



The Bioregional Park: Commemorating the visit of Captain Cook

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Declaration of work

I confirm that:

- In this thesis, all the work involved represents my own work.
- The contribution of supervisors and others to this work was consistent with the Unitec Code of Supervision.

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Date: August 2018

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Abstract

Not up until recently, the majority of people have begun to be concerned about the impact of human activities on the environment. As an increasing amount of people flood into towns and suburbs and more and more people are leaving the city, restoration, preservation and enhancement of biodiversity in towns and suburbs areas have become important. This research is to develop landscape architectural methodology that applies bioregional concepts in concepts. The Mercury Bay is the place to test this new method. The research is expected to be used in the Mercury Bay test to apply this method to other projects. The aims are that to protect the ecosystem of the restoration of habitat patches, and to form a new cultural display window and to build a human activity network. This project's other aim is to celebrate and commemorate the 250th anniversary of Captain James Cook's first voyage (1769) to New Zealand.

Keywords: Biodiversity concepts, bioregional park, improve the environment, habitat patches, Bioregional Approach.



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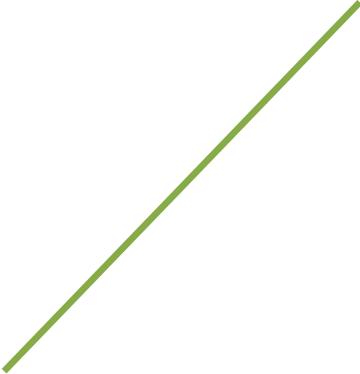
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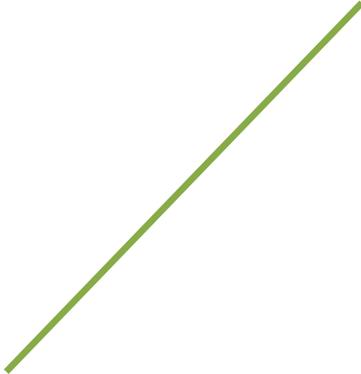
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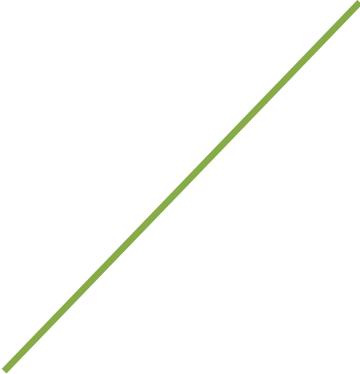
Part.01

Introduction



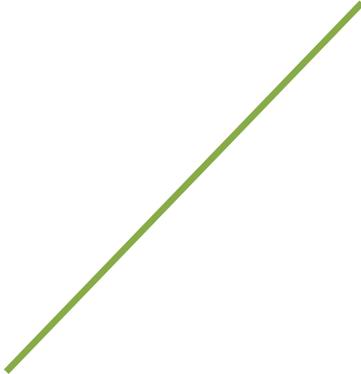
1. Introduction

Nowadays, with the process of society, cities, towns and rural areas have all witnessed expansion of scales, high-speed growth and overpopulation to some extent. For the environment, human activities have brought about problems such as pollution, global warming, extinction of species, overpopulation and destruction of natural habitats (Berg, n.d.). Therefore, the construction of ecological green space system emerge as a new measure for human beings to fight with these challenges for survival. It is also an important part of promoting social development and sustainable development of cities, towns and rural areas. Ecological green space system can not only improve people's living environment but also connects people to nature, and make a habitat for ecosystems of plants and animals. In this paper, the researcher introduces a brand new project of bioregional park which is now being constructed in New Zealand. This project will investigate how the concept of bioregional park can improve the local ecologies in the the place where Captain Cook landed as a means to commemorate his arrival in New Zealand. This thesis will illustrate how we can protect environment and make public space. The main aim of this paper is to show how the bioregional approach can protect environment and make sustainable public space in New Zealand around.



Part.02

Background

- 2.1. Project Background
 - 2.2. Historical Background
 - 2.3. Captain James Cook
- 

2.1. Historical Background

■ Polynesia

In 3500 BC, people began to explore from Asia to the east of Pacific. In about 1500 BC, starting from Taiwan then through Philippines and Eastern Indonesia, explorers travelled from new guinea island to Melanesia Island. They reached the Western Polynesian islands around 900 BC. (Kayser, Brauer, Weiss, Underhill, Roewer, Schiefenhövel, & Stoneking, 2000).

According to the definition of Wikipedia is that "Polynesia is generally defined as the islands within the Polynesian Triangle, although there are some islands that are inhabited by Polynesian people situated outside the Polynesian Triangle. Geographically, the Polynesian Triangle is drawn by connecting the points of Hawaii, New Zealand and Easter Island. The other main island groups located within the Polynesian Triangle are Samoa, Tonga, the Cook Islands, Tuvalu, Tokelau, Niue, Wallis and Futuna and French Polynesia" (Wikipedia, 2008). In addition, Polynesia is a cultural term. It is one of the three parts of Oceania, and the other two parts are Micronesia and Melanesia.

The place where Polynesia finally settled is Aotearoa (New Zealand), in around 1200 AD. According to tribal narratives, Kupe was the first Polynesian to discover the islands of New Zealand. Therefore, New Zealand's traditions, arts, religions, and sciences are similar to those of Polynesia (Anderson, 2005, p: 791-800).

■ Ngati Hei land lands and Pa sites

Around 800 AD, a tribe came from Polynesia. The name of this tribe is Hei, the elder brother of Tama Te Kapua, Captain of the Arawa canoe. When Arawa lands on Bay of Plenty, Hei goes north to Coromandel at the same time. His journey is commemorated in the names Hahei and Te Whanganui a Hei (Mercury Bay). Therefore, the people called Ngati Hei to represent the combination of the early population and the main line of Arawa's origin. With the increase of population in the region, competition in food and resources has led to the development of the war. The first Pa on Wharetaewa headland was an early example of a terraced Pa with lines of palisades to defend them. With the development of the war, there were a lot of Pa sits in this area It was during this period that Captain Cook saw Wharetaewa in 1769 (Ngati Hei Charitable Trust 2016, 2016).

During the historical period, the war destroyed the tribes on Coromandel, including Ngati Hei. In 1852, the tribes met to discuss limiting land requirements for Ngati Hei. At present, Ngati Hei has 120 hectares of land in the heartland of the region. Its most obvious feature is the Wharetaewa Pa and the connected Urupaa, which is the connection between the descendants of Ngati Hei and their ancestors, where their ancestors' bones were buried (Ngati Hei Charitable Trust 2016, 2016).

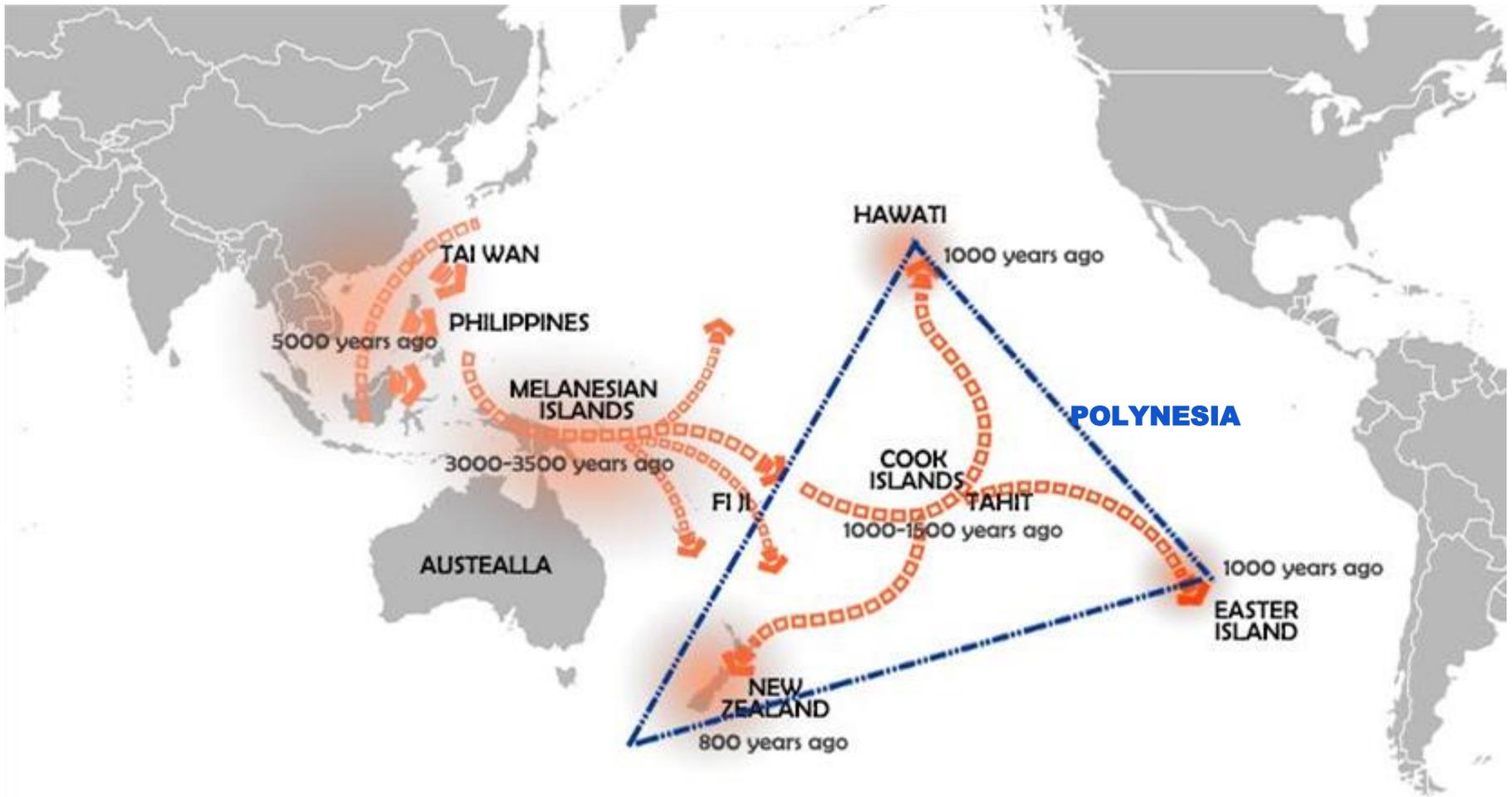


Figure 2.1. People habitation of NZ - Maori arrival

2.2. Captain James Cook

Captain James Cook (7 November 1728– 14 February 1779) was a British explorer, navigator, cartographer, and captain of the Royal Navy. Captain Cook was one of the first Europeans to land in New Zealand. Cook spent 328 days on New Zealand's three voyages (Figure 2.2). (Mackay, 2007)

■ First Voyage

On 6 October 1769 a boy spotted the land. After two days, Cook landed at Poverty Bay which was near present day's Gisborne. It was the first time he landed in New Zealand. After landing, Cook and his fellow crews began collecting specimens of New Zealand flora. But an unfortunate skirmish with Māori happened and caused some casualties of Māori. Like Tasman's bloody experience at Murderers Bay (Golden Bay) in 1642, this incident indicated Māori's effort of dealing with strange newcomers in their traditional way. (Wilson, 2016; Mackay, 2007)

After the skirmish, Cook and his fellows continued their journey to Mercury Bay and his investigation of flora. Nowadays, people can still see the monument of his arrival near the Cook beach.

Cook then carried on his journey along the east coast of New Zealand and arrived in Bay of Islands, where he spent a week and continued collecting specimens of flora. Bay of Islands is the first site of permanent European settlement. After that, Cook quickly sailed along the west coast of North Island to Queen Charlotte Sound. Queen Charlotte Sound is

the base for the three voyages of Cook.

■ Second Voyage

On 13th July, 1772, Cook, sailed from England to Queen Charlotte Sound, New Zealand. The only important significance of the second voyage is that Cook painted Dusky Sound, and he spent six weeks here in the autumn of 1773. (Wilson, 2016)

■ Third Voyage (1776–1779)

In his third voyage, In his third voyage, from 12th to 25th February 1777, Cook stayed at their base in New Zealand where is Ship Cove in Queen Charlotte Sound, before he sailing into the North Pacific. Unfortunately, on February 14, 1779, he was killed in a clash on the island of Hawaii (Wilson, 2016).

Among Cook's three voyages, his first voyage has a very important impact on New Zealand. After discovering New Zealand in October 1769, Cook drew the very first chart of New Zealand in 1770 and completed adding details during following two voyages to New Zealand. The chart is the first completed chart of the country's coastline, and is remarkably accurate and incredibly detailed. (Carter, 2006) It has a great significance in the New Zealand history.

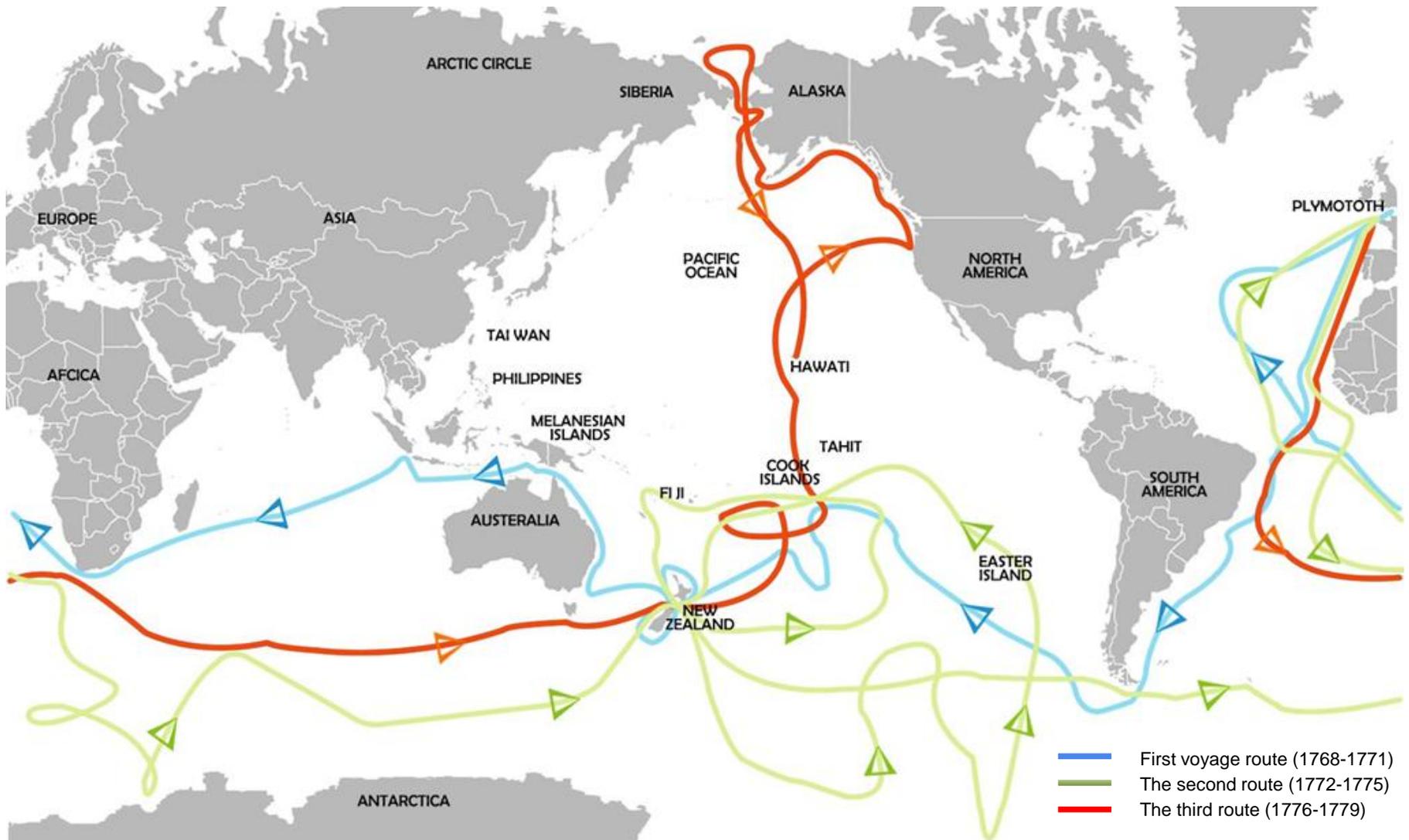
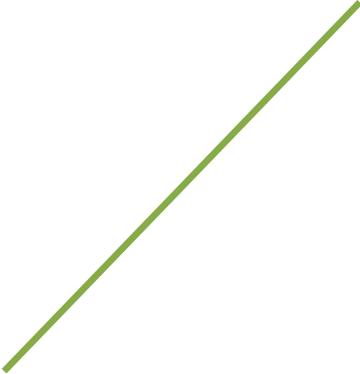


Figure 2.2. Map of Cook's three voyages

2.3. Project Background

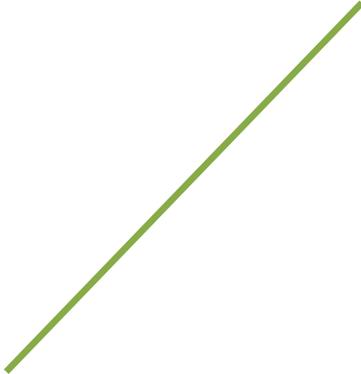
- The project is informed by a wider Global, Local, Bioregion concept. One of its aims is to develop landscape architectural methodology that applies bioregional concepts in New Zealand context.
- The chosen site to test this new methodology is Mercury Bay. To investigate the transferability of this new methodology is another objective of this project.
- The project has a real-world context and influence:
 - It is a part of the landscape architecture work to celebrate and commemorate the 250th anniversary of Captain James Cook's first voyage (1769). For example, a strategy of land and sea interventions which create a memorial across Mercury Bay
 - secondly, it is a part for a wider strategy for the integration of land management strategies following the Hauraki Treaty Settlement, focused on Ngatei Hei lands.



Part.03

Research Question

3.1 Sub-questions

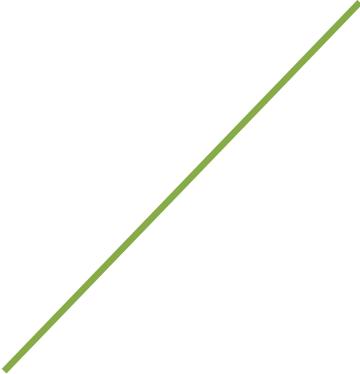


3. Research Question

How can mapping a bioregion and its ecological connections be used as a driver for landscape architecture: conservation, and public space strategies?

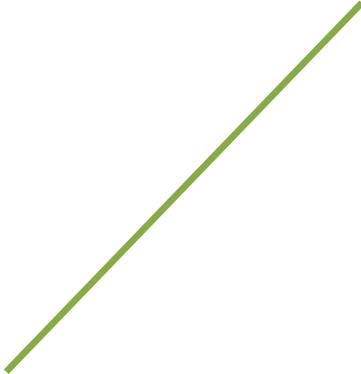
3.1. Sub-questions

- How can tourism/recreation and ecological restoration be interwoven?
- How can both Maori and Pakeha cultural values be integrated within the framework of the Bioregional park?
- What influences does bioregional park bring about ecological connectivity?



Part.04

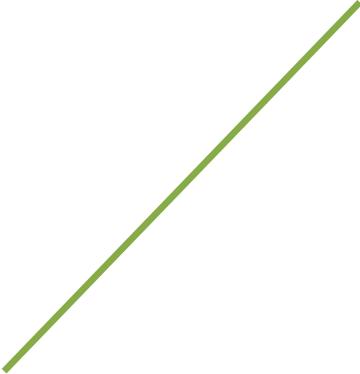
Aims and Objectives



4. Aims and Objectives

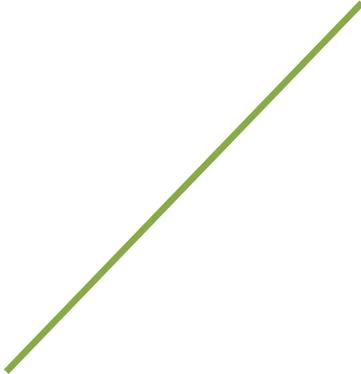
This project serves as a real project with multiple departments and organizations, including Ngati Hei, 2019 Organising Committee and local community and Sam Bourne who is Landscape Architect – External Advisor. Its main objectives and aims has the following points:

- To establish a healthy ecological matrix within Mercury bay.
- To enhance terrestrial and map marine habitats.
- To establish and reinforce cultural connections and narratives within the landscape of Mercury Bay:
 - A landscape scale national memorial to the meeting of people,
 - A land management strategy for the return of Ngati Hei lands



Part.05

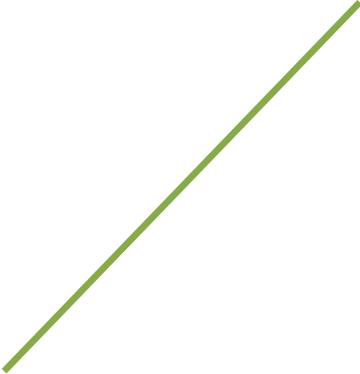
Methodology



5. Methodology

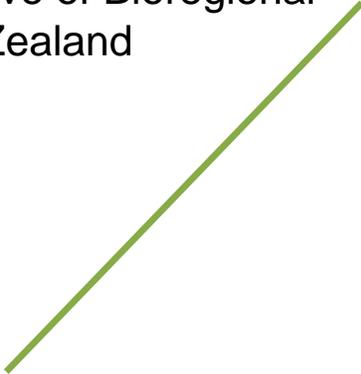
My methodology includes the following parts of the survey:

- Research by design
A survey of the background and historical background of the design project
- Literature Review
This part includes the design Approach, theory and basic principles.
- Case studies
Reference and analysis of successful design projects to solve similar problems.
- Site Selection
The site inspection will be carried out after the site selection is determined. This part includes: Site investigation , site visit, Meet with local scholars, experts and project sponsors. Make a thorough investigation of the project background, local history, culture and lifestyle.
- Site and Context Analysis
Accurate information on the design site will be obtained through data collection and GIS analysis mapping, including the land ownership of Ngati Hei land lands and Pa sites, land cover, land use capability, slope, stream systems, habitat, and vegetation cover.
- Landscape Strategy and Design
Through the above investigation and analysis, determine the preliminary plan and master plan of the design and then enter the detailed design and design presentation.
- Conclusion



Part.06

Literature Review

- 6.1. Bioregional Approach
 - 6.2. Basic Principles and Theories
 - 6.3. Prospective of Bioregional Park in New Zealand
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6. Literature Review

6.1 Bioregional Approach

6.1.1. Latest Researches in Bioregionalism

Although an increasing amount of people now realize biodiversity as a global asset and its value to present and future generations, there are still species disappearing everyday as a result of human activities. Biological resources are the foundation which civilizations are built on. The products of nature not only support human beings but also provide support for industries ranging from agriculture to construction and waste treatment. Thus, the loss of biodiversity threatens our food supplies, interferes with essential ecological functions and restricts the sustainable development of all industries.

The idea of bioregionalism was formed by cooperation of natural scientists, social and environmental activists, artists and writers, community leaders and workers who studied natural resources since the early 1970s. They want to do "more than just save what's left" in nature, wilderness and biosphere (Berg, n.d.). Vincent McGinnis (1999) claimed that "Bioregionalism is a body of thought and related practice that has evolved in response to the challenge of re-connecting socially-just human cultures in a sustainable manner to the region-scale ecosystems in which they are irrevocably embedded" (McGinnis, 1999).

Meanwhile, bioecology is also known as 'politics of place' (Michael, 1983). It has many characteristics, including

beliefs about nature rather than political or administrative regions as organizational units for human activities; Emphasizing the practical land principles applied at local and regional scales. It is also against the development trend of monoculture in the world, and advocates the development of multiculturalism in local areas (Alexander, 1990).

In many ecologically sustainable areas, bioregional thinking has a strong affinity. Bioregional thinking is applied and manifested in different aspects in different industries by scholars and experts. For example, It is easy for restoration ecology workers to appreciate the importance of local culture because they are trying to restore native plants and animals. Urban ecology advocates the use of biosphere as a guide for their redesigned cities. Environmentalists and most farmers adopt technologies that are suitable for their specific areas and adhere to the maintenance of soil, water sources and local species. Poets, painters, theatrical troupes and other artists embodied the themes of biology in their works (Berg, n.d.).

The United Nations has formulated the convention on biological diversity, the international legal instrument for "the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources" that has been ratified by 196 nations (United Nations, 1992).

