Connecting the Pūharakekenui/Styx River Reserve Network

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Executive Summary

- The Styx Living Laboratory Trust is a local organisation developing the Pūharakekenui Styx River catchment. They wish to encourage people to spend more time in the Pūharakekenui/Styx environment and appreciate its unique character.

- This project aims to connect reserves within the Pūharakekenui/Styx catchment by navigating a path along Ka Pūtahi Creek to the Pūharakekenui/Styx River.

- The research question was: *"How can the Pūharakekenui/Styx reserves be connected in safe, creative ways that reinforce the unique character of the Pūharakekenui/Styx environment and celebrate a sense of place?"*

- Quantitative land assessments provided data for use in GIS to plan network connections. Field surveys supplemented GIS with hazard identification and understanding of the Pūharakekenui/Styx sense of place. Ecological assessments determined plantings appropriate to the area. Interviews and email surveys gained relevant perspectives on the project.

- Key results include a cohesive Pūharakekenui/Styx design and crossing solutions that address the aspirations of the Styx Living Laboratory Trust and celebrate the Pūharakekenui/Styx as a place to be.

- Limitations of the research include time constraints, accessibility of resources and data and unfamiliarity with the human research process.

- Future research opportunities include measuring reserve usage, developing further crossings, streamlining the reserve development model, and applying to other underappreciated waterways in need of development.

1.0 Introduction

Located in Christchurch, Canterbury, the Pūharakekenui/Styx (known hereafter as Pūharakekenui) is a spring-fed meandering river. It travels 24.8 kilometres from near Christchurch Airport to Brooklands Lagoon (Fig.1 b). It is a river of historical, environmental, and cultural value, providing mahinga kai, areas for recreation and habitat for wildlife. It passes through several minor arterial roads and reserves owned by the Christchurch City Council (CCC). This provides an opportunity to establish a pathway through the reserves in the Pūharakekenui river catchment. This project also incorporates reserves surrounding Kā Pūtahi Creek, a tributary meeting the Pūharakekenui River at the Kaputone Confluence Reserve near Marshlands Road.

Figure 1. Map of a) New Zealand and b) Styx catchment with x for the Styx's source and where it reaches the sea. Key landmarks labelled.

The Styx Living Laboratory Trust (SLLT) is a river care to establish the Styx Vision of developing a "living laboratory" in the catchment. They also support the Styx Visions of enhancing the source-to-sea experience and establishing the Styx as a "place to be". To do this, they and CCC wish to connect reserves along the Pūharakekenui River and Ka Pūtahi Creek into a network and reinforce the unique natural and cultural character of the Pūharakekenui environment. Due to the bicultural nature of Aotearoa New Zealand's history, this study incorporates many aspects of Te Ao Māori (the Māori world) ensuring developed solutions are inclusive and respectful.

Reserve networks are defined as "linking spaces of environmental, social, cultural and historic resources with each other and with people" (Vasconcelos, 2007, p.1). This aligns with the intent of the SLLT to encourage people to spend time in and around the Pūharakekenui River and Ka Pūtahi Creek. Reserves are important in planning for healthier, more sustainable cities, due to

their benefits for human wellbeing (Vasconcelos, 2007). Research by Fumagalli and Toccolini (2012) also identified that these benefits are amplified when spaces are connected. The benefits that people receive from spending time in reserves also depend on the characteristics of the reserve, which highlights how the Pūharakekenui reserves will uniquely influence the experiences and wellbeing of people spending time there.

To aid the SLLT in reaching their goals for the Pūharakekenui, the following research question was formed: *How can the Pūharakekenui/Styx reserves be connected in safe, creative ways that reinforce the unique character of the Pūharakekenui/Styx environment and celebrate a sense of place?"* This project will design crossings at specific connection points along the reserve network. The following aims will aid in achieving this:

1.1 Aims

a. Determine the unique characteristics of the Pūharakekenui environment.
b. Reinforce this unique character through the design of a reserve network.
c. Identify the most important connection points to focus on along the network.
d. Design safe crossings for connection points along the Pūharakekenui River and Ka Pūtahi Creek.
e. Design novel and creative crossings that celebrate a sense of place associated with the Pūharakekenui environment.

Section Two outlines literature relevant to the objectives. Section Three provides an overview of the methods used. Section Four presents the results. Section Five describes proposed solutions in the context of specific connection points. Section Six includes a discussion of results, literature integration and the project's contribution to existing literature.

2.0 Literature Reviews

The research question was split into four subthemes, outlined below, which were researched in depth. This allowed for a more thorough understanding of the objectives and provided rationale for the methodology.

2.1.1 The Need for Reserve Networks

By 2050, the portion of people living in urban environments could reach 68% (Cao et al., 2024). However, researchers are becoming more aware of how this upward trend in urbanisation is fragmenting the natural environment and causing disconnection between humans and green spaces (Akpinar, 2014; Fumagalli & Toccolini, 2012). Therefore, understanding how to organise our cities to incorporate and celebrate these green spaces has become a priority in city planning (Fumagalli & Toccolini, 2012; Vasconcelos, 2007).

Studies by Cao et al. (2024), and leBrasseur (2022), depicted human wellbeing (HWB) as physical, psychological, and social, aligning with the World Health Organisation's definition (1946). However, this overlooks *wairua* (Appendix B for Māori translations) and how green spaces develop *tūhonohono* (Durie, 1984)**.** Diener & Chan (2011) conducted an analysis of connections between wellbeing and quality of life. The analysis featured longitudinal studies, and physiological experiments. Literature is increasingly suggesting that HWB is linked to happiness.

Use of blue and green spaces is associated with benefits to HWB (Lee & Maheswaran, 2010; Maas et al., 2006). Lee and Maheswaran (2010) note that safe, inviting greenspaces encourage cardiovascular exercise and recreation. Reserves also improve air quality by filtering pollutants (Rui et al., 2018; Venter et al., 2024). This is impacted by vegetation, local weather systems and the type of pollutant (Selmi et al., 2016). The active lifestyles associated with exercise, recreation, and improved air quality lead to better health outcomes (WHO, 2019).

