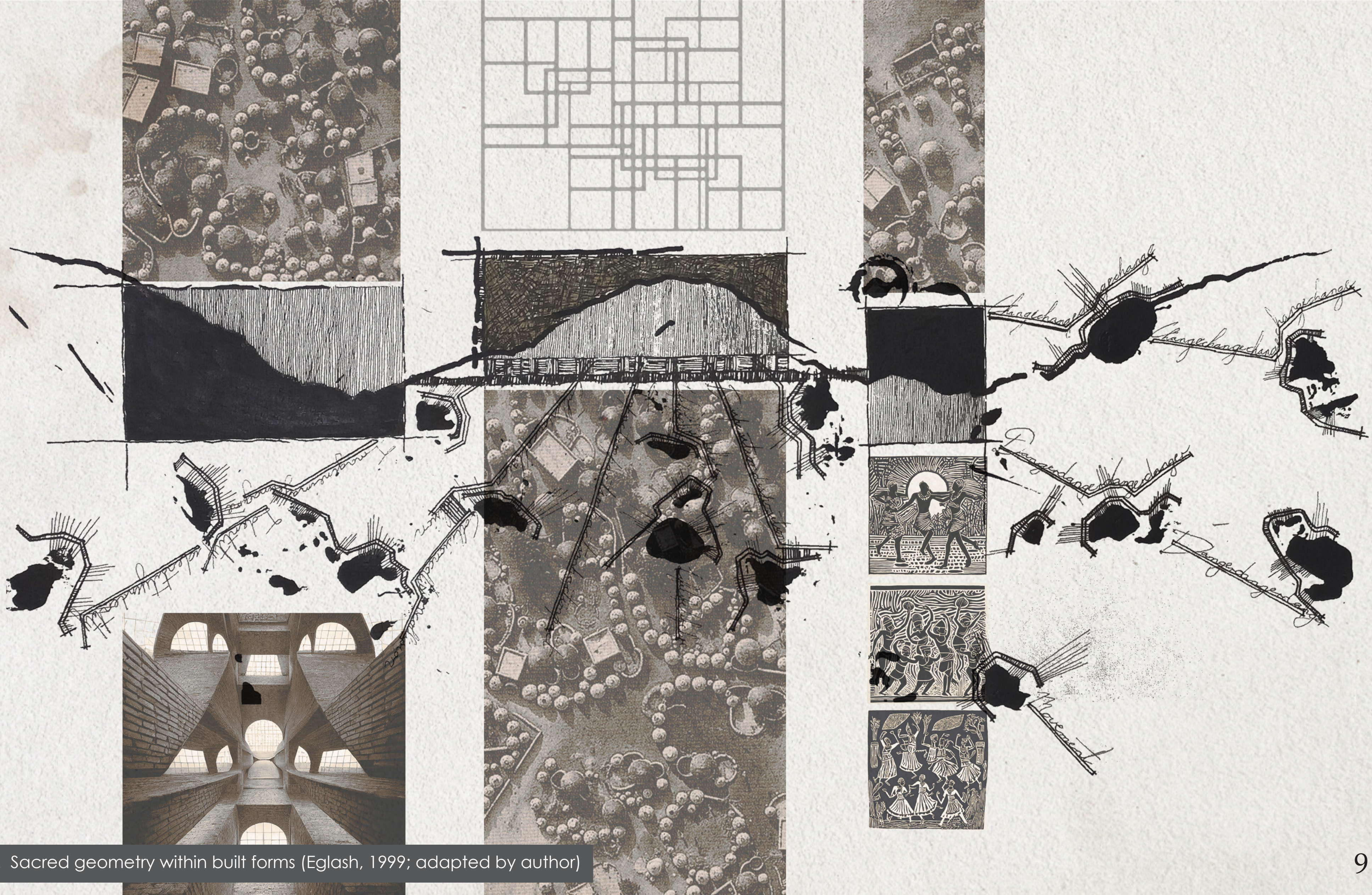


Fig.48. Sacred geometry within built forms (Eglash, 1999; adapted by author)

03.5.3 MAGIC REALISM

In her paper titled "A Magic-Real Gap in Architecture," Carolina Dayer offers an insightful exploration of the evolution of Magic Realism from the twentieth century into the twenty-first century. She traces its resurgence and influence in various architectural works, shedding light on its historical development within the field. The origin of the term can be attributed to the German art critic Franz Roh, who formally conceptualized Magic Realism in 1925 as "a celebration of the everyday life". (Dayer, 2016)

This notion found expression in various forms of literature and art but made its way into the realm of architecture in 1936, courtesy of architect Frederick Kiesler.(Dayer, 2016) Kiesler's perspective on Magic Architecture is that it "holds a balance between the two extremes of man a) desire for the machine b) the denial of science" He highlighted that the element of magic within architecture challenges established norms and principles and exists in "a realm of wondrous performance". (Dayer, 2016)

From an architectural design standpoint, these interpretations of Magic Realism offer two distinctive approaches.

The first approach, rooted in the celebration of everyday life, encourages the meticulous appreciation of architectural details. This aligns with the philosophies of architects like Peter Zumthor and Carlo Scarpa, who find enchantment in accentuating even the smallest architectural elements. This perspective resonates with Roh's idea that the magical is inherent in the real, urging practitioners to closely and precisely examine seemingly ordinary occurrences, thus revealing the profound mysteries underlying reality.

The second approach emerges when one considers the notion of a "realm of wondrous performance." This perspective promotes the incorporation of fantastical elements into architectural design, bridging the divide between the ordinary and the extraordinary. An example of this approach can be observed in the Bosjes Chapel in South Africa. Here, a pristine white structure is conceived as a lightweight, dynamic entity that seemingly hovers within the valley. Concrete, a material typically regarded as weighty, takes on an illusion of weightlessness through the clever use of a reflective pond and slender mullions, creating a magical presence that transcends conventional architectural expectations.

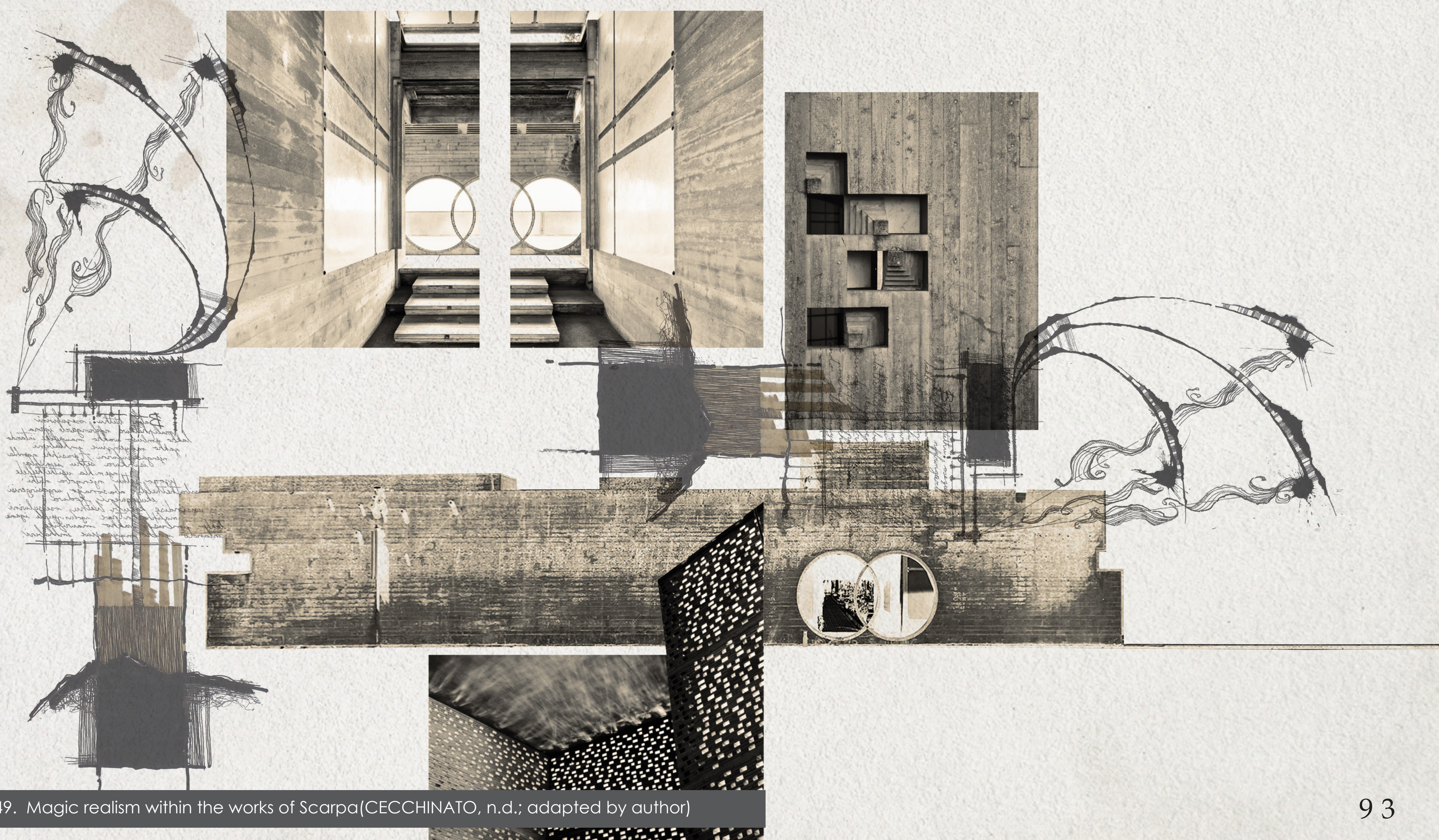


Fig.49. Magic realism within the works of Scarpa(CECCHINATO, n.d.; adapted by author)

03.6. CONCLUSION

The theoretical discourse constitutes a thorough exploration of various theoretical approaches, enriching the design process by critically assessing the appropriateness of the design intent. This chapter delved into three core theoretical concepts: bridging the gap, the oionistic oracle, and reading the omens. These concepts establish the fundamental framework for architectural translations, shaping the creation of spaces informed by three different theoretical groundings.

Upon this investigation, it becomes evident that all three concepts hold theoretical promise in their endeavor to articulate the real and the numinous. Consequently, each of these concepts will find their place within the design strategy and development outlined in the following chapter.

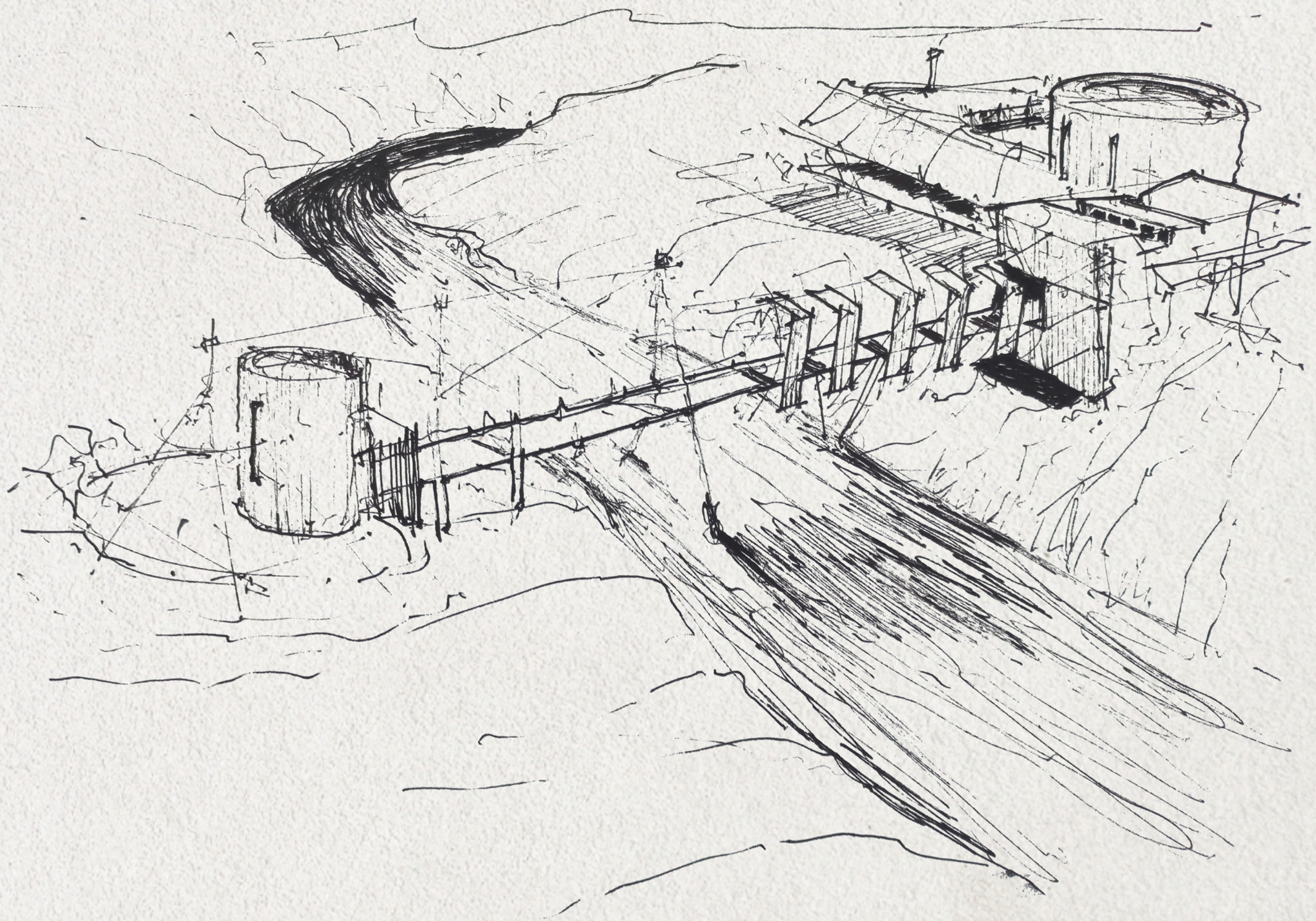


Fig.50. Flood Control and Research Centre rough sketch (Labuschagne, 2023)

Chapter 04

DESIGN STRATEGY

04.1. INTRODUCTION

After conducting extensive research on the project establishment, site, theories, and precedent studies, the focus now shifts towards envisioning a design proposal that embodies the intricate intertwinement of science and divination. This chapter aims to explore the guidelines of such a design and, in doing so, seeks to address the question of how this hybrid integration can manifest in architectural form. To achieve this objective, the chapter will combine design guidelines derived from the comprehensive analysis of the site, examination of three theoretical concepts, consideration of the project brief, and the insights gained from four relevant precedents. These guidelines will serve as the foundation for shaping the design strategy, culminating in the development of a distinctive strategy diagram. This diagram will intricately weave together elements of theory, precedent, site context, and project requirements, ultimately presenting a refined design strategy proposal. Following will be a brief description of each analysis and the guidelines drawn from them.

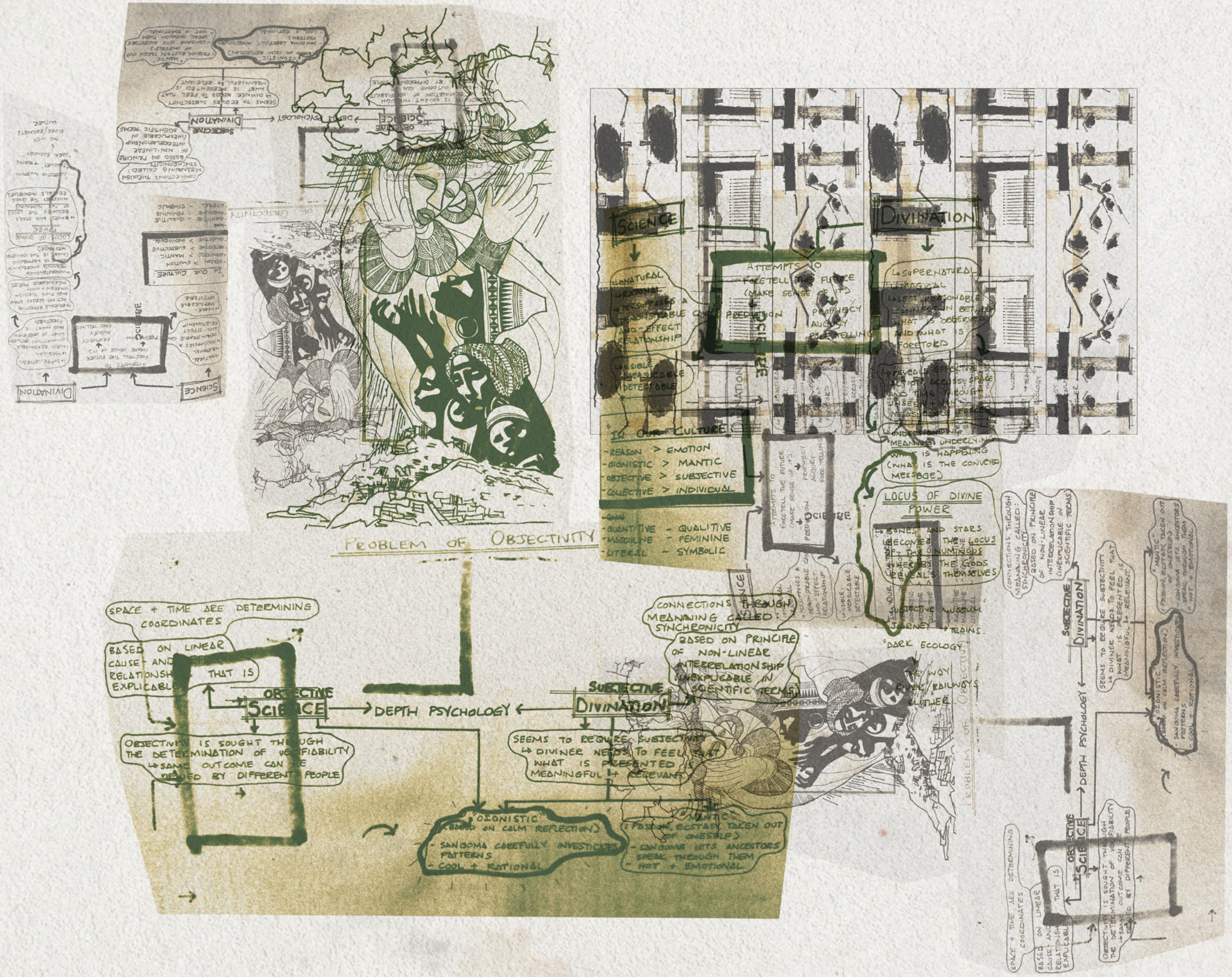


Fig.51. Process Work (author)

04.2. EXTRACTED DESIGN GUIDELINES

04.2.1 ANALYSING THE SITE

By conducting both objective and subjective analyses of the site, we can uncover a broader spectrum of guidelines that might have been overlooked if only one perspective were considered. As previously mentioned, the site extends along the uMzimkhulu River, adjacent to the St Helens Rock pump station, which serves as a significant anchor point for the site and a foundational starting point for the design process. The river boasts a rich history intertwined with the interactions between indigenous African societies and British colonial influences, as it once served as a border before the development of Port Shepstone. Moreover, the river played a pivotal role in the town's development, as it facilitated the construction of the harbor and, subsequently, the town itself. In our exploration of both the real and the numinous aspects of the site, it becomes evident that numerous considerations must inform our approach to the design intent. These considerations are explored in the following set of guidelines:

Analysing the Site

Report of the Real

- Preserve Site Narrative
- Harmonious Landscape Integration
- Flood Resilience
- Climate-Responsive Design
- Indigenous Plant Conservation
- Wildlife Habitat Protection
- Respect St. Helens Pump Station
- Accessible Roads
- Industrial Vernacular
- Saline Control Resilience
- Salinity Monitoring
- Riverbank Sustainability

Report of the Numinous

- Local Identity & Materials
- Memorialising Disasters
- Community Collaboration
- Infuse Storytelling
- Connecting views
- Cultural Practice Preservation
- Subjective Engagement

REAL

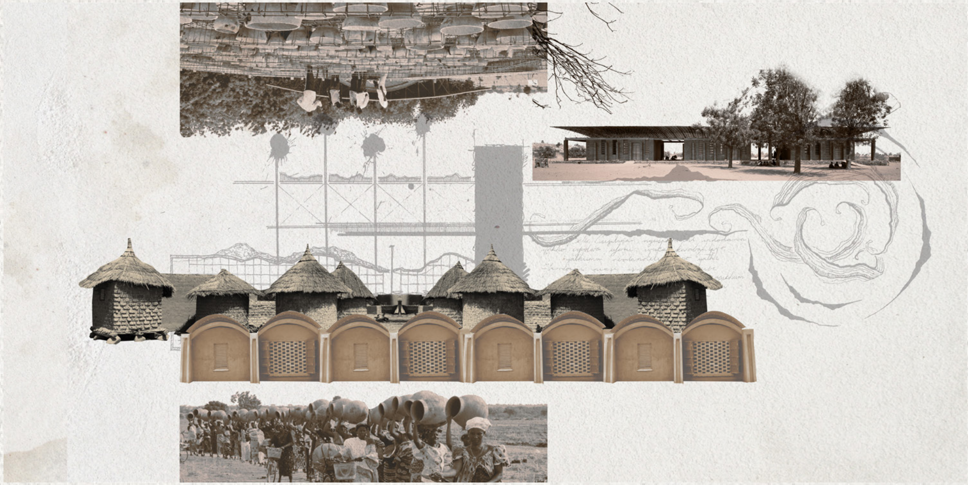
- Preserve Site Narrative: Retain the rich narrative of the border's movement and Port Shepstone's development, emphasizing the blend of indigenous practices and Western influences.
- Harmonious Landscape Integration: Integrate designs seamlessly with the diverse topography, respecting natural slopes and contours.
- Flood Resilience: Protect critical facilities by elevating them or placing them behind floodlines due to potential flooding.
- Climate-Responsive Design: Design for the local subtropical climate, incorporating features like shading and natural ventilation.
- Indigenous Plant Conservation: Conserve indigenous plant species, especially endemics and endangered ones identified in the area.
- Wildlife Habitat Protection: Minimize disruption to local wildlife habitats during construction.
- Respect St. Helens Pump Station: Ensure the proposed building complements the pump station's water supply process without disruption.
- Accessible Roads: Maintain accessible dirt roads on the southern bank and clear overgrown haulage dirt roads for northern bank access.
- Industrial Vernacular: Use concrete, steel structures, and adobe brick accents to align with the local industrial architectural style.
- Saline Control Resilience: Build saline control structures capable of adapting to flood events without harming riverbanks or ecosystems.
- Salinity Monitoring: Implement real-time salinity monitoring to assess saline control effectiveness and maintain water quality.
- Riverbank Sustainability: Prioritize long-term sustainability, considering both river ecology and riverbank alterations.

NUMINOUS

- Local Identity & Materials: Infuse Port Shepstone's unique identity and heritage into the design, employing local materials and elements to nurture a sense of belonging.
- Memorialising Disasters: Recognize the formidable nature's might, paying tribute to those affected by the April 2022 floods, and prioritize resilience in design.
- Community Collaboration: Engage the local community actively, leveraging their insights and preferences to craft a design that aligns closely with their needs.
- Infuse Storytelling: Weave storytelling and local voices into the design, adding a personal, emotional dimension to the space.
- Connecting views: Create spaces that seamlessly connect with the river and surroundings, capitalizing on breathtaking views to enrich the overall experience.
- Cultural Practise Preservation: Design spaces for cultural activities, rituals, and events, upholding and celebrating local traditions, ensuring cultural continuity and pride.
- Subjective Engagement: Acknowledge the importance of individual experiences, facilitating diverse, personal connections with the site through design elements.

