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How a Stream can Change a City

Restructuring a city for the people

How a Stream Can Change A City

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0.1 Abstract

The motivation of this thesis is to generate an understanding of how cities can begin to shift towards pedestrian friendly centres for activity. Introducing streams into urban environments through the process of daylighting can generate public life, improve sustainability, and enable growth. Daylighting is the process of bringing a stream back to the surface into a more natural state. By ensuring the stream is used as the core driver for strategic change, development can occur on the edges of the stream as a decentralised hub for activity and movement within the public realm. The stream as a public element can connect people and create active stakeholders within urban communities as the contributors to the vibrancy of the city.

Daylighting can be the catalyst to revitalise Wellington and demonstrate that urban environments are not confined to the existing structure of the city when reintegrating natural elements. Pedestrian activity along stream edges can act as a central mode of urban life, complementing Wellington's existing waterfront. Generating public space around water as a central hub can connect people to social spaces that the city has previously turned from in favour of roads. Establishing dominant pedestrian areas located around a daylighted stream enables public space to prioritise activity over movement and allows infrastructure to prioritise people over vehicles. From hills to harbour, water can be used as a design tool, generating a language that can activate urban environments.

In developing the stream's framework, it is important that the first considerations take regard of the direction and flow of the water's path. The directionality of the stream should have the greatest benefit to the affected stakeholders to ensure the stream positively contributes to the qualities of the city. This contribution is essential for the people that work or live adjacent to the new infrastructure, as they will occupy the new space most frequently. Viability of the stream is dependent on the path it takes through the city, as this affects which landowners will be included in the project. Old or small structures, empty sites such as car parks, or roadways with limited vehicle movement could provide the greatest opportunity for development within the city. These should be considered fundamental to the implementation of the stream as they mitigate the changes to the affected stakeholders and benefit other members within the adjacent area.

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1.0 Research Positioning

1.1 Positioning Introduction

Research Positioning

How a Stream can Change a City

Water is the lifeblood of the Earth, however, cities have developed in a way that ignores the natural waterways that once crossed through them. This thesis aims to adapt how water can be re-established within urban environments to respond to the needs of the people who reside in them. Several cities and towns have successfully integrated streams into their fabric, however, this is not common practice for developing urban landscapes. By investigating how a stream can be successfully resurfaced, water can begin to re-enter the veins of the constructed world.

Te Aro, Wellington is in the early stages of its density growth as it looks to build up, instead of out. New Zealanders have a culture of enjoying a large house and a quarter acre section. As houses become increasingly unaffordable in cities, apartments and a higher density lifestyle will inevitably become an acceptable alternative. As this transition occurs, it is important that these urban environments facilitate a high standard of living as they increasingly become homes to New Zealanders.

As populations grow, and the density of urban environments becomes increasingly suffocating, the need for suitable green space for pedestrian activity will continue to increase. Wellington is already well situated along the edge of the harbour, and the walls of the green belt that wrap around the urban landscape. This closely connects people to the sites that contrast from the bustling inner city. The introduction of streams can be used to link the spaces that pedestrians enjoy within the urban context, and reduce the harsh atmosphere of the increasingly vast concrete realm.

It can be argued that there is a lack of understanding in the extent a stream can benefit an urban environment and public activity. Currently, the renewal of streams tends to occur as a 'project', a single element of growth within a city. This contributes to the quality of the space, but does not contribute to the growth of the city as a whole. The daylighting of urban streams within Wellington is a crucial step towards creating a legible city that allows pedestrians to move away from the congested roadways to occupy intimate spaces for more than just transport.

1.1 Positioning Introduction

Research Positioning

Urban environments will face ever growing issues as they adjust to resolve the issues of climate change. One of the core issues that will affect the urban landscape is that of increased storm surges and weather events. By investing in the transition of our cities to reduce the effects of climate change, urban environments will be far less susceptible to damage in the future. Our cities can become more resilient to the effects of climate change by reintegrating the natural systems that have been removed throughout the urbanisation process.

Connecting the urban realm to the natural setting can help to connect pedestrians to a balanced living environment. Allowing people to engage with the surrounding green space by bringing it into the inner city can positively affect the quality of life for pedestrians as they move through the space. A shift towards a more environmentally conscious public realm can be used to integrate large natural systems into the natural infrastructure. The stream can become a natural step towards a more serene and comfortable living environment for the occupants of a city. By addressing the flaws of current daylighting practices, streams will be able to become integral parts of the existing city. The implementation of the stream can be used to add spatial value to the positive and interesting elements of each city.

This exploration aims to analyse and implement solutions to enhance the pedestrian experience. Utilising streams to generate space for pedestrians within the urban realm can help to improve the quality of life for Te Aro's residents. People are the driver for a city's activity, and understanding how pedestrians respond to space in and around the elements of a stream can enable a more positive experience. The focus on the human element within the urban realm can be used to enhance the focus of the city as a place of residence for the people.

This research proposes a different approach to the conventional methods of daylighting streams. The city rather than a single space should be used to direct where streams flow and how development can occur. This development change can enable the implemented streams to build on the aspects of Te Aro that require the most change. Utilising the stream as a tool for redeveloping the city can help to repurpose the use of the stream in an urban context, and reignite public activity around it.

1.1 Positioning Introduction

Research Positioning

Wellington provides a perfect test site for this thesis due to the steep slopes and historical streams that intersect the urban realm. While these streams have been submerged below the city's streets, resurrecting these waterways could completely change the dynamic of the urban fabric.

Fig 1.101. Historical streams throughout Wellington

Wellington Water Network

Culverted Streams

Large concrete culverts have been erected throughout the city to store and remove water as it flows through the city. This method of dealing with water is not only unsightly, but also poor for treating contaminants from the urban environment.

Poor Street Drainage

Drainage from the surface into the stormwater pipes below is necessary due to the current response to water. When water is seen as a waste product it should be removed as quickly as possible. As water can add so much to the urban environment, it seems necessary to shift this outlook and find alternatives to the urban drainage problem.

Street Flooding

Consistent flooding within the streets of Wellington illustrates a need to adapt the way water is treated within the urban context. As our current system cannot handle the capacity of these ever increasing weather events, it's right to adapt how water is removed from the city.

Contaminated Water

Fig 1.201. Issues within Te Aro's Urban Waterways

The removal of natural cleansing systems upstream has caused public waterways to become contaminated. Areas that were once seen as an amenity for the public are now off-limits at the risk of peoples health. Restoring these natural systems can enable these places to be utilised as originally intended.

1.2 Polluted Hydrology

Research Positioning

Urban environments are very susceptible to producing contaminated water due to the way water is transported through cities. Whether from natural aquifers or from precipitation, water entering the city is treated as a waste product, and removed immediately to prevent any disruption to life. This creates a number of problems for the environment, from degraded habitats and ecosystems, to polluted waterways and bodies of water.

The water network that previously flowed through Wellington was capable of cleaning the water before it entered the harbour. The removal of wetlands and plant life from the system has caused the harbour to become filled with contaminants washed down from the streets (Rand Water, 2018). This lack of cleansing affects the way the residents of Wellington are able to occupy their city, preventing them from safely entering the harbour without risk of becoming sick.

The Wellington stormwater system currently relies on an outdated and overwhelmed network of pipes. This system requires a significant upgrade to increase stormwater capacity. The Council has committed investing in the separation of the sewage and stormwater crossovers. This upgrade aims to prevent contaminated water from entering surrounding waterways and Wellington Harbour. This contamination problem also extends to traces of lead, copper and zinc found within the urban stormwater system.

Upgrading of Wellington's water infrastructure will help to minimise the contamination of water within the city. However, this upgrade will have limited capacity benefits for the city, forcing a move towards alternative measures. Insufficient pipe size, and constant blocking of drains due to excess waste material becoming trapped are all regular problems that require urgent attention. Other solutions for removing water from the city must be utilised to minimise the water that must enter the existing network and protect against large weather events.

Wellington Precedents

Waimapihi stream

Fig 1.301. Existing stream representation

Historical streams have been submerged below the city surface and removed from the urban context. This shrine illustrates a positive shift towards appreciating the water ways that traverse Wellington, however, it seems to symbolise the death of our waterways.

Kumutoto Stream

Fig 1.302. Existing stream mouth representation

Existing streams such as the Kumutoto have been reinvigorated, where the water from the land meets the sea. This stream has not yet been completely destroyed, and as a result has been commemorated by opening out the mouth of the stream to illustrate that the water still runs through this site.

1.3 Addressing Streams

Research Positioning

Wellington's network of streams is poorly represented by the current infrastructure. New Zealanders, especially Māori and Iwi, have a special relationship with water. Therefore, it is disappointing to see how restricted the waterways that used to traverse the entire area have become. A little shrine and a rejuvenated stream mouth, the Council appears to be content with the restoration.

Māori continue to have a close relationship with water in all its forms, both spiritually and physically. This special relationship is compromised by the current urban conditions of most New Zealand cities, including Wellington. Water is seen as *taonga* (object or natural resource which is highly prized) to Iwi, therefore it is of great cultural importance for a restoration of Wellington's waterways to take place (Grace, 2010). Māori consider the health of their waterways and themselves to be intertwined, therefore the restoration of these streams within Te Aro would restore this taonga for the local Māori community within Wellington.

Wellington has several interesting features at the water's edge, however this link between the beautiful harbour and the urban environment beyond is limited. In fact, the city has a six lane motorway that divides the two. Projects such as the *City to Sea Bridge* have aimed to reduce the visual and physical disconnect between the two contrasting sites. The movement between these sites though fundamental for any Wellingtonian's recreational activities, is extremely restricted.

The streams that have been submerged below the landscape once provided a link between the hills and harbour. This research project can be used to guide pedestrians between these two contrasting environments by encompassing this fundamental feature of the New Zealand landscape: our waterways.

1.4 National Context

Research Positioning

Fig 1.401. Location of research project

1.4 National Context

Research Positioning

Wellington is the national capital of New Zealand and is home to almost 11% of the total New Zealand population, with almost 500,000 people living in the greater Wellington regional area (WREDA, 2017). Wellington city itself is home to approximately 179,000 residents, a large majority of whom interact with the central, inner suburbs of Wellington.

Due to the steep terrain of Wellington, the hills that surround the central business district (CBD) have squeezed the urban areas into a small slice of land between the harbour and hills creating a dense urban hub. The narrow opportunities for development is one of a number of factors that have contributed to the current housing crisis in Wellington. Due to Wellington's geographical location, a poorly regulated housing market, and a culture of single dwelling living, the price of housing has skyrocketed in the past several years (Tom Hunt, 2017). By transitioning away from low density housing Wellington can generate a paradigm shift from the lifestyle blocks we have previously demanded, towards a more sustainable living.

Wellington was ranked the number one most livable city in the world according to the Deutsche Bank study last year (Deutsche Bank, 2017). This was measured based on a culmination of several factors, including safety; cost of living; commute time; pollution; and others. In order for a city like Wellington to maintain such a positive reputation on the world stage, the city's urban growth must be appropriately managed. It is important to understand that the problems Wellington currently faces could result in the city becoming a less desirable place to reside.

Generating a new model for a densified city is perfect for testing within Wellington's environment, due to the transitioning demographic of the population. Wellington's working age population is expected to rise by over 20,000 in the next 30 years, while groups aged 40 and over stagnate in growth (WCC, 2013). Considering this shift, and with almost 25% of those living within Wellington born internationally, there is now a great opportunity to reinvent the idea of "Kiwi Living" within the city.

1.5 Current Urban Fabric

Research Positioning

Fig 1.501. Existing development plan

Vehicle Movement Corridor	Open Space	Recent development
Pedestrian Movement Corridor	Future Development	Existing Structure

1.5 Current Urban Fabric

Research Positioning

The Wellington City Council Development Plan (WCCD) for Te Aro demands that the density of the inner city increases, in order to grow, without adding more strain to its infrastructure. By shifting this population growth into the CBD and Te Aro, the city's growth can become more sustainable as more people will live within walking distance of their places of employment and amenities. This will also reduce the need for expanding infrastructure into new areas, placing greater demands on existing resources at the heart of the city.

Congested roadways that cut through the centre of the city have caused significant issues for pedestrians and motorists. The growth of the airport and several fast-growing suburbs located to the south and south-east of the city will add strain to infrastructure within central areas of the city. This growth will cause issues of congestion, as the single access way to these areas cuts through Te Aro. Ensuring that this traffic does not disrupt the local lifestyles within these central areas is crucial to maintaining a high quality of life for Wellingtonians.

Currently the WCCD relies almost entirely on private developers to choose where development will be undertaken. By controlling the growth and placement of these developments, Te Aro can grow in a sustainable way that also improves quality of life. A more consistent development plan from the Council can ensure that growth occurs where the infrastructure is required. A strategic plan would enable greater control of the city's resources as it looks to expand and accommodate for Wellington's future growth.

Pedestrian and vehicle movement corridors can be adapted to separate recreational movement from commuting, in order to create safer and more enjoyable spaces for pedestrians to occupy. Current movement focuses on core vehicle transport corridors and movement to and from the waterfront. Generating positive pedestrian spaces away from the increasing traffic through the city will provide quieter, and more comfortable spaces for the surrounding population.

1.6 Research Objectives

Research Positioning

Aim + Objectives

The aim of this thesis is to critique the way urban environments are currently developed, and to realign the stream as a major tool for developments. Large scale redevelopment of urban environments often occur as a fractured mess within existing cities. As the street grid is already set, and the fabric of the urban environment is mostly fixed in place, the opportunities for redevelopment are extremely limited within the existing model. This trend of development tends to limit the growth of a city to a site-by-site and block-by-block process, restricting the control of an urban vision for the city

The specific aims of the research are:

- to contribute to the understanding of daylighting streams within the urban context
- to discover how people perceive the edge conditions within and among stream environments
- to examine how restructuring currently takes place, and how it can be adapted to enable greater benefits to the urban realm
- to investigate the spatial understanding of pedestrians within urban environments, enabling greater understanding for design implementation
- to explore opportunities for growth within different levels of density of existing urban fabric to strategically grow cities.

Specific objectives of the research:

- establish an understanding of potential for daylighting streams within urban environments contrasting from the existing models
- generate spatial applications for future streams implemented within cities and urban space
- create a basic framework for what needs to be considered when undertaking a daylighting process within cities.

1.6 Research Objectives

Research Positioning

Methodology

Urban Research

Investigate the urban context of Wellington to gain understanding of how the city functions on a macro scale.

Spatial Research

Develop an understanding of how pedestrians occupy the current streetscape to generate knowledge of how people traverse the larger context of the city. This can generate an appreciation of why pedestrians utilise the popular/less popular elements of the urban fabric.

Precedent Research

Travel to, and critique how existing streams throughout a variety of contexts affect public life. Utilise different typologies of streams to ensure that a variety of outcomes and spatial occurrences are understood within the context of the stream.

Design Research

Apply urban/spatial/precedent research to specific spaces within the city across a variety of scales. Design interventions are applied to each site with heavy consideration of context within Te Aro, to ensure that outcomes generate specific spatial changes within each site.

1.6 Research Objectives

Research Positioning

Research Problem

Wellington's transition from a landscape to an urban environment has caused the city to quickly and unceremoniously destroy the waterways that once passed through the centre of its varying landscapes. This thesis argues that the problems that have been created through this development can be resolved through the adaptation and redevelopment of these urban places. This development can generate space that benefits the people, reflects upon the history, and resurrects the environment of the site without compromising the growth of the city.

1.6 Research Objectives

Research Positioning

Research Driver

How can a stream be used as a tool to generate public life within urban environments?

2.0 Urban Context

Site Reasoning

Te Aro, Wellington has several streams that can be resurfaced to illustrate the spatial and macro benefits of daylighting within the urban context.

Wellington's steep natural topography encloses Te Aro's population between the hills and water's edge. This central suburb is in transition between low-density suburban housing, to a compact hub of activity. This creates opportunity to break from the common practices of developing sprawling western cities to enable a greater quality of life within the growing centre. Understanding essential urban infrastructure, and the environmental systems that provide habitat for flora and fauna, can drastically improve a city's social context. As these two systems are both in a state of flux in Te Aro's current expansion, developing these aspects simultaneously can create a beautiful merger of these contrasting elements.

The significant water runoff that passes below the urban environment can be reimplemented into the streetscape to contribute to the qualities of the city. This water currently passes directly into the city harbour with little treatment, to then be dumped into the harbour as a waste product. Much of the infrastructure used to achieve this output is old or outdated, requiring substantial restructuring or replacement, forcing Wellington to make significant infrastructural changes. This provides an opportunity to transform Wellingtons' stormwater network into a system of urban streams. These streams can be used to adapt the urban fabric and shift the focus of the city towards the pedestrian experience, whilst generating interest in the historical context, and providing clean water for native species.

2.1 Research Site

Urban Context

Te Aro, Wellington

Fig 2.101. Wellington urban landscape

2.1 Research Site

Urban Context

Fig 2.102. Wellington urban overview from Mount Vic

2.2 Site Hydrology

Urban Context

The four historical streams that dissect the central Te Aro landscape can enable a transformation of the urban realm. Their catchments will play a large role in the character of the streams that are rejuvenated through the city. This is due to the stormwater systems and catchment size that move varying quantities of water through the Central Wellington site.