Research by Fumagalli and Toccolini (2012), consistent with Vasconcelos (2007), found that the benefits of these spaces are enhanced when connected into networks. leBrasseur (2022) built on this by saying that connection results in synergistic impacts for human wellbeing.

2.1.2 Methods for Planning Reserve Networks

Geographic Information System (GIS) map software allows the creation of a network plan. The next step is a field trip to measure the spatial connectivity of the planned route, identify potential risks, check the GIS data for accuracy, and gather information to improve the route (Rae et al., 2007; Tresidder, 2005). The next step is to combine GIS with multi-criteria decision-

making to design a route that meets multiple criteria and incorporates human design (Chiou et al., 2010; Talebi et al., 2019).

Culture is a value linked with the Pūharakekenui environment. However, many recent reserves network planning studies lack cultural considerations, suggesting a reduced awareness of the cultural implications in planning reserve networks. This review includes an older study which emphasises how spending time in the field can facilitate *tūhonohono* (Yahner et al., 1995*)*. While the study's technical methodology is outdated, it therefore has strong current implications for this project.

The importance of field observation was reinforced by methodologies used in studies to test reserves impacts on participants' wellbeing. Studies differ in their purpose, focussing on broad wellbeing or the physical experience of being in reserves (Cao et al., 2024; leBrasseur, 2022). Considering Yahner et al. (1995), the sensory interaction with the environment leads to the most thorough, albeit qualitative, understanding of the space and is therefore important in the research and reserve network planning process.

2.2.3 Safely Connecting Reserves

Between the Pūharakekenui reserves are roads lacking footpaths and safe crossings. Crossing at roads and intersections without traffic control devices leads to more severe injuries (Koopmans et al., 2015). Developing crossings between reserves will enhance connectivity and encourage people to utilise these spaces.

The largest determinant of road safety is speed and the selected sites each have a 60km/h speed limit (NZTA, 2022), highlighting the importance of speed when planning solutions. When measuring the effectiveness of traffic calming devices, Mao and Koorey (2010) explain that zone-wide statistical analysis is used. These authors describe how implementation of vertical devices lowers maximum speeds from 100km/h down to 40km/h. Implementing speed controls can lead to reacceleration after the device, which creates excess noise and increases risk (Gonzalo-Orden et al., 2018). Narrowing along with raised crossings reduces pedestrian time on the road and slows motorists for longer increasing safety (Cantisani et al., 2023).

Lack of clear vision is an obstacle that causes car accidents in low light conditions (Konstantopoulos et al., 2010). The complexity of the driving environment means that drivers do

not typically search for warnings at night or in bad weather (Gregory et al., 2016). On Fords Road and Guthries Road, the roads are narrow and lack light, which makes it difficult for pedestrians and drivers to see each other at night or when visibility is poor, further increasing the possibility of accidents.

Safe ways to cross the street are especially important for vulnerable groups including children, elderly, and those with limited mobility and/or visual impairments. Due to the decline in physical mobility and perceptual cognitive function, the ability to cross the road safely may be impacted for elderly (Grisé et al., 2018). Understanding the different difficulties faced by users can help inform safe solutions to ensure that everyone can cross the road conveniently and safely.

Collisions between pedestrians and vehicles involve high risk, and design should reduce the occurrence of these conflicts. The practice of halting all vehicular traffic for a portion or the entirety of the duration of a pedestrian crossing signal markedly reduces the incidence of conflict (Retting et al., 2003

For novel traffic devices, non-Newtonian fluid speed bumps and 3D drawings on the road were researched**.** Non-Newtonian fluid speed bumps are liquid speed bumps that are designed based on the principle of non-Newtonian fluids, thus avoiding the safety and comfort problems associated with traditional speed bumps. (Parmar & Mauttu, 2021). 3D painting is an emerging art creation that can be used in traffic. Compared with traditional 2D pedestrian crossings, 3D pedestrian crossings enhance visual stimulation for drivers, leading to reduce speed and fewer accidents. (Rebelo et al., 2019).

2.2.4 Features of Reserve Networks for Connectivity

Akpinar (2014) highlights how the strength of reserve networks is their ability to bring several elements together that positively benefit those experiencing the spaces. He states that high performance reserve networks are those that identify the strengths of the unique environment and blend them into a cohesive design for the whole network (Akpinar, 2014).

The literature suggests that native and diverse plantings provide the most psychological benefits in reserves, due to their positive impacts on *tūhonohono* (Fumagalli & Toccolini, 2012; leBrasseur, 2022; Yahner et al.,1995). Tall, shady trees also provided the most physical comfort,

so would increase the time people spend in the reserves, and therefore encourage this development of *tūhonohono*.

Pou have a history of signifying boundaries and indicating the significance of place (Te Ara, 2007). Interviews reveal posts and pou were used to navigate through swamplands of the Ouruhia region by Māori and European settlers.

3.0 Methods

A series of methods were used to achieve objectives a-c and to inform the solutions in Section 5.0, which achieve the aim.

3.1 Quantitative Land Assessment Data Sources

Styx river flow data was obtained from the *Environment Canterbury* (ECAN) website (n.d). Speed limits zones and traffic volume data were from the *New Zealand Transport Agency* (NZTA) website (2022). Future district plans were obtained from the CCC website (2017).

3.2 Spatial Methods

3.2.1 ArcGIS Network Plan

Aerial views of the walkway and four crossings of interest were provided by the community partner. These were combined with Google Maps observations to create the route network plan using ArcGIS.

3.2.2 ArcGIS Flooding Map

ECAN flow data was imported into ArcGIS to visualise flooding risk. Peak flow layers were created for maximum flows for the month of August, the year of 2024, and the decade 2013-2023.