According to Atlas's research and investigation (2016), there are 391 ecoregions (out of 823 ecoregions total worldwide) that comprise the world's 35 biodiversity hotspots. And 21 of 35 those hotspots currently fall short of the United Nations Convention's target of achieving 17 percent global terrestrial area as protected habitat by 2020. Moreover, within the 420 major cities from the Atlantic Forests hotspot in Atlas's survey, half of the cities were found to be faced with a huge problem: 244 of the cities were on a collision course with unique and irreplaceable biodiversity (Weller, 2016). And this problem has nothing to do with the whole-of-city urban planning.

The lack of planning is also evident at the national scale. Almost all the hotspots in the world do not have a complete national land usage plan to incorporate biodiversity with the country's long-term development. In fact, under the Convention on Biological Diversity, each nation does have to come up with National Biodiversity Strategy and Action Plan, but these plans tend to be wordy, platitudinous reports and many are out of date.

Therefore, how to solve the tension between human beings, organisms and nature in protected areas has become an important task in the sustainable development of the world.

6.1.2. Definition and interpretation

A biological area as a unit, bioregional-based planning and action can help narrow social problems and solve problems, and help participants know the limitations of resources in one place so that people will not continue to overestimate the ecological carrying capacity of our residential areas.

Bioregional approach will have a huge impact on the mainstream of the world through local culture, ecosystems, and resources to the uncertain future, which will help to meet the needs of life on the earth more widely. This will be more effective than national or global scale initiatives (Flint, 2015).

According to Berg (n.d.) and Dasmann (1978, p. 218), in terms of the unique overall pattern of natural characteristics which are found in a specific place is called a bioregion. It is obvious to figure out the main features throughout a continuous geographic terrain, especially a particular climate, local aspects of seasons, landforms, watersheds, soils, and native plants and animals, and also includes people. It is also a cultural idea, a feature of a particular biota that is formed by mapping information from natural sciences and many other sources. Such as anthropological studies, historical records, social development, customs, traditions and art (Berg, 2002).

According to Berg (n.d.) and Flint (2015), bioregionalism and bioregional approach are utilized for the main purposes as below:

- Recovery and maintenance of local natural ecosystems,
- Develop sustainable approaches to meet basic human needs, such as food, water, energy, houses, resource materials, waste disposal and cultural information.

- Create and support a wide range of activities to better integrate into life.
- Support recovery work.

The use of Bioregional Approach to start the sustainable development of the biological region is a compass to realize the sustainability of the bioregion in any city, town, and rural area. The approach calculates human needs, community functions and ecosystems (Berg, n.d; Miller, K & Hamilton, L, 1999). The following are the basic policies that need to be taken in different areas of the bioregion.

■ Water

The water purity of freshwater resources such as nearby rivers, streams and lakes , as well as collection, filtration and two times of use for rainwater and domestic wastewater should be restored.

■ Food

Among the city, rural and suburban areas, individuals and groups support small-scale agriculture development.

■ Garbage

The garbage is classified and recycled.

■ Resources

The development and utilization of new energy sources including wind energy, solar energy and water flow, and the rational exploitation and utilization of natural resources. Meanwhile it emphasizes the use of local and sustainable resources and materials instead of natural resources.

■ Transportation

Converting public vehicles to renewable energy, such as solar power. The use of non-fossil fuel cars and trucks is encouraged. Establish a perfect public transport system and encourage people to use public transport system to travel. Build more footpaths and bicycle lanes to encourage people to use them.

■ Education and culture

Dissemination of ecological sustainability information in schools and in some public places, and publicize its importance through some celebrations, public art projects.

■ Parks and Open Spaces

Redesign and upgrade the original parks and open spaces, and establish new parks and green space systems as plant and animal ecological habitats. Restore and protect the natural ecological environment.

The bioecological approaches focus on many aspects including nature, water, culture and human life in the bioregion. They might have different priorities depending on the location and location of each project. The mercury Bay Bioregional Park project focuses on the establishing a new ecological patch, combining a celebration to publicize and display the local cultural history and the construction of the biologic Park.

6.2. Basic Principles and Theories

■ Principles

Silbernagel (2005) claims that “The bioregion, a unique area defined by natural boundaries and supporting distinct living communities, is emerging as a meaningful geographic framework for understanding place and designing long-term sustainable communities” (p, 111). Therefore, the design of a biological park should include the following factors:

□ Local Characteristics

Understanding the local natural and cultural background is the basis for a design. For any design problem, the designer should first consider following the questions which are: Where we are? What does nature allow us to do? What does nature help us to do? Firstly, Landscape designer should respect traditional culture and local knowledge, because they stem from the experience of local people's lives. Designer should also understand the lives of local people, including water, food, animals, plants, energy, medicine, and spiritual sustenance. Secondly, landscape design must adapt to the local natural process. The biological area design should be based on the local natural process, such as the local sunlight, terrain, water, wind, soil, vegetation and energy. The process of design is to combine these natural factors with local features in the design, and to maintain the health of the design site (Silbernagel, 2005). Thirdly, the use of local plants and building materials is an important aspect of ecological design. The returns of using local materials can not only support the growth, management and maintenance of local species, but also help preserve the endangered species. Therefore,

conservation and utilization of local species is one of the main objectives in the design of biological areas (Yu, Li, & Ji, 2001, p: 4).

□ The Protection and Conservation of Natural Resources
The earth's natural resources are divided into two categories: renewable resources (such as water, forests, animals, etc.) and non-renewable resources. In order to achieve sustainable development environment, we must protect and save non-renewable resources. If we can effectively use the solar energy, wind energy and other green energy in the design, we can reduce the use of nonrenewable energy resources (Yu, Li, & Ji, 2001, p: 5).

□ Biodiversity

The natural system contains a variety of biological species. The core of the designing bioregional park is to reserve biological diversity. The fundamental purpose of protecting biodiversity is to protect native species (Savard, Clergeau & Mennechez, 2000). It is the goal of the future development of urban environment to design a sustainable landscape system by adopting the concept of biological area landscape design.

□ Artistic and Cultural Expression

Traditional design emphasizes the individual creation of the designer, which is a pure artistic process. The landscape design of a biological area and the traditional landscape design are different in some aspects. However, biological area design should be the evolution and continuation of the traditional design, rather than the mutation and fragmentation. Therefore, it should also have a unique cultural meaning and artistic beauty.

■ Theories

According to the geographic environment of the project, the terrain in this area is complex and contains different terrains such as mountain, forest, grassland, wetland, urban land, and ocean. So according to the different geographical environment, different parts will use different design concepts. The land section includes mountain, forest, grassland, wetland, and urban land, which will use the Landscape ecology (Patch-Corridor-Matrix Concept). In the ocean part, coastal marine and coastal terrestrial areas will apply the concept of Marine Space Planning.

□ Landscape ecology (Patch-Corridor-Matrix Concept)

Forest plants in New Zealand have evolved without mammalian herbivores. As mentioned previously, the introduction of the New Zealand biota suggests that exotic species pose a great threat and impact to New Zealand's biological communities. For example, the introduction of mammals has led to an increase in mortality of native tree species and the introduction of dry fruit trees and wind pollination trees in lowlands may eventually threaten the viability of New Zealand frugivorous and honey-eating birds, as they threaten the growth of woody plants that provide fleshy fruits or nectar for these birds (Clout & Hay, 1989, p:27-33; Meurk & Hall, 2006, p:131-146).

However, the interactions between birds and forest plants provide numerous benefits, including pollination and seed dispersal. In New Zealand forests, about 70% of woody plants have fruits suitable for the transmission of vertebrates, most of which are likely to be spread by birds. The extinction of recent fruit forest birds (e.g., moas, piopio

Turnagra capensis, huia *Heterolocha acutirostris*) and the reduction of other species (e.g., kokako) have reduced the number of potential seed seeding, especially for large fruit tree species. Similar problems have occurred in Polynesia recently, but the impact on forest regeneration patterns is unknown (Clout & Hay, 1989, p:27-33). Therefore, it is necessary to restore and establish ecological habitat green system in biological areas, because in the broken landscape of New Zealand, the main limitations of the plant are the lack of places with high-quality ecological functions to attract birds, the inhibition of flourishing grass, and the restriction of grazing and predatory mammals (Clout & Hay, 1989, p:27-33).

In urban and rural environments, protected areas are restricted by land use and commercial factors, so the habitat patches are more important because it is the supply station for the migration and free travel of these birds. Therefore, small habitat patches (1 to 6 hectares) need to be reclaimed. However, this is not necessarily a key limitation, because most existing New Zealand wildlife (insectivorous birds, lizards, invertebrates) are very small or roaming. Habitat patches can perform useful ecological functions without reducing habitat quality (Clout & Hay, 1989, p:27-33; Meurk & Hall, 2006, p:131-146).

Young and Mitchell (1994) and Davies-Colley et al. (2000) In Auckland, they found that the edge effect of climate is about 50m around the city, with an area of about 6.25 hectares (250 x 250 square meters) surrounded by a core area of more than 2 hectares, surrounded by about 4 hectares of buffer zone (Figure 6.2.1). Therefore, the core area of the 2- ha will be the minimum value to satisfy the

habitat of animals and plants (Meurk & Hall, 2006, p:131-146).

In fact, a patch-pattern should be designed as a landscape, where the available land is the smallest forest patch size in a limited range. In urban or rural areas, a core shelter should be established every 6.25 hectares, and every 1.6 hectares should provide habitat for most plants, lizards, insectivorous birds and invertebrates (Figure 6.2.2). The interval between each small patch is about 5 to 0.2 kilometers, in order to achieve spatial connectivity. (Young & Mitchell, 1994; Meurk & Hall, 2006, p:131-146).

This concept can help us analyze and understand the local natural resources, guide us to protect and restore ecosystems and create a healthy habitat for animals.

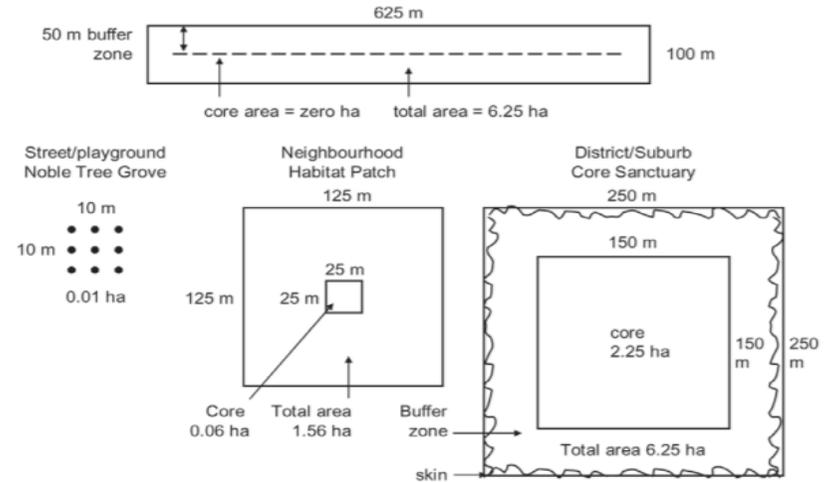


Figure 6.2.1 Reserve patch designs (Meurk & Hall, 2006, p:131-146).

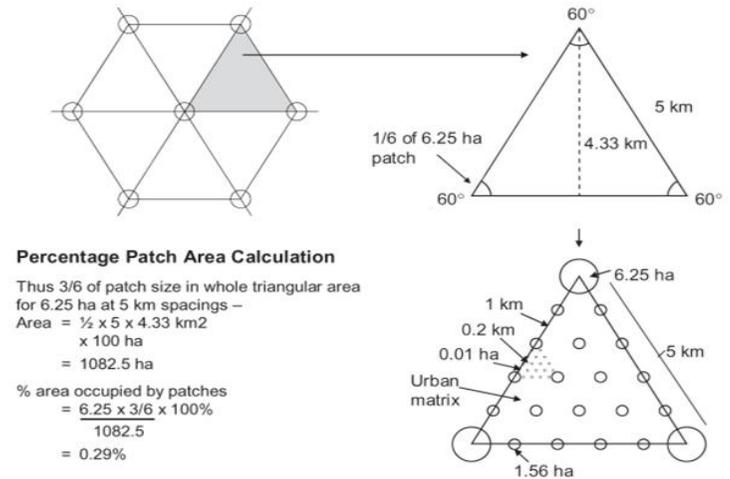


Figure 6.2.2 “An idealised, nested forest patch configuration of three patch sizes; and method of calculation of percentage area occupied by patches, applied to the largest patch size of 6.25 ha” (Meurk & Hall, 2006, p:131-146).

□ **Marine Space Planning**

The concept of Marine space planning will be applied in the design of ocean part. Marine space planning is a reasonable planning and distribution of marine space and activities. It aims to protect the marine ecosystem, reduce fragmentation of marine habitats, and effectively use marine resources (Alexander & Janssen & Arciniegas & O'Higgins & Eikelboom & Wilding, 2012).

Mercury Bay belongs to the Hauraki Gulf Marine Park. Its main purpose is to protect New Zealand's natural resources and marine ecological environment. Therefore, the sea area must follow the planning of the marine reserve. And the part of Coastal Marine and Coastal Terrestrial Areas will apply the concept of Marine Space Planning for design guidance. The Hauraki Marine Spatial Plan will be used to modify policies and regulations. Its purpose is to improve the health and productivity of Thames River, Hauraki Gulf and east coast Coromandel (Thames-Coromandel District Council, 2017).

6.2.1. Hauraki Gulf Marine Park

In 2000, due to its national significance, the marine tapestry of ecosystems and rich biodiversity was officially named the Hauraki Gulf (Figure 6.2.3), becoming first national marine park in New Zealand.

Today, the park has five separate marine sanctuaries. There are many kinds of animals and plants in the Gulf of HuraKi. For example, Today, the Gulf of Hauraki has five separate marine sanctuary, which has a wide variety of

animals and plants. For example, snorkelers and divers like large numbers of rainbow-colored fish, sharks, crabs, starfish and seals. There are also species of birds that are popular with bird lovers (Hauraki Gulf Marine Park Act 2000).

Hauraki Gulf Marine Park Act 2000 (2000) claims that “the purposes of the Hauraki Gulf Marine Park are—

- to recognise and protect in perpetuity the international and national significance of the land and the natural and historic resources within the Park (Hauraki Gulf Marine Park Act 2000, 2000);
- to protect in perpetuity and for the benefit, use, and enjoyment of the people and communities of the Gulf and New Zealand, the natural and historic resources of the Park including scenery, ecological systems, or natural features that are so beautiful, unique, or scientifically important to be of national significance, for their intrinsic worth (Hauraki Gulf Marine Park Act 2000, 2000);
- to recognise and have particular regard to the historic, traditional, cultural, and spiritual relationship of tangata whenua with the Hauraki Gulf, its islands and coastal areas, and the natural and historic resources of the Park (Hauraki Gulf Marine Park Act 2000, 2000);
- to sustain the life-supporting capacity of the soil, air, water, and ecosystems of the Gulf in the Park” (Hauraki Gulf Marine Park Act 2000, 2000).

6.3 Prospective of Bioregional Park in New Zealand

Les Molloy (2007) claims that "Protected areas are places where natural or cultural resources and biodiversity are protected, maintained and managed, usually by law". There are about 60 different types of protected areas in New Zealand, including national parks, conservation parks, nature reserves, scientific reserves, scenic reserves, historic reserves, other conservation land and recreation (and other) reserves.

Until present days, New Zealand has established more than 10000 protected areas which cover more than 8.6 million hectares and account for 32% of the total land area. Among those protected areas, the most famous ones are 13 national parks. According to the National Parks Act 1980, national parks are defined as "areas of New Zealand that contain scenery of such distinctive quality, ecological systems, or natural features so beautiful, unique, or scientifically important that their preservation is in the national interest" (section 4(1), National Parks Act 1980). Most national parks are in the forest cover. Other protected areas are natural reserves, historical reserves and marine reserves. Natural reserves protect habitats of endangered animals and plants. Historical reserves are places of historic or cultural significance. Marine reserves are places where people can swim, dive and explore, but they cannot catch fish or other creatures (Molloy, 2007).

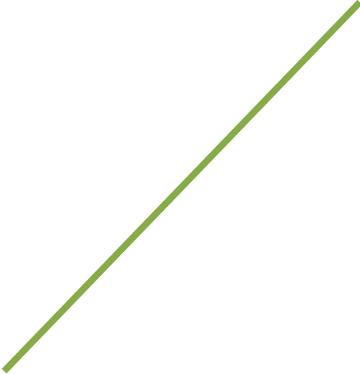
These different types of protected areas have their own functions and meanings, such as entertainment and leisure functions, business activities, ecological landscape

functions, and traffic access functions. According to their distinctive functions, their boundaries may be based on buildings, roads or natural factors (rivers, watershed, etc.).

Nowadays, New Zealand has parks like Sport & Recreation, Neighbourhood, Public Gardens, Nature, Cultural Heritage and so on. (Milne & Director & Ltd, 2011). These types of parks have different functions and meanings in our lives:

- Sport & recreation: They are mainly for sports and entertainment venues, including a lot of entertainment facilities.
- Neighbourhood: They are mainly on the street of the community. They are informal entertainment, play and comfortable leisure space.
- Public gardens: They are comfortable spaces to display the gardening, letting people rest and relax. At the same time, they have educational significance.
- Nature: They mainly experience and protect the natural environment, such as native bush coastal forestry, farm parks, wetlands and water bodies.
- Cultural heritage: Their role is to protect the cultural and historical environment, to provide a place for mourning and remembrance.
- Outdoor adventure: They provide people with a variety of entertainment facilities and entertainment activities.
- Civic space: They are the open space and communication space of society and community.
- Recreation and ecological linkages: They serve as a corridor connecting open areas and ecological zones in open space.

The bioregional park is a new type of park, which is different from the existing categories of parks or protected areas in New Zealand. The bioregional park for example does not have a clear boundary unlike other types of parks whose boundaries are defined mostly by topography. For example, natural parks are mainly established to protect the natural environment, and the role of cultural heritage parks is to protect the cultural and historical environment. Bioregional park, however, is a compound park covering different types of uses and activities, as well as serving as an ecological habitat. It has a lot of functions and features. For example, it can not only restore and maintain a local natural ecosystem but also develop sustainable means to meet the basic needs of human beings, such as food, water, energy, shelter, resource materials, waste disposal and cultural information. It also serves as a network connecting habitats and culturally significant landscapes that may be physically separated but are ecologically and culturally/historically connected.



Part.07

Case studies

- 7.1. Te Araroa - New Zealand's Trail
 - 7.2. Tidbinbilla Nature Reserve
 - 7.3. Twin Peaks Bioregion
 - 7.4. Conclusion
- 

7. Case Studies

7.1. Te Araroa - New Zealand's Trail

Te Araroa - New Zealand's Trail is a continuous 3,000 km walking track from Cape Reinga to Bluff (Figure 7.1.1). It takes walkers 5 months to complete the whole trail, so it has earned the name “the ultimate 5-month New Zealand experience”. The trail also provides a journey from a few days to a week or longer and many attractive day or overnight walks.

Te Araroa is different from the traditional country route. It connects tribes, towns and nature. This is a corridor to encourage social and economic exchanges. For the sake of



Figure 7.1.1 Te Araroa - New Zealand's Trail (Soldier, n.d.).

travellers' stay and other cultural experiences (food and accommodation). The track corridor shows a lot of New Zealand experience - nature, culture, and history - nature, culture, and history (Soldier, n.d.). Figure 7.1.2 and Figure 7.1.3 are Te Araroa Trail through Mavora Lakes and Papakauri Stream.

The boundary of Te Araroa is the natural boundary of New Zealand itself. En route explores New Zealand's tomboles, volcanoes, range and mountain uplift, rivers, lakes, valleys and the sea.



Figure 7.1.2 Te Araroa Trail - Mavora Lakes (Curran, n.d.).

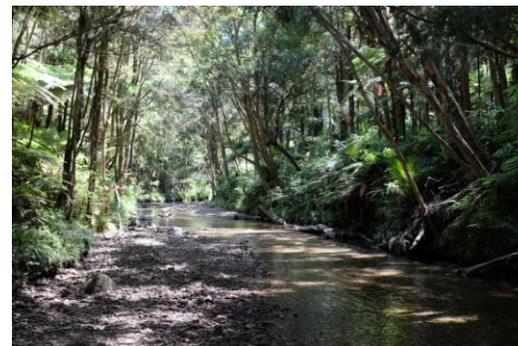


Figure 7.1.3 Walking Te Araroa Trail - Papakauri Stream (Auckland council, n.d.).

7.2. Tidbinbilla Nature Reserve

Tidbinbilla Nature Reserve is located in Australia (Figure 7.2.1), which offers outstanding wildlife viewing including koalas, kangaroos, platypus as well as bushwalking. Tidbinbilla Nature Reserve has fourteen protected habitats including different land types such as wetlands, grasslands, woodlands and so on (Figure 7.2.2 and Figure 7.2.3).

Tidbinbilla is part of the Australian Alps national parks, a series of parks and reserves that span Australia's southeastern high country. The Australian Alps are National Heritage listed, recognising that its natural and cultural values are of outstanding national significance (ACT Government, 2017).

Recognised as Canberra's leading ecotourism attraction, Tibbbindra provides experience in protecting wildlife and nature in the natural environment as well as the opportunity to understand and find Tebbbina's conservation initiatives. The beautiful and quiet Tidbinbilla Valley protects wetlands, grasslands, woodlands and eucalypt forest habitats, as well as wet fern gullies, mountain streams and subalpine forests (ACT Government, 2017).

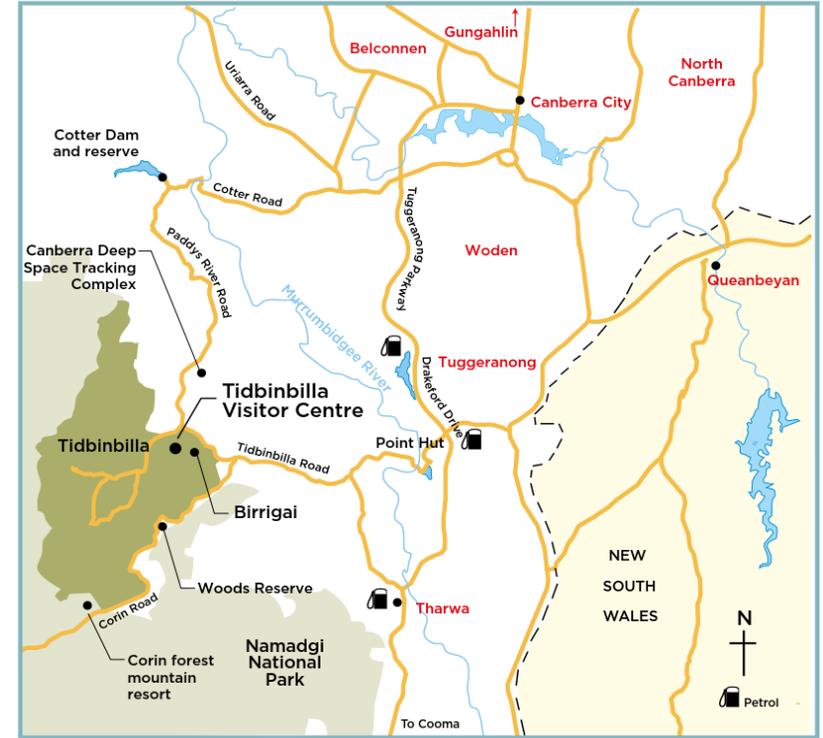


Figure 7.2.1 How to get to Tidbinbilla (ACT Government, 2017).

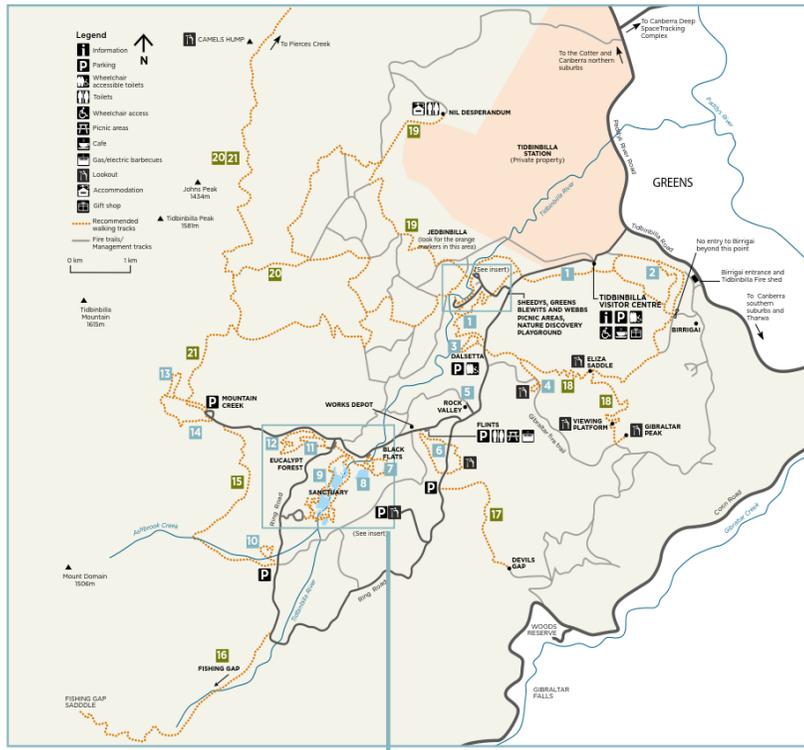


Figure 7.2.2 Tidbinbilla Map 1 (ACT Government, 2017).