Fig 2.201. Culverted streams that could be resurfaced

2.2 Site Hydrology

Urban Context

0 400 800 1,600

Fig 2.202. Te Aro catchment opportunities

2.2 Site Hydrology

Urban Context

Climate Analysis

Rainfall Patterns

1264.6mm

Annual Precipitation

105.4 mm

Monthly Precipitation

159

Annual Days Of Rainfall

Fig 2.203. The site has Consistent annual rainfall patterns that affect Te Aro

Temperature Patterns

15.8

Average Max Temperature

12.8

Average Temperature

9.3

Average Min Temperature

Fig 2.204. Average temperature analysis indicates what periods will have the smallest water flow

Te Aro Shadow Study

2.3 Site Infrastructure

Urban Context

Fig 2.301. Broken grid limits movement through Te Aro

Fig 2.302. Stormwater pipes align with streets

Te Aro's stormwater network is heavily aligned with the existing roadways within the urban environment. This enables these waterways to help as an overflow for a stream that cuts through the streetscape to ensure that flooding does not become a problem for residents and other stakeholders adjacent to a stream intervention.

2.3 Site Infrastructure

Urban Context

Te Aro was once a low lying haven for wildlife and waterways, however, urban development has removed any sight of these systems. Streams and waterways are currently presented to the urban population as a relic of the past, and visualised as an element of history that cannot be restored. The issues that Wellington is currently facing in regards to quality of water and expected urban growth have created a climate that would enable these issues to be resolved by restoring the stream to a functioning aspect of the city.

Four streams historically dissected the Te Aro landscape, however, their appearance has been removed from the urban realm in favour of an unobstructed road network shown in Fig 2.201. This urban landscape has not only shut water out from the streets, but also confines pedestrians to the edges of these roads. Reprioritising Wellington as a pedestrian city can be achieved by restoring these streams to the pedestrian realm and limiting vehicle movement through the city.

Wellington's submerged streams have been diminished through the introduction of severe hardscaping within Te Aro and other densified suburbs. This has caused a significant proportion of rainwater run off to enter the stormwater system and exacerbate Wellington's stormwater capacity issues. This could be significantly reduced by creating a secondary floodwater management system to function adjacent to the current network.

A newly implemented stream can be utilised to service several roadways within Te Aro as the primary flood management prevention system. This system would prevent large quantities of stormwater from entering the existing network of pipes. An adjacent stream would also create further opportunity for green space and softscaping to generate more permeable solutions away from both of these systems, creating a more flood resistant city.

2.3 Site Infrastructure

Urban Context

Exploded Urban Context

Fig 2.303. Exploded view of Te Aro indicates predominant infrastructure

2.3 Site Infrastructure

Urban Context

Structural Analysis

Fig 2.304. Predominant structures that affect development opportunities within Te Aro

2.4 Site Movement

Urban Context

City Pedestrian Movement

Fig 2.401. Population that has access to vehicles in Te Aro's surrounding suburbs

Fig 2.402. Core pedestrian movement through Te Aro

2.4 Site Movement

Urban Context

Routes & Destinations

Fig 2.403. Core pedestrian movement towards the CBD through Te Aro

Fig 2.404. Core pedestrian movement towards the Social hubs through Te Aro

2.4 Site Movement

Urban Context

Figure 2.401 illustrates the population living in the suburbs that surround Te Aro and the access they have to vehicles. Given that these surrounding suburbs have up to 38.1% of the population without access to any form of private vehicles, a large number of pedestrians will use other sources of transport (i.dCommunity, 2013). The number of people that depend on access to the central city area extends far beyond those residing within it, due to the significant number of commuters.

The amenities must be capable to service much more than just this immediate population in the city centre. This is due to the influx of people utilising these amenities, such as park spaces and retail outlets causing excessive demand. As the population of Te Aro grows, it should also be noted that the surrounding suburbs are also likely to increase as well, albeit at a slower rate. This should influence the future growth of Te Aro as a central activities hub for these surrounding populations to facilitate the demands of this commuting social community.

The core movement of pedestrians through Te Aro comes from the suburbs to the south with two factors influencing core pedestrians movement. This movement is either towards the CBD, mostly for employment, and to the social hubs of Te Aro, either Cuba Street, Courtenay Place, or sites along the waterfront, and places such as Taranaki Wharf and Oriental parade. In both of these instances, a significant portion of the population will look to cross through the central core of Te Aro. It is this section of the pedestrian population that would be affected by any changes to movement.

The implementation of a stream would change how the city interacts with pedestrians as they make choices for movement. Whether they wish to move swiftly or comfortably drastically changes the type of interaction pedestrians have with a new stream. It is important that these decisions do not erode the quality of the city's experience, but add to the opportunities for its users. Creating moments within the city through the implementation of the stream can influence pedestrians decisions on how they choose to continue their venture. It is crucial that this decision is openly presented to these people.

2.4 Site Movement

Urban Context

Pedestrian activity is a core factor in where a stream can be successfully daylighted as a balance must be struck between adding to existing spaces and creating new ones. Areas such as Courtenay Place and Cuba Street already have large pedestrian movement through the site, so creating alternatives for people to traverse the city as well as creating new areas for businesses to flourish will only increase the vibrancy of Te Aro.

Fig 2.405. Centres within Te Aro that generate varying levels of pedestrian activity

2.4 Site Movement

Urban Context

Te Aro is challenged with moving people through the city. The steep terrain that surrounds Wellington limits the opportunities for growth and has created a bottle neck for vehicle congestion at several points within Te Aro. Employment within the city centre has risen by 22.6 percent since 2000 (WCC, 2015). This trend will continue as the population is also forecasted to rise to 250,000 in 2043. The problem of Wellington commuters travelling through the city will only continue to increase as the airport expansion, and growth of the outer suburbs progress.

Wellington's core public transport routes all intercept the CBD and Te Aro, making these places perfectly connected to the outer suburbs and ideal for intensification. Nearly two thirds of people in the greater Wellington area had used local public transport in 2015, and with growing congestion concerns this will only increase (Government, 2015). These routes that cut through the city are fundamental to its functionality, therefore, enhancing pedestrian access to these transport connections is essential to the city's growth.

Te Aro has a large number of graded parking sites and buildings for commuters to utilise throughout the day for work or recreational activities as shown in figure 2.304. This illustrates the significant opportunities for non-private off-street parking within Te Aro. As the city struggles to push vehicles through, it would seem reasonable to limit the opportunities for commuters to add to the already congested roadways. By limiting the amount of parking available for workers in the central city, demand for alternatives such as public transport and cycling can increase.

2.4 Site Movement

Urban Context

Transport Context

2.4 Site Movement

Urban Context

2.4 Site Movement

Urban Context

The variety of roadways that cut through the city provide an opportunity for analysis. The spatial uses for these street typologies differs greatly, while the contrast between the individual streets regardless of the typology is also very prominent. Understanding how pedestrians utilise each space is fundamental to generating new spaces that function within these existing urban environments.

Te Aro consists of several poorly defined and incomplete roadways within the urban realm. The city's grid appears to have been cut off before completion at a number of junctions and is now trapped by the structures that it attempts to serve. The roadways that feed into centre of the city strangle the hub as routes are intertwined with one another. This provides the greatest challenge for any growth, as the city looks to limit the traffic that chokes it without cutting off the lifeblood that enables progression.

Considering the nuances within micro environments will enable a full understanding of the most applicable solutions that can be appropriated for each space.

3.0 Spatial Context

3.1 Context Introduction

Spatial Context

Site Reasoning

This spatial context test aims to fully understand how the spaces within Te Aro currently function, and how they can be optimised within the development of the city. The spaces have been categorised according to the streets to investigate the nuances that occur within them. This enables further understanding of the pedestrian responses that often occur as a result of the relationship between the movement of vehicles and people.

The four categories chosen for further investigation are main roadways, arterial roadways, moderate roadways and minor roadways. This categorisation of spatial typologies will provide a platform to understand how each space can be developed or avoided. This will enable greater rationale when determining the directionality of the streams as it intersects through the city.

The core street typologies have distinct and defining characteristics that have been outlined in Fig 2.305. Each space has a variety of factors that affect the levels of pedestrian engagement within each space; whether, it be the location of the street within the city, or the proximity to specific destinations. All of these traits need to be considered in attempting to understand how a space has been developed.

There are a number of other factors that need to be considered within this test. The perception of the space is drastically altered by the persons moment of interaction, as activities shift over various time scales. Weather patterns and time of day significantly affect the response of pedestrians to each space, as this can change the programme of the site. More consistent patterns of behaviour as pedestrians interact with objects, such as seating and traffic lights also occur at much smaller cycles within each space, and should also be considered within this investigation.

The consideration of all of these factors will be fundamental to how a space can be developed, and whether changing the space is necessary in improving the city as a whole. Utilising these spatial investigations and the greater urban analysis will provide a method for reimplementing of a daylighted stream through Te Aro.

3.1 Context Introduction

Spatial Context

Street Typologies

Fig 2.305. Te Aro street typologies

3.2 Main Roadway Spatial Programme

Spatial Context

The main roadways that cut through the city are the core barrier to the comfortable movement of people through Te Aro. Understanding these spaces is necessary to ensure that the flow of people does not become an issue of safety and congestion.

0 100 200 400
Fig 3.201. Main Roadways intersecting Te Aro

3.2 Main Roadway Spatial Programme

Spatial Context

Fig 3.202. Southern Cambridge Terrace reference map

Lorne Street

Very few pedestrians walk along Lorne Street, instead utilising Tennyson Street and College Street due to the increased sunlight exposure

Congregational Church

A small historic church is located on the edge of the several residential suburbs

Vivian Street

Few Vehicles move north along Cambridge Terrace, instead moving to the outer suburbs

Fig 3.203. Southern Cambridge Terrace movement diagram

Elizabeth Street

This roadway is a core bus route for commuters living out beyond the airport

Home Street

Several small apartments exist along this street however the space is dominated by vehicle distributors

Gazley Motors

This section of Kent and Cambridge Terrace is dominated by vehicle oriented commercial industry

Pirie Street

Pedestrian movement between Mt. Victoria and Te Aro often comes from Pirie and Elizabeth Street

Central green space between both lanes of traffic is under used due to the lack of atmosphere in the space

Parking along the street is often heavily used however creates a much wider and more barren streetscape

Fig 3.204. Southern Cambridge site on-street elements

3.2 Main Roadway Spatial Programme

Spatial Context

Fig 3.205. Northern Cambridge reference map

- Public Commercial Eateries**
Several small commercial eateries add to the atmosphere to the end of Courtenay Place
- Large Medium Strip**
This large medium strip is poorly utilised by pedestrians as it is difficult to safely cross to the center
- Alpha Street**
Alpha Street is a small roadway used primarily for parking within close proximity to popular pedestrian areas such as Courtenay Place and the waterfront
- Tennyson Street**
This edge of Tennyson Street has a narrow single lane roadway but both directions are legal for vehicles

Fig 3.206. Northern Cambridge movement diagram

- The Welsh Dragon Bar**
A historic bar located in the centre of Kent and Cambridge Terrace occupies an otherwise underutilised medium
- The Embassy Theatre**
The theatre is a high-end site driver located at the end of Courtenay Place and brings a large number of pedestrians to the site
- Commercial Offices**
These offices contribute little to the public life of the site
- Edge Hill**
This road is primarily residential consisting of several small town houses

Seating in the central portion of the road is almost always empty as this space is very uncomfortable to occupy during any period

Taxis regularly park along Cambridge Terrace as they wait for a call from surrounding busy pedestrian streets

Fig 3.207. Southern Cambridge site on-street elements

3.2 Main Roadway Spatial Programme

Spatial Context

Cambridge Terrace Movement

Section Features

- Single Side Covered Walkway
- Minor Street Planting
- Significant Sunlight Exposure
- No Parking
- Very Wide Roadway
- Wide Central Medium Strip
- Eatery Site Drivers
- Very Wide Pedestrian Area

Section Features

- Single Side Covered Walkway
- Significant Street Trees
- Significant Sunlight Exposure
- Single Side Street Parking
- Very Wide Roadway
- Wide Central Medium Strip
- Vehicle Site Driver
- Very Wide Pedestrian Area

Fig 3.208. Vivian Street intersection spatial analysis

Fig 3.209. Pirie Street intersection spatial analysis

3.2 Main Roadway Spatial Programme

Spatial Context

Cambridge Terrace Movement

Section Features

- Covered Walkway
- On-street Parking
- Vehicle Site Driver
- Parking Site Driver
- Significant Street Trees
- Very Wide Roadway
- Very Wide Pedestrian Area
- Significant Sunlight Exposure
- Wide Central Medium Strip

Section Features

- Single Side Covered Walkway
- No Parking
- Vehicle Site Driver
- Pedestrian Site Driver
- Central Covered Pedestrian Area
- Very Wide Roadway
- Very Wide Pedestrian Area
- Significant Sunlight Exposure
- Wide Central Medium Strip

Fig 3.210. Alpha Street intersection spatial analysis

Fig 3.211. Courtenay Place intersection spatial analysis

3.2 Main Roadway Spatial Programme

Spatial Context

Cambridge Terrace Programme Variation

Fig 3.212. Cambridge Terrace morning activity

Fig 3.213. Cambridge Terrace noon activity

- Roadway
- Shared Space Roadway

- Exposed Walkway
- Exposed / Undesirable Walkway

- Covered Walkway
- Covered / Undesirable Walkway

- Road Area Parking
- Pedestrian Area Parking

3.2 Main Roadway Spatial Programme

Spatial Context

Cambridge Terrace Programme Variation

3.2 Main Roadway Spatial Programme

Spatial Context

Fig 3.217. Vivian Street reference map

Vivian Street Programme Variation

Fig 3.218. Vivian Street movement diagram

The green space in Cobblestone Park creates a comfortable place to occupy despite the fast moving traffic

Movement across the road is dependent on the distance of the vehicle from the pedestrian

Fig 3.218. Vivian Street site on-street elements

3.2 Main Roadway Spatial Programme

N Spatial Context

Vivian Street Movement

3.2 Main Roadway Spatial Programme

Spatial Context

Vivian Street Programme Variation

- Sunlight exposure creates comfortable park space and footpath
- Wide footpath gives pedestrians significant space to wait before crossing
- Shadows limit pedestrian comfort

Fig 3.223. Vivian Street noon activity

- Sunlight exposure creates comfortable park space and footpath
- Wide footpath gives pedestrians significant space to wait before crossing
- Shadows limit pedestrian comfort
- No vehicles creates sense of comfort to cross the road

Fig 3.224. Vivian Street afternoon activity

- Sunlight exposure creates comfortable areas within park space
- Wide footpath gives pedestrians significant space to wait before crossing
- Shadows limit pedestrian comfort

Fig 3.225. Vivian Street evening activity

- Footpath becomes remains comfortable due to lack of vehicles movement
- Streetscape becomes comfortable once past moving vehicles
- Poor lighting removes comfort within park space

Fig 3.226. Vivian Street night activity

0 10 20 40

- Roadway
- Exposed Walkway
- Covered Walkway
- Road Area Parking
- Shared Space Roadway
- Exposed / Undesirable Walkway
- Covered / Undesirable Walkway
- Pedestrian Area Parking

3.2 Main Roadway Spatial Programme

Spatial Context

Fig 3.227. Eastern Wakefield Street reference map

- Waterfront Access**
Wakefield acts as a barrier that wraps around the waterfront making it difficult to reach during peak traffic periods
- Tory Street**
Due to Wakefield Streets single directionality and open view of on coming traffic, this area is much easier to cross
- Angled Parking**
The street width is significantly expanded due to the area required for on-street angle parking
- Allen Street**
Less people move down Allen Street due to the lack of direct access to the waterfront and heavy parking

Wakefield Street (Eastern)

Fig 3.228. Eastern Wakefield movement diagram

- Waitangi Park**
Pedestrians often cut through the supermarket car park and Chaffers Street towards the park
- Supermarket Parking**
Significant space is occupied by parking provided for patrons
- New World Supermarket**
Heavy pedestrian movement across Wakefield Street is caused by the supermarket
- Cambridge Terrace**
Heavy vehicle movement turns onto Wakefield Street from Cambridge Terrace

Pedestrians will always cross when an opening occurs in traffic, whether it is permitted or not

Shelters placed correctly have been used to block the view of traffic from pedestrians utilising the bench

Fig 3.229. Eastern Wakefield site on-street elements

3.2 Main Roadway Spatial Programme

Spatial Context

Fig 3.230. Western Wakefield Street reference map

- Petrol Station**
Used by pedestrians as a convenience store due to a lack of alternatives close by
- Taranaki Street Intersection**
One of the largest intersections in Wellington has several connecting roads and consistently heavy traffic
- Commercial Offices**
Newly Renovated offices bring a large number of workers to the site
- Off-street Parking**
This large unoccupied site is utilised primarily for the cinema's during the Weekend and for general parking during weekdays

Fig 3.231. Western Wakefield Street movement diagram

- Te Papa**
One of the largest site driver in Wellington requires crossing both Wakefield and Cable Street
- Off-street Parking**
The Proposed site for a large movie museum, the site has recently been cleared and currently used for parking
- Wide Roadway**
The wide nature of the roadway creates an uncomfortable pedestrian experience for pedestrians
- Interior Thoroughfare**
The interior space enables pedestrians to walk through to Wakefield Street and towards the waterfront

Limited on-street amenities causes people to take advantage of kerbs and other unintentional pedestrian spaces

So many parking areas begins to allow for interactions between people as they pay for parking or move between their vehicle

Fig 3.232. Western Wakefield site on-street elements

3.2 Main Roadway Spatial Programme

N Spatial Context

Wakefield Street Movement

3.2 Main Roadway Spatial Programme

Spatial Context

Wakefield Street Programme Variation

Green Light

- Sunlight exposure improves pedestrian comfort
- Safe area away from vehicles
- Fast moving vehicles prevent crossing

Green Light

- Sunlight exposure improves pedestrian comfort
- Safe area away from vehicles
- Space past oncoming vehicles feels comfortable
- Oncoming vehicles prevents crossing

Yellow Light

- Sunlight exposure improves pedestrian comfort
- Safe area away from vehicles
- No visible oncoming vehicles creates sense of safety

