He Puna Wai-Papa-Ora | Emergent Ecologies Lab

[Whanaatahi to be rhythmical]

Figure 1: [COVER] Crescent Moon by manuelhuss

Manawataki ...
to be rhythmical

Yenegh Badimayalew

2022

Huri Te Ao Hoahoanga | School of Future Environments
Te Ara Auaha | Faculty Design and Creative Technologies

An exegesis submitted to Auckland University of Technology in (partial) Fulfil-

ment of the requirements for the degree of
Master of Architecture [Professional]

Attestation of Authorship

I am the sole author of this thesis, except where due acknowledgment is noted.

I also affirm that no part of it has not been submitted previously to qualify for any academic endeavour. It is a true copy, including any required final revisions, as accepted by the examiners.

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Signature

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Date

Abstract

In a bid to forge new ways to coexist with natural ecosystems, this work seeks to find alternatives for shelter that will meet all the needs of the people of Te Arawa and their cultural imperatives to maintain mauri ora or holistic wellbeing. This research explores an intensive, interlinked housing alternative model for Te Tatau o Te Arawa in Rotorua.

It asks, *"How might the Maramataka of Te Arawa be applied as a socio-cultural-ecological design driver for developing holistic housing that supports Mauri Ora [wellbeing]?"*

This work presents a challenge to the endless proliferation of suburbia with little or no consideration extended to the knowledge held by indigenous people who have an intimate understanding of the environment. The shortage of housing and the search for alternatives has prompted the focus on indigenous theoretical and methodological approaches for designing dwellings for all who inhabit the planet, human and nonhuman alike.

The research and the resulting proposal posits the value embedded in two world views: the environmental pattern

language of the Maramataka of Te Arawa and biophilic design. It utilises a Mauri Ora holistic wellbeing compass to bridge the gap.

This exegesis is a practice-based research project exploring how time exists for Māori through the Maramataka. This research speaks through the worldview of an Amhara/Ethiopian woman.

It considers the significant importance of indigenous knowledge. It examines the opportunities ahead that are possible through honouring the indigenous knowledge and those that protect and pass it down to generations.

By proposing an interpretation of this knowledge and reclaiming space for living in alignment and harmony with nature, this research reflects on reconnecting the people with their heritage. It suggests a sustainable means of inhabiting the land guided by an indigenous framework that helps to establish architectural and urban design perspectives.

Keywords: Maramataka, engawa [lanai], food forests, systems thinking, phasing, reciprocity, Architecture

Contents

Who am I?

While writing this thesis, identifying oneself and acknowledging others played an essential part in the process of whakawhanaunga (connectedness) or relationship building.

For this reason, crafting an expression of who I am in my language has helped me develop one in Te Reo. I offer this in Amharic, Te Reo and English.

እኔ ማን ነኝ?

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He Pepeha?

Ko Yeneghkokebe Kesatebirhan Badimayalew toku ingoa No
Ethiopia ahau. Kei Stanley Bay taku kiānga. Ka haere au ki Maunga
Takarunga raua ko Maungauika ki te rongo kaha. Ka haere au ki te
moana o Ngataringaringa kia kaha taku mauri. I tipu ake ahau ki
Addis Ababa Ethiopia. No Gojjam me Affar oku tupuna. I te taha
o toku Matua no Bure ahau. I te taha o toku Māma no Debete
Mariam ahau. Ko Daniel taku hoa tāne. Ko Dawit raua ko Siyadae
aku tamariki. Ko Amhara te iwi. Kua mutu aku kōrero I tēnei wā,
nō reira, e te Kaiako, e aku hoa mahi.

Tēnā koutou, tēnā koutou, tēnā tātou katoa.

Who am I?

My name is Yeneghkokebe Kesatebirhan Badimayalew. I am
Ethiopian. I live in Stanley Bay. I relate to Mount Victoria and North
Head, known to Māori as Takarunga and Maungauika. I have lived
in and around Ngataringa Bay, and I draw my strength from this
area. I grew up in Addis Ababa, Ethiopia, and my ancestors are
from Gojjam and Afar. On my father's side, I am from Bure. On my
mother's side, I hail from Debete Mariam. I am married to Daniel,
and Dawit and Siyadae are my children. I am of the Amhara tribe.

The above is my introduction, and I acknowledge our teacher,
greetings to all.

Acknowledgements

I wish to acknowledge the contributions of others in this work.

Firstly, I would like to acknowledge my supervisor, Associate Professor Amanda Yates and co-supervisor, Professor Charles Walker. They helped me identify the intricacies of this research approach and challenged my perception of architecture and what it can be.

I must extend my gratitude to Senior Lecturer Andrew Burgess for the encouragement to challenge the norm. He inspired me to question how architecture and urban planning occur in ways that are not always mutually beneficial to the natural environment.

I also extend my gratitude to Te Tatau o Te Arawa for the collaboration and feedback provided during the development of this work. Central to this project is Te Maramataka o Te Arawa 2021-2022, shared by Ngā Pātaka Kōrero o Te Arawa. I am grateful to Jade Kameta for the interview and knowledge sharing for this research.

I am thankful to my mother, Bazgenawork W/Medhin, and my father, Kesate Birhan Badimayalew, for the way

He Puna Wai-Papa-Ora | Emergent Ecologies Lab

This exegesis has been developed as an initiative of He Puna Ora, the Regenerative Action Lab at Huri te Ao, the AUT School of Future Environments.

This research is part of a collaborative group studio called He Puna Kāinga-Ora Urban Wellbeing Lab. This postgraduate research lab focused on holistic wellbeing at a housing and neighbourhood scale.

The work in this lab consisted of research conducted both individually and collectively to advance shared research focused on holistic socio-cultural-ecological wellbeing in terms of housing and neighbourhoods.

Te Tatau o Te Arawa is a pan-iwi governance group linked with Rotorua City Council. It is the founding partner for this Urban Wellbeing Lab. Established in 2015, Te Tatau o Te Arawa represents Te Arawa iwi or kinship groups. Te Tatau works with Rotorua Lakes Council to achieve enhanced socio-economic and cultural prosperity for Te Arawa, for Māori and the broader community in Rotorua.

Key Te Tatau briefing documents are the 2050 Te Arawa vision and the Te Tatau Housing Wellbeing compass form the genesis of this thesis.

Finally, this postgraduate lab links with the National Science Challenge urban wellbeing research programme (Huritanga) led by AUT's He Puna Ora Regenerative Action Lab.

The work conducted in this postgraduate lab occurs then at an interface between national co-creative and iwi-partnered research and the transformative focus of Huri Te Ao, the School of Future Environments.

Figure 2: [IMAGE] Aerial view of Rotorua Craters of the Moon, New Zealand

Preface

The thin line between life and death is still under construction (Kalwar, 2011).

To live in Aotearoa (New Zealand) is to become part of a diverse and nuanced people with interweaving histories that influence how we relate to the natural environment.

Aotearoa is full of natural amenities increasingly infringed upon by the built environment. Much of Aotearoa's contemporary architecture has a colonial source and is developed within a colonising framework, as is the case for many settler-colonial countries. However, I had heard of Māori culture before I arrived in Aotearoa and was curious about pre-colonial life. At that time of climate emergency, I was interested in why the lead author of the Intergovernmental Panel on Climate Change, Professor Bronwyn Hayward, called for a more indigenous influence in the design of our cities to mitigate ecological destruction (U.C. Connect: What Does the New IPCC Climate Report Mean for Our Cities? - YouTube, 2022).

What would Māori architecture have looked like if it were able to thrive? What could other indigenous cultures learn

from Māori architecture? The answers to these questions fuel my curiosity and encourage more research.

My architecture experience in New Zealand kicked off amid the weather tightness crisis that started in the 1990s.

As a drafting assistant working for a small architectural firm that focused on weather tightness remediation in August 2007, I got a view right into the inner workings of construction practices. In terms of my work, I was very enthusiastic. However, this was in sharp contrast to the anguish homeowners went through as they realised their leaky homes would cost them more than they ever imagined.

I learned an immense amount about remediating construction faults; however, it was unclear why so many houses were performing poorly at that time.

After two and a half years, it was time to start a journey of inquiry into why we collectively made so many errors in deciding how we built houses.

Fuelled by curiosity, a Bachelor of Architectural Studies became a chance to learn more about architecture in New Zealand. I understood that the history of land

occupation and housing development in New Zealand has gone through many significant changes in the last two hundred years [1]. In recent years, the importance of Te Tiriti has become more and more apparent through my professional practice and social engagement.

Today, I understand that Te Tiriti stands as a possibility for a bright future if realised. It might facilitate a more sustainable approach to help us remediate how we live on this land.

I have looked to Te Kawenata o Rata, a values-based agreement signed by Ngā Aho and Te Kāhui Whaihanga New Zealand Institute of Architects (NZIA), based on five articles as an example of how to approach architectural design across cultures (Te Kawenata o Rata, n.d.). These values include: Whakaritenga (Respect), Rangatiratanga (Authority and Responsibility), Mātauranga Whaihanga (Knowledge and Tikanga), Mahi Kotahitanga (Co-operation) and Kanohi Kitea (Representation)(te Kāhui Whaihanga New Zealand Institute of Architects & Ngā Aho, 2017)[2].

1 I knew that a Treaty of Waitangi (Te Tiriti) existed; however, little or no mention of it occurred while studying architecture. This reality explained why the built environment did not reflect indigenous values.
2 These values are now filtering through to professional practice as they should have been from the beginning.

The research for this exegesis occurs within a research lab (He Puna Ora: Regenerative Action Lab) that is a partnership between a Māori research leader and Te Tatau o Te Arawa. Underpinning my involvement in this research is the commitment to engage with Mātauranga Māori as a Tiriti partner without misappropriation[3]. The He Puna Ora Action Lab seeks to generate research that meets Te Tatau's interests in papakiānga and housing development and the Mauri Ora tool co-created between Te Tatau and He Puna Ora: Regenerative Action Lab.

In part one of this thesis, I describe the harm we collectively witness due to the current climate crisis. I look at an alternative to the Anthropocene through understanding the concepts of the Ecocene and what it could mean for architecture in New Zealand. Since the Pacific is subject to shifting landscapes and movement just beneath the Earth's crust, I propose an architecture that follows suit, moving with time, able to rise and fall as required. I introduce the principles that underpin the Māori environmental pattern language, the Maramataka, from which Māori get their environmental

3 Within this research, I have interviewed Jade Kaemata to formally ask to use his research of Te Maramataka o Te Arawa, this is attached in the addendum.

cues and dwell on the land accordingly. The main focus of this research is the Maramataka as it applies to Rotorua. Te Maramataka o Te Arawa, authored by Ngā Pātaka Kōrero o Te Arawa(Ngā Pātaka Kōrero o Te Arawa, 2021) is the guiding document for this research. I am in gratitude and appreciate having the use of this knowledge.

In part two, I explain the perspective shift I have experienced through this research. I explore how designing a brief with the natural environment at the forefront on an equal footing with humankind can be an act of defiance against the status quo. This part will also describe the selected research approach. It will cover other projects worldwide that propose new ways to coexist with nature and tackle climate change.

Part three will explore the challenges I encounter as I attempt to find a bridge across the various aspects of architectural practice today and how it applies to a Māori worldview and vice versa. I explain the research method using the Mauri Ora Holistic wellbeing navigator as an indigenising tool. I will outline the final project

brief and objectives that have led to the final design outcome[4].

In part four, I put forward the final design that I believe might inspire hope for the future. This thesis presents design research exploring architecture and what it could be if its frame of reference included the natural environment as its leading agent.

By exploring housing development trends, this work presents an alternative architectural proposal that considers more-than-human requirements while designing spaces for living[5].

For Māori, the voice of the environment is captured and passed down through generations with the Maramataka. This record, captured through observation and oral history, frames the pattern of the natural environment. The Earth, the Moon, stars, and the Sun exist within the world of Māori knowledge differently from Western Earth Sciences.

As a counterpoint, western philosophical and architectural knowledge about the nature of human-centred design

4 As non-Māori, selecting this research approach provided secure inquiry into Mātauranga Māori and provided the confidence I needed to progress the work involved.
5 Reframing the design brief from the perspective of humans and nonhumans as the same entity includes the often-forgotten voice of the environment upon which all living things rely on to thrive.
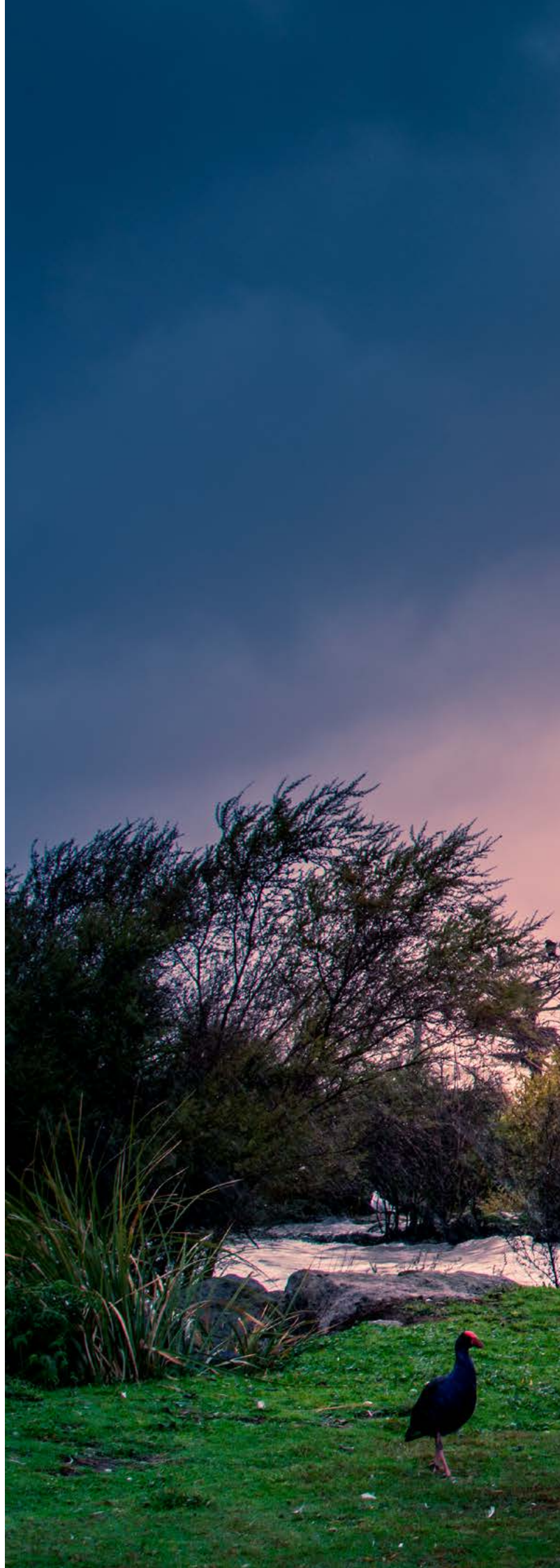
has played a formative role in the resulting outcome. By proposing an interpretation of indigenous knowledge and reclaiming space for living in Te Arawa, this research reflects on reconnecting the people with their heritage, thereby suggesting a sustainable means of inhabiting the land from an architectural and urban design perspective.

Part five highlights outlines the scope and limitations of this thesis and summarises the findings attained through research.

It also outlines the answer to the thesis question with the hope that from this work future research can be undertaken to find housing solutions for other indigenous communities.

The hope is to approach design practice through developing local tools that can enable the actualisation of positive place-based outcomes crafted with native voices at the forefront.

Figure 3: [RIGHT] Stormy evening over lake Rotorua. A seagull struggles against strong wind by Irina B

Part 1. Loss

● Part 1 - Loss: How did we get here?

● Introducion — Propose a place-based housing development alternative for Te Tatau o Te Arawa

Holocene

● Research Focus — Environemental Pattern Languages

Anthropocene

● Te Maramataka — Te Maramataka of Te Arawa

Ecocene

● Aims and Objectives — A place-based rhythmical architectural response

• Scope — **Te Maramataka o Te Arawa 2021-2022**
Te Arawa Vision 2050 (2020)

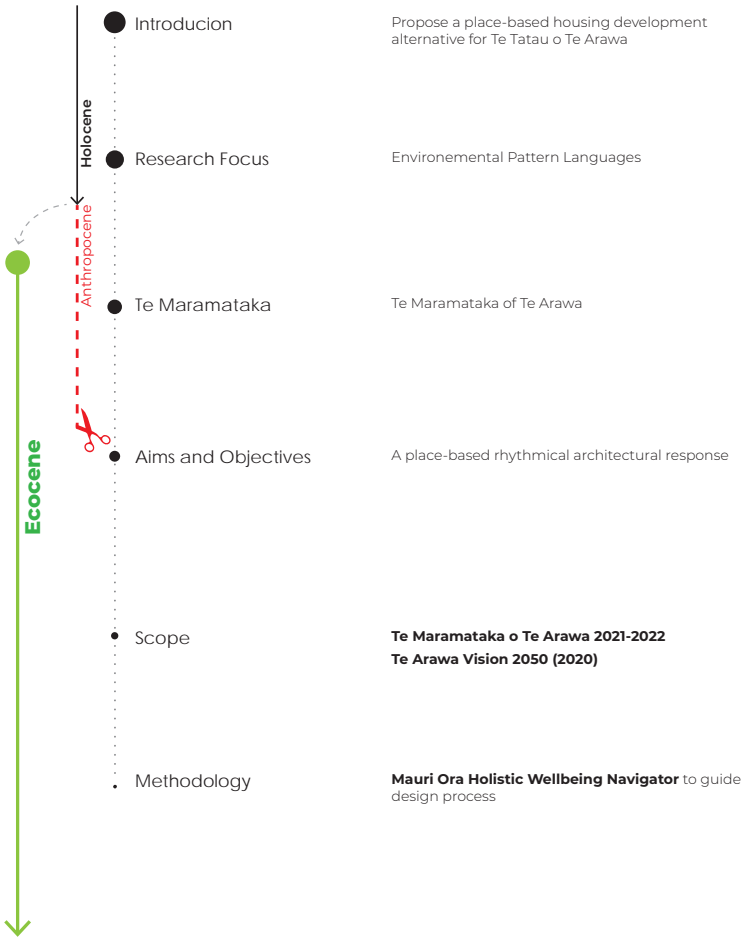• Methodology — **Mauri Ora Holistic Wellbeing Navigator** to guide design process

Figure 4: [ABOVE] Thesis diagram for Part 1

1.1. A planet with a people problem

It is easy to imagine that the cities we live in today have always existed the way they have. In fact, the current norms of highly extractive, resource-consuming, polluting cities are a recent phenomenon, an acceleration of ecological destruction.

Humankind now exists as a geological change agent through irreversible ecological imprints that significantly impact all the natural systems that sustain life. Researchers Mathew Lawrence and Laurie Laybourn-Langton state that the violence of the accelerated breakdown of the environment disproportionately affects those least responsible for the damage. (Lawrence & Laybourn-Langton, 2021).

The Anthropocene era represents the geological timescale driven by human behaviour and dominance over Earth's natural systems. The beginning of this timescale also marks the end of the Holocene (National Geographic Society, 2019).

Anthropocene comes from the Greek words anthropo, for "man," and cene for "new". This term which is not a political or scientific term, was coined and made famous

by biologist Eugene Stormer and chemist Paul Crutzen in 2000 (National Geographic Society, 2019). It relates to the era where economic models rely on nature as the primary source of wealth extraction. However, the perception that the instrumentalisation of the Earth for financial means can be a sustainable way of life leads to the fact that our species could be the next in line to extinction.

These economic models are not fit for purpose because they serve the few at the expense of many while single-handedly governing all ways of life[6].

Climate change has moved from a debated concept to a crisis that divides people, clearly drawing a line between those who understand it is happening and those who do not. Either way, it is undeniable that our increased consumption every day represents the taking of more from an already stressed life-sustaining phenomenon on the planet. We are part of a complex, global system, and evidence of our impact is apparent everywhere (Pavid, 2021).

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6 These financial systems lead humankind to extinction through deforestation, resource mining, and greed.

It falls on humankind to devise methods through which harmonic coexistence on this planet becomes the norm. All thriving ecological systems have equal rights and autonomy to occupy space and resources. This generation and those that follow face a losing struggle, torn by the dichotomy between progress and climate change, and carry the burden of making choices that will determine the future.

To date, the human response to meet the need for housing has responded to the necessities of daylight, external climate, outdoor amenity and protection. Recent changes have moved towards improving the indoor environment and curbing energy consumption. Nevertheless, the whole process of housing human beings has not considered the entirety of the natural environment. Humans inhabiting the planet alongside the natural non-human living world must consider more than just general provisions (stability, protection from fire, access, moisture, the safety of users, services and facilities and energy efficiency) as set out by the New Zealand Building Code.

Whom are we housing?
Is it just humans that need
shelter?
Which species must
lose its home to make
it possible to house
humans? [7]

This exegesis attempts to respond to these questions with an experimental design for a small portion of Ngati Whakaue's current housing development project. Ngati Whakaue Tribal Lands Inc is a major landowner in Rotorua with approximately 4,500 Maori shareholders. They have a vested interest in the long-term wellbeing of their members and aim to approach housing development with holistic ecological principles in practice. Ngati Whakaue aims to build 1,000 residential housing units, neighbourhood reserves, a village commercial centre, and walk-and-cycleway links to accommodate around 2,000-3,000 people (Poutasi et al., 2010).

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7 Could all living entities be equal candidates for necessities of living? What would that mean for the planet's future if the value of existing ecosystems mattered as much as human life? These were the questions that challenged me.

Figure 5: [IMAGE RIGHT]
Ngati Whakaue First site visit main entrance gate April 12 2021

Ngati Whakaue is also involved in the strategic planning of their 1,500ha Rotorua Eastern Blocks, located 4km from Rotorua CBD. Ngati Whakaue, in association with Beca, has also developed a Structure Plan for a smaller 150ha area. The Structure Plan is a guide for protecting, using and developing the smaller size of land known as the Wharenui Rise Area for the next 15 to 20 years(Poutasi et al., 2010). This exegesis aims to play a part in this system change process by proposing an alternative approach to designing housing development to Ngati Whakaue's housing development strategy.

1.2. The Ecocene

Discovering the answers to the questions above requires considerable shifts in human perspective, most of which can be confronting. This process involves redefining economic models that complement positive environmental outcomes. Architecture plays a significant role in enabling shared food sources and social wellbeing.

The only way forward is to alter the fundamental paradigm on which human development is based. For this, we must first change our expectations in the overarching mythos of the story of humankind (Armstrong, 2016).

The Ecocene refers to a deviation from the current trajectory that humankind is on and introduces an epoch. The Ecocene is an epoch where humans and their design practices identify ecological frames of reference that enhance living ecosystems alongside human efforts to improve coexistence (Armstrong, 2016).

Achieving the deviation towards the Ecocene depends on creative transformations from human subjectivities to political economies. The environment is the source of interbeing, prosperity and survival. The change must be at every level of life (Bose, 2016).

> *We require strong moral sanctions against life-destroying industrial development. Until these can be created, as long as we live in a society with capitalism and a centralised state, we need robust mechanisms in the public sector to monitor, regulate and transform industry along with strong laws against ecocide (Boehnert, 2018).*

To enable a future Ecocene, most current design proposals should include integrating ecological positions in architecture. This practice puts forward a theoretical foundation for ecologically informed design.

As an academic exercise, to test the value of this direction, this exegesis will utilise this approach with the

view ultimately to carry this into professional practice post-completion.

1.3. Research Focus

Today, social wellbeing has become more prominent due to the collective experience of the global Pandemic (COVID-19 and Well-Being: Life in the Pandemic, 2021).

Every community connection, big and small, is now challenged by separation at various levels. As such, the places where we live have taken on new meaning. Now our homes are more than just homes[8]. Unfortunately, despite the mounting evidence supporting the desperate need for holistic, sustainable housing, both large and small, new proposals have not changed dramatically in quality or affordability.

As the researcher, housing humans in small sections separated by imaginary boundary lines does not serve our hardwired instinct to connect with the natural environment and each other. Physical separation leads to the degradation of our collective psyche because we cannot see or take responsibility for environmental damage which occurs behind walls or even far away.

8 Many of us have started to take better care of our environment and consider the needs of the places we live.

Multi-unit housing developments that separate and create segments of people's lives affect our collective mental health in the long run due to growing loneliness and isolation.

To date, plenty of research focuses specifically on ecological housing development models. However, they originate from the framework of western knowledge prevalent throughout New Zealand. Little research exists across various social and cultural boundaries to discover what indigenous ways of life require in architectural representation in housing design.

In New Zealand, the underlying and essential requirement in honouring Te Tiriti of Waitangi and working with Māori is to create housing models built from this partnership that present favourable opportunities for discovering new ways of dwelling on this land.

This inclusive approach allows the natural environment to thrive because of the added cultural aspects within Mātauranga Māori, such as Kaitiakitanga or guardianship and managing the natural environment based on a Māori worldview (Taonga, n.d.).

Some aspects of Mātauranga Māori have become more available to non-Māori in recent years[9]. One such reference is Te Aranga Design Principles that start to articulate values, such as Rangatiratanga, Kotahitanga, Kaitiakitanga, Wairuatanaga, Manakitanga,
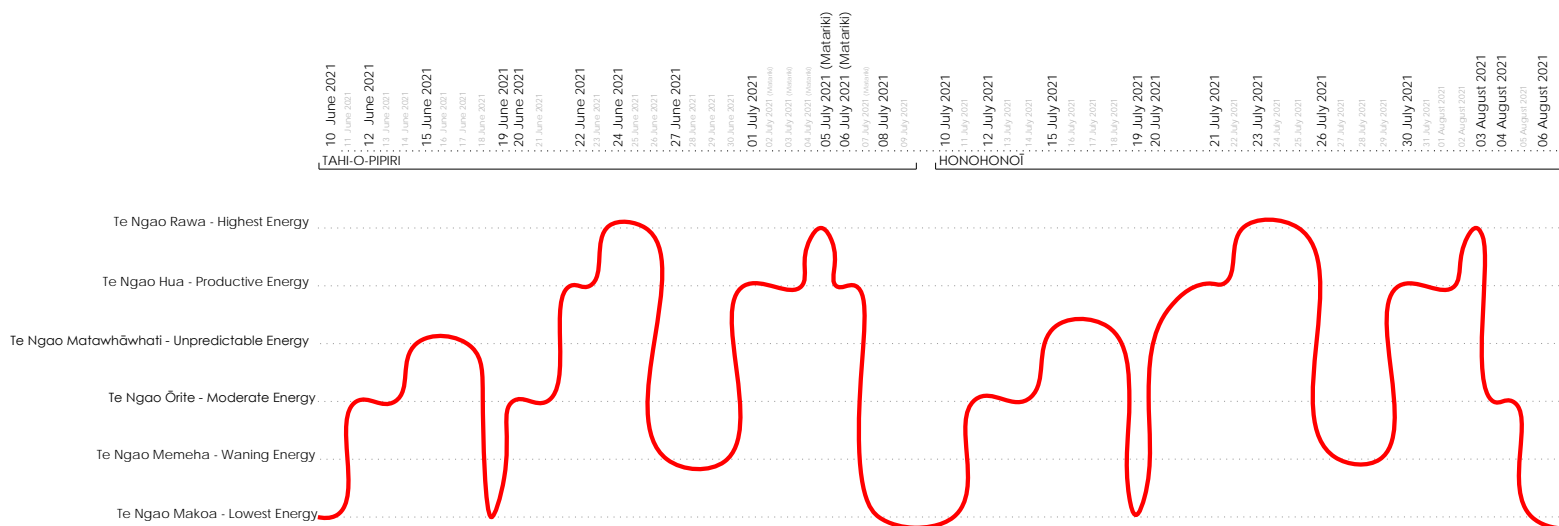
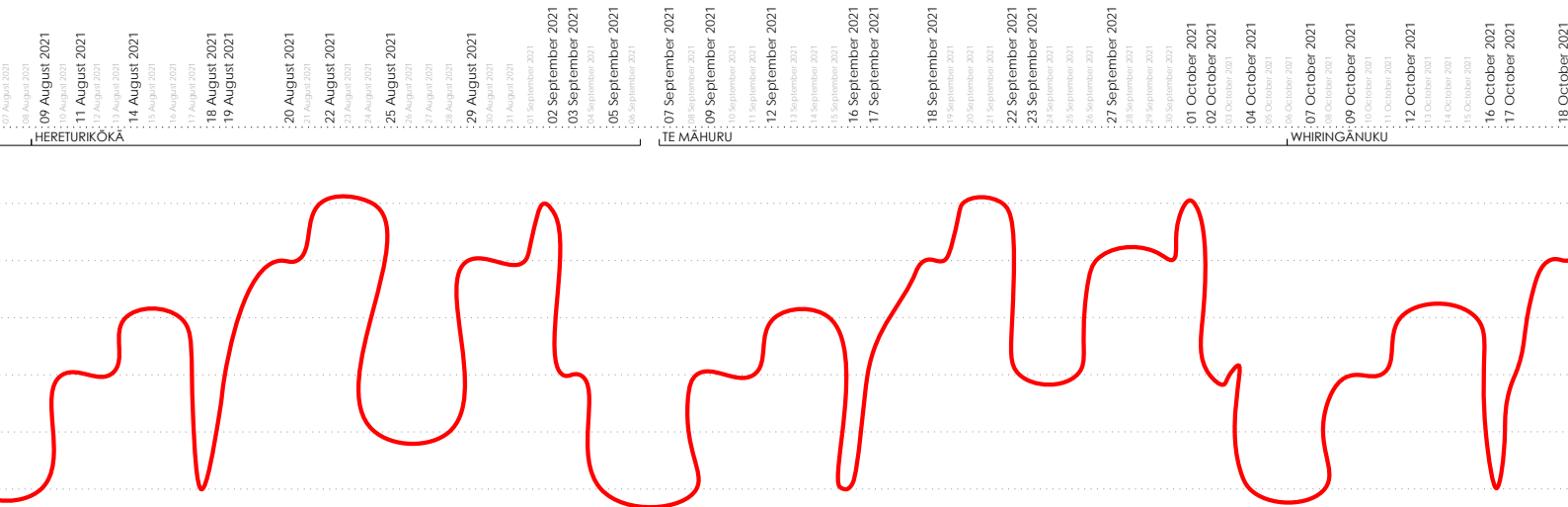Whanaugatanga and Mātauranga (Paul, 2017).

However, further reading of the applicability of these values and their principles shows that these design values and regulations originated in and apply to Tamaki Makaurau(Company, 2016).

Outside the Te Aranga Principles, as outlined by the Auckland design Manual (Te Aranga Design Principles,

9 The socio-cultural knowledge gap is slowly closing with more understanding and education.

2016), little research into incorporating more Mātauranga

Māori principles exists.

Due to different locations and historical practices, other

areas in New Zealand have unique values and principles

specific to place.

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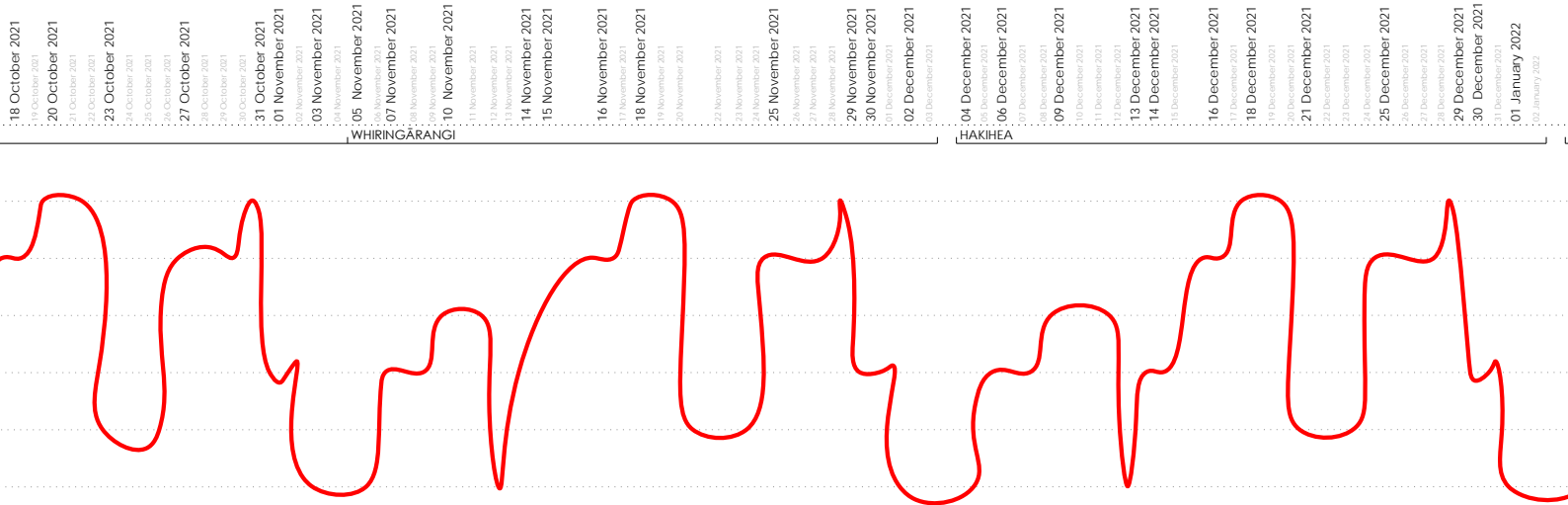HERETURIKŌKĀ · TE MĀHURU · WHIRINGĀNUKU

1.4. Patterns and rhythms

Different human realities give rise to radically diverse

attitudes towards the natural world depending on where

one lives on the planet.

Stargazing is an activity that transcends race and culture. All societies around the world have a history of looking into the night sky, contemplating the wonders of the universe and seeking answers to fundamental questions regarding life and humanity (Ruru & Nikora, 2021).

Figure 6: [DIAGRAM ABOVE] At the early stage of this research diagramming the energy according Te Maramataka of Te Arawa enabled the view of the expected environmental pattern from an indigenous perspective.

In Ethiopia and most of Africa, social and cultural systems have shaped the way humans dwell on the land[10]. Africa is still subject to severe environmental challenges that overshadow the industrialisation efforts across the continent. This aspect dominates the human psyche

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WHIRINGĀRANGI · HAKIHEA

to mainly focus on survival rather than observing and coexisting with the changing climatic patterns to thrive.

In contrast, New Zealand has had diverse climatic patterns observed and recorded since the arrival of the early Polynesians (Tarakawa, 1893). This aspect has fostered the people's strong relationship with the environment despite extreme volcanic events threatening their existence.

10 I have witnessed the devastation of climate extremes only set to worsen with the current climate emergency.

To survive, the Māori have had to evolve with the climate. Many of their practices deal with their symbiotic engagement with the natural environment. The Maramataka is just one aspect of Mātauranga Māori studied in this thesis. A very light interpretation of
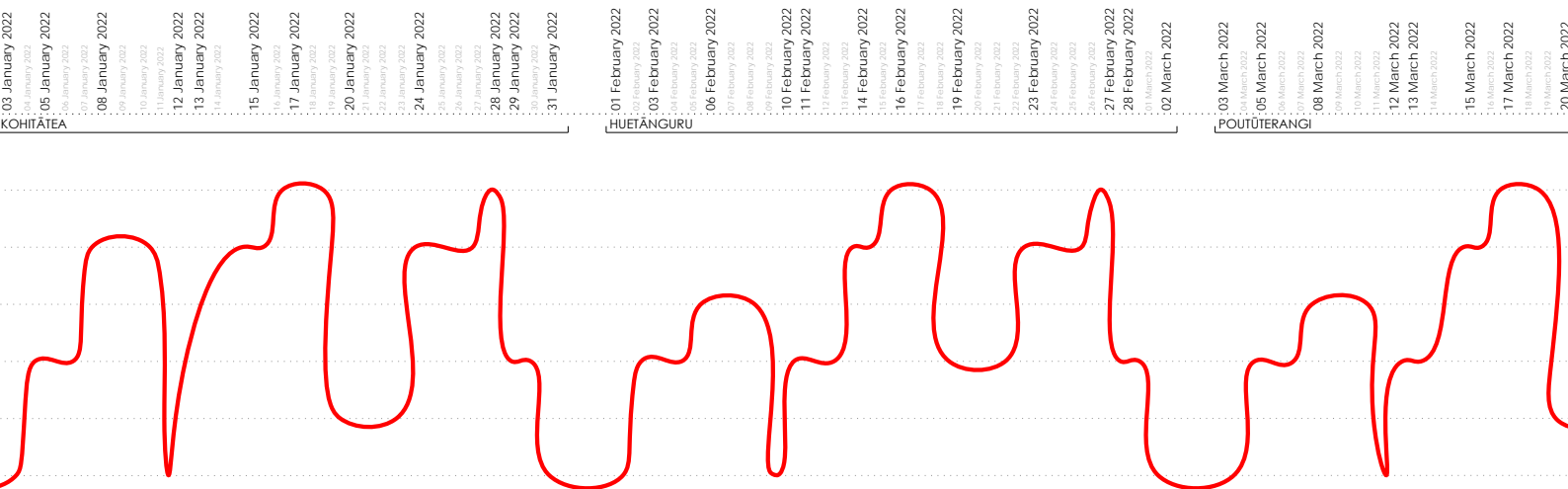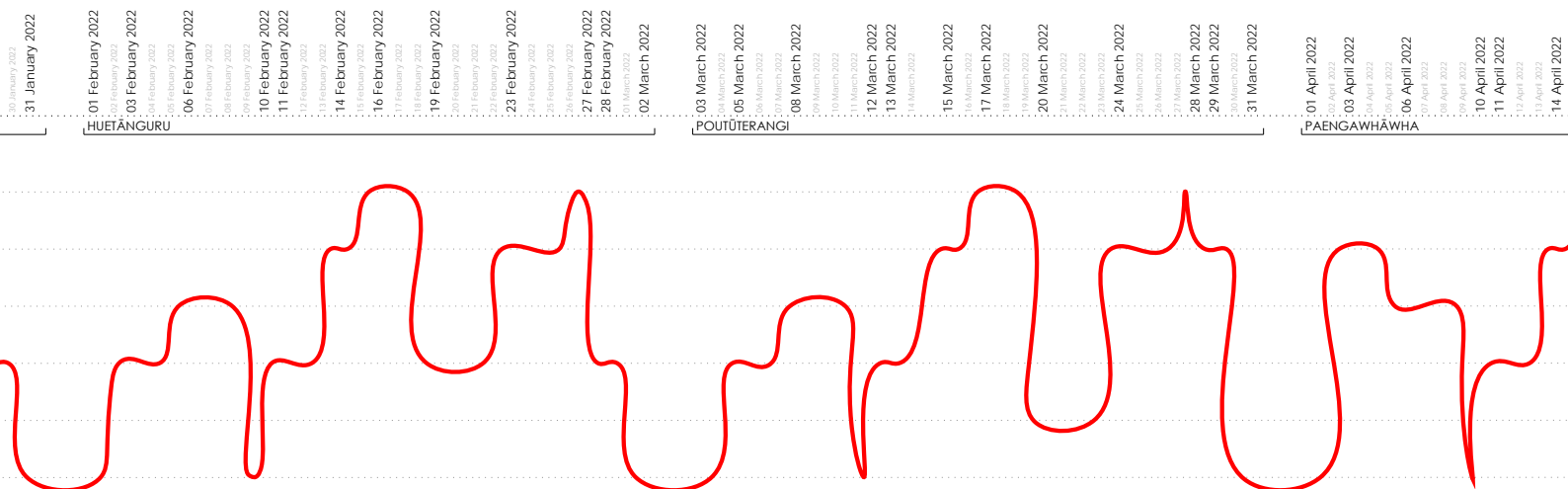
the Maramataka involves considering openness and enclosure to suit cohabitation. From the Māori worldview, Whakapapa genealogically links terrestrial and spiritual worlds (What Is Whakapapa? – Te Ara Encyclopedia of New Zealand, 2015). And Pūrākau reflects statements of the natural world that, if recounted ritually, recreate the natural world (Creation and the Māori World View – Te Ara Encyclopedia of New Zealand, 2005)[11].

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11 This is important to understand because the oratory medium is the register of indigenous history and hold the key to grasping the knowledge therein.

Figure 7: [DIAGRAM ABOVE]
Plotting the line diagram shows the ebb and flow of the environment.

They are essential in understanding how Māori view natural resources in the environment (What Is Whakapapa? – Te Ara Encyclopedia of New Zealand, 2015) . Matua Rereata Makiha, a Maramataka expert of Te Arawa descent, has described the Maramataka

| 31 January 2022 | | | 01 February 2022 | 02 February 2022 | 03 February 2022 | 04 February 2022 | 05 February 2022 | 06 February 2022 | 07 February 2022 | 08 February 2022 | 09 February 2022 | 10 February 2022 | 11 February 2022 | 12 February 2022 | 13 February 2022 | 14 February 2022 | 15 February 2022 | 16 February 2022 | 17 February 2022 | 18 February 2022 | 19 February 2022 | 20 February 2022 | 21 February 2022 | 22 February 2022 | 23 February 2022 | 24 February 2022 | 25 February 2022 | 26 February 2022 | 27 February 2022 | 28 February 2022 | 01 March 2022 | 02 March 2022 | | 03 March 2022 | 04 March 2022 | 05 March 2022 | 06 March 2022 | 07 March 2022 | 08 March 2022 | 09 March 2022 | 10 March 2022 | 11 March 2022 | 12 March 2022 | 13 March 2022 | 14 March 2022 | 15 March 2022 | 16 March 2022 | 17 March 2022 | 18 March 2022 | 19 March 2022 | 20 March 2022 | 21 March 2022 | 22 March 2022 | 23 March 2022 | 24 March 2022 | 25 March 2022 | 26 March 2022 | 27 March 2022 | 28 March 2022 | 29 March 2022 | 30 March 2022 | 31 March 2022 | | 01 April 2022 | 02 April 2022 | 03 April 2022 | 04 April 2022 | 05 April 2022 | 06 April 2022 | 07 April 2022 | 08 April 2022 | 09 April 2022 | 10 April 2022 | 11 April 2022 | 12 April 2022 | 13 April 2022 | 14 April 2022 |

HUETĀNGURU   POUTŪTERANGI   PAENGAWHĀWHĀ

as a Māori environmental pattern language by which Māori understand the world around them. The underlying knowledge of the Maramataka, observed and recorded by Māori ancestors, is rich with a historical understanding of how to live in harmony with the natural environment[12].

Maramataka originates from the Māori words' Marama', for Moon and 'Taka', for revolving. Most indigenous

12 Sir Hirini Moko Mead defines Mātauranga as Māori knowledge (Environmental Protection Authority, 2020). One part of Mātauranga Māori, the Maramataka, records the evolving environmental patterns through the long experience of New Zealand's climate and environment. This knowledge remains mainly among Māori. It is understood to be specific to every area and respective tribe.

societies around the world follow the movements of the Moon to varying degrees.

In some Aboriginal cultures, the Sun is a woman, and the Moon is a man. Aboriginal communities describe the Sun woman pursuing the Moon man across the sky
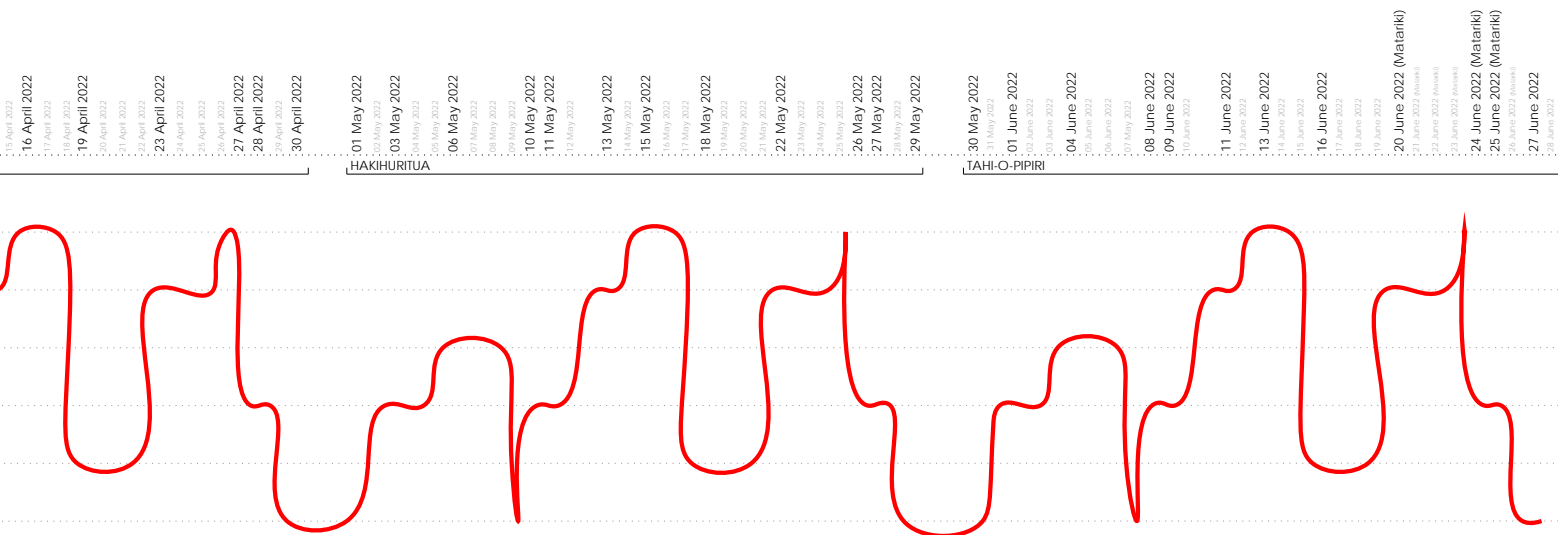
from day to day, occasionally meeting during an eclipse (Hamacher & Norris, 2011).

For most cultures in the Americas, the cycle of the Moon (Buck, 2021) denotes the passage of time. Robin Wall Kimmerer explains that paying attention is a form of reciprocity with the living world (Kimmerer, 2014); by learning through observation of the world, we become bonded to it. Dr Dan Hikuroa describes the Maramataka as having codified knowledge collected through

Figure 8: [DIAGRAM ABOVE] A pattern emerged after the diagramming was complete registering the give and take the occurs in the environment which humans are able to support.

observation (Hikuroa, 2017). This information includes empirical techniques to investigate environmental phenomena, acquire new knowledge, and update and integrate previous knowledge.

Unlike western society, where physical satellites act as eyes in the sky to inform humans of the status of the weather, the Maramataka encourages humans to understand and connect through their own eyes[13].

The Maramataka framework then approaches understanding climate patterns and environmental cycles specific to particular locations.

Finding one Maramataka record that represents one environmental pattern language for all of New Zealand is virtually impossible, and rightly so. It is not like the satellite-based weather report we get after the news that we often find inaccurate and unreliable. Every area of New Zealand has an individual temporal response to its immediate and specific environment[14]. Māori have recorded these climatic events and passed this knowledge through generations making this information an added sphere of expertise to existing western science.

13 This act enables us to form spiritual connections with the natural environment by taking responsibility and caring for the natural world.
14 Human beings and nonhumans play an essential role in developing individual responses accordingly.

Jade Kameta lead the way in authoring the Maramataka of Te Arawa. He describes it as quantum physics, like astronomy, marine biology, navigation, permeating into agriculture, and serving as

the environmental science for the people of Te Arawa (Kameta, 2020).The illustration shows common ground between Te Maramataka o Te Arawa and the navigator and identifies the gap that

informs the way forward for this research. I suggest that comparing and contrasting indigenous world views with non-indigenous world views provides the opportunity to discover new approaches

towards the Ecocene. This thesis then proposes an architectural response to the need for housing on Ngāti Whakaue Tribal Lands, with importance given to the social and cultural needs.

TE MARAMATAKA O TE ARAWA

Te Ngao Rawa Highest Energy
16. ŌTURUTURU
17. RĀKAUNUI
18. RAKAUMĀTOHI
27. ŌTĀNE

Te Ngao Hua Productive Energy
14. ATUAHAEHAE
15. ŌHOTUROA
23. KOREKORE-PIRI-KI-NGĀ-TANGAROA
24. TANGAROA-Ā-MUA
25. TANGAROA-Ā-ROTO
26. TANGAROA-Ā-KIO KIO

Te Ngao Matawhāwhati Unpredictable Energy
6. TAMATEA TUATAHI
7. TAMATEAANGANA
8. TAMATEAAIO
9. TAMATEA WHAKAPAU

Te Ngao Ōrite Moderate Energy
3. HOATA
4. ŌUENUKU
5. ŌKOROTĀTEA
11. ARIMATANUI
12. MĀURE
13. MĀWHARU
28. ŌRONGONUI
29. ŌRONGOMAURI

Te Ngao Memeha Waning Energy
19. TAKIRAU
20. OIKE
21. KOREKORE-TE-WHIWHIA
22. KOREKORE-TE-NGANGANA

Te Ngao Makoa Lowest Energy
1. WHIROWHITI
2. ŌTIREA
10. HUNA
30. ŌMUTU
31. MUTUWHENUA
32. TĀPIKIORA

WHENUA-ORA LIVING GREEN ECOSYSTEMS
Cultural landscape restoration
Biodiverse living soil & composting
Urban orchards, Mara Kai and Rongoā
Urban forests and greens and socual infrastructures
Carbon storing (Soil, Plants)
Regenerative low-till, no-clear agriculture

KAINGA-ORA LIVING CARBON-POSITIVE BUILDING
No build protections
Co-housing
Multi-generational Housing
Compact development
Nature-based building shading and cooling systmes
Creating living neighbourhoods and cities

HAPORI-ORA CONNECTED COMMUNITY
15 min city
Child-centred
Socially connecting
Ukaipōtanga - nurturung cultural landscapes
Creating wellbeing through connections

WAI-ORA LIVING BLUE ECOSYSTEMS
Celebrating diverse living systems
Cultural landscape restoration
Biodiversity regeneration and rewilding

ARCHITECTURE & URBAN HOLISTIC WELLBEING COMPASS

Figure 9: [ABOVE] Diagram of Te Maramataka o Te Arawa connections with Urban Holistic Wellbeing Compass

This research asks, "How might the Maramataka of Te Arawa be applied as a socio-cultural-ecological design driver [or catalyst] for developing holistic housing that supports Mauri Ora [wellbeing]?"

1.5. Experience vs Practice

1.5.1. **Maramataka Māori**

Even if the experience of the Maramataka is novel to non-Māori, one soon realises that the gravitational forces of the environment around us affect everything to varying degrees[15].

Adjusting our activities with an intimate understanding of the ecological energy respective to our surroundings connects our lives to place. Referring to records, such as the Maramataka, allows one to start understanding how to live in a place and source foods for the sustenance of that specific place from an indigenous perspective.

Today, the applicability of the Maramataka to daily life in Aotearoa is not widespread among Māori and non-Māori . This fact is changing this year because 2022 is the first year Aotearoa will acknowledge Matariki as a public holiday. Matariki is the rising of a cluster of stars, known as the Pleiades, known to Māori name as Matariki, which translates to the "eyes of God". When people reflect on the year that has passed and prepare for the future. The time Matariki [Pleaides] rises is marked using the Maramataka Māori [the Māori lunar calendar], which aligns to the phases of the Moon, not the Gregorian calendar (Matamua, 2019).

The Maramataka Māori consists of twelve 29.5-day months and a 354-day year compared to the Gregorian calendar, a solar calendar that has 365-day years(Matamua, 2019). An 11-day shortfall between the calendars makes it

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15 The pace of life is subject to all environmental forces around us.

challenging to utilise the Gregorian calendar to predict the rising of Matariki. The best time to observe the rising of Matariki is in the phase of the Moon known as Tangaroa, the Moon of plenty (Matamua, 2019)[16].

This study's overarching objective is to understand the records provided by Ngā Pātaka Kōrero o Te Arawa through their research and find their applicability to social wellbeing and the architecture of social housing.

1.5.2. Te Maramataka o Te Arawa - Positioning this research

The lunar phase data of Te Arawa originates from the people who come together to learn, share and apply traditional knowledge associated with the Maramataka in their daily lives.

Ngā Pātaka Kōrero o Te Arawa published the extent of the calendar considered in this thesis: Te Arawa lunar phases and stellar months from May 23 2020, to June 9 2021 (Ngā Pātaka Kōrero o Te Arawa, 2021). This date range is 383 days, or one year and 18 days. The 18 days are for lunar phases that extend beyond the Gregorian

16 This difference also registers the undrstanding of time as it exists for Māori as not being a linear calculated feature of life but an observed, sensed and reviewed aspect of life.

calendar of 365 days. The inland nature and geothermal activity inform Te Maramataka o Te Arawa.

