New Brighton Community: Improving Science Communication to Better Community Wellbeing and Engagement

Casey Carass
82108700
Master of Urban Resilience and Renewal
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Supervisor: Dr Deirdre Hart

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Abstract

Due to the dynamic nature of the coastal environment, it is important to understand community values associated with it in over to ensure their persistence and protection over time. As a natural barrier to flooding and sea level rise, dune systems can play a significant role in climate change adaption for coastal communities. The combination of all four community wellbeings, cultural, economic, environment and social is rare in published literature compared to studies examining economic and/or environmental wellbeings. This results in a misconception that some values are less important to communities than others.

This research focuses on the New Brighton community and highlights their values associated with, and perspectives of, the dune system. Furthermore, it aids in understanding the different methods of science communication that might work best for the community, from a community perspective. Results highlight the strong sense of place held by New Brighton community residents and visitors alike, and their, valuing of all four community wellbeings: cultural, economic, environmental and social. Furthermore, the results showcase the wide variety of science communication methods available and reveal a need for more social media/online presence and education as an effective form of science communication.

This research has found that it is important to voice the perspectives and values held by the community, and to illustrate the science communication methods they wanted. This research aids in understanding the New Brighton beach users community, suggests ways to enhance or better tailor the science communication for meaningful community engagement between local government, scientists and the New Brighton community

Key words: Dune system, New Brighton, Community wellbeing, Science communication methods

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1. Introduction

This research was undertaken as part of the Masters of Urban Resilience and Renewal programme through the University of Canterbury. This research aims to evaluate the New Brighton community values associated with the dune system and to explore various methods of scientific communication between community and local government.

1.1 Research Objectives

The aim of this research is to understand how scientific communication can improve community engagement by incorporating community values for the New Brighton dune system, as well as by selecting optimal communication methods and approaches. This research aims to explore the knowledge and values held by the members of the community of the dune system in New Brighton and to understand methods of communication most beneficial for them. The purpose of this research is to critique current scientific communication methods on the dune system, to a method wanted and understood by the community. Furthermore, providing the perspective of the Christchurch City Council (CCC), will aid in building a meaningful relationship, by gaining both perspectives. By investigating the communication methods and community values, an understanding of better science communication can be applied and encourage meaningful community engagement. Furthermore, this research provides the New Brighton community a voice showcasing their values and needs, facilitated with evidence and research.

1.2 Community Partner

The research project conducted, was in collaboration with Environment Canterbury (ECan), serving as the community partner. ECan is the Regional Council which works with iwi, local and central government bodies, businesses, various industries and community to manage the environment and resources. ECan provides management for the natural resources within the region with specific responsibilities including hazard management and flood protection, environmental monitoring and reporting, public transport services and many more (Environment Canterbury, n.d.-b). ECan have designed six broad portfolios with programmes and projects within each. A key portfolio related to this research is on 'Climate Change, Hazards, Risk and Resilience' with a programme based on the coastal environment and hazards (Environment Canterbury, n.d.-b).

With approval from Justin Cope (Principal Science Advisor- Natural Hazards at ECan), I drew on one of ECan's overarching goals that is 'Community engagement for natural hazard awareness' when

brainstorming research topics. Utilising this goal and two of their key values 'people first' and 'collaboration', this research intends to provide insight into community wellbeing values associated with the dune system. In turn, this can aid in critiquing and add to the discussion of improving community engagement and science communication for the New Brighton community and council.

Community engagement and science communication are highly important attributes to ECan. Currently, ECan is in collaboration with the CCC implementing a Coastal Hazard Adaption Planning programme. This aims to collate coastal information to inform and engage the public in discussions about climate change and sea level rise issues. Providing an understanding of the community values and communication methods will benefit this programme and enhance meaningful community engagement.

Through an internship with ECan, an apparent gap in research appeared in literature combining community wellbeing and engagement, with effective science communication in relation to the coastal environment, specifically the dune system. By researching the values and perspectives held by the communities, council and experts involved, there is an opportunity to increase community engagement through building meaningful relationships. In turn, this cultivates a space for innovative ideas and practices, designed with the four community wellbeings (cultural, economic, environmental and social).

1.3 Positionality

As a university student not from New Brighton, I have situated myself as an outsider to provide a voice and gain perspectives from the community of New Brighton. From the information gathered I will be able to provide an overview of the values associated with the dune system and the methods of science communication wanted by the community.

1.4 Research Questions

1. *How does the community value the dunes in relation to the four community well-beings?*

Undertaking research at the community level will identify the key values and knowledge of the dune system held by the community of New Brighton. The four community wellbeings include cultural, economic, environmental, and social. This will gain an understanding of what the

community deem important and value most. In turn, this will aid in tailoring science communication methods to fit the needs and values of the community.

2. *How can council and community communicate together about the dune system state in ways which meet both the Christchurch City Council and community needs?*

Communities are often unaware of the science associated with the dune system due to the complexity of the research and contradicting or lack of information communicated (Wilkinson, 2010; Boykoff & Rayan, 2007). This information can be from the severity of climate change, urbanisation impacts, sea level rise predictions and the release of technical reports.

Providing an opportunity for the community to critique the current community engagement and science communication will give an understanding to what is working and what methods need to be improved. Furthermore, gaining a wide range of perspectives will aid in tailoring an adaptive method of science communication suited for the New Brighton community. As a result, this will improve community wellbeing and meaningful engagement for both parties involved (community and CCC)

2. Literature Review

This chapter aims to explore the literature of related topics to the research. It is divided into four main sections, firstly examining the environment in section 2.1. The discussion from this will inform and aid in understanding the natural characteristics and importance of the environment, more specifically the dune system. Section 2.2 discusses the notions of community and wellbeing as individual terms. The results from this will inform how community wellbeing, using the four wellbeing values (cultural, economic, environmental and social), play a part in science communication and decision making. Community engagement is reviewed in section 2.3 to explore the complexity of the definition and how to improve and create meaningful engagement. Section 2.4 reviews science communication, the definitions, the importance, and methods of communication. This will aid in informing the community of methods and understand the types of methods best suited for New Brighton. To conclude this literature review, an evaluation on the research gaps found within the overall literature will be discussed.

2.1 Environment

2.1.1 Coastal Environment

The coastal environment encompasses the space where terrestrial and marine environments influence each other through dynamic geographical and geological processes (Carter, 1988). The coast is viewed as a common resource incorporating physical, biological, chemical, social, economic and cultural attributes. Due to human alterations and environmental impacts from climate change, many coastal environments worldwide have become vulnerable to sea level rise and increased storminess, leading to erosion and loss of space and habitat (Labuz, 2015; Carter, 1988).

The coastal environment as described by Gesler (1996, p. 96) is a therapeutic landscape "*through the combination of the built and physical environment, human perception and social conditions to produce an atmosphere conducive to healing*". The coastal environment provides a unique place for traditional, recreational, educational and leisurely practices to occur. It provides a sense of place and belonging for individuals and communities.

According to the Coastal Sand Budget for Southern Pegasus Bay- Stage B Future Sand Budget (National Institute of Water and Atmospheric Research [NIWA], 2018), the New Brighton coastline is in an accretionary phase for the next century. This was under all scenarios with the exception of

the most extreme (RCP8.5) (NIWA, 2018). The distal end of the spit is likely to erode as the Avon-Heathcote inlet widens due to sea level rise (NIWA, 2018).

2.1.2 Dune System

Interlinked with other parts of the beach system, sand dunes are dynamic bio-geomorphic forms characterised by spatial and temporal morphological changes (Warren, 2013; Walker et al., 2017; Madurapperuma et al., 2019). The formation of a sand dune is through the intermittent phases of accretion and erosion from wind and wave processes (Masselink & Gehrels, 2014). During erosional phases, a large storm or storm-in-series, with elevated sea levels due to decreased barometric pressure, can create energetic waves which reach back-beach areas such as the foredune toe or embryo dune. In dynamically stable dune systems, the recovery period will allow for a subsequent accretion phase to occur, rebuilding the beach berm through swash processes and subsequently, via aeolian processes, the dune profile (Haslett, 2000; Masselink, 2014). With climate change induced increased storminess, recovery times are predicted to be shortened or insufficient for many dune systems worldwide, and dune systems may be unable to fully recover. Once the dune has eroded, it can take years to recover (Warren, 2013; McLean & Shen, 2006).

Table 2.1 illustrates the changes in the environment divided into cell sections for New Brighton. The beach profile locations within each cell are displayed in Figure 2.1 Cell B has been modified for the construction of carparks, structures and public accessways to the beach (Tonkin and Taylor, 2017). This area has the lowest accretion rate due to the established structures and the lack of vegetation within the dune system. The lack of vegetation decreases the dunes ability to trap sand and build. Cell F is within the Southshore area, with the highest accretion rates along the Southern Pegasus Bay. These two cells (B and F) are highlighted in Figure 2.1.

Table 2.1: Summary of behaviour of characteristics within cell groups

Site	Christchurch open coast						
Cell	A	B	C	D	E	F	G
Chainage[1], (m)	0-1950	1950-3700	3700-5200	5200-6300	6300-7250	7250-8650	8650-9600
ECan beach profiles within each cell	C1130 C1111 C1100 C1086 C1065 C1041	C1011 C0952 C0924 C0889 C0863 C0856 C0853	C0848 C0815 C0781 C0748	C0703 C0650 C0600	C0531 C0513	C0471 C0431 C0396 C0362	C0350 C0300 C0271
Morphology	Unmodified dune backshore	Modified dune backshore	Unmodified dune backshore	Unmodified dune backshore	Unmodified dune backshore	Unmodified dune backshore	Low-lying distal spit backshore
Historic shoreline movement	Accretion (high)	Accretion (low)	Accretion (average)	Accretion (average)	Accretion (average)	Accretion (high)	Fluctuates

[1] Chainage is a distance measure from the origin taken as the start of cell A at E1577557m N5186179m (NZTM)

Source: Coastal Hazard Assessment for Christchurch and Banks Peninsula (p. 15), by Tonkin & Taylor, 2017
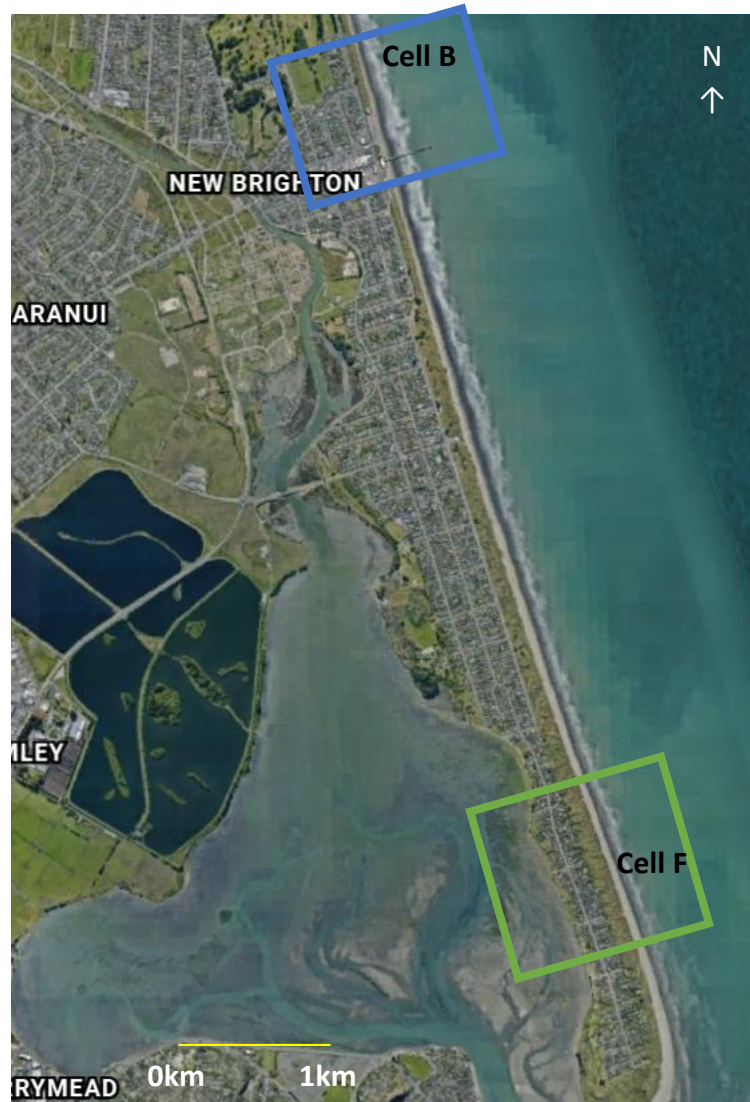
Figure 2.1: Environment Canterbury beach monitoring locations along New Brighton Coast

Note. Adapted from Coastal Hazards Assessment for Christchurch and Banks Peninsula, (p. 15, Table 4-3), By Tonkin & Taylor, 2017. Using Google, 2021, TerraMetric, Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Dune systems have niche microhabitats due to the differences in topography and dune type; embryo dune, foredune (primary dune), and established foredune (secondary dunes), illustrated in Figure 2.2. These microhabitats are influenced by salt content and pH levels in the water and soil, soil development and the geomorphic stability (Haslett, 2000). The secondary dunes are located inland of the primary dunes and are disassociated from wave processes and salt spray. This is represented by the increased vegetation coverage of woodland or pioneer species and soil development (Masselink et al., 2014; McLean & Shen, 2006). This provides stabilisation in the

secondary dune, as these species have large root systems. Furthermore, a wide dune field provides a larger source of sand for dune building, protection and habitat area for biodiversity (Nordstrom, 2008).
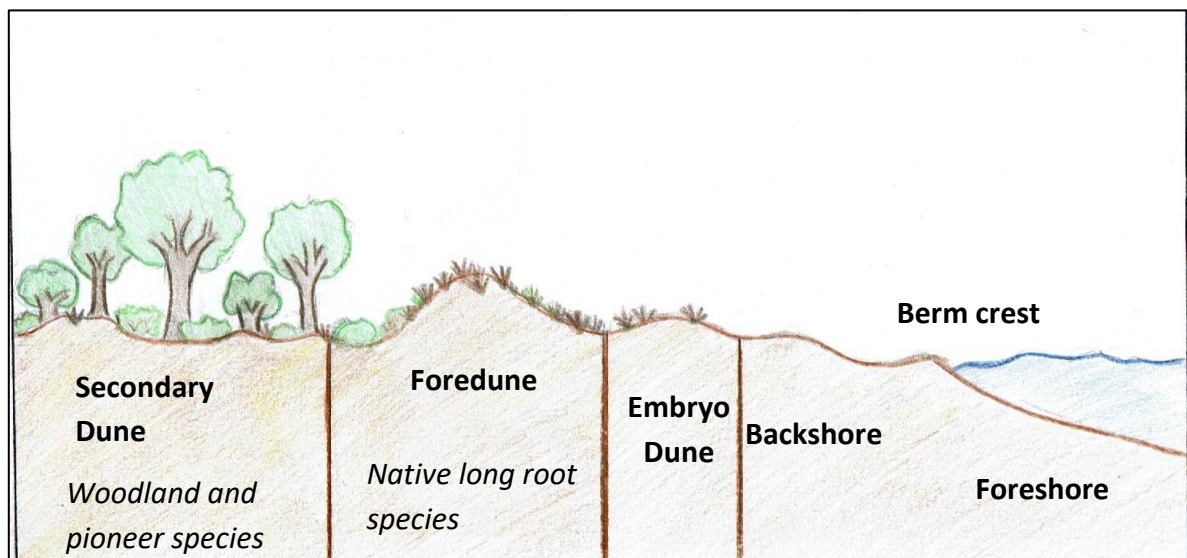
Figure 3.2 Cross section of a dune system

In Canterbury, the primary dunes are vegetated with long grasses including spinifex, pīngao (Golden Sand Sedge) and marram grass. Pīngao is a native plant and regarded as taonga (treasure) by Māori people with significant cultural, spiritual and traditional value (Te Rūnanga o Ngāi Tahu, 2014). These species have long roots, providing stability in the dunes, and entrain sand in aeolian and wave transportation (Te Rūnanga o Ngāi Tahu, 2014; Environment Canterbury, n.d.-a). Embryo dunes are formed through deposited sand on sparse vegetation building to potentially form into a primary dune (van Puijenbroek et al., 2017). For embryo dunes to develop into primary dunes there must be enough beach width (Nordstrom, 2008).

Walker et al. (2017) provides an elaborate review of various temporal scale methods of beach-dune system evolution and changes, illustrating and critiquing the complexities and challenges of different scales. The authors provide approaches to linking short term and long-term prediction methods and name these inadequate due to the vast number of variables associated with sand supply to the dune system. The authors focus on temporal physical processes, leading to their dismissal of approaches that promote human intervention and alteration of the beach-dune system, indicating that this can significantly negatively affect and change such environments. Human intervention and alteration in this context refer to building on the sand dunes, re-contouring of the sand dunes and inadequate management (Walker et al., 2017).

The presence of vegetation is highly important for the dune system stability and growth. Vegetation on the dune can provide a protective role from wind erosion (including preventing blowouts), it can decrease erosion rates during a storm event, and it is centrally important to dune recovery post-storm erosion (Silvia et al., 2016). Although dune systems worldwide in remote areas can be unmanaged, maintenance and management of dune vegetation in areas affected by human activity is imperative to mitigate climate change impacts and human-induced degradation. Soft management practices, including the management of pedestrian traffic and other human activities, is commonly used by directing the public through certain pathways and tracks using fencing, signposting and planting (Roig et al., 2009). Fencing is commonly used to trap sand, encouraging sand dunes to grow in width and height (Nordstrom, 2008). The fences influence the aeolian transportation processes by reducing wind speeds. This technique is inexpensive, easy to construct and does not negatively impact the existing biodiversity (Hanley et al., 2014; Nordstrom, 2008). In contrast, fencing was used near the New Brighton Library and carpark, to limit the accumulation of sand (Tonkin & Taylor, 2017).

Sand dunes act as a natural flood protection barrier for coastal communities. However due to increased storminess and sea level rise, consequences of climate change, many dune coast communities worldwide are increasingly at risk of flooding. The sand dunes, to be an effective barrier, must be able to withstand storm events and erosional periods. The volume of sediment accumulation in the dune system plays a vital role in growing dunes. The amount of sand delivery (positive or negative) to the system can either encourage growth in width or in height or make vulnerable to wave processes such as scarping and erosion on the dunes (Hanley et al., 2014).

The natural processes and dune development have been influenced and impacted by urbanisation and anthropogenic structures and practices, globally. Built structures create changes in wind funnelling, sediment transportation and wave processes (Hanley et al., 2014; Nordstrom, 2008). Locally, this is occurring on the New Brighton spit, where the road has been developed perpendicular along the dunes, funnelling the wind.

The North New Brighton dune system had been recontoured to a lower elevation for residential development, aesthetics, and human use. In 1995 a consent was granted to lower the sand dunes to eight metres above mean sea level before roughly 8000 cubic metres of sand was removed from

the sand dunes in 2000 (Sinclair, 2000). These alterations were primarily for sea views for residents, however, have long lasting effects on the environment and biodiversity (Sinclair, 2000).