Bridging the gap – Connecting the Nodes – Hybridity

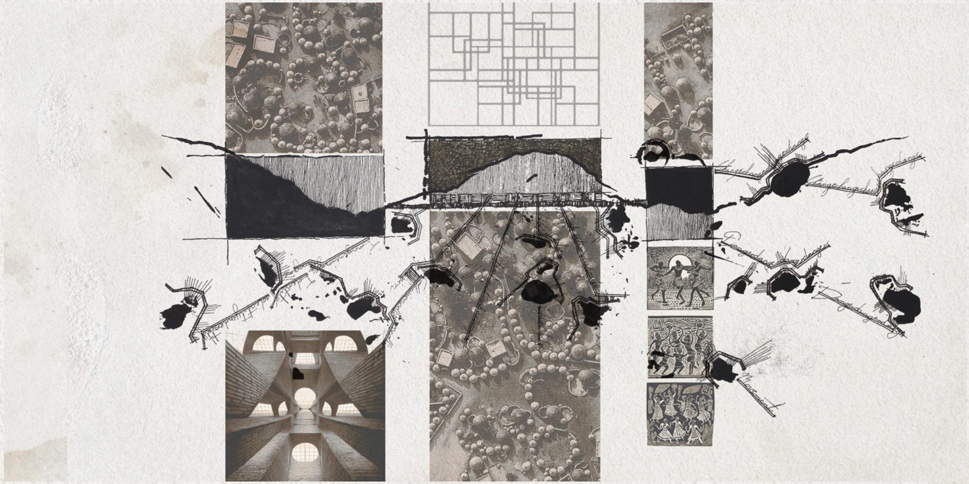
Bridging the gap acknowledges and celebrates the differences between science and divination, recognizing the unique roles each plays in offering insight and articulating them accordingly. This concepts translates to spaces that connect the nodes, seamlessly linking them within the architectural framework. These spaces resonate with the theoretical grounding of hybridity because of the "third space" nature of these links that initiate a dialogue between established architectural conventions and the marginalized narratives of African diviner spaces. Translated in design guidelines this concept brings forth the following:



- Acknowledging Differences: Embrace the differences between science and divination as valuable perspectives. Encourage the celebration of their unique roles in offering insight. Design spaces that symbolize this acknowledgment.
- Shared Objectives: Highlight the common ground between science and divination – the pursuit of understanding time and events. Design with the shared objective of predicting the future and comprehending the past in mind.
- Architectural Connectors: Translate the concept of "bridging the gap" into the design by establishing spaces that act as connectors between different functions. These spaces should facilitate smooth transitions and the flow of occupants and activities between realms.
- Hybrid Identity: Embrace the concept of hybridity in architecture, adapting the idea of a "third space" where diverse cultural values and practices converge. Design with the intention of weaving together distinct processes and experiences.
- Creating a "Third Way": Strive to establish a "third way" in architecture that merges diverse cultural perspectives and traditions. Design with the aim of connecting technological cultures with traditional ones, fostering inclusivity and understanding.

The Oionistic Oracle – Habitat of the Oracle – Sacred Geometry

The oionistic oracle highlights the inductive art of the uninspired and the sane oracle who inquires purely from human reasoning by observing and investigating possible patterns. This concept translates to spaces where the oracle (scientist or diviner) takes centre stage, and either preaches their knowledge or broadens it. These spaces resonate with the theoretical grounding of sacred geometry due to the fact that oracles work within the repetition of rituals and routines grounded in the appreciation of patterns and phenomenological experiences. Translated in design guidelines this concept brings forth the following:



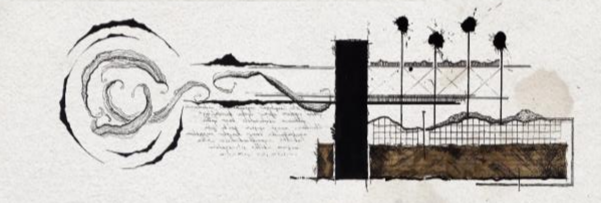
- Oionistic Oracle Integration: Embrace the concept of the Oionistic Oracle, where scientific observation and divinatory interpretation intersect or happen separately. Design these spaces as a place for creative fusion between the thoughts of one or the thoughts of many.
- Oracle Habitat: Dedicate spaces within the centre to serve as habitats for oracles, whether they are scientists or diviners. These spaces should revolve around the central role of the oracle, facilitating discourse, intellectual exchange, and the sharing of insights. Create areas for reflection and contemplation, offering a sanctuary for deep thinking and pondering the profound implications of research.
- Sacred Geometry Influence: Infuse the principles of sacred geometry into the design, recognizing its role in establishing connections between the human and divine worlds by incorporating proportional and harmonious relationships in architectural elements to foster a sense of equilibrium and order.
- Rituals of the Oracles: Keep in mind the actual rituals performed by the oracles and design these habitual spaces accordingly to those routines.

Reading the Omens – Sources of Information – Magic Realism

Reading the omens emphasizes the preservation of historical narratives, encapsulating them for the purpose of future prophecies, predictions, and as a tribute to those impacted by past omens and the remembrance of significant events. This concept translates to spaces that act as sources of information and where observation takes place or history is revisited or memorialised to make predictions for the future. These spaces resonate with the theoretical grounding of magic realism because of how these seemingly mundane spaces of information can be celebrated using fantastical elements and attention to detail to inflict a sense of magic within the real. Translated in design guidelines this concept brings forth the following:

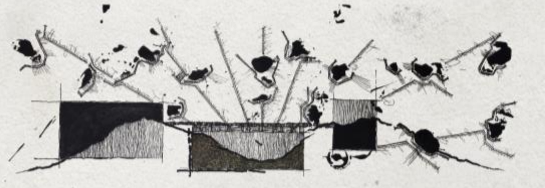
- Omen-Inspired Spaces: Incorporate elements that honor the significance of omens and their role in predicting notable events. These spaces should serve as a tribute to past omens, fostering an understanding of their impact on the future.
- Historical Memory Archives: Design areas within the center dedicated to collecting, preserving, and memorializing historical narratives, including stories of past omens and recurrent floods. These archives should facilitate the study of history and its application to contemporary flood control strategies.
- Celebrate the Everyday: Embrace the Magic Realism concept of celebrating the everyday. Encourage designers to find enchantment in even the smallest architectural details, promoting a deep appreciation for the ordinary.
- Wondrous Performances: Explore the concept of "a realm of wondrous performance" in design. Encourage the use of dynamic architectural elements that create an illusion of weightlessness and magic, transcending conventional expectations.
- Inspire Awe: Design spaces that inspire awe and fascination. Magic Realism architecture should evoke a sense of wonder and captivation, encouraging visitors to explore and engage with the environment.

Analysing the Theoretical Discourse



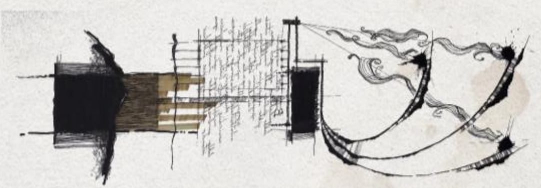
Bridging the Gap

- Acknowledging Differences
- Shared Objectives
- Architectural Connectors
- Hybrid Identity
- Creating a "Third Way"



The Oionistic Oracle

- Oionistic Oracle Integration
- Oracle Habitat
- Sacred Geometry Influence
- Rituals of the Oracles



Reading the Omens

- Omen-Inspired Spaces
- Historical Memory Archives
- Celebrate the Everyday
- Wondrous Performances
- Inspire Awe

04.2.3 ANALYSING THE BRIEF

By parnering up with one of South Africa's leading water research companies, Council for Scientific and Industrial Research (CSIR), and the help of funding from other investors, this thesis proposes constructing a Flood Control and Research Centre that aims to use architecture as an instrument to explore and demonstrate how the hybrid intertwinement of science and divination can offer insight into new ways of creating innovative solutions to address the flood crisis in South Africa. The mission is to appropriatly articulate the real and the numinous, embody the rituals of the scientist or diviner, and provide momentum for connecting past and present knowledge. Translated in design guidelines the brief brings forth the following:

- Client Engagement: Involve the Council for Scientific and Industrial Research (CSIR) and other stakeholders actively in the design process to align the center with their requirements and ensure their involvement throughout the project's lifecycle.
- Multi-User Flexibility: Create spaces that cater to various user groups, including non-profit organizations, diviners, researchers, and private tenants. These spaces should be versatile and adaptable to accommodate diverse needs.
- Operational Efficiency: Ensure efficient day-to-day operations by designating roles and spaces for core researchers, librarians, facility managers, administrative staff, and technicians.
- User-Centric Spaces: Tailor spaces within the center to cater to different user groups, providing information, workshops, event venues, research labs, ritual huts, and educational facilities to meet their specific needs.

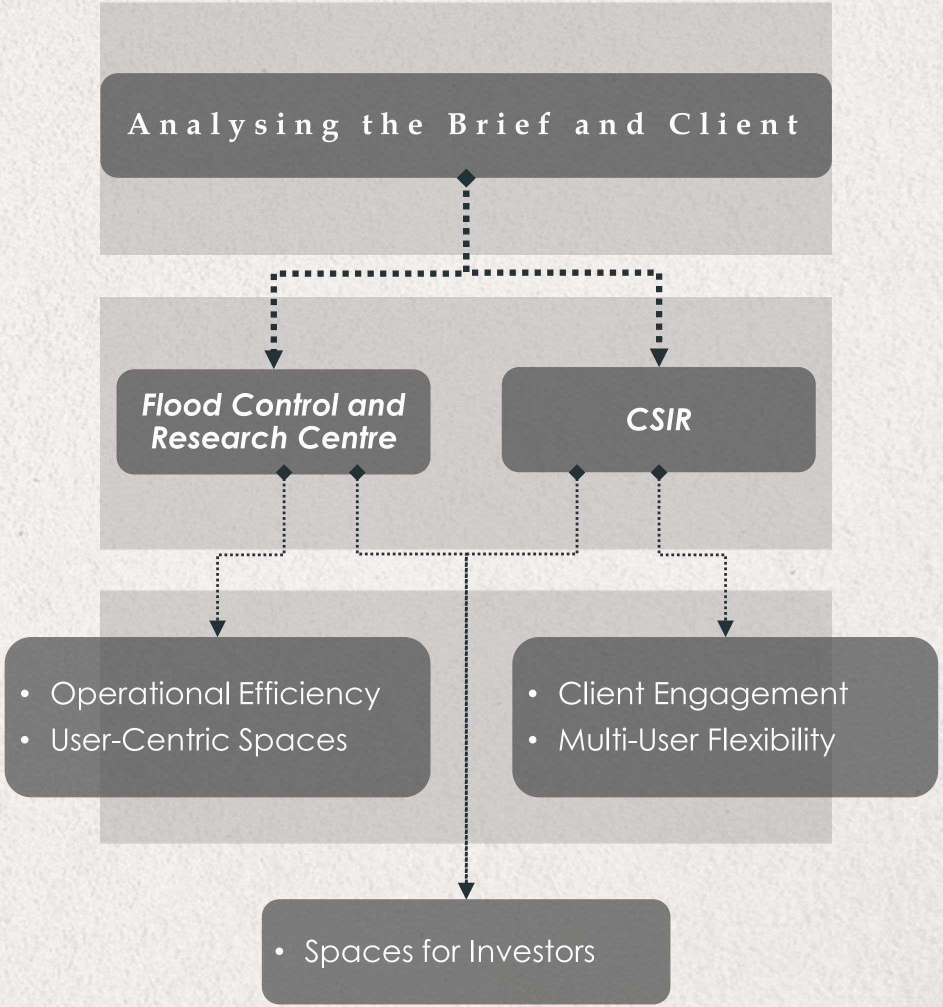


Fig.52. MoSE Project (KIECKENS, 2020)

MoSE Project, Venice, Alberto Scotti

The operation of the MoSE project flood-barrier system, which involves the use of independently movable floodgates, compressed air, and buoyancy-based principles to temporarily isolate the lagoon from the sea during high tides, can provide valuable insights for addressing saline intrusion in the river. This operation mechanism could potentially be adapted and applied to control the flow of saline water into the Umzimkulu River during high tide events. By using similar principles, a flood control and research centre could develop a system that effectively blocks saline intrusion, helping to maintain the river's water quality for various research and community purposes.

Fig.53. Allmannajuvet Rest Area and Museum (Amoretti, 2019)

Allmannajuvet Rest Area and Museum, Sauda, Norway, Peter Zumthor

The Allmannajuvet precedent's notable approach to materials integration and structural adaptation is highly suitable for incorporating into the Umzimkulu River flood control and research center. Architect Peter Zumthor's adept use of locally sourced materials like creosote-coated pine, steel, and zinc not only enhances aesthetics but also establishes a meaningful connection with the project's context. Implementing this approach promotes site identity and relevance. Additionally, the design's ability to create structures that seemingly float or delicately fit into place aligns with the concept of magic realism in an attempt to evoke a feeling of mystery and wonder. These structures are also useful to adapt to changing water levels for they are hovering above the rocky terrain.

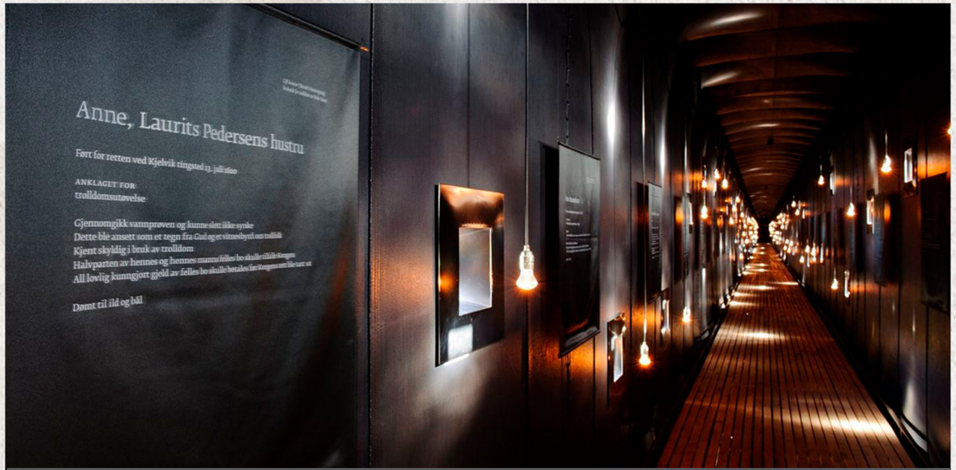


Fig.54. Steilneset Memorial (HOFMEISTER, 2013)

Fig.55. Mortensrud church (JSA, 2004)

Steilneset Memorial for the Victims of the Witch Trials, Norway, Peter Zumthor

The most appropriate aspect to integrate into the design of a flood control and research center from the Steilneset Memorial precedent study would be "Historical Narrative." This involves incorporating elements that convey the historical narrative and emotional weight of the center's purpose. Much like the Steilneset Memorial showcases the names and stories of those accused of witchcraft, the flood control and research center could display information about past floods, their impacts on the community, and the efforts to mitigate future risks. Integrating this historical narrative element into the center's design would help create a meaningful connection between visitors and the center's mission. It would provide a tangible link to the community's history with floods, emphasizing the importance of flood control and research while fostering a sense of empathy and understanding among visitors.

Mortensrud church, Jensen & Skodvin Architects

An intriguing aspect from the Mortensrud Church precedent study to integrate into the design of a flood control and research center would be the "careful orchestration of space and illumination." This includes the use of natural light and innovative design elements that transform the visitor's experience over time. By incorporating similar design principles, the flood control and research centre can create spaces that are not only functional but also offer a sense of awe and connection with the environment, making it more inviting and emotionally resonant. Additionally, the use of materials that blend with the natural surroundings and provide a tactile connection can enhance the overall design of the centre, making it harmonious with its context.

04.3. FINAL DESIGN STRATEGY PROPOSAL

Articulating the Real and the Numinous

Site Analysis

Report of the Real

- Preserve Site Narrative
- Harmonious Landscape Integration
- Flood Resilience
- Climate-Responsive Design
- Indigenous Plant Conservation
- Wildlife Habitat Protection
- Respect St. Helens Pump Station
- Accessible Roads
- Industrial Vernacular
- Saline Control Resilience
- Salinity Monitoring
- Riverbank Sustainability

Report of the Numinous

- Local Identity & Materials
- Memorialising Disasters
- Community Collaboration
- Infuse Storytelling
- Connecting views
- Cultural Practise Preservation
- Subjective Engagement

Theoretical Discourse

Bridging the Gap

- Acknowledging Differences
- Shared Objectives
- Architectural Connectors
- Hybrid Identity
- Creating a "Third Way"

The Oionistic Oracle

- Oionistic Oracle Integration
- Oracle Habitat
- Sacred Geometry Influence
- Rituals of the Oracles

Reading the Omens

- Omen-Inspired Spaces
- Historical Memory Archives
- Celebrate the Everyday
- Wondrous Performances
- Inspire Awe

Brief and Client

Flood Control and Research Centre

- Operational Efficiency
- User-Centric Spaces

CSIR

- Client Engagement
- Multi-User Flexibility

Precedents

Structural Precedent

- MoSE Project
- Allmannajuvet Rest Area and Museum

Design Precedent

- Steilneset Memorial
- Mortensrud Church

04.4. CONCLUSION

Essentially, the proposed design aims to emphasize the poetic potential arising from the intertwinement of science and divination. Its primary goal is to address the ongoing flood crisis in South Africa. To accomplish this as a design strategy, the structure must respect the site's history and significance in both objective and subjective aspects. Furthermore, the building should bridge the gap between the real and the numinous, embody the methodologies of the oionistic oracle, and highlight the significance of interpreting and memorialising past omens. Additionally, it must adhere to a practical project brief and draw lessons from prior endeavors. Establishing this design strategy provides a foundation for exploring the design development process that ultimately led to the final design.

Fig.56. View of the site (author)

Chapter 05

DESIGN DEVELOPMENT

05.1. INTRODUCTION

This chapter is dedicated to providing a comprehensive overview of the design development process throughout the project. It serves as a critical juncture where all the elements previously scrutinized and examined in the preceding chapters merge into a singular, coherent design, which is envisioned as the proposed Flood Control and Research Centre situated on the banks of the uMzimkhulu River. Chapter 6 will be dedicated to introducing and elaborating on this final design. Furthermore, this chapter will structure itself by introducing elements of the program, the initial design reaction, and the layout and spatial development of the building.

These aspects, will trace the evolution of ideas, problem-solving strategies, and the synthesis of concepts that have culminated in the conception of the centre. It provides a holistic view of how the project has unfolded, highlighting the creative journey that have shaped this transformative endeavor, ultimately aimed at addressing the pressing flood crisis in South Africa.

PROGRAM ELEMENTS

CONNECTING THE NODES
- 2022 Flood Memorial
- Berm / Bridge
- Flood Capsule

HABITAT OF THE ORACLE
- Research Labs
- Auditorium / Nondenominational Church
- Performance Space
- Ritual Huts

SOURCES OF INFORMATION
- Greenhouse
- Hydro-Library
- Audio Pods

SERVICES
- Ablutions
- Offices
- Storage
- Admin

05.2. INITIAL REACTION

The initial response to the design intent involved a careful assessment of the site, taking note of its existing focal points. It became evident that St. Helen's Pump Station should serve as a central anchor due to the pre-existing accessibility of the building.

In response to the river's border narrative outlined in Chapter 2, the design plays on the contrast between indigenous societies, characterized by divination, historically located on the southern banks, and Western influences, driven by science, predominantly occupying the northern banks. The design process started by reversing this narrative, with St. Helen's Pump Station anchoring the scientific practices, while the northern banks were designated primarily for divinatory practices.

This shift in perspective essentially transformed the river into the central articulation space bridging the realms of science and divination, giving rise to what can be considered the third space. This pivotal concept then laid the foundation for the subsequent phases of the design.

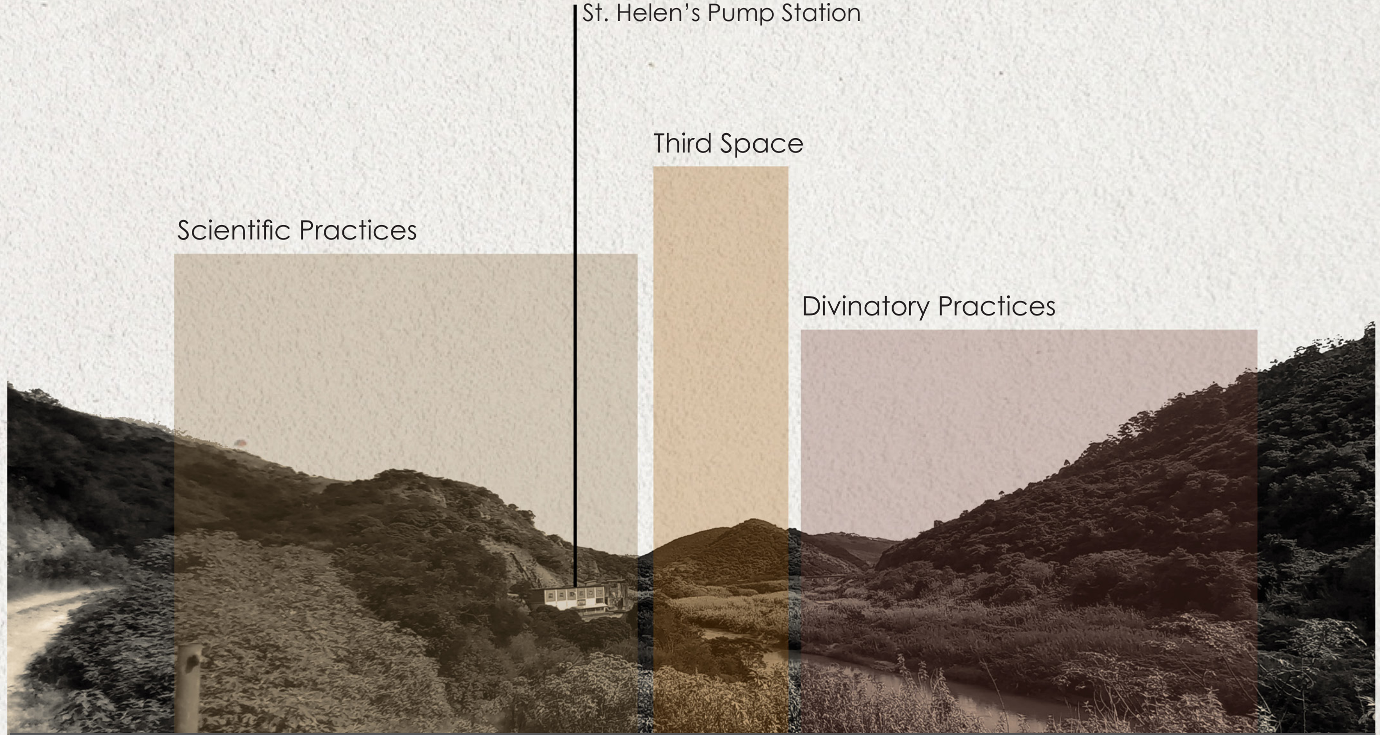
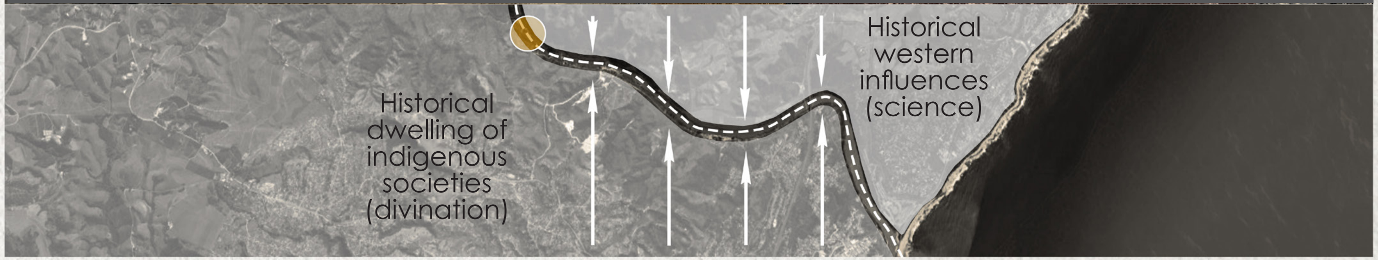
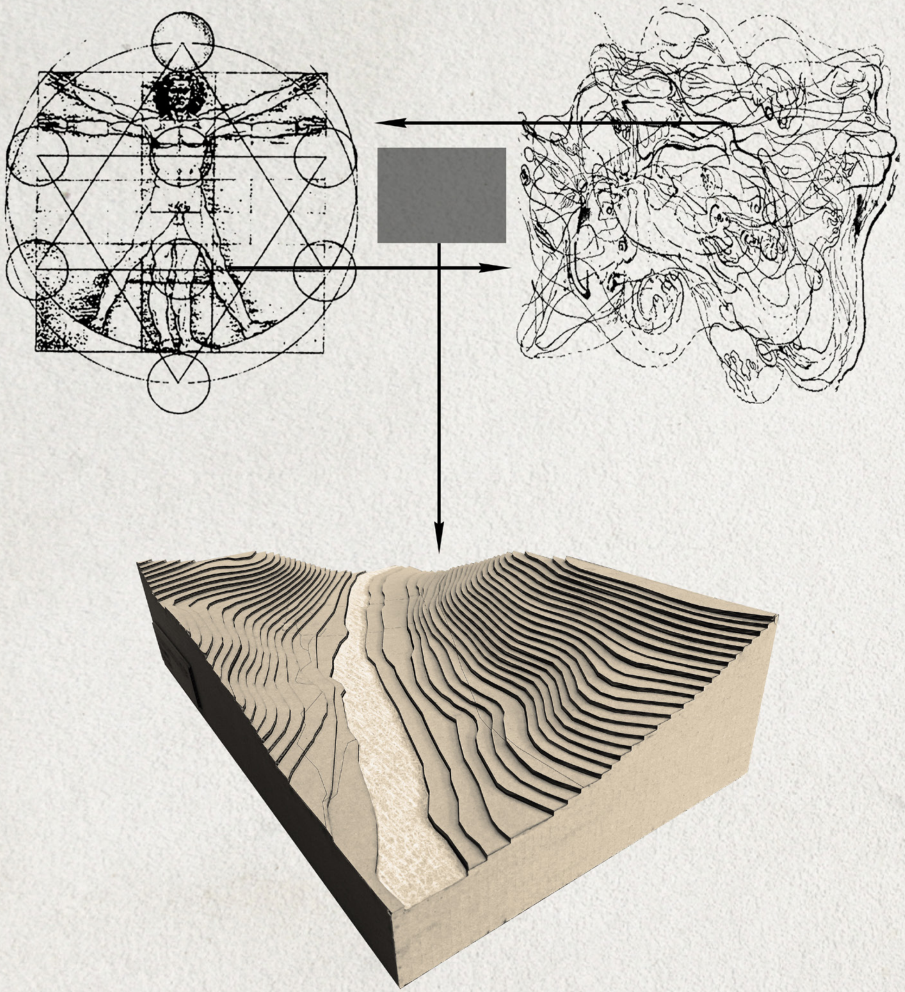