The data in Te Maramataka o Te Arawa also includes the rising of seasonal stars and constellations Matariki (Pleiades), Whakaahu (Castor) and Rehua (Antares) (Te Maramataka o Te Arawa — Ngā Pātaka Kōrero o Te Arawa, 2021).

As their research continues, new knowledge will help reshape and develop the wānanga, practice and shared learning conducted by Ngā Pātaka Kōrero o Te Arawa.

There are fascinating aspects of the calendar that are distinctly unique. Jade Kameta explains that understanding the art of observation outside the five senses that western science relies upon is critical. Unlike western scientists, Māori ancestors also measured the Mauri (aliveness) and the Wairuatnaga (spiritual/physical health and wellbeing of the environment) (Maramataka in Conservation - YouTube, 2020).

He explains the observations of these additional environmental cues as techniques for comparing the current state of life within rivers and soil to previous forms of Mauri (aliveness). These comparisons help inform the

TE MARAMATAKA O TE ARAWA 2021–22

TE NGAO ENERGY KEY:
- Te Ngao Rawa - Highest Energy
- Te Ngao Hua - Productive Energy
- Te Ngao Memeha - Waning Energy
- Te Ngao Makoa - Lowest Energy
- Te Ngao Ōrite - Moderate Energy
- Te Ngao Matawhāwhati - Unpredictable Energy

MARAMA	TE NGAO	TAHI-O-PIPIRI	HONOHONOĪ	HERETURIKŌKĀ	TE MĀHURU	WHIRINGĀNUKU	WHIRINGĀRANGI	HAKIHEA	KOHITĀTEA	HUETĀNGURU	POUTŪTERANGI	PAENGAWHĀWHA	HAKIHURITUA	TAHI-O-PIPIRI
1. WHIROWHITI		10th June, 2021	10	9	7	7	5	4	3	1st February	3	1st April	1st May	30
2. ŌTIREA		11	11	10	8	8	6	5	4	2	4	2	2	31
3. HOATA		12	12	11	9	9	7	6	5 *Rehua	3	5	3	3	1st June
4. ŌUENUKU		13	13	12	10	10	8	7	6 *Rehua	4	6	4	4	2
5. ŌKOROTĀTEA		14	14	13	11	11	9	8	7 *Rehua	5	7	5	5	3
6. TAMATEA TUATAHI		15	15	14	12	12	10	9	8 *Rehua	6	8	6	6	4
7. TAMATEAANGANA		16	16	15	13	13	11	10	9 *Rehua	7	9	7	7	5
8. TAMATEAAIO		17	17	16	14	14	12	11	10	8	10	8	8	6
9. TAMATEA WHAKAPAU		18	18	17	15	15	13	12	11	9	11	9	9	7
10. HUNA		19	19	18	16	16	14	13	12	10	12	10	10	8
11. ARIMATANUI		20	20	19	17	17	15	14	13	11	13	11	11	9
12. MĀURE		21	*Earth Regenerates over this time*					15	14	12	14	12	12	10
13. MĀWHARU									13		13		*Earth Regenerates over this time*	
14. ATUAHAEHAE		22	21	20	18 *Whakaahu	18	16	16	15	14	15	14	13	11
15. ŌHOTUROA		23	22	21	19 *Whakaahu	19	17	17	16	15	16	15	14	12
16. ŌTURUTURU		24	23	22	20 *Whakaahu	20	18	18	17	16	17	16	15	13
17. RĀKAUNUI		25	24	23	21 *Whakaahu	21	19	19	18	17	18	17	16	14
18. RAKAUMĀTOHI		26	25	24	22 *Whakaahu	22	20	20	19	18	19	18	17	15
19. TAKIRAU		27	26	25	23	23	21	21	20	19	20	19	18	16
20. OIKE		28	27	26	24	24	22	22	21	20	21	20	19	17
21. KOREKORE-TE-WHIWHIA		29	28	27	25	25	23	23	22	21	22	21	20	18
22. KOREKORE-TE-NGANGANA		30	29	28	26	26	24	24	23	22	23	22	21	19
23. KOREKORE-PIRI-KI-NGĀ-TANGAROA		1st July	30	29	27	27	25	25	24	23	24	23	22	20 *Matariki
24. TANGAROA-Ā-MUA		2 *Matariki	31	30	28	28	26	26	25	24	25	24	23	21 *Matariki
25. TANGAROA-Ā-ROTO		3 *Matariki	1st August	31	29	29	27	27	26	25	26	25	24	22 *Matariki
26. TANGAROA-Ā-KIO KIO		4 *Matariki	2	1st September	30	30	28	28	27	26	27	26	25	23 *Matariki
27. ŌTĀNE		5 *Matariki	3	2	1st October	31	29	29	28	27	28	27	26	24 *Matariki
28. ŌRONGONUI		6 *Matariki	4	3	2	1st November	30	30	29	28	29	28	27	25 *Matariki
29. ŌRONGOMAURI		7 *Matariki	5	4	3	2	1st December	31	30	1st March	30	29	28	26 *Matariki
30. ŌMUTU		8	6	5	4	3	2	1st January	31	2	31	30	29	27
31. MUTUWHENUA		9	7	6	5	4	3	2				*Earth Regenerates over this time*		28th June 2022
32. TĀPIKIORA		*Earth Regenerates over this time*	8	*Earth Regenerates over this time*	6	*Earth Regenerates over this time*								

http://www.ngapatakakorerootearawa.org

Figure 10: [ABOVE] Te Maramataka o Te Arawa from June 2021 to June 2022

observer of the spiritual sense of health. Ngā Pātaka Kōrero o Te Arawa has also published resources to enable the participation of people that dwell on their land. This invites people to regularly record their observations and act accordingly to the natural environment.

These resources have questions that present inquiry into the wellbeing of the observer and which activities happen to capture then the way these activities influence the surrounding environment and vice versa. The act of daily record-keeping creates a strong bond between the human and the more-than-human, weaving a pattern.

Jade explains the Māori concept of Matangaro (absent or unseen aspects) or Mata Hunahuna (undercover agent), such as the wind one can feel yet not see.

For Māori, the same holds for spiritual intuition and feeling about the environment and one another. Their ancestors understood a holistic and connected aspect of life absent in contemporary western ways of life (Maramataka in Conservation - YouTube, 2020).

Te Maramataka o Te Arawa is not a calendar. According to the Gregorian calendar, we understand dates as a series of continuous-time. In contrast, Te Maramataka

o Te Arawa collates days and nights in a lunar phase under planetary influences.

A closer look at the environmental pattern language shows lunar phases that continue without a corresponding Gregorian date. Some lunar phases extend to give the environment time to regenerate, allowing natural ecosystems to replenish. The overarching principle behind Te Maramataka o Te Arawa is observing everything in the environment and connecting these observations to the broader spectrum of life, from personal to universal.

> *Paying attention is a form of reciprocity with the living world, receiving the gifts with open eyes and open hearts (Kimmerer, 2014).*

Therefore, the Maramataka is a universal measure of time formed by Mauri or life energy. The Mauri across large areas can be similar. However, no two locations have identical Mauri, making this lens a more tailored approach to a specific natural environment.

Therefore, place-based observations have formed Te Maramataka o Te Arawa. In part two of this thesis, I have derived the project brief as a series of events highlighting what could occur during these observations.

1.6. Research Methods

1.6.1. Mauri Ora Holistic wellbeing navigator

The research method of this thesis will focus on employing the 'Mauri Ora Housing development Well-being Compass' as a navigation tool. It acts like a kit of parts to visualise the Mauri Ora in Te Maramataka o Te Arawa for the design proposal.

The navigator tool utilised is co-created by Te Tatau o Te Arawa and the Huritanga Mauri Ora research team as a strategic tool to assist in operationalising the wellbeing vision for Te Arawa (A. M. Yates, 2021). This then becomes a method of quantifying the voice, the perspective, and the value of communities.

The importance of utilising this navigator tool is in its capacity to visualise Whaka-Ora (holistic wellbeing) throughout the design process. This method ensures that fundamental indigenous values are centred and well established. The navigator presents key groupings of importance. In part two, this thesis zones in on Kāinga-Ora (built infrastructure), Whenua-Ora (green ecologies), Wai-Ora (blue ecologies), and Ōhanga-Ora (circular bio-economy and Hapori-Ora (Communities).

MAURI ORA HOUSING DEVELOPMENT WELLBEING COMPASS

TRANSITIONS TOWARDS:
RENEWABLE ZERO-CARBON ENERGY
REGENERATIVE ECOLOGICAL SYSTEMS
CIRCULAR ECO-ECONOMIES
COMMUNITY WELLBEING

WHAKA-ORA: HOLISTIC WELLBEING ACTIONS

KĀINGA-ORA: REGENERATIVE LIVING BUILDINGS & NEIGHBOURHOODS

WHENUA-ORA | WAI-ORA: GREEN & BLUE ECOSYSTEMS

ŌHANGA-ORA: CIRCULAR BIO-ECONOMY

TANGATA-ORA: PEOPLE WELLBEING

Te Maramataka o Te Arawa

MAURI-ORA: PLANETARY WELLBEING

RANGI-ORA | BALANCED TEMPERATURE

WAI-ORA | BALANCED WATER CYCLE

PAPA-ORA | ECO-DIVERSITY

MATA-ORA | ECO-INTEGRITY

HAPORI-ORA | COMMUNITY WELLBEING

Figure 11: [ABOVE) Mauri Ora Housing Development Wellbeing Compass Engagement areas for Manawataki

1.6.2. Aims and Objectives

In the first instance, this project explores designing social and ecological housing that responds to the cultural needs through the conceptualisation of Te Maramataka o Te Arawa. Secondly, and closely aligned with this is the exploration of multigenerational residential [live/work]housing models and their possible application in Rotorua through the Te Tatau Housing Development Holistic wellbeing compass.

This central but essential aim of this research is to serve more-than-human living entities by crafting an inclusive brief defined by the Maramataka. The broad intent behind this proposal is to enhance the social safety of communities to thrive through everyday wellbeing[17].

According to the CDC, there is no consensus around a single definition of wellbeing. Still, there is general agreement that wellbeing includes the presence of positive emotions and moods (contentment, happiness) and the absence of negative emotions (depression, anxiety). Therefore, wellbeing is related to satisfaction with life, fulfilment, and positive functioning (Well-Being Concepts | HRQOL | CDC, 2018).

17 What is wellbeing? Can universal wellbeing be defined or enhanced through housing?

However, the Māori apply connected wellbeing at many scales. For Māori, ora is wellbeing; Mauri is the integrative life force that connects all - rocks, rivers, trees, people (A. Yates, 2019)[18].

Well-being aspects across Mātauranga Māori encompass a place-based, co-creative and interconnected approach. Many of the practices have evolved. They include the health of the natural environment, such as Kāinga-ora (built infrastructure); Waka-ora (transport infrastructures); Whenua-ora (green ecologies); Wai-ora (blue ecologies); Ōhanga-ora (circular bio-economy) and Hapori-ora (communities) (A. M. Yates, 2021).

18 This is the first time I come across the concept of integrative wellbeing that consideres interbeing wholeness.

Figure 12: [RIGHT] Scenic View Of Sea Against Sky During Sunset by moon-byung chae/ EyeEm

Part 2: Defiance

● Part 2 - Defiance: What can we do about architecture and the future?

● **Shifting Perspectives**   Understanding a new way of seeing the natural environment

● **Precedent Studies**   UN17 Village

Curtain Green House

The Paddock

Te Aro Pa

● **Site Context**   Site Visit and Analysis

● **Research Method**   Mauri Ora Housing wellbeing Compas

· **Refelections**   Iterative ecological design that is place based and responsive to climate

Figure 13: [ABOVE] Thesis diagram for Part 2

2.1. Shifting Perspectives

We all observe that the Moon is a satellite planet whose shape changes the most from one day to another. The Moon, the Sun and the stars hold significant ancestral meanings for many people worldwide.

However, indigenous concepts often remain outside the realms of modern science, used only for reference to enhance empirical outcomes of scientific knowledge but never understood as being part of science.

Therefore, attempting to understand the world of Māori from the outside requires a reset of perspective to unveil new horizons[19].

For many non-western societies throughout history, the Moon is not just a moon or Earth's natural satellite; it is more than just a reduced celestial planet.

Modern-day scientists do not refer to the Moon to mark the passing of time or as a reference for scientific and ecological functions of the natural environment (Scientists

―――――――――――

19 Throughout the research for this project, biases that have clouded personal perspectives have hindered possible routes toward imagining a worthwhile design outcome. Critical informal learning from family and formal education from a western society restricted this inquiry for the better part of 2020. As a non-Māori confidently, navigating academia to find critical information with Mātauranga Māori proved challenging until I began to rely on simple observation.

NEW
Beginning

WAXING CRESCENT
Growth

FIRST QUARTER
Action

WAXING GIBBOUS
Assessment

Rubbish Auckland University Professors' Letter Claiming Māori Knowledge Is Not Science - NZ Herald, 2021).

The term 'Moon' originates from the Indo-European word 'Mence', meaning 'to measure'. Man looked to the sky to create months for a calendar to know when to sow seeds around five thousand years ago (Secrets of the Moon | Episode 01 | By the Light of the Moon - YouTube, 2015).

Remembering that science is universal and crosses all boundaries irrespective of author, origin, and the participant's inclusion has propelled this enquiry.

The magic in understanding the Maramataka is that every person is a part of the environment and not apart from it via daily observations of the night sky. Māori ground their people through this and many practices such as the Pepeha.

FULL
Culmination

WANING GIBBOUS
Co-Operation

THIRD QUARTER
Contemplation

WANING CRESCENT
Immmersion

In learning to recite one's Pepeha, Māori evoke the appreciation of what a sense of place means, inviting everyone to reflect on the journey that life has provided each person. Though anchoring a person in a Pepeha, people can find their origin in their individual sense of arrival[20].

This practice focuses on understanding the value of a place whose purpose is to sustain all life. The intrinsic value of 'place' and its inhabitants, big and small, take on new importance through this crisp view because this practice forms a sense of place, and strengthens the meaning of what it means to be from or of a 'place'.

The following precedent projects have been chosen because of their response to place and their varied applications of architecture to housing practices.

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20 To understand how to conceptualise a Pepeha, one must sharpen that sense of arrival through remembering and articulating the original start of one's belonging to a place.

Figure 14: [ABOVE] Moon phase and energy response interpretation

2.2. Precedent Studies

2.2.1. UN17 Village

Location	Architect	Typology	Status
Copenhagen, Denmark	Lendager Group	Multi-unit Housing	Unbuilt

TThis project has been selected as the first precedent because it addresses all 17 of the U.N.'s Sustainable Development Goals. This design aspect is important because the sustainability goals include no poverty, zero hunger, gender equality and reducing inequality, all of which are important to Te Arawa. UN17 Village is a construction project for around 400 new homes and apartments in Copenhagen. According to U.N. Environment, if the visions are brought to life, it will be the most sustainable building project in the world. The aim is to construct the houses using as many upcycled materials as possible, making it a project that taps into the circular economy. The objective is to create an iconic and sustainable building from recycled materials and create the opportunity for a sustainable way of life with a focus on health and community is why this project is worth considering seriously[21].

21 To operationalise the UN's 17 development goals, these have been clustered in six main categories – biodiversity, community, health, materials, water, energy (NREP - UN17 Village, 2022).

Figure 15: [ABOVE] South Elevation and Section https://www.archdaily.com/907097/sustainable-startup-beats-out-big-henning-larsen-for-a-new-eco-village-in-copenhagen?ad_medium=gallery

Figure 16: [ABOVE] Artists illustration of UN17 design. https://lendager.com/en/architecture/sustainable-eco-village/

17 PARTNERSHIPS FOR THE GOALS

Partnership for the goals

Build strong partnerships for sustainabl
the creation and transfer of environmen

e development by mobilizing resources, sharing knowledge, promoting
tally sound technologies, building capacities and tracking progress

The Paddock

Location	Architect	Typology	Status
Castlemaine, Victoria, Australia	Crosby Architects	Terraced Housing	Under construction
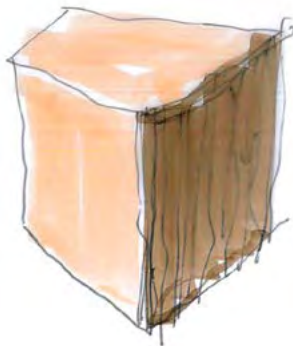
The Paddock project is under construction, and it comprises 27 homes, plus a community centre, in Central Victoria, Australia. The design shows terraced houses set amongst land dedicated to a shared orchard, planted wetlands and native gardens. The vision is to create a new standard for scalable housing that fosters a sense of community and a closer connection to nature. The Paddock aims to connect people to the natural world in a very direct way. If one is continuously close to something, one is far more likely to care for it.

Beyond the physical systems, the project recognises that the key to net-positive energy is understanding how people live. The design included community shared gardens, connecting footpaths, leisure areas, solar-powered electric bike charging and a laundry with external clotheslines through workshopping with future residents making this project an excellent reference for this thesis.

Figure 18: [ABOVE] Concept Sketch https://crosbyarchitects.com.au/the-paddock-2/

A spare bedroom in a shared community centre is available as temporary housing for guests, instead of every household having an extra bedroom used for only a few nights in any given year. This aspect reduces the footprint of the units and the wasting of space. When not used by the guests, income from renting rooms in the community centre reduces shared running costs.

The design flexibility of the homes allows intensification of use and ageing-in-place, reducing occupant turnover.

Figure 20: [ABOVE] First units arise nestled amid existing trees. https://sustainablehouseday.com/listing/the-paddock-eco-village/

Figure 22: [ABOVE] Site Meeting https://crosbyarchitects.com.au/the-paddock-2/
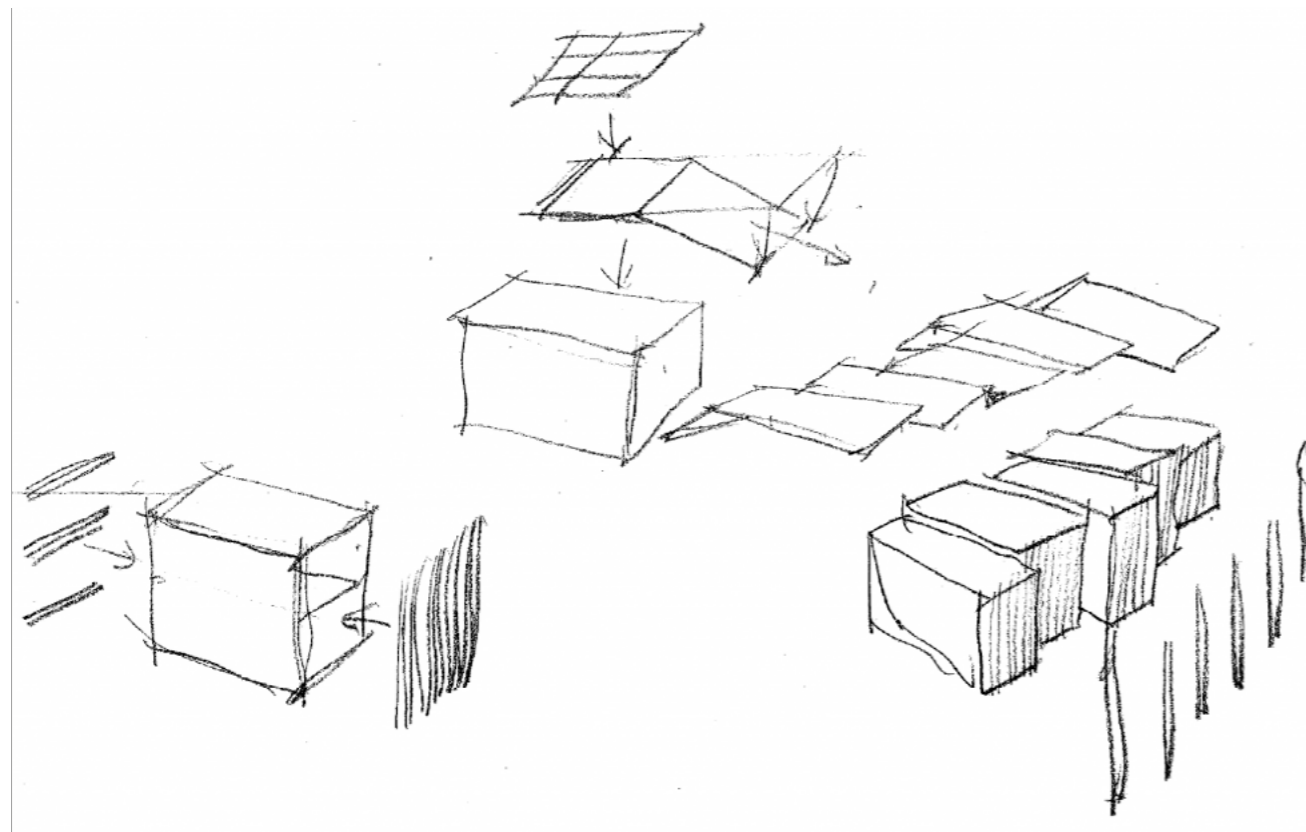
Figure 19: [ABOVE] Architect's Concept development https://crosbyarchitects.com.au/the-paddock-2/
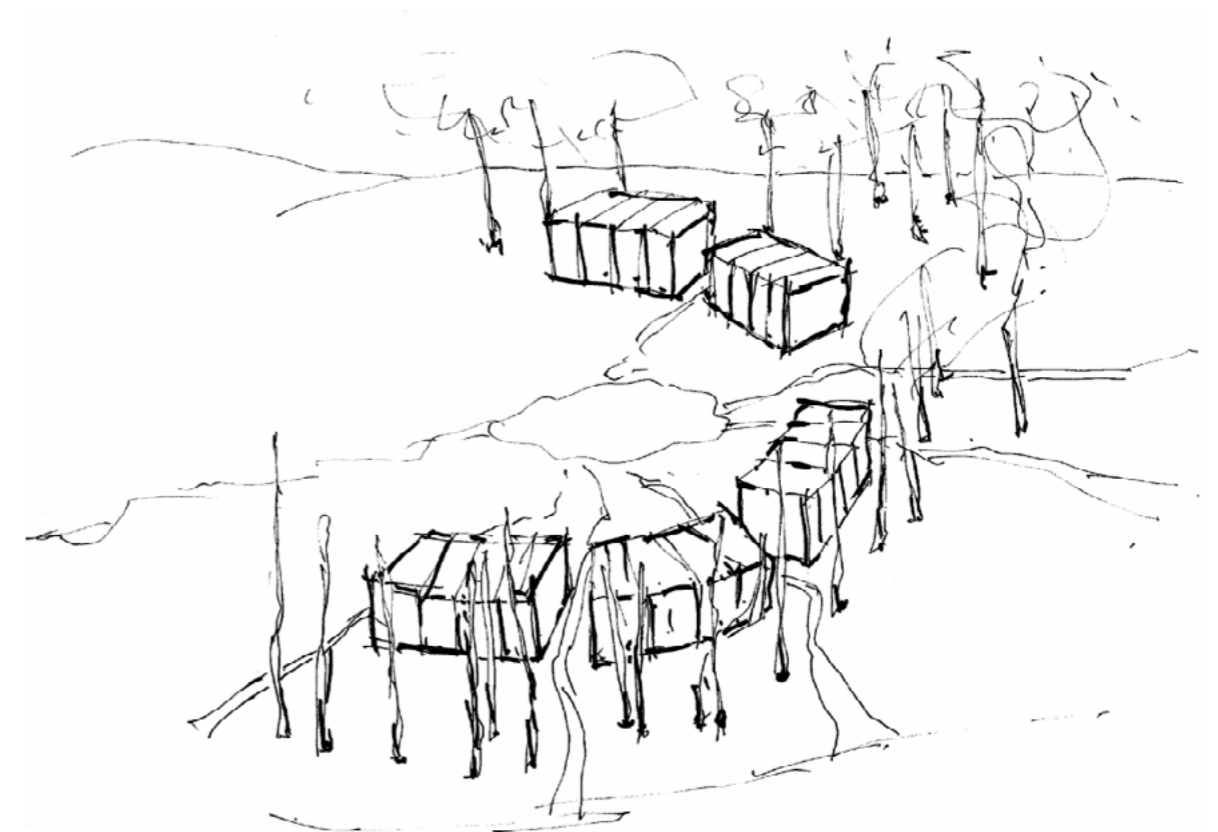
Figure 21: [ABOVE] Developed Design https://crosbyarchitects.com.au/the-paddock-2/

Figure 23: The Paddock artist's impression https://www.thepaddockcastlemaine.com.au/

2.2.2. Te Aro Pa

Location	Architect	Typology	Status
Wellington, New Zealand	Roger Walker Architecture & Design Ltd	Papakāinga Housing, Housing Multi-Unit	Built

This 14 unit papakāinga, completed in 2016, is the first papakāinga development of its kind in Wellington. It is part of the growing trend for Māori landowners to find solutions for their housing crisis. The design includes ten three-bedroom apartments and four one-bedroom apartments set in two blocks with shared garden space.

Some of the precast panels featured vertical groove details. At the end of each block, there was a feature exposed aggregate pattern. In 2018, Walker Architecture & Design was awarded the NZIA Wellington Architecture Award for this Te Aro Pā Trust papakāinga housing project.

Figure 24: [ABOVE] Artist's impression https://nzia.co.nz/awards/local/award-detail/7605#!