Furthermore, the addition of roads built behind the dunes restrict the growth and can influence erosion rates (Maun, 2009). These changes influence the topography, vegetation coverage and size of the dune (Nordstrom, 2008). Modifications to the environment create vulnerable areas within the dune system, which can lead to an increased risk associated with coastal flooding. Furthermore, development has caused the dune system to be restricted to a single narrow, uniform dune ridge along much of the New Brighton spit coastline, as shown in Figure 2.3 (Tonkin & Taylor, 2015). From this development, the New Brighton dune system does not have secondary dune ridges.
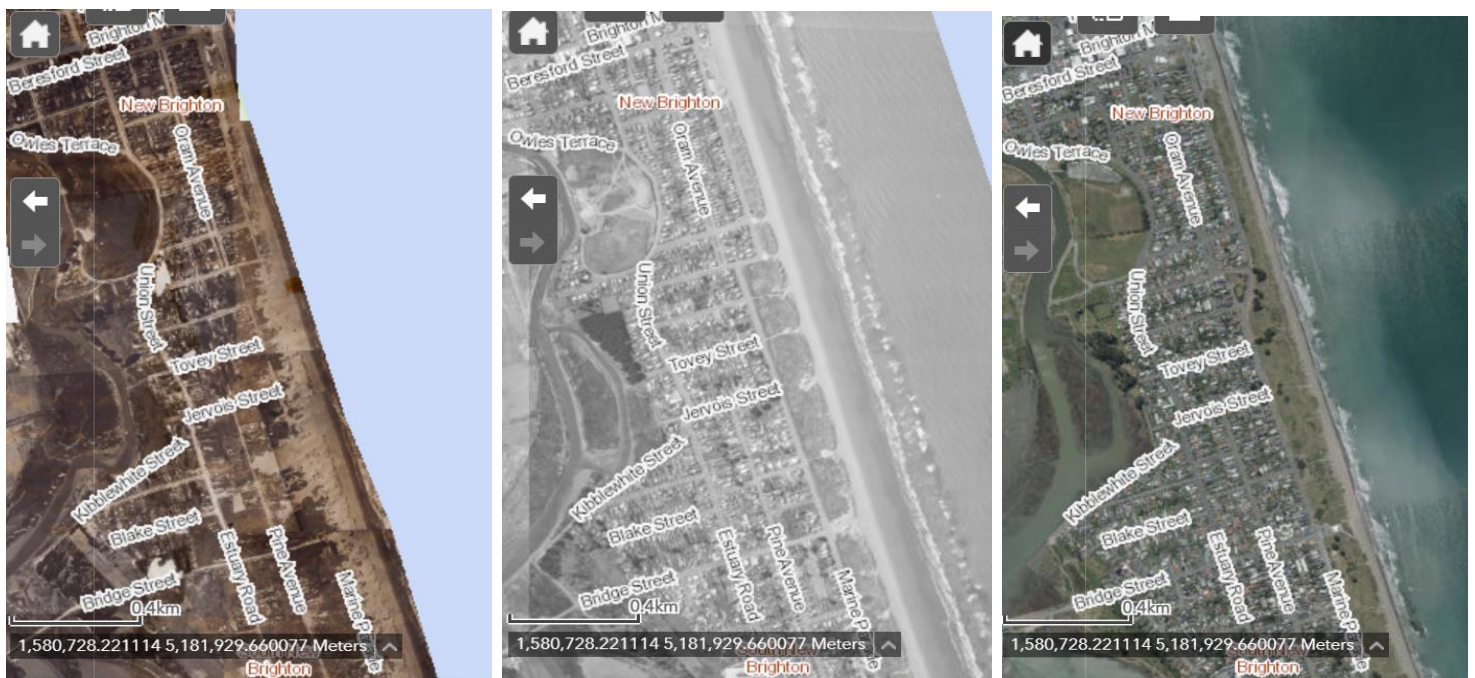
Figure 2.3: Aerial Imagery of a section of the New Brighton dune system and development south of the New Brighton Pier illustrating the changes in sand dune coverage. Left: 1925-1929, Middle: 1965-1969, Right: latest aerial imagery
Source: Canterbury Maps, n.d (https://mapviewer.canterburymaps.govt.nz/) Land Information New Zealand, Statistics New Zealand, Royal New Zealand Air Force, Environment Canterbury.

Beyond their importance for hazard mitigation and management, and as touched on briefly earlier, research has acknowledged that sand dunes offer a wide range of values including cultural, recreational, social, economic, and the supporting of environmental processes and ecological systems (Silvia et al., 2016; Everard et al., 2010). However, this is not often communicated

effectively with coastal communities or reflected in policy and decision making (Bracic, 2013). It is common for people to disregard management and overtime degrade the dune system. Academics have noted that community education on the values of the dune system and importance of management in place may encourage people to comply and aid in ensuring the sustainability of the dunes and overall coastal environment (Everard, 2010; Silvia et al., 2016; Hu et al., 2018).

Community groups such as the Coastal Restoration Trust of New Zealand, are already supporting the coastal environments through various projects, initiatives and workshops with school groups (Coastal Restoration Trust of New Zealand, n.d.-a). In the Canterbury region there is ten Coast Care groups, displayed in Figure 2.4, formed under the Coastal Restoration Trust group (Coastal Restoration Trust Restoration Trust of New Zealand, n.d.-b).
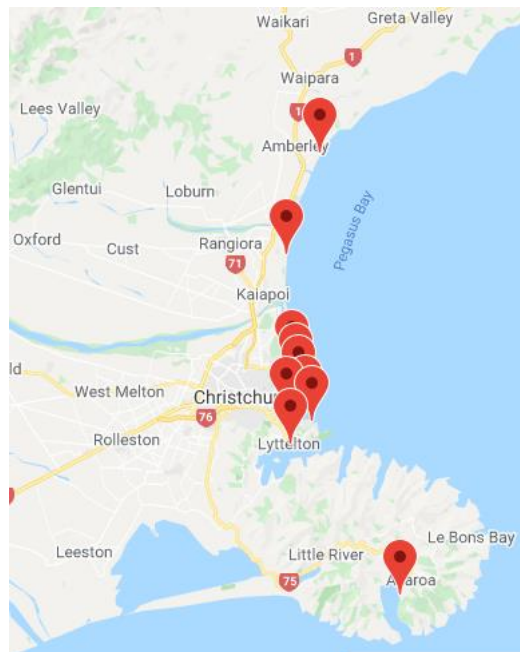
Figure 2.4: Coastal Restoration Trust of New Zealand Coast Care Groups in the Canterbury region.
Source: Coastal Restoration Trust of New Zealand, n.d.-b.
https://www.coastalrestorationtrust.org.nz/coast-care-groups/groups/

2.2 Community Wellbeing

Community and wellbeing are complex concepts with interchangeable meanings, interpretations and methods of measuring. The recent focus on community wellbeing arose from Bhutan's Gross National Happiness Index, developed in 2008 (Weeranakin & Promphakping, 2018). It was after this concept became prominent worldwide that it became apparent to authorities that community

wellbeing can be indicator of individual wellbeing. It is through the act of being well together that a community can flourish (Wiseman & Brasher, 2008; Atkinson et al., 2020). It should be acknowledged that community wellbeing can also be considered national wellbeing within research, and although similar in definition, have different measurement methods. It is important to acknowledge community and wellbeing as individual concepts before providing an understanding of community wellbeing.

2.2.1 What is Community?

The term 'community' was previously understood as people being connected or in communication by a geographical space. This term however, over the last decade has changed, as virtual platforms and interactions have created a sense of place and community amongst online users (Atkinson et al., 2020). Many academics deem that territorial boundaries can no longer be used to define community. However, due to governments' use of territorial boundaries for jurisdiction, commonly used definitions of community wellbeing still draw from this territorial approach (Atkinson et al., 2020). Academic Murphy (2010, p.3), describes community as the following:

"Community arises through social interaction"

Murphy (2010) describes community as place based or by interest, allowing for a broad use of the term 'community'. This idea follows the notion that a community does not need to be bound by a place but can be linked to other places through interests, faith and culture (Murphy, 2010).

2.2.2 What is Wellbeing?

Wellbeing is a complex term with multiple definitions and meanings within disciplines and communities. Allin and Hand (2014) acknowledge that wellbeing should not be condensed to one definition but have multiple meanings that suit different purposes, aspects, and interpretations. Wellbeing can be divided into two aspects of individual or personal wellbeing and societal or community wellbeing, with subjective and objective indicators for each. Objective wellbeing is defined by predetermined attributes such as material resources and social attributes (Western & Tomaszewski, 2016). Conversely, subjective wellbeing is a self-reported evaluation of an individual's life (Western & Tomaszewski, 2016).

Related Māori words often have various meanings, interpretations and can hold responsibilities and feelings. The term *Hauroa* is used to describe the philosophy of health and wellbeing, encompassing physical, mental, social and spiritual values. The Where Tapa Wha model represents

the Hauora for Māori, illustrated in Figure 2.5. The foundation of this model is whenua (land or roots) that supports the interactions between four values or dimensions, and provides a framework of wellbeing (Rawson, 2016; Health Navigator New Zealand, 2020). The four dimensions are taha tinana (physical), taha hinengaro (mental), taha wairua (spiritual) and tata whānua (family), illustrated in the whare tapa whā in Figure 2.5.

Figure 6.5: The Whare Tapa Whā- a holistic model of health based on Māori wellbeing a values (Health Navigator New Zealand, 2020)

It is believed that by strengthening these four dimensions and the foundation, yourself, whānau and iwi will flourish. This Māori concept provides a similar understanding of being well together (Wiseman & Brasher, 2008; Atkinson et al., 2020). It is important to acknowledge the different cultural understandings of wellbeing and to encompass it within the community wellbeing framework.

A development in the school curriculum in 2020 focuses on climate change, the awareness, role of science and understanding the response to and impacts for climate change (Te Kete Ipurangi, 2021). The Climate Change Learning Programme - Wellbeing Guide focuses on providing teachers with resources and information to deliver the scientific content in an appropriate way, to maintain student wellbeing (Te Kete Ipurangi, 2021). Support is given to aid in the challenging conversations that will be had on climate change issues to aid mental and social wellbeing. This is a fundamental step in teaching children the importance of understanding climate change, in a controlled manner that will not endanger their wellbeing.

2.2.3 What is Community Wellbeing?

There are many different attributes put forth to represent community wellbeing. Some of these include cultural, environmental, economic, social, political, and spiritual. Community wellbeings fundamental component illustrates the relationship between people, built and natural environments, and the socio-cultural construction created through interactions of individuals and communities (Wiseman & Brasher, 2008).

The four most common values associated with community wellbeing across various disciplines and research are cultural, economic and environmental and social wellbeing (Yates et al., 2019; Wiseman & Brasher, 2008; Cox et al., 2020). These four values encompass the depth, broadness and interpretation needed for communities to flourish as a group and individuals.

Issues arise within community wellbeing discourse as there is often a focus on economic indicators, which does not encompass the essence of community or wellbeing. Wiseman and Brasher (2008) discuss community wellbeing and introduce an evaluation of rethinking progress from the traditional economic indicators, to instead consider the societal, cultural, and environmental concerns. This piece of literature provided the disparities of economic growth indicators and highlighted the broadness of the concept 'community wellbeing' before proposing their own definition encompassing individuality in communities:

Community wellbeing is the combination of social, economic, environmental, cultural, and political conditions identified by individuals and their communities as essential for them to flourish and fulfil their potential (Wiseman & Brasher, 2008, p. 358).

Cox et al. (2010) follow a similar notion of community wellbeing, defined as the following:

Community wellbeing encompasses the broad range of economic, social, environmental, cultural and governance goals and priorities identified as of greatest importance by a particular community (p. 72).

These two pieces of research use an understanding of individuality within communities to not concretely define community wellbeing but to provide a broad framework and indicators to assist communities in meeting goals (Cox et al., 2010; Wiseman & Brasher, 2008). Many academics (e.g. Atkinson et al., 2017; Weeranakin & Promphakping, 2018) follow the notion of community wellbeing as Wiseman and Brasher (2008) have set forth, thus the current research will follow this definition.

Yates et al (2019) work on '*Whanake mai te mauri ora: Think piece: An expanded wellbeing framework and urban science data tool for integrated wellbeing governance*' is a key piece of literature that provides a framework for effectively introducing community wellbeing into governance. This framework was guided by the New Zealand 'Local Government (Community Well-being) Amendment Bill 2019, with the main objective of restoring and 'promoting the social, economic, environmental, and cultural well-being of communities' (Mahuta, 2018).

This goal is designed for both present and future communities and includes the ability to adapt to the changing environments and needs of people. Additionally, this framework facilitates the indigenous wellbeing thinking of mauri ora within the legal structure (Yates et al., 2019). *"Mauri ora is the vitality and wellbeing of life as a collective, connected field"* (Yates et al., 2019, p. 21). The Local Government Amendment Bill 2019 is a multi-dimensional approach to encourage community engagement and in tun, better community wellbeing.

2.2.4 Measuring Community Wellbeing

Studies have recognised the importance of developing indicators to assess and measure community wellbeing. Dating back to the late 1980's, community wellbeing was developed into a holistic idea utilising economic, social and environmental wellbeing to measure community wellbeing (Murphy, 2010).

The most common framework at the forefront of decision-making is that of economic wellbeing (Murphy, 2010). This is driven by a strong focus on economic growth and the security it brings to nations. The Green Growth Initiative, founded in 2010, was designed with the idea of shifting focus from an economic perspective towards also considering environmental and cultural wellbeing values. Although this initiative does not encompass the four community wellbeings of cultural, economic, environmental and social values evenly, it provides an important necessary step in moving away from the current focus of economic wellbeing alone (Global Green Growth Institute, n.d).

Academics have agreed that there is no singular measurement for evaluating community wellbeing due to the broadness of community and wellbeing (Atkinson, 2020; Bagnall et al., 2016; Gibbs et al., 2015; Allin & Hard, 2014). Gibbs et al. (2015) provided an assessment of community wellbeing indicators from a range of studies to illustrate the depth and diversity in community values (see Table 1 in Gibbs et al., 2015). From this study it is evident that the four wellbeings are not evaluated

within the same studies, often only focusing on two or rarely three. The reliance on assessing community wellbeing through economic growth indicators was recognised as a weakness within academic work (Murphy, 2010), cultivating a paradigm shift to include the collective community wellbeing values as equal (Weeranakin, & Promphakping, 2018; Yates et al., 2019; Gibbs et al., 2015).

Authors Allin and Hard (2014) and Murphy (2010) suggest that wellbeing measurements should be dependent on what aspect (subjective or objective) is being evaluated, as within these two aspects there are various attributes to measure. Other academics (Lau, 2013; Clifton et al., 2014; Petrescu et al., 2020) have researched the idea of monetising wellbeing values, though they agree that this adds to the focus on economic growth and does account for varying perspectives on different values and wellbeing attributes.

In 2010 the United Kingdom's endorsement of the Office for National Statistics' '*Measuring National Wellbeing Programme'* opened international debate about what is valued by the public (Bache, 2019). It was through this consultation progress with the public and communities involved, that led to wellbeing initiatives being placed at the forefront of the government's agenda (Bache, 2019). An issue faced for this measuring programme was the different interpretations and discourse on the fundamentals of wellbeing across regions and authorities (Bache, 2019). This further solidifies the idea of researchers and local governments needing to include communities at local scales to identify key concerns and opportunities to better community wellbeing.

2.3 Community Engagement

It is important to understand that complex terms like community and engagement, when combined, have several definitions (as mentioned for 'community' and 'wellbeing' earlier). Authors Johnston and Taylor (2018, Table 1.1) provided a collection of definitions for 'engagement', segregated in to three themes and sourced from several authors. These themes include social and relational, interaction and exchange, and dynamic and dimensional). These themes are illustrated in Figure 2.6 with key words generated by authors in 'The handbook of communication Engagement' (Johnston & Taylor, 2018).

Figure 2.6: Key words from the three themes of engagement: social and relational, interaction and exchange, and dynamic and multidimensional. (Johnston & Taylor, 2018, p. 35).

A key definition that encompasses all themes previously mentioned, and which will be used to provide an understanding of community engagement in this study, is:

[Community engagement] is a relational process that facilitates understanding and evaluation, involvement, exchange of information and opinions, about a concept, issue or project, with the aim to build social capital and enhance social outcomes through decision making (Johnston & Taylor, 2018, p. 36).

In simple terms community engagement is to understand a wider perspective and values of those who are affected by decision making and practices within a space (Ahmed & Palermo, 2010). Integrating value(s) into decision making and policy is not an easy task due to differing views and perspectives on what is valued. This provides an instant issue that can tend to make not involving value in policy and decision making an easy, albeit sometimes less ideal, option (Deiz, 2013).

The Coastal hazards and climate change: guidance for local government report (Ministry for the Environment [MfE], 2017), discusses the reasons behind engaging with community and a process of identifying who should be participating, the social context and how engaging in this process should

occur (see Section 3.2 in Coastal hazards and climate change: guidance for local government, MfE, 2017).

It is known that meaningful community engagement can aid in effective management responses, however, is difficult to implement in practice (Oppenheimer et al., 2019). Understanding and utilising core values will enhance both community engagement and policy and decision making. This engagement with members of the community can improve policy making by encompassing value and corrections suited for the environment and people (Bracic, 2013). Engaging with the local community to help inform policy will increase the use of local knowledge for individual communities (Oppenheimer et al., 2019; Deitz, 2013; Bracic, 2013). To build on community engagement and participation in supporting and maintaining management, policy and environments, science communication is required to be readily available and digestible for communities.

2.4 Science Communication

Science communication as a definition is varied amongst academics, scientists, communities and decision makers. It is important to illustrate these definitions to provide a similar understanding of what science communication is for this research. Burns et al. (2003, p. 191) compiled a range of definitions to illustrate the varying interpretations of science communication before providing their own definition using a vowel analogy:

Science communication may be defined as the use of appropriate skills, media, activities and dialogue to produce one or more of the following personal responses:

- *Awareness, including familiarity with new aspects of science*

- *Enjoyment or other affective responses*

- *Interest, as evidenced by voluntary involvement with science or its communication*

- *Opinions, the forming, reforming or confirming of science related attitudes*

- *Understanding of science, its content, processes and social factors*

Science communication may involve science practitioners, mediators and other members of the general public, either peer-to-peer or between groups.

Similarly, Juncan and Juncan (2014) produced a list of definitions from the *Office of Science and Technology and Welcome Trust* plus from various academics (e.g., Burns et al., 2003; Fischhoff & Schefele, 2012; MaCallie, 2009) to provide a concise but broad definition:

[Science communication] *… is framed as a multi-directional dialogue among people that allows all the participants to learn (p. 463).*

More recently, Illingworth and Allen (2016, p. 1-3) described science communication in its simplest form as: "*to communicate science, is to communicate knowledge from those that know to those that do not*". For this research, the definition produced by Burns et al. (2003) will be used, as this definition facilitates a broad understanding of the term that will be of use in the present research.

Whitemarsh et al. (2011) indicate that political parties and government organisations are concerned with the societal engagement in policy making. They deemed that for success in implementing policies, specifically those that ask for individual and community behavioural changes, that the public must have meaningful engagement and communication. Whilst Whitemarsh et al. (2011) research has a strong focus on the reduction of carbon emissions, it provides a fundamental view on the importance of community engagement and effective science communication within in the wider sphere of science and climate change concerns.

2.4.1 Why Communicate?

Scientists have an obligation to communicate their research to the public, including the impacts it will have on their community and themselves, and what is being done. This communication facilitates a dialogue between different perspectives and disciplines which can aid in informing and contributing to science inquiry (Illingworth & Allen, 2016).

Science communication provides factual information to inform decisions and policy. However, author Deitz (2013) questions how decision making can be truly informed if values are not regarded. Hu et al. (2018) provides a framework of a two-step process to encourage scientists to utilise and become accustomed to community engagement and scientific communication in effective methods. This two-step process involves acknowledging the act of community engagement to peer scientist to encourage participation and the efforts of participation (Hu et al., 2018). The authors note that this research was only conducted amongst scientists in China with a unique collectivistic approach and should be conducted at regional levels (Hu et al., 2018). Author Horita et al. (2009) discuss the use of soft and hard technologies in urban planning to facilitate

communication and engagement. Soft techniques refers to the untaught and know-how knowledge compared to hard technology which refers to telecommunication (Horita et al., 2009).

Public Understanding of science (PUS) can help aid in informing day to day decision made (Royal Society, 1985; Gregory & Miller, 1998). For science communication to be effective, assessments on and with the communities involved or affected must be made (Burns et al., 2003). The Royal Society (1985) believe that if the public understood science and the limitations, findings and methods of science, that it can increase the value of decision making). The Royal Society (1985) provide a clear understanding that PUS is a significant factor for long term sustainability and improvement in changing climates and decision making:

Improving the public understanding of science is an investment in the future, not a luxury to be indulged in if and when resources allow (The Royal Society, 1985, p. 9).