3.2.3 ArcGIS Speed Limits Map

Updated speed limit data came from NZTA (2022). Data was imported to *ArcGIS to* create a speed limit layer. Speed limits were coloured-coded to visualise them spatially. This allowed assessment of crossing safety.

3.3 Ecological Assessments

Data on soil, bird and insect species and appropriate plant types for each crossing was obtained from the Ōtautahi Christchurch Ecosystems map (2021) by *Lucas and Associates*.

3.4 Field Observations

Site visits were conducted to assess the condition of reserves and road crossings. This allowed the development a sense of place per Styx Vision 4 (2000). The route followed is mapped in Fig. 2 and supplemented by visits with the community partner.

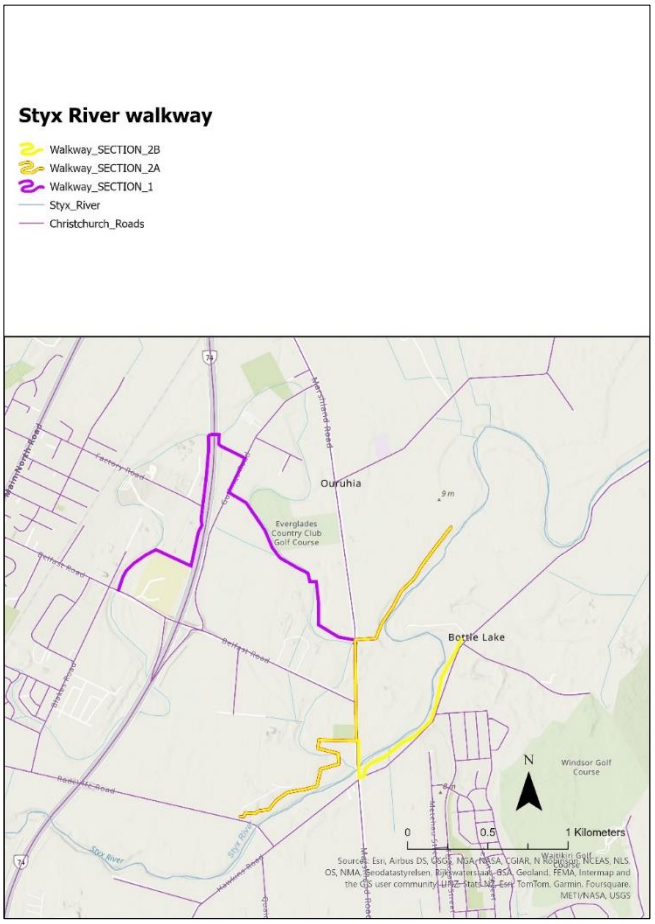

Figure 2. The walkways of the Pūharakekenui River.

3.5 Interviews

Semi-structured interviews were conducted to seek feedback on solutions. Ethical approval was received 9th September 2024. Selection criteria was determined by the expertise of interviewees and their ability to help us meet objectives. Two traffic engineers provided feedback on safety, relevant to Objectives (c-d). A rongoā healer provided site-specific information. Appendix A outlines the interview questions; however, the conversations were allowed to flow.

3.6 Surveys

The SLLT, a Wednesday Wheelies member, and interviewees were surveyed to determine key features for reserve networks. An email survey asked *Rank the top 5 features in order of those you believe make reserves more comfortable to spend time in.”* Answers were graphed and the key features identified.

3.7 Analysis

Assessment of risks associated with flooding and traffic data will be analysed in ArcGIS using river flow data and land elevation. This data is supplemented by field visits to ensure site conditions are fully assessed. Survey data was analysed in Excel, visualising the responses as graphs. Ecological assessments were analysed in an Interactive Map (Ōtautahi Christchurch Ecosystems, 2021) and support plantings for each solution. Interview data was transcribed with OtterAI and reviewed during solution development to ensure best practice.

4.0 Results

4.1 Quantitative Results

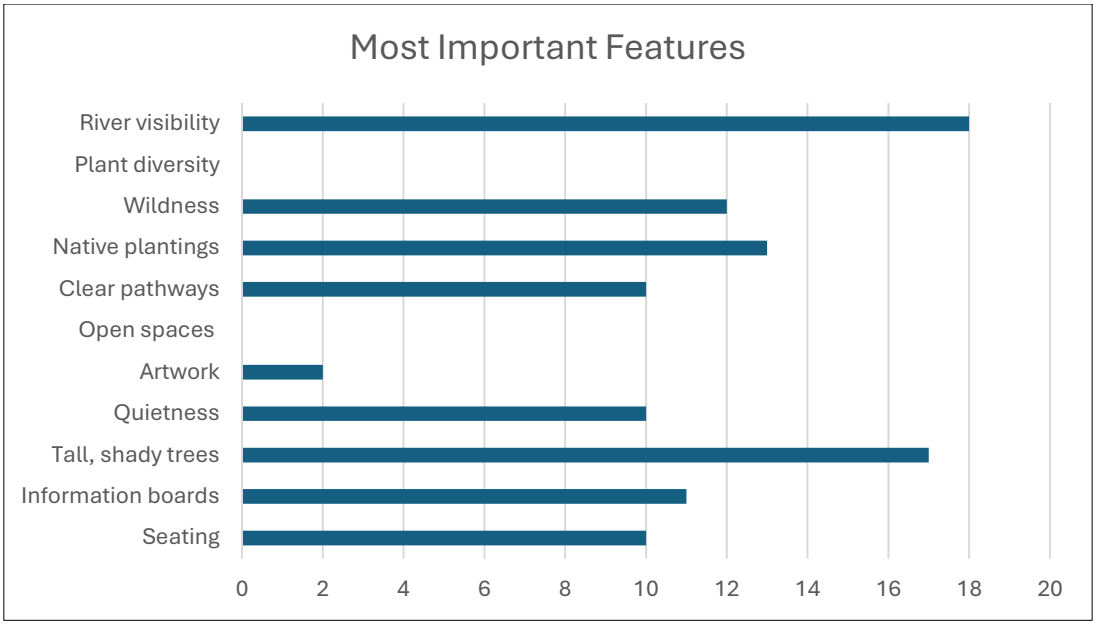

Figure 3. Result of excel graph of features ranked in order of importance for reserves and connection points from September 2024 email surveys.