Fig.57. Flipped border narrative (author)





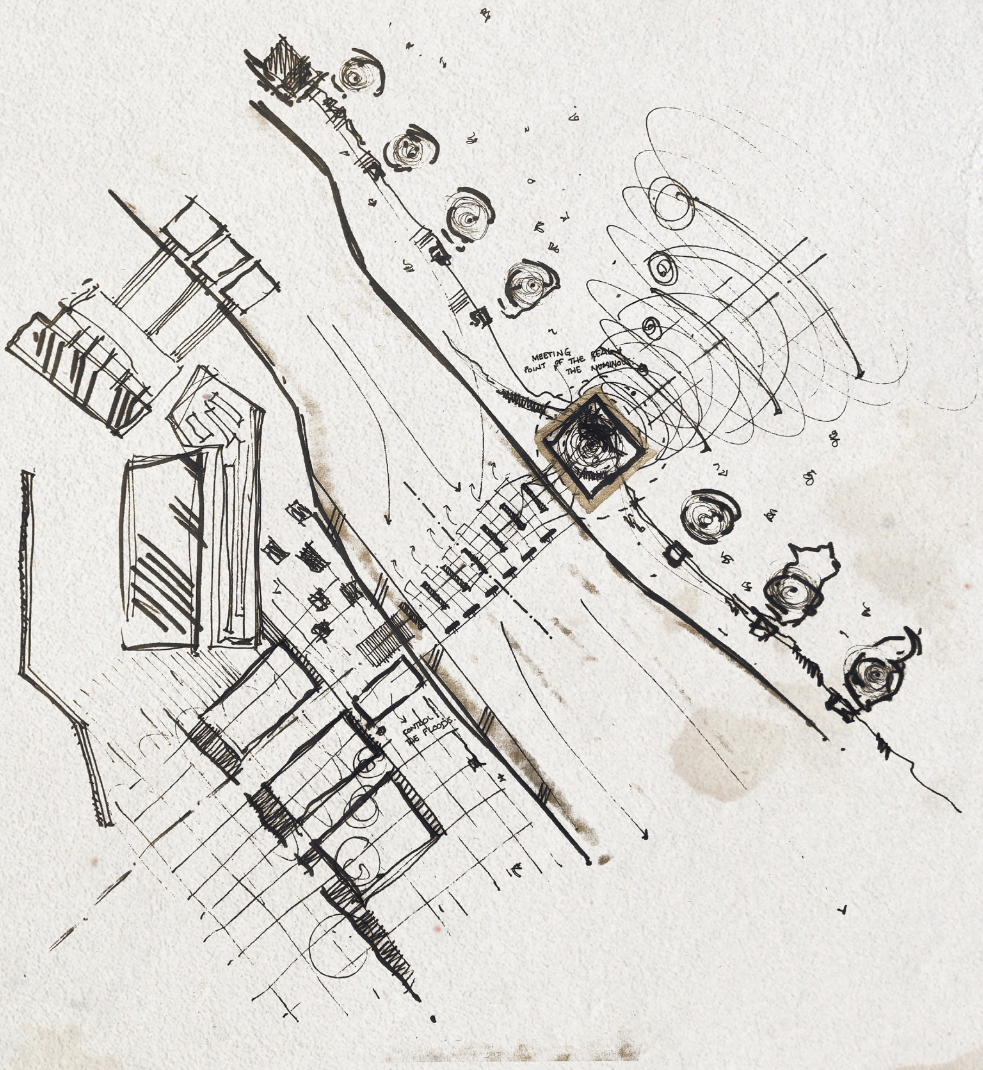


Fig.58. Trying to place a dialogue between two realms onto the site (author)

Fig.59. Initial response to site (author)

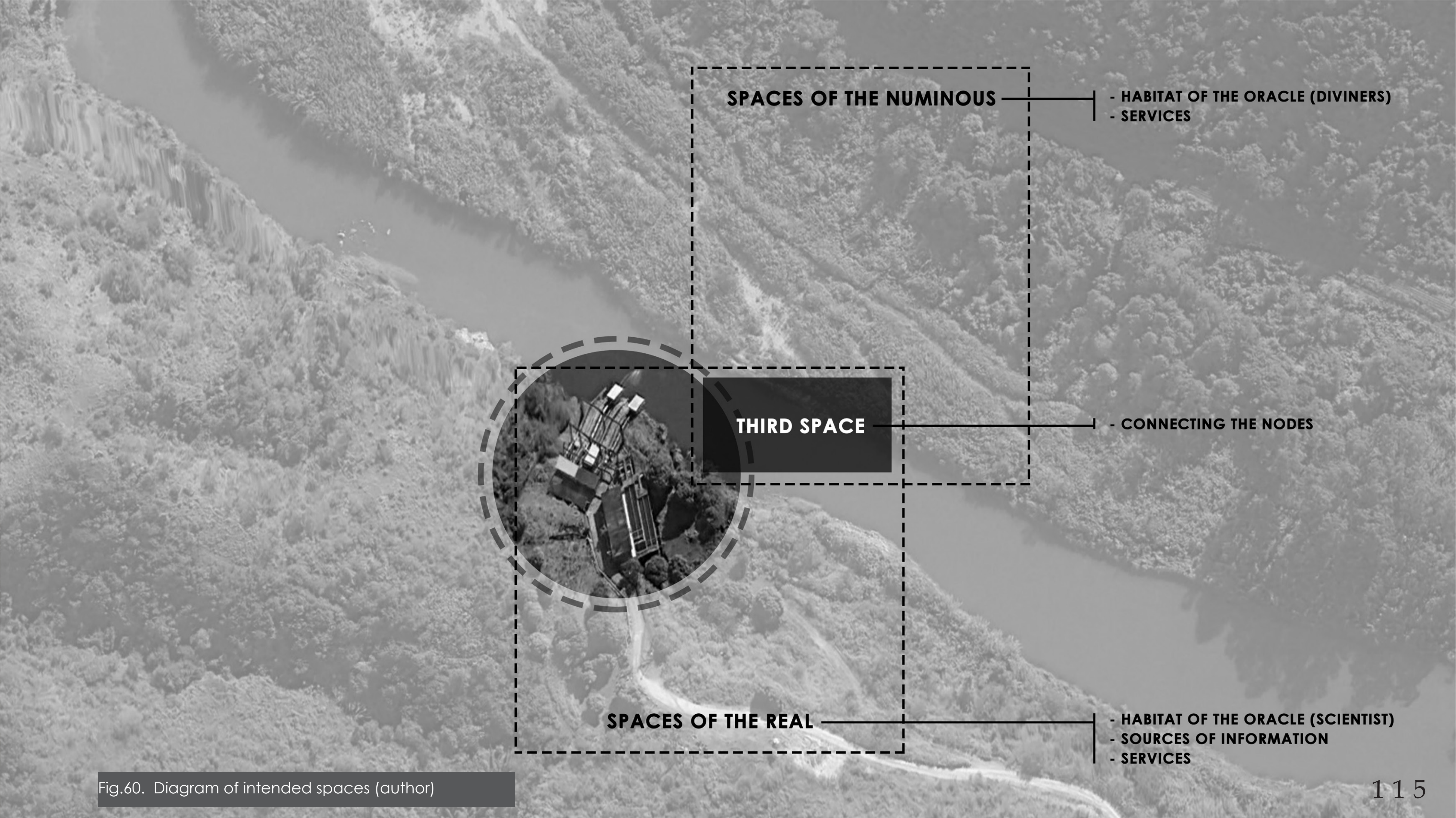


Fig.60. Diagram of intended spaces (author)

05.3. LAYOUT DEVELOPMENT

The layout was first drawn from existing orders within the pump station. It started with a simple box, focusing on the utilization of two perpendicular axes. The first axis was derived from the established axis of the high-lift pump station, it is essentially the axis derrived from the real. The second axis, on the other hand, is derrived from the energies of the site. This is an interpretation of the siteDAte explained in chapter two and in essence, follows the direction of the river flow.

With these axes as guiding principles, the layout of the Flood Centre was explored. The idea was for one axis to seamlessly transition into the other, much like how one might walk along one axis and gently change direction onto the other. During this process, it was decided that most of the functional spaces would be embedded into the southern bank of the river. Meanwhile, the more poetic and expressive spaces would be situated on the northern bank. This decision did not imply that the architectural language of the southern bank lacked poetic qualities; rather, its poetic nature would serve as a means of connecting and articulating the relationship between these two distinct realms.

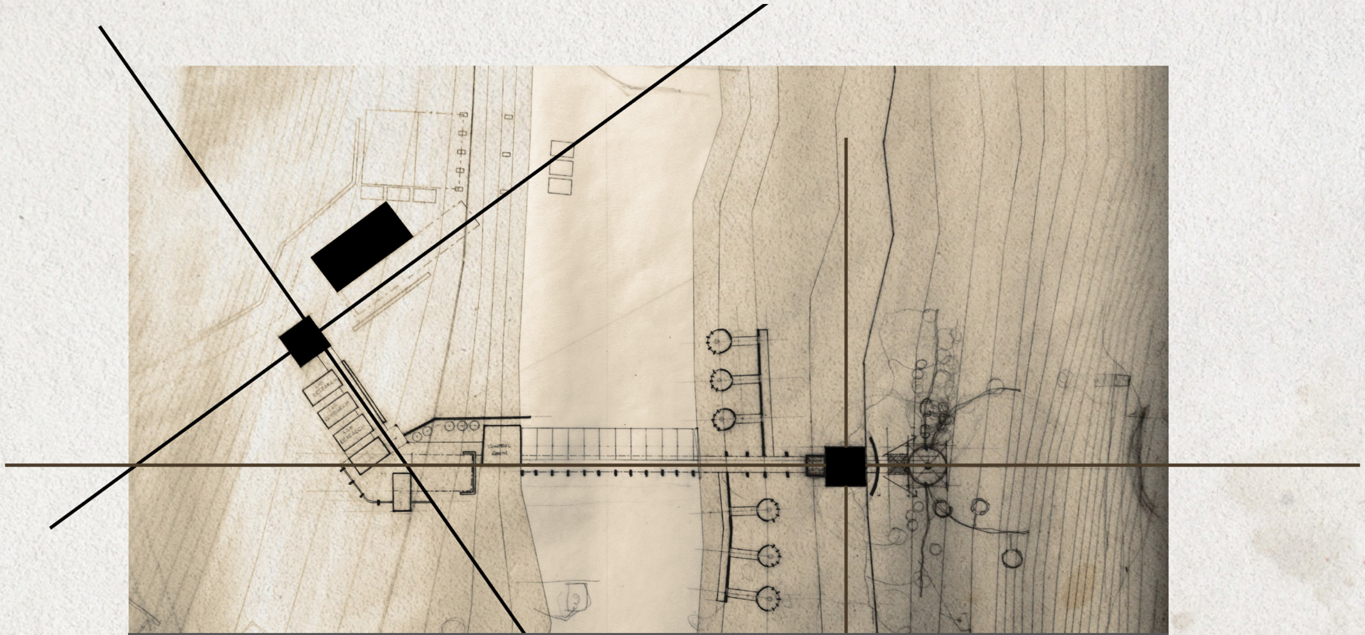


Fig.61. Development of axis and nodes (author)

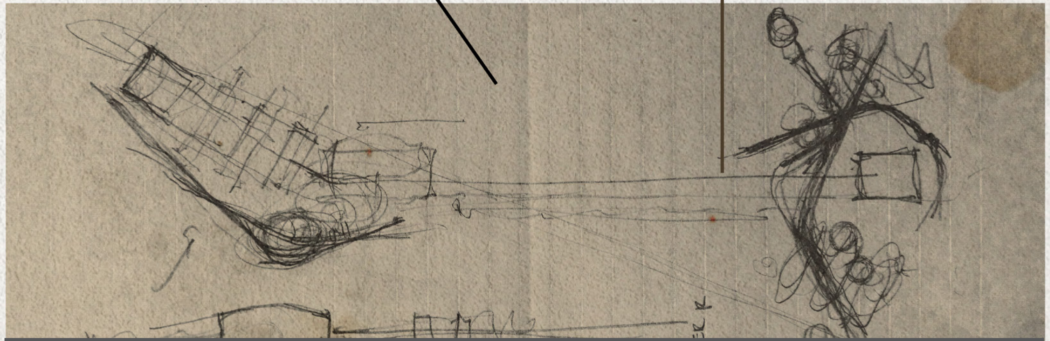


Fig.62. Process work (author)

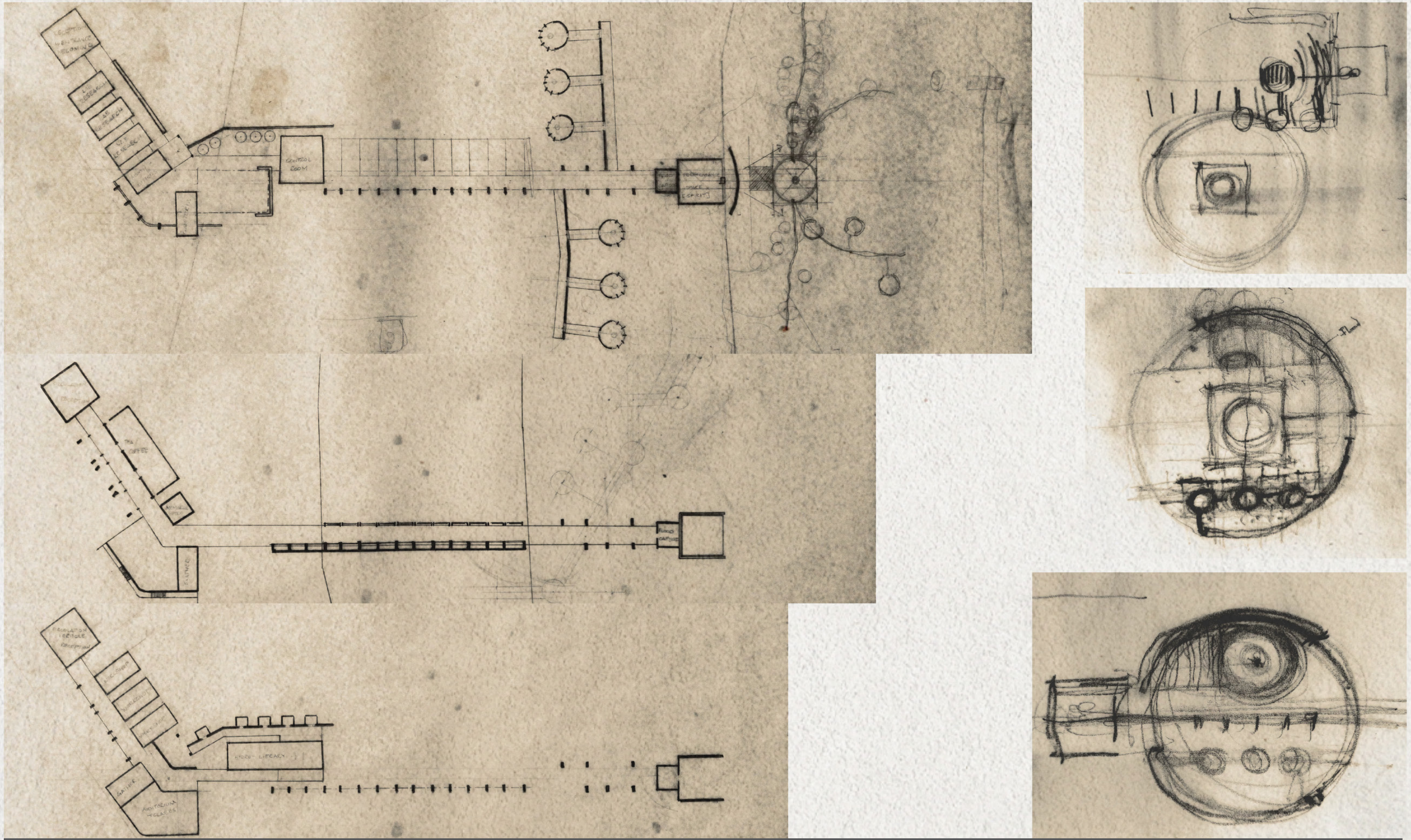
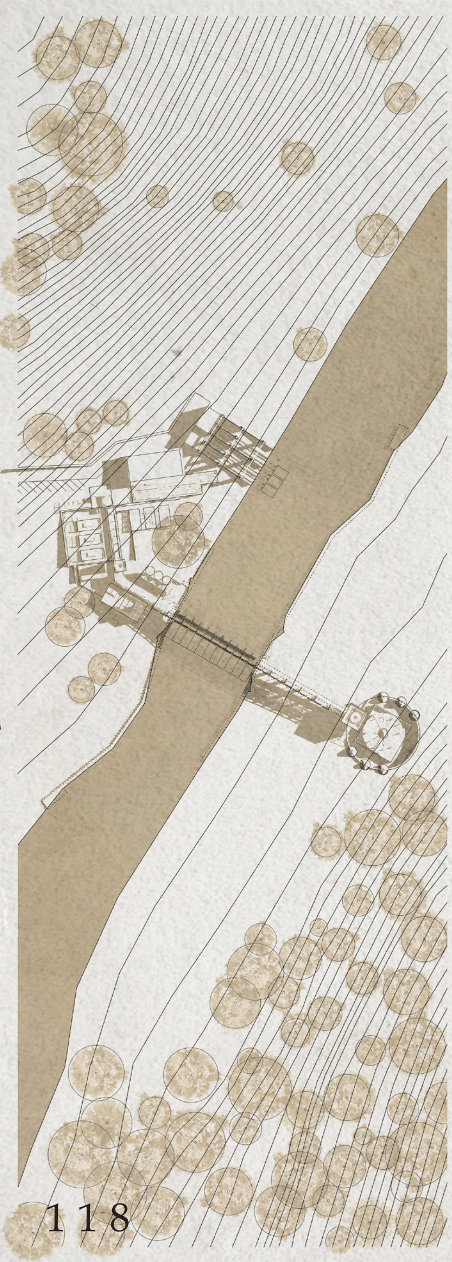
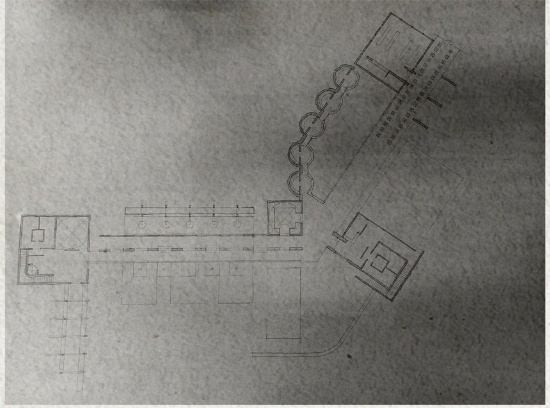
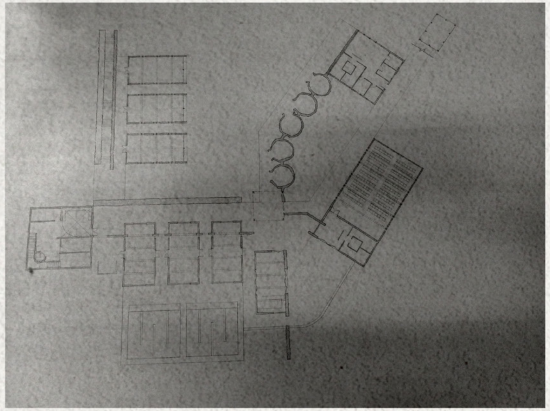
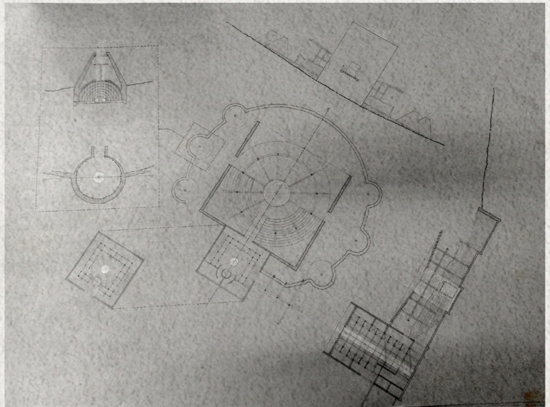


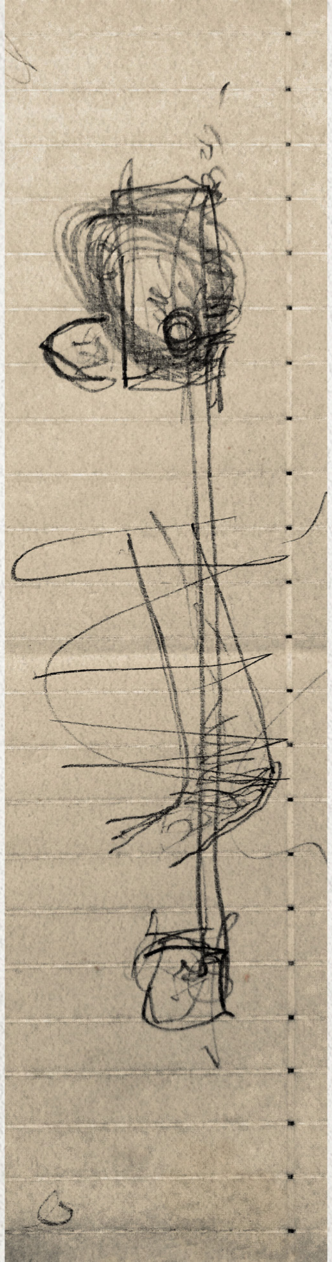
Fig.63. Process work (author)