However, in order to gain beneficial PUS, science communication must be effective.

Cormick (2019) provides an 'ultimate guide' to science communication. This piece of literature addresses the need and issues for bettering science communication and the tools to aid this. Cormick (2019) addresses that science communication is often derailed by many problems, including political expedience, misinformation and propaganda. A key idea through this literature is understanding the public's perception of science, science communication and science literacy. It is important to be aware of the social context when informing science communication and understanding that the public is made up of many different communities (Cormick, 2019). This can only be achieved with informed conversations with the communities involved to understand their levels of knowledge and participation.

2.4.2 Science Communication Methods

Research by Kearns (2012) identified contemplative practices as an effective method which captivates and engages communities through listening, connecting, and resolving issues. McGee-Collier (2012) notes that companies who actively engage with local communities create lasting relationships that benefit both parties. The notion behind using this method in science communication and community engagement is to bring forth values and perspectives that are not often recognised. This aids in creating new solutions to ongoing environmental issues.

Various researchers (e.g. Johnston & Taylor, 2018; Illingworth & Allen, 2016; Jucan & Jucan, 2014) have provided science communication methods, focusing on presentation skills involving effective speaking, the use of PowerPoint and an appropriate audience. Although this information is beneficial for science communication, the current research will look more into the methods of science communication involving social media use, citizen science, public talks and more.

The Coastal hazards and climate change: guidance for local government report (MfE, 2017, p. 60) categorised types of activities and events of engagement into three groups:

"Methods that provide one-way information

Approaches that collate feedback from different social groups

Methods that facilitate dialogue and partnership to support decision-making"

These categories encompass various activities and events for methods of engagement, illustrated in Figure 2.7. This will be a key piece of information for comparing science communication methods and engagement with the community questionnaire responses. The methods of science communication will be discussed further in the Section 4 - Results.
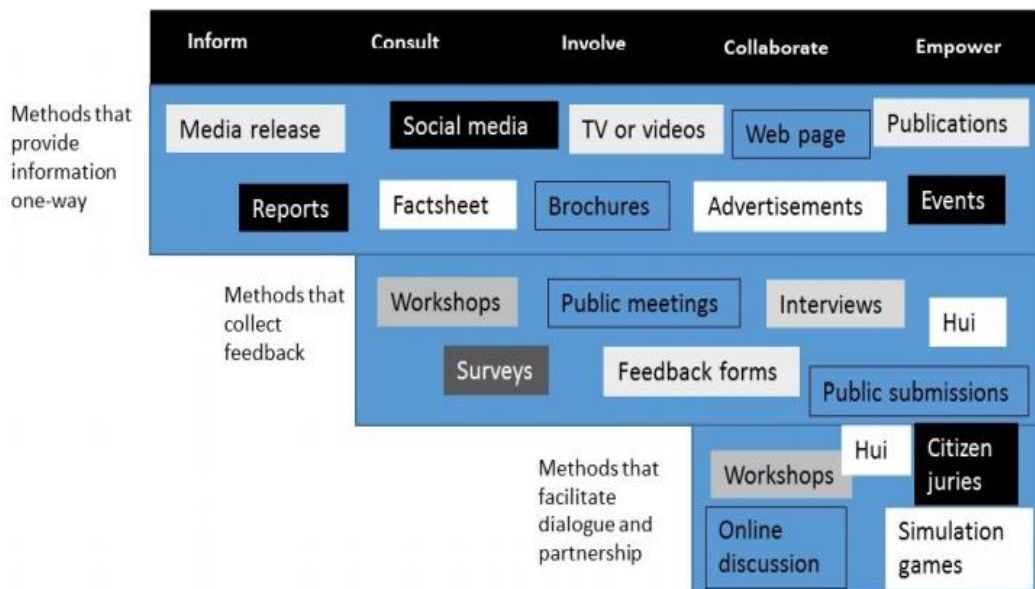
Figure 2.7: Types of activities or event that fit along the International Association for Public Participation spectrum of participation (inistry for the Environment, 2017, p.60

2.4.3 Issues

Science communication is often complex and ineffective from a public perspective, and this can lead to disengagement (Cormick, 2019; Illingworth & Allen, 2016; Johnston & Taylor, 2018). Furthermore, the conflicting information surrounding climate change, sea level rise implications and anthropogenic impacts on the environment that is in the public sphere can be over-whelming and create uncertainty and lack of concern (Whitemarsh et al., 2011; Cormick, 2019; Burns et al., 2003).

The communication of sea level rise and climate change is a debated topic due to the uncertainties involved. However, by not including or informing the community of uncertainties and various outcomes that could occur, would be a dis-service and increase the unawareness, preparedness of people to understand the communication and the overall potential risk to the hazard (MfE, 2017; Oppenheimer et al., 2019). Scientific messages can be heard and taken differently by individuals and different groups, so that it is important to tailor scientific messages multiple ways, encompassing various values, for effective communication (Cormick, 2019).

2.5 Literature Gaps

This literature review evaluated the topics regarding the coastal environment, specifically looking at the dune system, community wellbeing, community engagement and science communication methods. Through this literature review, evident gaps became apparent. Firstly, lacking in literature is the combination of all four community wellbeings, often missing out cultural or social wellbeing. This results in the misconception that these values should not be regarded or as significant as the more common use of the economic and environmental wellbeings.

Secondly, previous literature has produced various studies on the importance of the coastal environment, with some focus on the values associated with the beach. However, very little has been researched into the values of the dune system and how the community view the dunes in regard to community wellbeing. Due to the dynamic nature of the coastal environment, it is important to understand the values associated to it. Furthermore, as a natural protection barrier to flooding and sea level rise, the dune system has a significant role in climate change adaption. Thus, gaining the communities values on this system will aid in climate change adaptation planning and decision making.

3. Methodology

3.1 Study Area

New Brighton (Te Karoro Karoro/ Te Kai-a-Te Karoro) is a coastal area in Ōtautahi, Christchurch, which includes North New Brighton, New Brighton, and South New Brighton, as shown in Figure 3.1. New Brighton is located on a spit formation, which semi encloses the Ōpāwaho-Ōtākaro (Heathcote-Avon) Estuary. Spit formations occur when a narrow accumulation of sand or gravel semi encloses a bay or estuary (Masselink et al, 2014).
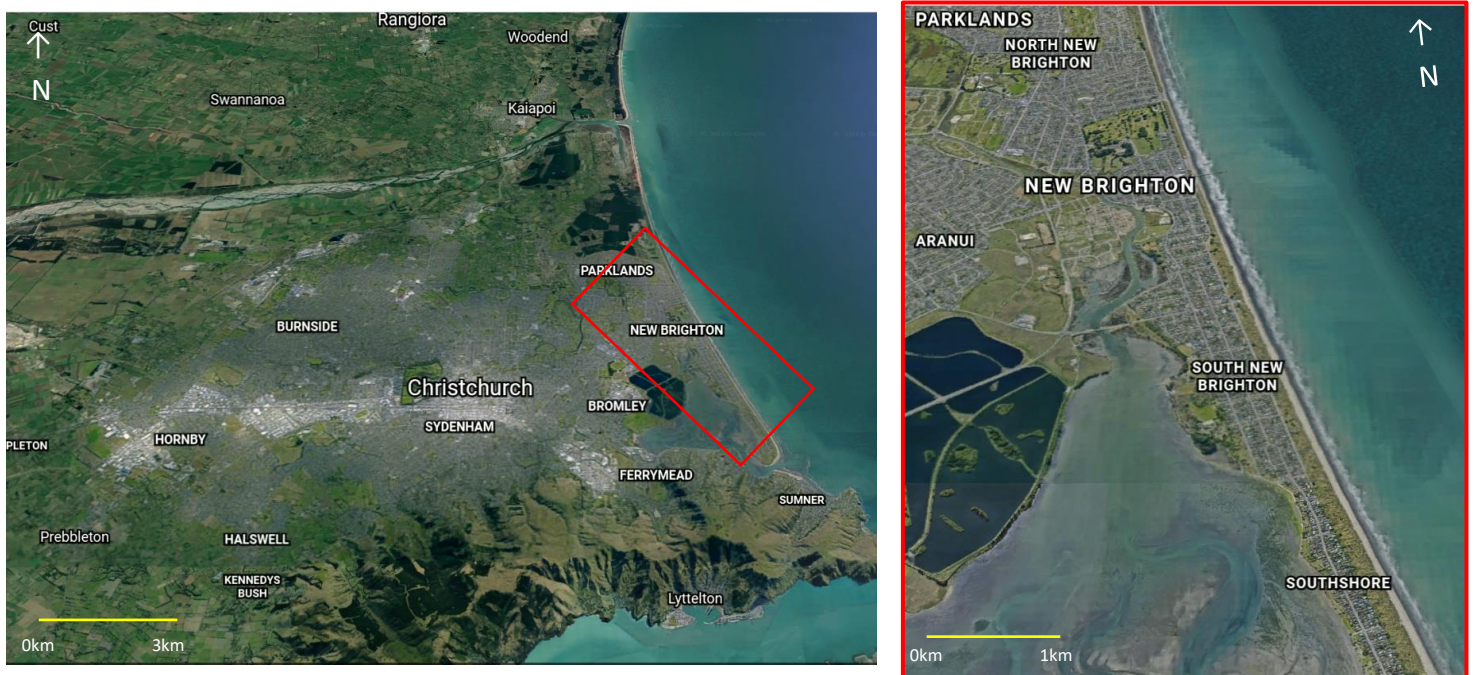
Figure 3.8: Left - New Brighton in relation to Christchurch. Right - Zoomed in on North New Brighton, New Brighton, South New Brighton and Southshore.
Maps Data Left, Google, 2020(a), Maxar technologies, TerraMetrics, Data SIO, NOAA, U.S. Navy, GEBCO, CNES / Airbus, Landsat / Copernicus
Maps Data Right, Google, 2020(b), TerraMetrics, Data SIO, NOAA, U.S. Navy, NGA, GEBCO Maxar Technologies

The first settlement on the New Brighton spit were the Māori tribe Waitaha before European settlers arrived in 1853 (Comfort, 1995). Permanent development begun in 1939 with the establishment of Rockinghorse Road in 1945. This increase in development is illustrated in Figure 3.2 (Canterbury Maps, n.d). Comfort (1995) produced a table to illustrate the increase in the number of houses from 7 in 1948 to 650 in 1995 in the Southshore area, presented in Table 3.1. As of 2018 there is now 1584 private dwellings in New Brighton and 1419 in South New Brighton (StatsNZ, 2018a; StatsNZ, 2018b).
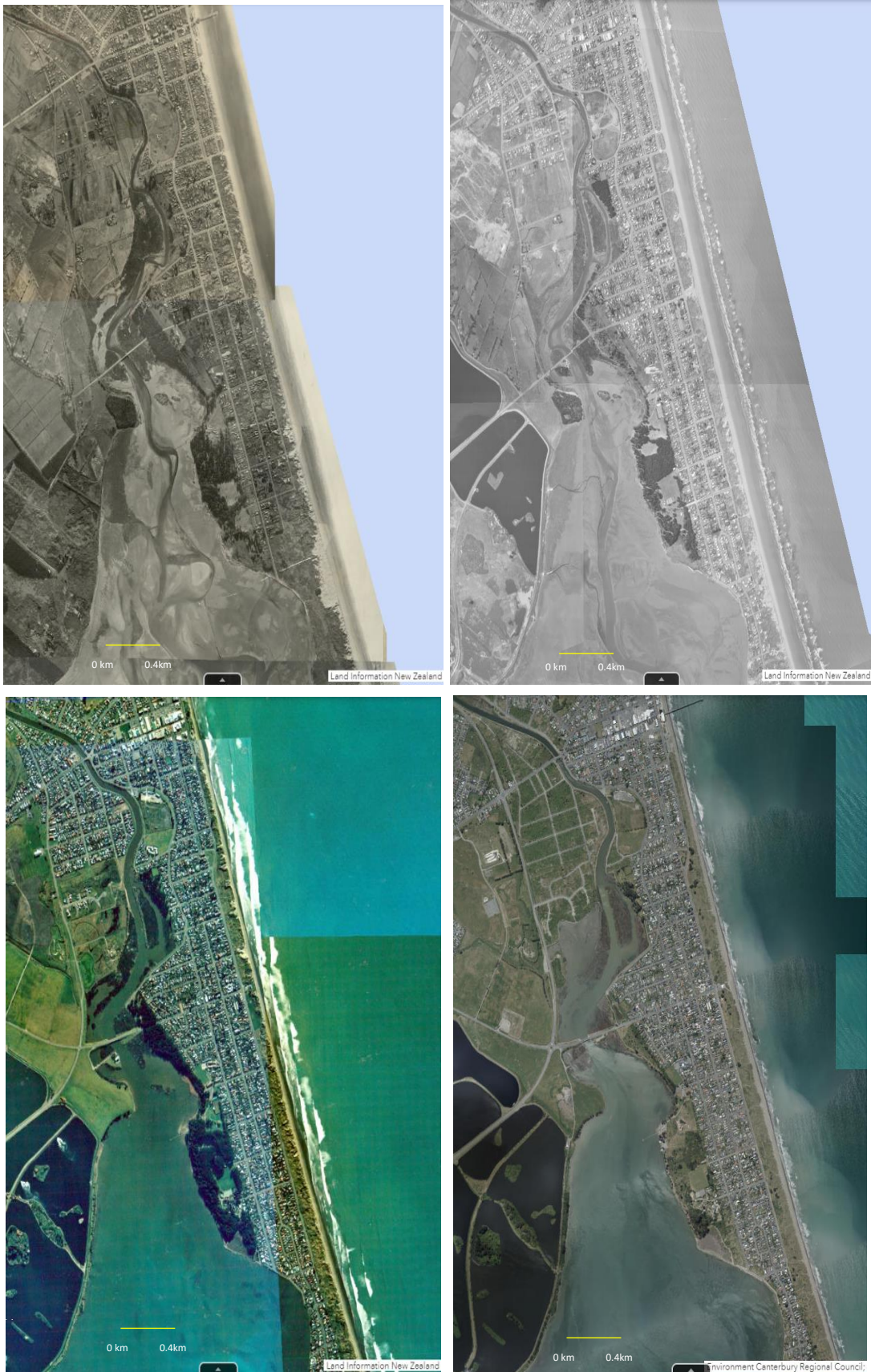
Figure 3.11: New Brighton development. Top Left: 1945-1949, Top Right: 1965-1969, Bottom Left: 1995-1999, Bottom Right: Latest Imagery

Source: Canterbury Maps, n.d (https://mapviewer.canterburymaps.govt.nz/), New Zealand Aerial Mapping, Environment Canterbury, Land Information New Zealand

Table 3.2: Population and Number of Houses in the
Southshore area (1948-1995) (Comfort, 1995, p.39)

Year	No. of Houses	Population
1948	7	
1956	58	
1972	220	650
1991	516	1425
1995	650	

The dune system along the New Brighton coast is exposed to climate change impacts including accelerated sea level rise, and human modification and degradation. This results in increasing the risk of inundation, creating a vulnerable area (Tonkin and Taylor, 2015). The Coastal Hazard Assessment- Stage Two report (2015) indicated that the lowest accretion rates along the Christchurch coastline were where the backshore has been modified by carparks, structures, and other development (Tonkin & Taylor, 2015). These areas include the North New Brighton Community Centre, North Beach Surf Lifesaving Club, and the New Brighton Library (Tonkin & Taylor, 2015). This can influence the vulnerabilities and risks associated with sea level rise and flooding (Tonkin and Taylor, 2015).

The Canterbury region is located on low lying coastal flood plains which has been influenced by tectonic activity. The Canterbury earthquake sequence 2010-2011 caused significant land displacement of translational and elevational changes, liquefaction, and slope instability (Tonkin and Taylor, 2013). The earthquakes caused an uplift in the South New Brighton area of approximately 50 mm (Beavan & Litchfield, 2012). Furthermore, extending north of New Brighton, there was more than 50 mm of subsidence that occurred (Beavan & Litchfield, 2012).

The community of New Brighton is a diverse and inclusive group with varying demographics of age, ethnicity, and culture. New Brighton and South Brighton have had an increasing Māori population since 2006 (StatsNZ, 2018a; StatsNZ, 2018b). Roughly 50% of the New Brighton population is within the age bracket 30-64. The remaining population is split roughly evening across the other three age brackets (under 15, 15-29 and 65 years and over) (StatsNZ, 2018a; StatsNZ, 2018b). This creates an opportunity for accessing a range of diverse and different values and perspectives to provide a unique approach for community engagement and methods of science communication.

3.1.1 Statutory Management framework for Canterbury

The coastal environment is a significant resource to New Zealanders for various values, uses and opportunities. From this, the New Zealand government, regional and local authorities, and community groups (some shown in Figure 3.3), share responsibility to protect and enhance this natural resource using a top-down approach. This is achieved by the Resource Management Act (RMA) 1991, New Zealand Coastal Policy Statement 2010 and various other legislation pieces (shown in Figure 3.4). Local authorities implement local legislation acts and goals that must adhere to the RMA and other national and regional policies in place.

