USE IT OR LOSE IT

MOBILITY
PROMOTING IN
ADVANCING AGE

"Use it or lose it!"

Mobility promoting in advancing age

BY

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Abstract

In the foreseeable future, the elderly will make up a significant proportion of New Zealand's population. The relationship between ageing and disability means the disabled population is expected to increase as the population ages. Physical disabilities especially mobility impairments have adverse impacts on the life experience of elderly people. The outdoor environment contributes to the physical and mental health of ageing people and can provide the opportunities to enhance their quality of life. This thesis explores the concept of a rehabilitative landscape design at Kenepuru Community Hospital. The design aims to improve and maintain mobility during the ageing process, and potentially provide feedback which will motivate the ageing to continue a healthy lifestyle. The thesis concludes that the "disabled" elderly and their community gain a better life experience while reconnecting with a strategically designed outdoor environment.

Key words: ageing group, disabled elderly, rehabilitation, mobility

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Preface

"Our ultimate goal, after all, is not a good death but a good life to the very end."

(Gawande 56)

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1

Introduction

1.1 Problem statement

Fig 1.01. Diagram of the proportion of ageing population and disabilities rate among elderly.

Statistically, the most common type of disability in advanced age is mobility related, which impacts on people's ability to live independently (Health of Older People in New Zealand). Among the ageing population of New Zealand, 59% of those aged 65 and over are classified as disabled (MacPherson). Over the last two decades, there has been a significant increase in the population aged 65 and over, as the baby boomer generation reach their retirement age (Fig 1.01). Currently, 12% of the New Zealand population are aged 65 and over, and this percentage will rise to 25% by 2051 (Statistics New Zealand). However, many elderly people are unaware of the impact that declining mobility will have on their independence and the benefit of exercise and health promotion (Lee). This extraordinary rate of growth in the elderly population will increase demand for health services, and pressure regional economies and communities.

Fig 1.02. Elderly and obstacle of mobility.

There is a growing group of older New Zealanders with a lower income and lower living standards. Finances can be an issue when unexpected events and emergencies occur. Their limited income cannot always cover expenses for local transport for nonnecessities such as travel and entertainment. Affordable social and recreational activities are essential for the quality of life of older adults living alone and on low incomes. Mobility is essential for people to be able to carry out activities outside the apartment or house (Heidrun and Fiorella).

Most of the studies of therapeutic design environments focus on addressing the diseases which accompany mobility loss (Rogers et al.). Chronic diseases such as arthritis and obesity are common health issues of older people and contribute to disability (MacPherson). In advancing age, age-related illness, diseases and impairments are the leading cause of functional limitation which will later increase the risk of mobility decline (Morris and Hardman). Moreover, any decrease or decline may make it difficult to return to pre-illness levels, especially for the elderly. To prevent ongoing mobility decline and future loss, it is essential to have an ongoing plan.

The inaccessible design of physical environments become a barrier between the elderly and their community(Fig 1.02). Mobility is essential for trips out of the home. The elderly face the loss of their ability to drive which impacts on how they remain active and engaged with their com-

munity. Out-of-home mobility and the use of the transport system, whether on foot or by private or public transport, have become major prerequisites in maintaining autonomy, independence and quality of life for an elderly adult. The elderly are often home-bound and find it challenging to interact with the community they live in (Bassuk, Glass and Berkman). Feelings of loneliness and isolation from society are higher among older adults who live alone (Forbes).

Bohannon and also Andrews and Thomas argue accessible design can affect the well-being of the general community (Bohannon, Andrews and Thomas). However, researchers in the field of accessible design have not sufficiently addressed the challenges facing the elderly.

Misconceptions and negative stereotypes of older adults have often excluded them from many activities in society. The experiences of an older adult in the environment is very different from a younger adult. During the ageing process, people tend to develop an increasing awareness of their own restrictions of movements in the built environment (Ziegler and Schwanen). There is a need to consider the mental health of the elderly, as well as their physical health and safety in outdoor activities (Vellas et al.). In addition to the physiological, there are also emotional factors, such as the fear of tripping or falling outside, the feeling of insecurity, the feeling of being alone and the fear of other people which can discourage the elderly from going out and participating with others in public (Rantakokko et al.; Vellas et al.). Moreover, for the ageing, a clear mind and full control of their communication and actions when they have to face a tough social situation in public may cause concern. For elderly people, the needs for socialisation can be seen as a motivator to get involved with their communities for a sense of belonging (Sik et al.). Many designs for the people with disability focus on designing to create physical accessibility, but neglect social and psychological needs especially for ageing population.

There is limited research focused on promoting the mobility of the elderly who are already affected by mobility decline, even though therapeutic landscape design has had a long history of aiding healing. Maintaining the mobility of the elderly will allow them to manage their life independently. Therefore, designers could use therapeutic landscape to rehabilitate the mobility of the elderly which will improve mental and social health. This

thesis explores how landscape architecture can help increase the quality of life for those older people facing mobility decline and assist them in maintaining their independence.

1.2 Research Question, Aims and Objectives

Research Question:

How can landscape design promote the mobility of elderly people with advancing age to enhance their quality of life?

Aims:

My aim in this project is to use landscape design to maintain and improve mobility. The designed environment will enhance physical and mental health in participants by facilitating rehabilitative activities. The environment will also encourage people with mobility issues to engage with their community.

1.3 Methodology and Structure

1. Cross-disciplinary literature research

This thesis explores a cross-disciplinary range of literature on how landscapes can shape a rehabilitative environment. These range from design for general health, through to design of therapeutic gardens, to environmental psychology. The synthesis of literature has established a set of performance criteria which can be used to evaluate the design.

2. Case studies and precedents

This thesis analyses a series of existing projects that seek to improve the mobility of the elderly. These projects demonstrate how landscape rehabilitates the user.

Each project tests different design interventions that this thesis will compare. This will provide an insight into successful inventions that will be used in future design iterations.

3. Site analysis

To test the design, a site has been carefully selected based on analysing the composition of the ageing in the context of two main healthcare facilities. Personal observation, site visits and data were used to validate the selection of the site.

4. Preliminary design

The early research formed a set of criteria for design interventions that has been developed and tested. The design takes into consideration how it will achieve the objectives. Then the initial design was reviewed by New Zealand and international experts and academics in order to get suitable feedback.

5. Design iteration

I continued to test the design iterations formed from previous research, then I exposed them to experts for review. The feedback helped form a more practical design iteration.

1.4 Scope of the design

The scope of the design investigation is limited to the Kenepuru region of Porirua, which accommodates elderly residents from the adjacent hospital and rehabilitation centre, and also service for the future residential development immediately adjacent. The site has a complex user group and has visitors in different stages of mobility decline, especially older adults 65 and over. While the design is specific to this location, the principles can be applied universally.

2

Literature Review

Fig 2.03. Garden of the Hospital in Arles, Vincent van Gogh, 1888

Fig 2.04. Classical Chinese garden for mediation.