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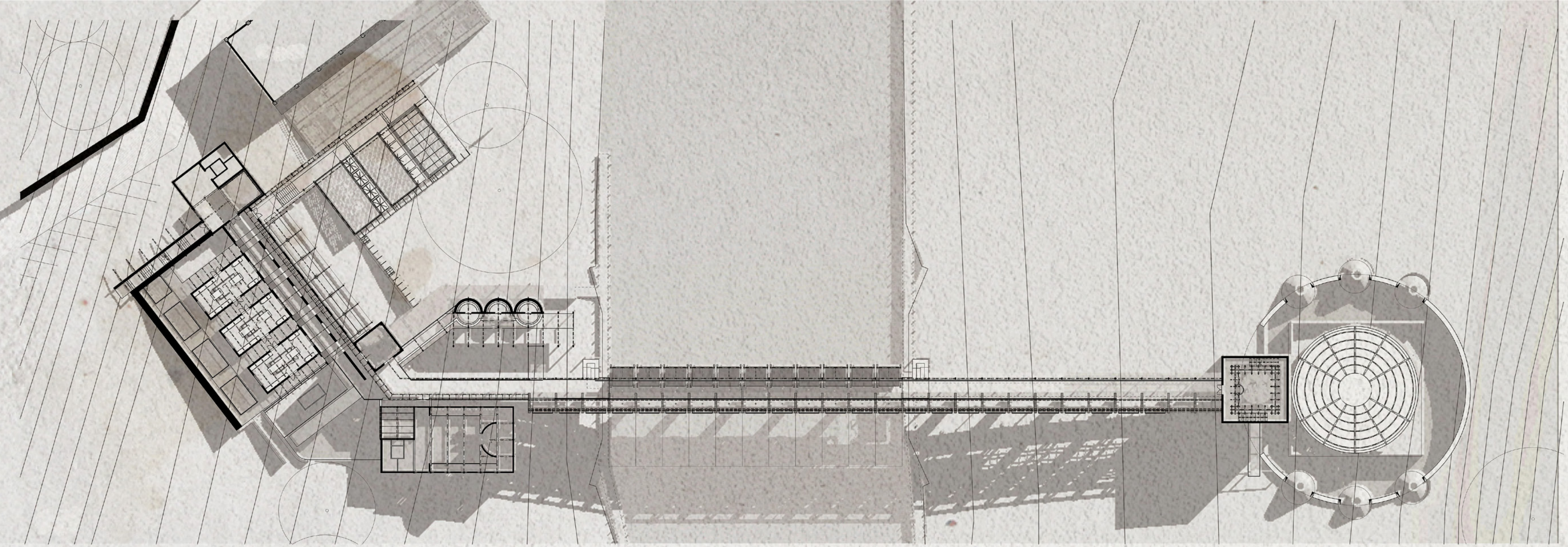
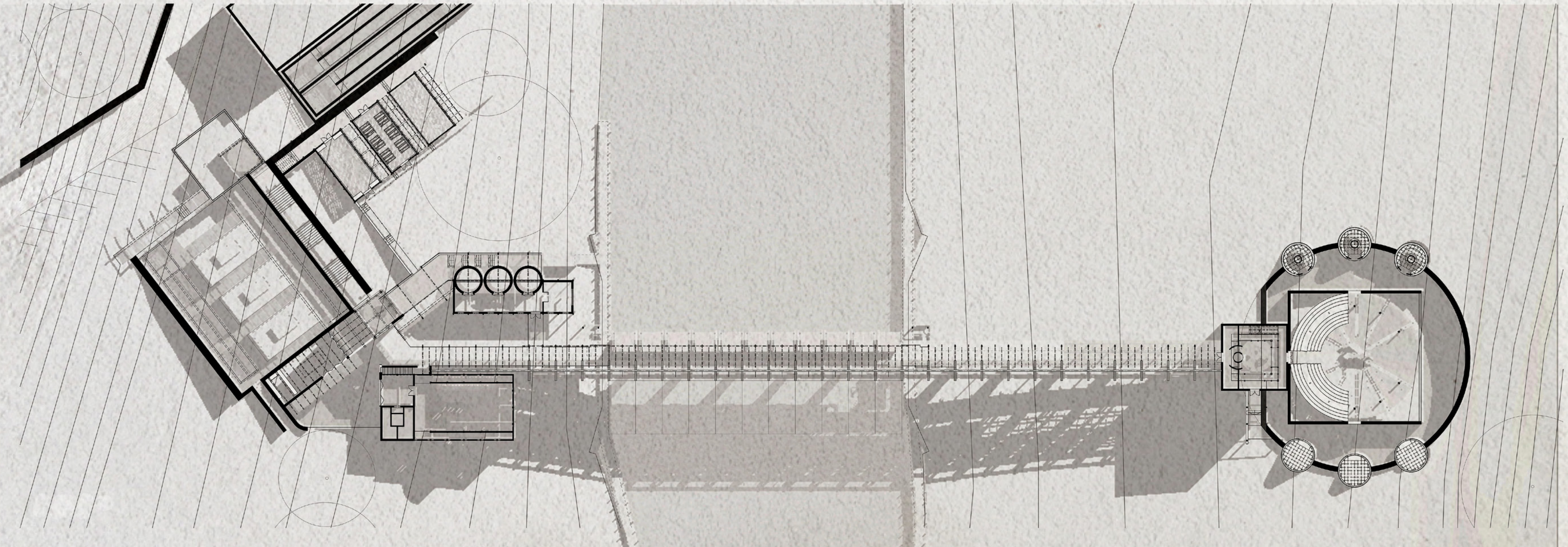




05.4. SPACIAL DEVELOPMENT

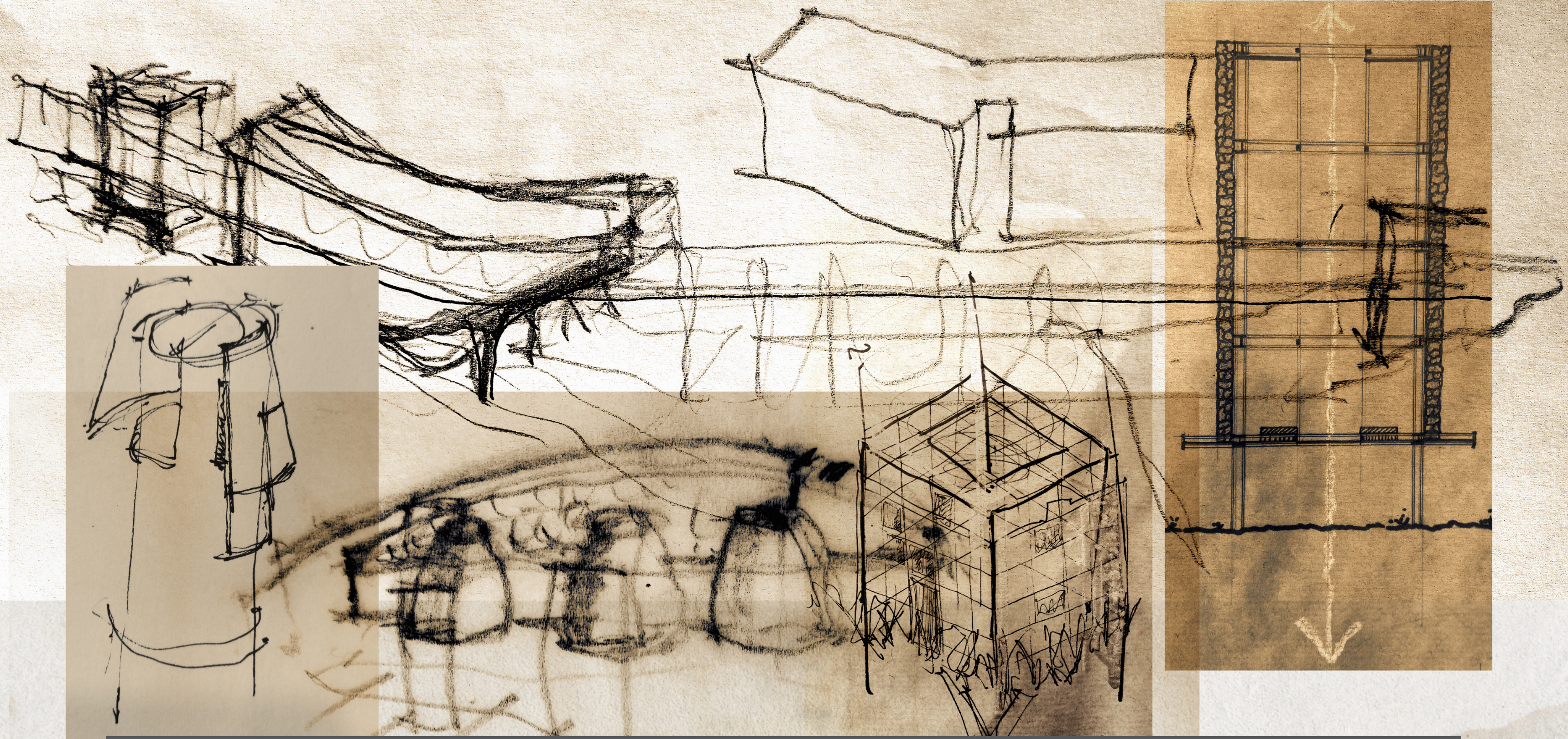
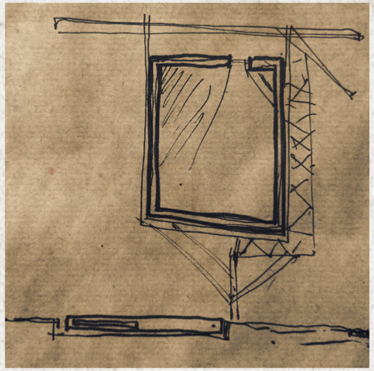
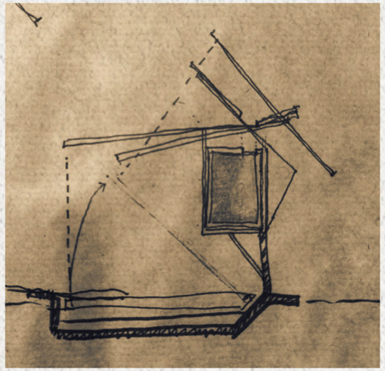
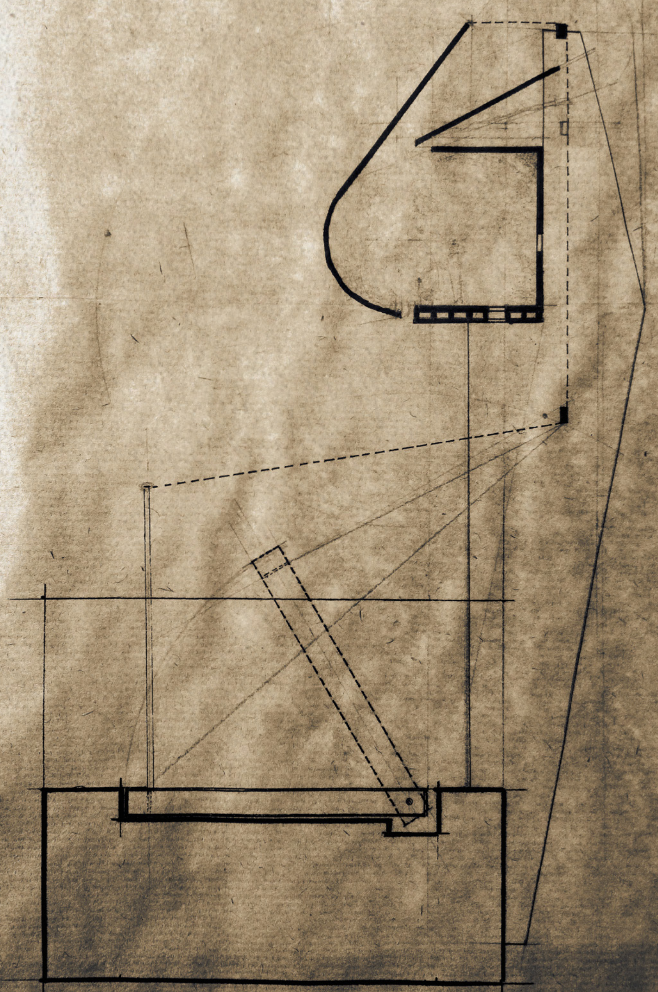


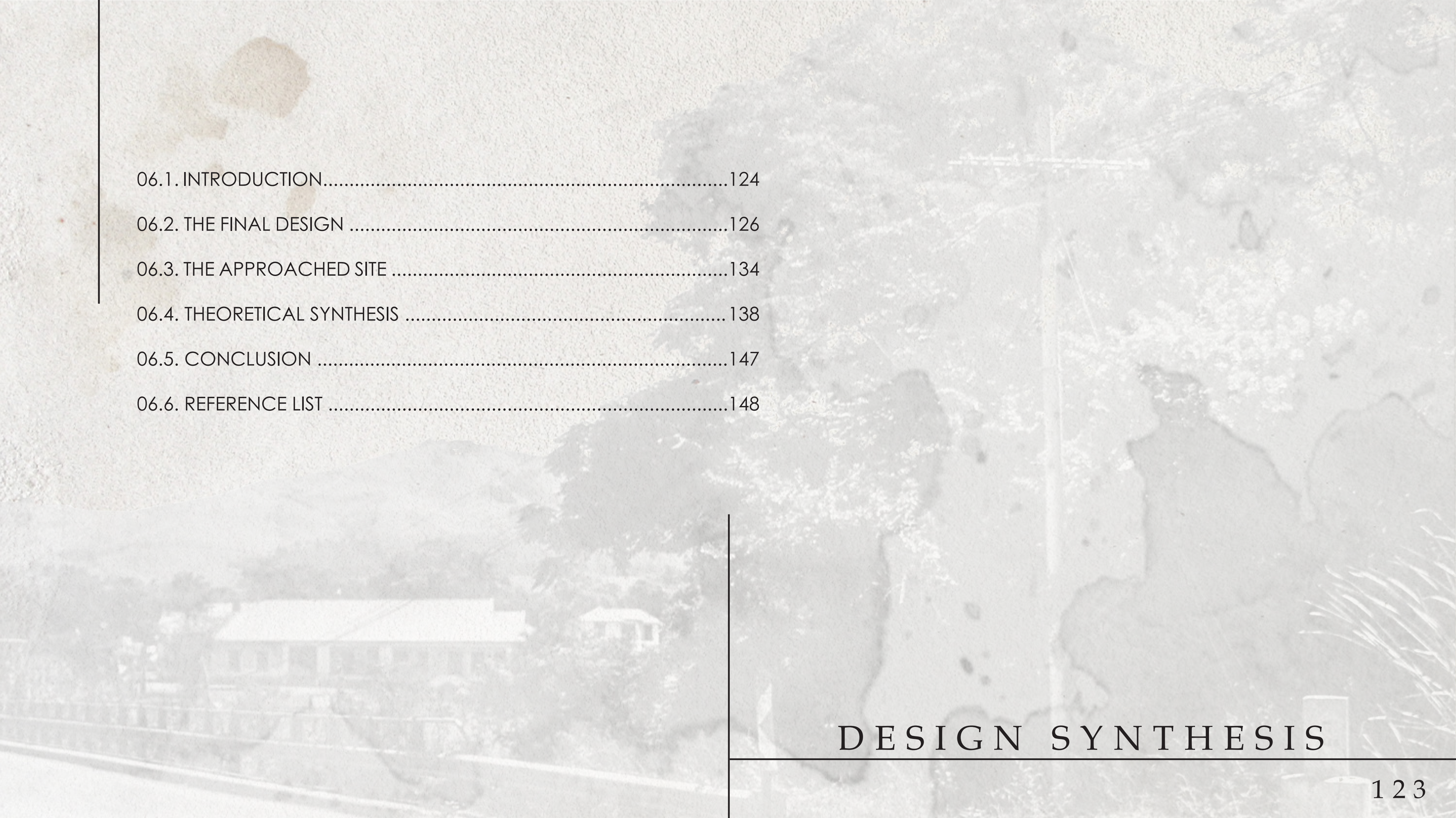
Fig.64. Process work (author)







Chapter 06



DESIGN SYNTHESIS

06.1. INTRODUCTION

The preceding chapters have laid the foundation for the project by establishing its purpose and research inquiry. They have also delved into the thorough analysis of the site, relevant theoretical frameworks, and precedents, all of which collectively informed the formulation of a comprehensive design strategy. In turn, the design strategy became the driving force behind the design development which can now be highlighted in the final design.

This chapter's primary objective is to describe the design as a response to the research question initially introduced in chapter one. The structure of this chapter follows a logical progression: it commences by introducing the final design, subsequently delineates how the final design successfully integrates elements from the site, theoretical underpinnings, and project brief. The research question established in chapter one is as follows:

How can dialogical forms and orders drawn between the practices of science and divination, articulate and bridge the gap between the real and the numinous, embody the methodologies of the oionistic oracle, and highlight the importance of reading and memorialising past omens in an effort to address the current terrors of flooding?

ACCOMMODATION LIST

1. Reception
- Office
- Ablutions

2. Greenhouses

3. Research Labs
- Flood and ecological studies
- Water chemical lab
- General lab

4. Water channel

5. Cafe
- Storage

6. Auditorium / Non-denominational Church
- Reception
- Ablutions
- Storage

7. Hydro-library
- Audio Pods
- Storage
- Control Room

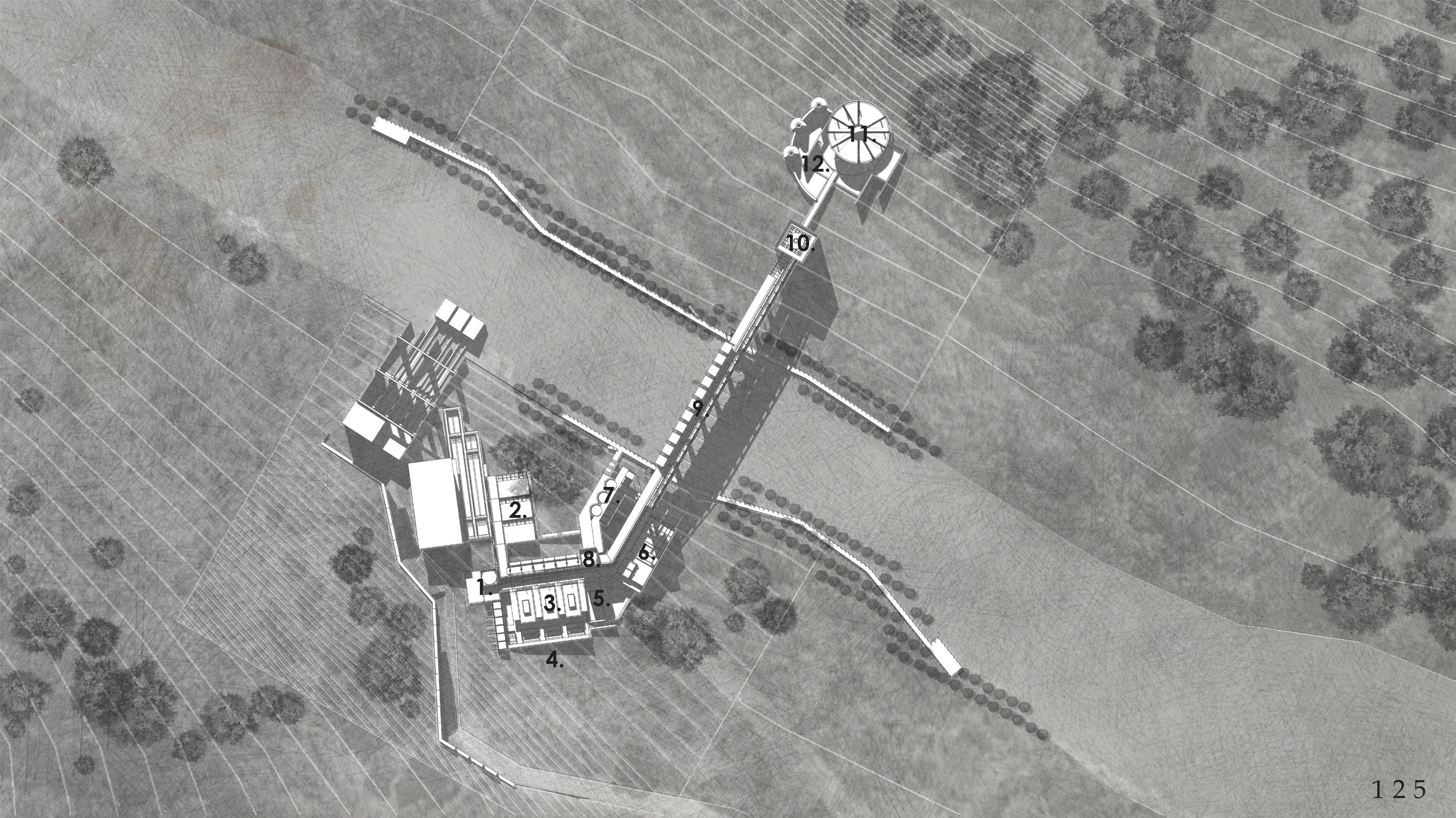
8. 2022 April Flood Memorial

9. Controllable Berm / Bridge

10. Flood Capsule

11. Performance Space
- Ablutions

12. Ritual Huts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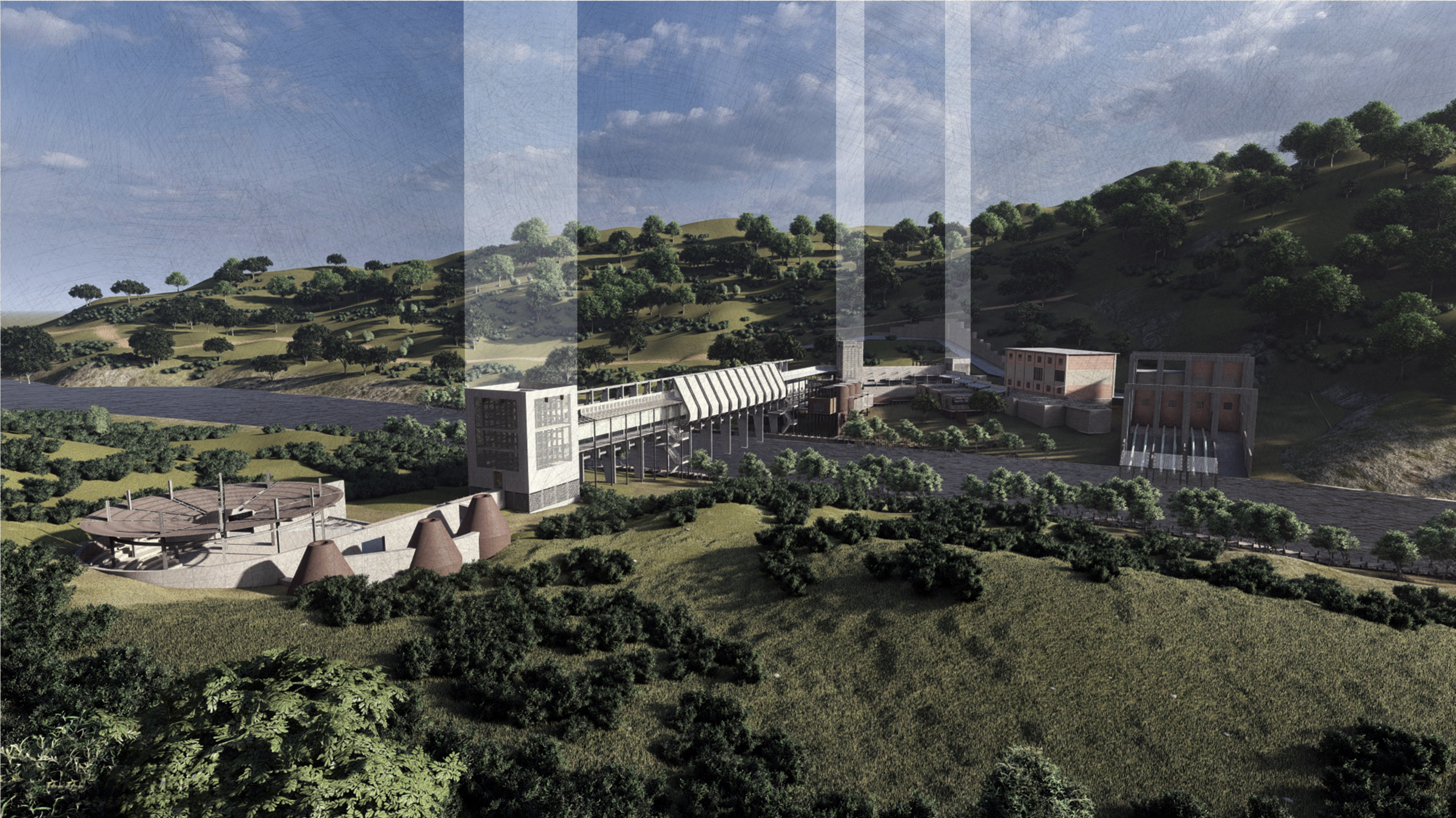
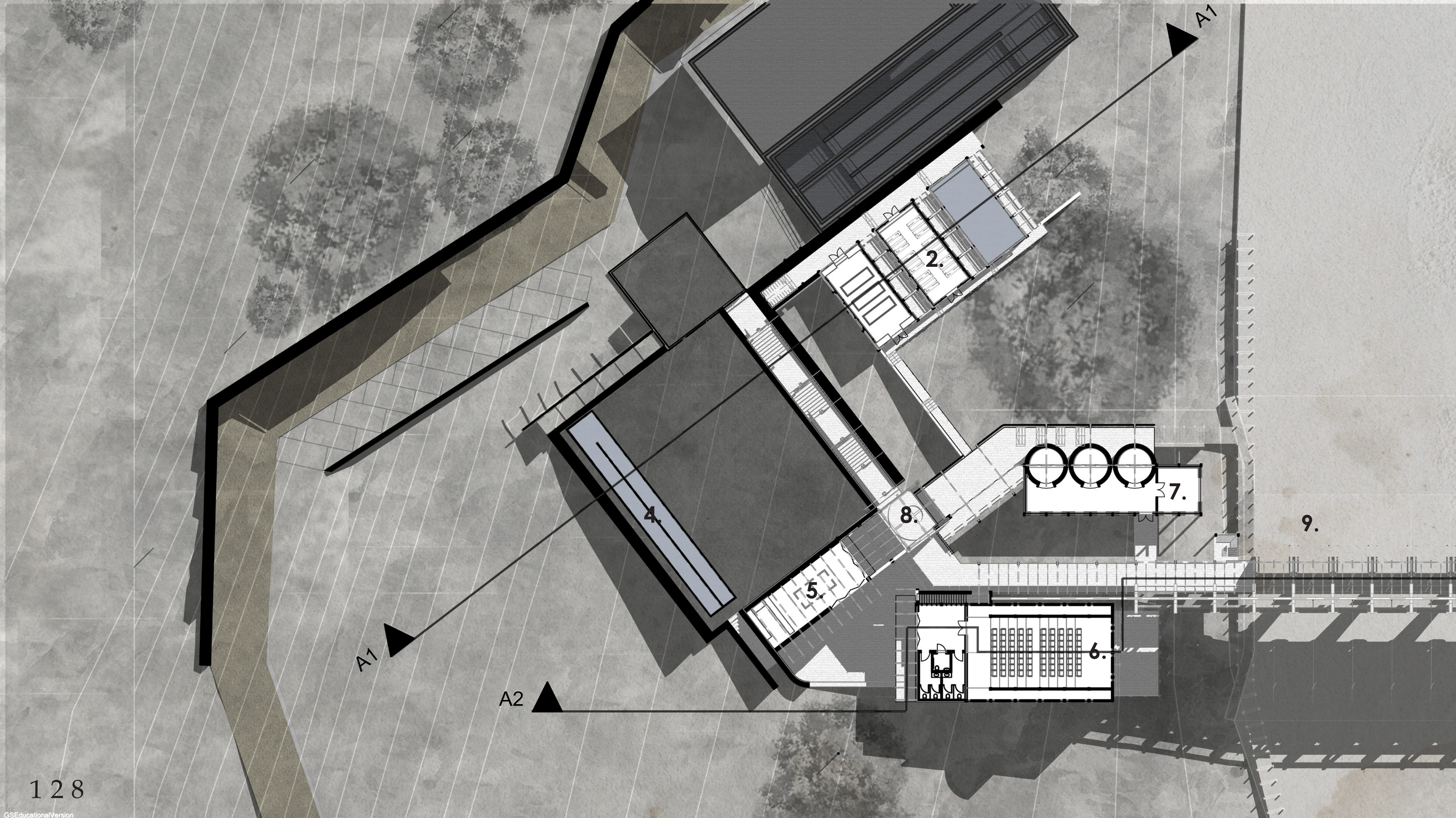
06.2. THE FINAL DESIGN