Community groups and resident associations play vital roles in informing local authorities of what the community need or how local legislation may or may not be working. These groups fight for what they believe is necessary for their community and often extremely dedicated to making sure they are heard as a community.
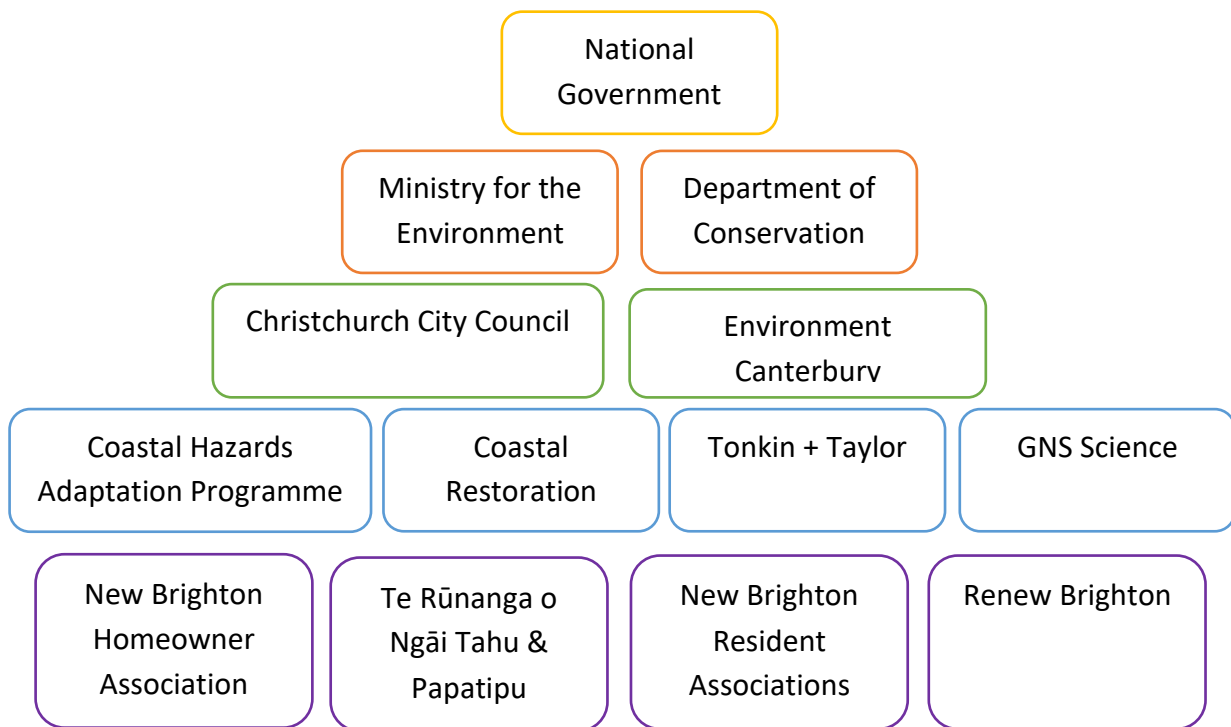
Figure 3.14: A management framework of a top-down approach of government authorities, agencies and consultants and prominent community groups that maintain regulations and work towards improving the coastal environment in New Brighton.
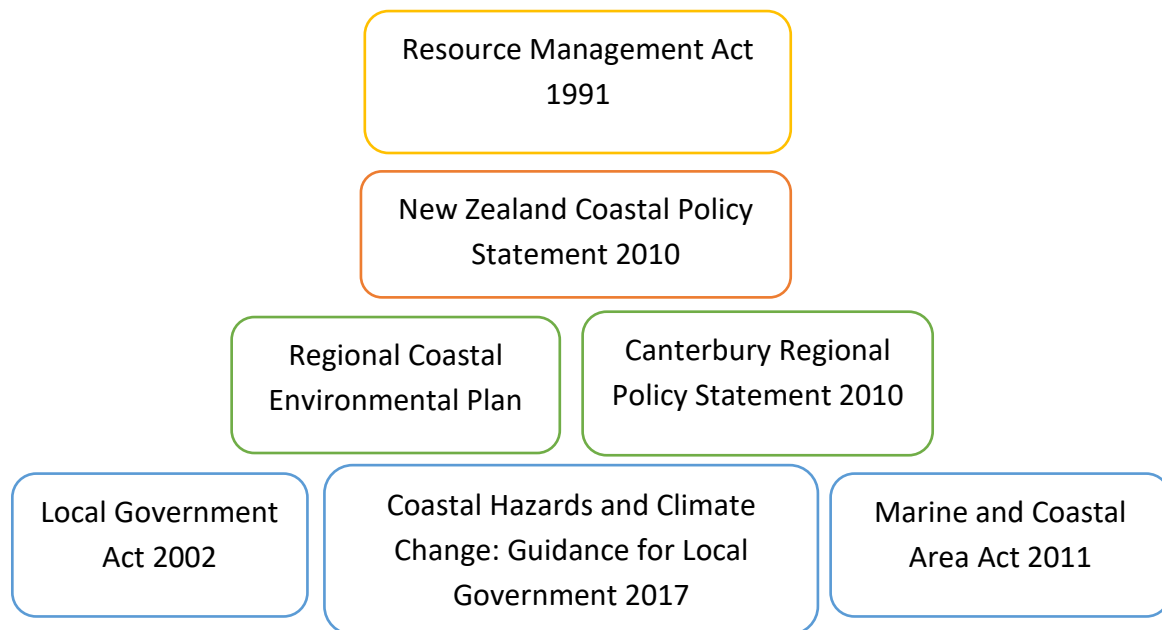
Figure 3.16: Statutory management Framework of Acts, laws and regulations for the New Brighton area to manage, sustain and improve the environment of the area

3.2 Theory and Justification

This research used a mixed method approach of qualitative and quantitative methods. This approach employs a triangulation framework, whereby the research seeks to go beyond solely confirming results but to inform, complement and expand quantitative data with qualitative values and perceptions from individuals and groups (Williamson & Bow, 2002; Dunning et al, 2007). Using a mixed method approach helped to provide a local perspective from a diverse range of people and to affirm results by cross validating answers with literature (Leavy, 2017; Dunning et al, 2007). Quantitative data allows for the testing of a theory and/or investigating the relationship between variables (Cresswell, 2014). Qualitative methods involve moving beyond the numbers to understand perspective and/or issues relating to a person or group (Cresswell, 2014). A key benefit of undertaking qualitative methods is the in-depth interpretation and understanding provided by interviews and/or local perspectives (Basias & Pollalis, 2018). A qualitative approach can be divided into three types: the oral, the observational and the textual (Winchester & Rofe, 2010). This research used techniques from the oral and the textual types of qualitative methodologies to answer the research aims. Using methods of both qualitative and quantitative techniques provides different strengths and weaknesses, which can offset and complement each other (Johnson & Turner, 2003; Leavy, 2017).

The methods used to answer the research aims and questions comprise of two key approaches: community surveying and semi-structured interviews. These will be complemented by an in-depth literature review which allowed for local and global examples. This literature review will illustrate the gap in literature encompassing community values, knowledge, and engagement in science communication specific to the dune system (White, 2003). This mixed method approach was suitable for being exposed to local knowledge of the community values and knowledge associated with the dune system, community wellbeing and engagement and science communication. It provided the opportunity to evaluate perspectives on these topics from experts in related fields, gaining understandings from different parties associated with the research.

3.3 Literature Review

Snyder (2019) describes the use of a literature review in the methodology as creating a building block of knowledge, which facilitates the theory development of the research. This research involved an in-depth literature review on the broad definitions of community wellbeing, the relationship between community wellbeing and dune systems, and science communication methods. Existing research has investigated factors influencing community wellbeing and science communication separately but, little research has occurred into relationships between these two concepts. Making this link is beneficial as wellbeing can be affected positively or negatively by what information is shared and how it is communicated (Illingworth & Allen, 2016; Wilkinson, 2010). An analysis was undertaken connecting the two key concepts together to provide knowledge of their relationship.

Current science communication methods using both local and global case studies were evaluated regarding what worked well, what can be improved and what did not work for communities. These science communication methods were evaluated based on the involvement with and effectiveness of engagement. The results of the evaluation were cross examined with responses from the community questionnaire and interviews with community representatives. This was achieved to illustrate the various methods of science communication beneficial to the New Brighton community.

3.4 Community Surveying

Community surveying was chosen as it provides the values, perspectives, and experiences from a sample of the studied population (Cresswell, 2014). The questionnaire was conducted in person

and online using the convenience sampling method. This method of sampling has been chosen as it had no inclusion and limited exclusion criteria. In terms of the in-person surveying, those under the age of 18 without any parent or caregiver present were not approached as potential participants, to ensure ethical considerations were upheld. Additionally, for safety purposes, adults that were actively supervising children or people engaged in activities that might preclude safe participation, were not approached as potential participants. This was to prevent the risk of harm or annoyance. Although this may have created bias in the results, due to excluding the age bracket of under 18 and those with minors, I am confident that this did not misrepresent the population. As only approximately 20% of the New Brighton population is under 15, and only a small percentage likely having the knowledge to being able to complete the questionnaire, any bias from excluding this group is minimal. Furthermore, those most likely to be with minors (30-64) are in the majority of the population so excluding those with minors will not misrepresent the age bracket.

The in-person surveying was conducted in close proximity to the accessways to the beach where the aim was to get 30 New Brighton residents or beach goers. New Brighton had approximately 7000 residents, according to the in 2018 census of New Brighton and South New Brighton (StatsNZ, 2018a; StatsNZ, 2018b). Thus, this number should not have proved too much of an annoyance on the community population and, while it might not end in data saturation or prove 100% representative of the whole population, the questionnaire should give rise to some diversity of values and perspectives. The community questionnaire is shown in Appendix One.

The questionnaire used a mixture of closed-ended questions, rating based responses and open-ended questions. Closed-ended questions allow for a quick analysis, as the answers will fall within a limited range of categories (McLafferty, 2003). The rating-based response gives the opportunity for the participant to rate, the most to least important attribute specified (Azroin & Cameron, 2010). The open questions provided an opportunity for the expression of individual thoughts, experiences, critiques, and knowledge, generating a qualitative analysis. A limitation of open-ended questions is the interpretation of words and meanings by different people (Cresswell, 2014). To mitigate this issue, key definitions were provided to ensure the participants have the same baseline of understanding the terms.

To further the reach of the questionnaire, it was made available online using Qualtrics, through a Quick-Response (QR) code (Qualtrics, 2021). This online questionnaire tool was chosen as

participants remain anonymous when completing the questionnaire. This online questionnaire was advertised on appropriate Facebook community groups associated with New Brighton and emailed to New Brighton community groups. This list is provided in Appendix Two.

The QR code method is becoming increasingly popular in social science research due to the increase of people using technology and having access to the internet. Additionally, it is typically easy to access, use and reaches a wide audience of different demographics (Harrison et al, 2019). Thus, I decided that an online, QR code-based version of the questionnaire was ideal to broaden my respondent audience.

One limitation with QR codes and online questionnaires is that it does not account for those who are not tech savvy, have access to the internet and/or technology, and the young and elderly populations. This method is used however, as it will give range to a wider sample and demographics. Additionally, the use of QR codes will allow those under 18 to access the questionnaire. To mitigate ethical risks to those under 18 participating in the questionnaire they were redirected to the end of the questionnaire if they were underage.

Both methods of surveying the community (in-person and online) have limitations of accessibility and coverage of demographics, however by employing both I am able to somewhat mitigate the weaknesses and limitations encountered as they are complementary methods (Cresswell, 2014). Both methods provided the participant with an information sheet, prior to beginning the questionnaire (refer to Appendix Three).

3.5 Semi-Structured Interviews

Semi-structured interviews with experts in related fields to the research questions were conducted for this research. A target of six interviewees in fields including: dune system and coastal science, community wellbeing and engagement, and science communication were sought after. Furthermore, community representatives were interviewed to gain a community perspective. This was to ensure a wide perspective from a variety of people with different backgrounds and associations to New Brighton was heard. The purpose of using semi-structured interviews was to allow for flexibility within the interview, basing further questions off the answers to earlier questions (Longhurst, 2003). This methodology complemented the community surveying as it provided the addition of different perspectives and knowledge on community engagement and science communication from a diversity of stakeholders and actors in these processes.

The interviewees were chosen from several different methods including connections with the community partner, the snowball technique whereby, one contact provides an additional contact they think could benefit the research (Longhurst, 2013), and reaching out to individuals and organisations.

Each interviewee was required to read an information sheet and sign a consent form before proceeding with the interview. This was emailed prior to the interview to give the participant time to read the information and come to a decision about participating. This consent form allowed the researcher to record the interviews and use these discussions within this research. The interview information sheet and consent from are outlined in Appendix Four.

The interview used probing questions to begin the discussion with each interviewee. To mitigate bias or swayed answers, the questions asked did not force any particular answer, but allowed for the interviewee to discuss their experiences and perspectives (Dunn, 2010). This was aided by open-ended questions and allowing further discussion if the participant wished to expand on the question.

A limitation to consider was the possibility of researchers' presence causing a biased response (Cresswell, 2014). However, since the interviewees were all professional experts in their fields of study, with questions only relating to this expertise, the probability of bias response due to interviewer presence was likely very minor.

3.6 Methods of Analysing Qualitative Data

The method of analysis for the open questions was to seek out key words and common phrases and ideas through the creation of codes. Cope (2010) acknowledges that coding is used to reduce, organise, and analyse data, to create a manageable amount for the researcher to identify key themes. To organise the key themes and phrases, a codebook was formed using the *In vivo* techniques. *In vivo* uses descriptive coding where common phrases and ideas within the same context (positive or negative connotation) are taken from participant responses and organised (Cope, 2010). A codebook is a long list of codes, categorised and organised continually through the analysis (Cope, 2010). Key words and quotes were then categorised in these codes. Starting codes for the codebook included the following terms: Climate Change, Dune System and Management and Community Wellbeing, with subheadings of cultural, economic, environmental and social.

3.7 Ethics and Health and Safety

Due to the nature of the research evaluating culture and values, human ethics approval was required to ensure the safety of the public was upheld. Due to the cultural aspects of this research, Māori consultation was also undertaken and approved, shown in Appendix Five. This research was approved by the University of Canterbury Human Ethics committee, see application in Appendix Six. The research does not ask invasive questions on culture or values and aimed to ensure a wide demographic was heard and represented within the results. The questionnaire was optional, and potential participants were not pressured or coerced into participating. To further the welfare of the participants, they were able to choose to stop at any stage during answering the questionnaire up until they had handed over or submitted through the QR code. This was due to not being able to identify individuals once collated. Health and safety approval was also required to partake in community surveying and expert interviews. This application can be reviewed in Appendix Seven.

4. Results

This section presents results from the community questionnaire, literature review and interviews. The first section discusses the community questionnaire, elaborating on the demographics of the respondents, information regarding the dune system, community wellbeing and science communication. The literature review on science communication and the Coastal Hazards Adaption Planning programme will be evaluated in Section 4.2. Section 4.3 will elaborate on the interviewee's discussions.

4.1 Community Questionnaire

The questionnaire was open from the 3rd January 2021 to 14th January 2021, advertised on two Facebook community groups: Southshore 8062 and New Brighton Community. In-person surveying was conducted on two occasions, with no responses. A total of 49 people began the questionnaire, with 40 people completing majority of the questionnaire. The minimum questionnaire response number aimed for was 30, thus, the responses collected exceeded this aim. Those nine respondents who only answered the age question and/or if they lived in New Brighton were omitted from the results as no other information was obtained. All subsequent results and discussion if the questionnaire excluded those largely incomplete responses. Some respondents did not answer all the questions. This could be for a number of reasons, one being that there were a lot of open-ended questions. Respondents can become disengaged with long surveys and/or a number of open-ended questions (Leavy, 2017; Illingworth & Allen, 2016). Figures and tables were generated using Microsoft Excel and Qualtrics Data & Analysis, and Reports.

With any research there will most likely be negative comments associated to the research topic. This research associated with climate change, coastal vulnerability and community wellbeing led to several disgruntled community members comments. These were received through a number of private messages over Facebook, comments being made on the Facebook posts and multiple people sharing complaints when in-person surveying. Two participants in the online questionnaire responses expressed complaints and disrespectful comments about myself, research, and local authorities. These comments were made by people within the age bracket of 25-44, which is the most populous age bracket in New Brighton.

4.1.1 Basic demographics of questionnaire respondents

The following figures represent the basic demographics of the respondents to provide an understanding for perspectives made in the questionnaire. Figure 4.1 displays the age brackets and number of participants who took part in the questionnaire. Of the age brackets, 18-24 range bracket had the most respondents with 27 (67.5%), showing significant percentage of all the respondents. This could be due to the high online presence this age bracket has.
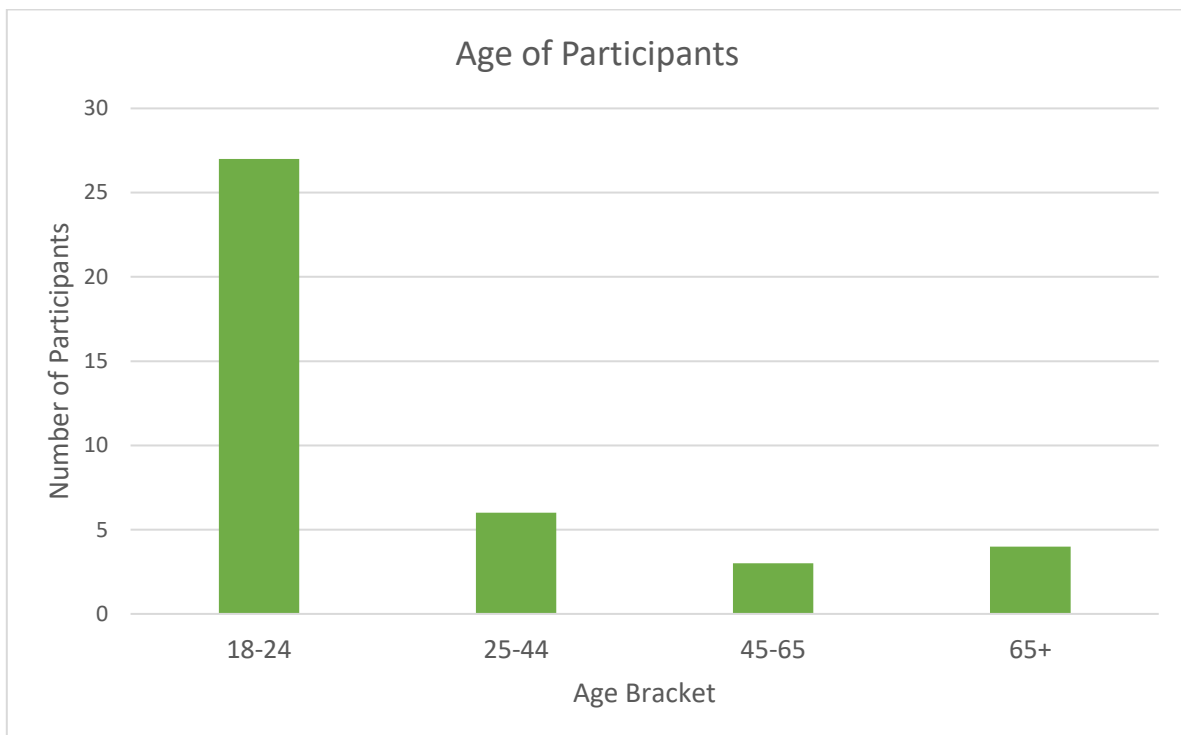
Figure 4.1: Age of respondents from the community questionnaire

Of the 40, 33 (82.5%) participants answered if they lived in New Brighton. 12 (39%) participants answered Yes to be a resident and answered how long they have lived in the area for. 19 participants answered No to being a resident and preceded onto how long they had been visiting the area of New Brighton. These results are interesting as majority of the respondents are not residents of New Brighton, however, are on New Brighton community pages and completed a questionnaire based on New Brighton. Hereafter, residents of New Brighton will be referred to a x-R-NB, and non- residents will be referred to as x-NR-NB. x refers to the number associated to each participant.
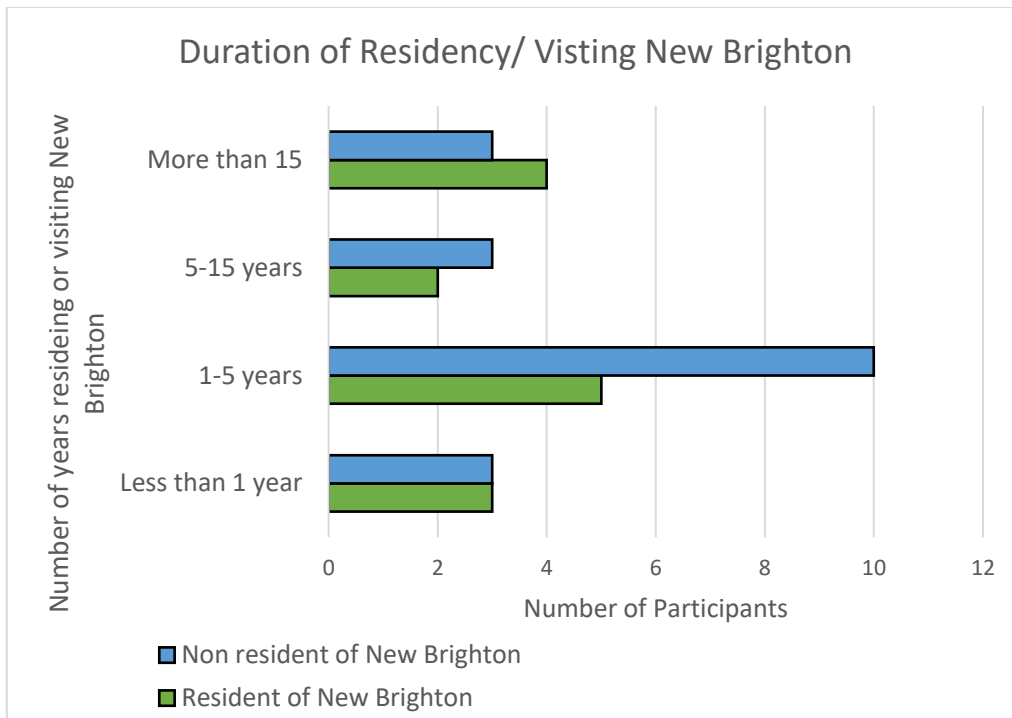
Figure 4.2: The duration of residency or of visiting the area

4.1.2 The dune system

Do you think the dunes are important and why?