River visibility was rated the most important feature for reserves and crossings (Fig.3). This was followed by tall, shady trees and native plantings. Rated least important were open spaces and plant diversity, along with artwork.

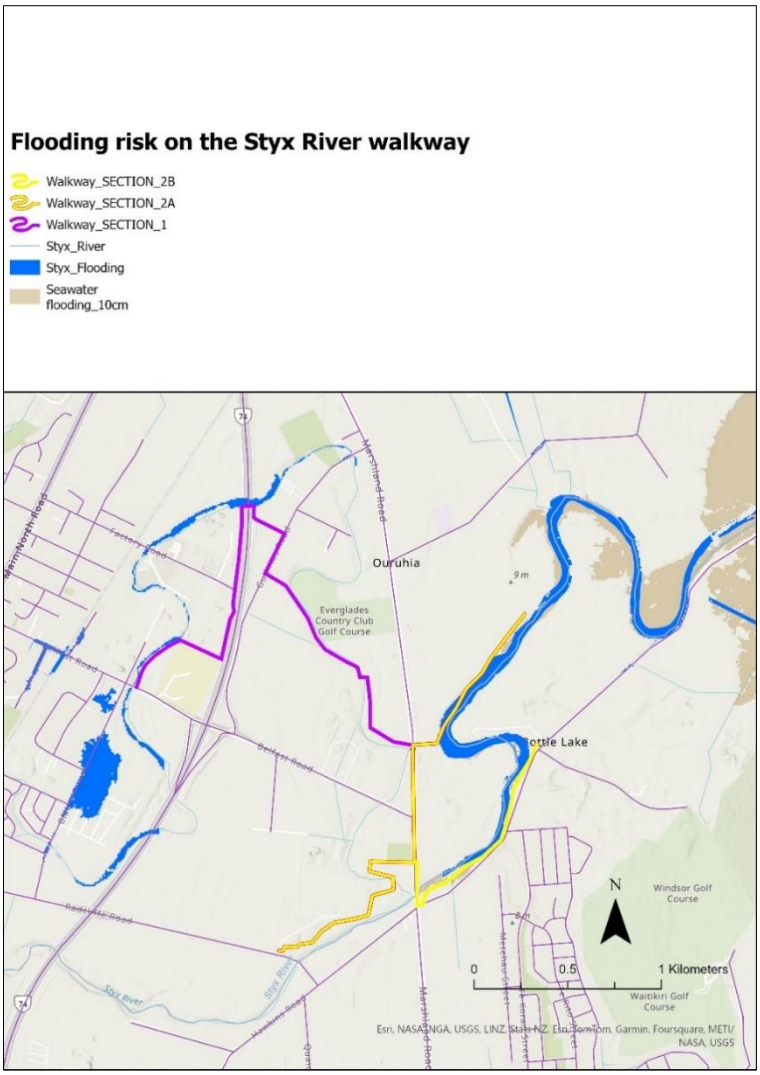

Figure 4. Flooding risk map. Blue areas show zones at risk of flooding.

Figure 4shows that Belfast Road is the only selected crossing site with flood risk associated.