2.1 Literature Review

Since medieval times, nature has been used for healing (Clare Cooper Marcus). The gardens of the ancient Egyptian nobility were used to recover from diseases (Fig 2.03); also, the gardens of merchants in medieval Chinese cities indicate (Fig 2.04) how the landscape was used for stress relief (Hongxun). Recently many researchers have demonstrated that the outdoor environment can serve as a resource for recovery and rehabilitation (Clare Cooper Marcus; Humpel, Owen and Leslie; R. Ulrich). Even viewing the landscape can be beneficial. One significant study found that patients in hospital with a window view to nature recovered more quickly than those without such a view (R. Ulrich). Kaczynski and Henderson concluded that the nearness of parks and natural settings were positively related to some physical activities, especially for elderly people (Kaczynski and Henderson). In addition to mobility decline, the elderly often have reduced income, and nature is the most accessible and affordable source to help with healing. The concept of therapeutic landscape was developed by Dr Cooper Marcus. The resulting studies demonstrated the role of nature in healing people with physical and mental illnesses. As the population ages the opportunity of landscape increases as it not only helps with mobility decline in advanced age but also it affects seniors' quality of life by increasing the possibility to socially engage with their surroundings. Thus, there is potential for using therapeutic landscape design to rehabilitate their mobility; this idea has three significant layers: active body, supportive contextual design, and psychological involvement.

2.1.1 Active body

The mobility of the elderly is either “use it or lose it” (Webber, Porter and Menec). Outdoor mobility can refer to all types of trips outside one’s house, from collecting the mail to using local services. Ageing increasingly impairs sight, hearing and other senses. This reduces environmental sensitivity and precision of movements (Howe et al.). Ageing also impairs movement by reducing muscle strength, flexibility, and endurance (Alexander). Maintaining mobility is an important goal for seniors. The elderly benefit from staying mobile by keeping their independence and maintaining their physical function. The literature identifies four key components of an active body:

Exercise is essential for quality of life and has a strong effect on mobility and independence. Researchers such as Clark or Rantanen et al. have demonstrated that physical activity is an affordable and efficient way to prevent chronic diseases and conditions and enhance independence and high quality of life for older adults (Clark; Rantanen et al.). Outdoor physical activity, particularly walking, plays a vital role in the maintenance of functionality for elderly with limited physical ability. Walking acts as the most basic predictor of movement ability in older adults (Simonsick et al.). Studies by Dr. Priscilla demonstrate that elderly adults in a nursing home have a significant improvement in their walk endurance time after completing a walking program (MacRae et al.). Walking is the most accessible method of exercise. It helps the elderly receive daylight exposure and enhances their bone density by vitamin D production. Walking helps older people with sleeping disorders and reduces sleeping pill usage by 70%. It also helps people with stress and anxiety, lowers blood sugar, and improves cognitive ability (Morris and Hardman). These are common health issues the elderly face. Walking is potentially a practical form of exercise with relatively low risk for the elderly to get their fitness level back (Morris and Hardman). Although the walk may be therapeutic, it might also be exhausting. Walking can be strenuous and stressful rather than health promoting for those with physical impairment, or for low-income mothers with children in tow. Therefore, participants will need space for rest and recreation instead of having to walk for a long distances without a break.

Walking is an essential method used as therapy and a tool for predicting the

health statement of the elderly. It offers more than just a type of aerobic activity. The elderly, especially those with low-income, normally find it hard to visit healthcare facilities frequently. They need to be aware of their physical condition. Graham et al. argue that walking speed is commonly used as a clinical measure for the elderly (Graham et al.). Slow walking speed is associated with several adverse health outcomes, including poor general health, low physical and cognitive functioning, falls, hospitalization, and loss of independence (Cesari et al.; Engedal). Research by Laboratories and Enright et al. presents evidence that walking speed is an important predictor of health (Laboratories; Enright et al.). This research also illustrates that distance walked in 6 minutes can be used as measurement of health especially for elderly people.

Ageing impairs movement, which reduces muscle strength and power (Woolacott and Shumway-Cook). A variety of exercises involving gait, balance, exercise - including tai chi, qi gong, dance, yoga - can enhance muscle strength, balance, and mobility in the elderly, reducing the risk of falls (Howe et al.; Rogers et al.).

In Alfieri and his colleagues' study of multisensory exercise interventions, participants walk different distances, forward and backward with open or closed eyes, or exercise on different ground surfaces, or add challenges like cones or sticks (Alfieri et al.). Alfieri argues that these interventions can restore muscle strength by stimulating the sensory systems.

To sum up, using landscape design as a "treatment" directly and indirectly benefits elders' mobility. Physical activities, such as walking, are good ways to exercise and regain strength and flexibility. Walking can also be used as an assessment tool for the elderly so that they are aware of their body's condition. The design in this thesis incorporates a multisensory concept and to help stimulate participants' sensory system and to act as a form of therapy(Fig 2.05).

Active body

Walking as therapy

Self-assessment

Multi- sensory exercise

Strength exercise

Fig 2.05. Key objectives to maintain an active body for the elderly.

2.1.2 Supportive Contextual Design

Freund and Martin state that mobility is not only determined by the capacity of individuals but also by whether the environment supports them (Freund and Martin). Freund and Martin call this 'an interpenetration of capabilities and context'.

Engedal indicates that elderly people with stronger connections to their community have lower levels of mortality (Engedal) and better physical body conditions (Seeman). Through the study of the relationship between environmental factors and physical activities, Humpel and her colleagues found that physical environment factors, especially accessibility, opportunities, and aesthetic attributes had the most significant associations with physical activity (Humpel, Owen and Leslie).

Walking can be promoted by environmental factors. The aesthetic attributes of walking, the presence of facilities, and the accessibility of a destination all influence walking frequency (Owen, Booth et al. Ball et al.),).

Level of engagement with society helps predict well-being and longevity of older adults (Maas et al.; Kweon, Sullivan and Wiley). Social integration is relatively challenging for the ageing demographic due to a decline of engagement in physical activities outdoors. There are studies stating that people actively involved in community or socially engaged with others tend to be healthier both physically and mentally. Socialization is consistently associated not only with higher life satisfaction but also with better health and a longer life (Heidrun and Fiorella ; Edwards and Tsouros; Maas et al.). Mobility for the elderly is more than a way for people and places to be linked, and more than methods for undertaking the activities of daily living. Mobility is a multidimensional concept of the willingness to engage mentally and socially with 'difference,' to retain the ability to socialize with other people, both at the level of the local community and more widely (Ziegler and Schwanen).

Accessibility for the elderly is defined as the ability to visit, reach, use,

and access urban facilities regardless of their physical condition (Burton and Mitchell). According to Gabriel and Bowling, one of the necessary measurements of quality of life in advancing age is offering access to facilities and services in their neighbourhood (Gabriel and Bowling). People are more active in accessible surrounding environments (Handy et al.; Saelens, Sallis and Frank).

Most suburban areas of New Zealand are planned for motor vehicle movement (Pawson). This has become an environmental barrier for older adults especially those who have stopped driving. Walking is one of the most low-cost activities that can be enjoying by everyone. It is essential to bring accessibility to the community in order to help elderly people who face mobility difficulties (Kim and Kaplan). A healthy physical and accessible environment setting is more likely to encourage physical activities and social connection. An accessible route for travel is the main factor to help everyone use a site safely and independently. Such a route should connect site arrival points, i.e. parking or bus stops with exterior and interior amenities.