Participants were asked if they thought the sand dunes were an important part of the beach. 38 participants responded yes while one responded no. To further this question, participants were asked to explain their answer. Whilst many shared different opinions behind why the dunes are important, common themes of protection from coastal erosion and climate change impacts and ecological importance arose. Some responses are directly quoted below:

"They help mitigate the effects of many forces of nature - such as storms, wind, swells, storm surges and they will probably help when the sea level rises" (31-NR-NB)

"The dunes are a natural feature of this part of the coast, offering protection against coastal energy of the waves. They also provide shelter, biodiversity, reduce noise and wind and are home to many native species. The sand dunes are beautiful to look at, especially since they are quite high and therefore offer panoramic views of the coastline" (35-R-NB)

"It protects our home from the beach be great if we could see the water but I love the walk thru it to the beach and lots of animals and plants live in there" (40-R-NB)

"Sand dunes are super important for coastal protection and ecology. We have an accreting beach in Southshore. It is dynamic - sand will come and go from the edge but not go into a negative sand budget. Dune health is important. They must be an appropriate shape and be well vegetated. SS residents work hard on dune health, planting days, removal of lupin and bone seed and the promotion of spinifex Patches all of which is volunteer work" (33-R-NB)

The one participant who answered 'No' to whether they thought sand dunes are an important part of the beach stated, *"Let nature run its course" (9-R-NB).* Only three respondents did not answer this question, however answered that they believe the dune system is important.

Is dune management important and why?

The participants were asked if they believed dune management was important and to explain their answer. Of 39 answers, only one selected no, that dune management is not important. The participant that selected no, stated that [the management] *'is to costly and repetitive' (9-R-NB).*

Below are some of the answers received when asked to explain their answer for the participants that said dune management is important:

"A lack of maintenance can result in a fire hazard, and unstable ground. It's also nice to have maintained tracks so that people are able to walk through the dunes safely" (38-R-NB)

"I believe that it is almost impossible to ensure that all community members treat our ecosystems and dunes correctly, thus if we are able to provide some management towards them i.e. paths and fencing we can minimize man-made damage or harm" (15-R-NB)

"Given the proximity to residential housing, it would make sense for the dunes to be appropriately managed" (14-NR-NB)

Highlighting another issue, one long term resident stated the following

"Management is Not Appropriate on private property that is dune. But provision of resources for owners to self-manage is the best approach. People who live in the dunes are passionate about dune health and often do a more consistent job of managing their small area than others. Yes on public/reserve land. Good path and access ways keeps walkers to a defined area" (33-R-NB)

When asked if they have noticed any changes in the New Brighton area the participants gave mixed responses of negative and positive impacts on the area. Out of 34 responses for this question 14 (41%) stated that they witnessed no significant to no change in the area. Of these 14, five have lived in the area for 1-5 years or more, two have lived in the area for less than one year while seven do not live in the area. Overall, the answers to this question varied with common themes including infrastructure, the newly built hot pools, dune accretions and vegetation. Table 4.1 illustrates some statements made by participants. One respondent very passionately stated "people need to grow up and come to terms with the fact that the environment changes" (9-R-NB). This comment provided a different perspective to most of the other responses. People who live in the area provided the following comments:

"Lived here over 35 years. Less shops. Less perverts. More rubbish. Same level of community participation. Too much lupin growing and not enough natives" (21-R-NB)

"I have lived here for 17 years and use the beach regularly. The dunes have accreted over that time especially at North Beach and we notice the tideline is further out than it used to be. We still get the King tides but overall, the tideline is further out and the dunes are much deeper from the sea to the road by several metres. We love this. We wonder if we had uplift during the earthquake because the tide being further out has occurred since then" (10-R-NB)

"Good to see development. We can be adaptive and live alongside the dunes Disappointing that CCC do not recognise that buildings by the sea require different solutions than town. They need to better consider wind and sand movement. The maintenance budget for coastal buildings needs to be more than non-coastal areas. The maintenance budget for the pools is pitiful and will soon see the building becoming shabby. Unbelievable that the hot pool site did not have an outside tap that allowed them to rinse salt off their buildings regularly. Very short sited. No very coastally aware" (33-R-NB)

"Since living in NB the dunes have been accreting but have been artificially changed in certain areas" (11-R-NB)

The following comment made by a resident, shows a different outlook on the changes they have noticed:

"…There are also a lot more visitors who are coming to fish, particularly at the end of the spit. I see a lot more families coming to harvest tuatua and pipi, fishing for crabs and long lining. The increased number of people collecting shellfish has upset a lot of locals as there seems to be more and more of this happening on a daily basis. …" (13-R-NB)

Although, this community member does not reside in New Brighton, they provided the following comment on changes to the area:

"It has become a less popular beach and it seems there has been less of an importance on maintaining the beach/dunes as more people have moved away from New Brighton since the earthquakes" (5-NR-NB).

4.1.3 Community wellbeing

What is the most important community wellbeing?

Participants were asked to rank the most important wellbeing value (1) to their least important (4), with results of this displayed in Figure 4.3. they were then asked to explain their reasoning for their most important selection.
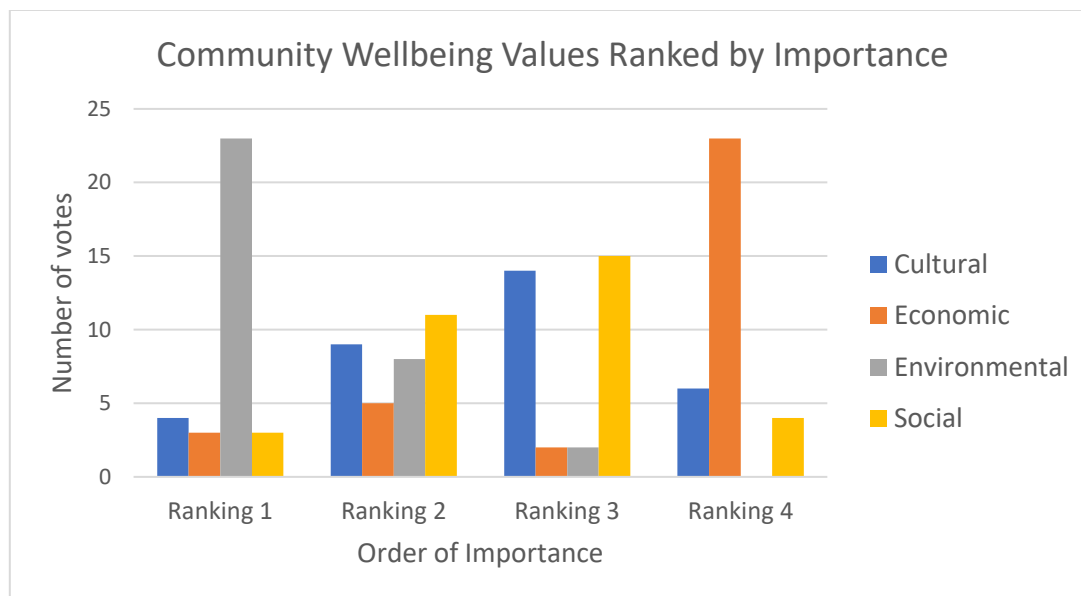
Figure 4.3: The four community wellbeings (cultural economic, environmental and social) ranked in order of importance to the participants

23 (69%) of participants selected environmental value as their most important and had similar responses as to why. A common theme in their responses was the reliance humans have on the environment, and thus should be putting the environmental wellbeing at the forefront of agendas, policy, and management. Similarly, 23 (69%) of participants selected the economic wellbeing as their least important. The cultural and social wellbeing rankings are similar across the ranking scale, with majority of participants divided between placing them in rankings two or three.

One respondent commented:

"…Our lives are small compared to the lifetime of the environment. A dune system is just one part of a coastal environment, but it can play a key role ensuring the sustainability of an environment …." (31-NR-NB)

And introduced a Māori proverb highlighting the importance of the environment:

"A Māori proverb goes 'Toitu te marae a Tane, toitu te marae a Tangaroa, toitu te Tangata' which means 'if the land is well and the sea is well, the people will thrive'… people and communities thrive in all areas of wellbeing, but it must start with the environment." (31-NR-NB)

The four (12% of) participants who selected cultural value as their most important related it back to bicultural societies and Māori importance for the area. A respondent provided the following comment as to why cultural wellbeing was the most important to them:

"Because in our bicultural society I believe that protecting and preserving Māori whenua and tikanga is very important" (5-NR-NB)

Three participants selected social wellbeing as their most important value, associating the dune system with a good, peaceful place, 'to catch up with friends', 'creates a safe, calming space',

"The ability to socialise around the dune systems with friends and family are very important to me" (20-R-NB)

Lastly, the three participants who value economic wellbeing as the most important focused on coastal protection and that without economic wellbeing at the forefront of agendas, people's social and cultural wellbeing will be negatively affected. One participant provided the following statement:

"They must feel they are ok to be there. Not to feel like an imposter. A sense of belonging and social cohesion promotes wellbeing and resilience. This gives residents the emotional head space to be involved in community initiatives Southshore is an example- has won awards for its dune restoration. If communities are fighting for Economic survival they have no time or energy to devote to the environment" (33-R-NB)

How do the four wellbeing's relate to you in regard to the dune system

When asked how the four wellbeings relate to you in regards to the dune system, the respondent were given the four wellbeings to answer the question separately.

Cultural wellbeing

Of the 40 participants, 20 responses were taken for the cultural wellbeing. Figure 4.4 represents the mindset of the participants, illustrating key words that were mentioned. The term Māori was mentioned six times closely followed by historical significance.

Figure 4.4: Key words taken from the community questionnaire related to the association between cultural wellbeing and the dune system

Economic wellbeing

24 responses were taken for the association between economic wellbeing and the dune system. Figure 4.5 illustrates three common categories from the responses: protection of infrastructure, tourism, and management. Interestingly, many are opposed to the management of the dunes due to the cost being put onto them due to a perception that the cost is paid for by the residents.

Protection of infrastructure refers to both business and residential property, roading and drainage systems. The protection not only refers to sea level rise but also the protection from the dune system itself, for example, sand blowing into residential properties.
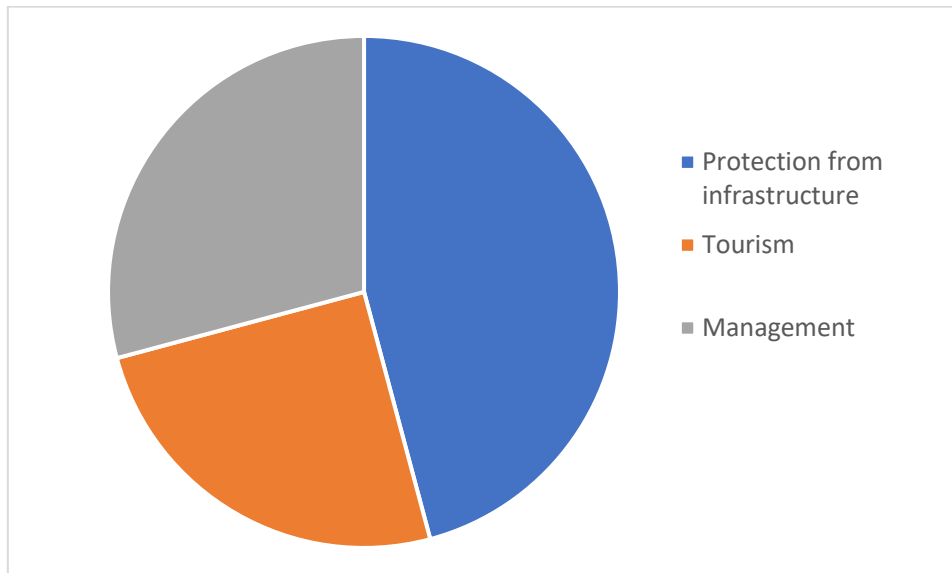
Figure 4.5: The association respondents have between economic wellbeing and the dune system categorised into three themes

Some of the comments made by respondents are provided below:

"Protection of properties and infrastructure such as roads and drainage" (34-R-NB)

"Protects from coastal flooding damage" (25-NR-NB)

"Look after our dunes, less money towards maintenance. Potentially having people come to view the beautifully maintained beaches and dunes" (15-R-NB)

"It would attract people to beach areas which would support local businesses" (3-NR-NB)

Environmental wellbeing

25 respondents commented on the association between environmental wellbeing and the dune system. The responses were categorised into three common themes: biodiversity, management/sustainability, and climate change, as displayed in Figure 4.6. Management and sustainability had a total of 15 comments (56%) within this category.
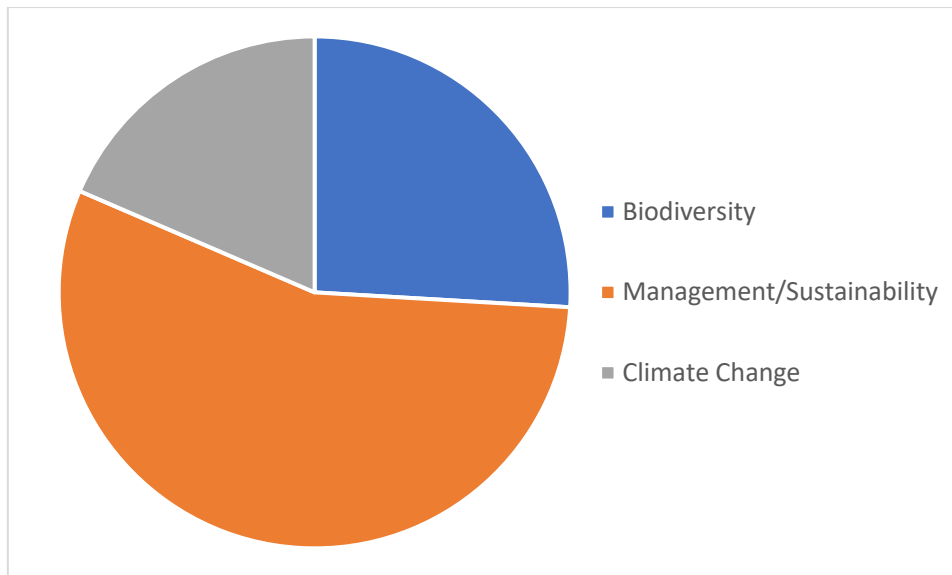
Figure 4.6: The association respondents have between environmental wellbeing and the dune system categorised into three themes

Some responses from this question are listed below:

"Ensuring that the land is safe from coastal erosion and that native wildlife and plants are thriving" (5-NR-NB)

"The dunes are a vital part of our local ecosystems and are important for maintaining the biodiversity and shelter needed for our native species to survive" (29-NR-NB)

Planting to keep the dunes in place and support the ecosystems (31- NR-NB)

Social wellbeing

21 respondents gave a response for their association between the social wellbeing and the dune system. The social wellbeing responses were categorised into two themes: Community and activities/events/recreation. Eight responses were categorised into 'community' while 12 responses were categorised into 'activities/events/recreation'. Table 4.1 displays the two categories and some responses shared.

Table 4.1: Responses for the association between social wellbeing and the dune system, categorised into two themes (community and activities/events/recreation)

Community	Activities/events/recreation
Community happiness from amenities (31-NR-NB)	*Hanging out with mates, group activities/events (29-NR-NB)*
Community members coming together to improve the dune (15-R-NB)	*Being able to spend time with family and friends here (19-R-NB)*
The dunes being an iconic part of the New Brighton community (14-R-NB)	*Walking, swimming, picnicking with friends and whanau (8-R-NB)*

4.1.4. Community engagement

Positive or negative experiences with council/policymakers, scientist and community representatives

The participants were asked to talk about any positive or negative experience they have had with council/policymakers, scientists, and community representatives. Figure 4.7 categories the types of experiences (positive, negative or no experience) within the different groups.
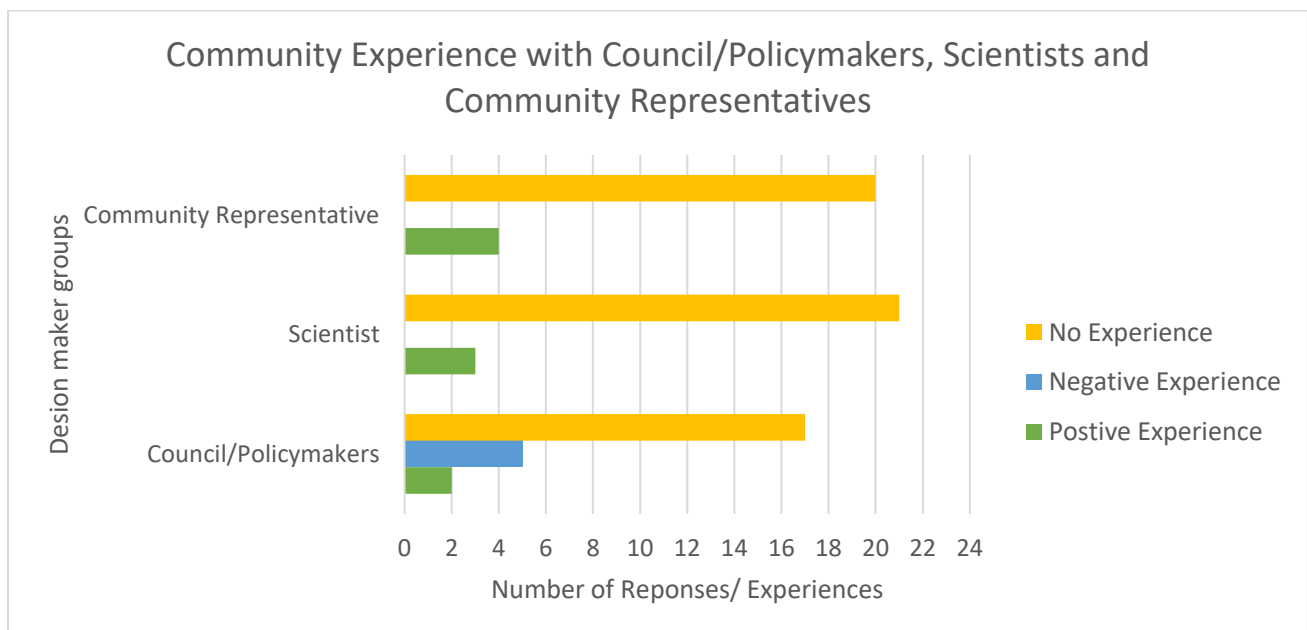
Figure 4.7: Experiences the community have had with council/policymakers, scientist and community representatives

Of the 24 responses for this question, the majority (17, 70%) had no experience with any of the groups. The remaining seven responses gave reviews on multiple groups, or experiences with a mixed response of positive and negative (each interaction with a group is illustrated in Figure 4.9):

"Scientists - good. they all have interesting solutions Policy makers/lawyers/engineers - good, they all have interesting solutions CCC - not so good. They don't seem to have a plan. ECan - mixed. For all of local Government, after the debacle of the Regenerate Plan which many residents were excited about and in a lot of energy there needs to be some enthusiasm and hope injected into the community residents' associations and homeowner associations - good - see below. NGOs - brilliant - THANK GOODNESS all the little projects exist, bringing people together, organising events. Fantastic community stuff" (35-R-NB)

Common themes included the amount of work the Residents Association of New Brighton and Southshore have achieved over the last few years. Many made remarks that although they have done so much, that they should not have to if the Council (namely the CCC) had looked after the area and to quote many, 'done their job'. Participants stated that they feel they have received terrible communication from CCC, with the following statement reflecting a common theme in multiple responses:

"Consultation after consultation after consultation then nothing. These organisations such as CCC and ECan ask for our input then completely ignore it. We have got to the stage where we can't be bothered engaging anymore" (10-R-NB)

In contrast to the negativity towards the council, one respondent provided the following comment:

"CCC staff in the past have been great at explaining changes in our area" (-19-R-NB)

Two participants commented on excellent help and communication from CCC park rangers stating:

'park rangers were readily available to help and give knowledge on the local area' (*27*-NR-NB)

It would appear that the investment in public friendly park rangers is potentially worthwhile from a community perspective.

4.1.5 Science communication

Should wellbeing values play a role in the communication of dune science?