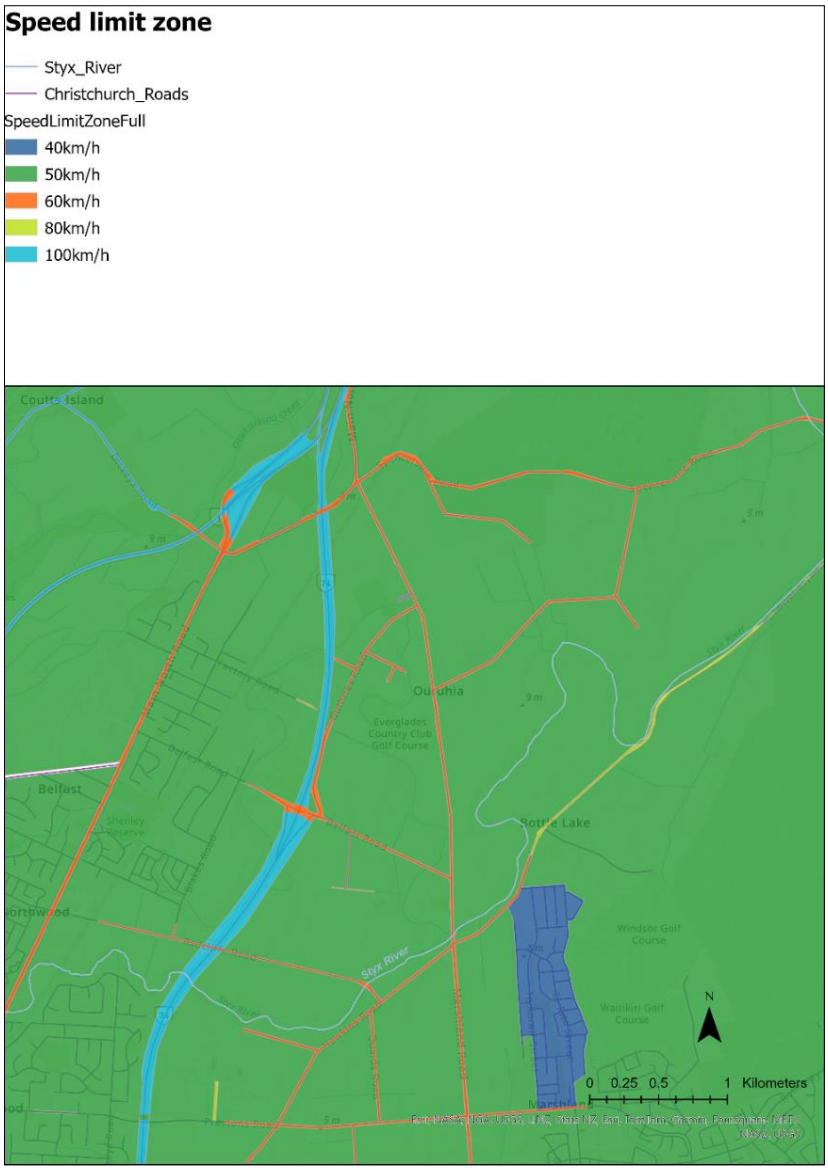

Figure 5. Speed limit zone map created using ArcGIS.

Figure 5 shows all roads have speed limits of 60 kilometres an hour.

4.2 Interview Findings

Themes identified in the literature reviews were discussed with interviewees though the focus of each interview was tailored to their respective field of expertise. The interview process provided insight from experience. Results from the interviews are below in the form of key topics covered and suggestions.

4.2.1 Traffic Engineers

Safety and suggestions for implementing traffic management solutions.

Professional pointers

- Keeping in mind maintenance and possibility of vandalism
- The importance of driver line of sight
- Use of uncertainty to increase driver caution and awareness
- A focus on low-cost high reward solutions

Site specific suggestions

- Not to cross at the existing entrance for Belfast Road due to proximity to intersection
- Removal of centre line along Guthries Road
- Inclusion of cycle shoulders for Marshlands Road

4.2.2 Rongoa Healer

Culture, history, and the benefits of greenspaces.

Topics covered

- Importance of the site
- Whakapapa to the land and of wairua
- Living life by the flow of the river
- Tour of the site to see medicinal plants.
- Importance of community
- Reserves as spaces to connect with others and with nature.

Question: "*What makes this area special to you*?"
Answer: "I feel one."

5.0 Solutions

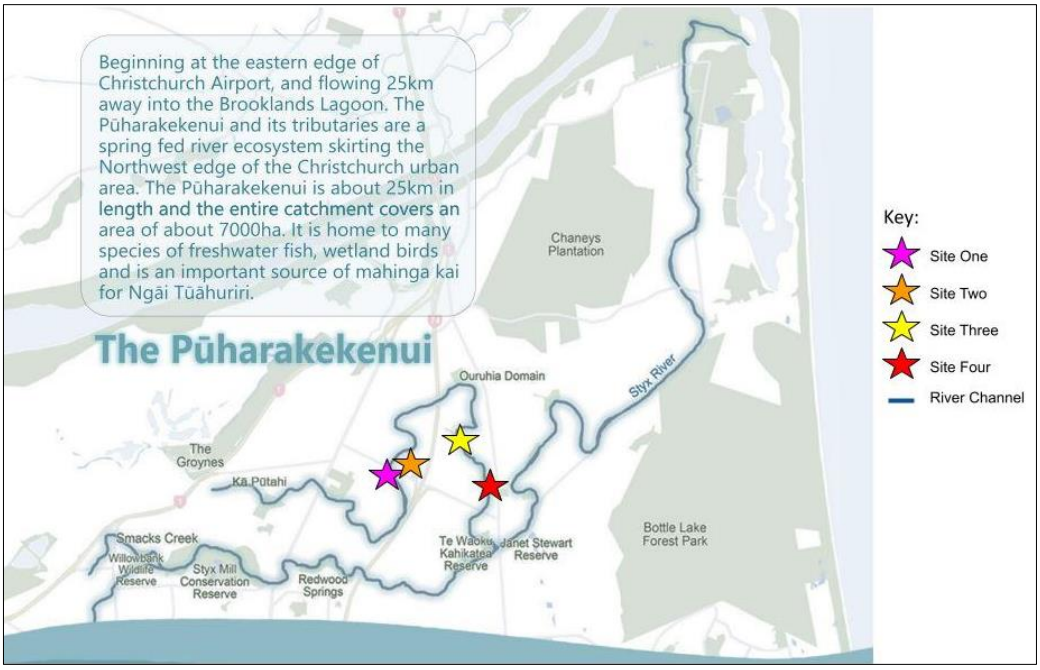

Figure 6. Map of the Pūharakekenui with Ka Pūtahi Creek and Pūharakekenui River outlined. Four sites labelled. Adapted from SLLT website.

Sites were selected based on recommendations from our community partner and field observations (Fig.6). Literature reviews informed the hazard identification process and field observations identified areas lacking tūhonohono. The following concept art illustrates solutions developed for each connection point along the Pūharakekenui river.

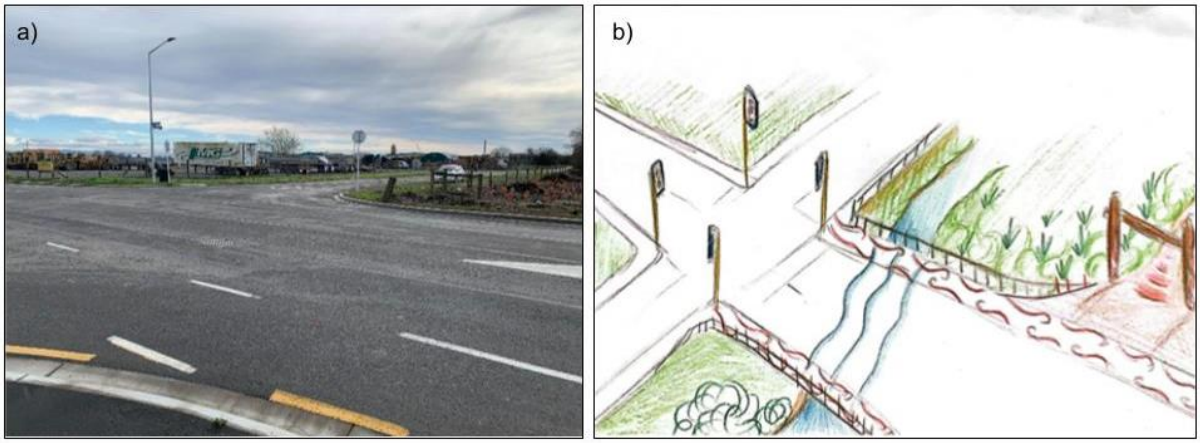

Figure 7. a) Photo of Site One, Belfast Road. b) Drawing of proposed solution for Site One.