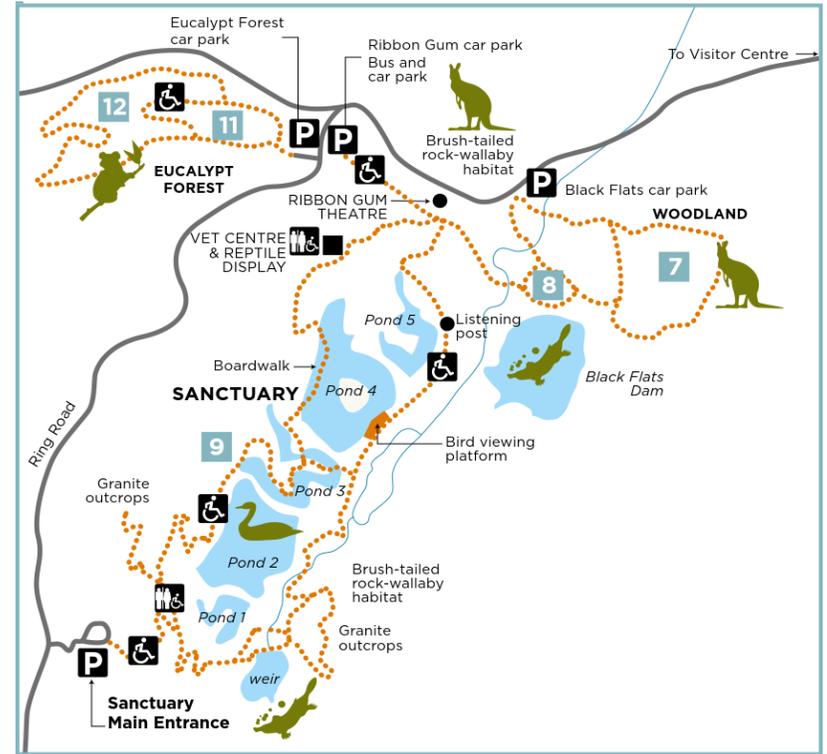


Figure 7.2.3 Tidbinbilla Map 2 (ACT Government, 2017).



Figure 7.2.4 koala (ACT Government, 2017).



Figure 7.2.5 kangaroos (ACT Government, 2017).



Figure 7.2.6 Tidbinbilla viewing platform (Wrigley & Taylor, 2009).



Figure 7.2.7 Tidbinbilla Waterside footpath (Wrigley & Taylor, 2009).

7.3. Twin Peaks Bioregion

Twin Peaks Bioregion is located in San Francisco, occupying 150-acre area around Twin Peaks that includes many zones of natural habitat. Parks in this area like Mount Sutro and Glen Canyon Park contain a diverse range of habitats and many native species, but they are under different jurisdictions and it can be difficult to get from one to another (Thill, 2010). Therefore, how to build a continuous ecological corridor to connect each ecological protection zone, park system and urban open space has become a problem to be solved.

This park's designer, Beyer, wanted to create a space that would be of both ecological valuable and recreational use for San Franciscans. In this park, people could enjoy the natural landscape in the City hikes through Mount Sutro, Twin Peaks, and Glen Canyon, on which one could learn about the history and ecology of an area truly worth protecting (Thill, 2010). Encouraged by the city's many existing nature-oriented policies: the Better Streets Plan, the Significant Natural Resource Areas Management Plan, the Municipal Transportation Agency's Pedestrian Master Plan, and more, Beyer better cooperated with land ownership departments on the matter of land in this area.

7.4. Conclusion

Te Araroa - New Zealand's Trail is a walking track with New Zealand as its natural boundary. It connects nature, town and countryside, and shows the rich experience of New

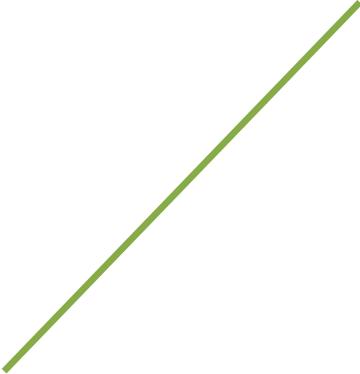
Zealand - natural scenery, culture and history. In the project of this paper, the bioregional park is also a connection of town, rural and natural area, showing New Zealand's history, culture, natural scenery, protection and restoration of ecology. Tidbinbilla Nature Reserve is the great example of establishment and protection of animal habitats, providing inspiration for designing healthy habitats. Furthermore, Twin Peaks Bioregion is the most similar case to the project. Both show how to build a continuous ecological corridor connecting every ecological reserve, park system and urban open space.



Figure 7.3.1 2007, Twin Peaks volunteers plant natives (Thill, 2010).

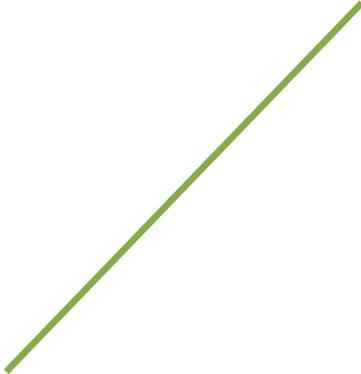


Figure 7.3.2 Twin Peaks Spring (Thill, 2010).



Part.08

**Bioregionalism in
New Zealand**



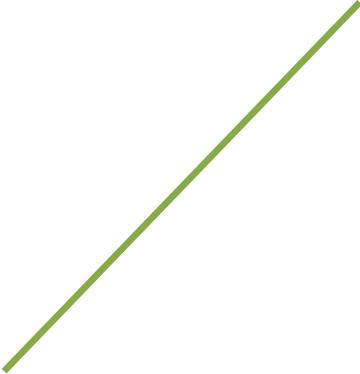
8. Bioregionalism in New Zealand

There is a lot of evidence to show that human settlements often cause deforestation and the extinction of large numbers of animals. The difference between New Zealand and other landmasses is that its biological community has been separated from other continents 80 million years ago, which means that the bioregion of New Zealand is relatively independent and has a unique life form.

New Zealand is recognized as a biodiversity hotspot. Nowadays, New Zealand's endemic communities are threatened and affected by the increasing number of alien species and the lack of their management and isolation. For example, the introduction of mammals has led to an increase in mortality of native tree species. Introduction of dry fruit trees and wind pollination trees in lowlands may eventually threaten the viability of New Zealand frugivorous and honey-eating birds, as they threaten the growth of woody plants that provide fleshy fruits or nectar for these birds.

In fact, the need to protect and restore biological diversity in New Zealand has long been recognized. New Zealand has built many ecological protected areas to protect, maintain and manage local natural or cultural resources and biodiversity through laws. These protected areas include national parks, conservation parks, nature reserves, scientific reserves, scenic reserves and historic reserves. In 1987, the government's land management organization was reorganized and the Ministry of protection was set up, which manages most of the public protected areas now. Laws and

regulations have also been enacted to protect and manage these protected areas, for example, Conservation Act 1987, National Parks Act 1980, Reserves Act 1977, Wildlife Act 1953, Marine Reserves Act 1971 and Marine Mammals Protection Act 1979 (Molloy, 2007). At the same time, New Zealand has enacted legislation to protect native species in New Zealand, such as the Resource Management Act (1991) and the Convention on biological diversity. However, through the cognition and implementation of these regulations, it seems impossible to prevent the loss of natural habitat and landscape characteristics in some areas. The sustainability of the biota in New Zealand brings both ecological problems and social problems. There are a number of ecological problems related to the protection of unique native species and the risk of resisting alien species (Clout & Hay, 1989, p:27-33; Meurk & Hall, 2006, p:131-146). But these problems will serve as the driving force for promoting the development of Bioregionalism in New Zealand. It will make people know more about the environment we live in from perspectives of biology, nature, water, culture and human life.



Part.09

Landscape Strategy and Design

- 9.1. Site Selection
 - 9.2. Site and Context Analysis
 - 9.3. Preliminary plan
 - 9.4. Master Plan
 - 9.5. Detailed Design and
Design Presentation
- 

The Mercury Bioregional Park is part of the landscape architecture work to celebrate and commemorate the 250th anniversary of Captain James Cook's first voyage (1769), a strategy of land and sea interventions to create a memorial across Mercury Bay; it is also a part for a wider strategy of integrating land management strategies on Ngati Hei lands by the Hauraki Treaty Settlement.

The Mercury Bioregional Park design differs from traditional park design. It not only contains the characteristics of traditional park, but also possesses a wide range of functions which cannot be found in traditional parks. This real life project will present the very first bioregional park in New Zealand, demonstrating how bioregionalism and its approaches can be utilized in landscape design and the profound meanings of this brand new type of park. The objectives of this project are to:

- Develop a framework for bioregional park;
- To investigate how the developed methodology may be extended and applied New Zealand wide.

The design can be divided into four stages:

1. Site selection
2. Site and context analysis
3. Preliminary plan and Master plan, including transportation system, functional zoning, and landscape node distribution.
4. Detailed design of landscape node in the site.

9.1. Site Selection

My design site and design range is centered on the Whitianga and Cooks beach, covering the whole Mercury Bay. This place has a variety of terrains, such as mountains forest and ocean.

Mercury Bay has a long history: Kupe's tribe once settled there one thousand years ago; it is the landing point of Captain Cook in New Zealand. Mercury Bay was named by the English navigator Captain James Cook during his exploratory expeditions. It also has a Māori name, Te Whanganui-o-Hei, which means the great bay of Hei.

Today Whitianga serves as a small regional centre for the eastern side of the Coromandel Peninsula and Mercury Bay area (Wikipedia, 2018; Ellis, 2001). It is a focal point for local fishing, farming and tourism and is near some popular Coromandel tourist spots including Hahei, Cathedral Cove, and Hot Water Beach. And the world-renowned Coromandel Coast and the Cathedral Cove (Te Whanganui-A-Hei) Marine Reserve are on its doorstep (Waikato Regional Council, 2016). Whitianga and Cooks beach also have many historical sites, such as Mercury Bay Museum, Whitianga War Memorial and Soldiers Memorial Park Whitianga, Historic Whitianga Rock Maori Pa site and Cooks Monument.

People can travel to Mercury Bay by driving through highway 25 and town roads as well as taking Whitianga ferry.

It is worth mentioning that Mercury Bay is within the Hauraki Gulf Marine Park which is aimed to protect New Zealand's marine resources. There are many water based activities to do there, such as boating, fishing, surfing, scuba diving and dolphin watching.

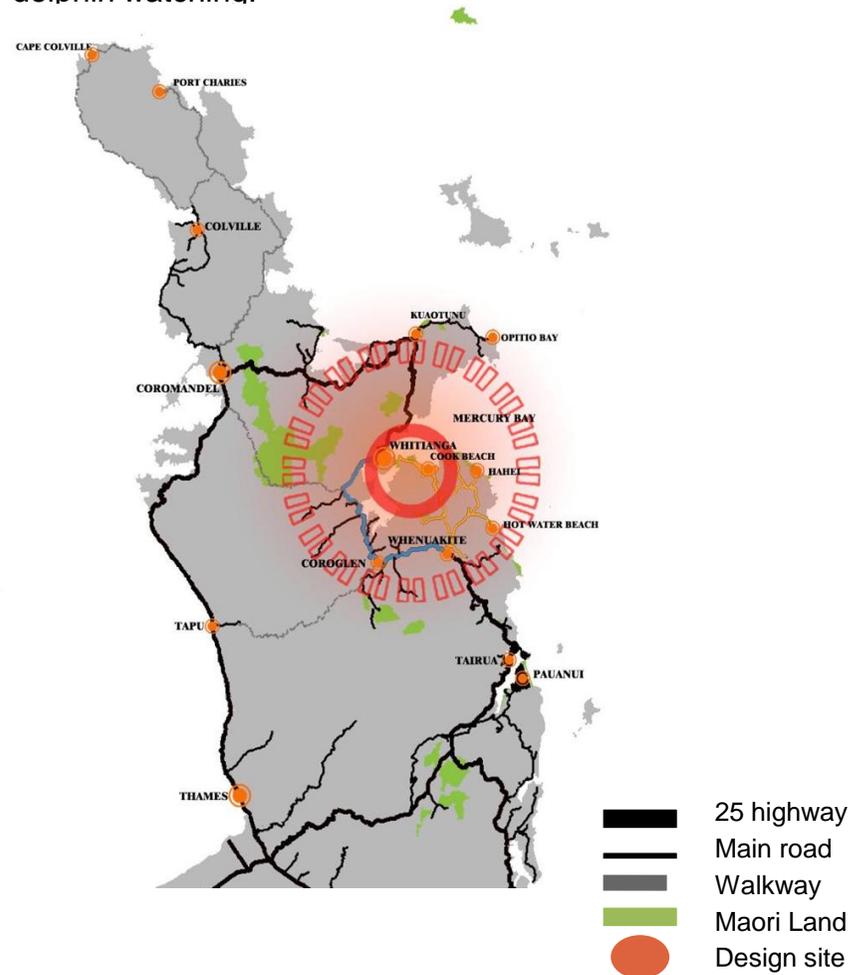


Figure 9.1.1 Location and Context

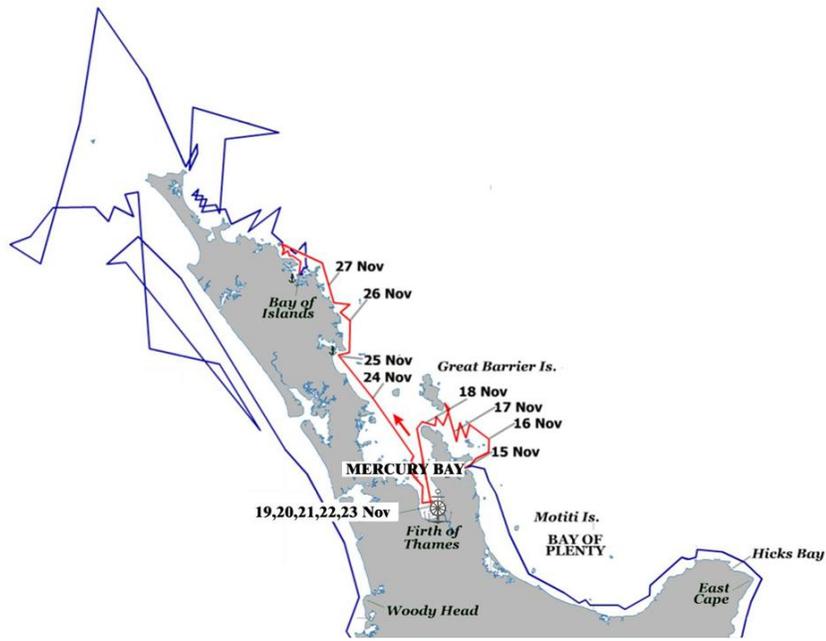


Figure 9.1.2 Map of Cook's voyages to Coromandel in 1769 (South Seas, 2004).

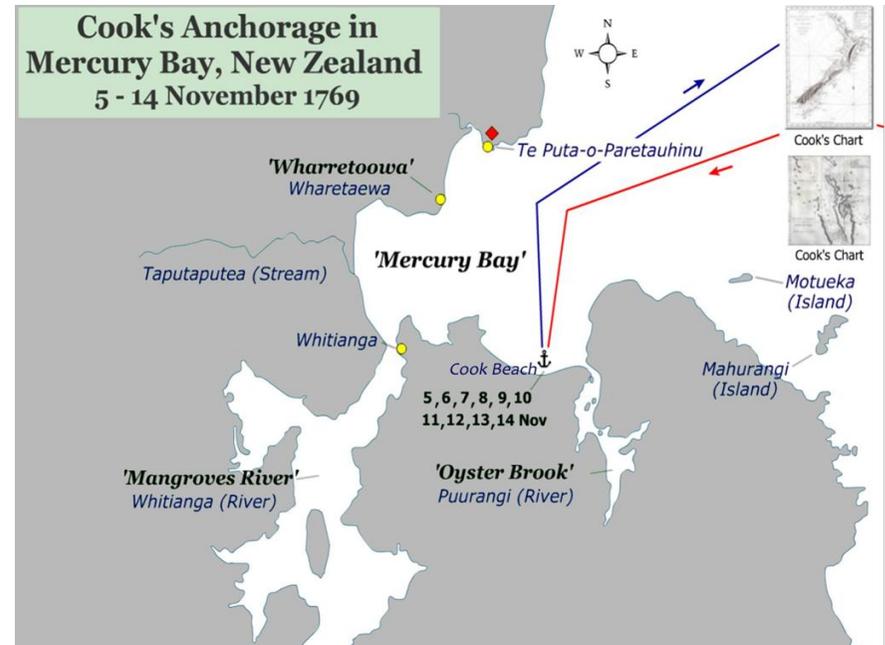


Figure 9.1.3 26 - Anchorage in Mercury Bay, New Zealand (South Seas, 2004).

With the increasing number of tourists every year, agricultural activities and natural disasters have brought about a lot of environmental problems in the region, such as :

- Vegetation degradation (Figure 9.1.4): logging, mining and agricultural activities led to the local vegetation degradation.
- Exotic species invasion and Weed problem (Figure 9.1.5): In this area, the remains of original vegetation are decreasing, and they are replaced by exotic species and weeds. The Peninsula is plagued by a wide range of weeds that take advantage of the warm, wet climate and are a threat both to agriculture and native biodiversity (Waikato Regional Council, n.d.).
- Stream bank erosion, landslides (Figure 9.1.6) : Frequent rain storms cause severe stream bank erosion, landslides and flooding which pollute waterways and threaten lives and property (Waikato Regional Council, n.d.).
- Destruction of the marine environment (Figure 9.1.7) : Short-beaked common dolphins (*Delphinus delphis*)

often gather along the east coast of New Zealand (Neumann & Orams, 2006). Bay Mercury is their main gathering area. But development of tourism and human activities have led to the destruction of marine life environment.

Therefore, the project of biological park introduced in this paper aims to mitigate the above problems and help restore the biodiversity in Mercury Bay, as well as to highlight the memorial and cultural characteristics of this area. The bioregional park in Mercury Bay will not only provide a place for leisure and entertainment for local residents in the neighborhood, but also provide an opportunity for them to understand New Zealand history and culture.



Figure 9.1.4 Vegetation degradation (Stewart, 2016).



Figure 9.1.5 Weed problem (Wilton, 2008).



Figure 9.1.6 Stream bank erosion, landslides (Author, 2017).



Figure 9.1.7 Endangered Bryde's (Auckland council, n.d.).

9.2. Site and Context Analysis

“Geographic information systems (GIS) are massive software packages providing a range of functions for creating, acquiring, integrating, transforming, visualizing, analyzing, modeling, and archiving information about the surface and near-surface of the earth. They associate locations in space, and often in space–time, with properties such as temperature, population density, land use, or elevation, and are widely used today in support of research in geography, and in any other disciplines concerned with phenomena on or near the earth’s surface” (Goodchild Michael, 2009, p. 251).

The collection and analysis of GIS data are the collection and analysis of geographic information of designed addresses, which is the first step in the design. GIS will be applied to collect and analyze biophysical data, including topography, NZ coastline, NZ islands, land use capabilities, hydrology, land use, slope, buildings, road and vegetation cover. The analysis will also cover social-cultural data, including land ownership, Maori heritage, other heritage, Ngati Hei land lands and Pa sites.

9.2.1. Land Ownership (Ngati Hei land lands and Pa sites)

The understanding of the land ownership of the various departments in the design area, and the communication and adjustment of the land owners of various departments are the basic guarantee for the successful implementation of the project.

Through GIS data analysis (Figure 9.2.1), we can see that most of the land in the design area belongs to private owners, and part of it belongs to Council and crown. Although the land belongs to different departments, the project has been supported by the New Zealand government, Ngati Hei, 2019 Organising Committee and the local community, and so on. These organizations will assist in the communication and adjustment of landowners in various departments during the implementation of the project..

At the same time, Ngati Hei land lands and Pa sites are also analyzed. From Figure 1, you can see clearly the distribution of Ngati Hei land lands and Pa sites. According to the Ngati Hei Charitable Trust 2016 (2016), Ngati Hei was the first settler in New Zealand who came here from Polynesia around 800 BC. During the voyage of Captain James Cook in 1796, Ngati Hei held the first welcoming ceremony when they met with Cook and his crew at Wharekaho north of Whitianga.

9.2.2. Land Cover

The main analysis of Land cover is on the coverage of the current land in the design area. The basis of the data source comes from the New Zealand Ministry for the Environment. It provides free online access to our environmental data set. Through GIS data layer analysis (Figure 9.2.2), the current land cover is divided into broadleaved indigenous hardwoods, cropping, exotic forest, exotic grassland, indigenous forest, other indigenous vegetation, scrub, wetland and urban. Most of the land in the design area is covered by grasslands and forests. While,

cropping, other indigenous vegetation, and scrub cover a small part of the land.

9.2.3. Land Use Capability

According to the land resource information system spatial data and layers data dictionary “land use capability (LUC) is a hierarchical classification identifying: the land’s general versatility for productive use; the factor most limiting to production; and a general association of characteristics relevant to productive use (e.g., landform, soil, erosion potential, etc.)” (Newsome & Wilde & Willoughby, 2008, P. 5). Table 1 is a description of different levels of land use capacity.

In the analysis of the land use capability (Figure 9.2.3), it is clear that most of the land in the designed area is restricted non-cultivated land, which is mainly suitable for perennial vegetation such as pasture or forest. Apart from the restricted non-cultivated land, there is also some land suitable for planting crops, pasture or forestry. The following LUC Class code is used in guiding the restoration of the ecological system and vegetation in the designed area.

9.2.4. Slope

According to the land resource information system spatial data layers data dictionary, “slope class is polygon layer delineating physiographic areas of relatively homogeneous average slope class” (Newsome & Wilde & Willoughby, 2008, p. 5). Detailed description of Table 2.

9.2.5. Aspect

Through the GIS map analysis, we can see the light in each area of the design area, which has an important impact on the selection of plant species in plant planting (Figure 9.2.5).

9.2.6. Stream Systems

Stream Systems is an analysis of the levels of the catchment and the river. As shown in the GIS map (Figure 9.2.6), we can easily identify the distribution of the water catchment area, the river and the entrance to the sea in the design area.

9.2.7. Habitat Patch

In terms of size, ecological patches can be classified into large patches and small patches. The size of large patches is larger than 25h hectare. The size of small ecological patches is 5 to 25 hectares (Opdam, 1991, p:93-106).

Forman (1995) claims that “Ecological large patches are the only structures in a landscape that protect aquifers and interconnected stream networks, sustain viable populations of most interior species, provide core habitat and escape cover for most large-home-range vertebrates, and permit near-natural disturbance regimes” (p: 135-136). They provide many important ecological functions and benefits for the landscape (Forman, 1995, p: 135-136). Small patches, on the other hand, serve as stepping stones for species dispersal or recolonization. They can protect rare species or small habitats, provide heterogeneity in the matrix. The benefits of small patches are supplementary to large patches, instead of substitute for large patches.

Through GIS data analysis (Figure 9.2.7), in the design area the types of habitat patches mainly include exotic forest habitat and native forest habitat. They can be divided into large patches, middle patches and small patches according to their sizes. Through the analysis chart, it is obvious that most of the design area is not ecological patches, or only some scattered small patches. This situation can not meet the basic requirements of local animals for habitat.

In this area, new habitat patches need to be created to restore habitats and connect the original patches. According to the Landscape Ecology (Patch-Corridor-Matrix Concept), a new habitat patch for every 6.25 hectares of land needs a 1.6 hectare core shelter, which provides habitat for most plants, lizards, insectivorous birds and invertebrates. The interval between each patch is about 5 to 0.2 km to achieve spatial connectivity (Young & Mitchell, 1994; Meurk & Hall, 2006, p:131-146).

9.2.8. Vegetation Cover

In Figure 9.2.8, we can clearly see that Coromandel vegetation coverage has undergone tremendous changes from 1840 to recent days. Originally these areas were covered with natural vegetation. There were mainly four types of forests--coastal (pohutukawa, kohekohe and puriri) forest, conifer (kahikatea, matai and totara) forest, mixed kauri-conifer-broadleaved forest and montane conifer forest. These forests play an important role in the protection and construction of land resources, reducing soil erosion and preventing floods, protecting water resources, and providing habitat for local animals. Since the settlement of European,

vegetation has changed a lot. Now there is little virgin forest in this area. Most of the remaining vegetation has been cut down, destroyed by disasters from human behavior such as fires or have been cleared up for the development of agriculture.