Many participants when answering the question of 'what role if any should wellbeing play in the communication of dune science' shared frustration from past communication. The majority of responses gave similar remarks that all the values should play an important role as they establish clear categories and are inclusive of the different values and perspectives people hold. Below are some direct quotes taken from participants responses:

"I believe all values play a part, it could be said that they all interrelate in order to maintain the dune environment short and long term" (15R-NB)

"They should probably be the backbone of any communication of dune science back to the community. For example, if some piece of information is getting relayed to, or discussed with, the community, they should also know what value this information relates to and why" (14-NR-NB)

"I think they should play a huge role because the reason for everything that people do is based off of values. I believe that each of the areas of wellbeing in relation to dune management should be presented in community meetings to provide holistic reasoning around the management of dunes. Also, because everyone will prioritise the different wellbeing areas differently, including all of them will help to reach the widest amount of people" (5-NR-NB)

One resident of New Brighton interestingly shared a similar idea to author Murphy (2010), that the economic wellbeing is often being at the forefront of decision-making:

"More often than not, the economics of decision making plays a dominant role rather than the inclusion of other important and valued perspectives. It is important to change the narrative of the importance of the sand dunes and other important features of coastal living to not marginalise coastal communities. There is currently, in terms of communication in the media, a lot of negative stigma, misconception, stereotyping, blaming and climate shaming of coastal communities…" (35R-NB).

It is evident from these quote extracts that the community have a high regard for community wellbeing having a role in science communication. Therefore, it would be a worthwhile use of time for the CCC to gain the perspectives from the wider Christchurch area on community wellbeing.

Science communication methods or information that would work for New Brighton
When asked what methods of engagement the participant would want to receive, a number of methods were mentioned, with very few responses providing the same method. When categorised into key themes Social Media/online presence was found to be the most common with 37%. Social media/online presence refers to all social media platforms, email, and websites. Six (29%) participants stated they want to see more education within schools for children through basic YouTube videos and workshops with community groups. These results are displayed in Figure 4.8.

These results show similar communication methods to the information presented by the MfE on types of activities or event for public participation (refer to Figure 2.6).
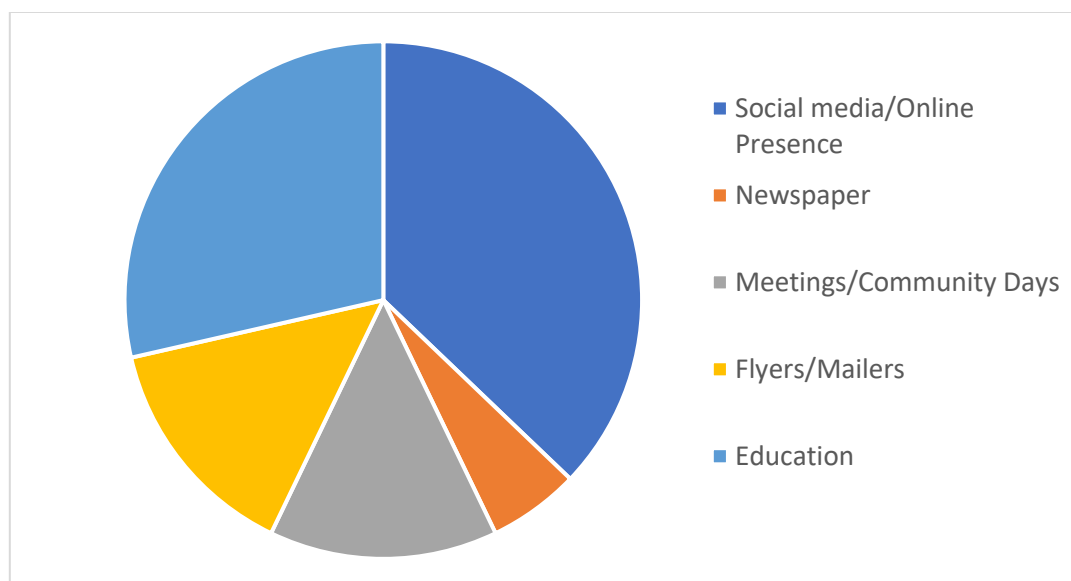
Figure 4.8: Methods of science communication categorised from the community questionnaire

Table 4.2 lists these types of science communication methods related to dune science, that the community would wish to see with examples and ideas from the questionnaire responses.

Table 4.2: Methods of science communication the community want to see, put into categories and examples

Category of Communication	Example/ Ideas
Education	Workshops with community with community groups
	Short interactive Youtube videos on coastal information and reports
	Signs in the coastal environment with different vegetation, cultural significance ect
	School curriculum to focus on local events and issues
Meetings/ Community Days	Activities i.e. clean ups, surveys, workshops, community day out with council, scientist attending
	Regular meetings with updates and all information shared
	Outreach programmes
	Active community engagement and consultation on all reports and science involved with
Flyers and Mailers	Posters
	Mail - pamphlets/ newsletter/ Newspaper

	Community board with updated information close to popular beach access points
Social Media/ Online Presence	Provide links to educational videos, reports and meetings
	Create Polls on topics to get a quick understanding of importance. Polls for meeting times to get the most people attending
	Email
	Updates on key Facebook pages of scholarly and local articles, local representatives, current/ ongoing research in the area

Figure 4.9 links the age brackets and the types of communication methods stated within the questionnaire. The results of this, illustrating a high preference for social media/online information, is reflective of society today (McKenzie, 2013), with this predominant preference from the age bracket 18-24 (10 responses). Interestingly, those most likely to have children in their care (age 25-44) had no mention of education in either schools or in the dune system. However, this age bracket had six participants out of 40. Thus, this may not be a reflective perspective for this age bracket.
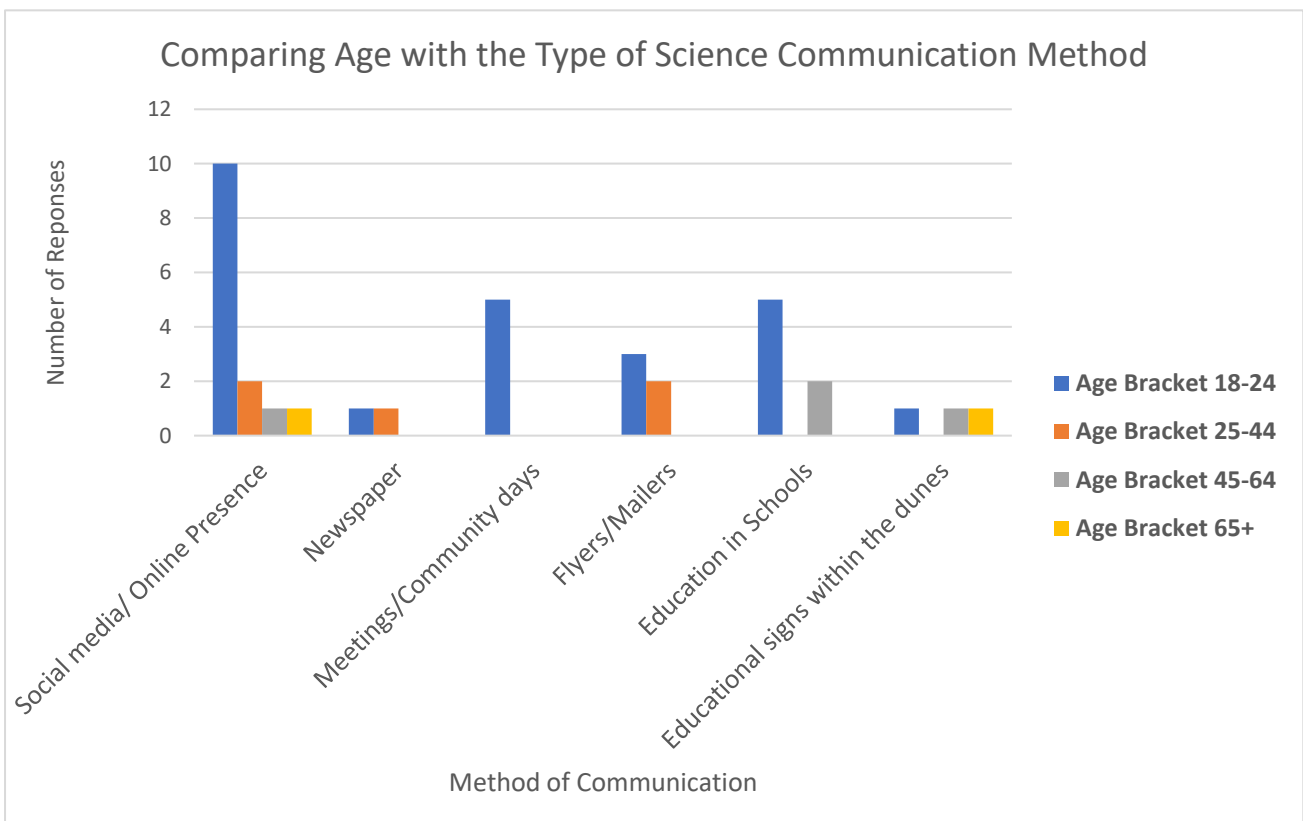
Figure 4.9: A comparison of age groups and the types of science communication methods selected by participants

4.1.6 Other thoughts

Lastly, the respondents were asked 'Is there anything else that they would like to tell me in relation to the New Brighton dune system, dune/coastal science communication, and/or community engagement?' 17 people answered this question, with the majority (10, 58%) answering with a simple 'No or N/A', while others (4) gave positive comments on the research and myself. Two stated the following comments, giving an overall feeling that they are tired of the ongoing issues:

"No. Just please listen to the people who live it every day" (10-R-NB)

"No to many questions not enough listening from council. Just tired of nothing happening" (40-R-NB)

A contrasting comment by a long-term resident of more than 15 years, stated the following:

"We should move more away from the coast" (9-R- NB)

4.2 Literature Review

The following section reports on the findings of the literature review into science communication method and discusses these in light of the questionnaire results.

4.2.1 Science communication methods

Horita et al. (2010, p.46) presented the following table of communication techniques for urban planning, specifically road planning:

Table 4.3: Communication techniques for road planning constructed on citizen engagement (Horita et al., 2009, p.46)

Purpose	Technique
Preliminary understanding of situations	Key-person interview
	Stakeholder analysis survey
Opinion survey	Questionnaire survey
	Group interview
	Focus group survey
Promotion for participation	Event (symposium, on-site observation meeting, fair)
	Mailing list
	Corporate identity formulation
Official and unofficial dialogue	Briefing
	Open hearing
Unofficial dialogue	Open house
	Workshop
	Taskforce
	Briefing
Dissemination, understanding of opinions	Public relations documents (brochures, fact sheets, public relation papers)
	FAX, hotlines, comment cards
	Website
	Media (TV, radio, newspapers)
	Information center

These results of communication methods, although specific to urban planning, can be used and compared to other techniques of communication and public engagement in diverse subject areas. Some communication techniques found within the Horita et al. (2009) research includes public relation documents, mailing lists, questionnaire survey, websites, and media, which were also methods of communication presented in the findings from the community questionnaire.

Author Bultitude (2010) presents a list of advantages and disadvantages of direct communication and communication through media channels, listed in Table 4.4. The results from here are important as the method of communication will be dependent of the audience and what type of science is being communicated. Bultitude (2010) refers to direct communication as public lectures, workshops, science fairs and science theatres. The current findings indicate that social media/online presence is much more preferred to direct methods of communication. Using both techniques will allow for the weaknesses to offset each other (Leavy, 2017).

Table 4.4: Comparative advantages and disadvantages between direct communication and media channels (Bultitude, 2010, p. 129)

Direct (live) communication		Media communication	
Pros	*Cons*	*Pros*	*Cons*
Audience personally meet a scientist	Small audience size	Reach a large potential audience	Scientist no longer has control over what is delivered
Scientist has control of content	Resources (time, money) intensive; low sustainability	Opinions formers/decision makers likely to be in the audience	Limited focus, both in time and subject matter
Two-way communication is possible	Often preaching to the converted	Different media have different audience profiles so targeting is possible	Generally one-way communication

Authors Hook and Brake (2010) reflect on science in popular culture specifically social media and social networking. They conclude by stating that social networking and social media within popular culture, if properly used, can bridge the gap between science and culture. The authors state the following as final comment, to describe the effectiveness of this communication method:

"Popular culture can be one of the most effective tools within the science communicators' toolbox; however, if ignored it can also be one of the most dangerous pitfalls" (Hook & Brake, 2010, p. 48)

Table 4.5 displays the methods of gaining an understanding of community values, by the MfE. These four categories, although showing similar results to the responses from the community questionnaire, also have a focus on evaluating current documents. Integrating all four categories will create a balanced and broad method of communication to meet the multiple needs of the community.

Table 4.5 Four categories of methods that can be applied to gain an understanding of community values (Ministry for the Environment, 2017, pp. 167-168)

Methods	Description
Interrogate existing documents	Explore and examine what values are already documented, e.g. iwi/hapū management plans, iwi/hapū natural resource management plans, community outcome documentation, surveys, reports. **Advantages**: Scoping existing knowledge around values and conflicts avoids repeating questions and provides context for future engagement. **Disadvantages**: Things change and will need to be verified through subsequent methods.
Surveys	Postal, internet-based or telephone surveys can be undertaken to ask participants about their values, what they value and their objectives for addressing coastal hazards and climate change impacts. **Advantages**: Can obtain information from a large number of participants at a wide scale (eg, regional); raise awareness of the issues; obtain input from a range of participants. Low cost. Identify key issues that are critical at a regional scale. **Disadvantages**: Low levels of detail on specifics (superficial data), response rates can be low and represent particular demographics, little opportunity for learning, discussion or interactions. Risks missing key information.
Key informant interviews	Interviews with key groups and individuals in the community (iwi and stakeholders). **Advantages**: Obtains a good level of detailed information on relevant topics. Obtains views of those who are not comfortable contributing in other forums. **Disadvantages**: Interviewing key individuals who represent the different groups is essential. May miss sections of the community. No opportunity for participants to listen to or learn from other participants or groups.

Meetings and Hui	Public meetings, hui or other events (eg, open days, field days) can be organised to discuss the issues. **Advantages**: Can apply a number of participatory data collection methods in this setting. Suited to the local scale, listening and learning can be built in. **Disadvantages**: May miss sections of the community who cannot attend. Careful organisation of the event (timing and the way the event is held) will be required to ensure balanced dialogue

The combination of direct and indirect communication methods would work well for the diverse community of New Brighton. A number of questionnaire respondents expressed their annoyance to the continuous surveys being pushed out with nothing coming of them. The CCC therefore, could take this into consideration when communicating with the New Brighton community, as it could result in disengagement from the community.

4.2.2 The Coastal Hazard Adaption Planning programme

The Coastal hazards Adaption Planning programme is a community-led adaptation programme to aid in managing risk to sea level rise in the next 100 years (Christchurch City Council [CCC], n.d.-a). The intention of the programme is to identify possible pathways communities can take with options and triggers as to when these will be implemented (CCCC, n.d.-a). This process follows the Coastal Hazards and Climate Change Guidance for Local Government. The Coastal Hazard Adaptation Planning programme has three phases: Programme establishment, City-wide awareness and education, and Adaptation planning with communities (CCC, n.d.-a). Currently, Phase one has been underway for approximately nine months, with Phase two prepared to start in the second quarter of 2021 (CCC, n.d.-a). The options assessment framework is a decision-making framework which will be put out for community consultation at the same time as coastal hazards data is made public. The idea behind this framework is to explain the decision-making process to the communities including policy principles and the criteria used for decisions made by the Coastal Panels in an attempt to engage the whole district. The Coastal Hazards Working Group is made up from elected members from the CCC (all elected members representing coastal wards are in the group), two ECan representatives and two representatives from Ngāi Tahu.

A vital component of this programme is understanding the diversity of communities. The CCC state within their overview of Phase Three that 'Adaption planning with communities better recognises

the diversity of communities and the different approaches that may best suit each community.' (CCC, n.d.-a, our adaption planning programme – phase three). This acknowledgement of diversity in communities will allow for local knowledge and suitable planning and adaption methods for specific areas.

From this literature review on science communication methods, it is apparent that there are many different methods and techniques when communicating to the public. However, no method will work if the community it is presented to, do not want, understand, or accept the method. Thus, working with specific communities through consultation and meaningful engagement, will aid in finding the correct or best fit approaches to science communication. The Coastal Hazard Adaptation Planning programme is a significant step towards facilitating meaningful engagement.

4.3 Council and Community Representative Interview Responses

Due to the time of year this research was conducted over (November to February), only three interviews took place with community representatives and council members associated with the Coastal Hazards Adaptation Planning programme. This was due to potential interviewees being on holiday, slow reply to emails and email issues with the University postgraduate email system updating. The participants included two community representatives and two council members (the latter being interviewed together). This section is divided into four parts, based four key questions asked to the community representatives. Additionally, the information provided by council members is used to show comparisons of ideas and thoughts on community engagement and science communication.

4.3.1 What do you think the community think of in terms of community wellbeing?

The community representatives became very emotional when answering this question. To them the idea of wellbeing in their community is significantly important after the trauma and on-going issues they have faced. Below are some quote extracts from responses:

"I've seen the lack of wellbeing and I've dealt with it for the people, I've fought for peoples wellbeing" (Community Representative [CR1])

"Wellbeing is telling true stories and working together" (CR1)

Wellbeing is a big part of a community, specifically for New Brighton, as it has a specific lifestyle unique to the area. One interviewee expressed the following:

"There's a lot of miscommunication out there, it doesn't take much to break the trust and the big thing about wellbeing is there's got to be trust" (CR2)

The wellbeing of children is an important concern mentioned by the community representatives. To quote:

"There's a fine line there, because some talk you hear, and everyone has different opinions, will be quite scary for kids" (CR1)

There is a need for a trust-based relationship between community and council in order for the children to engage and learn from them. One community representative mentioned that they do not believe the New Brighton community would let their children listen to the council as it is incorrect information. In contrast, the interviewee said some community members may not be educated enough to be able to teach a challenging subject of climate change and their local area to their children. This in turn provides miscommunication and multiple theories and ideas that are most likely inaccurate.

4.3.2 What would you want to see moving forward?

Interviewees were asked what they want from council, experts and policy makers for future community engagement and science communication. Multiple responses were made whereby the community representatives believe that the community can no longer trust the council 'so why bother tyring' (CR). The community representatives and members of the community argue that they are never heard, do not have a say in decision-making and distrust the council. A common comment being that the council treat people purely as statistics and percentages. One response from a community representative is provided below:

"I'd plead with council saying homes and families are not just a dot or shading on a map" (CR1)

One interviewee continued by stating that the way the council have previously put out information was shocking. The sand report for example, was not told to the community. One interviewee elaborated and stated that the community hear bad news of erosion and sea level rise time and time again, however the sand budget report showed the opposite of what had previously been said. Despite this, in the community meeting, this report was not mentioned, even though it would have lifted everyone's spirits and started building a foundation of trust.

Moving forward, the community representatives want all information on New Brighton (good or bad) to be shared at a public meeting and advertised through social media accounts and newspapers. For them, this is where the community can voice what they believe is the right action and have a conversation with council about what should happen next before plans are made. One interviewee mentioned they were sick of council coming in with plans and information that the community had to accept and take on board without any consultation:

"There [council] plans do not work in New Brighton because no one cares anymore, people are sick of being told what to do when the community themselves have ideas and methods which are working" (CR2)

The implementation of the Coastal Hazards Adaptation Planning programme is a step forward towards creating meaningful engagement with the community. However, the community representatives are apprehensive about the level of engagement stated within the programme in light of the previous engagement and interaction had.

The community representatives want open conversations with council and decision-makers and to be listened to, heard and thought of as people. In contrast, the council are working hard towards building a relationship with communities through the Coastal Hazards Adaption Planning programme. However, they are aware that they can never make everyone happy within the community but can try to hear and encompass various perspectives where possible.

4.3.3 What methods of science communication would suit, or do the community of New Brighton want from the Christchurch City Council?