Site One is the Belfast Road crossing, situated in an industrial area with frequent large vehicles. It lacks a safe crossing and clear reserve entrance (Fig.7 a).

The solution proposed for this site is a traffic light system to enhance pedestrian safety (Fig.7 b). A new entrance to the reserve is recommended to enhance visibility and accessibility. This entrance would include a *waharoa* and a surrounding fence incorporating Māori motifs. Specific rationale for the solution is explained in Section 6. 2.

Figure 8. a) Photo of Site Two, between Ka Pūtahi Reserve and Belfast Cemetery. b) Drawing of proposed solution for Site Two.

Site Two is marked by a farm gate between Ka Pūtahi Reserve and Belfast Cemetery. It lacks signage, clear direction, *tūhonohono*, and native plantings (Fig 8 a). The proposed solution for

this site is a seating area. This incorporates the cohesive Pūharakekenui reserve network design elements of blue and red, native plantings, tall, shady trees, a clear, well-maintained path, and artwork. Specific rationale for the solution is explained in Section 6. 2-3.

Figure 9. a) Photo of Fords Road. b) Photo of Guthries Road. c) Drawing of the proposed solution for Site Three. d) Drawing of the specific design plans for the crossing.

Site Three includes Fords Road and Guthries Road. It lacks a pedestrian plan on the road, the pace of traffic is excessive and there are no signs directing visitors to the reserve (Fig.9 a). A green belt of native plants can connect Fords Road to the junction, with to gravelled pathways within the reserve. Refuge islands and road bending reduce speeds. Additionally, 3D pedestrian

crossings are suggested. Specific rationale for the proposed solution is explained in Section 6. 2-3.

Figure 10. a) and b) Photos of Marshlands Road. c) Drawing of bridge crossing proposal. d) Drawing of refuge island proposal.

Site Four is Marshlands Road. The solution includes a pedestrian bridge (Fig.10 c). It would extend into reserves to provide an accessible slope and clearance of 4.3m (NZTA, 2003).

Solution B includes refuge islands which remove the limited visibility to the north (Fig.10 d). This solution was supported by the traffic engineers who rated this site as the most in need of crossing development. Specific rationale for the solution is explained in Section 6. 2-3.

6.0 Discussion

6.1 Summary of Results

The aim of this project was to connect the Pūharakekenui reserves in safe, creative ways that reinforce the Pūharakekenui environment and celebrate a sense of place. The need for connection points along the network was identified in the literature, field observations and interviews. Four connection points along the Pūharakekenui reserve network were designed to meet the aim. Specific solutions designed during the research process were supported by industry professionals and relevant stakeholders.

6.2 Integrating Results with Literature

6.2.1 The Need for Reserve Networks

Urbanisation fragments the natural environment and therefore creates reserves (Akpinar, 2014; Fumagalli & Toccolini, 2012). Due to the negative impacts of urbanisation and the positive impacts of reserves on human wellbeing, the conservation of the green space surrounding the Pūharakekenui River should be a priority for planners (Akpinar, 2014; Cao et al., 2024; Fumagalli & Toccolini, 2012; Vasconcelos, 2007; Yahner et al., 1995). The solutions of this project provide a way to do so.

Results suggest that features specific to the Pūharakekenui environment such as river visibility are valued by key stakeholders, highlighting its unique value to the Christchurch area. Yahner et al. (1995) highlight the value of knowing the natural environment, and interview results support this, saying that connection to the land is important for *tūhonohono*, which impacts our experience of the natural world, and how we inhabit it. Therefore, solutions such as the seating area at Site Two encourage people to spend time in the Pūharakekenui reserves (Fig.8).

6.2.2 Methods for Planning Reserve Networks

Measuring spatial connectivity is important when using GIS to plan a network (Tresidder, 2005). Results agree that planning is required to improve spatial connectivity of the Pūharakekenui. Research suggested that field observations are required to prove GIS accuracy and identify additional hazards (Rae et al., 2007; Talebi et al., 2019). Informed by this, a rough route was planned, and field observations provided supplementary information (Fig.4). Research also emphasised user-friendliness and accessibility of design (Chiou et al., 2010). Therefore,

solutions incorporate features such as the seating area at Site One (Fig.8) to allow people to rest as they walk through the reserves.

6.2.3 Safely Connecting Reserves

Literature cites speed, visibility, and designated crossings as key factors in road safety (Gonzalo-Orden et al., 2018; Retting, 2003). Field observations allowed identification of locations dangerous for pedestrians. Refuge islands help pedestrians cross safely (Cantisani et al., 2023). The design of the refuge island at Site Three will make the road bend and narrow, slowing the speed of vehicles and increasing safety down (Gonzalo-Orden et al., 2018; Majer & Solowczuk, 2023) (Fig.9). Retting et al. (2003), supported by Koopmans et al. (2015), explain the effectiveness of stopping traffic to improve safety, which informed the traffic lights at Site One (Fig. 7).