9.2.9. Coastal Marine analysis

Cook beach and Wiiganga are popular entertainment venues for water sports (Figure 9.2.9), including canoeing, swimming and boating. Whitianga includes a waterway development supporting private port terminals. People can take a boat trip to the sea and see dolphins here. The rocky coastline extending from cook beach to hot water beach has areas where some coastline is not accessible from the land. There near some popular Coromandel tourist spots including Hahei, Cathedral Cove and Hot Water Beach and its adjacent marine reserve Te Whanganui-A-Hei. This area is a popular snorkelling, diving and canoeing location, with a large number of tourists to the area. This place is a famous resort in New Zealand (Waikato Regional Council, 2016).

The Whanganui-A-Hei Marine Reserve (Figure 9.2.10) is located between Hahei and cook beach, and its area is about 9 square kilometres. It is a diverse habitat including hard rock, soft sediment, caves and arches.

Whitianga Harbour is the largest seaport on Coromandel with high wildlife value. At present, there are 22 to 27 reef fish species in the maritime space of Opito Bay, Whitianga and Hahei. There are also some marine farms, such as Whitianga Harbour oyster farm (Figure 9.2.10).

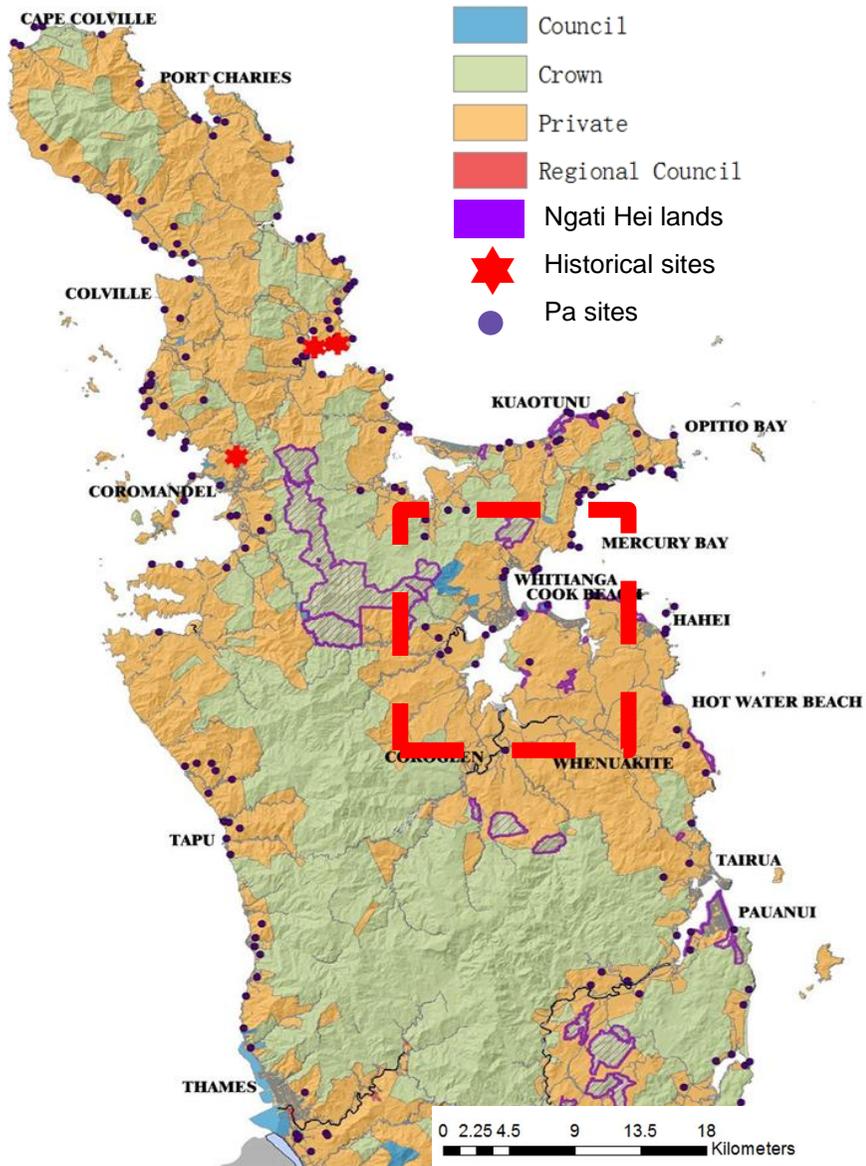


Figure 9.2.1 Land Ownership (Ngati Hei lands and Pa sites)

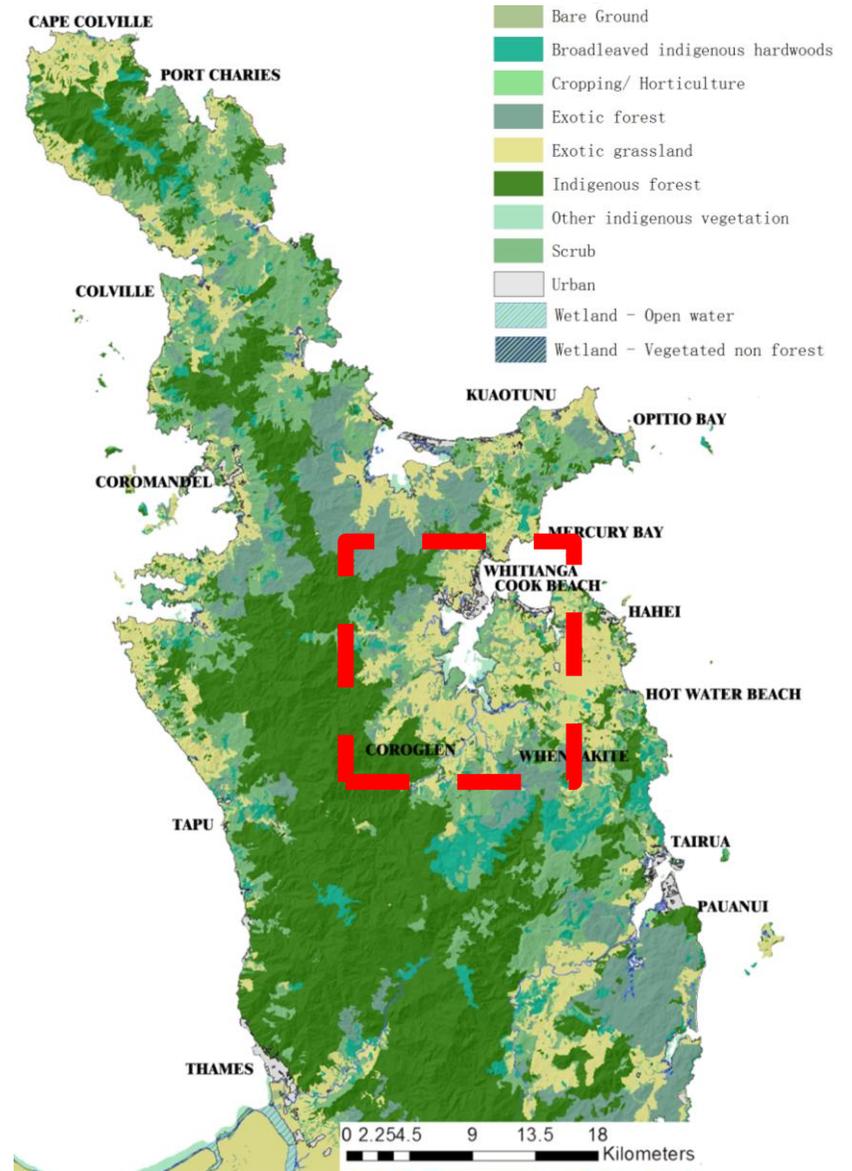


Figure 9.2.2 Land cover

LUC Class code	Description
1	Land with virtually no limitations for arable use and suitable for cultivated crops, pasture or forestry
2	Land with slight limitations for arable use and suitable for cultivated crops, pasture or forestry
3	Land with moderate limitations for arable use, but suitable for cultivated crops, pasture or forestry
4	Land with moderate limitations for arable use, but suitable for occasional cropping, pasture or forestry
5	High producing land unsuitable for arable use, but only slight limitations for pastoral or forestry use
6	Non-arable land with moderate limitations for use under perennial vegetation such as pasture or forest
7	Non-arable land with severe limitations to use under perennial vegetation such as pasture or forest
8	Land with very severe to extreme limitations or hazards that make it unsuitable for cropping, pasture or forestry

Table 1. LUC Class code and Description (Newsome & Wilde & Willoughby, 2008, p. 5).

<i>Item code</i>	<i>Class description</i>	<i>Class range</i>
A	Flat to gently undulating	0–3°
B	Undulating	4–7°
C	Rolling	8–15°
D	Strongly rolling	16–20°
E	Moderately steep	21–25°
F	Steep	26–35°
G	Very steep	>35° (36–42°)[1]
H	Precipitous	(>42°) ¹
estu	estuary	
ice	icefield	
lake	lake	
quar	quarry, mine, other earthworks	
rive	river	
town	urban area, airport, oxidation pond	

Table 2. Slope Class and Description (Newsome & Wilde & Willoughby, 2008, p. 5).

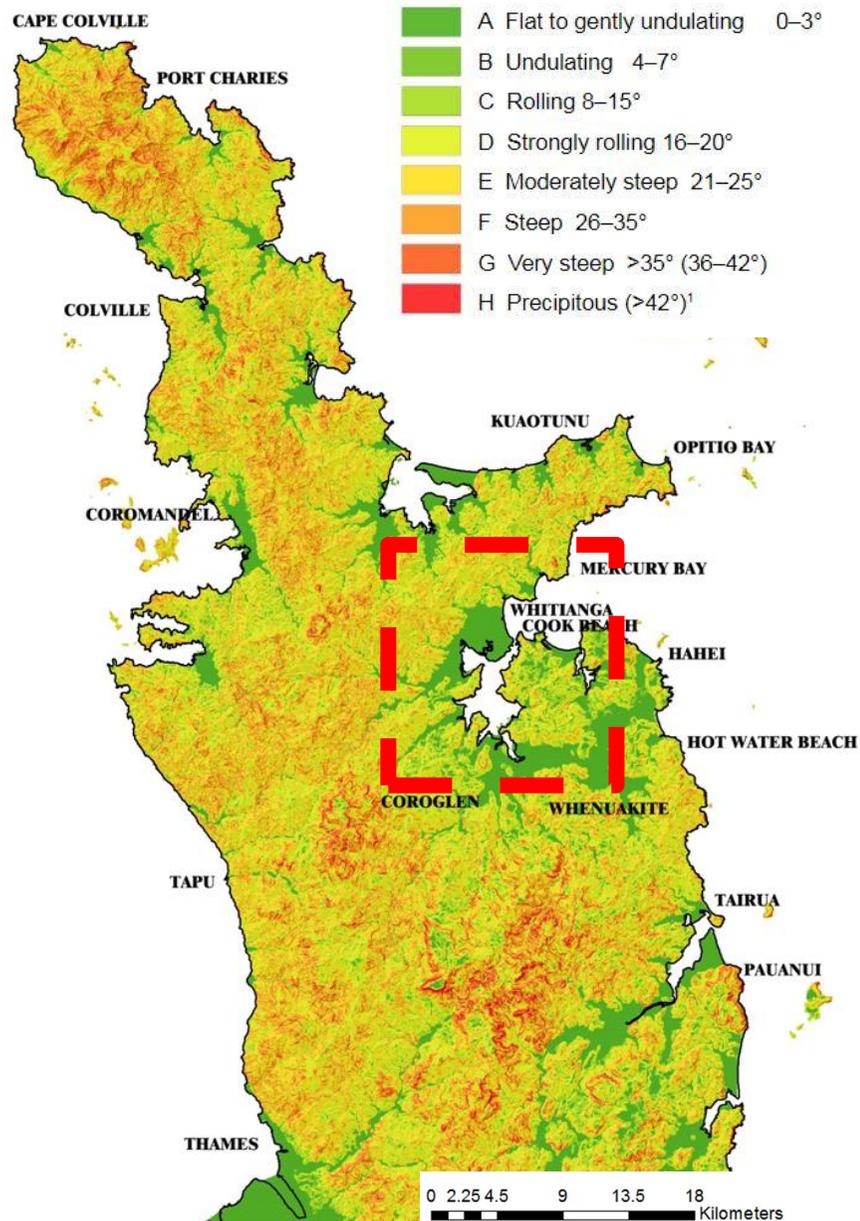


Figure 9.2.4 Slope analysis

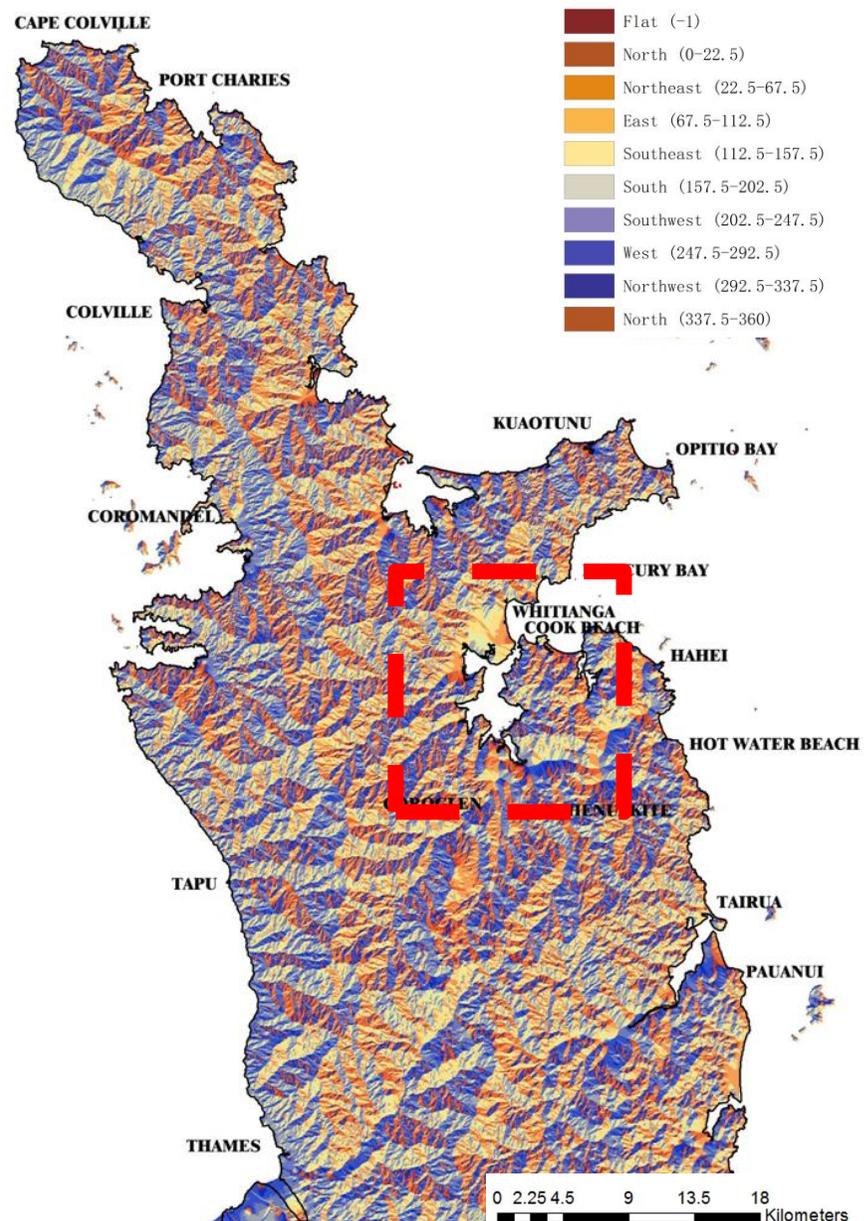


Figure 9.2.5 Aspect

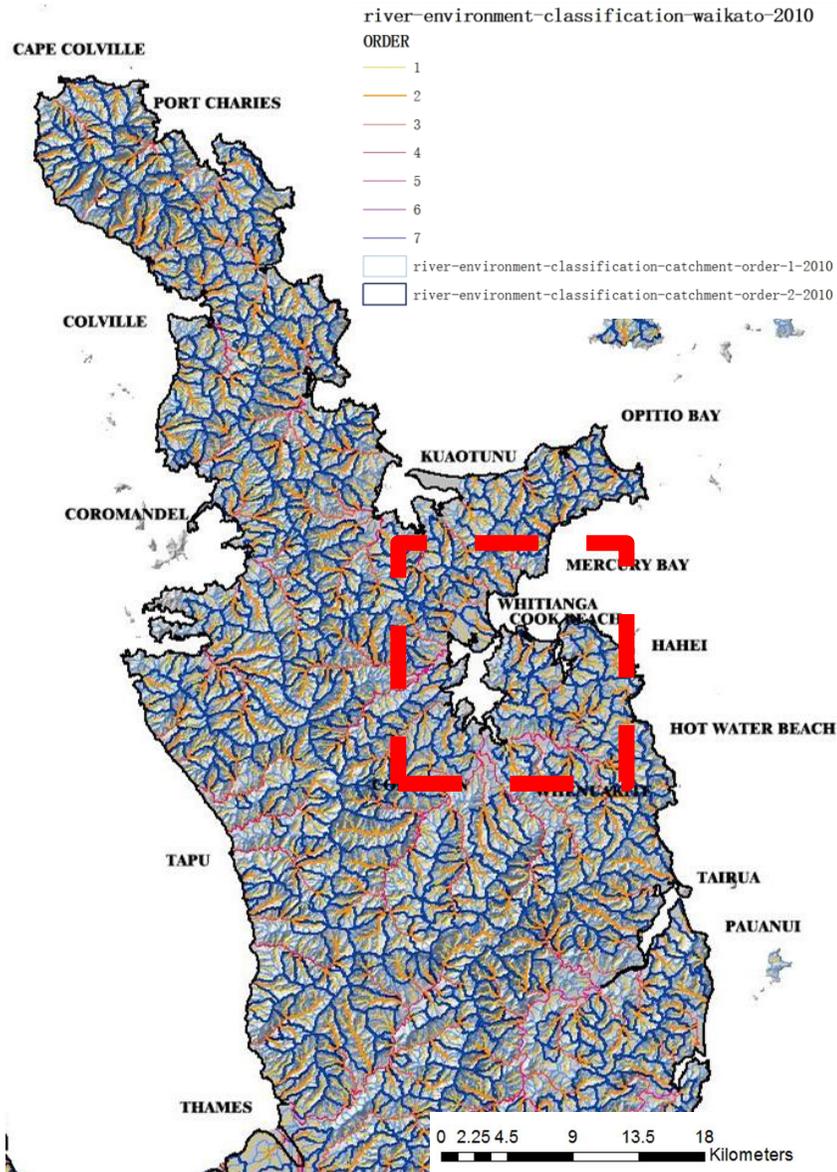


Figure 9.2.6 Stream systems

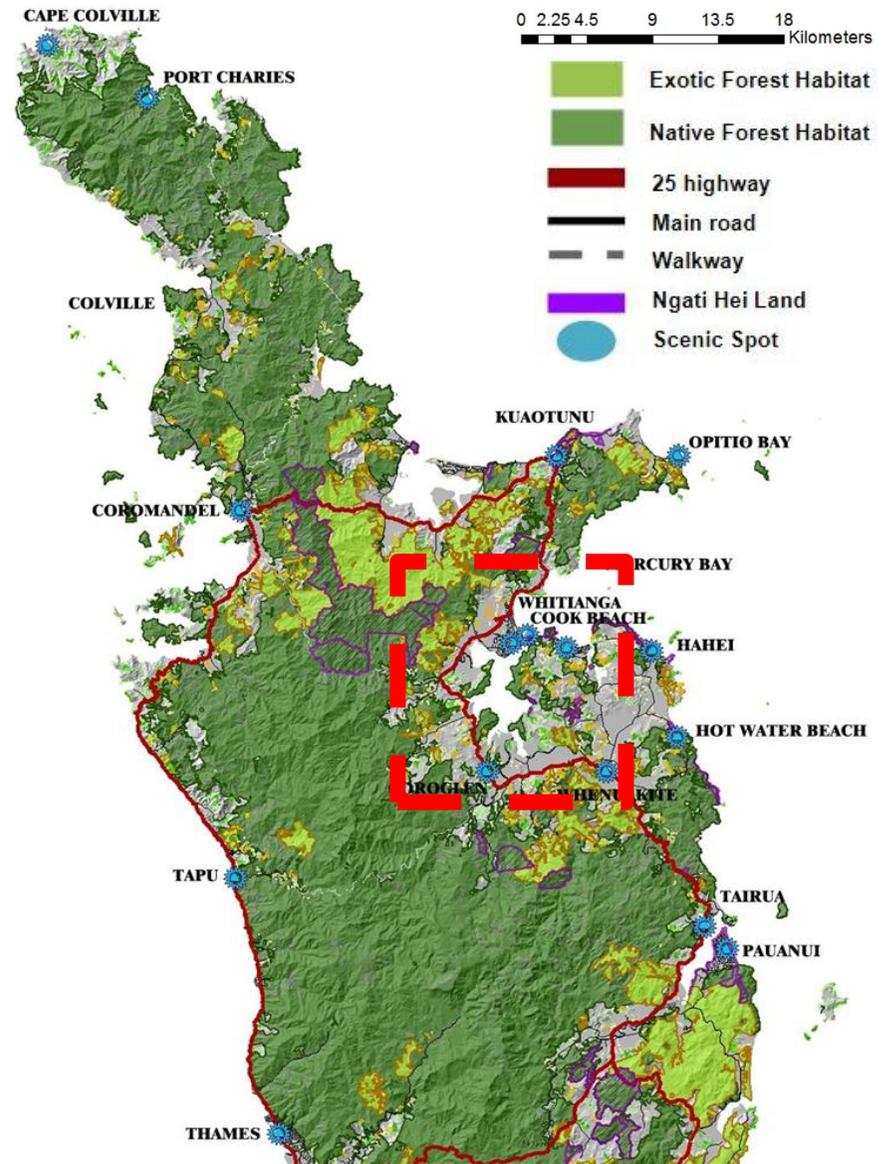


Figure 9.2.7 Habitat Patch

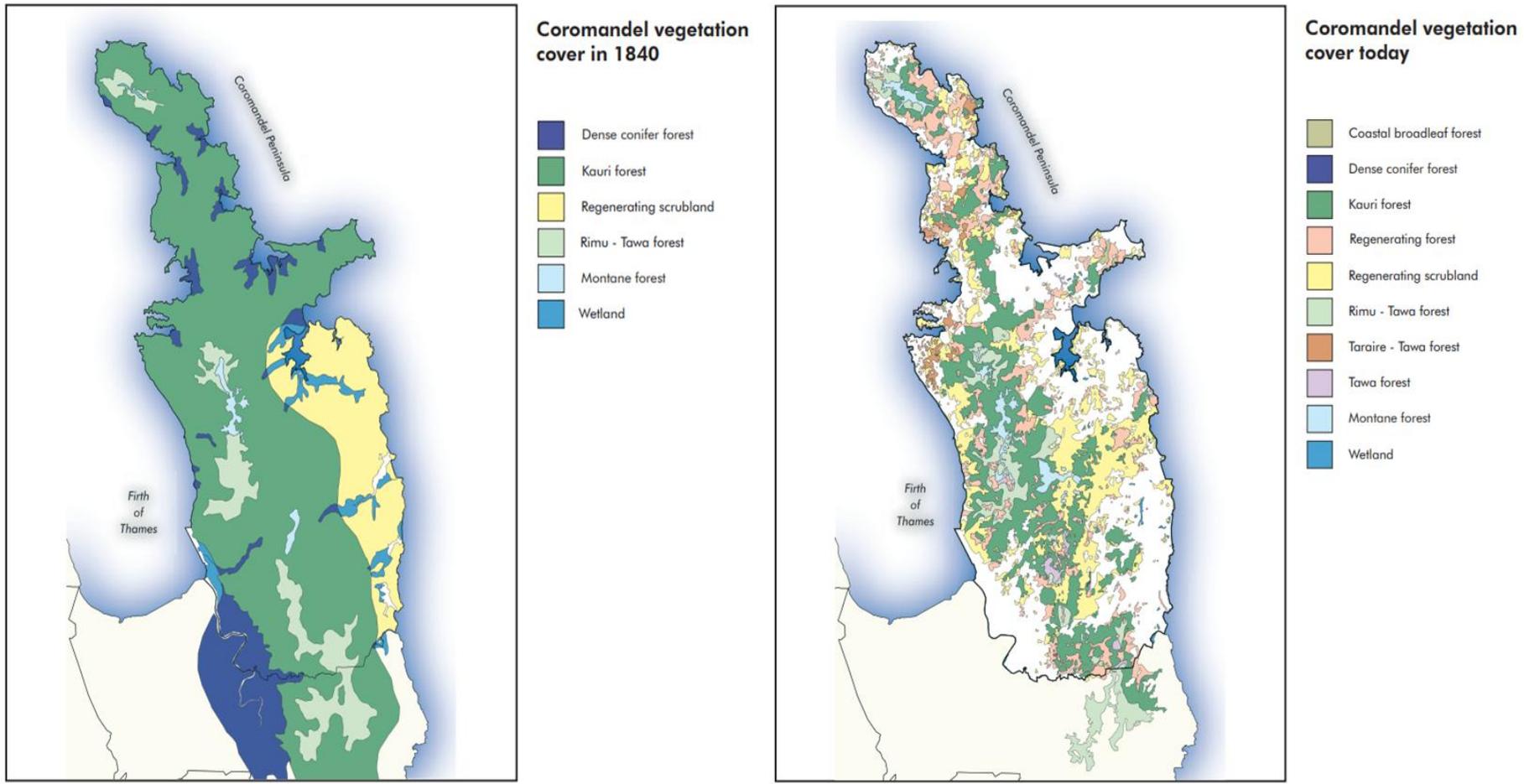


Figure 9.2.8. Vegetation cover (Environment Waikato Regional Council, 2006).