Red Light

- Sunlight exposure improves pedestrian comfort
- Green Man enables all pedestrians to cross comfortably

Fig 3.234. Wakefield Street green

Fig 3.235. Wakefield Street green

Fig 3.236. Wakefield Street yellow

Fig 3.237. Wakefield Street red

3.3 Arterial Roadway Spatial Programme

Spatial Context

0 100 200 400
Fig 3.301. Arterial Roadways intersecting Te Aro

3.3 Arterial Roadway Spatial Programme

Spatial Context

Fig 3.302. Eastern Courtenay Place reference map

Courtenay Place (Eastern)

Allen Street
Minor movement as the parking layout prevents free movement by restricting free space

Central Pedestrian Median
Helps to break up the road and slow vehicle traffic while enabling pedestrian traffic to cross

Side Road
A small side road used for parking and as a loading zone to adjacent businesses

Cambridge Terrace
Significant pedestrian traffic moves towards Courtenay Place through the rest of the city

Fig 3.303. Eastern Courtenay Place movement diagram

Blair Street
Used primarily as a pedestrian thoroughfare to the water front and a social hub

Bus Stops
Six large bus shelters line the edges of the street for commuters

Large Angle Parking
Space for pedestrians is significantly reduced due to the inefficient parking option

Pedestrian Area
A largely unused pedestrian area due to its large scale and poor placement within the space

Significant bus shelters due to the heavy commuting population that use this route provides a comfortable space to wait

Road reduces space for pedestrians to occupy while providing parking to people in close proximity to public transport Routes

Fig 3.304. Eastern Courtenay Place site on-street elements

3.3 Arterial Roadway Spatial Programme

Spatial Context

Fig 3.305. Western Courtenay Place reference map

Courtenay Place (Western)

- Taranaki Street Intersection**
Heavy vehicle traffic creates a dangerous obstacle for pedestrians moving along this core corridor
- Tommy Millions Pizza**
Food at the western edge of Courtenay Place is a core site driver for pedestrians
- Open Pedestrian Space**
The large pedestrian space is often occupied due to the significant sunlight exposure

Fig 3.306. Courtenay Place movement diagram

- Interior Thoroughfare**
The interior space enables pedestrians to walk through to Wakefield Street and towards the waterfront
- Reading Cinemas**
A significant site driver for afternoon and evening activities while remaining quiet during the day
- St. James Theatre**
A significant site driver for evening activities with a popular cafe during the day
- St. James Theatre Lane-way**
Small an underutilised lane-way from behind parking areas creates a uncomfortable space for pedestrians

Unique on-street furniture is heavily used due the sunlight exposure and close proximity to eateries

Small gravel mediums create a sense of safety for pedestrians when crossing this arterial roadway

Fig 3.307. Courtenay Place site on-street elements

3.3 Arterial Roadway Spatial Programme

Spatial Context

Courtenay Place Movement

Section Features

- Covered Walkways
- Single Edge On-street Parking
- Bar Site Drivers
- Eatery Site Drivers
- Significant Street Trees
- Wide Roadway
- Very Wide Pedestrian Area
- Significant Sunlight Exposure

Fig 3.308. Blair Street intersection spatial analysis

Section Features

- Covered Walkways
- No Parking
- Eatery Site Drivers
- Wide Roadway
- Wide Pedestrian Area
- Significant Sunlight Exposure
- Central Medium Strip

Fig 3.309. Allen Street intersection spatial analysis

3.3 Arterial Roadway Spatial Programme

Spatial Context

Section Features

- Covered Walkways
- No Parking
- Bar Site Drivers
- Narrow Roadway
- Wide Pedestrian Area
- Moderate Sunlight Exposure

Fig 3.310. Tory Street intersection spatial analysis

Courtenay Place Movement

Section Features

- Covered Walkways
- On-street Parking
- Restaurants Site Drivers
- Eatery Site Drivers
- Narrow Roadway
- Narrow Pedestrian Area
- Significant Sunlight Exposure

Fig 3.311. Courtenay Place intersection spatial analysis

3.3 Arterial Roadway Spatial Programme

Spatial Context

Courtenay Place Programme Variation

- Wide pedestrian areas improves comfort
- Shadow limits pedestrian comfort
- Moving vehicles restrict pedestrians to the edges
- Central medium strip enables pedestrians to cross more safely
- Areas on roadway feel unsafe while vehicles move through space

- Wide pedestrian areas improves comfort
- Shadows reduce pedestrian Comfort
- Moving vehicles restrict pedestrians to the edges
- Side roads become pedestrianised when no vehicles are present
- Heavy Public Transport creates hazards on the edges of pedestrian spaces

Fig 3.312. Courtenay Place noon activity

Fig 3.313. Courtenay Place evening activity

0 10 20 40

- Roadway
- Shared Space Roadway

- Exposed Walkway
- Exposed / Undesirable Walkway

- Covered Walkway
- Covered / Undesirable Walkway

- Road Area Parking
- Pedestrian Area Parking

3.3 Arterial Roadway Spatial Programme

N Spatial Context

Courtenay Place Programme Variation

- Covered pedestrian area improves comfort
- Trees create small areas of shelter
- Lack of vehicles remains uncomfortable due to rain
- ▼ Vehicles prevent pedestrians from moving to shelter

Fig 3.314. Courtenay Place poor weather activity

- Sufficient lighting increases pedestrian comfort
- Shadow limits pedestrian comfort
- No vehicles improves pedestrian comfort
- Central medium strip improves pedestrians safety
- Wide pedestrian area improves comfort
- Areas away from vehicles create comfortable spaces for pedestrians
- Poor Lighting reduces pedestrian comfort
- ▼ Vehicles must often stop for crossing pedestrians

Fig 3.315. Courtenay Place night activity

0 10 20 40

- Roadway
- Shared Space Roadway

- Exposed Walkway
- Exposed / Undesirable Walkway

- Covered Walkway
- Covered / Undesirable Walkway

- Road Area Parking
- Pedestrian Area Parking

3.3 Arterial Roadway Spatial Programme

Spatial Context

Fig 3.316. Southern Taranaki Street reference map

Marion Street

Wide street used predominantly for both on-street and off-street parking

Briscoes

The retail store occupies a significant area while acting as a moderate site driver

Vivian Street

State Highway One is the core transport corridor through to Wellington International Airport and therefore has a consistent traffic flow

Knigges Avenue

A small, dead end street provides access to several off-street parking areas however the narrow street has difficult access from Vivian Street

Taranaki Street (Southern)

Fig 3.317. Southern Taranaki Street movement diagram

Capital City Mazda

Occupies a large section of Taranaki Street without contributing to public life

Jessie Street

This side street is often used as a short cut for vehicles to skip the Vivian Street traffic lights.

Jessie Street Parking

Empty lots have been occupied by parking however these have also created access ways for pedestrians to move amongst the vehicles rather than the traffic

Abandoned Lot

A large abandoned site with a historic church has been left empty for several years

Heavy public transport route causes Taranaki Street to be used as a thoroughfare for pedestrians from outer suburbs

The four lane road is difficult to traverse however the medium strip enables easier transitions across the road

Fig 3.318. Southern Taranaki Street site on-street elements

3.3 Arterial Roadway Spatial Programme

N Spatial Context

Fig 3.319. Southern Taranaki Street reference map

Taranaki Street (Northern)

Inglewood Place
Small side street is used as a parking area and transition point for vehicles

Egmont Street
Egmont is a quiet lane-way predominantly used by pedestrians however does have vehicle access

Soho Apartments
Many pedestrians move onto Taranaki Street from Ghuznee to move north to the waterfront or south to the suburbs

Ghuznee Street
Many pedestrians move onto Taranaki Street from Ghuznee to move north to the waterfront or south to the suburbs

Fig 3.320. Southern Taranaki Street movement diagram

Courtenay Place Intersection
The wide street and fast moving traffic creates an unsafe environment for pedestrians to enter and cross

Restaurants and Eateries
This section of roadway transitions into a pedestrian friendly area which provides several dining options before transitioning onto Courtenay Place

York Street
Often used as a thoroughfare between Tory Street along with an off-street parking area

Wellington Methodist Parish
Property is often used as a thoroughfare for pedestrians while also providing a central city meeting place

Inglewood Place is often home to small street vendors that add to the public life of the area

Significant street trees help to separate areas and move pedestrians away from the fast moving and dangerous areas of traffic

Fig 3.321. Southern Taranaki Street site on-street elements

3.3 Arterial Roadway Spatial Programme

Spatial Context

Taranaki Street Movement

Section Features

- Single Covered Walkway
- Off-street Parking
- Commercial Store Site Drivers
- Vehicle Site Drivers
- Very Wide Roadway
- Wide Pedestrian Area
- Significant Sunlight Exposure
- Central Medium Strip

Fig 3.322. Frederick Street intersection spatial analysis

Section Features

- Single Covered Walkway
- Off-street Parking
- Commercial Store Site Drivers
- Vehicle Site Drivers
- Very Wide Roadway
- Wide Pedestrian Area
- Significant Sunlight Exposure
- Central Medium Strip

Fig 3.323. Taranaki Street Briscoes car park spatial analysis

3.3 Arterial Roadway Spatial Programme

Spatial Context

Section Features

- Covered Walkway
- No Street Parking
- Vehicle Site Drivers
- Narrow Roadway
- Wide Pedestrian Area
- Moderate Sunlight Exposure
- Central Medium Strip

Fig 3.324. Ghuznee Street Intersection spatial analysis

Taranaki Street Movement

Section Features

- Two Side Covered Walkway
- On-street Parking
- Gym Site Drivers
- Bus Stop Site Driver
- Very Wide Roadway
- Wide Pedestrian Area
- Significant Sunlight Exposure

Fig 3.325. Inglewood Place spatial analysis

3.3 Arterial Roadway Spatial Programme

Spatial Context

Taranaki Street Programme Variation

- Wide pedestrian areas improve comfort
- Wide medium strip improves comfort for pedestrians
- ⚠ Heavy traffic restricts movement across roadways

Fig 3.326. Taranaki Street noon activity

- Roadway
- Shared Space Roadway

- Covered walkway improves comfort
- Wide pedestrian area improves comfort
- Exposed walkway becomes unpleasant due to rain
- Central medium strip becomes unpleasant due to rain

Fig 3.327. Taranaki Street poor weather activity

- Exposed Walkway
- Covered Walkway
- Road Area Parking
- Exposed / Undesirable Walkway
- Covered / Undesirable Walkway
- Pedestrian Area Parking

3.3 Arterial Roadway Spatial Programme

Spatial Context

Taranaki Street Programme Variation

Fig 3.328. Taranaki Street evening activity

Fig 3.329. Taranaki Street night activity

3.3 Arterial Roadway Spatial Programme

N Spatial Context

Fig 3.330. Southern Victoria Street reference map

Victoria Street (Southern)

- Redevelopment**
A large apartment building is currently being constructed in this area to increase the central population
- Parking Structure**
A large building provides commuters with another alternative for parking during weekdays
- Off-street Parking**
Significant off-street parking is a dominant feature of this site as its also located adjacent to Vivian Street and commuters coming into the city from the suburbs
- Vivian Street**
This One way main roadway dominates the flow of vehicles in this area

Fig 3.331. Southern Victoria Street movement diagram

- Off-street Parking**
This area is utilised entirely for parking preventing this space from being occupied by pedestrians
- Ghuznee Street**
Movement of pedestrians along Cuba Street is much more comfortable for pedestrians than Victoria, so pedestrians use Ghuznee to move across to Cuba
- Garret Street**
Movement onto Garrett Street has been blocked due to private parking preventing access
- Pedestrian Area**
Newly created pedestrian areas are underutilised due to the lack of public commercial infrastructure

New green space alongside the road will only improve as the trees grow and shelter the space from the noise of heavy traffic

Victoria Street is the main connection through to some southern Suburbs and therefore a significant bus route

Fig 3.332. Southern Victoria Street site on-street elements

3.3 Arterial Roadway Spatial Programme

N Spatial Context

Fig 3.333. Northern Victoria Street reference map

Fig 3.334. Northern Victoria Street movement diagram

On-street seating and a small cafe are used to bring people to an otherwise unusable space with this temporary intervention

Seating facing the minor pedestrian areas is still utilised despite the loud and fast moving traffic moving through the space

Fig 3.335. Northern Victoria Street site on-street elements

3.3 Arterial Roadway Spatial Programme

Spatial Context

Victoria Street Movement

Section Features

- Exposed Walkway
- Off-street Parking
- Vehicle Site Driver
- Parking Site Driver
- Minor Street Trees
- Very Wide Roadway
- Very Wide Pedestrian Area
- Significant Sunlight Exposure
- On-street Seating

Fig 3.336. Vivian Street Intersection spatial analysis

Section Features

- Exposed Walkway
- Off-street Parking
- Vehicle Site Driver
- Parking Site Driver
- Significant Street Trees
- Very Wide Roadway
- Very Wide Pedestrian Area
- Significant Sunlight Exposure

Fig 3.337. Ghuznee Street Intersection spatial analysis

3.3 Arterial Roadway Spatial Programme

Spatial Context

Victoria Street Movement

Section Features

- Exposed Walkway
- No Parking
- Vehicle Site Driver
- Parking Site Driver
- Significant Street Trees
- Very Wide Roadway
- Very Wide Pedestrian Area
- Moderate Sunlight Exposure
- On-street Seating

Fig 3.338. Dixon Street intersection spatial analysis

Section Features

- Exposed Walkway
- On-street Parking
- Vehicle Site Driver
- Parking Site Driver
- Significant Street Trees
- Very Wide Roadway
- Wide Pedestrian Area
- Moderate Sunlight Exposure

Fig 3.339. Manners Street intersection spatial analysis

3.3 Arterial Roadway Spatial Programme

Spatial Context

Victoria Street Programme Variation

Morning

- Wide pedestrian areas improve comfort
- Trees create barrier between vehicles and pedestrians
- Shadows reduce pedestrian comfort
- In frequent northbound traffic improves comfort for pedestrians on roadway
- Heavy southbound traffic restricts movement across roadways

Noon

- Covered walkway improves comfort
- Trees create barrier between vehicles and pedestrians
- Space on roadway due to rain
- Roadway becomes unsafe for pedestrians due to rain
- Heavy traffic creates difficult space to cross

Fig 3.340. Victoria Street morning activity

Fig 3.341. Victoria Street poor weather Activity

0 10 20 40

- Roadway
- Shared Space Roadway

- Exposed Walkway
- Exposed / Undesirable Walkway

- Covered Walkway
- Covered / Undesirable Walkway

- Road Area Parking
- Pedestrian Area Parking

3.3 Arterial Roadway Spatial Programme

Spatial Context

Victoria Street Programme Variation

- Wide pedestrian areas improve comfort
- Shadows reduce pedestrian comfort
- ▲ Heavy southbound traffic restricts movement across roadways
- Trees create barrier between vehicles and pedestrians
- Infrequent northbound traffic improves comfort for pedestrians on roadway

- Well lit areas improve pedestrian comfort
- Wide pedestrian area improves comfort
- Poorly lit roadways feels unsafe for pedestrians
- ▲ Heavy traffic creates difficult space to cross

Fig 3.342. Victoria Street afternoon activity

Fig 3.343. Victoria Street night activity

0 10 20 40

- Roadway
- Shared Space Roadway

- Exposed Walkway
- Exposed / Undesirable Walkway

- Covered Walkway
- Covered / Undesirable Walkway

- Road Area Parking
- Pedestrian Area Parking

3.4 Moderate Roadway Spatial Programme

Spatial Context

The moderate roadways within the city are often much quieter than the arterial and main roadways, however, during periods of high congestion these roads often overflow with slow moving vehicles and change the dynamic of the urban landscape.