6.2.4 Features of Reserve Networks for Connectivity

Factors influencing tūhonohono identified by literature include native plantings, shady trees, artworks, connectivity, and cohesive design (Akpinar, 2014; Fumagalli & Toccolini, 2012; leBrasseur, 2022; Yahner et al.,1995). The results suggest that while native plantings and shady trees are valued by stakeholders, the most valued feature to include in a cohesive design is river visibility (Fig.3). Solutions include blue painted over the road as it crosses the river, to increase river visibility (Fig.7). Shady trees have been included in the solution for Site Two (Fig.8) to provide physical comfort and encourage people to spend time in the reserve. At other sites, the height of trees must be balanced with road regulations. Native plantings have been included in each solution, on refuge islands or near the roads to effectively extend the reserves across the road (Fig.9-10).

Due to the value of culture and artwork in the Pūharakekenui observed during field observations, while artwork was not identified as valued in the results, it was included in solutions (Fig. 7-10). Solutions included artwork reflecting local culture and incorporating red and blue hues in the design to emphasise the area's identity (Fig. 7-10). The *waharoa* at Site One is an example, improving reserve visibility and encouraging interest in the culture of the Pūharakekenui.

Akpinar (2014) emphasises the importance of incorporating features unique to the reserves as part of a cohesive design for the network, supported by Witten (2022), who endorses the usage of cultural landscapes, native plantings, and public art to enhance *tūhonohono*. Ground paintings incorporating Māori cultural motifs guide people to the reserve entrance in the solution for Site One, combining clear signage with artwork to enhance sense of place and connectivity (Fig.7). Therefore, the literature and results support the need for cohesive Pūharakekenui designs incorporating these features at connection points and throughout the reserve network.

6.3 Contribution to Existing Literature

This project raises awareness that cultural and artistic elements are important in reserve network planning. These elements were overlooked by existing literature, especially how we can add cultural value to our green spaces (Cao et al., 2024; Fumagalli & Toccolini, 2012). The results incorporated cultural and artistic features, with the caveat that cultural value is subjective and dependent on the history and character of the space, therefore any research into it is difficult to generalise and not a "one size fits all" model.

Rather than developing the reserve network with only one goal in mind (safety *or* sense of place), this project has taken a multi-aspect approach to reserve development. Through prioritisation of safety *and* sense of place, proposed solutions are not only practical but grounded in an experience of the Styx environment. A mixed-methodology approach has facilitated this, providing us with qualitative data from interviews and field observations, and quantitative data from email surveys and GIS land analysis to inform our solutions.

6.4 Strengths and Limitations

Limitations of the research process results provide opportunities for future research. The study duration was constrained, hindering an in-depth understanding of the details. It also prevented in-depth communication with community members, which affected the project's intersubjectivity potential.

Another limitation was research data availability. Gaps in data sources of flow data for the Pūharakekenui River and Ka Pūtahi Creek have limited reliability of flow data. Specific watersheds involved in the project exhibit gaps in data availability. While from reliable,

government-maintained websites, supplementary data from additional sources like other research data was lacking, diminishing its accuracy and credibility.

Finally, the research process was limited by insufficient GIS software functionality and limited GIS experience, which could have led to incomplete data processing (flood risk, trail mapping) and result presentation. It is suggested interpretation of results and conclusions drawn from them is approached with this in mind.

6.5 Future Research Recommendations

Opportunities for improvement include conducting field visits regularly, to understand how the characteristics (e.g. traffic and lighting) of each reserve and crossing changes throughout the day, week, and seasons. To gain an understanding of how the solutions provided have impacted connectivity and sense of place through the Pūharakekenui, it would be beneficial to conduct a survey of users and quantify usership changes over time.

Development of further crossings in the reserve network would lead to increased connectivity of the reserve network. A suggestion would be the connection between the Confluence Reserve and Janet Stewart Reserve (Fig.11) which would link two sites used for gathering of *harakeke* and *rongoa* plants. Streamlining the project's reserve development process would allow application to other underappreciated waterways and reserve networks.

7.0 Conclusion

This aim of this study was to connect reserves along the Pūharakekenui river in safe, creative ways that celebrate the unique character of the Pūharakekenui environment. A mixed methods approach targeted road crossings and led to safe, Pūharakekenui-inspired designs for four connection points along the river. This research provides a springboard for further reserve network developments including cultural elements. More research is needed into how reserve networks impact the unique environments they are part of, and the people who use them.

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Appendix A

Interview Questionnaire that served as guide for the interviews.

Questions to be asked in all interviews:
Tell us a little about what you do, what is your area of expertise?
What is your relationship to the land and river around the Styx Pūharakekenui catchment?
What unique features of the area make it special to you?
Do you visit just one reserve or use many of them?
If so, which reserves/sites?
Have you visited: • *The Ka Pūtahi Community Orchard* • *Ka Pūtahi Reserve on Belfast Road* • *Ouruhia Reserve/ Te Waoku Kapuka off Guthries Road* • *Janet Stewart Reserve* • *Kaputone Confluence Conservation Park* • *The underpass under the northern motorway*
If not, would you be more likely to visit others if they could be easily walked to? *Rank the following features in order of the ones that you believe make reserves more comfortable to spend time in:* *Information boards* *Seating* *Tall, shady trees* *Quietness* *Artwork* *Open spaces* *Clear pathways* *Native plantings* *Wildness* *Plant diversity* *River visibility*
Do you have anything you specifically wish to share with us about the Styx?

For those associated with the Māori groups that use the awa and whenua we will be asking about the significance of the land to their people and anything they specifically wish to share.
Confirm if there are any tapu *(sacred) sites we should not be directing people towards*

For the architect and engineers, we will show them pictures of our crossing sites and give a description of our proposed solutions.
Do you foresee any issues with the proposed road crossings?
Are there any hazards we have not identified you note about this site? *If you have worked on a project like this in the past what was the approximate time and cost of this project?*
What challenges did you face in this project?
What are the advantages and disadvantages of crossing Method 1 vs Method 2, e.g. A traffic light-controlled crossing vs a raised painted crossing?