GSEducationalVersion

First Floor Plan
Scale 1:500

1. Reception
- Office
- Ablutions

2. Greenhouses

3. Research Labs
- Flood and ecological studies
- Water chemical lab
- General lab

4. Water channel

5. Cafe
- Storage

6. Auditorium / Non-denominational Church
- Reception
- Ablutions
- Storage

7. Hydro-library
- Audio Pods
- Storage
- Control Room

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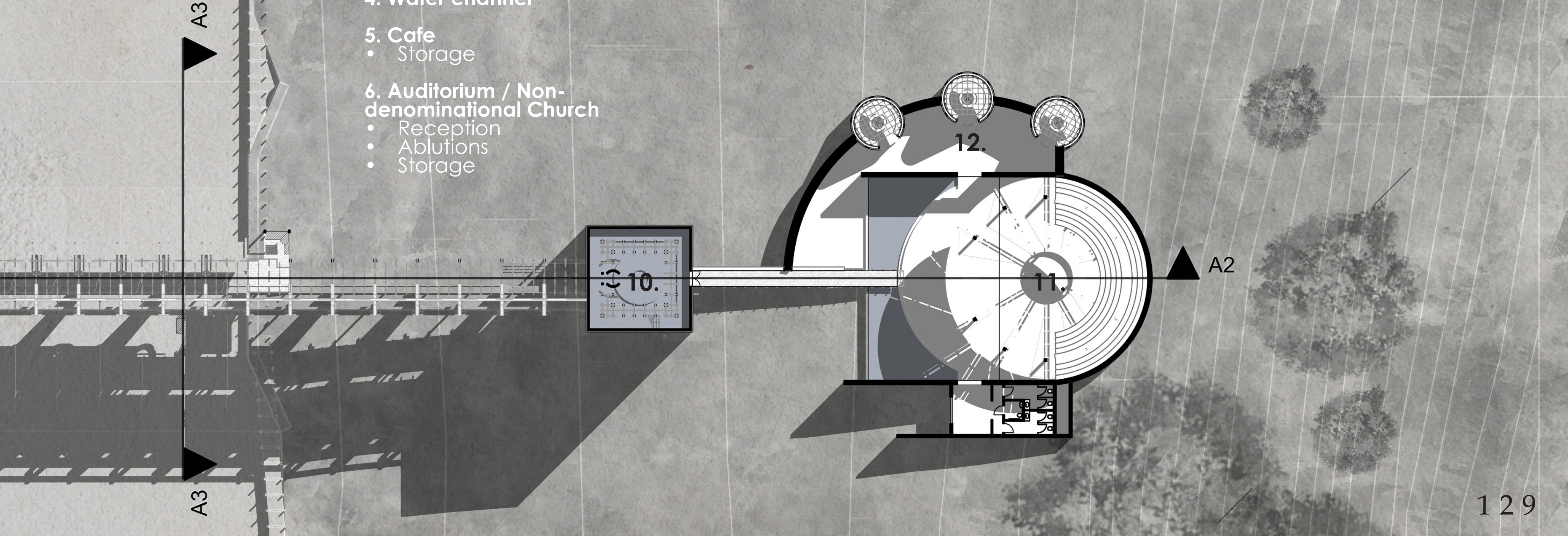
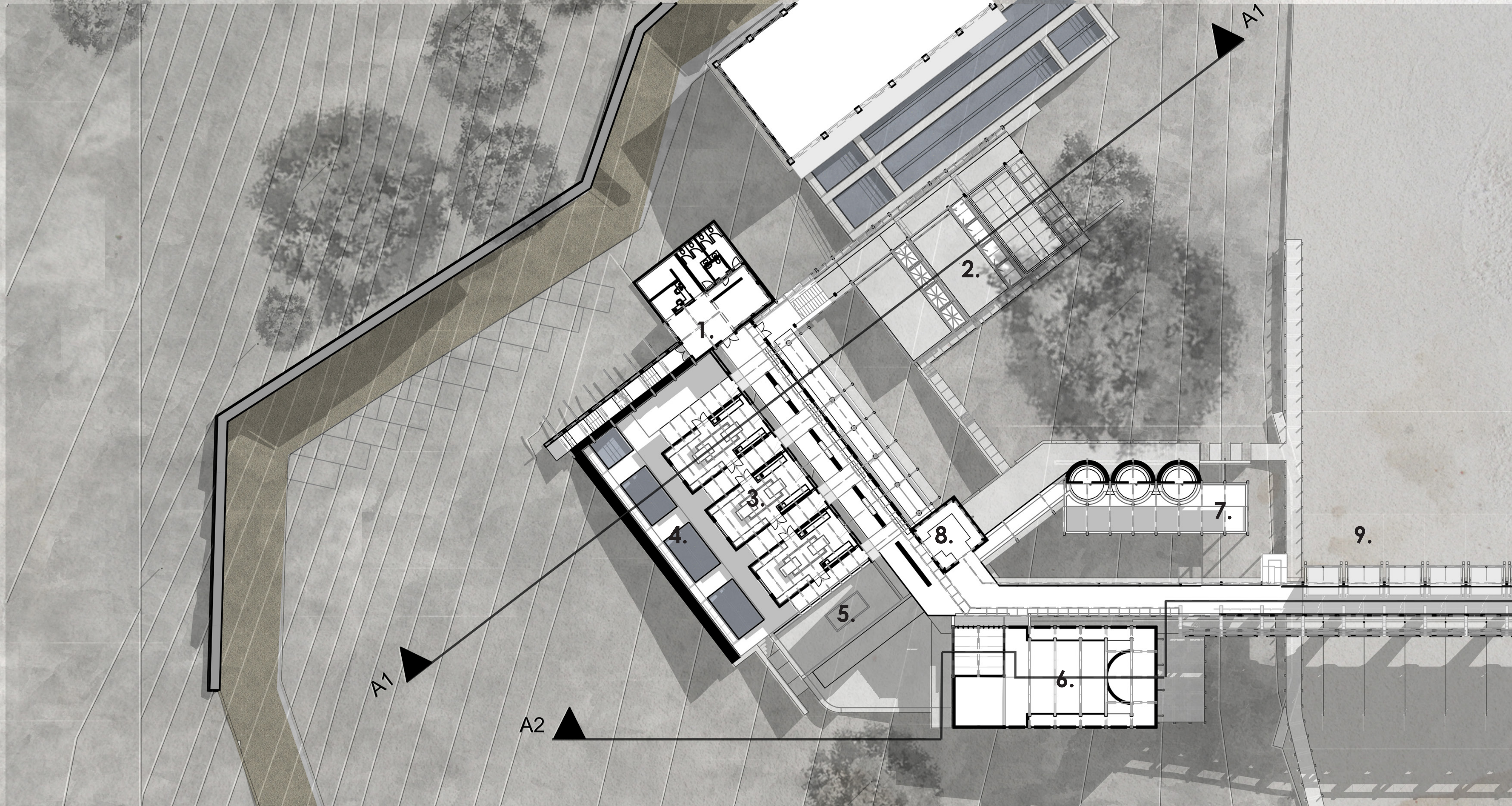
- Ablutions

12. Ritual Huts





GSEducationalVersion

Ground Floor Plan
Scale 1:500

1. Reception
- Office
- Ablutions

2. Greenhouses

3. Research Labs
- Flood and ecological studies
- Water chemical lab
- General lab

4. Water channel

5. Cafe
- Storage

6. Auditorium / Non-denominational Church
- Reception
- Ablutions
- Storage

7. Hydro-library
- Audio Pods
- Storage
- Control Room

8. 2022 April Flood Memorial

9. Controllable Berm / Bridge

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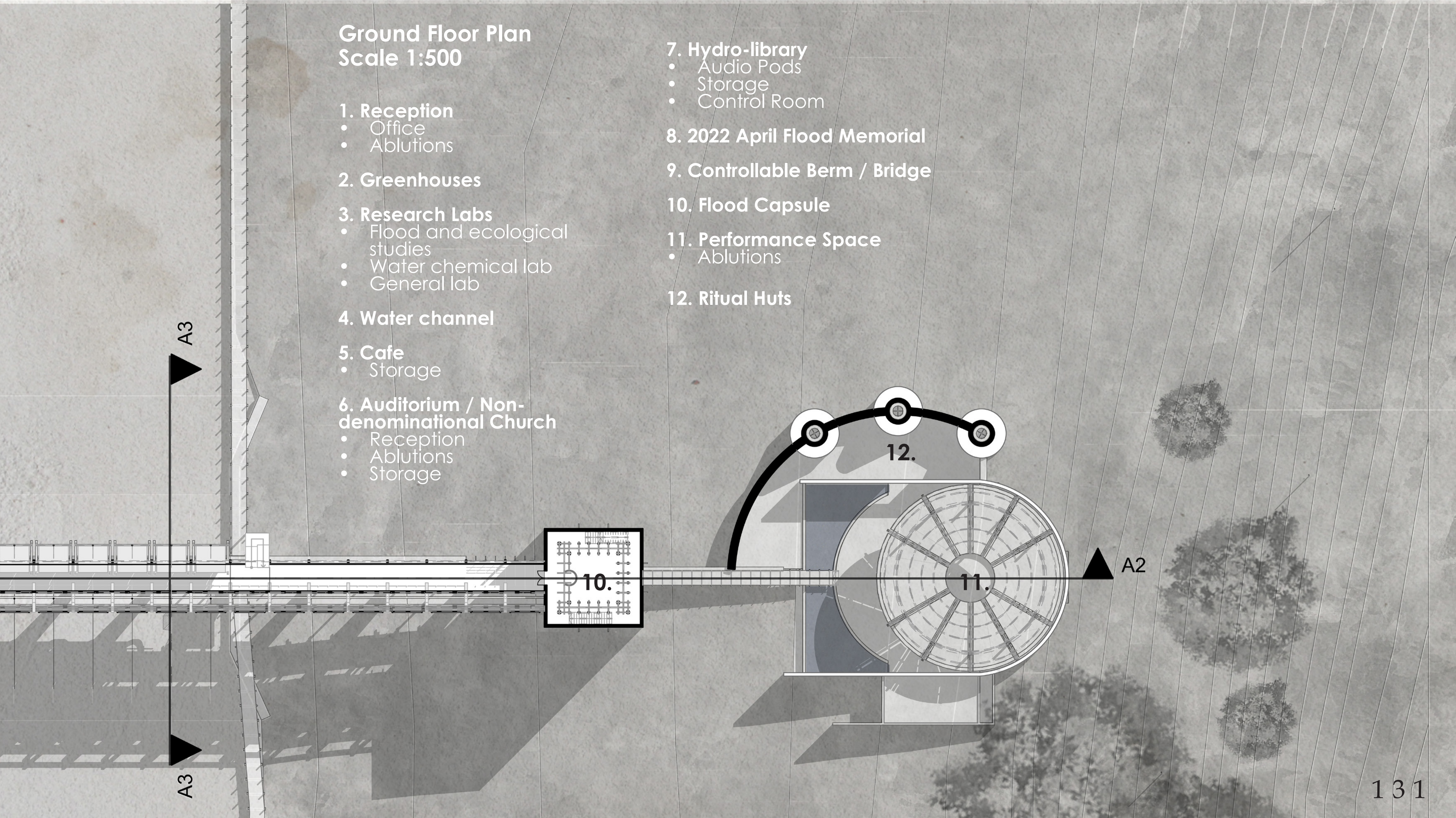
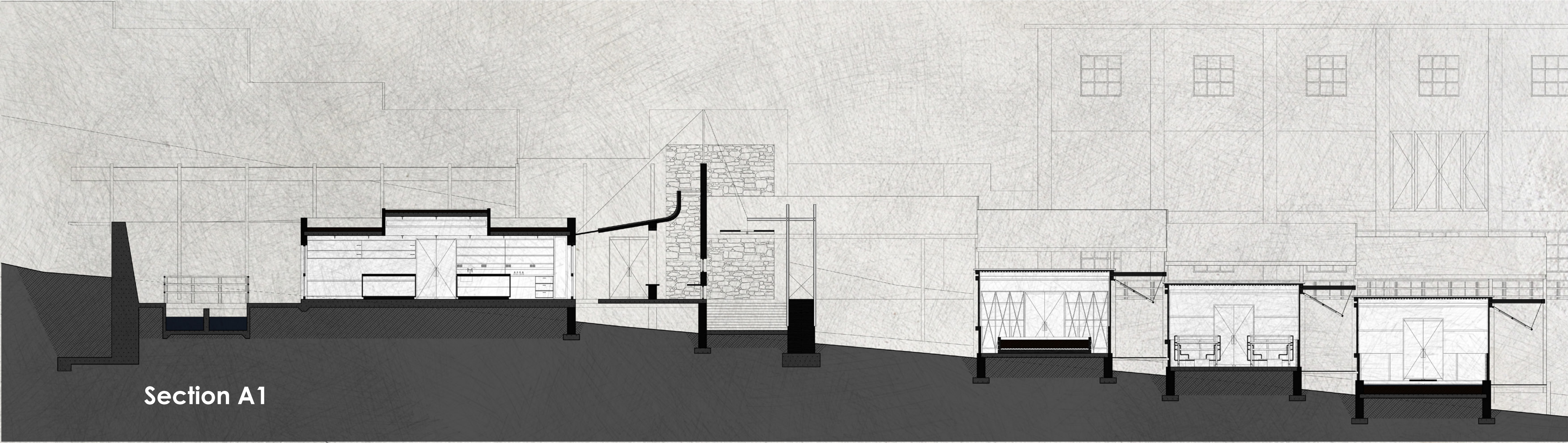
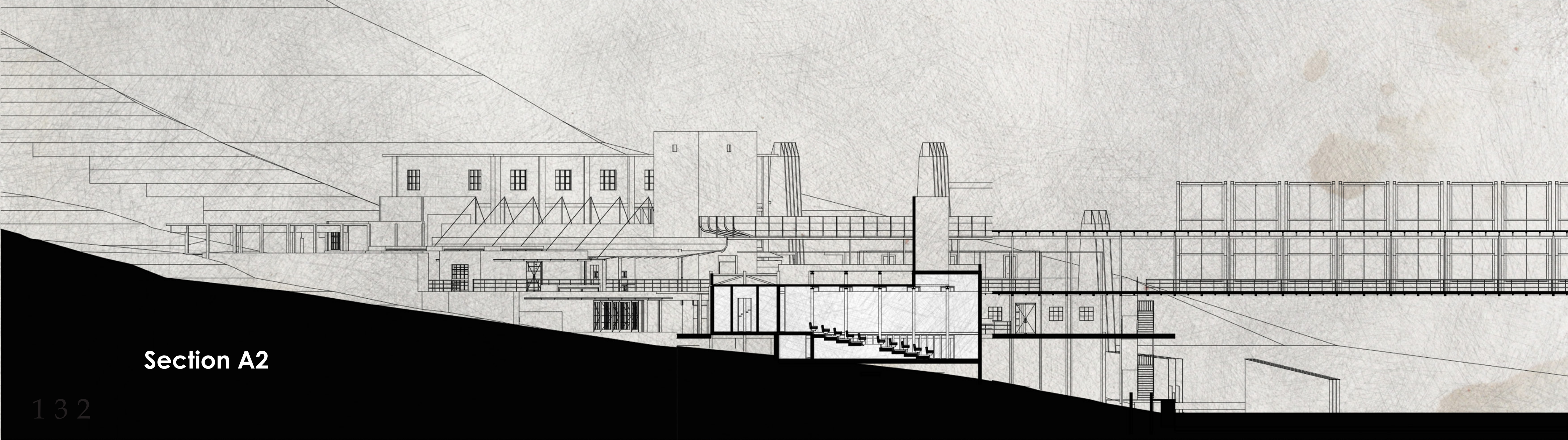
11. Performance Space
- Ablutions

12. Ritual Huts



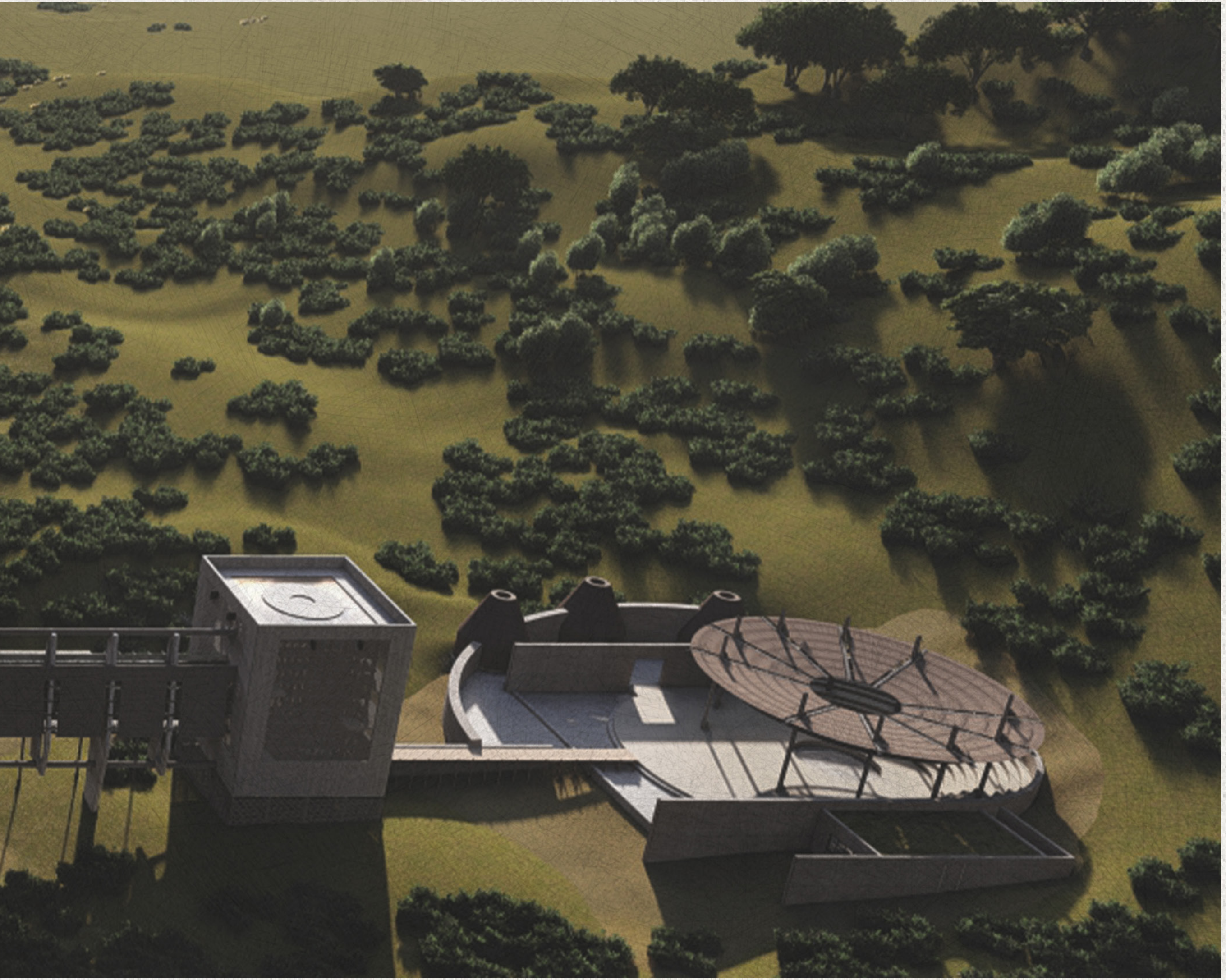


Section A1



Section A2

06.3. THE APPROACHED SITE



The proposed building is thoughtfully positioned adjacent to the existing Pump Station, extending gracefully over the uMzimkhulu River and embracing both its northern and southern riverbanks. The structure's design is sensitive to the natural slope of the site, at times gently integrating with the landscape, and at other points appearing to hover above the terrain. This harmonious interplay between grounded and floating elements is a response to the floodline, with all indoor spaces strategically elevated well above the floodline's 5-meter threshold above sea level.

In keeping with the surrounding industrial architectural style, the Flood Control and Research Centre utilizes materials such as concrete, steel structures, and brick accents. Notably, many of these construction materials are sourced from the industrial facilities lining the river, reinforcing the building's strong connection to the site's origins.

The design capitalizes on the scenic vistas, enriching the overall experience for visitors. It is an acknowledgment of the significance of individual experiences, fostering diverse and personal connections with the site through these carefully considered design elements. Additionally, the design tackles the challenge of saline intrusion by incorporating a controllable berm, further enhancing its environmental resilience and functionality.