A common answer from interviewees when asked 'how do you think the community want science communicated' was:

"How do you educate people where there is no evidence… to the point where the community are seeing the opposite of what they are being told" (CR1)

Furthermore, a common understanding shared amongst community representatives was new infrastructure (namely the hot pools) have been built, thus the community believe that the area cannot be or will not have issues in the foreseeable future. Figure 4.10 illustrates the location of the newly built He Puna Taimoana - New Brighton hot pools, adjacent to the beach. The New Brighton Hot Pools Coastal Hazard Assessment (2018) deemed it impractical, both financially and practically,

to design a 100-year time frame coastal hazard assessment (Todd, 2018). This is due to the uncertainties of sea level rise and implications of this. Thus, a 50-year effective life development plan was adopted to identify the coastal hazards for this project (Todd, 2018).

Figure 4.10: He Puna Taimoana – New Brighton hot pools. Photo taken 4/02/21, 10:14 (tide: 1.94), high tide at 10:54 (1.97m) (Surf-Forecast, 2021)

4.3.4 Do you think in the future there should be more connection between the council and community?

Lastly, the interviewees were asked if they thought there should be more connection between council and the community. Whilst the community representatives stated that the distrust was already gone between the two parties (community and councils), they do believe the relationship could be repaired. One community representative believes it will be hard to change the perception of the council that the community hold. Furthermore, the interviewees mentioned that the next few months would be critical to gain back the trust of the community.

Another representative mentioned that the community themselves could have done better in how they face the council. Many of the interactions between council and community become heated as emotions rise. The majority of the interviewees stated the emotional toll 'facing' each other has had on them personally and as a community, with the following message mentioned across the interviews:

"Its hard to get people to understand when there only thinking with emotion" (CR)

5. Discussion

This section discusses the implications of the results addressing the research questions as outlined in Section 1.4 and reflected in this chapter's structure. Results from the primary research methods (questionnaire and expert interviews) are compared with a literature review of science communication techniques to identify key values of the dune system held by the community and preferred science communication methods by local residents and visitors alike.

5.1 How does the community value the dunes in relation to the four community well-beings?

5.1.1 Community wellbeing

It is evident that the New Brighton residents hold strong values for community and the wellbeing of people. This comes across through ongoing battles with local and central government regarding post-earthquake matters, environmental management styles and worries about insurance over the next 20 years. According to a community representative there is roughly 100 community groups within the New Brighton area from homeowner associations to life saving clubs to book clubs. This demonstrates one of the many ways the residents gather and connect to create the community. Regarding the dune system, the community hold significant value in the four community wellbeings (cultural, economic, environmental, and social). In particular, the environmental wellbeing, as apparent in the Chapter 4 responses to the questionnaire. The New Brighton community are also a passionate group, as evidenced across their multitude of Facebook groups, their activism for their area, and comments made in the questionnaire and interviews. Key representatives have provided a voice and a spokesperson for the community, someone to go to when there is doubt and distrust towards government officials in the community. Seeing the community go through so much trauma from the earthquakes to the Mosque shootings, Covid-19 and now insurance threats, members of the community state, "they fight because they see the effect these issues have on the community" (CR01, January 2021).

5.1.2 Cultural wellbeing

The community have a high regard for cultural values, specifically those associated with Māori culture. This finding was prevalent across the community questionnaire and interviews. The coastal environment provides a source of kaimoana for the community and holds spiritual values. Sand dunes in New Zealand were once used as living areas, burial grounds, and dump sites (Waikato Regional Council, n.d). Understanding the cultural aspects of the dune system creates connections

between people, land, and ancestors, which in turn, fosters people to be more respectful to the environment. Commonly, this wellbeing value is not considered when regarding the community wellbeing. However, as a multicultural society, it would be a disservice not to value the cultural wellbeing of the communities in decision-making and future planning.

5.1.3 Economic wellbeing

A key concern that was apparent in the questionnaire results was the public money spent on the management of the dunes and the private cost of property insurance. Economic value will almost always be at the forefront of decision-making for both the community, who require money, and the council, who must adhere to a district budget. In contrast, the questionnaire results show that the economic wellbeing, is for most, the least important community wellbeing. However, with the concern of insurance issues within the next 20 years (CR1), it is human nature to shift values, often resulting in the environment being pushed aside or neglected by the residents when decisions need to be made.

5.1.4 Environmental wellbeing

The New Brighton residents are passionate about the health of the dunes due to the close proximity their home is to them. With the beach on one side and the estuary on the other, the residents of New Brighton choose a lifestyle of living with nature. The community value the native plants and wildlife that the coastal environment has to offer and the atmosphere it brings. However, historically, the native plants were removed for the recontouring of the dunes (Manaaki Whenua Landcare Research, n.d). Introduced plants such as marram grass and tree lupin were extensively planted to aid in stabilising the dune. In recent years, native species such as spinifex and pīngao have been reintroduced (Manaaki Whenua Landcare Research, n.d), enhancing the natural characteristics of the New Brighton coastal environment.

 A key concept that was evident across the questionnaire and through the interviews was the natural coastal protection the dunes offer. Due to the previous urban development and encroachment in the coastal environment, the dunes have less space to recover. With rising sea levels and climate change, communities are becoming aware of the possibilities they could face in the next 20 years (CR1, 2021), with increased storminess leading to less time for the coastal system to recover (Rouse et al., 2017; Tonkin & Taylor, 2015). Thus, the importance of sustaining the environment has been a key concern for communities and council over the last decade.

One resident of New Brighton regarded the dunes as private property to the residents, which they believe should not be managed by the council. However, this becomes an issue when left to the community, as it is a public access area, to not only the residents but the wider Christchurch community and tourists. Due to the extent of human interaction in the New Brighton dune system, if there was a lack of appropriate management then the dune system could become degraded. Some members of the community value the management of the dune system achieved by the CCC. The boardwalk through certain areas of the New Brighton dune system aids those with mobility issues and keeps pedestrians out of the vegetated areas, enhancing the natural characteristics of the environment (Silvia et al., 2016; Roig et al., 2009). A common response mentioned by community representatives and in the questionnaire was that the upkeep of management in the dunes was lacking. To elaborate, accessways with wooden steps or planks have been buried by sand. This creates issues for those with mobility concerns and those with pushchairs.

5.1.5 Social wellbeing

The coastal environment as previously stated by Gesler (1996, p. 96) is a 'therapeutic landscape'. This notion of the coastal environment summarises the comments made by the community of New Brighton and their view on the societal aspects of the dune system. Place as defined by Cresswell (2014) is a 'meaningful location' taken from Agnew's work on place in 1987. The sense of place creates a strong essence of belonging and is conducive to Gesler's notion of a 'therapeutic landscape'. The coastal environment creates exposure to green-blue space, which has been linked to positive mental health outcomes (Grellier, 2017; Gascon et al., 2015). One respondent stated "… I value the coastal environment for its scale and the feeling of escapism it brings" (31-R-NB). A common theme from the questionnaire regarding the social wellbeing, was the interaction between friends, family and community. Roberts et al. (2015) presented findings that resulted in a stronger connection to sense of place when with others in the natural environment.

Overall, through the results of the questionnaire, the four wellbeings have a different level of importance, with the environmental wellbeing being at the forefront for most people. However, most respondents gave elaborate answers to the association of the four wellbeings regarding the dune system. From this, an understanding can be made that although the environmental wellbeing is at the upmost importance for the majority of people in this study, cultural, economic and social wellbeing's are also important to the community. Therefore, it will be vital to include all components of community wellbeing in decision making, to ensure all perspectives and values are

heard and integrated. People will have different immediate responses and priorities than in the future on climate change and sea level rise issues. Although can be considered timely, combining scenarios from each wellbeing will give an all-encompassing set of possibilities for future decision-making (National Research Council, 1992), without neglecting any wellbeing.

5.2 How can council and community communicate together about the dune system state in ways which meet both council and community needs?

Coastal environments require frequent communication and adaption to decision making due to the uncertainty of sea level rise and hazard risk (MfE, 2017). Communication with the public, is challenging in any sphere, however on topics like sea level rise and climate change that have high uncertainties and frequent changes in technical assessments (Oppenheimeret al., 2019), emotions become overwhelming.

Blanchette and Richards (2004) provided a study whereby two experiments were carried out to determine if people reason differently when emotional. They concluded that emotions do influence the way people think logically. Furthermore, academics Jung et al. (2014) identified through a literature review that when people are emotional it will have a negative effect on their logical reasoning. Thus, in an often confrontational meeting about climate change adaption, both the community and the council involved, must understand the position of each party. One method to mitigate this confrontation could be for the CCC to be more active in the New Brighton community to build a foundation to the relationship. This will aid in understanding the communities perspective and lifestyle choices, while in a calm, non-confrontational environment.

5.2.1 Science communication

Individuals within a community have different preferences on the methods of science communication, also the information they want to receive. The council follow guidelines for community engagement, use research-based evidence to come up with plans and have projects that require detailed planning in short time frames. To the community this comes across as though the council are apathetic and consider the community as numbers and statistics (CR). With this in mind, both parties should be aware of the difficulty communication on community scale issues presents, and thus, need to take this into account and work on some processes that might enable each group to understand the aims and needs of each other.

Past and current issues with science communication

A lack of communication can be devasting to the trust and future engagement. Members of the New Brighton community have stated their distrust for the local council due to lack of information on issues and more recently the lack of communication on positive findings. For instance, the 'Coastal sand budget for Southern Pegasus Bay' was said to not have been mentioned at a public meeting, although the talk was about erosion rates and flooding issues (Community Representative, 2021). The community heard this information through a grapevine affect from a source involved and expected the results to be mentioned at the meeting. For the community, these findings showed the results that they have been saying for years, stating the New Brighton beach is accreting. One community representative stated that the lack of information on these findings, gave indication that there could be an agenda. In contrast to this, the council, as previously stated are obligated to make any findings public. This was achieved by publishing this budget on the CCC website in June 2018 (see Christchurch City Council, n.d.-b, for the full report).

This miscommunication is often prevalent in interactions between council and community. The community have expectations, of which will change over time. Furthermore, human nature suggests that once an individual is happy or content, they will eventually want more, or become dissatisfied with what they have or are receiving. This becomes difficult when the council need to communicate findings or plans, as what may have worked in the past, may not work now. Successful communication can only occur when both parties can understand the position of the other. With the community values and perspectives constantly evolving, it would be recommended that this be discussed on an annual to bi-annual basis, to encourage positive criticism between the two parties.

Methods of science communication

As a result from the literature review on science communication, it is evident that science can be communicated in a multitude of ways. Thus, categories of science communication methods are required. This is to ensure that the methods used, do not fall within the same category, to reach a wide population. The two main methods of science communication voiced by the New Brighton community include social media/ online presence and education.

Due to the technological advancements and reliance on technology for day-to-day activities, social media and an online presence is becoming a popular resource to communicate. The results show that people in all age groups would like to receive science communication through social media/online presence. This could be achieved through updated Facebook pages, emails or a website designed for the New Brighton community to receive information.

Due to the questionnaire being distributed through an online service, this may have caused a bias in responses, as the participants had access to the internet. However, when in person surveying over two days, the questionnaire had no participants, nor any communication to the surveyor. Thus, any bias in this regard would be exceedingly small.

Education

A common theme through the results, was the community wanting education, whether this be within the dune system using signposting, in schools, or through educational YouTube videos. It is evident that the New Brighton community, want to be informed and educated on topics surrounding climate change and the impacts different effects will have and the coastal environment including the different systems, biodiversity, management of the area and sustainable adaption methods to sea level rise. Furthermore, a desire for educational signage through the dune system was prevalent amongst responses and in interview discussions. These could include biodiversity facts for the area, coastal science, climate change implications and updated sea level rise information. This can not only educate people but could encompass an interactive walk for children to encourage education and healthy living through walking.

5.3 Recommendation for the University of Canterbury (Geography department)

As a tertiary education facility, the University of Canterbury Geography unit, could, as a 400-level assignment, take on educational videos as a science communication method on behalf of the council. This could be achieved by going to the community to gain an understanding of what the community would want to know, of which the students can create a YouTube video to inform the community. Additionally, this provides the students with the ability to help society through education and have experience with real world applications. This science communication method is currently wanted by the New Brighton community and would create a relationship between the community and the University.

6. Limitations

Like any research, limitations arose throughout this research dissertation:

1. Human Ethics application and Māori Consultation - The application for Human Ethics was a protracted not least due to the time of year of the application. Delays due to leave, prevented data collection before the busy holiday period begun. The Māori consultation process, started after Human Ethics approval, was also not possible within the restricted timeframe of the MURR project, since existing relationships could not be drawn upon. This caused an issue when wanting to interview a Māori representative from Ngai Tahu, as gaining permission went through multiple chains of new people. Due to this process, a Māori representative was unable to be interviewed.

2. Time - Due to the time frame of this research, it often felt rushed. Survey responses were predominantly from non-local residents of New Brighton that frequent the beach. A longer period of time would allow for further in-person surveying to occur to get a more diverse and representative perspective from the New Brighton residents.

3. Sample sizes - Due to the time period of December and January, I struggled booking interview times due to people being away or busy. Whilst the interview sample size was restricted to two community representatives and two members of CCC, I do believe I was able to get a good pool of knowledge and a set of additional perspectives on the communication techniques and values associated with New Brighton.

4. Email issues - The University email system was being changed over during the time of research. This often meant that my emails were not being delivered to recipients or I was not receiving emails. This became a problem with application processes including the Health and Safety application.

7. Future Research

Due to this research having a focus on the New Brighton area, it would be beneficial for further research to be done on other dune systems in Christchurch such as Woodend beach. This will give an opportunity to compare values, community engagement and science communication methods between different communities. Additionally, identifying other coastal environments in Canterbury and completing a similar study to identify the key values held by the local community will aid in future decision making and adaption programmes to climate change.

A catalogue of science communication methods can be designed for the Canterbury coastal communities with the advantages and disadvantages of each in relation to the perspectives and preferences of the communities. This will aid future communication to individual communities.

Accessing those under 18 years old, would help provided the voice of future generations. It will be crucial to gain the perspectives of the younger generation as they will be the ones to live in the area in the future. Furthermore, the younger generation often place less thought on political or economic concerns, thus, holding a unique perception on what they value and the solutions they provide.

The Ngai Tahu hold significant value to the coastal environment and as tangata whenua, have a key role in terms of being kaitiakitanga of the area and would provide substantial insight and knowledge on the values for this environment. Furthermore, gaining insight from experts in related fields such as a coastal scientist and a community engagement expert would provide a more inclusive pool of values. Thus, gaining these perspectives will be imperative to ensure all communities within and associated to the New Brighton area are heard.

8. Conclusion

This research focused on creating a better understanding of the values held by the New Brighton community, including residents and beach users, specifically focusing on the dune system. Furthermore, it has provided an understanding of the science communication methods wanted by the New Brighton community that meet both community and council needs and wants. As shown through the analyses completed as part of this research, there is a paucity of examples in literature of integrating all four community wellbeings into decision-making, particularly for coastal environments. This research has sought to highlight this gap in literature and provide evidence from a community perspective of the importance of incorporating all four wellbeings: cultural, economic, environmental and social.

Councils and community members will never see eye to eye on everything, but further efforts to bridge the gap in order to build a meaningful, trustworthy relationship between these two coastal environment stakeholders could aid peoples' understanding of where the different perspectives are coming from. Enhancing government understanding and acknowledging the community members as a diversity of people, as opposed to the necessary but not all-meaning or all-encompassing figures and percentages could, build a foundation for this engagement to thrive on, and make communicating between various parties involved easier. Additionally, as a community, the New Brighton residents, although very passionate, can enhance their understanding and acknowledge the government, experts and scientists, as people with a tough job to complete. In turn this will create healthy communication between all parties involved in coastal hazards and living. This research concludes that through the Coastal Hazards Adaptation Planning programme, meaningful communication between community and council over the next year is crucial to the continual of community engagement.

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10. Appendices

10.1 Appendix One: Community Questionnaire

**New Brighton Community:
Improving Science Communication
for Better Community Engagement**

1. What is your age group? (*select one*)
   - ☐ 18-24
   - ☐ 25-44
   - ☐ 45-64
   - ☐ 65+

2. Do you think the sand dunes are an important part of the beach? (*circle one*)

   Yes   No

3. Explain a bit about your answer to the previous question

   _____

   _____

   _____

   _____

   _____

4. Do you think dune management is important? (e.g., fences, walkways, planting, monitoring) (*circle one*)

   Yes   No

5. Explain a bit about your answer to the previous question

   _____

   _____

   _____

   _____

   _____

6. What changes have you noticed in the dune system since living/visiting the New Brighton area?

   _____

   _____

   _____

   _____

Wellbeing: 4 different kinds of wellbeing are:

Cultural wellbeing: supports individuals and communities through participation in creative/ recreational/ cultural activities, and the freedom to retain/ interpret/ express arts, traditions and heritage.

Economic wellbeing: is present and future financial security, through the ability to make economic choices with a sense of fulfilment at individual/ community levels.

Environmental wellbeing: supports interactions between people and sustainable ecosystems/ environments.

Social wellbeing: is a sense of belonging to a group/ community, including people who communicate together in some way, and who develop meaningful relationships.

7. How do the four wellbeings (defined above) relate to the dune system for you?

   _____

   _____

   _____

   _____

   _____

8. What do you value about the coastal environment?

   _____

   _____

   _____

9. Regards the dune system, write numbers 1 to 4 beside the wellbeing values listed below to indicate which is the most (1) to least (4) important to you.

   _____ Cultural wellbeing value
   _____ Economic wellbeing value
   _____ Environmental wellbeing value
   _____ Social wellbeing value

10. Why have you considered the value labelled 1 most important to you regards the dune system (i.e. please explain a little more about this value)?

   _____

   _____

   _____

   _____

11. In relation to the dune system, what do you associate each wellbeing with?

- Cultural wellbeing:

_____

_____

- Economic wellbeing:

_____

_____

- Environmental wellbeing:

_____

_____

- Social wellbeing:

_____

_____

12. What role, if any, do you think wellbeing (values) should play in the communication of dune science? (e.g., in community meetings about the coast and dune system, in coastal hazard and dune resources produced by councils, in online resources)?

_____

_____

_____

_____

_____

13. What aspects of community engagement in coastal/ dune issues would you like to see, or could be improved?

_____

_____

_____

_____

_____

_____

14. Do you have suggestions for dune and/or coastal science communication methods or information that would work well/ better for you than what you have seen so far?

_____

_____

_____

_____

15. What positive and/or negative experiences with scientists, the councils (CCC, ECan) and community representatives (e.g. residents associations, New Brighton Project) have you had? Explain a bit about this experience and who it was with:

_____

_____

_____

_____

_____

16. Do you live in the New Brighton area? (*circle one*)
Yes   No

17. If yes, how long have you lived in New Brighton?
- ☐ less than 1 year
- ☐ 1 to 5 years
- ☐ 5 to 15 years
- ☐ more than 15 years

18. If no, how long have you been visiting the New Brighton Beach?
- ☐ less than 1 year
- ☐ 1 to 5 years
- ☐ 5 to 15 years
- ☐ more than 15 years

Is there anything else that you would like to tell me in relation to the New Brighton dune system, dune/coastal science communication, and/or community engagement?

_____

_____

_____

_____

_____

Thanks for your time. Once finished, please seal the questionnaire in the envelope provided and hand it back to me, Casey Carass (the researcher).

10.2 Appendix Two: Community Facebook pages and community groups that were emailed or private messaged

Community Facebook Page	Community Groups
The Bridge South Brighton	New Brighton Project
The Southshore Beacon	Surf Community Trust
New Brighton Business and Landowner Association	New Brighton Surf Life Saving Club
Sustain South Brighton	Renew Brighton
The New Brighton Project	The Networkers
New Brighton Community Noticeboard	New Brighton Residents Association
New Brighton Community	
Southshore 8062	

Department: Geography
Email: cca66@uclive.ac.nz
Date: 27/10/2020
HEC Ref: HEC 2020/131

New Brighton Community: Improving Science Communication to Better Community Engagement
Information sheet for participation

Hi, I am Casey Carass, a Master of Urban Renewal and Resilience (MURR) student at the Department of Geography, School of Earth and Environment, University of Canterbury (UC). I wish to invite you to participate in my research, in collaboration with Environment Canterbury (ECan). Your participation in a questionnaire would help me understand the perspectives of the New Brighton and beach goers community about the value of the dune system and about coastal/dune science communication, and, create a method to communicate dune science in a manner that is engaging and useful to your community.