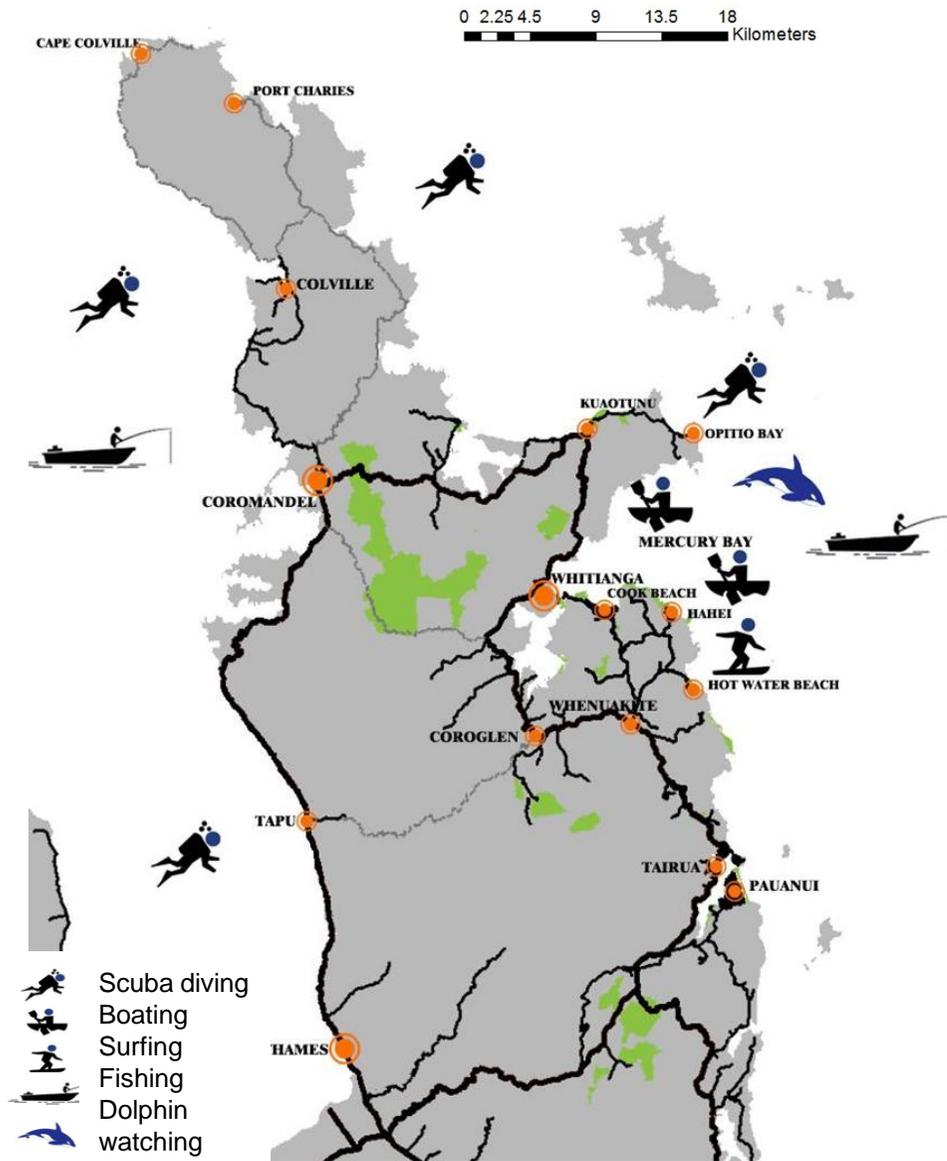


Figure 9.2.9 Water Based Activities



- Whitianga Harbour oyster farm
- Whanganui-A-Hei Marine Reserve

Figure 9.2.10 Marine Reserve and Marine Farm

9.3. Preliminary plan

Mercury Bay Bioregional Park is designed as a journey experience that takes a few days. Of course, based on personal needs and hobbies, people can make it a short trip of only half a day or a day, or even a wonderful night walk with camping.

Bioregional Park is not a traditional park. It plays a lot of roles in this project. First of all, it can help protect and restore the Mercury Bay ecological environment and create new animal habitats. Second, it is a window to protect and display Maori culture and history. Third, it offers people access to being close to nature and caring for the earth's life. Fourth, it is a place to celebrate the Cook 250 anniversary of 2019. Finally, it plays an important role in regulating the conflict between the city and the ecological environment.

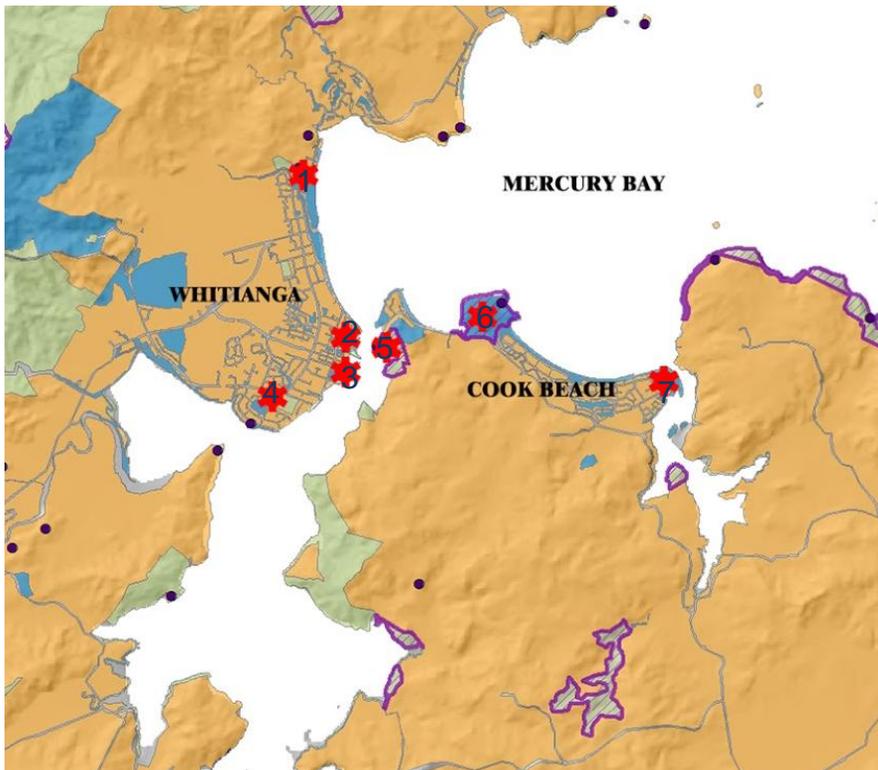
Therefore, in order to achieve the goals and requirements of the project, three functional networks must be built: ecological connections network, historical and cultural changes display network and human activity network.

■ Historical and cultural changes display network

From the above survey on the historical and cultural background of New Zealand, we can see that Polynesians came to New Zealand before 1200 years ago, and Kupe was the first Polynesian to discover New Zealand. Therefore, New Zealand's traditions, arts, religions and sciences are similar to those of Polynesia. Then the captain of Cook went to New Zealand, and Europeans emigrated to

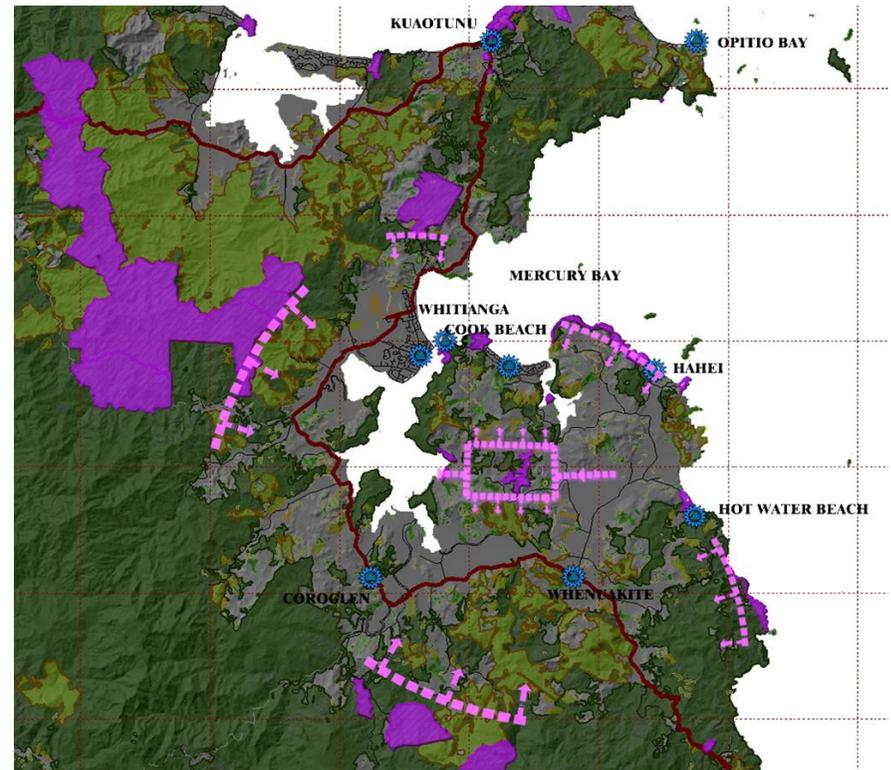
New Zealand.

After the change of history, by analyzing the GIS data of Land Ownership (Figure 9.2.1), we can see most of the land now belongs to the private, crown and council in Coromandel. On these lands, Maori land, historical sites and PA sites are still retained. Ngati Hei land is the first place where immigrants live in New Zealand. There retain historical traces of their original life and culture. Mercury Bay near some popular Coromandel tourist spots including Hahei, Cathedral Cove, and Hot Water Beach. And the world-renowned Coromandel Coast and the Cathedral Cove (Te Whanganui-A-Hei) Marine Reserve are on its doorstep. Whitianga and Cooks beach also have many historical sites, such as Mercury Bay Museum, Whitianga War Memorial and Soldiers Memorial Park Whitianga, Historic Whitianga Rock Maori Pa site and Cooks Monument (Figure 9.3.1). In 2019, this is also the place to celebrate and celebrate the 250th anniversary of Captain James Cook's first voyage. These are New Zealand's unique historical, cultural and historical sites. Culture is an important part of biota park. Therefore, the establishment of a historical and cultural network that shows the Maori culture in New Zealand and connects the original attractions and historical sites is a very important part of the design (Figure 9.3.1).



- 1 Whitianga Town Walk
- 2 Mercury Bay Museum
- 3 Whitianga War Memorial, Soldiers Memorial Park Whitianga
- 4 Stone Store, Whitianga
- 5 Stone Wharf, Ferry Landing & Historic Whitianga Rock Maori Pa site
- 6 Shakespeare Headland Track
- 7 Cooks Monument

Figure 9.3.1 Culture and Heritage



-  Ngati Hei land
-  Maori cultural corridor

Figure 9.3.2 Ngati Hei cultural landscape analysis in Preliminary design

■ Human activity network

Cook beach and Wiiganga are popular entertainment venues for water sports (Figure 9.3.6), such as canoeing, swimming, snorkelling and boating, attracting a number of tourists to visit every year. Whitianga includes a waterway which can be developed to support private port terminals. People can take a boat trip to the sea and see dolphins here. The rocky coastline extending from cook beach to hot water beach has areas where some coastline is not accessible from the land and there are some popular Coromandel tourist spots like Hahei, Cathedral Cove (Figure 9.3.3), Hot Water Beach(Figure 9.3.4) and marine reserve Te Whanganui-A-Hei in the nearby area. Therefore, it is necessary to establish a human activity network in this area to connect cultural display areas, towns, seacoasts, natural landscapes, and provide service facilities and leisure and entertainment places for people.

In the human activity network, the road system is the foundation for connecting towns, suburbs, coastal areas, natural landscapes, cultural areas and entertainment projects. In order to provide people with a healthy ecological leisure space and reduce economic costs and damage to the ecological environment, the new road system should include the walkway and bicycle lanes. The system should also combine the original road system (highway, urban road) to form a new traffic system network (Figure 9.3.5), which not only ensures the independence and safety of the new road system but also makes full use of the original road for people to drive. Meanwhile, the design of new landscape circulations is essential, providing people with sightseeing,

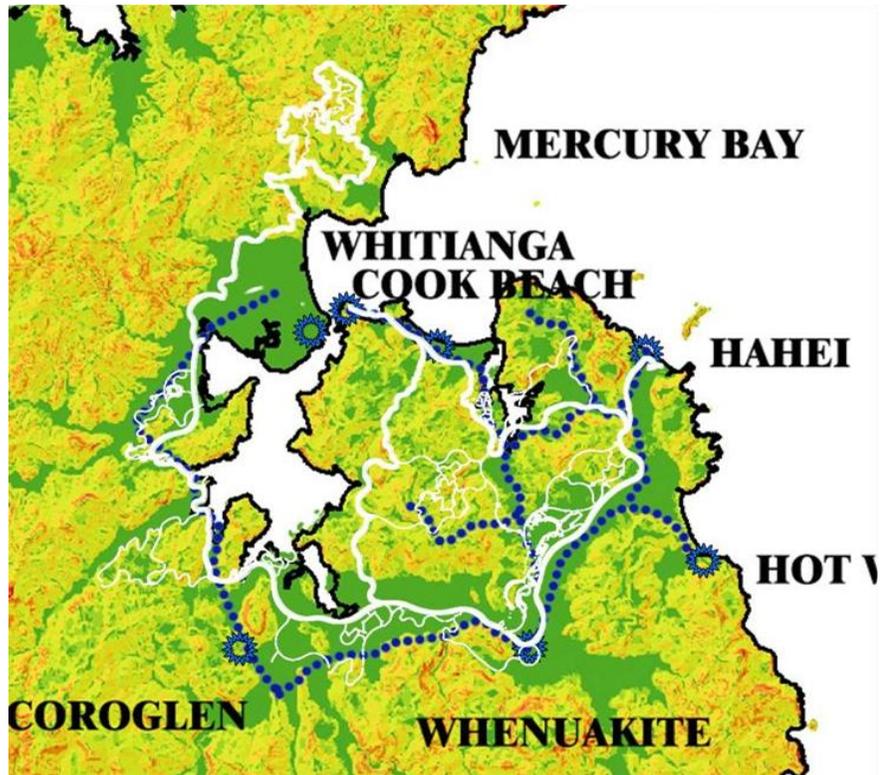
consultation, recreation, rest, catering, camping and medical services in the course of people's trip and journey..



Figure 9.3.3 Cathedral Cove (Aotearoa, 2013).



Figure 9.3.4 Hot Water Beach (Aotearoa, 2013).



-  Scenic spot
-  Road
-  New Main Walkway and bicycle lane
-  New Walkway

Figure 9.3.5 New traffic system network



-  Scuba diving
-  Boating
-  Surfing
-  Fishing
-  Dolphin watching

Figure 9.3.6 Water Based Activities

■ Ecological connections network

In the analysis of the GIS data in the designed area, the ecological habitat analysis shows that the designed area covers a large number of grey areas with no ecological habitat patches. Moreover, the land cover and vegetation cover analysis indicates that there is almost no vegetation in the designed area which is mainly covered by grasslands. The analysis of land use capability also suggest that most of the land in the designed area is restricted non-cultivated land, which is mainly suitable for perennial vegetation such as pasture or forest. There is also some land suitable for planting crops, pasture or forestry. Therefore, the establishment of new ecological habitat patches and ecological corridors is a good way to restore and build ecosystems and habitats and to form a new Ecological connections network(Figure 9.3.7) in the region.

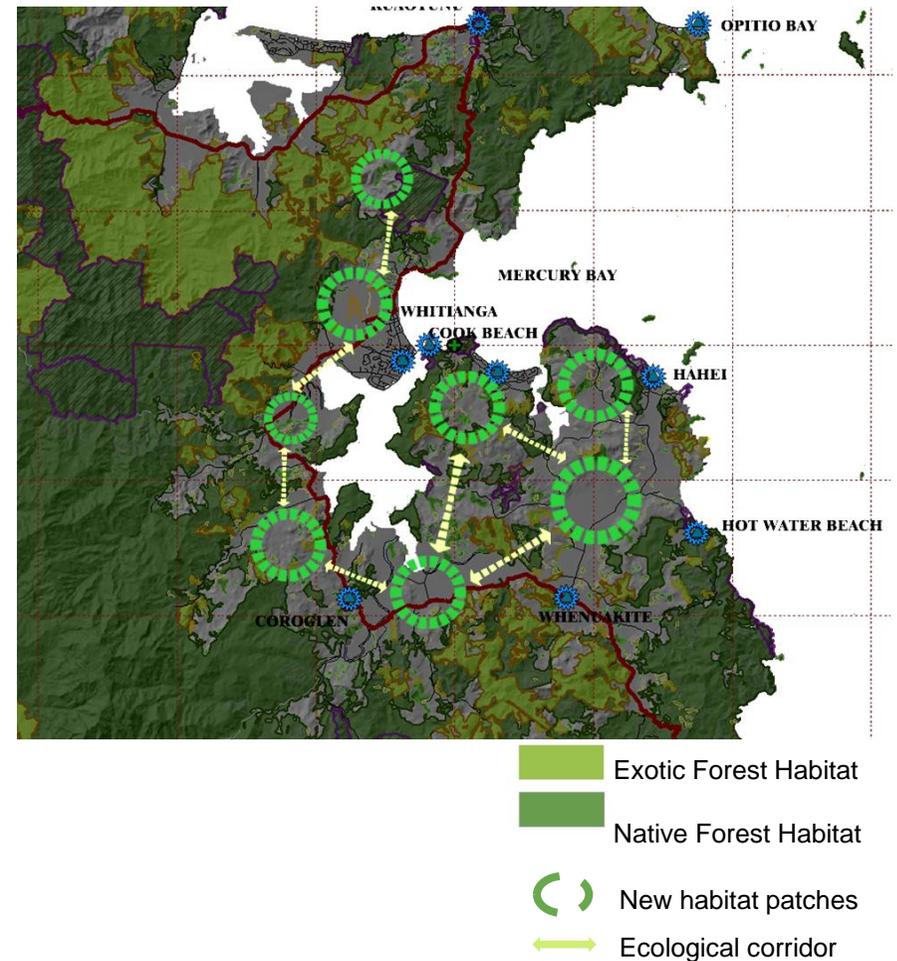
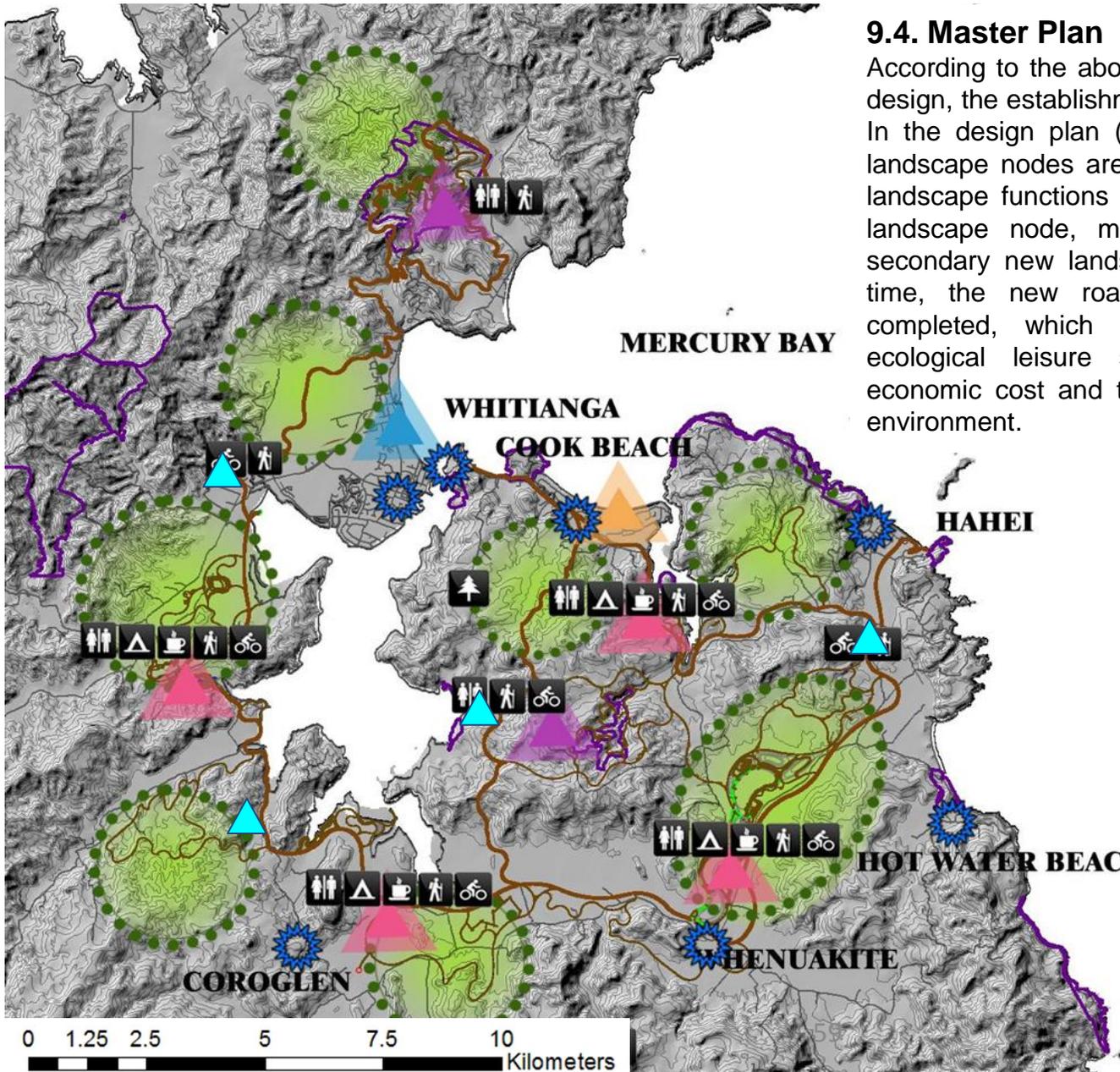


Figure 9.3.7 Habitat Analysis in Preliminary design



9.4. Master Plan

According to the above data analysis and preliminary design, the establishment of three functional networks. In the design plan (Figure 9.4.1), different types of landscape nodes are designed according to different landscape functions and targets, including ecological landscape node, main new landscape circulation, secondary new landscape circulations. At the same time, the new road system planning has been completed, which not only provides a healthy ecological leisure space but also reduces the economic cost and the destruction of the ecological environment.

-  Maori cultural landscape node
-  Coastal landscape node
-  New landscape circulation
-  Memorial landscape belt
-  Secondary New landscape circulation
-  Ecological landscape node
-  New habitat patches
-  Ngati Hei land
-  Scenic spot
-  New Main Walkway and bicycle lane
-  New Walkway

Figure 9.4.1 Master Plan - Overlays

9.4.1. Ecological landscape node

The main purposes of this node are vegetation planting, ecological restoration, and the establishment of new ecological patches for animals to provide food, gathering and breeding sites.