Figure 25: Te Aro Pa Trust Papakāinga, Dawn Ceremony https://citygallery.org.nz/events/nzia-city-talks-te-aro-pa-papakainga-wellington-city-community-housing/
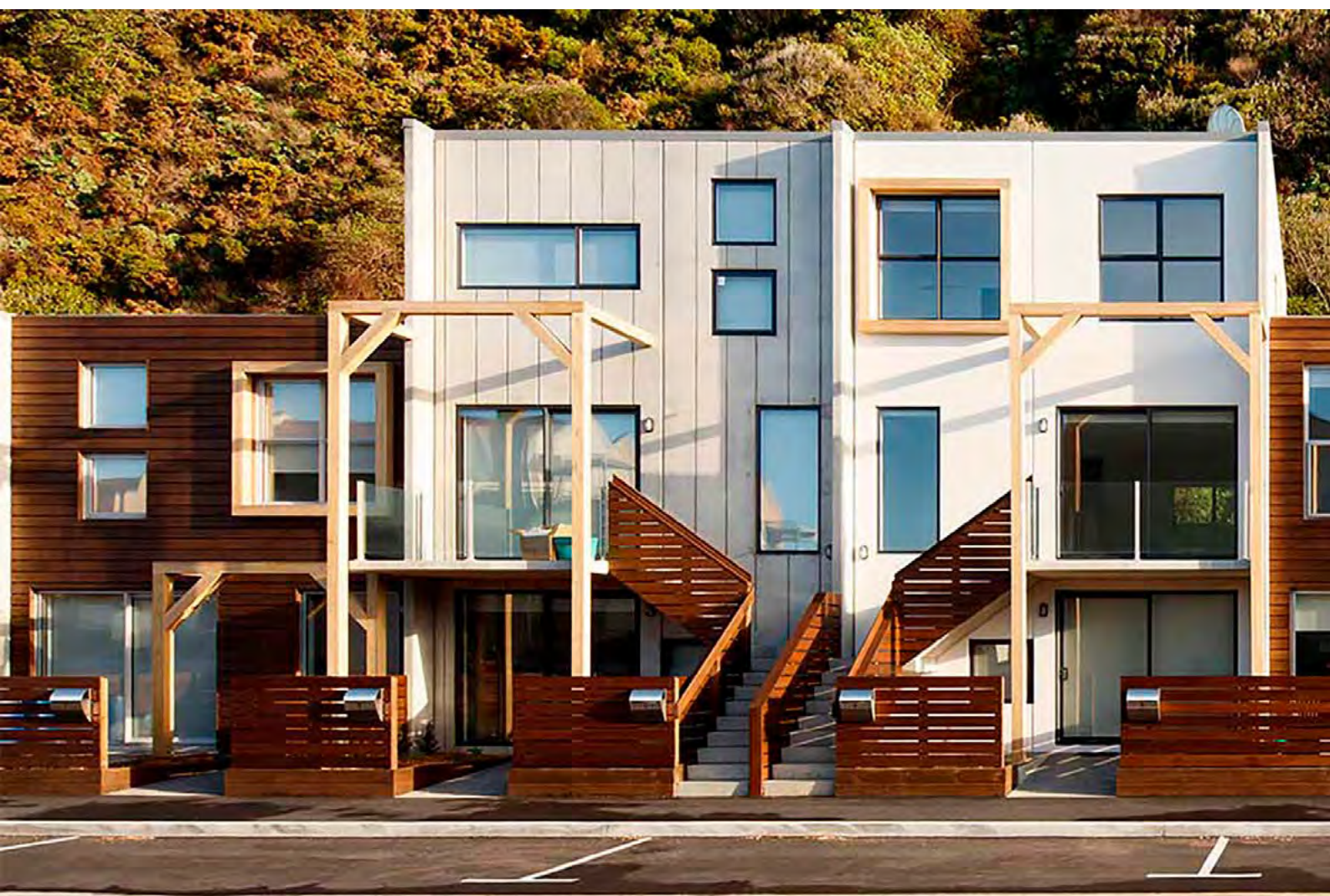
Figure 26: [IMAGE] Te Aro Pa Apartments street view https://www.homesteadconstruction.co.nz/
projects/te-aro-pa-apartments

2.2.3. Greenery Curtain House

Location	Architect	Typology	Status
Vietnam	HGAA	Elderly housing	Built
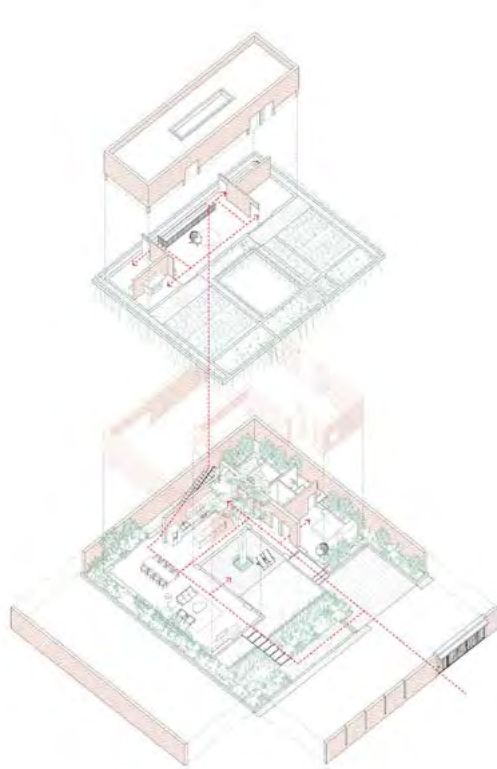
Figure 27: [ABOVE] Exploded Axonometric drawing for the Curtain House https://www.archdaily.com/948380/greenery-curtain-house-hgaa

This house was selected because it was built specifically for an elderly couple in an urban setting previously suffering from air pollution. However, in recent years the focus has shifted towards housing that aids the revival of the urban environment.

There is a strong focus on quest spaces for withdrawal and meditation of worship. The house invites light via low and high windows, focusing on the ground and the sky.

The spaces are arranged around a central courtyard, garden and integrated fishpond, inviting vital elements in nature to human living spaces.

The takeaway from this project is the use of opening and enclosure, the creation of emotive spaces enhancing the beauty of simple indoor spaces

Figure 28: [IMAGES ABOVE LEFT TO RIGHT] Exterior interior flow https://www.archdaily.com/948380/greenery-curtain-house-hgaa

2.3. Site Context

The site is located at the road crossing Waingaehe Stream and is subject to overland flow paths from the upstream catchment. This is located 10m from the Waingaehe Stream flood zone level and suggests an alternative to inhabiting the water's edge. According to the Final Eastside Community Wellness Plan from Rotorua Lakes Council (Te Oranga Nui Rāwhiti Mai, 2021).

The development process is excavating secondary flow paths to accommodate stormwater runoff to ensure that buildings do not flood. At our site visit, the Wharenui Rise Development was at Stage 1, and the existing stormwater redirection process had already been underway. Significant earthworks and gullies back-filling to make way for roads and redirect rainfall.

2.3.1. The history of Rotorua

The Lake Rotorua Basin is tectonically formed and lies on the western side of the Taupo Volcanic Zone. The city of Rotorua [second lake] gets its name from the Maori word 'Roto' for lake and 'rua' for the second. It was the second lake discovered by Ihenga, originally named

TE ROTORUA NUI Ā KAHUMATAMOMOE

WAIKAWAU BAY

N

HINEMOA POINT

ŌWHATA MARAE

Ōwhata Road

W

Te Ngae Road

NGĀPUNA

TE PAPA-ARUAMOA

HURUNGA TE RANGI MARAE

HINEMIHI MARAE

Porikapa Road

Wharenui Road

WAINGAEHE STREAM

S

PUKEPOTO

APUMOANA MARAE

Wharenui Development Area

WHAKAREWAREWA FOREST (REDWOODS)

MANAWA
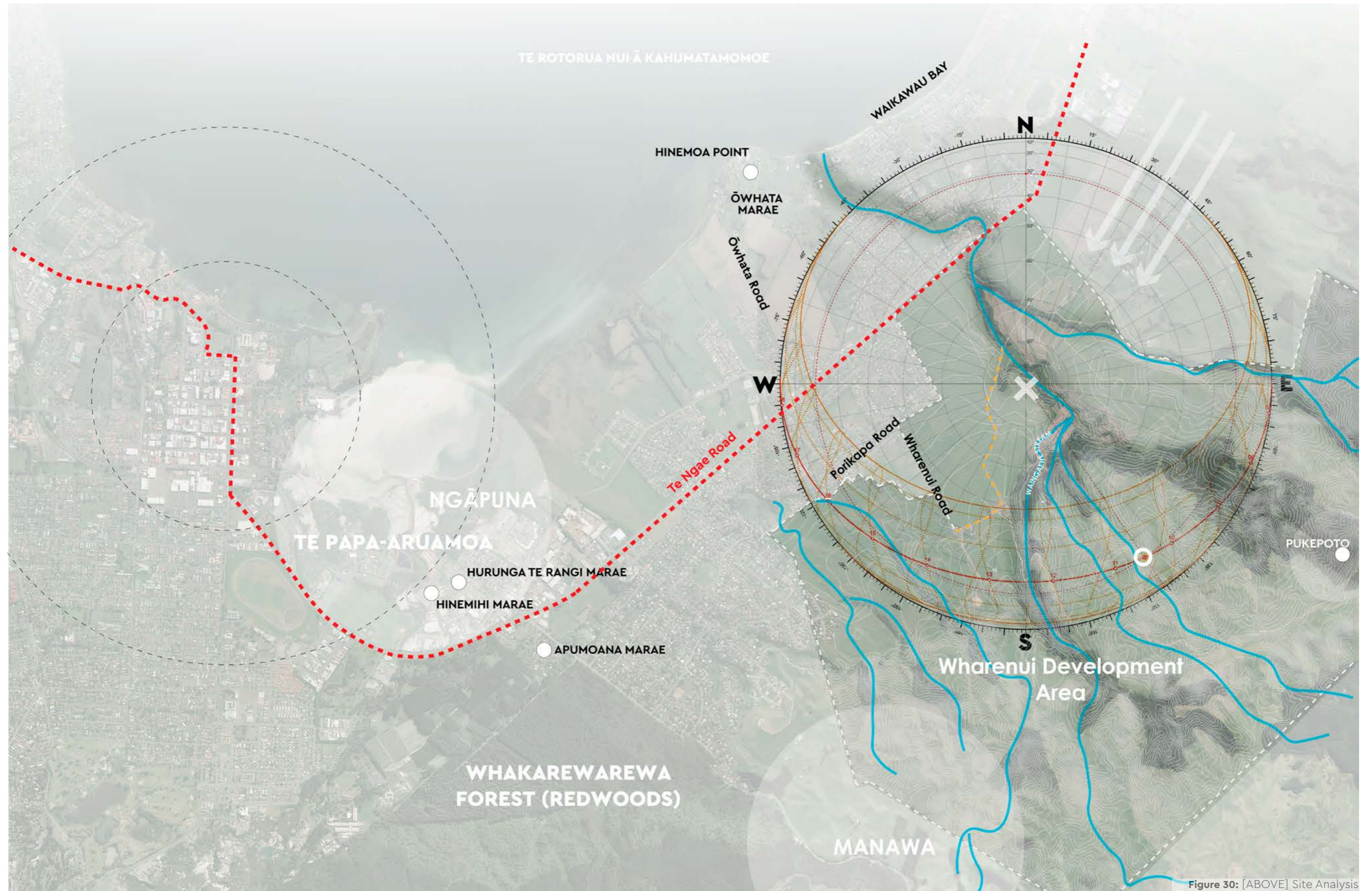
Figure 30: [ABOVE] Site Analysis

Rotorua Te Rotorua Nui-ā-Kahumatamomoe (Rotorua | NZHistory, New Zealand History Online, n.d.).

The ancestors of the people of Te Arawa originate from Hawaiki (Tarakawa, 1893). The name Te Arawa comes from a species of shark that rescued the remaining survivors from being eaten by a sea creature after their maiden journey from Hawaiki (Tapsell, 2017).

Since they arrived in Maketu, the people of Te Arawa have established a connection covering the Bay of Plenty extending up to Taupo. Since then, Te Arawa members have grown to 43,374 according to the 2013 census (Arawa, 2013). This number of projected to grow to 56,700 by 2050 (Te Tatau o Te Arawa, 2020).

Lake Rotorua is at the centre of Rotorua. It carries cultural importance because of the legendary love between Hinemoa and Tūtānekai. Māori legend describes the tale of forbidden love between the daughter of a chief, Hinemoa, and the commoner Tūtānekai. He played his flute every night, sending sounds across the lake to Mokoia, where she listened. Despite her family's disapproval, she swam across the lake. Eventually,

she married Tūtānekai (Māori Love Stories – Te Ara Encyclopedia of New Zealand, 2017).

Rotorua is a unique place because of the geothermal activity beneath the surface. Before arrival, one's nostrils become filled with sulphur's scent, and this experience instantly connects one to the place. Finally, as one walks through the streets, the scenery is accentuated further by the misty steam bubbling under the pavements.

In the 1870s, the Government recognised that the unique nature of Rotorua should be showcased to visitors and sought to lease the land for development. This recognition led to the establishment of the 'Fenton Agreement' between Ngāti Whakaue and the Crown in 1880 (Rotorua Museum Te Whare Taonga o Te Arawa, 2018). This agreement gets its name from the Native Land Court Judge Francis Dart Fenton, who liaised with the original owners on behalf of the Crown and the Thermal Springs District Act 1881, made the contract official.

2.3.2. Mana Whenua

Today, the Te Arawa vision 2050 lists twelve iwi trusts represented by a pan-iwi group known as Te Tatau

o Te Arawa. These iwi manage 50 Marae across the rohe[land]. Ngati Whakaue, Ngati te Roro o te Rangi and Te Ure Uenukukopako are the iwi who have territorial rights over the land involved in this project.

The Ngāti Whakaue Trust aims to build more than 1000 houses over the next 15 or 20 years. On July 9 2021, Ngati Whakaue invited iwi members to purchase home packages at the Wharenui Rise subdivision via a ballot process. Ngāti Whakaue Trust has prepared the tribal lands for the 106-hectare Wharenui Rise development at Ōwhata, near Rotorua Airport.

Their primary development strategy focuses on providing house and land packages. The development will take place in 3 stages, and at the time of our first site visit, the project was in stage one. Our connection to the project is facilitated by Te Tatau, who is in partnership with AUT's He Puna Ora Regenerative Action Lab. This partnership has enabled the transfer of critical interests through the Te Matakitenga a Te Arawa [Te Arawa 2050 Vision].

2.3.3. Lake Rotorua

Modern-day Rotorua is a tourist hot spot sporting a world-class trout fishery and the new $40 million revamped lakefront. It consists of a curved 600m boardwalk that reflects the lake's scalloped shoreline. It represents the footsteps of the ancestors of Te Arawa (Rotorua Lakefront. - Isthmus, 2021). The lake itself is the largest in the Bay of Plenty region by spatial extent. However, it is exceeded in volume by nearby Lake Tarawera.

Nine significant streams enter Lake Rotorua that contribute about two thirds (64%) of the inflow to the lake. A large proportion of the surrounding catchment is forested with an even mix of exotic and indigenous vegetation.

These lakes, along with ten other significant lakes within the Rotorua lakes district, are situated in caldera basins and explosion craters of the Ōkataina Volcanic Complex (McBride, Verburg, Bloor, & Hamilton, 2015). Each has a unique history, from the youngest, Lake Rotomahana, formed during the eruption of Mt Tarawera in 1886, to the oldest, Lake Rotorua, which resulted shortly after the Mamaku eruption about 140,000 years ago.

Lake Rotorua and the surrounding basin are sheltered from winds making it one of the least windy places in New Zealand (McGlone, 1983). However, Lake Rotorua is subject to nutrient flushing via rainfall from the Awahou, Hamurana, Ngongotahā, Puarenga, Utuhina, Waiohewa, Waiowhiro, Waitetī and the Waingaehe Catchment.

2.3.4. Site Location

The site is in Ōwhata, a semi-rural suburb of Rotorua in New Zealand's North Island Bay of Plenty region. As per the 2018 census, the population in Ōwhata was 6216, increasing by 720 people. 62.0% of residents identify as European/Pākehā, 45.9% identify as Māori and 5.3% as Pacific. The 10% identify as Asian and other ethnicities.

According to the New Zealand Ministry of Culture and Heritage, the name Ōwhata comes from, Ō, which means a place and Whata, which translates as an elevated stage. The high-level stage protects food from bush rats and drying (New Zealand Ministry for Culture and Heritage, 2016).

The site for this proposal is just off Porikapa Road. The closest Marae is Ōwhata Marae, located at 1 Iri-Irikapua Parade.

The Waingaehe stream runs through the site flanked by trees on both sides, forming an ecological belt delineating the land with deep gullies in parts. It intersects with this land block at the southeastern end at the Pukepoto Pa site and enters Lake Rotorua at Waingaehe [Holdens] Bay. According to the Master Plan, these areas are set aside from housing development. These ecological green belts will be revegetation and serve as stormwater corridors (Poutasi et al., 2010).

According to Waka Kotahi's detailed business case for State Highway 30 Eastern Corridor Connect Rotorua – Stage two report, there is also a considerable flood risk (Case, 2020).

The history of the Waingaehe stream is tied with the evolution of the other streams that flow into Lake Rotorua. Waingaehe Stream serves as a record for Holocene age lake-edge deposits seen via a sequence of lake

sediments that contain a history of lake fluctuation since c. 9000 B.P (McGlone, 1983).

Councils operate on a 1% AEP (Annual Exceedance Probability) measure to describe the likelihood of flooding. This practice restricts developments with a 1% AEP flood plain. The logic behind this approach is counterintuitive to the natural flow of land water.

Due to comprehensive urbanisation creating increased runoff, this working model puts water ecology on the back foot.

This issue makes a case for designing compact developments and allowing existing undisturbed overland flow paths to continue naturally.

Making a move to restrict the flow of vehicles to the peripheral of the site also reduces the need for paved surfaces.

2.4. Research Method

The research method for this thesis involves visualising Te Maramataka o Te Arawa through architectural events and aligning these events to the Te Arawa Vision via

the Mauri-ora navigator. Te Tatau o Te Arawa and the Huritanga Mauri Ora research team developed this navigator as a strategic tool to assist in realising the wellbeing vision for Te Arawa (Yates, 2021). The navigator is a future-focused action tool that establishes a direction to steer the design thinking triggering reminders around collective wellbeing. It is important to note that the navigator presented here is the latest iteration to date, and it continues to evolve through workshops, interviews and surveys with Te Arawa kin.

Throughout the research for this exegesis, technical knowledge was the medium utilised to start the design process.

However, developing a high level of artistic sensitivity was required to communicate the Maramataka narrative's aesthetics and allow the project to move freely in the world of imaginative media. At the later stages of design development, it became clear that representing the phasing of time was better illustrated by employing watercolours at varying levels as a creative process for iterating the changing experience of the Maramataka from night to daytime.

At night, the images evoke dream art, avoiding the need to be accurate or prescriptive but rather to represent material resembling dreams whilst not being directly based on them. This changes in the daytime as the Moon is not visible, and the experience is more of the state of being more awake and present.

It is a unique artistic application that aims to show how the designs of buildings would look surrounded by their environment inspired by the phasing of the Moon. In choosing this medium, the communication moves towards the ideology behind Te Maramataka in its visual impression of an architectural suggestion of space.

2.4.1. Kāinga-Ora (built infrastructure)

The impetus of this research is to propose an alternative housing development that addresses the need for multigenerational housing typologies connected to the Maramataka. Offering multigenerational housing enables larger family groups that live together within the same site to support one another. This project aims to create a strong sense of inhabiting a place through the feeling of belonging and entwining the self to the land whilst practising connection to Te Maramataka o Te Arawa.

While spaces of residence intermingle with the existing landscape, there is an opportunity to create variations in experience through the co-occupation of the existing forest.

This design limits vehicles' movement to the site's peripheral and provides roading and infrastructure connections to support future residential developments.

The built structure is intended for growth and un-growth to mimic the nature of the existing forest. Networks of living spaces are added on as family sizes increase, and similarly, they are repurposed as families move away . This process enables a balanced coexistence between the forest and the existing natural environment.

2.4.2. **Whenua-Ora (green ecologies)**

Most existing housing developments include a fair amount of ground excavation and ground disturbance. However, this project intends to create the least amount of disruption to the current earth structure by following the existing land contours and slope.

The connection to garden spaces for food production and self-sustenance is vital in this project. The built

structure bridges the relationship between the interior environment, the garden, and the stream. The large garden is layered in swales on the slopped site enabling the capture of nutrients on garden pads.

The suggestion here is that humans can co-occupy here, living with as much integrity as the land requires for humans and the land to thrive together.

2.4.3. Wai-Ora (blue ecologies)

This aspect of the project entails promoting the health of existing water cycles on land and along the Waingaehe Stream.

Figure 31: [ABOVE] Moon observatory image sequence

The navigator presents opportunities to celebrate diverse living systems through the restoration of cultural landscapes. Shared resources are available across various families from the urban forests and green and social infrastructures, i.e, hangi pits, outdoor kitchens and barbecues. Arranging living spaces along the stream is not a new concept. However, designing locally sourced biodegradable off-grid structures with water tankers and composting toilets , offers flexibility for community engagement during the construction process. This brings more permanence to Waingaehe stream, tipping the dominance over space towards its ecology. The design of impermanent form also enables humans to take more

responsibility for what goes in the stream because it lives on. The built structure may or may not continue to occupy space.The design of the long structure and landscape elements that run parallel to the Waingaehe stream create a porous level along the terrain to enable nature-based building shading & cooling whilst allowing compact living at the upper level. The concept design emphasises horizontal and vertical porosity as a strategy for filtering light and activity. Layering the rain gardens along the natural slope and raising the floors above the terrain along the riverside slows down water run-off via swales.This creates resilience in the event of heavy storms

2.4.4. Tangata-ora

Accessing affordable housing, energy, food, and mobility is a real challenge for many communities across Aotearoa. This project looks at including work/live shared space that reduces the requirement for regular single-car commute needs to multi-modal active travel needs.

2.4.5. Ōhanga-ora

Financial wellbeing and security can be improved through community workgroups that regenerate food

production onsite and supply micro-economies close to the residential area and across from the urban ecological food forest. This aspect of the project affects system change by creating local bio-economy production and building community connections by providing a living wage and life-work balance.

2.5. **Reflections**

These approaches cover an array of design moves that help inform this thesis. However, this project seeks to create a new public realm for living through growing food and sharing resources within a residential housing concept based on Te Maramataka of Te Arawa. Therefore, the design approach responds to selected Moon phases through sketching activities in various site places that integrate with a place-based response to the environment. In addition to this, the materials for this proposal are to be place-sourced and repurposed after use.

Thus, the locally defined experience comes first in the design thinking process then the architecture visualisation follows.

Figure 32: Photo from Whakarewarewa Forest to Mokoia Island

Part 3. Bridge

Making the urban realm sustainable requires not only a reconfiguration of the technical or material aspects of our society but, more radically, reconceptualising the very basic principles by which we live(Stuart & Thompson, 2010).

3.1. Creative Design Process

Unlike the traditional architectural design approach to starting a design with a site plan and a physical location in mind, this design is envisioned as a proposal that begins with the imagination of experiences of the Moon phases of Te Arawa. An initial look at Te Maramataka o Te Arawa shows that every phase corresponds to planting or a fishing reference. However, this thesis suggests an architecture for harmonious, sustainable socio-cultural wellbeing and will interpret indigenous interpretations of moon phases for biophilic design implementation.

A deeper understanding of the Maramataka narrows the main ideas to strengthening the human-nature bond through frequent observation and activation of the human senses. This endeavour requires repeated and sustained exposure to nature in everyday life. This concept is similar to Stephen R. Kellert's principles of Biophilic design application, which suggests that design enables three types of human experiences of nature, i.e.

Direct experience, Indirect experience and experience of space and place (Kellert & Calabrese, 2015).

With wellbeing in mind, the initial design focus is on enhancing the psychological, physiological and cognitive perception of nature through architectural design with Te Maramataka o Te Arawa at its core. Te Maramataka of Te Arawa is not prescriptive; however, it classifies environmental energy patterns into six groups, i.e. Low, High, Passive, Productive, Waning and High Energy.

Nature-Health relationships in the built environment underpin the following sketch and show how the experience of the Maramataka can inform a biophilic design framework for the site.

The next step was considering the materiality that suits living in the direct and indirect Moon phases, i.e. exposure spaces and withdrawal spaces. The proposal begins with a series of sketches of the experience and the interface with architecture. Translucent facades and apertures allow for varying levels of enclosure and exposure in a natural environment.

In Te Arawa, Whirowhiti can extend out to two days and is usually a time of retreat and self-care. This sketch helped me imagine interior materials and lighting and plan for light catchers for comfort and connection to the sky.

Figure 33: [COLLAGE] Whirowhiti phase

Mutuwhenua is a time to replenish one's inner being and plan. It is a time to mimic the environment and allow for interbeing vitality. This sketch depicts refuge and inspires views of the surrounding supporting design ideas for window seating and elevated spaces.

Figure 34: [COLLAGE] Mutuwhenua phase

Takirau period is a time to give back and look after the soil. This sketch starts to show interbeing re-engagement after a time of withdrawal. This sketch inspires sensitive design towards interior spaces.
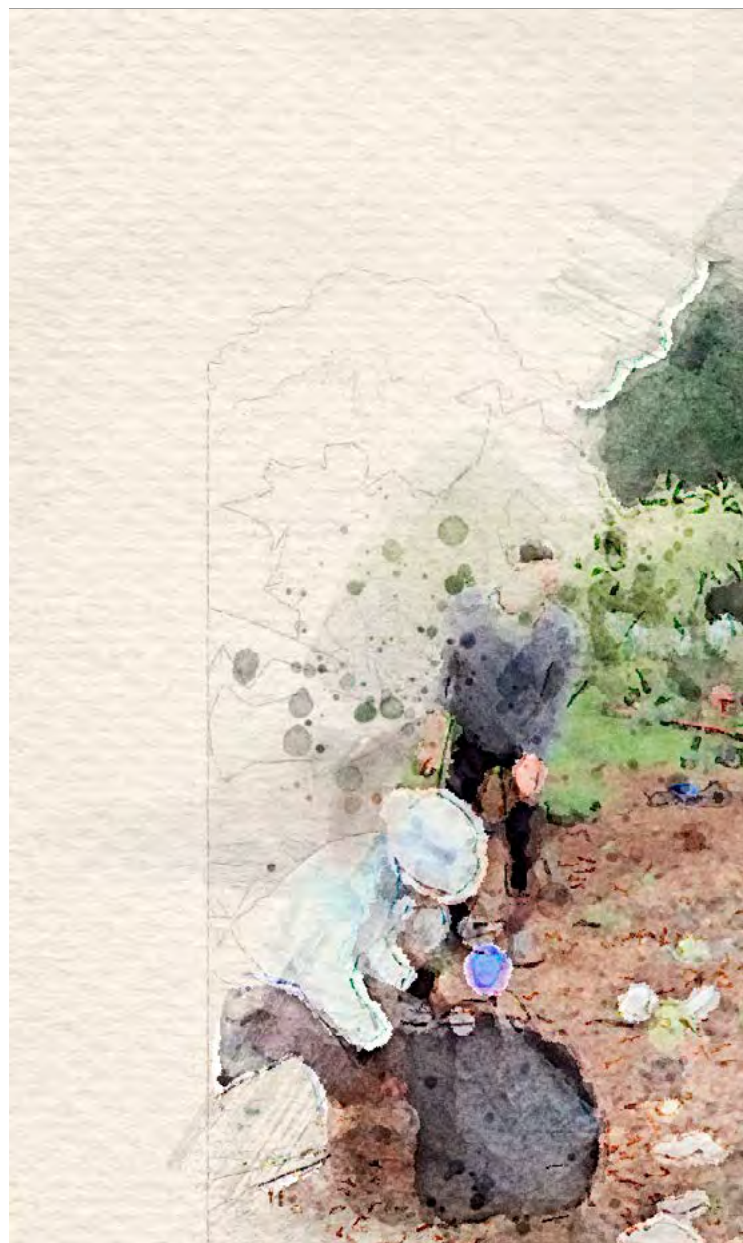
Figure 35: [COLLAGE] Takirau phase

In Te Arawa, during Korekore Te Ngana, the evening is a fruitful time to go to the water's edge and forage for food or enjoy nature. This sketch inspired a more engaged design for the land and water interface. Designing an eeling platform for improved access

Figure 36: [COLLAGE] Korekore Te Nganga phase

This sketch is for Tamatea Tuatahi and is in Te Arawa. The Tamatea phase is unpredictable when caution and care are needed between humans and the environment. This sketch inspired design for family gatherings with many children.