If you agree to fill in my questionnaire it should take roughly 10 minutes to complete, you will find questions about your experiences of the:

- dune system
- of community wellbeing
- of current types of community engagement and science communication methods used by coastal authorities.

If you do not wish to answer the questionnaire just now, there is also an option to complete the questionnaire online using the QR code on the back.

It is possible that discussing the state of our city's dunes, and how this is communicated might give rise to worry or discomfort. If you encounter any form of stress while completing the questionnaire, you can withdraw from it without any penalty, or pressure to continue. You can also get support from Samaritans NZ on 0800 726 666 or Healthline on 0800 611 116, if any stress is experienced

To ensure anonymity, please do not enter any identifying information such as your name or address when filling in the questionnaire. The information collected through the questionnaire will remain anonymous and private between myself and my Supervisor Assoc. Prof. Deirdre Hart.

This project is carried out as part of the requirements of the MURR degree by Casey Carass, under the supervision of Assoc. Prof. Deirdre Hart, who can be contacted at deirdre.hart@canterbury.ac.nz.

This project has been reviewed and approved by the University of Canterbury Human Ethics Committee, and participants should address any complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

If you understand and agree to participate in this study, please proceed to begin the questionnaire. By proceeding, you are acknowledging that your participation is voluntary, you are 18 years of age or older, and that you are aware that you can withdraw at any stage *during completing the questionnaire*, for any reason. If you do not wish to proceed, please simply hand back the clipboard to me.

Thank you for your time and contribution to the research

Casey Carass

FAQ

Can I skip questions?
Yes- simply leave the question blank and move on

What happens after this research?
The summary findings of this research will be published in a Master of Urban Renewal and Resilience report, a copy of which will made public on the UC Library website. There is also the possibility for future peer reviewed publications.

Can I withdraw for the questionnaire?
Your participation is voluntary, and you have the right to opt out at any stage during questionnaire completion.

If you wish to opt out, you may wish to take the uncompleted survey with you, or I can destroy the partially completed paperwork for you if requested.

Withdrawal from the questionnaire is only possible before your full questionnaire is submitted, as all answers are anonymous so, should you change your mind and wish to withdraw later, it would be impossible for me to identify your questionnaire to destroy/disregard.

Where will the data be stored?

Hard copies of the questionnaire will be transcribed onto a secure laptop and then safely kept in a locked office at the University of Canterbury. Electronic copies will be downloaded onto a password protected folder on my secure personal laptop and the UC servers.

Both electronic and hard copies of data will be destroyed after 5 years of project completion

Where can I find more information about coastal science and the state of our dunes and coasts?

- **Christchurch City Council: Coastal Hazard:**
  https://ccc.govt.nz/environment/coast/coastalhazards

- **Christchurch City Council: The Coast:**
  http://resources.ccc.govt.nz/files/cityleisure/parkswalkways/popularparks/factsheetthecoast-christchurchbeaches.pdf
- **ECan Spectacular Coast- Coastal Dunes:** api.ecan.govt.nz

Online access to the questionnaire

http://canterbury.qualtrics.com/jfe/form/SV_3sLNN4X8fLcdSbX

10.4 Appendix Four: Interview Participant Information and Consent Form

Department of Geography
Email: cca66@uclive.ac.nz
Date: 27/10/2020
HEC REF: HEC 2020/131

New Brighton Community: Improving Science Communication to Better Community Engagement
Information Sheet for Interviewee

Hi, I am Casey Carass, a Master of Urban Renewal and Resilience (MURR) student at the Department of Geography, School of Earth and Environment, University of Canterbury (UC). I wish to invite you to participate in my research, in collaboration with Environment Canterbury. This research aims to evaluate the New Brighton community values of the dune system and explore various methods of scientific communication. The research will aid in providing a scientific communication method that benefits both the community and scientist to improve and enhance community engagement.

If you choose to take part in this project, your involvement will consist of a short semi structured interview, taking a maximum of an hour of your time. The interview data will be used to provide an overall view from experts, community representatives and scientists.

Your participation is voluntary, and you have the right to opt out at any stage of the interview without penalty. You may ask for the raw data (audio recording and transcribed notes) to be returned to you or destroyed at any point up until the 20th December 2020, when the discussion section of the report starts. After this point it will become difficult to remove data without influencing the results and discussion.

The information collected will be confidential between myself and my supervisor Assoc. Prof. Deirdre Hart. Information used from this interview will be used in the results and discussion of the research unless explicit consent has been given not to. There is potential for direct quotes to be used unless explicit

This project is carried out as part of the requirements of the MURR degree by Casey Carass, under the supervision of Assoc. Prof. Deirdre Hart, who can be contacted at deirdre.hart@canterbury.ac.nz.

This project has been reviewed and approved by the University of Canterbury Human Ethics Committee, and participants should address any complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

If you agree to participate in this research, you are asked to complete the consent form and return to Casey Carass at the beginning of the interview process or feel free to email it prior at cca66@uclive.ac.nz

FAQ

Can I skip questions asked in the interview?

Yes- you can skip questions asked without penalty or pressure and we will move onto the next question

Where will the data be stored?
Audio recordings - The audio recordings will be backed up onto password protected folders on both my secure personal laptop and UC servers before being deleted from the phone.

Transcribed notes- will be safely kept in a password protected folder on both my personal secure laptop and UC servers

Consent forms- Hard copies will be safely kept in a locked room at the University of Canterbury. Electronic copies will be downloaded and safely kept in a separate password protected folder from the transcribed notes on both my secure personal laptop and the UC Servers.
 Both electronic and hard copies of data will be destroyed after 5 years of project completion

Will I have access to my interview data?
Yes – your interview will be recorded and transcribed and you may ask for a copy of both your audio recording and transcribed notes.

Transcribed Notes
Your interview will be transcribed and emailed back for your review and amendment on any comment made before use in the results. This will be emailed approximately within a week of the interview.

What happens after this research?

The summary findings of this research will be published in a Master of Urban Renewal and Resilience report, a copy of which will made public on the UC Library website. There is also the possibility for future peer reviewed publications.

Quotes/Information used in the research
Consent to Direct quotes with your name will be listed including your name title/organisation

Consent to direct quotes without being identified will be list including a basic title eg. Community representative, coastal expert ect

The data collected from the interview will be collated to generate a representative/ overall opinion of which no identifying information or direct quotes will be used unless consent has been given

New Brighton Community: Improving Science Communication to Better Community Engagement
Consent Form for Interview Participants

- ☐ I have been given a full explanation of this project and have had the opportunity to ask questions.
- ☐ I understand that participation is voluntary, and I may withdraw at any time without penalty. Withdrawal of participation will also include the withdrawal of any information I have provided should this remain practically achievable.
- ☐ I understand that any information or opinions I provide will be kept between the researcher, Casey Carass and Assoc. Prof. Deirdre Hart, and that any published or reported results will not identify the participant unless consent has been granted for direct quotes. Please choose one of the following statements regarding direct quotes:
  - ☐ I give consent to the use of direct quotes to be used in this research (your name and title/organisation will be listed alongside the quote)
  - ☐ I give consent for direct quotes to be used without being named or identified
  - ☐ I do not consent to the use of direct quotes to be used in this research
- ☐ I understand that all data collected for the study will be kept in locked and secure facilities and/or in password protected electronic form and will be destroyed after 5 years.
- ☐ I understand that a thesis is a public document and will be available through the UC Library.
- ☐ I understand that the interview will be recorded using note taking and audio recording
- ☐ I understand that I can contact the researcher Casey Carass cca66@uclive.ac.nz or supervisor Assoc. Prof. Deirdre Hart, deirdre.hart@canterbury.ac.nz, for further information.
- ☐ If I have any complaints, I can contact the Chair of the University of Canterbury Human Ethics Committee, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz)
- ☐ I would like a summary of the results of the project.
  By signing below, I agree to participate in this research project.

Name: _____

Signed: _____
Date: _____

Email address (for report of findings, if applicable):
_____
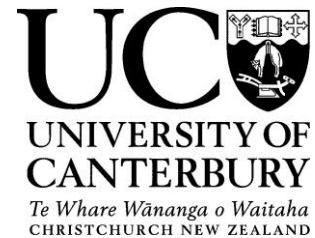
Ngāi Tahu Consultation and Engagement Group

14 December 2020

Tēnā koe Casey

Re: New Brighton Community: Improving Science Communication to Better Community Engagement

This letter is on behalf of the Ngāi Tahu Consultation and Engagement Group (NTCEG). The NTCEG considered your proposal and acknowledge it is a worthwhile and interesting project and you are clear about how you ought to take participants' (cultural) needs into account if and when applicable.

Given the scope of your project, no issues have been identified and further consultation with Māori is not required.

Thank you for engaging with the Māori consultation process. This will strengthen your research proposal, support the University's Strategy for Māori Development, and increase the likelihood of success with external engagement. It will also increase the likelihood that the outcomes of your research will be of benefit to Māori communities. We wish you all the best with your current project and look forward to hearing about future research plans.

The Ngāi Tahu Consultation and Engagement Group would appreciate a summary of your findings on completion of the current project. Please feel free to contact me if you have any questions.

Ngā mihi
Research & Innovation (on behalf of the NTCEG)
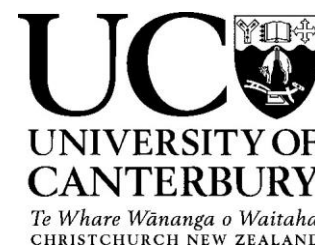

Research & Innovation | Te Rōpū Rangahau

University of Canterbury | Te Whare Wānanga o Waitaha Private
Bag 4800, Christchurch | Ōtautahi
ethicsmaoriconsultation@canterbury.ac.nz

10.6 Appendix Six: Health and Safety Approval Letter

HUMAN ETHICS COMMITTEE
Secretary, Rebecca Robinson
Telephone: +64 03 369 4588, Extn 94588
Email: human-ethics@canterbury.ac.nz

Ref: HEC 2020/131

22 December 2020

Casey Carass
Earth and Environment
UNIVERSITY OF CANTERBURY

Dear Casey

The Human Ethics Committee advises that your research proposal "New Brighton Community: Improving Science Communication to Better Community Engagement" has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your emails of 25th November and 14th December 2020.

Best wishes for your project.

Yours sincerely
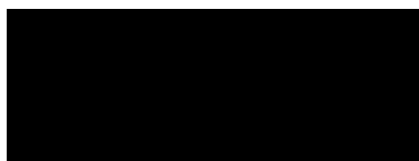
Dr Dean Sutherland
Chair University of Canterbury Human Ethics Committee

Field Activity Plan

Human Resources

Activity Leader

Full Name	Casey Carass		
Work Area	New Brighton Beach (Dune System)		
Email	cca66@uclive.ac.nz	Phone	███████████
Signature	████████████████	Date	11/11/20

Deputy Activity Leader *(if required)*

Full Name			
Work Area			
Email		Phone	

Approval to Undertake the Field Activity *(for completion by Manager/Head or delegated authority i.e. Departmental Safety Officer, Academic Supervisor)*

I consent for this Field Activity to be run to the specifications of the plan.

Full Name	
Date	
Signature	

Field Activity Details

Paper/Course	MURR – GEOG692
Purpose of Field Activity	To survey people in the local area with a questionnaire
Start Time and Start Date	TBD- waiting on ethics
Finish Time and Finish Date	TBD- once 30 people have completed the questionnaire
Return from activity method of notification (who you will notify and how you will notify them)	The shared Health and Safety email address (earthandenvironmentsafety@canterbury.ac.nz)
Location Contact Address	New Brighton pier library, surf life saving club
Location Contact Phone	N/A (my phone- ███████████)

Accommodation	N/A
Map Reference *(if no contact address)*	Map provided below

Intended Programme

Provide brief description of the daily field activities, including location of activities, distance from field HQ, planned route and transportation

- This field work intends to collect survey data from the local residents and beach goers in the New Brighton area using a questionnaire. This entails talking to the public explaining who I am (a University Student carrying out a research project) and asking if they would like to look at the information sheet/participate. The participants will be left alone for 10 minutes to complete the questionnaire whilst those that do not wish to participate will be left alone. I will be carrying student ID for anyone who asks.
- I will be busing to and from New Brighton as transport.

- The map below provides the location (red dots) where the surveying will be undertake along New Brighton beach. Surveying will take place in open visible areas near beach accessways at these two locations (I will not be going onto the beach itself).

- I will be notifying my partner/Flatmate who works from home each time I go out and when I return. This will be a text when I am on the bus and then I will see them when I arrive home.
- If an incident were to occur (no matter the severity – I would contact Deirdre Hart (project supervisor) to inform her of the issue)

Emergency Contacts *(please complete Safety Equipment List on page 4 if required)*

Mobile Phone Number	▓▓▓▓▓▓▓▓▓▓▓▓▓
Field First Aid Kit	☐ **Yes** ☐ No
List names of qualified First Aiders attending the Field Activity *(if none, consult the Health & Safety Manager)*	Discussed with Justin Harrison, SEE technical and safety staff person – since this research is within city limits, this certification is not required.
UC Security (anytime)	0800 823 637
	Name	Deirdre Hart

UC Emergency Contact	Position	Supervisor
	Phone	███████████████████
Field Station Manager *(if relevant)*	Name	
	Mobile	
	Office	
UC Health and Safety Manager	Name	
	Mobile	
	Office Phone	
UC Health and Safety Consultant	Name	**Grant Craig** (contact anytime 24/7 re notifiable event or high risk event)
	Mobile	███████████████████
	Office Phone	███████████████████

Emergency Procedures

What could go wrong despite efforts to control risks? How will you manage the emergency? Consider:
- *prevention of further harm or injury*
- *communication*
- *access to emergency services*
- *emergency equipment*

Phone (charged) communication to Justin Harrison/health and safety team and/or Deirdre/ and/or partner/flatmate – 111 if required
Staying local and in public areas with access to emergency services
Communication to local facilities if an incident with a community member occurs – will not continuing surveying after an incident
I will have this health and safety form with contact number as a hard copy and electronic on my phone

Participant Health *(group field activities only)*

Attach completed Field Activity Participant Declaration and Consent Forms.

Name	Description of Health Condition	Controls to be applied

Additional Information *(complete the items relevant to your Field Activity)*

Alternative Route/Plans *(for bad weather/emergencies etc)*	If it is bad weather I will not attend. For emergencies I will go to the closest local facility (New Brighton Public Library or South New Brighton Surf Life Saving Club). The two locations were chosen as they are in close proximity to public facilities if help is needed.
Have you received consent/permit/access permission for the Field Activity locations?	☐ Yes ☐ No
If yes, specify consent/permits obtained	

Are there cultural considerations, e.g. Marae protocol, specimens not to be collected if rahui is in place?		☐ Yes ☐ No ☒ **N/A**
Accommodation contact person	Name	n/a
	Mobile	
	Office Phone	
Travel arrangements		
Vehicles used for transport		UC vehicles ☐ Yes ☐ No ☒ N/A Rental vehicles ☐ Yes ☐ No ☐ N/A Private vehicles ☒ **Yes** ☐ No ☐ N/A
Car Rental Company *(if applicable)*		

Vehicle Details *(of private vehicles only)*	Vehicle 1	Vehicle 2	Vehicle 3	Vehicle 4	Vehicle 5
Make					
Model					
Year					
Colour					
Current Registration	☐	☐	☐	☐	☐
Current WOF	☐	☐	☐	☐	☐
Vehicle First Aid Kit	☐	☐	☐	☐	☐
Chains	☐	☐	☐	☐	☐

Have all requirements for transportation of hazardous goods been considered? See Land Transport for guidance.	☐ Yes ☐ No ☒ **N/A**
Expected road conditions	Varying conditions but manageable
Contingency plan for adverse conditions, e.g. weather, rockfall	If weather is bad, then this fieldwork will need to be rescheduled since particpants will nto want to stand and fill in a paper survey in bad weather.
Catering arrangements, e.g. self-catered	N/A
No. of days extra emergency food	N/A
Do your participants have any special requirements with regards to food or medical requirements?	☐ Yes ☐ No ☒ N/A *If medical/allergy related, list in participant health list above.*
If yes, have these people been appropriately catered for?	☐ Yes ☐ No ☒ **N/A**
Are you carrying drinking water, purifier or have access to it during the trip? *Please specify*	Carrying drinking water
Satellite Phone / UC Mobile Phone	☐ Yes ☒ **No** Number
Personal Locator Beacon	☐ Yes ☒ **No** Serial Number
Mountain Radio	☐ Yes ☒ **No** ☐ N/A
Emergency Shelter	☐ Yes ☐ No ☒ **N/A** *If yes, describe.*
Wet weather gear and thermal clothing requirements	☐ Yes ☐ No ☒ **N/A**

Any other personal protective clothing and equipment	Sunblock, sunglasses, sunhat and layers to enable me to keep warm or cool depending on temperature and weather fluctuations within the scope of fair weather conditions.
Name(s) of qualified/experienced person accompanying the group	N/A
Mandatory certificates, licences and training are current, e.g. Firearms Licence, First Aid Certificate, Driver Licence	☐ Yes ☐ No ☒ N/A
Overseas travel. See University Travel website for guidance. (Provide the destination, visa and vaccination requirements, travel insurance, and security arrangements for risk destinations. Attach the travel itinerary to this plan)	☐ Yes ☐ No ☒ N/A

Safety Equipment List *(complete for safety equipment taken, ensure equipment is maintained and relevant training is received)*			
Type of Equipment	Checked/Maintained	Quantity	Serial Number *(if relevant)*
Hi-visibilty vest & clipboard			
First aid kit			
Sunblock, sunglasses and sunhat			
Adequate food (lunch, snacks) and water to keep me going for the survey duration			
Clothing layers for thermal comfort in variable fair weather conditions.			
UC ID card			
Charged phone/ portable charger			

Hazard Risk Assessment and Management

Use this form for Risk assessment of short term work or activity

Work/Activity Details /Risk Assessment					
Type of work or activity :	Collecting survey data from the general public using a questionnaire	Location	New Brighton Beach (near New Brighton Public Library & South New Brighton Surf Life Saving Club)	BEIMS No. *(if applicable)*	N/A
Risk assessment conducted by:	Casey Carass		Date: 18/11/20	Time:	10am

Hazard (An actual or potential source of harm, including behaviour)	Consequence If Hazard Not Controlled (i.e. Injury, Illness, Incident, Property Damage, etc)	Likelihood (L value)	Consequence (C value)	Risk Rating (L x C)	Controls (i.e. Eliminate, Substitute, Guarding, Training, Administrative, PPE)	Residual Risk Rating (The remaining level of risk after controls have been implemented)	Hazard Eliminated or Minimised (E or M)
People	Conflict/ Injury	2	3	6	-Walk away if someone gets frustrated or angry/ go to local facility. -If someone is verbally abusive/ to other members of the community or visibly intoxicated, I will not approach. I will also notify a public facility if no other members of the community are involved/around. I will not get involved myself - after a conflict with a member of the community, I will stop	Low	M

					surveying for the day and go home- notifying Deirdre Hart of the incident		
Dehyrdation	Illness	1	3	3	Frequent hydration breaks, carry water bottle	Low	E
Sun burn	illness	3	3	9	Sunblock, sunglasses, hat, appropriate clothing layers	Low	E
Slips and trips	Injury	3	2	6	Watch where walking on grass/ sand, wear outdoor walking footwear	Low	M
Car accident/bus accident	Death/Injury	2	5	10	Sensible driver/ seatbelts / car in warranted and safe condition	Low	M

Person in Control of Work/Activity	Name ....
Position	Position ....
Signature .... Date	Signature .... Date ....
Hazards not eliminated on completion of work must be recorded on Hazard Register	

How to use this form: