

Vulnerable Territories:

The Perpetually Shifting Edge.

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by

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Vulnerability

“the quality or state of being exposed to the possibility of being attacked or harmed, either physically or emotionally”

in danger - peril - in jeopardy - at risk
endangered - unsafe - unprotected

Abstract.

New Zealand's coastline is rapidly receding. The increased threat of rising sea levels continues to erode the shore line causing extensive and irreparable damage to thousands of coastal properties, often dismantling communities and the kiwi dream of living near the ocean.

With global temperatures continuing to rise, all of our coastal communities are at risk. The current measure of response to this issue is through managed retreat, the removal and relocation of all 'at risk' buildings in coastal hazard zones. While this approach is successful in preserving the physical structures, it remains an undesirable solution that forces homeowners to abandon their community and the coastline for the safety of higher ground. The retreat is hampered among debate within the effected regions as the forced detachment of long standing communities often results in the loss of 'sense of place' that living within a coastal community enables.

This thesis proposes that Haumoana in Hawkes Bay offers the fitting location to introduce an alternative coastal community model that actively responds to the impending hazards whilst retaining the societal poetics. Situated just south of the nearby communities of Te Awanga and Haumoana, two of the most at-risk coastal regions in New Zealand that are currently facing the prospect of dismantlement. The site was specifically chosen due to the fact that erosion is predicted to diminish half its usable land over the next century, this thesis

will investigate the potential risks to the respective coastline, the role that this would play in an adaptive community, and the possible design options that can respond and enhance a future sustainable landscape.

This thesis argues that a coastal community can be designed to actively adapt and respond to the threat of erosion rather than being dismantled through retreat; that by adopting design principles that protect the land on which they are placed, the coastal hazards of the region can be lessened; and that an adaptive community model can be achieved whilst retaining the 'sense of place' that coastal community's exhibit.

The thesis proposes that this can be achieved by incorporating and reinforcing natural features of the coast into the architectural design at various scales; accommodating for, and adapting to the imminent threat of erosion; and by invoking principles of sustainable design in company with adaptive planning and resilient design, thereby pushing the standards of coastal planning beyond typical practice.

Haumoana.

Hawkes Bay, New Zealand



39°S 176°E
Est 1913.

Preface.

This project exists in the context of conceptual architectural design. It critiques and explores the existing built environment, making explicit remarks towards issues such as climate change, sustainability, landscape preservation and methods of coastal habitation.

It has come about through the observation of the many cherished coastal New Zealand community's that have become exceedingly threatened by the product of sea level rise.

The title of this thesis, *Vulnerable Territories*, reflects on the fact that the built environment often neglects how delicate, dynamic and extraordinary some of these places are, and the damage that inappropriate buildings can do to them.

Acknowledgements.

I would like to thank my friends, for the last five years of memories. The people that I am privileged enough to be surrounded by have helped me in more ways than I can express.

Most importantly, I would like to thank my family.

To my parents who have shown unconditional encouragement and support throughout the last five years of study, it goes without saying that i could not have done any of this without your help.

And to my siblings, who have unwittingly driven me to continually uphold a similar standard of motivation, persistence and achievement that they have attained in their own pursuits of passions and professional endeavour's.

For everything

Thank you all.

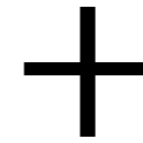
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CONFLICT OF THE BEACH.

introduction



Introduction.

| vulnerable territories |

A large majority of New Zealand's urban development has prioritized coastal areas as desirable landscapes, and the dramatic increase of property values along the coastal edge has reinforced the strong demand for further development (Cheyne & Freeman, 2006, p. 105). Induced by anthropogenic climate change, sea level rise and resulting events such as erosion and inundation remain the most pressing obstacle to this coastal inhabitation. These coastal events are only perceived as hazardous when they begin to impact the human occupation of a region. The grounded structures that humans erect often fail to consider the shifting dynamics of the ocean, in the perception of inhabitants, these dwellings seemingly define where the coastal edge ought to remain (Ricketts, 1986, p. 197).

As the development of homes and communities persist in the path of these hazards, three broad responses arise as mitigation options; to resist, retreat or adapt (Refer pg.10). Historically protection techniques were seen as the desired response to the prominent coastal hazards, the construction of barrier structures and the implementation of soft engineering techniques to slow

or halt any edge deterioration (Cooper & McKenna, 2008, p. 296). However, it has been recently recognised that these common methods of protection are not only financially unreasonable, but regularly have an adverse repercussion on both the immediate and adjacent coastal environments (Reinen-Hamill, Clode, & Daykin, 2009, p. 1). More recently, New Zealand regional councils are being encouraged to consider the option of managed retreat, the design of communities for future relocation of at-risk structures inland away from adverse effects of coastal hazards (NZCPS, 2010, pp. 24, Policy 25c). This retreat is hampered with debate as whilst it remains effective in preserving the built environment, it often eventuates in the disbandment of communities through the decline of residents and coastal property, resulting in a loss of connection to home and place (Owen et al., 2018, p. 10).

"The way managed retreat is currently implemented in coastal New Zealand seems less about retreat and rather more about displacement"
(Bloomfield, 2018, p. 558)

The continued effect of sea level rise and its associated coastal hazards such as erosion and inundation is a well-established management problem for coastal communities around the country. The fore mentioned resistance option positions itself on artificially manipulating nature (place) to protect architecture (built environment), whereas the retreat option focuses on protecting architecture through abandoning nature. With a conclusive mitigation preference still lacking, this thesis argues that management of the coast needs to take a more nature centric approach, embracing innovative strategies of adaption to enforce a mutualistic relationship where architecture and the built environment stand as a tangible meeting point between nature and humans.

It is with this idea in mind that I have framed my design-led research, with the intended objective of exposing a designed solution where architecture and nature can cohabit place harmoniously, where the built environment is sympathetic to the vulnerable landscape, thereby allowing nature to retain its freedom whilst preserving the luxury of coastal occupation.

"The real conflict of the beach is not between sea and shore, for theirs is only a lover's quarrel, but between man and nature. On the beach, nature has achieved a dynamic equilibrium that is alien to man and his static sense of equilibrium. Once a line has been established, whether it be a shoreline or a property line, man unreasonably expects it to stay put."

(Soucie, 1973, p. 56)

Research Methodology.

A topic such as this grounds itself in the realm of scientific plausibility, and expresses itself through the poetic notions of its response.

Understandably, there is a significant lack of grandiose theoretical doctrine of a poetic nature in regards to the scientific plausibility of the subject, and as a result, this thesis will follow the model of 'grounded theory'. A model that:

"...allows the researcher to develop a theoretical account of the general features of a topic while simultaneously grounding the account in empirical observations or data" (Martin & Turner, 1986, p. 141)

As such, this project begins by conducting qualitative research, primarily through the exploration, observation, and analysis of the chosen site, its issues, and the historic responses that are potentially adaptable to similar locality.

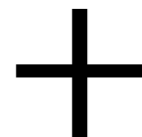
By initially and systematically exploring the reports and data that provide substantial groundwork for a designed intervention to establish itself on, a more esoteric response can be explored and illustrated whilst maintaining elements of feasibility with continuous reference to elements discovered within the initial research.

This thesis analyses historic architectural techniques that were

implemented in response to similar issues, their design principles and the justification for such methods. This is followed by modern examples of architectural designs that follow similar principles

The process of design then follows the adaption of all of the principles that have proven effective in various scenarios from these case studies, assessing how similar techniques can be applied to a New Zealand context and the chosen site in particular.

This results in an emergent design method, embracing unanticipated information and change, maintaining the ability to adapt to new ideas and findings made by revisiting discoveries made at the beginning of the process.



Scope.

This thesis will develop one coastal New Zealand site as an exemplary design model, following an approach that can be replicated and adjusted for similar regions elsewhere.

The research focuses on the approach and justification for a new method of coastal habitation in New Zealand, encouraging the implementation and assessment of unconventional building techniques that respond empathetically to the highlighted issues and site.

Some limitations of this work, that are beyond the scope of the investigation are that there are no considerations towards such things as detailed structural analysis, restraints due to economic viability or resource consent obligations.

The project is of theoretical nature and is intended to remain a speculative and poetic exercise that is based on the premise of inciting conversation about the changing conditions and requirements of continued coastal habitation.

Structure.

Chapter 01 - Introduction

Explores the selected region and categorises the highlighted hazards that effect the built environment along with the typical responses that have been implemented historically.

Chapter 02 - Chosen Response

Justifies the technique that has been chosen for exploration and further development, analysing what has been implemented and how it could be adapted to site.

Chapter 03 - Site Analysis

Introduces and explores a refined and specific site that is deemed suitable for a designed intervention to use as a vessel.

Chapter 04 - Design Considerations

Investigates circumstances that need to be considered throughout the design process.

Chapter 05 - Conceptual Design

Introduces and develops a conceptual design example that follows the outlined design considerations, then reflects on the success of the intervention.

Chapter 06 - Developed Masterplan

Revisits the scope of the project and adapts design to a more inclusive and communal product.

Chapter 07 - Final Design

Outlines the decisions behind the final design and what effects such decisions have on its surroundings.

Chapter 08 - Conclusions

Reflects on the nature of the problem, the steps that have been taken and the limitations of the investigation. It then reflects on why such a project is an important argument and how it may continue in the future.



Haumoana.

As an island nation, there are an abundance of quintessential coastal regions in New Zealand that are exceedingly vulnerable to the fore mentioned coastal hazards, many of which would function as a suitable vehicle for this design-led research to take place. However, throughout the initial research investigation of coastal New Zealand hazards, the region that is consistently highlighted as one of the most at-risk in the country is the southern Hawkes Bay coastline, specifically the small community of Haumoana.

Haumoana is considered one of New Zealand's 'hot spots' of community vulnerability to coastal hazards (Kench & Dickson, 2018, p. 1). The town, located near the

southern end of the gravel barrier beach stretching between Napier to Cape Kidnappers, is home to one of the fastest deteriorating coastlines in the country. It has been subjected to extensive erosion since the 1931 Hawkes Bay Earthquake resulted in the alteration of the coastal system along the 'cape coast' due to tectonic uplift (Bloomfield, 2018, p. 556). Since then the community has consistently battled with the natural forces of the ocean, implementing hard engineering techniques such as the construction of concrete sea walls and groyne in an attempt to protect their homes from the ever-rising waters.

With these hard engineering techniques proving costly and

adversely less effective than predicted, a large number of the Haumoana community are now facing the 'managed retreat' option of abandoning properties to the mercy of the tide and relocating their homes away from the coastline, an approach that is heavily contested among the effected residents. The retreat approach is not disputed for the reasons that would seem most logical, such as the loss of land or home, but for the more poetic notion of attachment of place (Gudsell, 2016). Residents are less concerned about the physicality of their property and more about the cherished values, memories and experiences that the Haumoana community has catered for, as climate change commentator Jeff Goodell states:

"But they love where they live and the whole notion of getting up and going somewhere else is very hard... Even people who understand climate change still think sea-level rise is a slow, gradual thing and they can build a seawall that will be fine for X number of years and this is a remedy for the problem."
(Blundell, 2018)

Unfortunately, it is already inevitable that many of the homes will have to be relocated due to how immediate the threat from the sea is, and with the homes displaced, the community is under threat of disbandment. However it is for this purpose that the Haumoana region adheres to the optimal circumstances for this

design-led research portfolio, this thesis proposes that although they may have to abandon their homes, they do not have to abandon their community.

This proposal suggests that a new community design can be established to allow for the continued habitation of the Haumoana coastline. It suggests that the exploration of an adaptive model that harmonises with the dynamic environment is essential to retaining the place attachment and values of the region, even in the face of coastal hazards.

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Fig 1.02.
Haumoana's
Artificial
Defenses Failing

The Natural Issue.

In its most recent 2013 report, the Intergovernmental Panel on Climate Change (IPCC) outlined the sea is predicted to rise between 60cm and 100cm in the course of the next century with the former being the rise under a 'stringent mitigation' strategy, and the latter under a 'very high greenhouse gas emission' scenario (The Working Group I, 2013, pp. 1181–1182).

The unavoidable sea level rise is expected to exponentially aggravate the coastal hazards of New Zealand
The Parliamentary Commissioners Report for the Environment (PCE)

report highlights the three types of coastal hazard that will directly affect New Zealand by rising sea, these are:

- + Flooding along coast where sea flows over low-lying land.
- + Erosion that occurs when waves and currents eat away at 'soft' shorelines.
- + Groundwater that can be affected in two ways - water tables can rise and fresh water can become saline.

(Parliamentary Commissioner for the Environment, 2015, p. 23)



Coastal Flooding

Coastal flooding can range from 'nuisance events' to widespread inundation, and with the sea rising, the latter is becoming increasingly regular. Flooding due to rising sea is expected to not only to originate from the coast, but is predicted to increase the duration and extent of river floods also (Parliamentary Commissioner for the Environment, 2015, p. 28). As the sea continues to rise coastal land and communities will experience more frequent and severe flooding, a hazard that will cover more land, last longer and do more damage as water levels rise.

Coastal Erosion

Although erosion (and subsequent accretion) is a natural process of the coast that has been

happening for thousands of years, as the sea rises, erosion will undoubtedly increase around the New Zealand coast. As high energy storm waves rush further inland, coastal regions that regularly take the brunt of storm surges are becoming much more susceptible to the repercussions of erosion. Thus regions such as Haumoana, that are already heavily prone to the effects of erosion, are likely to erode faster (Parliamentary Commissioner for the Environment, 2015, p. 38).

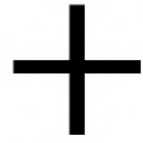
Coastal Groundwater

The effects of flooding and erosion are often clearly evident, however the problems of ground water are seldom evident immediately. High ground water due to sea level rise can lead to extensive damage to infrastructure and the built environment, boggy

ground and surface ponding, and the increased threat of liquefaction in earthquakes (Parliamentary Commissioner for the Environment, 2015, p. 40). Because of Haumoana's low lying water table, much of the fore mentioned flooding hazard will come directly from the ground, and will not be able to retract back into the soil for a much longer period of time.

With this prediction by both the IPCC and PCE that sea level rise will not falter for the reasonable future, it is critical for the continued habitation of the coast that a designed solution be identified that addresses and responds to these three hazards and the associated disturbance that they will have on both the natural and built environment.





The Human Issue.

Whether the area comprises largely of an unscathed landscape, or an area of few natural features, all of Hawkes Bay's coastal edge possesses some degree of natural character. The procedure under the [1991] Resource Management Act (RMA) is to actively explore protection of the features which amplify a regions natural character (Resource Management Act, 1991, p. 62), and whilst they themselves do not define what 'natural character' is or is not, the [2014] Hawkes Bay Regional Coastal Environment Plan (RCEP) takes the consideration of several Environmental Court decisions to assist the interpretation. The

summary of which focalize on regional attributes as criteria, these attributes to an areas identity include "outstanding natural features of the landscape, areas of significant indigenous vegetation and significant habitats of indigenous fauna, and ecological and hydrological systems" (HBRC, 2014, p. 12). According to this management plan, under the titled section of 'Matters of National Importance', the report highlights the regional concern of pernicious subdivision and development, stating that:

"The coastal environment's natural character is being modified and adversely affected through inappropriate subdivision, use and development" (HBRC, 2014, p. 11)
&
"Inappropriate subdivision, use and development may degrade the physical integrity and aesthetic values of outstanding natural features and landscapes within the coastal environment" (HBRC, 2014, p. 13)



Such development can be observed throughout the Haumoana community, where human interventions are at the mercy of the ocean. Historically, coastal houses have developed over time with a stable sea in mind, with construction and infrastructure rooted heavily in the ground. This model of building demonstrates the fact that majority of human intervention in the region has not considered its contextual locale. Dwellings have been constructed in the same manner as if they were in town, and consequently, they have become a logistical burden as now the community and council struggle with the

resistance to the natural forces of the coast. These immense structures of permanence have proven devastating to both the physical integrity and the aesthetic values of the coastal edge, with many falling into disrepair and abandonment.



A fragile and finite resource, the natural character of the coastal environment is a vulnerable territory that must be protected from irreversible alteration or damage. To cohabit a dynamic environment such as the coastal edge requires a precautionary approach applied to the built environment, one that differs greatly from the prevalent model of habitation. This design-led research portfolio seeks to uncover an intervention that harmonises the interaction between man and nature by protecting and amplifying the Haumoana regions extensive natural character.

Research Aims.

Enable enhanced occupation of sites that are vulnerable to coastal hazards.

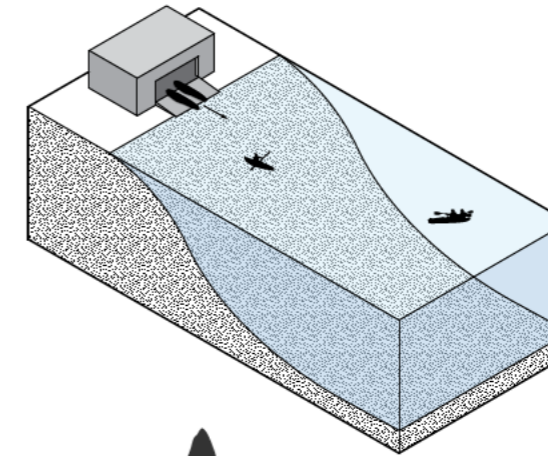
Establish an innovative designed solution that allows the continued habitation of the Haumoana coastline.

Demonstrate a mutualistic relationship between nature and architecture

Retain the 'natural character' of Haumoana's coastal edge.

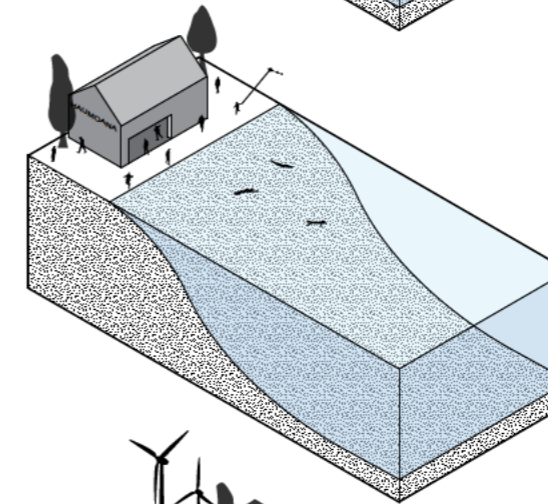
Use architecture as a tool to harmonise the interactions of man and nature.

Design Objectives.



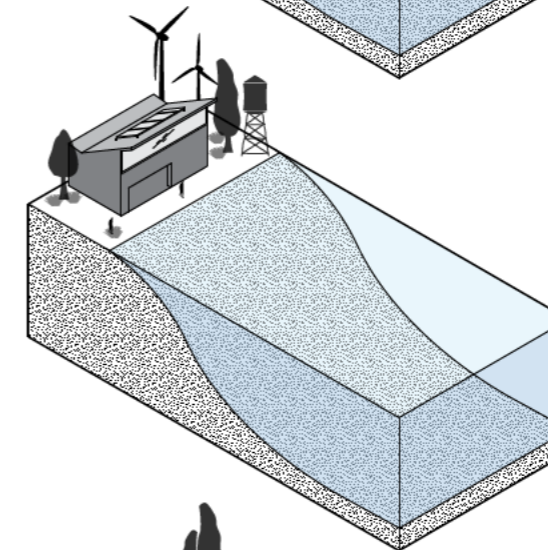
Coastal Access

+ Create access points for continued public and community waterfront use. Explore inclusive design principles to establish a sociable community intervention.



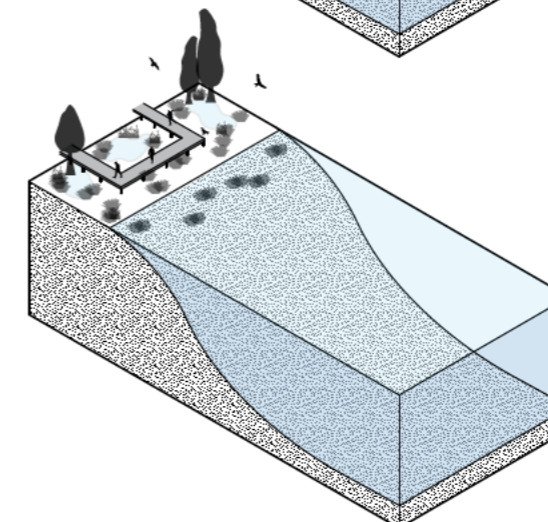
Sense of Place

+ Retain the place attachment that is crucial to coastal New Zealand regions. Reflect the vernacular architecture of the many established coastal settlements portray.



Sustainability

+ Employ sustainable design principles and energy generation techniques to provide a feasible coastal living environment.

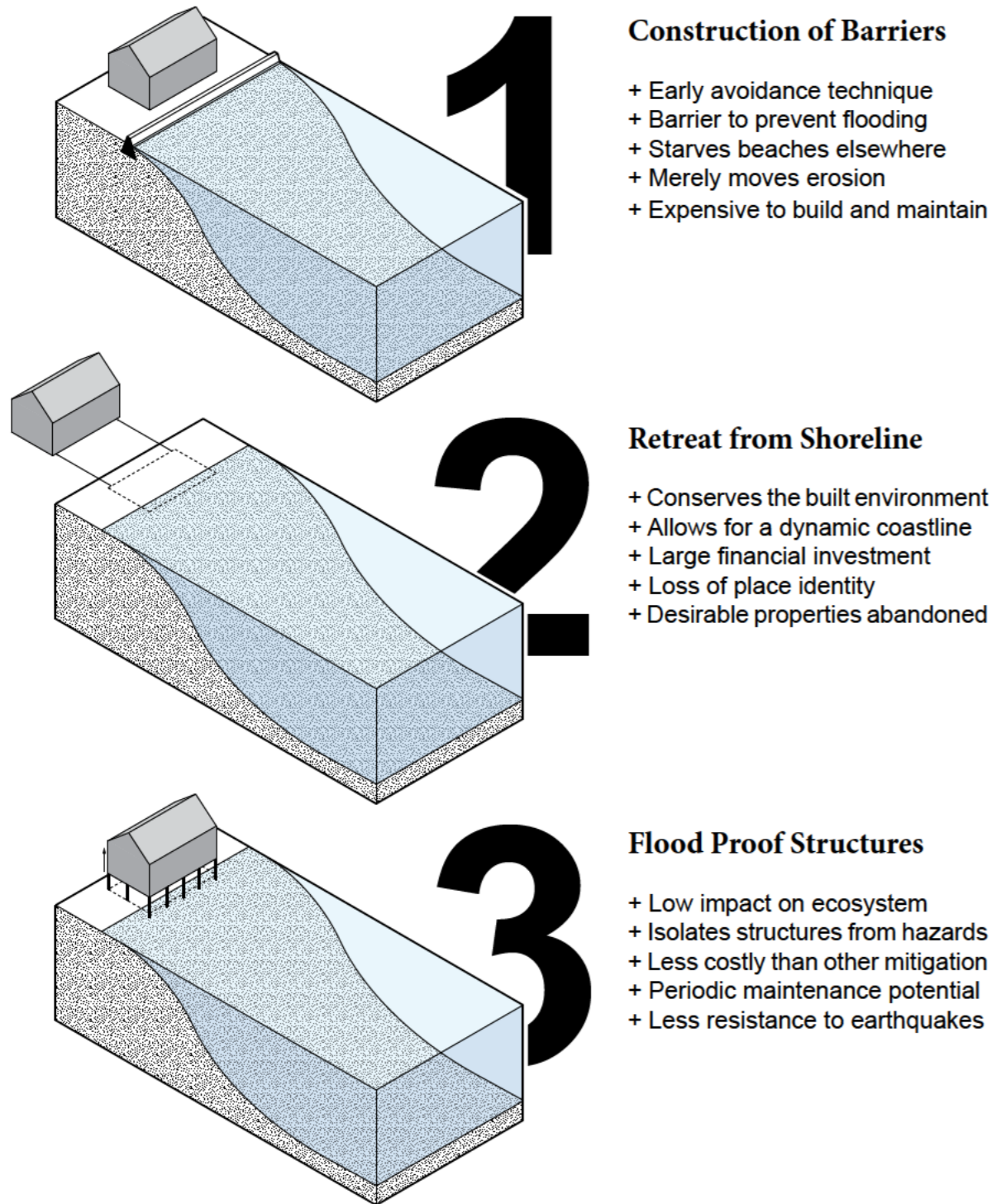


Protection

+ Minimise the built environments impact on the surrounding environment throughout its lifetime from construction to deconstruction.

Typical Responses.

Guarding Against Sea Level Rise



1 Construction of Barriers

- + Early avoidance technique
- + Barrier to prevent flooding
- + Starves beaches elsewhere
- + Merely moves erosion
- + Expensive to build and maintain

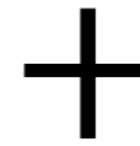
2 Retreat from Shoreline

- + Conserves the built environment
- + Allows for a dynamic coastline
- + Large financial investment
- + Loss of place identity
- + Desirable properties abandoned

3 Flood Proof Structures

- + Low impact on ecosystem
- + Isolates structures from hazards
- + Less costly than other mitigation
- + Periodic maintenance potential
- + Less resistance to earthquakes

Information courtesy of FEMA
(Federal Emergency Management Agency, 2007, pp. 55–83)



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Haumoana.

Guarding Against Sea Level Rise

Fig 1.03.

Construction of Barriers:

As a result of the major 1931 Hawkes Bay Earthquake and subsequent sediment shift, the southern Hawkes Bay coast line has continually been constructing and implementing barriers through the means of hard and soft engineering techniques to resist the eroding coast. These include sea walls, groynes, and beach and gravel nourishment (REF). Whilst the hazard from the coast was effectively mitigated for the immediate future, over time the barriers have proven to fail. The powerful storm surge and resulting erosion of the coastal edge has diminished the barriers to the point where many have become completely ineffective or destroyed entirely (Fig 1.11).

Retreat from Shoreline:

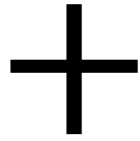
The current recommendation from the Hawkes Bay Regional Council is for the Haumoana region to

undergo the option of 'managed retreat'. This measure refers to the retreat or relocation of settlements and infrastructure out of the path of the coastal hazards (Fig 1.12). The proposal for retreat is controversial in the Haumoana region, in particular the affected homeowners understandably hold some of the strongest opposition to this management plan as it often results in the resident's involuntary removal from the coast and the subsequent community.

Flood-Proof Structures:

Flood proof structures are buildings that are designed to accommodate for the predicted risk of flooding. With techniques such as floating or amphibious structures that adjust with the alternating water levels, sealable buildings that aim to barricade the water and prevent any seepage, and building on poles to raise the ground level of a structure above the design water level.

The technique of flood proof structures is the only approach that the built environment of Haumoana has not employed in response to the imminent coastal threats. This thesis proposes that to retain the continued habitation of the Haumoana coastal edge, a flood proof building technique must be explored with regards to both individual dwellings, and community amenities. It proposes that a flood proof design would react to the coastal hazards in a more dynamic way than the barrier method, and would have the ability to retain the place attachment that is lost when undergoing the 'managed retreat' method



Flood Proof Structures.

Sealable Buildings.

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Fig 1.04.
WATSO Flood protection
system - UBGB

The sealable building technique refers to actively making the exterior shell of a building waterproof to prevent any water entering in the event of a flood. In case of a flood, the building will not be damaged by water so typical operations of the building can usually resume promptly after the water has subsided. However the design relies on the water subsiding, and would not be effective if the water level continued to raise.

- + Allows for instant operation after hazard
- + Very cost effective
- + Minimal alterations to existing building
- Does not allow continuation of hazard
- Requires continued maintenance
- Response rather than mitigation

Amphibious Buildings.

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Fig 1.05.
Amphibious House
- Baca Architects

As opposed to the floating building technique, amphibious buildings are designed to be situated above the water and are designed to float once the water rises. They are often fastened to mooring posts and rest on concrete foundations when the water level is low. They are restricted to vertical movement with the water only as the fasteners to moorings restrict the motion caused by water.

- + Ensures building and inhabitants safety
- + Allows for occupation of vulnerable site
- + Minimal visual difference in homes
- Difficult in salt water conditions
- Heavy on the land
- Short term solution to a short term issue

Flood Proof Structures.

Floating Buildings.

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Fig 1.06.
Mirjiang Floating System
- NLE Works

Floating structures are built to be situated on top of a body of water and are designed to conform to the rising and falling of the water levels. A floating building is permanently atop the water and can often be easily manoeuvred accordingly. Floating buildings are most successful in calmer waters such as canals and small lakes.

- + Little to no impact on the land
- + Relocatable out of the path of hazards
- + Ability to move with rising waters
- Not combatable with wave environments
- Difficult to apply community infrastructure
- Requires fixed mooring platform

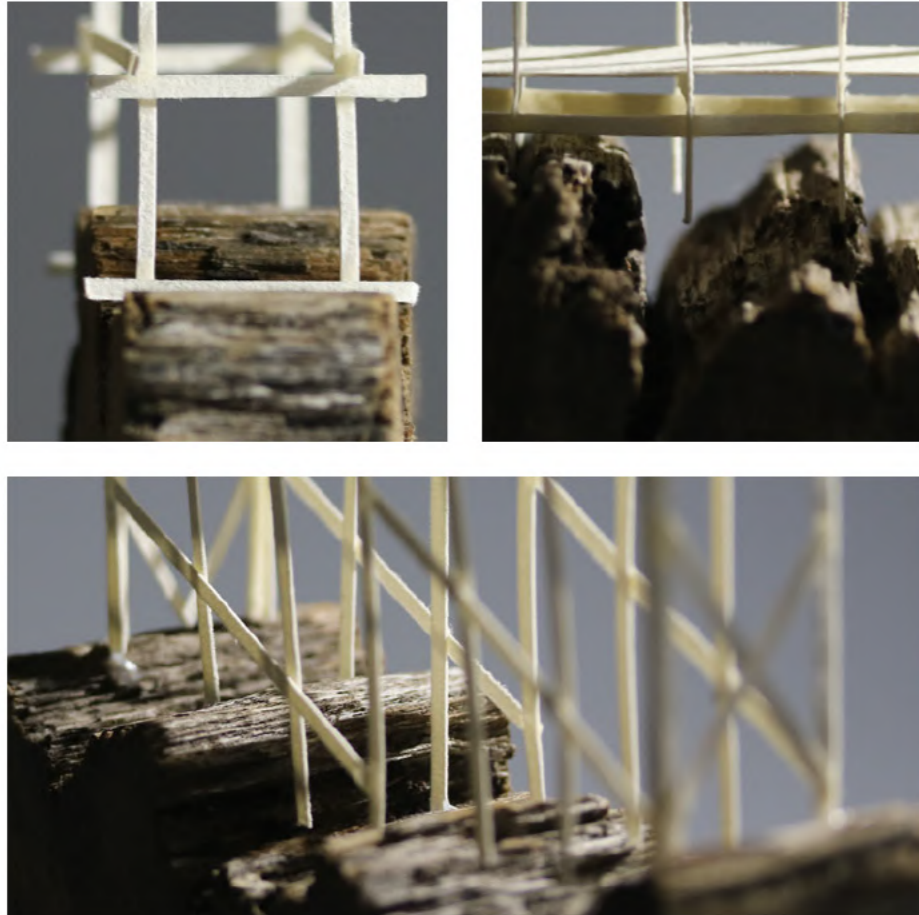
Stilted Buildings.

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Fig 1.07.
Badjao Stilted Village
- South East Asia

Raising a building off the ground allows for any water that could be a potential threat, to pass freely underneath. The poles that the building sit on provide a strong foundation and separate the built form from the hazard of the water.

- + Minimal impact on the land
- + Allows water to retain dynamics
- + Segregates hazard from structures
- Must separate infrastructure from issue
- Requires periodic maintenance
- Often more exposed to greater hazards

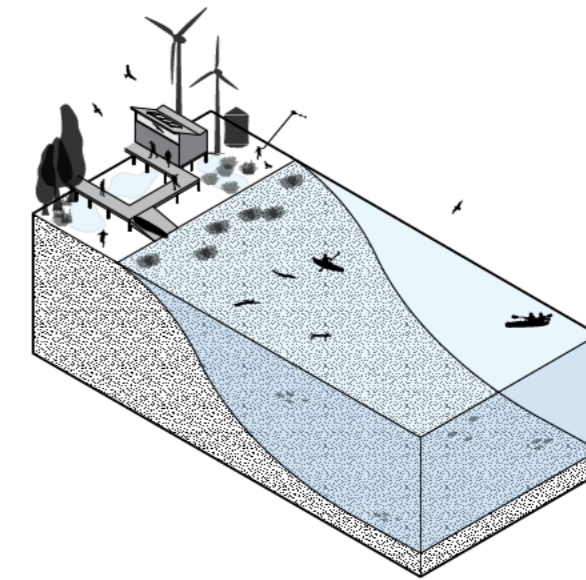


ARCHITECTURAL MUTUALISM.

required response

"Mutualistic architecture embraces complexity. It cannot be a simple system because there are too many processes at work and to call it a simple system is to ignore this. It is because of this complexity that mutualistic architecture is in a unique position to reestablish the natural presence and its non-man made physical characteristics in the built urban landscape and establish a sense of harmony between the two. In this era when the effects of our actions on the natural world are becoming increasingly evident, it is necessary for architecture to embrace the complexity, diversity and uniqueness that exists between built and natural form."

(V. A. Workman, 2004, p. 7)



Required Response.

Stilted Architecture

Throughout the previous investigation process, it has become apparent that the most appropriate response to the highlighted issues surrounding the continued habitation of coastal New Zealand regions is to employ the strategy of elevating buildings using the technique of stilted architecture.

The technique succeeds in satisfying many of the underlying principles that this design led research investigation aims to follow. Elevating the built environment above the delicate landscape has the potential to allow for humans and nature to occupy the same territory's, maintaining the ability to interact with one another, simultaneously granting the two the freedom to operate how they see fit in their

own assigned environments.

In this way the technique both segregates and unifies the interactions of humans, nature, and the built environment. With the potential capacity for the luxury of continued coastal occupation, while natural processes and shifting dynamics of the coast are retained, the stilted architecture approach stands as the most applicable response to this ever growing issue.

In such a scenario, the built environment plays a critical role in bringing these two forces, man and nature, together in a mutualistic manner, an essential balance must be obtained in order to accomplish true architectural mutualism.

A Historic Technique.

Stilted Dwellings.

Water has ceaselessly been the antagonist of architecture, to separate human from water is one of the fundamental principles of shelter. On the contrary, all life on earth has an intimate relationship with water, as a species we have long depended on water, it has forever prevailed as a crucial source of nourishment.

The conflict between the need to live contiguous with water for nourishment, and the need to be detached from water for dwelling compelled adaption of the built environment to conform to man's needs. Humans ultimately discovered a building technique that allowed them simple travel

between architecture and nature, whilst retaining the essential separation, a techniques that harmonises the relationship between the natural and built by only permitting contact where vital.

The implementation of stilted housing systems in vernacular architecture have allowed entire communities to cohabit the natural environment around the world for centuries. Adaptions to flooding in historic communities are notably distinguishable in the built environment, with the frequent adoption of constructing houses on stilts to allow floodwaters to pass underneath (Cuny, 1991, p. 335).

Traditional Malay society was centralized around the exploitation of floodplains for fishing, planting of padi, and 'kampung'. The plains were also pivotal in their culture and heavily intertwined in the daily rural ways of life. The employment of stilts to raise their homes is an important characteristic of the vernacular 'kampong' house design. This crucial element of design evolved out of the necessity to reduce flooding and flood damage by allowing swamp and river environments to be settled underneath, rather than imposing on dwellings(Chan & Parker, 1996, p. 320).

Tonlé Sap.

Stilted Community.

Located in central Cambodia, the great lake of Tonlé Sap lies within a geological depression in the vast floodplain of the lower Mekong River. Tonlé Sap is a seasonally inundated freshwater lake and as such, community habitation of the lake has adapted outstandingly to the natural environment (Kuenzer, 2013, p. 30). The vernacular buildings of the great lake stand as incredible examples of how individual stilted dwellings can be intertwined to form a dynamic community ecosystem.

With an economy centralized around the fishing industry, the lake is home to exceptional

biodiversity that serves as one of the world's largest fresh-water fisheries. On the perimeter of this lake, around 100,000 people inhabit the over 150 mixed villages containing floating homes as well as homes elevated on eight to ten metre high stilts (Kuenzer, 2013, p. 29). The inhabitants of the villages have adapted to the water and stilted environment perfectly, houses are built densely close to one another, with the little space between functions as public roads and meeting places in the dry season, and waterway navigation in the wet (Sithirith, 2007, p. 18).

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Fig 2.01 .
Traditional Maylay Dwelling

Fig 2.04 .
Tonlé Sap, Cambodia

Precedent Study 01.

Chiquet Flood House
Ben Adams Architects
Weybridge, United Kingdom

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Fig 2.05 .
Physical Model, Ben Adams Architecture, 2011

The 'Chiquet Flood House' was designed by Ben Adams Architect's in a manner that celebrates its captivating site on the banks of the River Thames in Weybridge. It is situated on the greenbelt on the surrounds of the river, a primary floodplain that becomes overrun by the river on average twice a year and can remain waterlogged for weeks at a time.

The form of the house is centralized around the constraints of the extraordinary site, with the river being the major driver for most design decisions. Most notably, the design is lifted more than two meters off of the ground by a series of concrete and steel posts, raising the occupation areas above any potential flood level. This elevation allows for the ground floor to become the 'piano nobile' of the house, with heightened views across the

extent of the Thames and into the open spaces of Hamm Court.

The mass of the house is minimised through the formal restraints of the site, the low roof line on the river side condenses its visual impact while the ascending forms on the road side diminish the impression of volume. It being a long slender building results in the majority of the mass remaining hidden from the primary viewing positions at either end. The plan of the house manages to conform to the exterior conditions whilst still maximising any natural light through roof lights along the length of the house, leading the occupant towards the river.

This simple, yet astute home becomes light on the land, not only through the application of stilts detaching form from site, but visually through the conscious regard of its contextual environment.

All information courtesy of Ben Adams Architects
(Ben Adams Architects, 2011)

Relation to Design.

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Fig 2.06 .
House on the River Thames, Ben Adams Architecture, 2011

- | | | |
|---|--|---|
| + | Respect of contextual environment, both physically and visually | + |
| + | Stilted construction in response to inundation hazard | + |
| + | Challenges of site highlighted within design features | + |
| + | Sensitive site leading to sensitive design | + |
| + | Simple, essential design axiom | + |

Precedent Study 02.

Black House
George & Yvonne Hilgeholt
Nelson, New Zealand

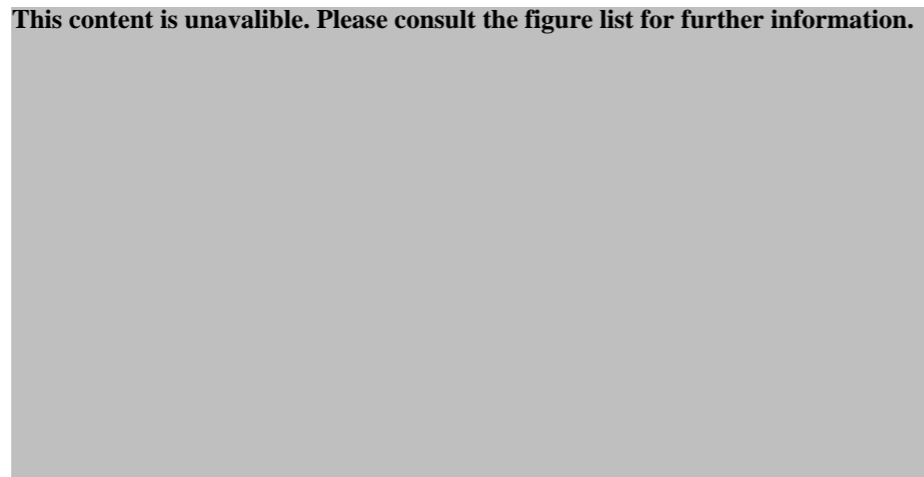


Fig 2.07 .
Black House elevated above the estuary.

Situated on a delicate estuary between Nelson and Motueka, the 'Black House' by George Hilgeholt serves as a successful exemplar of how to apply affordable and sustainable design techniques to a vulnerable site.

The major threat to the site is inundation due to sea level rise over the next century. Amazingly, Hilgeholt addresses this obstacle by highlighting it. The home is raised on an impressive set of 90 exposed timber posts, allowing it to sit well above the high tide line and out of any immediate exposure to the hazard of water. The posts themselves were rammed and vibrated into the softer estuary ground, a technique that required no removal of earth, proving faster, more sustainable and more cost

effective than traditional methods. This technique also resulted in the compaction of the soil around the poles ensuring added strength to the foundation supports.

Even with the stilts, the unpredictable nature of global warming and sea level rise means that the building may eventually still be in danger of damage, and Hilgeholt acknowledged this by designing for impermanence. The three main pods of the building were all extensively designed so if need be, they could be craned onto the back of a truck and relocated.

With the fragile nature of the estuary's ecosystem, the safe management of the sewage system and waste water disposal

was a crucial consideration that had to adhere to the morals of the entire build. To combat any opportunity for the waste to enter the water table, the entire sewage system was elevated on a sand bank, fitted with an eco-friendly, gravity fed scheme that requires no power and minimal maintenance, needing only be cleaned every three to five years.

The innovative design transforms a seemingly undesirable and complicated site into an idealistic platform for a beautiful home, it becomes an exemplar of how any challenge of site can be re-established and exploited as an opportunity to develop into one of the most astonishing feature of the design.

Relation to Design.

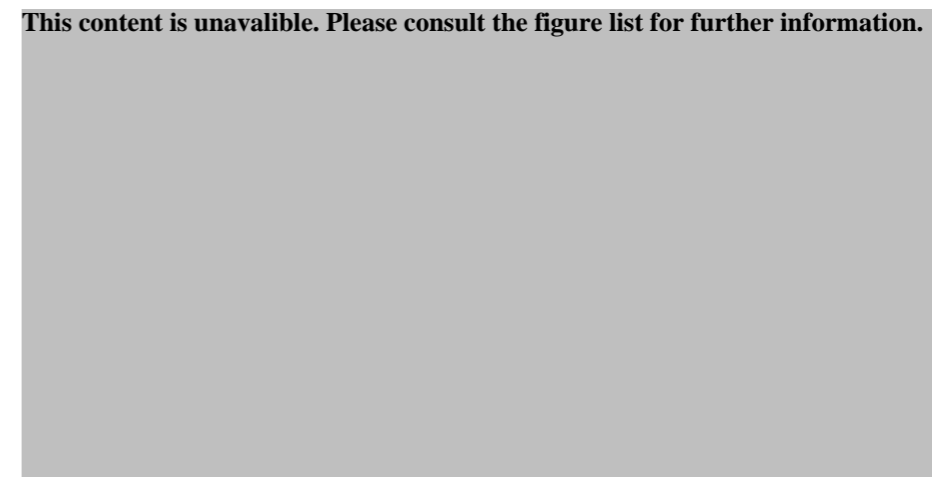
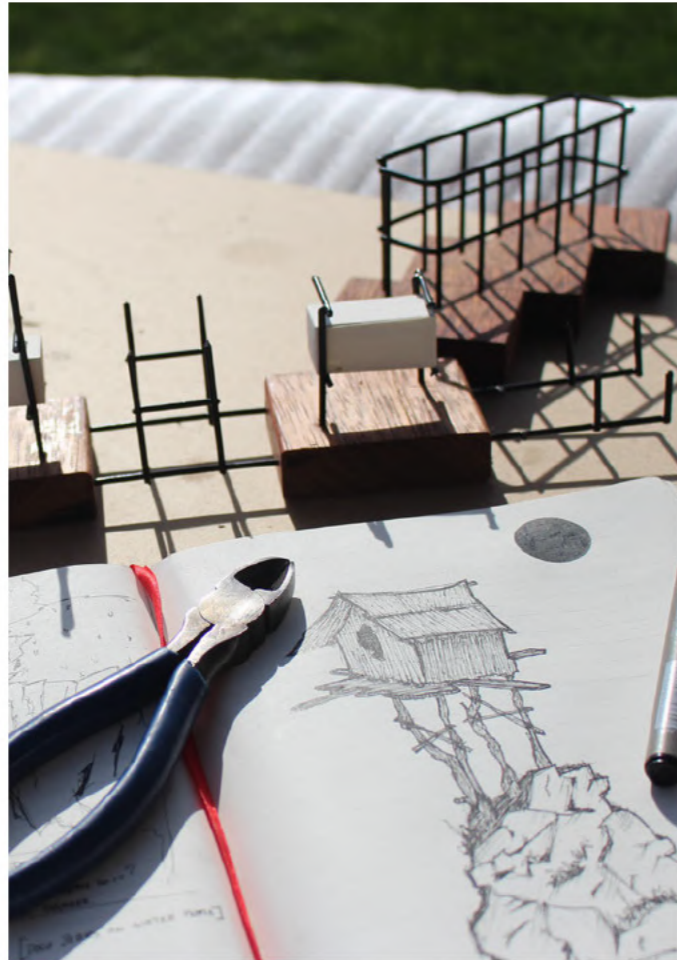


Fig 2.08 .
Three separate buildings make up the Black House.

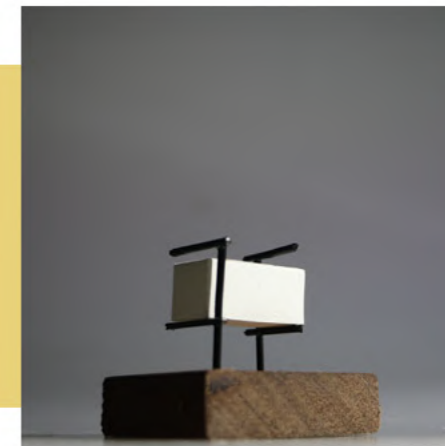
- | | | |
|---|---|---|
| + | <i>New Zealand example of stilted construction on vulnerable territory</i> | + |
| + | <i>Emphasis on designing to the requirements of site</i> | + |
| + | <i>Adapting weaknesses into opportunities</i> | + |
| + | <i>Carefully thought out infrastructure</i> | + |
| + | <i>Sustainable and affordable design</i> | + |
| + | <i>Light on the land</i> | + |
-



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{02}



{03}

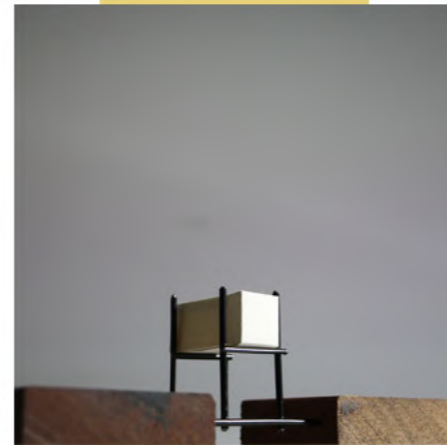
Design Experiments. 01

the simple stilt

{04}



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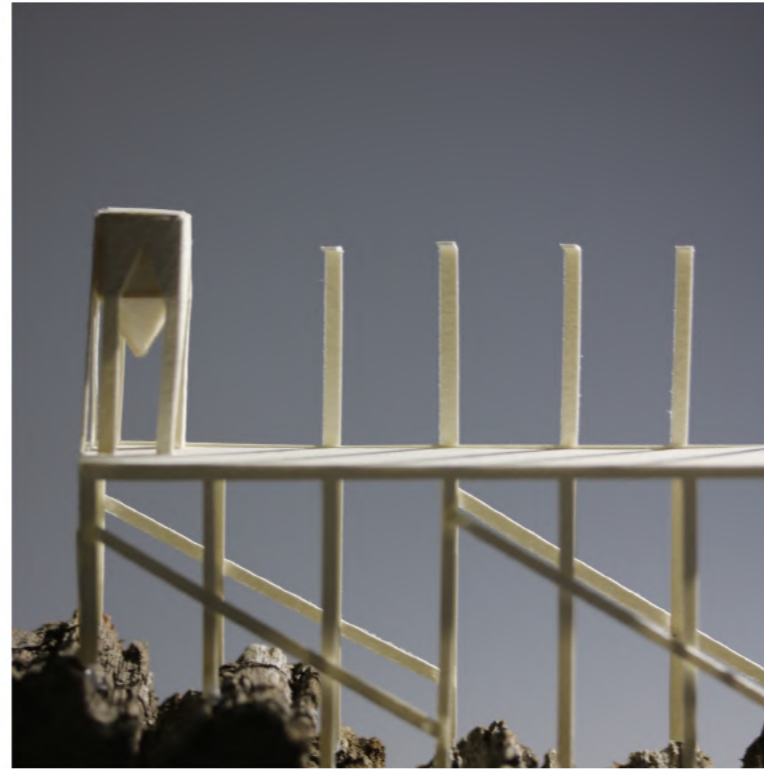


A series of sketch models exploring the relationship between the vertical and horizontal elements of the simple tilted form, and how many unique configurations can be implimented with a restricted structural form. Especially looking at the effect that segregating a designed intervention from territory can have in regards to site, structure and building.





{01}



{02}

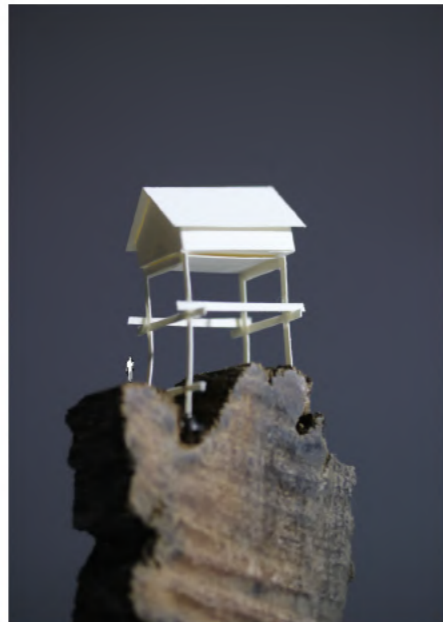


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Design Experiments. 02

the relationship of **habitat** and **territory**.

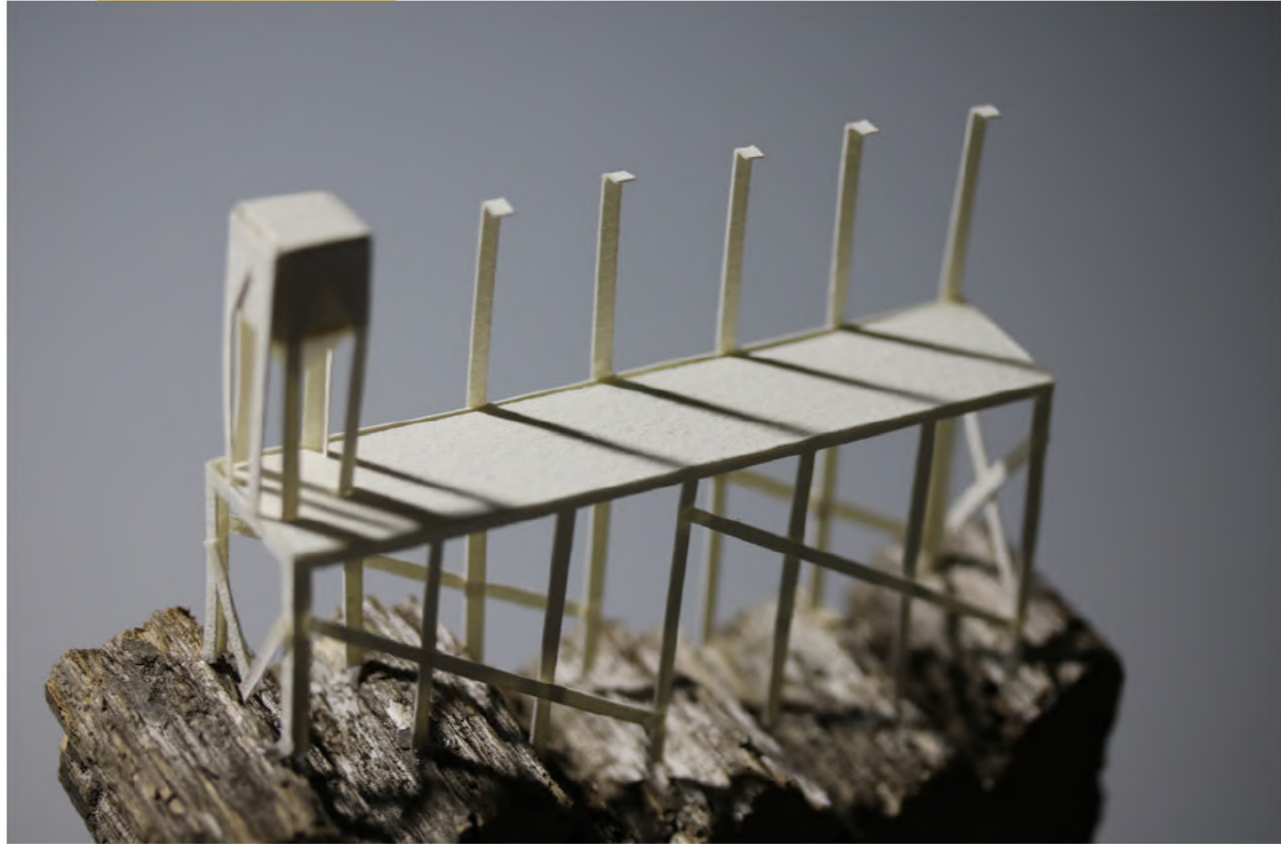
Vulnerability.



{01}



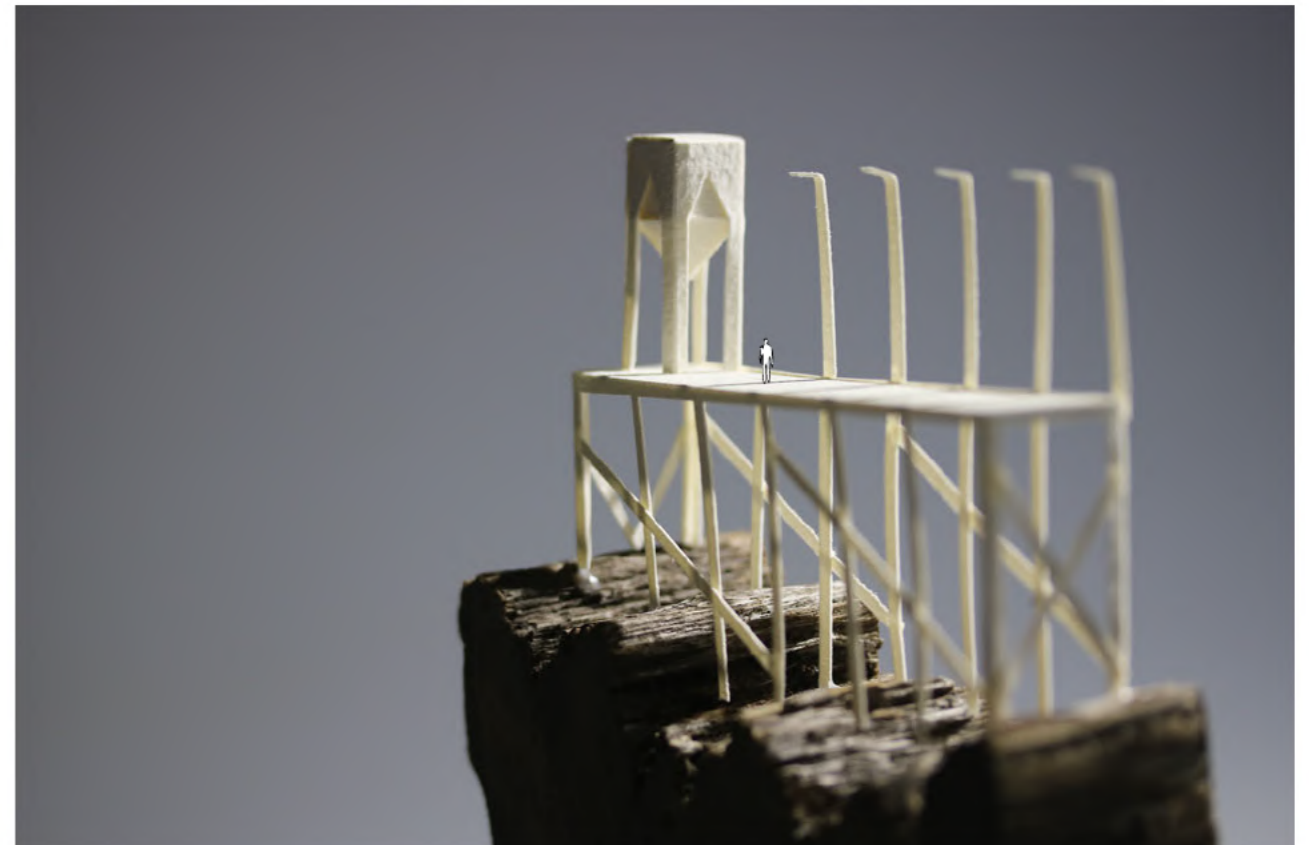
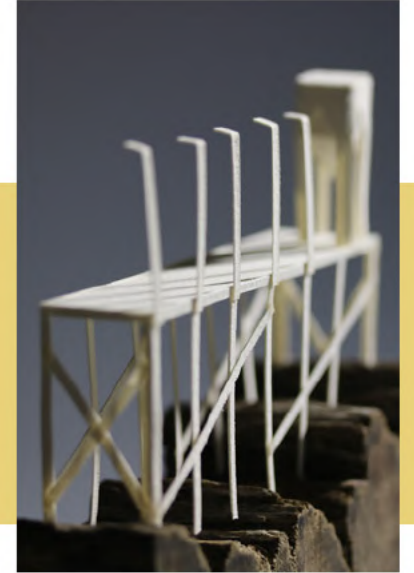
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“What could architects do to turn these instant cities into affirmations of the human spirit? Architecture is about planning. How can architects plan for the unplanned, for the unpredictable? Exactly...”

{Lebbeus Woods}

{02}



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{03}

Territories of Vulnerability.



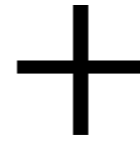
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THE SAYING OF THINGS.

introduction to site



The Community.

haumoana region

“A work of architecture does not exist in a vacuum, but in the world of things and human beings, and reveals this world as what it is. Thus it helps man to dwell poetically. Man dwells poetically when he is able to ‘listen’ to the saying of things, and when he is capable of setting what he apprehends into work by the means of the language of architecture.”

The Haumoana coastline is a quintessential coastal New Zealand community, it is a vibrant and social region, forging a reputation as a mecca for creative arts. Well known throughout Hawkes Bay for its beautiful beaches, winery’s and surfing spots, Haumoana is a common weekenders spot for locals and is often buzzing with activity.

With a total of roughly 2,256 permanent residents, the village is home to a school, many varying artists studios, a general store and a Presbyterian church, any needs beyond what these cater for are easily obtained, with Hastings city only 10km away.

The region is part of the Heretaunga Plains and as such, predominantly

comprises of low lying flat land, but is in close proximity to the large hills of Cape Kidnappers to the southwest. It is part of three sister communities along the same stretch of Hawkes Bay coastline, the other two being Te Awanga and Clifton, both also incredibly susceptible to the highlighted coastal hazards.

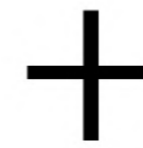
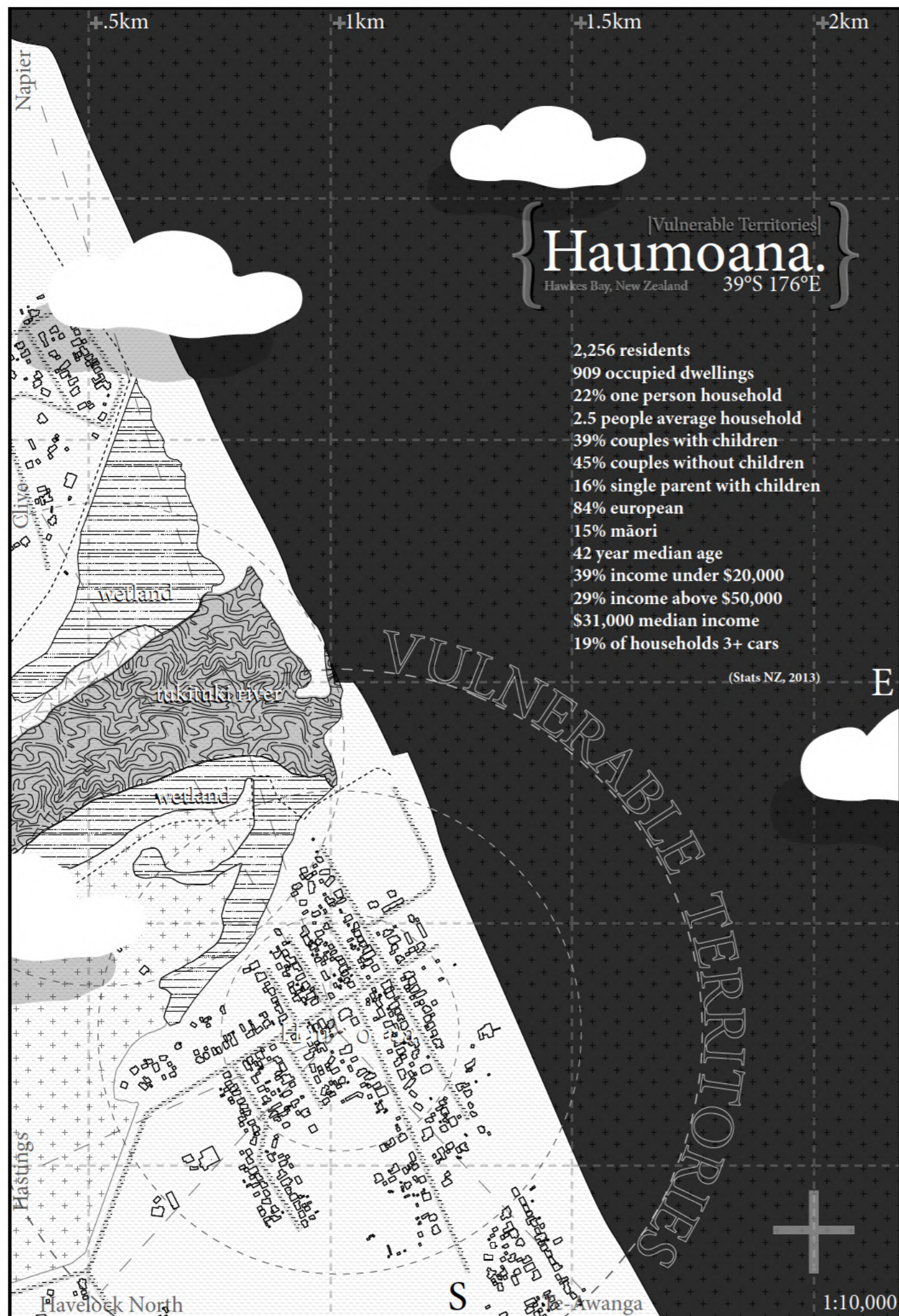
The people of the Haumaona region, being encouraged towards the method of managed retreat, would immensely benefit from an adaptive approach to coastal habitation that allows them to continue to remain in their cherished community.

As one of the main design principles is to be light on the land, the intention is to not interfere

with the natural processes of the environment, because of this, the selection of site is not restricted by stability of location. The project welcomes a region that is close to the Haumoana community, but notably exposed to the expressed coastal hazards.

By selecting a potentially more difficult site based on these conditions, the intervention will be forced to be over designed, ensuring that the process can be potentially replicated in similar regions around New Zealand.

Throughout this chapter the Haumoana region will be further studied to find the perfect site for the design process to begin.



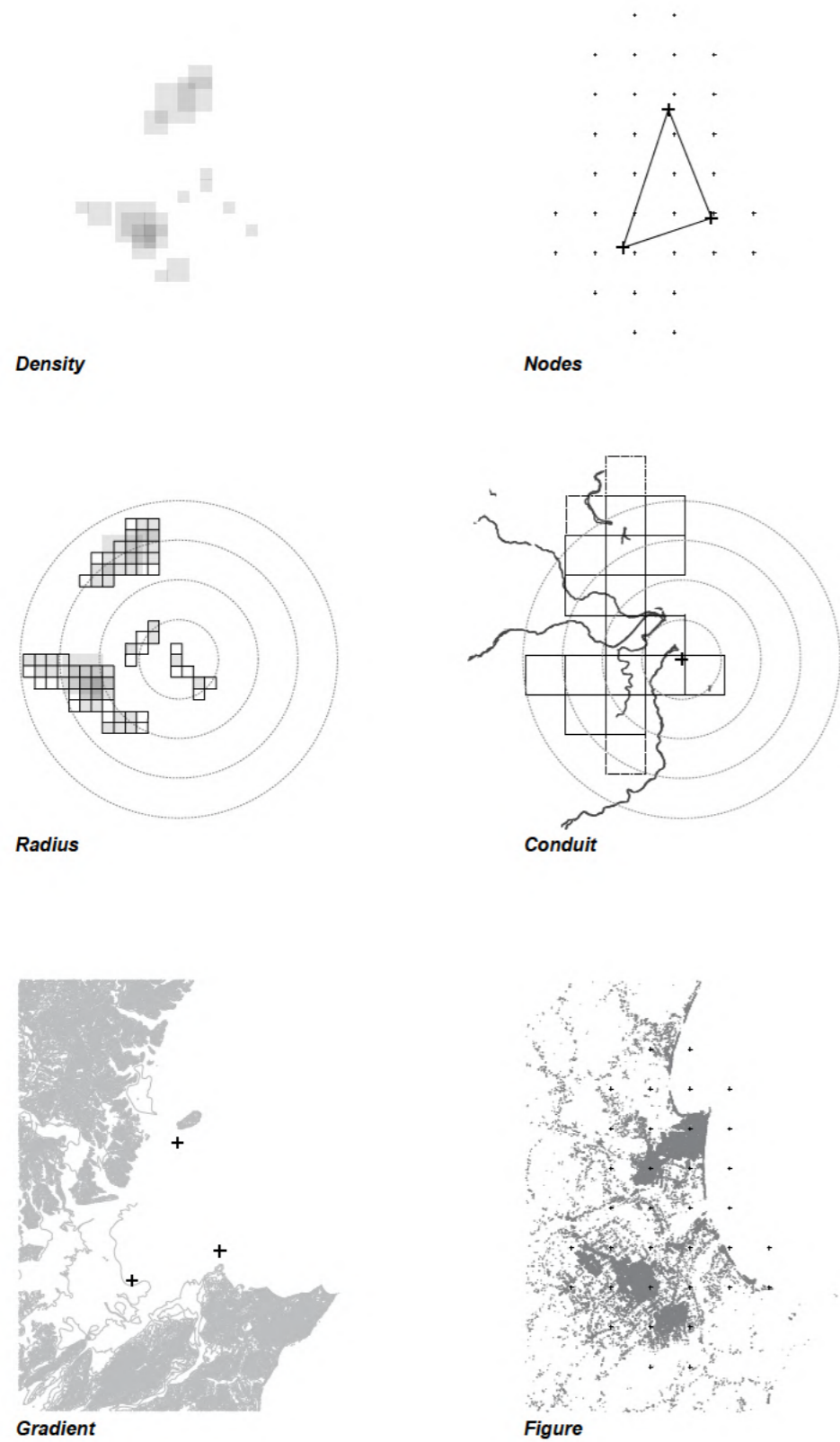
Architypes.



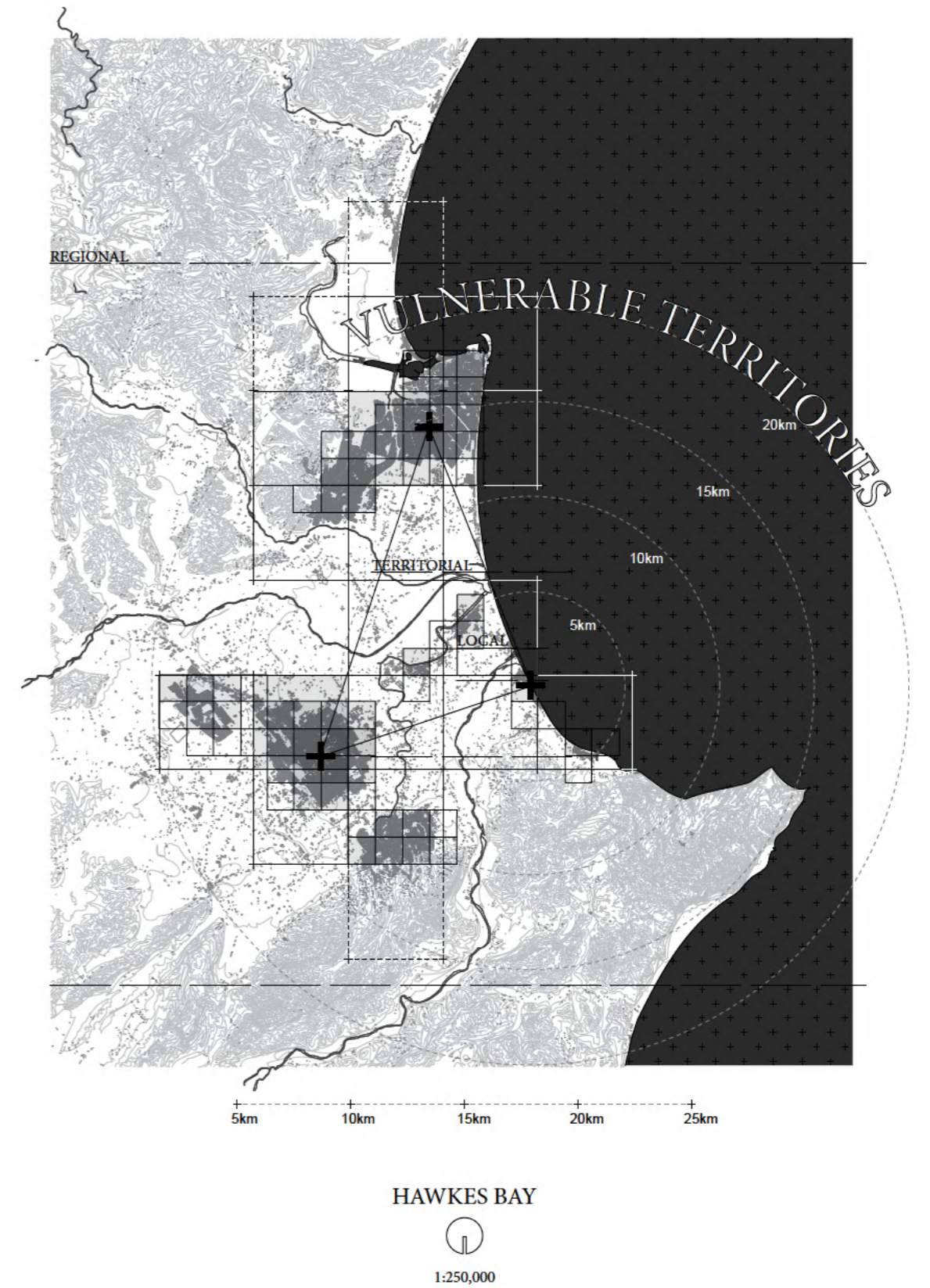
Haumoana exhibits its relaxed coastal atmosphere throughout its built environment, with the majority of dwellings being modest homes of simple construction, surrounded by lush tropical plantings. The most celebrated houses are those that encapsulate the fundamentals of the humble kiwi bach.

Regional Conditions.

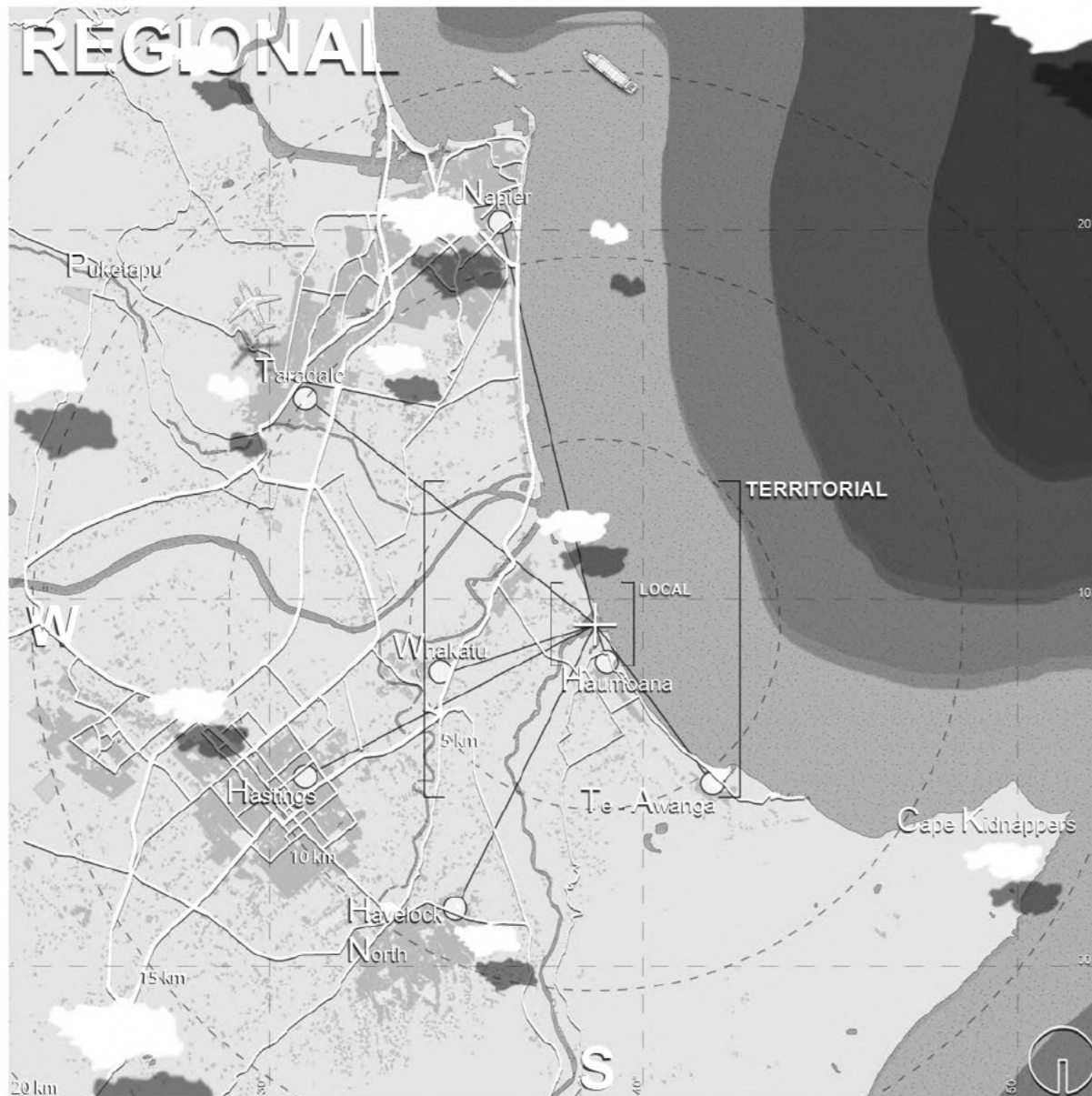
hawkes bay



Region Extent.

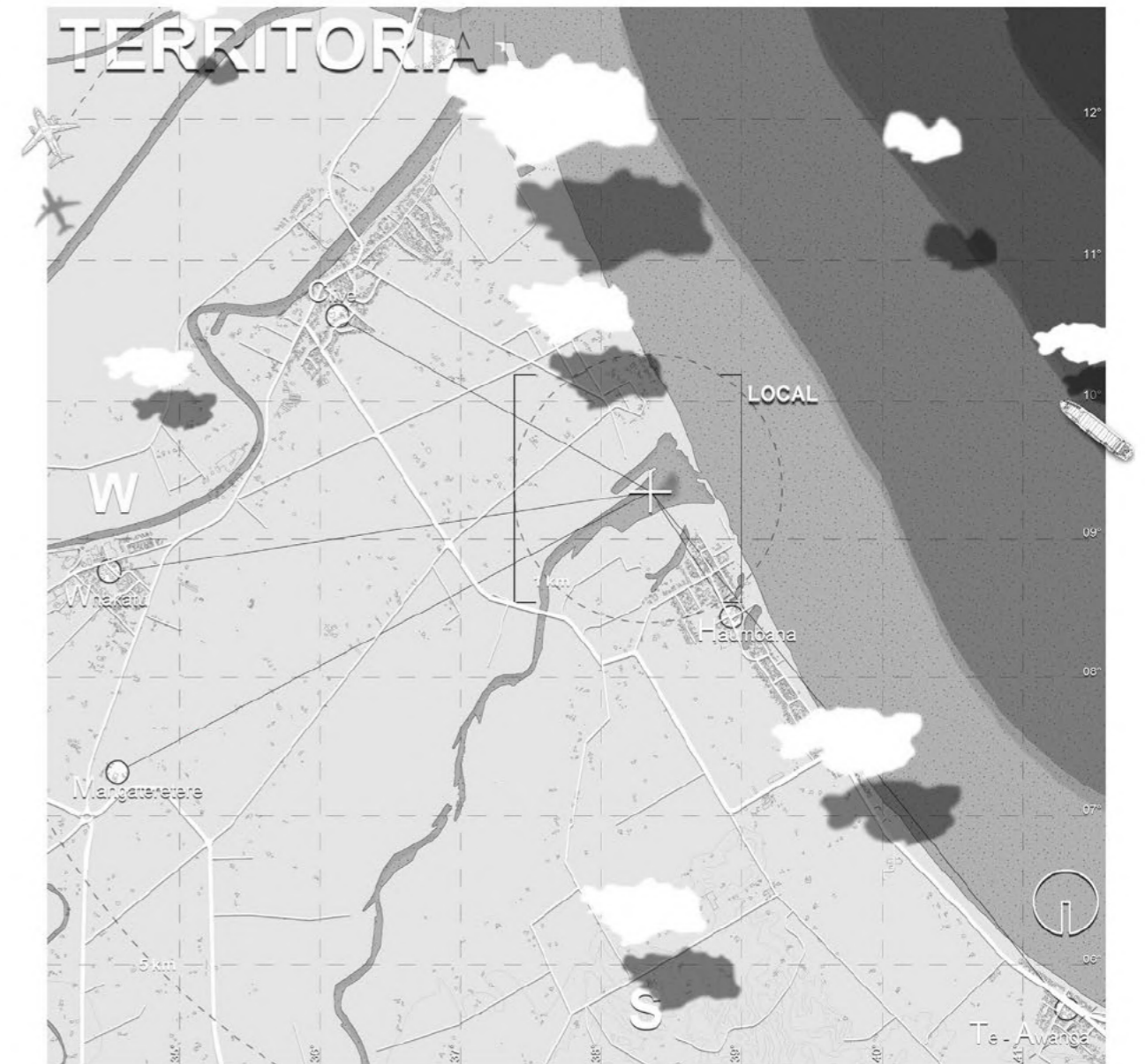


Regional Extent.



Hawkes Bay.

Territorial Extent.

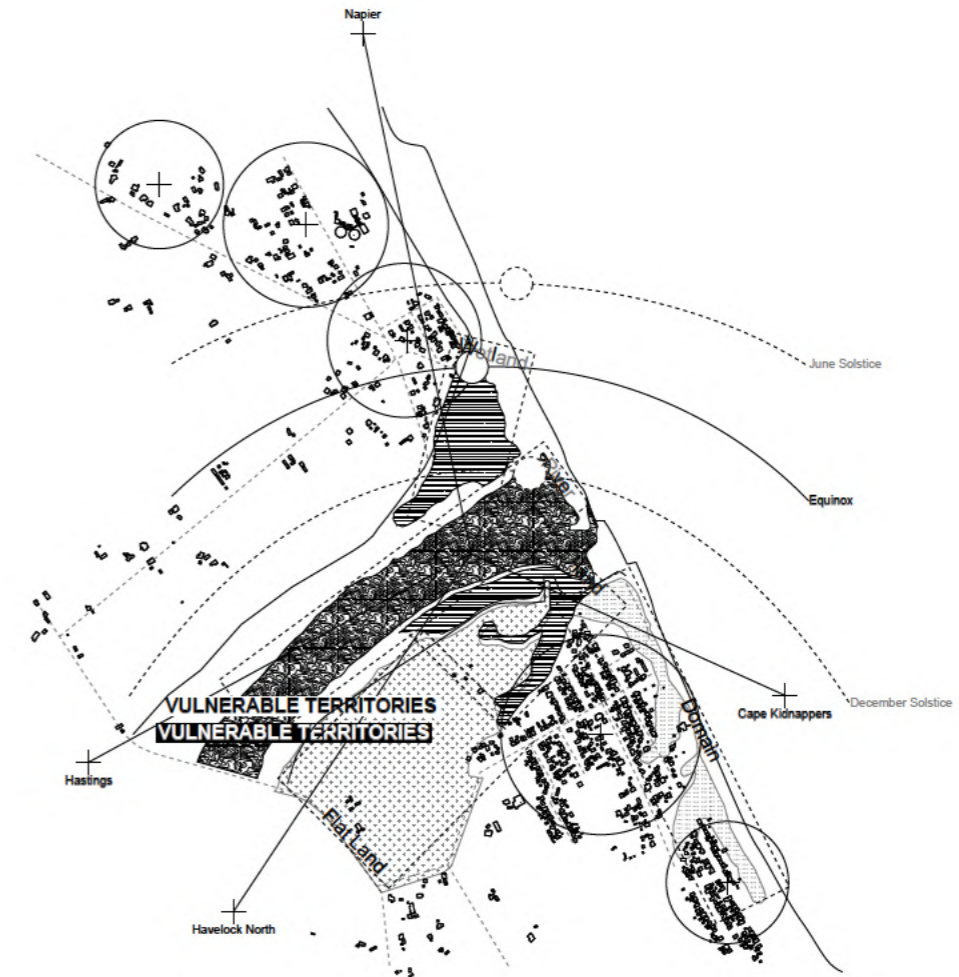


Haumoana.

Local Extent.



Tukituki River.



The Legend of the River.

For Māori, the connection of people and water is a basic tenet, when Māori meet for the first time, each is asked 'Nō wai koe?' (Where are you from? From where do your waters flow?). The Tukituki awa (river) has long been essential to the different hapū (tribal clan) that have resided along its banks, serving as a highway that interconnects varying whānau with each other along this 'river of villages' (HBRC, 2012, p. 14).

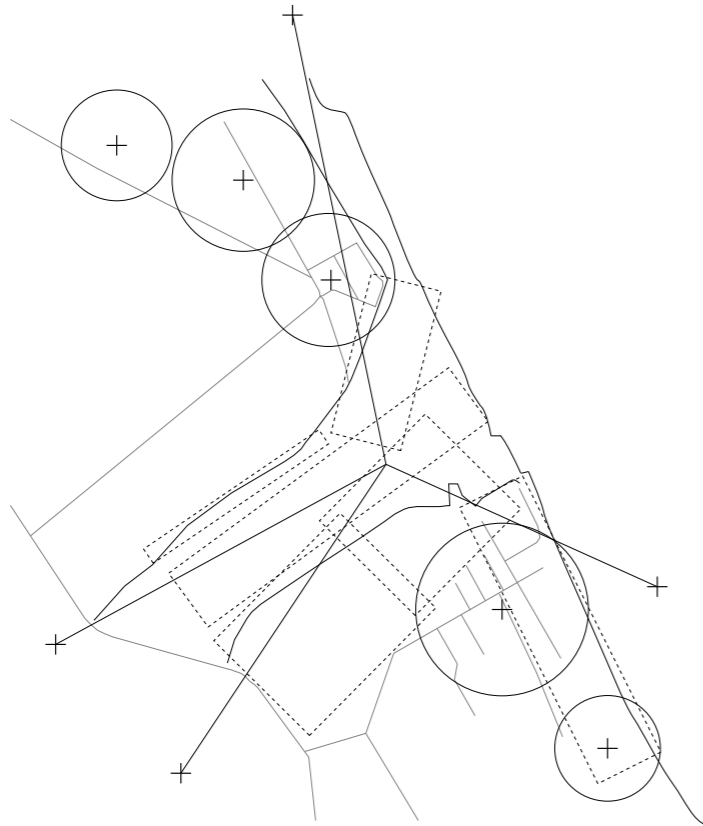
The river originates from the Ruahine ranges and flows over the Ruataniwha plains before wandering northeast to the mouth of Waipureku (the meeting of waters), eventually flowing out into Te Moananui a Kiwa, the great ocean (HBRC, 2012, p. 14).

According to legend, there was once a large lake that covered the Ruataniwha plains, this lake was the lair of two enormous taniwha.

One day a young boy fell from a cliff into the lake, the taniwha fought a vicious quarrel between them as to who would get this appetising food. The wild thrashing of their tails in this fight is said to have cut through the eastern hills and the lake gushed out, forming the Waipawa and Tukituki rivers of today. The name Tukituki means "to demolish" and is thought to refer to the destruction of the lake mentioned in the story (Grant-Taylor, 1996).

Tukituki River Mouth.

site selection



The Tukituki river mouth is a territory of vitality, it is a central hub where humans and nature can occupy space mutualistically without interference.

The mouth of the river itself is surrounded by curious natural features. Over time, the forces of the river and Pacific Ocean pushing against one another has created a soft gravel barrier segregating the gentle flowing water, and the powerful ocean surge. With this barrier in place, the mouth of the river slows down, seeping over the land and creating the estuary plains on the northern and southern edges of the river.

This barrier and estuary system ensures that the river mouth remains a mild coastal environment even though it is adjacent to a turbulent sea.

Because of this, the river mouth is one of the most stable regions along the coast. A built intervention would benefit being located at this river mouth as while it epitomises coastal living, it remains protected from the immediate hazards of the sea.

It is for these reasons that the river mouth and the surrounding region has been chosen as the optimum location to explore a potential precedent model of coastal New Zealand habitation.

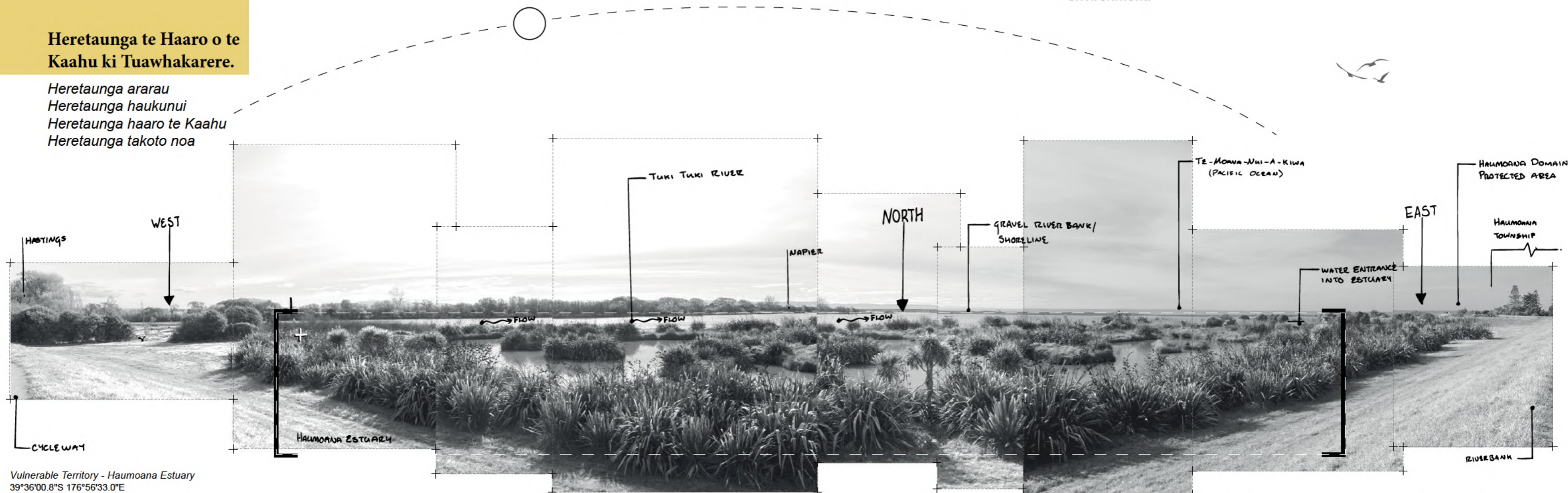
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Fig 3.01. Tukituki Rivermouth.

The Estuary.

Heretaunga te Haaro o te Kaahu ki Tuawhakarere.

*Heretaunga ararau
Heretaunga haukunui
Heretaunga haaro te Kaahu
Heretaunga takoto noa*



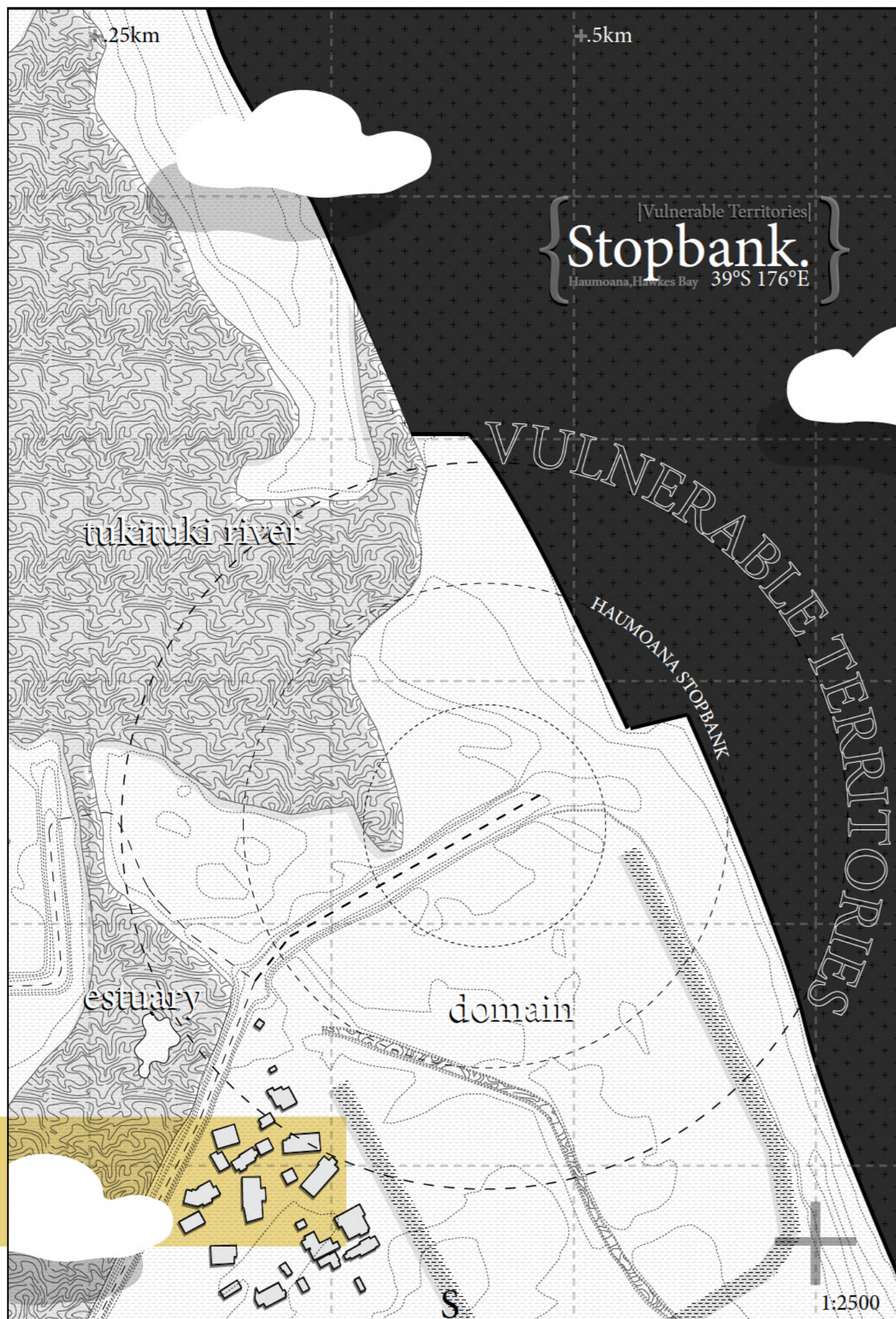
Vulnerable Territory - Haumoana Estuary
39°36'00.8"S 176°56'33.0"E

The Tukituki estuary is a biodiversity hotspot, providing essential habitat to the local fish, birds and spawning whitebait. Further cherished by the Haumoana community, the estuary provides a pristine natural system for the public to enjoy, with walking and cycling trails weaving around the perimeter elevated on a stopbank to allow the public to fully observe the thriving environment.

Under the Hawkes Bay Regional Coastal Plan (HBRC, 2014, p. 197), the estuary is recognised as a significant area and is recommended for protection under the Department of Conservation's Protected Natural Areas Program. For these reasons this body of work will avoid any undertaking that would diminish the value of the estuary and its natural processes.

See Beyond the Horizon.

Heretaunga of a hundred pathways
Heretaunga of the life-giving waters
Heretaunga - the true beauty of
which can only be seen through the
eyes of the hawk



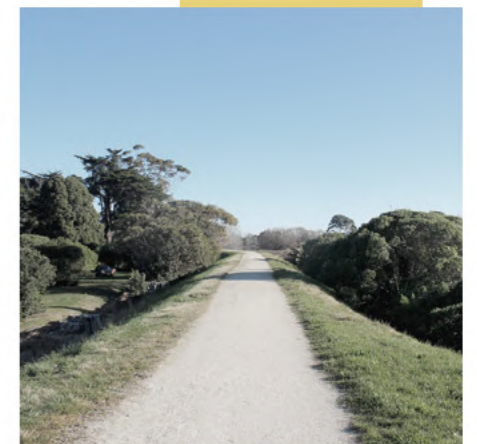
The Stopbank.

The stopbank of focus lies on the southern boundary of the Tukituki River, and the northern edge of the Haumoana community. While the bank runs a great length along the river, this proposal is primarily interested in the eastern most end of the bank, where the bank meets the ocean.

Designed to separate the occasional flooding hazard of the river from the nearby houses of the Haumoana community, the four meter high stopbank is one of the most sympathetic flooding hazard mitigation methods. In its simple construction of mounded earth, the stopbank allows for vegetation to grow around it, aesthetically and physically melding the bank into the surrounding landscape compassionately.

Due to its proximity to the ocean and river, the stopbank is heavily exposed to the highlighted hazards associated with sea level rise, but retains the advantage of inherent strength through shear mass and calculated design when compared to the surrounding environment of wetland, low ground and unprotected housing.

Atop the stopbank is a limestone path that serves as a walking and cycling trail utilized by the public in a network of connected paths that span the majority of the Heretaunga Plains. Through this, the simple path is a tool that connects the stopbank and the coastline to the entirety of the populous of Hawke's Bay, often serving as a destination for weekend recreational activities for people from all around the region.



An Artificial Natural.

{Man and Nature}

On the one hand, the stopbank represents the tangible meeting point between man and nature, it allows for man to occupy land a great deal closer to the desirable landscapes while allowing the natural proceedings of the river to take place. Stopbanks are typically situated a fair distance away from the extent of the river itself, as to only interfere with its natural process during a flooding event.

Although it is a man-made artificial barrier, the presence of the stopbank can be perceived as almost natural due to the simplicity of its form and the organic relationship it seems to have with the surrounding environment, its design being sympathetic to the natural environment by replicating the natural features and passive defence of standard riverbanks.

{Man and Nature}

.VS.

{Man}and{Nature}

On the other hand however, it can also be perceived as embodying the separation of man and nature, the large mass acts as a physical and visual obstruction that disconnects the Haumoana community from the Tukituki River. Whilst physically protecting both, it can also symbolically divide the two entities, acting as a boundary that dictates what activities are appropriate either side.

The stopbank provides a distinct separation line, north of the bank is almost completely natural with a diverse range of native life and natural processes that the river and its surrounding area accommodate for. Whereas south of the bank is almost completely manipulated by man, with housing and infrastructure providing the dominant features of the landscape

Site Selection.



The Haumoana / Tukituki stopbank is a territory where man and nature adjoin, acting both as a tool of separation and unity. While it stands between the community and the river, it simultaneously brings the two closer together.

Considering these conditions, the stopbank presents itself as the optimal location to explore continued coastal habitation in the path of the highlighted

hazards, where man, nature, and architecture can potentially co-habit place harmoniously.

This thesis aims to use the stop bank as a means to further obscure the boundary of man and nature by implementing a designed architectural intervention that portrays a mutualistic relationship between the artificial and the natural.

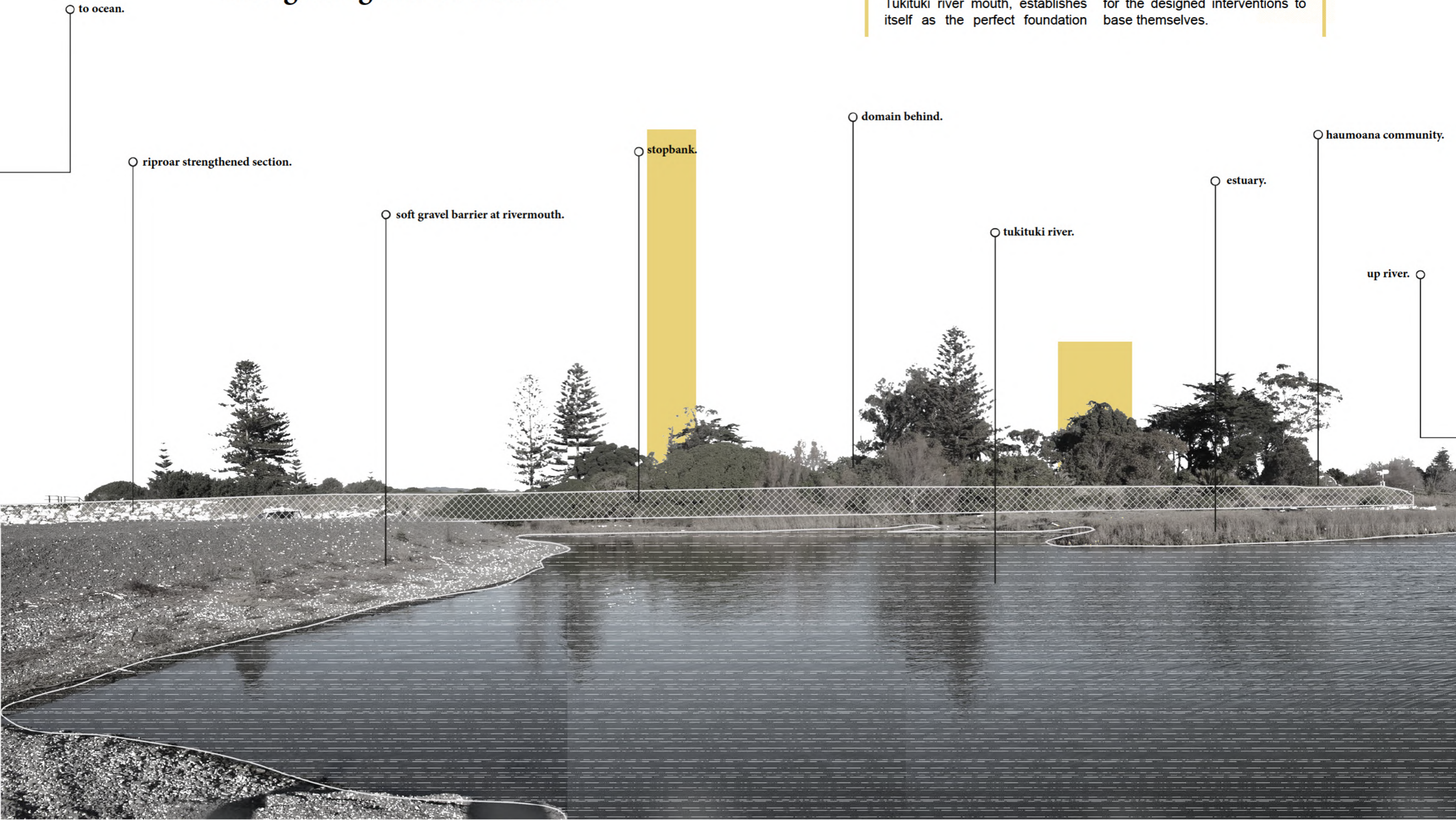


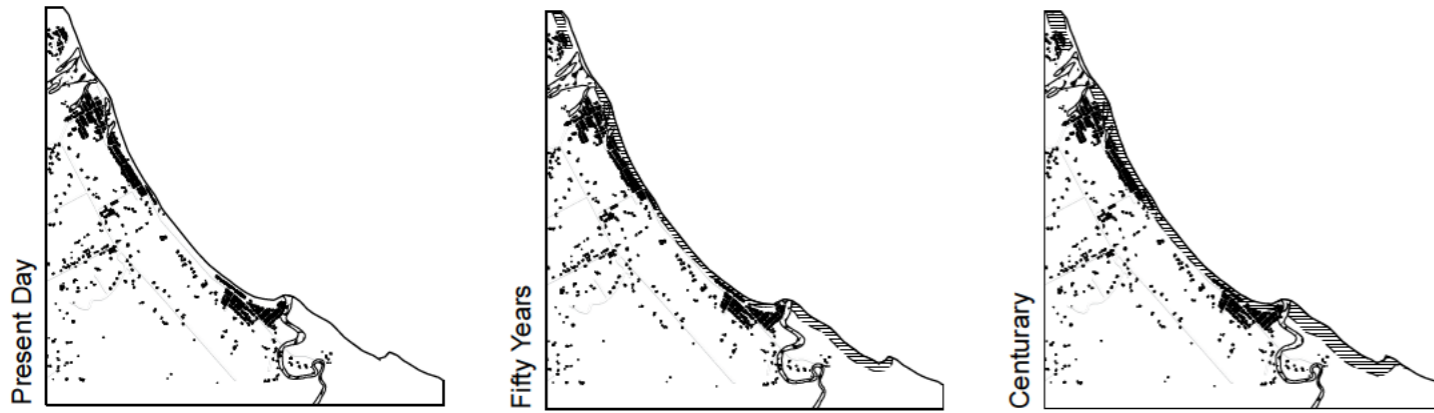
The Spine. — Intergrating the Riverbank.

The stopbank, constructed with strength in mind, provides the perfect anchor point for the community design to branch out of. Running perpendicular to the ocean, and also protected by the soft gravel barrier beach at the Tukituki river mouth, establishes itself as the perfect foundation

for the continuation of coastal habitation.

This project will exploit the inherent strength that the stopbank provides against the threat of rising water by adopting it as an anchor point for the designed interventions to base themselves.





Erosion.

Erosion is a gradual, yet persistent threat to the site. It can be detrimental to the land on which it effects, destroying anything in its path and permanently weakening any human or natural defences. The main two being the stopbank and gravel barrier beach.

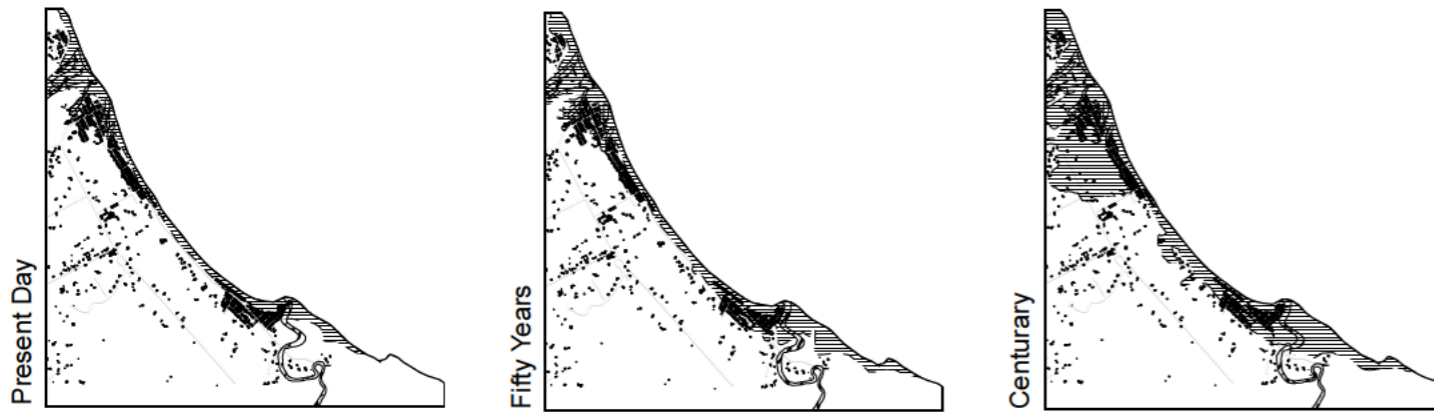
The bank, a man made flood defence, is fortunate enough to be perpendicular to the churning waves of the Pacific Ocean. For this reason, the erosion will eat away at it lengthways, slowly as opposed to the speed it would be if it was parallel. The end of the bank has already been strengthened temporarily resist the threat of erosion, a technique that can be implemented along the entire stretch of bank.

The gravel barrier beach is a much easier landmass for the ocean to erode, with the soft gravel freely moving under the power of the ocean. However with the opposing force of the river, there will essentially always be a gravel barrier at the river mouth, but the mouth itself has already begun to move up stream.

This means there will always be an accessible, and fairly strong landmass alongside the bank to assist in protecting it from the ocean, but once the gravel barrier moves along the length of the bank, any original stopbank exposed to the waves will quickly deteriorate.

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Erosion.



Innundation.

Major flooding of the Tukituki River occurs roughly twice every year, and at its peak, waters can rise substantially, even flowing around the tip of the bank and seeping back towards the Haumoana community. While the stopbank has been specifically engineered with these elevated waters in mind, flooding is considered temporary hazard, with the threat from the water always expected to recede after a period of time.

Even though the stopbank is designed defend against water, it is not anticipated this threat would be present for an extended period of time as it has potential to be in the predicted event of sea level rise.

Because of this, the bank is even more susceptible to threats of failure. To combat this, an initial strengthening process must be undertaken before any of the design can be feasibly implemented.

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Innundation.

Current Threats.

the unprotected stopbank



Underflow.