Figure 37: [COLLAGE] Tamata Tuatahi phase

Tamatea Whakapau is the last day of the passive energy phase encouraging the care of elders in the community that might need support. This sketch inspired a level of connection and accessibility for senior members to engage quickly and ask for what they needed.

Figure 38: [COLLAGE] Tamatea Whakapau phase

Maure is a time to harvest what is plentiful.

It is an excellent time to be with people

and get work done. This sketch inspired

the design for connected thinking around

food forests and supporting Tangata-Ora

and Ōhanga-ora.

Figure 39: [COLLAGE] Maure phase

Ōrongonui is shown in this sketch and informed the design for Engawa spaces where there is a linear connection between indoor spaces and the outdoors for creative energy to flow and goals or aspirations can be collectively achieved
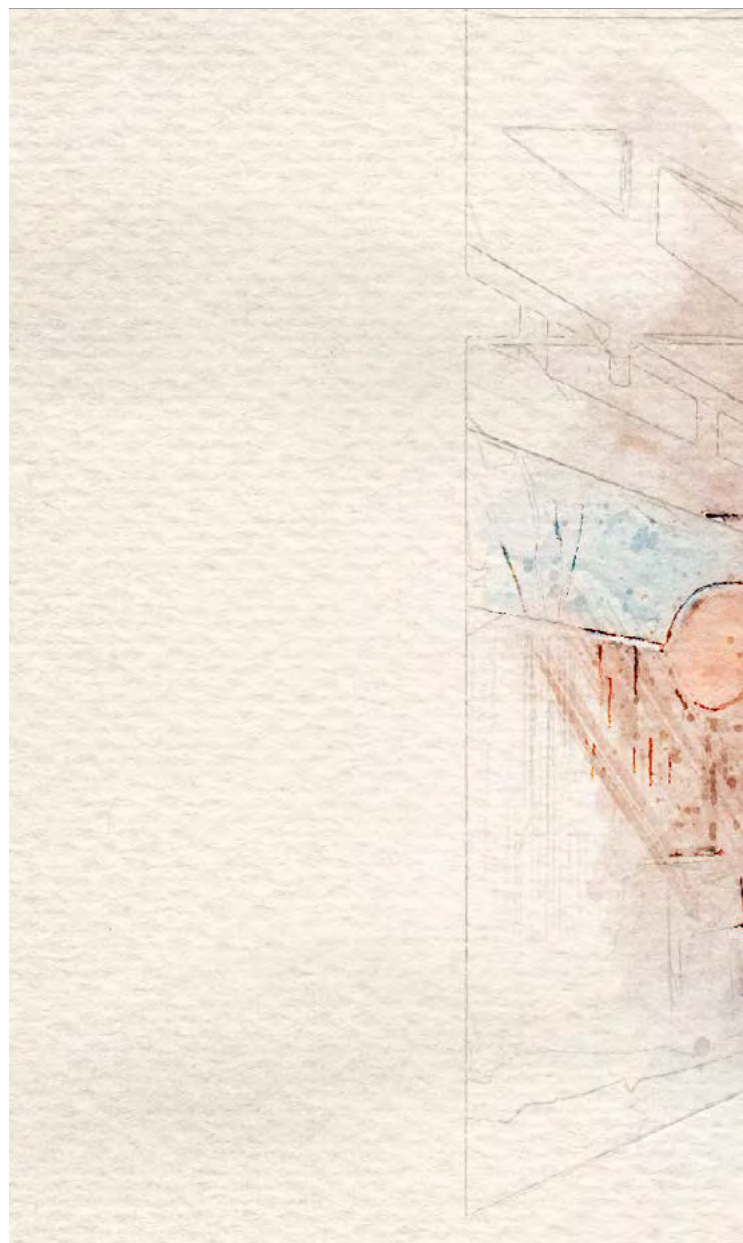
Figure 40: [COLLAGE] Ōrongonui phase

Atuaheahea is a good time for planting, so this prompts the design to include access to a natural planting area in line with the Mauri ora holistic navigator. Have social gatherings and receive guests to socialise..

Figure 41: [WATERCOLOUR RENDER] Atuaheahea phase

Tangaroa Kiokio is an excellent time to enjoy water internally and externally and any connection with blue-green ecology. It is a time of excellent interbeing communication. Best time to have a Market gathering to encourage local bio economies.

Figure 42: [WATERCOLOUR PLAN VIEW] Tangaroa Kiokio laying uwhi mats along Waingaehe stream

Raukanui is the time to pick fresh vegetables and fruit for a feast to have family gatherings. Designing indoor-outdoor cooking areas that are covered and uncovered

Figure 43: [WATERCOLOUR PERSPECTIVE] Raukanui phase

Ōtane is a time eeling or fishing, being out in nature for a walk and enjoying the late-night Moon. This phase inspires the need for a fire pit outdoors next to Waingaehe Stream.

Figure 44: [WATERCOLOUR PERSPECTIVE] Otane phase

3.2. Concept Design

The experience of ecological connection of Te Maramataka o Te Arawa becomes foregrounded through experiential spaces that encompass rain gardens, indoor and outdoor cooking spaces and covered and uncovered connection corridors through the forest. Light catchers maintain a connection to the outdoors, whiles porous enclosures engage the senses to the climate.

Multigenerational family spaces can be arranged with these conceptualised ideas of Te Maramataka o Te Arawa.

3.2.1. Project Brief

• To create an ecological architecture that merges or co-occupies the landscape and registers the ephemeral change of daylight and moonlight.

• To design interior and exterior spaces with degrees of enclosure that communicate seasonal variation through engaging human senses.

• Viewing platforms that engage moments in garden growth, moonlight castings, porous boundaries that allow breeze, filter the bird-song into open interiors.

• To utilise biodegradable materials that register and return to the Earth, design spaces that grow with the changing nature of the inhabitants – human and more-than-human - as families change.

- To create a human and more-than-human habitat for broader ecology at the water's edge.

- A living place that celebrates a social-ecological architecture at the edge of a Waingaehe stream

- A residential architecture that combines a range of different home spaces, enabling larger extended families, individuals, and Rangatira elderly to live together as a community

- Engawa or outdoor multi-use corridors in-between areas that become link spaces between architecture and garden, meeting spaces, flow spaces that connect the neighbourhood to the natural environment

- A shared ecological food forest that provides sustenance – physical and mental – for the neighbourhood

- A public blue learning space that advocates for the Waingaehe stream & improved water quality for stream habitats & cultural learning about the Maramataka

A destination public space that connects & engages people with the Te Maramataka o Te Arawa provides a place for recreation social & cultural activities, including access to mara kai and local food gardens.

3.3. Developed Design

The next step in the design involved drawing housing units for an array of family groups. For this stage, I turned to computer-aided drawings for accuracy in iterating the massing and structural arrangement of the sequence of buildings for the site. The plan intends to provide the opportunity to connect people with their gardens with varying degrees of public and private space.

This intent is further supported by creating an active central shared food area and an activated water's edge where everyone can look after the Waingaehe Stream. The new space provides exciting new opportunities to engage with the stream and an expanded range of recreational, social and event activities at the water's edge.

This concept sketch starts at the edge of Waingaehe Stream with a small structure that extends over the stream to a small riverboat. The vertical columns find spaces between existing trees and allow for human connection to the water.

This drawing conceptualises structures that weave along the existing mature forest. Each building sets its height if

Figure 45: [MASSING UNIT 1] Shared house for two families

the existing canopy allows. The concept of temporary structures entering the forest is critical.

This concept suggests that a simple timber structure can allow for interconnected living and working spaces with long pathways exposed to the surrounding natural environment with varying degrees of publicness. These paths provide lanai spaces that continue with engawa spaces for rest and observations of the environment and recording the changes according to the Maramataka.

The following sketch image portrays an arrival area leading to an extended semi-enclosed path linking various buildings. The vertical structures emulate the stature of the trees, and the horizontal members mimic the expanse of the tree roots.

The massing of the buildings is capable and intended to be temporal. The impermanence of form, quality, or nature at any given time is a critical aspect of the design as the equitable status of the built form alongside the natural forests must occur in balance with interbeing (humans and the nonhuman beings) survival.

The mutable characteristic of this design strategy also responds to how families change from one generation
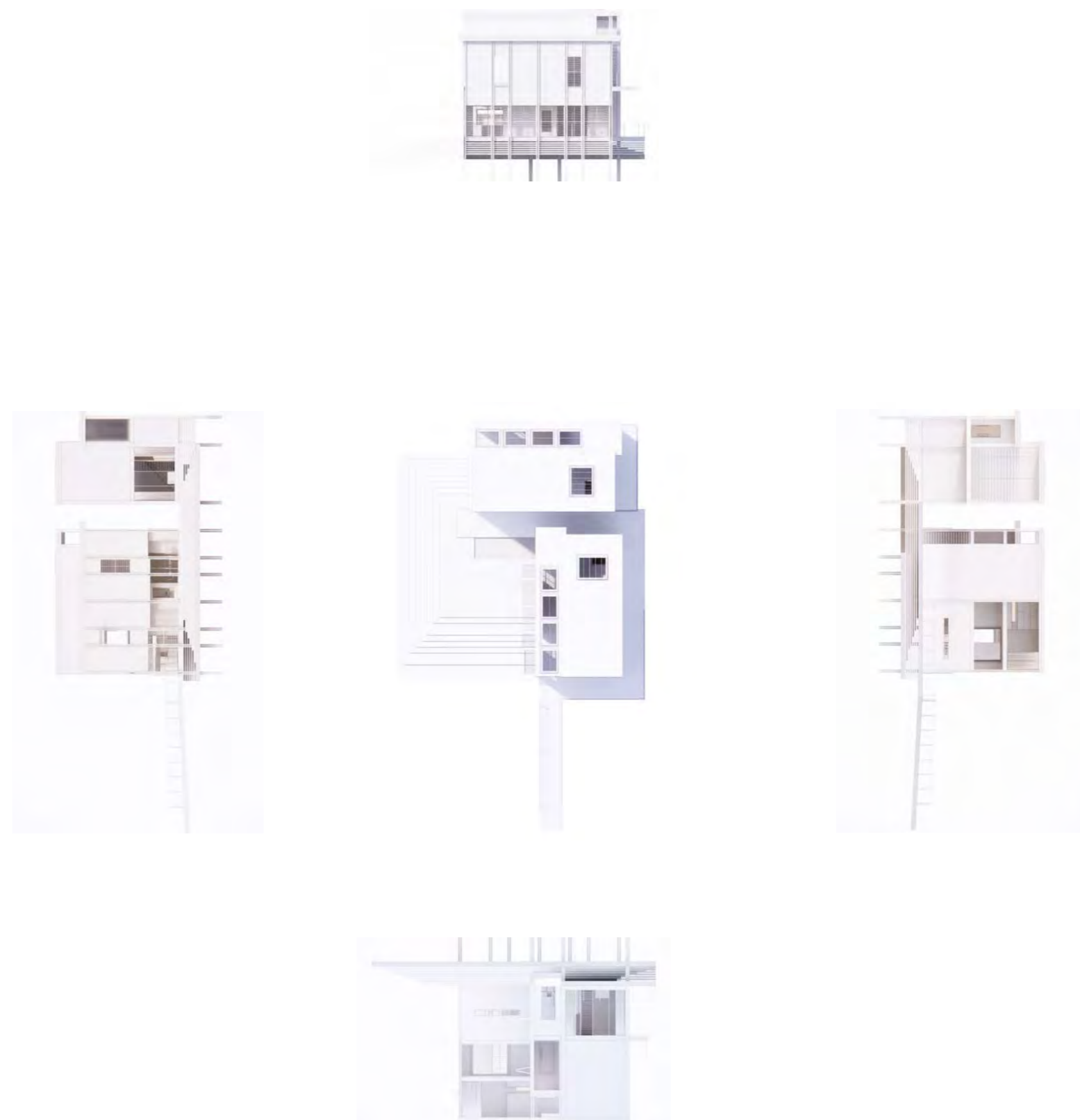
Figure 46: [MASSING UNIT 2 & 3] Shared house for four families

to the next. Families go through many changes and are loosely connected as they grow. The gaps in the built mass represent the change of phases in the Matamataka.

The elevated structure allows groundwater to flow unobstructed while the swales that follow the land contours capture the nutrients as they move through the Whenua to Waingaehe Stream. The openings at the first level have varied levels of transparency, allowing views through to the steam and beyond.

This project developed from a single co-housing unit for two families through to 4 and 6 family housing typologies with multifunctional spaces.

The verticality of the dwellings incorporates lightwells to reflect moon castings and shadows. Engawa or lanai spaces of differing sizes, degrees of publicness and exposure via porous vertical openings and length to connect these spaces and to provide access.

These units are raised well above the anticipated flooding levels of the stream but are not entirely in parts. The landscape conditions and Maramataka data are identified and utilised by managing primary architectural
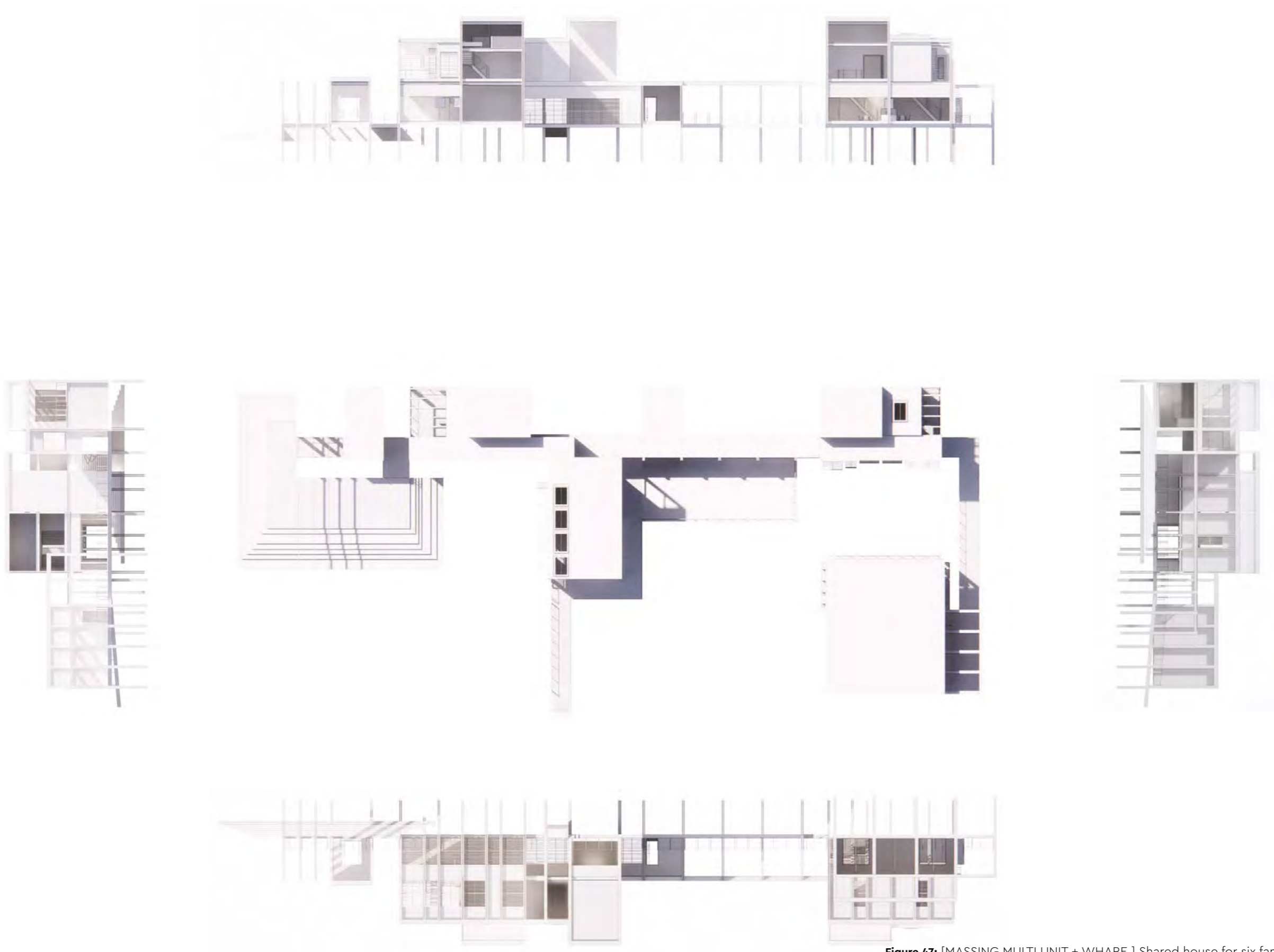
Figure 47: [MASSING MULTI UNIT + WHARE] Shared house for six families or more

façade interfaces to create spatial combinations that configure the architecture's horizontality. The additive growth of the architecture in place mimics the nature of the forest that is rephrased as the composition of unprescribed spatial arrangements and the landscape's topography and dynamic process of mutation justify the creation of opportunistic geometrical forms which allow the site's nature to prevail above the stagnation of built structures.
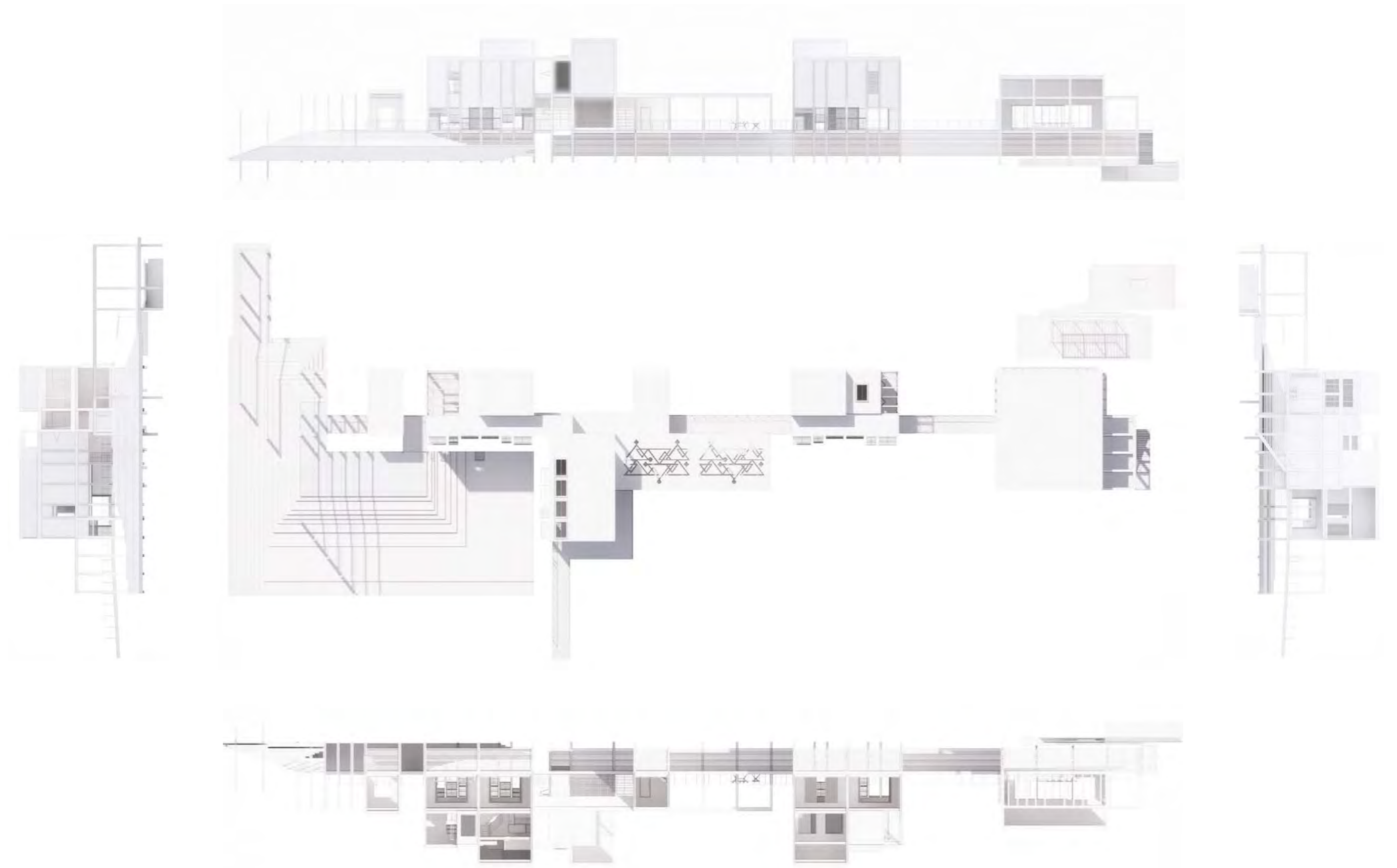
Figure 48: [MASSING MULTI UNIT + WHARE + PUBLIC GATHERING SPACE] Shared house for eight families or more

Figure 49: [IMAGE RIGHT] The Beautiful
New Zealand Tui Brid by joeycheung

Part 4. Hope

4.1. Detailed Design

The Maramataka underpinned the design framework for this design leading the development of a design brief, concept massing and porous elevated living/working spaces evolve through the development stage.

The detailed design stage further develops through floor plans and sections, exploring interior/exterior inhabitation with engagement to the mutable landscapes, which has the potential to enliven the experience of Te Maramatka by reimagining the perception of the Moon to show that observing the night sky creates a knowing of the unseen.