0 100 200 400
Fig 3.401. Moderate Roadways intersecting Te
Aro

3.3 Arterial Roadway Spatial Programme

Spatial Context

0 100 200 400
Fig 3.301. Arterial Roadways intersecting Te Aro

3.3 Arterial Roadway Spatial Programme

Spatial Context

Fig 3.302. Eastern Courtenay Place reference map

Courtenay Place (Eastern)

Fig 3.303. Eastern Courtenay Place movement diagram

Significant bus shelters due to the heavy commuting population that use this route provides a comfortable space to wait

Road reduces space for pedestrians to occupy while providing parking to people in close proximity to public transport Routes

Fig 3.304. Eastern Courtenay Place site on-street elements

3.3 Arterial Roadway Spatial Programme

Spatial Context

Fig 3.305. Western Courtenay Place reference map

Courtenay Place (Western)

Taranaki Street Intersection

Heavy vehicle traffic creates a dangerous obstacle for pedestrians moving along this core corridor

Tommy Millions Pizza

Food at the western edge of Courtenay Place is a core site driver for pedestrians

Open Pedestrian Space

The large pedestrian space is often occupied due to the significant sunlight exposure

Fig 3.306. Courtenay Place movement diagram

Interior Thoroughfare

The interior space enables pedestrians to walk through to Wakefield Street and towards the waterfront

Reading Cinemas

A significant site driver for afternoon and evening activities while remaining quiet during the day

St. James Theatre

A significant site driver for evening activities with a popular cafe during the day

St. James Theatre Lane-way

Small an underutilised lane-way from behind parking areas creates a uncomfortable space for pedestrians

Unique on-street furniture is heavily used due the sunlight exposure and close proximity to eateries

Small gravel mediums create a sense of safety for pedestrians when crossing this arterial roadway

Fig 3.307. Courtenay Place site on-street elements

3.3 Arterial Roadway Spatial Programme

Spatial Context

Courtenay Place Movement

Section Features

- Covered Walkways
- Single Edge On-street Parking
- Bar Site Drivers
- Eatery Site Drivers
- Significant Street Trees
- Wide Roadway
- Very Wide Pedestrian Area
- Significant Sunlight Exposure

Fig 3.308. Blair Street intersection spatial analysis

Section Features

- Covered Walkways
- No Parking
- Eatery Site Drivers
- Wide Roadway
- Wide Pedestrian Area
- Significant Sunlight Exposure
- Central Medium Strip

Fig 3.309. Allen Street intersection spatial analysis

3.3 Arterial Roadway Spatial Programme

Spatial Context

Section Features

- Covered Walkways
- No Parking
- Bar Site Drivers
- Narrow Roadway
- Wide Pedestrian Area
- Moderate Sunlight Exposure

Fig 3.310. Tory Street intersection spatial analysis

Courtenay Place Movement

Section Features

- Covered Walkways
- On-street Parking
- Restaurants Site Drivers
- Eatery Site Drivers
- Narrow Roadway
- Narrow Pedestrian Area
- Significant Sunlight Exposure

Fig 3.311. Courtenay Place intersection spatial analysis

3.3 Arterial Roadway Spatial Programme

Spatial Context

Courtenay Place Programme Variation

- Wide pedestrian areas improves comfort
- Shadow limits pedestrian comfort
- Moving vehicles restrict pedestrians to the edges
- Central medium strip enables pedestrians to cross more safely
- Areas on roadway feel unsafe while vehicles move through space

- Wide pedestrian areas improves comfort
- Shadows reduce pedestrian Comfort
- Moving vehicles restrict pedestrians to the edges
- Side roads become pedestrianised when no vehicles are present
- Heavy Public Transport creates hazards on the edges of pedestrian spaces

Fig 3.312. Courtenay Place noon activity

Fig 3.313. Courtenay Place evening activity

- Roadway
- Shared Space Roadway

- Exposed Walkway
- Exposed / Undesirable Walkway

- Covered Walkway
- Covered / Undesirable Walkway

- Road Area Parking
- Pedestrian Area Parking

3.3 Arterial Roadway Spatial Programme

Spatial Context

Courtenay Place Programme Variation

- Covered pedestrian area improves comfort
- Trees create small areas of shelter
- Lack of vehicles remains uncomfortable due to rain
- ▼ Vehicles prevent pedestrians from moving to shelter

Fig 3.314. Courtenay Place poor weather activity

- Sufficient lighting increases pedestrian comfort
- Shadow limits pedestrian comfort
- No vehicles improves pedestrian comfort
- Central median strip improves pedestrians safety
- Wide pedestrian area improves comfort
- Areas away from vehicles create comfortable spaces for pedestrians
- Poor Lighting reduces pedestrian comfort
- ▼ Vehicles must often stop for crossing pedestrians

Fig 3.315. Courtenay Place night activity

0 10 20 40

- Roadway
- Shared Space Roadway

- Exposed Walkway
- Exposed / Undesirable Walkway

- Covered Walkway
- Covered / Undesirable Walkway

- Road Area Parking
- Pedestrian Area Parking

3.3 Arterial Roadway Spatial Programme

N Spatial Context

Fig 3.316. Southern Taranaki Street reference map

Fig 3.317. Southern Taranaki Street movement diagram

Heavy public transport route causes Taranaki Street to be used as a thoroughfare for pedestrians from outer suburbs

The four lane road is difficult to traverse however the medium strip enables easier transitions across the road

Fig 3.318. Southern Taranaki Street site on-street elements

3.3 Arterial Roadway Spatial Programme

N Spatial Context

Fig 3.319. Southern Taranaki Street reference map

Fig 3.320. Southern Taranaki Street movement diagram

Inglewood Place is often home to small street vendors that add to the public life of the area

Significant street trees help to separate areas and move pedestrians away from the fast moving and dangerous areas of traffic

Fig 3.321. Southern Taranaki Street site on-street elements

3.3 Arterial Roadway Spatial Programme

Spatial Context

Taranaki Street Movement

Section Features

- Single Covered Walkway
- Off-street Parking
- Commercial Store Site Drivers
- Vehicle Site Drivers
- Very Wide Roadway
- Wide Pedestrian Area
- Significant Sunlight Exposure
- Central Medium Strip

Fig 3.322. Frederick Street intersection spatial analysis

Section Features

- Single Covered Walkway
- Off-street Parking
- Commercial Store Site Drivers
- Vehicle Site Drivers
- Very Wide Roadway
- Wide Pedestrian Area
- Significant Sunlight Exposure
- Central Medium Strip

Fig 3.323. Taranaki Street Briscoes car park spatial analysis

3.3 Arterial Roadway Spatial Programme

Spatial Context

Section Features

- Covered Walkway
- No Street Parking
- Vehicle Site Drivers
- Narrow Roadway
- Wide Pedestrian Area
- Moderate Sunlight Exposure
- Central Medium Strip

Fig 3.324. Ghuznee Street Intersection spatial analysis

Taranaki Street Movement

Section Features

- Two Side Covered Walkway
- On-street Parking
- Gym Site Drivers
- Bus Stop Site Driver
- Very Wide Roadway
- Wide Pedestrian Area
- Significant Sunlight Exposure

Fig 3.325. Inglewood Place spatial analysis

3.3 Arterial Roadway Spatial Programme

Spatial Context

Taranaki Street Programme Variation

- Wide pedestrian areas improve comfort
- Wide medium strip improves comfort for pedestrians
- ⚡ Heavy traffic restricts movement across roadways

Fig 3.326. Taranaki Street noon activity

- Roadway
- Shared Space Roadway

- Covered walkway improves comfort
- Wide pedestrian area improves comfort
- Exposed walkway becomes unpleasant due to rain
- Central medium strip becomes unpleasant due to rain

Fig 3.327. Taranaki Street poor weather activity

- Exposed Walkway
- Covered Walkway
- Road Area Parking
- Exposed / Undesirable Walkway
- Covered / Undesirable Walkway
- Pedestrian Area Parking

3.3 Arterial Roadway Spatial Programme

N Spatial Context

Taranaki Street Programme Variation

Fig 3.328. Taranaki Street evening activity

Fig 3.329. Taranaki Street night activity

3.3 Arterial Roadway Spatial Programme

N Spatial Context

Fig 3.330. Southern Victoria Street reference map

Victoria Street (Southern)

- Redevelopment**
A large apartment building is currently being constructed in this area to increase the central population
- Parking Structure**
A large building provides commuters with another alternative for parking during weekdays
- Off-street Parking**
Significant off-street parking is a dominant feature of this site as its also located adjacent to Vivian Street and commuters coming into the city from the suburbs
- Vivian Street**
This One way main roadway dominates the flow of vehicles in this area

Fig 3.331. Southern Victoria Street movement diagram

- Off-street Parking**
This area is utilised entirely for parking preventing this space from being occupied by pedestrians
- Ghuznee Street**
Movement of pedestrians along Cuba Street is much more comfortable for pedestrians than Victoria, so pedestrians use Ghuznee to move across to Cuba
- Garret Street**
Movement onto Garrett Street has been blocked due to private parking preventing access
- Pedestrian Area**
Newly created pedestrian areas are underutilised due to the lack of public commercial infrastructure

New green space alongside the road will only improve as the trees grow and shelter the space from the noise of heavy traffic

Victoria Street is the main connection through to some southern Suburbs and therefore a significant bus route

Fig 3.332. Southern Victoria Street site on-street elements

3.3 Arterial Roadway Spatial Programme

Spatial Context

Fig 3.333. Northern Victoria Street reference map

Fig 3.334. Northern Victoria Street movement diagram

On-street seating and a small cafe are used to bring people to an otherwise unusable space with this temporary intervention

Seating facing the minor pedestrian areas is still utilised despite the loud and fast moving traffic moving through the space

Fig 3.335. Northern Victoria Street site on-street elements

3.3 Arterial Roadway Spatial Programme

Spatial Context

Victoria Street Movement

Section Features

- Exposed Walkway
- Off-street Parking
- Vehicle Site Driver
- Parking Site Driver
- Minor Street Trees
- Very Wide Roadway
- Very Wide Pedestrian Area
- Significant Sunlight Exposure
- On-street Seating

Fig 3.336. Vivian Street Intersection spatial analysis

Section Features

- Exposed Walkway
- Off-street Parking
- Vehicle Site Driver
- Parking Site Driver
- Significant Street Trees
- Very Wide Roadway
- Very Wide Pedestrian Area
- Significant Sunlight Exposure

Fig 3.337. Ghuznee Street Intersection spatial analysis

3.3 Arterial Roadway Spatial Programme

Spatial Context

Victoria Street Movement

Section Features

- Exposed Walkway
- No Parking
- Vehicle Site Driver
- Parking Site Driver
- Significant Street Trees
- Very Wide Roadway
- Very Wide Pedestrian Area
- Moderate Sunlight Exposure
- On-street Seating

Fig 3.338. Dixon Street intersection spatial analysis

Section Features

- Exposed Walkway
- On-street Parking
- Vehicle Site Driver
- Parking Site Driver
- Significant Street Trees
- Very Wide Roadway
- Wide Pedestrian Area
- Moderate Sunlight Exposure

Fig 3.339. Manners Street intersection spatial analysis

3.3 Arterial Roadway Spatial Programme

Spatial Context

Victoria Street Programme Variation

Morning

- Wide pedestrian areas improve comfort
- Shadows reduce pedestrian comfort
- Heavy southbound traffic restricts movement across roadways
- Trees create barrier between vehicles and pedestrians
- In frequent northbound traffic improves comfort for pedestrians on roadway

Noon

- Covered walkway improves comfort
- Trees create barrier between vehicles and pedestrians
- Heavy traffic creates difficult space to cross
- Space on roadway due to rain
- Roadway becomes unsafe for pedestrians due to rain

Fig 3.340. Victoria Street morning activity

Fig 3.341. Victoria Street poor weather activity

0 10 20 40

- Roadway
- Shared Space Roadway

- Exposed Walkway
- Exposed / Undesirable Walkway

- Covered Walkway
- Covered / Undesirable Walkway

- Road Area Parking
- Pedestrian Area Parking

3.3 Arterial Roadway Spatial Programme

Spatial Context

Victoria Street Programme Variation

- Wide pedestrian areas improve comfort
- Shadows reduce pedestrian comfort
- Heavy southbound traffic restricts movement across roadways
- Trees create barrier between vehicles and pedestrians
- Infrequent northbound traffic improves comfort for pedestrians on roadway

- Well lit areas improve pedestrian comfort
- Wide pedestrian area improves comfort
- Poorly lit roadways feels unsafe for pedestrians
- Heavy traffic creates difficult space to cross

Fig 3.342. Victoria Street afternoon activity

Fig 3.343. Victoria Street night activity

0 10 20 40

- Roadway
- Shared Space Roadway

- Exposed Walkway
- Exposed / Undesirable Walkway

- Covered Walkway
- Covered / Undesirable Walkway

- Road Area Parking
- Pedestrian Area Parking

3.4 Moderate Roadway Spatial Programme

Spatial Context

The moderate roadways within the city are often much quieter than the arterial and main roadways, however, during periods of high congestion these roads often overflow with slow moving vehicles and change the dynamic of the urban landscape.

0 100 200 400
Fig 3.401. Moderate Roadways intersecting Te
Aro

3.5 Minor Roadway Spatial Programme

N Spatial Context

College Street Spatial Programme

Fig 3.531. College Street morning activity

Fig 3.532. College Street noon activity

Fig 3.533. College Street poor weather activity

Fig 3.534. College Street night activity

- Roadway
- Exposed Walkway
- Covered Walkway
- Road Area Parking
- Shared Space Roadway
- Exposed / Undesirable Walkway
- Covered / Undesirable Walkway
- Pedestrian Area Parking

3.5 Minor Roadway Spatial Programme

N Spatial Context

Fig 3.534. Wigan Street reference map

Fig 3.535. Wigan Street movement diagram

Wigan Street is significantly occupied by vehicles, contrasting to other public commercial site drivers

The narrow streets prevents vehicle movement from using wigan street as a short cut

Fig 3.536. Wigan Street site on-street elements

3.5 Minor Roadway Spatial Programme

Spatial Context

Wigan Street

Section Features

- Exposed Walkway
- Off-street Parking
- Church Site Drivers
- Very Narrow Roadway
- Narrow Pedestrian Area
- Significant Sunlight Exposure

Section Features

- Exposed Walkway
- On-street Parking
- Cinema Site Driver
- University Site Driver
- Narrow Roadway
- Wide Pedestrian Area
- Limited Sunlight Exposure

Section Features

- Exposed Walkway
- Off-street Parking
- Vehicle Site Drivers
- Narrow Roadway
- Wide Pedestrian Area
- Significant Sunlight Exposure

Section Features

- Exposed Walkway
- Significant Parking Occupation
- Vehicle Site Drivers
- Narrow Roadway
- Narrow Pedestrian Area
- Moderate Sunlight Exposure

Fig 3.537. Covered parking spatial analysis

Fig 3.538. Theatre spatial analysis

Fig 3.539. Local mechanics spatial analysis

Fig 3.540. National mechanics spatial analysis

3.5 Minor Roadway Spatial Programme

N Spatial Context

Wigan Street Spatial Programme

- Sunlight exposure creates comfortable space for pedestrians
- Wide footpath improves pedestrian comfort
- Slow moving cars gives pedestrians time to cross
- Shadows limit comfort for pedestrians

- Pedestrian comfort only remains where footpath is covered
- Rain reduces pedestrian comfort
- Slow moving cars gives pedestrians time to cross

- Shadow reduces pedestrian comfort
- Safe area from traffic improves pedestrian experience
- Vehicles will drive through parking spaces when not occupied

- Good lighting improves pedestrian experience
- Safe area from traffic improves pedestrian experience
- Limited traffic creates safe streetscape

Fig 3.541. Wigan Street noon activity

Fig 3.542. Wigan Street poor weather activity

Fig 3.543. Wigan Street evening activity

Fig 3.544. Wigan Street night activity

0 10 20 40

- Roadway
- Exposed Walkway
- Covered Walkway
- Road Area Parking
- Shared Space Roadway
- Exposed / Undesirable Walkway
- Covered / Undesirable Walkway
- Pedestrian Area Parking

3.6 Spatial Context Conclusions

Wigan Street

Main Roadways

The heavy traffic that flows along these road corridors are crucial for commuters and services. There are inefficiencies such as parking along these roadways, the spaces themselves are difficult to enjoy and used by pedestrians as movement corridors.

Enabling the stream to dissect these spaces to provide a glimpse of better pedestrian routes would enable a stream to supplement these spaces without removing the core program of these spaces.

Arterial Roadways

Heavy vehicle traffic dissecting arterial roads would be significantly disrupted by the implementation of a stream. Space along these edges are already contested, and would only further congest urban areas as pedestrians utilise new stream spaces.

Utilising the small spaces on the edges of the arterial roadways can enable greater enjoyment within these spaces as several of these spaces are void of any public life other than movement.

Moderate Roadways

These roadways illustrate the balance of public pedestrian life and vehicle movement through the city. The roadways all have an element of shared space, however can also become heavily congested during rush hour. This balance makes adapting these spaces more delicate as it is important in the functioning of the city.

Implementing streams in these spaces must be done in a way that does not reduce the city's capacity in high movement periods, but also adds to the high functioning pedestrian life that exists.

Minor Roadways

Minor Roadways scattered all over the city provide underutilised spaces for traffic. These roadways usually have small commercial industry or businesses that contribute little to public life. This creates an opportunity to transition towards a pedestrian focused flow of people through these spaces.

Encouraging pedestrian movement along stream down these small streets would enable greater enjoyment of the city as pedestrians would be provided an alternative to the linear road corridors.

Fig 3.601. Te Aro street typologies reflection

3.6 Spatial Context Conclusions

Spatial Context

Spatial Context Conclusions

The circumstances that occurred throughout this testing indicated that the type of road programme is one of the defining factors of each space. The likelihood of pedestrians occupying a space does not align with the programme of the street, but the spaces beside it. A space with little vehicle noise will not necessarily be heavily occupied by pedestrians, while the inverse is also true for heavy vehicle noise. Each streetscape has different nuances that change depending on when and how it is used by both pedestrians and vehicles. The roadways that intersect the city are susceptible to changing circumstances, such as morning and evening commuting periods, and weekend and weekday time differences. All of these factors significantly affect the quantity and destination of the traffic flowing through the city.

Major roadways create a significant obstacle within the transitioning of the city towards a pedestrian friendly urban centre, as the roadways that dissect the space significantly are paramount to the functioning capacity of Wellington. Road corridors such as Vivian Street act as State Highways, despite being designed as a standard inner city vehicle thoroughfare. Cambridge and Kent Terraces take heavy traffic and attempt to squeeze them into narrow roadways that are not capable of handling this demand. Disrupting the movement of these roads would prevent the city from functioning entirely as they are already stretched to capacity.

Arterial roadways within Wellington now act as a connector between the moderate and minor roadways of the city, as the main roadways prevent any fast movement through the city during peak hour. Roadways such as Taranaki Street and Victoria Street generate fluid movement through the city, however often become just as clogged as the main roadways they connect to. Other roadways, such as Courtenay Place and Willis Street, have become arterial roadways by default. This is due to the heavy traffic overwhelming other streetscapes within the city, which have now spread to the narrower corridors as a temporary solution for the congestion.

3.6 Spatial Context Conclusions

Spatial Context

Moderate roadways are awkwardly positioned within the needs of the city. They tend to fluctuate significantly in quantity of use throughout the day, and provide access to large businesses or transport routes. One example of this is Tory Street, providing a connection between Vivian Street and Wakefield Street. This street also connects heavy traffic between Taranaki Street and Cambridge Terrace. This central location has made the street significantly busier than the narrow roadway is capable of sustaining. Due to the poor layout of surrounding roadways, Tory Street has been forced to cope with the overflows of the surrounding network. Making small adaptations in the existing network could help to transition these streets into quieter, pedestrian-focused urban streetscapes.