When water permeates the sand deposits underneath the stopbank, and rises to the surface on the other side. With the expected future of the Tukituki stopbank being completely surrounded by water, the largest issue with underflow is the potential damage to the integrity of the internal bank structure.

Overtopping.

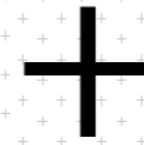
When water levels rise higher than the designed intention, spilling over the top of the bank. Even with the projected sea level rise of 1m, the Tukituki stop banks existing height of 4m is substantial enough to deter overtopping.

Slumping.

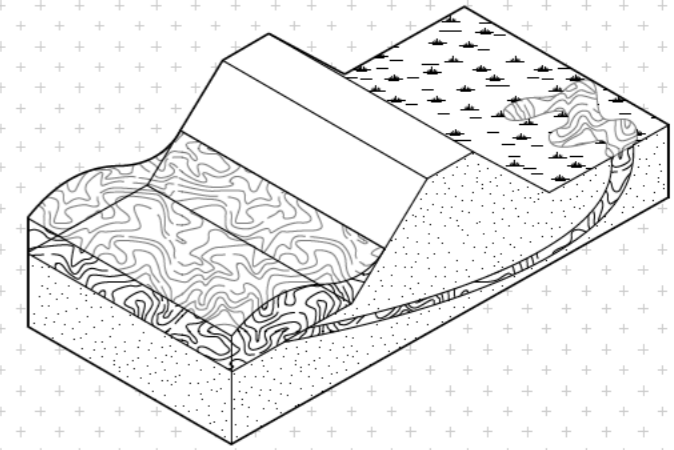
When the weight of the contained water pushes over the top of a stopbank by scouring out a weak point. If the projected level of water reaches within 1m of the top of the bank, slumping could prove an enormous issue, especially when water is expected to reside both sides of the bank.

Toe Scour.

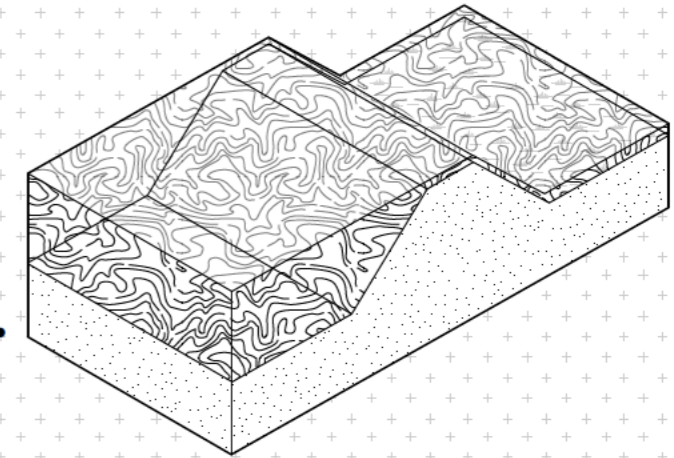
Wave action erodes away the toe section of the stopbank, causing slipping infill from the top and resulting in the integrity of the bank to be weakened. This is the issue of most concern for the Tukituki stopbank as with the ocean rising comes a substantial threat from waves.



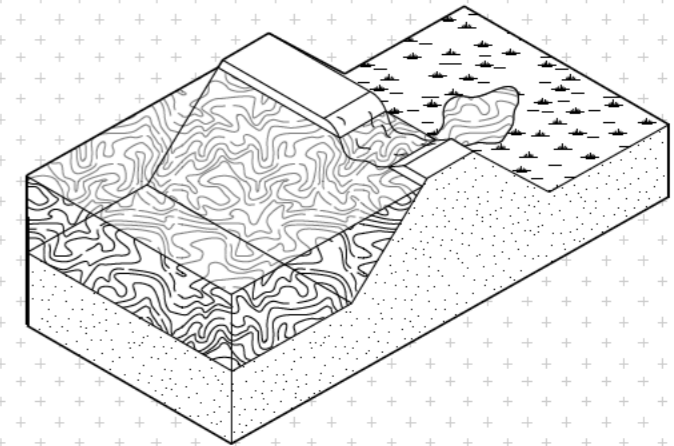
Underflow.



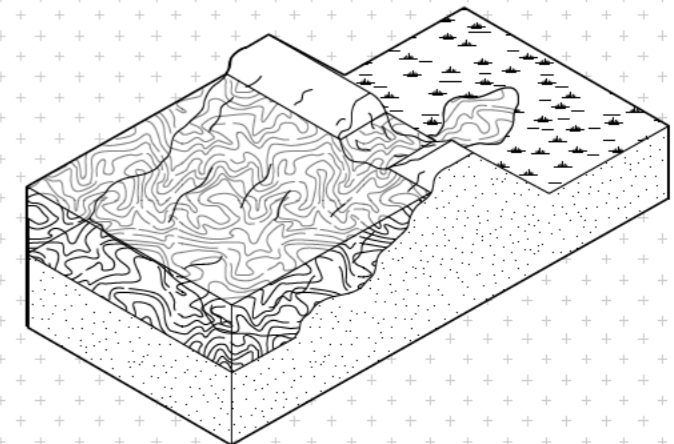
Overtopping.



Slumping.



Toe Scour.



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Preliminary Design.

the **protected** stopbank



Tip of the Haumoana / Tukituki stopbank. Image by Author

The primary concern for the Tukituki stopbank in relation to structural failure is Toe Scour, the degradation of the base of the bank leading to failures along the rest of the bank. As such, the stopbank must be strengthened before design can be considered. The most common methods of strengthening that could be applied to the Tukituki stopbank include:

Gabion baskets that are designed as flexible gravity barriers to resist scour (**fig 3.03**). However the baskets are ineffective in coastal environments due to the corrosion of the tie wires or the abrasion from gravel riverbeds, resulting in the baskets contents unravelling (Britton, 2014, p. 47)

Concrete barriers or **Concrete toe armour** that is placed close together on a bedding layer (**fig 3.40**). The interlocked mass provides sufficient resit to uplift, but this lack of permeability can lead to pore pressure build up in the bank leading to slope instability, additionally the surfaces often crack and require continued maintenance (Britton, 2014, p. 48).

However, the most appropriate intervention for the Tukituki stopbank is to implement a Riprap boulder system along the toe of the bank on either side (**fig 3.02**). Riprap comprises of natural rock laid over a granular filter layer and provides the ideal armour material to protect the toe against scour. The designed intent of Riprap is that the stones provide mass that reinforces the base of the bank,

whilst remaining porous allowing pore pressure to dissipate without causing erosion (Ministry of Environment, Lands and Parks, 2000, p. 3). They are particularly effective in wave environments as the stones act as a natural energy dissipater and the filter layer allows pore pressure to dissipate without causing erosion. Furthermore, the stones act as a flexible revetment that continues to protect the toe even if a scour hole develops, the stones will adjust and fall into said hole, preventing any further damage (Britton, 2014, p. 51).

This method has already been applied to the tip of the bank that is closest to the ocean, and has proven to be an effective defence measure. As such, the Riprap will be continued on both sides of the bank for the length of the designed intervention.

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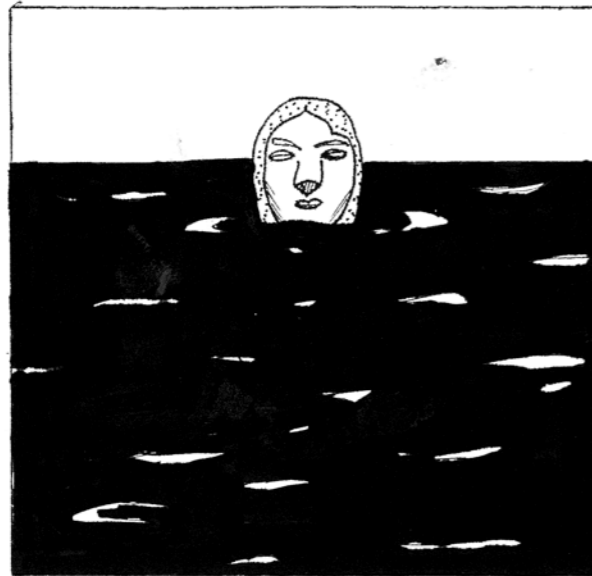
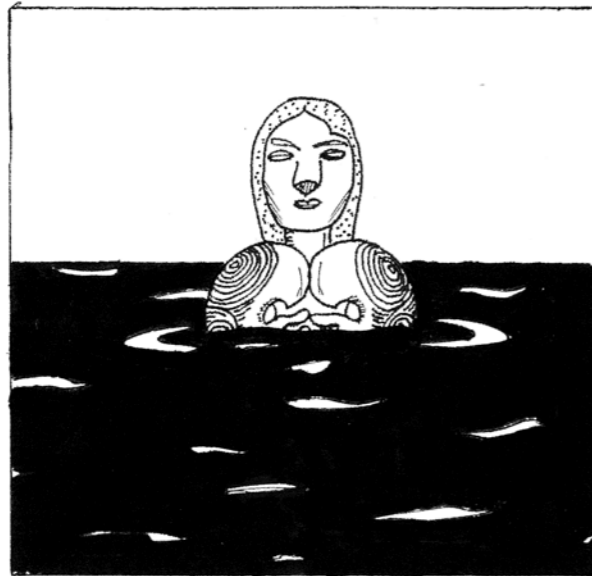
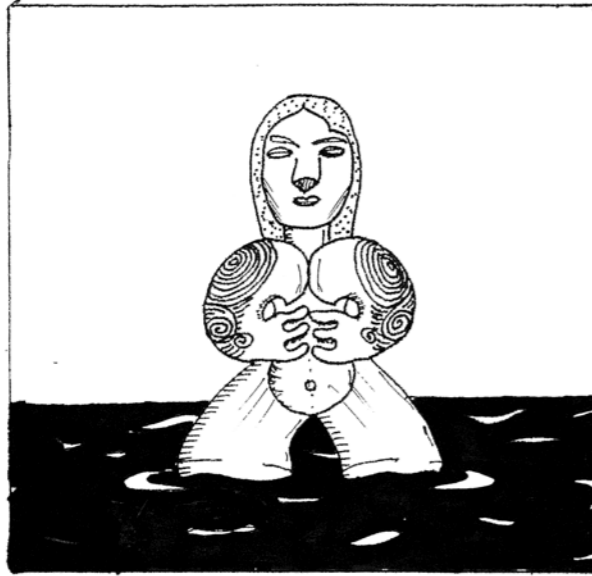
Fig 3.02. Riprap System

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Fig 3.03. Gabion Basket System

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Fig 3.04. Concrete Barrier System



AFFIRMATIONS OF THE HUMAN SPIRIT

design considerations

“...the hastily constructed communities of urban dwellers displaced by catastrophes of both human and natural origin — war, economic disaster, hurricane, and earthquake. After all, where was the role for architects in them? What could architects do to turn these instant cities into affirmations of the human spirit? Architecture is about planning. How can architects plan for the unplanned, for the unpredictable? Exactly....”



Design Considerations.

This chapter explores the preliminary considerations of this design-led research investigation.

It begins with exploring design considerations surrounding both the built and natural environments with particular emphasis on the Proposed Hastings District Plan and the objectives and policies that it outlines.

Alongside these considerations, are the established values of the Haumoana region, documented in a Hawkes Bay Regional Council report (HBRC, 2012, p. 16). The values have been collected and generalised into four easy to understand categories:

Economic Values

- + Long term economic growth
- + Flexibility
- + Employment Opportunities
- + Tourism
- + Reliable water supply

Social Values

- + Drinking water needs
- + Swimming and fishing
- + Passive enjoyment
- + Food gathering
- + Public access
- + Lifestyle

Cultural Values

- + Mauri - the life force
- + Wāhi tapu - scared places
- + Tikanga - protocols
- + Manaakitanga - being good hosts
- + Te Reo - language
- + Taonga - highly prized things
- + Mātauranga Māori - knowledge
- + Mahinga kai - food gathering

Ecological Values

- + Healthy ecosystems, life supporting capacity
- + Biodiversity
- + Native fish habitats
- + Trout habitats
- + Fish passage

Many of these values coincide with the objectives displayed in the District Plan, and will be considered throughout the design process.

The project then briefly explores some existing architectural projects in regard to program, typology and form, highlighting what they demonstrate that this project aspires to draw influence from.

Overall the design aspires to display a mutualistic design, one that benefits both the built and natural environments while accentuating the natural character of Haumoana.

Built Environment.

The first goal of the design is to maintain the residents of the existing community, this means providing a minimum of 10 dwellings to replace those that are deemed essential to be relocated away from the coastline.

Secondly, the design will aim to follow some of the pre-established council objectives highlighted in the Proposed Hastings District Plan, in particular:

“To minimise the adverse effects of developments created by excessive building scale”
(Proposed Hastings District Plan, 2013, Chapter 11.2.3, Policy HTRP5)

&

“Provide for non-residential activities which are compatible in scale, intensity and character within the Haumoana - Te Awanga Residential Zone”
(Proposed Hastings District Plan, 2013, Chapter 11.2.3, Policy HTRP6)

The first policy refers to the existing community's perception of residential amenity, private and open space and outlook. It highlights how the built environment that does not acknowledge its locale can be detrimental to a region such as Haumoana, stripping it of its uniqueness and appeal. This thesis will endeavour to follow the

established dialect of the existing built environment in Haumoana, with particular emphasis on scale and style.

The second policy refers to the social synergy of the region. Haumoana is already home to many arts and craft galleries, winery's and other visitor attractions that contribute to the unique character of the community. With the site already situating itself on a prominent Hawkes Bay beach, and being intended to be at the very end of a very popular weekend cycle trail, the design will attempt to provide a space where the unique character of the community can gather together and be on display to the general public.

Natural Environment.

One of the well-established considerations of this project is to ensure the outcome of design is 'light on the land', this was in direct response to the effect that the traditional method of building on New Zealand's coastal edge has had on the environment. Buildings consisting of heavy concrete foundations and deeply rooted infrastructure have proven harmful to the landscape and have become a troublesome logistics exercise when they are left to the mercy of the tide.

This project aspires to adopt a new approach to the built environment on coastal New Zealand sites, one that strives to:

“Protect the landscape features and character of the Tuki Tuki Special Character Zone by controlling or restricting inappropriate land use activities”
(Proposed Hastings District Plan, 2013, Chapter 5.4.3, Policy TTP2)

&

“Provide for the subdivision of Lifestyle sites in the Tuki Tuki Special Character Zone which maintains the openness of the landscape and the existing low density of housing.”
(Proposed Hastings District Plan, 2013, Chapter 5.4.3, Policy TTP5)

Adverse building practices has the greatest potential to threaten the natural character of the Haumoana region, and with the intent to establish a new community region, the minimization of impact on the surrounding environment is of absolute priority. Nonetheless, one of the most beneficial aspects of the stilted building technique is that it minimises the impact of any potentially adverse construction to just the posts that holds it above the ground, allowing and natural process of the landscape to continue without too much interference.

Programmatic Precedent.

Eco Village.

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Fig 4.01.

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Fig 4.02.

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Fig 4.03.

The ReGen Village is an integrated neighbourhood design that follows a ‘waste-to-resource’ approach to a sustainable community.

With a heavy focus on self sufficiency, the RenGen Village encapsulates a utopian example of the ambitions that this thesis

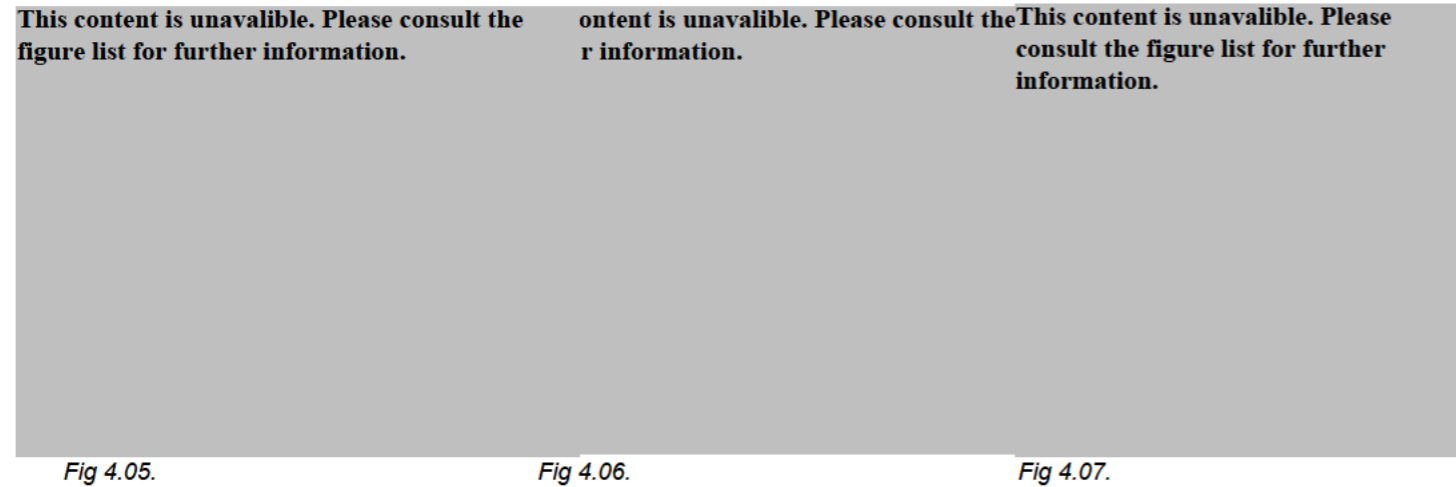
desires to tackle. While the design is not intended to be completely self-sufficient and off the grid like RenGen Village, it does aspire to enforce good practice when it comes to similar programmatic functions. A productive community that has the capibility to produce food and resources.

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Fig 4.04.

Typology Analysis.

A New Zealand Vernacular..



The New Zealand bach is a more than an architectural expression, it is a cultural icon. They are best known as home built weekenders that reject the values of traditional homes, they are uncomplicated, modest dwellings that are honest to their function, setting and materiality (Wood, 2000, p. 44).

For many New Zealanders, they have become a 'site of memory' (Kearns & Collins, 2006, p. 227), a place that is associated with relaxed family holidays, an escape

from the busy day to day life of bigger city living.

Bach's have had such a profound impact on New Zealand society that they have become the kiwi vernacular, with their embedded connection to land and sea, they reflect the humble and content nature that the residents of New Zealand are known around the world for.

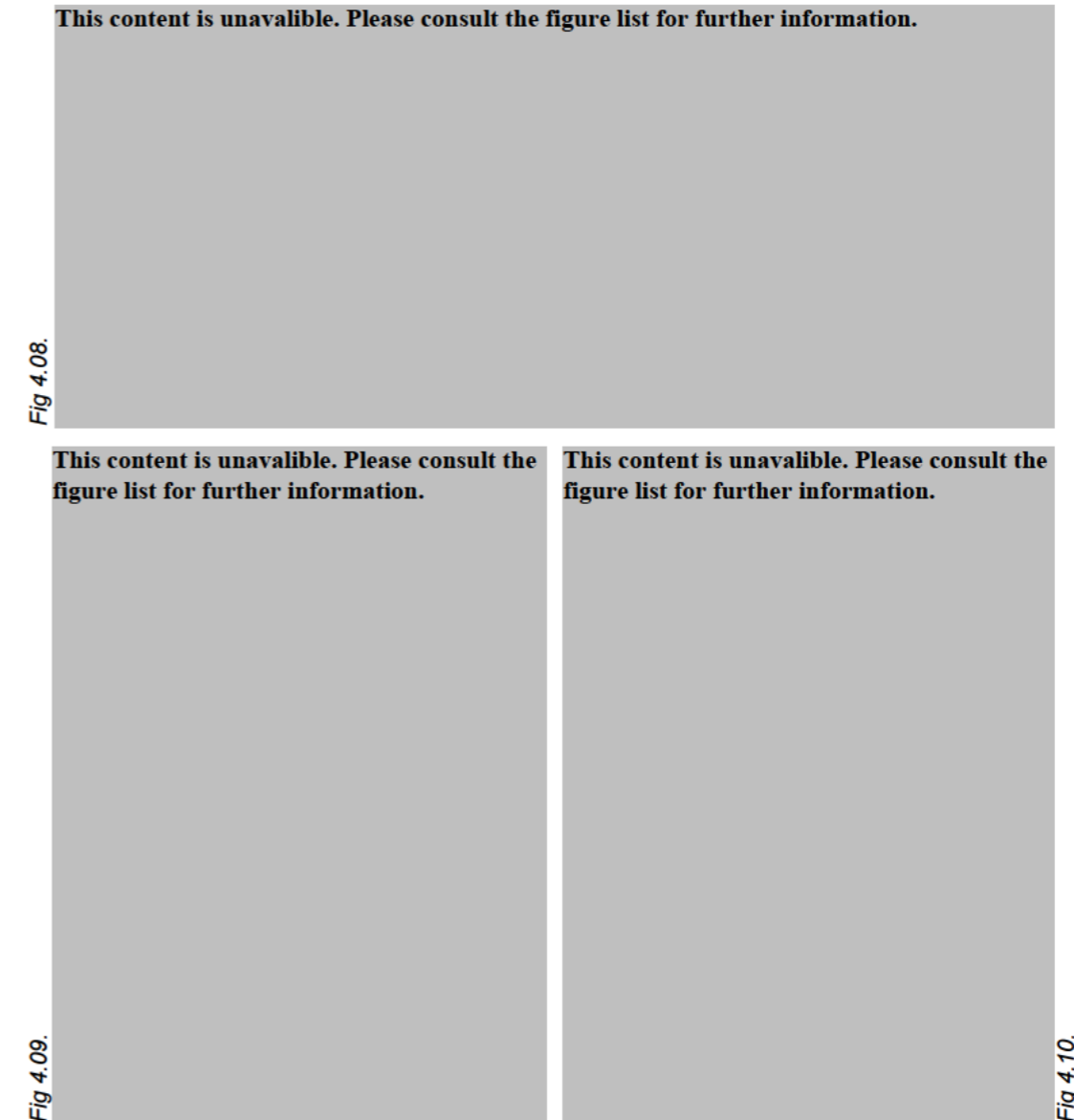
Being a coastal community, much of the built environment in the Haumoana region already reflects

the depiction of the bach and any contemporary addition to the region that diverged from this, would undoubtedly be disputed against by the local community.

For these reasons, this thesis aims to adopt the principles and values of the vernacular bach and transplant them into all aspects of the proposed design.

Modern Precedent.

The Kiwi Bach



Although modern bach's are often much more comfortable than the traditional vernaculars, the underlying principles often remain evident. By combining our modern technologies, building materials and design attitudes with the basic principles that makes the bach such a cultural repository, the modern bach presents itself as the pinnacle of coastal architecture.

As with Crosson Architects 'Hut on Sleds', a design that pays homage to the vernacular bach, but enhances user experience by allowing the luxury's of modern materials. This self-contained, semi permanent design embodies the design intent of this project, with its simple yet powerful presence and its use of honest and effective materials.

Crosson Architects
Hut on Sleds | Corromandel | 2012

Design Precedents.

Structural Elegance.



Fig 4.11.

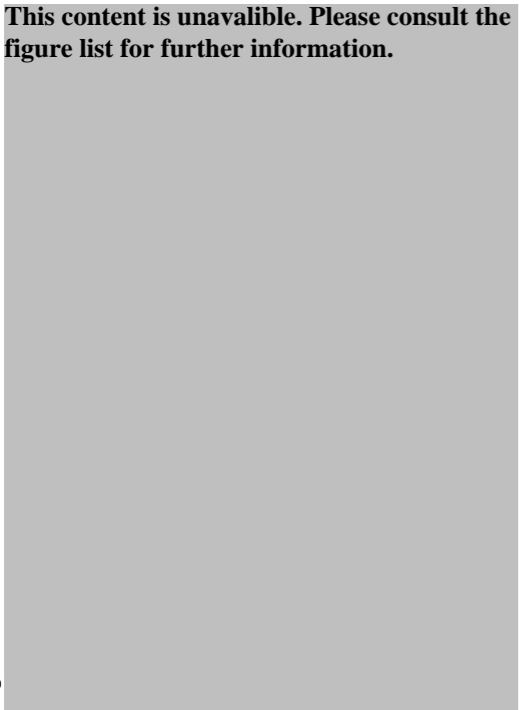


Fig 4.12.



Fig 4.13.



Fig 4.14.

Exposing and expressing structure



Fig 4.15.

Peter Zumthor
Zinc Mine Museum | Sauda | 2016

Design Precedents.

Humble Strength.



Fig 4.16.



Fig 4.17.



Fig 4.18.



Fig 4.19.

Simple forms create a powerfull



Fig 4.20.

Dennis Andernach
Landschaftshäuser | “Landscape for Houses” | *Caspar David Friedrichs*



TO SETTLE IN THE LANDSCAPE

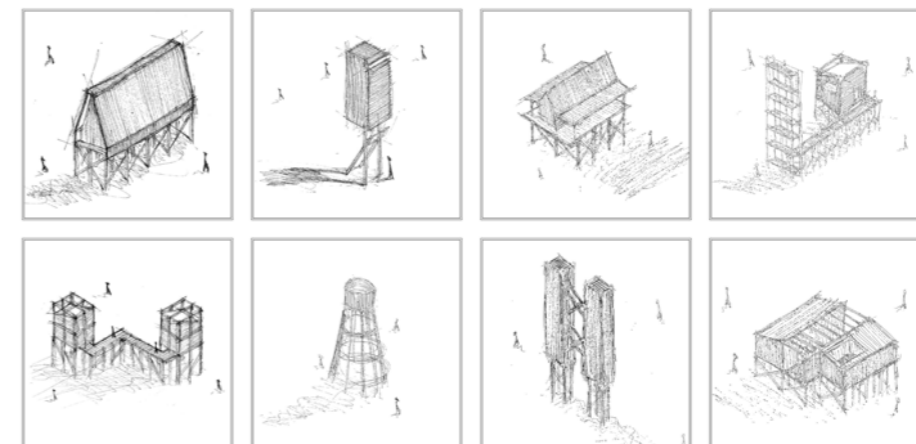
conceptual design

Conceptual Design.

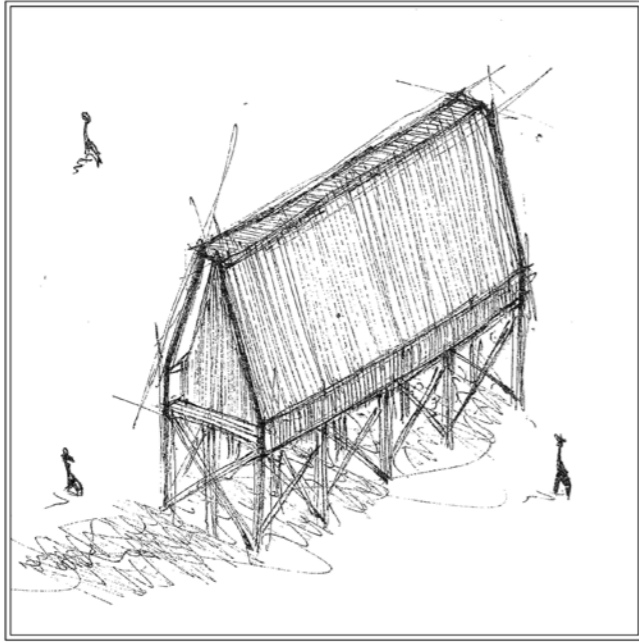
The exploration of varying formal and structural techniques at multiple scales that follow the established precept of the precedent studies.

The underlying principles of each individual design will follow that of

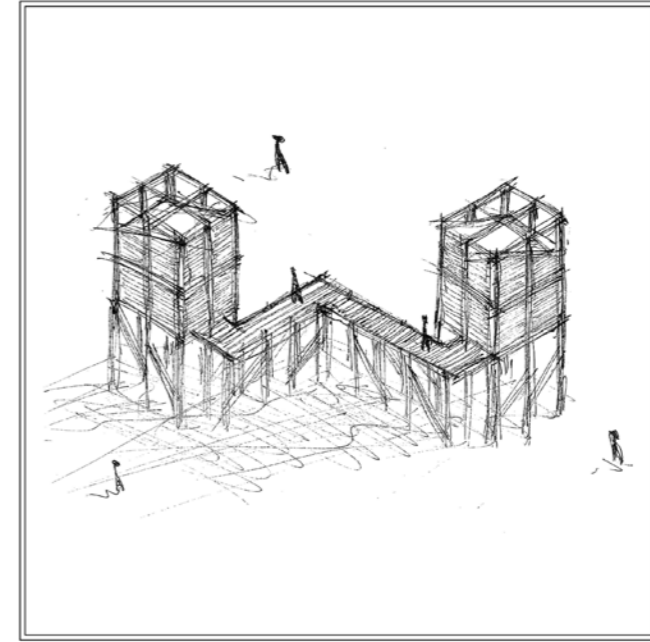
the vernacular New Zealand bach, principles that are complimented by the Zinc Mine Museum's elegance and honesty of structure and the humble strength of simple, bold forms that are illustrated by Dennis Andernach



"To settle in the landscape means to delimit an area, a place. We stop our wandering and say: Here! Then we create an 'inside' within the encompassing 'outside'."



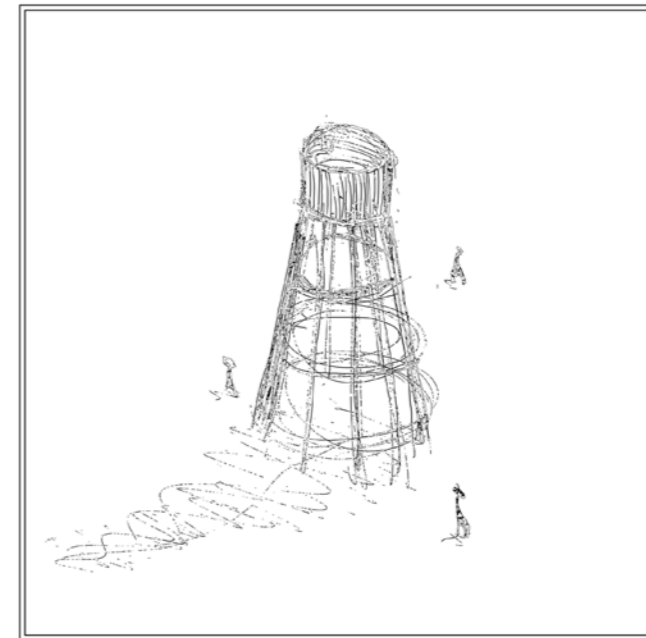
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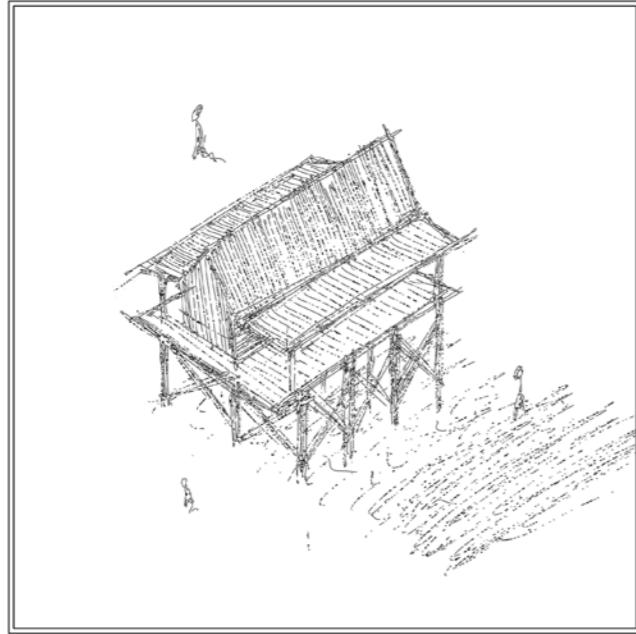
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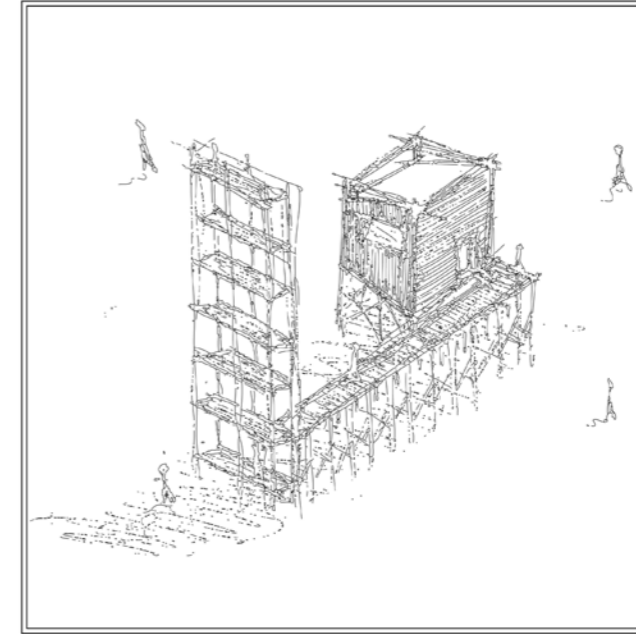
02



04



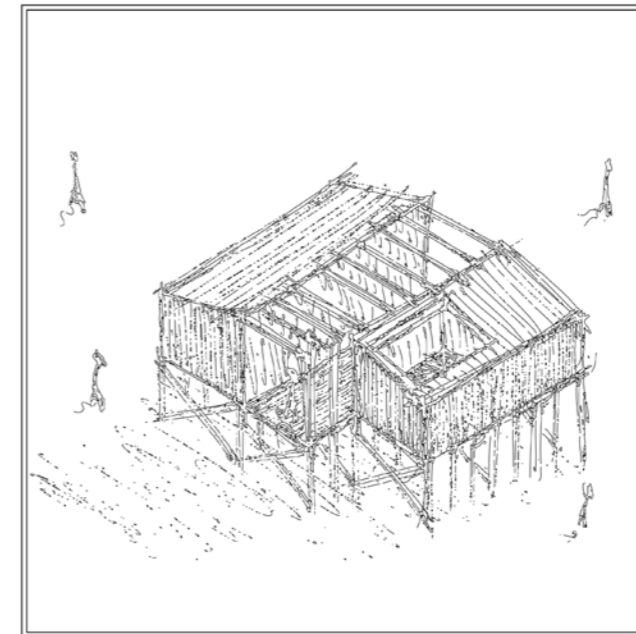
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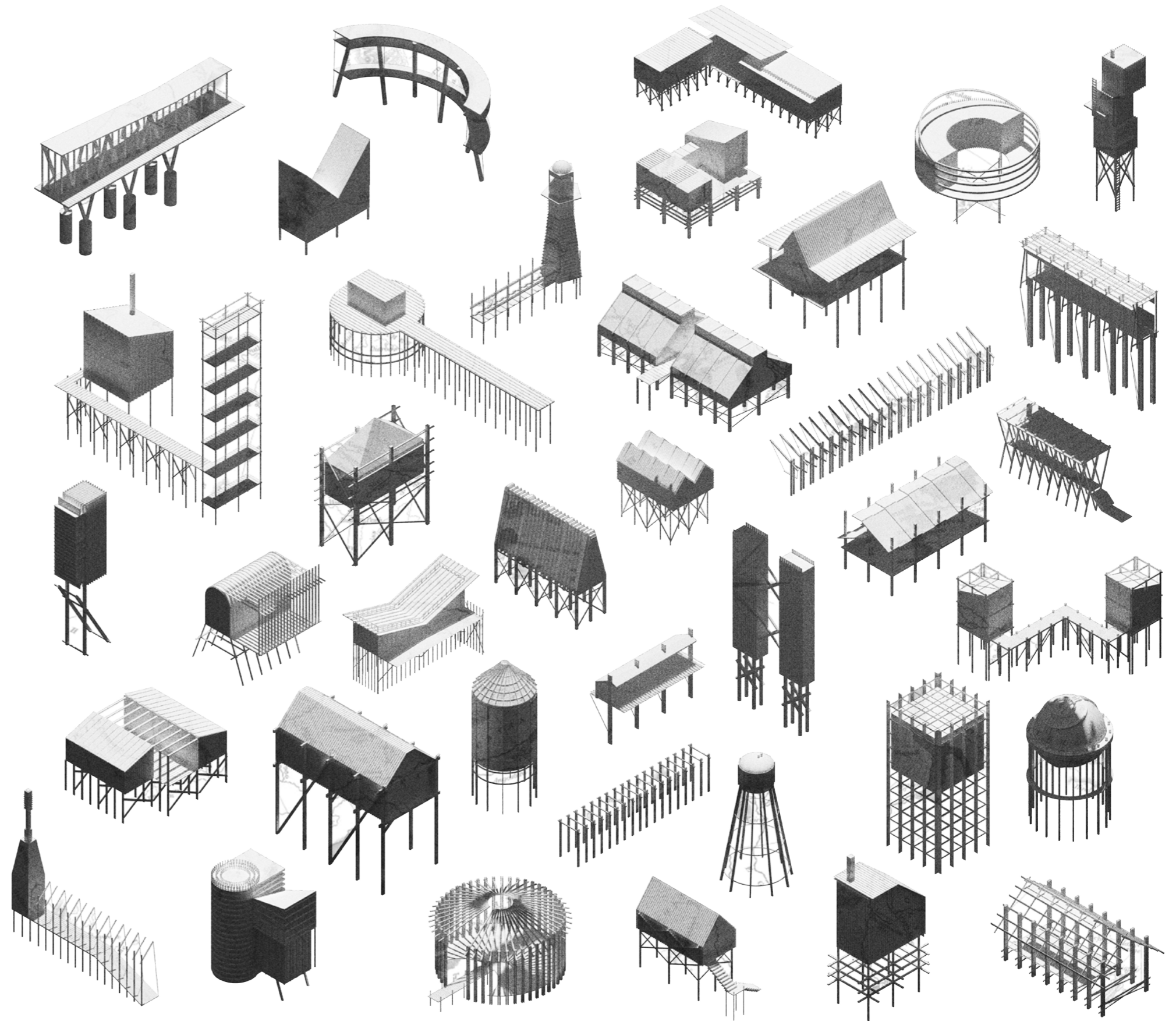
06



07

A Landscape of Prototypes.

Structural Elegance.
Humble Strength.



Developed Design.

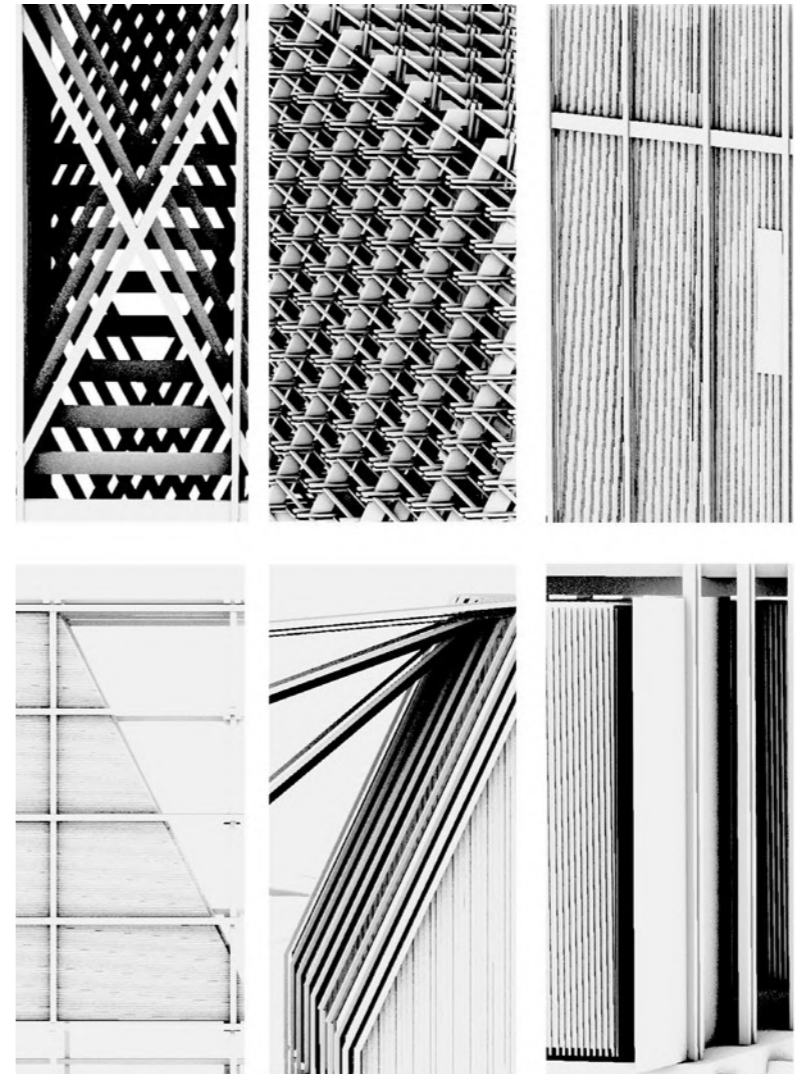
contextualisation

While the conceptual design was rooted as a formal exploration of the underlying design principles, this next stage looks to contextualise the interventions onto the stopbank itself.

A series of six buildings have been chosen to explore further, three dwellings and three community buildings. The designs are

investigated into more detail, setting out to add and examine hints towards potential structure, materiality and textures.

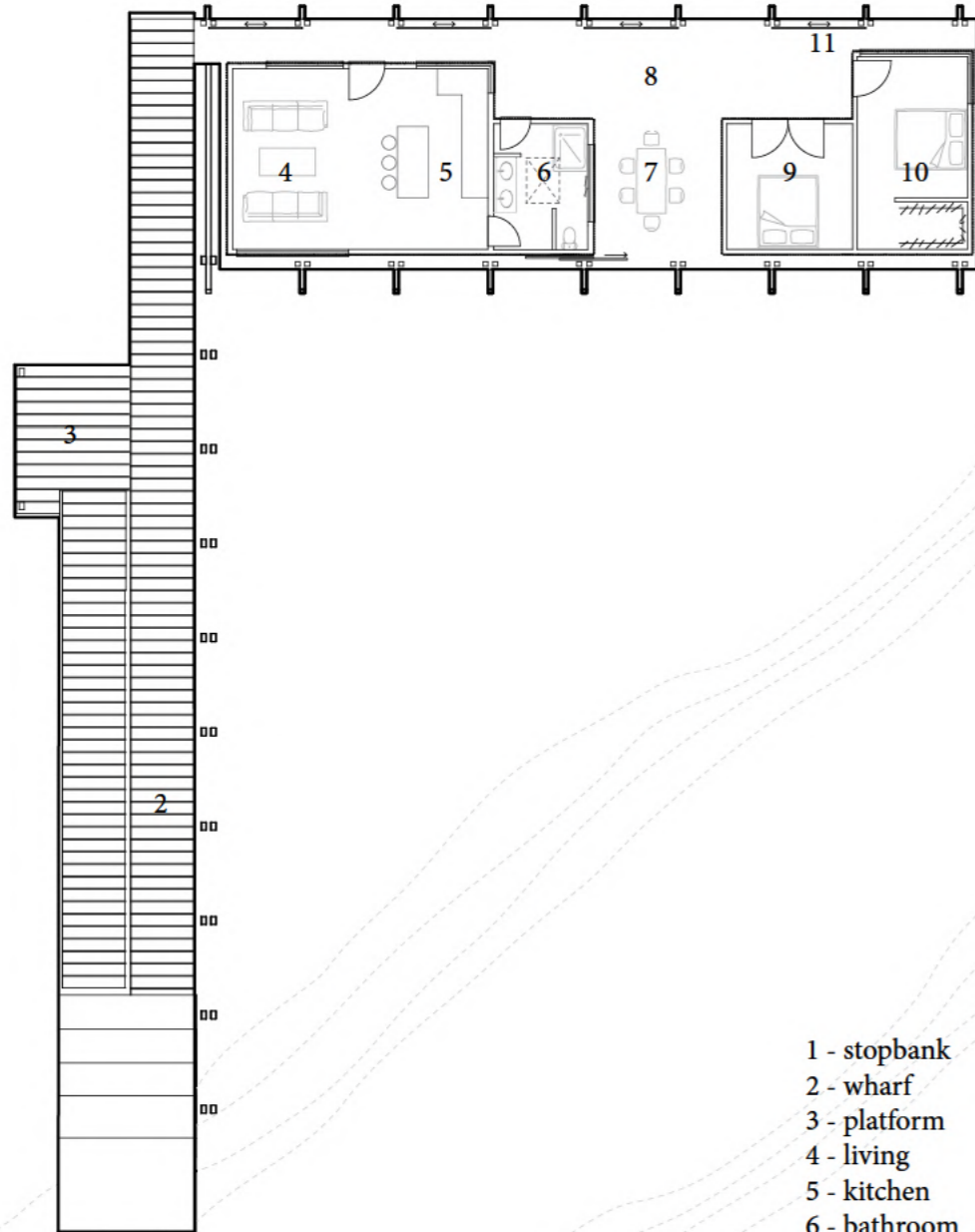
The series of designs are adoptions of the conceptual forms shaped by developing floor plans of each, exploring the liveability of such buildings and how they respond to site.





one.

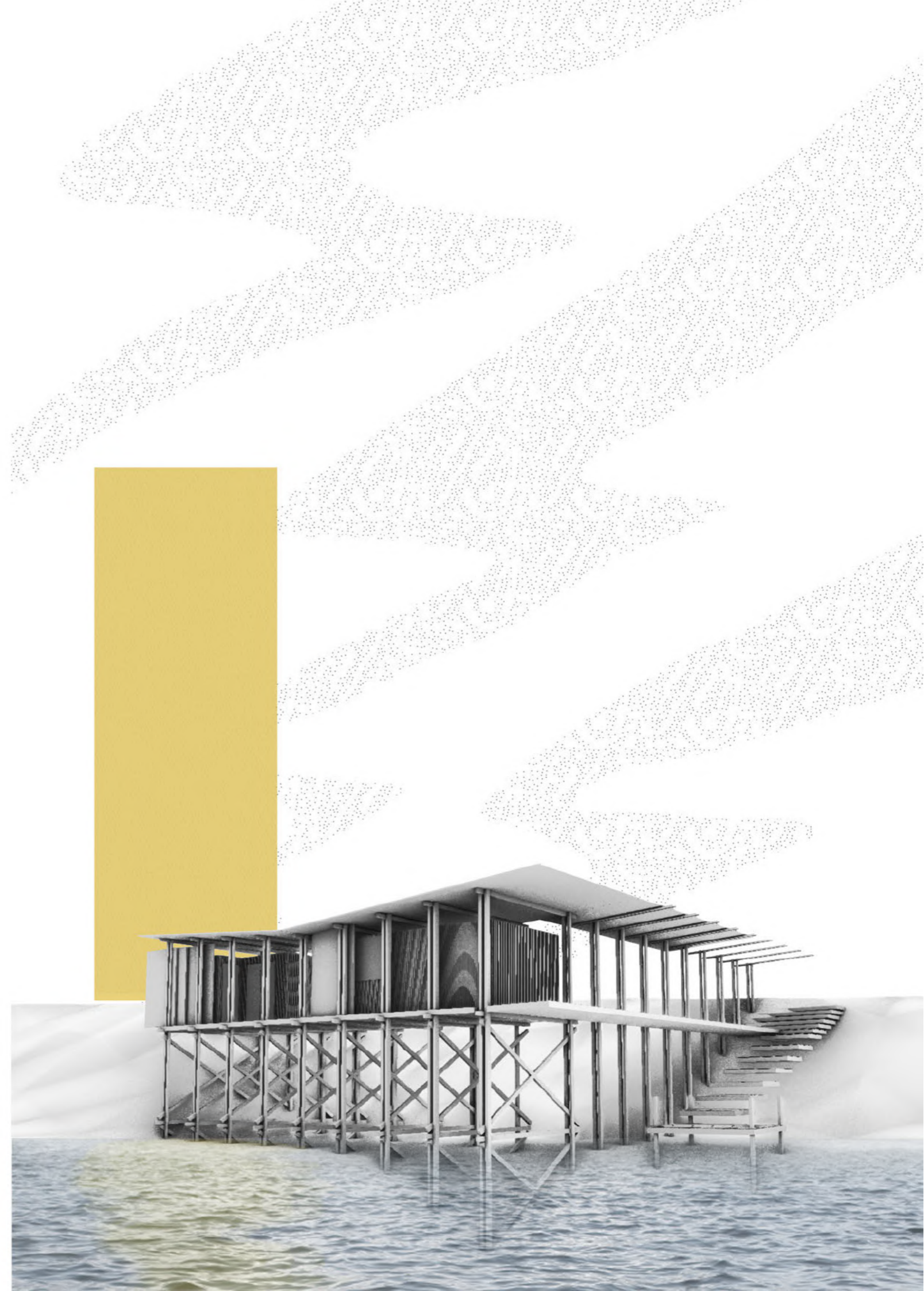
{dwelling}



- 1 - stopbank
- 2 - wharf
- 3 - platform
- 4 - living
- 5 - kitchen
- 6 - bathroom
- 7 - outdoor dining
- 8 - deck/circulation
- 9 - bedroom 01
- 10 - bedroom 02
- 11 - shutters

1:200

1

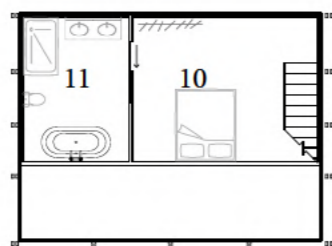
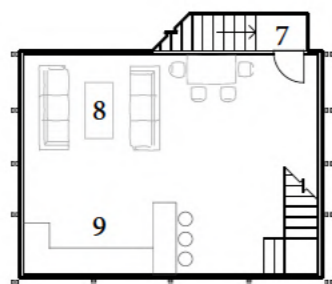
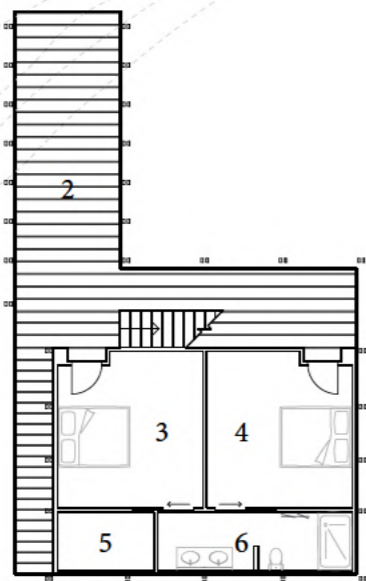




two.

{dwelling}

1



- 1 - stopbank
- 2 - wharf
- 3 - bedroom 01
- 4 - bedroom 02
- 5 - storeroom
- 6 - bathroom 01
- 7 - main entrance
- 8 - living / dining
- 9 - kitchen
- 10 - master bed
- 11 - ensuite

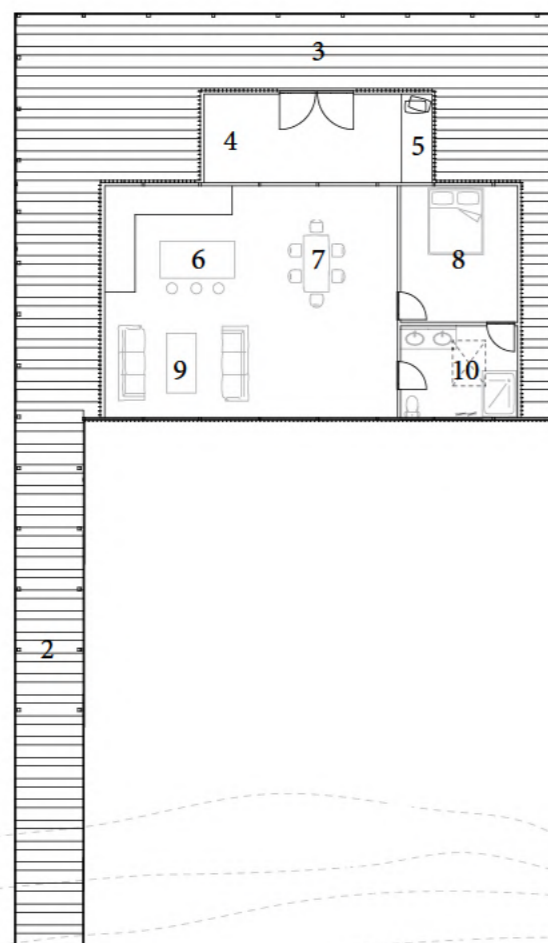
1:200





three.

{dwelling}



1

- 1 - stopbank
- 2 - wharf
- 3 - deck
- 4 - sun room
- 5 - sun bed
- 6 - kitchen
- 7 - dining
- 8 - master
- 9 - living
- 10 - bathroom

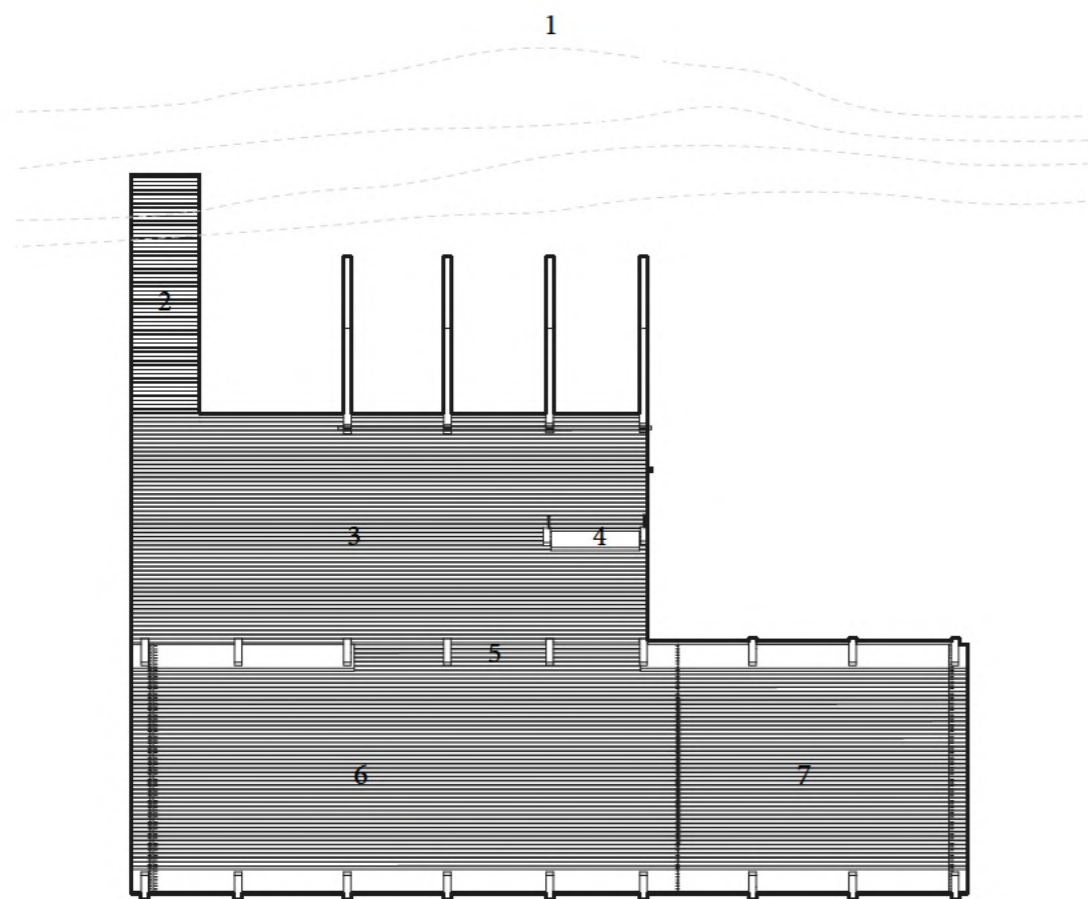
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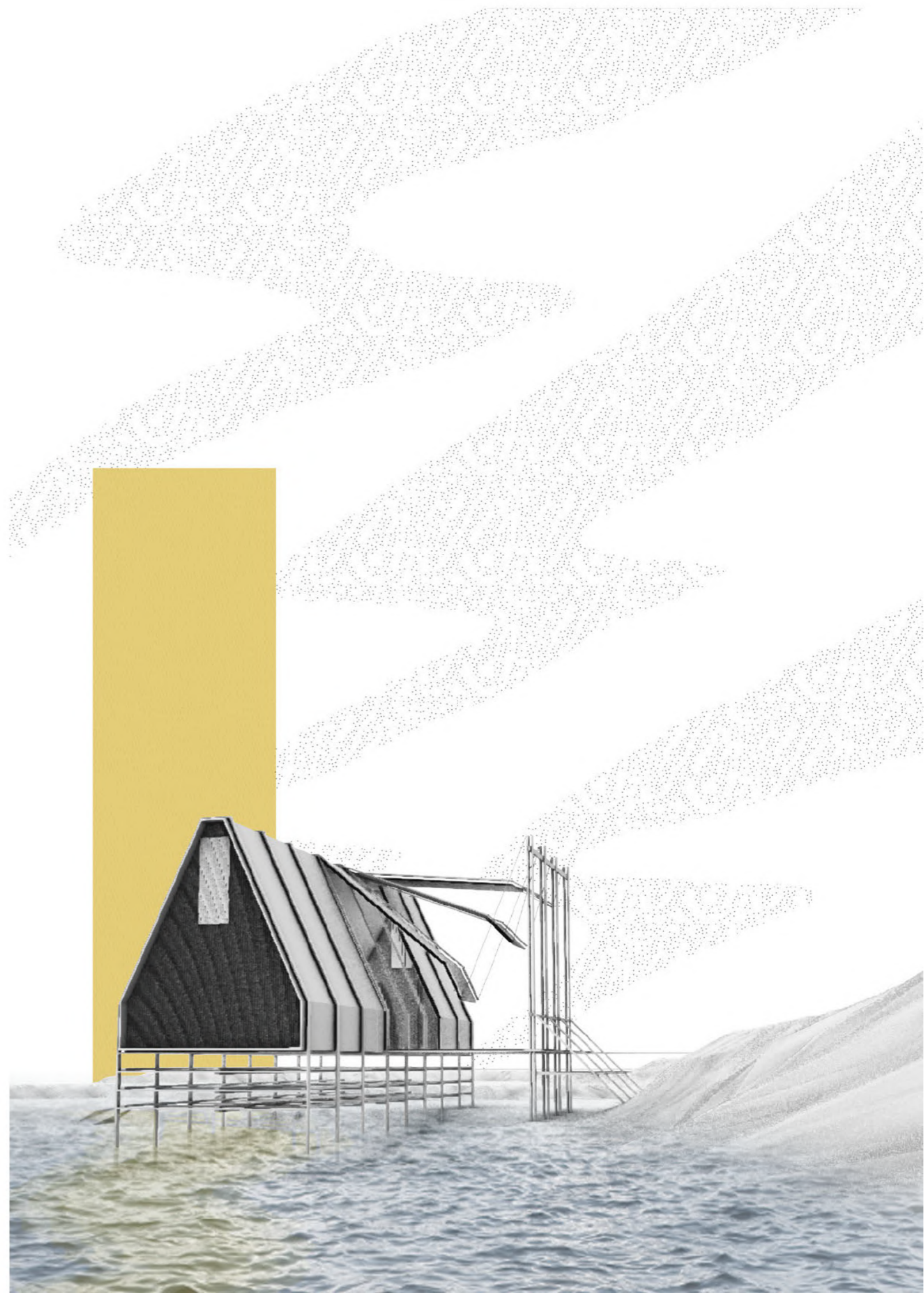
four.

{community building}



- 1 - stopbank
- 2 - wharf
- 3 - decked space
- 4 - opening screens
- 5 - transition space
- 6 - open hall
- 7 - enclosed hall

1:200

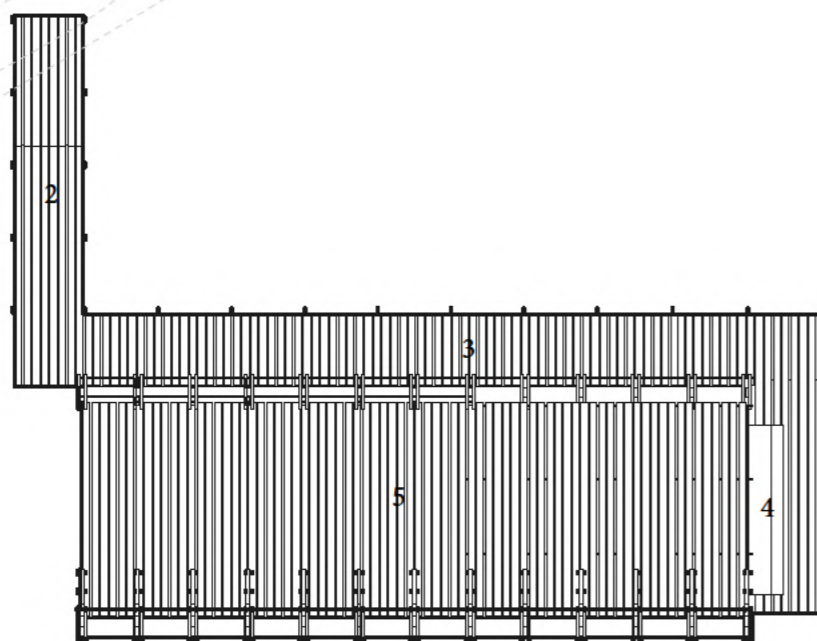




five.

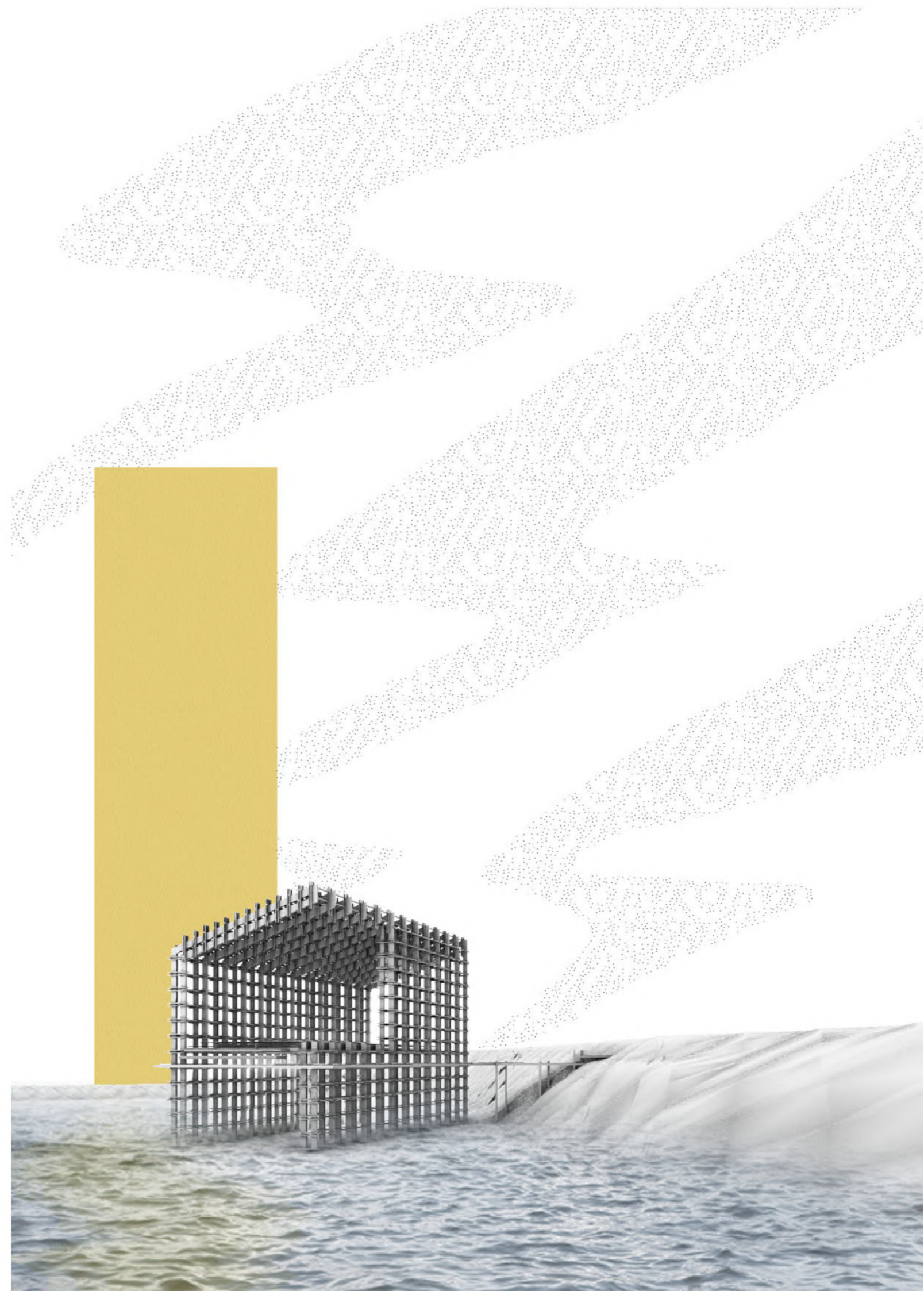
{greenhouse}

1



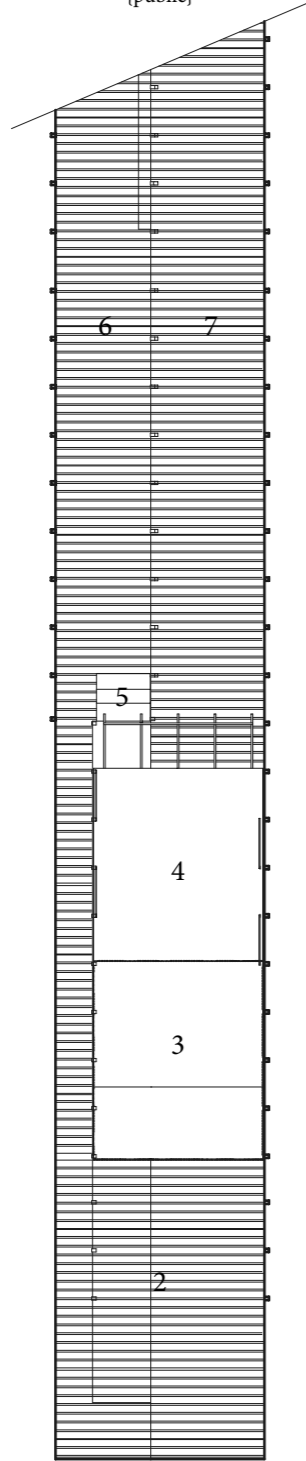
- 1 - stopbank
- 2 - wharf
- 3 - boardwalk
- 4 - open entrance
- 5 - cultivation

1:200





six.
{public}



1

- 1 - stopbank
- 2 - wharf
- 3 - wharf dwelling
- 4 - dwelling deck
- 5 - stair
- 6 - low pier
- 7 - high pier

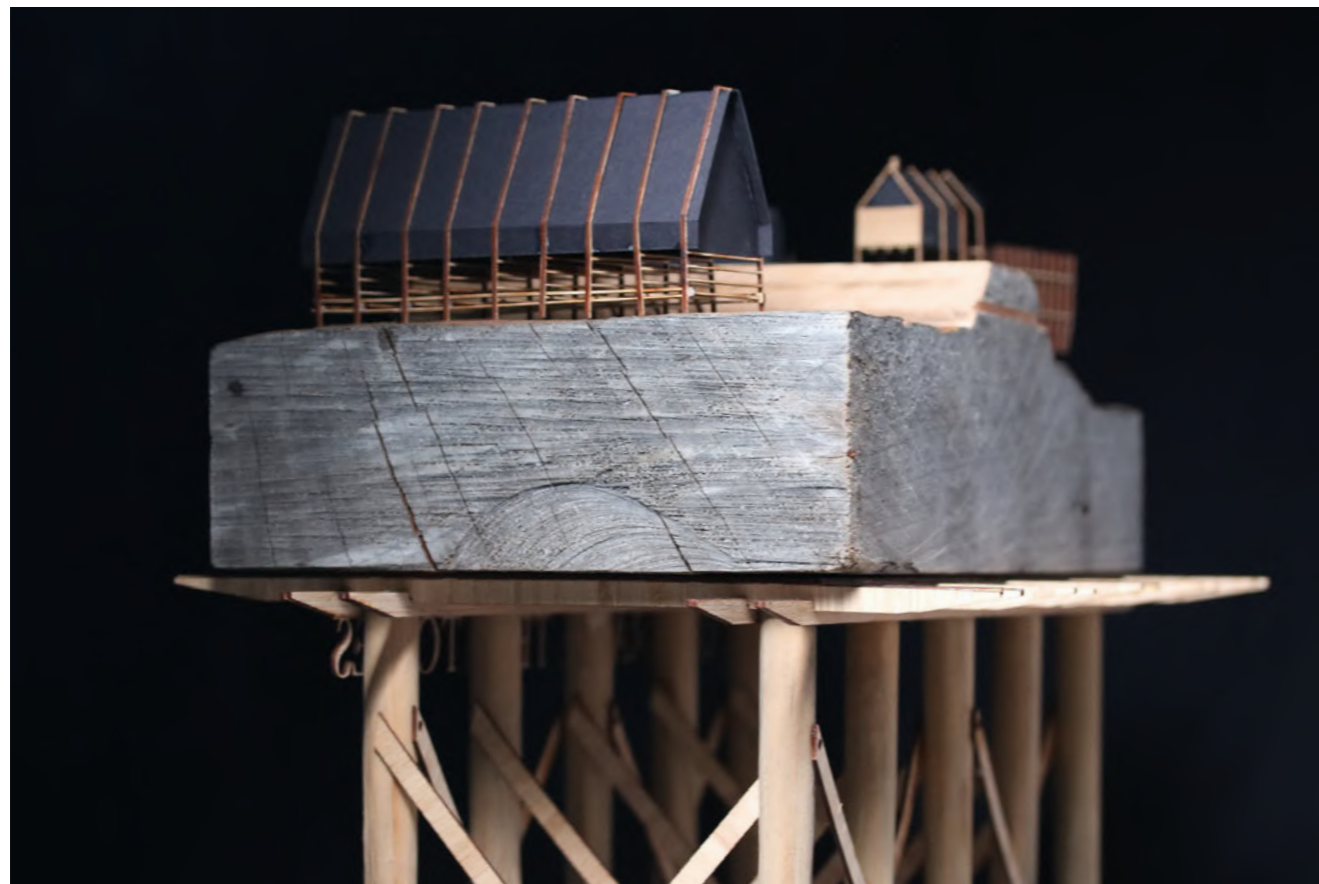
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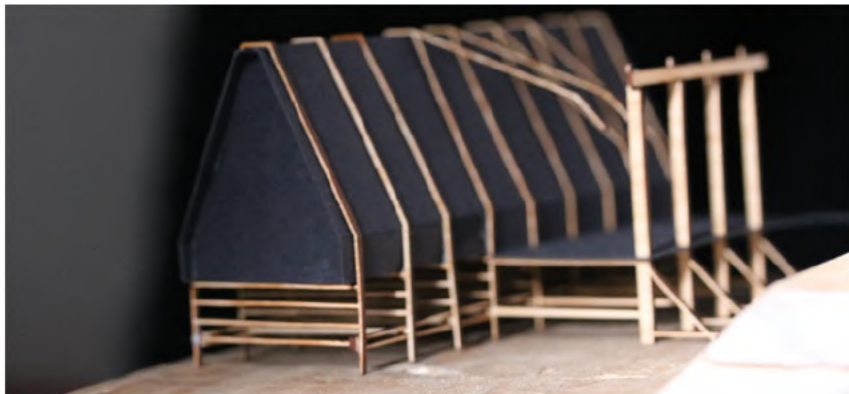
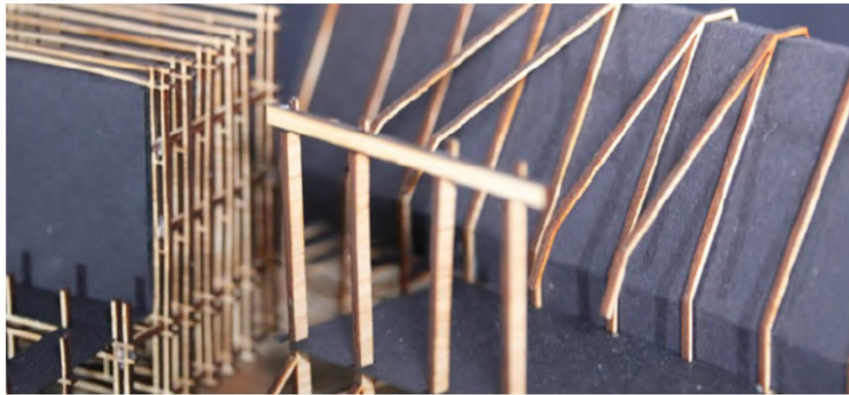


Physical Model.

developed design.

A 1:200 scale model exploring the relationship between architecture and site, atop a 1:20 scale model of the timber post structural system with a traditional asian accent on the decking joists.

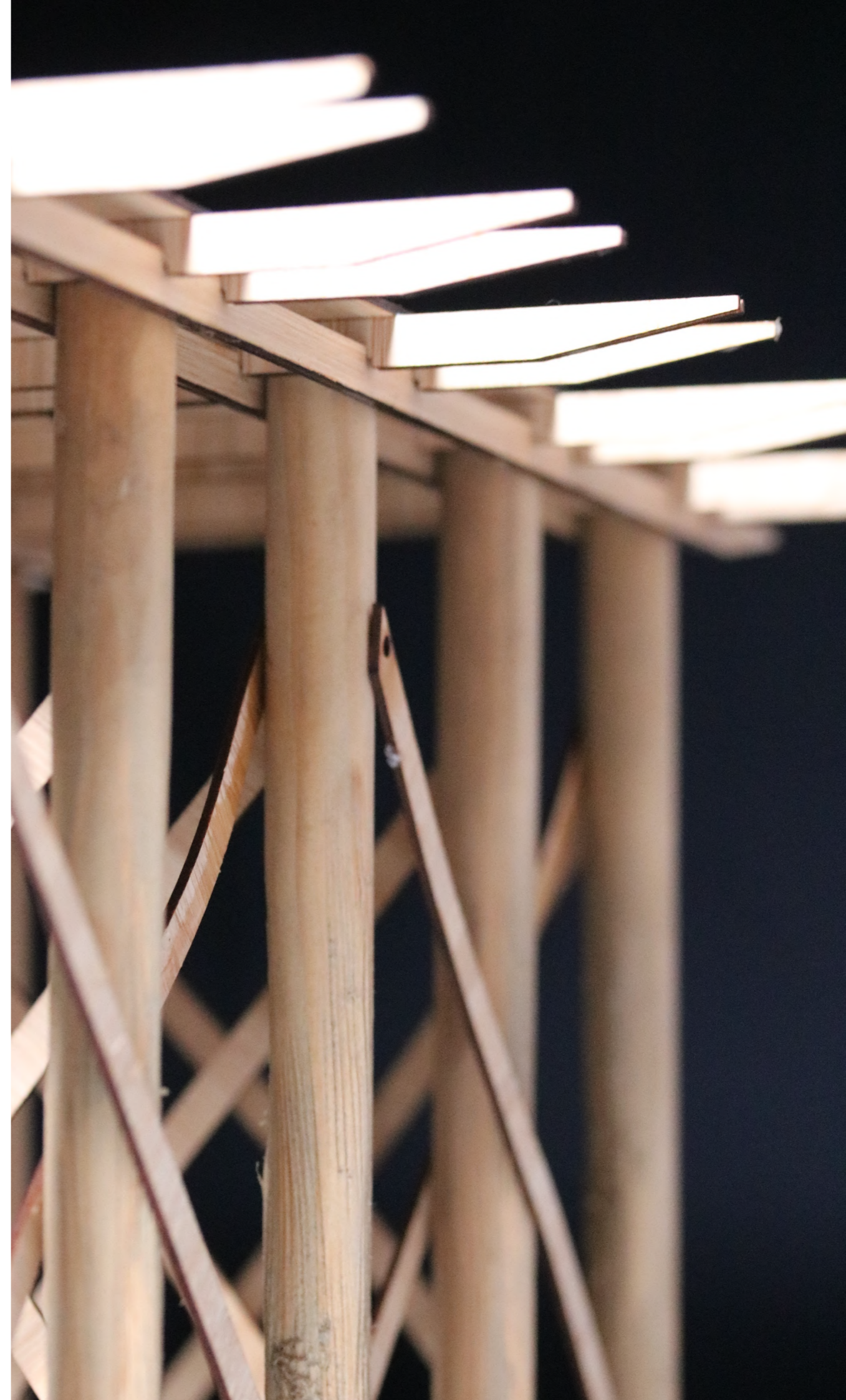




humble strength.



structural elegance.



humble strength.

structural elegance.



VULNERABLE TERRITORIES



Issues Arisen.

This preliminary design outcome has resulted in the design of individual dwellings that are anchored from the stopbank, all exploring different formal and structural techniques.

As segregated designs, each stands as a successful speculative intervention that positively responds to the physical design principles of site. However as they were designed individually, it has proven challenging to tie them together.

While the physical model begins to employ the stopbank to integrate the various buildings together to test their potential relation, they remain detached, relying on the stopbank for any connection to each other and environment.

It has become apparent that while this design is conceivably feasible and effective as individual buildings, it is when they are applied simultaneously and the stopbank is populated,

that the concept essentially becomes a mere collection of private dwellings that are elevated above the ground. Most noticeably, the scheme seems to almost neglect any appreciation of the intangible design principles such as 'community' and 'sense of place' that was discernibly critical throughout the initial study of the region.

Combination.

Conceptual representation of what a potential community like design would look if the idea was continued to be developed solely relying on the stopbank.



Whakataukī.

[to utter a proverb]

Nā tō rourou, nā taku rourouka ora ai te iwi

“With your food basket and my food basket the people will thrive”

This whakataukī encapsulates the notion that while working in isolation might result in survival, working together can take people beyond survival and onto prosperity.’ (Berryman & Ford, 2014, p. 1)

In much the same manner, this design must adopt a more significant focus on communal design outcomes, how the design functions as a whole and how each aspect can benefit another.

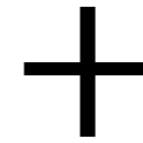
Moving Forward.

For the final stage of design this thesis aspires to focus more on the intangible design principles surrounding the idea of community. To do this requires the design to be pushed further than the individual dwelling, and into one cohesive intervention.



SENTIMENTS IN MAN

revised design



Introduction.

| developed design |

“Architecture arouses sentiments in man. The architect’s task, therefore, is to make those senti-ments more precise.”

As established, for this design to develop further, requires it to become a more inclusive intervention. The conceptual design has relied too much on the stopbank to tie the community together, a job that this thesis argues the built environment should be responsible for.

To Achieve this, an almost entirely wharfed design, housing all community functions will be explored. The intent in doing so, is to allow the design to tackle the intangible aspects of the community, whilst further pushing the capabilities of an architectural intervention.

A collective design outcome has the potential to make the design a more catalytic example of coastal living, and less reliance on the stopbank that is specific to Haumoana will only reinforce this further.

To do this, the stopbank will remain an anchor for the structure of the design, but the functions of the community will not rely on it, rather the built environment will employ a completely stilted, wharfed design to act as a vehicle for all community functions.

With the freedom of moving away from the bank, the design also becomes unfastened by the limitations of the stopbank. As such, the scope can be increased

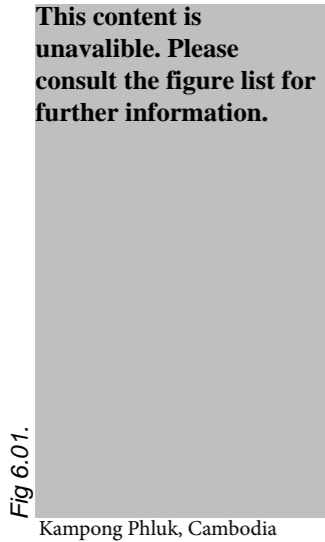
and experimented with to explore the full potential of a stilted community.

This chapter focuses on developing a masterplan that satisfies the established requirements of a collective design.

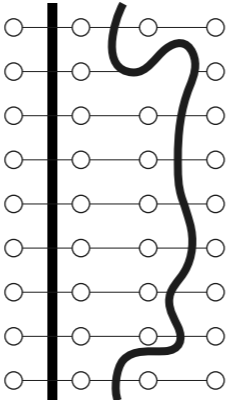
The chapter begins by observing and analysing existing communities that operate with similar environmental conditions.

Then, by revisiting the analysis of site with a greater consideration of a fully wharfed design that will extend away from the stopbank itself, a developed master plan that follows some of the traditional principles can be uncovered and reflected upon.

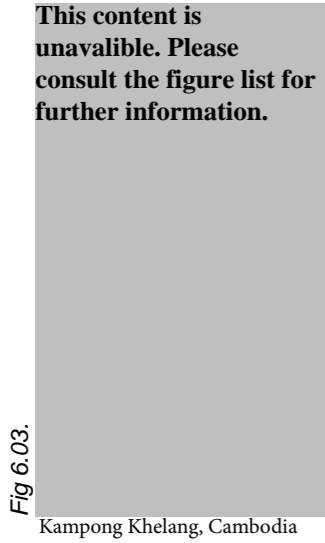
Traditional.
{Tonle Sap, Cambodia}



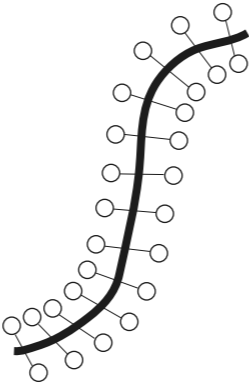
Kampong Phluk, Cambodia



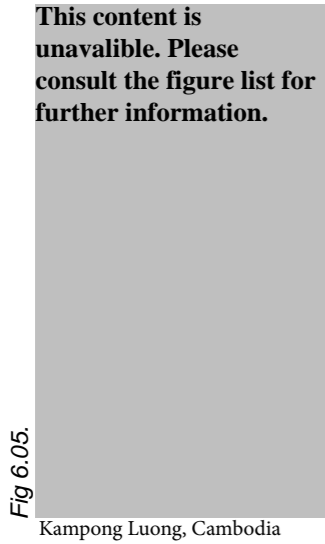
Symmetrical



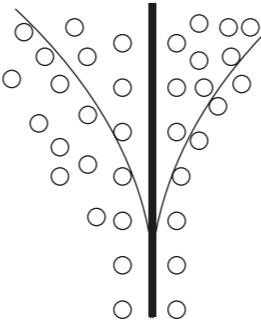
Kampong Khelang, Cambodia



Splayed



Kampong Luong, Cambodia

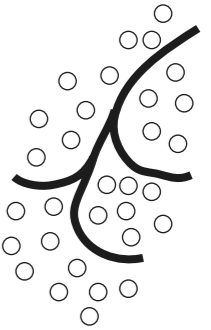
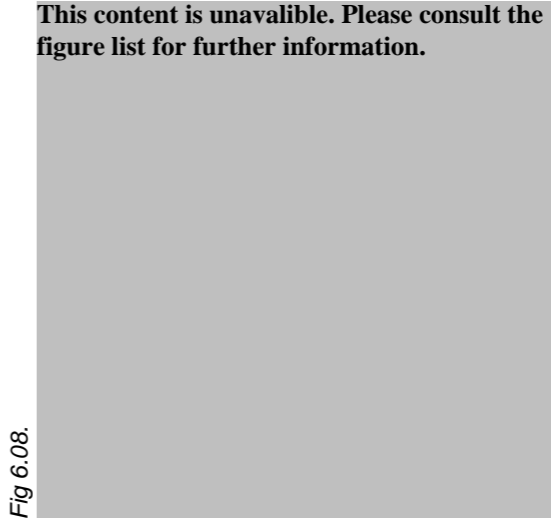


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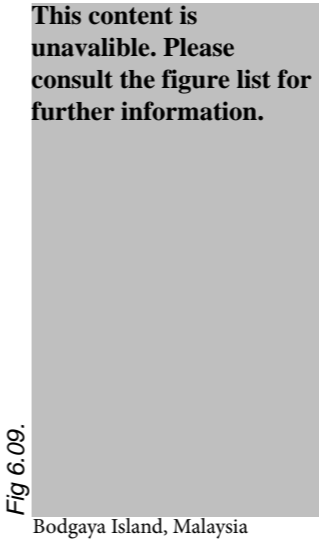
Traditional.
{International}



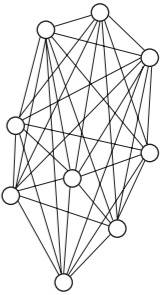
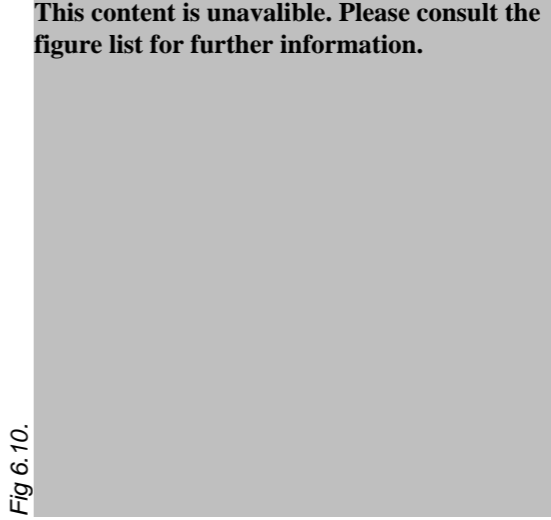
Semporna, Malaysia



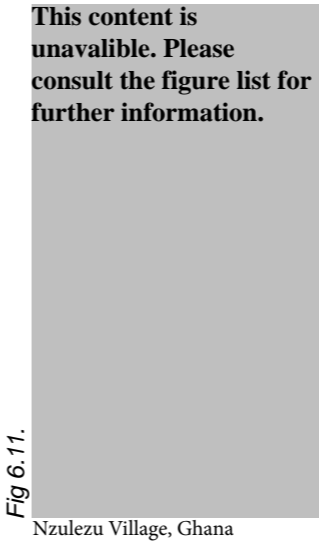
Dispersed



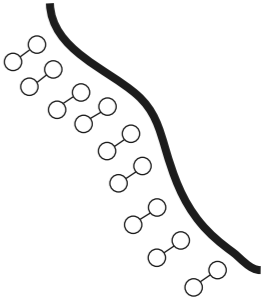
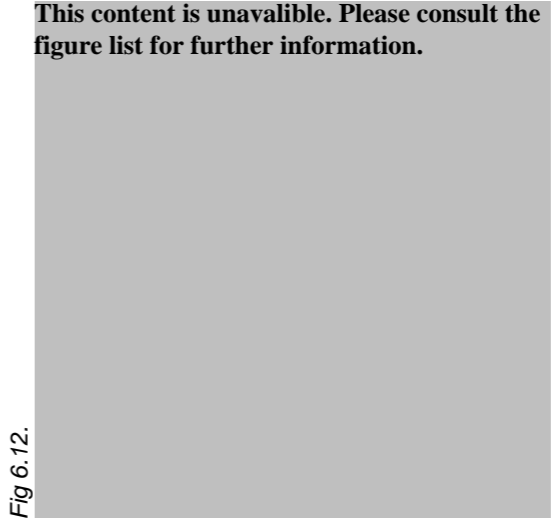
Bodgaya Island, Malaysia



Scattered



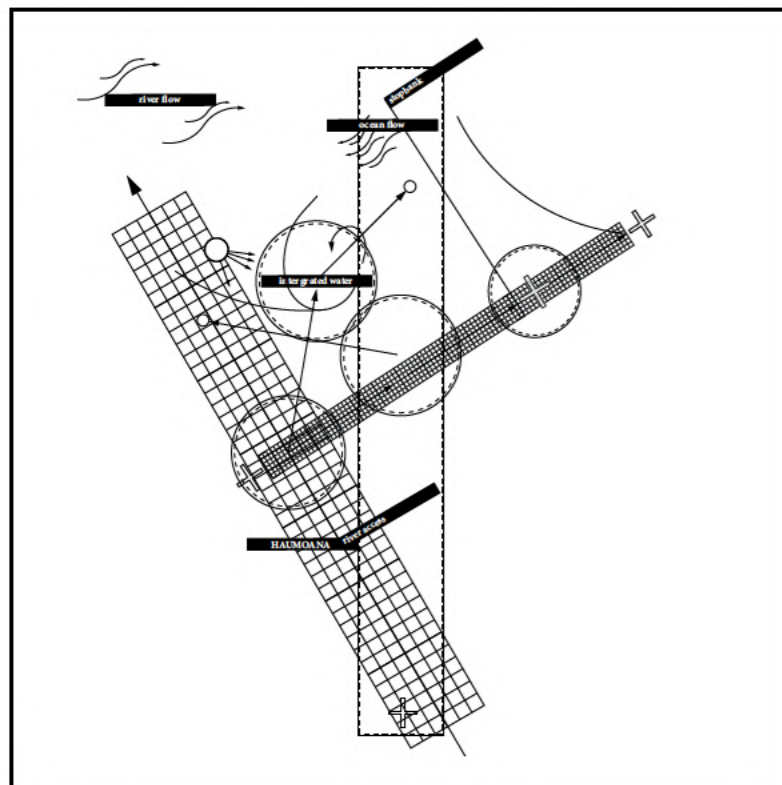
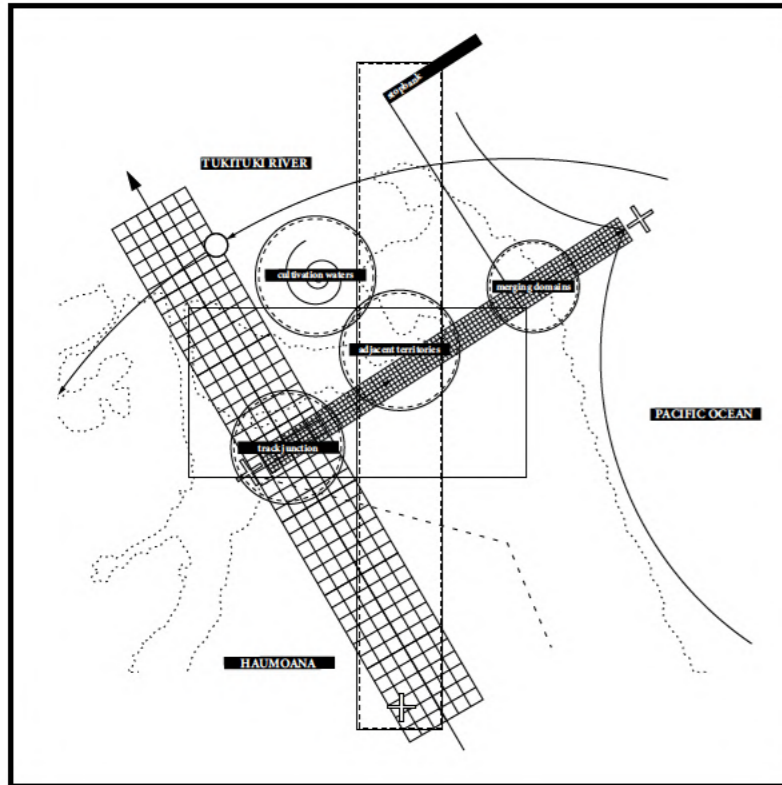
Nzulezu Village, Ghana



Flowing

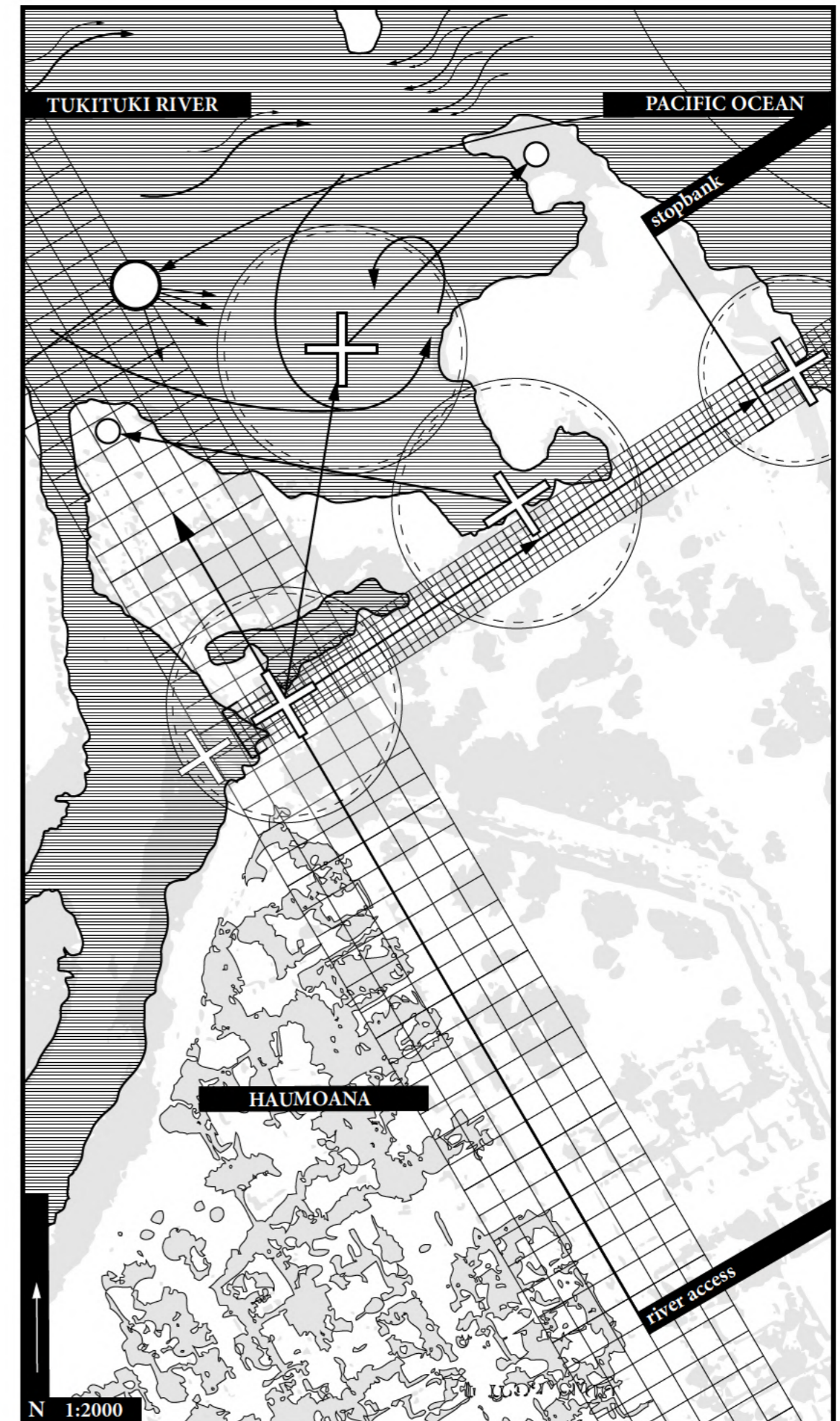
Master Plan.

Key Site Conditions.



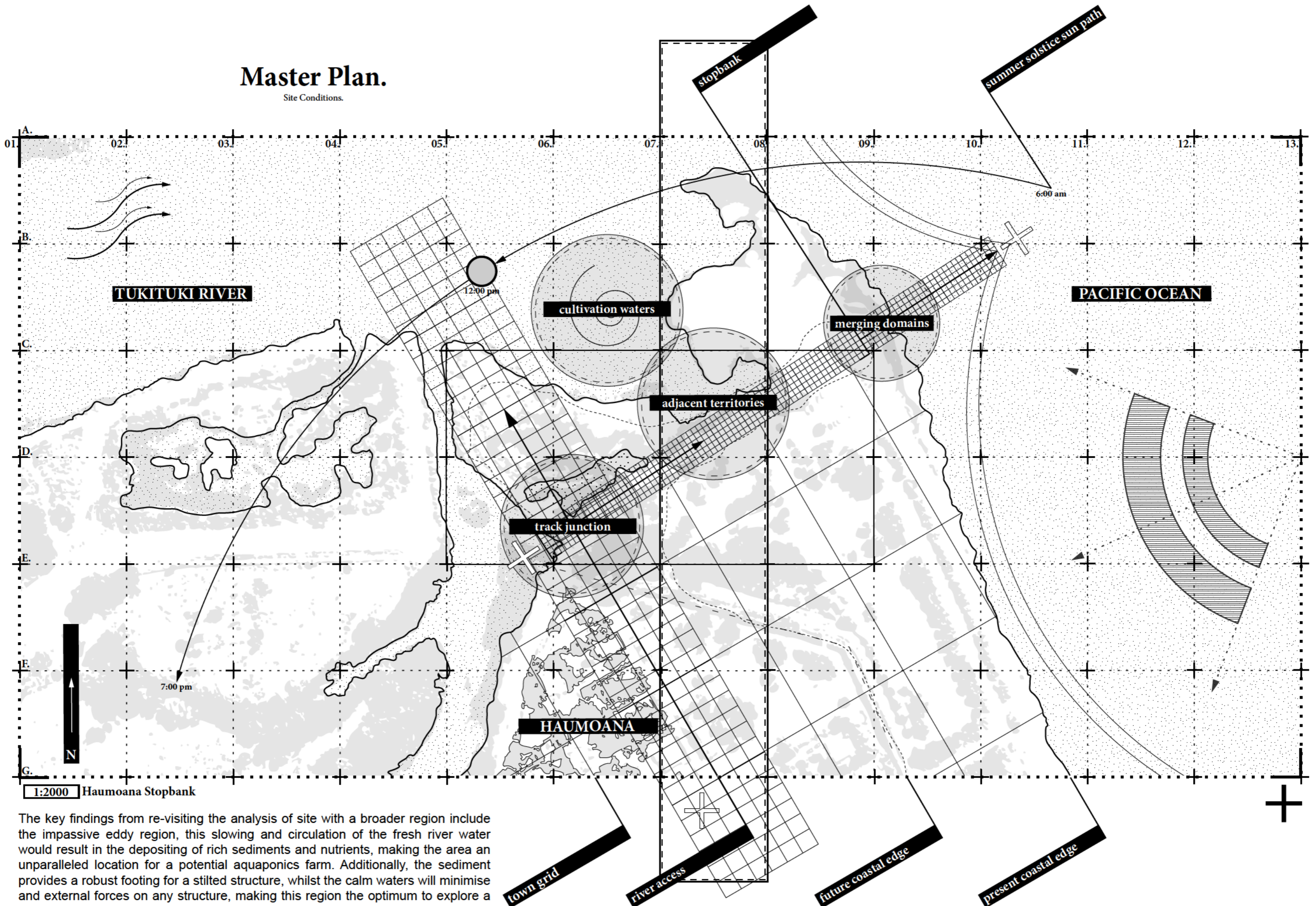
In discovering that the initial strategy of solely building off of the stopbank was inadequate for the scope of what this thesis aims to achieve, and that expansion is necessary. It broadens the potential impact that humans have on the natural environment and vice versa. Architecture will be used as the tool to determine whether that impact will be of positive nature, or negative.

To begin with, it is necessary to re-visit the analysis of site with a larger design concept in mind. With the intent outlined to expand the scheme into a predominantly wharfed intervention, much more of the aquatic environment will be utilised, and this analysis intends to uncover the optimum method of doing so.



Master Plan.

Site Conditions.

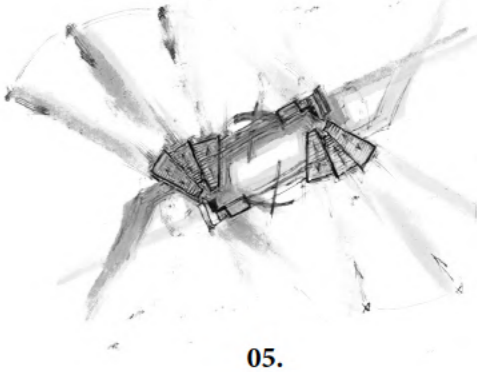
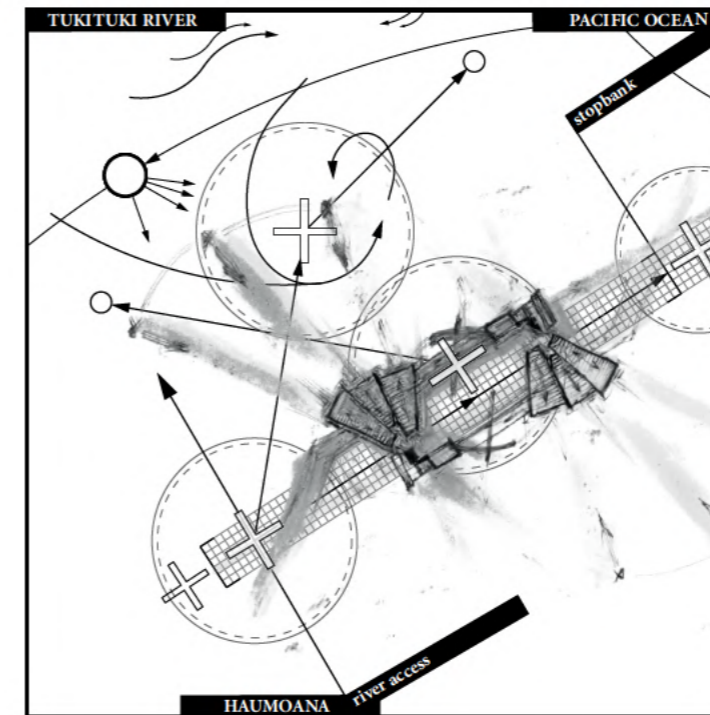
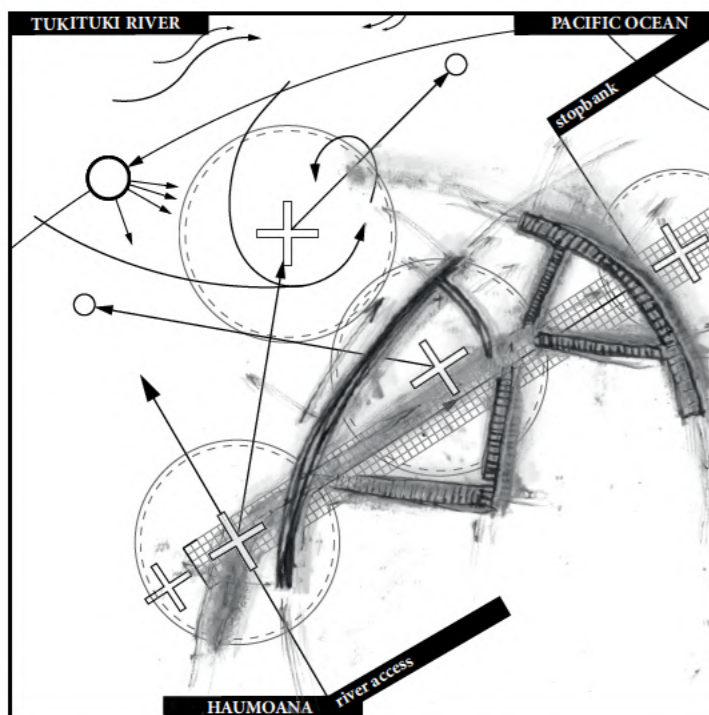
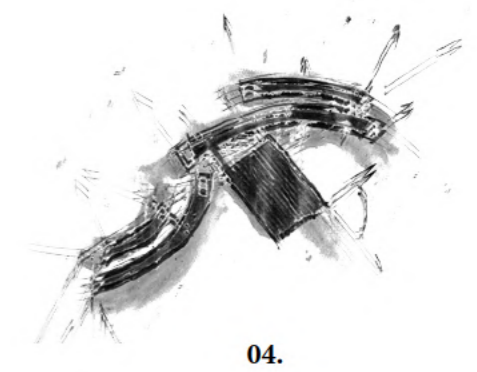
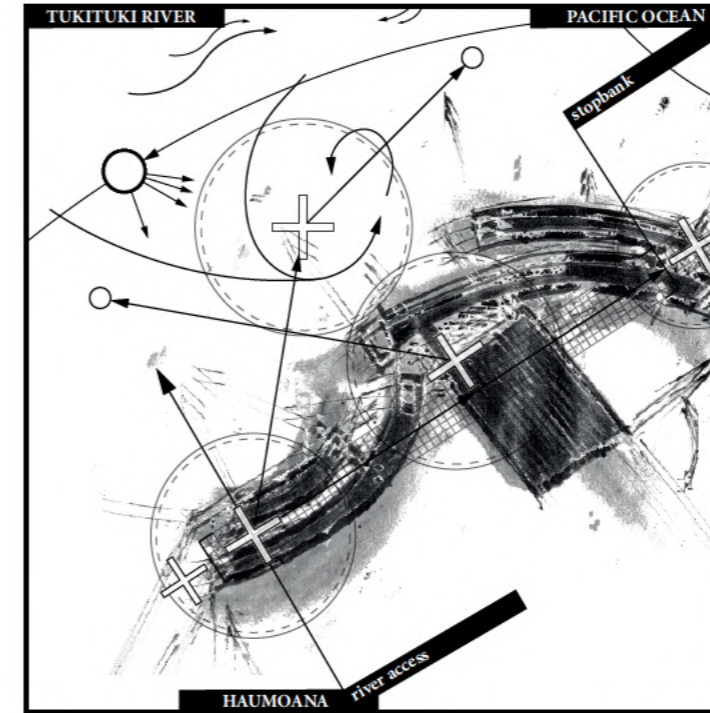
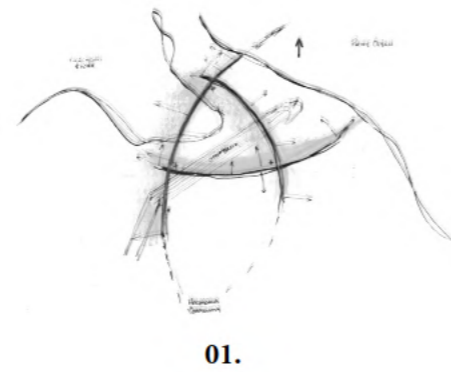
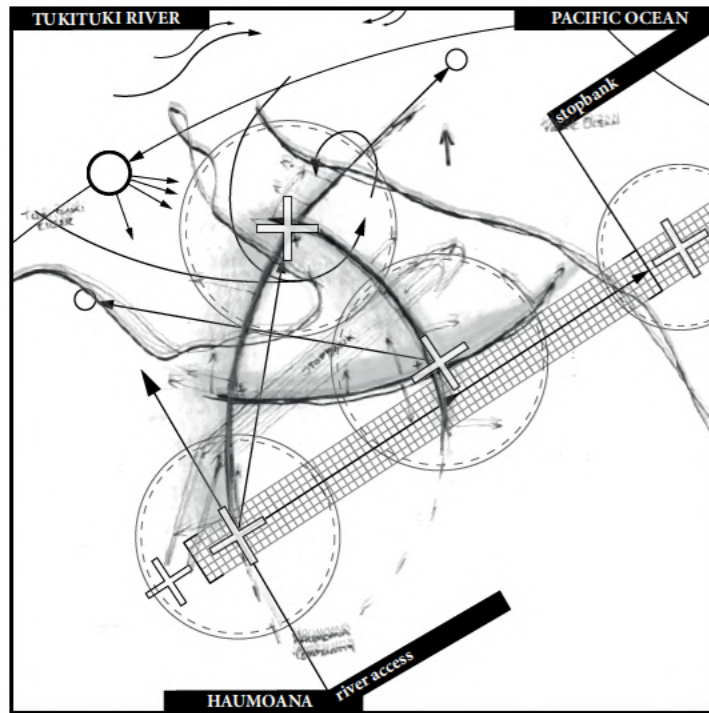


The key findings from re-visiting the analysis of site with a broader region include the impassive eddy region, this slowing and circulation of the fresh river water would result in the depositing of rich sediments and nutrients, making the area an unparalleled location for a potential aquaponics farm. Additionally, the sediment provides a robust footing for a stilted structure, whilst the calm waters will minimise and external forces on any structure, making this region the optimum to explore a wharfed community design.

Master Plan.

Conceptual Wharf Sketches.

The arm and stopbank act as focal points that emphasise directionality, they will become passage ways to the various communal functions branching off.

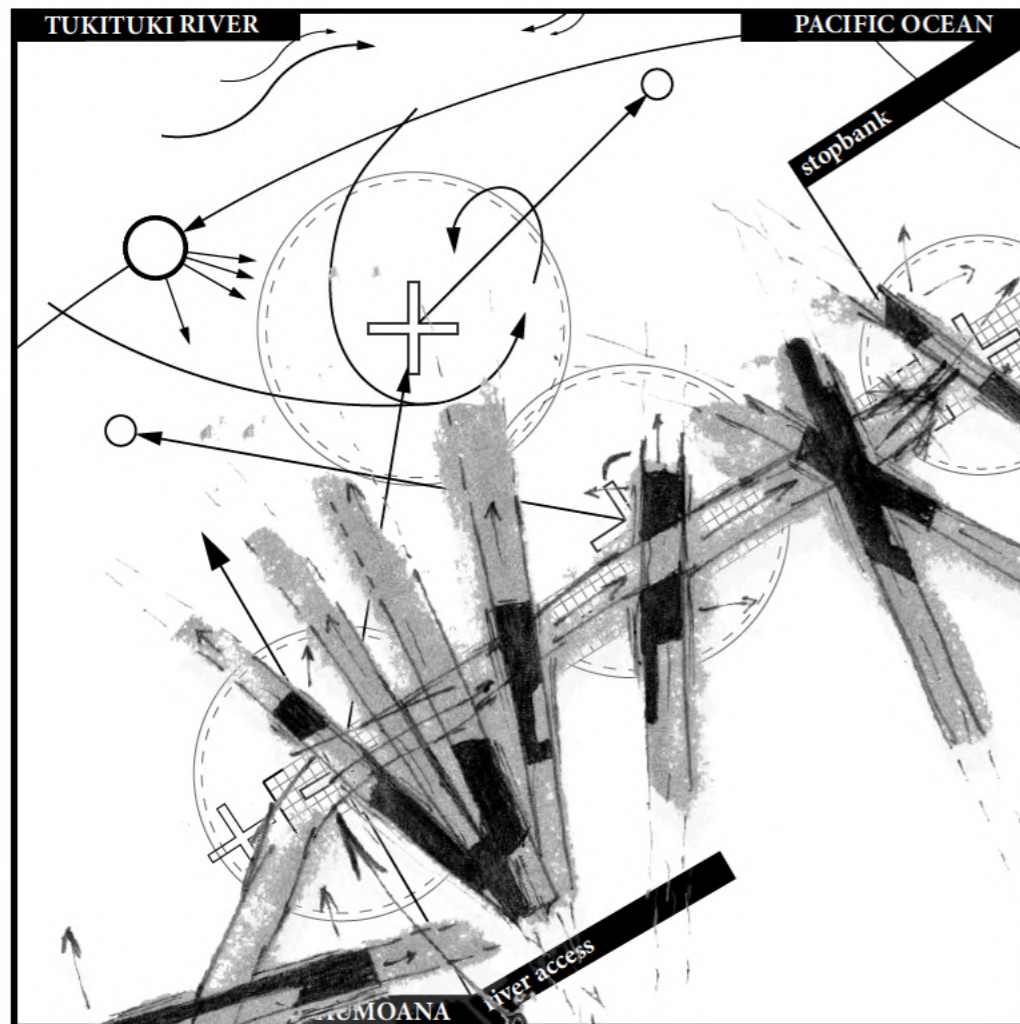


Master Plan.

Developed Wharf Sketches.



05.

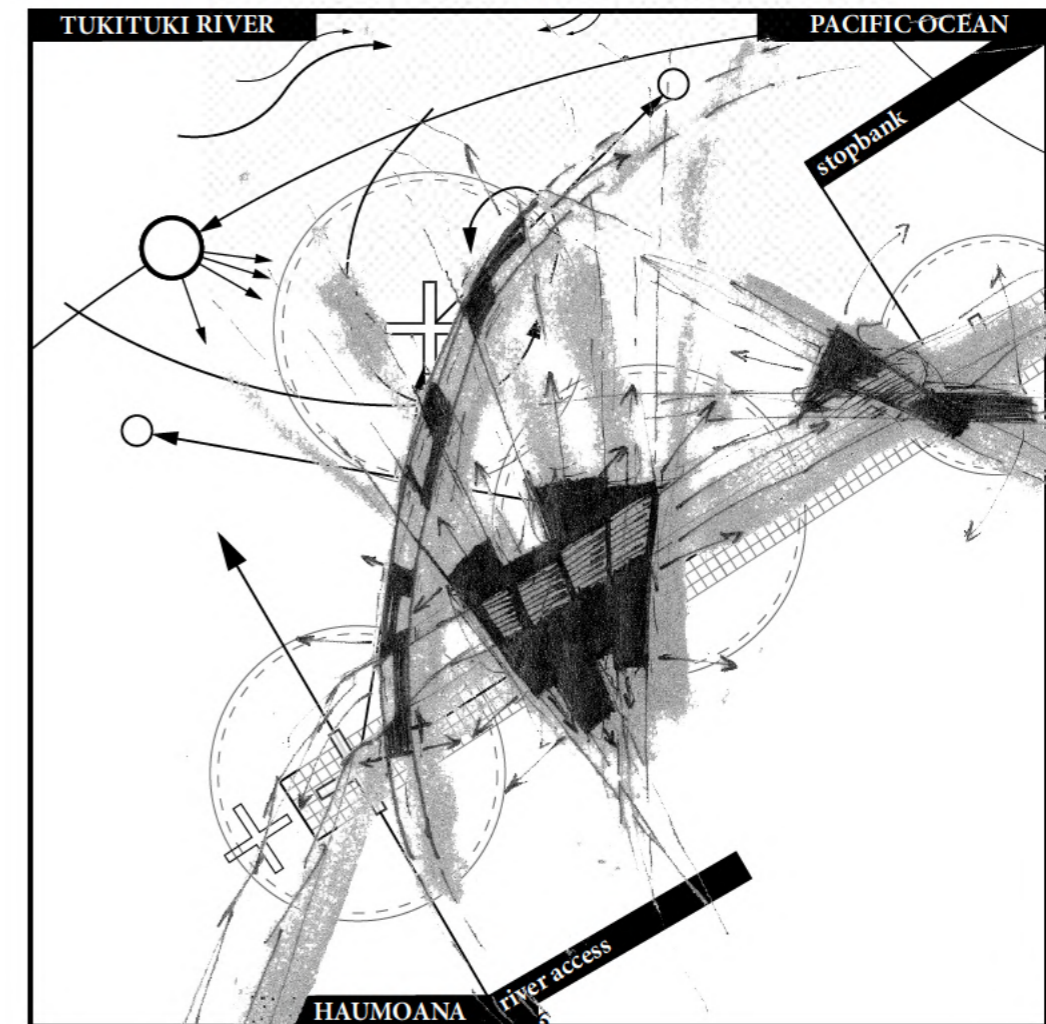


A large sweeping arm intersects the stopbank while gently connecting the existing Haumoana community with both the river and the ocean.

The arm and stopbank act as focal points that emphasise directionality, they will become passage ways to the various communal functions branching off.



06.



Master Plan.

Developed Wharf Design.

This developed plan introduces functionality to the large arcing wharf, sweeping out from the tip of the existing Haumoana community, over the placid waters and finishing at the boundary of the ocean. The arc becomes the promenade for most residential dwellings, where it meets with the stopbank expands to a flexible communal space, and between the two sits an adept location for seasonal aquaponics.



Progressing into the digital medium of 3D modelling, allows the conceptual sketches to attain further authenticity. It is here, where scale is explicit, that design gains groundedness and potential feasibility.

greenhouses

communal wharf

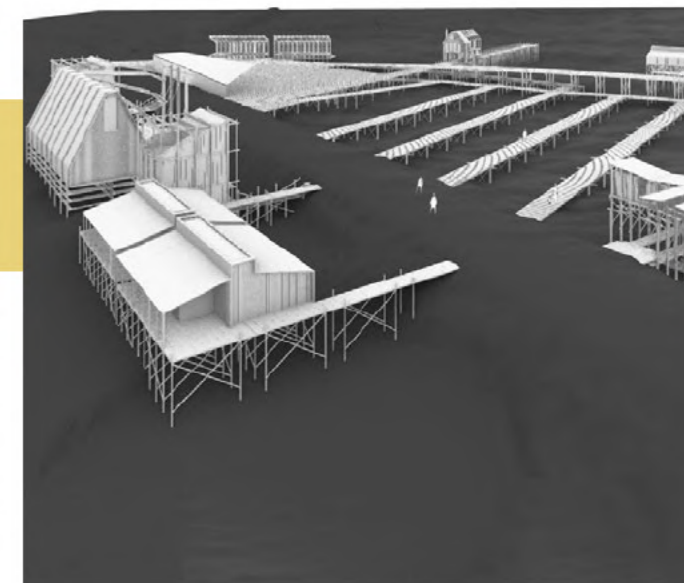
Aquaponics / Farm

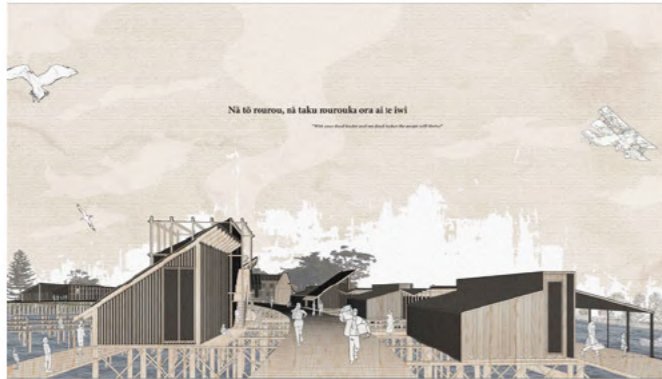
coastal edge

Draft Atmospherics.

Developed Wharf Design.

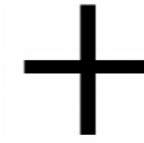
A series of clay renderings of the developed wharf layout exploring how the potential design functions as a working community, how it sits on site and impacts the surrounding environment, and what the interventions would feel like from the view of the inhabitants.





OF THE ENVIRONMENT

final design



Introduction.

| final design |



“The building is not an object, screaming for attention. It allows the environment to shape the experience with the building and at the same time the building shapes the viewer’s new interaction with the environment. It is mutual and not exclusive. This building is not a didactic structure; it seem to be of the environment rather than in contrast to the environment. This is the in-between; a building that is both aware of the natural and the built form. There is a complexity that is inherent in this type of relationship”

The final design for the Haumoana community is expressive of the values of the region, it utilises the built environment as a tool to strategically integrate the relationship between humans and nature, whilst the product of its response directly addresses the natural hazards prevalent on site.

To make this possible, the design has adopted the stilted technique that was initially applied to individual buildings, and expanded upon this to explore the potential of elevating a common wharf platform that buildings and community functions can operate atop of.

This chapter explores the macro, meso and micro scales of the intervention, reflecting the final outcome against the principles that have been established throughout this thesis.

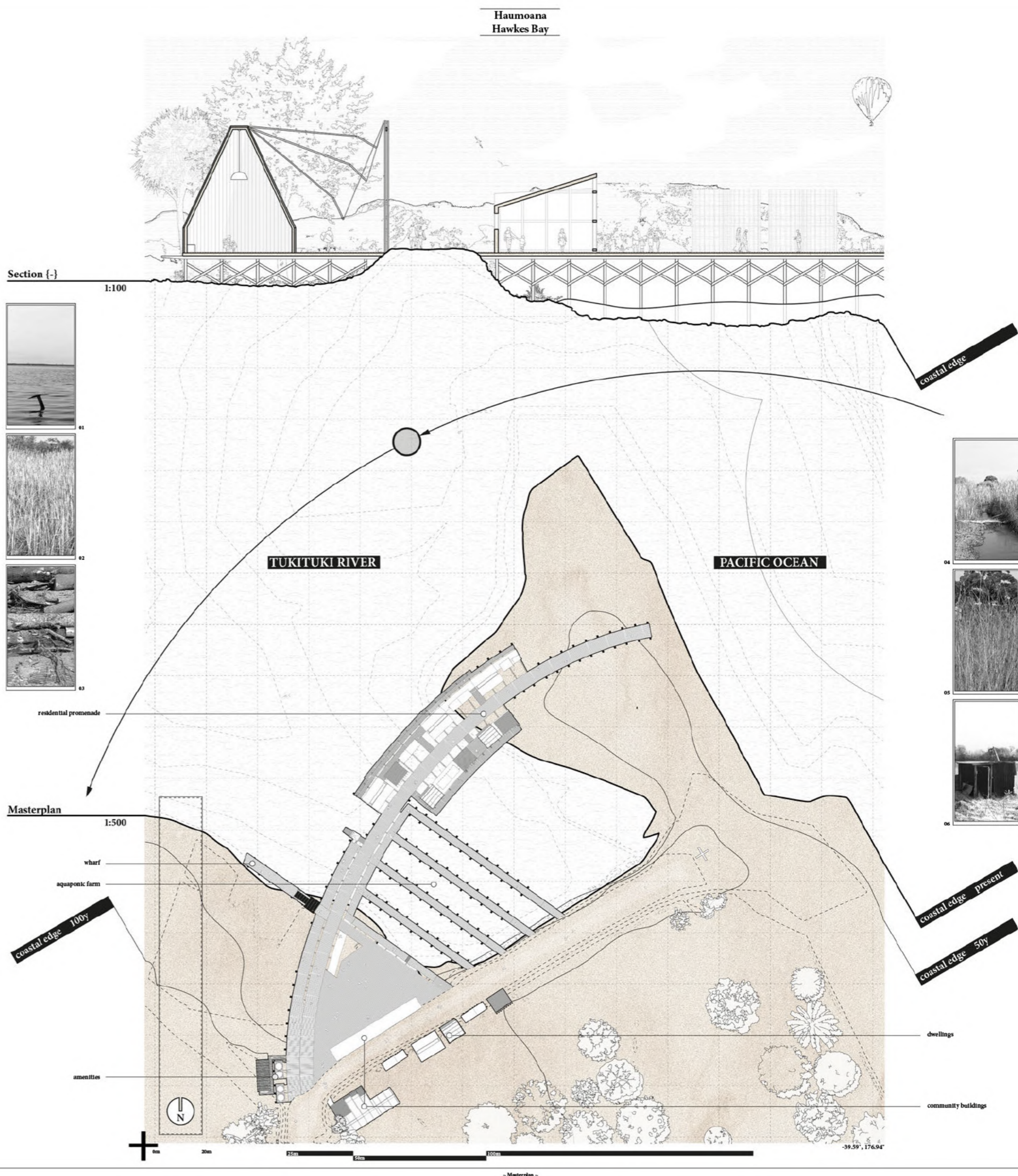
Final Master Plan.

At the macro scale, the design, curving with the flow of the river, sits delicately on the site embracing all aspects of its locale. Elevating the design assures maximum liveability without interrupting the natural processes of the river below.

The most robust part of the design, is the large open platform at the base of where the wharf structure and the stopbank meet. This is the most protected region of the site and as such, is home to the community buildings and amenities.

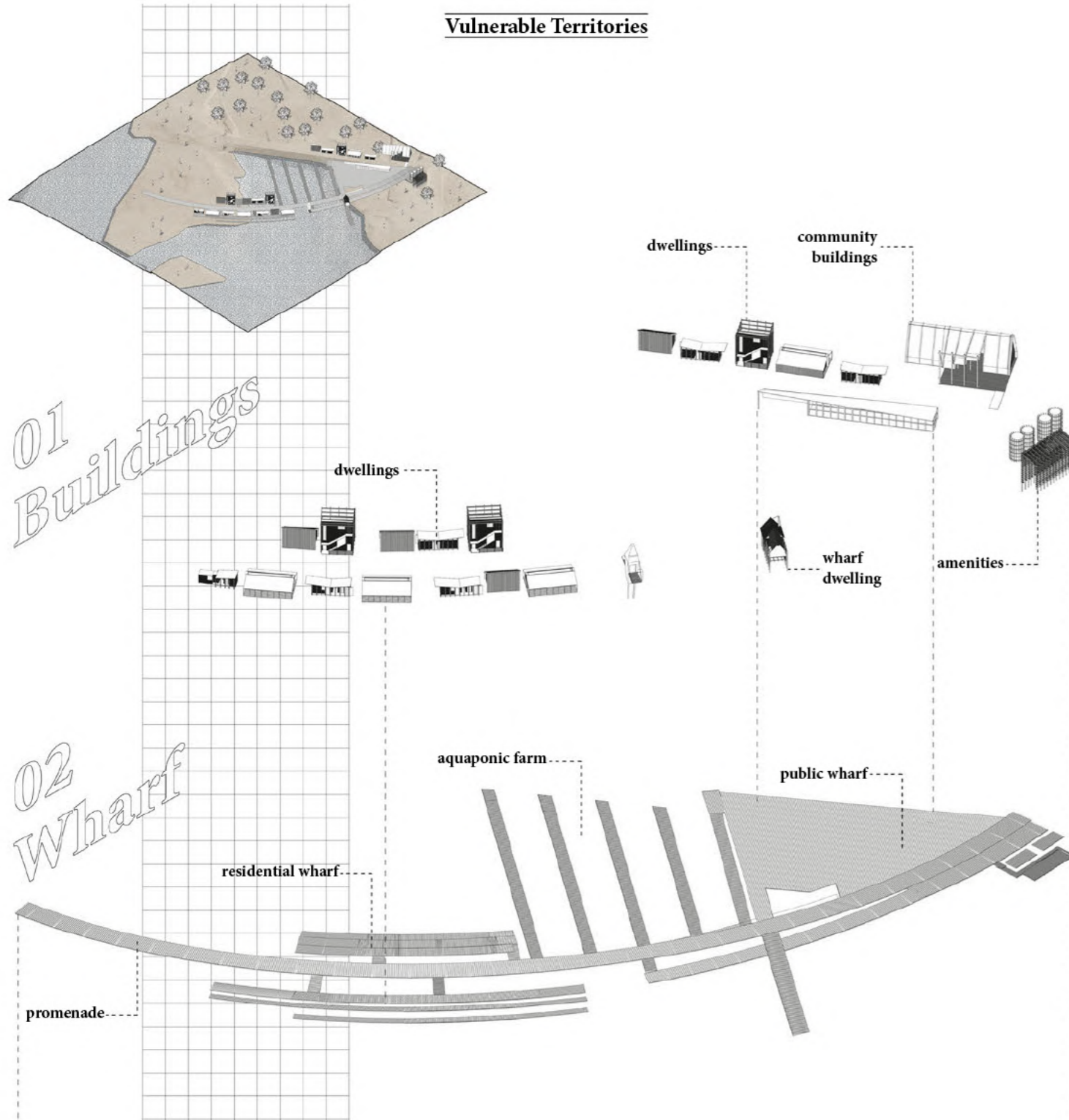
Being contained between the stopbank, gravel barrier, and the structural members of the promenade, the aquaponics / aquaculture farm sits low to the water and consists of four long piers overtop of the calm, nutrient rich waters of the river.

The dwellings exploit the true beauty of the coastal edge, they embrace the northern sun while having direct access to the waters below. Protected by the gravel barrier beach, with an incredible view over Hawkes Bay, the river, estuaries and the ocean, they undoubtedly redefine the definition of coastal living.



Exploded Isometric.

Final Wharf Design.



Buildings

A collection of dwellings, amenities and community buildings that house all the basic functions of the community. They are all of simple form and minimal footprint, ensuring they are easy to install or remove. The external dimensions are designed with the structural dimensions in mind to fit atop the marine poles perfectly, preserving stability and interchangeability.

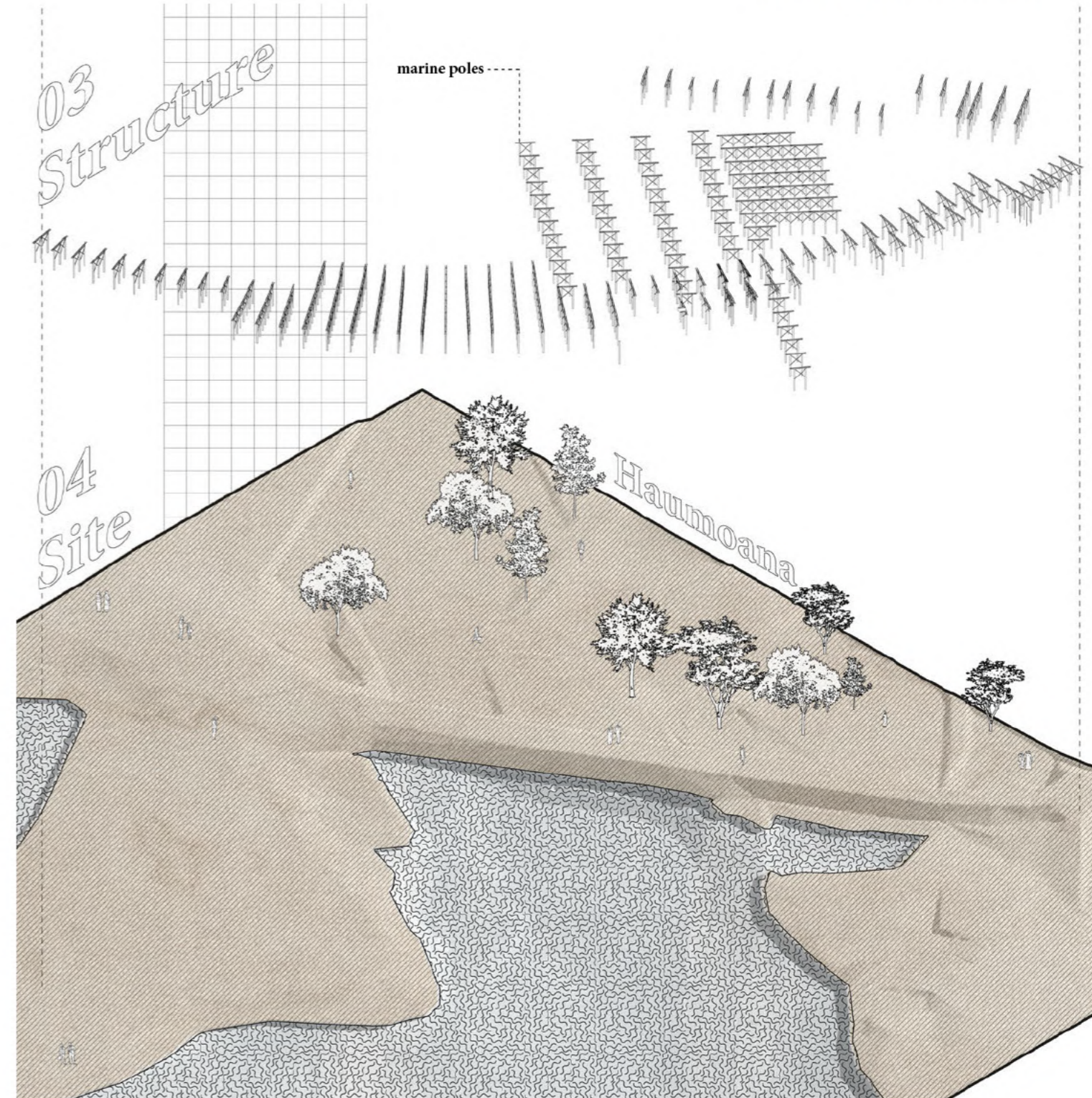
Wharf

The wharf acts as a base platform that connects all of the buildings and integrates community functions around the whole intervention. The wharf has multiple level changes for interaction with the natural environment and to promote access to the coastal edge.

Structure

A simple and efficient arrangement of marine poles with a traditional Asian joist profile.

The structure adopts the same installation method as the 'Black House' by George Hilgeholt. By vibrating the vertical members into the ground, the poles compact the earth and sediment around them to ensure strength without the need for digging or foundations.



Community Buildings.

Being larger than the dwellings, the community and amenity buildings are drawn back to the base of the where the wharf meets the stopbank ensuring that they are more protected from the hazards of the site, and act as introductory buildings that welcome the community and general public to the intervention

The buildings that were deemed essential to the design are:

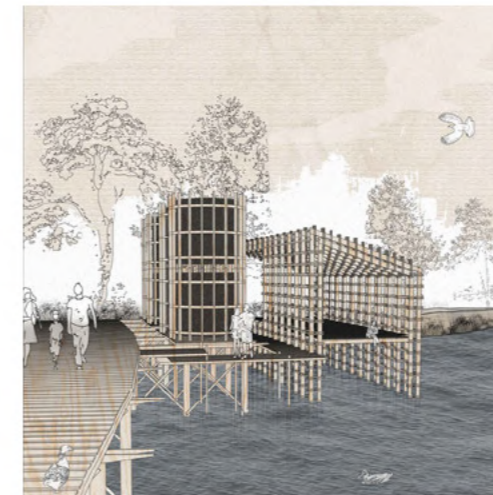
(01) A large community hall / events centre that opens to its own wharf platform that can double as

a gallery or performance space.

(02) A public wharf for mooring boats, access to the water for small boats, kayaks, Waka Ama and a place for fishing.

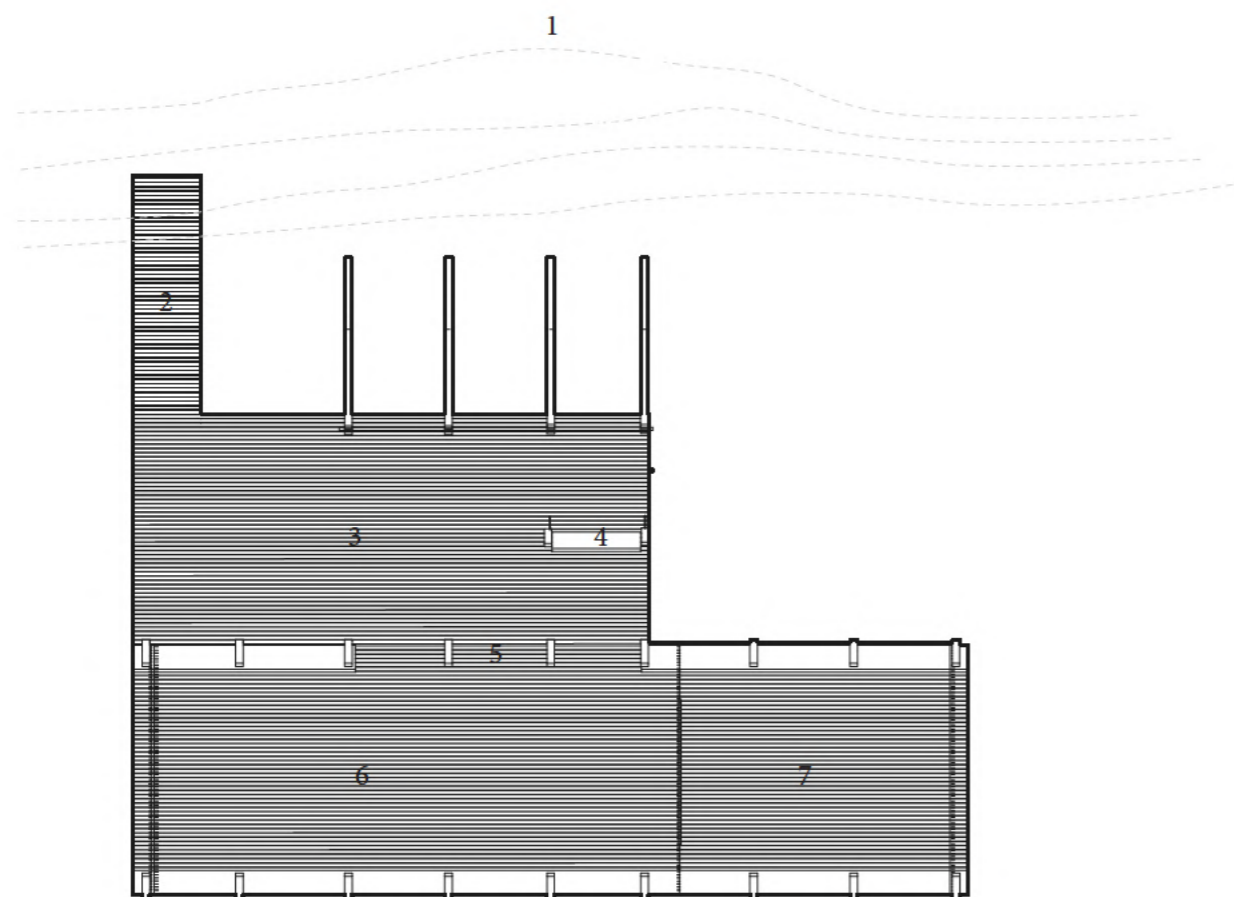
(03) Amenities buildings for housing fresh water supplies and the recycling of grey water through a greenhouse.

(04) A long and flexible spaced building that opens onto the communal wharf, intended for functions such as the weekend markets.





community building.



- 1 - stopbank
- 2 - wharf
- 3 - decked space
- 4 - opening screens
- 5 - transition space
- 6 - open hall
- 7 - enclosed hall

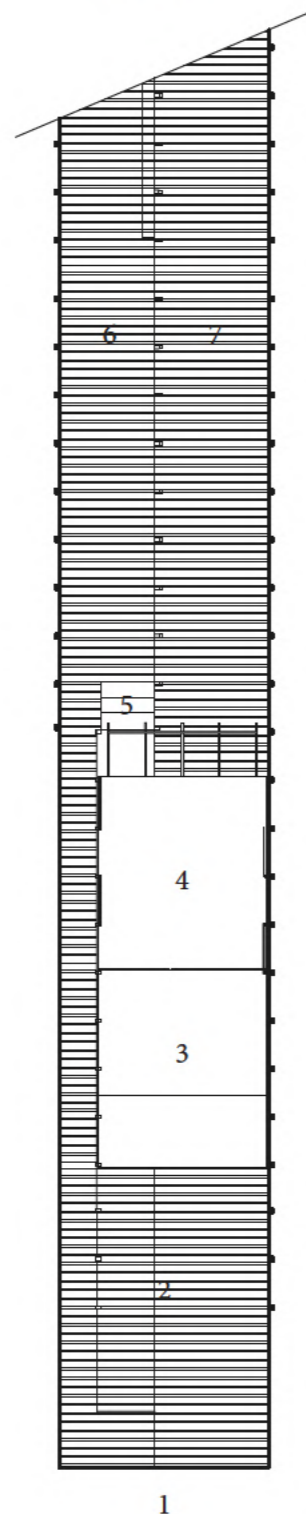
1:200

~ Whare Hapori ~





wharf.



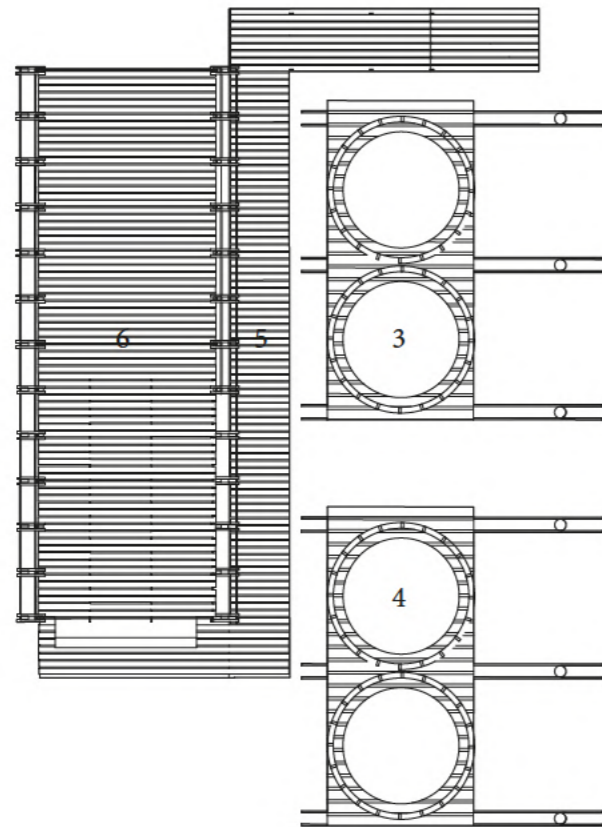
- 1 - promenade
- 2 - wharf
- 3 - wharf dwelling
- 4 - dwelling deck
- 5 - stair
- 6 - low pier
- 7 - high pier

1:200





amenities.



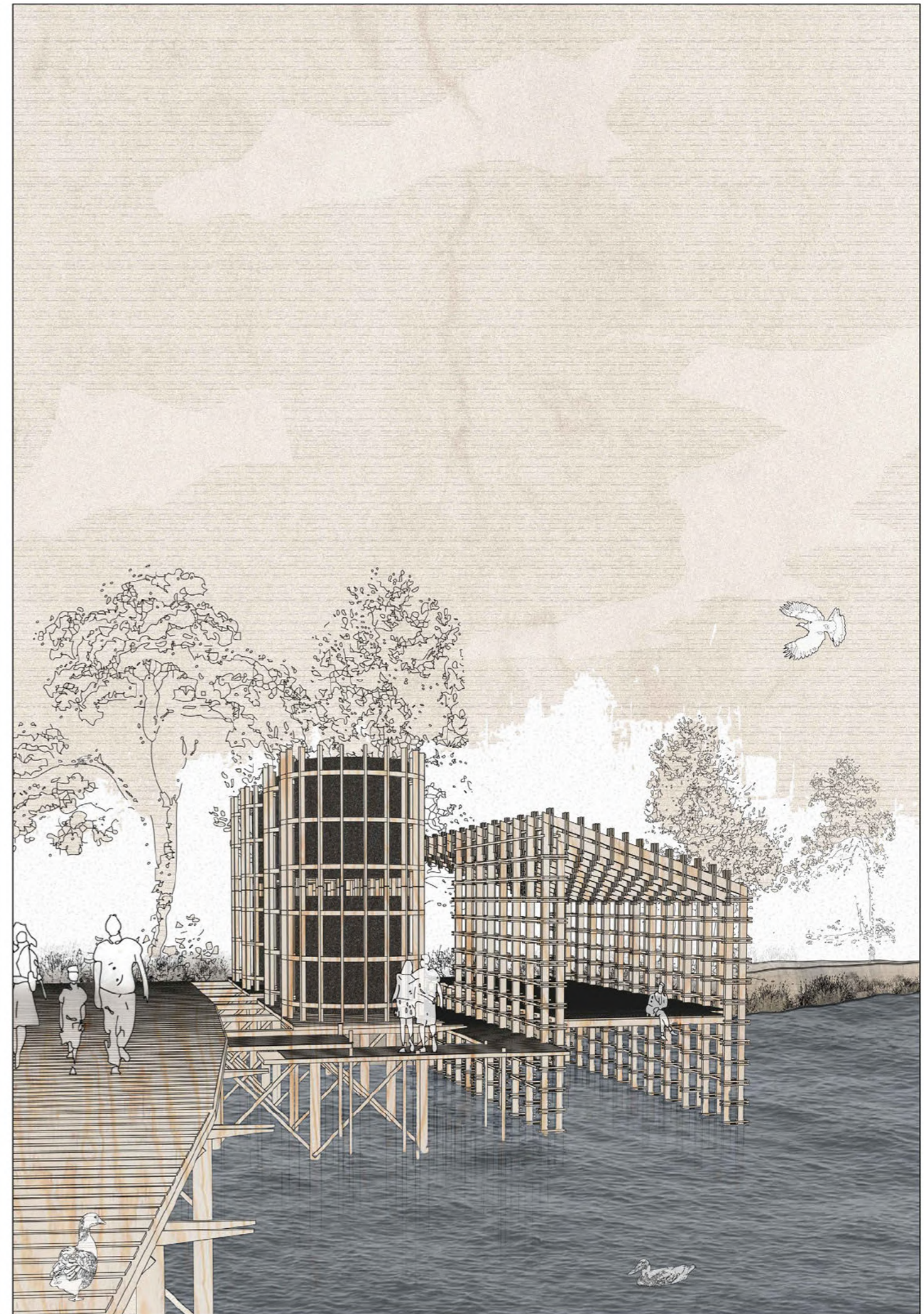
2

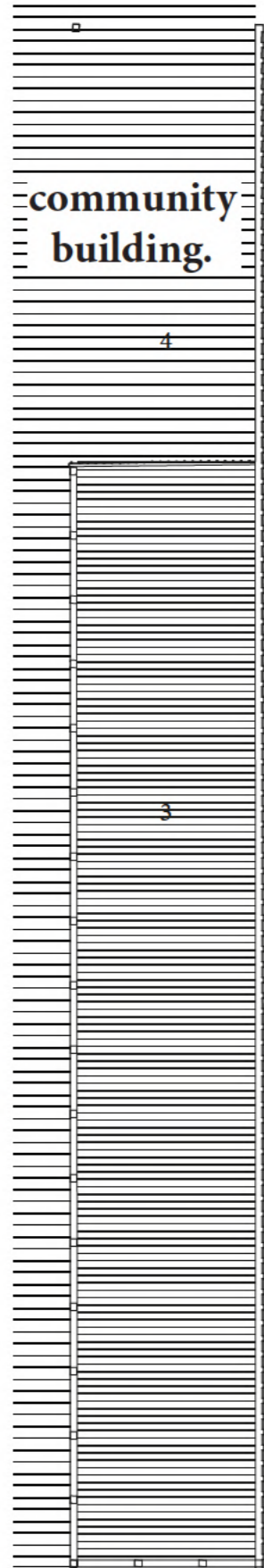
1

- 1 - stopbank
- 2 - wharf
- 3 - fresh water storage
- 4 - grey water storage
- 5 - walkway
- 6 - communal greenhouse

1:200

~ Haupa Whakaputu ~





1:200

- 1 - stopbank
- 2 - wharf
- 3 - flexible interior space
- 4 - covered area

~ Whare Hapori ~



Dwellings.

The design consists of a series of several buildings of varying formal qualities, but all aspire to follow the established principles demonstrated by the humble New Zealand bach.

While there are a series that attach themselves to the backside of the stopbank, the majority are situated out on the arcing promenade.

The dwellings are all connected by an access wharf running perpendicular to the main promenade. Additionally, in front

of all of the dwellings, there is a lower wharf that encourages communal interaction with the natural environment, providing access to the river and gravel beach below.

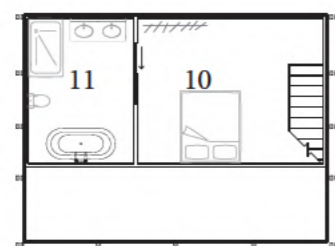
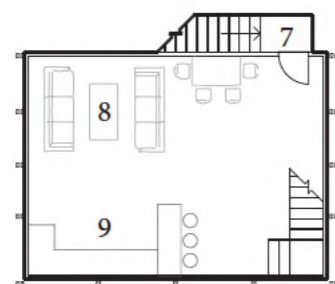
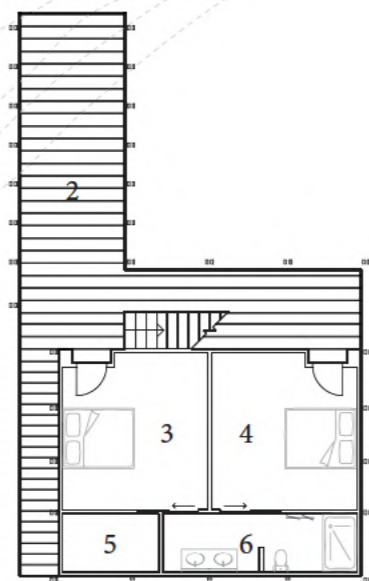
They will remain protected by the gravel barrier beach and clam waters of the river for the entirety of their expected life span, and because of their small scale and uniform shapes, they are designed to be easily dismantled and removed when required.





dwelling.

1



1:200

- 1 - stopbank
- 2 - wharf
- 3 - bedroom 01
- 4 - bedroom 02
- 5 - storeroom
- 6 - bathroom 01
- 7 - main entrance
- 8 - living / dining
- 9 - kitchen
- 10 - master bed
- 11 - ensuite

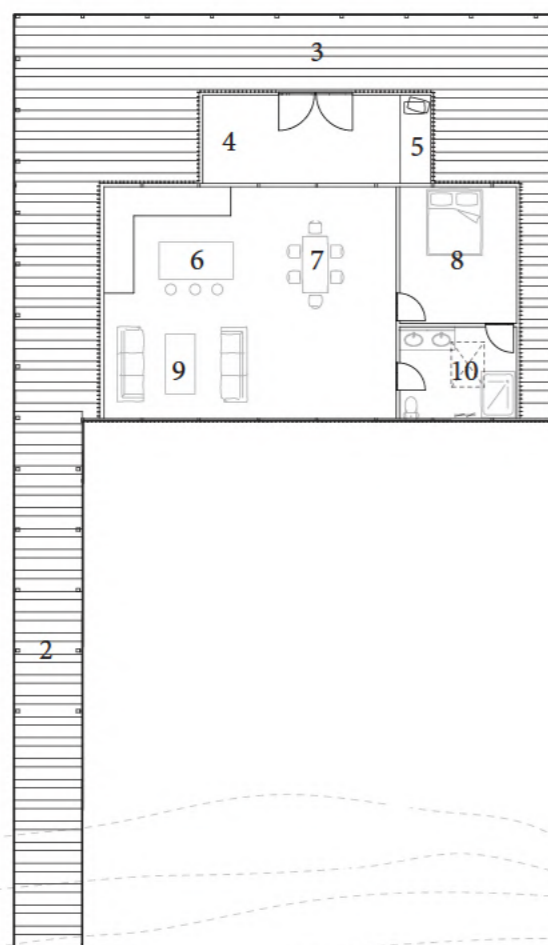
~ Kāinga ~



~ Dwelling ~



dwelling.

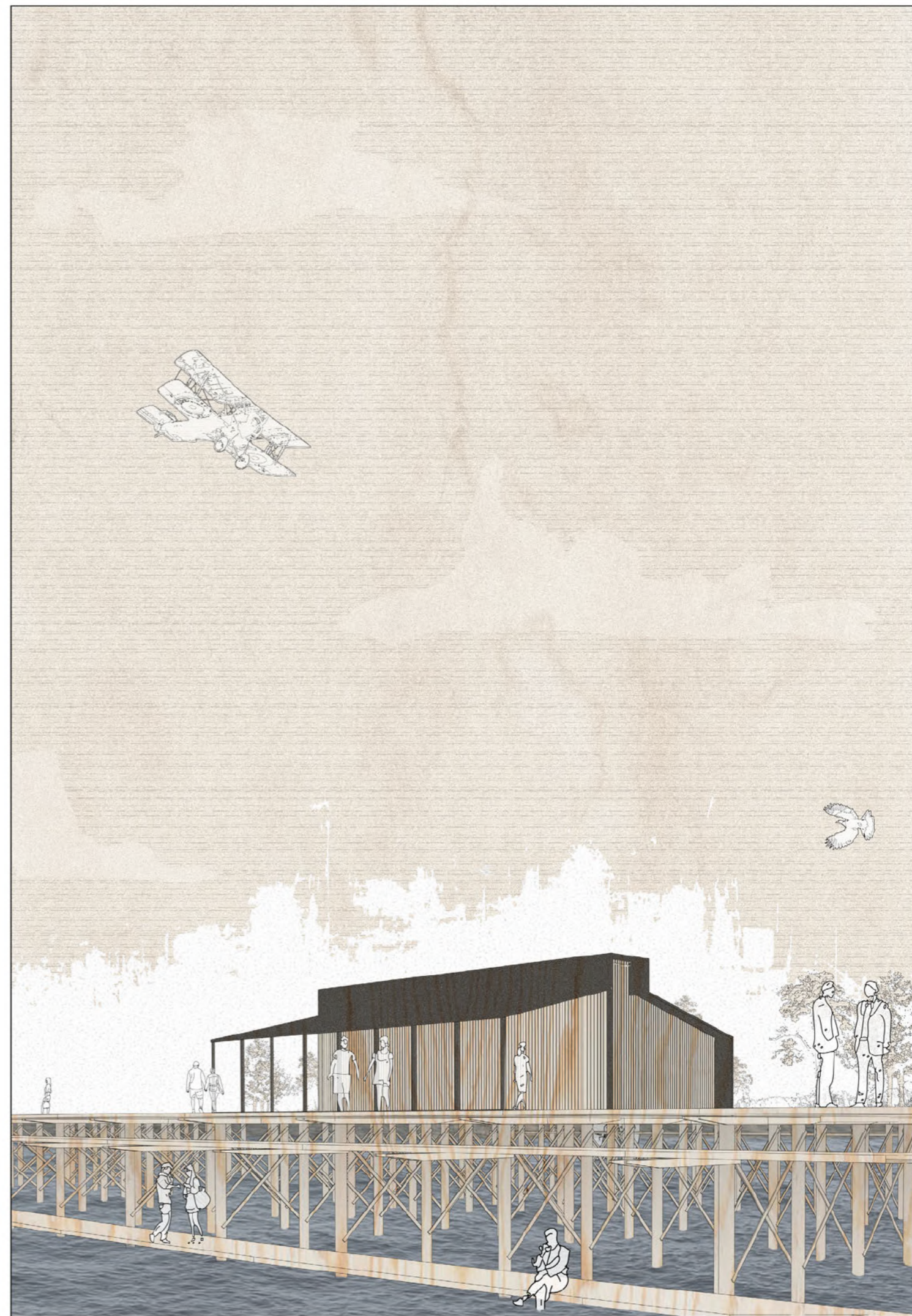


1

- 1 - stopbank
- 2 - wharf
- 3 - deck
- 4 - sun room
- 5 - sun bed
- 6 - kitchen
- 7 - dining
- 8 - master
- 9 - living
- 10 - bathroom

1:200

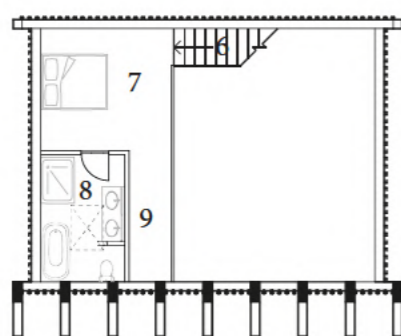
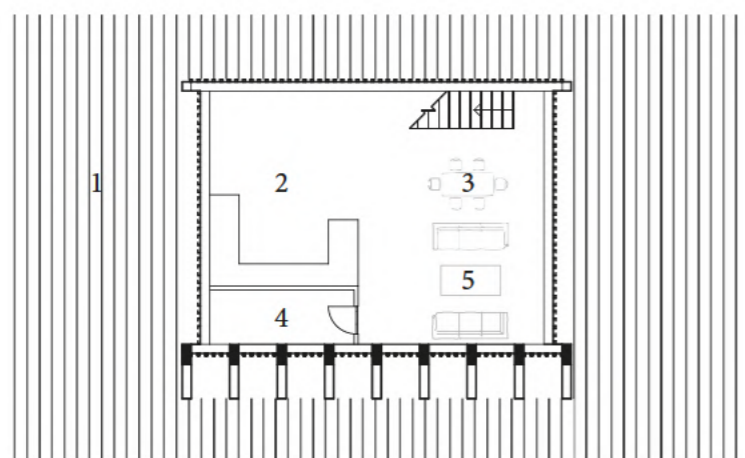
~ Kāinga ~



~ Dwelling ~



dwelling.



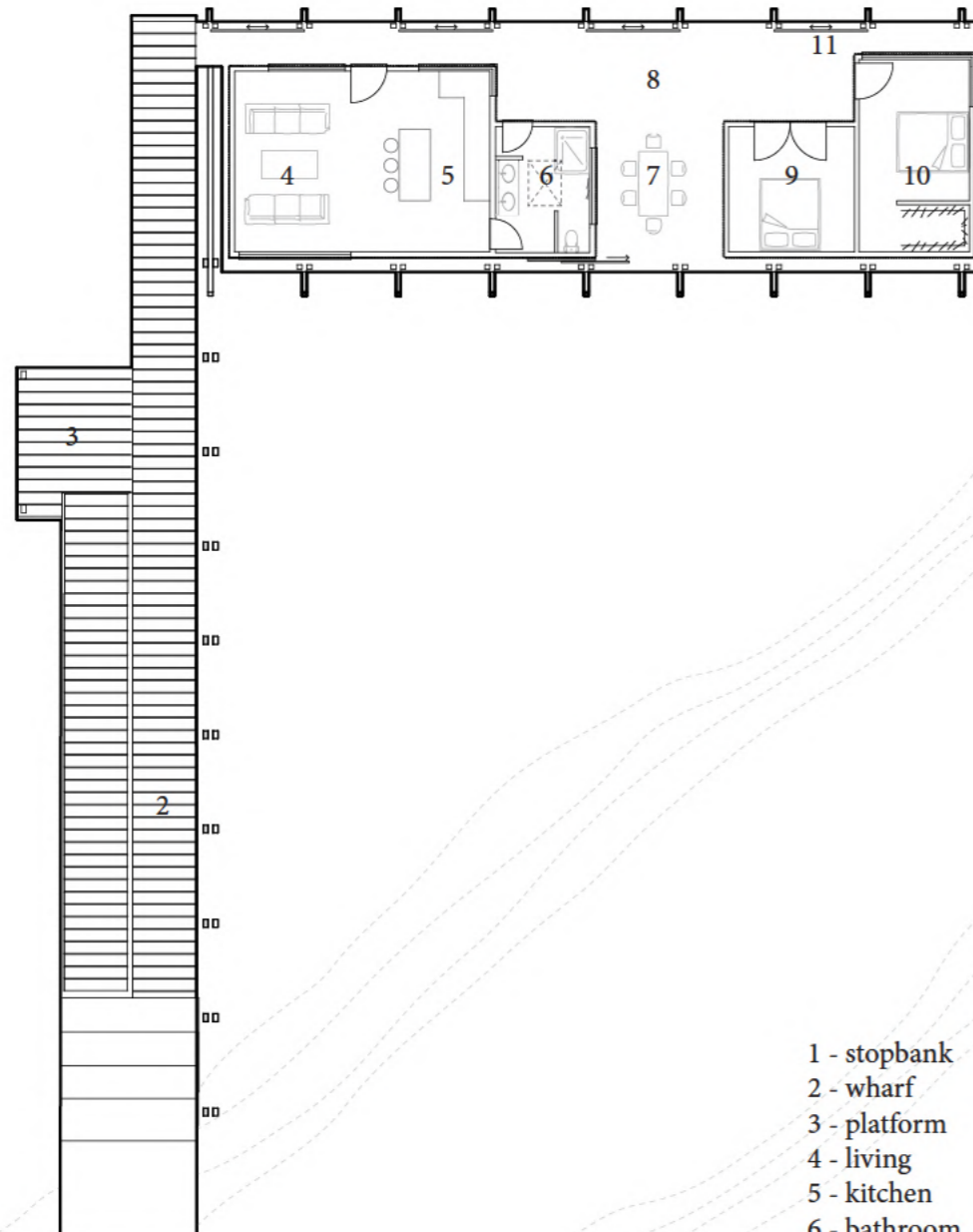
- 1 - wharf
- 2 - kitchen
- 3 - dining
- 4 - pantry / storage
- 5 - living
- 6 - stair
- 7 - bedroom
- 8 - bathroom
- 9 - mezzanine

1:200





dwelling.

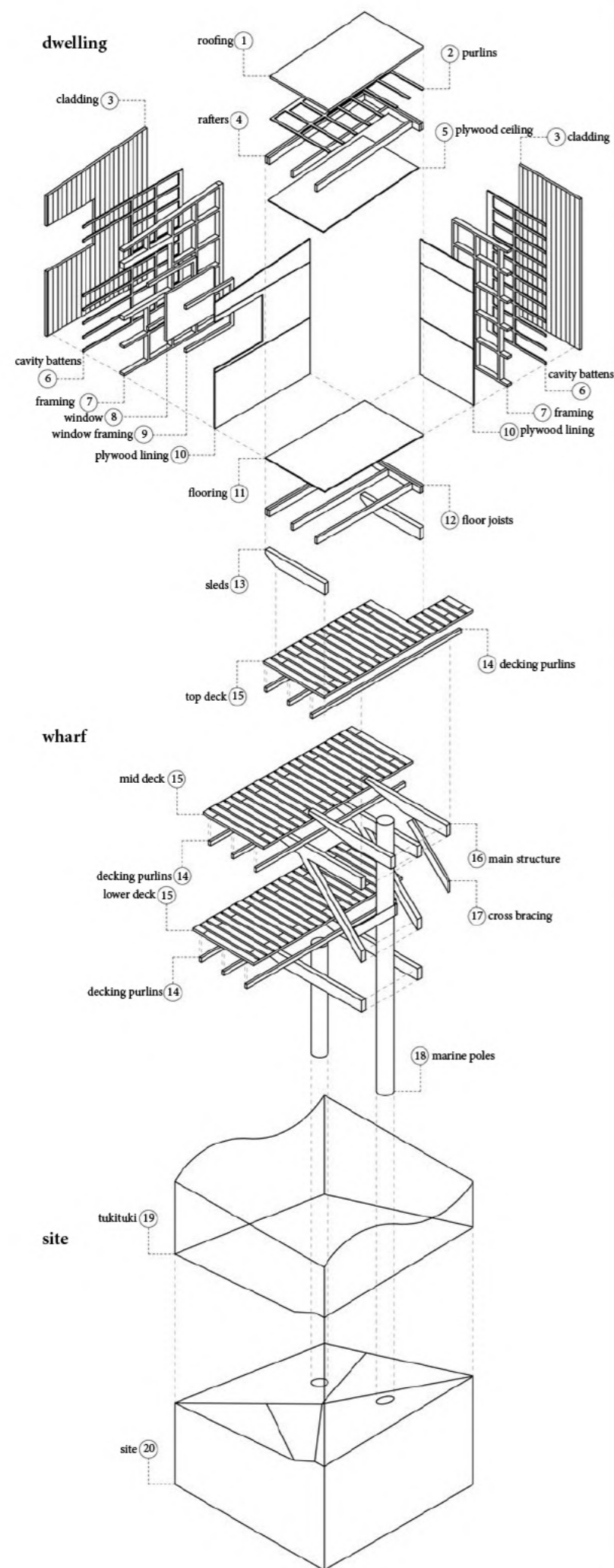


- 1 - stopbank
- 2 - wharf
- 3 - platform
- 4 - living
- 5 - kitchen
- 6 - bathroom
- 7 - outdoor dining
- 8 - deck/circulation
- 9 - bedroom 01
- 10 - bedroom 02
- 11 - shutters

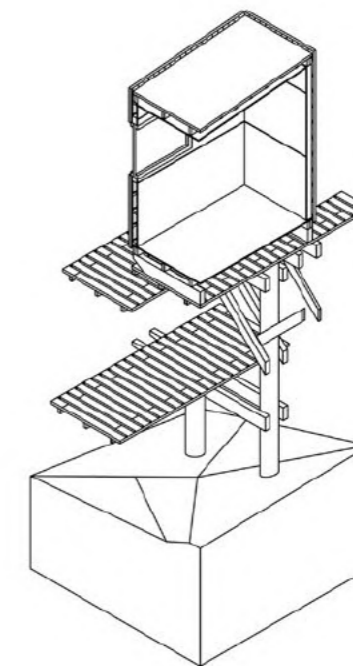
1:200

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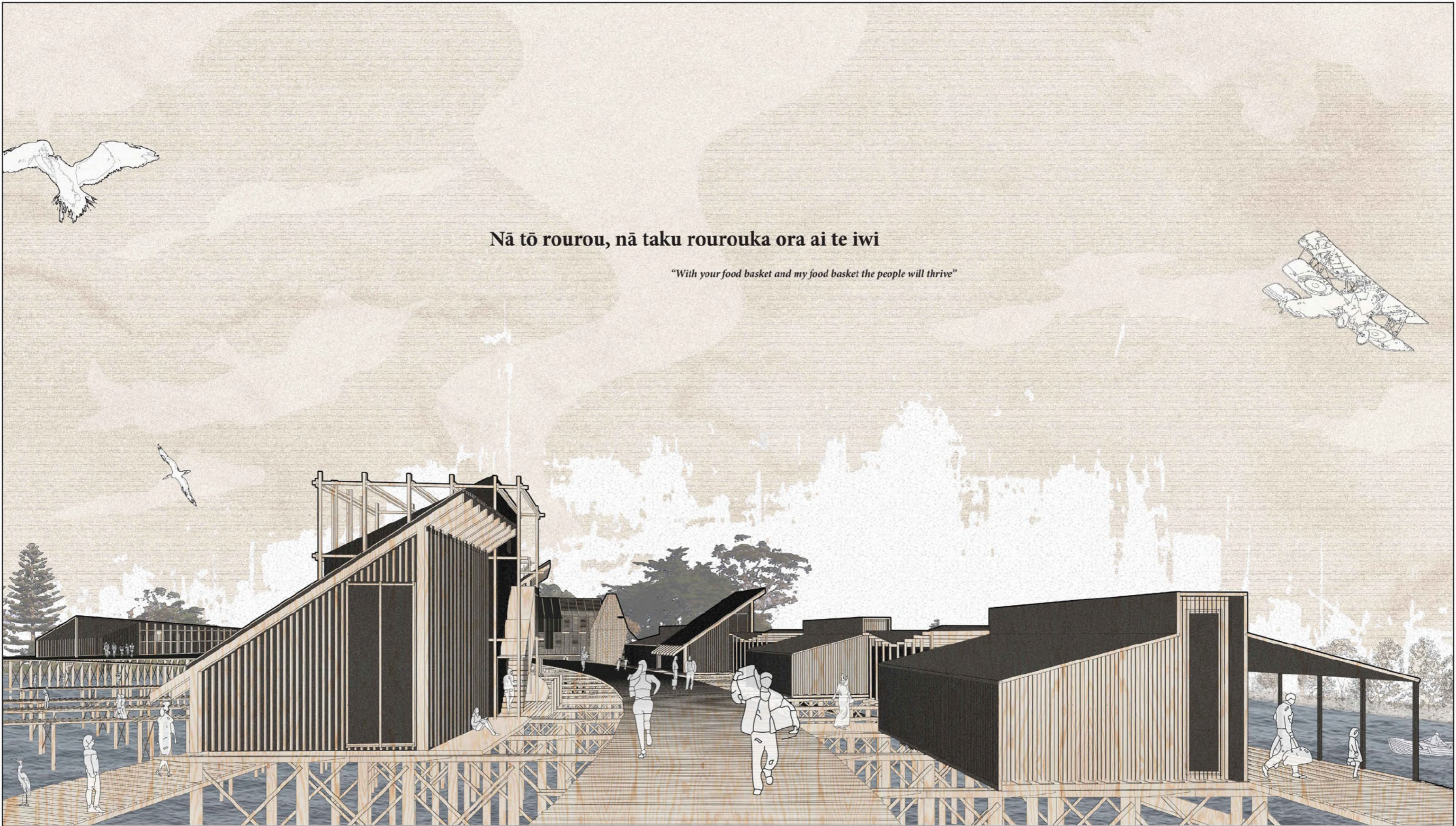


By investigating the intervention at the macro scale of the masterplan, the meso scale of the experience, and this micro scale of specified materials and finishes, the design further manoeuvres itself to the realm of possibility. All materials were heavily inspired by the established precedent material, along with hints towards the building methods of traditional stilted architecture.



- 1 - zincalume corrugate roofing
- 2 - 75 x 50 timber purlins
- 3 - 140 x 20 vulcan cladding
- 4 - 150 x 50 timber rafters
- 5 - 18mm plywood ceiling
- 6 - 45 x 25 cavity battens
- 7 - 90 x 45 timber framing
- 8 - double glazed windows
- 9 - aluminium window framing
- 10 - 12m plywood lining

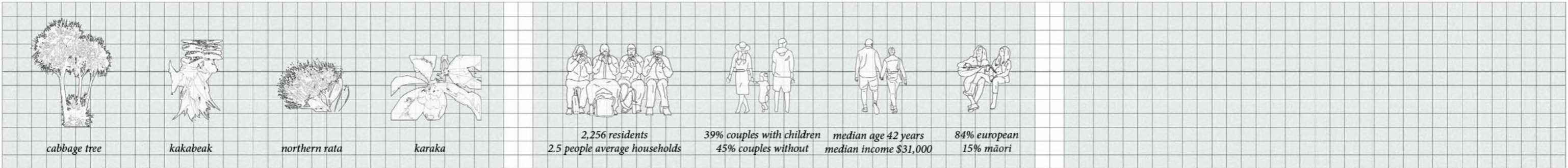
- 11 - 25mm plywood flooring
- 12 - 150 x 50 floor joists
- 13 - 300 x 100 timber sleds
- 14 - 90 x 45 decking joists
- 15 - 140 x 45 decking timber
- 16 - 300 x 100 timber structure
- 17 - 140 x 45 cross bracing
- 18 - 300mm H6 marine poles
- 19 - tukituki river
- 20 - site



Nā tō rourou, nā taku rourouka ora ai te iwi

"With your food basket and my food basket the people will thrive"

~ Residential Promenade ~



native trees

regional demographics

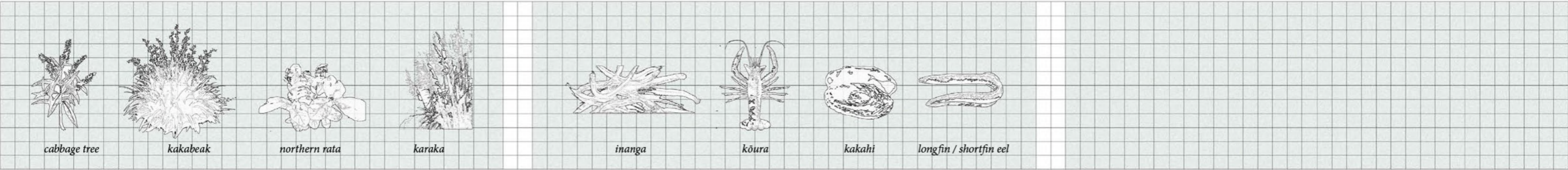
site textures

Heretaunga te Haaro o te Kaahu ki Tuawhakarere.

“Heretaunga ara
Heretaunga haukunui
Heretaunga haaro te Kaahu
Heretaunga takoto noa”



~ Aquaponic Farm ~



native shrubs

local aquatic species

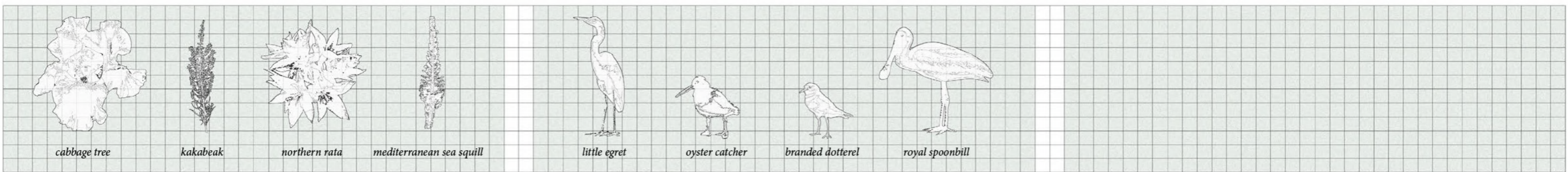
site textures



See Beyond the Horizon.

*"Heretaunga of a hundred pathways
Heretaunga of the life-giving waters
Heretaunga - the true beauty of which can
only be seen through the eyes of the hawk"*

~ Aquaponic Farm ~



cabbage tree

kakabeak

northern rata

mediterranean sea squill

little egret

oyster catcher

branded dotterel

royal spoonbill

exotic plant species

native bird

site textures



Cape Kidnapers

Tukituki River



~ Contextual Elevation ~



Te-Mata Peak

Haumoana Township

Havelock North

Full Site.



Physical Exploration.

Finally, the project was once again explored through the medium of physical modelling.

Beginning with a 1:500 representation of the entire proposed scheme. The model has particular emphasises on the affiliation between the built environment and the landscape it sits atop.

At the next scale, a 1:100 callout model demonstrating the relationship between two of the dwellings, the wharf surrounding, the structure that elevates it all,

and the territory that retains its dynamics.

Lastly, an intricately designed 1:25 scale model of the previous isometric section cutting through all aspects of the design, from dwelling to structure to territory.

This model places emphasis on the marriage between all the elements of the design vertically, the disparities and similarities between the enclosed private spaces and the more communal exterior territories.



1:500

Dwellings.



1:100

Detail Section.



1:25

NZIA Student Design Awards.

Jury Citation

Vulnerable Territories: The Perpetually Shifting Edge

“The thesis is a very timely response to a specific incidence of an increasingly urgent problem: the existential threat posed to coastal communities by sea-level rise induced by climate change. In a project that exhibits commendable ambition, and benefits from well-directed research into typological precedents, Joseph has produced sympathetic responses to the immediate environmental and social challenges facing the Hawkes Bay community of Haumoana. The scheme uses a coherent architectural language and demonstrates a sensitive appreciation of appropriate building scale.”

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Photos courtesy of David St George



NEVER FINISHED.
conclusions.

“A building is never finished; there is a life that goes on beyond our work on it”



Project Summary.

This thesis has dedicated itself to address the growing issue of sea level rise and the impact it has on the built environment of New Zealand. Drawing attention not only to the pressing hazards that coastal New Zealand communities are currently facing, but to the flaw of humans in the way that we have inhabited such delicate and dynamic landscapes by erecting structures of immense permanence.

The work covered has centred on developing the technique of stilted communities in response to these hazards. An approach that is foreign to any current coastal regions, but would allow the residents to maintain the luxury of coastal habitation while preserving

the surrounding environment. A technique that has the potential to allow for humans to co-habit harmoniously with the dynamic yet vulnerable landscapes.

Initially, this thesis explored the approach of elevating individual dwellings and community buildings above any potential threat from hazards, and for structural integrity they were anchored into the Tukituki stopbank. Upon reflection, the process of design deviated away from the individual stilted dwelling, into the examination of elevating an entire community.

Ultimately, the design of a full community wharf was conceived, establishing a base platform where all the essential functions

of a community can operate. The design off a full wharf allows the residents of Hamoana to continue to live and collaborate in a community that they love and the general public become encouraged to frequent the region more, all while maintaining an appreciation for the areas natural character and environmental processes.

The design of the structures, dwellings, and community buildings endeavoured to follow the design principles that are exhibited in the vernacular New Zealand bach, with emphasis on simple formal qualities, and expressed structural components.

- + To enable *enhanced occupation* of sites that are vulnerable to coastal hazards.
- + Establish an *innovative designed solution* that allows the continued habitation of the Haumoana coastline.
- + Demonstrate a *mutualistic* relationship between *nature and architecture*
- + Retain the '*natural character*' of Haumoana's coastal edge.
- + Use architecture as a tool to *harmonise* the *interactions* of man and nature.



Conclusion.

The final design is a product of both the design requirements derived from the response to hazards and demands of site, integrated with the design principles that were introduced through the study of precedent design and traditional typologies.

It has been iteratively developed through a systematic conceptual investigation, and continually reflected upon and tested through the method of physical modelling.

The thesis argues that the continued habitation of New Zealand coastlines vulnerable to sea level rise and its associated hazards (mainly erosion and inundation) is advantageous if the built environment embraces an adaptive approach to community design that allows nature to retain its natural dynamics and processes.

With the designed intent to explore the considerably radical approach of stilted the village of small houses and community buildings were designed to not only retain,

but enhance the natural character of Haumoana's coastal edge. It becomes just as much of a public experience as a functioning community.

Being home to the fastest receding coastline in New Zealand, this thesis focused on the Haumoana community to implement a design and test its findings. However, the potential applications of this design are not limited to the site that was explored. It was always intended that Haumoana would act as a catalytic site for a potentially transferrable design.

As the title of this chapter suggests, the design such as this is never finished. Permitted with the luxury of more time and scope, this project would next explore the idea of easily transferable buildings atop the wharf, with the potential for a customisable or kinetic design that could be manipulated efficiently depending on the community's needs.

It would then continue on to address the applicability of similar

designed interventions in similar vulnerable coastal environments around New Zealand such as the Coromandel or Dunedin. The project would assess what factors of the design could remain, what would change, what effect such a design would have on the environment and community.

There are some fundamental limitations to a project such as this. The architectural process and outcome followed was of personal preference, and while it was presented as a potential final intervention, design will always be open to individual interpretation, therefore many aspects of the design could take all manner of alternate forms.

It is for that reason that this thesis paid particular attention to the issues raised surrounding the current recommendation's for coastal management in New Zealand. There remains no sensible argument for the continuation of coastal habitation without an adaptive and alternative architecture.

~~"I've said goodbye to the overworked notion that architecture
has to save the world"~~
Peter Zumthor

Closing Statement.

Architecture is a multi-disciplinary field, as an architect, you must be acute to all aspects of the world, be it religious, political, environmental or any other manner of things. We are privileged enough to be in a position where the architectural community contains a diverse breadth of knowledge, creativity and influence, three things that can change the world as we know it.

It is then, in my belief that as architects, be it students, graduates, or professionals, have a responsibility to continually strive towards the creation of a superior world.

We have seen the power of architecture throughout society. Just as we often take influence from other art forms, many walks of life draw inspiration from architecture. With every small change that the built environment makes, other aspects of society will follow, with this, architecture can be the catalysts to a sublime future.

We do not *have* to save the world, but we should *want* to, even if its just one small coastal community at a time.

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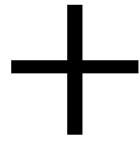
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“It’s kind of fun to do the impossible”
Walt Disney