Through the ageing process, loss of short-term memory and cognitive decline can interrupt decision-making while walking in public space. This decrease in spatial awareness limits options for the older population. It has a significant impact on their daily autonomy. It is challenging and complex for the elderly to understand maps, directions and signs. Therefore, a sense of spatial navigation is a fundamental ability for the elderly to maintain.

The physical environment can help the elderly to navigate in a community (Moffat). Different user groups within a community require different methods of navigation. Street layout, alternative routes, and location of services, pedestrian movement and signs are essential to make urban environments inclusive for the elderly. These ensure that the elderly can explore the environment and engage with activities in different destinations. Landmarks, environmental features or sometimes a distinctive tree are used as a sign for the elderly walking in public space (Burton and Mitchell). Intuitive directions minimize confusion for elderly people navigating the

environment. When designing, it is essential to give a clear image to the visitor by using certain colours, or materials to make spaces distinct from one another and easily recognized (Marcus and Francis).

Environmental activities correspond to the user's requirements and provide them a challenge. A sense of control and freedom is an essential element for an individual's physical and psychological health. People want to be able to live their lives independently. There is also research that indicates a greater sense of control over one's life lowers the rate of illness (Proshansky, Ittelson and Rivlin). With a garden or outdoor space, people seek a place for privacy or to be alone. Choices within the garden of places to wander, things to look at, and places to sit all facilitate a sense of control. Therefore, a designed environment should be shaped with a range of accessibility options regarding different levels of mobility(Fig 2.06).

Contextual design

Connections

Navigation

Options

Accessibility

Fig 2. 06. Key objectives for a supportive context.

2.1.3 Psychological Involvement

When designing to improve the mobility of the elderly, the focus is not just on how to improve the physical surroundings, but also to increase opportunities to connect socially. Psychological involvement with the environment also empowers participants while interacting with the physical environment (Fig 2.08). Two studies, Vellas et al. and Delbaere et al., found that about one-third of older adults develop a fear of falling after a fall. Repeated exposures to a familiar outdoor landscape can help diminish these fears and allow the individual to regain their confidence. Spending time outdoors can improve mood, lessen agitation and aggression among people with mobility issues (Vellas et al.; Delbaere et al.).

As stated by Ulrich: "Persons who undergo medical treatment often feel psychologically vulnerable, which has been demonstrated to heighten their sensitivity to insecurity in an environment." (Ulrich). Research by Ottosson shows that the experience of nature affects people differently, largely depending on their life situation (Ottosson and Grahn). When people feel good, they can function in most kinds of environments. The environments can give them strength and pleasure. During a life crisis, communication with the surrounding world becomes tough, and an individual's feelings for objects change. This in turn changes individual's cognition and scope of action (Grahn et al.).

As illustrated in the diagram (Fig 2.07), a person's relationship with the physical environment depends on one's subjective experience of well-being. People in crisis are more dependent on the physical environment. People with low mobility need a natural, physical environment that will build up their mental strength (Grahn et al.). Therefore, therapeutic landscape should be designed to suit participants at all levels of well-being. This so-called psychophysiological balance has a strong influence on how older adults respond to the physical environment.

Fig 2. 07. Diagram showing the relationship of Well being and involvement type.

Passive and active involvement

Grahn's triangle of a supporting environment shows how human beings' passive and active engagement with nature depends on their well-being.

1. At top of the pyramid is the outward involvement level, where an individual's well-being is highest and is least sensitive to the environment.
2. In this level active participation which presumes a high level of well-being. This means the individual takes part in physical activities and social engagement.
3. As one's well-being decreasing, sensitivity to the surrounding environment increases. Therefore, in this level individuals enjoy more while emotionally attached to the surroundings.
4. The person's well-being is lower than other levels and is most sensitive to the environment. Direct inward involvement is more manageable compared with another layer. This means individuals at this level are mentally active but not willing to participate in physical activities.

Restoration benefit theory

The attention restoration theory developed by Kaplan and Kaplan states that humans have two systems of receiving information while experiencing the environment: the directed attention and soft fascination. According to Kaplan, while people are in a situation of illness, traumatic experiences

and challenging life transitions, there are high demands for directed attention and therefore people losing mobility may benefit more from restorative experiences. During many illnesses and difficult life transitions, there are extreme needs for directed attention since individuals have less energy to sort complex information received (Marcus and Barnes). For the elderly with different mobility capacities, a restorative environment needs to include:

- Extent: a place where they have enough to see, experience and think. Places that arouse memories, stories, and histories, including natural environments, provide this.
- Being away: an escape to a different environment. In this case, the place other than home or the healthcare facilities that the elderly use.
- Soft fascination: easy access so that the natural environment does not take much effort during a visit.
- Compatibility: a layout that fits individuals' or groups' intentions and facilitates going to a certain place.

The environment for the elderly therefore needs to be designed for those with all levels of mental strength of supportive non-human environments. In situations of crisis, for instance, mobility loss, the individual seems to have a need to revert to simpler relations, to simple objects in nature (Kaplan and Kaplan).

Psychological involvement

Level of well-being

Restoration benefit

Passive engagement

Active engagement

Fig 2.08. Key objectives for psychological involvement.

2.2 Summary

Overall, the findings and discussion highlight that mobility is not only important in fulfilling the essential utilitarian needs of older people, but also in enhancing social interaction, creating a sense of control and independence, representing status and role and helping people to interact with nature and exercise cognitive skills (Fig 2.09).

This chapter combines findings from the literature through multidisciplinary research and provides guides for the design generally as well as specifically based on the benefits of therapeutic landscape design. Those discoveries are divided into three categories: active body, supportive contextual design, and psychological involvement. All three aspects combine to promote the mobility of the elderly (Fig 2.10). By using them as design guidelines helps investigate how therapeutic landscape design can promote the mobility of elderly people.

Fig 2.09. Window viewing for the elderly in healthcare facilities.

Fig 2.10. Combination of the literature review.

3

Case Studies

Project name: Iidabashi Plano

Location: 2-7-2 Fujimi Chiyoda-ku Tokyo, Japan

Project by: Earthscape

This project is an example for navigation. It was meaningful marks on the floor entitled “knowledge lines” which are used for navigation. People passing by can slow down and read the story of local historical buildings and landmarks by looking at the tiles with pictures on the floor. Rock sides and street furniture surfaces feature the scientific names of plants and story of Fujimi history(fig 3.11,14). The “knowledge lines” make visitors spend more time on site, and gain contact with local memories of the site. When designing for older adults this can be used to help them navigate on the site. Signage and wayfinding methods can also provide information for visitors about the site(fig 3.13).

Strength:

- Wayfinding methods used not just for navigation but also for extra information and community connection(fig 3.15).

Weakness:

- The tiles are dark and set low, and are difficult for people with flexibility and balance problems to access, especially the elderly. Elderly people would need brighter material(fig 3.12).

Fig 3.11	Fig 3.12	Fig 3.11.	The landmark symbol labelled on the ground.
	Fig 3.13	Fig 3.12.	Local history story painted on the ground.
Fig 3.14	Fig 3.15	Fig 3.13.	The sign language is labelled at vertical structures.
		Fig 3.14.	3D structure marked on floor for sensory interact.
		Fig 3.15.	Overall navigation method on the site.

Project name: Park of the China Airline Town
Location: Longxing Zhonghang Town, Chongqing City
Project by: CHANGE Landscape Studio
Year of completion: 2015

This project is an example of how to design for people with different mobility needs. There are three trails of 3km, 5km and 10km respectively, mainly based on the different natural settings and slope rate (Fig 3.16). Each track is marked with a different colour based on its length and destination. There are animal symbols painted on the lane every few metres (Fig 3.17). These refer to the natural habitats that visitors could witness on site. Slogans also encourage visitors to go further (Fig 3.18). This shows how designers can use wayfinding methods to facilitate people's needs.

Strength:

- The navigation method helps visitors find a suitable destination, personalizing the site to individuals with different needs (Fig 3.19).

Weakness:

- There is a lack of shelter and seating facilities for elderly people. The site's circulation pattern makes it hard to leave the trail once you start it. People with mobility issues will find it hard to finish the trail.

Fig3.16	Fig3.17	Fig 3.16.	People jogging at the trail.
Fig3.18	Fig3.19	Fig 3.17.	Different colour and label used to navigate and measure.
		Fig 3.18.	Different colour for different direction on site.
		Fig 3.19.	General plan for the whole project.

Project name: Lady Cilento Children's Hospital

Location: South Bank 3, Clem Jones Promenade, Brisbane QLD 4101, Australia

Project by: Lyons + Conrad Gargett

Lady Cilento Children's Hospital is an example of a landscape design that achieves benefits in terms of community health and the environmental benefits in an urban environment. This project shows the significant contribution of nature and the built environment to health and wellbeing. It is a good case study on how access to nature can manipulate our frame of mind and in turn this can affect our physiological and psychological health (Fig 3.20, 3.21). The most significant approach in this case is how public and therapeutic outdoor spaces can be combined to help not only the patients in hospital but also everyone that may use the space.

Strength:

- In the compact urban area with limited contact with nature, the hospital still incorporates natural elements. For example, epiphyte columns and tropical plants create a 'Jungle Garden', and vines disguise security fences (Fig 3.22).
- Different garden rooms designed particularly for people with different demands in space. For instance, the adventure garden supports events and exercise programs; the relaxation garden is provided for staff (Fig 3.23).

Weakness:

- The ideal of a therapeutic landscape is mainly incorporated into the building design - mainly the hospital's interior - and not the landscape.
- Shared public space is relatively small due to the compact context.

Fig
3.20

Fig
3.21

Fig
3.22

Fig
3.23

Fig 3.20.

Vertical wall with sensory stimulation function.

Fig 3.21.

Vertical garden at rooftop.

Fig 3.22.

Tropical vegetation placed around the site.

Fig 3.23.

Resting space for the patients.

Project name: Friendship Park

Location: Zoológico Municipal Villa Dolores, Avenida General Fructuoso Rivera 3245, Montevideo 11600, Uruguay

Project by: Marcelo Roux + Gastón Cuña

Friendship Park is a public, urban space created for the recreation. Children and youth can participate regardless of their physical or cognitive abilities. It is a good example of how landscape design can facilitate accessibility to a site for people with multiple ability levels. There are 6 main spaces on site providing different atmospheres to facilitate people with different needs and abilities. For example, the children's corner features games for children from zero to three years old. These include 'Turn and roll', various hammocks, and a carousel for psychomotor development.

Strength:

- The level difference between the park and the street and side avenue protects it from the noises of traffic and the dynamic urban perimeter (Fig 3. 24).
- Different design interventions enhance the tactile, audible and aromatic experiences.
- The dominant materials are concrete, metal and rubber, giving the site differing textures of soft and hard, but also a sense of security.
- There are technologies supplied at amenities and facilities for digital and virtual development. These enhance the playfulness and interactivity of the site (Fig 3. 27).

Weakness:

- The playground is mainly designed for the younger generation instead of the ageing population. Since there is lack of proper rest facilities and technology for the elderly.

Fig 3.24	Fig 3.25
Fig 3.26	Fig 3.27

- Fig 3.24. Play ground open for public.
- Fig 3.25. Accessible equipment for disabled children.
- Fig 3.26. Sheltered playground for the public.
- Fig 3.27. Open space visually connect with surrounding space .

Project name: Nacadia Healing Forest Garden

**Location: Hoersholm Arbortetum,
Copenhagen, Denmark**

"In 2001 the Alnarp Rehabilitation Garden was designed and built in a corner of the university campus. The aim was to develop a new kind of therapy that combined the use of restorative natural areas, with horticultural therapy and traditional occupational therapy, physiotherapy and psychotherapy and create a garden design that merged theories on horticultural therapy with restorative environments. It was hypothesized that this garden environment, with its combination of possibilities for experiences and the different activities conducted within the therapy would be able to help people restore from stress and promote health(Fig 3. 28-3.31).

Strength:

- A forest garden with plant materials creating "rooms" to enhance feeling of being immersed in nature.
- Different garden room colored for certain usage to shape the space into nature and cultivation space for function mental purposes.

Weakness:

- The pathway design mainly for visitors with certain fitness level and for patients with their assistants.
- Lack of supportive facilities makes it challenge for elderly to visit independently.

Fig 3.28	Fig 3.29
Fig 3.30	Fig 3.31

- Fig 3.28. Play ground open for public.
- Fig 3.29. Accessible equipment for disabled children.
- Fig 3.30. Sheltered playground for the public.
- Fig 3.31. Open space visually connect with surrounding space .

Project name: University Hospitals' SchneiderHealing Garden
Location: Commissioned by University Hospitals in urban Cleveland, Ohio
Project by: Virginia Burt Designs

This healing garden adjacent to the Seidman Cancer Centre is specifically a respite for cancer patients, survivors, staff, and family members. Passing through the gate and into "somewhere else instead", street noise recedes immediately, replaced by rustling leaves (Fig 3. 33). Spiralling outward from the centre is an accessible granite labyrinth. Intended for spiritual and physical stimulation, this multi-curial path can be used as a walking meditation tool.

Strength:

- A garden wall separates the garden from busy streets, while windows in the adjacent hospital allow patients to look into the garden from multiple levels (Fig 3. 32).
- The labyrinth is designed as a tool for walking meditation (Fig 3. 32).
- The wall provides a swift transition from the stressful healthcare facilities to the natural garden (Fig 3. 34).

Weakness:

- This garden is specially designed for people under long-term care for cancer, not accessible to people with short-term health issues.

Fig 3.32 | Fig 3.33
Fig 3.34 | Fig 3.35

Fig 3.32. Window view from the hospital unit.

Fig 3.33. Vegetation with different texture help stimulate the patients sensory system.

Fig 3.34. Different themes that help visitor switch from the hospital environment.

Fig 3.35. Accessible water feature stimulate visitors' sensory system, lighting make the space safe to visit at night.

Equipment name: Trampe/CycloCable®
Project by: Lyons + Conrad Gargett

Trampe is a system first made in Norway. It is technically quite similar to a ski lift. Most of the design structures are placed underground and only part of the track is visible on the surface. It is designed to help cyclists climb the steep slope. Currently some creative parents use the lift to support their baby carriages (Fig 3. 36-40).

Strength:

- There is potential to apply this in really steep parts of the project site to help people with mobility issues to reach the hill top or simply to move from one place to another.

Weakness:

- This walking aid can be used by everyone which may reduce the opportunity to exercise.

Fig 3.36	Fig 3.37	Fig 3.38	Fig 3.36.	Detail of how cyclist use the equipment.
Fig 3.39	Fig 3.40		Fig 3.37.	Cyclist use Trampe to climb up to the hill.
			Fig 3.38.	Kid using the equipment for fun.
			Fig 3.39.	Equipment use by parent to support their baby carriage.
			Fig 3.40.	Detail of the component of the Trampe system.

4

Site Analysis

Ageing 60+ population of Porirua

Ageing 60+ population of Newtown

4.1 Site Selection

In order to test rehabilitative design for mobility issues, a site needs to have elderly people in different stages of mobility decline. Therefore, an environment with nearby aged care facilities including housing and healthcare facilities will suit the design. In the Wellington region, there are two main hospitals both surrounded by residential areas: Wellington hospital in Newtown, and Kenepuru hospital southwest Porirua (Fig 4.41). Both sites have experienced significant population growth. However, Kenepuru district has a much larger ageing population compared with Newtown and has a lower income population. For this reason, the Kenepuru district is suited to the design.

Fig 4.41. Location and age structures of two candidate sites from 2001 to 2013.

Fig 4.43. Transmission gully motor way development on Kenepuru site.2015 vs 2020

4.2 Location of Kenepuru district

Kenepuru is located 1km away from the centre of Porirua city and 20 km away from Wellington's CBD, as shown on the aerial image(Fig 4.42). The figure shows that the Kenepuru district consists of large, undeveloped, open space adjacent to Kenepuru Hospital.

The Transmission Gully motorway project introduces interchanges connecting eastern Porirua and Kenepuru (Fig 4.42). Traffic density will be increasing in the future. The Kenepuru district offers significant potential for residential intensification.

Fig 4.42. (left) The boundary of Kenepuru district in aerial view.

Kenepuru district is surrounded by low income households and is recognized as a low income region of Wellington. The government needs to respond to the consequent health issues. According to a Porirua Community Outcome Monitoring report from Porirua City Council, providing health services that are accessible and affordable continues to be Porirua City Council’s focal point for public health. Nature is the most affordable healing method and encourages physical activities, therefore the design explores the site’s potential to offer an accessible experience of nature.

Fig 4.44. Percentage of low income household of Kenepuru region.

As shown on the diagram, there is currently no significant aged population staying in Kenepuru as long-term residents. However, people aged 65 and over frequently visit the Kenepuru region for health services and short-term stays as patients of the rehabilitation centre and Kenepuru Hospital. Recent development proposals indicate significant plans for increasing housing density and diversity. The future residential intensification will increase the ageing population of the region.

Fig 4.45. Percentage of population age 65+ of Kenepuru region.

4.3 Review of history

Fig 4.46. Urban configure and proportion of pedestrian movement of the Kenepuru region 1905 - present.

Fig 4.47. Historical picture of Kenepuru region. 1900s(left) 1956(right).

The Kenepuru region was relatively isolated in its first 30 years. It was very pedestrian friendly during that time, but now is dominated by vehicle users. As shown on the diagram(Fig4.46), the Mount View Asylum opened 22 May 1864 in the rural region of Porirua. The site was used as a farm. Patients did physical farm activities which is proven to help recovery from mental illness. There is potential to bring pedestrian movement back to the region for both patients and the residents on the proposed site.

Fig 4.48. Historical picture of Kenepuru region.1900s(left) 1912(right)

Fig 4.49. Institutions around the site.

Fig 4.50. The boundary of potential site in aerial view.

Kenepuru region has a mix of both healthcare institutions and temporary and permanent resident areas(Fig 4.49). Kenepuru Community Hospital is at the west part of the site, while on the southeast part is the Abi Rehabilitation Centre. These two facilities provide visitors with different abilities ranging from patients to professionals working in the hospital. At the far south site there are people working at the environmental research centre.

Source of the client group

Group one

- Staffs of Kenepuru hospital
- Residents of Kenepuru
- Short term patients of the Kenepuru
- Visitor of the hospital

Group two

- Patients after surgery
- Visitor of the hospital
- Elderly residents with minor impairment

Group three

- Patients after stroke
- Visitor of the hospital
- Elder with serious disease
- Residents with stroller

Fig 4.51. Threes groups in different stage of mobility loss.

5 min walk

Fig 4.52. (Right) Average walking speed of each group.

Fig 4.53. (Left) Postural change of people while mobility decline.

In summary, the site has a special context of mixed-use land, with health-care facilities and a rehabilitation centre near each other. Professionals and patients are normally seen around the Kenepuru site passing through from one building to another. There are elderly people facing different levels of mobility loss using the Kenepuru region as a shared space for different purposes. In summary, the client group is divided into three main categories based on the stage of mobility decline (Fig 4.51). Each group has different walking speed and their postural changes through the ageing process (Fig 4.52, 4.53).

4.4 Site analysis

The Kenepuru site has significant vegetation, with both native and exotic plants. Two large native forests sit around the Kenepuru hospital. The site ranges from meadow to forest. Michelle Stream crosses through the site, offering several spots for stream side features and habitat for birds (Fig 4.55). These will bring a positive atmosphere that promotes health for the elderly with low mobility.

This shows the extent of the vegetation coverage on site. The density of the vegetation gives the site a unique atmosphere. There is a great range of vegetation with various textures and sizes (Fig 4.56). This vegetation can be shaped to promote both passive and active involvement.

Fig 4.55. Site view drawing. The direct feeling of vegetation on site.

Fig 4.54. The vegetation coverage based on satellite image of site.

Streamside

Woodland

Woodland

Mature Woodland

Fig 4.56. Pictures of the main vegetation types on site.

Miro

Prumnopitys Ferruginea

Rewarewa

Knightia excelsa

Kahikatea

Dacrycarpus dacrydioides

Matai

Prumnopitys taxifolia

Titoki

Alectryon excelsus

Rimu

Dacrydium cupressinum

Fig 4.57. Mature woodland and typical plant type.

Tree fuchsia

Fuchsia excorticata

Five finger

Fuchsia excorticata

Fig 4.58. type.

Woodland and typical plant

Fig 4.59. Streamside feature on site and typical plant type.

Fig 4.60. Wetland on site and typical plant type.

Fig 4.61. Meadow and open space.

The vegetations type currently on site can be divided into five main groups including the mature woodland (Fig4.57), woodland (Fig4.58), streamside (Fig4.60), wetland (Fig4.60), and meadow (Fig4.61). Each of the feature provides a different experience of nature and also can be beneficial for people with varying mobility levels. For instance, the meadow is suitable for people with serious mobility issues while the woodland will be easier for people with higher fitness levels to enjoy.

Fig 4.62. Site view drawing . The inaccessible part of the site.

Fig 4.63. Steep slope area.

Water barriers

Topography barriers

Topography +Vegetation barriers

Vegetation barriers

Man made barriers

Fig 4.64. Pictures of the barriers on site

As shown on the drawing(Fig 4.62, 4.63), the topography and vegetation, while beneficial, sometimes make the site hard to access(Fig 4.64). Most of the site's edges are covered by vegetative barriers that prevent access. The edges of the site are a mix of soft and hard textures. The vegetation is soft and sometimes traversable, and the topography is hard and often blocks access. However, there are also several flat areas on site that can potentially be entrances, and even some of the steep sites can also be transformed for visitors of all ability levels. The site needs spaces for programs that aid the physical conditions of the elderly, especially those already facing mobility decline.

The Kenepuru site could be opened up for both healthcare facilities and the general public. The entrances need to both visually and physically connected to the surrounding facilities.

Fig 4.65. Site view drawing . Circulation barrier on site

Fig 4.66. Walking distance of the different user group on site.

Lack of pedestrian lane

Lack of pedestrian lane and amenity for elderly

Lack of pedestrian lane and steep slope

Lack of pedestrian lane and sign in intersection

Fig 4.67. Existing transport barriers on site.

The main finding while investigating the existing transportation system is that vehicles are the main transportation method used in Kenepuru(Fig 4.65). The existing circulation on site makes it hard to travel from point A to point B by walking. This is especially so for the elderly and patients with physical conditions as it takes them longer to walk certain distances.

Public transport is currently available on site by bus and rail. However, the only bus stop is at the hospital, and the railway station is a 10 minutes walk to reach(Fig 4.66). The inconvenience of walking to the railway station and bus stop will have negative effects on the mobility of people visiting the hospital or the future residents of Kenepuru(Fig 4.67). This is especially so for elderly people who have given up on driving.

Fig 4.68. SWOT analysis: site strengths

Weakness

Fig 4.69. SWOT analysis: site weaknesses

The hospital is in the centre of the site, which might make the Kenepuru site seem institutional and inaccessible to the general public.

Ongoing residential development could block circulation on the site and isolate the facilities from each other.

The whole site could be overtaken by residential development.

0m 100m 500m 1000m

The entrance of the Kenepuru site is currently steep and lacks the proper support for pedestrian movement.

Threats

Fig 4.70. SWOT analysis: design threats

Fig 4.71. SWOT analysis: design opportunities.

4.5 Conclusion

The proposed Kenepuru site is selected based on the ageing population. The site is surrounded by healthcare facilities with people in different stages of mobility decline. Users are divided into groups with different capacities for enjoying outdoor activities. Vegetation coverage, topography, and circulation pattern of the site is analysed based on the data collected and found to have sufficient variety for sensory engagement. The analysis identified issues on the site to solve, and opportunities that can be exploited.(Fig 4.72)

Fig 4.72. Concept image of the future design of the site.

5

Preliminary Design

The proposed area is located in the centre of Kenepuru with abundant natural resources. The site needs space for programs that aid the elderly with different physical conditions to remain healthy and keep an active body.

The conditions of the site limit engagement with nature for people with mobility issues, especially the elderly. The initial design stage will focus on how people with different mobility issues can use the site as a source of rehabilitation. The accessibility of the site will be tested.

Site users are divided into four groups based on their mobility. These range from older people with serious physical limitations, for example, those in wheelchairs or post-stroke to those who are still fit and mobile. The design allocates areas to each group based on their ability and closeness to particular institutions(Fig 5.74). Four scenarios will be designed to test how each group accesses the site.

Fig 5.73. Main Components of the whole Kenepuru site.

Fig 5.74.
analysis.

New street layout of Kenepuru proposed base on

Fig 5.76. Potential new urban layout of the Kenepuru.

- Natural surrounding
- Middle Density Residential
- The Commercial Area
- Middle Density Residential
- Healthcare Facilitate
- Main Site

Healthcare facilitates

Residential area
& Healthcare facilitates

Residential

Public space

Scenario one

Client group one contains people with severely limited mobility as result of diseases such as stroke and chronic heart disease. This includes many elderly people. The majority of them are inpatients who require assistance. They may also rely on a wheelchair. Most of this group will come from the nearby healthcare facilities, for example the rehabilitation centre and the hospital(Fig 5.77).

Fig 5.77. Type of flow of the people in healthcare facilities.

Fig 5.78. The model shows the ten minutes walk area of the client group one currently.

For elderly people with a serious mobility issues or a wheelchair, walking and moving speeds are normally slower than others. With an average speed of 0.5 metre per second, elderly in this scenario usually walk an estimated four hundred meters in ten minutes(Fig 5.78, 5.79).

The priority of the design is a supportive environment for people who have already lost mobility. The initial design needs to focus on rebuilding contact with the surrounding environment both physically and psychologically.

Fig 5.79. The model shows the 10 minutes walk area of the client group one while interact with the site.

Fig 5.80. Purpose of walking and walking destination of client group one.

Fig 5.81. Walking pattern of client group one.

Fig 5.82. The ergonomic requirements for the client group one.

Fig 5.83. The focus is on muscle strengthening for client group one.

Fig 5.84. Hand rail can be designed to help the client group one exercise upper limb muscle.

Fig 5.85. Design focus and user's condition of the scenario one and program shaped for client group one.

Fig 5.86. Concept image of the scenario one.

Visitors from client group one might experience physical exhaustion. There is a need for a variety of seating places. The seating area will be located along the pathway for frequent rest and mainly under sheltered areas. The client group one finds it is hard to involve with the environment actively. Visual contact and passive involvement are more suitable for clients. Accessible equipment at outdoor environment will be beneficial in improving their fitness level(Fig5. 86).

Scenario Two

Client group two are people who are fit but have minor mobility issues. With or without a walking aid, a client in this group can walk recreationally but not for a long time or distance. Most of this group comes from either the hospital or residential areas (Fig 5.87). The design priority is to use the environment to help users gain and retain their fitness and building endurance. Also, the design should create the opportunities for active and passive engagement with the environment.

Fig 5.87. The model shows the ten minutes walk area of the client group one currently.

With an average speed of one metre per second, the elderly in this group can walk estimated six hundred meters in ten minutes (Fig 5.87,88).

The elderly with minor mobility issues will also work to regain ability, and learn to self-assess their own physical condition. For example, they might attempt the six minute walking test on the site to keep a record of their gait speed and any changes either positive or negative.

Fig 5.88. The model shows the ten minutes walk area of the client group one while interact with the site.

Fig 5.89. Purpose of walking and walking destination of client group two.

Fig 5.90. Walking pattern of client group two.

Fig 5.91. The ergonomic requirements for the client group two.

Fig 5.92. The muscle part need to improve for client group two.

	User's Condition	Design Focus
Body	<div></div>	<div></div>
Context	<div></div>	<div></div>
Psychology	<div></div>	<div></div>

Fig 5.93. Design focus and user's condition of the scenario two and program shaped for client group two.

Fig 5.94. Concept image of the scenario two.

To help with independent exercise, this scenario provides a program that is suitable for people with walking a aid or stick(Fig 5. 91). To aid in mobility improvement, the lower limb muscle strength needs to be exercised more frequent than other area. The activities and equipment shown in will help elderly regain lower limb muscle strength. In addition, the activities showing in (Fig 5.92) can be transformed into activities in outdoor space that help the elderly exercise while interacting with nature.

Scenario Three

Client group three is composed of healthy elderly people who can participate in most community activities, but not high intensity sports. This includes people from the residential developments and elderly hospital visitors (Fig 5.95). They remain active, and are able to cope with daily exercise, however, ongoing ageing will continue to challenge them to remain active (Fig 5.100).

The design priority of this scenario is for the elderly to engage with their community and to stay mobile. This means the users of space will have the ability to walk longer and to explore more of the site. Also, their participation in the site can involve a higher sensory and emotion level.

Fig 5.95. The way client group three interacts with the space.

Fig 5.96. The model shows the ten minutes walk area of the client group three currently.

With an average speed of 1.4 metre per second, elderly in this scenario usually walk for an estimated eight to nine hundred meters in ten minutes(Fig 5.96, 5.97).

Fig 5.97. The model shows the ten minutes walk area of the client group three with site interaction.

Fig 5.98. Purpose of walking and walking destination of client group three.

Fig 5.99. Walking pattern of client group three.

Fig 5.100. The ergonomic requirements for the client group three.

Fig 5.101. The muscle part need to improve for client group three.

To maintain general mobility, elderly people need to exercise full body. Often, design for the elderly is placed at a flat area, however, stairs, slopes, and uneven surfaces help the elderly by increasing their lower limb muscle strength (Fig 5.101). Therefore the steep part of the site can be developed into space for both physical activities, walking, and linking the transit point with amenities.

Fig 5.102. Design focus and user's condition of the scenario two and program shaped for client group three.

Fig 5.103. Concept image of the scenario three.

For client group three, majority of the elderly can manage to walk outside for relatively longer periods. Placement of popup stalls, and resting spaces in this scenario are designed to provide connections to their surrounding community to help create a sense of belong. Information boards can be designed for elderly to learn more about the benefits of exercise on the site and how to monitor their program. The ageing process will make it challenging to walk for longer than one or two hours. Seating areas and navigation markers will help the elderly and the general public to enjoy the space.

Scenario Four

Fig 5.104. Client group four interacts with the space.

Fig 5.105. Full body of general public.

Client group four contains the general public, staff from the healthcare facilities, future residents of Kenepuru, as well as the residents of southern Porirua (Fig 5.106). The clients in this group are most capable with good level of fitness (Fig 5.105).

With an average speed of 2.5 metre per seconds, elderly in this scenario usually walk for an estimate one thousand and five hundred meters in ten minutes (Fig 5.106).

The design priority is to help people move in and out of the site by creating a connective environment that maximises users' ability to explore. The users will need space and activities to reinforce their psychological and physical health. These users can finish the entire walking program and this will help to increase their fitness level.

Fig 5.106. The model shows the ten minutes walk area.

Fig 5.107. Purpose of walking and walking destination of client group four.

Fig 5.108. Walking pattern of the client group four.

Fig 5.109. The ergonomic requirements for the client group four.

Fig 5.110. Design requirements and user situation of the scenario four.

Summary and reflection

Retaining mobility in a community environment has positive effects on the health performance of elderly people. In this chapter, the goal was to design intersecting spaces for different groups of the elderly according to their abilities.

Firstly, analysing the characteristics of each user group gave criteria to meet their needs. Then the design was developed to provide a different program for each group. The site was tested to see if it could accommodate the design criteria. The different environmental needs of each group was then assessed as that the design could improve their fitness level. The limitation of this design was that the space were not sufficiently inclusive. Each space was specially designed for only one client group. The separated space blocked the connection of the elderly with their surrounding environment. To program the design, a more mixed-use site that caters to and also connects a wide variety of people is preferred.

6

Developed Design

Fig 6.111. The overall relation of loops and site.

Developing from the pre-design phrase, older adults sharing the site need services and amenities that promote and retain mobility. The proposed design will facilitate the client groups from the previous chapters into three spaces connected by intersecting walking loops. Each loop will cater to the ability level of specific client group users(Fig 6.111).

Fig 6.112. The overall program of different layers on site.

As showing on the image(Fig 6.112), different colours to identify target groups to help users navigate and identify the space they are using. Each loop is also programmed to suit the walking speed of the client group. A variety of activities provided in the suitable area of the site including walking, biking and a playground that has been customized for the particular user group.

Loop one:

Connector

The entrance of this loop will be within a five minute walk from local transit systems, residential areas, and surrounding facilities. This brings people in and out from both community and healthcare institutions to the larger context. The majority of the people currently using the site are capable of daily activities. They are fit enough to move from point to point within and out of the region. The first loop creates a walkable environment that will link with public transport use and encourage pedestrian movement. The first loop will be the entrance into the site so it needs to be accessible for every client group.

Main client group

Fig 6.113. User group of loop one.

Features of the client group:

- Outdoor amenities needed
- Sense of community
- Access to transit points
- Maintaining mobility through daily exercise
- Fully sensory engagement.

Fig 6.114. Overall plan of loop one.

Commercial area for recreational activities and information.

Public parking as the main entrance of the site.

Check point for rest and amenities
Node link with other loops.

The entrance for the nearby healthcare facilities.

The entrance form the residential area.

The overall plan(Fig 6.114) shows shows the layouts of the necessary connections on the site. These connections create opportunities for walking, cycling, and bringing people to the outdoor activities space.

Bus stop for visitor from Porirua and other region.

The link point with the railway station.

First Loop+ Surrounding Facilities

First Loop + Spot with main natural resources

First Loop + The intersection point connect with other loops

Fig 6.115. Diagrams showing the connection of first loop and surrounding.

Fig 6.117. Location of the plan.

Fig 6.116. Plan of the main entrance for visitors from hospital.

The first loop links natural site with the transit spot, the local residents, and surrounding facilities(Fig 6.115). This helps elderly people and the general public connect all in one shared space, Thereby creating the sense of community for elderly people.

Fig 6.118. Section a-a' -loop one.

Fig 6.119. Section b-b' - pathway to loop two.

Fig 6.120. Section c-c'-slope link with the hospital and site.

Fig 6.121. Section d-d' the section of the node links loop one and loop two.

Fig 6.122. Perspective one of the node that links loop one and loop two.

Fig 6.124. Location of the plan.

Fig 6.123. Detailed plan of the main entrance for public.

Fig 6.125. Perspective two of the main entrance.

Fig 6.127. Location of the plan.

Fig 6.126. Plan of the entrance from rehabilitation centre. Rehabilitation centre

Fig 6.128. Perspective entrance from rehabilitation centre.

Fig 6.129. Section e-e' - Link of rehabilitation centre with the site.

Loop two:

Walking program

Mobility means an individual is able to walk around autonomously. However, many elderly people with physical conditions find it challenging to interact with their surroundings. Therefore, the second loop focuses on creating a supportive environment that benefits elderly people with minor impairments. The design incorporates accessible spaces so that the elderly can engage with the site and the surrounding context. The wayfinding method is a measurement tool for visitors to note the distance they have walked and their walking speed. This gives them insight into their current health status.

Fig 6.130. The client group of the loop two.

Features of the client group:

- Need of frequent shelter
- Sensory loss through ageing process
- Sensitive to extreme weather condition
- Need of navigation and measurement methods

Fig 6.131. Overall plan of the second loop.

Walking track with interval of ten meters.

Walking track with interval of ten meters.

Fast track within different space help clients move easily from one space to another.

Rest area.

Gathering space

Stream side walking track

Playground for elderly

The proposed design (Fig 6.129) of the second loop is a walking track with measurement and an easy access slope that provide the exercise space for elderly people with minor impairment as well as the general public.

Each of side of the second loop designed with distance measure and facilities that help the elderly assess their health status. Every ten meters there are programs designed for the elderly to regain their muscle strength and flexibility. Frequent resting place provided within every twenty meters allow the participants to enjoy the outdoor activities safely.

Fig 6.132. Spatial flow pattern of the second loop.

The second loop linked the third loop and the first loop. The whole loop is divided into a small section of ten meters and with guide post at the starting point and end(Fig 6.132, 6.133). This helps the elderly to locate themselves and collecting the distance they walked. Visitors have more options while visiting. For example, the client with serious mobility issues can use the second loop as the gateway to get into the third loop. Elderly with minor impairment can walk a reasonable distance to reach the shelter space and the next checking point(Fig 6.131).

Fig 6.133. Options on site that can be selected in second loop.

Fig 6.134. Section of loop two every ten meter. Part one.

Fig 6.135. Section of loop two every ten meter. Part two.

Wall for recreational use and sensory stimulation.

Information board for smart-phone or wearable equipment to interact.

Vertical green wall with various species for interaction with plants.

Fig 6.138. Type of information board that provide on site.

Fig 6.139. Perspective of the streamside walk track of the second loop.

Fig 6.140. Perspective of walk track crossing the meadow of the second loop.

Loop three

Play! Play! Play!

The third loop is intended to provide accessibility and space for people with serious mobility issues to enjoy. It mainly focuses on helping the elderly to maintain and regain their physical capacity. The activities on site will stimulate their senses and support recovery from physical impairments. Use of the loop will shorten their stay in the rehabilitation institution and let them regain their confidence and a sense of community instead of being isolated.

Fig 6.141. The client group of the loop three.

Features of the client group:

- Need of assistance
- Sensory impairment
- Need special wayfinding methods
- Interactive space
- Cannot easily do outdoor activities

Fig 6.143. Overall plan of the third loop.

Fig 6.144. Overall section of the third loop.

The proposed design(Fig 6.143) of the third loop divided the relatively flat part of the site into serial space with certain themes. Each space mainly provides the facilities and activities space for elderly with a mobility issue and general public to exercise different body part. When people in low well-being, in this case, the mobility lose, environment with supportive facilities and reachable natural resource will be more beneficial.

Fig 6.145. Potential activities that beneficial for user group.

Fig 6.146. Sensory interaction point.

Fig 6.147. Perspective of "the forest" playground.

The Forest Area

The forest area using the vertical garden to rebuild the feeling of stay in a woodland that existing on site. For elderly especial those with mobility issues, it is essential to have a restorative nature environment without causing the attention fatigue.

Fig 6.148. Potential activities that beneficial for user group to regaining the mobility level.

Fig 6.149. Sensory interaction point.

Fig 6.150. Perspective of the labyrinth.

Labyrinth Walk

The labyrinth walk on the west side can help the user group to walk directed patterns to help rebuild their mental capacity and sensory system.

Fig 6.151. Potential activities that beneficial for user group.

Fig 6.152. Sensory interact point of the space.

Fig 6.153. Perspective of the “mature woodland” playground.

Mature Woodland

This area of the third loop recreates the feeling of mature woodland into a playground with activities and facilities help the client group especial elderly to experiencing the feeling of stay in a closure space. Also, the equipment on site also can be used for exercise to gaining the mobility level back.

Fig 6.154. Potential activities that beneficial for user group.

Fig 6.155. Sensory interact point of the space.

Fig 6.156. Perspective of the sand playground.

7

Conclusion

New Zealand has an ageing population. Statistically, the disability rate has increased significantly. The most common type of disability for people aged 65 and over is mobility related. It can happen either gradually through the ageing process or suddenly as the result of acute disease. Loss of mobility affects the elderly in more than just their physical condition, it also affects their ability to engage with society. This affects their quality of life. Consequently, designs for elder mobility need account for different stages of mobility loss. Landscape design can increase the frequency with which people engage in physical activities. Through the physical activity the elderly can increase their health condition. The focus of this thesis is to create an environment that promotes elder mobility through a landscape design intervention.

Through a multi-disciplinary literature review, and reviews of existing case studies, a design guideline was created in the early phase of the thesis. This suggested that to promote the mobility of the elderly the environment needed to facilitate contextual engagement, improve physical condition, and reduce the negative psychological impacts from the surrounding environment. Mobility problems vary for the different client groups. Each group has different needs, especially the elderly. Some of the spaces have a stronger focus on mobility improvement than others.

Through investigating the Kenepuru site, the design intervention responded to different client group needs. Elderly people with different mobility levels engage with the space differently and require different rehabilitation methods. Using the idea of four phases of rehabilitation from the environmental psychologist Grahn, the design needs to have different spaces catering to the ability and well-being each client group.

Kenepuru is region with a growing population. This means considering the growing number of non-disabled people that will be engaged with the site alongside people with mobility issues. Due to the special context of the site, the design interventions cater in part to nearby healthcare facilities, however, the design is focused on promoting mobility across different client groups instead of focusing on specific institutions.

The pre-design section, tested how each client group connected with the community and with each other. For the elderly with the most critical mobility issues, it is a challenge to engage with each space to conditions

such as topography and inaccessible pedestrian lanes. For instance, in preliminary design chapter (page 77, 84 and 91) the model illustrate how people in each of the four scenario is catered into one part of the site due to their walking endurance. Those limitation blocked the connection between the elderly and their surroundings. Therefore, the site should not be divided into isolated spaces for particular client groups. It needs to be one shared space with small areas customized for people with different mobility levels.

The developed design phase divided the site into three loops each intersecting in one central space for greater inclusivity. Each loop addressed a client group with a different level of mobility and facilitated their specific needs for rehabilitative space but permitted the use to move into adjacent pathways and areas. It provides specific programs for elderly people with different mobility level ranging from the most critical medical situation to people with average ability. The design was explored in different scales, matching the progress as decline of mobility.

The well-being level affects the way how individual involves with the physical environment. Therefore, designing a rehabilitative space for people with mobility issues is not only about having an environment for users to recover just physical ability but also providing participants with a place to engage both actively and passively with their surroundings. For years, therapeutic landscape design has provided a restorative atmosphere that is beneficial for healing. However, currently it is mainly used for certain diseases such as dementia and cardiovascular disease, and it is limited to healthcare facilities rather than public spaces. There are few designs specifically for promoting mobility. There is potential for this research to be implemented on another site with a different context involving elderly people with mobility issues. The finding of this thesis can potentially be applied in the field of rehabilitative landscape design for ageing.

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Appendices

Fig 10.157. Information board design combine with smartphone app.

Fig 10.158. Guide post combine with smart app to measure the speed and provide information for exercise.

Fig 10.159. Physical and sensory activities combine with the smart-phone.