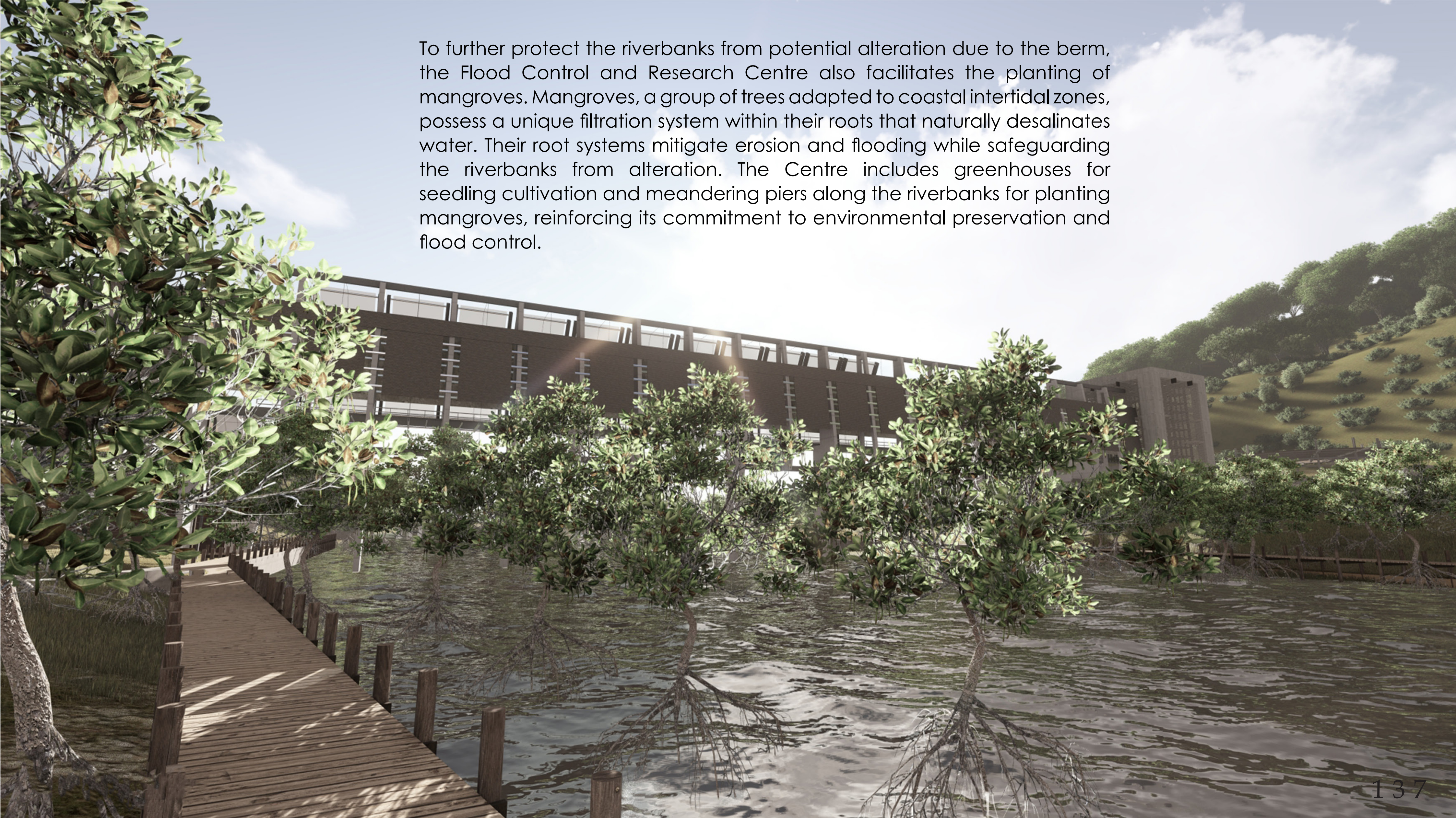
06.3.1 CONTROLLABLE BERM

To combat the saline intrusion challenges faced by the pump station, this design suggests the implementation of a controllable berm system, drawing inspiration from the structural touchstone discussed in chapter two. When the river's saline levels are low, the berm modules rest on the riverbed, filled with water. However, as salinity rises, these modules are activated by introducing compressed air, expelling the water from within. Subsequently, they pivot on their hinged axes and rise. This innovative approach not only offers a potential solution to saline intrusion but also minimizes the need for extensive alterations to the riverbanks during flood events. Each berm module is intricately linked to its individual screen system, inspired by a conceptual model from Chapter 3. These modules move independently, with the accompanying screen systems mirroring their motion, creating an engaging interplay between the river below and the bridge above.

Several crucial points should be considered when evaluating this solution for saline intrusion:

- The modules must be oriented in a way that allows them to be safely pushed down to the riverbed by the force of the water during floods.
- Cables connecting the modules and screens should incorporate safety release joints to ensure a controlled response in case of debris impact.
- The screens should be equipped with hydraulic levers, preventing abrupt falls when the cable is released, and ensuring a gentle folding motion.

To further protect the riverbanks from potential alteration due to the berm, the Flood Control and Research Centre also facilitates the planting of mangroves. Mangroves, a group of trees adapted to coastal intertidal zones, possess a unique filtration system within their roots that naturally desalinates water. Their root systems mitigate erosion and flooding while safeguarding the riverbanks from alteration. The Centre includes greenhouses for seedling cultivation and meandering piers along the riverbanks for planting mangroves, reinforcing its commitment to environmental preservation and flood control.



06.4. THEORETICAL SYNTHESIS

06.4.1 BRIDGING THE GAP

2022 FLOOD MEMORIAL

The memorial underscores the convergence of science and divination, representing the shared objective of comprehending time and the occurrences that shape our world.

This memorial serves as a poignant reminder of the individuals affected by these devastating events and emphasizes the need for comprehensive investigations and actions to mitigate future floods. It stands tall as a symbolic node, bridging both horizontal and vertical dimensions. Inside, it features plaques dedicated to the 491 people impacted by the disaster. Steel plaques commemorate those who tragically lost their lives during the event, while Cor-Ten plaques honor those who remain missing and unaccounted for. This space represents a hybrid acknowledgment of the common ground between scientific understanding and divination's intrinsic connection, uniting people in their shared goal of mitigating future disasters.

BERM / BRIDGE

The berm/bridge concept embodies the essence of "bridging the gap" in its design, serving as a connective space that seamlessly facilitates the transition of occupants and activities between various functions. This central element acts as a golden thread, promoting the harmonious flow of individuals and experiences across the two distinct realms.

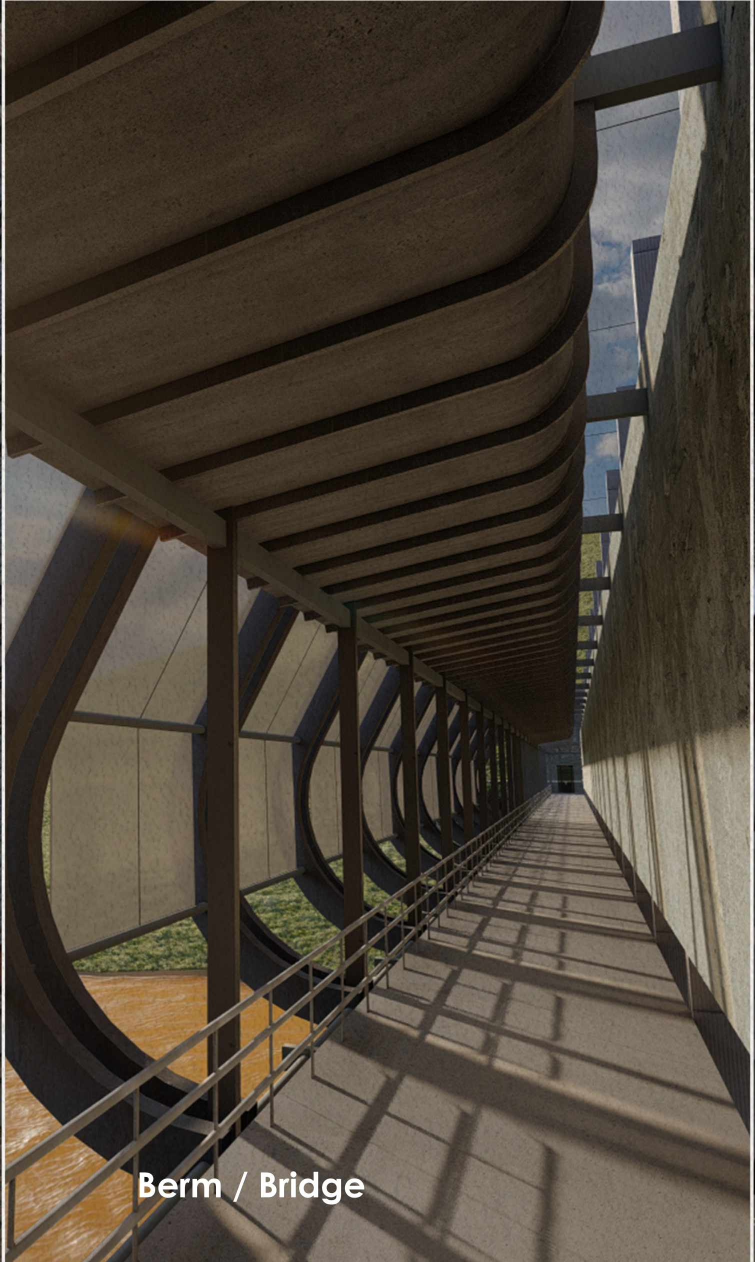
Through its playful interplay between science and divination, the berm takes on a unique, hybrid identity that embraces the concept of a "third space." Here, a convergence of diverse cultural values and practices occurs, blurring the lines between the rational world of science and the profound, sacred experiences of divination. The bridge, in turn, intricately weaves together these distinct processes, creating a bridge of understanding and unity between the realms of science and divination.

FLOOD CAPSULE

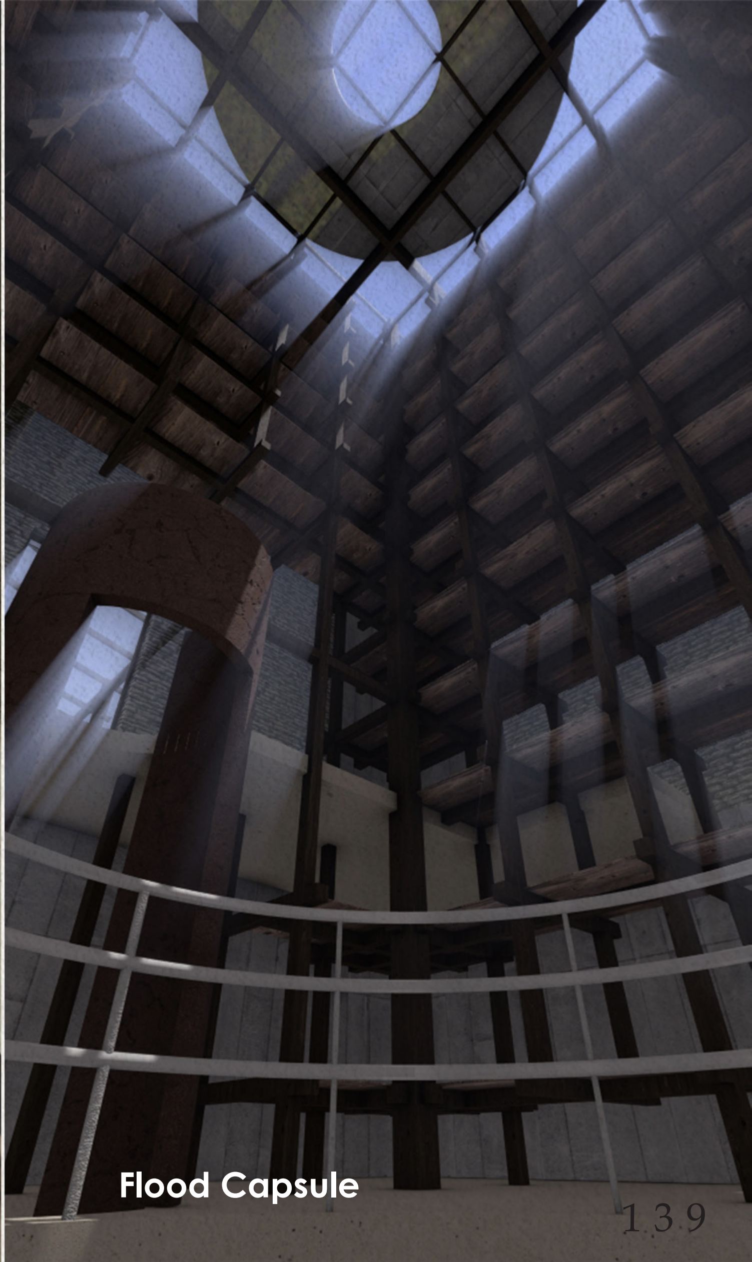
The Flood Capsule serves as the second node and primary circulation point for the northern bank. Conceptually, it draws inspiration from the idea of a time capsule and functions as a repository for a curated selection of objects that are deemed representative of the present era. These items are preserved within it for future generations to unearth and understand.

In contrast to the memorial's role as a commemoration of the past, the flood capsule takes on the unique role of representing the future. It underscores a shared objective of not only commemorating historical events but also predicting and preparing for the future. The structure is designed to become a future ruin, housing valuable information about our time for the generations yet to come. It is rooted in the belief that if, one day, the floods do come and reshape our world, the collective efforts to address this crisis will never be in vain.

2022 Flood Memorial



Berm / Bridge



Flood Capsule

06.4.2 THE OIONISTIC ORACLE

RESEARCH LABS

The research labs are dedicated to serving as the sacred dwelling of the oracle and are fundamentally centered around the pivotal role of this figure. These labs provide the fertile ground for discourse, intellectual exchange, and the sharing of profound insights. Within their walls, contemplation thrives, offering a haven for deep thinking and the exploration of the far-reaching implications of research.

The Flood Control and Research Centre accommodates three of these labs, each devoted to a distinct realm of research: flood mitigation and ecological studies, water chemical testing, and a general research space. These laboratories are the spaces where scientists perform their daily rituals, and they also serve as the oracle's private sanctuaries for understanding and contemplation. In these sacred chambers, the oracle reflects upon the knowledge garnered and seeks further insights.

AUDITORIUM / NONDENOMINATIONAL CHURCH

This space embodies the essence of the Oionistic Oracle concept, where the realms of scientific observation and divinatory interpretation converge, yet remain distinct. It has been meticulously designed to serve as a creative hub, where individual thoughts or collective ideas can flourish harmoniously.

Within this section of the building, the oracle imparts wisdom and knowledge to those who seek understanding, inviting all to partake in a transformative experience. The architectural design incorporates sacred geometry, aiming to evoke spiritual connections and responses. Furthermore, it is intimately linked to its natural surroundings, providing a seamless transition towards the river, offering visitors an unobstructed view of the controllable berm, and enhancing the holistic experience.

PERFORMANCE SPACE AND RITUAL HUTS

These spaces are expressly devoted to the role of the diviner within the realm of research. The performance space and ritual huts have been meticulously crafted by analyzing the diviner's rituals and are thoughtfully constructed to align with these sacred routines.

They serve as a conduit for a spiritual connection to anotherworldly realm, offering the diviner opportunities for both communal engagement in social performances with peers and solitary moments of deep reflection within the ritual huts. These spaces have been designed incorporating sacred geometry and a play of light to enhance their spiritual atmosphere.

Furthermore, these spaces are intentionally structured to accommodate the lighting of fires within, enabling the conduct of sacred rituals as an integral part of their purpose and design.


Water Chemical Lab


Auditorium Entrance


Ritual Hut


General Lab


Auditorium / Non-
denominational Church


Performance Space
Ritual Hut

06.4.3 READING THE OMENS

GREENHOUSES

The greenhouses are designed as dedicated spaces for the cultivation of mangrove seedlings. Within these structures, the seedlings are observed and tested to gain a deeper understanding of their natural filtration processes and to explore various environmental growth conditions. These greenhouses serve as invaluable sources of information, aiding the oracles in their quest for more natural approaches to managing floods. Three distinct greenhouses are available. The first greenhouse is designed for traditional seedling cultivation in regular planter boxes under standard conditions. This greenhouse also provides space for diviners to cultivate the herbs they require. The second greenhouse employs hydroponics to nurture the seedlings, preparing them for transplantation into the river once they reach sufficient strength. The third greenhouse utilizes a flooding method, featuring a soil base that can be fully inundated to facilitate further investigations into the seedlings' growth and behavior.

HYDRO-LIBRARY

The hydro-library incorporates elements that honor the significance of omens and their role in predicting notable events. It serves as a tribute to past omens, fostering an understanding of their impact on the future.

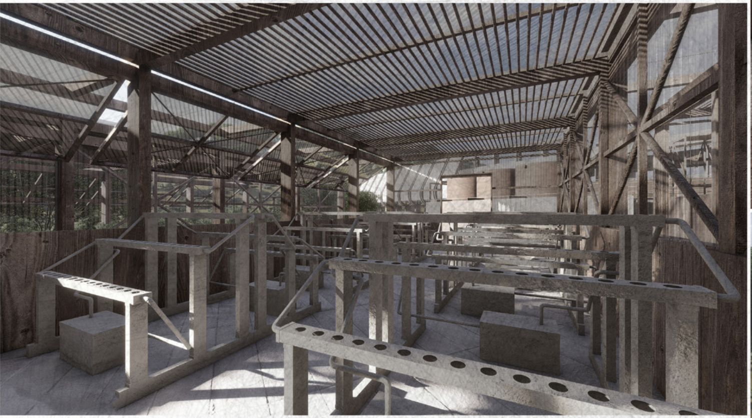
The hydro-library is dedicated to collecting, preserving, and memorializing historical narratives, including stories of past omens and recurrent floods. These archives facilitate the study of history and its application to contemporary flood control strategies.

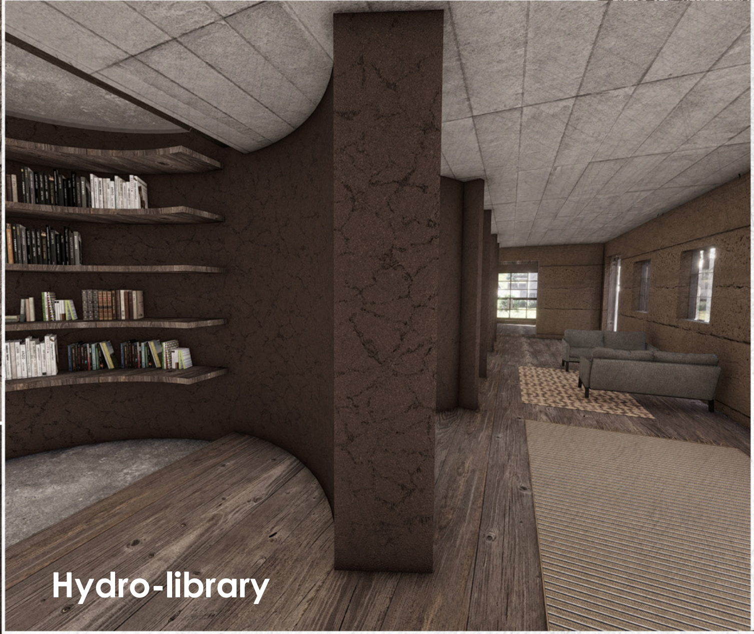
This space acts as a repository of collective memory, where the stories of the past are archived and memorialized, ensuring that the knowledge derived from history continues to guide contemporary decision-making.

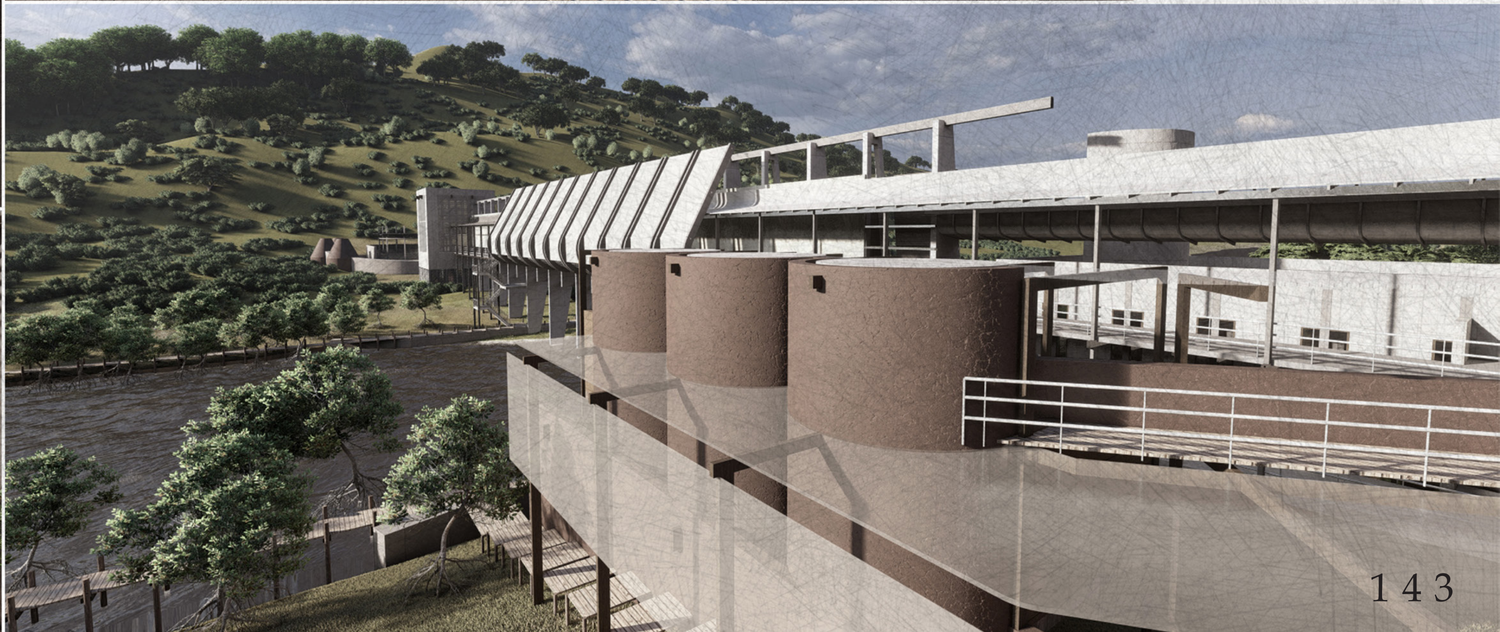
AUDIO PODS

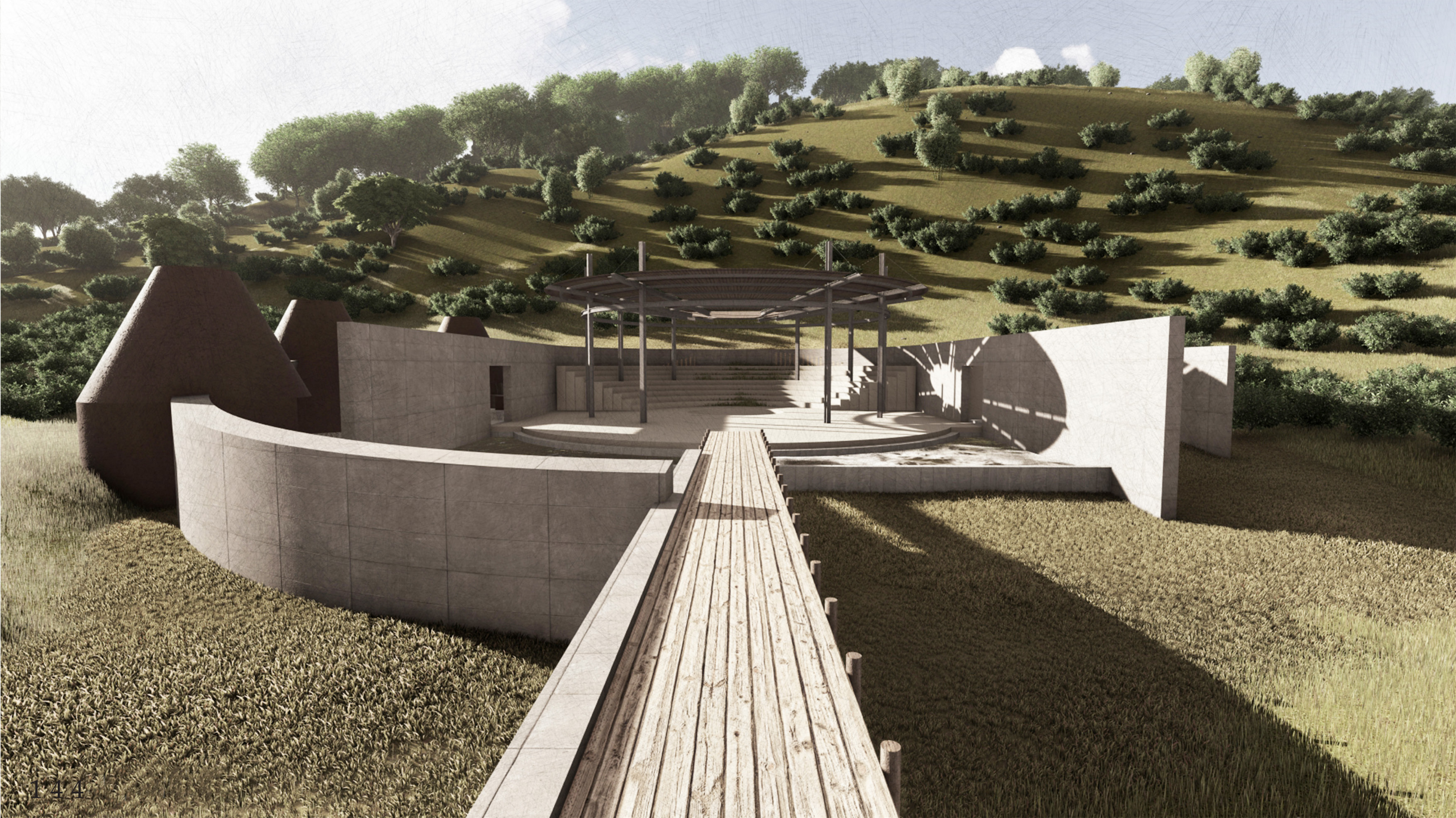
It's crucial to acknowledge the difference in how science and divination preserve information. Science relies on books, journals, and articles to document findings for future reference. In contrast, divination relies on the art of storytelling, passed down through generations as an interactive method of passing on knowledge. With this distinction in mind, the audio pods serve as a bridge between these two approaches. They provide spaces where diviners can bring their stories and record them for future generations to listen to. Vice versa could be done where scientists record their narratives for diviners to listen to.