Figure 50: [DETAILED PLAN DEVELOPMENT] Multiunit Roof plan
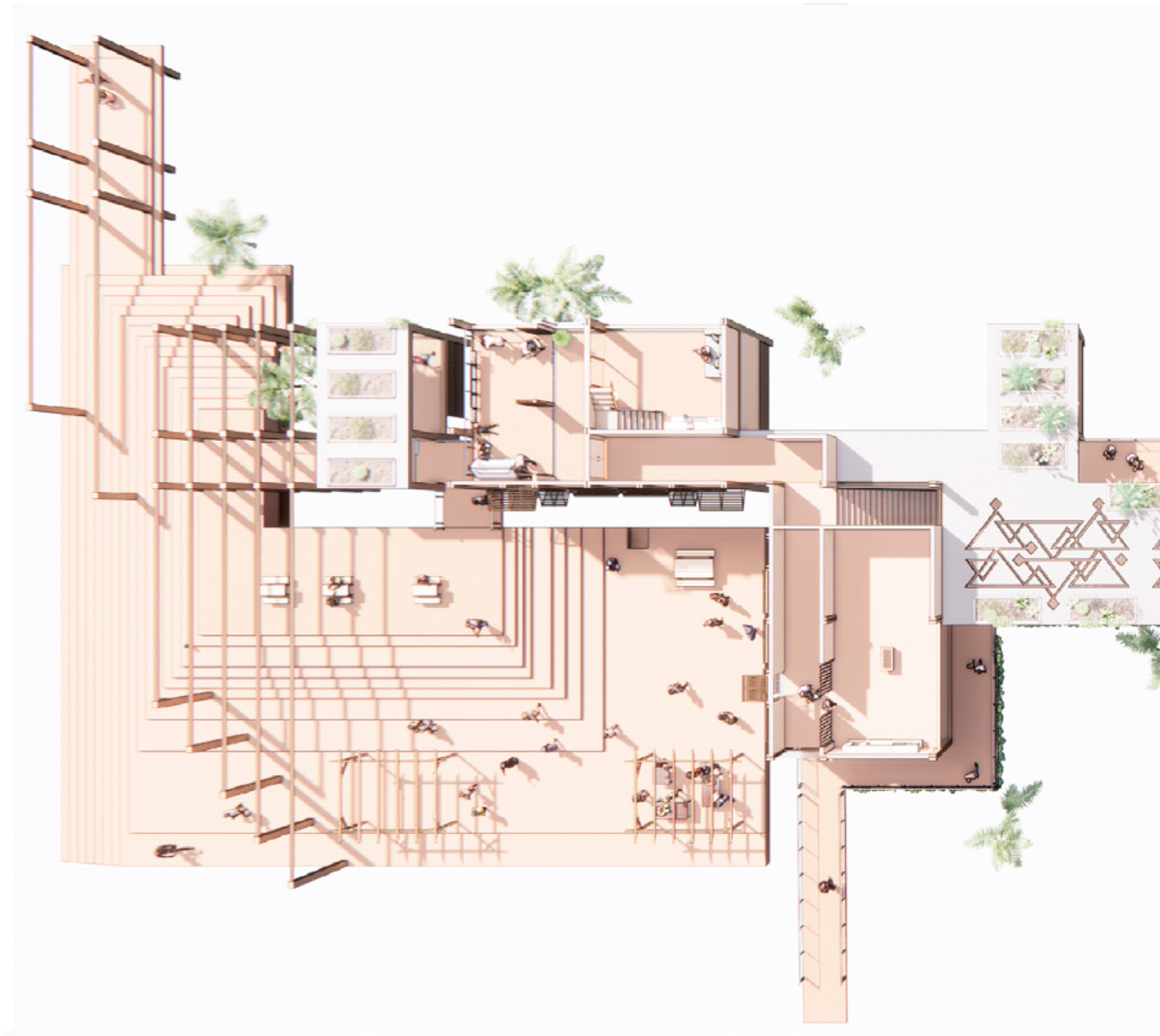
Figure 51: [MULTI UNIT UPPER FLOOR PLAN]

Figure 52: [MULTI UNIT GROUND FLOOR PLAN]
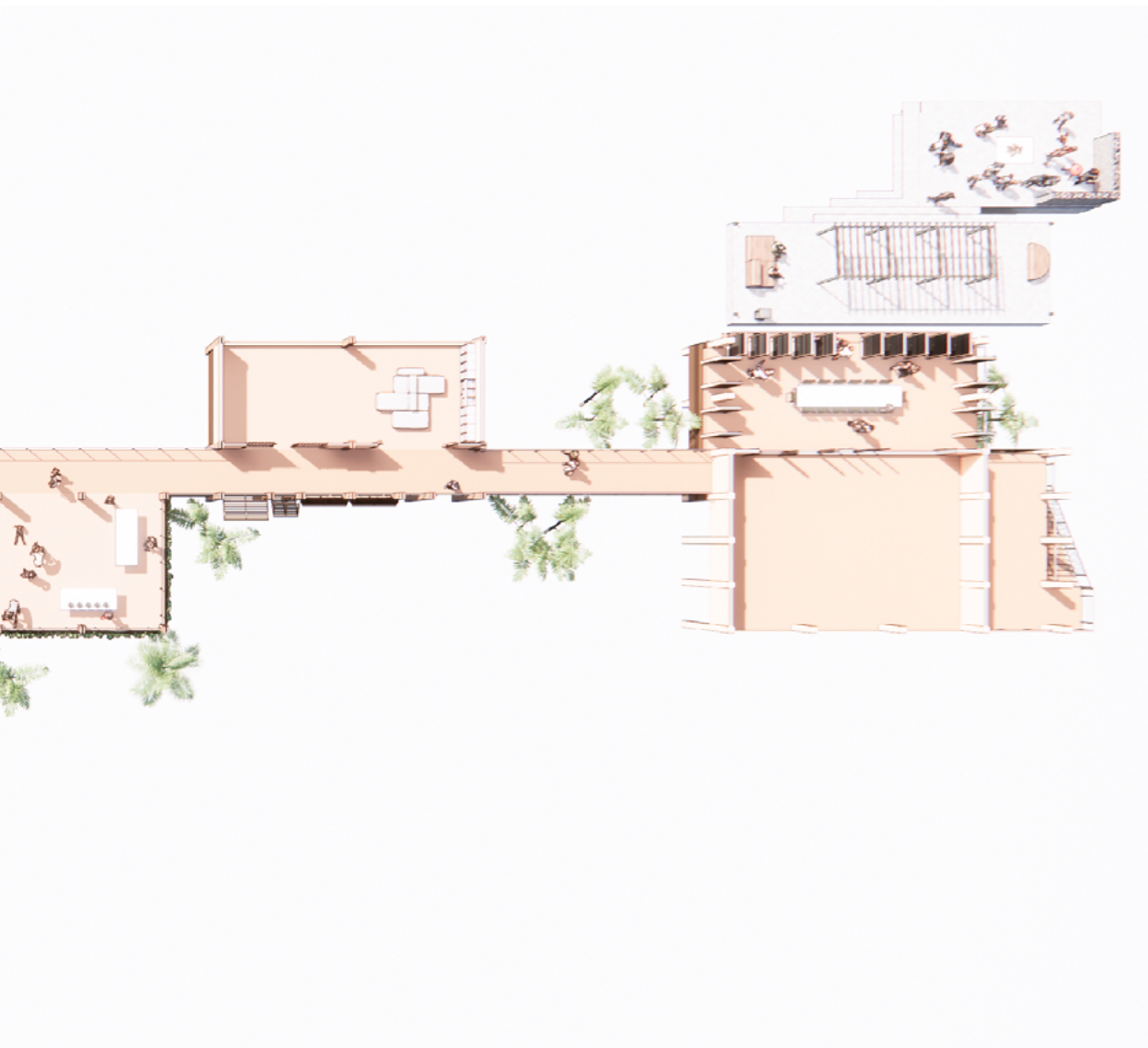
The outcome of the design shows a structure that is an active participant in the landscape's ephemeral processes of engaging with climate, geology, ecology, and interbeing cohabitation.

The presence of a water corridor such as the Waingaehe stream that ebbs low in summer is celebrated through community members engaging in restoring the stream bed by laying locally made Uwhi mats.

Figure 53: [SECTIONAL PERSPECTIVE A]
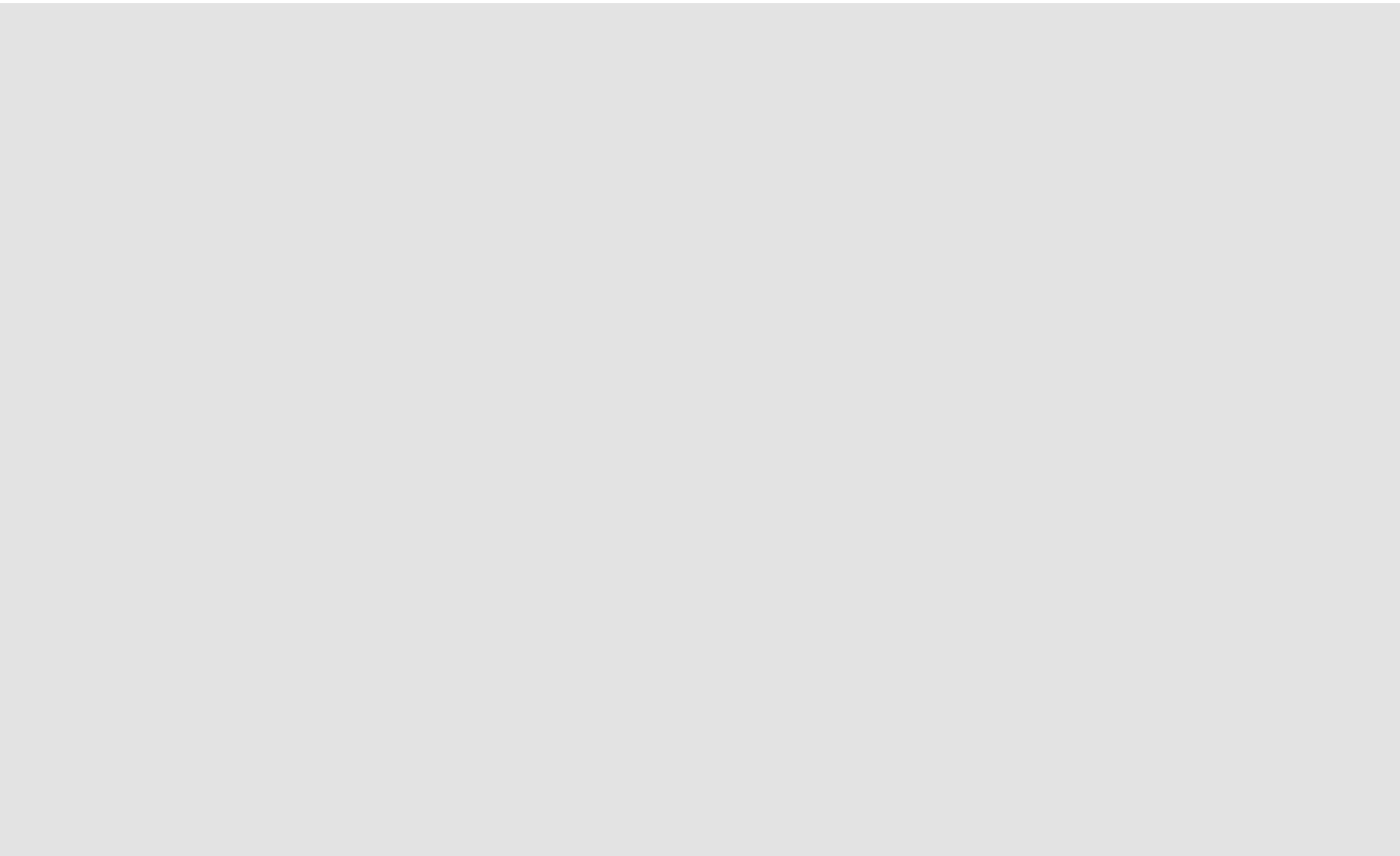
The steam is enlivened with winter rains and occasionally floods, constituting a mutable waterscape that links sky, Earth, lake, and sea in an ancient, ongoing cycle.

Figure 54: [SECTIONAL PERSPECTIVE B]
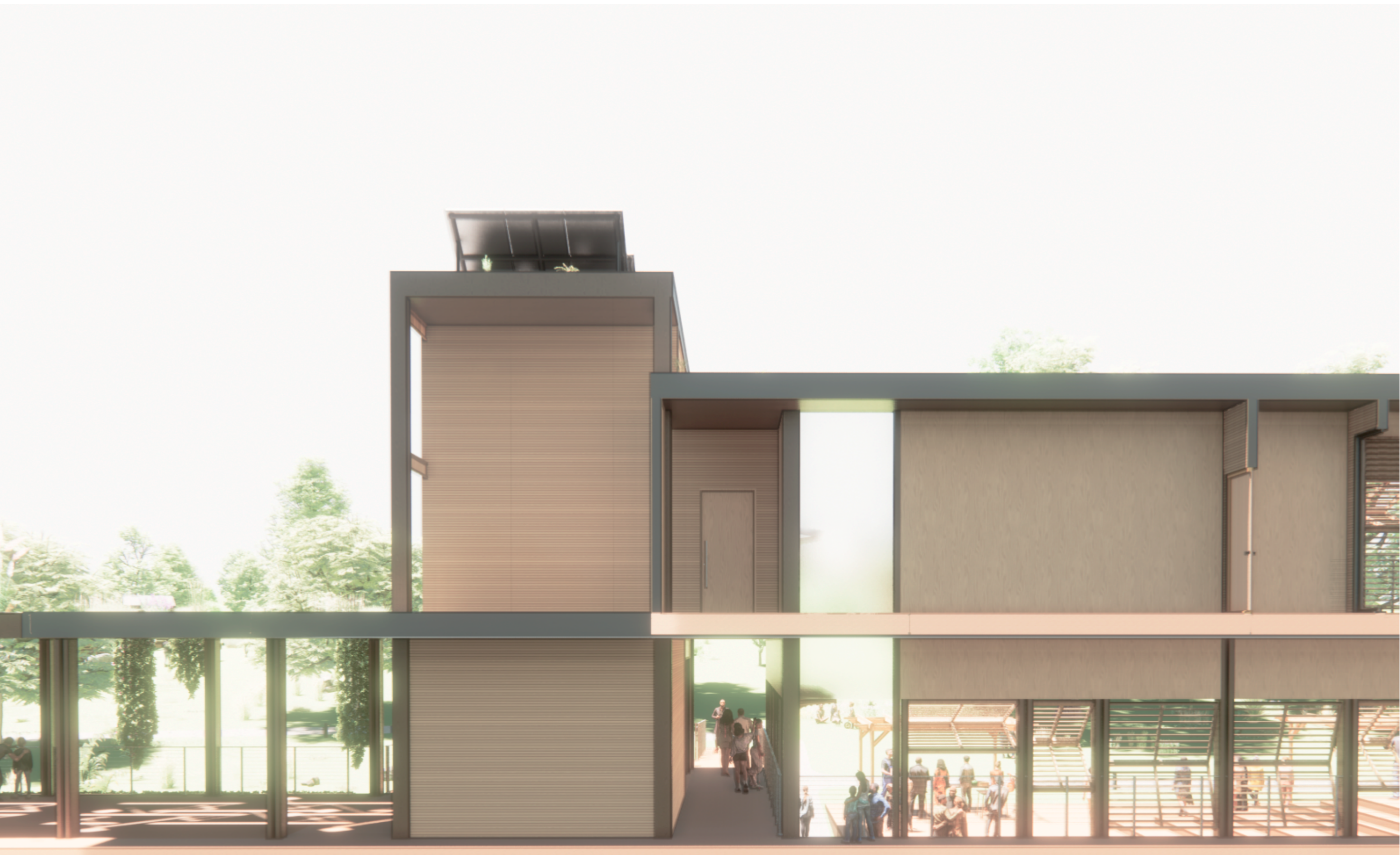
This design mediates between stream and forest, between landscape and architecture, between sky and moon and day and night as it registers and specialises a rich ecological interplay, an interbeing inhabitation.

The design aims to create moments that register ecological rhythms into the diurnal patterns of inhabitation.

Figure 55: AXONOMETRIC ENGAWA CONNECTOR

AXONOMETRIC
ENGAWA INTERIOR
STUDY

Hope
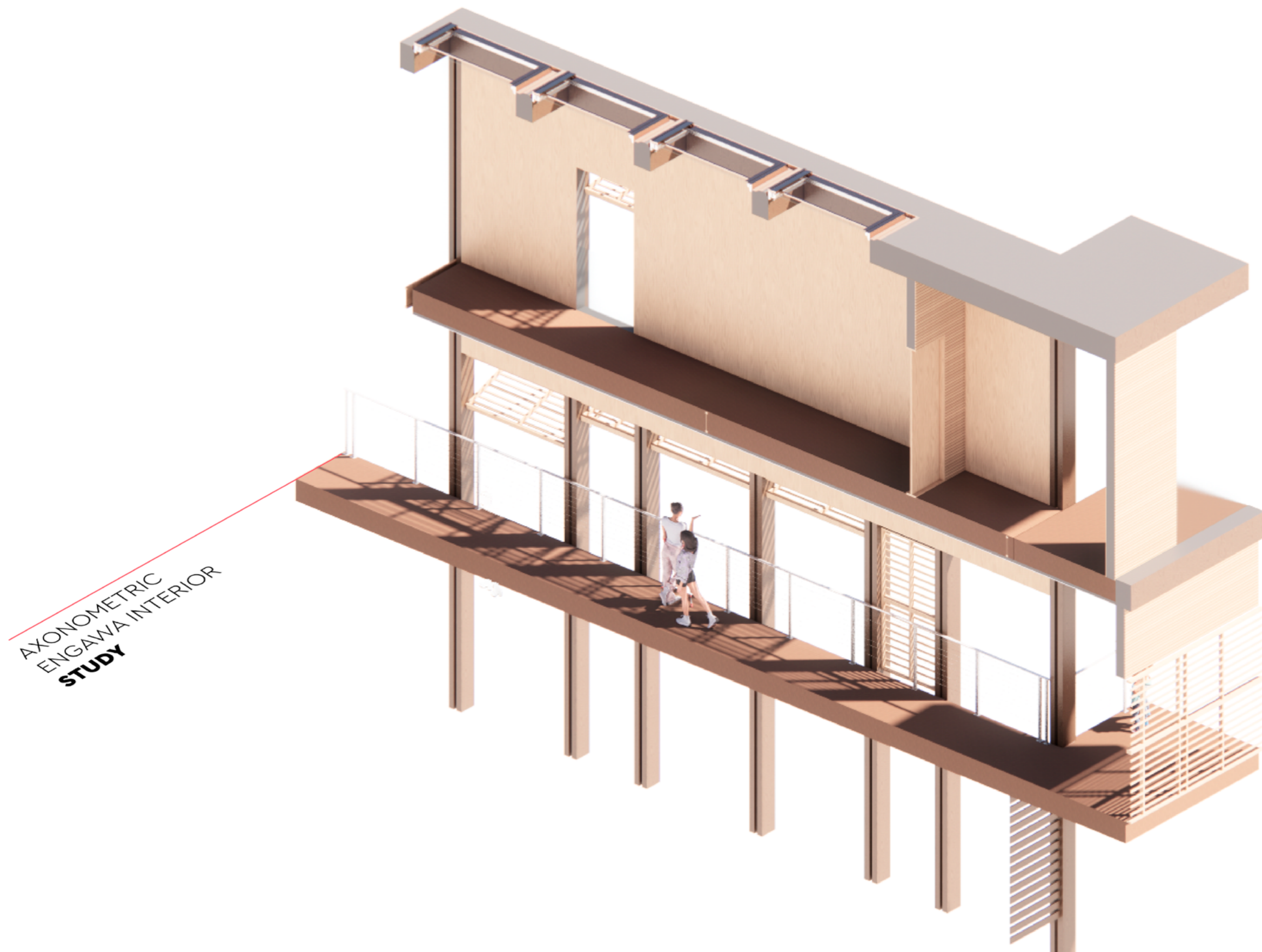
Figure 56: [IMAGE RIGHT] a swallowtail butterfly on a meadow clover by Wirestock
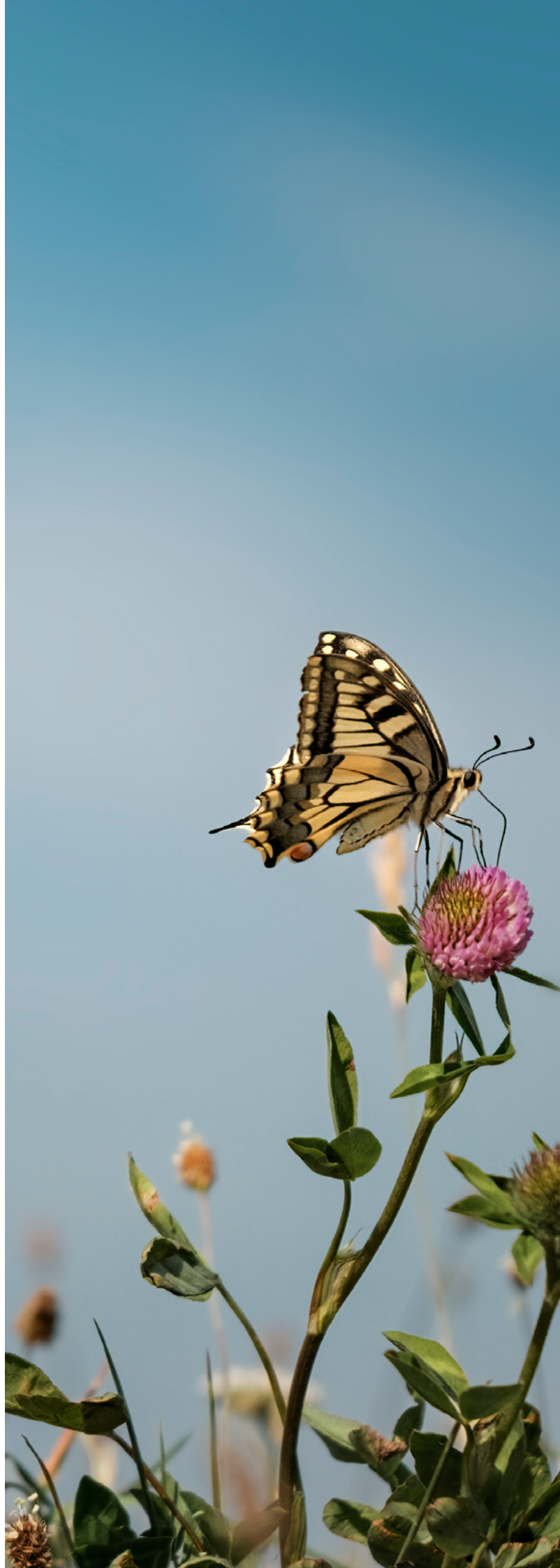
Part 5. Reflections

Figure 57: Thesis diagram for Part 4

"Ecology is permanent economy (James, 2013)."

5.1. Scope and Limitations

5.1.1. Scope

Te Arawa Vision 2050, the Māori Ora Holistic Wellbeing Navigator and the Maramataka o Te Arawa define the scope of this thesis.

When this project started, Te Tatau o Te Arawa published Te Arawa Vision 2050 (2020), which sets out the key strategic directions for Te Arawa communities, economy and built and natural environment to 2050.

Around the same time, a Māori Ora Holistic Wellbeing Navigator was developed through He Puna Ora workshops with Te Tatau o Te Arawa. The navigator has been an important design tool that has helped bridge the gap between Māori and Pākehā frameworks, particularly in architecture.

The first Maramataka for Te Arawa was developed in 2018 based on the research, wānanga, practice and shared learning conducted by Ngā Pātaka Kōrero o Te Arawa. Since then, Ngā Pātaka Kōrero o Te Arawa

has presented the best of what they know. However, as research and learning continue, so does the presentation of their Maramataka. For simplicity, this research will focus on the Maramataka released in June 2021.

This present study employs these two documents to compose a design brief. It focuses on how this information can inform the design process when planning largescale housing models for Te Arawa.

A central issue in this process is the importance of remaining authentic to the initial information in these documents to avoid possible misrepresentation.

5.1.2. Limitations

Pandemic woes aside, the initial limitations of this research came from the lack of varied sources of peer-reviewed literature on the Maramataka and Mātauranga Māori. However, this was mitigated by communicating directly with the authors of Te Maramataka o Te Arawa because it allowed the exchange of essential understanding behind the differences in the Maramataka.

Another aspect limiting the breadth of this research is the setting for learning the Maramataka. A more

suitable way to learn about the Maramataka is in a Noho marae (immersion-based) learning at a marae on the site experiencing the environment simultaneously. It is essential to learn about the Maramataka with local experts in the area at the helm.

For the uninitiated, it is hard to grasp the evidence within Mātauranga, which incorporates Maori philosophy, tangible and intangible matters and a strong focus on oral tradition. Through research, I discerned the subjective and objective aspects of the Maramataka to continue this work.

When probing Mātauranga Māori, one comes up against the effects of colonisation and the enduring tension that quietly permeates every facet of life in New Zealand, including academia. It is like an undertow moving in many directions simultaneously.

Even though I am not Pākehā, I was strangely influenced by what I later discovered was Pākehā "Paralysis" (Tolich, 2002). Finding suitable sources of information for this research was a real challenge.

5.2. Final Findings

The project is conceived as an amalgamation of sensitive interpretations of indigenous concepts of the phases of the Moon. The resulting buildings for interbeing habitation suggest an alternative form of architecture that can exist in mutual benefit to the site, embracing the intersection of various life-sustaining systems, demographics, programs, and activities. The building simply manifests the complex nature of interbeing needs that exist seamlessly infused into a built form, resulting in an interconnected web of landscape and building forms in the terrain.

The temporal nature of the Maramataka is not only a phenomenon that changes the landscape's scenery; it is utilised as a design parameter that affects functions and uses such as accommodation, building accesses and outdoor circulation activities in different ways at different times of the year.

The mutable landscape generates an experimental form of interbeing inhabitation based on designing events derived from the site's natural Maramataka processes conceived as an act of performance. A temporary concept of collective cohabitation emerges

Figure 58: [IMAGE LEFT]
Cloudy sky. by Artinun

by eliminating the conventional interpretation of housing according to western spatial layout concepts and repositioning comforts and amenities to suit cooperative living. This involves reconsidering introverted, extroverted, private, communal and public spaces to discover a new interlacing of living and working spaces.

During the research and design process, a key finding has evolved, enabled and enacted through the collaboration with Te Tatau o Te Arawa. As the recent IPCC 6th assessment report (UC Connect: What Does the New IPCC Climate Report Mean for Our Cities? - YouTube, 2022) affirms – indigenous knowledge is vital when rapid system change is imperative.

In this research, Te Arawa's mauri-led Vision 2050 and the co-created Te Tatau and He Puna Ora Regenerative Action Lab Mauri Ora compass became transformative tools for architectural action.

Transformation in architectural practice must come from top-down processes and from the bottom up drivers, as transformative flax-roots indigenous initiatives that usher in social, ecological and cultural change.

A further finding is embedded in the practice discussed here, embedded into an exploratory architecture that links building and landscape, people and gardens, river and recreation.

The research practice has revealed how the Maramataka o Te Arawa becomes a means to ground indigenous ecological experiences in architectural form. The Maramataka becomes an architectural driver that emphasises ecological connection and structures a tidal moon-responsive architecture and landscape.

5.3. Thesis Conclusion

In architecture, we often approach the design brief in response to assumed environmental needs and with the client's wish list on hand. However, with the current climate and more comprehensive ecological emergency, we must expand our professional practices and norms so that ecological drivers and regenerative strategies are considered at a scale that is more than human.

As demonstrated in this design, architecture can play a subtle but influential role in improving how we occupy land through alternative ways of living.

Architecture at this time must evolve to consider larger environmental and socio-cultural ecologies and connected systems - urban agriculture and food distribution systems, local renewable energy, community connection architecture that supports community connection, and landscape architecture strategies to grow local biodiversity. Architecture should now foster ecological urbanism as a transformative practice.

In terms of my own enquiry, this is a vital direction for future research and practice, exploring how I can support the development of architectural approaches

Figure 59: [IMAGE LEFT]
Sunset over Hot Mud Pools in
Rotorua by Viktor

and projects that enhance environmental and socio-cultural wellbeing to meet the current challenges of climate change and build a more resilient future for humans to thrive.

It started with inquiring about **how the Maramataka of Te Arawa could be applied as a socio-cultural-ecological design driver for developing holistic housing that supports Mauri Ora [wellbeing].**

The journey has come full circle with the result that offers an alternative path to occupying space.

It is possible to include the voices of those who come before us through their observations of the natural environment to find the rhythm of a place to render architecture with Manawataki.

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List of Figures

Manawataki ...
to be rhythmical

ትውውቅ

ጤና ይስጥልኝ

ስላምታ ለሁላችሁም::

ኢትዮጵያዊት ነኝ::

ቤተሰቦቼ የጎጃም እና የአፋር ሰዎች ናቸው::

የህግ ኮከብ ከሳቴ ብርሃን ባድማ ያለው አባላለሁ::

HE PEPEHA

Tēnei taku mihi

Ka mihi ki o kautau maunga, o kautau marae, o kautau whenua

Tena kautau tena kautau tena kautau katoa

No Ethiopia ahau

No Gojjam me Afar oku tupuna.

Ko Yeneghkokebe Kesate Birhan Badimayalew taku ingoa

HE PUNA ORA, THE REGENERATIVE ACTION LAB

Mesh Architecture asks, "How can Mesh Architecture improve the wellbeing of more-than-human entities in Aotearoa (New Zealand)?

-Todd Collis

Tūhononga asks. "How can we better co-occupy with more-than-human entities like our Maunga, wai, rangi and whenua?

-Matangireia Yates Frances

Underpinning my involvement in this research is the commitment to engage with Mātauranga Māori through understanding the Maori environment pattern language known as the Maramataka.

-Yenegh Badimayalew

Manawataki ...
to be rhythmical

DON'T NEED
TO KNOW WHERE
YOU'RE GOING...
YOU'RE GOING

ADAPTATION IS THE ONLY
WAY FORWARD

MAURI ORA - WHAT IS WELLBEING IN ARCHITECTURE?

Te Tatau o Te Arawa and the Huritanga Mauri Ora research team developed this navigator as a strategic tool to assist in realising the wellbeing vision for Te Arawa.

MAURI ORA HOUSING DEVELOPMENT WELLBEING COMPASS

TRANSITIONS TOWARDS:
RENEWABLE ZERO-CARBON ENERGY
REGENERATIVE ECOLOGICAL SYSTEMS
CIRCULAR ECO-ECONOMIES
COMMUNITY WELLBEING

WHAKA-ORA: HOLISTIC WELLBEING ACTIONS

KĀINGA-ORA: REGENERATIVE LIVING BUILDINGS & NEIGHBOURHOODS

WHENUA-ORA | WAI-ORA: GREEN & BLUE ECOSYSTEMS

PANEKE-ORA: ACTIVE & ZERO-CARBON MOBILITY

ŌHANGA-ORA: CIRCULAR BIO-ECONOMY

TANGATA-ORA: PEOPLE WELLBEING

Te Maramataka o Te Arawa

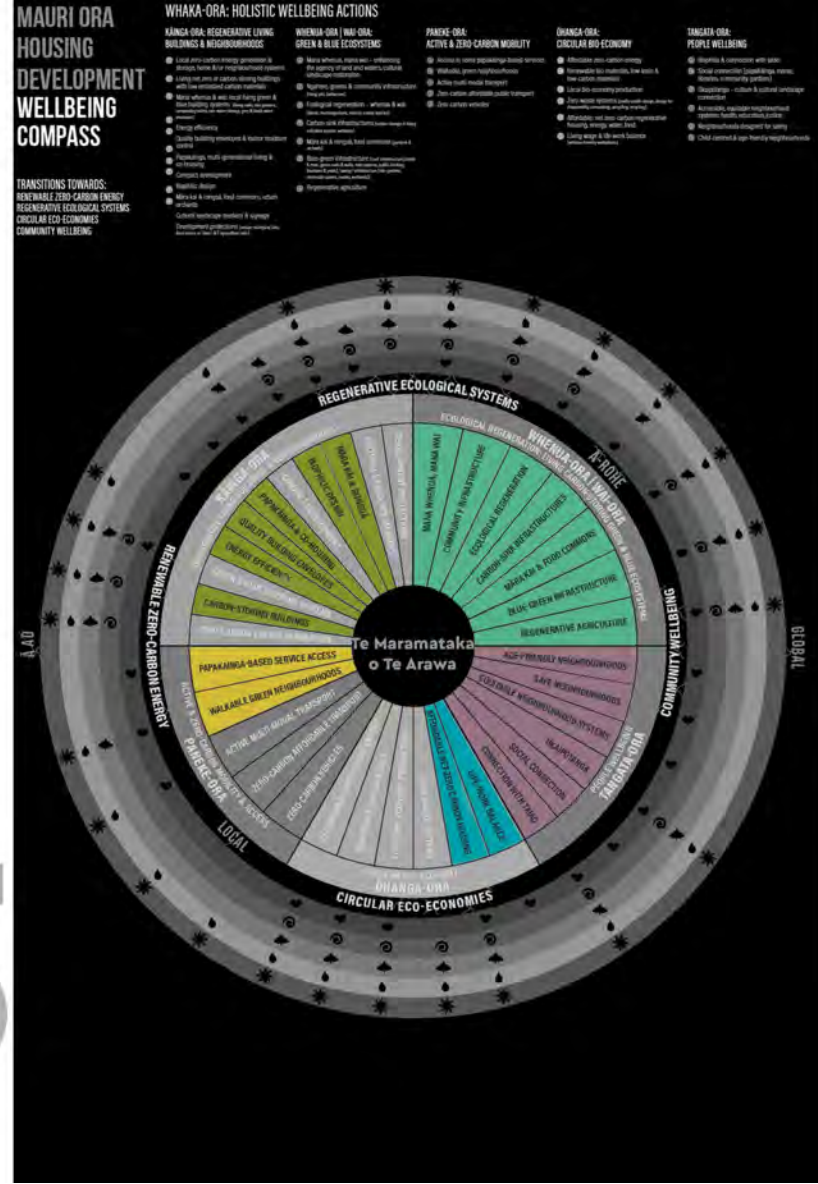# Pāpakainga & Co-Housing

MAURI ORA - WHAT IS
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MAURI ORA
HOUSING
DEVELOPMENT
WELLBEING
COMPASS

TRANSITIONS TOWARDS:
RENEWABLE ZERO-CARBON ENERGY
REGENERATIVE ECOLOGICAL SYSTEMS
CIRCULAR ECO-ECONOMIES
COMMUNITY WELLBEING

WHAKA-ORA: HOLISTIC WELLBEING ACTIONS

Pāpakainga & Co-Housing
Māra Kai and Food commons

**MAURI ORA - WHAT IS
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realising the wellbeing vision for Te Arawa.

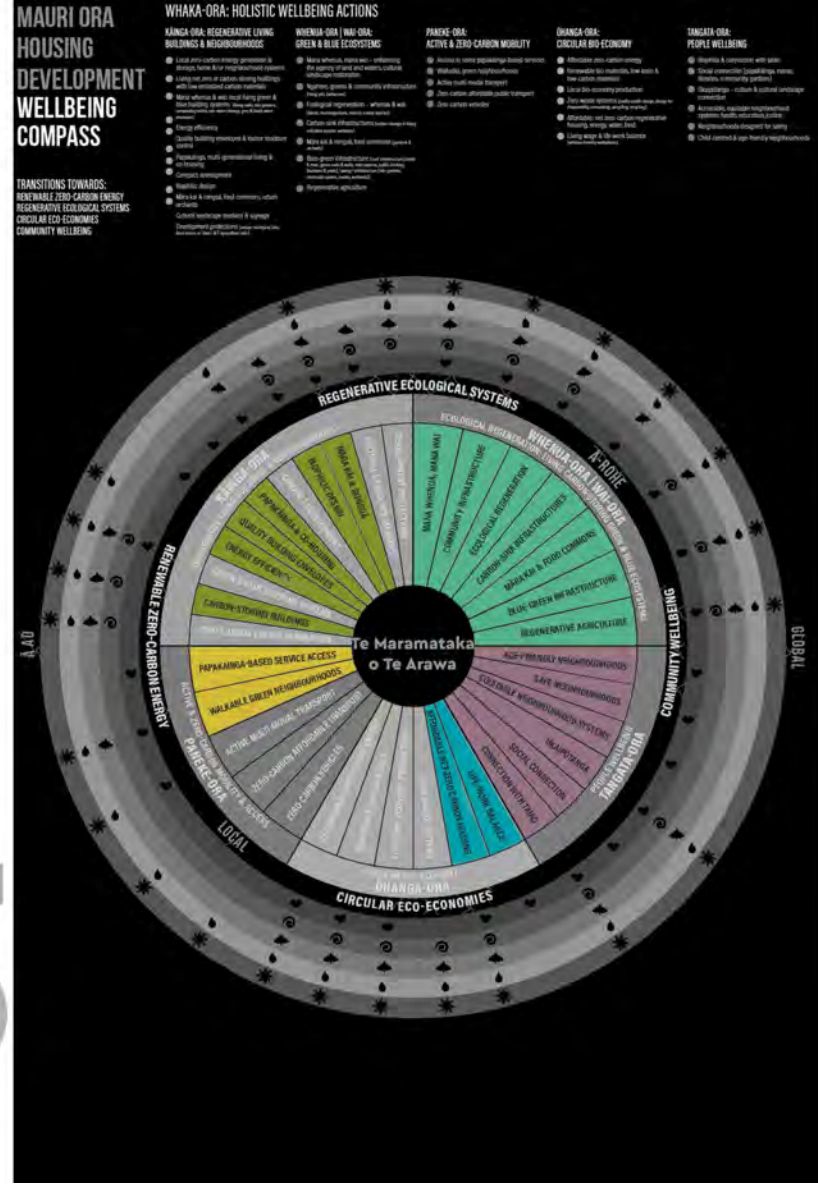# Pāpakainga & Co-Housing

Māra Kai and Food commons

Biophilic Design

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Pāpakainga & Co-Housing

Māra Kai and Food commons

Biophilic Design

Community and BLUE-GREEN infrastructure and

MAURI ORA HOUSING DEVELOPMENT WELLBEING COMPASS

WHAKA-ORA: HOLISTIC WELLBEING ACTIONS

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Pāpakainga & Co-Housing

Māra Kai and Food commons

Biophilic Design

Community and BLUE-GREEN infrastructure and

LIFE-WORK balance in Affordable NET-ZERO CARBON HOUSING

MAURI ORA - WHAT IS WELLBEING IN ARCHITECTURE?

Te Tatau o Te Arawa and the Huritanga Mauri Ora research team developed this navigator as a strategic tool to assist in realising the wellbeing vision for Te Arawa.

MAURI ORA HOUSING DEVELOPMENT WELLBEING COMPASS

WHAKA-ORA: HOLISTIC WELLBEING ACTIONS

PROJECT LOCATION

- Aotearoa [NEW ZEALAND]

- Bay of Plenty

- Rotorua

Auckland

Bay of Plenty

SITE ANALYSIS

SITE ANALYSIS

Te Ngae Road

SITE ANALYSIS

Te Ngae Road

ŌWHATA

Porikapa Road

Wharenui Road

✕ MANAWATAKI SITE LOCATION

SITE ANALYSIS

TE ROTORUA NUI Ā KAHUMATAMOMOE

WAIKAWAU (HANNAHS) BAY

HINEMOA POINT

ŌWHATA MARAE

ŌWHATIURA BAY

ŌWHATA

Ōwhata Road

Te Ngae Road

NGĀPUNA

TE PAPA-ARUAMOA

HURUNGA TE RANGI MARAE

HINEMIHI MARAE

APUMOANA MARAE

Porikapa Road

Wharenui Road

Wharenui Development Area

PUKEPOTO

⊗ MANAWATAKI SITE LOCATION

SITE ANALYSIS

TE ROTORUA NUI Ā KAHUMATAMOMOE

WAIKAWAU (HANNAHS) BAY

HINEMOA POINT

ŌWHATA MARAE

ŌWHATIURA BAY

Ōwhata Road

ŌWHATA

Te Ngae Road

Porikapa Road

Wharenui Road

Waingaehe Stream

PUKEPOTO

NGĀPUNA

TE PAPA-ARUAMOA

HURUNGA TE RANGI MARAE

HINEMIHI MARAE

APUMOANA MARAE

Wharenui Development Area

MANAWATAKI SITE LOCATION

SITE ANALYSIS

TE ROTORUA NUI Ā KAHUMATAMOMOE

WAIKAWAU (HANNAHS) BAY

HINEMOA POINT

ŌWHATA MARAE

ŌWHATIURA BAY

Ōwhata Road

ŌWHATA

Te Ngae Road

NGĀPUNA

TE PAPA-ARUAMOA

HURUNGA TE RANGI MARAE

HINEMIHI MARAE

APUMOANA MARAE

Porikapa Road

Wharenui Road

Waingaehe Stream

Wharenui Development Area

PUKEPOTO
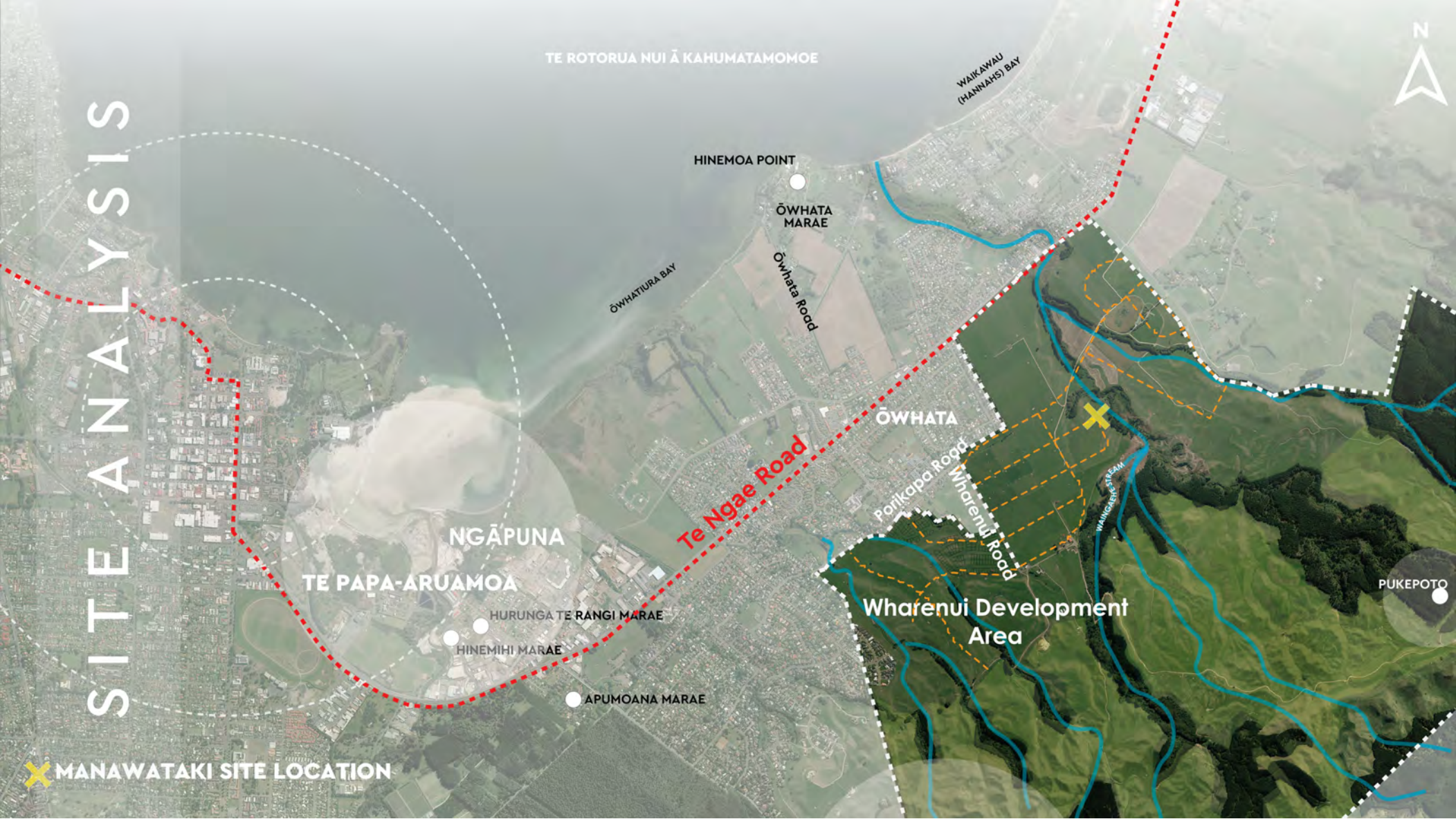
✗ MANAWATAKI SITE LOCATION
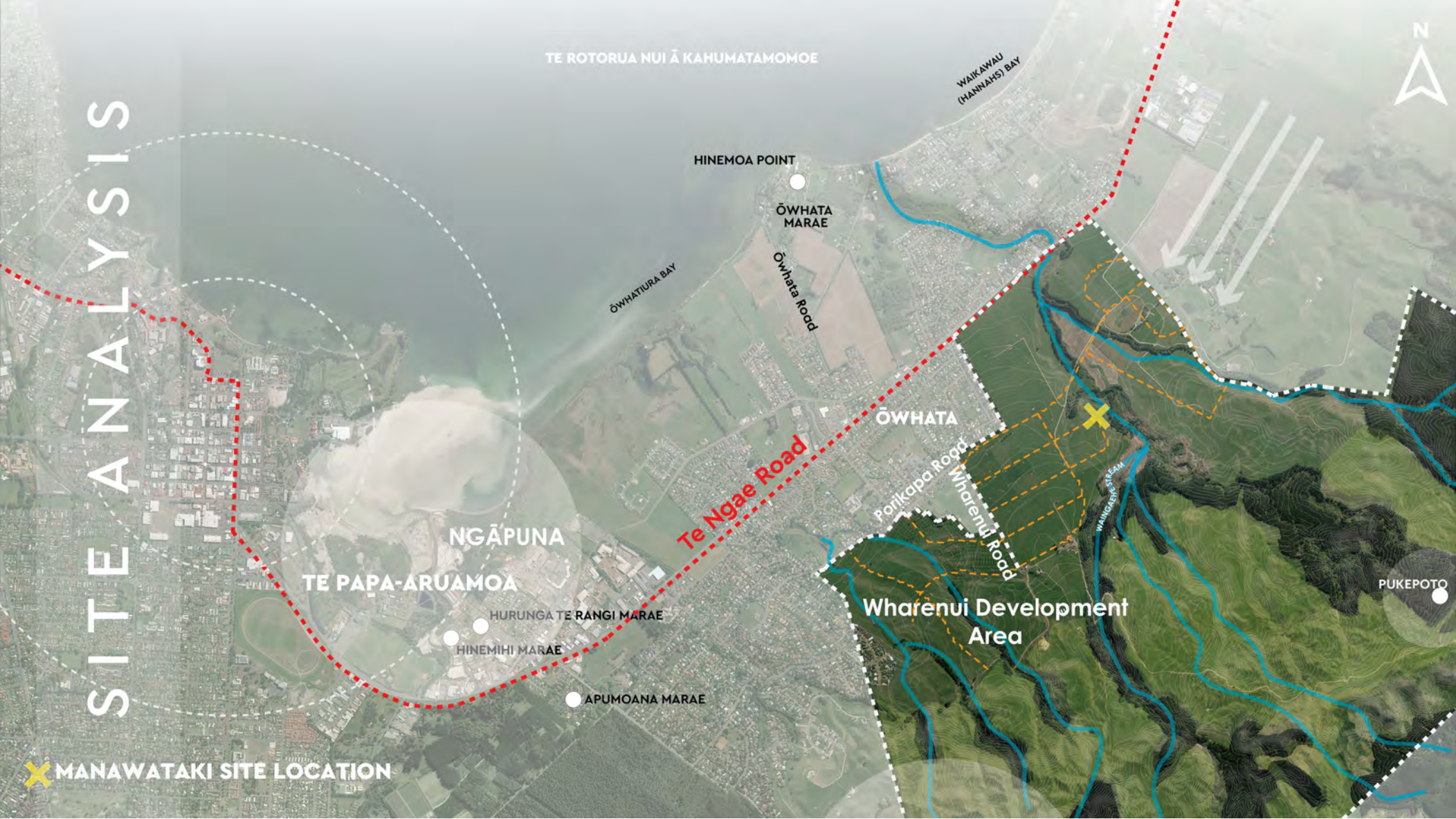
Manawataki asks, "How might the Maramataka of Te Arawa be applied as a socio-cultural-ecological design driver [or catalyst] for developing holistic housing that supports Mauri Ora [wellbeing]?"

MOON PHASES

NEW
Beginning

WAXING CRESCENT
Growth

WANING CRESCENT
Immersion

FIRST QUARTER
Action

THIRD QUARTER
Contemplation

WAXING GIBBOUS
Assessment

WANING GIBBOUS
Co-Operation

FULL
Culmination

02

PROJECT FOCUS

MARAMA   *... moon*

TAKA   *... revolving*

PATTERNS & RHYTHM

This recorded data is passed through generations to transfer knowledge of natural phenomena to inform iwi of conditions suitable to thrive in the environment.

TE MARAMATAKA
O TE ARAWA 2021–22

- Te Ngao Rawa - Highest Energy
- Te Ngao Hua - Productive Energy
- Te Ngao Memeha - Waning Energy
- Te Ngao Makoa - Lowest Energy
- Te Ngao Ōrite - Moderate Energy
- Te Ngao Matawhāwhati - Unpredictable Energy

MARAMA	TE NGAO	TĀHI-O-PIPIRI	HONGONGOI	HERETURIKŌKĀ	TE MĀHURU	WHIRINGA-NUKU	WHIRINGA-RANGI	HAKIHEA	KOHITĀTEA	HUETANGURU	POUTŪTERANGI	PAENGAWHĀWHĀ	HAKIHURITUA	TĀHI-O-PIPIRI
1. WHIROWHITI		10th June 2022	10	9		7	5	4	3	1st February	3	1st April	1st May	10
2. ŌTIREA		11	11	10	8	8	6	5	4	2	4	2	2	11
3. HOATA		12	12	11	9	9	7	6	5 *Rehua	3	5	3	3	1st June
4. ŌUENUKU		13	13	12	10	10	8	7	6 *Rehua	4	6	4	4	2
5. ŌKOROTĀTEA		14	14	13	11	11	9	8	7 *Rehua	5	7	5	5	3
6. TAMATEA TUATAHI		15	15	14	12	12	10	9	8 *Rehua	6	8	5	6	4
7. TAMATEA-ĀNGANA		16	16	15	13	13	11	10	9 *Rehua	7	9	7	7	5
8. TAMATEA-ĀIO		17	17	16	14	14	12	11	10	8	10	8	8	5
9. TAMATEA WHAKAPAU		18	18	17	15	15	13	12	11	9	6	9	9	7
10. HUNA		19	19	18	16	16	14	13	12	10	12	10	10	8
11. ARIMATANUI		20	20	19	17	17	15	14	13	11	13	11	11	9
12. MĀURE		21					15	14	12	14	12	12	10
13. MĀWHARU								13		13	
14. ATUAHAEHAE		22	21	20	18 *Whakaohu	18	16	16	15	14	15	14	11
15. ŌHOTUROA		23	22	21	19 *Whakaohu	19	17	17	16	15	16	15	14	12
16. ŌTURUTURU		24	23	22	30 *Whakaohu	20	18	18	17	16	17	16	15	13
17. RĀKAUNUI		25	24	23	21 *Whakaohu	21	19	19	18	17	18	17	16	14
18. RAKAUMĀTOHI		26	25	24	22 *Whakaohu	22	20	20	19	18	19	18	17	15
19. TAKIRAU		27	26	25	23	23	21	21	20	19	20	19	18	16
20. OIKE		28	27	26	24	24	22	22	21	20	21	20	19	17
21. KOREKORE-TE-WHIWHIA		29	28	27	25	25	23	23	22	21	22	21	20	18
22. KOREKORE-TE-NGANGANA		30	29	28	26	26	24	24	23	22	23	22	21	19
23. KOREKORE-PIRI-KI-NGĀ-TANGAROA		1st July	30	29	27	27	25	25	24	23	24	23	22	20 *Matariki
24. TANGAROA-Ā-MUA		2 *Matariki	31	30	28	28	26	26	25	24	25	24	23	21 *Matariki
25. TANGAROA-Ā-ROTO		3 *Matariki	1st August	31	29	29	27	27	26	25	26	25	24	22 *Matariki
26. TANGAROA-Ā-KIO KIO		4 *Matariki	2	1st September	30	30	28	28	27	26	27	26	25	23 *Matariki
27. ŌTĀNE		5 *Matariki	3	2	1st October	31	29	29	28	27	28	27	26	24 *Matariki
28. ŌRONGONUI		6 *Matariki	4	3	2	1st November	30	30	29	28	29	28	27	25 *Matariki
29. ŌRONGOMAURI		7 *Matariki	5	4	3	2	1st December	31	30	1st March	30	29	28	26 *Matariki
30. ŌMUTU		8	6	5	4	3	2	1st January	31	2	31	30	29	27
31. MUTUWHENUA		9	7	6	5	4	3	2						28th June 2022
32. TĀPUKOIRA													

http://www.ngapatakakorerooteawa.org

Energy levels (left axis, top to bottom):
- Te Ngao Rawa - Highest Energy
- Te Ngao Hua - Productive Energy
- Te Ngao Matowhāwhati - Unpredictable Energy
- Te Ngao Ōrite - Moderate Energy
- Te Ngao Memeha - Waning Energy
- Te Ngao Makoa - Lowest Energy

Timeline dates:
10 June 2021, 12 June 2021, 15 June 2021, 19 June 2021, 20 June 2021, 22 June 2021, 24 June 2021, 27 June 2021, 01 July 2021, 05 July 2021 (Matariki), 06 July 2021 (Matariki), 10 July 2021, 12 July 2021, 15 July 2021, 19 July 2021, 20 July 2021, 21 July 2021, 23 July 2021, 26 July 2021, 30 July 2021, 03 August 2021, 04 August 2021, 06 August 2021, 09 August 2021, 11 August 2021, 14 August 2021, 18 August 2021, 19 August 2021, 20 August 2021, 22 August 2021, 25 August 2021, 29 August 2021, 02 September 2021, 03 September 2021, 05 September 2021, 07 September 2021, 09 September 2021, 12 September 2021, 16 September 2021, 17 September 2021

Month periods: TAHI-O-PIPIRI, HONGONGOI, HERETURIKŌKĀ, TE MĀHURU

ENERGY FLOW - TE MARAMATAKA O TE ARAWA

INGĀNUKU   WHIRINGĀRANGI   HAKIHEA   KOHITĀTEA   INGĀNUKU   HUETĀNGURU

EXCERPT FROM ABSTRACT

This research explores an intensive, interlinked housing alternative model for Te Tatau o Te Arawa in Rotorua.

It asks, "How might the Maramataka of Te Arawa be applied as a socio-cultural-ecological design driver for developing holistic housing that supports Mauri Ora [wellbeing]?"

The research and the resulting proposal utilises a Mauri Ora holistic wellbeing compass and considers the significant importance of indigenous knowledge. It examines the opportunities ahead that are possible through honouring the indigenous knowledge and those that protect and pass it down to generations.
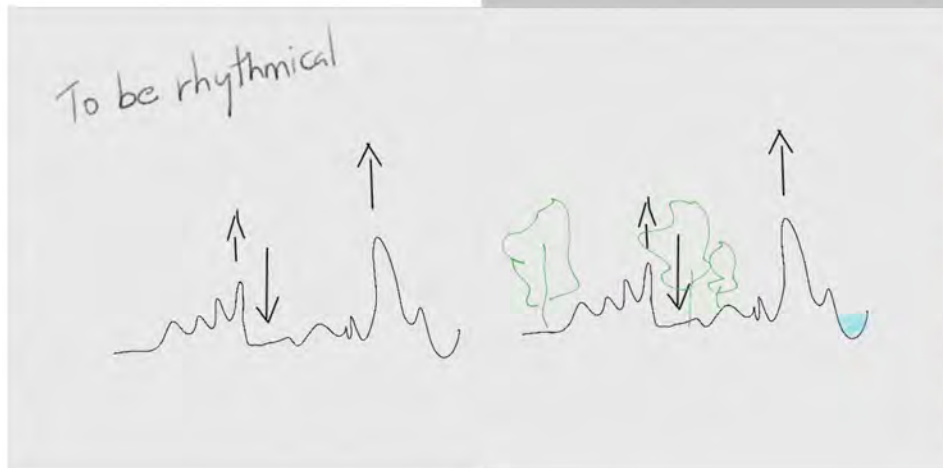
To be rhythmical

RHYTHMICAL CONCEPT

03 PROCESS

Emergent tree layer [Kahikatea & Rimu]

Canopy tree layer [Tawa, Northern Rata, Rewarewa & Totara]

Subcanopy tree layer [Kanuka Hinau & Tawa]

Understorey tree layer [Mahoe & Kanuka]

Seedlings & leaf litter layer

Emergent tree layer [Kahikatea & Rimu]

Canopy tree layer [Tawa, Northern Rata, Rewarewa & Totara]
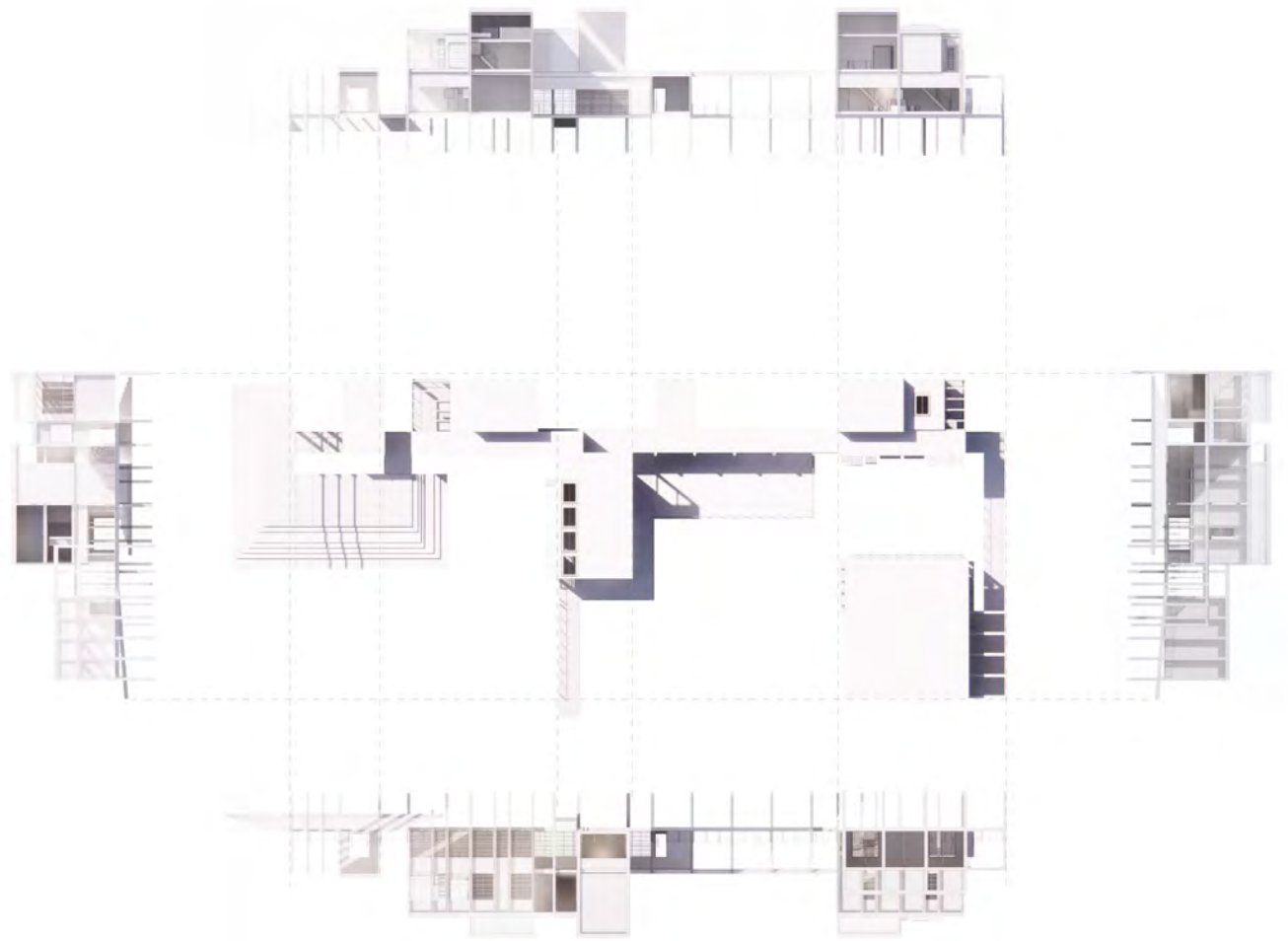
Subcanopy tree layer [Kanuka Hunau & Tawa]
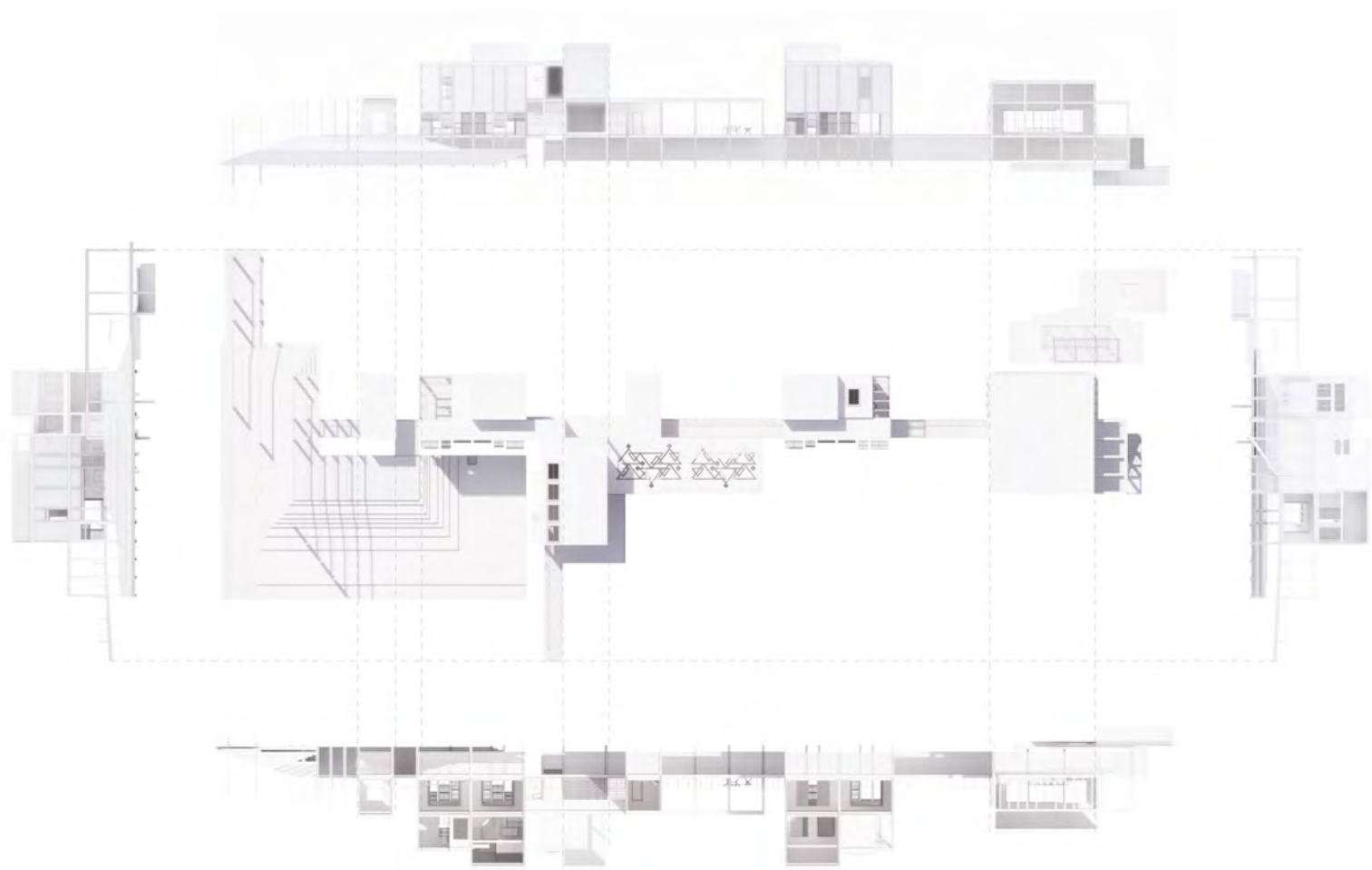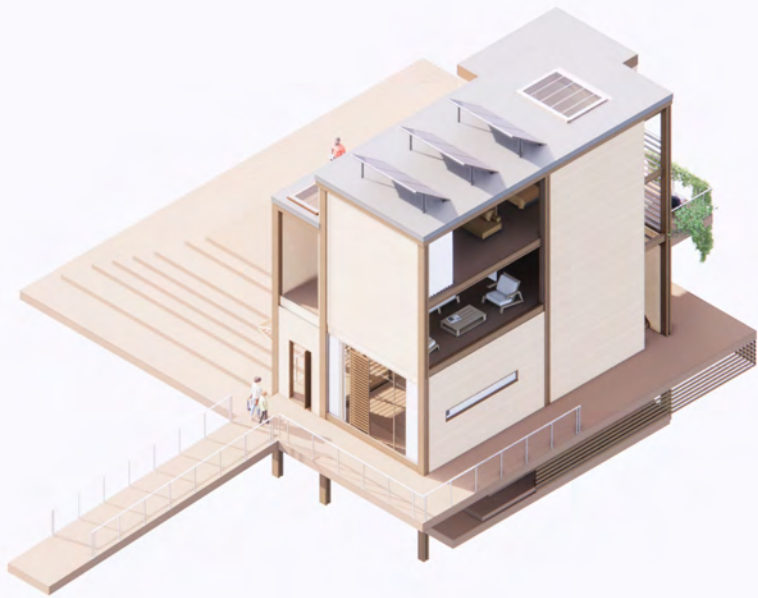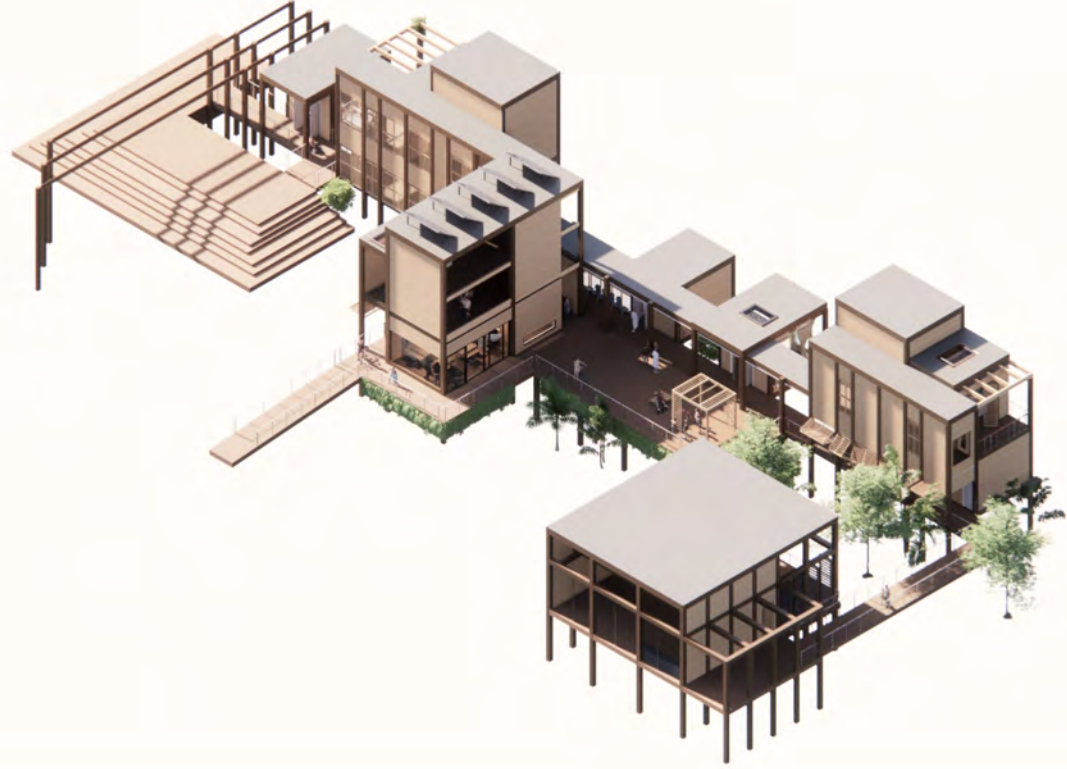
Understorey tree layer [Mahoe & Kanuka]

Seedlings & leaf litter layer

Emergent tree layer [Kahikatea & Rimu]

Canopy tree layer [Tawa, Northern Rata, Rewarewa & Totara]

Subcanopy tree layer [Kanuka Hunau & Tawa]

Understorey tree layer [Mahoe & Kanuka]

Seedlings & leaf litter layer

Whirowhiti [low]

Mutuwhenua [low]

Takirau [waning]

Korekore Te Nganga [waning]

Tamatea Tuatahi [unpredictable]

Tamatea Whakapau [unpredictable]

Māure [medium]

Ōrongonui [medium]

Atuaheahea [productive]

Tangaroa Kiokio [productive]

Rākaunui [high]

Ōtane [high]

COHOUSE

COHOUSE X2

COHOUSE + OUTDOOR LIVING + GATHERING HOUSE + PUBLIC MARKET

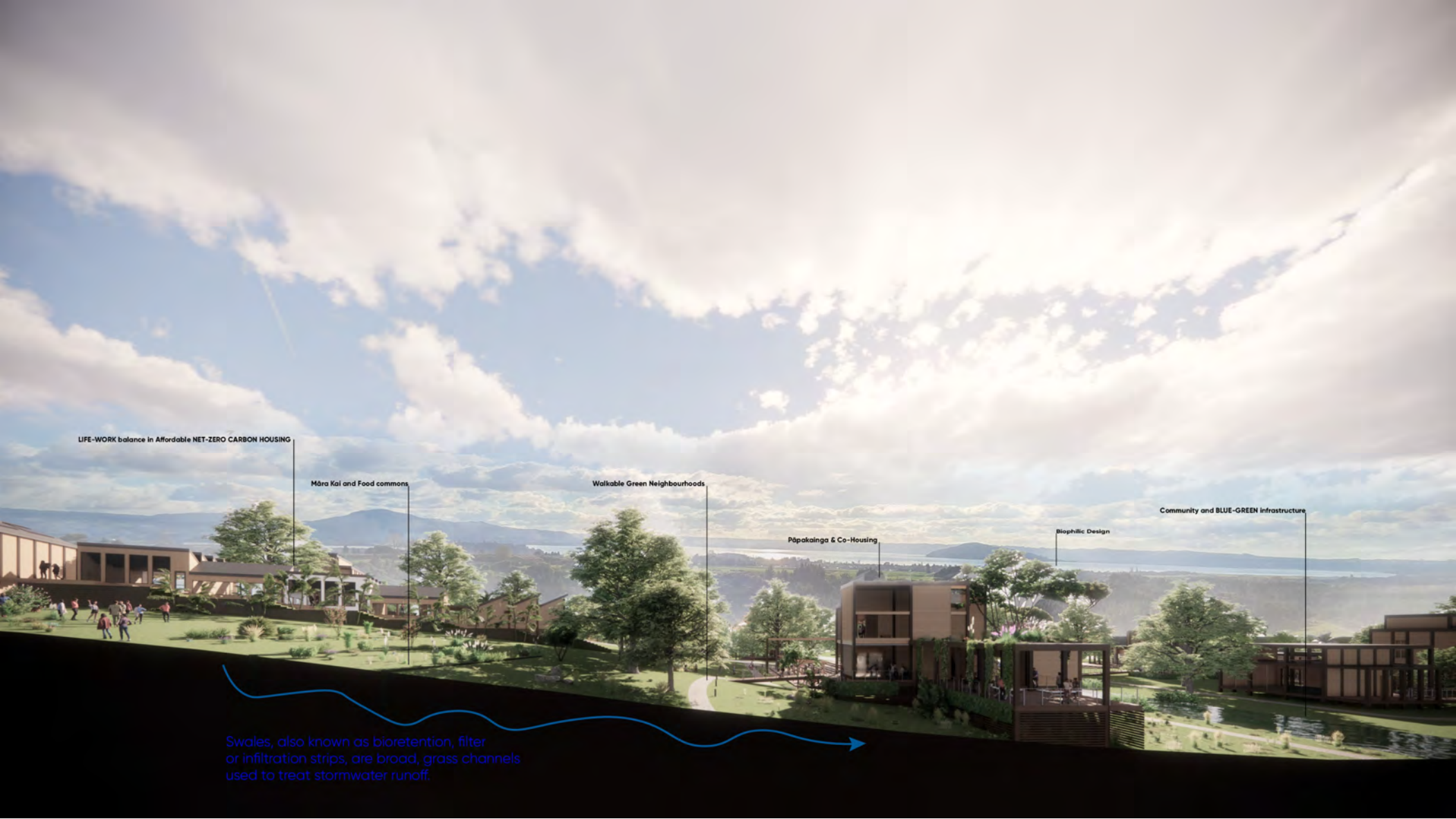ENGAWA SPACES AS THIRD SPACES

AXONOMETRIC
ENGAWA INTERIOR
STUDY
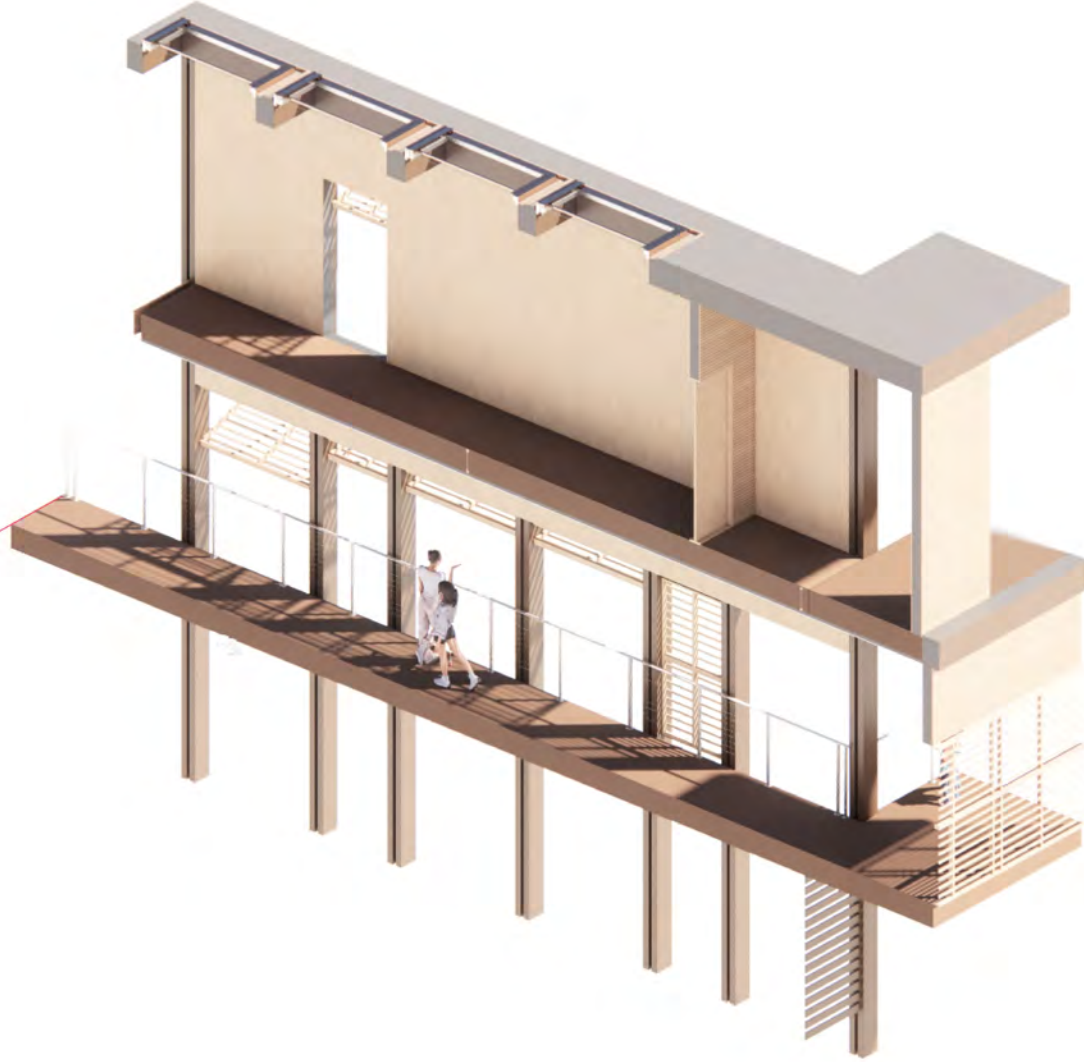
04 LIVING IN RHYTHM

Transformation to an ecological living systems culture

LIFE-WORK balance in Affordable NET-ZERO CARBON HOUSING

Māra Kai and Food commons

Walkable Green Neighbourhoods

Community and BLUE-GREEN infrastructure

Pāpakainga & Co-Housing

Biophilic Design

Swales, also known as bioretention, filter or infiltration strips, are broad, grass channels used to treat stormwater runoff.
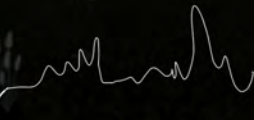
TANGAROA KIO KIO

TANGAROA KIOKIO

AUAHEAHEA

RAKAUNUI
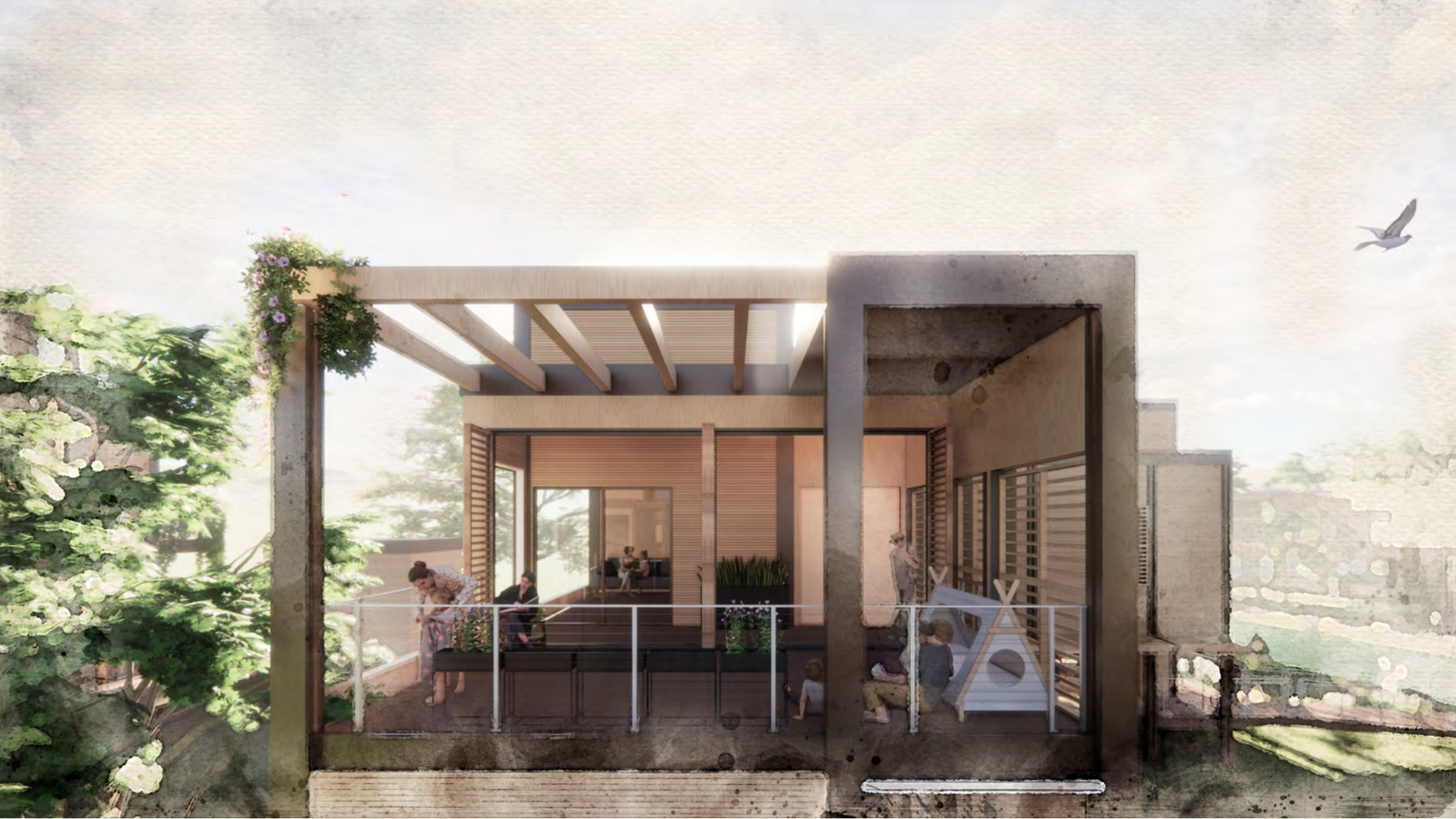
Mananataki ...
to be rhythmical

Manawataki ...
to be rhythmical