Appendix B

Glossary of Māori kupu (words) used throughout.

Definitions supplied by *Te aka Māori Dictionary*. (n.d.). Te Aka Māori Dictionary. Retrieved October 17, 2024, from https://www.maoridictionary.co.nz/

Cultural connotations informed by interviews

Harakeke:

1. (noun) *New Zealand flax, Phormium tenax - an important native plant with long, stiff, upright leaves and dull red flowers. Found on lowland swamps throughout Aotearoa/New Zealand. It has straight, upright seed pods. This is a general name for the harakeke leaf and the plant itself, but each different variety has its own name.*

Used for textiles and medicine

Kā Pūtahi

ka 1. (particle) Used before a verb to name an event as occurring or a state existing. No tense is implied so it may be past, present or future.

pūtahi 1. (verb) (-ngia) to join, meet.

2. (noun) confluence, intersection.

Mana

2. (noun) prestige, authority, control, power, influence, status, spiritual power, charisma - *mana* is a supernatural force in a person, place or object. *Mana* goes hand in hand with *tapu*, one affecting the other. The more prestigious the event, person or object, the more it is surrounded by *tapu* and *mana*. *Mana* is the enduring, indestructible power of the *atua* and is inherited at birth, the more senior the descent, the greater the *mana*. The authority of *mana* and *tapu* is inherited and delegated through the senior line from the *atua* as their human agent to act on revealed will. Since authority is a spiritual gift delegated by the *atua*, man remains the agent, never the source of *mana*. This divine choice is confirmed by the elders, initiated by the *tohunga* under traditional consecratory rites (*tohi*). *Mana* gives a person the authority to lead, organise and regulate communal expeditions and activities, to make decisions regarding social and political matters. A person or tribe's *mana* can increase from successful ventures or decrease through the lack of success. The tribe give *mana* to their chief and empower him/her and in turn the *mana* of an *ariki* or *rangatira* spreads to his/her people and their land, water and resources. Almost every activity has a link with the maintenance and enhancement of *mana* and *tapu*. Animate and inanimate objects can also have *mana* as they also derive from the *atua* and because of their own association with people imbued with *mana* or because they are used in significant events. There is also an element of stewardship, or *kaitiakitanga*, associated with the term when it is used in relation to resources, including land and water.

Ōtautahi

1. (location) Christchurch.

Ouruhia

2. (location) region within the Pūharakekenui catchment

Pou

1. **(verb)** (-a) to erect, establish, fix, elevate on poles.
2. **(noun)** post, upright, support, pole, pillar, goalpost, sustenance.
3. **(noun)** support, supporter, stalwart, mentor, symbol of support, metaphoric post - someone, a group, tribe, gathering or something that strongly supports a cause or is a territorial symbol, such as a mountain or landmark, representing that support.
4. **(noun)** column.

Pūharakekenui

pū

1. **(verb) (-hia) to blow gently.**

Harakeke see above

Nui

1. **(verb) to be large, big, many, plentiful, numerous, great, abundant, ample, superior, of high rank, important.**
2. **2. (noun) size, quantity, vastness, greatness, importance, amount, abundance, plenty, rank.**

Rongoā

1. **(verb)** (-tia) to treat, apply medicines.

   2. (noun) remedy, medicine, drug, cure, medication, treatment, solution (to a problem), tonic.

Tūhonohono

1. (verb) (-a) to join.

2. (modifier) compact, linking.

Contextually used to specify the joining of person to land

Waharoa

1. (noun) entrance to a *pā*, gateway, main entranceway.

Wairua

1. **(noun)** spirit, soul - spirit of a person which exists beyond death. It is the non-physical spirit, distinct from the body and the *mauri*. To some, the *wairua* resides in the heart or mind of someone while others believe it is part of the whole person and is not located at any particular part of the body. The *wairua* begins its existence when the eyes form in the foetus and is immortal. While alive a person's *wairua* can be affected by *mākutu* through *karakia*. *Tohunga* can damage *wairua* and also protect the *wairua* against harm. The *wairua* of a miscarriage or abortion can become a type of guardian for the family or may be used by *tohunga* for less beneficial purposes. Some believe that all animate and inanimate things have a *whakapapa* and a *wairua*. Some believe that *atua Māori*, or Io-matua-kore, can instill *wairua* into something. *Tohunga*, the agents of the *atua*, are able to activate or instil a *wairua* into something, such as a new *wharenui*, through *karakia*. During life, the *wairua* may leave the body for brief periods during dreams. The *wairua* has the power to warn the individual of impending danger through visions and dreams. On death the *wairua* becomes *tapu*. It is believed to remain with or near the body and speeches are addressed to the person and the *wairua* of that person encouraging it on its way to Te Pō. Eventually the *wairua* departs to join other *wairua* in Te Pō, the world of the departed spirits, or to Hawaiki, the ancestral homeland. The spirit travels to Te Reinga where it descends to Te Pō. *Wairua* of the dead that linger on earth are called *kēhua*. During *kawe mate*, or *hari mate, hura kōhatu* and other important occasions the *wairua* is summoned to return to the marae.

whakapapa

1. (transitive verb) give history.

3. (verb) (-hia,-tia) to recite in proper order (e.g. genealogies, legends, months), recite genealogies.

4. (noun) genealogy, genealogical table, lineage, descent - reciting *whakapapa* was, and is, an important skill and reflected the importance of genealogies in Māori society in terms of leadership, land and fishing rights, kinship, and status. It is central to all Māori institutions. There are different terms for the types of *whakapapa* and the different ways of reciting them including: *tāhū* (recite a direct line of ancestry through only the senior line); *whakamoe* (recite a

genealogy including males and their spouses); *taotahi* (recite genealogy in a single line of descent); *hikohiko* (recite genealogy in a selective way by not following a single line of descent); *ure tārewa* (male line of descent through the first-born male in each generation).