These pods are situated atop the hydro-library and are dedicated to the recording and listening of these stories. Additionally, local voices can be recorded, sharing memories of the site to further connect the project with its surroundings.

Greenhouses

Hydro-library

Audio Pods





Water Channel

06.5. CONCLUSION

The design synthesis section serves as an exposition of the final design proposal, providing a comprehensive response to the research question introduced in the thesis' introduction. It explains how the integration of the design guidelines from Chapter 4 drove the development of the Flood Control and Research Centre's final design. With this understanding, it is now possible to delve into the technical aspects of this design and thereafter bring this thesis to a close, reflecting on the personal journey, the project's accomplishments, and areas for improvement.

Chapter 07

TECHNICAL SYNTHESIS

07.1. INTRODUCTION

The Flood Control and Research Centre is primarily constructed using a combination of concrete, steel systems, and adobe brick infills, mirroring the traditional construction techniques of the region. These structures are strategically embedded into both the northern and southern banks of the river. A central feature of this project is a bridge/controllable berm that spans the 44-meter-wide river. It's important to note that the design of the bridge/controllable berm may require the expertise of a licensed engineer to refine the technical details. Consequently, the construction methods outlined in this thesis are based on fundamental principles and may undergo alterations following consultation with an engineer. In this chapter, we will explore the technical aspects of the development, including the site's technical response, sectional development, and various structural systems.

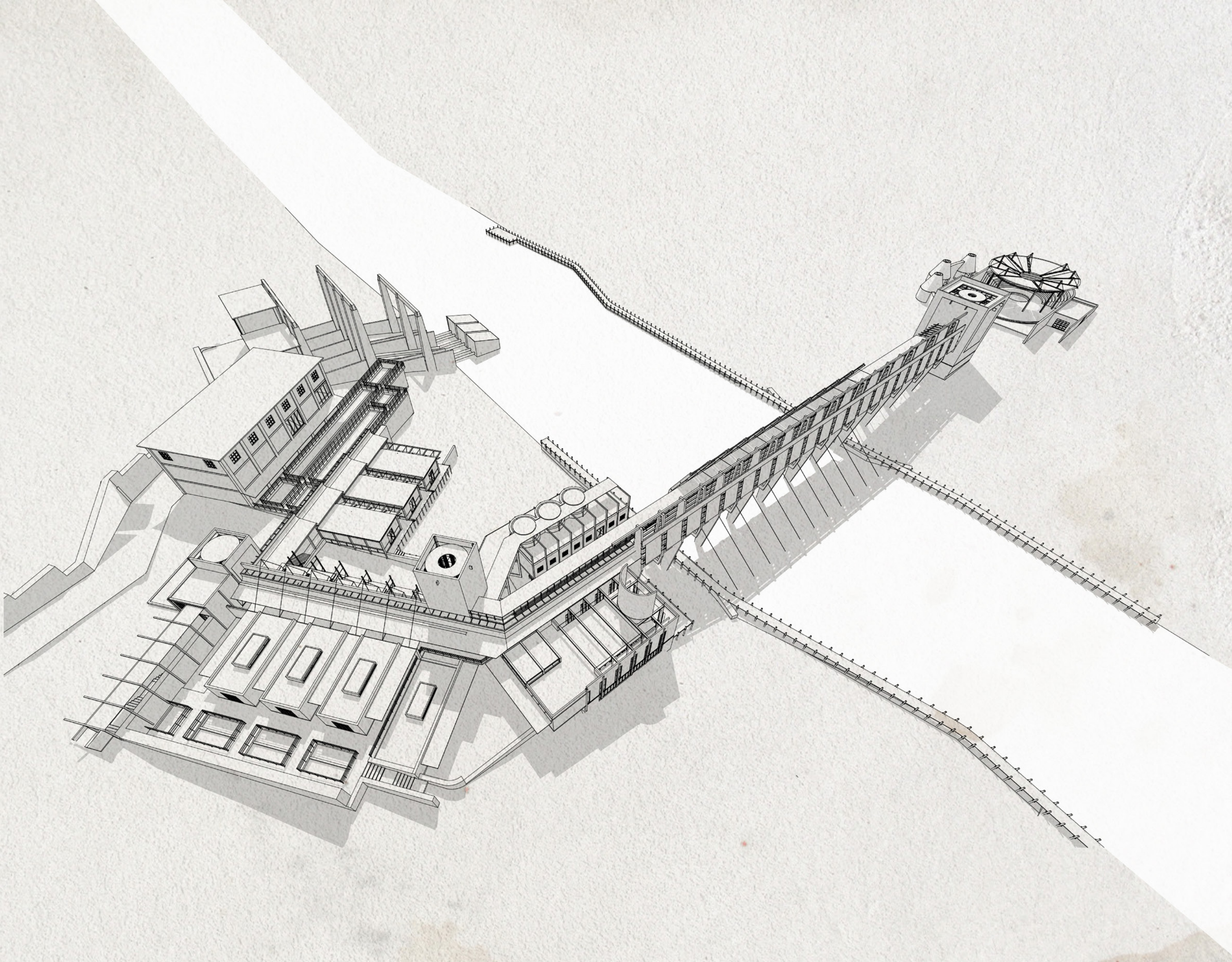


Fig.65. Building Outline (author)

Site conditions and challenges

The site presents two significant physical challenges. Firstly, due to recurrent flooding, the structure must be securely anchored. This requires excavation to embed the structures and ensure stability during floods. Inspiration for addressing this issue is drawn from the adjacent pump station, which utilizes heavy concrete footings and foundations anchored in granite rock. The pump station employs these robust measures to support the weight of both the abstracted water and heavy machinery inside. In contrast, the flood control and research center will adopt a more subtle approach. While it won't need to bear as much weight, it still must be robust enough to withstand flooding events. Further details on this approach will be provided in the sub-structure section.

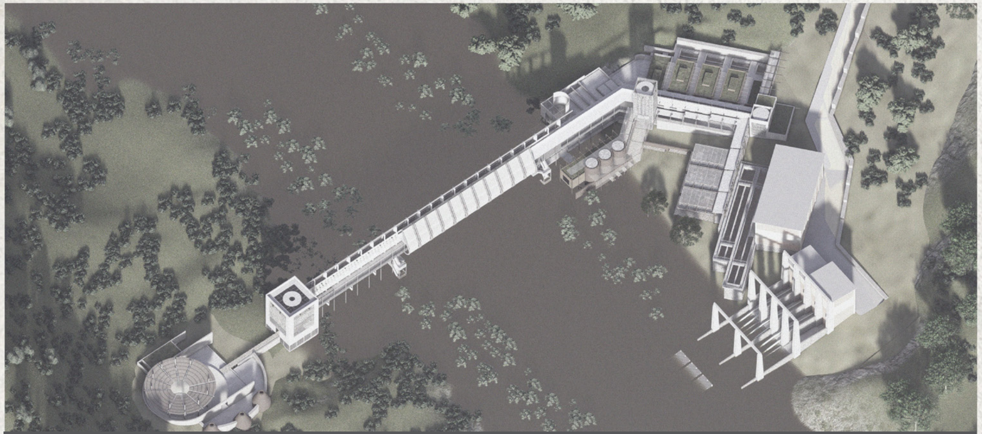


Fig.66. uMzimhkulu River in Flood (author)

Secondly, strict precautions must be taken during construction to preserve existing ecological systems. A Biodiversity Impact Assessment conducted by Mahomed Desai in 2022 for a similar project on the proposed site (Desai,2022) identified various risks and recommended mitigation strategies, including:

- Clearly demarcating construction areas to prevent encroachment into surrounding environments, particularly wetland habitats.
- Using existing access routes and paths whenever possible while minimizing the creation of new routes.
- Committing to rehabilitating all structure footprints after construction, utilizing topsoil, and re-vegetating disturbed areas with indigenous plant species.
- Implementing a hydrocarbon spill management plan to prevent chemical spills from affecting the surroundings.
- Properly handling and storing removed topsoil according to national and provincial guidelines.
- Providing Environmental Awareness Training for all personnel and contractors with documented attendance records.
- Identifying and safely relocating endangered species within the site boundaries, followed by post-construction rehabilitation.
- Taking extra measures to prevent erosion and bank alterations.

Protecting the Banks

It is important to remember that any berm system placed into the river has the potential to create river bank aterations for the change of river flow can eat away at the sides of the river. This has been the case for the past berm attepts discussed in chapter 2. As mentioned before, this project also facilitates the plantation of mangrove trees to combat the issue. This subsection aims to highlight the technical aspects of of this initiative.

Fig.67. Rising of water level from normal height to 100 year flood line (author)

The Mangrove

Mangroves, a group of shrub and tree species, thrive in the coastal regions of tropical and subtropical environments, along shores, rivers, and estuaries. Most species of mangroves can be found growing on muddy soil, and some even adapt to sand, peat, and coral rock. What truly distinguishes these remarkable trees is their ability to flourish in water up to 100 times saltier than most other plants can endure. Their natural filtration system allows them to extract up to 90% of salt from the water, which is then stored in their leaves.

Mangroves grow where land and water meet. Their intricate root systems not only provide a habitat for many species but also serve as a crucial defense against soil erosion, particularly in the face of changing tides and coastal flooding.Among the diverse mangrove species, the black mangrove stands out as one of the most important and widespread large-leafed varieties. It’s known to thrive under a broad range of intertidal conditions, enduring salinity levels from nearly freshwater to fully seawater, and adapting to various soil types.

Regrettably, these species are now critically endangered, particularly in KwaZulu-Natal. Many estuaries in this region have seen mangroves removed to make way for industrial and residential development. These practices highlight the urgent need for establishing mangrove plantations to help preserve these invaluable coastal ecosystems.

Proposed planting process

After conducting research, two primary methods for mangrove plantation have been identified. The first approach involves the use of nurseries, dedicated areas for raising and tending to mangrove seedlings until they are ready for permanent transplantation in natural environments. The second method is a more straightforward process, where planters harvest propagules from mature trees and select suitable locations for planting these propagules. Both of these techniques will be employed in this project.

At the Flood Control and Research Centre, three separate greenhouses have been established for cultivating mangrove seedlings, each employing one of the three methods explained in the previous chapter. Once the seedlings reach sufficient strength, they are transplanted onto the sandy riverbeds using traditional timber piers, which also serve as pathways within the mangrove plantation. If necessary, these piers can be extended to accommodate future growth. Additionally, these access routes facilitate easy access for planters to gather propagules for immediate planting or propagation back at the nurseries.

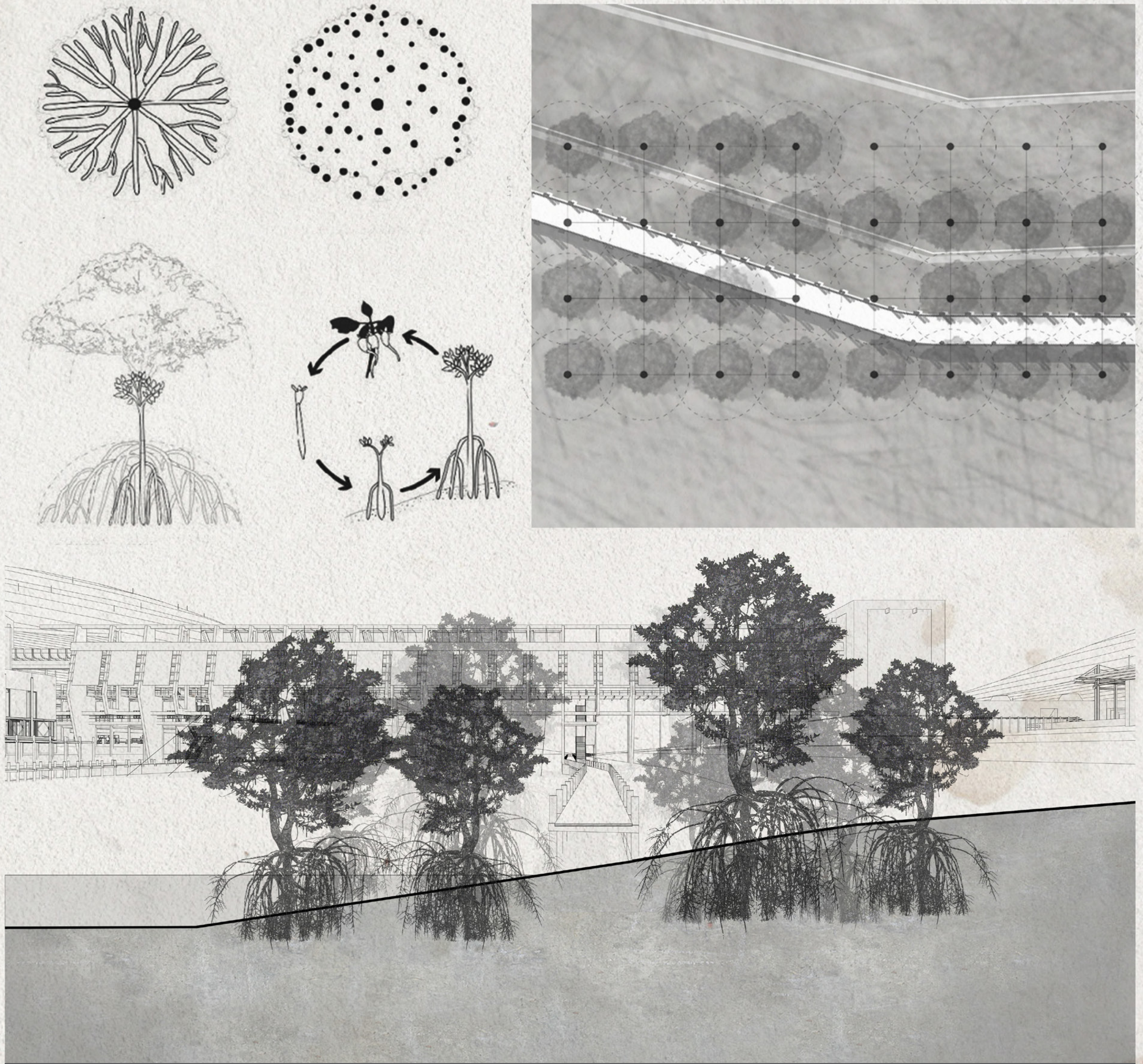


Fig.68. Mangrove plantation (author)

07.3. SECTIONAL DEVELOPMENT

Throughout the design process, various sections were thoroughly examined and modified to arrive at the final design proposal. A primary challenge was how to accommodate the site's natural slope, which is 20° on the southern bank and 8° on the northern bank. This topographical characteristic necessitated adjustments in the floor levels and spatial positioning, particularly to ensure that spaces remained well above the 5m flood line. As a result, the decision was made to position the entrance of the building on the first floor, with a gradual descent towards the river.

In addition to addressing the topography, there was also focus put on integrating an optimal balance of light and ventilation within the spaces. This involved producing process sketches for the greenhouses and constructing section models for the research labs and hallway. These illustrations were instrumental in determining the desired inflow of light through various means, including skylights and designs inspired by traditional kgotla construction methods.

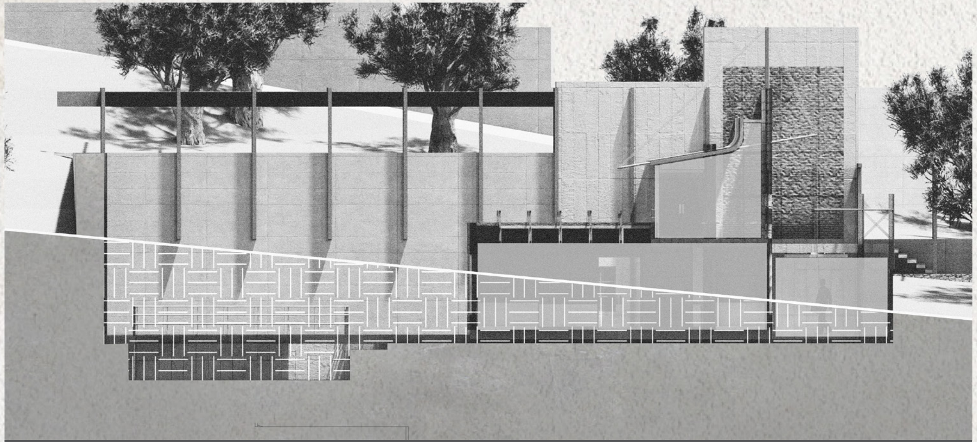
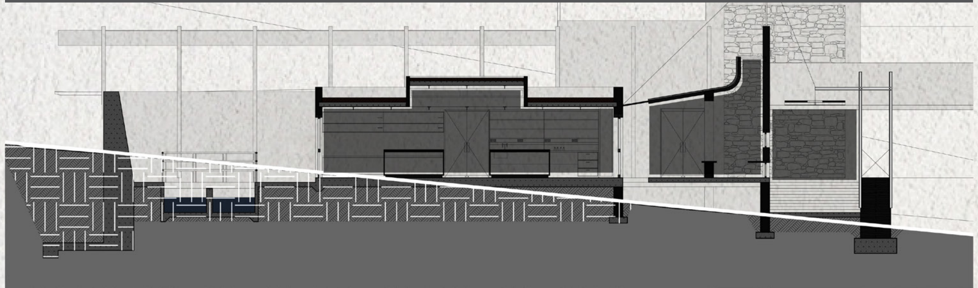


Fig.69. Development of levels (author)



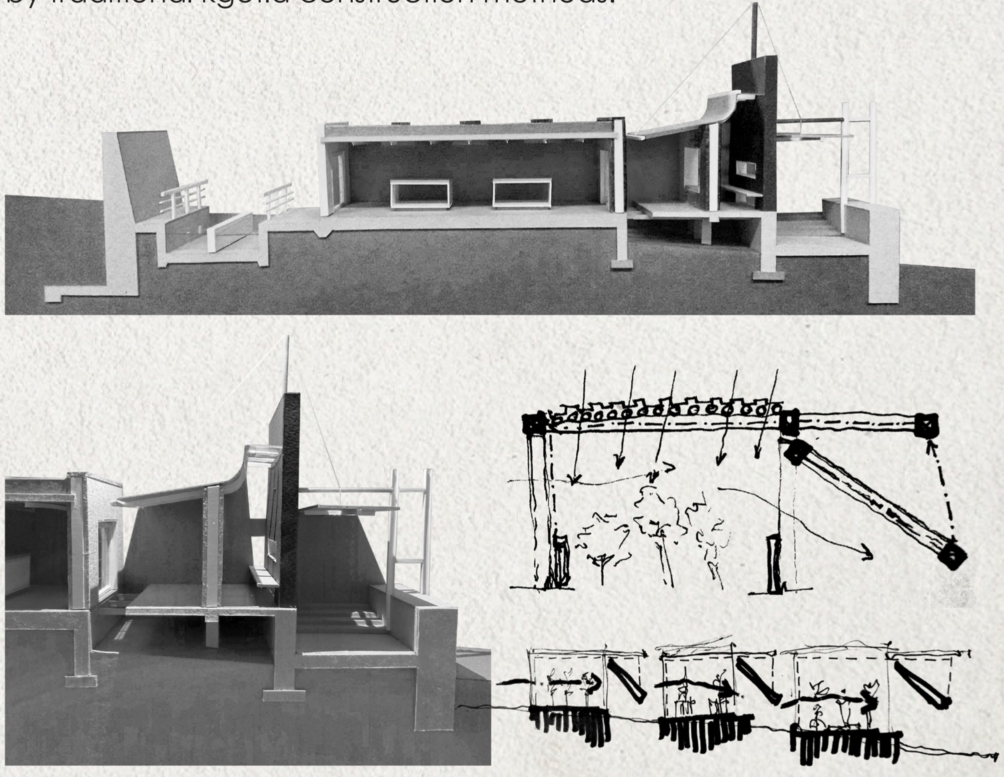


Fig.70. Playing with light and ventilation (author)

One of the most significant challenges encountered was in developing the berm system. The development began with conceptual sketches exploring different construction and movement possibilities, which were later translated into a construction touchstone (as explained in Chapter 2). This touchstone served as the foundation for the design, though it will necessitate consultation with a licensed engineer and likely further modifications. Nevertheless, the core principles of the intended design are evident in the following section.

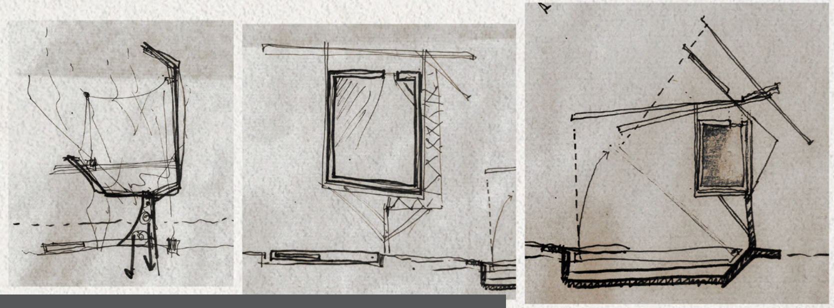


Fig.71. Process Sketches (author)

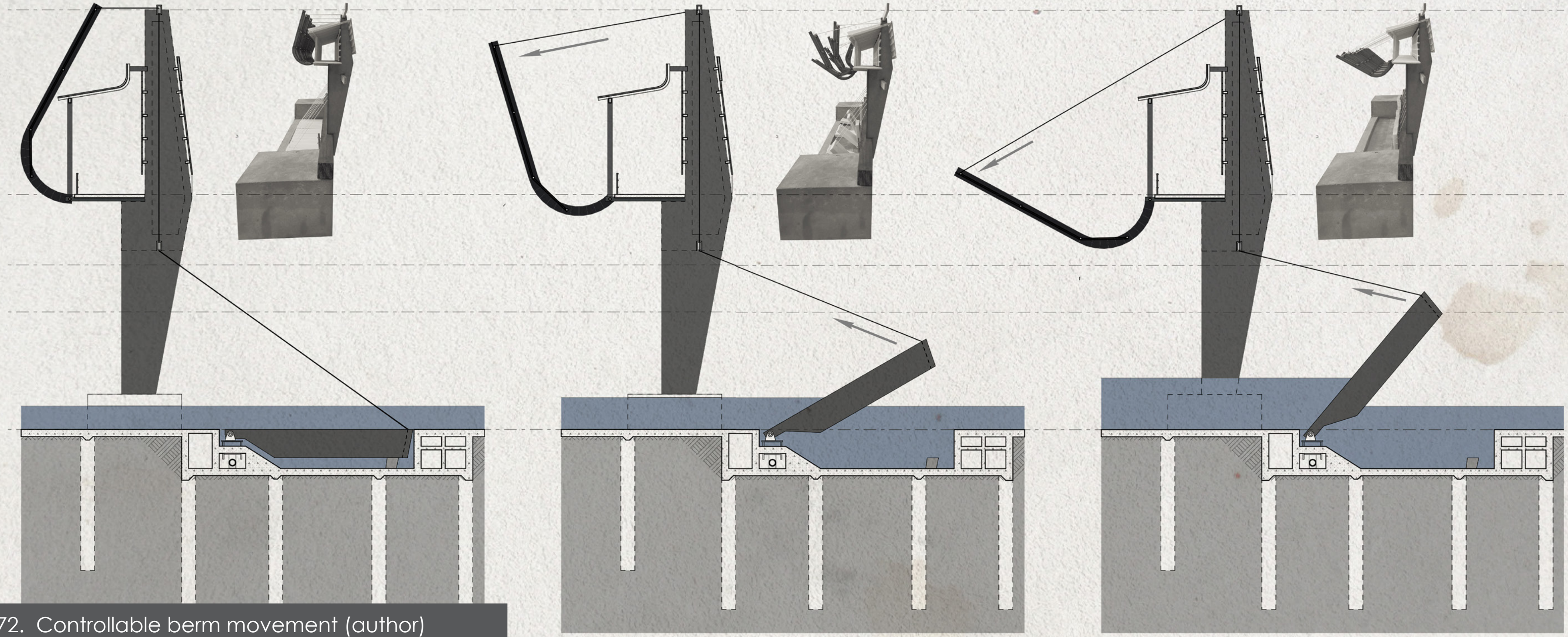


Fig.72. Controllable berm movement (author)

07.4. SUB-STRUCTURE

Soil Conditions

A geotechnical assessment done by A. Joubert in 2022 of the proposed site describes the presence of a diverse range of soil conditions, offering both opportunities and challenges for architectural development. The presence of layered gravelly sand provides a stable foundation for the construction because it has reasonable load-bearing capacity, allowing for straightforward excavation and the potential for effective drainage systems. However, the unconsolidated material may require additional structural considerations, as it can be prone to shifting and settlement. The presence of a granite rock bed, though providing excellent load-bearing capacity, might necessitate specialized foundation techniques. These varying soil conditions demand a thoughtful design to ensure the safety, stability, and longevity of the project.

Foundations

The structures on the river banks make use of excavation work to embed the sructures into the soil. After excavation, a combination of raft and strip foundations are used to evenly distribute forces onto gravelly sand which typically stable and less prone to settling and subsidence compared to purely sandy or silty soils. The structures closer to the river make use of pile foundations to bypass the unconsolidated materials and thus anchor the structure into the strong granite rock bed at 6m deep.

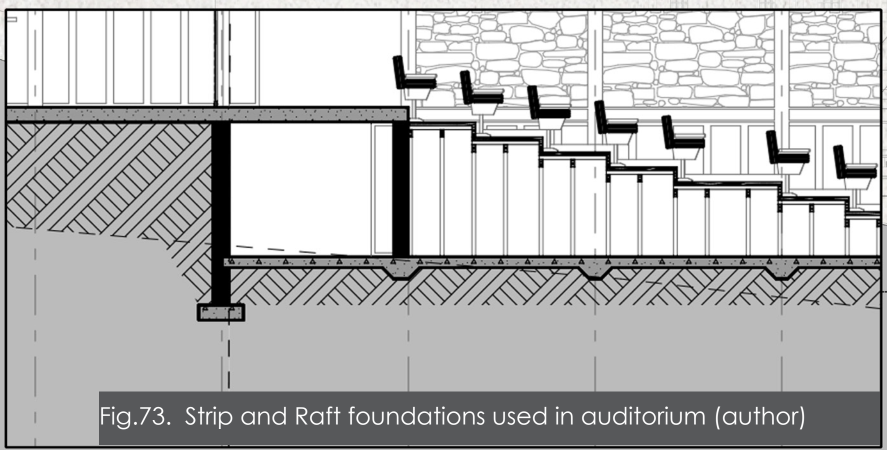


Fig.73. Strip and Raft foundations used in auditorium (author)

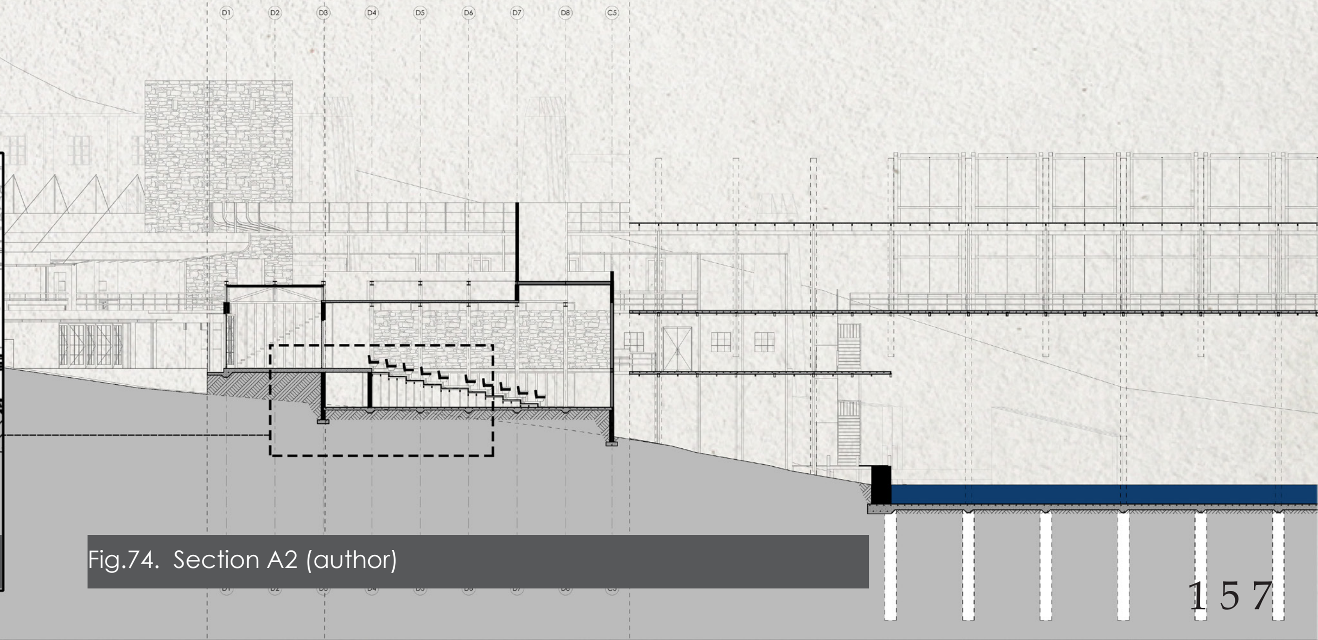


Fig.74. Section A2 (author)

Furthermore, the bridge structure and berm system use a pile foundation system. Given the size of the Umzimkulu River and its strength during periods of flood, it will likely be necessary to anchor the berm into competent, granite bedrock along its entire length to stabilize it. These pile foundations can comprise rotapiles and/or oscillator piles, both of which are well suited to the conditions on-site and are able to create the necessary socket into the very hard bedrock.

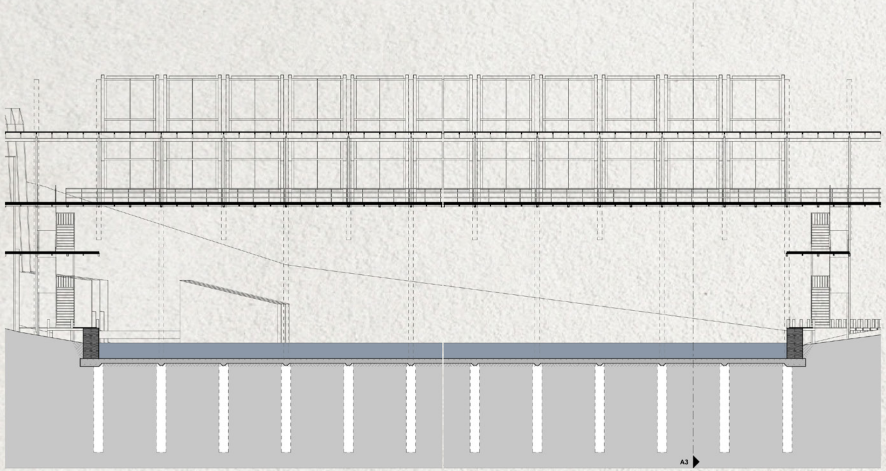


Fig.75. Section A2 (author)

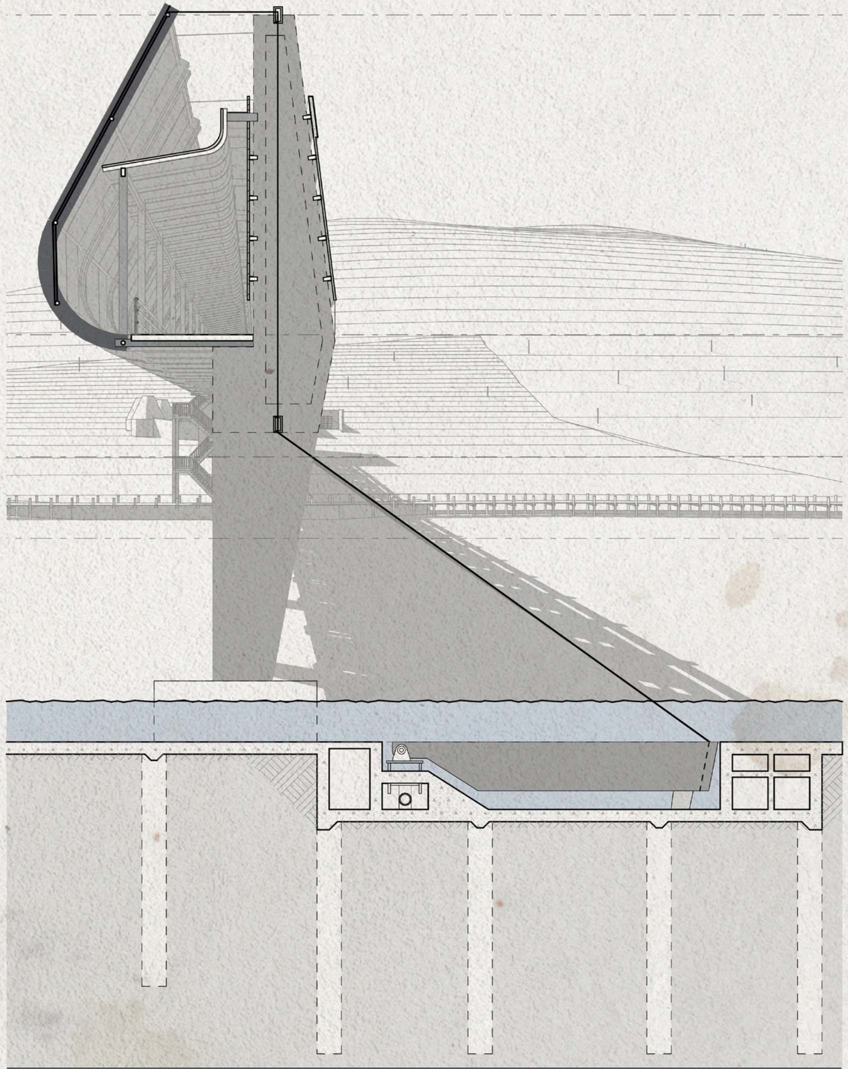


Fig.76. Section A3 (author)

07.5. TOP-STRUCTURE

Column and Beam

The top structure mostly consists of steel column and beam structures anchored onto the concrete foundations with brick infills, following the architectural language of local architecture. The primary structure consists of 203×133mm galvanised steel I-beams used as columns and beams with angles welded to them off-site and then bolted together on-site. These structures are welded to custom steel footings which are then bolted to concrete flooring.

Walls

A combination of dry-stack stone, plastered adobe bricks and traditional african earth walls are further used throughout the proposed design. These three examples can all be seen in the following section. The traditional African earth walls consist of earth blocks made from local materials that are roughly plastered with a mud-cement mixture gathered from the site. These walls are reminiscent of construction methods used in African societies and also propose an opportunity to involve local people.

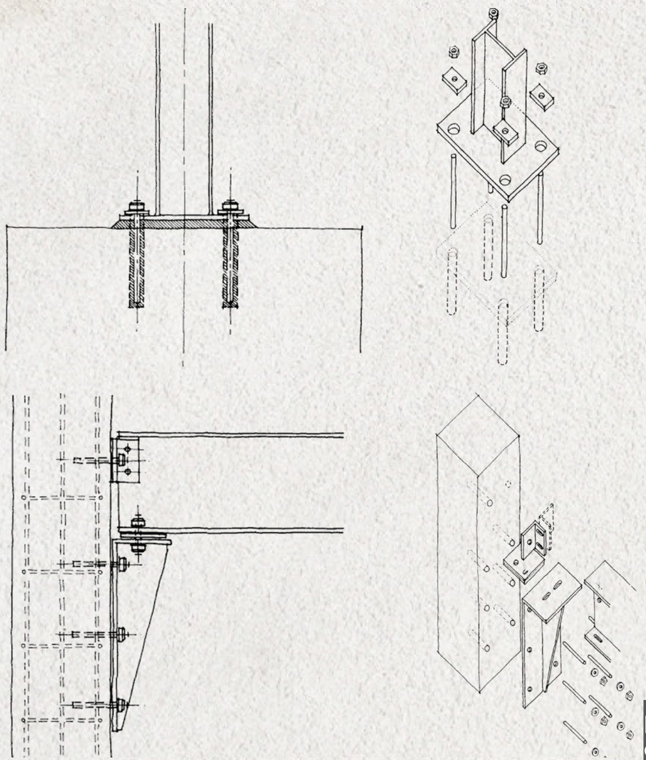


Fig.77. Column and beam connections

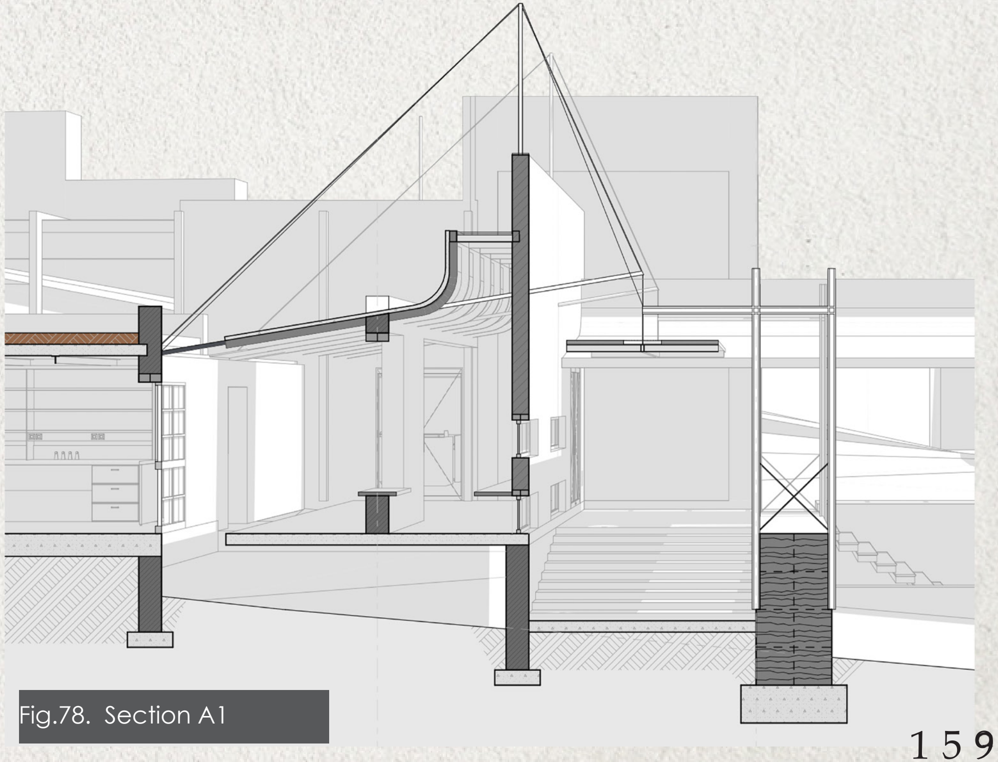


Fig.78. Section A1

Flooring

The project will incorporate a variety of flooring types, all waterproofing the concrete raft foundation and either giving it a smooth or rough finish. For interior spaces either epoxy flooring or polished concrete will be employed, providing a smooth finish. For large outside spaces, timber planks will be used as framework to give a rough floor finish and paint-on concrete sealers will be applied afterwards. In the auditorium, hardwood flooring is used to blend in with the exterior pier-style walkways and look-out points.

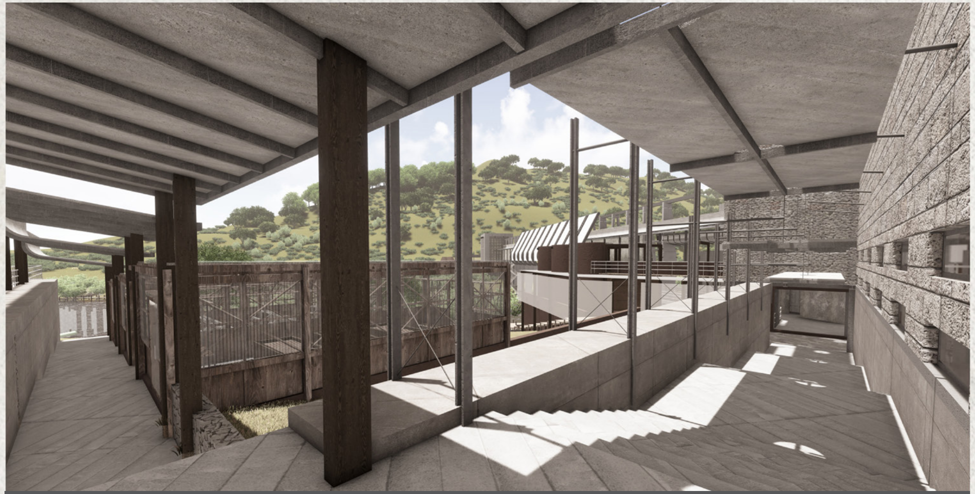


Fig.79. Rough concrete floor finish

Roof Plan

1. Reception
- Urbanscape Green Roof System
- Flat Concrete Roof
- Skylight Details

2. Greenhouses
- Clear Policarbonate Roof Sheeting on Timber Structure

3. Research Labs
- Urbanscape Green Roof System

5. Cafe
- Urbanscape Green Roof System

6. Auditorium / Non-denominational Church
- Flat Concrete Roof
- Skylight Details

7. Hydro-library
- Urbanscape Green Roof System
- Flat Concrete Roof
- Skylight Details

8. 2022 April Flood Memorial
- Flat Concrete Roof
- Skylight Details

9. Controllable Berm / Bridge
- Curved Concrete Cast Shell

10. Flood Capsule
- Flat Concrete Roof
- Skylight Details

11. Performance Space
- Urbanscape Green Roof System
- Policarbonate Roof Sheeting

12. Ritual Huts
- Cone Concrete Cast Shell

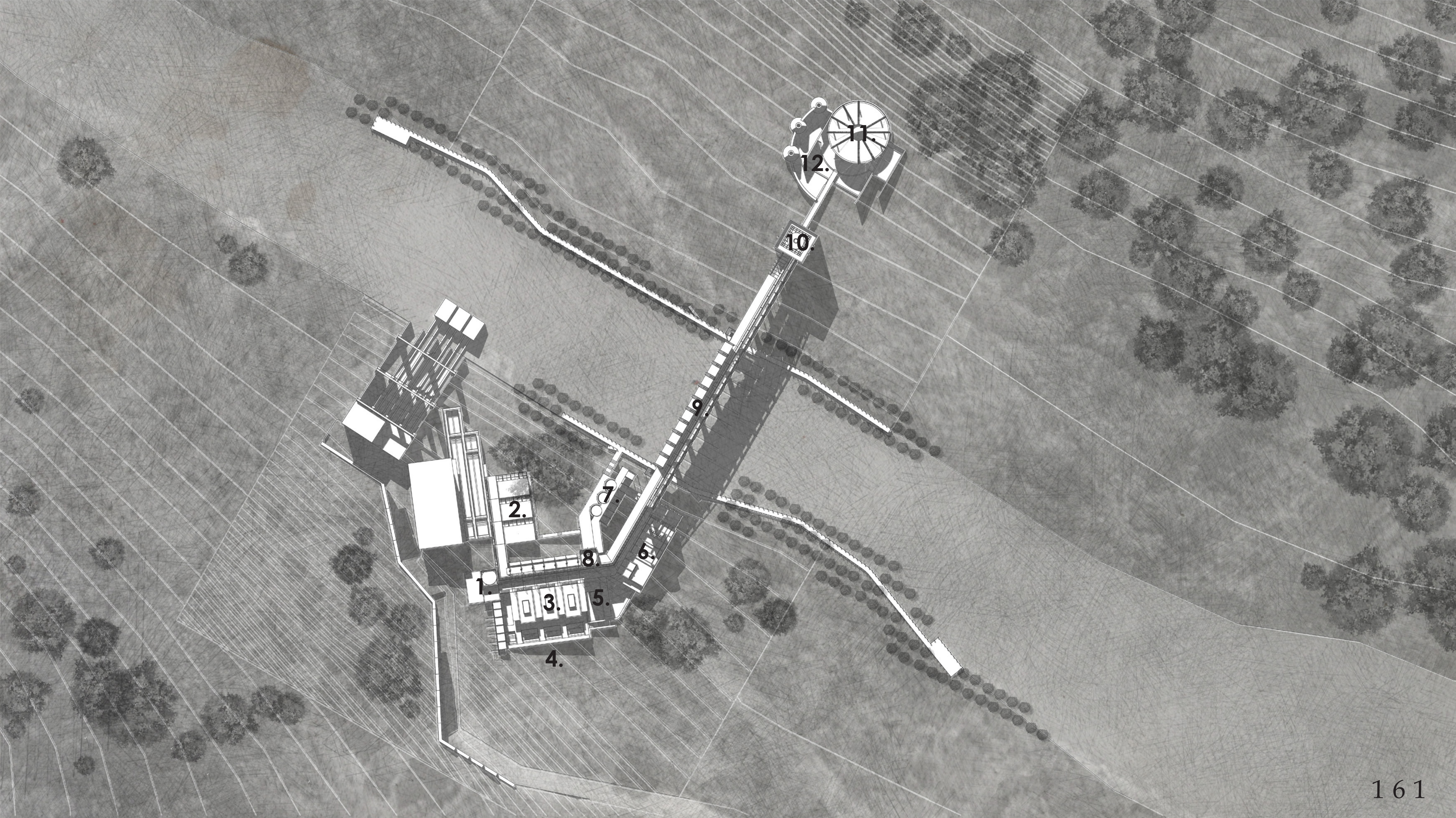


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Fig.80. The uMzimkhulu River in Flood

07.7. CONCLUSION

In conclusion, the technical synthesis has meticulously examined the intricacies of the project, focusing on key elements such as technical site response, sectional development, substructure, and top structure. This comprehensive analysis is built upon the presentation of the Flood Control and Research Centre's final design. By delving into these technical dimensions, we have gained valuable insights into how to approach the construction process for the center, making this synthesis a pivotal contribution to our project.

Chapter 08

CONCLUSION

08.1. CONCLUSION

The main goal of this dissertation was to formulate a design methodology within a prefigured landscape in order to actively respond to the research question. With establishing the project in The Meandering Motif it was clear that the amount, as well as the intensity of floods in South Africa are increasing thus highlighting why further investigation into the topic of the flood crisis isn't just important, but necessary. This project structured itself around the hybrid intertwinement of science and divination and proposed constructing a Flood Control and Research Centre embedded in the banks of the uMzimkhulu River. The design process consisted of a objective and subjective evaluation of the site and its history in the landscape as well as an investigation into different theoretical approach possibilities that further enabled the design process to critically notice the appropriateness of the design intent. The theories investigated were hybridity, sacred geometry and magic realism. This together with the analysis of the site, brief and precedent studies made it possible to structure a design strategy which in turn guided the design development to a final design proposal. In essence, the final design proposal adresses the current terrors of flooding by constructing a Flood Control and Research Centre that bridges the gap between the real and the numinous, embodies the methodologies of the oionistic oracle, and highlights the importance of reading and memorialising past omens within the inundated landscape.

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