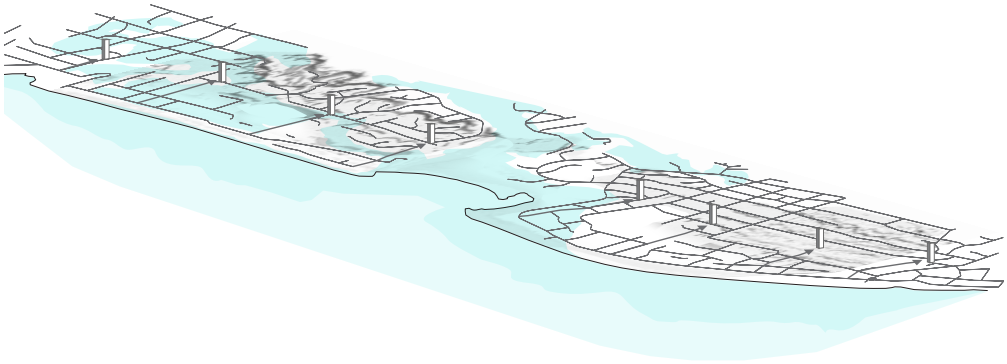

High Ground, Low Ground

Explorations in Topography and Neighbourliness in Coastal Dune Settlement

A 120-point thesis submitted to the Victoria University of Wellington in partial fulfilment of the requirements for the degree of Master of Landscape Architecture (Professional).

Stephanie Caitlin Wallis

2015

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Thank you Hamish for being an amazing house 'husband' throughout all the years of university.

Lastly, thanks to all my friends and wider family, step family, (once, twice removed...) all over the world xx

Fig 1.1. Masters research stream on a site visit in the Kapiti Coast's extensive coastal dune system.

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Fig 1.2. Aerial photograph of the coastal settlement condition at the Waikanae River mouth.

1.0

Introduction

1.1. Abstract

The desire to live close to the ocean often brings about settlement that sprawls along the beachfront, parallel to the coastline. This settlement structure is problematic as it diminishes the importance of community while exposing beachfront housing to coastal hazards. The coastal dune settlements of Waikanae and Paraparaumu, where this research has been undertaken, exhibits this problematic settlement structure.

Using these sites as a case study, the research seeks to re-examine the New Zealand coastal land settlement formation. It explores what could happen if the current coastal settlement pattern re-organised as a more social structure? The research is investigating an approach to settlement through re-examining the idea of neighbourhood by looking at its whole relation to the coastal dune topography, ecology, and wider landscape relations.

However, not only does this research look at the social potentials of coastal settlement but how disaster planning can become a device to achieve this outcome. Essentially, it aligns itself with the attitude that flooding and coastal hazards should not just be looked at as an engineering problem but an opportunity to alter the way in which we settle coastlines in a way that builds community.

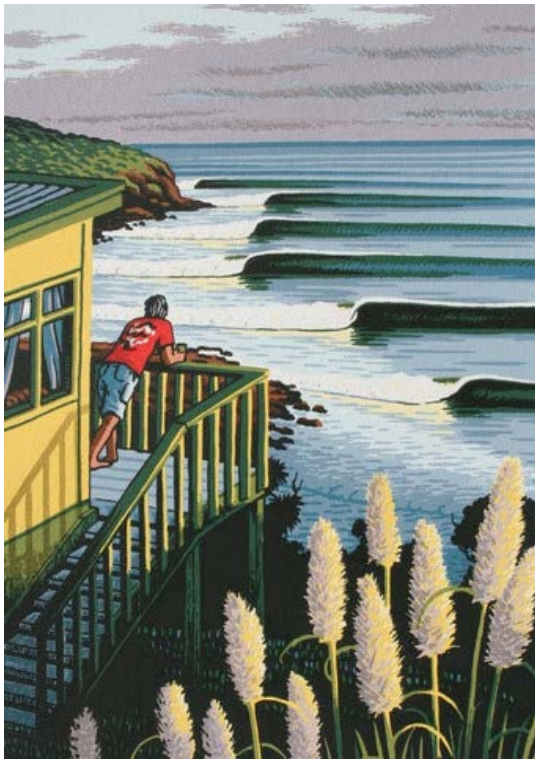


Fig 1.3. "Rising Swell Raglan" by Tony Ogle.
Showing the New Zealand dream and coastal living ideal.
Fig 1.4. Coastal erosion threatens settlement, revealing the realities of this dream.

1.2. Problem Statement

The New Zealand ambition to live by the water has defined the way that we have settled our landscape. This presents an interesting dilemma when confronted with the current research surrounding coastal hazards and sea level rise. The tension between coastal hazards and settlement is a global issue but as an island nation New Zealand has a particularly high number of sites that face these challenges.

The Waikanae and Paraparaumu coast have had their share of problems arisen from New Zealand's coastal settlement legacy. New Zealanders longing to live and holiday by the coast has encouraged widespread coastal subdivision often located in near-shore areas vulnerable to coastal hazards (Dahm 4).As residents have sprawled further and further north of Wellington to attain their own slice of the coast, territorial agencies have finally begun to investigate the emerging complications of these movements.

These investigations have been ongoing but are notably embodied by the Kapiti Coast District Council Coastal Hazard Report released to the Kapiti public in 2012. In the report, it was revealed that 1800 of Kapiti's beachfront properties are at risk of coastal flooding with housing around the Waikanae River being particularly vulnerable. This report has had huge repercussions on the affected residents with potential devaluation and fears to begin the process of managed retreat (Blundell "Kapiti Erosion Risk May Devalue 1800 Homes"). With the potential threat to properties, it is not surprising that residents have vocalised a backlash towards the report.

The specific problem communicated in the KCDC hazard report of finding ways to manage the 1800 houses at risk of coastal housing was the catalyst for design exploration, setting the perimeters of the research. It prompted the question of: how can landscape architectural interventions ensure that coastal residents remain by the coast while enabling a more responsive urban form in regards to coastal hazards? And simultaneously: how can the urban form contribute socially to the coastal communities of Waikanae and Paraparaumu? These issues were the drivers for the subsequent design research.

Shoreline forecast devalues homes

Paekakariki resident says Lim information pushing down prices.

A Kapiti Coast homeowner has told district councillors how their actions have wiped at least $100,000 off the value of her property.

Sharon Strong's home in Marine Pde, Paekakariki, falls within 50 and 100-year predicted shoreline hazard zones announced by the Kapiti Coast District Council last year.

The predictions were immediately placed on the Lim reports of about 1800 affected properties.

Ms Strong's home, which features three one-bedroom cottages overlooking the sea, has a rateable value of $600,000. Two years ago she was offered $700,000 for it.

Now, however, a real estate agent has told her she can expect to sell for a figure somewhere in the low $500,000s.

"Coastal property prices have plummeted in Paekakariki," she told a council meeting last week. "Hazard lines on our Lim reports created market hysteria. With the stroke of a pen, my home has devalued some $150,000."

Property plunge: Sharon Strong says coastal property prices have plummeted in Paekakariki, with her house losing $150,000 in value.

She urged councillors not to "become entrenched in defending what should have been a first draft" of the shoreline hazard predictions, and instead pause to have "a cup of tea".

"You will compound an untenable stance by burdening ratepayers with legal costs and cause even more harm to our greatest asset – the coast."

Her plan to join two of her cottages was now impossible.

"The banks are alert to what has happened and insurance has become an issue. I am left trapped in a rising tide of escalating rates and plummeting property value."

Kapiti RE/MAX real estate agent Della Randall confirmed the hazard lines had affected property sales in the area.

"There has been a decline in sales along the constline. The market has been hesitant.

"There is uncertainty around how insurance policies will be affected by the lines," she said.

Harcourts consulting executive Mick Robbers said he had not seen a consistent pattern, but believed property owners were "sitting on their hands" awaiting the outcome of a High Court challenge to the shoreline predictions.

Mayor Jenny Rowan said the council could not respond to Ms Strong's remarks because of the pending legal action.

Fairfax NZ

COOL: Paraparaumu College students Connor Williams, left, and Cooper Wattam use a kayak to cross a paddock in Paraparaumu. PHOTO: MARK MITCHEL

Kapiti responds to crisis

DAVID HAXTON

Mayor Ross Church says Thursday's extensive flooding brought out the best in the Kapiti community.

"Never have I felt so proud as mayor to see the way our community pulled together to face this crisis.

"From emergency services, welfare agencies, council staff and volunteers, everyone played a part.

"This event tested us and we were up to the challenge.

"We practice and prepare for such events but nothing equips you to have to deal with a real thing and a situation that developed rapidly."

He says residents affected by the flooding will continue to be supported by the council and community and the repair work will continue for some time.

"The event may have only lasted 24 hours but the resulting damage could take months to repair.

"We are grateful the bad weather did not last longer and I am immensely proud of the way our community showed true grit and resilience facing this unexpected challenge."

The cost of the response to the flooding will be known in the next couple of weeks but the total cost of the damage will take longer to determine, he said.

The rain bomb delivered a staggering 143.6mm of rain over 24 hours in Paraparaumu — the average May rainfall for Paraparaumu is about 90mm.

MetService meteorologist John Law said the rain was caused by a warm moist air mass coming from the north and the west, into the district, and into the hills.

"In among the band has been some pretty intense pulses of rain and they've run across the same spot."

A total of 27 properties were evacuated, the Kapiti Community Centre became an evacuation centre for affected residents, Waikanae River reached one in 10 year flood levels peaking at about 4.5 metres, Wharemauku Stream overflowed in parts, four civil defence emergency assistance centres were activated but only two members of the community required their support, council's call centre received 1100 calls (on a normal day the centre receives 250 to 300 calls), about 2000 sandbags were used, some schools closed, train services were suspended, various roads were closed including SH1 for a time due to debris at Paekakariki.

About 50 council operations staff went into overdrive supported by more than 40 staff from Goodmans, Downers and the M2PP Alliance.

More than 60 council staff and police, fire, ambulance, public health, Downer and Electra worked in the Emergency Operations Centre during the day.

Paraparaumu Fire Brigade station officer Jason Brinck said the brigade responded to 127 callouts to flooding in roads and properties.

"There was a seven hour pumping job in Wairere Grove.

"We went back there during the night and it was worse than when they started because it's the lowest point and everything drains down on to it."

Senior Sergeant Anita Dixon c Kapiti police said it was a busy day for police who had "prepared for the worse".

"I had 28 staff to deploy which was brilliant for up here."

She said the emergency response, featuring other organisations, was "a well oiled machine".

■ *Kapiti News* has extensive rain-bomb coverage in today's edition

Fig 1.5. & 1.6. Newspaper articles demonstrating the impact of coastal hazards in the study area.

1.3. Research Scope

The physical context of this research centres on the Waikanae and Paraparaumu coastal floodplain. However as the specific problem of parallel settlement is one frequently found in many coastal communities the findings and strategies communicated in this research could be applied both in New Zealand and internationally.

The study area begins at the high-water mark and extends five hundred metres inland through existing coastal settlement. This particular physical limitation has been uncovered through the design process and is where the study area is most vulnerable to coastal hazards.

An ongoing limitation to the research is that there was no consultation with Waikanae and Paraparaumu residents regarding the specific movement of particular coastal properties. This is because the research was a purely speculative design exercise. To achieve the desired outcome it would have been critical to involve residents, landowners, Kapiti Coast District Council. As the planning process explored was very much a bottom-up exercise there would certainly have been negotiations with individual landowners resulting in a somewhat different urban form.

1.4. Thesis Structure

Chapter 2.0 of the thesis begins by introducing the reader to the Waikanae and Paraparaumu study area. It elaborates on the enduring urban and ecological problems that are derived from the site's particular settlement formation and sets up the framework for potential settlement moves.

Chapter 3.0 discusses the key disciplinary tendencies exhibited throughout the design process and expands on how these tendencies sit within current design practice.

Chapter 4.0 is when the design proposal is introduced. This chapter beings by describing the main precedent that influenced the resultant urban form, initial design tests as well as the overall urban systems that influence the settlement strategy.

Chapter 5.0 looks at the individual public spaces that make up each individual neighbourhood parcel in the settlement. Each public space description will open with an account of the key precedent(s) that facilitated the design process, then lead on to their subsequent design application.

Lastly chapter 6.0 concludes with a discussion on the design outcome and process in relation to the scope of the research. Then concludes by suggesting uses for the research and opens up possible design directions.

1.5. Methodology

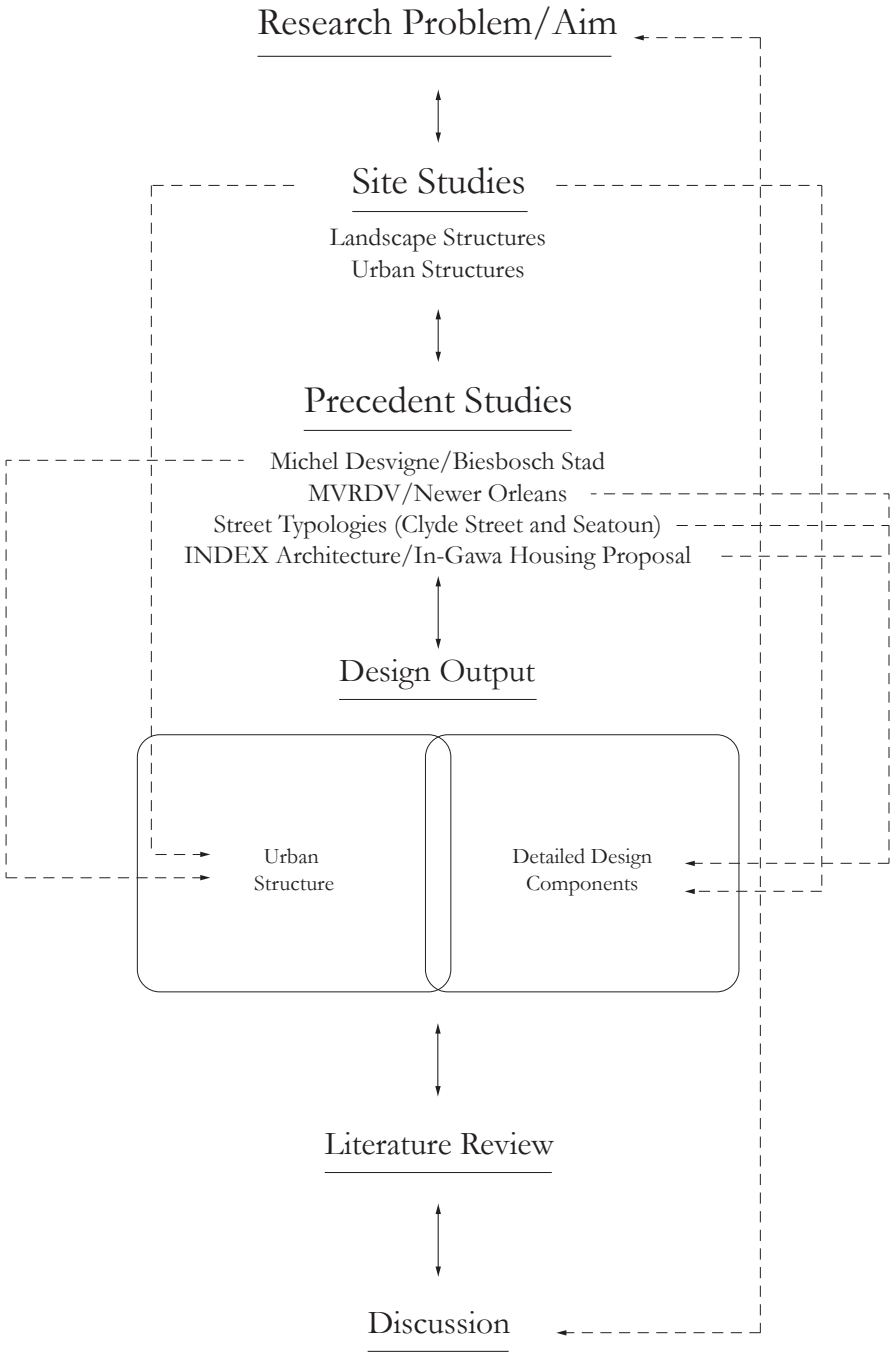


Fig 1.7. Design research methodology.

2.0

The Site

2.1.
Locating the Site

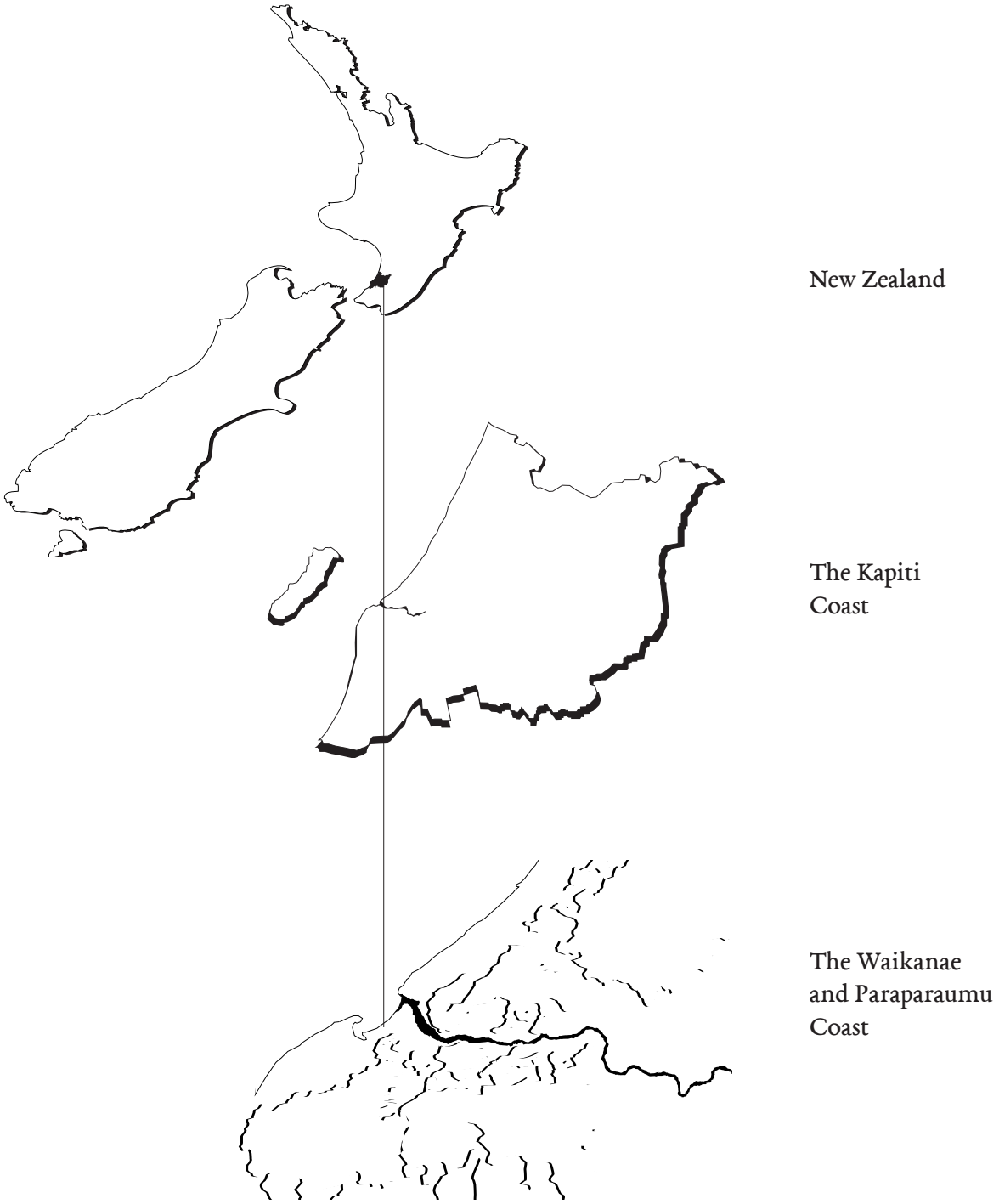


Fig 2.1. Locating the study area within the New Zealand and Kapiti Context.

2.2. The Landscape Condition

The majority of Waikanae and Paraparaumu's populations reside on a low lying coastal plain. And much of this coastal terrain is only marginally above the existing sea level. The landscape is a mosaic of coastal ecologies; dunes, streams, lagoons and estuaries all surmounted by the Waikanae River, and Tasman Sea.

A complex wind driven dune system dominates the landscape of Waikanae and Paraparaumu. Dune formation over time has impeded waterways, creating swamps and meandering streams in narrow, deep channels throughout the region. This wet/dry dune ecology embodies the landscape of the Kapiti region and is the landscape structure this research will be most receptive towards (Boffa Miskell 3).

Fig 2.2. Aerial photograph of the Waikanae Beach end of the area. This photograph shows how low-lying and water-logged the site is.

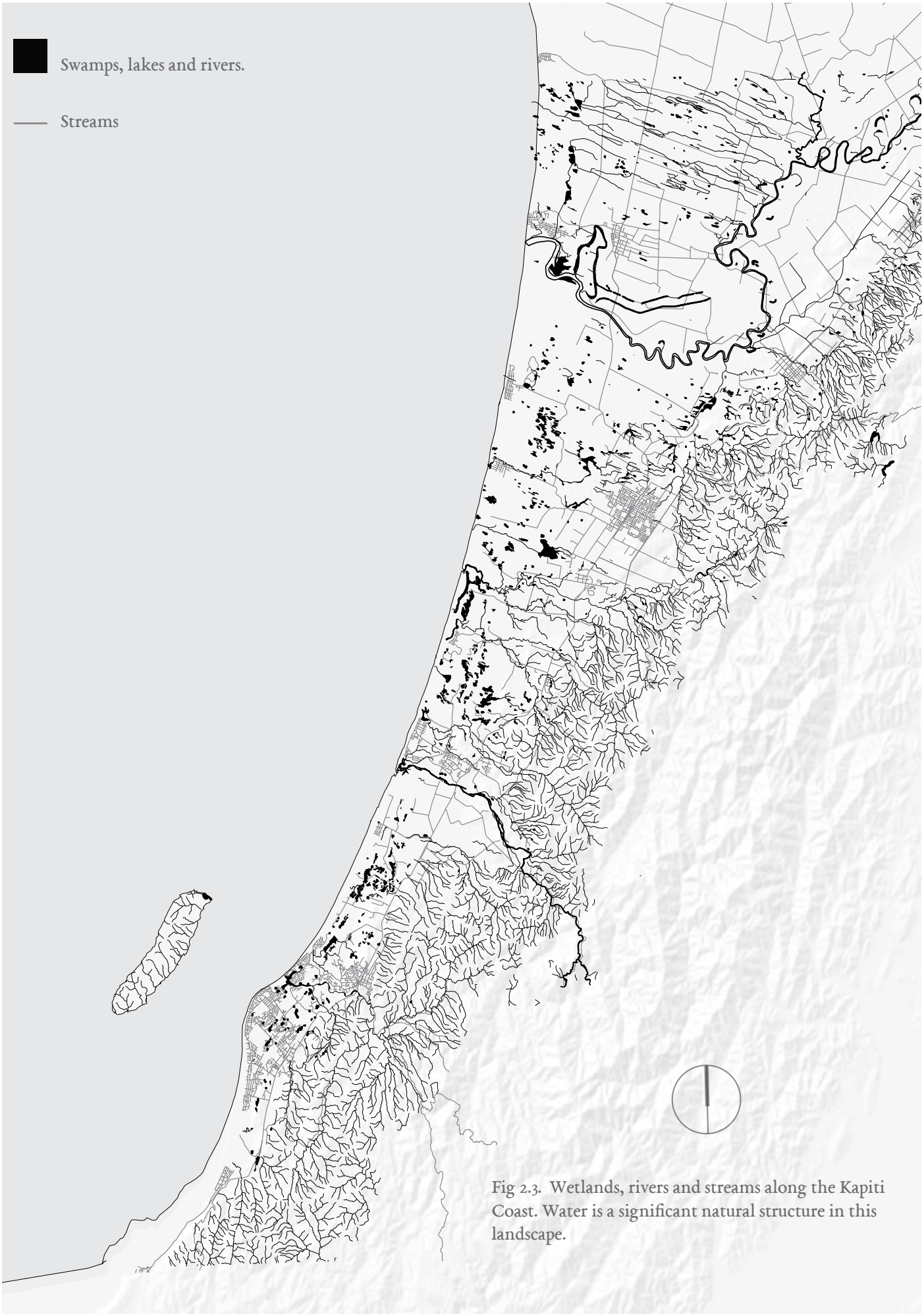


Fig 2.3. Wetlands, rivers and streams along the Kapiti Coast. Water is a significant natural structure in this landscape.

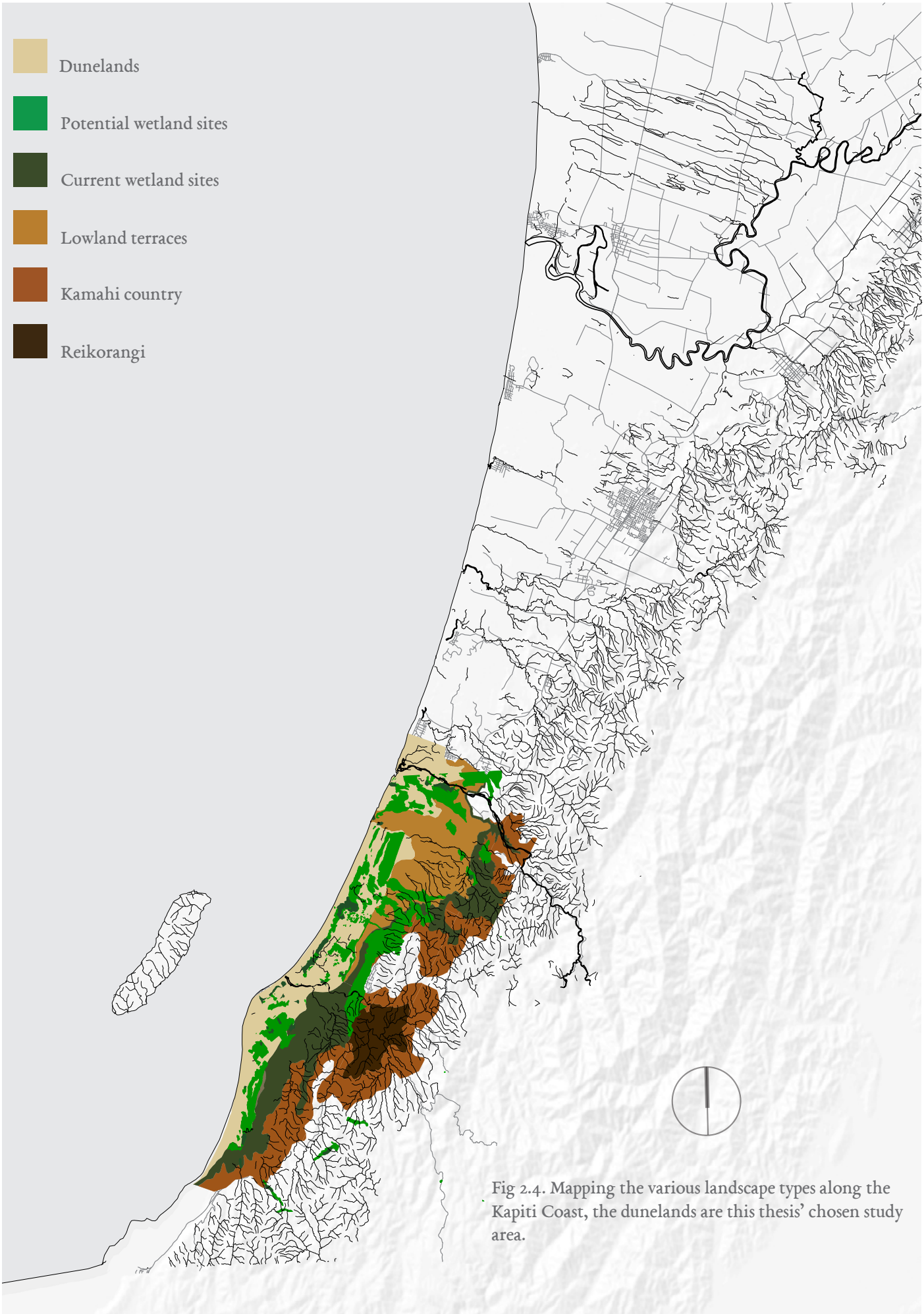


Fig 2.4. Mapping the various landscape types along the Kapiti Coast, the dunelands are this thesis' chosen study area.

2.2.1. Dune Structures on the Coast

To enable a clear understanding of the site's landscape structure a simple transect was drawn along a segment of the study area. A transect is a spatial device that simplifies the landscape, encapsulating complex working systems into a series of snapshots cataloguing their progression and change (Macfarlane 118). With Waikanae and Paraparaumu the entire study area can be interpreted as a progression from coast, foredune, wetland to stabilised backdune. Each succession of the dune system will be highlighted in transect in an attempt to reveal the very different dune habitats, each with their own set of site conditions and design potentials.

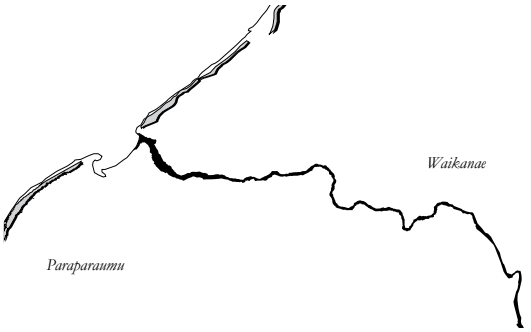


Fig 2.5. Location of foredunes within the greater study area.

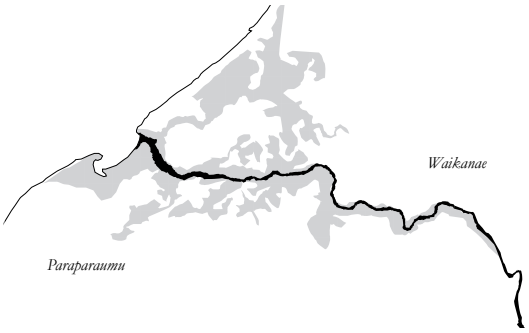


Fig 2.6. Location of 1-100 flood zone where wetland environment once occurred within the greater study area.

Fig 2.7. Location of backdunes within the greater study area.

Figs 2.8, 2.9, 2.10 and 2.11 (left to right). Snapshots of various dune environments found along the Waikanae and Paraparaumu coast.

2.2.2. Foredunes

The coastal foredunes once ran almost the entire length of the Kapiti Coast but recently they are being lost to the sea. Coastal foredunes are crucial in combating erosion that threatens housing along the coastal edge. They represent the most dynamic part of the dune sequence and form when there is shelter from strong waves, onshore winds, and sand-binding plants such as grasses and sedges (Milne and John 6).

Fig 2.12.Calystegia soldanella.

Fig 2.13. Desmoschoenus spiralis.

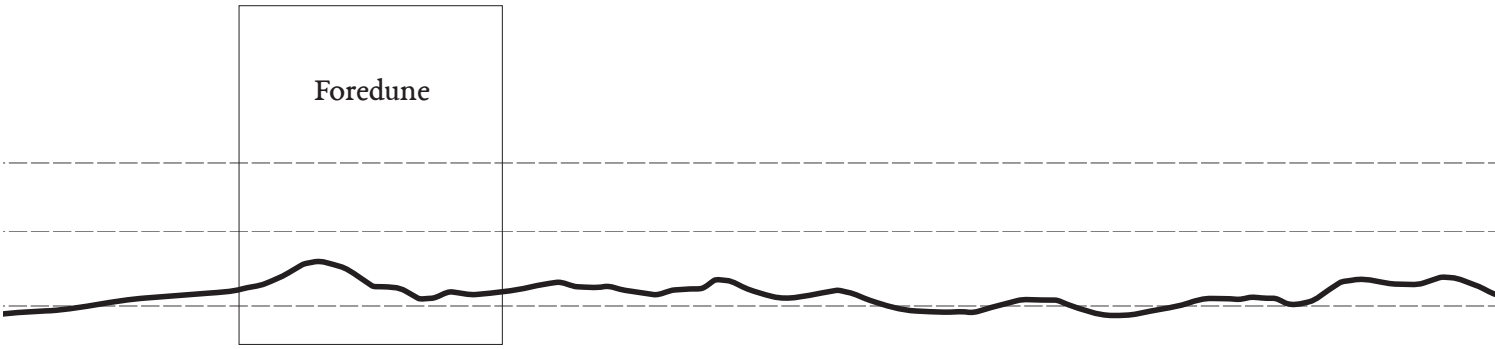
Fig 2.14. Spinifex sericeus.

Fig 2.15. Carex pumila.

Fig 2.16. Coprosma acerosa.

Fig 2.17. Disphyma australe.

Fig 2.18. Tetragonia trigyna.



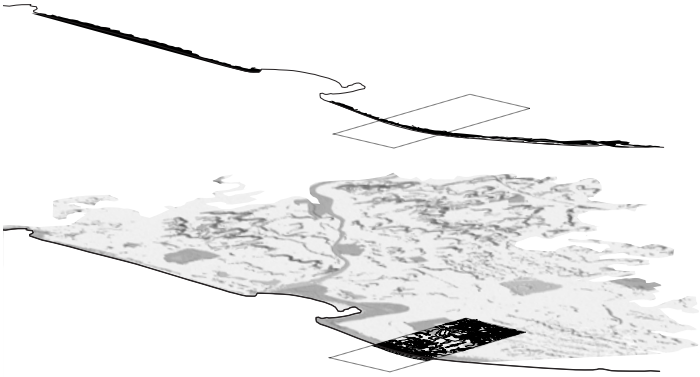


Fig 2.19. Axonometric of the Waikanae and Paraparaumu coast highlighting the foredunes.

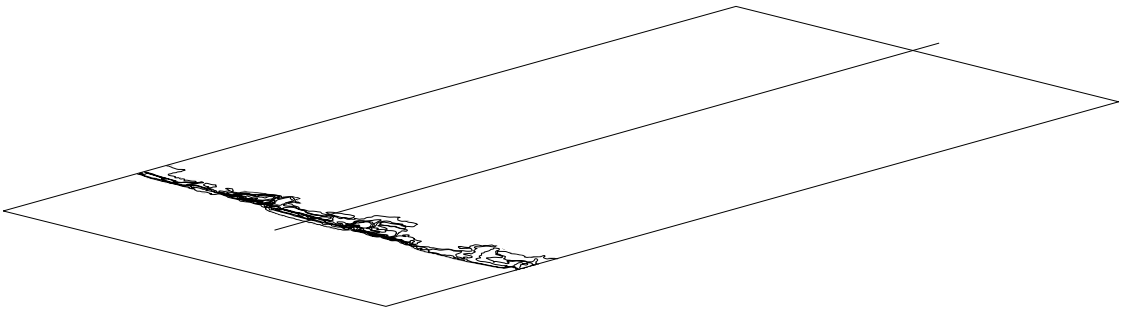


Fig 2.20. Transect of the Waikanae and Paraparaumu coast highlighting the foredunes.

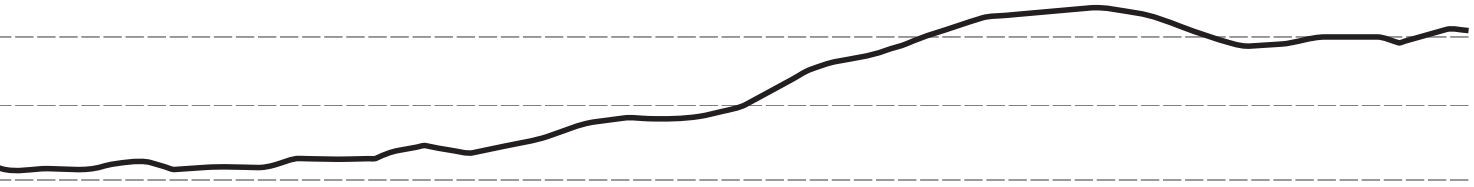


Fig 2.21. Transect of study area highlighting the foredunes.

2.2.3. Wetlands

The Waikanae Estuary once extended far outside its present boundary and would have been once a significant landscape feature of the site (Wellington Regional Council 20). Because of this past the depression between the foredune and stabilised backdunes would previously have been a significantly waterlogged terrain comprised of a diverse patina of wetland species.

Fig 2.22. Leptocarpus similis

Fig 2.23. Phormium tenax

Fig 2.24. Cortaderia toetoe

Fig 2.25. Carex virgate

Fig 2.26. Cyperus ustulatus

Fig 2.27. Plagianthus divaricatus

Fig 2.28. Coprosma robusta

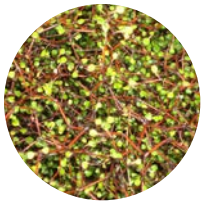
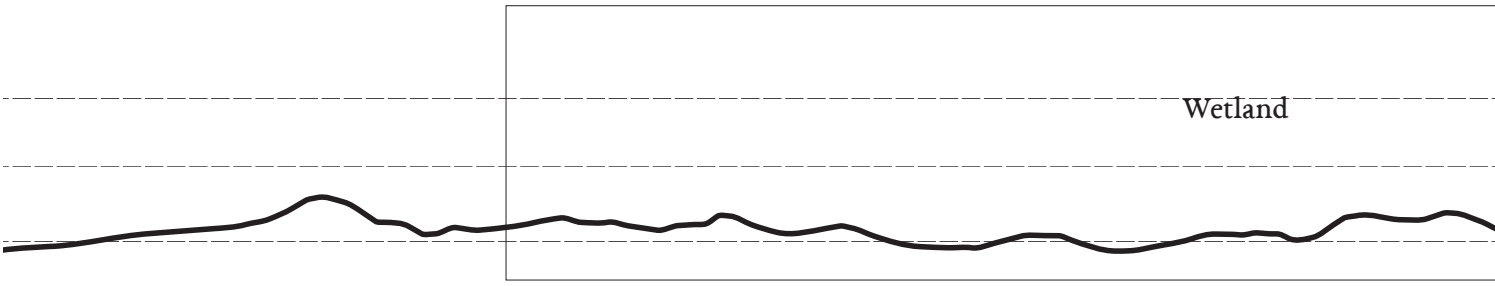


Fig 2.29. Myrsine divaricate



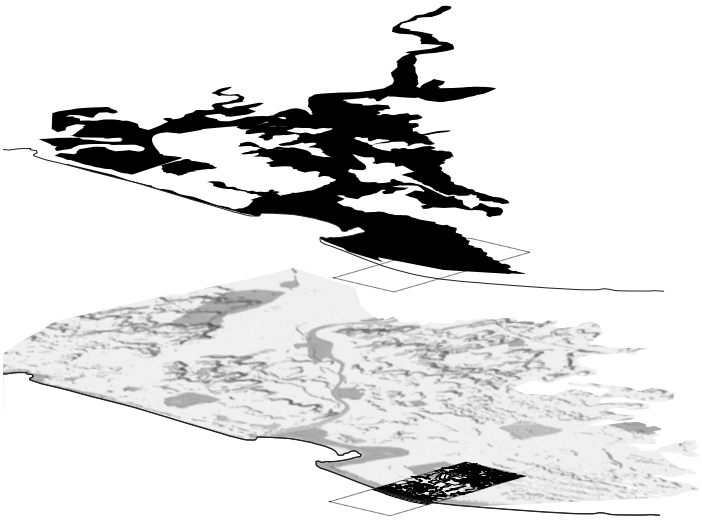


Fig 2.30. Axonometric of the Waikanae and Paraparaumu coast highlighting where wetlands once occurred in the study area.

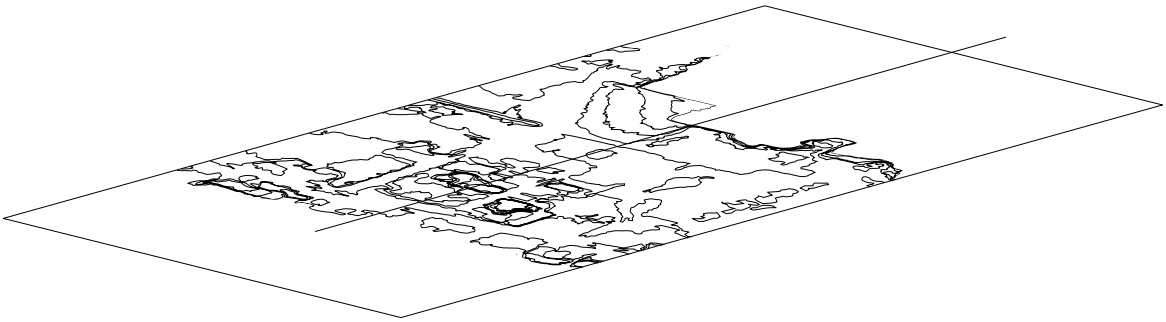


Fig 2.31. Transect of the Waikanae and Paraparaumu coast highlighting where wetlands once occurred in the study area.

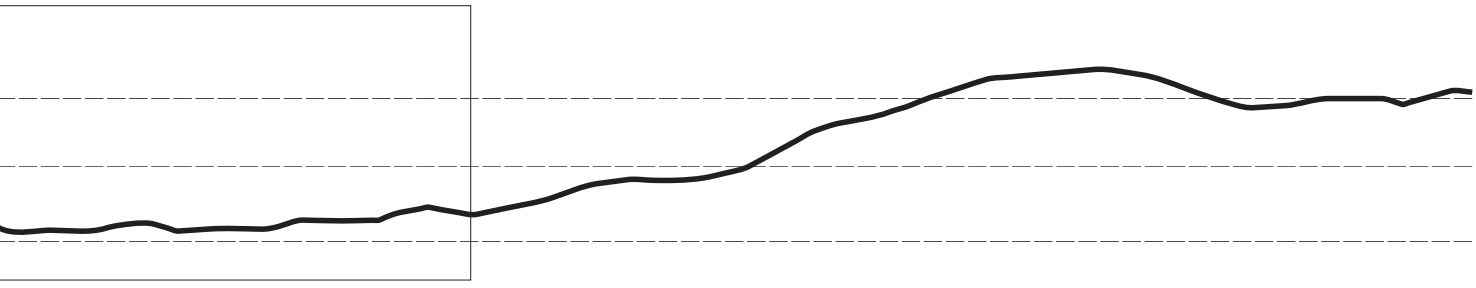


Fig 2.32 Transect of study area highlighting the wetlands.