In light of the analysis of the habitat patches in the first stage, most of the design area is not ecological patches or only some scattered small patches, which can not meet the basic requirements of habitating local animals. Therefore, it is necessary to establish new ecological patches and corridors (Figure 9.4.2) in this area for animal migration. The following table 3 is the analysis of animal species in New Zealand, especially birds, which includes information like species, indicator species, habitat cover, patch size interpatch gap, types of landcover, food preferences (Gravatt 1971; Craig et al. 1981; Angehr 1986; O'Donnell & Dilks 1994; Williams & Karl 1996; Murphy 1998; Baker 1999; Murphy & Kelly 2001, 2003; Young & Mitchell, 1994; Spur r & Rod & Trante. 2011).

According to the Patch-Corridor-Matrix concept and analysis data of biological patch, the spacing of each new ecological patch is mostly limited to around 5km. The minimum value of patch size is 5-10 hectare. Therefore, the area of each new patch must be more than 5 hectares, and the gap between each big patch is about 5km (Young & Mitchell, 1994; Meurk & Hall, 2006, p:131-146).

Most birds use nectar, honeydew, fruit and invertebrates as food. But the importance of food is also

changing along with the seasons. For example, nectar and honeydew are most important in late winter, spring and early summer; the most important fleshy fruits in the late summer and fall and the most important invertebrates in winter. And the invertebrate is a whole year's food (Spur r & Rod & Trante. 2011). Therefore, two basic requirements should be satisfied in the choice of plant species. First, select the local species, because local species are the most suitable for local growth, management and maintenance costs, and this practice can assist alleviating the environmental problems of disappearing species. Secondly, the project should select trees that can provide foods for animals, such as Kowhai, Puriri, Rewarewa, Pohutukawa, rata and flax.

Guild	Indicator species	% habitat cover	Minimum patch or matrix area (ha)	Maximum interpatch gap (km)	Types of land cover	Food preferences
bush bird-herbivore	NZ wood pigeon	10-15	5-10	25	forest/scrub	fruit of native plants such as miro, tawa, puriri, taraire. Kahikatea and coprosma.
bush bird-omnivore	bellbird and tui	10-15	5-10	10	forest/scrub	Nectar, fruit and insects. Kowhai, Puriri, Rewarewa, Pohutukawa, rata and flax.
bush bird-insectivore	Silvereye, grey warbler and fantail	5	0.5-1	1	forest/scrub	Flying insects eg. Moths, flies etc. sometimes fruit. Seldom feed on ground.
wetland bird	Weka, Australasian bittern, fernbird and pukeko	5	25-50	50	wetland	
forest/scrub lizards and sedentary inverts	gecko and leaf vein slug	5	5-10	0.005	forest/scrub	
open ground lizards and mobile inverts	skink and large moth	5	1	0.05		
Seabird-Coastal seabird	red-billed gull					
Seabird-Shore birds	red knots, banded dotterel					

Table 3. Analysis of animal species in New Zealand.

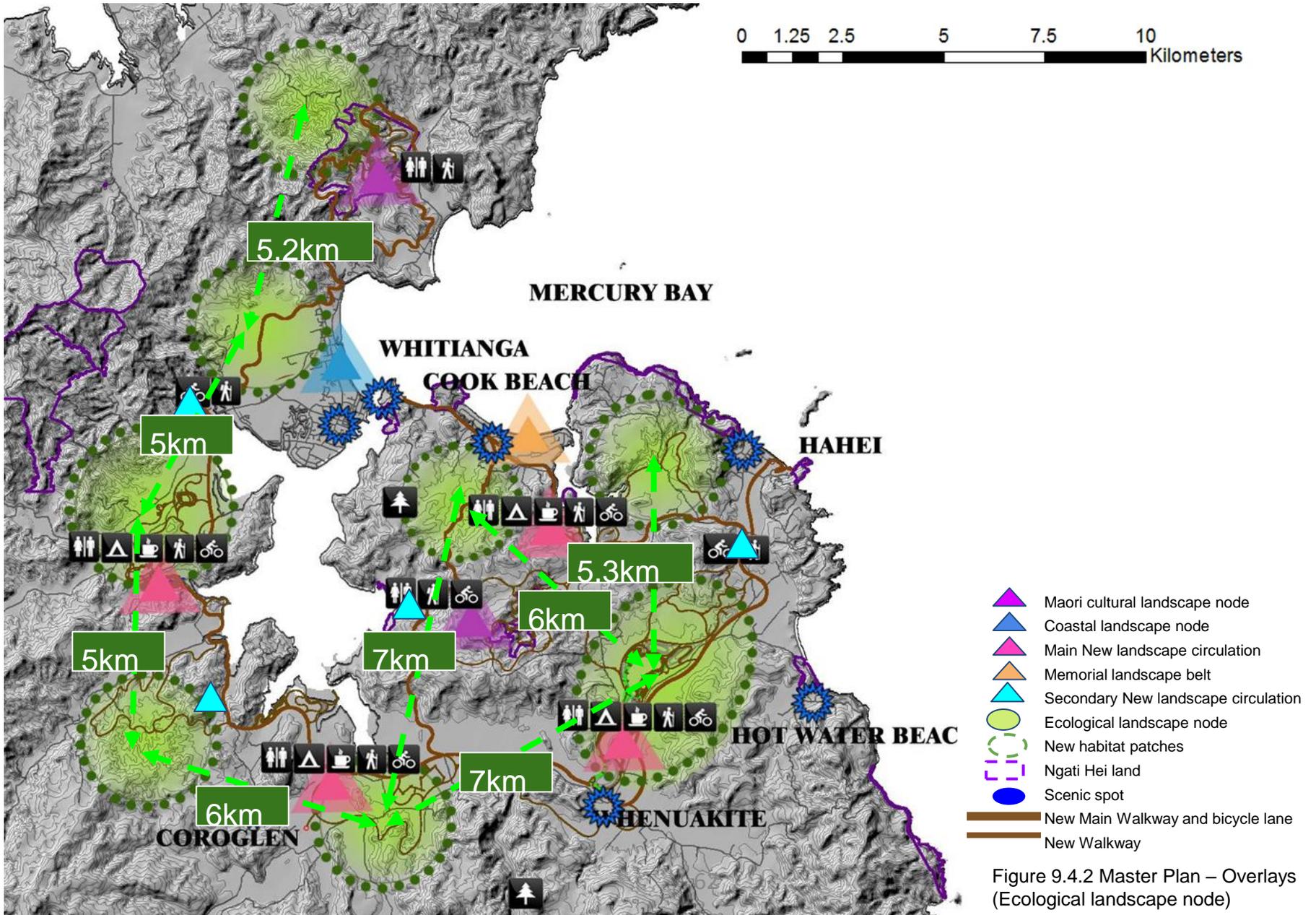


Figure 9.4.2 Master Plan – Overlays (Ecological landscape node)

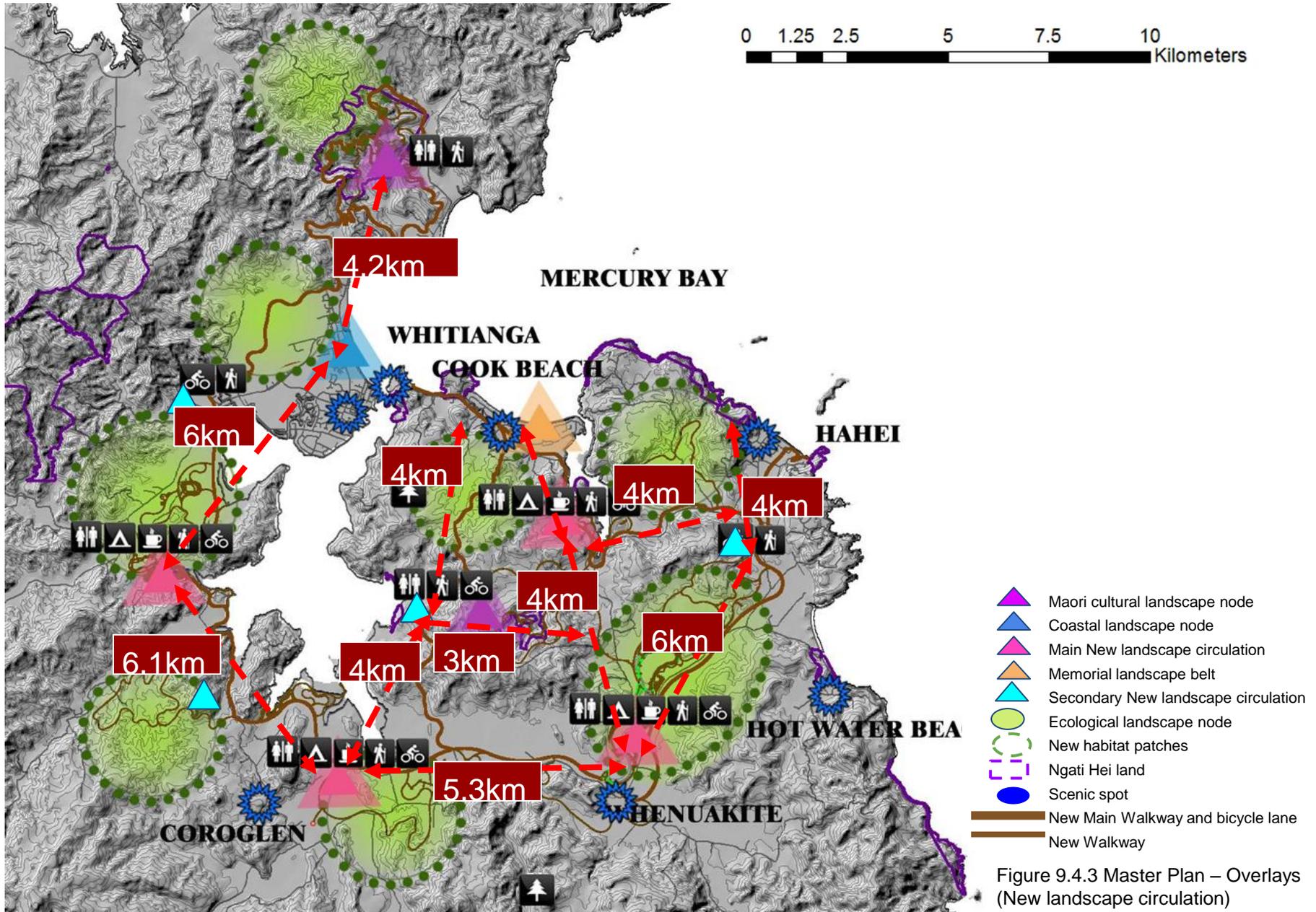


Figure 9.4.3 Master Plan – Overlays (New landscape circulation)

9.4.2. New landscape circulation

As shown in the site analysis in the first stage, the main new landscape circulations are located in the gentle slope area which is suitable for construction rest area.

According to the functionality, the new landscape circulation (Figure 9.4.3) is divided into two levels. The main new landscape circulation is designed to combine villages and scenic spots, and design some landscape activities venues to provide people with viewing, entertainment, rest, catering, camping, medical and other functional facilities. The general spacing is 5-10km. In the meantime, it connects or intersects with the original local driveway, which makes it convenient for people to drive to every main landscape circulation in the biological park and start their journey anywhere in the park. Secondary new landscape circulation is mainly to meet the basic needs of people walking, such as short rest, toilets, garbage cans and other infrastructure. Its spacing should be 3-5 km (Ministry of Housing and Urban-Rural Development of the People's Republic of China 2016).

9.4.3. Maori cultural landscape node

Maori cultural landscape nodes are located in the Ngati Hei land lands which are characterized by the original Maori lifestyle and Maori culture. The cultural nodes will be divided into two part, cultural display and cultural experience.

The cultural display area mainly shows the historical changes and characteristics of the Maori culture through some landscape walls, sculptural buildings, and special paving elements, letting people know what Maori culture is.

In the Maori culture experience area, a series of human activities will be designed, such as hunting, fishing, farms, food, accommodation houses, traditional art shows (dance, songs, etc.). It aims to use these activities to simulate and restore the traditional life of Maori people, and let people have a better experience and understand the Maori culture and local customs.

9.4.4. Memorial landscape belt

In the design, the Memorial landscape belt is located along the coast of Cooks beach. This is Captain Cook's first landing in Mercury Bay (Figure 9.1.3), where the historic site of Captain Cook's landing has been preserved (Figure 9.4.4.1) . The purpose of Memorial landscape belt is to commemorate the landing of cook and protect historical relics. Mercury Bay will play a special role in celebrating the 250th anniversary of Captain James Cook's landing in New Zealand. In the celebration in November 2019, a replica of Captain Cook's ship, The Endeavour, will arrive. Thus, this commemorative landscape node will be a new area for displaying historical sites and cultures and co-ordinate the Endeavour 's New Zealand sailing tour.

9.4.5. Coastal landscape belt

Coastal landscape belt is a rich and fragile landscape area. It is a blend of land and sea, and has a unique community of organisms, for example, mangrove, shellfish and amphibious animals. It is also an important part of human activities and ecological environment connecting coastal marine and coastal terrestrial areas.

Mercury Bay belongs to the Hauraki Gulf Marine Park. Its main purpose is to protect New Zealand's natural resources and marine ecological environment. Therefore, the sea area must follow the planning of the marine reserve and the part of Coastal Marine and Coastal Terrestrial Areas will apply the concept of Marine Space Planning for design guidance. The role of the coastline landscape belt is to assist the protection of marine resources and ecology by Hauraki Gulf marine reserves; reduce the impact and destruction of terrestrial human activities and urban development on marine ecology; protect the ecological resources of the coastline landscape belt. In this part of the design, it's just marked human activity location and provide a safe place for people to get close to the sea and entertainment.

9.4.6. Road System

Undoubtedly, connecting and integrating the different functions of landscape nodes can allow people to participate in the experience of travel and reduce the re-destruction and impact of the ecological environment. Therefore, a healthy ecological trail that runs through the whole design area and connects all the landscape nodes seems significantly important. The main reasons are as follows:

- the walkway can minimize the impact and destruction of human activities on the ecological environment.
- It enables people to experience the natural landscape and understand the local history and culture more directly and deeply.
- It also provides an opportunity for people to get close to wildlife, while protecting the safety of habitat and

reducing interference from outside. According to the needs of functional nodes and the different terrain, walkways are divided into three types: walkway, bike lanes, walkway and bike lanes. According to the research, the width of the trail is generally 1.5 meters to 2 meters, with the slope from 0% to 8%, and the slope should be set up when it is more than 8%. The width of the bike lane is 2 meters to 3 meters, with slope of generally 0% to 2.5%. The maximum slope is not more than 8%, and the slope length should be between 150 meters and 300 meters. The width of the trail and bicycle lane is no less than 3 meters, and the slope is generally 0% to 2.5%, with the maximum of 8%. The slope length is 150 meters to 300 meters. Consequently, most of the main trails and bicycle lanes are in the gentle areas of 0% to 7% of the slope (Cervero & Duncan, 2003; Yunfang, J., Tiemao & Juan, 2010; Ministry of Housing and Urban-Rural Development of the People's Republic of China, 2016).



Figure 9.4.4.1 The Cook Monument (Tom, Kim & Emily , 2011).

9.4.7. Summary

To sum up, different design concepts, theories and principles are applied to different types of landscape nodes in the master plan, and the following are the functions and objectives of different types of landscape nodes (Figure 9.4.4):

- Ecological landscape node: this area is a newly designed ecological patch area, and the main vegetation planting and restoration area. The distance and size of patches in each new habitat are also strictly controlled. The distance is around 5km, and the area is not less than 5 hectares. Local plant species are selected.
- Main new landscape circulation: in the region, a number of service facilities will be built, such as tourists service centre, toilet, camping area, and outdoor activity area.
- Secondary new landscape circulations: this section is for basic service facilities and small rest areas.
- Maori cultural landscape node: this area is designed to be Maori cultural display and experience area, allowing visitors to experience the daily life and culture of the Maori original people through different sightseeing routes.
- Coastal landscape belt: through the design of the coastal walkway and Viewing deck in the area, people can get close to the sea and feel the beauty of the sea.
- Memorial landscape belt: in the landing site of Captain Cook, a memorial landscape is designed to commemorate the discovery voyage of Captain Cook.
- Road system: In the road system, the width and slope requirements of different types of roads vary.

- A. Ecological landscape node
- B. Main New landscape circulation
- C. Secondary New landscape circulation
- D. Maori cultural landscape node
- E. Coastal landscape node
- F. Memorial landscape belt

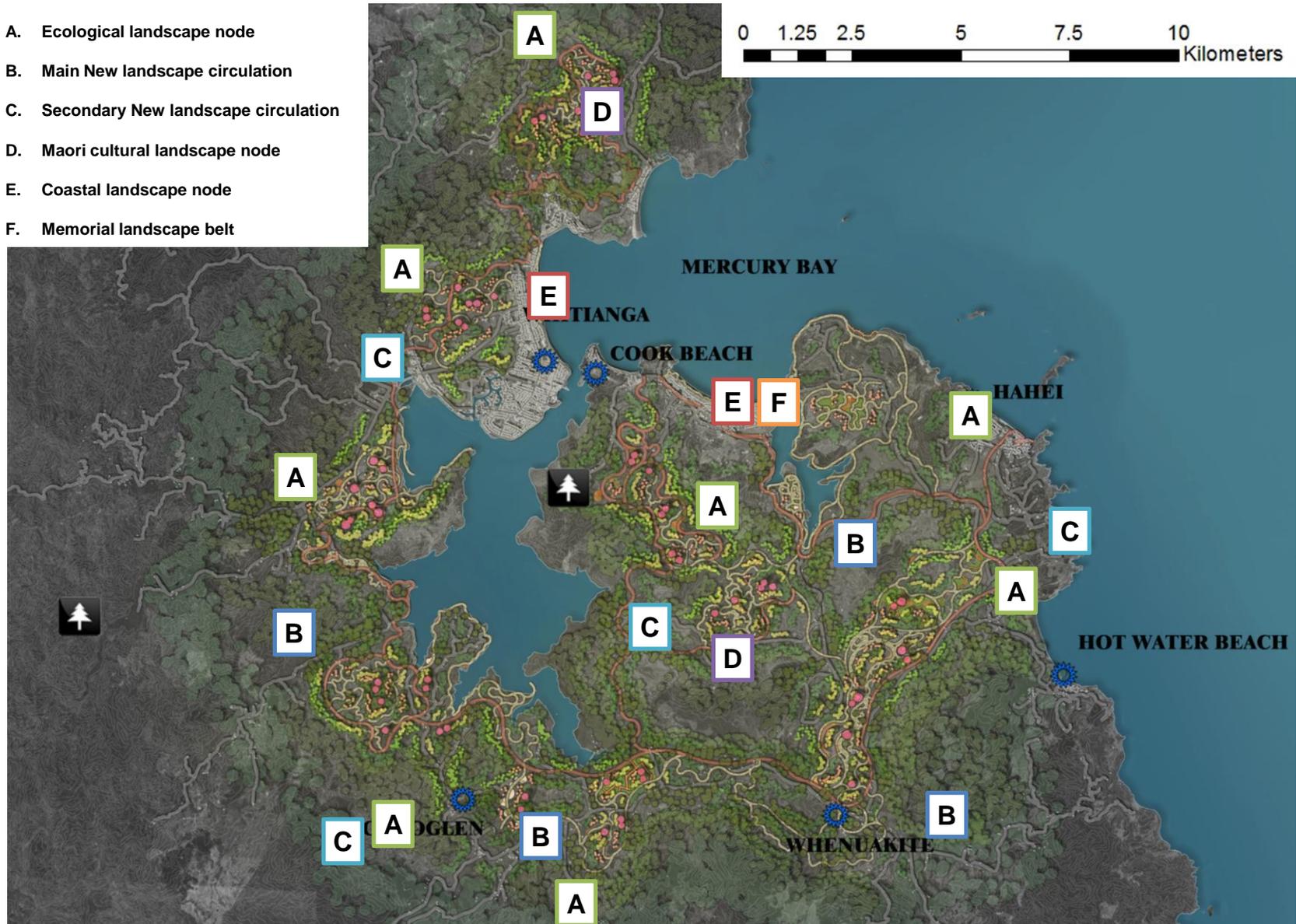


Figure 9.4.4. Master Plan

9.5. Detailed Design and Design Presentation

In this section, it is a detailed design description of 4 important areas in the project will be demonstrated (Figure 9.5.1). It mainly displays different types of landscape nodes in different functional zoning and site distribution, as well as a variety of artistic and cultural elements in the landscape performance.

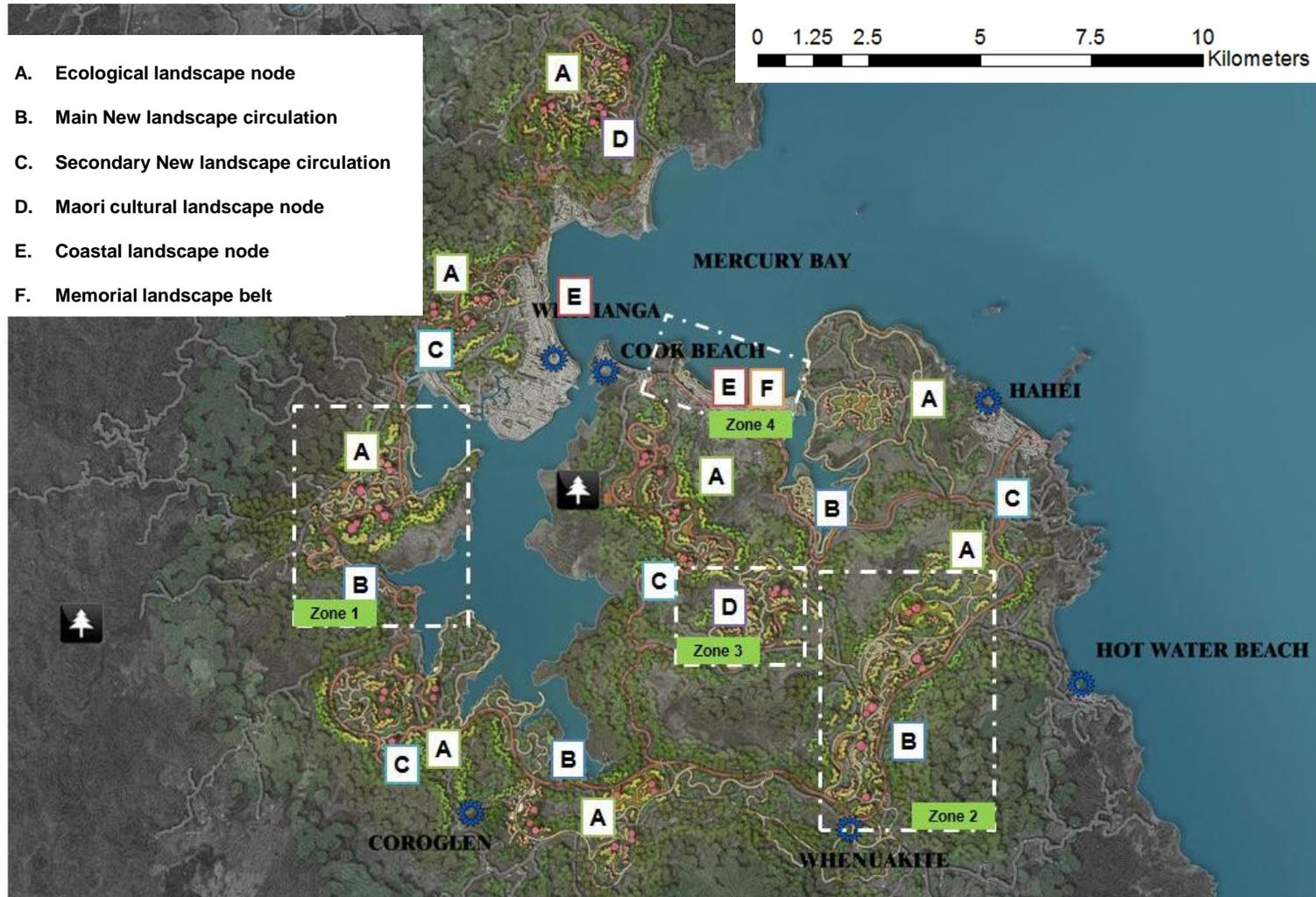


Figure 9.5.1.
Distribution of section

- A. Ecological landscape node
 - 1. Service Centre
 - 2. New Main Walkway and bicycle lane
 - 3. New Walkway
 - 4. New habitat patch
- B. Main new landscape circulation
 - 5. RV parking
 - 6. Camping area
 - 7. Service Centre

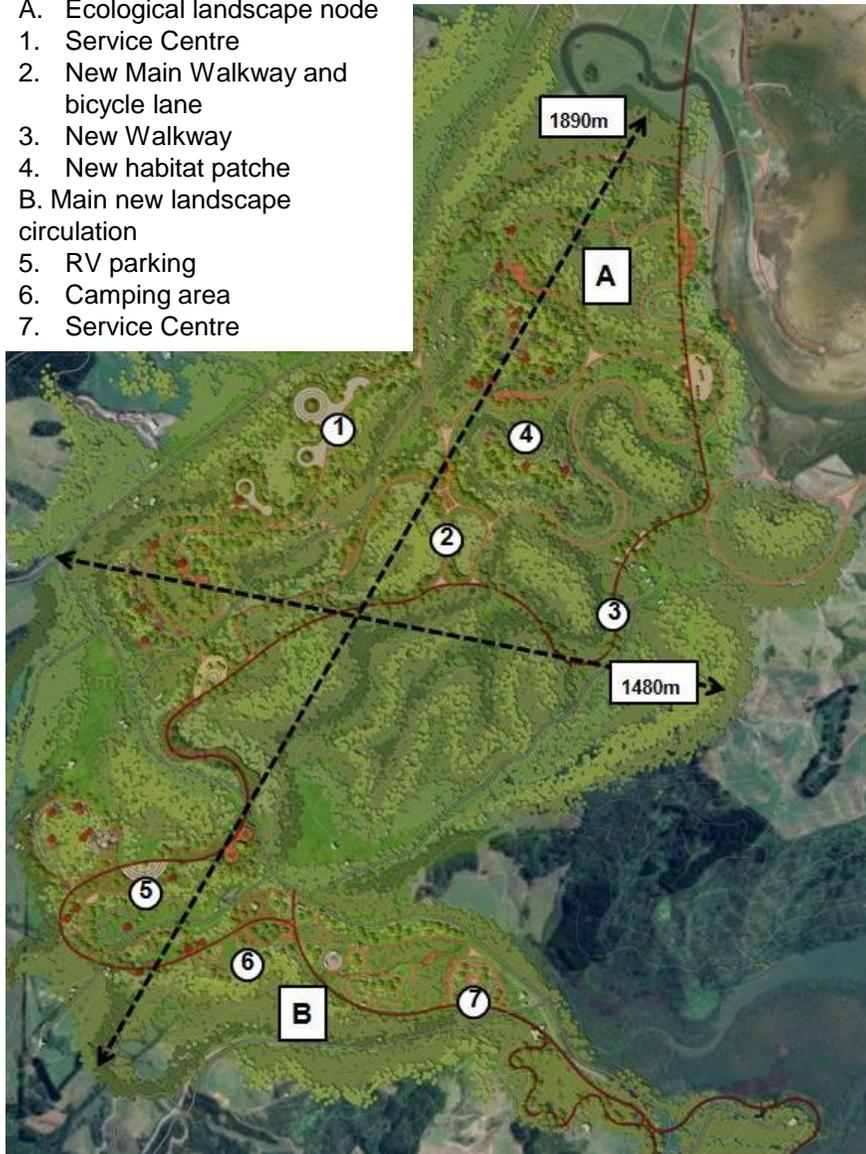


Figure 9.5.2 Zone 1 plan map

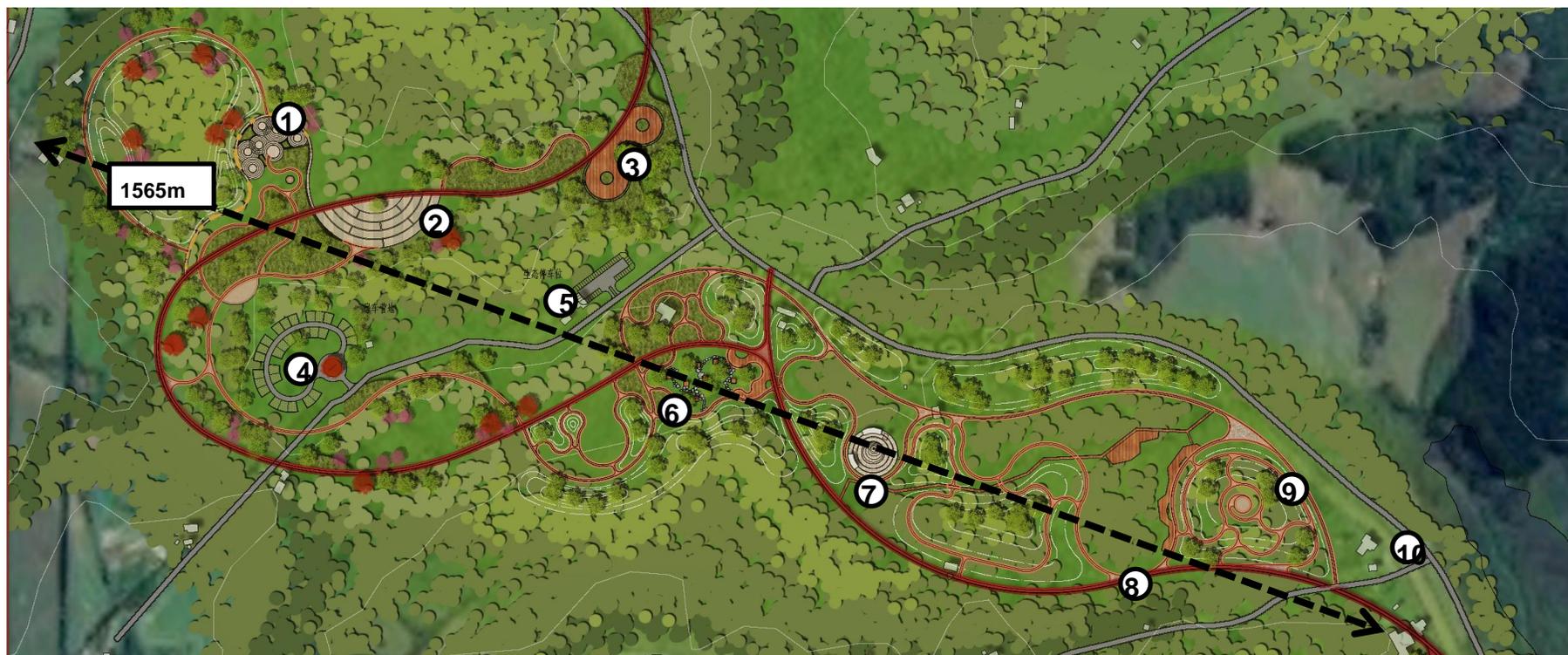
9.5.1. Zone 1

This area includes two types of landscape nodes: ecological nodes and main landscape circulations. These two nodes are spaced and independent, so the functional zoning in this area is also independent (Figure 9.5.2).

The functions of ecological node are vegetation planting, and the establishment of new ecological patches for animals to provide food, gathering and breeding sites. The road system in this area includes walkway (Figure 9.5.4) and bike lanes, which enable people to walk through the ecological patches while experiencing natural ecology and meeting wildlife. Moreover, it allows people to quickly pass patches and reduce the impact on animals and plants in habitat patches. Only a rest centre is designed in this area to provide toilets and short rest areas for people.

The main landscape circulation (Figure 9.5.3) in this area are close to the original driveway, and parking and RV camps are designed near the road. The RV camp is in the depth of the node. This is to ensure the safety of the parking area and not be disturbed by the passing vehicles.

Within the node, there is service centre that can provide food, consultation, rest and simple medical assistance. Camping areas (Figure 9.5.6), small venues and fun trails (Figure 9.5.5) are designed to provide people with activities and entertainment. At the same time, some colourful plants have been added to improve the ornamental quality of landscape nodes.



- | | |
|---------------------------|--------------------------------------|
| 1. Resting place | 7. Service Centre |
| 2. Ornamental plants area | 8. New Main Walkway and bicycle lane |
| 3. Viewing deck | 9. New Walkway |
| 4. RV parking | 10. Original road |
| 5. Parking | |
| 6. Camping area | |

Figure 9.5.3 Zone 1 plan map for main landscape circulation



Figure 9.5.4 Zone 1 - walkway in new ecological patches perspective view



Figure 9.5.5 Zone 1 – walkway in main landscape circulation perspective view



Figure 9.5.6 Zone 1 - Camping area in main landscape circulation perspective view



Figure 9.5.7 Zone 1 - Resting place in main landscape circulation perspective view

9.5.2. Zone 2

This is the largest patch node and main landscape circulation in the whole design area (Figure 9.5.8). Unlike section 1, the ecological nodes and landscape circulations in this area are connected together, so the interaction between landscape circulations and ecological nodes is inevitable. In order to ensure the continuity of the landscape in the whole area, the sharing of site functions and the use of the same artistic and cultural elements are considered in the design of the landscape function. For example, the whole area has only one service centre and is located in the middle of the area. The car park and caravan camps are also close to the original driveway.

In the landscape circulations, there are camping areas, fun trails, and landscape terrace and wildlife viewing platforms to ensure the continuity of the landscape in this area. Therefore, in the ecological node, the walkways and bicycle lanes are designed to let people go through, and the platform is also added for watching wild animals and a small number of short rest areas.

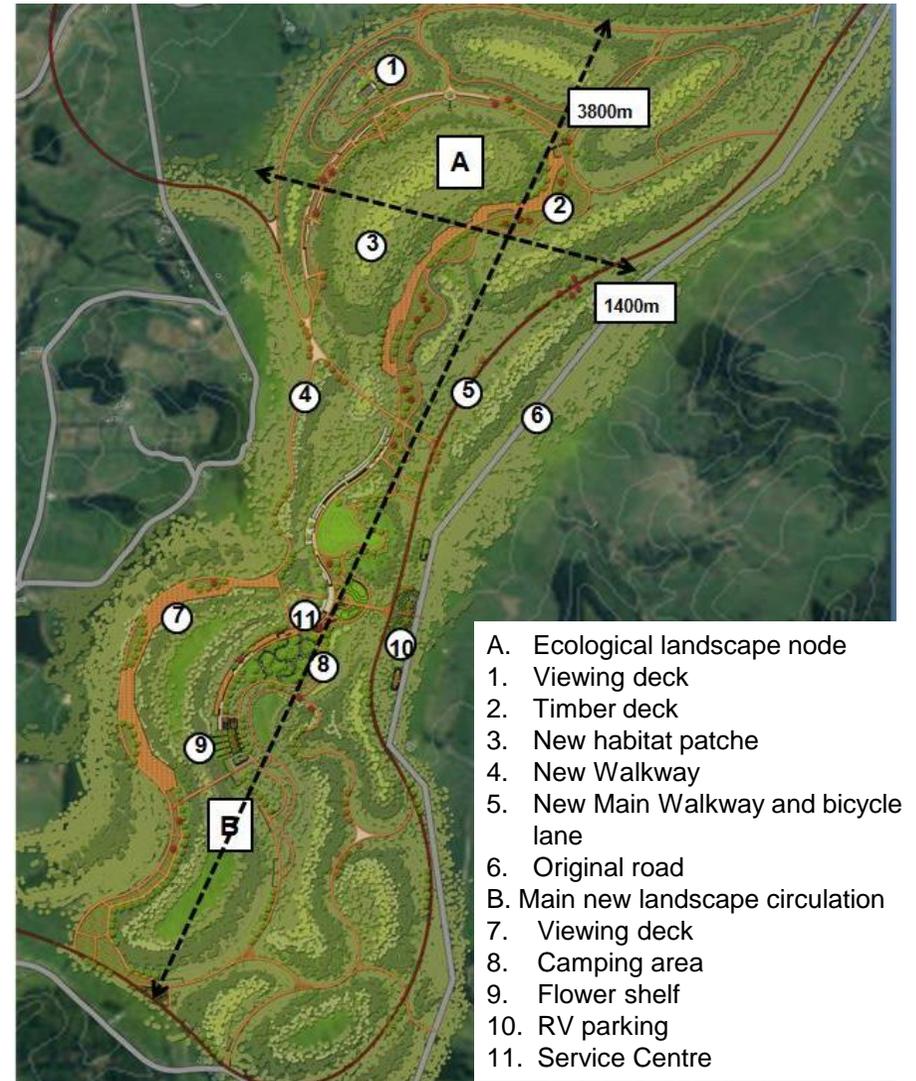


Figure 9.5.8 Zone 2 plan map

Figure 9.5.9 Zone 2 plan map
(Main new landscape circulation)



- | | |
|-------------------|---------------------------------------|
| 1. Timber deck | 8. Ornamental plants area |
| 2. Service Centre | 9. Lawn space |
| 3. Camping area | 10. New Walkway |
| 4. Stepping stone | 11. New Main Walkway and bicycle lane |
| 5. Parking | 12. Original road |
| 6. RV parking | |
| 7. Flower shelf | |



Figure 9.5.10 Zone 2 - RV parking perspective view



Figure 9.5.11 Zone 2 - Camping area perspective view



Figure 9.5.12 Zone 2 - Timber deck in new ecological patches perspective view

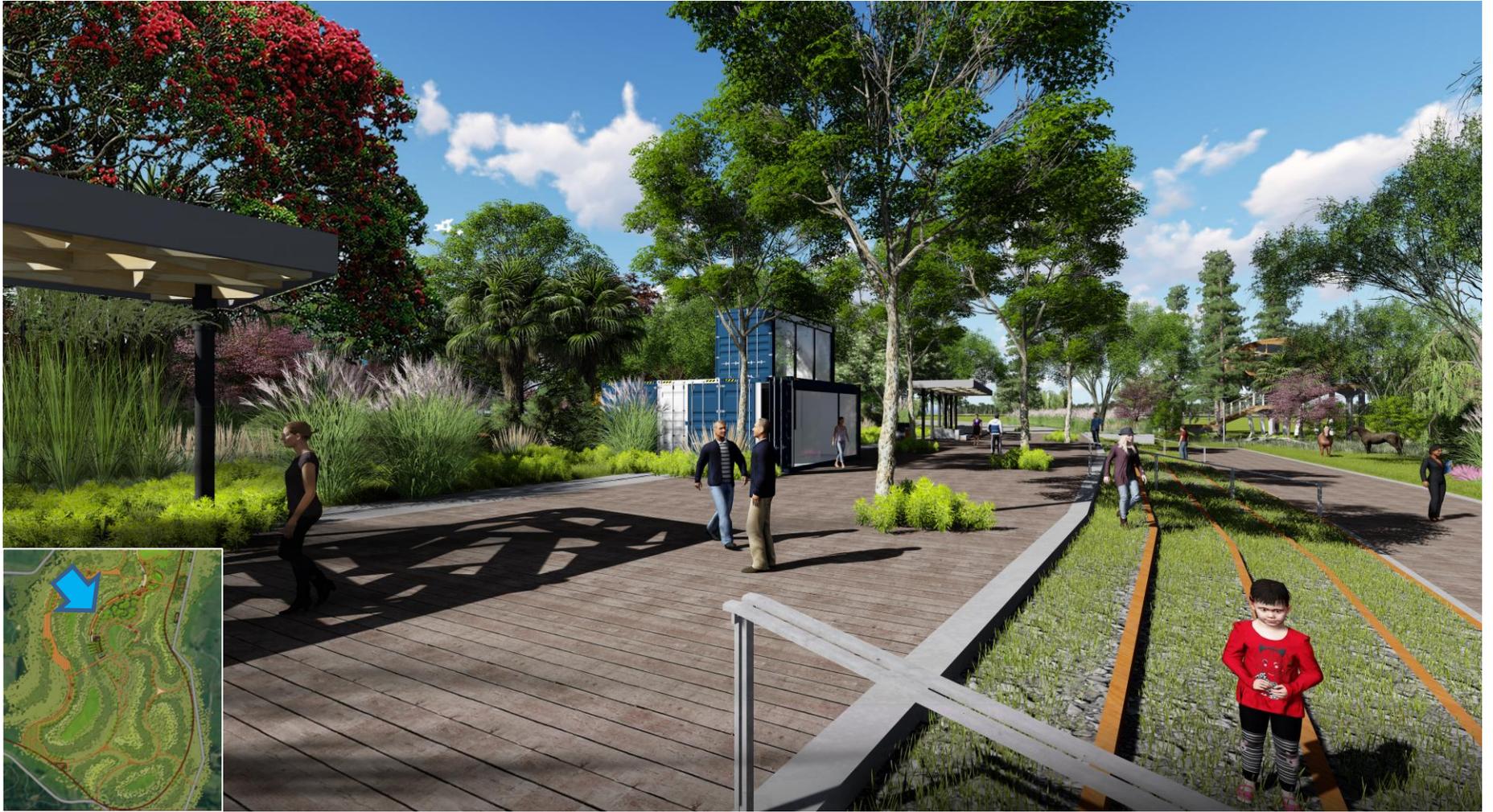


Figure 9.5.13 Zone 2 - Service Centre perspective view



Figure 9.5.14 Zone 2 - New Main Walkway and bicycle lane perspective view



Figure 9.5.15 Zone 2 - Resting place and Flower shelf perspective view

9.5.3. Zone 3

Due to different functional requirements, cultural nodes will be divided into two parts, cultural display and cultural experience (Figure 9.5.19).

The cultural display area mainly expresses the historical changes and characteristics of the Maori culture through some landscape walls, sculptural buildings, and special paving elements. In the Maori culture experience area, a small original Maori village is restored, where people can experience Maori original lifestyle, such as hunting, fishing, farms, food, accommodation houses, traditional art shows (dance, songs, etc.). Service centre and Maori store are designed to sell and display Maori special foods and cultural artworks. Since there are differences in height in this area, steps and artificial terrain are going to be adopted.

However, Maori culture is a traditional and complex cultural system that needs special emphasis and explanation, so the project will only use function partition design and professional Maori culture designers will be invited to complete the Maori buildings and totem, sculpture and other details.



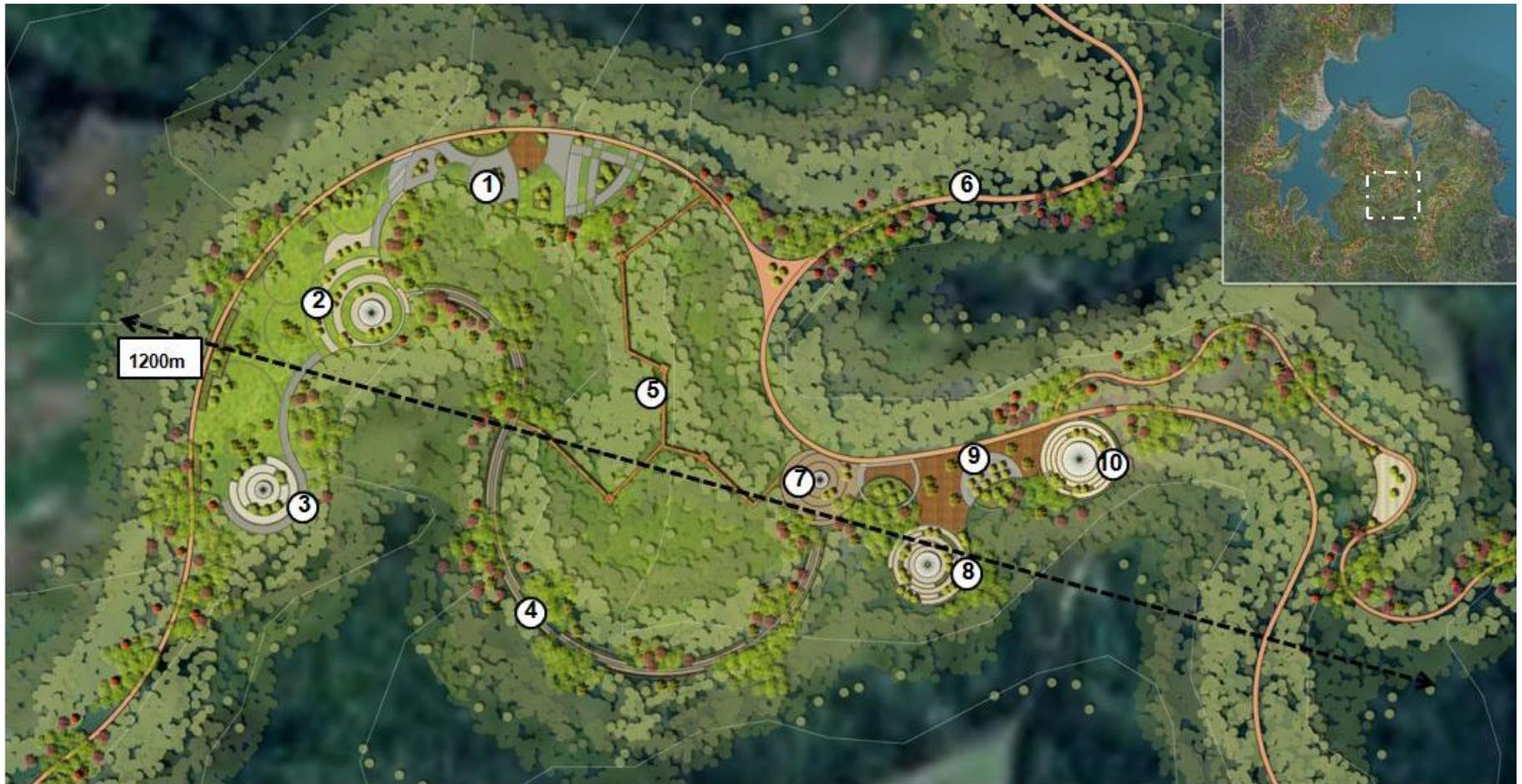
Figure 9.5.16 Maori building (Turley, 2017).



Figure 9.5.17 Maori village (Backpacker deals. n.d.).



Figure 9.5.18 Maori dance (Backpacker deals. n.d.).



- | | |
|---|-----------------------------|
| 1. Maori style sculpture square | 6. New Main Walkway |
| 2. Maori life exhibition area | 7. Service Centre |
| 3. Maori building | 8. Maori building |
| 4. History and Culture exhibition gallery | 9. Maori totem display area |
| 5. Maori style plank road | 10. Maori store |

Figure 9.5.19 Zone 3 plan map

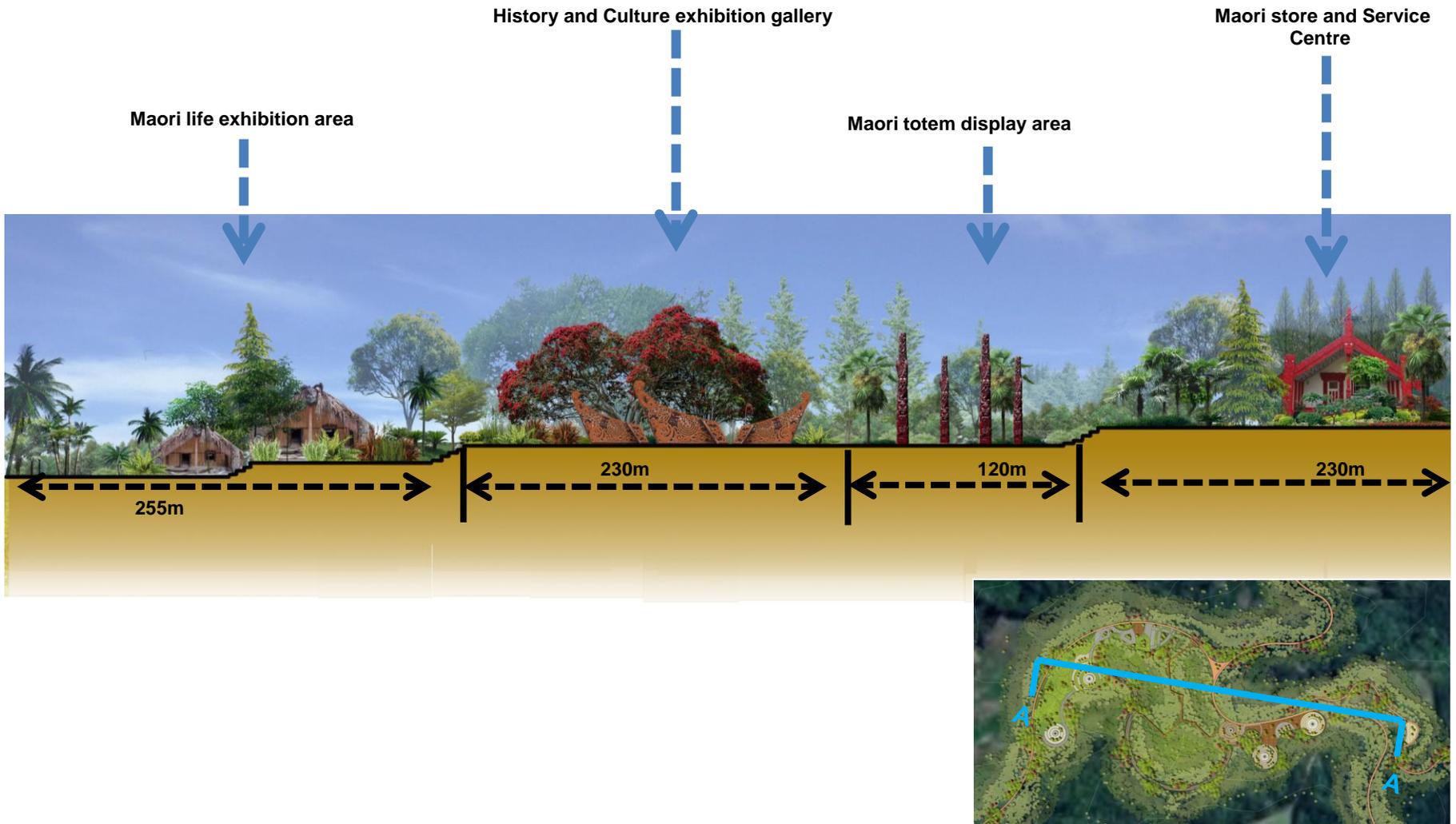


Figure 9.5.20. Zone 3 Elevation A - A



Figure 9.5.21 Zone 3 - Maori life exhibition area perspective view

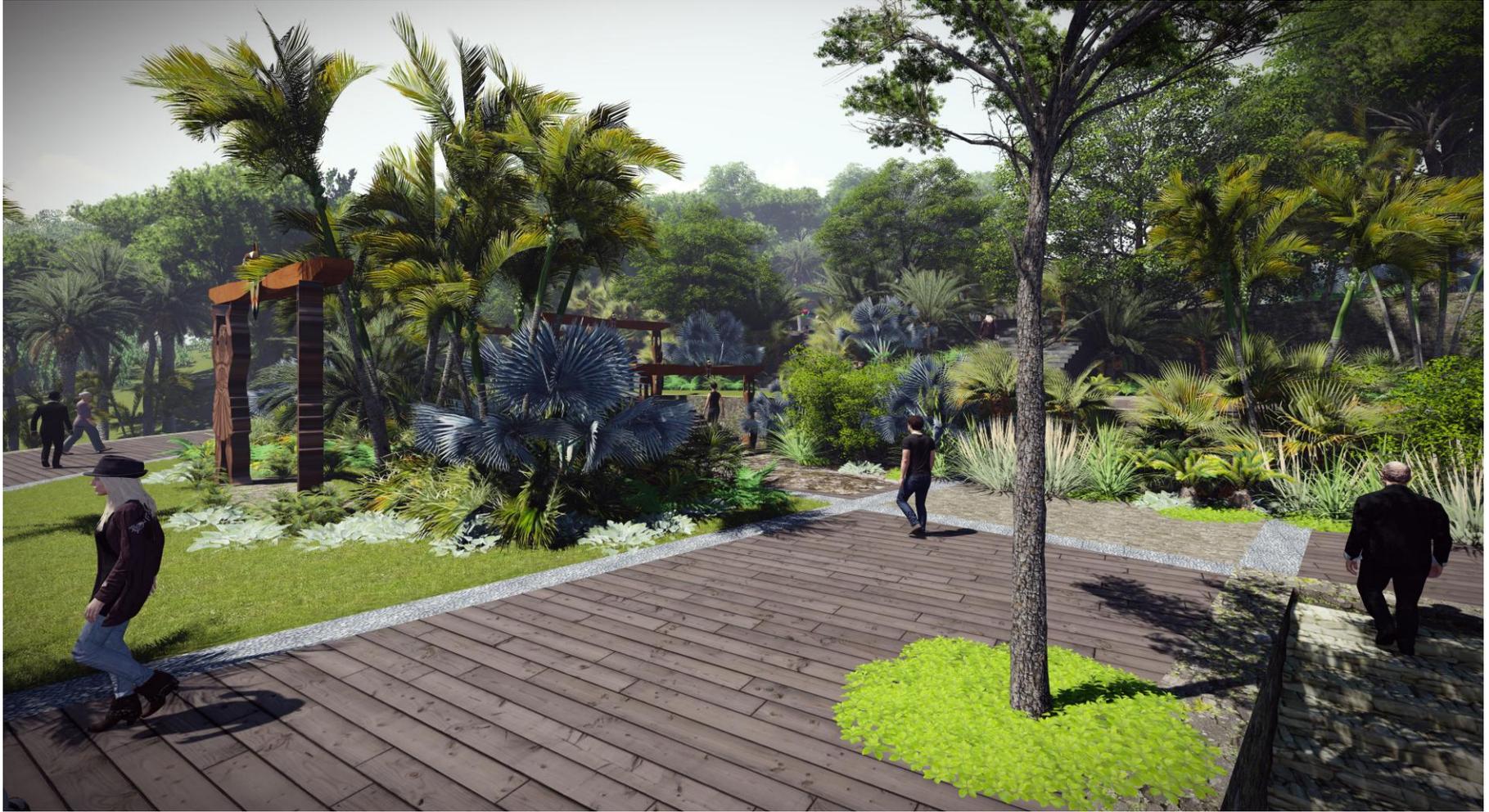


Figure 9.5.22 Zone 3 - Maori style plank road perspective view



Figure 9.5.23 Zone 3 - Maori totem display area perspective view



Figure 9.5.24 Zone 3 - Service Centre perspective view

9.5.4. Zone 4

This part includes memorial landscape belt and coastal landscape belt (Figure 9.5.29). These two landscape belts form the town coastline of Whitianga and Cooks beach. They are not only part of the Bioregional Park, but also part of the urban landscape. Therefore, they also have some urban landscape functions, which can benefit the protection of the urban environment.

In the memorial landscape belt, a commemorative square for commemorating cook is designed. And the historical deeds of Cook are described in the memorial sculpture. The memorial square is not only a place to protect and display historical sites, but also provides a venue for the 2019 Cook's anniversary celebration. It is a window to show cook's great contribution to New Zealand. There is also a sea viewing platform connecting the square and the ocean, and it can be used as a temporary dock for the Endeavour 's New Zealand sailing tour in November 2019.

The coastal landscape runs through the town coastline of the Whitianga and Cooks beach. It is connected by a seashore trail to the bioregion, towns and memorial landscape belt. In this part of the design, we should follow the planning of the marine reserve and the part of Coastal Marine and Coastal Terrestrial Areas apply the concept of Marine Space Planning for design guidance. It not only to assist the protection of marine resources and ecology by Hauraki Gulf marine reserves; reduce the impact and destruction of terrestrial human activities and urban development on marine ecology; protect the ecological

resources of the coastline landscape belt. At the same time, in the coastal landscape belt, some leisure venues and viewing platforms are designed to provide people with rest, entertainment, and access to appreciating the marine scenery. According to the topography and land conditions, a strip planting area along the promenade will be designed to form a coastal ecological corridor. It can restore and protect the coastline ecosystem in this area.



Figure 9.5.25 NSWSS0036 monument of Captain Cook's landing Kurnell Botany Bay NP (Botany Bay EEC, 2014).



Figure 9.5.26 Captain Cook Memorial Canberra (Wikimedia Commons, 2014).



Figure 9.5.27 Stone revetment (ArchDaily, 2008).



Figure 9.5.28 The planting pool on the beach (ArchDaily, 2008).



Figure 9.5.29 Zone 4 plan map

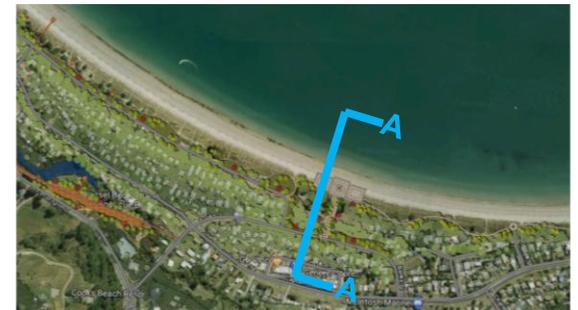
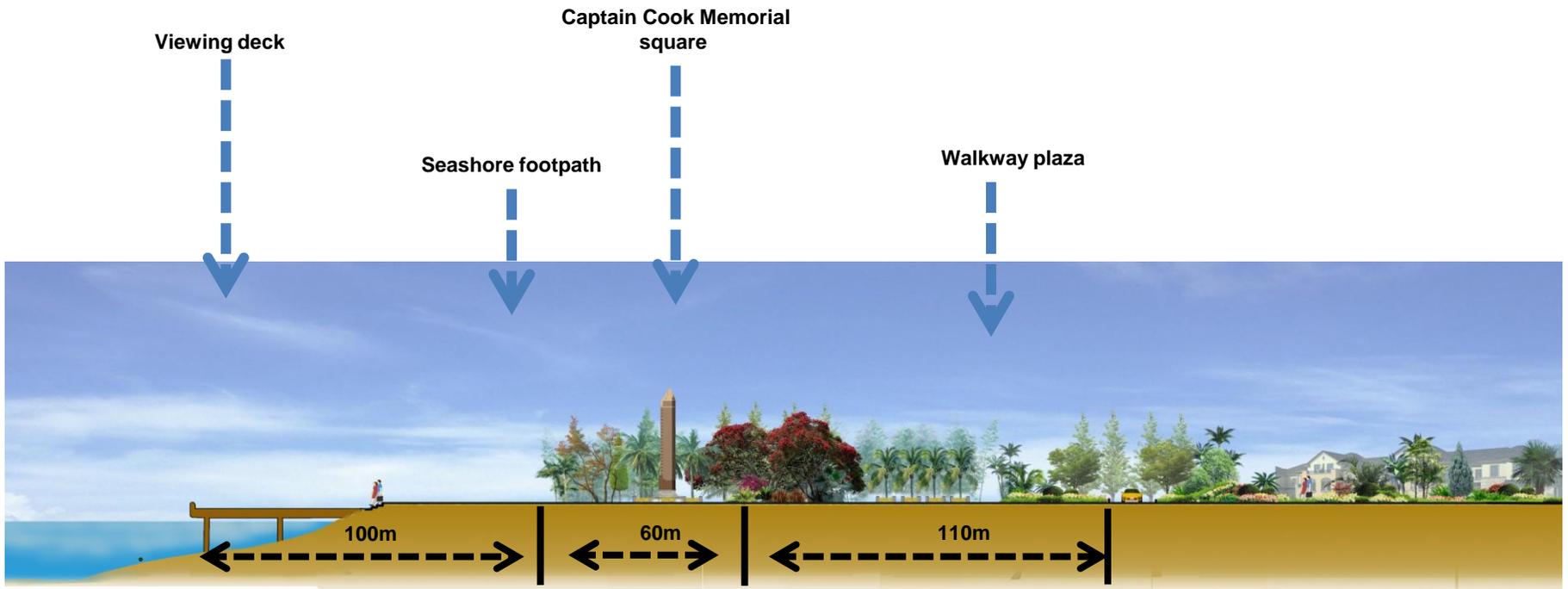


Figure 9.5.30 Zone 4 Elevation A - A



Figure 9.5.31 Zone 4 - Captain Cook Memorial square perspective view



Figure 9.5.32 Zone 4 - Viewing deck perspective view



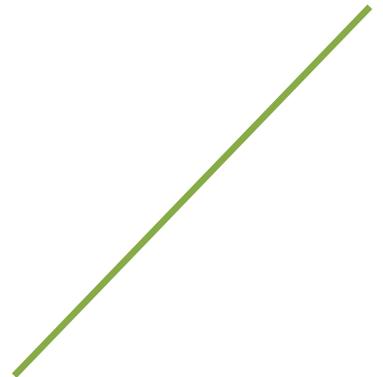
Figure 9.5.33 Zone 4 - Walkway plaza perspective view 1



Figure 9.5.34 Zone 4 - Walkway plaza perspective view 2



Conclusion



10. Conclusion

Research Questions

This research aimed to answer the following main research question and three sub problems:

Main research question:

“How can mapping a bioregion and its ecological connections be used as a driver for landscape architecture: conservation, and public space strategies?”

Sub-questions:

1. “How can tourism/recreation and ecological restoration be interwoven?”
2. “How can both Maori and Pakeha cultural values be integrated within the framework of the Bioregional park?”
3. “What influences does bioregional park bring about ecological connectivity?”

Aims and Objectives

The main goal of this project is to develop landscape architectural methodology in the New Zealand context by applying bioregional concepts. The chosen site to test the transferability of the new methodology is Mercury Bay. Moreover, this project serves as a real project involving multiple departments and organizations, including Ngati Hei, 2019 Organising Committee and local community and Sam Bourne, an external advisor of landscape architect. After the completion of this project, five outcomes are expected to be achieved:

- To establish a healthy ecological matrix within Mercury

bay.

- To enhance terrestrial and map marine habitats.
- To establish and reinforce cultural connections and narratives within the landscape of Mercury Bay:
- To establish a national commemorative landscape for commemorate the 250th anniversary of Captain James Cook's first voyage.
- A land management strategy for the return of Ngati Hei lands

Research of Project Design

Relevant historical background, figures and related historical events are surveyed before designing the project, which provides a general knowledge of the project from cultural perspective.

According to tribal narratives, Kupe was the first Polynesian to discover the islands of New Zealand. The place where Polynesia finally settled is Aotearoa (New Zealand), in around 1200 AD. Therefore, New Zealand's traditions, arts, religions, and sciences are similar to those of Polynesia (Anderson, 2005).

James Cook, one of the first Europeans to land in New Zealand, discovered New Zealand in October 1769. Among Cook's three voyages to New Zealand, he drew the first completed map of the country's coastline and is remarkably accurate and incredibly detailed (Carter, 2006), which has a great significance in the New Zealand history. During the

voyage of Captain James Cook in 1796, Ngati Hei held the first welcoming ceremony when they met with Cook and his crew at Wharekaho north of Whitianga.

Literature Review

■ Bioregional Approach

According to Berg (n.d.) and Dasmann (1978, p. 218), in terms of the unique overall pattern of natural characteristics which are found in a specific place is called a bioregion. Bioregional approach is the system of methods used to figure out the main features throughout a continuous geographic terrain. The description of a specific bioregion is drawn using information from not only the natural sciences but also many other sources. such as anthropological studies, historical accounts, social developments, customs, traditions, and arts can all play a part (Berg, 2002).

Main purposes of bioregional approach are as below:

- Recovery and maintenance of local natural ecosystems,
- Develop sustainable means to meet basic human needs, such as food, water, energy, shelter, resource materials, waste disposal and cultural information.
- Create and support a wide range of activities to better integrate into life.
- Support recovery work.

The bioecological approaches focus on many aspects including nature, water, culture and human life in the bioregion. They might have different priorities depending on the location of project. In this project, the Mercury Bay

Bioregional Park project focuses on applying bioregional approaches to establish a new ecological patch, combining a celebration to publicize and display the local cultural history and the construction of the biologic Park.

■ Principles

The design principles of the bio park include the following aspects: 1) understand local natural and cultural background; 2) protect natural resources; and 3) enhance the artistic and cultural performance.

■ Theories

According to the geographic environment of the project, the terrain in this area is complex and contains different terrains, such as mountain, forest, grassland, wetland, urban land, and ocean. Therefore, the whole design is divided into two parts: Ocean and land. Different parts will use different design concepts. The land part adopts the Patch-Corridor-Matrix concept and the marine part applies the concept of Marine Space Planning.

Case studies

The cases in this study are used to show how natural reserves can connect landscape, culture and nature; protect the natural ecological environment, wetland plant communities and animal habitats; and restore the ecosystem of coastal areas. By doing case studies, useful information can be obtained to support the project.

Site Selection and Site Context Analysis

The site inspection will be carried out after the site selection is determined. This part includes: Site investigation, site visit and meeting with local scholars, experts and project sponsors. After that, information on the design site will be obtained through data collection and GIS analysis mapping, including the land ownership of Ngati Hei land lands and Pa sites, land cover, land use capability, slope, stream systems, habitat, and vegetation cover.

Landscape Strategy and Design

The Mercury Bay bioregional park project focuses on protection and restoration of the ecological environment. Through this project, people can have a deep visit to New Zealand. During the journey, people can explore New Zealand's unique natural landscapes, such as volcanoes, mountains, forests, rivers, valleys and sea. It also provides precious chance of understanding the unique Maori history and culture, ranging from tasting Maori food to experiencing Maori original lifestyles. It also provides an opportunity for animal lovers and protectors to enjoy close contact with wildlife.

Answer Research Questions

Main research question:

“How can mapping a bioregion and its ecological connections be used as a driver for landscape architecture: conservation, and public space strategies?”

Unlike traditional park, the bioregional park is a brand new

type of park. It differs from the existing park types or protected areas in New Zealand. Without a clear boundary, the bioregional park is a compound park covering different types of parks, towns, urban public green space systems and protected areas. It is a new landscape framework used to connect, protect and restore the ecological environment of the Mercury Bay, create new animal habitats and ecological patches; it is a window to protect and display the culture and history of the Maori; it provides a way for people to be close to nature and care for wildlife; it is connected with the space and nature of the public green space of the town. At the same time, it possesses a special commemorative meaning of commemorating the 250th anniversary of Captain James Cook's first voyage. Therefore, in order to achieve the objectives and requirements of the project, three functional networks were set up in the design: ecological connections network, historical and cultural changes display window and human activity network. They played an important role in regulating the conflict between the city and the ecological environment.

This research was to develop landscape architectural methodology that applied bioregional concepts in concepts. The Mercury Bay is the place to test this new method. The research was expected to be used in the Mercury Bay test to apply this method to other projects, to protect the ecosystem of the restoration of habitat patches, and to form a new cultural display window and to build a human activity network.

Sub-questions:

“What influences does bioregional park bring about ecological connectivity?”

As mentioned previously, the introduction of the New Zealand biota suggests that exotic species pose a great threat and impact to New Zealand's biological communities. For example, the introduction of mammals has led to an increase in mortality of native tree species and the introduction of dry fruit trees and wind pollination trees in lowlands may eventually threaten the viability of New Zealand frugivorous and honey-eating birds, as they threaten the growth of woody plants that provide fleshy fruits or nectar for these birds. However, the interactions between birds and forest plants provide numerous benefits, including pollination and seed dispersal. The establishment of new habitat patches and ecological corridors in project design effectively solved and alleviated these ecological problems in the Gulf of mercury. The establishment of new habitat patches and ecological corridors provided a high-quality Habitat for the Mercury Bay and formed a corridor linking the original habitat. Restoring vegetation in this area could also attract animals, especially birds, and inhibit the growth of weeds and restricts the behaviour of mammals.

■ “How can tourism/recreation and ecological restoration be interwoven?”

In the project design, the healthy ecological walkway is the link connecting the various landscape nodes. It connects the habitat patches, the Maori cultural area, the town, the coast, and the landscape circulation landscape which is to provides functional facilities for people, such as viewing,

entertainment, rest, catering, camping, medical treatment and so on. The walkway can minimize the impact and destruction of human activities on the ecological environment. It enables people to experience the natural landscape and understand the local history and culture more directly and deeply. It also provides people with opportunity to get close to wildlife, and protects the safety of habitat and reduces interference from outside at the same time. So it's not just a way of serving humanity, providing tourism and entertainment, but also an ecological corridor connecting ecological habitats.

■ “How can both Maori and Pakeha cultural values be integrated within the framework of the Bioregional park?”

According to the research of New Zealand's historical and cultural background, Polynesians came to New Zealand before 1200 years ago, and Kupe was the first Polynesian to discover New Zealand. The Maori culture in New Zealand is similar to Polynesian in its tradition, art, religion and science. In both cultures, independent tribes and strong villages were established. People were engaged in hunting, fishing, trading commodities, and developing agriculture, art and weapons. When Captain Cook entered new Zealand and Europeans migrated to New Zealand, they brought European cultures from the west, such as Christianity, advanced technology, English language, digital and literacy. Due to war, social development and large-scale immigration, the number of Maori population has been decreasing in recent years. Maori traditional culture has also been seriously influenced by western culture and culture from all over the world. Therefore, Maori cultural

landscape node was designed to be Maori cultural display and experience area, allowing visitors to experience the daily life and culture of the Maori original people through different sightseeing routes. Among the three networks built in this project, cultural network connected various attractions, historical sites with the local culture of the human life area and the Ngati Hei lands Maori culture.

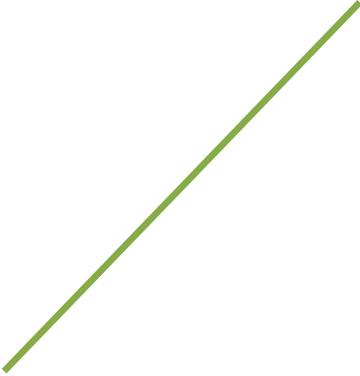
The Last Word

Overall, this research shows that bioregional concepts can be used to repair the broken ecological patches in the Mercury Bay, and restore ecosystems. The method can be used to strengthen the connection between land and sea, as well as building a landscape showing historical and cultural characteristics and commemorative significance. Therefore, this research method can be applied to other biota communities and other similar research fields.

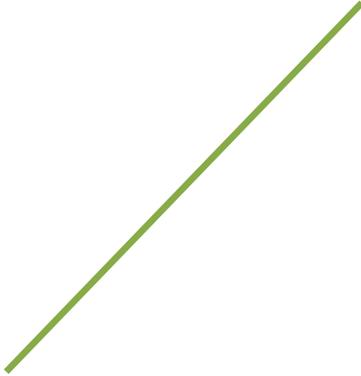
Future work

The Bioregional Park: the bioregional park project to commemorate the visit of Captain Cook is a national project. The location of the Mercury Bay bioregional park serves as a test site for applying bioecological approaches. The bioecological approaches focus on many aspects including nature, water, culture and human life in the bioregion. They might have different priorities depending on the location and location of each project. The Mercury Bay Bioregional Park project focuses on the establishing a new ecological patch, combining a celebration to publicize and display the local history and the construction of the biologic Park. If there is

still a chance to continue this project in the future. I will further study and learn other aspects of the bioecological approach.



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Figure 9.2.4. Slope analysis. Author's own.

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Figure 9.2.6. Stream systems. Author's own.

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Figure 9.3.7 Habitat Analysis in Preliminary design. Author's own.

Figure 9.4.1 Master Plan - Overlays. Author's own.

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Figure 9.4.3 Master Plan – Overlays (new landscape circulation). Author's own.

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Figure 9.5.2 Zone 1 plan map. Author's own.

Figure 9.5.3 Zone 1 plan map for main landscape circulation. Author's own.

Figure 9.5.4 Zone 1 - walkway in new ecological patches perspective view. Author's own.

Figure 9.5.5 Zone 1 – walkway in main landscape circulation perspective view. Author's own.

Figure 9.5.6 Zone 1 - Camping area in main landscape circulation perspective view. Author's own.

Figure 9.5.7 Zone 1 - Resting place in main landscape circulation perspective view. Author's own.

Figure 9.5.8 Zone 2 plan map. Author's own.

Figure 9.5.9 Zone 2 plan map (Main new landscape circulation). Author's own.

Figure 9.5.10 Zone 2 - RV parking perspective view. Author's own.

Figure 9.5.11 Zone 2 - Camping area perspective view. Author's own.

Figure 9.5.12 Zone 2 - walkway in new ecological patches perspective view. Author's own.

Figure 9.5.13 Zone 2 - Service Centre perspective view. Author's own.

Figure 9.5.14 Zone 2 - New Main Walkway and bicycle lane perspective view. Author's own.

Figure 9.5.15 Zone 2 - Resting place and Flower shelf perspective view. Author's own.

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Figure 9.5.20. Zone 3 Elevation A - A. Author's own.

Figure 9.5.21 Zone 3 - Maori life exhibition area perspective view. Author's own.

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Figure 9.5.23 Zone 3 - Maori totem display area perspective view. Author's own.

Figure 9.5.24 Zone 3 - Service Centre perspective view. Author's own.

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Figure 9.5.30 Zone 4 Elevation A - A. Author's own.

Figure 9.5.31 Zone 4 - Captain Cook Memorial square perspective view. Author's own.

Figure 9.5.32 Zone 4 - Viewing deck perspective view. Author's own.

Figure 9.5.33 Zone 4 - Walkway plaza perspective view 1. Author's own.

Figure 9.5.34 Zone 4 - Walkway plaza perspective view 2. Author's own.

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This Thesis/Dissertation/Research Project entitled: The Bioregional Park: Commemorating the visit of Captain Cook

is submitted in partial fulfillment for the requirements for the Unitec degree of Master of Landscape Architecture

Principal Supervisor: Nikolay Popov

A blue ink signature of Nikolay Popov, written over a horizontal line.

Associate Supervisor/s: Daniel Irving

CANDIDATE'S DECLARATION

I confirm that:

- This Thesis/Dissertation/Research Project represents my own work;
- The contribution of supervisors and others to this work was consistent with the Unitec Regulations and Policies.
- Research for this work has been conducted in accordance with the Unitec Research Ethics Committee Policy and Procedures, and has fulfilled any requirements set for this project by the Unitec Research Ethics Committee.

Research Ethics Committee Approval Number: N/A

Candidate Signature: Jie Zhang Date: 3/8/2018

Student number: 1440695