2.2.4. Backdunes

Further inland is when the older, stabilised dunes begin to occur. The older dunes have thin soils which drain readily and organic matter is rapidly filtered away. Although they have the ability to support forest growth this capacity is quickly lost when the land has been cleared for development (Bergin and Jim 5).
The backdunes are the most stable of the dune habitats found along the Kapiti coast and arguably where intensive settlement should have been located if environmental implications were more closely considered when the land was colonised.

Fig 2.33. Cyathodes fasciculatus

Fig 2.34. Coprosma repens

Fig 2.35. Olearia solandri

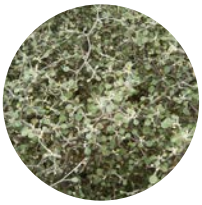


Fig 2.36. Corokia cotoneaster

Fig 2.37. Parsonsia capsularis

Fig 2.38. Plagianthus divaricatus

Fig 2.39. Clematis forsteri

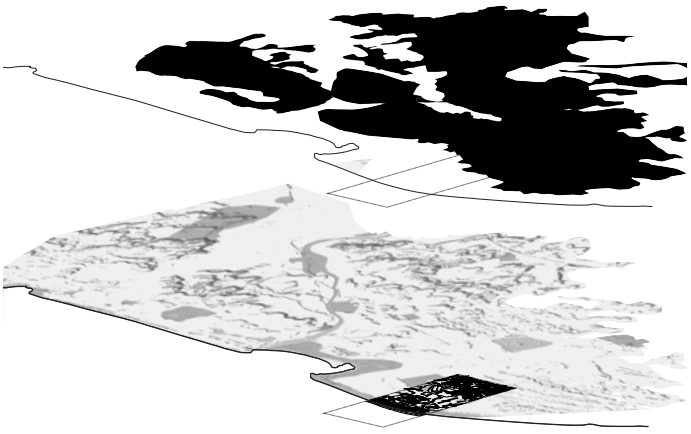


Fig 2.40. Axonometric of the Waikanae and Paraparaumu coast highlighting the backdunes.

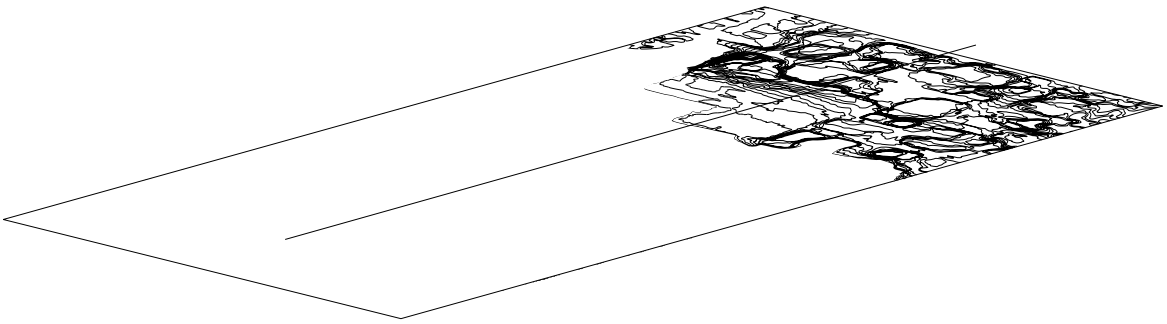


Fig 2.41. Transect of the Waikanae and Paraparaumu coast highlighting the backdunes.

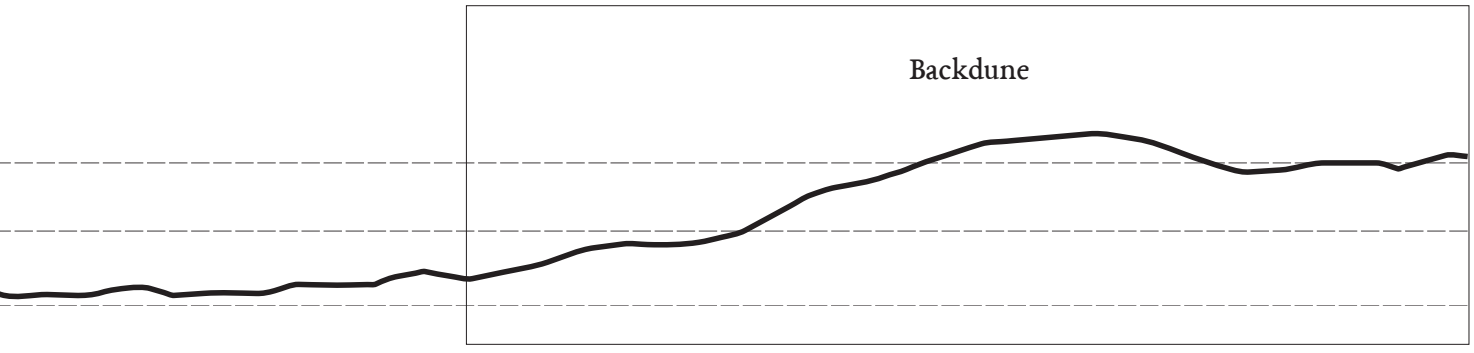


Fig 2.42. Transect of study area highlighting the backdunes.

2.2.5. Watercourses

Meandering watercourses govern the dunes of the Waikanae and Paraparaumu. These water courses weave in between the dune depressions creating an interconnected habitats for birds and fish. Some areas new dunes block the movement of streams to the beach establishing swampland. While in other areas wind scouring exposes the ground water-table creating small dune lakes or swamps (Boffa Miskell 6).

Fig 2.43. Sophora microphylla

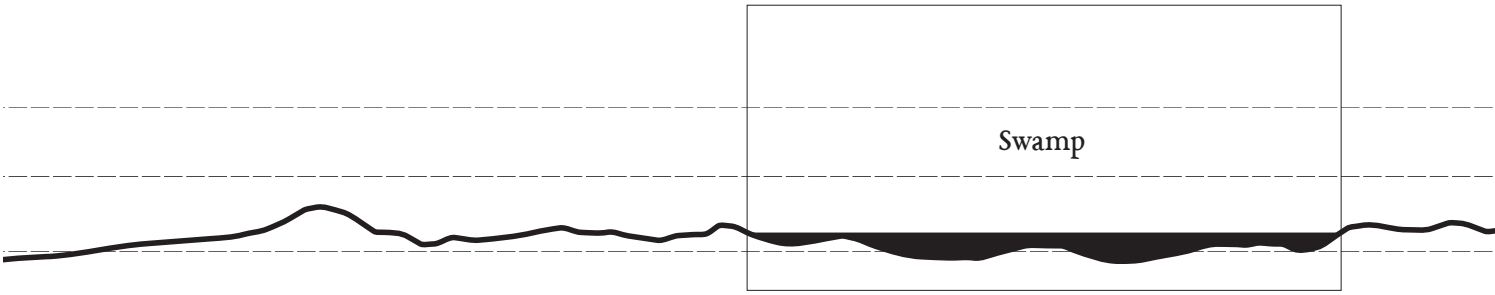
Fig 2.44. Hebe stricta

Fig 2.45. Cortaderia toetoe

Fig 2.46. Myoporum laetum

Fig 2.47. Carmichaelia odorata

Fig 2.48. Coriaria arborea



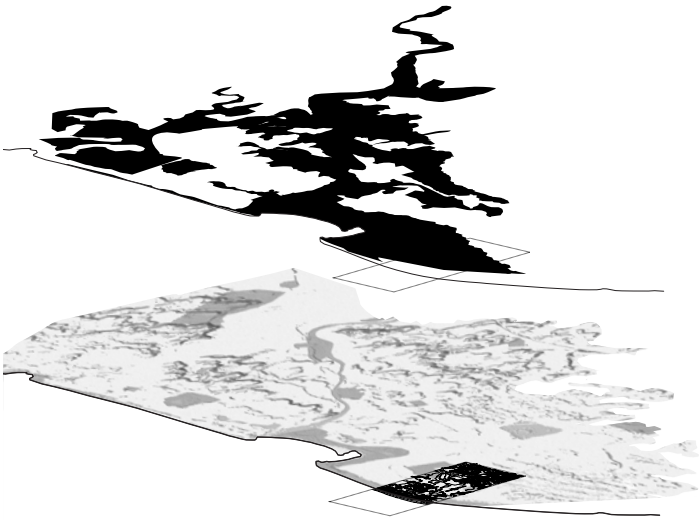


Fig 2.49. Axonometric of the Waikanae and Paraparaumu coast highlighting water courses in the study area.

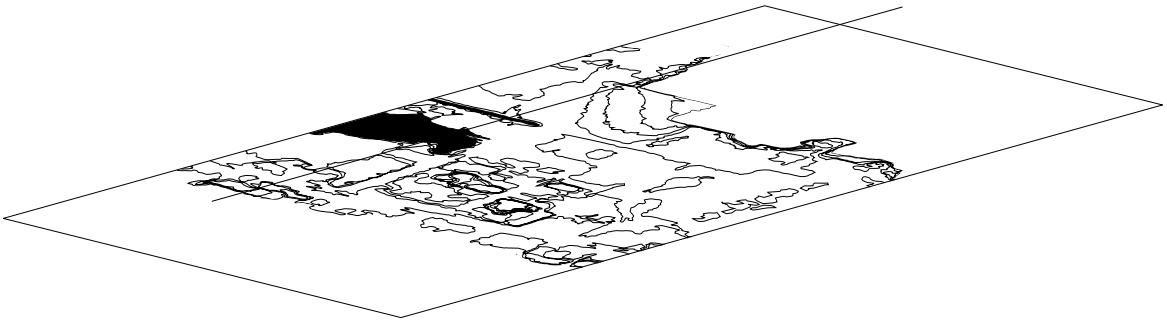


Fig 2.50. Transect of the Waikanae and Paraparaumu coast highlighting water courses in the study area.

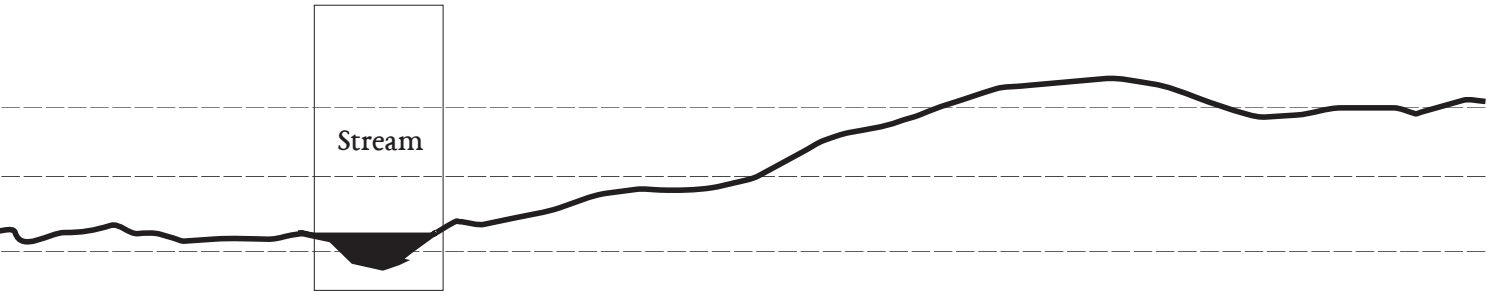


Fig 2.51. Transect of study area highlighting the water courses.

2.3. The Landscape Problem

This dynamic coastal landscape is subject to both frequent and potentially destructive hazards attributed to its seismic setting, flooding potential and coastal exposure. Along with this, the landscape's complex matrix of dune, river and wetland ecologies all present varying levels of flood risk to the settlements which have developed up around them. The coastal danger of flooding is the most frequent environmental hazard in the district (Ramsay et al. 11) and the problem this research will be most responsive to.

The following section of the site analysis intends to highlight the hazards the Waikanae and Paraparaumu coast experiences. It will identify where these hazards occur and the on the ground implications to housing along the coastal edge. In doing so, this exercise sets up a framework for how settlement could potentially be structured along with critical locations for key settlement moves. As a result of the following set of mappings, it was discovered that the major problem areas in the site occurred within the first five hundred metres of the coast. This knowledge was critical to the design process and defined the eventual limit for where the majority of urban moves needed to occur.

Fig 2.52. 1924 Flood showing the site's historic legacy of flooding.

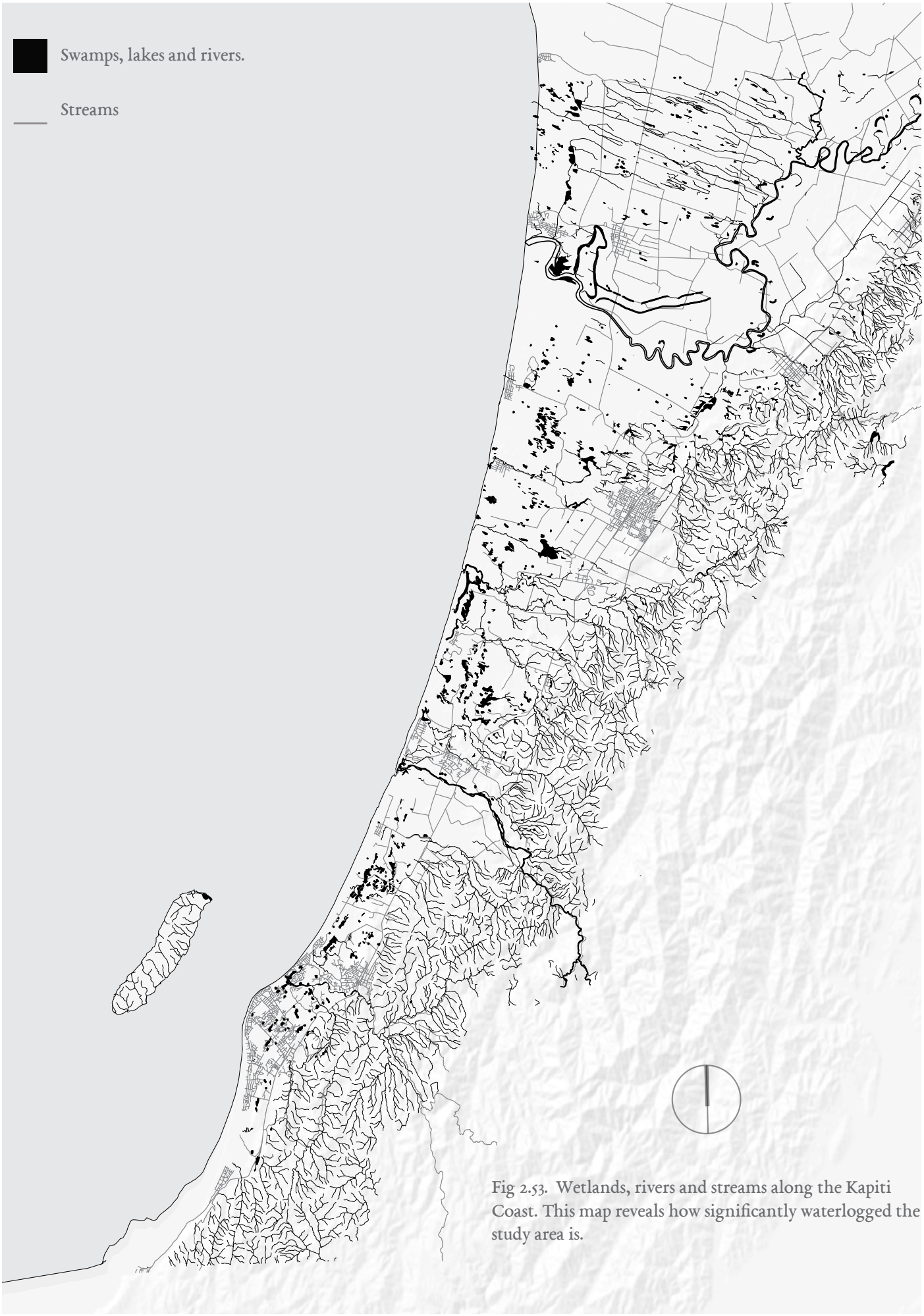


Fig 2.53. Wetlands, rivers and streams along the Kapiti Coast. This map reveals how significantly waterlogged the study area is.

Fig 2.54. 1:100 year flood zone of the Waikanae River.

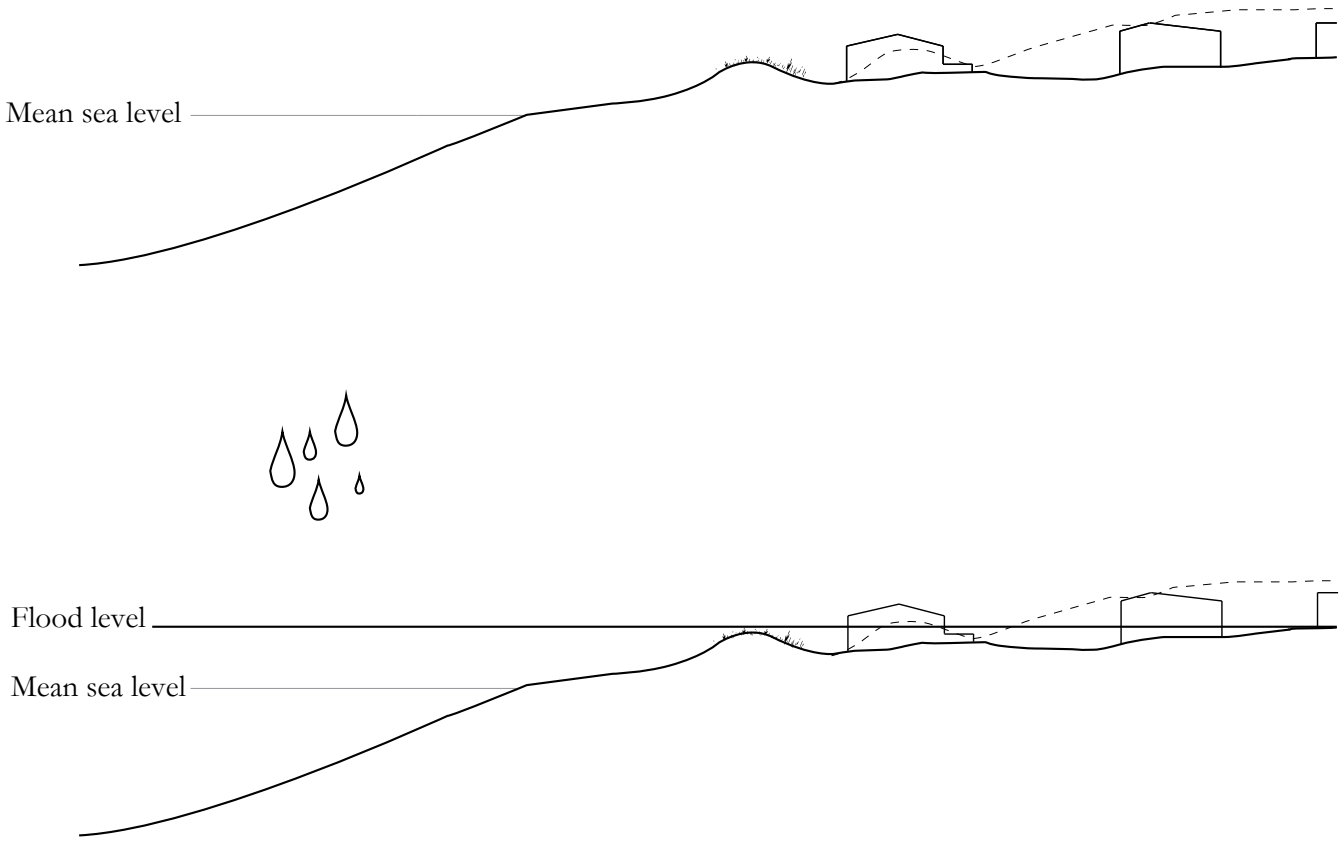


Fig 2.55. Sectional analysis of flooding hazard along the coastal edge.

Fig 2.56. Predicted erosion line in the study area.

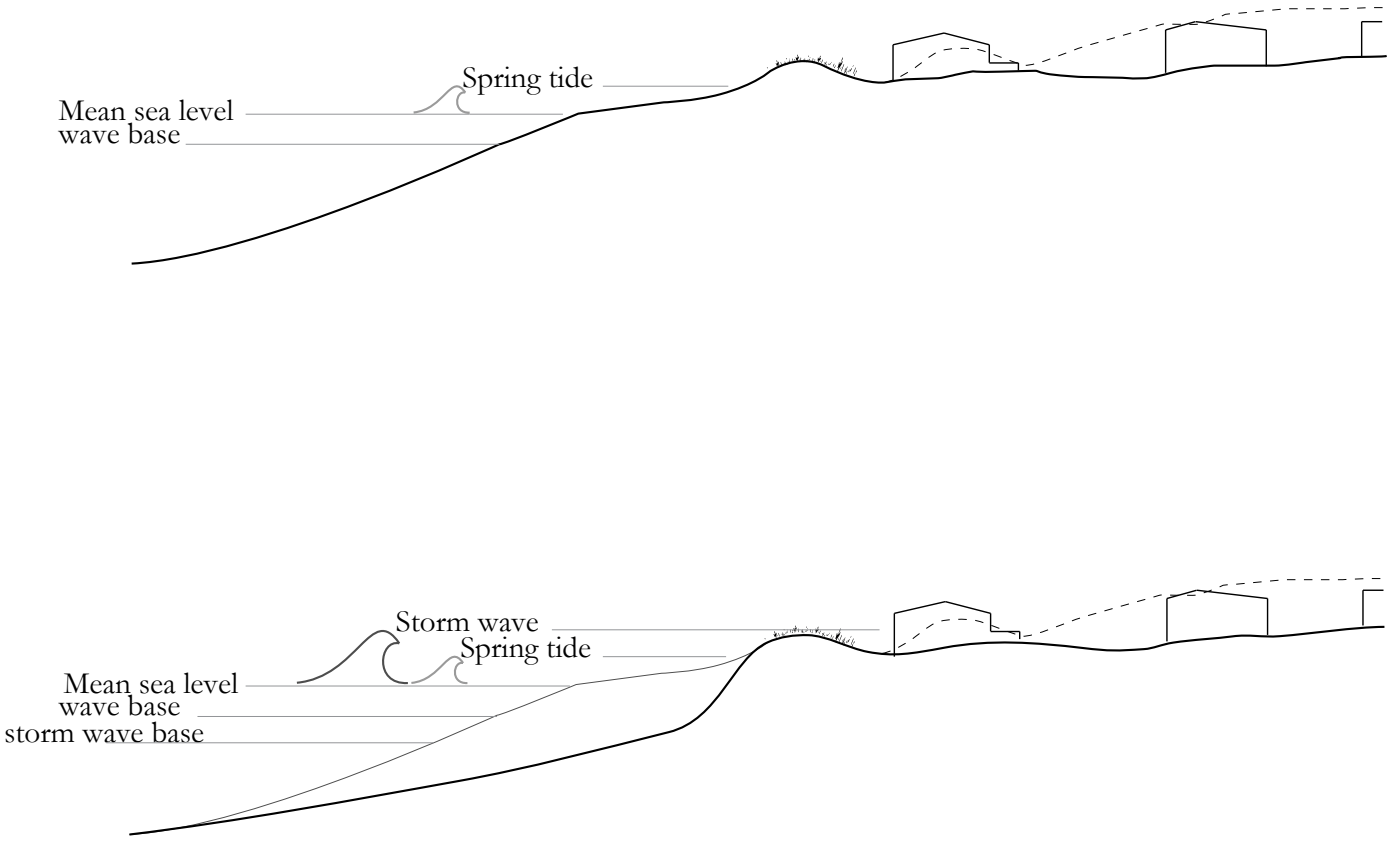


Fig 2.57. Sectional analysis of erosion hazard along the coastal edge.

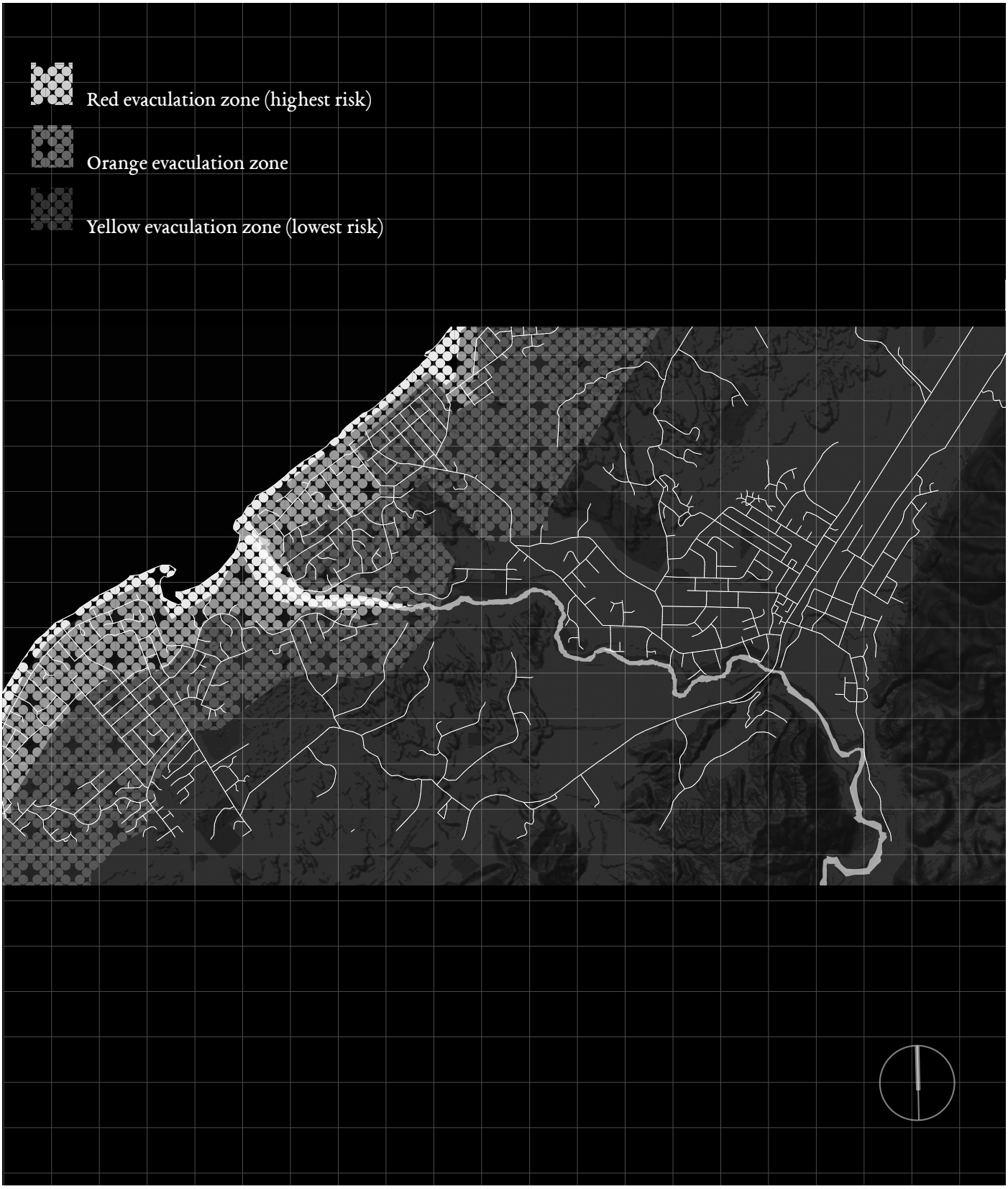


Fig 2.58. Tsunami evacuation zones in the study area.

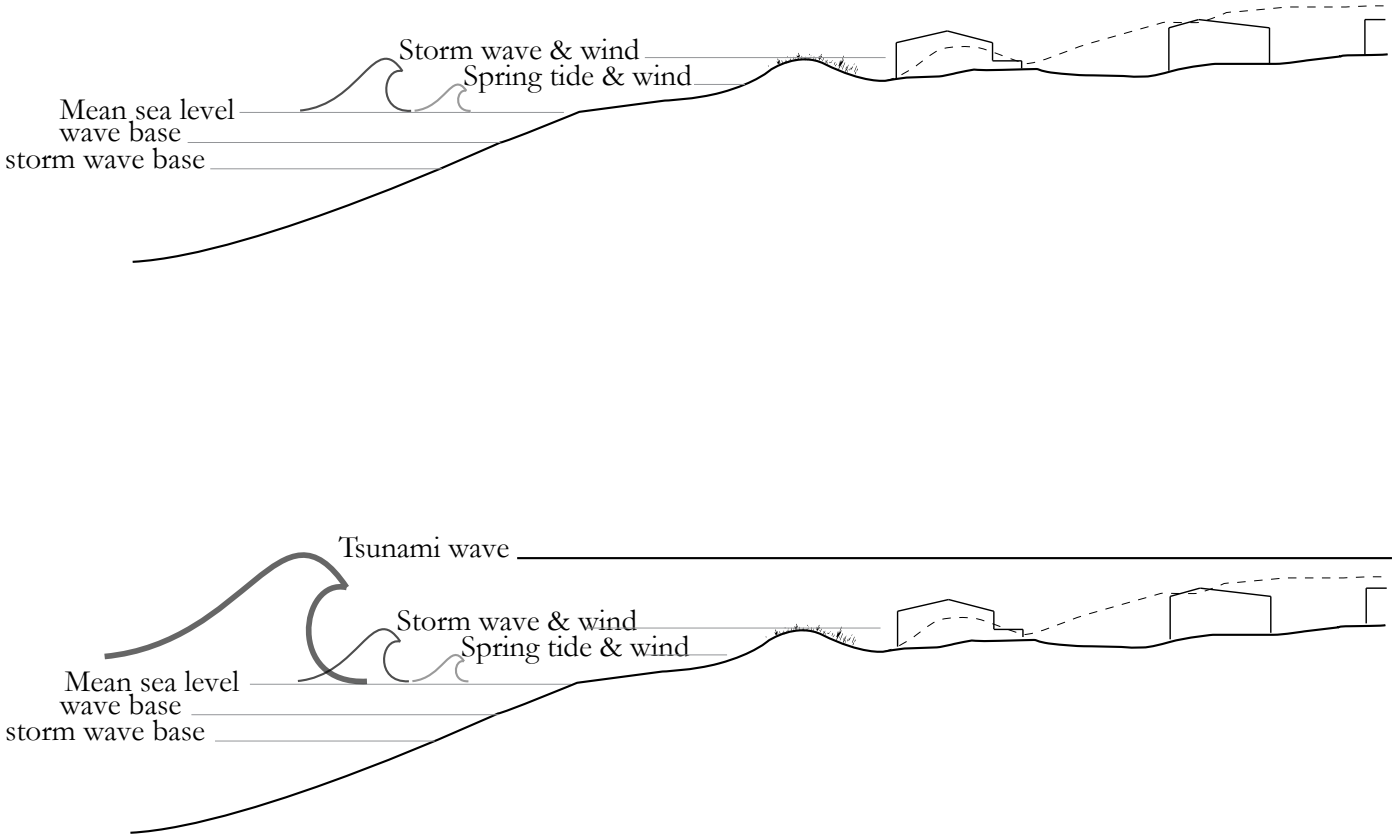


Fig 2.59. Sectional analysis of tsunami hazard along the coastal edge.

2.4. The Urban Condition (and how it came to be)

Successive responses to coastal land settlement have led to the site's particular settlement condition. The following set of maps will demonstrate this structure historically came to be while providing brief descriptions of the particular settlement moves and their revealed relationship with the coastal environment.

Since then there has been continual surges of population by the Ngati Apa, Rangitane and Muaupoko iwi groups (Te Ati Awa Ki). Tangata whenua maintained a close relationship with the wetland environment of the Waikanae and Paraparaumu coast. They expanded the swamps and streams to sustain their food supply. Water courses were cut to link water bodies and afford a ways of access through the dense lowland forest and swamplands. During this time the Waikanae estuary was a major resource in the coastal environment, and with Kapiti Island, formed the focus of Maori occupation (Easther 10).

At the onset of colonisation Pakeha quickly took up residence along newly established transport lines. In 1886, the railway opened up the flax and timber industries which resulted in widespread land clearance and drainage of water systems. By the late 1920's the flax and timber supplies were almost completely exhausted leaving the landscape transformed.

Waikanae as a township serviced these industries

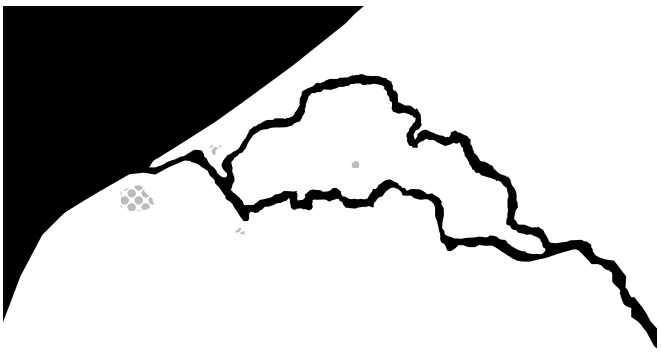


Fig 2.60. Clustered distribution of Pas and larger settlement sites reveal the area's settlement pattern pre-colonisation.

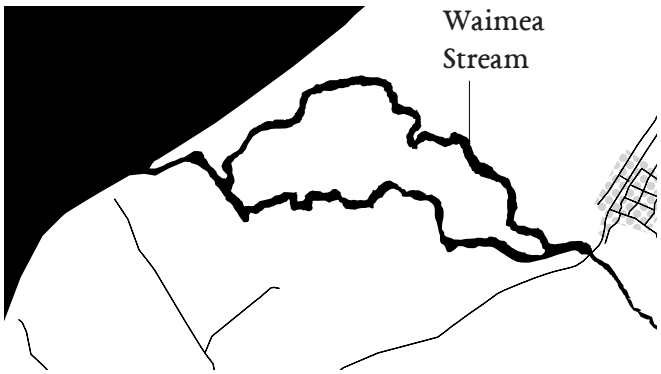


Fig 2.61. Study area's settlement pattern circa 1880. Showing Waikanae's devlopment along the railway line.

developing further inland, alongside the railway line. While subdivision of the coastal edge did not begin until the 1920s when Wellingtonians began to see the benefit of the Kapiti for holiday and retirement living. During this period the Waimea stream was diverted directly into the ocean freeing up land for the Waikanae Beach Township. Paraparaumu only appeared later when the estuary was further dredged and the Waikanae River channelled (Easther 11).

As with most of New Zealand, widespread subdivision of coastal land for development and holiday homes began taking place in the late 1950s and 1960s. The aspiration to vacation and live close to the water's edge, resulted in the expansion of long linear housing settlements sprawling down the coastline. A call for beachfront property meant the subdivision of previous farmland along the coast intensified considerably during the 1980s and 1990s (Dahm 4).

Today, the ageing population and increasing demand for affordable coastal housing has resulted in the entire Kapiti once again experiencing a major population surge (Maclean). With the combination of intensifying coastal hazards and more people seeking the beachside lifestyle, it is about time for the relationship between urban settlement and the coast to be re-examined.

Fig 2.62. Study area's settlement pattern circa 1920. The Waimea Township is able to be subdivided due to the diversion of the Waimea Stream.

Fig 2.63. Present day coastline is completely enclosed by private housing.

2.5. The Urban Problem

New Zealander's aspiration to live by the ocean has brought about a particular settlement condition embodied in the way of life typical along the Waikanae and Paraparaumu coast. Each competing for its very own slice of the coast, housing spreads out across the coastal edge row after row in long formations parallel to the coast. This approach to settlement generates an array of social implications for residents resulting in a disconnected and privatised urban condition. The following pages intend to elaborate on the present day social implications that have arisen from the settlement legacy.

Fig 2.64. Parallel housing formation set against the sensitive foredune system.

Fig 2.65. Map showing the current coastal settlements along the Kapiti Coast.

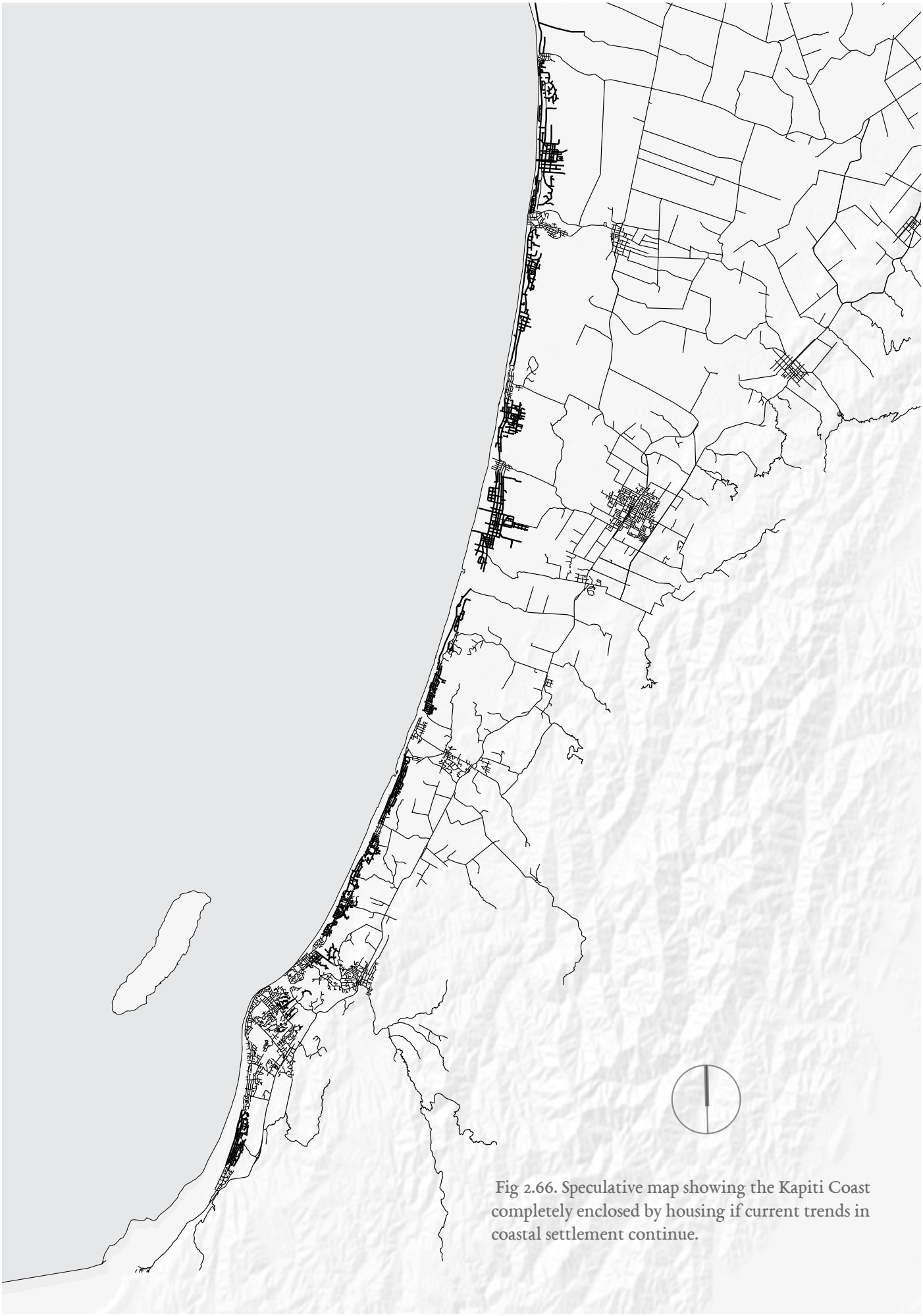


Fig 2.66. Speculative map showing the Kapiti Coast completely enclosed by housing if current trends in coastal settlement continue.

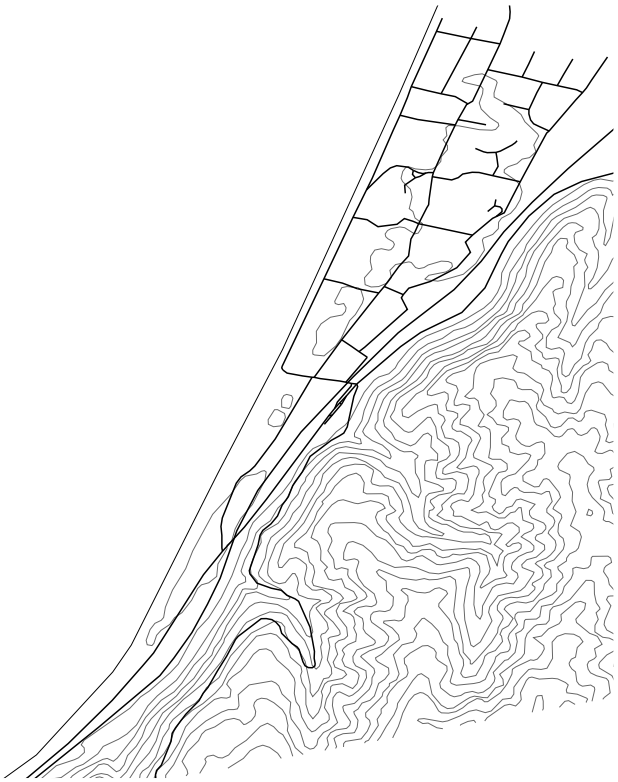


Fig 2.67. Paekakariki

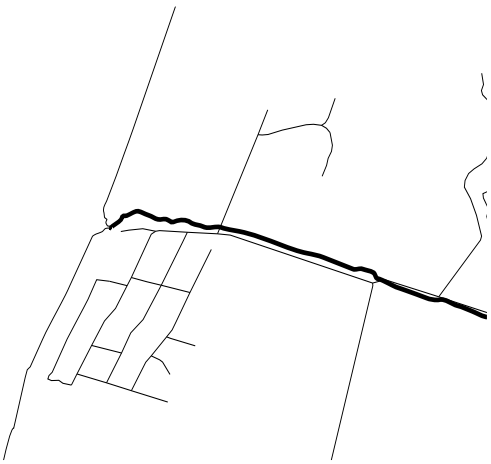


Fig 2.68. Te Horo Beach

Fig 2.69. Otaki Beach

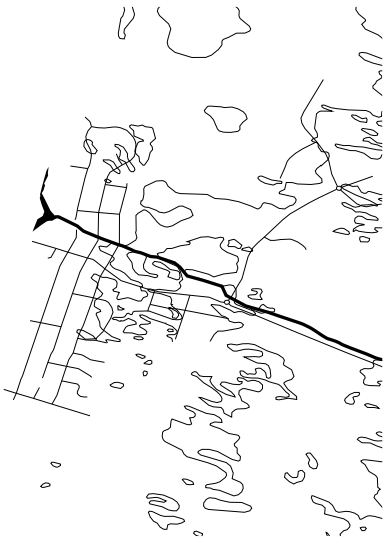


Fig 2.70. Waitarere Beach

Figs 2.67. to 2.70. Documenting the various coastal settlement scenarios along the Kapiti Coast. Each settlement appears to hug the coastline and is often within precarious proximity to river floodplains.

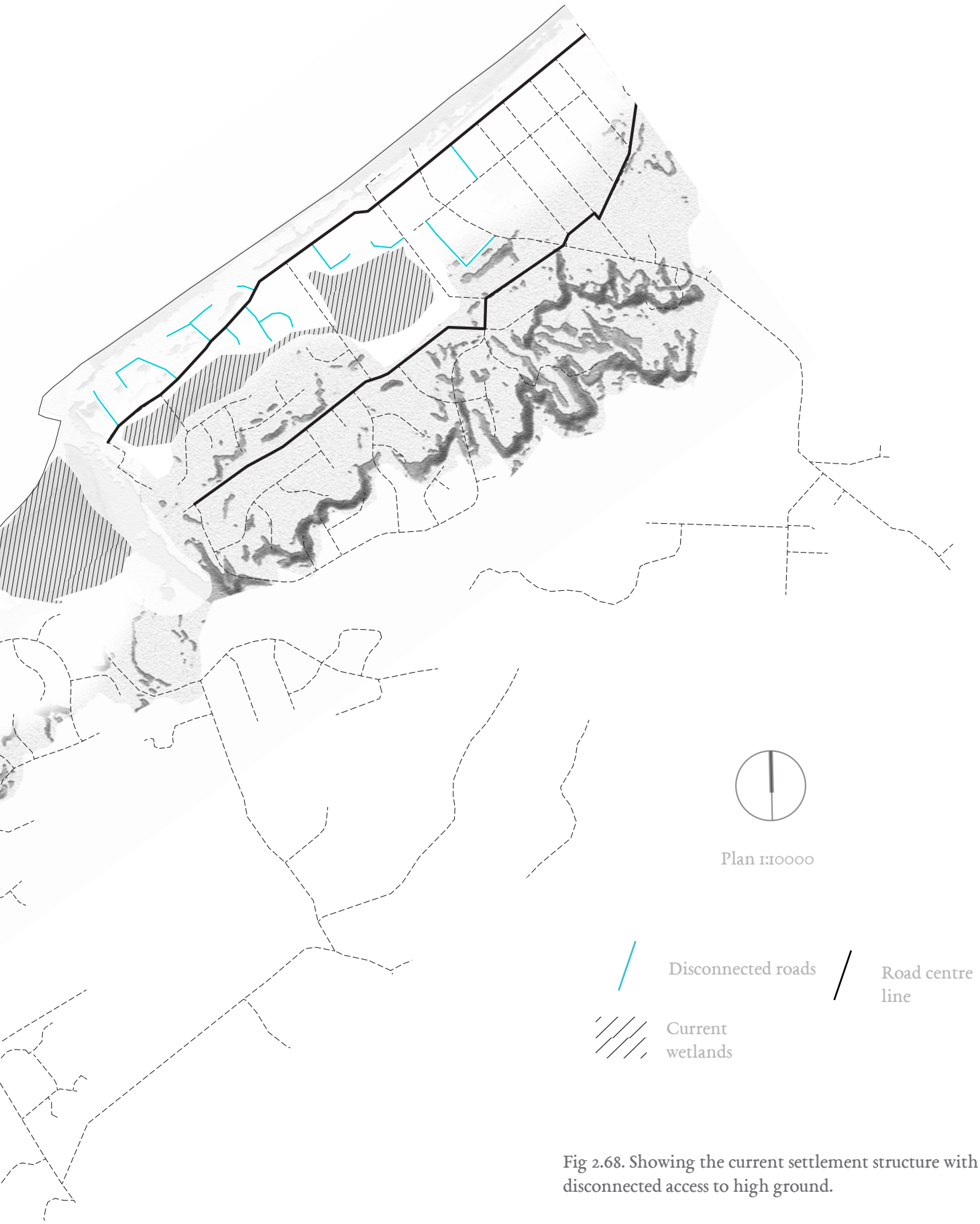


Fig 2.68. Showing the current settlement structure with disconnected access to high ground.

Perceived private ownership
of the foredune.

First line of housing blocks
the communal connection
to the coast.

Visually clear public access
to the coast

Figs 2.69. to 2.71 (top to bottom). Photographic analysis showing the varying interfaces with the coast from the first housing line along the coast to one street back.

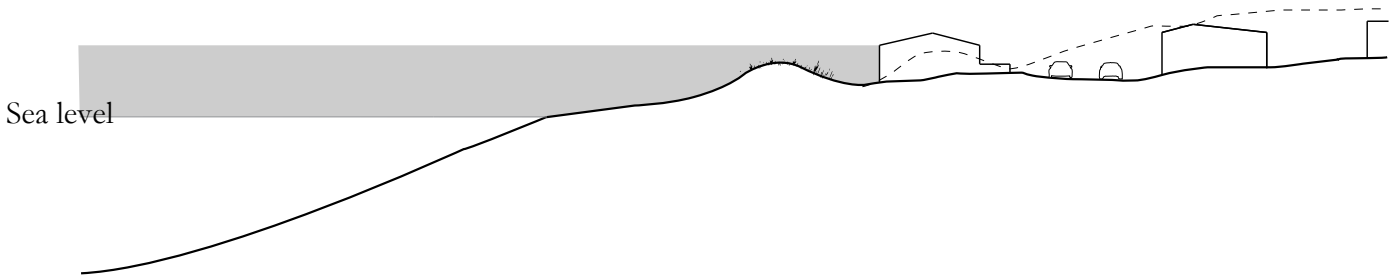


Fig 2.72. Sectional analysis of the expansive coastal views and superior living environment along the very first line of the coast.

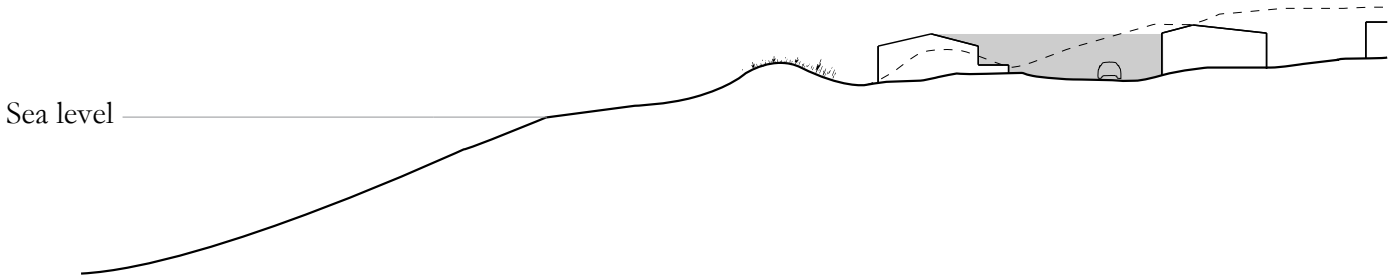


Fig 2.73. Sectional analysis of the blocked coastal views and inferior living environment only one housing line back form the coast.

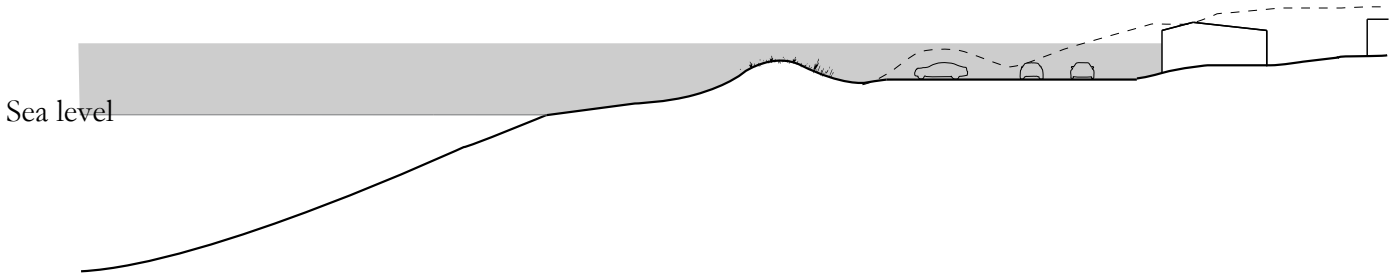


Fig 2.74. Sectional analysis of one of the rare instances of visually clear public access to the coast.

Privatised backdune system where only indivual residents get to experince the site from above.

Visually clear public view over the landscape

Figs 2.75. to 2.77. Photographic analysis of the urban problem.

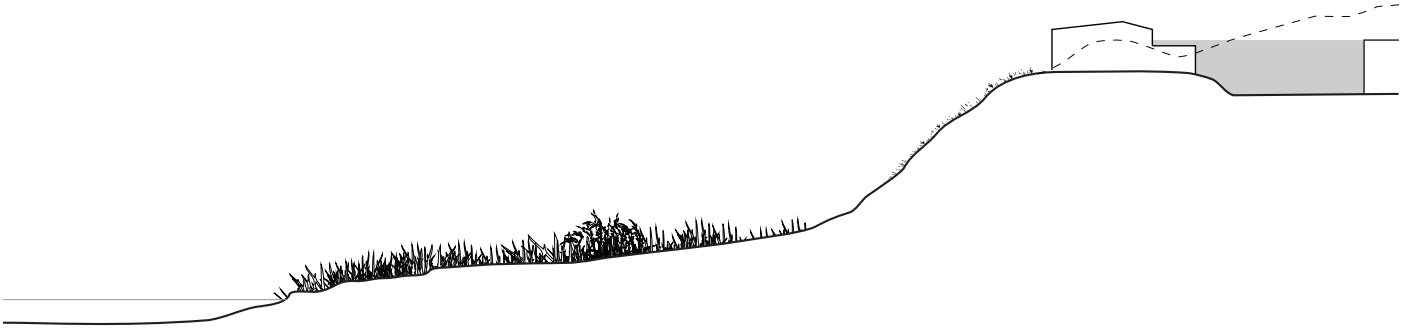


Fig 2.78. the privatse backdune and blocked highground public views over the estuary.

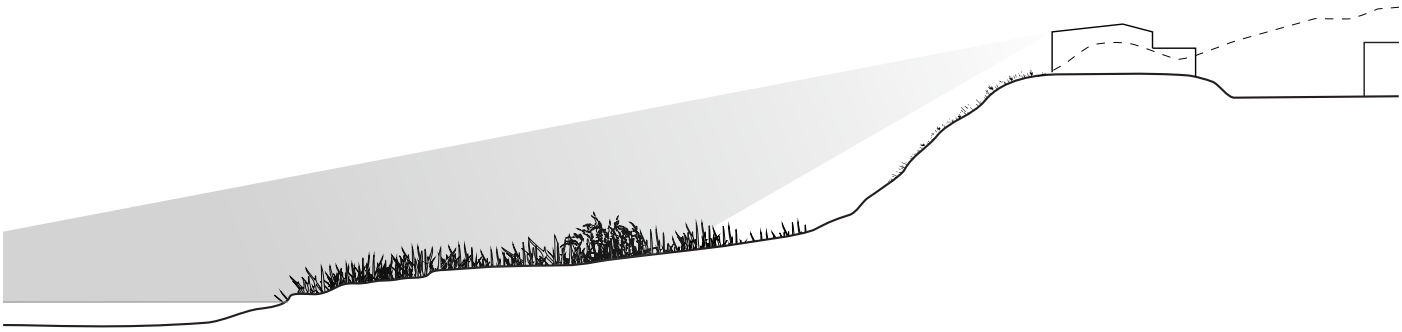


Fig 2.79. the privative housing utlilises views and connection to the estuary.

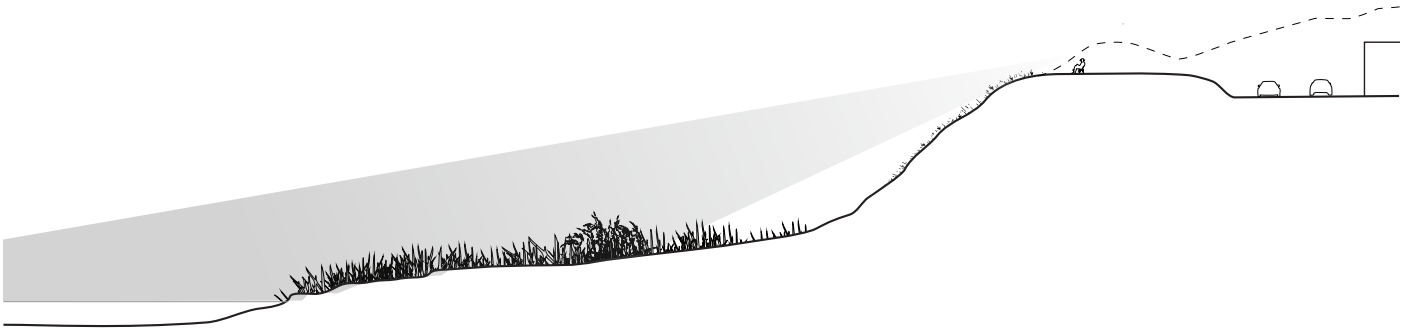


Fig 2.80. On of the few instances of public access to a high ground location with views.

3.0

Disciplinary Tendencies

Introduction

As this is a design led research thesis, the disciplinary tendencies were deduced during the process of designing. With the current climatic crisis the design of landscapes in flux has become a common disciplinary theme in landscape architecture with each individual designer applying their own approaches to the practice.

During the research process, certain tendencies were extrapolated from the design thesis' individual approach to the problem. The tendencies demonstrated do not occur in isolation but have come from a lineage of design practice.

This section of the design research seeks to communicate what disciplinary tendencies the design process has explored, how these tendencies sit within current design practice.

3.1. Landscape structures and the Urban Form

"A resilient world would embrace and work with ecological variability (rather than attempting to control and reduce it)"

Walker, Salt and Reid (147)

The attempt to control natural systems can often lead to disaster if control methods fail. The Waikanae and Paraparaumu coast exhibits this problem in its engineering legacy of flood control. If practitioners continued to go down their current course with sea levels continuing to rise, the river's stop banks would only become taller while more and more of the coastline would be held in place with sea walls. This is an exhaustive and costly exercise for small coastal townships such as Waikanae and Paraparaumu coast. Surely another way, instead of holding back the landscape's natural processes, would be to work with them?

Using landscape structures to drive settlement is not a new topic of research, as throughout history cities and their intrinsic functions were driven by natural structures. For example, in the eighteenth century city planners began the trend to produce monumental urban plans in which the natural systems and the city remarkably co-existed. In L'Enfant's Plan of Washington (fig 3.2), the great Potomac River literally streams through the urban fabric. Even the avenue road structures were conceived as a "secondary nature leading to nature (Witzgall, S., et al. 21)". Landscape structures were an intrinsic and guiding influence for eighteenth century urban planners.

"The components of nature are real and powerful props."

Michel Desvigne (17).

To bring the discussion forward to the present design thinking, there are remarkable similarities between Michel Desvigne's Biesbosch Stad and L'Enfant's plan of Washington. Biesbosch Stad (further examined as a key precedent in thesis) is a speculative design provocation devised by French landscape architect Michel Desvigne in 2005. It proposes an urban development vision at the confluence of the Rhine and Meuse Rivers where the artificial system of dikes are broken up to make way for the delta's natural river paths. Like L'Enfant's plan, these river structures drive the urban form but unlike his plan the river paths are inverted in a playful gesture and are raised up above the floodplain to allow safe ground for urban

Fig 3.1. View of the Paekakariki Sea Wall showing the storm damage in July 1978.

settlement. Michel Desvigne's work is certainly not an isolated exercise but comes out of a vast umbrella of landscape architectural research where natural systems are once again driving the form of our cities[1].

This way of thinking about landscape structures and city building was critical in formulating the design direction of the thesis. The landscape of the Waikanae and Paraparaumu is continually subjected to the failures of our need to control natural systems. Landscape architecture as a discipline can see the potentials of such an environment and instead work these natural systems. As exhibited in the work of Desvigne and L'Enfant, coastal systems need to be not merely seen as a problem but an opportunity for valuable design exploration.

[1] See: landscape urbanism and ecological urbanism.

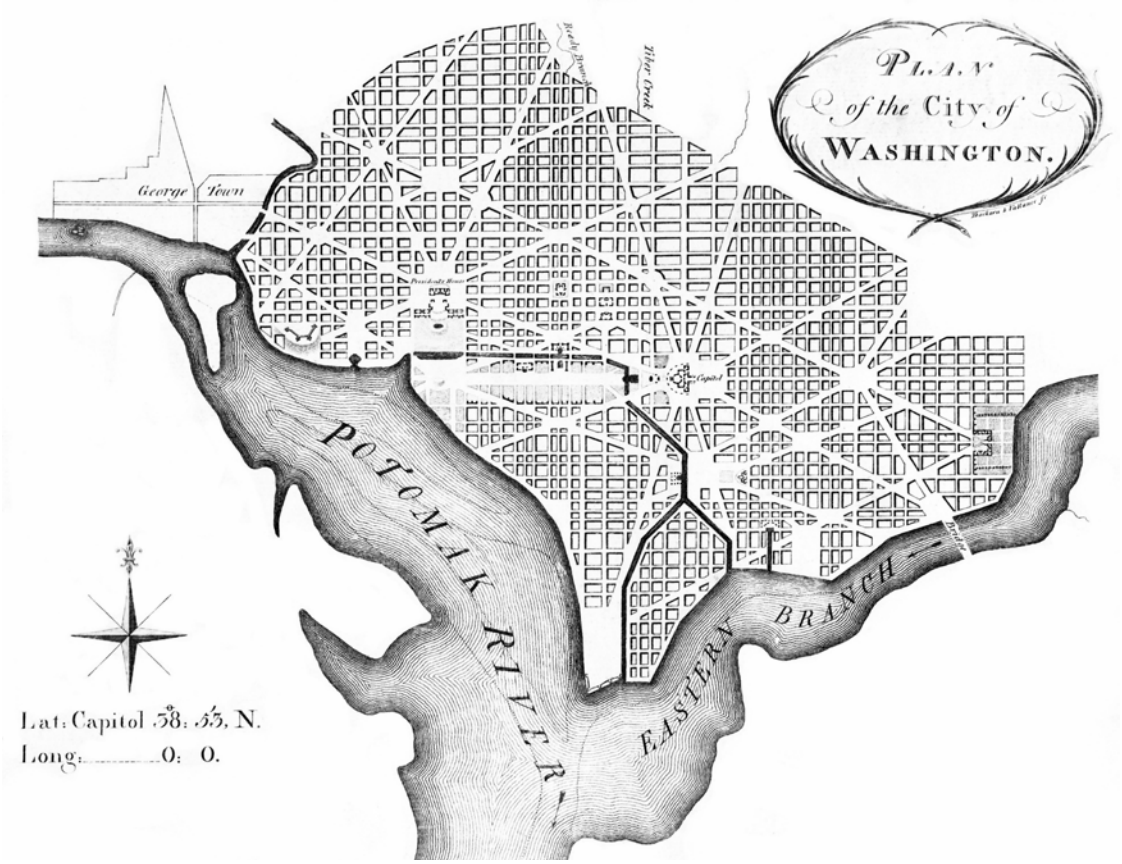


Fig 3.2. L'Enfant's plan for Washington.

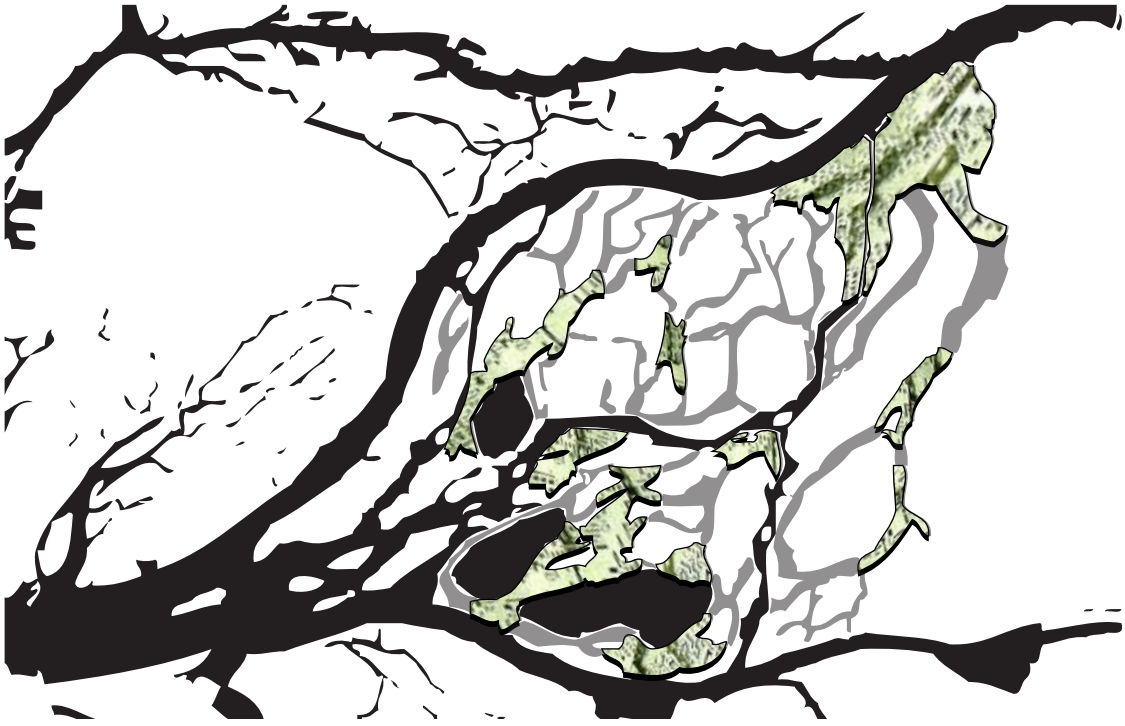


Fig 3.3. Michel Desvigne's Biesbosch Stad.

3.2. Neighbourhood Structures and the Urban Form

"A resilient world would promote trust and well developed social networks."

Walker and Salt (147).

Designing with neighbourliness in mind is an important and often over looked topic when planning settlements that experience frequent natural hazards. When settlements are ecologically vulnerable, this often leads to designers becoming solely preoccupied with "fixing" the landscape issues while the social implications of the site are disregarded.
This is a concern because when social implications are not considered in the design process these "solutions" might further exasperate unsocial urban forms. People living in urban landscapes such as the Waikanae and Paraparaumu coast, need to rely on established social connections when coping with natural disaster. For when communities are experiencing disturbance this is when social bonds are their most vital. According to Walker and Salt:

"Resilience in social ecological systems is very strongly connected to the capacity of the people in that system to respond, together and effectively to change any disturbance. Trust, strong networks, and leadership are all important factors in making sure this can happen (147)"

These attributes combined are what Walker and Salt refer to a social capital. Social capital is defined as, "the networks of relationships among people who live in a particular society, enabling that society to function effectively (Aldrich 16)." Social capital is a very important concept when dealing with sites like Waikanae and Paraparaumu that undergo frequent ecological disturbance. In these scenarios communities with high levels of social capital are more likely to be able to withstand and recover from adversity. And when related to spatial design disciplines social capital and neighbourhood planning can indeed be linked. This is because each of these subjects see the value of social connection – neighbourhood planning is merely the spatial output of this line of thinking.

Neighbourhood design has had a long tradition in the planning word and perhaps the most influential of examples is the "Neighbourhood Unit" developed in the 1920s by planner and sociologist, Clarence Perry. Perry's idea of the neighbourhood unit was influenced by a variety social, institutional and physical urban concepts popular at the time. Like many modernist ideologies, the work was driven by various spatial principles, a manifesto of urban planning so to speak. Interestingly many these design principles have carried through to present day neighbourhood planning. The table (next page)

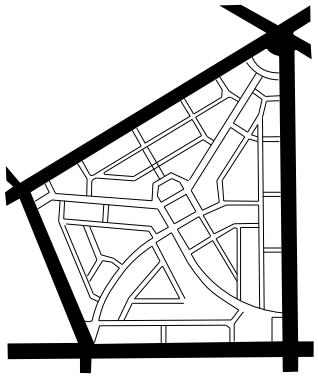


Fig 3.4 Clarence Perry's Neighbourhood Unit: Arterial and local roads define unit.

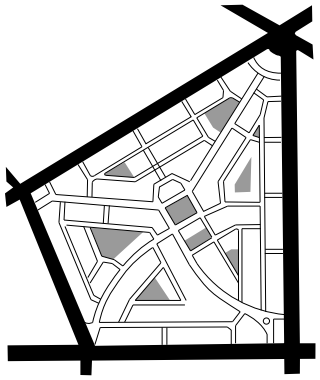


Fig 3.5. 10% of unit area to recreation and park space.

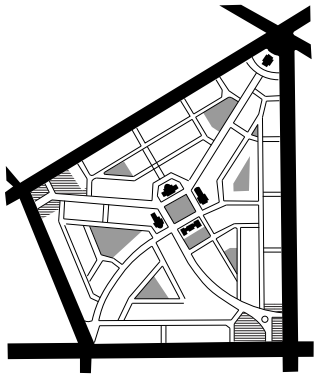


Fig 3.6. Community building at centre and shopping at periphery near traffic junctions.

indicates the similarities and diversions from Perry's principles in later design thinking.
It is evident that there are many differing opinions when it comes to neighbourhood design. These varying attitudes were continually confronted throughout the design process. A way forward from this predicament was to instead analyse real world examples to deduce what spatial parameters contributed to complementary neighbourhood scenarios for the Waikanae and Paraparaumu coast.

Also, while the neighbourhood unit could be criticised as being both formulaic and spatially inward, the real value of the Perry's ideas is the way he looks at the how the simple rearrangement of open spaces (such as parks, streets and schools) could potentially bring about new approaches to living. So perhaps when formulating an approach to neighbourhood design one could use similar tools but adapt them to the site's landscape condition. For what this unit is truly lacking is an adaption to site and a connection to something larger than its own enclosed community.

"Neighbourhood Unit" Design Principles
Centre the neighbourhood around a school (Perry 6).
Size the neighbourhood to sufficiently support a school (5,000 to 9,000 residents) (Perry 6).
Structure the neighbourhood so that its perimeters are no more than a five minute walking distance from the centre (Perry 6).
Place arterial streets along the perimeter of the neighbourhood block and limit shopping centres to this perimeter. This will define the boundary of the neighbourhood (Perry 6).
Allocate at least 10% of the neighbourhood to public space for community interaction (Perry 6).

Related Design Thinking

- "Neighbourhoods are the sense of community generated around centres such as schools, shops or transport links ("*Going Local – a Guide to Neighbourhood Community Planning*").

- Dunbar's Number – Is a proposed limit to the number of people with whom a person can maintain stable social relationships. If applied to neighbourhood planning the size of neighbourhood would be 150 people (Dunbar 3).
- Jane Jacobs states that only three kinds of neighbourhoods are useful:
    - The city as a whole
    - Sub-city's composed of 100,000 people or more (i.e. those large enough to hold political power)
    - The street-neighbourhood (The Economy of Cities 33).
- The preferred neighbourhood size is sometimes derived from the catchment's population for a primary school or, in the case of transit-orientated development, the population required to make public transit viable (Carmona 143).

- The preferred neighbourhood area is often limited to what is considered to be a comfortable walking distance – 5 or 10 minutes or 300 – 800m (Carmona 143).

- "Clear boundaries enhances functional and social interaction, sense of community and identity within those boundaries (Carmona 145)."
- Jane Jacobs opposed the boundaries concept. Alternatively she believed where neighbourhoods operated best depended on overlapping and interweaving – for example at street corners (Jacobs The Death and Life of Great American Cities 52).
- Kevin Lynch also held that organising a city as a structure of social neighbourhoods was either "futile" or would reinforce social exclusion because ... "any good city has a continuous fabric, rather than a cellular one (Lynch 27)".

- "The open spaces near our homes give us a valuable place to socialise with our neighbours (Woolley and Sian
- Carolien Hoogland discusses the introduction of a "semi-private zone" to the range of public spaces that grades the transition from public to private space. These spaces offer residents a place for chance encounters and result in stronger social cohesion (11).

3.2. Phasing and Implementation

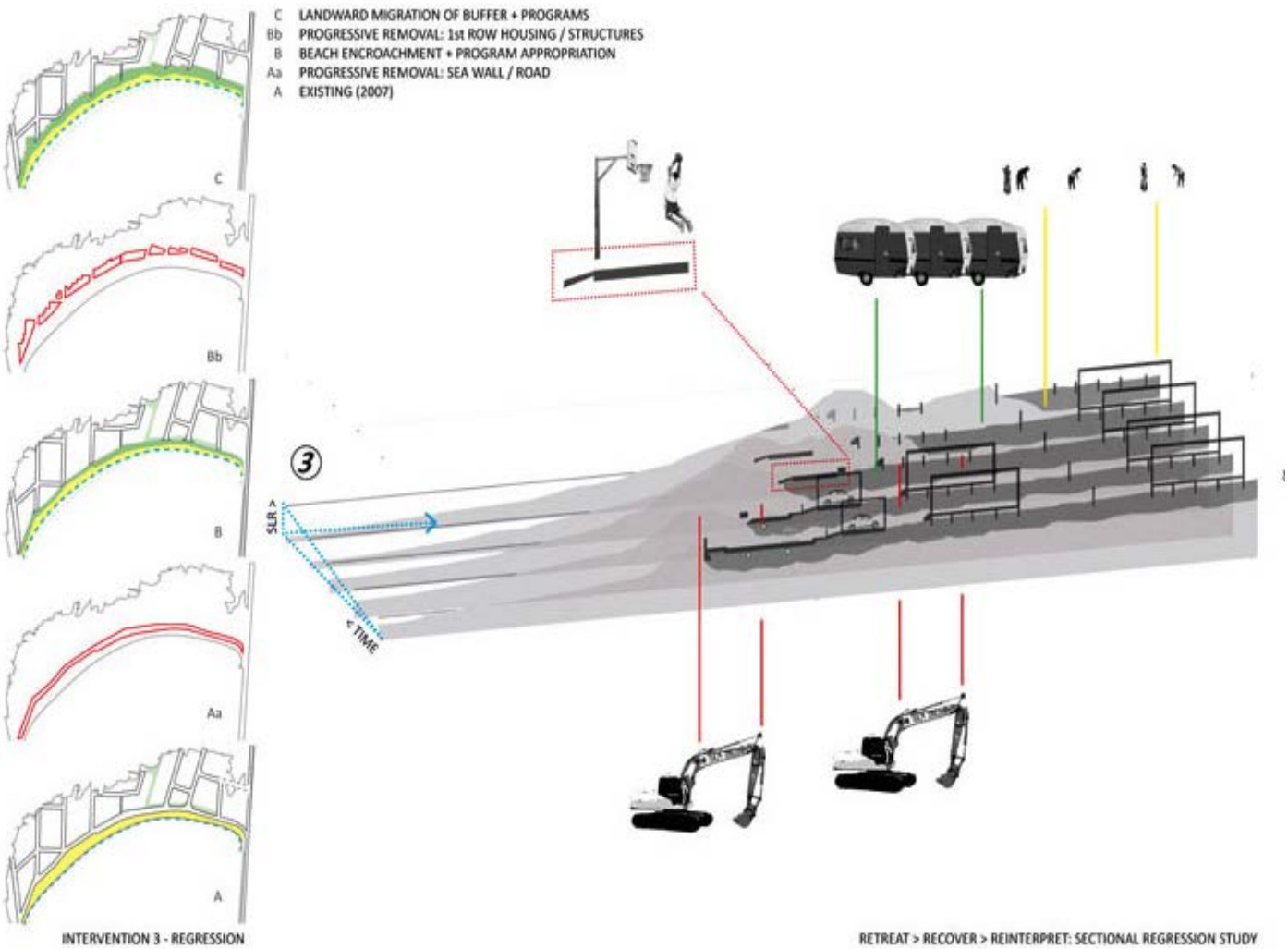
The study area of Waikanae and Paraparaumu represents a landscape that is already occupied. Fixed settlements can be a challenge to work with as the communities that continue inhabit them are often reluctant to accept change, especially if it affects their particular residence. Evidence that suggests this attitude in the study area is exemplified in the community retaliation following the Kapiti Coast District Council's coastal hazard report which suggested possibilities of managed retreat (Blundell "Residents Upset over Hazard Line Changes.")

Implementation over time is a process prevalent in the landscape architectural discipline that seeks to give landscape architects the power to design with seemingly fixed settlement. In townships with limited budget, resources and layers of cultural associations; grandiose visions for a settlement seem unfeasible. However, when very small interventions are slowly implemented over a long course in time, the "grand plan" can become a reality.

Michel Desvigne engages in this concept with his urban development strategy at the Lyon Confluence. This project is sited on a 150-hectare stretch of industrial land parcels pressed between the Rhone and Saone Rivers, a highway and a busy railway exchange. The industrial land where the project is intended is destined to be abandoned. Because of this condition it was necessary to wait several decades for land to be freed up, for the railway yards to be vacated and the highway bypass to be put in place to eventually realise the site plan (Tiberghien and Desvigne 41). Desvigne's envisioned scheme for this land is a series of linear green spaces running perpendicular from the river. Revealed in figure #, it is apparent that he did not wish to conceive a unitary project but a plan that "progressed in successive steps and changes, for this could give the area concerned an immediate landscape quality (Tiberghien and Desvigne 45)."

Michel Desvigne employs a valuable design approach, however as the coastal settlement of Waikanae and Paraparaumu is made up of mostly privately owned residential land it will be infinitely more difficult to free up the land needed. What Desvigne's scheme is missing is some kind of incentive or tipping point for when certain settlement moves are implemented. Nick Jones, a past student at the Victoria University of Wellington landscape architecture program, provides a possible solution to this dilemma. In his project for the redevelopment of Lyall Bay he suggests a three-stage urban response to sea level rise centred on projected impacts over time. Stage one of the project

Fig 3.7. Phasing diagrams of Michel Desvigne's Lyon Confluence.



INTERVENTION 3 - REGRESSION

RETREAT > RECOVER > REINTERPRET: SECTIONAL REGRESSION STUDY

implements a storm water strategy, stage two a high ground arterial road and the final stage the eventual landward shift of the settlement and demolition of the sea wall. In his project, sea level rise has become the catalyst for redevelopment where intervention only needs to happen when suggested sea level projections have been reached (Allan and Stutterheim 83).

"We need to develop institutional processes that allow us to progressively change our course of action (Glavovic)."

Bruce Glavovic supports Nick Jones' idea of gradually altering and reassessing the way we restructure coastal settlement. He elaborates that:

> *Instead of trying to craft static, silver bullet solutions in a world of change, of dynamism, of contestation, of turbulence and surprise. Where a sea wall is not going to be a permanent solution for a hundred plus years. We need to develop institutional processes that allow us to progressively change our course of action. It is a very different challenge from which past communities have faced where we have treated these issues as static problems (Glavovic).*

This method of planning is valuable to the coastal townships such as Waikanae and the Paraparaumu. Urban development strategies do not have to be a singular master plan and do not need to rely on a fixed solution. Instead design solutions could work with indeterminacy of sea level rise and seek for interventions that can be inserted over time with as little impact as possible. What is beneficial about this strategy is that not every intervention has to happen at once. Coastal communities will have time to adapt to each stage of the development process. Therefore communities will not feel unjustly moved out of their residence, for as sea levels rise the risk of them living there will continue to increase. Considering there has been so much strife over the release of the coastal hazard lines in the Kapiti Coast, a less drastic approach is certainly needed.

Fig 3.8. Nick Jones' staged project for removing the Lyall Bay sea wall.

4.0
The Urban Strategy

Introduction

The chapter will begin with describing the chief precedent that influenced the urban structure, its initial urban application, and the subsequent urban form the thesis has chosen to further explore. After this the chapter will illustrate the urban systems involved in the overall proposal.

4.1. Urban Structure Precedent

4.1.1. Biesbosch Stad/Michel Desvigne

Biesbosch Stad is a speculative urban development tested in the delta system located at the confluence of the Rhine and Meuse Rivers. It is a site, like the Waikanae and Paraparaumu coast, which is continually at risk of flooding. The land at present is defined by farming parcels that remain dry due to the artificial system of dikes used to suppress the land's natural processes (Tiberghien and Desvigne 11).

Flood control is a significant problem for the Netherlands, as about two thirds of its land mass is vulnerable to flooding (Janin and Mandia 111). The site constitutes a valuable land reserve, vital to the further development of Rotterdam. Therefore, the problem is a paradoxical one: how can designers make room for water in a site while simultaneously creating opportunities for massive construction of residential neighbourhoods?

The precedent looks at the idea of re-naturalising the land by breaking up the rigid dike system and allowing the land to become flooded once again. In this project Designee uses the landscape structures of old river paths and in a playful gesture, instead of re-flooding these paths, he inverts the land raising it up above the flood plain. The development occurs of the largest raised land area while the smaller land becomes the connections between them.

The idea of looking at settlement that is driven by large landscape structures is a notion that was considered to drive subsequent design experiments. One strategy was about allowing the natural processes to take place then using them as a framework for placement of settlement and landscape architectural interventions. Another strategy looked at situating key settlement moves around the high terrain where coastal processes would not become hazardous. Both of these concepts were approaches that were further tested in the design process.

Standard Practice of Flood Control in the Netherlands

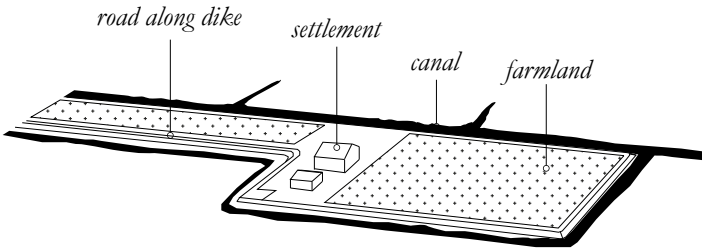


Fig 4.1. Diagram if how settlement occurs in Holland within the flooding structure.

Fig 4.2. Aerial photograph of housing settlement within the dike/polder system in Holland.

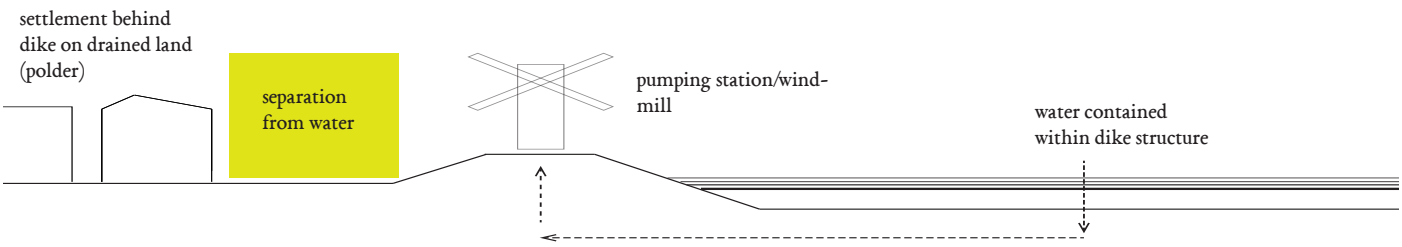


Fig 4.3. Sectional analysis of settlement in Holland and how it functions within the dike/polder system.

Biesbosch Stad: Site Location

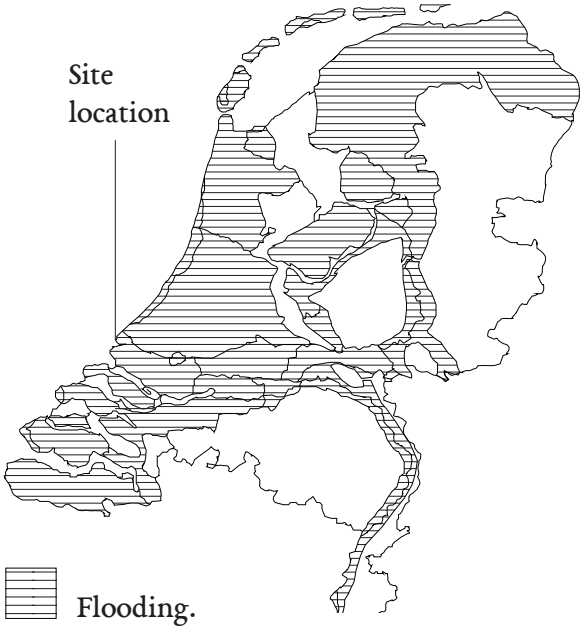


Fig 4.4. Indicating parts of Holland that would be flooded without the protection of dikes.

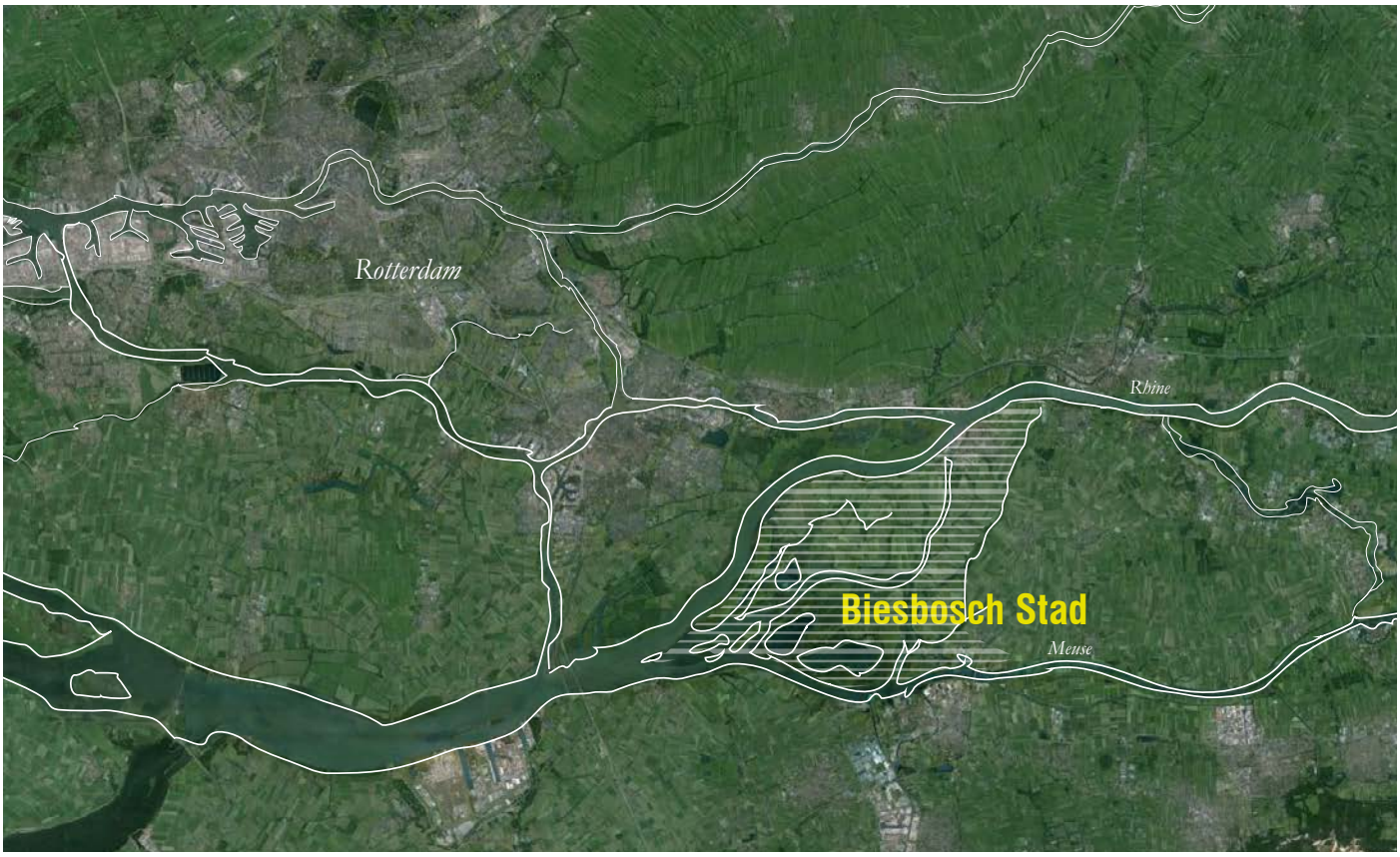


Fig 4.5. Locating Biesbosch Stad in relation to Rotterdam.

Fig 4.6. (opposite page). The Rhine and Meuse delta system where Biesbosch Stad was proposed.


potable water basins

Biesbosch Stad: Design Logic

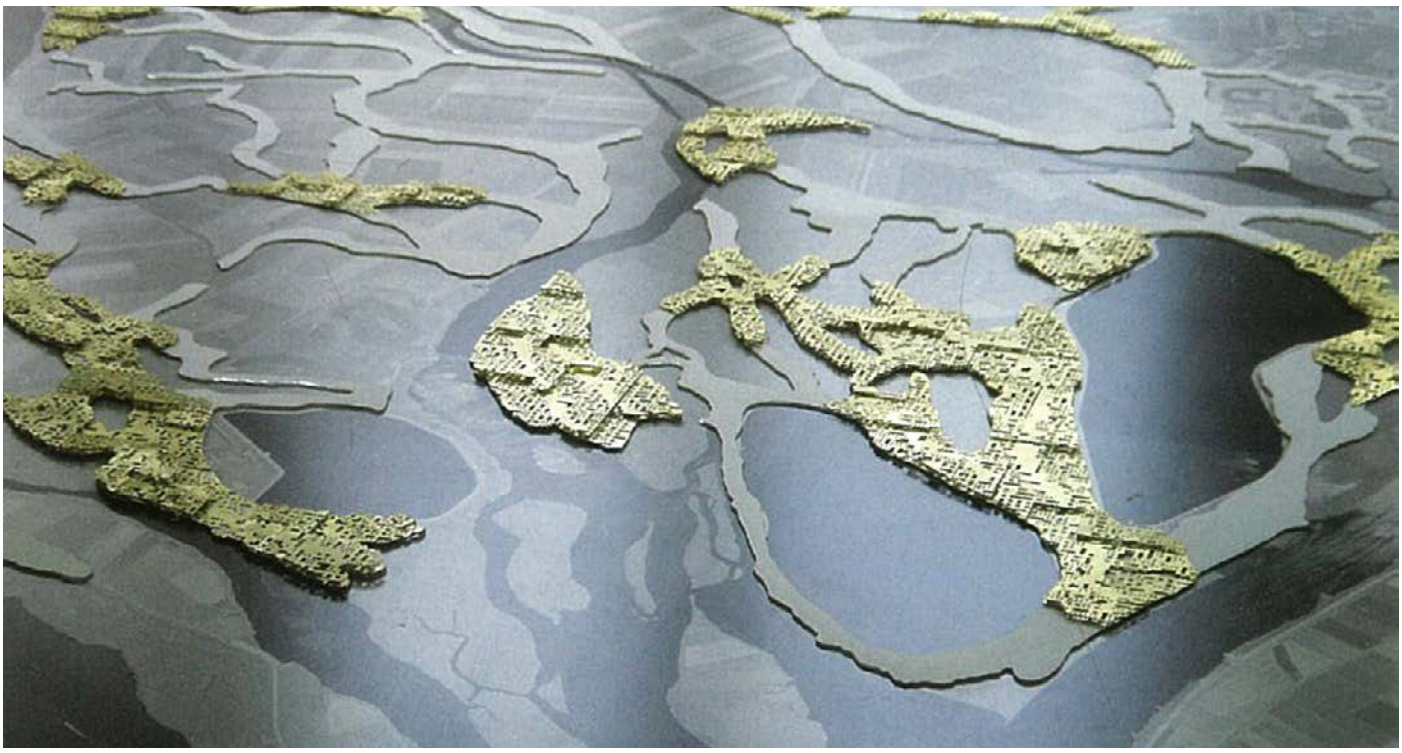


Fig 4.7. Model of Biesbosch Stad.

Fig 4.8. The Rhine and Meuse delta.

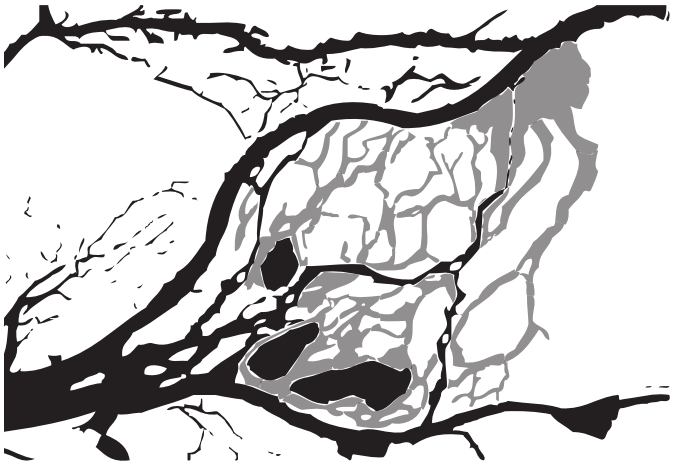


Fig 4.9. Traces of old river course highlighted in the floodplain

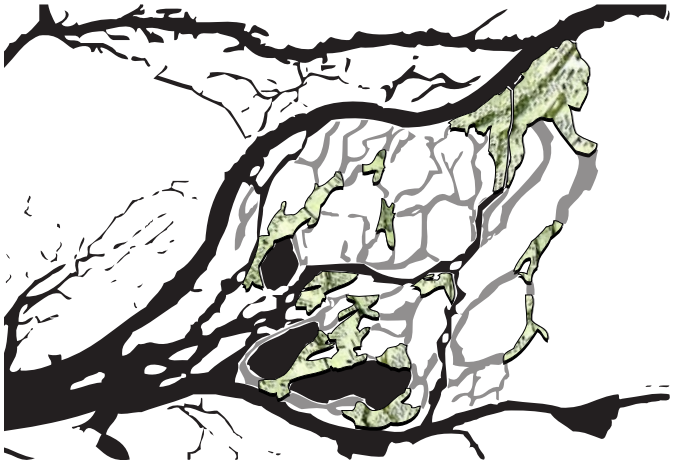
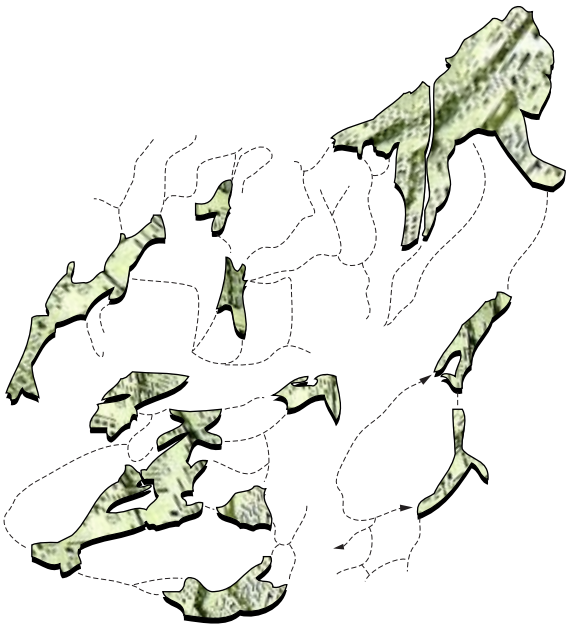


Fig 4.10. Development happens on largest raised land area.



4.11. Transportation routes are situated where land raised land is not large enough for settlement. These routes create connectivity between islands

4.12. Current situation of dikes controlling flood waters.

4.13. Old river paths identified on site.

4.14. Dikes are broken up.

4.15. Fill land from dikes used to create islands developments.

4.1.2. Application to Site: Initial Design Test

In the very first stages of the research process the case study was tested within my chosen study area to discover potentials not considered by only examining the project in isolation. This process involved testing Desvigne's process by creating new ground that highlighted the land-scape's fluctuating water levels. This test resulted in a small assembly of island communities situated at the mouth of the Waikanae River estuary. The islands where residential housing occurs are raised above the high tide mark with public access broad walks connecting each raised land area. A major element to this test is the series boardwalks that operate as ridged infrastructure in an otherwise shifting landscape. The boardwalks fluctuate between varying levels of accessibility as the tidal waters rise and fall. This allows visitors to the estuary to come into direct contact with the estuary, its tides and the fluctuating sea levels while keeping the residents on safe ground above these processes. By applying the simply applying the Biesbosch Stad case study to the site valuable discoveries were found.

<u>Positive aspects of this urban form:</u>

- The form looks at coastal processes as enabling design and not constraining it.
- Island housing has a greater interface with the estuary.
- There is potential for close neighbourhood connections on individual islands.
- Public and residents could have a close and positive interaction with each other.
- The housing could generate public life and interest in estuary.
- The form allows for an intimate relationship with natural processes and tides.

<u>Negative aspects of this urban form:</u>

- Reclamation of islands could be an expensive operation for council or developers.
- Island living could become exclusive and be unaffordable to the demographic of the Kapiti Coast.
- Settlement does not address the problem of flooding in the existing urban areas.

<u>Findings to further explore:</u>

- Use wetland and dune structures to inform urban form.
- Structure settlement around the safe high ground and let the water fluctuate below.
- Design with ecological variability and not against it.

Fig 4.16. to 4.18. Test drawings of the Biesbosch Stad precedent applied to the study area.

4.2. The Urban Structure

4.2.1. Re-alignments

The process of analysing the parallel settlement formation led to developing strategies which might be employed to enable a more social settlement that allows for ecological variability. Managed retreat was one of the options suggested in the Kapiti District Council Coastal Hazard Report (Shand) but what the research really wanted to discover was how settlements could somehow adapt in order to remain by the coast. New Zealand has a coastal identity that it will not readily give up on. So how could landscape architects negotiate ways in which to stay while also responding to the increasing coastal risk? Perhaps it could just be a matter of how we settle the coast? And what form this could take?

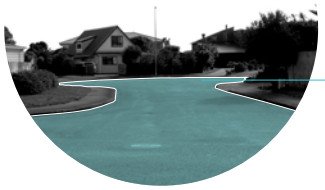
The initial urban form tested at the beginning the design research process was the catalyst for opening up a number of different spatial opportunities and logistical problems in the study area. This design test was valuable in that it brought in the concept of structuring the settlement around the high terrain, allowing flood waters the space to fluctuate and working with the sites existing landscape structures. However the test also failed in that the realities of implementing island living in the study area would be expensive, promote exclusivity and would not necessarily fix the flooding problem throughout the site.

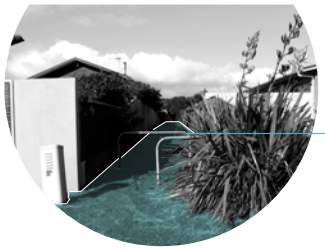
After this initial design test it was decided that a lighter touch would be best. The urban form that created the richest set of opportunities for the study area followed the simple move of rotating the existing settlement alignment. While each settlement move will be discussed in detail further on, this section of the design discussion intends to simply give an overall picture and how broad realignments affected the settlement as a whole.

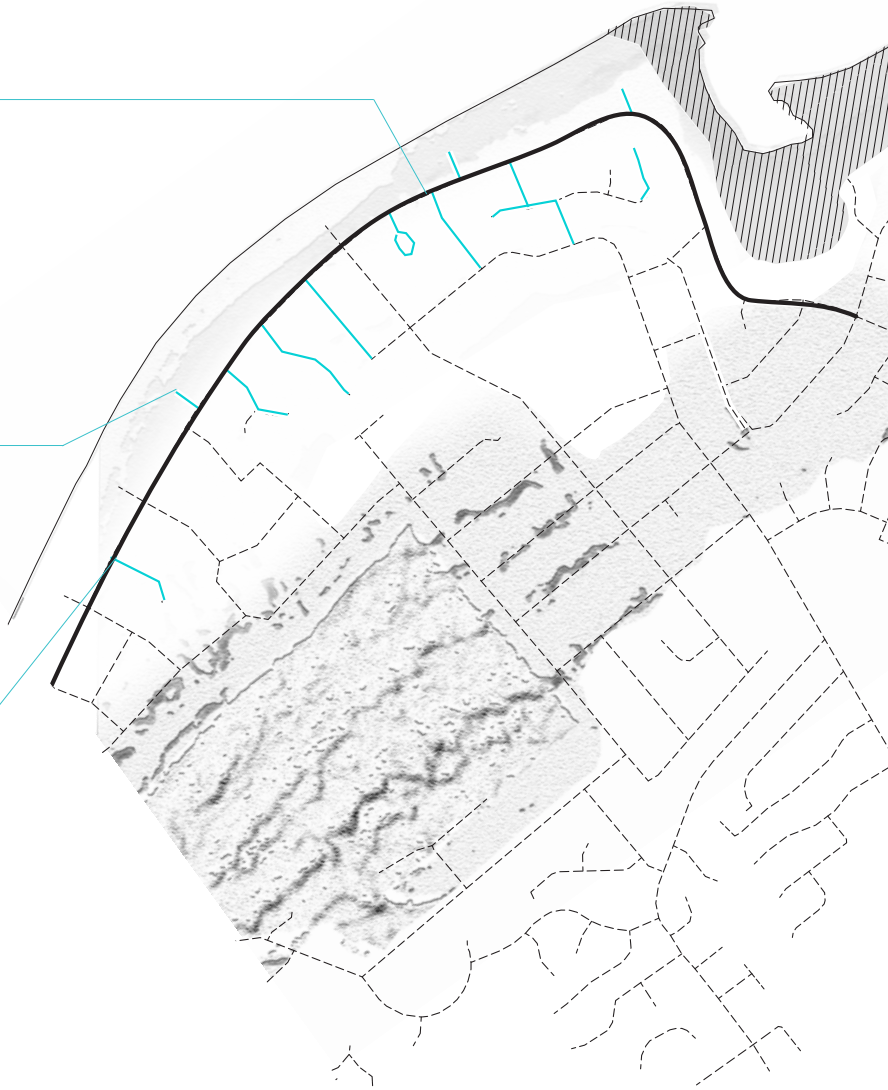
One of the design moves was about establishing new road links that crossed perpendicular from the coast connecting onwards to the back dune system. While creating new permeability to the beachfront, because the roads were contained within a boundary between coast and back dune, they enviably shortened. These shorter road systems create more intimate street neighbourhood scenarios as they contain the length of the street within this small (roughly 500m) boundary. Clear boundaries can very often enhance the functional and social interaction, sense of community and identity within those boundaries (Carmona 45). However, as the boundary is defined only visually by the terrain it does not become a barrier which is what happens gated communities. This means people can have both the intimate social connection within their neighbourhood network while also leaving room for flexibility and not promoting segregation between

Fig 4.19. Diagram showing the current alignment parallel of streets.

Fig 4.20. The proposed street alignment with new







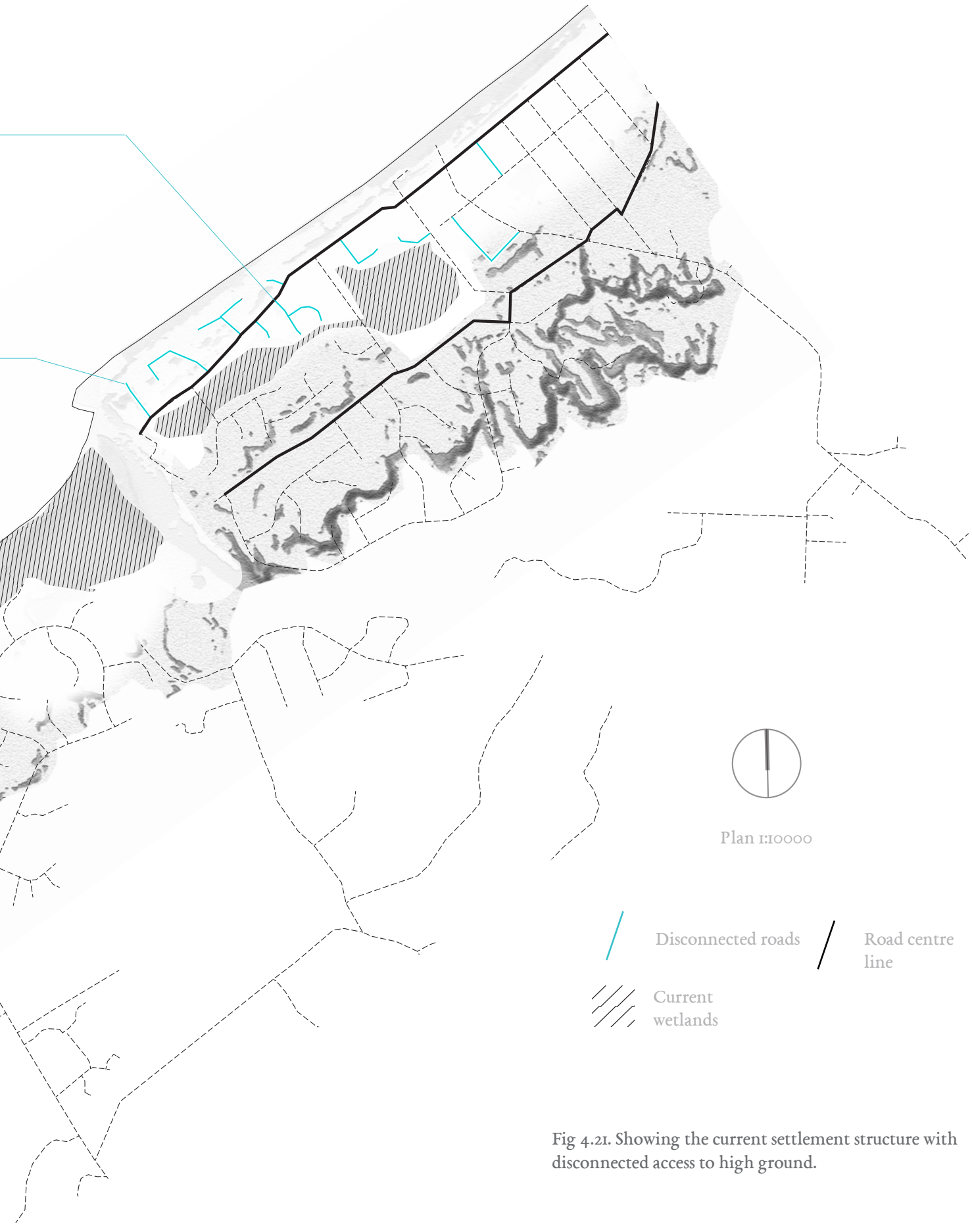
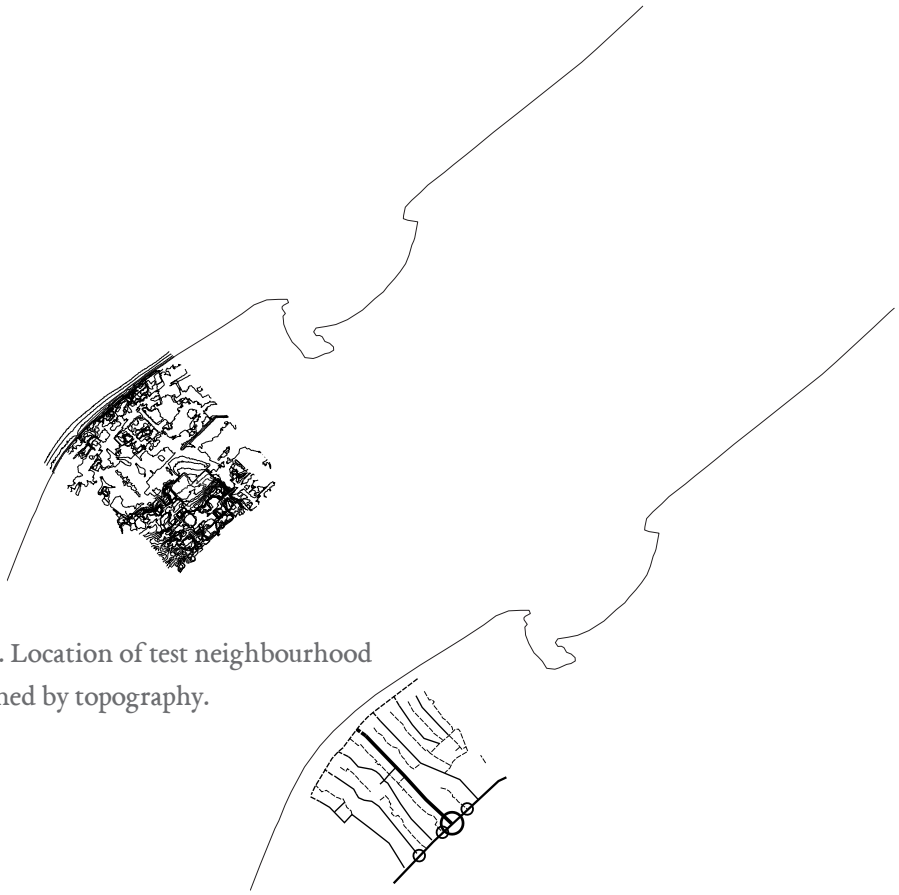


Fig 4.21. Showing the current settlement structure with disconnected access to high ground.



4.22. Location of test neighbourhood defined by topography.

4.23. Location of test neighbourhood defined by road hierarchy.

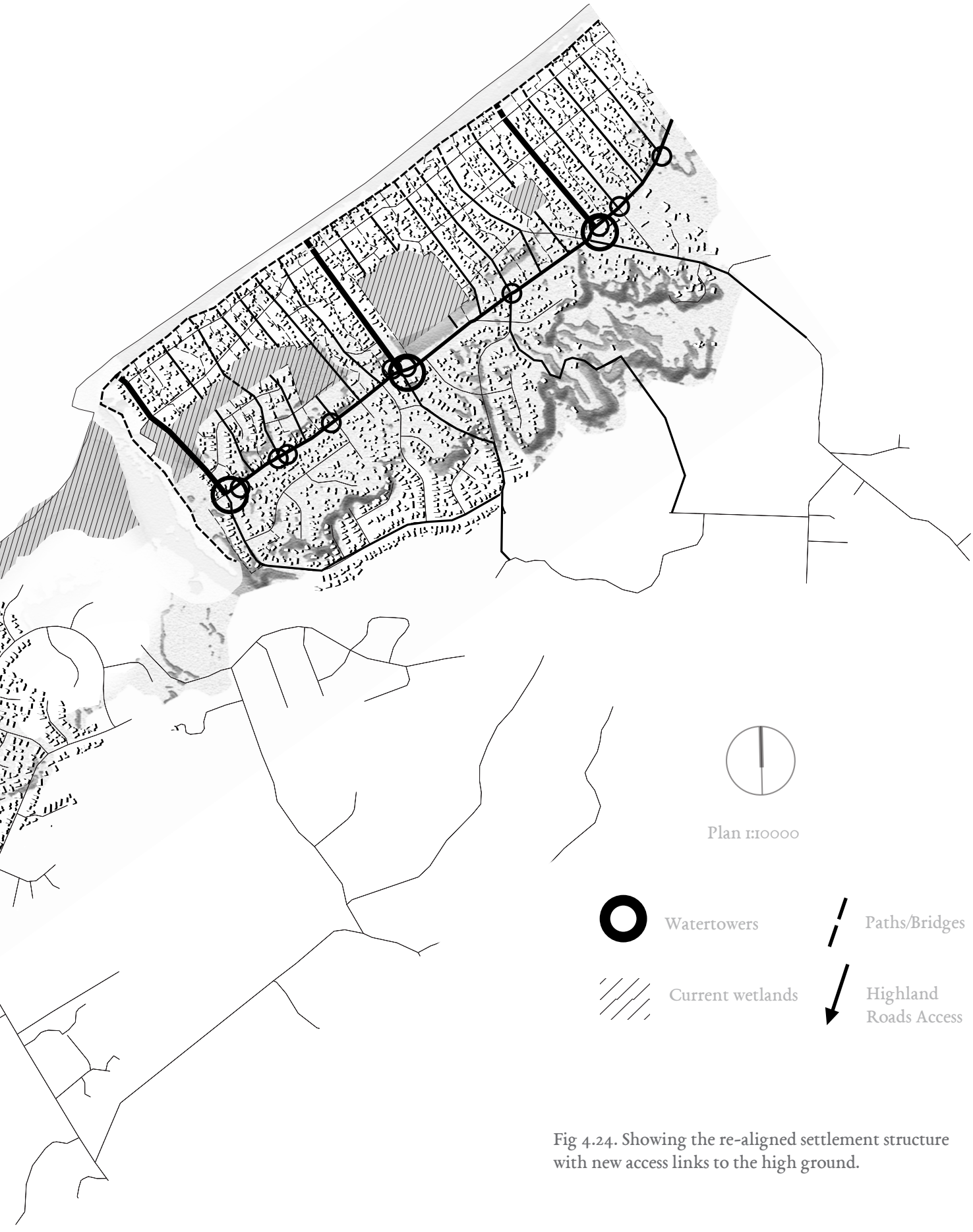


Fig 4.24. Showing the re-aligned settlement structure with new access links to the high ground.

4.3. Neighbourhood Structures within the Urban Form

Key neighbourhood planning devices informed the everyday and emergency functioning of the new settlement alignment. Simple planning methods were collated in the research process and adapted to suit of communities needs in an emergency scenario. This section of the design process will describe each planning method, its role in the neighbourhood planning of the settlement as well as its emergency use.

Figures 4.25. to 4.27. demonstrate how when key community facilities are re-structured they can become a place of retreat and act as key assembly points for coastal residents during emergency events.

Figures 4.28. to 4.31. (opposite page), outline key neighbourhood structures within the unit and their subsequent emergency functions.

Fig 4.25. New community facilities added along the first line of retreat from the coast.

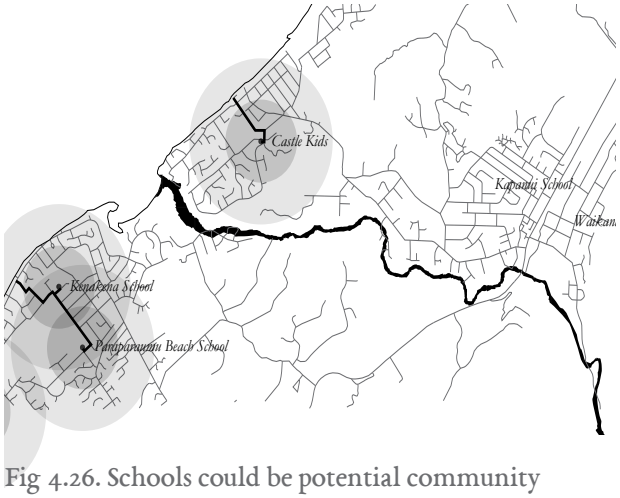


Fig 4.26. Schools could be potential community facilities and assembly points.

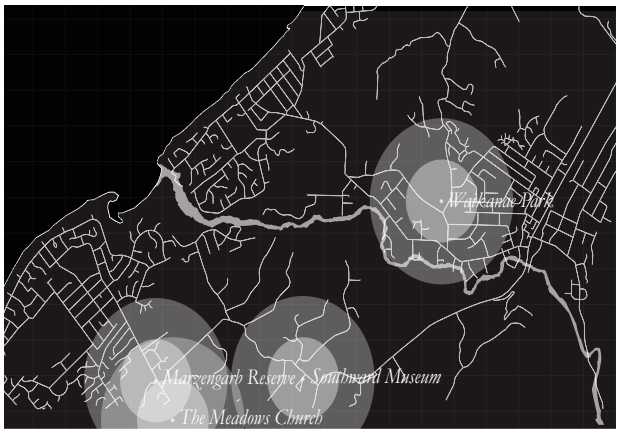


Fig 4.27. Current KCDC community facilities and assembly points.

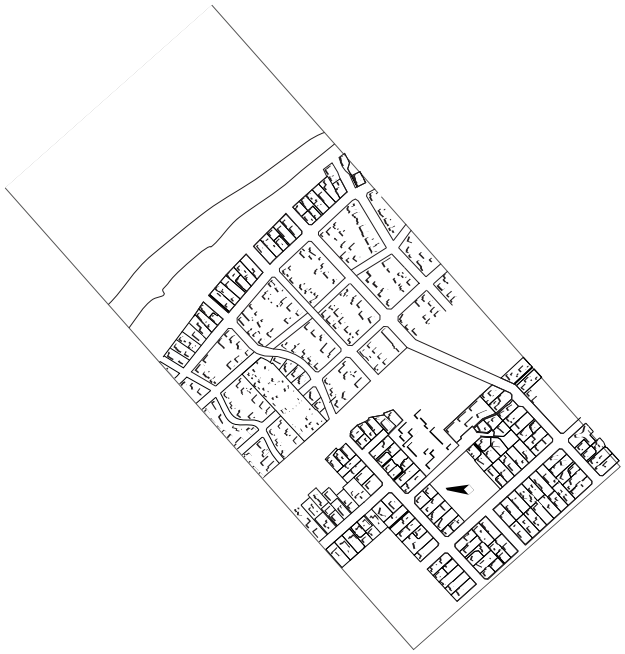


Fig 4.28. Building footprints.

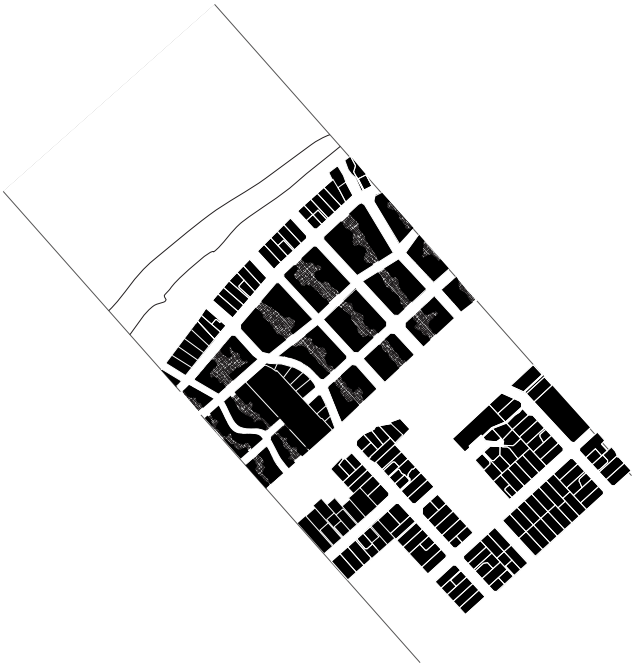


Fig 4.29. Public / private / semi-public land.

Neighbourhood function: Semi-public land is where more intimate neighbourly activities take place.
Emergency function: Semi-public land becomes sacrificial to flood waters and the public lands of streets and parks become core sites to assist residents in emergency.

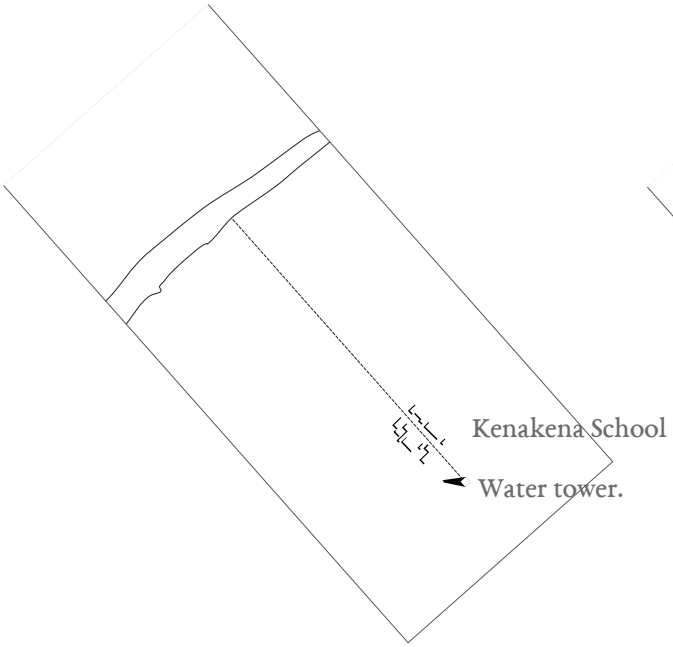


Fig 4.30. 5min walking distance
from coast to water tower.

Neighbourhood function: 5min walking radius promotes everyday access to community facility.
Emergency function: 5min walking radius becomes a quick access to assembly point in an emergency.

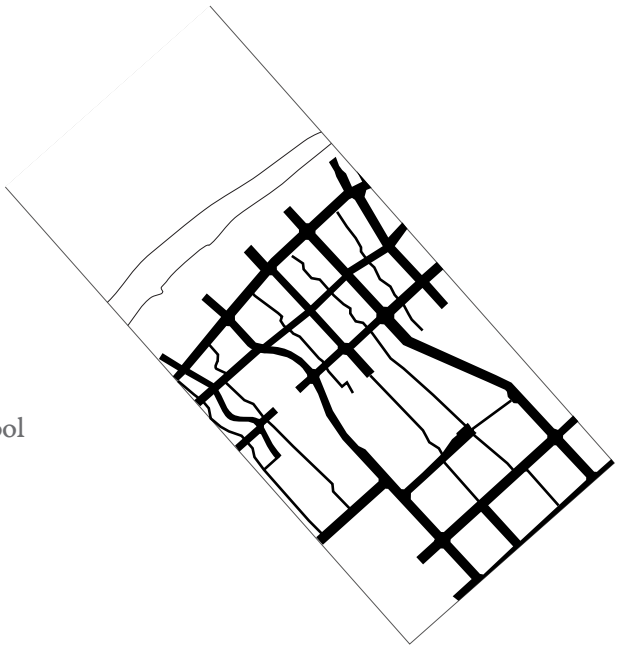


Fig 4.31. Street network allowing greater movement between coast and backdune system.

Neighbourhood function: Perpendicular streets bounded by backdunes, making them shorter and more social.
Emergency function: Streets promote connectivity quick access up to high ground in an emergency.

4.4. Landscape Structures within the Urban Form

In re-introducing and working with the existing dune and wetland systems this informs the placement of crucial flooding infrastructure, settlement moves, and the location of emergency assembly areas. This section of the design process describes each landscape element, its role in the ecological structure of the site as well as its emergency function.

Figures 4.32 to 4.34 demonstrate how the dune and wetand structures drive the subsequent placement of the dunetop parks.

Figure 4.35 to 4.38 (opposite page), outline landscape structures within the neighbourhood and their subsequent emergency functions.

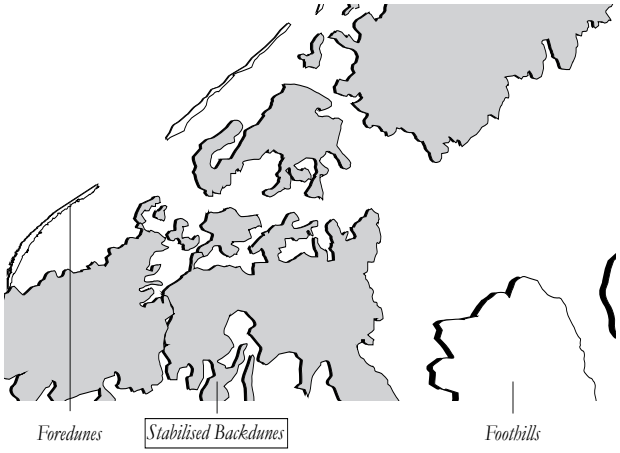


Fig 4.32. Safe ground for locations of dunetop parks. The stabilised backdune system is their ideal location.

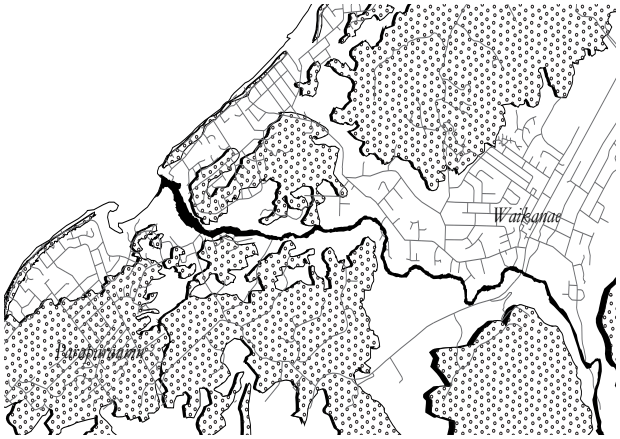


Fig 4.33. High ground locations on site (12m and above from sea level).

Fig 4.34. 1-100 level flood plain.

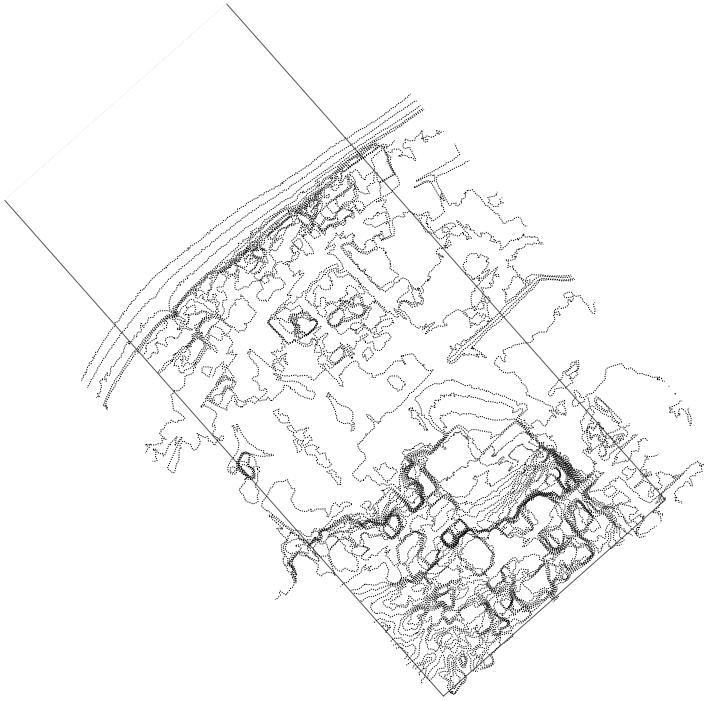


Fig 4.35. 0.5m contours.

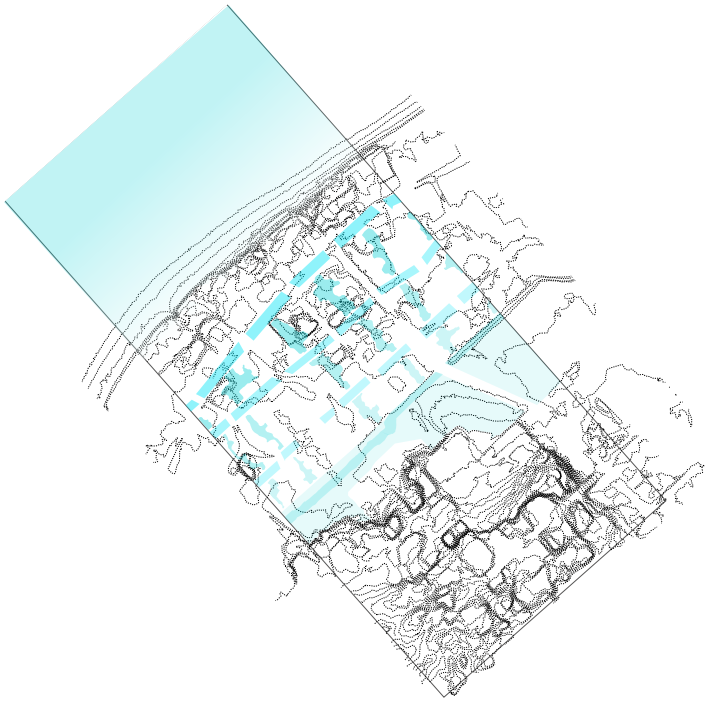


Fig 4.36. Water systems.

Landscape function: The water systems include river, swale and wetlands systems adapted to work within the re-aligned settlement.
Emergency function: The water systems allow for extra

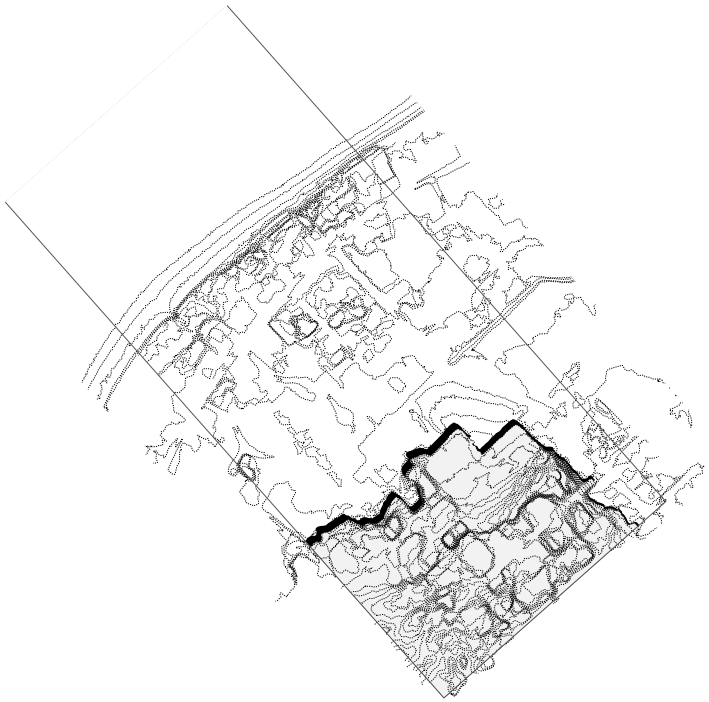


Fig 4.37.

Landscape function: The stabilised backdune system.
Emergency function: The backdunes form high enough above the floodable land and tsunami levels to inform the placement of assembly areas.

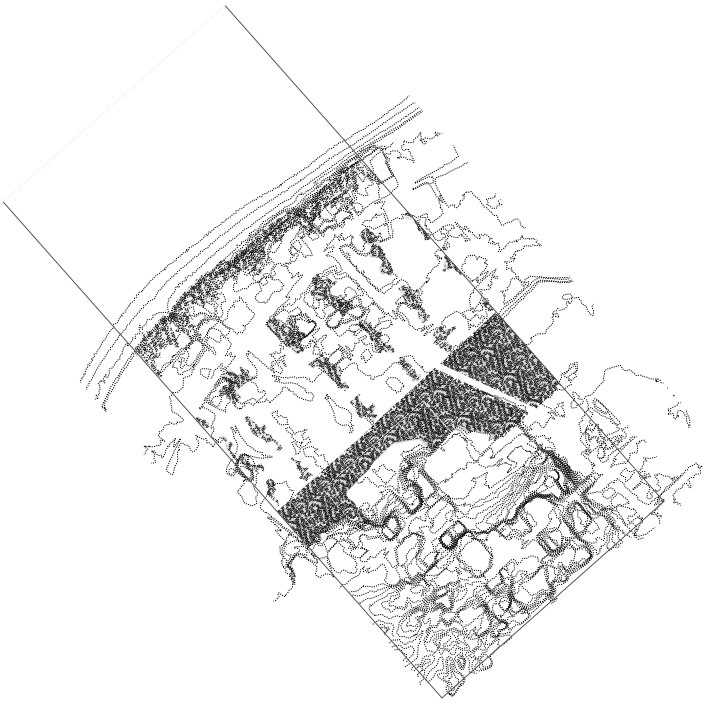


Fig 4.38. Key wetland structures.

Landscape function: Wetland and swale systems.
Emergency function: These strcutures become sacrificial in an emergency scenario, holding the storm waters.

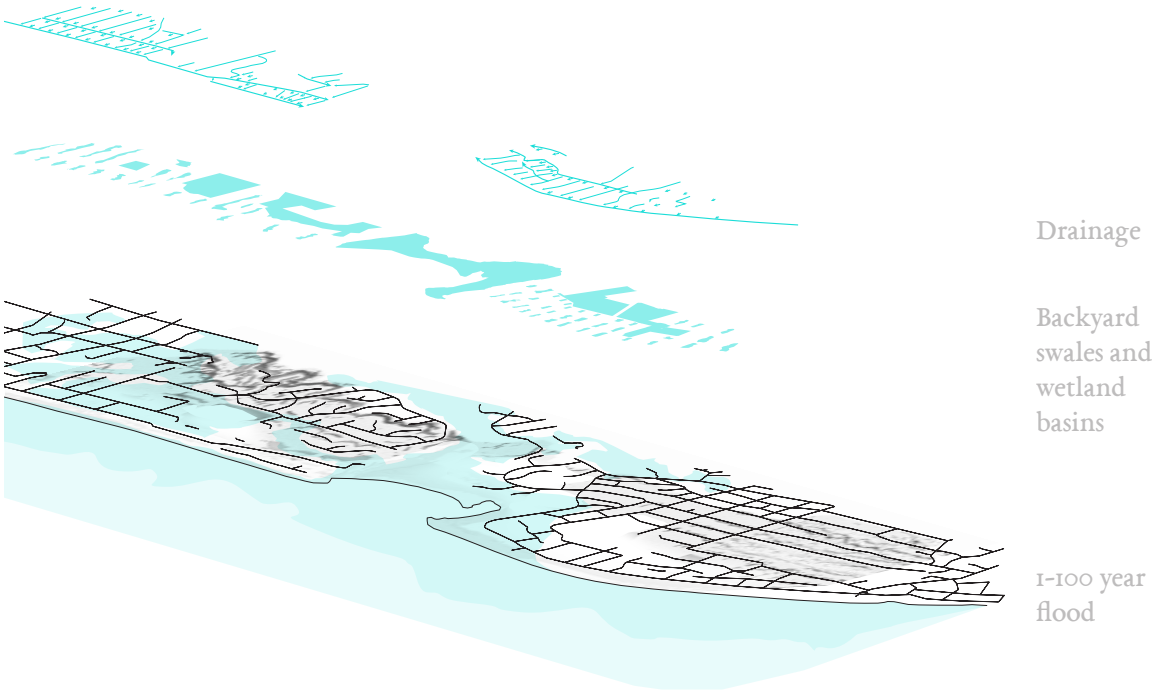
4.5. Flood Management Strategy

As the design response looks at flooding as the key driver for every design move further detailed components of the flood strategy will be communicated throughout the research. This design description simply seeks to give an overall picture of the flood strategy and what landscape structures influence its form.

The flooding strategy works with the existing settlement pattern by implementing a series of basins in publicly created land. These basins vary in size from the back yard swale systems to the larger wetland land basins in Te Atiawa Park. The purpose of the basin network is that they will be able to hold water in the event of both regular and major flood events. All the basins are designed to be permanently wet to support species habitats as well as an attempt to re-establish the former wetland ecology that was once a significant part of the Waikanae and Paraparaumu coast.

The street network will also function as an important component of the flood strategy. Streets running perpendicular to the coast will be raised up above the floodplain and will provide easy access to safe high ground. While the streets running parallel to the coast will perform as storm water holders allowing the excess water to slowly drain back into the Waikanae River.

The particular configuration of the flooding system pays respect to the original dune system where wet and dry land supported coastal ecologies. Although swale systems in between dunes usually run along the entire dune depression fig. 4.41 & 4.42 in the case of this settlement the design to break up their structures as the only land free was in the backyards among the housing blocks. Therefore instead of just replicating the entire dune ecology the flooding system needed to adapt to the existing settlement structure.



Swale, Basin and Drainage Network

Fig 4.39. Axonometric of swale, basin and drainage network applied to site in a 1-100 year flood scenario.

Dune structures
inform the
flooding strategy

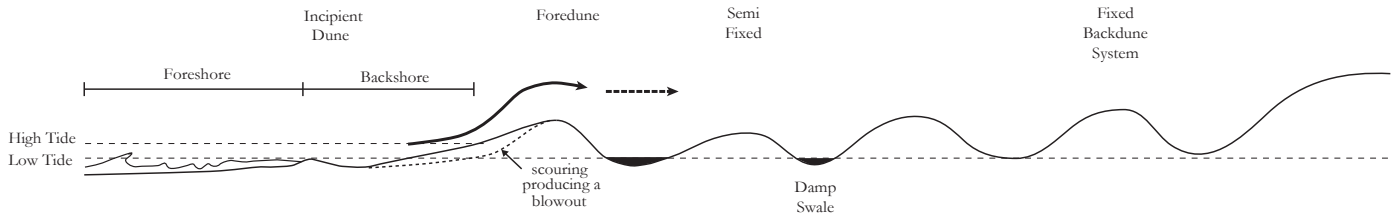


Fig 4.40. Dune system in section.

Fig 4.41. Successional diagram of a dune system.

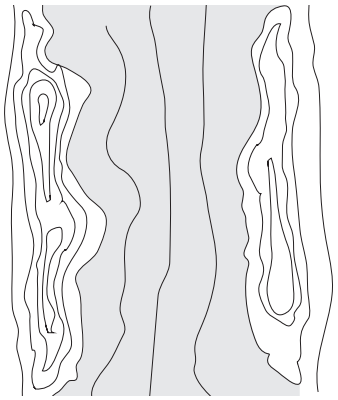


Fig 4.42. Schematic plan of dune swale.

Fig 4.43. Successional diagram of a dune system altered to work with flooding strategy.

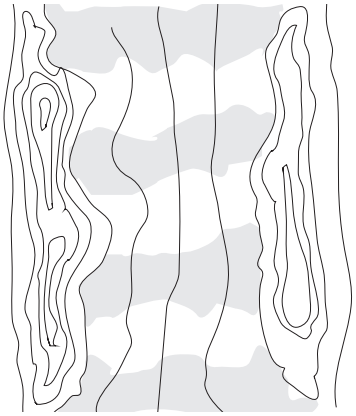
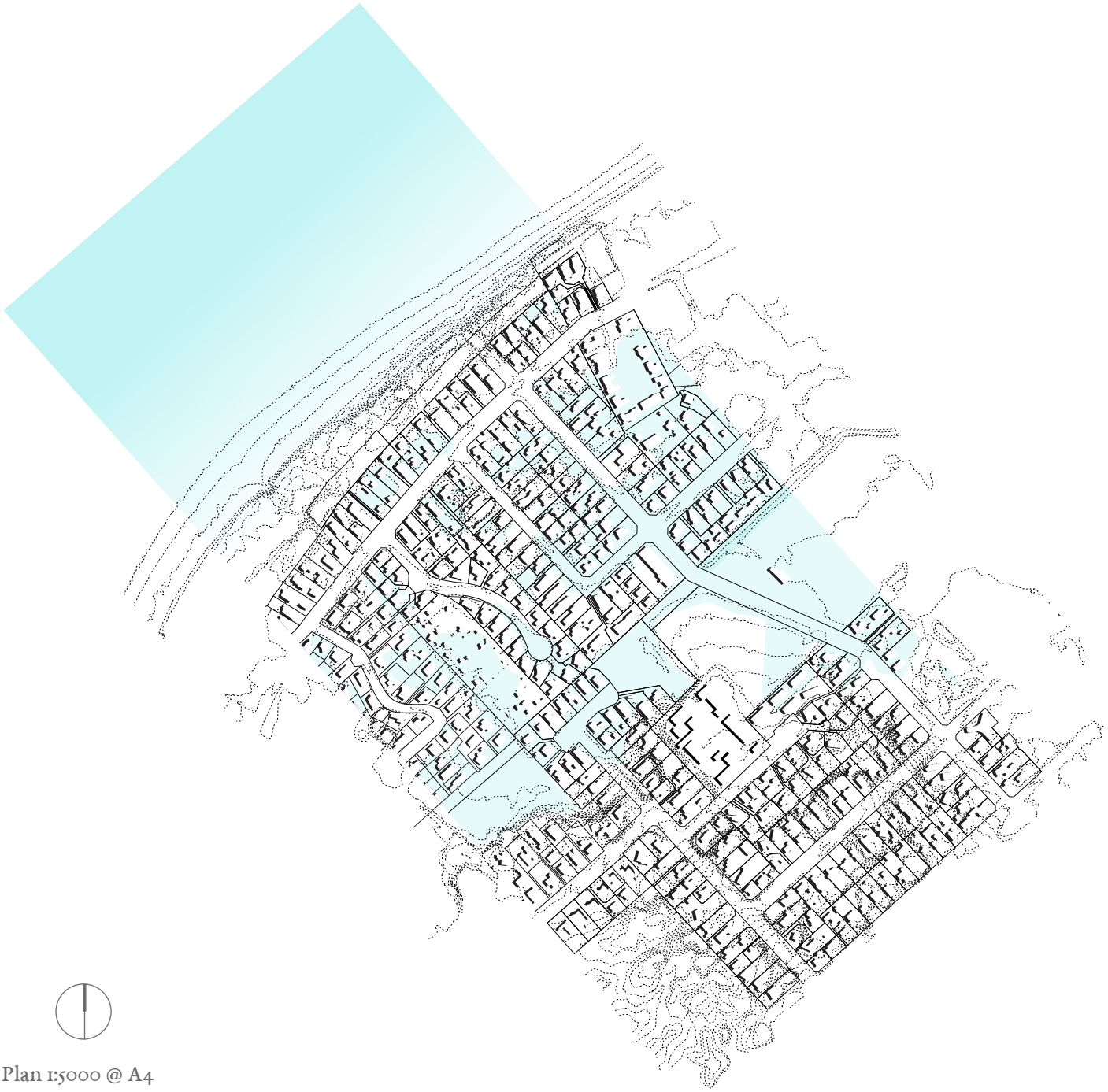
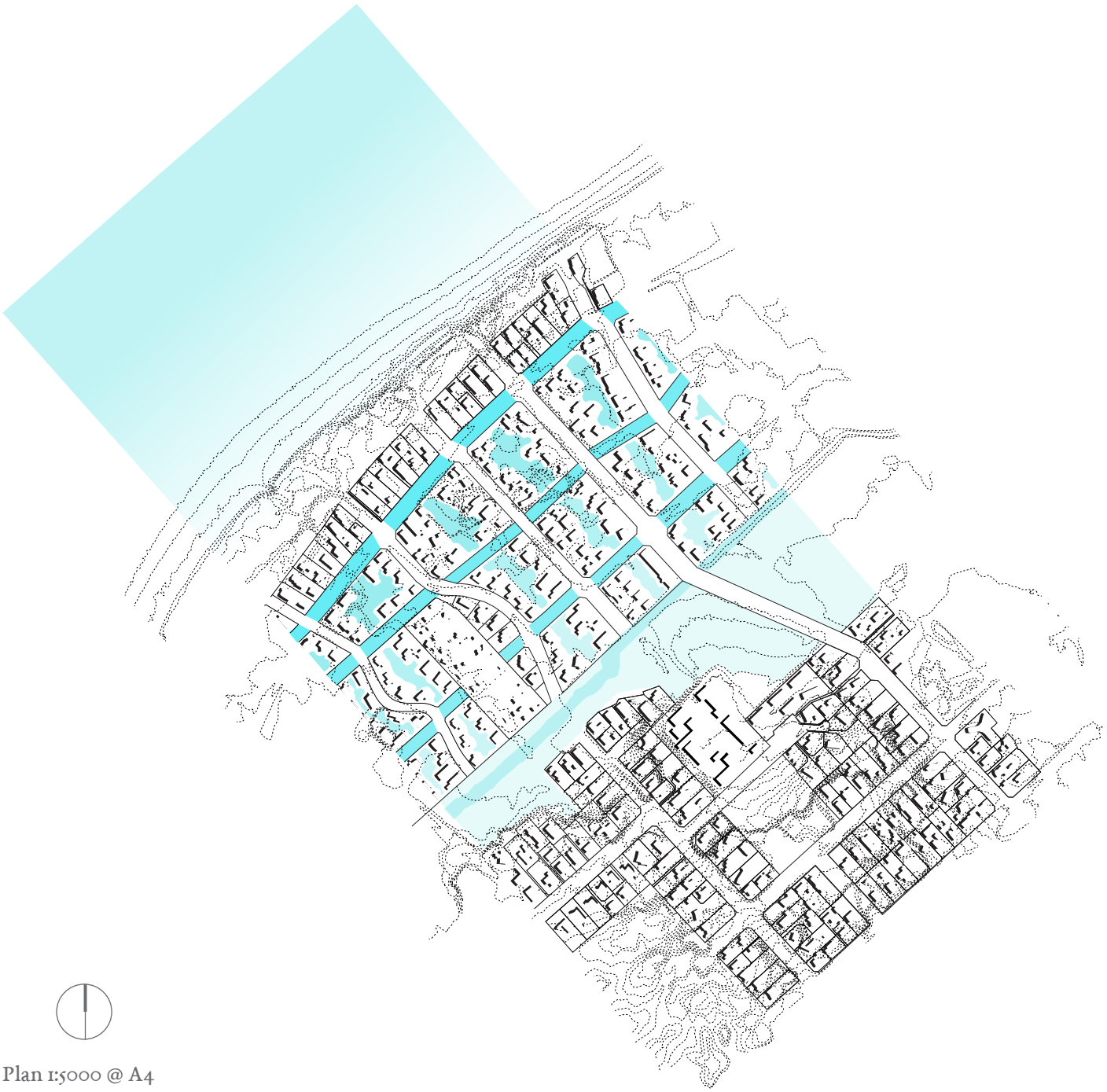


Fig 4.44. Schematic plan of dune swale. altered to work with flooding strategy.



Plan 1:5000 @ A4

Fig 4.45. Neighbourhood unit in a 1-100 flood before flood management.



Plan 1:5000 @ A4

Fig 4.46. Neighbourhood unit in a 1-100 flood after flood management.

4.6. Phasing Strategy

The premise for the phasing component of the design is to sequentially re-orientate the existing settlement pattern. The anticipation is that in slowly and incrementally changing coastal settlement residents will eventually acclimatise to the certain likelihood of increased coastal hazards. As future predictions of sea levels can be uncertain the scheme proposes that individual interventions will only be phased into the settlement when key thresholds of sea level rise have been reached. This suggests that the interventions may not need to happen at all – only when sea levels rise.

The first intervention at the 200 mm sea level rise mark will require implementing the water tower parks (fig 4.48). These are the smallest interventions in terms of how much land they require so will not dramatically interfere with private residencies. Yet, because of their stature and placement on the highest point of the dunes the water towers intend to be the most visually symbolic. Simply having a safe haven to retreat to in a crisis is an important public space to a neighbourhood which is why the parks will be the first to be placed.

The second intervention at the 400 mm sea level rise mark will involve re-aligning the road structure (fig 4.49). This will be slightly more disruptive as some 40 private residences will need to be moved. Still as with all the interventions the design proposes to shift as little private residencies as possible – for example in order for some streets to be connected to the high ground only one house is required to be moved.

The final and the most contentious intervention is installation of the storm water infrastructure which will be implemented at the 600 mm sea level rise mark. This intervention will require about 150 private residences to be moved and the intervention will result in a very different way of living for residents residing in the hazardous flood plain.

Take note that as each of these interventions are introduced urban densification processes will begin to occur on the safe land on the backdune system reinforcing the urban form. And overall, although the land will need to be negotiated from private land owners and compensation established - the idea is that these moves will become an alternative to councils investing in costly sea walls and hard engineering to "solve" the flood problem. Coastal developments need to re-evaluate where certain land uses take place and not continue down the same path.

Fig 4.47. Original cadastral plan.

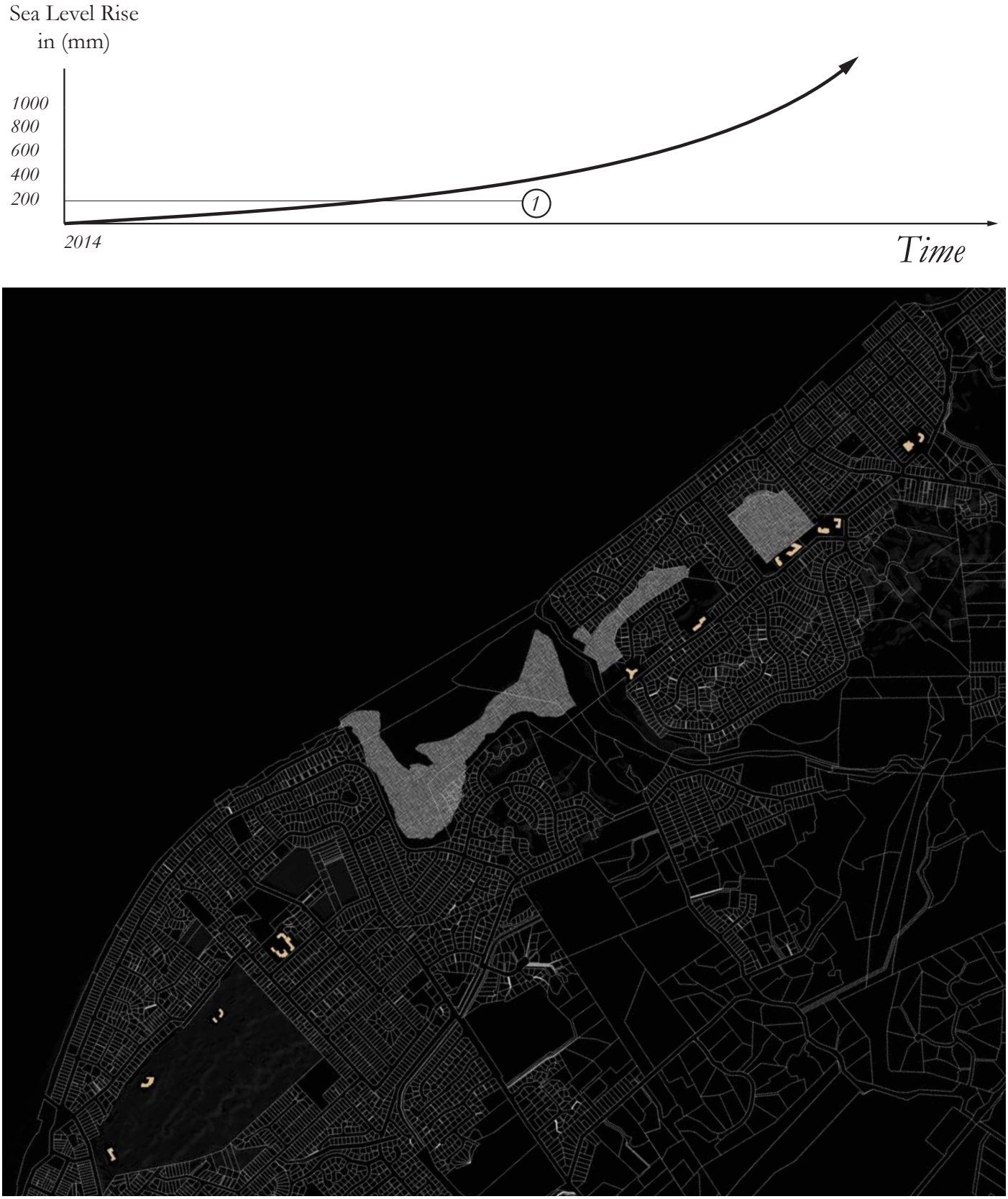


Fig 4.48. Introduction of water towers and dunetop parks.

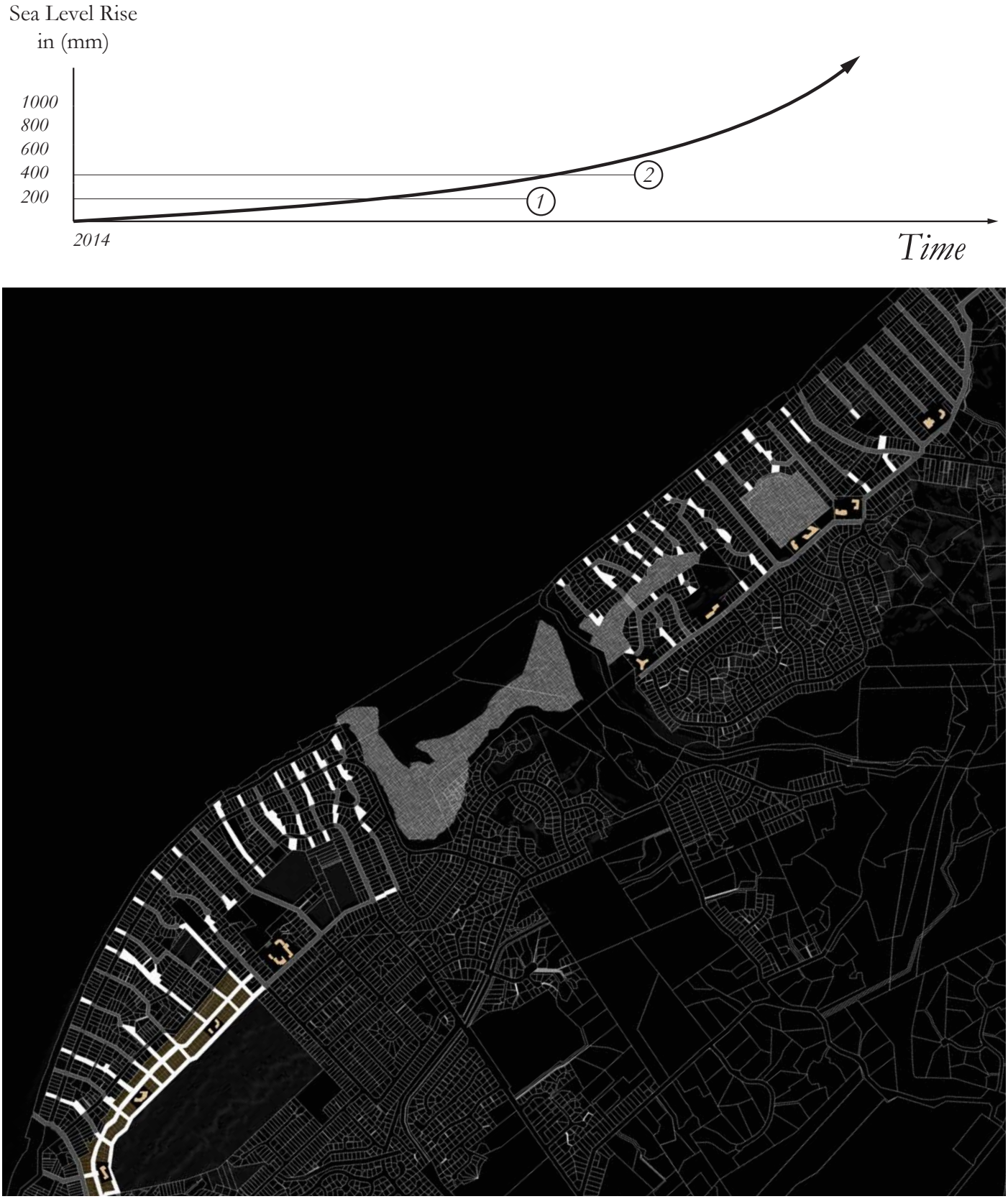


Fig 4.49. New road connections to the first line of the backdune system.

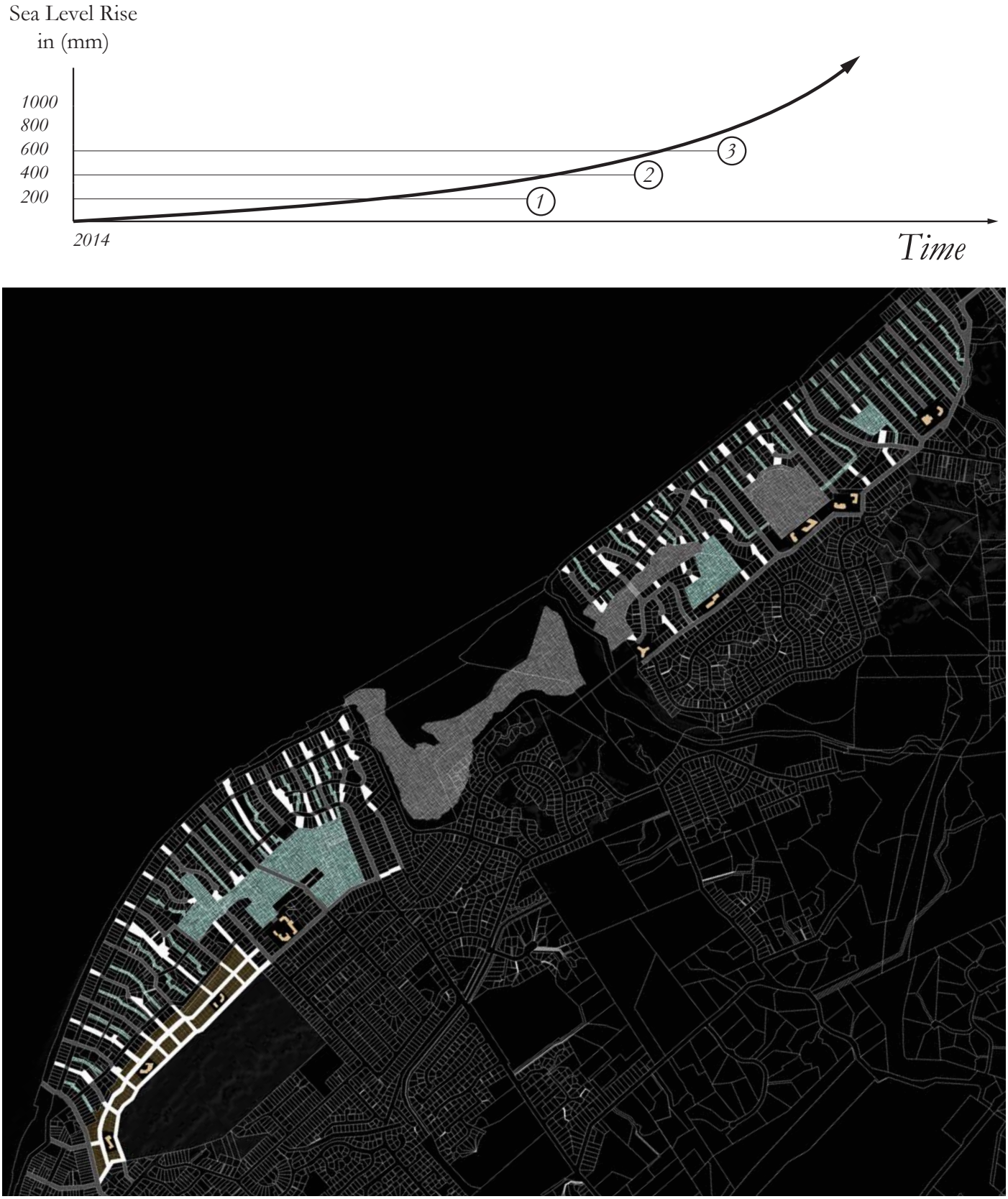
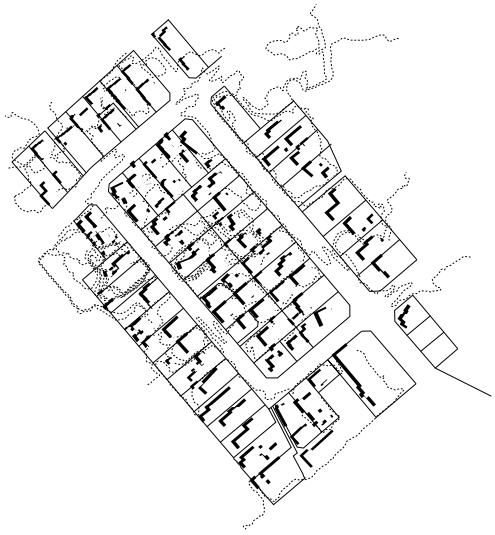
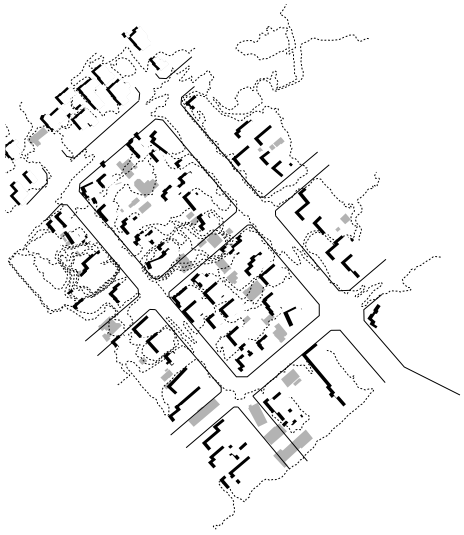


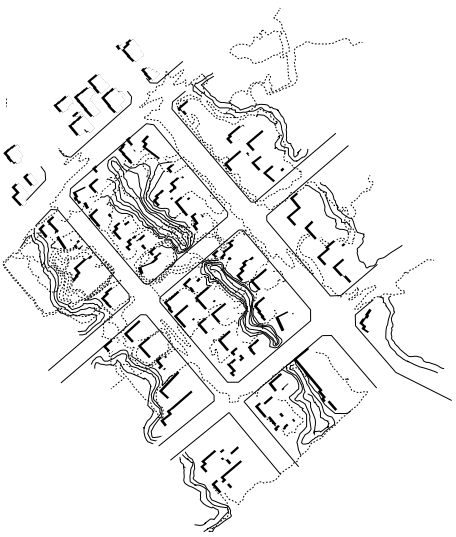
Fig 4.50. Storm water systems introduced.



Original cadastral boundaries.



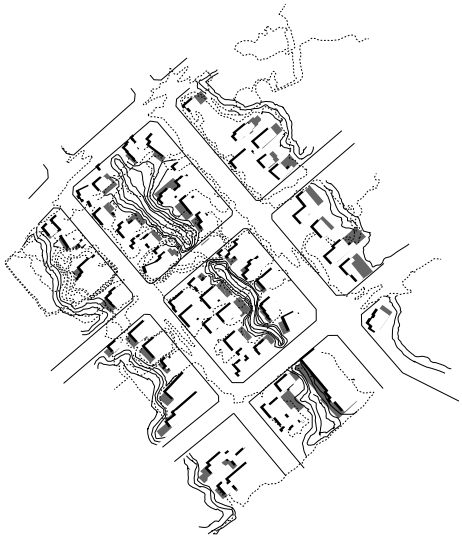
1. Sheds and cadastral altered with new road connections.



2. Block re-contoured.

3. Deck thresholds established.

4. Foredune housing removed.



New cadastral boundaries.

Fig 4.51. Example of how the phasing works on a detailed level. Phasing is tested in the development of the backdune swales (further elaborated in the "urban components chapter").

5.0
The Urban Components

Introduction

This section of the thesis intends to describe of the key urban components that make up an individual neighbourhood parcel. The description of the components will follow the order of the most publicly perceived of the neighbourhood spaces down to the most private – i.e. from the park, to the street to the backyard. Respectively, this is also the order in which the components intend to be phased into the present settlement to create the re-aligned urban structure.

As with the overall design strategy, each urban component will play its role in both the emergency and everyday neighbourhood and landscape functioning of the settlement. Each of these functions will be described in detail and communicated through small spatial shifts of the existing urban fabric. Please note, as this is landscape architectural research, this section will not include the detailed design of building structures but instead the spaces around these structures. The buildings will be considered, but only as a device to define the volume and quality of the designed space.

The Precedents

To inform the subsequent spatial structure of each urban component the research has looked into specific examples of how certain small public spaces induce neighbourly scenarios. These examples were later applied to the site and re-interpreted in light of flooding and emergency situations. Drawing these precedents in detail lead to the recognition of how small shifts in the proportion, topography and quality of the open space could allow for very different neighbourhood experiences and functions in emergencies.

5.1. The Dunetop Parks

5.1.1. Precedent: Newer Orleans/ MVRDV

Ever since Hurricane Katrina hit, designers all over the world have been rushing to present concepts for rebuilding the city. Remarkably though, the conversation has largely remained focused on what to rebuild – avoiding the bigger questions of exactly how and why a city should rebuild in a floodplain at all. It is collectively known that Hurricane Katrina was a catastrophe waiting to happen, simply because of its alluvial setting. The city lies below sea-level in a landscape that was previously swampland, bounded by water on all sides. Surely the only suitable proposals are ones that offer an answer to deal with the irrefutable possibility of the city becoming inundated once again?

MVRDV is embracing this inevitability in their design of a school by creating an artificial hill for it to be sited upon. They wanted, "A school that can serve as a public hill, from where everyone can look over the neighbourhood, the city, the landscape. A clear haven. Where children play. With benches and swings in the trees...(Fehrenbacher) ". The design is not only a hill but a structure with buildings and public spaces built within it. All the inhabitable spaces are located above flood levels and are constructed to be secure in an emergency.

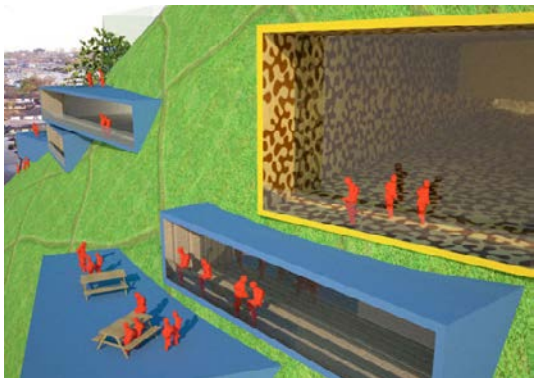


Fig 5.1. to 5.3. (top to bottom). Perspectives of the artificial hill with the school embedded into its form.

Fig 5.4. Aerial view of MVRDV's artificial hill in a flood scenario.

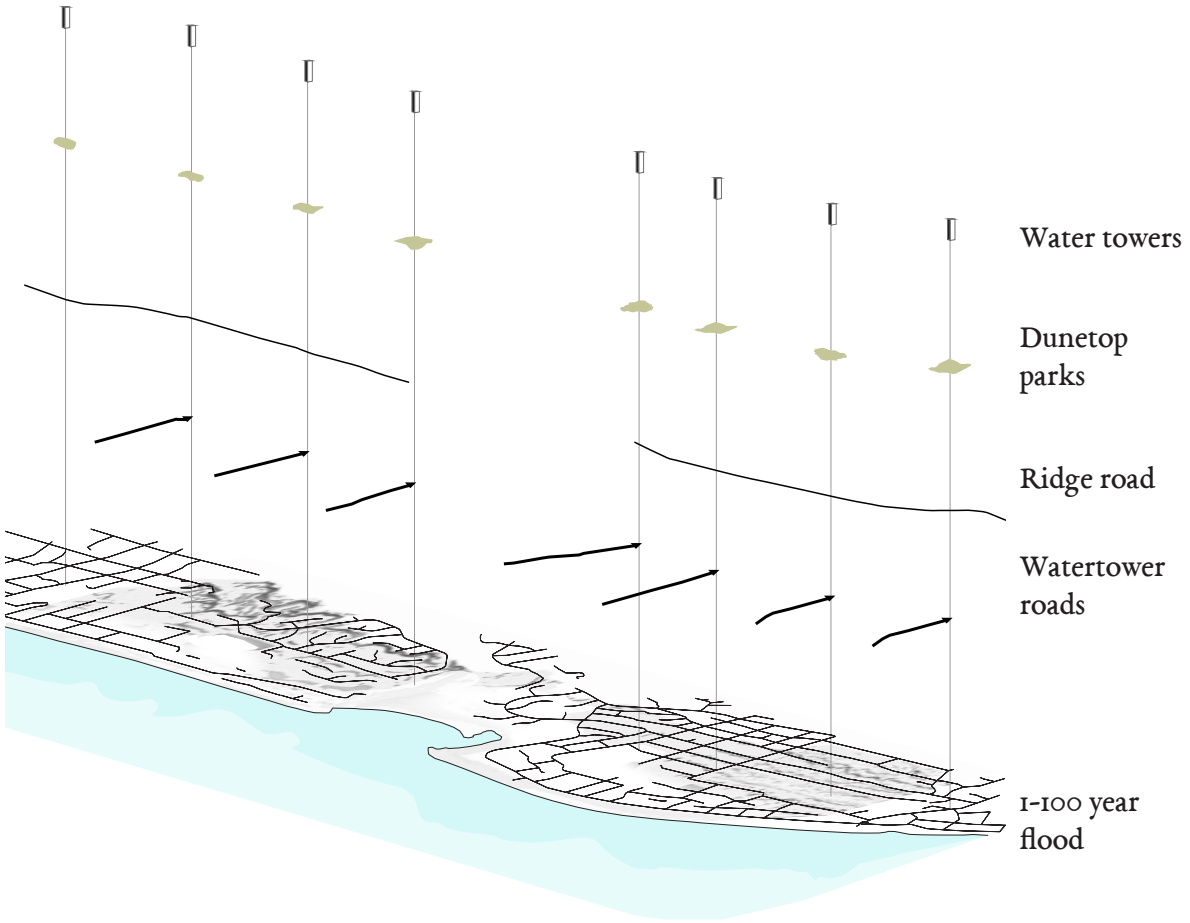
5.1.2 Application to Site and Potential Emergency Function

Traditionally in urban planning public parks are expected to reflect the size of their entire suburban catchment. This has to do with the disciplines preoccupation with efficiency and critical mass – where all public space functions of a catchment are crammed into the one large public space. But what if a public park did not have to function this way? Suppose that their size simply indicated each particular street neighbourhood and its legibility. The dune top parks adopt this role by creating about six slightly different parks distributed evenly along a connecting road found running laterally over the back dune system.

The parks individually come with their own water tower structure that are intended to define each neighbourhood while acting as a visual marker for the location of safe spaces in the settlement. The parks are envisioned to operate as an emergency assembly area if disaster strikes. They have each been carefully located more than 12m above the existing sea level, out of harm's way from both the fluctuating floodplain and the largest possible tsunami event ("Tsunami in New Zealand").

It is a high possibility that in a natural disaster the Kapiti's regional water supply network could become damaged. The water towers seek to supply each neighbourhood resident with enough emergency water supply for up to three days after an event happens – this time frame being specified by Wellington Regional Emergency Management Office ("Emergency Survival Items & Getaway Kit"). As these towers will be crucial elements of the region's water supply network, they expect to become key inserts into the Waikanae River Recharge Strategy (fig 5.6).

The Waikanae River Recharge Strategy takes advantage of the natural ground water storage of the Waimea aquifer. It pumps water from this water source into the Waikanae River downstream from the Waikanae Treatment Plant in times of low river flow. The benefit of this action is that valuable potable water will not be wasted in the effort of to resolve the river's low flow downstream. Therefore extra water (once treated) can be stored away in the water towers to serve as an emergency supply in times of drought or when the supply network has been damaged. This means in an emergency the residents of Waikanae and Paraparaumu can remain safe and self-sufficient until help comes their way.



The Dune Top Parks and Watertowers

Fig 5.5. Axonometric of dunetop parks and water tower network applied to site.

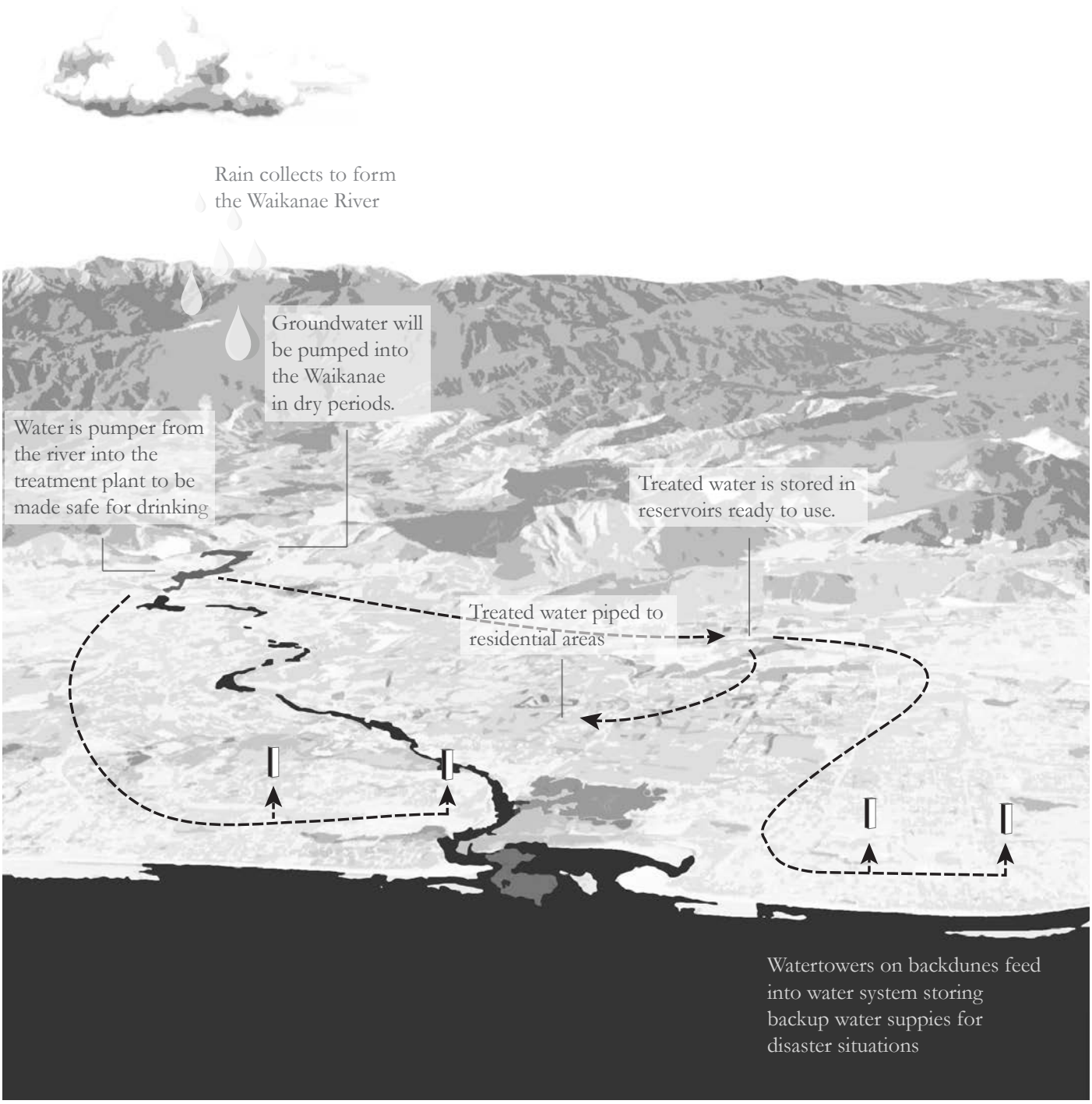


Fig 5.6. The water towers inserted into the Waikanae River Recharge Scheme.

Fig 5.7. Water tower precedents.

Neighbourhood 1

Neighbourhood 2

Neighbourhood 3

The individual dunetop parks where design has been further tested

Neighbourhood 4

Neighbourhood 5

Neighbourhood 6

Fig 5.8. Individual neighbourhood associations with water towers.

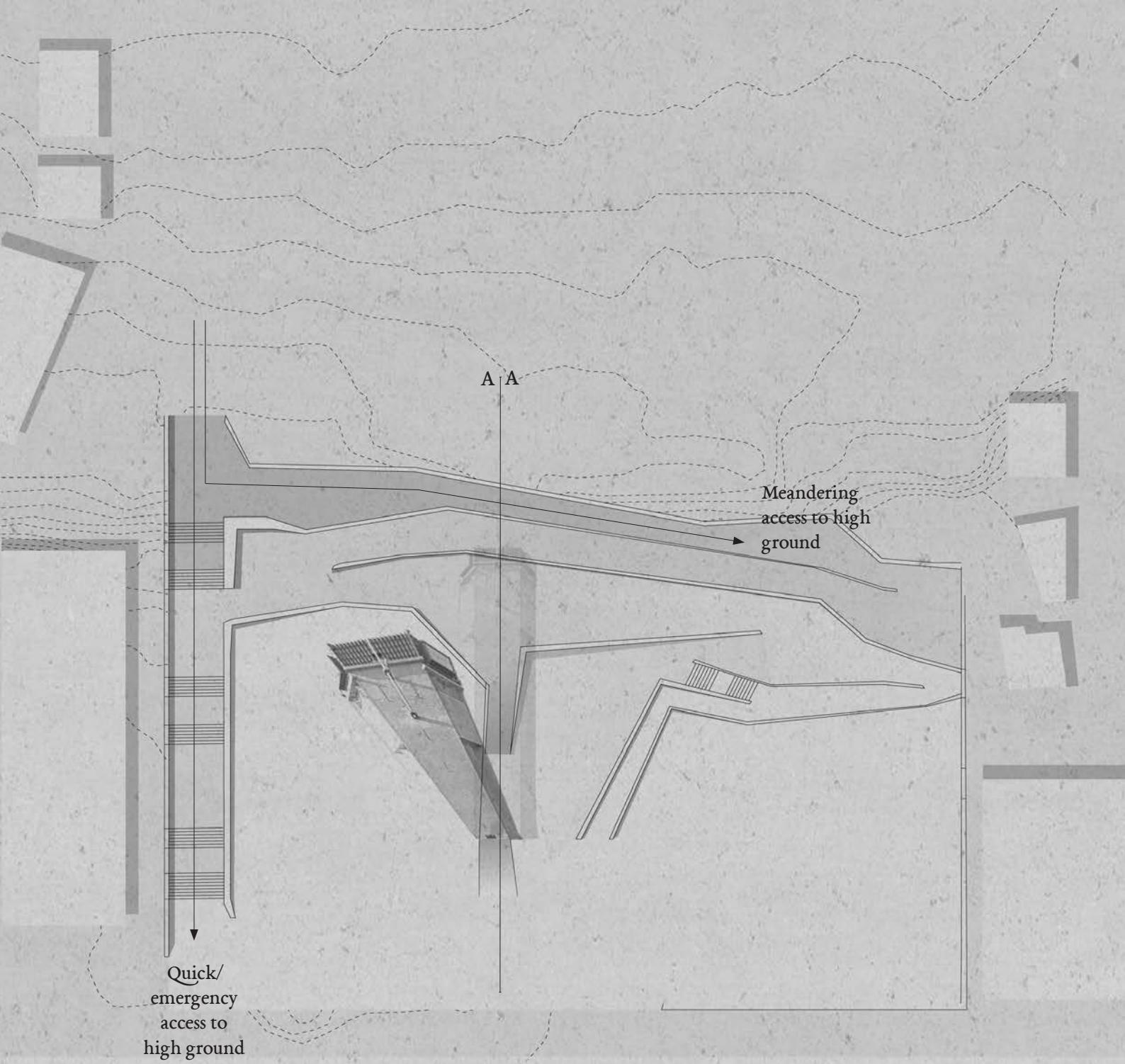


Fig 5.9. Water tower 2 and Dunetop Park 1-500 Plan

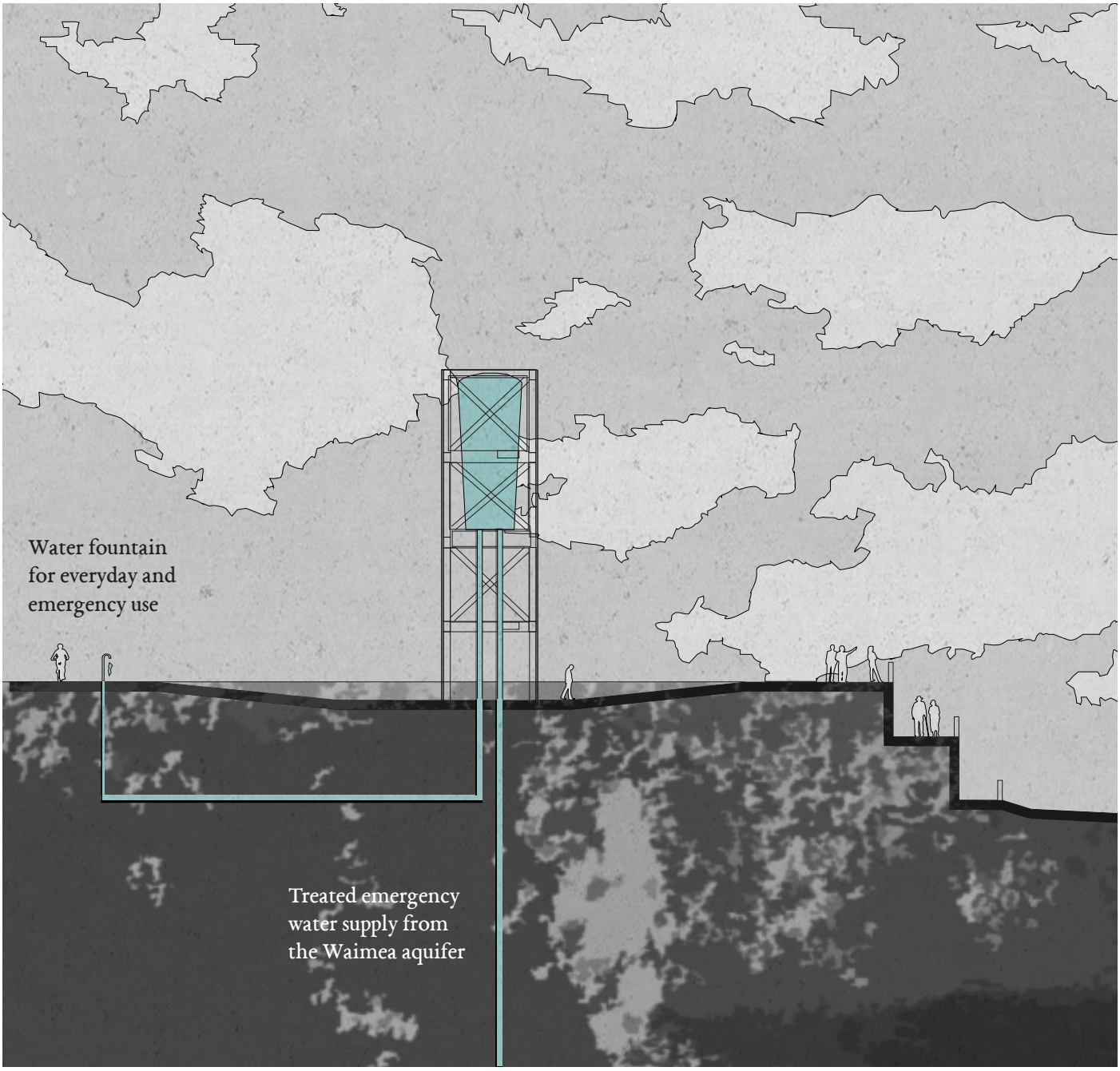


Fig 5.10. Section of Water tower 2 and Dunetop Park

Fig 5.11. Water tower 3 and Dunetop Park 1-500 Plan

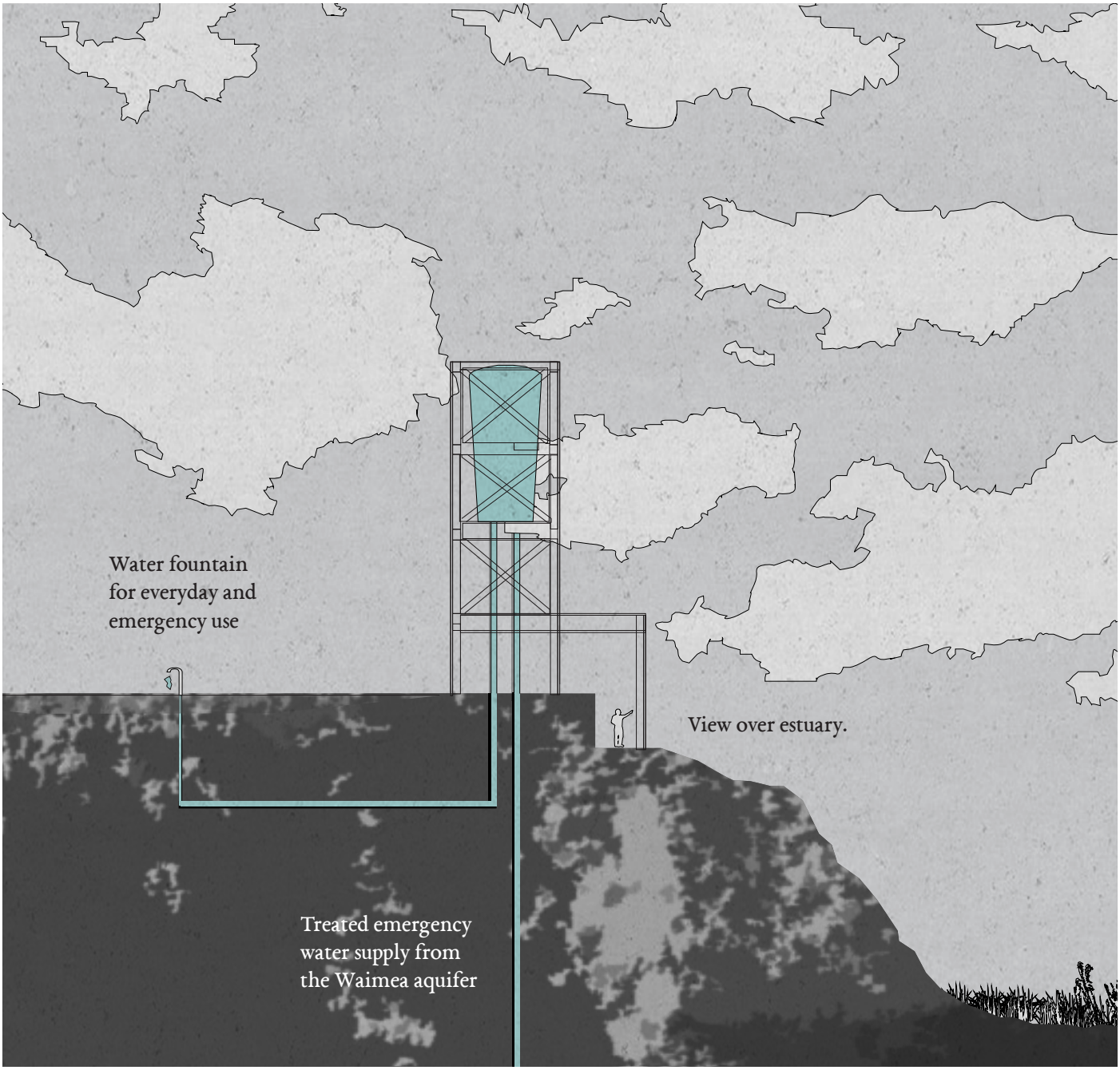


Fig 5.12. Section BB of Water tower 3 and Dunetop Park

Fig 5.13. Water tower 5 and Dunetop Park 1-500 Plan

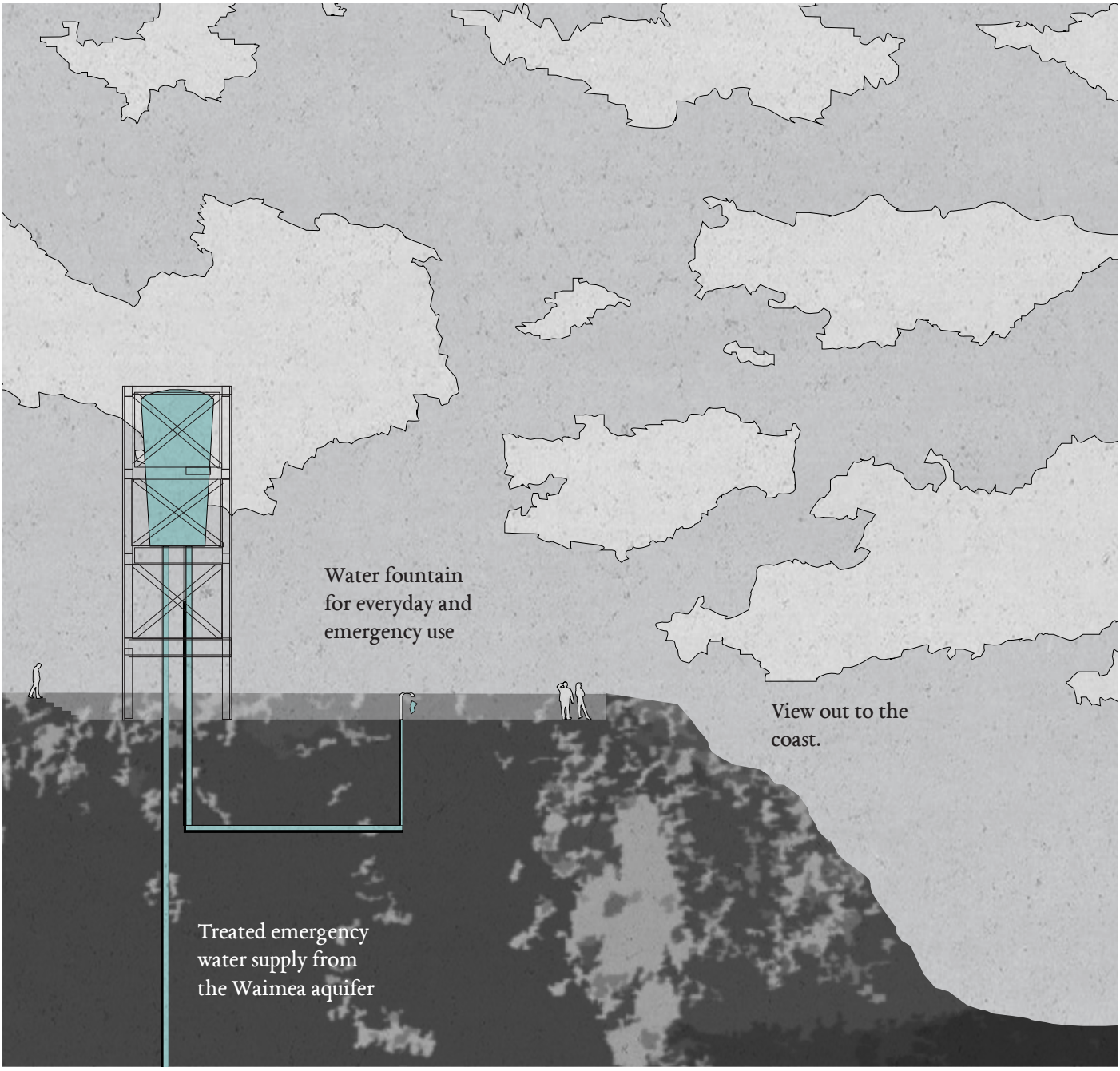


Fig 5.14. Section CC of Water tower 5 and Dunetop Park

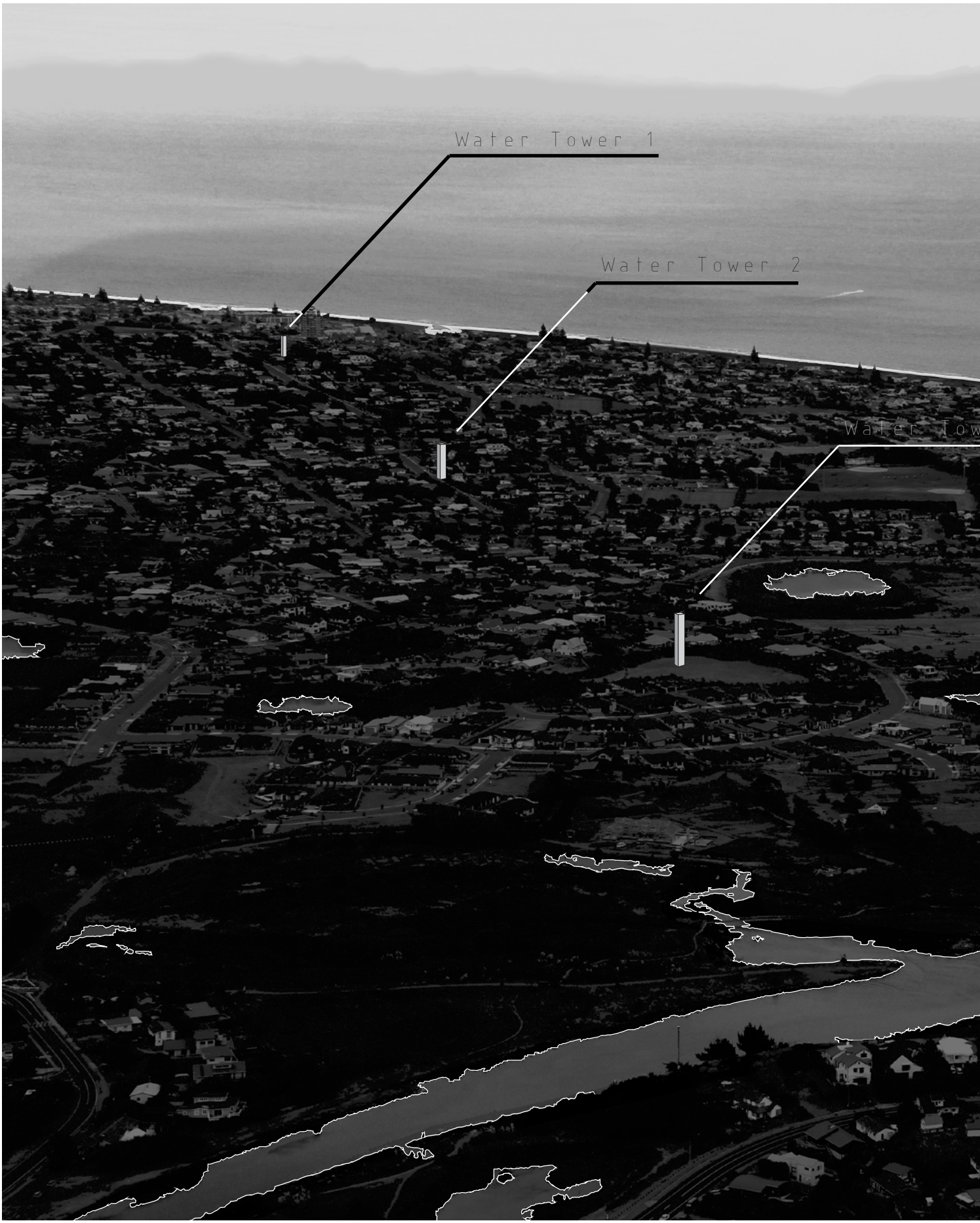

Water Tower 1
Water Tower 2
Water Tow

Fig 5.15. Aerial view of watertowers along the backdune system.

Fig 5.16. View of watertower 4 over the Waikanae Estary

Fig 5.17. Water tower 3 lit up in an emergency scenario.

5.2. The Duneslack Roads

5.2.1. Precedent: Studio Pacific Architecture Housing Project

In the first street example (fig 5.18), the narrowness of the laneway, the limited curb space as well the level ground plane allowed pedestrian walking routes and neighbourhood scenarios to occur predominantly in the street corridor. Essentially residents tended to exhibit behaviour which indicated their perceived ownership of their particular laneway where across-street walkability was easy and common. This instigated a condition in which neighbourliness could happen between each side of the street and the whole laneway could be owned by residents.

However along the key access route of the scheme a more "public" scenario was created in contrast to the intimate private streetscapes of the laneways. This was communicated through the widening of the street and sidewalk, the connectivity of the street to public beach access and the availability of on- street parking instead of garages. These small spatial moves resulted in a situation where very little on-street interactions took place. The street now operated purely functionally and the side-walk became the key pedestrian network to get people to and from their car, the beach or their private residence. Movement of both car and pedestrian became faster and very little lingering took place.

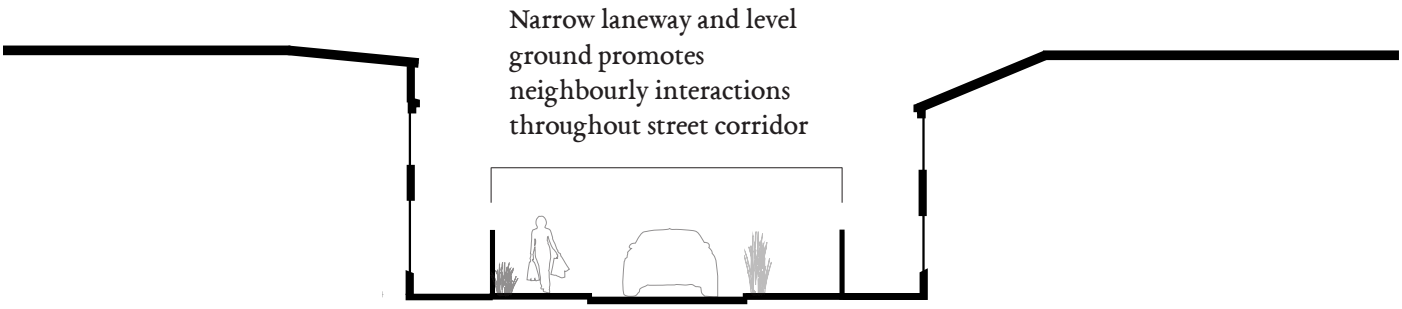


Fig 5.18. Laneway Section 1:200.

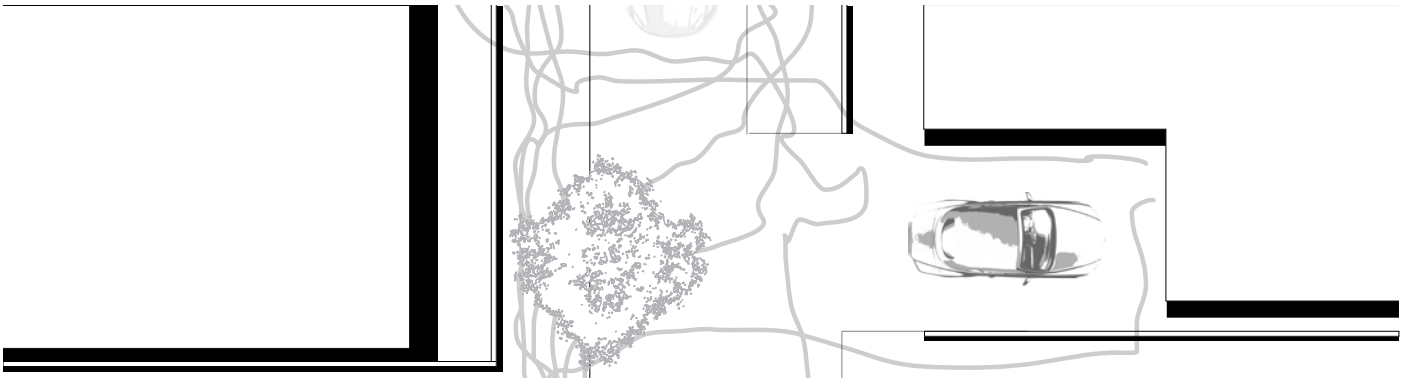


Fig 5.19. Laneway Plan 1:200 showing pedestrian walking routes and potential neighbourly interactions.

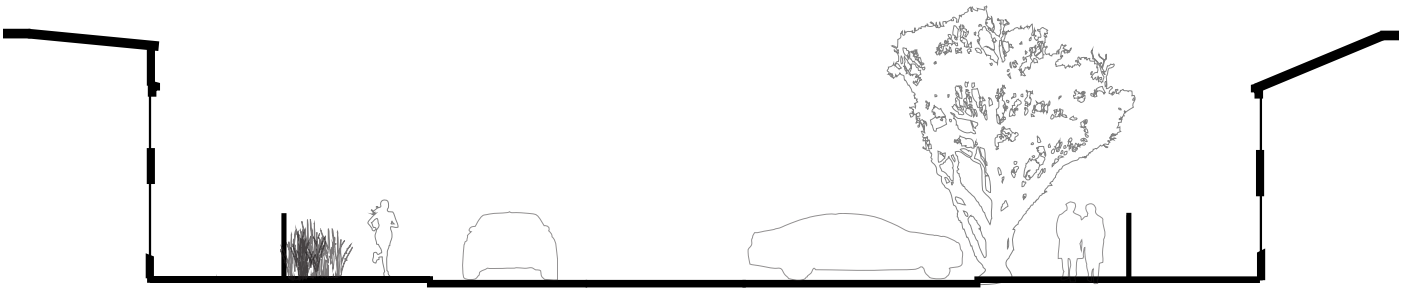


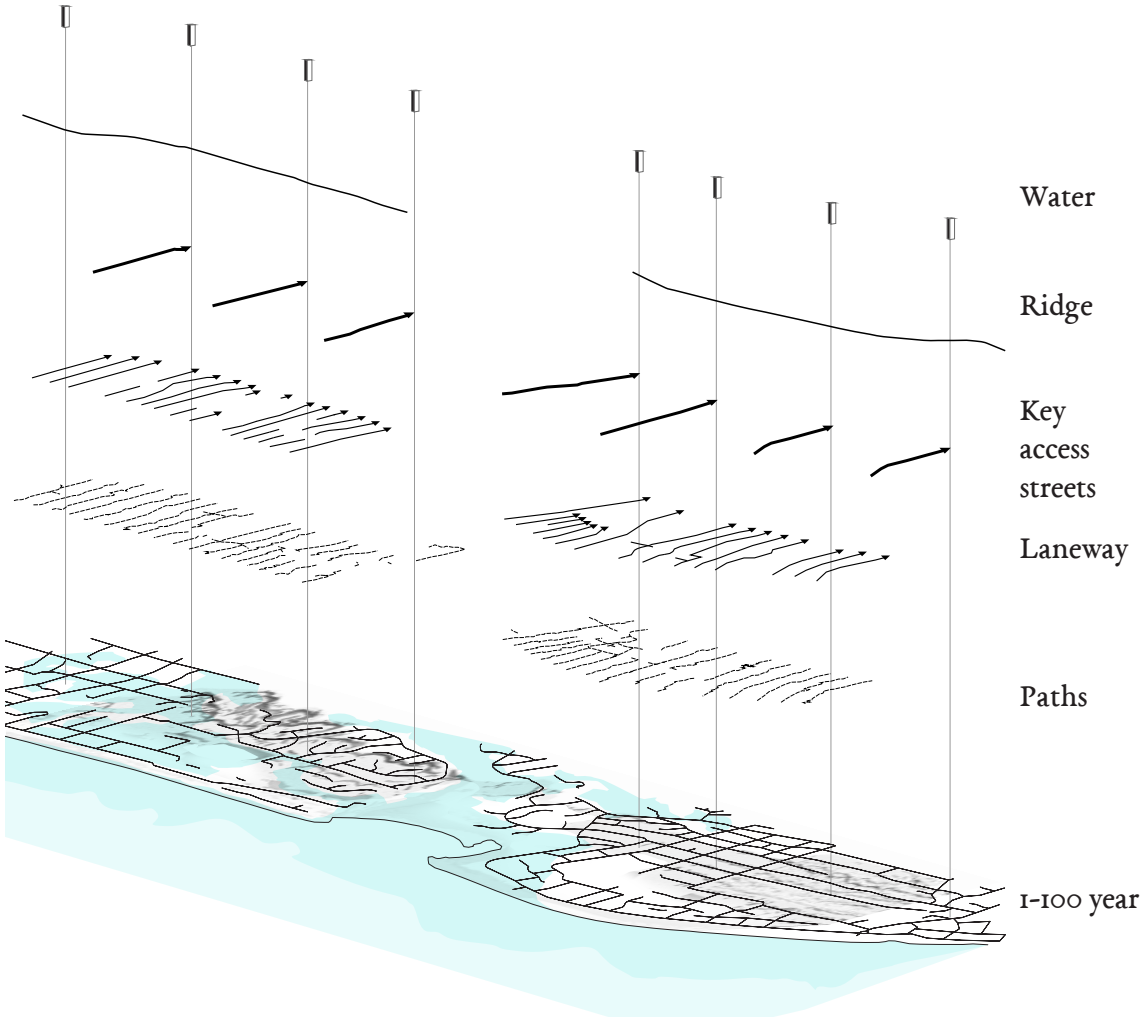
Fig 5.20. Key Access Section 1:200.

Figs 5.21. & 5.22. Street view of laneway and key access streets.

5.2.2. Application to Site and Potential Emergency Function

The core spatial moves from this field study that will be tested on the site are the ideas of varying the street and sidewalk width to communicate "public "or "semi-private" streets.

For example, a wider street, with sidewalks and on-street parking may not be supportive of a neighbourly streetscape but in an emergency it could become very important. Wide, clear streets in emergencies operate as key lifelines to move residents to where it is safe (Giovinazzi and Thomas). When applied to the site the more "public" streets could become linked up to the assembly park and emergency water towers. They will visually communicate the fastest route to safe ground in a disaster scenario. In contrast, a narrow street with little to no sidewalk could operate like the Seatoun private laneway. In an emergency these will not directly take you up to the high ground assembly parks but enable a more neighbourly everyday function. Essentially a settlement needs both of these street typologies to give a hierarchy to the overall street network so that residents can easily understand which streets suit their emergency access needs and which ones are sacrificial.



Street Network

Fig 5.23. Axonometric of street network applied to site.

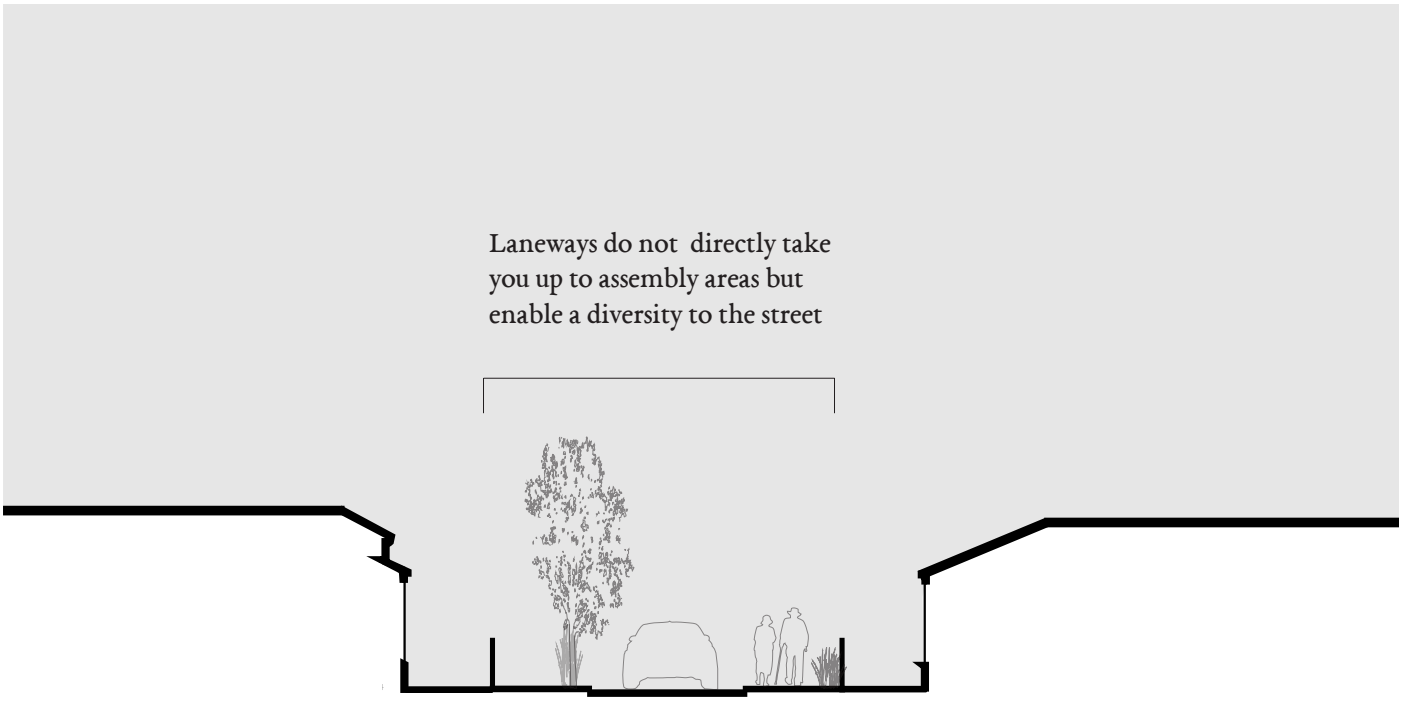


Fig 5.24. Laneway section 1:200.

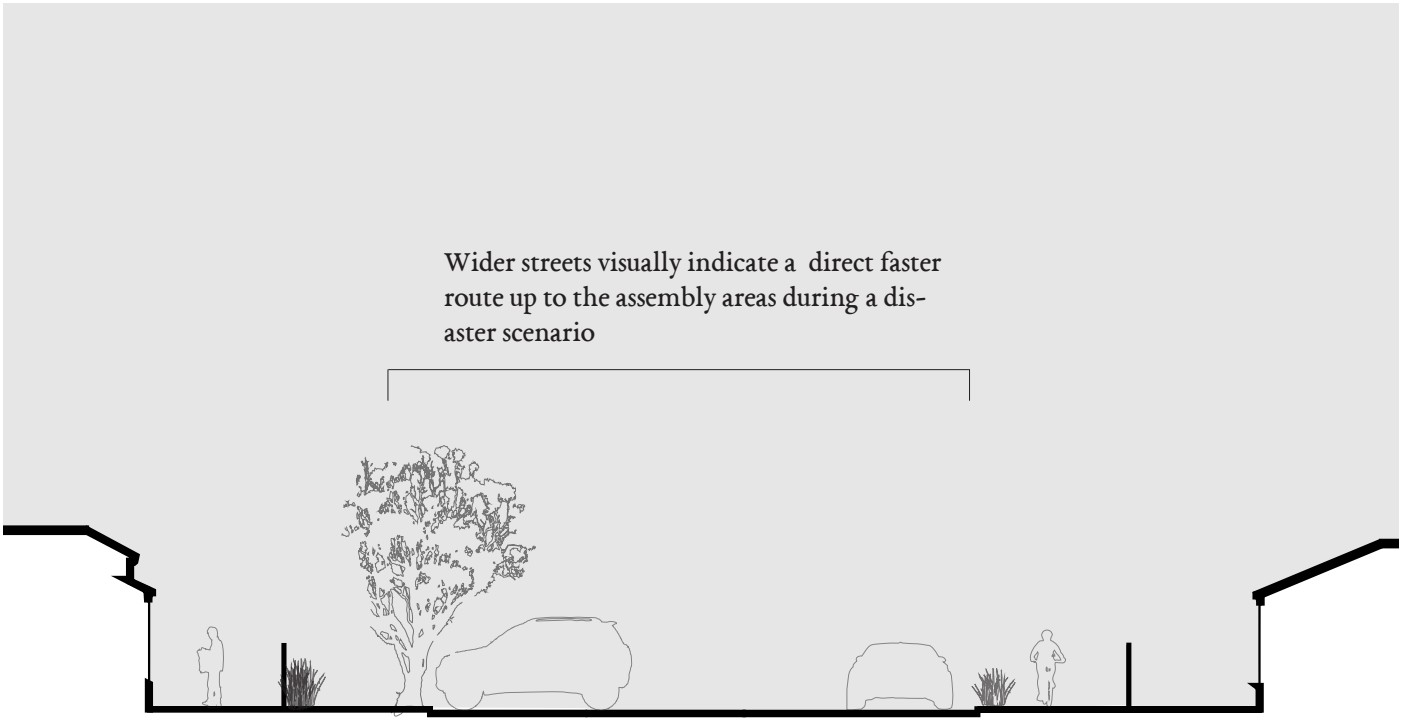


Fig 5.25. Key Access section 1:200.

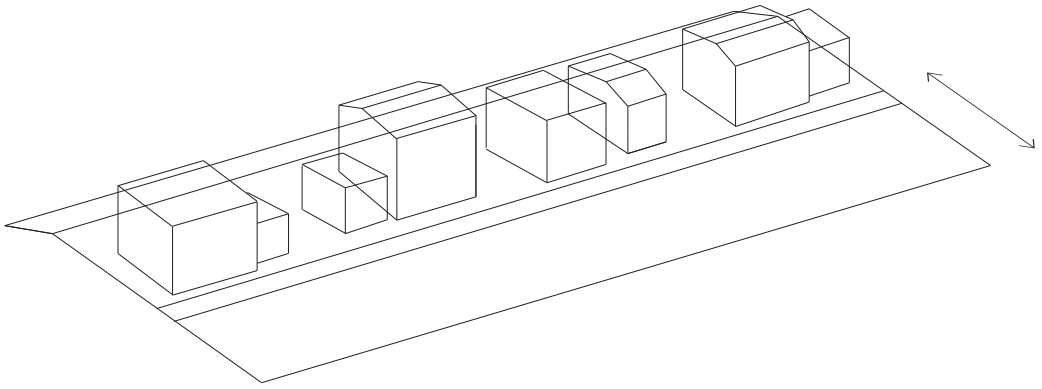


Fig 5.26. Axonometric of laneway street.

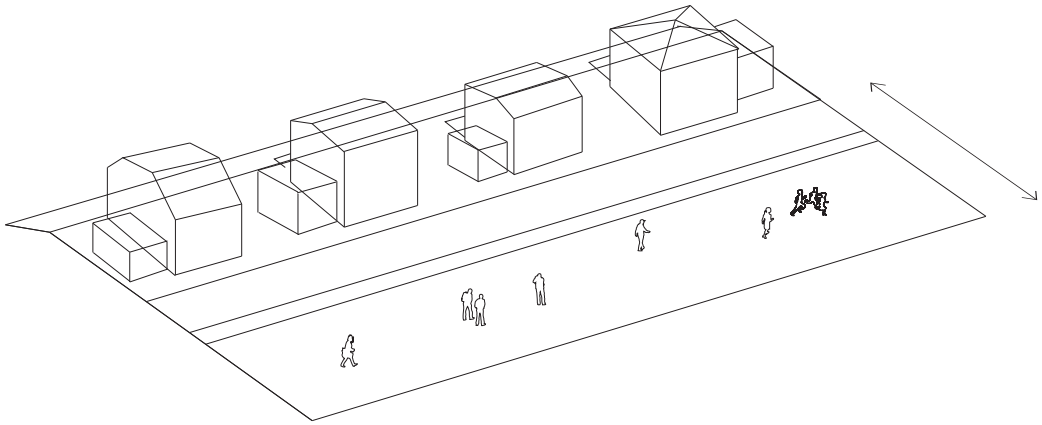


Fig 5.27. Axonometric of key access street in an emergency scenario.

5.2.3. Precedent: Clyde Street, Island Bay, Wellington

This precedent uses level changes to encourage an informal neighbourhood appropriation of the sidewalk. Here, privately owned and maintained swing sets and flowerbeds encroach onto the sidewalk promoting an element of neighbourhood care and ownership to this normally publicly owned space. This becomes a way to extend the boundary of the adjacent private residencies – creating a new "semi-public zone".

However, another effect of these level changes is that the street corridor has become a purely functional vehicle corridor and separates neighbours of either side of the street. This results in very little across-street interaction between residents. And so the level changes essentially operate as both a barrier and promoter of social interaction.

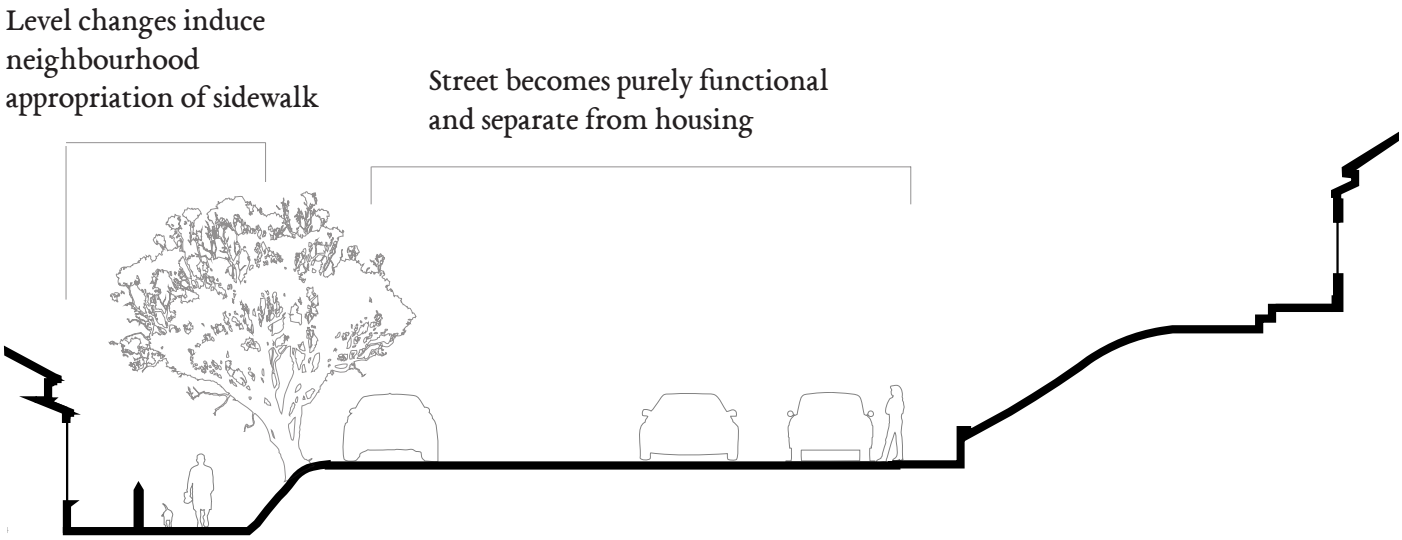


Fig 5.28. Section 1:200.

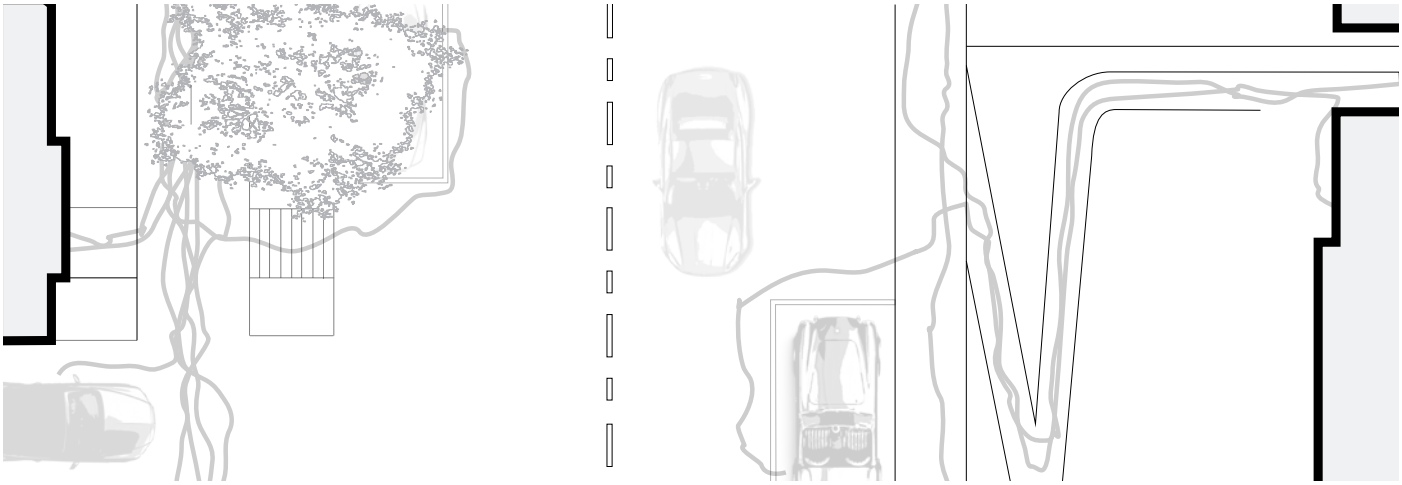


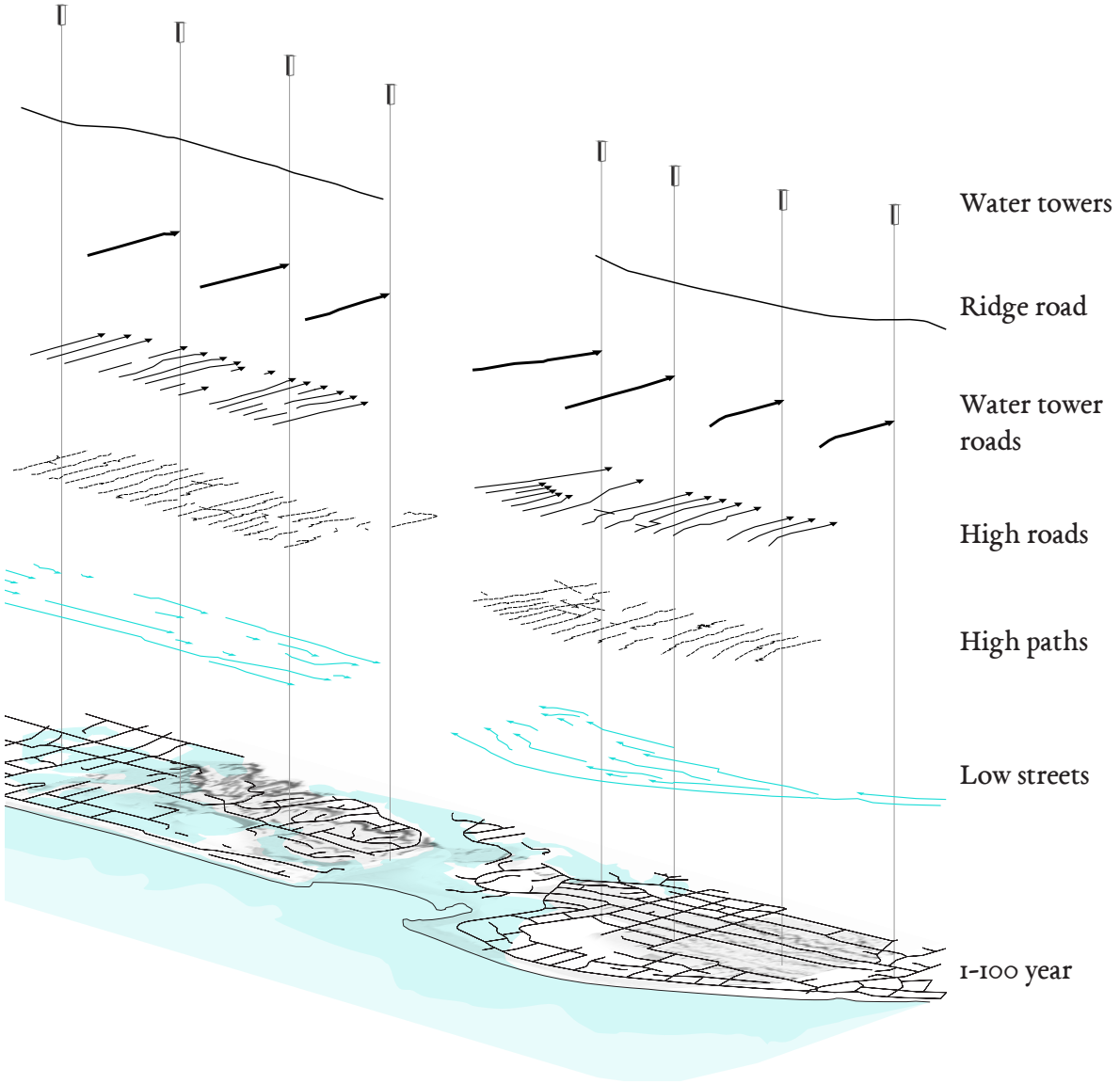
Fig 5.29. Plan 1:200 showing pedestrian walking routes
and potential neighbourly interactions.

Fig 5.30. Photograph depicting neighbourly sidewalk and
encroachment of private ownership.

5.2.4. Application to Site and Potential Emergency Function

Although not helpful in establishing cross-street interaction, the separation of social and functional zones could actually become very important in an emergency. Streets planned for lifeline access cannot be encumbered with programs that will affect its function in an emergency. They must remain obvious and clear as residents need to be able to escape from hazardous areas as soon as possible and without any physical interference (Giovinazzi and Wilson).

Level changes in the streets could also become a visual cue to indicate which street typologies are for access to safe ground and which become holders of storm water. In the overall road structure there could become a language of high and low streets. The "high streets" will be raised up above the floodplain and take you up to the assembly points and the "low streets" add extra capacity for storm water storage and slowly allow the water to drain back into the Waikanae River. In purely changing the level of the street the suburban housing will not be affected but it will give a lot more legibility in the overall street network.



Street Network

Fig 5.31. Axonometric of street network applied to site.

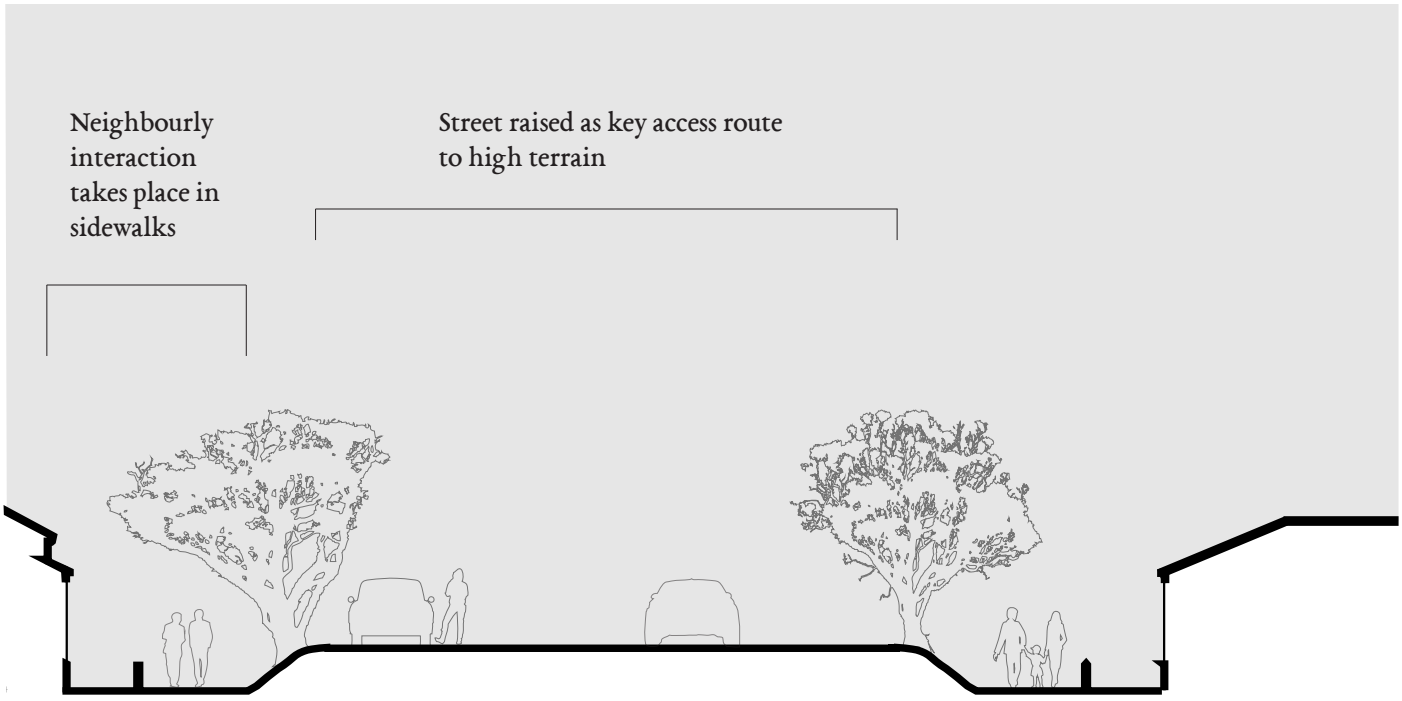


Fig 5.32. Section 1:200.

Fig 5.33. Section 1:200.

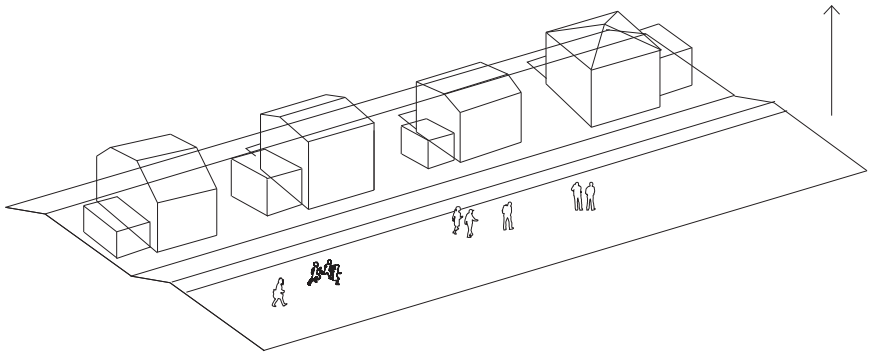


Fig 5.34. Axonometric of “high street” during an emergency event.

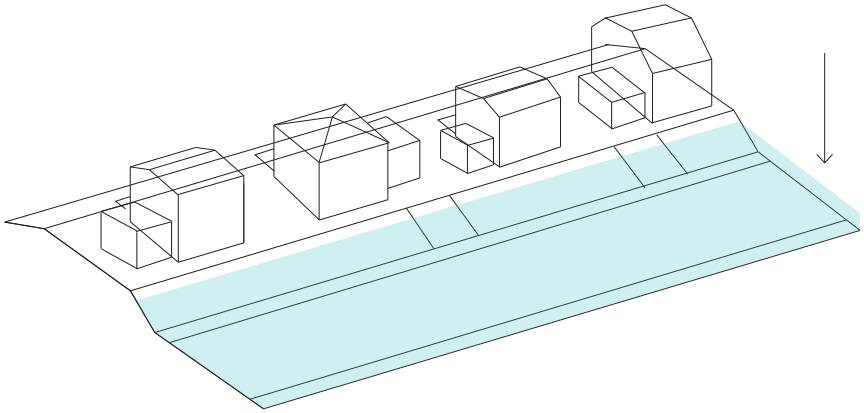


Fig 5.35. Axonometric of “low street” in flood.

Fig 5.36.Perspective of "high street" in everyday scenario. The neighbourly sidewalk is the main pedestrian thoroughfare.


Water Tower/ Dune Top Park

Fig 5.37. Perspective of the "high street" in an emergency scenario. The road corridor is the main pedestrian access to the dune top assembly parks as they are raised slightly above the floodplain.

Fig 5.38. Perspective of the "low street" in an everyday scenario. The road corridor is lowered and runs perpendicular to the "high streets" towards the Waikanae River/Estuary.

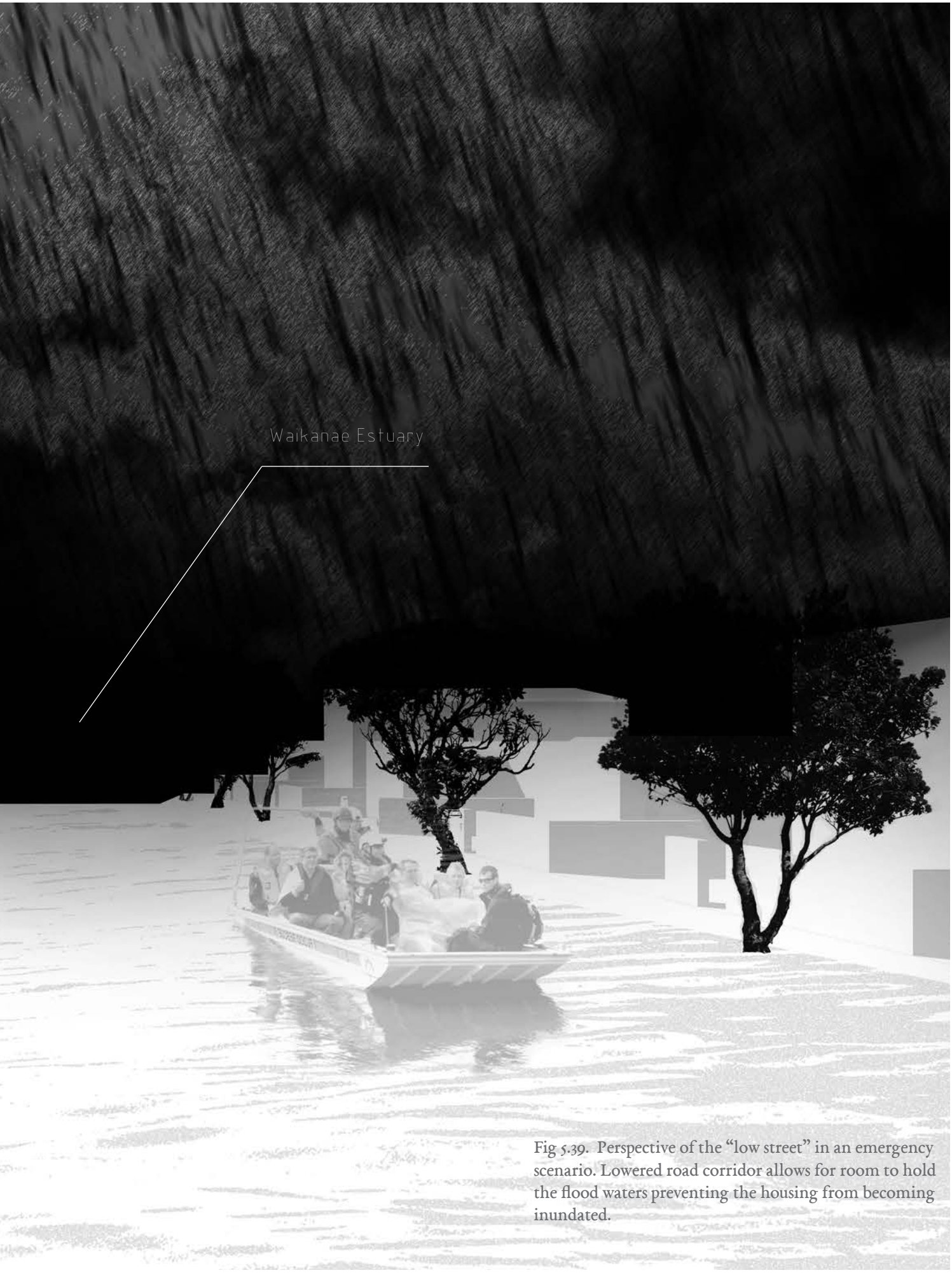


Fig 5.39. Perspective of the "low street" in an emergency scenario. Lowered road corridor allows for room to hold the flood waters preventing the housing from becoming inundated.

5.3 The Backyard Swales

5.3.1 Precedent: IN-Gawa Community Housing Proposal / INDEX Architecture

This is a proposal by the firm INDEX Architecture for a community housing development in Tomisato City, Japan. It incorporates the idea of "Engawa" or veranda space that can be found in many traditional Japanese housing types. The Engawa space typically forms a perimeter to the internal spaces of a house and creates a type of transitional zone between the interior and exterior of a house. Socially, the Enagawa was used as a form of outdoor room for receiving guests. Instead of the traditional response of locating the Engawa at the periphery of the house, the design sets up a series of internal verandah spaces that run between the rooms of the dwelling. The re-imagined "In-Gawa" cuts through the house connecting the interior to the outside through framed views of the communal garden spaces. Like the Engawa, the In-Gawa connects to the main spaces of the house and forms a kind of break out space that allows the activity of residences to overflow into the communal garden. What is valuable about this approach is the design pursues a new type of urban relationship that nurtures connectivity and community both within the structure of the house and its neighbourhood (Furuto).

Figs 5.40. to 5.43. Showing the communal garden in relation to the housing.

Fig 5.44. Diagramming the communal garden space in between the housing block.

Fig 5.45. Aerial view of the housing block and communal garden.

5.3.2 Application to Site and Potential Emergency Function

Seeing as this thesis is focused on the smaller spaces between buildings, the traditional location of the Engawa space on the exterior of the dwelling is appreciated. However, what is truly valuable about this precedent is the space's adjacency to the communal garden. The idea of a transitional space where the activities of the residents are welcomed to spill over could add to a more neighbourly dynamic than traditional residential block scenarios. And similar to the spatial principles of the street network, the key use of the concept of Engawa is its ability to act as a semi-private zone between the private dwelling and public space.

To enable this form of spill-over neighbourhood activity the design has tested the idea of taking down the back fences of the existing private residences and allowing a public walkway to infiltrate the backyard space. This establishes a more communal backyard system by introducing semi-public land into the privately owned land parcels. The design also tests the idea of lowering the land of the communal backyard where the more publicly perceived spaces are situated on the lower ground plane and the private residential land occurs above.

Although this a very different way of living from what the residents of Waikanae and Paraparaumu are used to, the idea is that even if you take down the back fences of properties residents could potentially still have the perception of privacy. This is where the concept of Engawa comes in useful. When applied to the site, the Engawa takes on the form of a deck protruding into the newly communal backyard from the private dwellings of the neighbourhood block. The deck of the house will now act as the perceived threshold between the "private" spaces of the dwellings and the "public" spaces of the boardwalk. And like the In- Gawa precedent this allows the private and public activities the spill over blurring the boundaries between them, creating an informal, "neighbourly" way of living.

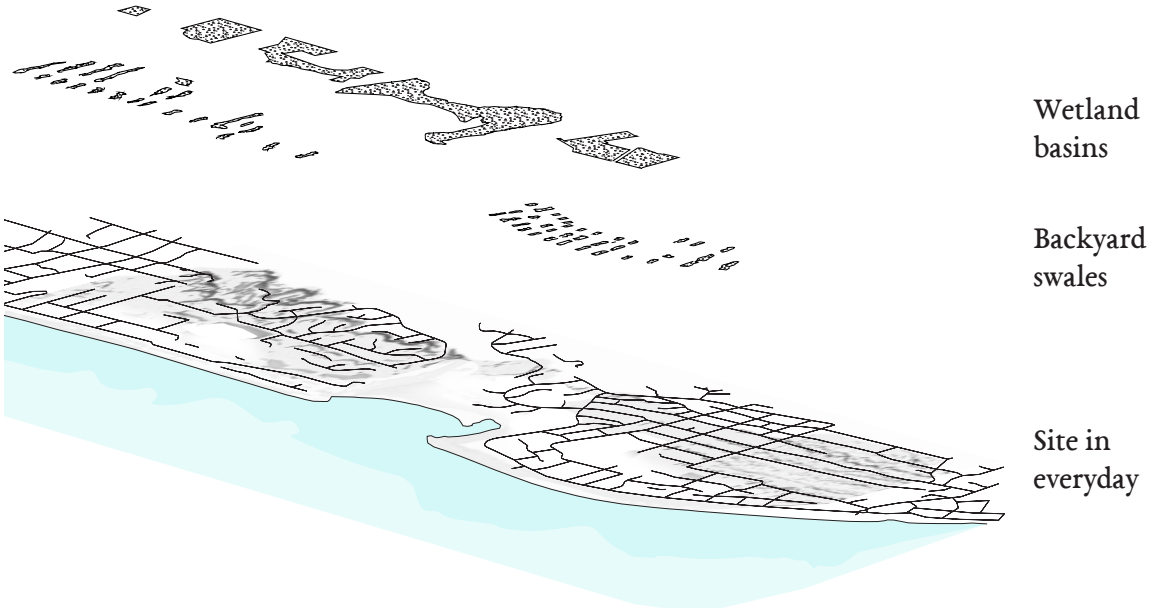
Although a public walkway is introduced, separation and privacy can also be achieved because of the level changes between private dwelling, semi-private deck space and semi-public walkway (the swampy ground condition also helps limit the walking route of the public to the designated boardwalks). The level change between house and walkway give the perception of "eye's on the street" security as the residential housing is at a higher level on the ground plane to the public walking route – i.e. the lower the ground gets the more

"public" the space is perceived. So residents living in these neighbourhood parcels are able to passively interact with both their neighbours across the way and members of the public passing through while still retaining their sense of privacy and ownership.

While also facilitating a new type of neighbourliness, the communal backyards are also crucial in the overall storm water management strategy. Operating as the "first line of defence" the re-contoured backyards function as storm water swales eventually linking up with the larger detention basins found further back at the wetland parks.

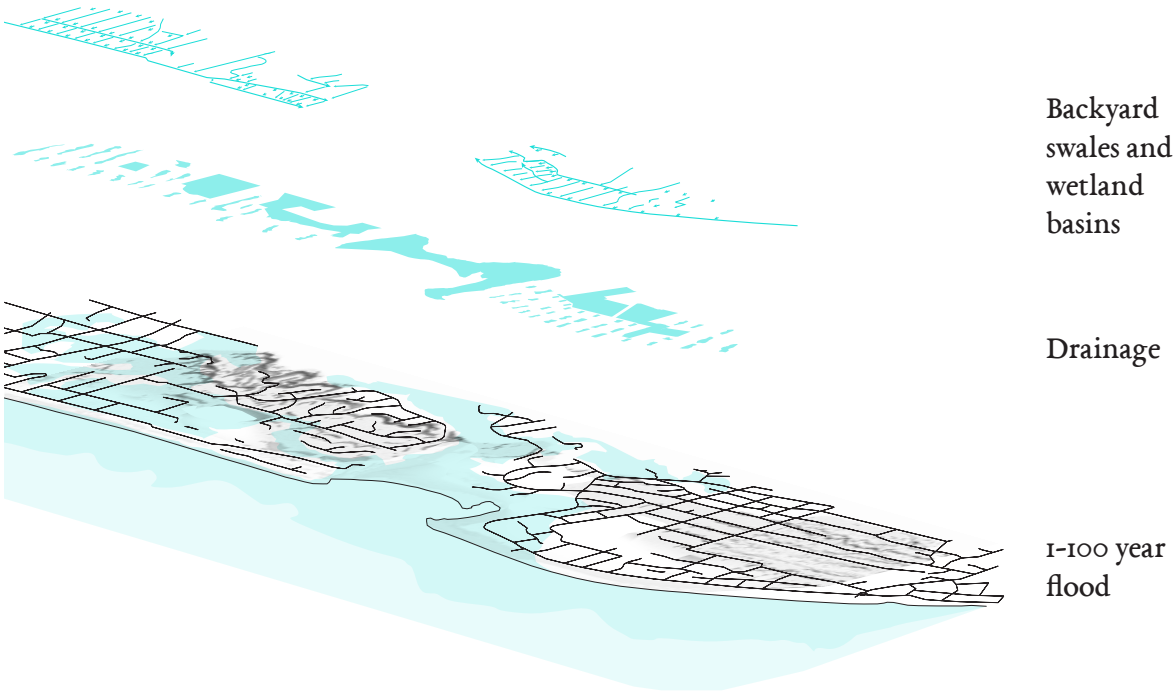
As the part of this research is about finding solutions to the site's coastal flooding issues while retaining as much of the residential housing as possible, the backyards were necessary land to play around with. In making this land "officially" public this can allow for the backyards to become incorporated into the sites public space strategy and thus function within its storm water management system – taking the responsibility from individual land owners. And as the parks and streets alone could not completely retain the water to keep the housing safe from flooding this land was critical to use. So during flood events, this newly public space will become sacrificial as the whole swale intends to hold the flood waters keeping the housing safe up to a 1-100 year flood scenario.

As with the larger storm water system, the backyard swales work within the original dune system of the site becoming micro-systems of the larger landscape structure. The ecological functioning of the backyard swales allows the dune system to permeate through the private land parcels, revealing small palimpsests of how the landscape originally operated before subdivision. These swales could now become part of a thriving wetland ecology allowing corridors for coastal processes and wildlife to infiltrate the site. Through the introduction of public space, the intention is to shift the way coastal settlement behaves and let ecological variability take place once again, rather than striving to contain it.



Swale and Basin Network

Fig 5.46. Axonometric of backyard swales and larger wetland basins in an everyday scenario.



Swale and Drainage Network

Fig 5.47. Axonometric of swale, basin and drainage network applied to site in a 1-100 year flood scenario.

Plan 1:2000 @ A4

Fig 5.48. Street block in a 1-100 year flood scenario (original contours).

Plan 1:2000 @ A4

Fig 5.49. Street block in a 1-100 year flood scenario (re-contoured with backyard swales).

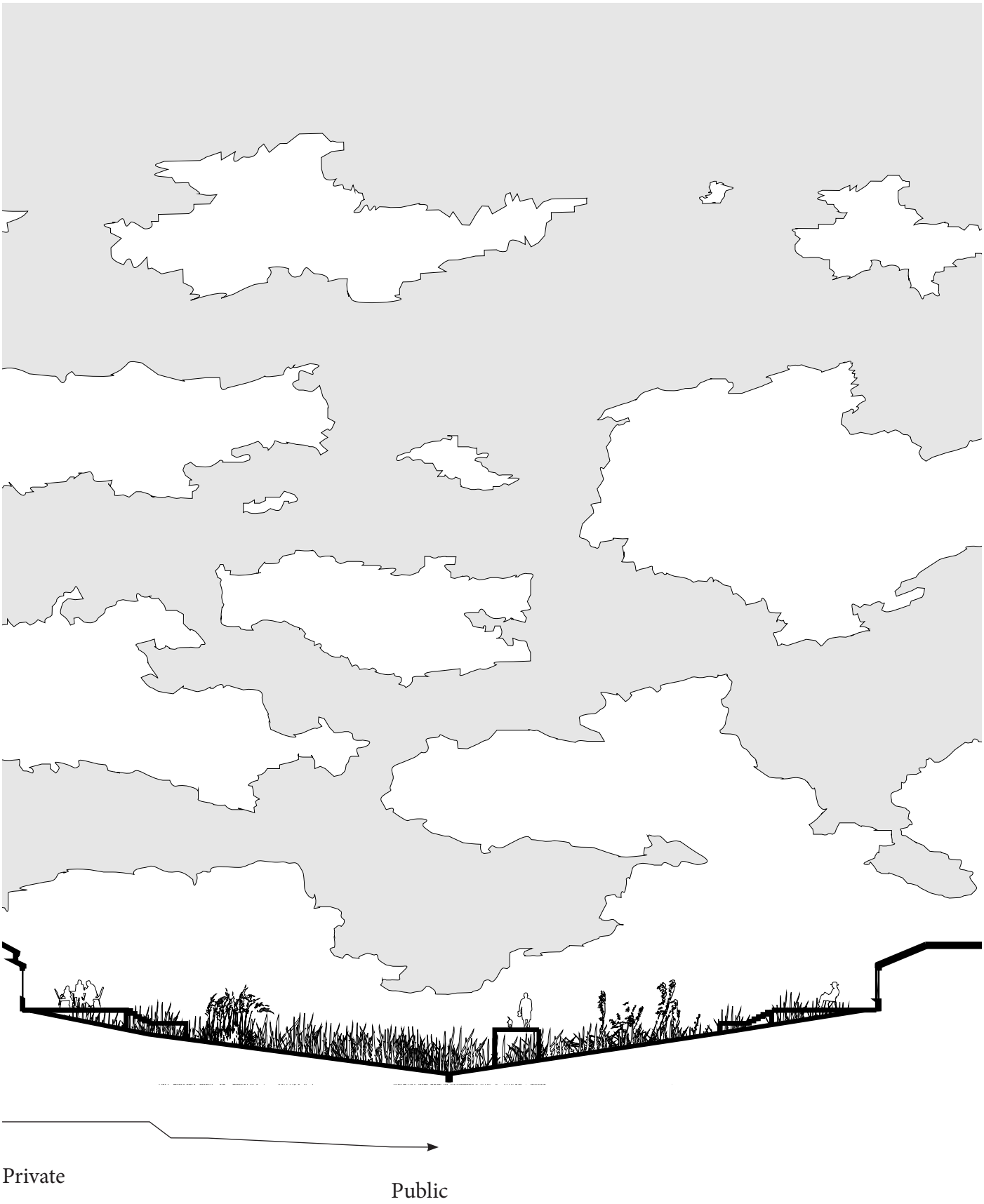


Fig 5.50. Section 1:400 of backyard swale in an everyday scenario.

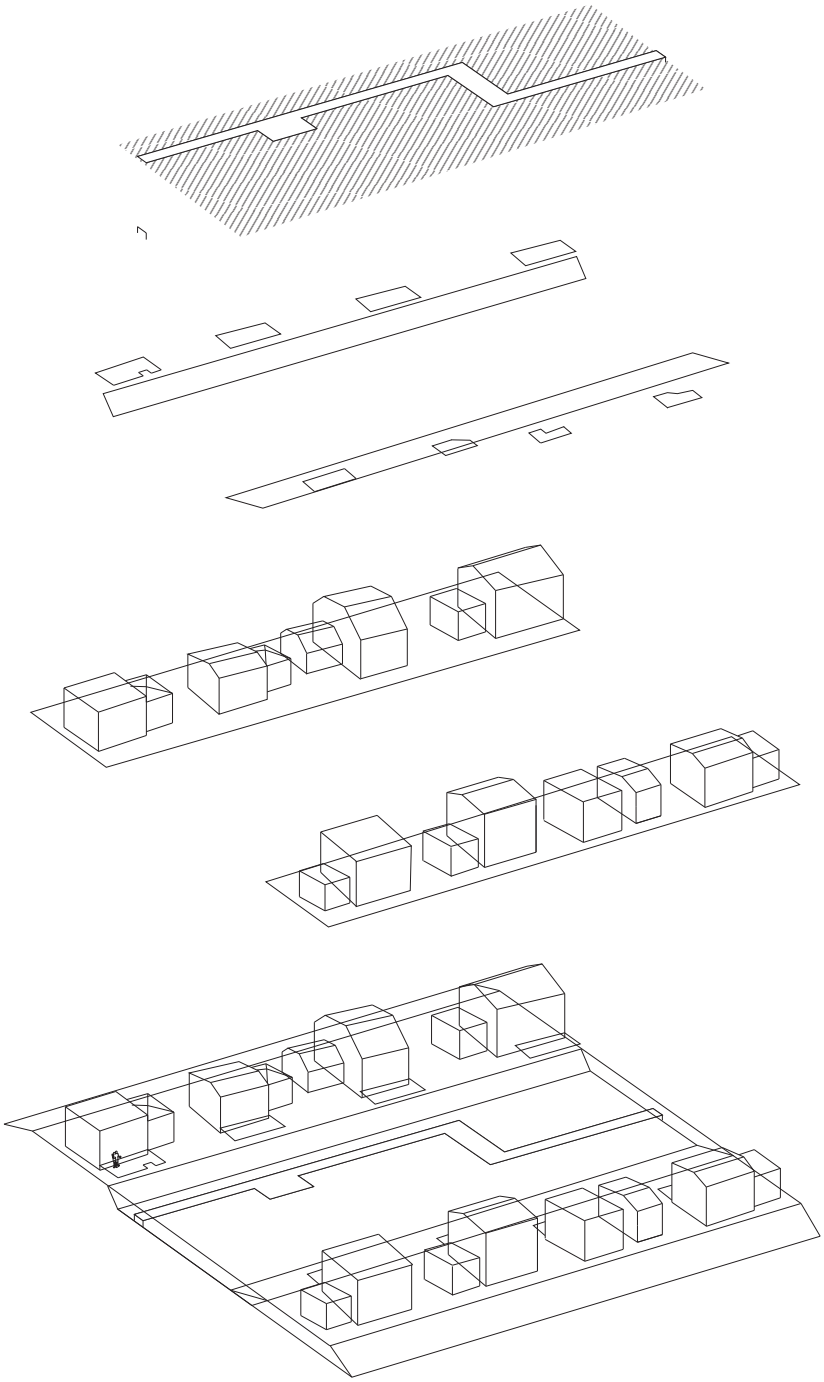
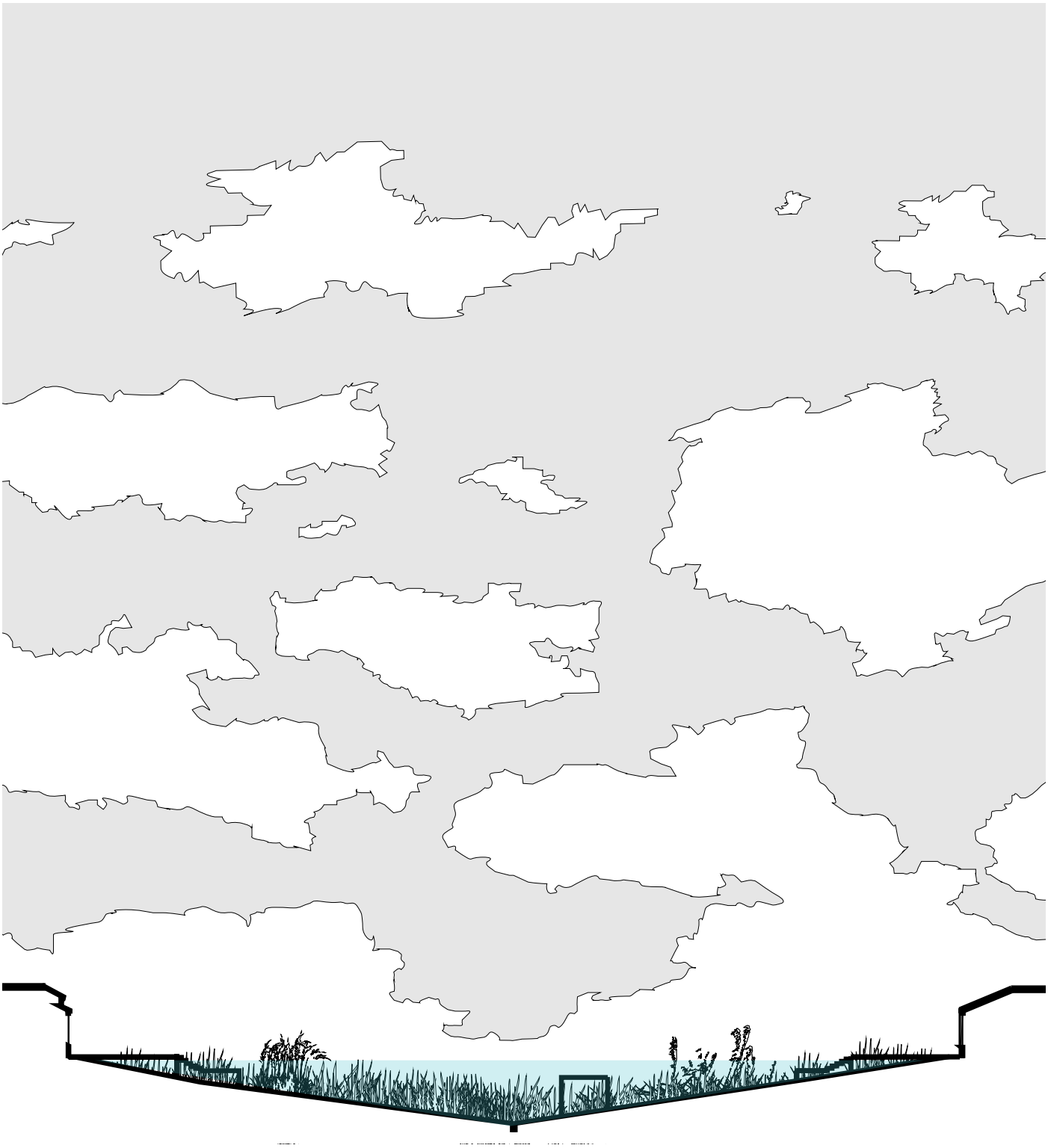


Fig 5.51. Axonometric of backyard swale in everyday scenario.



Protected from flooding Allowed to flood

Fig 5.52. Section AA 1:400 of backyard swale in a 1-100 year flood scenario.

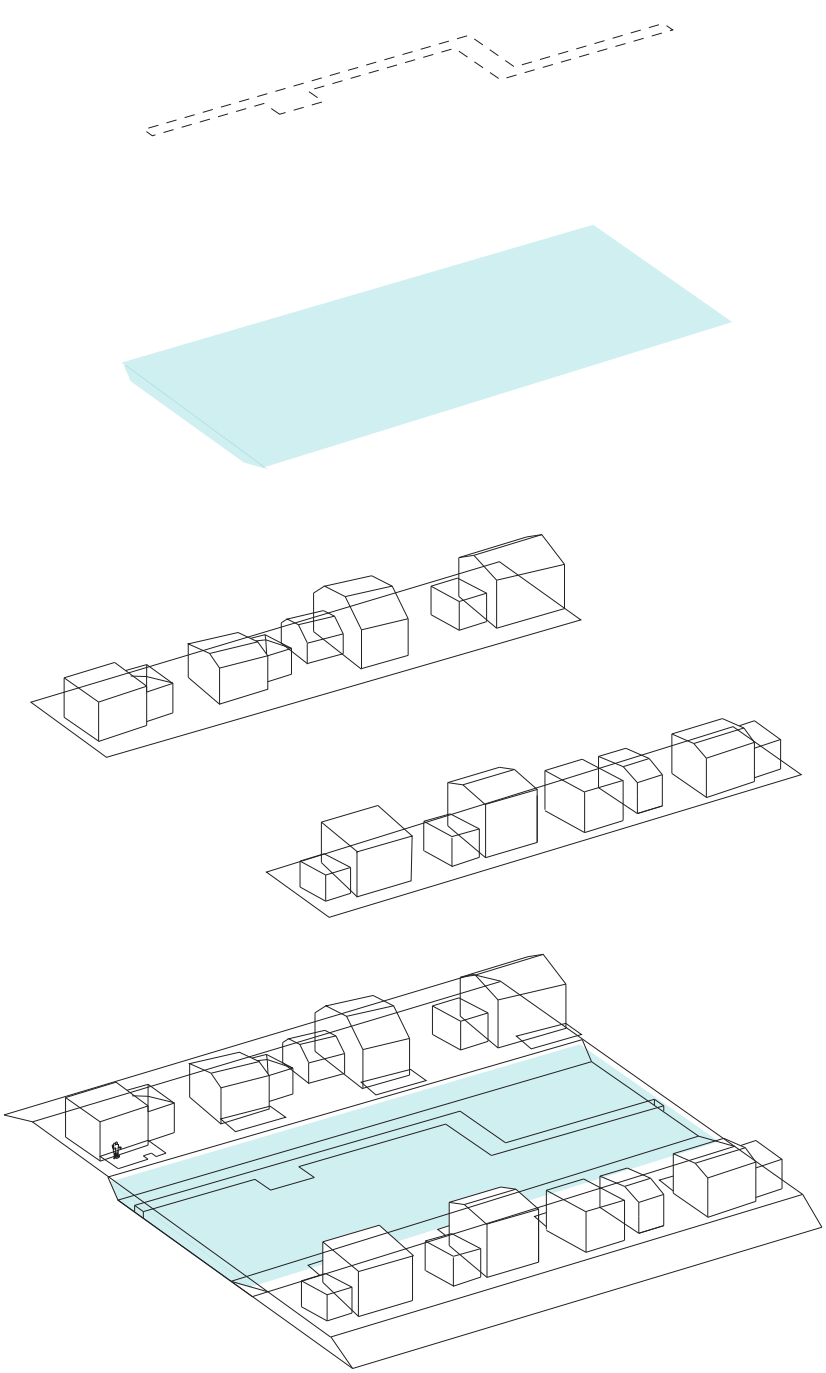
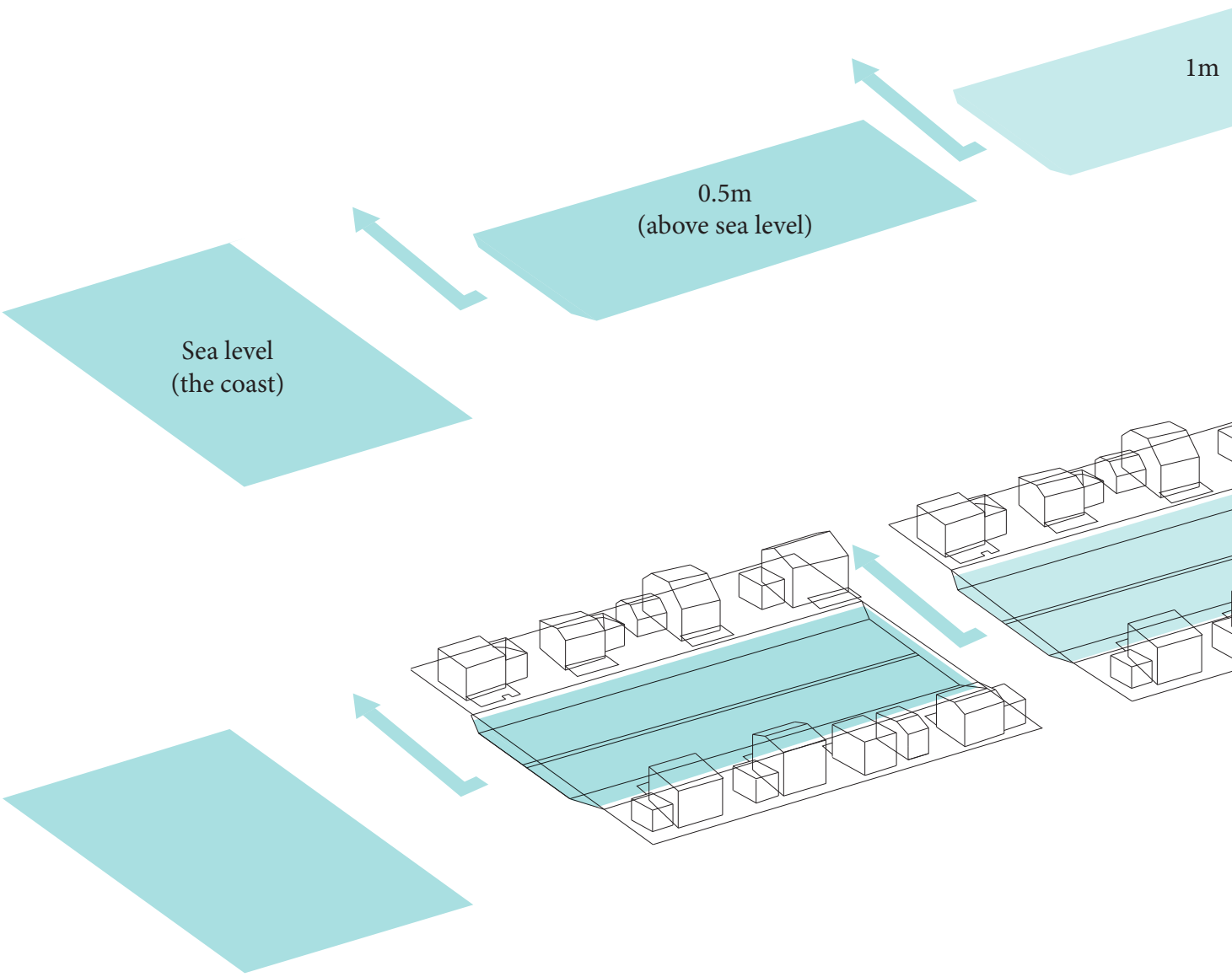


Fig 5.53. Axonometric of backyard swale in a 1-100 year flood scenario.


1m
0.5m
(above sea level)
Sea level
(the coast)

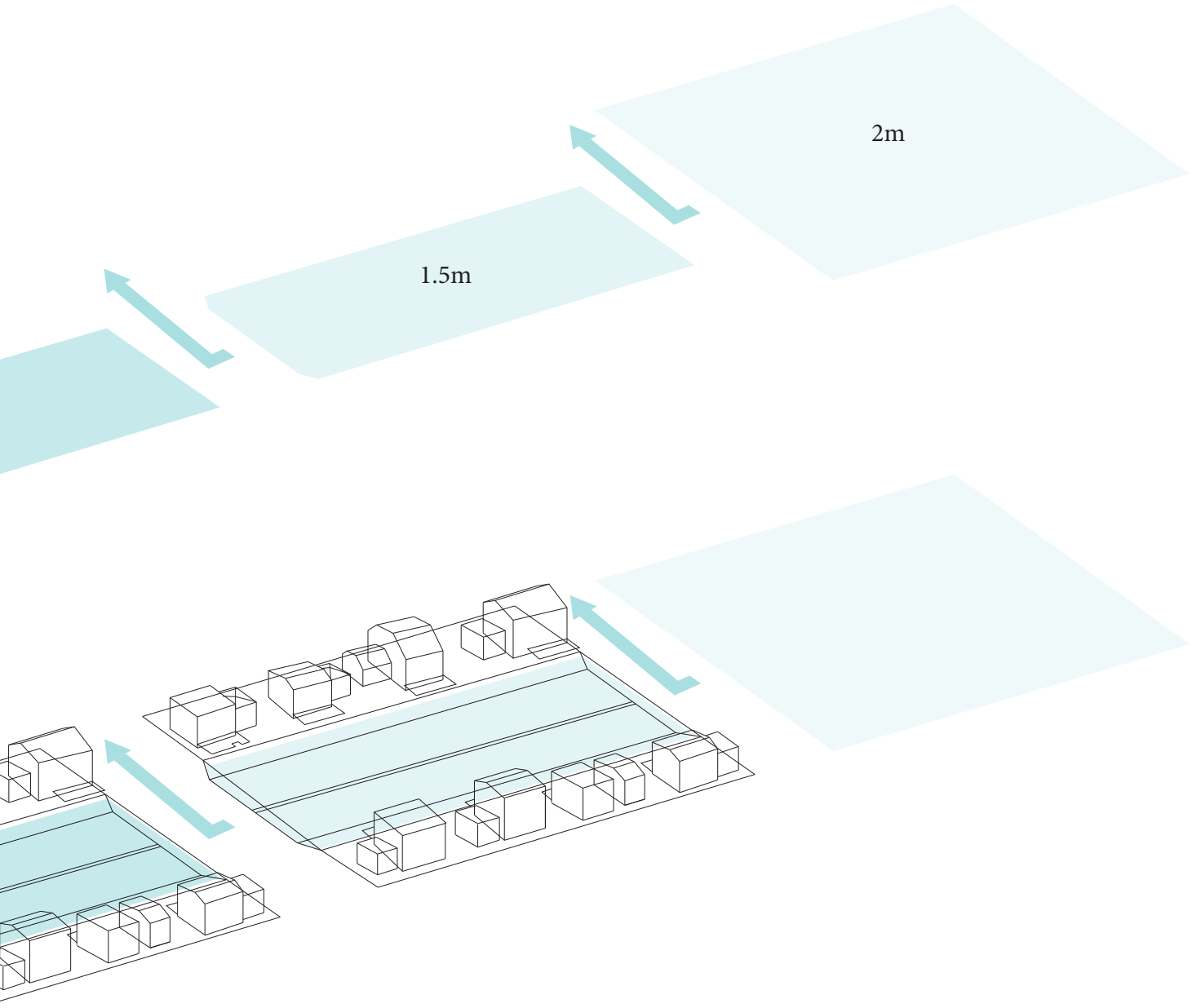


Fig 5.54. Axonometric of backyard swale flood system in a 1-100 year flood scenario.

Fig 5.56. Backyard swale in an everyday scenario.

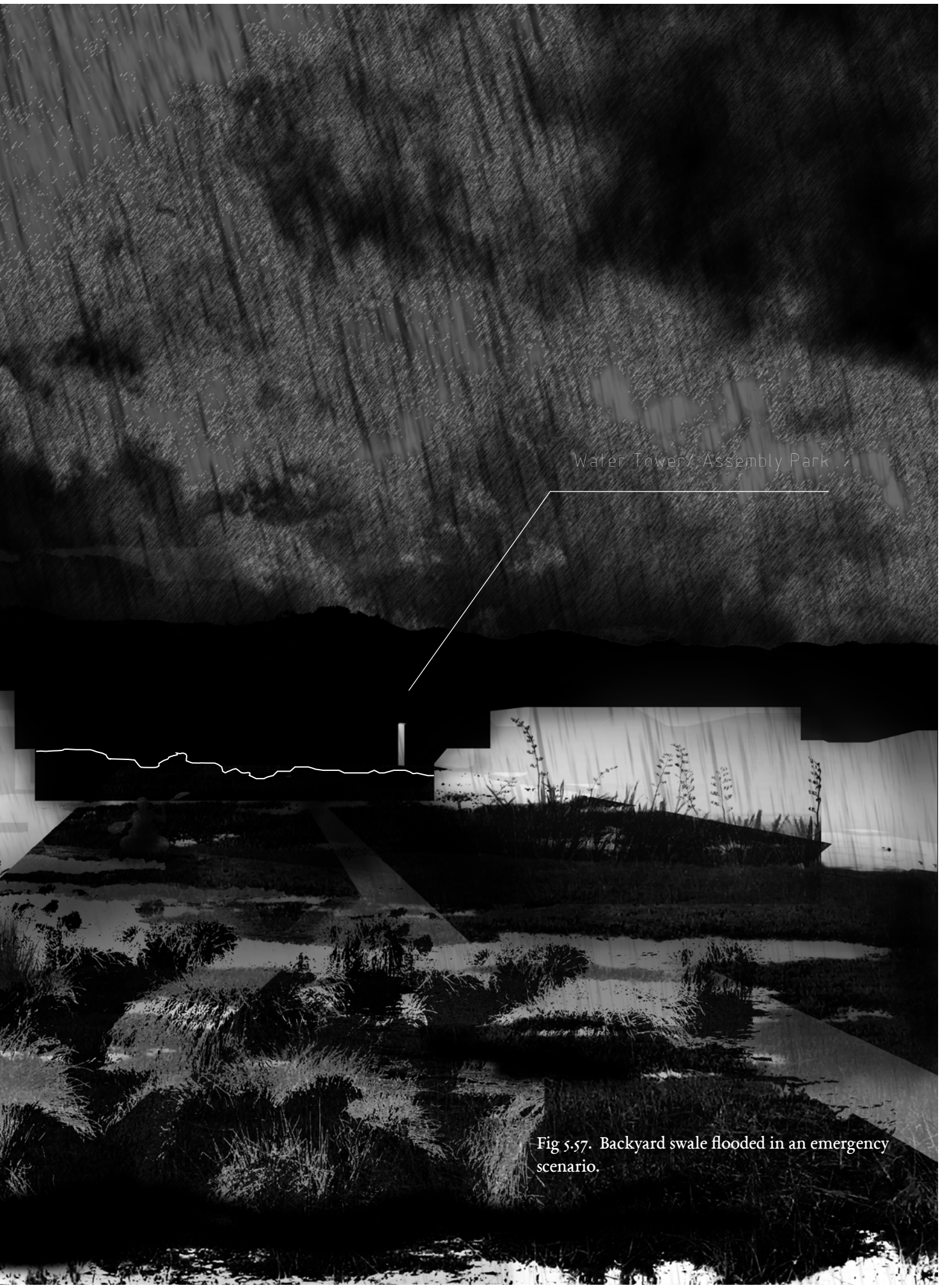


Fig 5.57. Backyard swale flooded in an emergency scenario.

6.0
Reflections

6.1. Discussion on Design Output

6.1.1. On Neighbourliness

Neighbourliness in the research looked at how both the larger urban and small spatial structures can facilitate whole neighbourhood territories as well as individual neighbourly interactions.

In the design process, neighbourliness was closely examined with specific urban precedents to try and understand how it is achieved with each of their spatial forms. The process of closely examining precedents then applying and adapting these findings could initially be perceived as research for design. However this is not the case as often the designers did not consciously realise the resultant neighbourly outcome of the spatial forms. Seen especially in the "urban components" section of the thesis, the spatial fabric of neighbourliness was discovered through carefully drawing out (to scale) each precedent example. Through this process the research was essentially cataloguing key proportions, heights, widths and qualities of each example to find out what exactly spatially contributes to neighbourliness. This was very much an act of design for during the research process individual assumptions were made on what contributed to the neighbourly quality of a space. And when each example was taken apart, applied and most importantly adapted to the specific scenario of Waikanae and Paraparaumu this no longer made it a passive act of precedent analysis but something that was intrinsically part of the design process.

To the overall discipline of neighbourhood planning, this process is important as neighbourhood planning has for the most part been restricted by a lot of clichéd thinking set up in the early twentieth century. The ruse was for the research to somehow go past these clichés through examples and design exploration. What these examples allowed me to consider was how even everyday urban spaces could have important social potentials. When the certain spatial moves in the examples (such as shifts in proportion, topography or alignment) were applied to the site – very different neighbourhood connections began to evolve. These at times were often very small changes, so residents while being able to retain their original associations with the site could also potentially reap new social benefits.

Clarence Perry's Neighbourhood Unit was discussed as an archetypal example of neighbourhood planning. It used modernist principals and rigid order to create a self-enclosed community. In fact, on the surface the design process in this research could be reproached for using similar methods. And while similar principles are indeed employed, what this research adds to the

discussion is the effect of site, topography and the seemingly minute spatial assemblies that induce certain neighbourhood associations. Put simply it uses a landscape architectural approach to re-examine neighbourhood planning practices.

Overall what the design research is showing is:

- Old suburbs can be retrofitted to create better neighbourhoods.
- That neighbourhoods do not have to be prescriptive but can respond to topography
- Neighbourhoods can have a diverse range of open spaces (streets, backyards, parks) that operate in both the everyday and emergency.
- Neighbourliness can address vulnerability.

6.1.2. A Phased Approach

When re-organising fixed settlements a certain synchronicity between the landscape architecture and the planning discipline needs to be cultivated. Planning is the discipline that holds the authority to control, restrict or enable certain forms of urban development by working within government systems. So to execute the desired settlement changes landscape architects need to broaden their design tool kit to include planning strategies. Therefore in this part of the discussion, landscape architecture and planning mechanisms will be critiqued in light of the potential benefits for floodplain communities.

The most significant planning technique used in the design is the idea of phasing in the development over time. The strategy uses the driver of sea level rise to incrementally implement each intervention – from the water towers down to the storm water systems. The design proposal is not be a singular master plan and does not rely on a fixed solution. The strategy will instead work with the indeterminacy of sea level rise and seek for interventions that can be inserted over time as sea levels rise with as little impact as possible. What is beneficial about this strategy is that not every intervention has to happen at once. Coastal communities will have time to adapt to each stage of the development process. Therefore communities will not feel unjustly moved out of their residence for as sea levels rise the risk of them living there will continue to increase. Considering there has been so much strife over the release of the coastal hazard lines in the Kapiti Coast, a less drastic approach is certainly needed.

There are also planning approaches employed to the detailed design component of the thesis. As explicitly conveyed in the design of the backyard swales, there is a certain flexibility and bottom-up approach to the design moves undertaken in the thesis. The design do not need to be concrete for in the real world individual landowners would want there say in the process and may not be on board when it comes to moving their individual property. In the "phasing" section of the design proposal, explorations were undertaken to show how certain design components may vary in their form if say one or two landowners refused to move their property. For example the design discussed how maybe the backyards do not need one continuous swale but some ebbs and flows or pinch points could occur in their form if certain properties remain where they are. While in the design of the high ground streets, there could be a kink in the path to high ground where a landowner has kept their property. This sort of design thinking is only enabled

when designers can begin to work on the very detailed design level where every property is considered in the design process.

6.2. Discussion on Design Process

6.2.1. Scale Strategies

The methods involved in the design of sites in flux have (for the most part) favoured process over space and form making. This tendency can be seen as a product of the school of thought where ecological theory and urbanism are combined as a way to address that matter of designing in a relentlessly changing environment. To communicate this fixation on process designs are often expressed elusively as a series of large mappings or multiple layers of maps. When this process in employed, certain forms take shape but this is often only seen at the city or site scale, leaving the rest up to the imagination.

What is missing in these representations are how people occupy these spaces. Life on the ground is brushed over as less important or sometimes non-existent compared to the larger landscape systems communicated. To address this flaw in the literature multiple scales are explored in the design process to enable a mutual relationship between the larger urban structure and how people occupy everyday spaces within this structure.

An example of this can be explained in the design of the streets. In this instance, the sectional study of an individual street is analysed in light of its spatial dimensions as well as its ability to facilitate small, on the ground neighbourly scenarios. Simple spatial cues such as the street's width, volume, level changes and quality can encourage a very different form of street life within a neighbourhood. But to truly understand the street's entire social contribution to a neighbourhood it cannot be just looked at in isolation but its entire relationship to the settlement.

When a street typology is looked at in detail and then repeated throughout a settlement this then gives the street a sense of legibility or hierarchy within its structure. For example the "high street" typology looked in detail the way it produced a certain neighbourly sidewalk scenario. The detailed design process undertook the process of simply raising and lowering the street corridor to enable separation between the street and the housing. This process established a scenario where neighbours were able to take informal ownership of the sidewalk space creating a semi-private zone between the private housing and public street space. Although not an ideal scenario to cultivate cross-street neighbourhood interactions, the separation of the street corridor as a purely utilitarian space actually greatly contributed to the street's emergency function. When an emergency scenario occurred it was able to shift into a clear, unencumbered pedestrian access raised above the

flood zone to take residents up to the high terrain.

When lowering individual streets and raising others closely connected to the dune tops parks an overall language appears in the larger urban structure. Raised streets would now be associated with key lifeline access up to the dune top parks while lowered streets would become holders of storm water filtering this back into the Waikanae River. Each of these scale applications gave the streets important neighbourhood functions – both in small daily situations and in emergency scenarios. This scale strategy has been repeated with each component of the design. And what is interesting about cataloguing this process is that almost every time the larger system demonstrates the component's emergency function and the detailed analysis its everyday function. So to have a fully resilient settlement that contributes to a neighbourhood in both emergency and everyday scenarios, systems and detailed space need to be considered in unison.

6.2.2. Reciprocity in Everyday and Emergency Urbanism

In order for the research to contribute positively to coastal communities a mutually productive relationship between emergency function and everyday use needed to be communicated throughout the design process. This proved to be a significant design challenge as often emergency functions such as flood engineering structures tend to restrict certain urban activities or quality urban design. This is problematic as practical flood mitigation devices and emergency areas have very real imprints on the everyday urban realm and thus have the qualities to be much more than purely utilitarian spaces. So as these spaces contained very specific sub-layers of emergency functions (e.g. storm water basins, assembly areas, lifeline access) the social potentials they held for communities were equally explored.

Effective neighbourhood spaces operate by maintaining public activation on a day-to-day basis. This day to day use could become lifesaving knowledge in an emergency when people need to be able to recall what places are safe and how to get there. For instance, when going through the process of designing the dune top parks, the park's inherent safety and location needed to be communicated through recognisable spatial cues. To begin, one method was to clearly link the location of the parks up to key high ground access routes. These high ground access routes were then raised up above the floodplain indicating a recognisably secure path to take residents out of harm's way. Equally, relocating bus stops, small community dairy's or cafés adjacent to these sites serve as a way to cluster certain public amenities. This consequently resulted in the site's daily activation and functioning as an everyday space for neighbourly interactions. And in addition to the water towers partnership with each park, a visual marker of safety is further reinforced.

The size, frequency and design of the parks are also equally relevant to their everyday and emergency function. Each park has been intentionally placed along the first line of the back dune system so that it is approximately a five to ten minutes walk from every residence in the coastal flood zone. This is achieved by opting out of simply creating one large park and instead establishing smaller sized parks to be repeated throughout the settlement giving each resident an equal and quick access route up to the high ground. The size and frequency of the parks additionally serves as a way to communicate the legibility of the neighbourhood unit, as each neighbourhood unit is associated with an individual park. The park's everyday function thus becomes of focal point of

the neighbourhood, holding the area together, and giving each residential cluster a space that can be perceived as uniquely "theirs".

In addition, each park has been designed equipped with its very own water tower that functions as both an emergency water supply as well as the centrepiece for each neighbourhood unit. These water towers are both tall and distinctive being placed on the highest points within the first five hundred metres of the coastline. Because of these qualities they sit as markers for the safe ground, directing residents to the dune top parks and can viewed from almost all locations of the flood zone. The parks themselves are minimal in design, embedded simply within their dune top locations. During times of crisis this minimalism plays an important role in maintaining a certain spatial flexibility for the predicted influx of people requiring a place to safely wait for help.

6.3. Conclusion

New Zealand's close association with our coastline is one that is central to the identity of our country. But with sea levels and coastal hazards ever increasing this continues to put our identity at risk. Yet this does not have to be the case. Through taking up the design challenge of remaining in the flood zone the research has provided a platform for discussing a new way of living that does not have to banish us from the coast. In remaining by the coast the thesis explored a variety of techniques for designers to consider when re-addressing the way we design coastal settlement. The design techniques and outcome expressed in the discussion, are meant to provide guidelines for landscape architects confronting this particular design scenario. The parallel coastal settlement problem is one that is not only found along the Waikanae and Paraparaumu coast but can be seen all around the world. Therefore, when undertaking design moves in a similar urban condition the research could be provided as a case study to further influence sensible development strategies.

As this was a landscape architectural research thesis, it exclusively looked at the potentials that public space can bring to the discourse of coastal settlement. As an experiment to further open up the research direction it would be interesting to see how architecture could play into the social and ecological potentials of coastal settlement. This research has the prospect to become a highly collaborative and cross-disciplinary discussion, a notion that would be valuable to further explore.

7.0
Work Cited

7.1. Bibliography

"Emergency Survival Items & Getaway Kit". 70-84 Lambton Quay, Wellington, New Zealand. Ed. Management, Ministry of Civil Defence & Emergency. <http://getthru.govt.nz/how-to-get-ready/emergency-survival-items/>.

Going Local – a Guide to Neighbourhood Community Planning. 19 North Anderson Drive, Aberdeen, Scotland, 2001.

"Tsunami in New Zealand". GNS Science. <http://www.gns.cri.nz/Home/Our-Science/Natural-Hazards/Tsunami/Tsunami-in-New-Zealand#has>.

Tokyo, University of ed. *Building Resilience – Social Capital in Post Disaster Recovery. A Symposium on Major Disaster & Resilience of Society: Lessons Learnt from the Past, for the Future*. 2013.

Allaire, Jerrald R. *Neighbourhood Boundaries*. Chicago, Illinois, United States: American Society of Planning Officials 1961.

Allan, P., and C. Stutterheim. *Moved to Design*. RMIT University Press, 2007.

Bergin, David, and Dahm Jim. *Backdunes: An Introduction*. Wellington: Dunes Restoration Trust of New Zealand, 2014.

Blundell, Kay. "Kapiti Erosion Risk May Devalue 1800 Homes." Stuff.co.nz 27/08/2012 2012.
---. "Residents Upset over Hazard Line Changes." Stuff.co.nz 02/05/2014 2014.

Carmona, M. *Public Places, Urban Spaces: The Dimensions of Urban Design*. Architectural Press, 2003.

Dahm, Jenks. *Community Based Dune Management for the Mitigation of Coastal Hazards and Climate Change Effects: A Guide for Local Authorities*: Ministry for the Environment, 2005.

Dunbar, R. I. M. "Neocortex Size as a Constraint on Group Size in Primates." Journal of Human Evolution 22 6 (1992): 469-93.

Easther, John. *Kapiti Coast Floodplain Management Plans: Waikanae River Archive*. Wellington, New Zealand: Wellington Regional Council Rivers Department, 1991.

Fehrenbacher, Jill. "Newer Orleans". 2006. InHabitat. (04/04/06). <http://inhabitat.com/newer-orleans/mvrdvneworleans/>.

Furuto, Alison. "In-Gawa: Community Housing Proposal / Index Architecture ". 2012. (07/06/2012). <http://www.archdaily.com/240412/in-gawa-community-housing-proposal-index-architecture/>.

Giovinazzi, Dr. Sonia, and Wilson, Dr Thomas. *National and International Know-How and Linkages to Support the Recovery of Lifelines Following the Canterbury* (Nz) Earthquake Sequence 2010-2011. Christchurch, New Zealand: University of Canterbury, 2012.

Glavovic, Bruce. "Bruce Glavovic on Rising Sea Levels." Radio New Zealand National. Ed. Glavovic, Bruce, 2015.

Hoogland, Carolien. "Semi-Private Zones as a Facilitator of Social Cohesion." Radboud University, 2000.

Jacobs, J. *The Death and Life of Great American Cities*. Vintage Books, 1961.
---. The Economy of Cities. Random House, 1969.

Janin, H, and Mandia; S. *A Range of Options to Cope with Sea Level Rise: Two Case Studies - the Netherlands and the United States*, 2012.

Kapiti Coast District Council. "River Recharge Scheme". 2015. <http://www.kapiticoast.govt.nz/river-recharge-scheme>.

Lynch, K. *The Image of the City*. Harvard U.P.; Oxford U.P, 1960.

Macfarlane, J.M. *The Ecological Touchstones of Our Identity: Confronting Native Landscapes with the Cultural and Ecological Identity of New Zealand's Society : A Thesis Submitted to the Victoria University of Wellington in Fulfilment of the Requirements for the Degree of Masters of Landscape Architecture*. Victoria University of Wellington, 2012.

Milne, Randall, and Sawyer; John. "Coastal Foredune Vegetation in Wellington Conservancy: Current Status and Future Management". Wellington, 2002. Department of Conservation. <http://www.doc.govt.nz/Documents/conservation/marine-and-coastal/coastal-management/wgtn-coastal-dune-plan.pdf>.

Miskell, Boffa. *A Guide to Growing Native Plants in Kāpiti*. 111 Dixon Street, Wellington.

Perry, C.A. *The Neighborhood Unit, a Scheme of Arrangement for the Family-Life Community*: Published as Monograph 1 in Vol.7 of Regional Plan of N.Y. Regional Survey of N.Y. And Its Environs, 1929.

Ramsay, Doug, et al. *Defining Coastal Hazard Zones for Setback Lines: A Guide to Good Practice*. Hamilton, New Zealand: National Institute of Water & Atmospheric Research Ltd, 2012.
Shand, Dr Roger. Assessment of the Kapiti Coast Erosion Hazard Assessment Report 2008 and 2012. Wellington, New Zealand: Cardno, 2013.

Te Ati Awa ki. "Some Aspects of Ati Awa Ki Kapiti History". 2013. 02/11/2015. <http://teatiawakikapiti.co.nz/iwi-history/>.

Tiberghien, G.A., and M. Desvigne. *Intermediate Natures: The Landscapes of Michel Desvigne*. Springer, 2009.

Walker, B., D. Salt, and W. Reid. *Resilience Thinking: Sustaining Ecosystems and People in a Changing World*. Island Press, 2006.

Wellington, Regional Council. *Waikanae Floodplain Management Plan: The Community's Plan for the Waikanae River and Its Environment*. Wellington, 1997.

Witzgall, S., et al. (Re)Designing Nature: Aktuelle Positionen Der Naturgestaltung in Kunst Und Landschaftsarchitektur. Distributed Art Pub Incorporated, 2011.

Woolley, Helen, and Rose; Sian. *The Value of Public Space: How High Quality Parks and Public Spaces Create Economic, Social and Environmental Value*. 11 York Road, London: Campaign for Architecture and the Built Environment 2003.

7.2. Figure List

All images are attributed to the author except where otherwise stated.

Chapter 1.0: Introduction

Fig 1.1. Image from George Grieve.
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Fig 1.4. Image from Te Ara - http://www.teara.govt.nz/en/photograph/6322/sandy-beach-erosion
Fig 1.5. Image from - coastalratepayersunited.co.nz/latest-news/?m+201306
Fig 1.6. Image from Kapiti News - http://issuu.com/the.star/docs/214148kn

Chapter 2.0: The Site

Fig 2.2. Image from - http://www.naturespace.org.nz/sites/default/files/u71/23%20August%2007%20-%20estuary%20fm%20air_0.jpg
Fig 2.12. Image from - http://www.caminhadanapraiadequiaios.blogspot.co.nz/2013/04/bookmarks-projectoquiaios_12.html?m=1
Fig 2.13. Image from - http://www.nhm.ac.uk/nature-online/art-nature-imaging/collections/endevour-botanical/detail.dsml IMAGO=003757&index=adv&detailtype=more
Fig 2.14. Image from - http://www.m.nzpcn.org.nz/flora_details.aspx?ID=2266
Fig 2.15. Image from - http://www.weblio.jp/content/carex+pumila
Fig 2.16. Image from - http://www.m.nzpcn.org.nz/flora_details.aspx?ID=1699
Fig 2.17. Image from - http://www.inaturalist.org/observations/413549
Fig 2.18. Image from -http://www.plantillustrations.org/taxon=593&lay_out=0&hd=0&group=1
Fig 2.22. Image from - http://www.m.nzpcn.org.nz/flora_details.aspx?ID=2052
Fig 2.23. Image from - http://www.terrain.net.nz/friends-of-te-henui-group/plants-native-botanical-names-m-to-q/nz-flax.html
Fig 2.24. Image from - http://www.plantsdirect.co.nz/products/farm-shelter/cortaderia-richardii-south-island-toetoe-1-99/
Fig 2.25. Image from - http://flickr.com/#/photos/84829097@N04/872544728/
Fig 2.26. Image from - http://www.wikiwand.com/en/Cyperus_ustulatus

Fig 2.27. Image from – http://www.kaiparacoast.co.nz/shop/media/catalog/product/cache/1/image/9df78eab33525d08d6e5fb8d27136e95/P/l/Plagianthus_Divaricatus_LRG.jpg
Fig 2.28. Image from - http://www.oratianatives.co.nz/catalogue_extras.php?photo_id=69Fig 2.29.
Fig 2.29. Image from - http://www.wunderground.com/wximage/Happysnappy/315
Fig 2.33. Image from - http://www.wikiwand.com/en/Leucopogon_fasciculatus
Fig 2.34. Image from - http://www.terrain.net.nz/friends-of-te-henui-group/table-1/coprosma-repens-var-poor-knights.html
Fig 2.35. Image from - https://upload.wikimedia.org/wikipedia/commons/0/08/Olearia_solandri_11.JPG
Fig 2.36. Image from - http://www.terrain.net.nz/friends-of-te-henui-group/table-1/korokio.html
Fig 2.37. Image from - http://phytoimages.siu.edu/users/pelserpb/11_8_11/8nov11/DSC_5158.jpg
Fig 2.38. Image from - http://www.kaiparacoast.co.nz/shop/media/catalog/product/cache/1/image/9df78eab33525d08d6e5fb8d27136e95/P/l/Plagianthus_Divaricatus_LRG.jpg
Fig 2.39. Image from -http://www.02landscapes.com/media/Cforsteri%20flowers.jpg
Fig 2.43. Image from - http://www.forestflora.co.nz/Plant%20profiles/sophora_microphylla/image002.jpg
Fig 2.44. Image from - http://www.oratianatives.co.nz/images/get_photo.php?photo_id=230
Fig 2.45. Image from - http://www.plantsdirect.co.nz/files/4176_20130507936l9-1367876179-500x375.jpg
Fig 2.46. Image from - http://www.smgrowers.com/imagedb/Myoporum_laetum_Carsonii.JPG
Fig 2.47. Image from - http://www.hebesoc.org/nz_plants/nz_plants_c/carmichaelia_odorata/carmichaelia_odorata_126-15_30kb.jpg
Fig 2.48. Image from - http://www.terrain.net.nz/friends-of-te-henui-group/table-1/tutu.html
Fig 2.52. Image from - Easther, John. *Kapiti Coast Floodplain Management Plans: Waikanae River Archive*. Wellington, New Zealand: Wellington Regional Council Rivers Department, 1991.
Figs 2.54 & 2.55. Images adapted from - Wellington, Regional Council. *Waikanae Floodplain Management Plan: The Community's Plan for the Waikanae River and Its Environment*. Wellington, 1997.
Fig 2.56.Image adapted from - Shand, Dr Roger D. *Kapiti Coast Erosion Hazard Re-Assessment: A Report Prepared for the Kapiti Coast District Council*. Kapiti Coast: Coastal Systems Ltd, 2012.
Fig 2.57. Image adapted from - Milne, Randall, and Sawyer; John. "Coastal Foredune Vegetation in Wellington Conservancy: Current Status and Future Management". Wellington, 2002. Department of Conservation. <http://www.doc.govt.nz/Documents/conservation/marine-and-coastal/coastal-management/wgtn-coastal-dune-plan.pdf>.

Fig 2.58. & 2.59 Images adapted from Kapiti Coast District Council - http://www.kapiticoast.govt.nz/Tsunami-Evacuation-Maps
Fig 2.60. Image adapted from Journal of Polynesian Society -http://www.jps.auckland.ac.nz/docs/Volume066/images/JPS_066_358_a.jpg
Fig 2.61. Image adapted from - https://ngamanuhistory.files.wordpress.com/2009/12/1942-waikanae-map.jpg
Fig 2.62. Image adapted from - Easther, John. *Kapiti Coast Floodplain Management Plans: Waikanae River Archive*. Wellington, New Zealand: Wellington Regional Council Rivers Department, 1991.

Chapter 3.0. Disciplinary Tendencies

Fig 3.1. Willem de Lange. 'Coastal erosion - Shifting sands', Te Ara - the Encyclopedia of New Zealand, updated 9-Jul-13
URL: http://www.TeAra.govt.nz/en/photograph/6325/storm-damage
Fig 3.2. Witzgall, S., et al. *(Re)Designing Nature: Aktuelle Positionen Der Naturgestaltung in Kunst Und Landschaftsarchitektur*. Distributed Art Pub Incorporated, 2011
Fig 3.3. Image adapted from - Tiberghien, G.A., and M. Desvigne. *Intermediate Natures: The Landscapes of Michel Desvigne*. Springer, 2009.
Figs 3.4. to 3.6. Images adapted from - Perry, C.A. *The Neighborhood Unit, a Scheme of Arrangement for the Family-Life Community*: Published as Monograph 1 in Vol.7 of Regional Plan of N.Y. Regional Survey of N.Y. And Its Environs, 1929.
Fig 3.7. Image from Michel Desvigne - Tiberghien, G.A., and M. Desvigne. *Intermediate Natures: The Landscapes of Michel Desvigne*. Springer, 2009.
Fig 3.7. Image from - Allan, P., and C. Stutterheim. *Moved to Design*. RMIT University Press, 2007.

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Fig4.1.Image from - http://i.guim.co.uk/static/w-620/h--/q-95/sys-images/Guardian/Pixpictures/2014/2/15/1392480497510/Netherlands-Kamerik-Farms-012.jpg
Fig 4.4. Image from - Janin, H, and Mandia; S. A Range of Options to Cope with Sea Level Rise: To Case Studies - the Netherlands and the United States, 2012.
Figs 4.7. to 4.11. Images adapted from Michel Designee - Tiberghien, G.A., and M. Desvigne. Intermediate Natures: The Landscapes of Michel Desvigne. Springer, 2009.

Chapter 5.0. The Urban Components

Figs 5.1 to 5.4. Fehrenbacher, Jill. "Newer Orleans". 2006. InHabitat. (04/04/06). <http://inhabitat.com/newer-orleans/mvrdvneworleans/>.
Figs 5.40 to 5.45. Images from INDEX Architecture - Furuto, Alison. "In-Gawa: Community Housing Proposal / Index Architecture ". 2012. (07/06/2012). <http://www.archdaily.com/240412/in-gawa-community-housing-proposal-index-architecture/>.