Minor roadways such as Wigan Street and Jessie Street presented themselves as spaces that could be adapted to create a fully pedestrianised streetscape. The low traffic flow through and large number of alternative routes around the site make these streets viable for change. These opportunities are substantial, as new pedestrian areas within the city would help to generate small hubs of activity away from the current areas of Courtenay Place and Cuba Street. One issue that could be faced by removing vehicle access from these sites is the loading accessibility to existing businesses within the sites. The transition into higher density populations living around, and occupying these sites can help to offset this inconvenience.

The final opportunity that presented itself within this study, was that of the unoccupied spaces that lie adjacent to the network of varying roadways within Te Aro. Sites like parks and parking lots provide the greatest opportunity for development. Unlike roadways, these are not fundamental to the movement of the inner city. While these spaces are integral to the future growth of the city, they can also be used to dictate how this growth occurs. Currently, the trend to upgrade each block within the city is dependent on the spaces that can be purchased for a suitable price, limiting the redevelopment process. Identifying these spaces as fundamental opportunities for a pedestrianised redevelopment is crucial to the successful growth of Te Aro.

4.0 Precedent Study & Application

4.1 Introduction

Stream Precedent Investigation

Stream Exploration Method

Understanding how spaces function within Te Aro has enabled a greater appreciation of the opportunities that exist within its context. In order to implement an effective daylighted scheme for the redevelopment of Te Aro, further analysis is required on the fundamental characteristics of stream spaces. For a stream to be successfully daylighted within the site, the nuances that occur within a streamscape should be fully explored, so that it can positively affect the existing spaces.

The qualities of a stream that create destinations for locals and tourists to utilise and occupy require further investigation. A number of stream spaces should be studied to understand how each space is affected by the flowing of water that connects them. This will create understanding of the connection, and how this generates movement within this series of unique spaces. This investigation aims to understand what elements can be used to generate similar or contrasting responses to the surrounding environment adjacent to the stream.

Urban and suburban streams should be analysed fully to address the spaces that are prevalent within a larger stream spatial ecology. Urban park and suburban park streams have also been investigated to explore the differences between streams in similar environments. While investigating these spaces, adaptations will be explored to fully understand the qualities that make each space either comfortable or uncomfortable. This understanding can be reimplemented throughout each space within Te Aro so that the moments that make Wellington special can be enhanced or revitalised.

Te Aro has a variety of site typologies, such as small alleyways, park spaces, and large roadways. Addressing these differences in space by exploring a variety of stream types will enable a thorough exploration into what issues have been resolved, or realised from the implementation of the streams. This study can enable these typologies to benefit as the stream is reintegrated into the adapted urban context.

4.2 Suburban Streams

Stream Precedent Investigation

Classification

- Daylighted Stream / River Flood Mitigation Space Revitalisation Ecological Renewal Flow / Historical Restoration

University Park, Essen - Germany

Fig 4.201. University park context

Source of the River Norges, Dijon - France

Fig 4.204. River Norges context

Water-retention Boulevard, - Luxembourg

Fig 4.202. Water-retention Boulevard context

Deichgärten and Donaupark, Bavaria - Germany

Fig 4.205. Deichgärten and Donaupark context

Thornton Creek, Seattle - USA

Fig 4.203. Thornton Creek context

Elwood Canal, Melbourne - Australia

Fig 4.206. Elwood Canal context

4.2 Suburban Streams

Stream Precedent Investigation

Elwood Canal, Melbourne

Fig 4.207. Elwood Canal Site Photo's

Fig 4.208. Elwood Canal Urban Context
1:200 Scale

Fig 4.209. Elwood Canal Urban Context
1:750 Scale

4.2 Suburban Stream Investigation

Stream Precedent Investigation

Open ground plane enables view from above
Parking at edge of space removes view of stream
Limited planting enables view towards housing

Elwood Canal Cross Section

Trees enclose view from balcony
Planting creates enclosed intimate space
Planting Move focus to the stream

Fig 4.210. Elwood Canal Cross section spatial analysis

Open walkway enables focus on stream
Heavy Planting creates barrier between roadway
Planting prevents pedestrians viewing stream immediately

Elwood Canal Long Section

Location of seating forces interaction with bypasses
Seat faces water extending view across stream
Barrier between cars and cycle lane is too small

Fig 4.211. Elwood Canal long section spatial analysis

4.2 Suburban Stream Investigation

Stream Precedent Investigation

Elwood Canal Intimate Spaces

Seat Adjacent Housing

Original Space

Seat facing stream exposed to other pedestrians
House Adjacent to pathway forces view towards stream
Housing encloses walkway

Adapted Space 1

View is limited due to increased planting
Seat sheltered by increased planting

Adapted Space 2

Pedestrians likely to look at activity on the seating
Seating places against house for improved awareness

Fig 4.212. Seat spatial adaption test

Pedestrian Bridge

Original Space

Height of bridge above water limits view
Close proximity to other bridge creates observational relationship
Bridges obstruct stream view

Adapted Space 1

Lowered bridge enables more open view over stream
Consistent relationship to original space

Adapted Space 2

Consistent limitations to original space
Open bridge removes relationship for pedestrians on edge

Fig 4.213. Bridge spatial adaption test

4.2 Suburban Stream Investigation

Stream Precedent Investigation

Elwood Canal Intimate Spaces

Vehicle & Cycle Crossing

Fig 4.214. Cycle Lane spatial adaption test

Enclosed Walkway

Fig 4.215. Walkway spatial adaption test

4.2 Suburban Stream Investigation

Stream Precedent Investigation

Elwood Canal Intimate Spaces

Fig 4.216. Open Seating spatial adaption test

Site Conclusions

Negative Site Outcomes

Positive Site Outcomes

Fig 4.217. Relevant spatial properties within spatial tests

4.3 Suburban Park Stream Investigation

Stream Precedent Investigation

Classification

- Daylighted Stream / River Flood Mitigation Space Revitalisation Ecological Renewal Flow / Historical Restoration

Catharina Amalia Park, Apeldoorn - Netherlands

Fig 4.301. Catharina Amalia Park context

La Rosa Reserve Stream, Auckland - New Zealand

Fig 4.304. La Rosa Reserve Stream context

Waitangi Park, Wellington - New Zealand

Fig 4.302. Waitangi Park context

Hassett Park, Canberra - Australia

Fig 4.305. Hassett Park context

Clementwijk District, Sint-Niklaas - Belgium

Fig 4.303. Clementwijk District context

Waiwhetu Stream, Wellington - New Zealand

Fig 4.306. Waiwhetu Stream context

4.3 Suburban Park Stream Investigation

Stream Precedent Investigation

Waiwhetu Stream, Wellington

Fig 4.307. Waiwhetu Stream Site Photo's

Fig 4.308. Waiwhetu Stream Urban Context
1:200 Scale

Fig 4.309. Waiwhetu Stream Urban Context
1:750 Scale

4.3 Suburban Park Stream Investigation

Stream Precedent Investigation

2a

Grass verge enables pedestrians to ignore vehicles
Walkway between trees feels empty
Open balustrades enable view to stream

Waiwhetu Stream Cross Section

View of bridge is only indicator of stream
No pathway creates downward view to maintain balance

Fig 4.310. Waiwhetu Stream cross section spatial analysis

2b

Bridge enables elevated view of stream
Walkway is heavily disrupted by overgrown planting
Green corridor heavily used for physical activity

Waiwhetu Stream Long Section

Vehicles dominate space along bridge
Low planting blocks view along stream
Sloping terrain towards stream constantly changes

Fig 4.311. Waiwhetu Stream long section spatial analysis

4.3 Suburban Park Stream Investigation

Stream Precedent Investigation

Waiwhetu Stream Intimate spaces

4.3 Suburban Park Stream Investigation

Stream Precedent Investigation

Waiwhetu Stream Intimate spaces

Vehicle Bridge

Original Space

Presence of vehicles dominates space

Bridge generates movement perpendicular to the stream

Adapted Space 1

Barrier enables pedestrians to look ahead or at view

Adapted Space 2

Gap provides view shaft into stream

Fig 4.314. Bridge spatial adaption test

Stream Embankment

Original Space

View up towards parking area
Foliage along stream attracts attention and improves habitat

Concrete edge enables movement along streams edge

Adapted Space 1

Bushes shift attention towards foliage and stream
Consistent relationship to original space

Adapted Space 2

Increased slope shift attention towards foliage
Consistent relationship to original space

Fig 4.315. Embankment spatial adaption test

4.3 Suburban Park Stream Investigation

Stream Precedent Investigation

Waiwhetu Stream Intimate spaces

Site Conclusions

4.4 Urban Stream Investigation

Stream Precedent Investigation

Classification

- Daylighted Stream / River
- Flood Mitigation
- Space Revitalisation
- Ecological Renewal
- Flow / Historical Restoration

Place de la Libération, Troyes - France

Fig 4.401. Place de la Libération context

Storaa Stream, Holstebro - Denmark

Fig 4.404. Storaa Stream context

Banyoles Old Town Refurbishment, Girona - Spain

Fig 4.402. Banyoles Old Town context

City Creek Center, Salt Lake City - USA

Fig 4.405. City Creek Center context

Melaan, Mechelen - Belgium

Fig 4.403. Melaan context

Cheonggyecheon River, Seoul - South Korea

Fig 4.406. Cheonggyecheon River context

4.4 Urban Streams Investigation

Stream Precedent Investigation

Cheonggyecheon River, Seoul

Fig 4.407. Cheonggyecheon River Site Photo's

Fig 4.408. Cheonggyecheon River Urban Context 1:200 Scale

Fig 4.409. Cheonggyecheon River Urban Context 1:750 Scale

4.4 Urban Stream Investigation

Stream Precedent Investigation

Stream contributes to views of the streetscape above
Pedestrians are isolated from cityscape by dense foliage

Cheonggyecheon River Cross Section

Heavy vehicle traffic occupies pedestrian attention
Artwork placed on vertical walls creates points of interest
Views across stream to opposite walkway are limited

Fig 4.410. Cheonggyecheon River Cross section spatial analysis

Cheonggyecheon River Long Section

Limited views of the stream between bridges
Small gaps between bridges allow light below
Pedestrian bridges away from vehicle traffic

Benches enable pedestrians to view stream
Limited stair access to street scape near over bridges
Planting is used to help divide each space

Fig 4.411. Cheonggyecheon River Long section spatial analysis

4.4 Urban Stream Investigation

Stream Precedent Investigation

Cheonggyecheon River Intimate Spaces

Multiple levels help isolate pedestrians
Steps to waters edge can be used as seating
Multi-leveled space under a street level vehicle bridge

Separation creates defined pathway
Water is used to separate spaces and limits variety of uses

Wharf type structure generates viewing platform
Walk way is confined enabling more space for lingering

Fig 4.412. Under bridge spatial adaption test

Uneven stepping stones shift view downwards
Uneven steps shifts view downwards
Only way across stream uses stepping stones

Level pathway enables view towards stream
Removing tactile qualities of stream shifts view ahead

Low pathway maintains tactile nature of stream crossing
Even steps and balustrade allows pedestrians to look ahead

Fig 4.413. Crossing spatial adaption test

4.4 Urban Stream Investigation

Stream Precedent Investigation

Cheonggyecheon River Intimate Spaces

Pedestrian Street Access

Access from street level into the stream walkway

Fig 4.414. Access spatial adaption test

Heavy Planting

Dense foliage running between the stream and walkway

Fig 4.315. Planting spatial adaption test

4.4 Urban Stream Investigation

Stream Precedent Investigation

Cheonggyecheon River Intimate Spaces

Fig 4.416. Vehicle bridge spatial adaption test

Site Conclusions

Negative Site Outcomes

Positive Site Outcomes

Fig 4.417. Relevant spatial properties within spatial tests

4.5 Urban Park Stream Investigation

Stream Precedent Investigation

Classification

- Daylighted Stream / River
- Flood Mitigation
- Space Revitalisation
- Ecological Renewal
- Flow / Historical Restoration

Sherbourne Common, Toronto - Canada

- Daylighted Stream / River
- Flood Mitigation
- Space Revitalisation
- Ecological Renewal
- Flow / Historical Restoration

Fig 4.501. Sherbourne Common context

Tanner Springs Park, Oregon - USA

- Daylighted Stream / River
- Flood Mitigation
- Space Revitalisation
- Ecological Renewal
- Flow / Historical Restoration

Fig 4.504. Tanner Springs Park context

Rochor Canal, Kallang - Singapore

- Daylighted Stream / River
- Flood Mitigation
- Space Revitalisation
- Ecological Renewal
- Flow / Historical Restoration

Fig 4.502. Rochor Canal context

Promenada, Velenje - Slovenia

- Daylighted Stream / River
- Flood Mitigation
- Space Revitalisation
- Ecological Renewal
- Flow / Historical Restoration

Fig 4.505. Promenada context

Saw Mill River, New York State - USA

- Daylighted Stream / River
- Flood Mitigation
- Space Revitalisation
- Ecological Renewal
- Flow / Historical Restoration

Fig 4.503. Saw Mill River context

Strawberry Creek, Berkeley - USA

- Daylighted Stream / River
- Flood Mitigation
- Space Revitalisation
- Ecological Renewal
- Flow / Historical Restoration

Fig 4.506. Strawberry Creek context

4.5 Urban Park Stream Investigation

Stream Precedent Investigation

Fig 4.507. Strawberry Creek Site Photo's

Strawberry Creek, Berkeley

Fig 4.508. Strawberry Creek Urban Context
1:200 Scale

Fig 4.509. Strawberry Creek Urban Context
1:750 Scale

4.5 Urban Park Stream Investigation

Stream Precedent Investigation

4a

Surrounding structures have view of stream
Adjacent pathways allow pedestrians to walk along stream
Stone pedestrian bridges block view of stream below

Large planted areas create separate spaces parallel to stream
Pedestrians use the edge of wide pathways due to vehicles
Cross pedestrian traffic creates intersections at bridges

Fig 4.510. Strawberry Creek Cross section spatial analysis

4b

Consistent views along stream pathways
Raised platform creates different view of surrounding flora
Historical features contribute to experience of stream

Adjacent parking distracts from surrounding stream and flora
Small pathways to discrete stream spaces
Lack of stream view narrows pedestrian focus on bridges

Fig 4.511. Strawberry Creek long section spatial analysis

4.5 Urban Park Stream Investigation

Stream Precedent Investigation

Strawberry Creek Intimate Space

Multi-leveled walkways adjacent to stream

Fig 4.512. Pathway spatial adaption test

Long pathway adjacent to stream

Fig 4.513. Shared space spatial adaption test

4.5 Urban Park Stream Investigation

Stream Precedent Investigation

Strawberry Creek Intimate Space

Quiet Stream Space

Quiet space within busy surrounding context

Fig 4.514: Forest stream spatial adaption test

Historic Over-bridge

Bridge becomes feature of the landscape

Fig 4.515: Historic bridge spatial adaption test

4.5 Urban Park Stream Investigation

Stream Precedent Investigation

Strawberry Creek Intimate Space

Wide Pedestrian Bridge

Original Space

Seating creates space to view stream surroundings
Open balustrade enables easy viewing of stream

Adapted Space 1

Planting can grow more freely over bridge
Increased exposure to stream below walkway

Adapted Space 2

View is limited due to other pedestrians using walkway
Interaction with others is now enhanced reducing stream exposure

Wide bridge with seating enables slower movement

Fig 4.516. Pedestrian bridge spatial adaption test

Site Conclusions

Negative Site Outcomes

Vehicles

Low Overhanging Tree

Enclosed Interaction

Open Edge

Positive Site Outcomes

Foliage Creates Interest

Objects Between Pedestrians

Interactions Beside Water

Level Change by Vehicles

Fig 4.517. Relevant spatial properties within spatial tests

4.6 Experience Outcomes

Stream Precedent Investigation

Negative Experience Outcomes

Elwood Canal

Vehicle crossings at several points throughout the Elwood Canal generate points of interaction between pedestrians. This generates several points for pedestrians to enter the stream walkway, however, this also reduces the flow of movement when crossing busy roads at either end of the stream, when traffic lights are required.

Low overhanging trees often disrupt the enjoyment of pedestrians within the space, as focus shifts towards the trees only when branches begin to strike them. This experience can be easily removed by pruning the trees along the edge of the walkway.

The walkways along the stream have been placed with a steep edge into the water. Due to the canals use as a flood mitigation system within the suburb, the edge is high enough to remove any tangibility to the water.

This single side edge within Elwood Canal creates an uncomfortable relationship between pedestrians using the seat in front of them. Adjusting the site to prevent this observational relationship would enable a more friendly interaction.

Elevated crossings over streams removes the immediate connection to the water. This can be used to generate a view of the stream beyond the immediate space. Due to the proximity of the pedestrian bridge, the view is significantly impeded by fast moving vehicles.

Fig 4.601. Negative factors affecting Elwood Canal spatial conditions

Waiwhetu Stream

While the streets around the stream are minor suburban roadways, the interaction between vehicles and pedestrians still creates an uncomfortable tension that distracts from the qualities of the space. This is most dominant along the stream crossings as the footpath along the roadway is very narrow.

The relationship of pedestrians walking along opposite edges of the stream create a difficult relationship for interaction, as both pedestrians feel obliged to focus on one another. By rearranging the adjacent planting, pedestrians are more free to choose their response to this interaction.

Enclosing pedestrians on both sides of the pathway is restricting, and limits the view in front of them. By opening the pathway on a single side it can draw attention to the edges of the space and allow people to view the more interesting aspects. By enclosing both edges, pedestrians focus on getting through the space instead of enjoying it.

Uneven terrain functions similarly to an enclosed space as it causes pedestrian to focus away from the positive qualities. This can be used positively to ensure pedestrians understand their footing at the streams edge. If the view of the surrounding areas is enjoyable, the terrain should be even to encourage outward looking.

Planting barriers at the water edge remove visibility of the stream from the pedestrian. This removes the stream from an active part of the environment and minimises the psychological benefits to for people within this space.

Fig 4.602. Negative factors affecting Waiwhetu Stream spatial conditions

Negative Experience Outcomes

Cheonggyecheon River

Traffic in the space is significant due to the large population living within close proximity to the stream. The adjacent roadways that cross the site carry a large number of vehicles towards nearby arterial roadways.

The bridges that cross the stream have created a number of problems for pedestrians utilising the space below street level. Due to the inconsistent design of the bridges above, the likelihood of pedestrians hitting their head is reasonably high. This could cause discomfort for people who are not aware of their surroundings.

The large flood walls that enclose the stream create an interesting observational relationship. This is also generated at the edge of the stream due to the close parallel walkways. This can be positive when the exchange is close enough to interact, however, the close proximity of these adjacent spaces becomes awkward for pedestrians.

At several points of the stream's edge the relationship to the edge of the water has no barrier. This condition creates an uncomfortable relationship to the water's edge. By adding a visual barrier at the water's edge, the transition into this space could be more controlled to prevent pedestrians from feeling as though they could fall in.

An observational relationship is created by the different pedestrian levels. Ensuring all pedestrians are at the same height would enable a more positive interaction between pedestrians.

Fig 4.603. Negative factors affecting Cheonggyecheon River spatial conditions

Strawberry Creek

The close proximity to vehicles at several points along the stream causes pedestrians to focus on the vehicles moving through the space. The lack of any definable barrier, whether physical or visual is extremely limited and should be more prominent in order to create a comfortable space for pedestrians.

Low overhanging trees are reasonably common along the edges of the stream, preventing any movement at these points along the edge of the water, limiting the fluidity of the space. The adaptations illustrate that the space is poorly informed by this issue, as the view that the bridge attempts to create has been restricted by this excess foliage.

Narrow crossing points usually occur at bridges, helping students on campus to traverse the stream. This contrasts from the surrounding space, creating a significant inconsistency in the movement of people around the park.

Several steep edges around the stream cause pedestrians to focus on the ground as they control their footing, rather than on the space around them. This limits the enjoyment of people walking through the space. Adapting these spaces can also help to remove people from the roads edge, helping to keep pedestrians away from oncoming vehicles.

Fig 4.604. Negative factors affecting Strawberry Creek spatial conditions

4.6 Experience Outcomes

Stream Precedent Investigation

Positive Experience Outcomes

Elwood Canal

The planting on the edge of the stream helps to guide the attention of pedestrians towards the water. Planting is used throughout the canal to physically direct pedestrians through the space and along the stream edge.

The implementation of raised barriers in narrow spaces along the stream would help create a level of comfort for pedestrians. Planting has been used frequently throughout the site to separate pedestrians and vehicle movement.

Large trees at some stages along the stream have been utilised to frame the site. The large apartments that overlook the stream could easily view the pedestrians moving through the space, creating an uncomfortable tension through this observation. The large trees help to create a more private space for pedestrians.

Barriers along the edge of the water could help to reduce the uncomfortable fear of falling in, while passing others utilising the space. A barrier would enable people to occupy the entire walkway, as people often have to walk on the grass to avoid pushing others towards the water.

Fig 4.605. Positive factors affecting Elwood Canal spatial conditions

Waiwhetu Stream

A small pipe along the edge of the stream creates a comforting sound of flowing water. This creates a relaxing node along the stream to stop and watch the water. This can be utilised in other ways to distract from the noise of other less satisfying sounds.

The edge of the stream utilised planting at several points to hide unsightly fences and parking spaces. Planting along the edge of these spaces enables people to focus on the stream and the adjacent interactive spaces.

Utilising barriers at the water's edge can help to control pedestrian movement and prevent pedestrians from falling into the stream. Soft earth and mud were constantly present throughout some areas within the site. The implementation of barriers when necessary, helps to control the interaction for the best experience.

The implementation of barriers along bridges and adjacent to roadways can improve the experience for pedestrians, and enable them to feel safer around the stream. This will also prevent vehicles from parking on open green spaces and minimise pedestrian movement.

Fig 4.606. Positive factors affecting Waiwhetu Stream spatial conditions

4.6 Experience Outcomes

Stream Precedent Investigation

Positive Experience Outcomes

Cheonggyecheon River

Steps down towards the waters edge at several points along the river work effectively, due to the refined frequency of this interaction. The stream regularly utilised dense planting to keep pedestrians away from the edges when the space is not suitable for lingering. This contrasts from the steps towards the water, encouraging interaction.

Stepping stones have been used when crossing the water to create a controlled natural experience with the water. This allows people to get down close to the water and also creates a sense of tension as people balance over the stones.

The connection between the two edges of the stream at several points creates a positive experience, as people are often able to view what happens across the water. This interaction creates a safe observational environment for parents watching their children etc.

The steep edges of the stream walls help to direct the attention of pedestrians towards the waters edge. This also helps to remove the urban streets from the stream environment by elevating the noises of the city above that of the flowing water.

The tactile nature at several points along the water's edge is created by the slow moving water and many interactive points along the stream edge. The clean water and comfortable environment generates a space for pedestrians to linger and touch the stream.

Fig 4.607. Positive factors affecting Cheonggyecheon River spatial conditions

Strawberry Creek

Foliage has been used at certain points along the stream to direct attention towards the natural environment, and away from the structures that surround the stream on the Berkeley Campus. Utilising planting to hide or highlight certain areas can positively improve the pedestrian experience.

Planting has also been used at several points to separate pedestrians. This generates an experience of isolation while still in a dense area. Creating this feeling within such a highly populated environment can be good, as it can help people to escape from the fast pace of the urban environments.

Generating interaction as people walk beside the water can help to make people feel comfortable in a foreign space. By creating narrow pathways, people are forced to interact as they pass each other on the edge of the stream. This can help to create a more friendly community environment.

Raised walkways visually define the spaces for vehicles and pedestrians. Contrasting these elements is crucial for people to feel safe when they are not paying full attention to their surroundings, due to the view of the stream or animals.

Fig 4.608. Positive factors affecting Strawberry Creek spatial conditions

5.0 Te Aro Application Experiment

6.1 Stream Concept Development

Urban Development

Te Aro Application Experiment

Implementing an urban redevelopment within Te Aro requires a large amount of understanding of the issues that can occur within a city. The previous investigations have been used to understand how pedestrians utilise space, both in Te Aro and around a stream space. Both of these elements are fundamental to successfully redeveloping Te Aro. Understanding how this implementation will affect existing elements of the city will enable a more thorough approach to designing on both an urban and human scale.

Wigan Street has been chosen for this testing as the site is a minor roadway, providing significant opportunity for a full daylighting intervention. The roadway has a large variety of businesses that could affect how the stream is implemented. Public commercial businesses such as Lighthouse Theatre and Havana Bar would be affected differently to light industrial businesses like Chung Hing Panel Ltd. and Ink Digital.

The connections between Wigan Street and several other areas in the city are helpful, but not essential to movement through the city. This provides an opportunity to analyse and test which routes contribute most to movement within the greater context of Te Aro. Testing this element will provide greater understanding of what elements are fundamental to the success of a space, and which can be sacrificed to focus on other benefits.

This exploration hopes to understand how a daylighted stream would affect all stakeholders within the site. Using this information to fully understand the effects of implementing a stream within Te Aro will enable a thorough exploration, and greater understanding of strategy.

5.1 Wigan Street Context Analysis

Te Aro Application Experiment

0 50 100 200
Fig 5.101. Wigan Street urban context.

Fig 5.102. Spatial visualisation of wigan street from Lighthouse Cinema

5.1 Wigan Street Context Analysis

Te Aro Application Experiment

Wigan Street Urban Context

5.1 Wigan Street Context Analysis

Te Aro Application Experiment

Fig 5.104. Property amenities and opportunities for development

5.1 Wigan Street Context Analysis

Te Aro Application Experiment

Wigan Street Pedestrian Activity

5.1 Wigan Street Context Analysis

Te Aro Application Experiment

Ekim Burger

Southern Cross

Ekim Burger

Southern Cross

Morning Activity

Afternoon Activity

Evening Activity

Fig 5.107. Ekim/Southern Cross activity

Lighthouse Theatre

Havana Bar

Lighthouse Theatre

Havana Bar

Morning Activity

Afternoon Activity

Evening Activity

Fig 5.108. Lighthouse Cinema/Havana Bar activity

5.1 Wigan Street Context Analysis

Te Aro Application Experiment

Wigan Street Vehicle Activity

5.1 Wigan Street Context Analysis

Te Aro Application Experiment

Abel Smith - Wigan

Abel Smith - Wigan

Traffic Into Wigan

Traffic Out of Wigan

Adjacent Vehicles

Fig 5.111. Abel Smith/Wigan Street intersection

Dunlop - Wigan

Dunlop - Wigan

Traffic Into Wigan

Traffic Out of Wigan

Adjacent Vehicles

Fig 5.112. Dunlop Terrace/Wigan Street intersection

5.1 Wigan Street Context Analysis

Te Aro Application Experiment

Wigan Street Structural Analysis

5.1 Wigan Street Context Analysis

Te Aro Application Experiment

Existing Street Context

Abel Smith Street 1

Wigan Street 1

Wigan Street 2

Wigan Street 3

Knigges Avenue 1

Fig 5.114. Existing Abel Smith
vehicle dominated Context

Fig 5.115. Existing Wigan Street
vehicle dominated Context

Fig 5.116. Existing Wigan Street
vehicle dominated Context

Fig 5.117. Existing Wigan Street
vehicle dominated Context

Fig 5.118. Existing Knigges Avenue
vehicle dominated Context

5.1 Wigan Street Context Analysis

Te Aro Application Experiment

Potential Site Outcomes

Fig 5.119. Abel Smith Street spatial revitalisation with introduced daylighted stream

Fig 5.120. Wigan Street 1 spatial revitalisation with introduced daylighted stream

5.1 Wigan Street Context Analysis

Te Aro Application Experiment

Fig 5.121. Wigan Street 2 spatial revitalisation with introduced daylighted stream

Fig 5.122. Wigan Street 3 spatial revitalisation with introduced daylighted stream

Fig 5.123. Knigges Avenue spatial revitalisation with introduced daylighted stream

5.2 Development Option One

Te Aro Application Experiment

Maintained Road Corridors

Fig 5.201. Redeveloping the site and maintaining a single directional roadway for access

5.2 Development Option One

Te Aro Application Experiment

Affected Properties

Fig 5.202. Properties that would be affected by this proposal

Vehicle Movement

Fig 5.203. Traffic flow through wigan street due to proposal implementation

Development Opportunities

Fig 5.204. Sites that could be developed into public space or structures to benefit the site due to proposal implementation

5.2 Development Option One

Te Aro Application Experiment

Environmental Space Pedestrian Environmental Space Vehicle Space Pedestrian Space

Fig 5.205. Development Option 1 Abel Smith renewed stream Context

Fig 5.206. Development Option 1 Wigan Street renewed stream Context

Fig 5.207. Development Option 1 Wigan Street renewed stream Context

Fig 5.208. Development Option 1 Wigan Street renewed stream Context

Fig 5.209. Development Option 1 Knigges Avenue renewed stream Context

5.2 Development Option One

Te Aro Application Experiment

Development Option 1 Conclusions

Wigan Streets maintained roadway proposal illustrates how a stream can be daylighted in a way that enables the existing roadway to remain undisrupted. While limitations have been added to the flow of traffic through the space, access to the surrounding structures and businesses remain mostly unaffected.

Several structures have been removed from the site as illustrated in Fig 5.202 to allow the stream to generate more public space on the edges of the streetscape. This has created several pocket parks on entering Wigan Street at 45 and 46 Abel Smith Street. These spaces enable people to occupy the edges, while also contributing to activity for surrounding businesses. The chosen development sites have significant sunlight exposure and would encourage significant on-street activity.

Vehicle access to existing sites, such as the Victoria University Campus has been removed, as the stream runs between the campus and the roadway. The campus has several loading access points so will not be heavily affected by this change. The Dunlop Terrace roadway has not been affected to maintain vehicle and pedestrian access to the Comfort Hotel. This roadway removal limits access to the car mechanic and accessories stores along Wigan Street and will no longer be able to utilise the site.

The stream is not able to improve the quality of the streetscape for businesses, such as Lighthouse Theatre and Havana Bar, due to the narrow streetscape limiting the space. The stream significantly restricts the flow of pedestrians through the space, making crossing the space impossible at certain points. The introduction of more pedestrian access through this space would alleviate this issue.

While traffic through the site has been reduced, the compromise between the new stream creates several limitations. This affects parking and pedestrians and disrupts the immediate businesses within the site. The restricted pedestrian space may also limit the number of people that utilise the space recreationally, and could be better suited by avoiding a mixed use space.

5.3 Development Option Two

Te Aro Application Experiment

Fig 5.301. Redeveloping the site and removing all vehicle access from the site to improve pedestrian activity

5.3 Development Option Two

Te Aro Application Experiment

Affected Properties

Fig 5.302. Properties that would be affected by this proposal

Vehicle Movement

Fig 5.303. Traffic flow through wigan street due to proposal implementation

Development Opportunities

Fig 5.304. Sites that could be developed into public space or structures to benefit the site due to proposal implementation

5.4 Development Option Three

Te Aro Application Experiment

Environmental Space Pedestrian Environmental Space Vehicle Space Pedestrian Space

Abel Smith Street 1

Fig 5.305. Development Option 2 Abel Smith renewed stream Context

Wigan Street 1

Fig 5.306. Development Option 2 Wigan Street renewed stream Context

Wigan Street 2

Fig 5.307. Development Option 2 Wigan Street renewed stream Context

Wigan Street 3

Fig 5.308. Development Option 2 Wigan Street renewed stream Context

Knigges Avenue 1

Fig 5.309. Development Option 2 Knigges Avenue renewed stream Context

5.4 Development Option Three

Te Aro Application Experiment

Development Option 2 Conclusions

This daylighting model attempts to use the entire space as a stream corridor to enable increased water flow and planting within the streetscape. This removes vehicles movement through the site, and generates pocket parks at the end of Wigan Street where the stream meets the roadway.

Removing vehicles from the site requires loading access to all of the structures to be adjusted. This can be resolved using a loading zone at the end of the street, where it can then be transferred to the individual businesses. While this can take longer, it would enable existing public commercial businesses to continue functioning within the site. All businesses that rely on vehicle access would require relocation to another more suitable site.

This intervention significantly improves the visibility of the stream as a feature within the site, generating a unique space within the city. Removing cars entirely from the streetscape would create a site void of the noise pollution that comes with heavy traffic. This would provide a unique sanctuary within the city, as even urban parks are still surrounded by vehicle movement.

Due to the space being almost entirely occupied by the stream, the pedestrian elements of the space are very limited. Pedestrian movement has been restricted to the edges of the street, similar to if it were occupied by traffic. The thoroughfare that now connects Wigan Street to Knigges avenue is also heavily restricted by this exploration.

Public commercial businesses would benefit little from this type of intervention due to the limited space in the streetscape. This makes access to any property on the site more difficult, limiting movement between these businesses and could reduce popularity of the site. Creating a greater balance between the stream and public space could help to enhance the spatial opportunities for pedestrians utilising the stream space.

5.4 Development Option Three

Te Aro Application Experiment

Fig 5.401. Concept 2, redeveloping the site and maintaining a single directional roadway for access

5.4 Development Option Three

Te Aro Application Experiment

Affected Properties

Fig 5.402. Properties that would be affected by this proposal

Vehicle Movement

Fig 5.403. Traffic flow through wigan street due to proposal implementation

Development Opportunities

Fig 5.404. Sites that could be developed into public space or structures to benefit the site due to proposal implementation

5.4 Development Option Three

Te Aro Application Experiment

Environmental Space Pedestrian Environmental Space Vehicle Space Pedestrian Space

Abel Smith Street 1

Fig 5.405. Development Option 3 Abel Smith renewed stream Context

Wigan Street 1

Fig 5.406. Development Option 3 Wigan Street renewed stream Context

Wigan Street 2

Fig 5.407. Development Option 3 Wigan Street renewed stream Context

Wigan Street 3

Fig 5.408. Development Option 3 Wigan Street renewed stream Context

Knigges Avenue 1

Fig 5.409. Development Option 3 Knigges Avenue renewed stream Context

5.4 Development Option Three

Te Aro Application Experiment

Development Option 3 Conclusions

This development option is designed to enable the stream to generate large areas of public space by removing structures that do not contribute to the public realm. This exploration looks to understand how a weaving stream through the site can enable pedestrian movement, while also incorporating a quiet urban stream space into the city.

The pedestrian spaces that are created due to the forms of the stream can help to increase the outdoor experience of the street. Pedestrians can occupy the spaces between the stream and the footpath, ensuring movement through the site remains uninterrupted. This can enable greater activity adjacent to existing businesses as people linger within these small spaces.

The winding stream through the site can also help to reduce the velocity of water by creating a meandering stream that twists through the site. The current can be controlled and slowed to improve the cleansing ability of the stream. Controlling the water flow can also be achieved by using small water falls to reduce the gradient, while also introducing tranquil sounds into the environment.

This exploration enables moderate vehicle access through the site, as it allows the stream to cross over properties when necessary. This enables loading access, servicing several businesses on both edges of the new pedestrian space, while also maintaining the vehicle thoroughfare between Abel Smith Street and Dunlop Terrace. Removing vehicle access to a space should only be implemented when it benefits all of the remaining stakeholders in the site.

Removing this many structures within the site is not cost effective and may significantly reduce density within the city within certain areas. Ensuring that structures are strategically removed, due to limited growth opportunities, or to maximise public space potential, would ensure the development plan remains feasible.

6.0 Urban Development

6.1 Stream Concept Development

Urban Development

Concept Exploration

Development within Te Aro relies on several factors to ensure maximum viability. Understanding that the stream must encourage public activity, and enable growth and development within the urban setting, is fundamental to the streams success. Improving the quality of the city as a whole is crucial for the streams successful integration into the urban realm, however, this is only possible when targeting the factors that are most beneficial to each individual site. The proposals must target these specific elements while balancing all of the factors effecting its implementation.

These concept developments hope to explore viable options for the streams core pathways, while comparing these to standard daylighted streams. This concept process illustrates the benefits of a transectional stream that cuts across the urban landscape, in contrast to a standard street corridor stream. This exploration hopes to highlight the benefits of utilising daylighted streams as a tool for urban growth, rather than just spatial improvement.

These concepts were rationalised using the research information found in the previous studies. Utilising this information to direct the stream through the most appropriate pathway, and using the historical streams as a starting point from existing water sources. Further development will enable the intricate spaces within the urban realm to be explored in greater depth and allow for a greater realisation of each sites potential.

6.1 Streams Concept Development

Urban Development

Corridor Streams Concepts

Victoria Street Stream

Fig 6.101. Stream concept along Victoria Street towards The Lagoon

Taranaki Street Stream

Fig 6.102. Stream concept along Taranaki Street towards the waterfront

Cambridge Terrace Stream

Fig 6.103. Stream concept along Kent & Cambridge Terrace towards the waterfront

0 200 400 800

These stream concepts run adjacent to different main and arterial roads that intercept Te Aro. This would directly improve a large area of the city however only affects a single space

6.1 Streams Concept Development

Urban Development

Epuni Stream Slope

Fig 6.104. Indication of Epuni Stream length and slope of stream concept

Mount Cook Stream Slope

Fig 6.105. Indication of Mount Cook Stream length and slope of stream concept

Waitangi Stream Slope

Fig 6.106. Indication of length and slope of stream concept

6.1 Streams Concept Development

Urban Development

Transect Stream Concepts

Epuni Stream

Fig 6.107. Stream concept near Cuba Street towards the Waterfront Jump Platform

Taranaki Stream

Fig 6.108. Stream concept crossing Taranaki Street towards Waitangi Park

Waitangi Stream

Fig 6.109. Stream concept from the basin reserve towards the lagoon

These stream concepts cut through the urban fabric of Te Aro in order to intersect areas that require improvement or could benefit from increased public space.

6.1 Streams Concept Development

Urban Development

Epuni Stream Slope

Taranaki Stream Slope

Waitangi Stream Slope

Fig 5.610. Indication of Epuni Stream length and slope of stream concept

Fig 6.111. Indication of Taranaki Stream length and slope of stream concept

Fig 6.112. Indication of Waitangi Stream length and slope of stream concept

6.1 Streams Concept Development

Urban Development

Corridor Streams Concepts Activity

Victoria Street Stream

Fig 6.113. Victoria Street stream activity

Several large spaces on the edges of the street could be utilised for stream development intervention. Heavy pedestrian activity from Manners Street to the waterfront, and several large structures along the entire stream site limit opportunities for implementation.

Taranaki Street Stream

Fig 6.114. Taranaki Street stream activity

Taranaki Street is a large arterial roadway that would significantly benefit from improved pedestrianisation. Te Aro's dependents on this street to minimise congestion issues limits the opportunities for redevelopment.

Cambridge Terrace Stream

Fig 6.115. Cambridge Terrace stream activity

The south eastern edge of Te Aro would benefit from further development as this site is occupied by several car sales yards. The sites wide road corridor could be easily adapted to be more pedestrian friendly, however development of this site would be limited by the long term leases held by these sales yards.

6.1 Streams Concept Development

Urban Development

Transect Stream Concepts Activity

Epuni Stream

Fig 6.116. Epuni Stream activity

Several sites along this section of Te Aro require redevelopment or rejuvenation. This intervention could help to move people away from the core Cuba Street pedestrian corridor and into other parts of the city. The high density of the site leaves little room for a stream intervention.

Taranaki Stream

Fig 6.117. Taranaki Stream activity

This west to east corridor through Te Aro has little existing directionality and would benefit from a stream guiding pedestrians through the site. Several spaces within this option have little pedestrian activity and would benefit from this growth.

Waitangi Stream

Fig 6.118. Waitangi Stream activity

This east to west corridor through Te Aro has little existing directionality and would benefit from a stream guiding pedestrians through the site. Several spaces within this option have little pedestrian activity and benefiting from this growth. The steep contours of the site would require significant site works to enable a stream to cross through.

6.1 Streams Concept Development

Urban Development

Epuni Daylighting Investigation

Fig 6.119. Epuni Stream concept Chosen for further development

6.1 Streams Concept Development

Urban Development

Fig 6.120. Urban Conditions between Victoria and Ghuznee Street

Fig 6.121. Urban Conditions between Hannah Factory Lane and Waterfront Jump Platform

6.1 Existing Urban Landscape

Development Concepts

Taranaki Daylighting Investigation

Fig 6.122. Taranaki Stream concept
Chosen for further development

6.1 Streams Concept Development

Urban Development

Fig 6.123. Urban Conditions between Inner City Bypass and Ebor Street

Fig 6.124. Urban Conditions between Tory Street and Waitangi Park

These streams have been selected for further development as their spatial relationship to the city, as well as each other, generate a large variety of opportunities for Te Aro's growth. These pathways will also create new pedestrian movement corridors away from the existing grid network within the city streets.

Fig 6.201. Affected urban context that can be developed as a result of stream implementation

6.2 Strategic Plan

Urban Development

Development Conclusions

The implementation of these two streams will significantly affect the surrounding urban context within the city. The streams will change the spatial arrangement, effecting the activity of both vehicle and pedestrian traffic flow within the site. This change is caused by the stream, but also by the change in structural elements within the urban realm. The significance of the structures that surround the stream are crucial to the success of the stream as a generator of public life.

Surrounding structures have all been considered in regards to the benefits to the public space they inhabit. This can ensure that all stakeholders within the vicinity of the stream will be positively affected by its implementation. This is also necessary in regards to the design to of the stream, as the design should ensure successful businesses can continue to thrive after the streams construction.

The new streams can be used to transform the urban context of the rest of the city. Opportunities for renewed pedestrian life between the two streams could change the dynamic of the city far beyond the waters edge. Increased density around both of the streams could be achieved based on the improved quality of the urban fabric. This will enable growth to be sufficiently facilitated within the confines of Te Aro.

Fig 6.202. Stream concept implementation with Proposed new structures

Epuni Stream Structural Affordances

Fig 6.203. Predominant structures that affect development opportunities within Along Epuni Stream Concept

6.2 Strategic Plan

Urban Development

Taranaki Structural Affordances

0 200 400 800
Fig 6.204. Predominant structures that affect development opportunities within Along Taranaki Stream Concept

6.2 Strategic Plan

Urban Development

Epuni Stream

Fig 6.205. Epuni Stream spatial elements

Due to the high density of the majority of the areas along the Epuni Stream, this intervention tests the application of a daylighted stream through a dense urban context.

Park spaces along the Epuni intervention are limited due to the close proximity to several pedestrianised spaces. Bute Street Park develops a small parking site, while the Te Aro park intervention rejuvenates a small underutilised park space (1).

The park spaces have also been utilised as micro wetlands, enabling natural cleansing of the water. While planting prominent throughout the entire stream, the urban nature of the site limits the ability of the stream to cleanse the water completely. The introduced of micro wetlands significantly increases the ability of the stream to process contaminants and contribute to the ecosystem.

No roadways have been removed in favour of fully pedestrianised spaces as this area already has a large network of these elements. Cuba Street and Manners Street run adjacent to the Epuni intervention, limiting vehicle access further would begin to affect loading access for the many businesses within this retail district.

Several roadways have been affected by the stream development, however, the movement of vehicles through these sites is not disrupted. These changes affect on-street parking to minimise the interruption of traffic within largely congested sites. Road corridors such as Vivian Street (2), and Taranaki Street (3) have been adapted to ensure traffic can flow freely, reducing congestion levels.

The introduction of two small pedestrian thoroughfares have been used to provide alternative routes for people moving through the city. This can also generate active pedestrian spaces away from the road corridors. Walter Street now leads directly onto Abel Smith Street (4), while a new development along Swan Lane has been opened, enabling movement between this site and Ghuznee Street (5).

6.2 Strategic Plan

Urban Development

The undeveloped nature of several spaces along the Taranaki Stream intervention, creates opportunities to investigate how daylighting can increase density within an urban environment.

A higher density within the site requires improved access to public space to ensure high standards of living are maintained. The underdeveloped nature of several areas within the site create several opportunities to implement new public spaces contributing to public activity. The beginning of the Te Aro stream has been developed along State Highway One as it leaves the city (1). A site along Taranaki Street is also undeveloped and can be utilised as a park space, generating public activity within the immediate environment (2).

The removal of two minor roadways has led to the development of urban stream parks within Te Aro. The sites are both underutilised spaces and predominantly occupied by on-street parking. This transition can create opportunities for new businesses to occupy these sites and create new micro hubs of activity. Wigan Street (3) and Tennyson Street (4) are both located near popular pedestrian centres and could shift activity into these revitalised spaces.

Several affected roadways along the Taranaki Stream are situated along Tory Street (5), and Blair Street (6). Both of these sites are surrounded by structures that prevent opportunity for development. This has directed the flow of the streams through the streetscape, however, this must be done in ways that prevents significant disruption to traffic circulation.

Several pedestrian thoroughfares have been implemented within the site as existing structures limited movement. These new thoroughfares have helped to re-establish connections within current dead ends, to improve the flow within the site. Knigges Avenue now connects to Wigan Street to establish a Northern connection beside Cobblestone park. Another connection between Alpha Street and Courtenay Place (7), through to Tennyson street has been re-established (8).

Epuni Stream - Property Costs

6.2 Strategic Plan

Urban Development

Fig 6.209. Properties affected by the Eponi Stream implementation

Taranaki Stream - Property Costs

Fig 6.211. Properties affected by the Taranaki Stream implementation

6.2 Strategic Plan

Urban Development

Fig 6.212. Properties affected by the Taranaki Stream implementation

Vehicle Movement Development

Redeveloping Te Aro using the stream will effect several aspects of life within the inner city suburb, however core vehicle movement will remain unchanged. Traffic flow issues have been minimised by ensuring the functionality of the site is improved, along with the public realm.

Road corridors throughout Te Aro have been analysed and adapted, when necessary, to ensure the negative effects of the street scape have been minimised. This has been achieved by implementing minor changes to selected spaces to improve the quality of the space. Reducing congestion and minimising traffic flow has been achieved while ensuring roadways can continue to function.

Jessie Street Adaptation ①

Eastern traffic flow towards Tory Street congested the Vivian Street intersection. Changing this to a western flow relieves pressure on this point. Traffic moving towards Taranaki Street was required to cross this the Vivian Street intersection and move up Haining Street. This change of direction creates an even flow in both directions as both Vivian and Frederick Street direct vehicles towards Tory Street, preventing heavy movement in a single direction.

Blair Street Adaptation ②

Movement through Blair Street was previously two directional. To accommodate the new stream intervention the street is now one-way. Its directionality pushes traffic towards Courtenay Place as this flows onto Cambridge Terrace. Access to this street still flows easily as the Wakefield Street entrance connects the loop between them. Allen Street maintains its function as a predominant parking roadway.

Pedestrian Movement Development

Main pedestrian routes through the city should remain mostly unchanged as pedestrians move in the fastest direction through the city towards their destination. Road corridors such as Cuba Street, Tory Street, and Courtenay Place will remain popular, even after the stream intervention has been implemented. The implementation of the stream will target future growth areas to supplement current recreational public space that exists within the urban landscape.

- (1) Several sites throughout Te Aro have removed parking in favour of a stream barrier between the roadway and the footpath. This enables heavy foot traffic areas to become more pedestrian friendly. This adaptation removes parking, limiting unnecessary traffic from using these roads. The permanent reduction in the road width slows vehicle movement in these spaces. This transition will create more comfortable spaces for pedestrians as they move through the city.
- (2) Dixon Street is a one way road corridor moving west towards Cuba and Vivian Street. Movement coming to and from Eva Street will increase due to the new stream intervention. To encourage pedestrian movement between Te Aro park, a pedestrian crossing has been implemented. This will highlight a safe point for pedestrians to cross within the site, without significantly disincentivising vehicle movement.
- (3) The aim of this Tory Street intervention is to significantly reduce traffic through the site and restore the streetscape to a moderate roadway. Raised pedestrian crossings have been implemented to slow vehicles through the site, while also increasing the permeability for pedestrian movement following the course of the stream.
- (4) The pedestrian crossing along Wakefield has been moved further away from the Cambridge Terrace street corner to give pedestrians increased warning of the on coming traffic. This shift will guide pedestrian towards the waterfront rather than the supermarket while making crossing safer.

Fig 6.216. Pedestrian movement changes through Te Aro

Urban Site Development

If an existing green belt or large portion of publicly owned property is not already established and available for renewal, the daylighting process is often dismissed as implausible. Property ownership, built form, private access ways, and public transportation are all factors that can be affected within this new model of daylighting within urban space. These limitations restrict the nature of urban development as the focus of existing infrastructure obstructs the improvement of the built environment and connection between public spaces.

Movement through the city along this new model of stream is difficult to maintain due to the number of roadways the stream intersects. Restricting the visual cues for this movement across roadways will help to limit the number of pedestrians encouraged to jaywalk across these streets. Utilising planting, parking and barriers to reduce this natural movement.

Each property has been considered within the implementation of the stream intervention illustrated in Fig 6.217. A concise development plan considering the effects on each property and structure, adjacent to the stream enables greater understanding of the entire urban context. The adjacent diagram also highlights the new thoroughfares and park spaces within this new urban growth development.

6.2 Strategic Plan

Urban Development

Fig 6.217. Exploded view illustrating the implemented amenities within Te Aro

Development Site Introduction

Design has been used to investigate how urban space of varying scales can be positively adjusted to improve the experience of pedestrians, while also considering the potential for development as a spatial outcome. The five spatial typologies that were selected for development were chosen based on the volume of traffic that used the adjacent roads. This is a core factor in how a site could be developed and how many pedestrians utilise the existing site.

- Main Roadway Streetscape
- Arterial Roadway Streetscape
- Moderate Roadway Streetscape
- Minor Roadway Streetscape
- Unoccupied Site Streetscape

By designing each space, different qualities are revealed, indicating the more prominent elements within the developments, and what type of spatial shifts are needed to positively alter the space for the pedestrian experience. Designing space according to what each space affords is a crucial element to the design process, and therefore the design is not indicative of how every space can be developed within these typologies. The spatial lessons learnt through each precedent study has generated understanding of what types of effects the stream can have on its surroundings, and therefore what can be implemented within each site.

To understand the context of these site development areas, a study of the factors affecting the site, from structural analysis to site features, has been conducted to ensure that all of the elements that could be affected have been comprehensively studied. This has enabled a structural strategic plan to be implemented throughout the site. This ensures that all surrounding stakeholders can manage their property in the way that would be most appropriate in response to the daylighted stream intervention.

Fig 6.218. Stream concept implementation illustrating all development solutions for Te Aro structures

6.3 Main Roadway Site Plan

Urban Development

0 100 200 400

Fig 6.301. Reference Map illustrating Main Roadway development site

6.3 Main Roadway Site Plan

Urban Development

Wakefield Street - Structures

0 20 40 80
Fig 6.302. Predominant structures that affect development opportunities within Main Roadway Site

6.3 Main Roadway Site Plan

Urban Development

Wakefield Street - Features

Blair Street Adjacent Buildings

- A
- Ground Floor Restaurants and Eateries
 - Upper Level Offices
 - On-street Loading Access

Blair Street

- B
- Narrow Road Corridor
 - Straight Parking
 - Slow Moving Vehicle Traffic

Wakefield Street

- C
- Wide Four Lane Intersection
 - Heavy Pedestrian Traffic
 - Small Covered Waiting Areas

Chaffers Street Pathway

- D
- Moderate Pedestrian Walkway
 - Edge Planting Between Off-street Parking & Pedestrians
 - On-street Parking

Chaffers Street Supermarket Parking

- E
- Outer Supermarket Parking
 - Less Frequently Used
 - Slow Moving Traffic

0 20 40 80

Fig 6.303. Illustration of core elements within the site that will affect development opportunities

6.3 Main Roadway Site Plan

Urban Development

Development Requirements

No Adjustments Minor Retrofit Major Retrofit New Structure

Wakefield Street Strategic Outcomes

0 10 20 40

Fig 6.304. Illustration of development outcomes for Main Roadway Development site

6.3 Main Roadway Site Plan

Urban Development

Strategic Outcomes

Site 1: Blair Street

Existing

0	Residential	45	On-street Parking Spaces
8	Commercial	1	Off-street Parking Access
0	Residential/Commercial	6	Business Loading Access
0	Public

Development

0	Removed Structures	0	Road Access Removed
0	New Structures		Parking Spaces Removed
		0	Parking Building
		24	Individual Spaces

Pedestrian Amenities

Widened pedestrian area
Slowed vehicle corridor

- A Several bars and office spaces would be separated by the stream however this would not prevent a bar from utilising the venues. This structure also has a thoroughfare through to Allen Street that can be used as a small function room. All of these businesses would be positively affected by any increase in pedestrian activity.
- B Restaurants would benefit from an improved streetscape experience.
- C These frontages are improved by removing the obstructive parking located directly outside the building. Loading access to several of the bars may be hindered but pedestrian movement towards the evening venues is improved over all due to the openness of the road.

0 20 40 80

Fig 6.305. Strategic outcomes for Blair Street aspect of Main Roadway site

6.3 Main Roadway Site Plan

Urban Development

Strategic Outcomes

Site 2: Wakefield Street

Existing

0	Residential	4	On-street Parking Spaces
2	Commercial	0	Off-street Parking Spaces
2	Residential/Commercial	0	Business Loading Access
0	Public

Development

0	Removed Structures	0	Road Access Removed
0	New Structures	0	Parking Spaces Removed
		0	Parking Building
		0	Individual Spaces

Pedestrian Amenities

Adjusted pedestrian crossing

- A Commercial Offices with little interaction with the stream.
- B Store frontage would benefit from increased pedestrian movement through Blair Street.
- C Restaurant and apartments would benefit from improved streetscape, the reduction of on-street parking on Blair Street would not affect demand for the restaurant as parking tends to empty after 5:00 pm when the restaurant is popular.

0 10 20 40

Fig 6.306. Strategic outcomes for Wakefield Street aspect of Main Roadway site

6.3 Main Roadway Site Plan

Urban Development

Strategic Outcomes

Site 3: Chaffers Street

Existing

0	Residential	14	On-street Parking Spaces
1	Commercial	148	Off-street Parking Access
1	Residential/Commercial	2	Business Loading Access
0	Public

Development

0	Removed Structures	0	Road Access Removed
0	New Structures		Parking Spaces Removed
		14	On-street
		17	Off-street

Pedestrian Amenities
Widened pedestrian area
Barrier between vehicles and pedestrians

- A A large apartment with ground storefront would benefit from an increase in pedestrians would generate more exposure for business.
- B A large covered car park that could be remodeled to function alongside the stream and benefit public life.

Fig 6.307. Strategic outcomes for Chaffers Street aspect of Main Roadway site

6.3 Main Roadway Site Plan

Urban Development

Site 1: New World Parking

Existing	Development
Commercial	Commercial
0 Levels	6 Levels
Heavy Off-street Parking	0 Off-street Parking Levels
	Integrated Stream

Parking is usually relatively full above ground however underground parking is used less frequently. Removing the edge parking spaces would enable pedestrians to feel more comfortable passing through this space without reducing the capacity for supermarket parking.

Fig 6.308. Affected properties along Chaffers Street

6.3 Main Roadway Site Plan

Urban Development

Strategic Outcomes

Site 4: Waitangi Park

Photo Location

Existing

0	Residential	16	On-street Parking Spaces
0	Commercial	17	Off-street Parking Spaces
0	Residential/Commercial	0	Business Loading Access
0	Public

Development

0	Removed Structures	0	Road Access Removed
0	New Structures		Parking Spaces Removed
		0	Parking Building
		3	Individual Spaces

Pedestrian Amenities

Improved pedestrian corridor

- A Dense planting separates the Walkway towards Te Papa and the waterfront however in order to maintain visibility of the stream, this area will be condensed to generate a visible site line from Chaffers Street.
- B A lowered overflow area for the existing wetland will be utilised for the increase in water flow from the new stream. This will enable the space to become more obvious to pedestrians walking past while also making the land more productive.

0 10 20 40

Fig 6.309. Strategic outcomes for Waitangi Park aspect of Main Roadway site

Main Roadway Development Outcomes

Development solutions for this main roadway site requires significant restraint, as the site has limited spatial opportunity for this implementation. Due to the heavy traffic moving through the site along Wakefield Street and the structural limitations, the streams directionality has been restrained to a standard urban daylighted model.

Surrounding heritage structures and several highly productive businesses within the site create limited structural change opportunities for the main roadway development site. Blair Streets heritage structures have prevented any integration between the urban realm and the structures. This has meant that the road corridor must be used to accommodate the stream as it flows through the site.

The integration of the Chaffers Street Site One, maintains the connection onto Oriental Parade. This reduces other activities on the site such as parking, however, New World Supermarket has significant underground parking that is scarcely utilised fully. The implementation of the stream can also be used as leverage as more people will be drawn to the site to utilise the stream and purchase goods.

The Waitangi Park Site has an urban wetland component that connects to the Cambridge Terrace stormwater pipes, filtrating the water before it enters the harbour. The newly implemented Taranaki Stream can occupy the dense planting space, and create a much bolder body of water entering the harbour.

6.4 Arterial Roadway Site Plan

Urban Development

0 100 200 400
Fig 6.401. Reference Map illustrating
Arterial Roadway development site

Taranaki Street - Structures

Fig. 6.102, Taranaki Street - Structures Map of land use/development opportunities within urban development

6.4 Arterial Roadway Site Plan

Urban Development

Taranaki Street - Features

Fig 6.403. Illustration of core elements within the site that will affect development opportunities

6.4 Arterial Roadway Site Plan

Urban Development

Taranaki Street Strategic Outcomes

Fig 6.404. Illustration of development outcomes for Arterial Roadway site

6.4 Arterial Roadway Site Plan

Urban Development

Strategic Outcomes

Site 1: Knigges Avenue

Photo Location

Existing

1	Residential	2	On-street Parking Spaces
2	Commercial	28	Off-street Parking Spaces
0	Residential/Commercial	2	Business Loading Access
0	Public

Development

1	Removed Structures	0	Road Access Removed
1	New Structures		Parking Spaces Removed
		0	Parking Building
		17	Individual Spaces

Pedestrian Amenities

Widened pedestrian area

- A Recently developed apartments would benefit from the improved public space
- B With the removal of vehicle access along Wigan Street this vehicle dependent business requires significant redevelopment to benefit from the stream.

Fig 6.407. Strategic outcomes for Knigges Avenue aspect of Arterial Roadway site

6.4 Arterial Roadway Site Plan

Urban Development

Structure 1: Chung Hing Panel Ltd.

Existing	Development
<div></div> Commercial Parking	<div></div> Public
1 Levels	0 Levels
Heavy Off-street Parking	0 Off-street Parking Spaces
	Integrated Stream

This small light industrial structure should be removed to enable a pedestrian thoroughfare between Knigges Avenue and Wigan Street. This also provides an opportunity for a micro wetland.

Structure 2: DLA Architects

Existing	Development
<div></div> Commercial	<div></div> Residential/Commercial
3 Levels	4-5 Levels
Limited Off-street Parking	0 Off-street Parking Levels
	Adjacent Stream

This earthquake prone structure requires demolition however the architecture practice could easily occupy the new offices implemented here.

Structure 3: Wilson Parking

Existing	Development
<div></div> Commercial	<div></div> Residential/Commercial
0 Levels	5-6 Levels
	0 Off-street Parking Levels
	Adjacent Stream

This parking area is confined and very restricted parking opportunities. The new structure adjacent to the stream will primarily be a residential property of a similar height to the surrounding structures with a commercial ground floor.

Fig 6.408. Affected properties along Knigges Avenue

6.4 Arterial Roadway Site Plan

Urban Development

Strategic Outcomes

Site 2: Taranaki Street

Existing

2	Residential	4	On-street Parking Spaces
2	Commercial	10	Off-street Parking Spaces
0	Residential/Commercial	2	Business Loading Access
0	Public

A This youth hostel would benefit from the implementation of the adjacent stream and park space.

Development

2	Removed Structures	0	Road Access Removed
2	New Structures		Parking Spaces Removed
		0	Parking Building
		0	Individual Spaces

Pedestrian Amenities

Widened pedestrian area

0 10 20 40

Fig 6.409. Strategic outcomes for Taranaki Street aspect of Arterial Roadway site

6.4 Arterial Roadway Site Plan

Urban Development

Structure 1: Holden Service Centre

Existing	Development
Commercial Levels	Residential/Commercial Levels
2	5-6
Limited Off-street Parking	0 Off-street Parking Levels Adjacent Stream

The removal of this earthquake prone structure would enable a new thoroughfare and park space and create opportunities for new structures. Significant exterior space would make this ideal for a dining opportunity.

Structure 2: Holden Service Centre

Existing	Development
Commercial Levels	Residential/Commercial Levels
2	5-6
Limited Off-street Parking	0 Off-street Parking Levels Adjacent Stream

This structure will help to control pedestrian movement through the site as it confines pedestrians to a smaller area adjacent to the stream.

Fig 6.410. Affected properties along Taranaki Street

Strategic Outcomes

Site 3: Frederick Street

Existing

2	Residential	6	On-street Parking Spaces
2	Commercial	22	Off-street Parking Spaces
0	Residential/Commercial	2	Business Loading Access
0	Public

Development

0	Removed Structures	0	Road Access Removed
2	New Structures		Parking Spaces Removed
		0	Parking Building
		22	Individual Spaces

Pedestrian Amenities

Widened pedestrian area

- A Large apartments would benefit from the implementation of the stream despite required earthquake strengthening
- B Large apartments would benefit from the implementation of the stream.
- A Empty commercial offices, however its central location would enable retail stores to benefit from the increased pedestrian activity.

Fig 6.411. Strategic outcomes for Frederick Street aspect of Arterial Roadway site

6.4 Arterial Roadway Site Plan

Urban Development

Structure 1: Rental Vehicle Lot

Existing	Development
Unused Levels	Public Levels
2	4-5
Limited Off-street Parking	0
	Off-street Parking Levels Adjacent Stream

The church currently faces the roadway, re-orientating the church to generate more movement into the space while rehabilitating the structure to improve the site.

Structure 2: Small Offices

Existing	Development
Commercial Levels	Residential/Commercial Levels
2	4-5
Limited Off-street Parking	0
	Off-street Parking Levels Adjacent Stream

A cafe or restaurant on this site would enable people to linger in this park space and enjoy the stream. This could also be a residential structure.

Fig 6.412. Affected properties along Frederick Street

6.4 Arterial Roadway Site Plan

Urban Development

Strategic Outcomes

Site 4: Vivian Street

Photo Location

Existing

0	Residential	12	On-street Parking Spaces
7	Commercial	12	Off-street Parking Spaces
0	Residential/Commercial	6	Business Loading Access
0	Public

Development

0	Removed Structures	0	Road Access Removed
0	New Structures		Parking Spaces Removed
		0	Parking Building
		12	Individual Spaces

Pedestrian Amenities

Widened pedestrian area
New Wetland

- A ANZ offices have recently been redeveloped and occupies the upper floors to the structure.
- B Prefab Cafe would benefit from increased pedestrian movement
- C The Baby Factory is not ideally suited to this location however creating a second entrance that enables access to the Taranaki Street park.
- D This small two storey commercial office could be maintained or developed to function with the stream and orientate away from Vivian Street as a busy State Highway.

0 20 40 80

Fig 6.413. Strategic outcomes for Vivian Street aspect of Arterial Roadway site

6.4 Arterial Roadway Site Plan

Urban Development

Arterial Roadway Development Outcomes

Development solutions for this arterial roadway site have been based around the structures within it. The Holden building's earthquake issues and the Frederick Street Church's provide opportunities for improved development and connection.

The opportunities created by the removal of the Knigges Avenue Site has enabled a pedestrian thoroughfare adjacent to the stream as it comes from Wigan Street. This has created a large pedestrianised area with several structural development opportunities within the site.

The Frederick Street Site has also enabled a small park space implementation centered around the church as a focal point for the site. The realignment of the structure also provides room for new developments on the site, and a renewal of site C to stimulate activity.

The movement of traffic across Vivian Street from the site is difficult to encourage due to the heavy traffic. As a result, the site has been designed in a way to minimise this movement towards this main roadway.

6.5 Moderate Roadway Site Plan

Urban Development

Moderate Road Strategic Plan

0 100 200 400

Fig 6.501. Reference Map illustrating Moderate Roadway development site

6.5 Moderate Roadway Site Plan

Urban Development

Tory Street - Structures

Fig 6.502. Predominant structures that affect development opportunities within Moderate Roadway Site

6.5 Moderate Roadway Site Plan

Urban Development

Tory Street - Features

Leeds Street Hannah's Apartments

- A
- Entrance to Upper Level Apartments
 - Busy Pedestrian Access Corridor
 - Covered Pedestrian Area

Tory Street

- B
- Narrow Vehicle Corridor
 - Double Edge On-street Parking

Tory Street Harvey Norman

- C
- Off-street Parking
 - Poor Vehicle Flow
 - Poor Pedestrian Flow

Tennyson Street Intersection

- D
- Earthquake Prone Structure
 - Evening Operating Hours

Tennyson Street On-street Parking

- E
- Exposed Seating Area
 - Poor Pedestrian Movement
 - Existing Exposed Water Features

0 20 40 80

Fig 6.503. Illustration of core elements within the site that will affect development opportunities

6.5 Moderate Roadway Site Plan

Urban Development

Tory Street Strategic Outcomes

0 10 20 40
Fig 6.504. Illustration of development outcomes for Moderate Roadway site

Strategic Outcomes

Site 1: Ebor Street

Existing

1	Residential	2	On-street Parking Spaces
2	Commercial	11	Off-street Parking Spaces
0	Residential/Commercial	4	Business Loading Access
0	Public

Development

2	Removed Structures	1	Road Access Removed
2	New Structures		Parking Spaces Removed
		0	Parking Building
		11	Individual Spaces

Pedestrian Amenities

New pedestrian corridor
New residential accommodation

- A Residential apartments would be improved by a stream close to the site.
- B This restaurant on the corner would benefit from increased pedestrian activity.
- D This parking structures entrance opens onto Ebor street however this could be realigned towards the parking space on Tony Street or transformed into residential or commercial structure.
- E The rear of Grand Century Chinese Restaurant has a loading entrance on the Ebor Street edge. This could be redeveloped to adapt the location of the structures loading entrance.

0 20 40 80

Fig 6.505. Strategic outcomes for Ebor Street aspect of Moderate Roadway site

6.5 Moderate Roadway Site Plan

Urban Development

Structure 1: Apartments

Existing	Development
■ Commercial Levels	■ Residential/Commercial Levels
2	2-3
Limited Off-street Parking	0 Off-street Parking Levels Adjacent Stream

Thus site has been redeveloped recently into medium density apartments however the site could easily maintain the western edge of this structure while enabling the stream to flow opposite.

Structure 2: Super Groomers

Existing	Development
■ Commercial Levels	■ Residential Levels
2	5-6
Limited Off-street Parking	0 Off-street Parking Levels Adjacent Stream

This vehicle cleaners requires demolition to ensure the site continues to increase density. The space has been opened up by shifting the structure to the rear of the site where parking.

Structure 3: Red Bull Events Storage

Existing	Development
■ Commercial Levels	■ Residential Levels
2	5-6
Limited Off-street Parking	0 Off-street Parking Levels Adjacent Stream

Red Bulls Event Storage would require a different site to store their vehicles. This structure could also be redeveloped into a residential apartment complex

Structure 4: B.M.U Engineering

Existing	Development
■ Commercial Levels	■ Residential Levels
2	4
Limited Off-street Parking	0 Off-street Parking Levels Adjacent Stream

This engineering workshop requires vehicle access to allow a large variety of work to take place. As this area densifies, the businesses that remain close to the stream should attribute to the pedestrian activity.

Fig 6.506. Affected properties along Frederick Street

Strategic Outcomes

Site 2: Tory Street

Existing

0	Residential	19	On-street Parking Spaces
4	Commercial	2	Off-street Parking Access
3	Residential/Commercial	4	Business Loading Access
0	Public

Development

0	Removed Structures	0	Road Access Removed
0	New Structures	0	Parking Spaces Removed
		0	Parking Building
		4	Individual Spaces

Pedestrian Amenities

Widened pedestrian area
Slowed vehicle corridor

- A Hawthorne Lounge would not be affected by the implementation of adjacent stream.
- B Tory Urban Retreat would not be affected by the implementation of the small stream intervention along Tory Street.
- C Distinction Wellington Century City Hotel and Apartments would benefit from the adjacent park space and improved streetscape
- D Grand Century Chinese Restaurants benefits from increased pedestrian activity however the site does not open out to Ebor Street, minor redevelopments could resolve this.
- E Harvey Normans parking requires a small change to improve vehicle and pedestrian flow through the site.

0 20 40 80

Fig 6.507. Strategic outcomes for Tory Street aspect of Moderate Roadway site

Strategic Outcomes

Site 3: Tennyson Street

Photo Location

Existing

1	Residential	39	On-street Parking Spaces
2	Commercial	50	Off-street Parking Spaces
3	Residential/Commercial	2	Business Loading Access
0	Public

Development

0	Removed Structures	1	Road Access Removed
2	New Structures		Parking Spaces Removed
0			Parking Building
32			Individual Spaces

Pedestrian Amenities

New pedestrian thoroughfare

- A This residential apartments and supermarket would benefit from more people residing in the area. Loading access would be more difficult however the store has small and frequent deliveries that could be easily delivered by hand from the vehicle end of Tennyson Street.
- B Recently renovated residential apartments would benefit from the improved park space.
- C Commercial offices and apartments do not require any redevelopments as a result of the stream.
- D New renovated offices would only require minor redevelopments to enable the new structure.

0 20 40 80

Fig 6.508. Strategic outcomes for Tennyson Street aspect of Moderate Roadway site

6.5 Moderate Roadway Site Plan

Urban Development

Structure 1: Private Business Parking

Existing	Development
Commercial Parking 2 Levels Limited Off-street Parking	Residential/Commercial 6 Levels 0 No Parking Adjacent Stream

A new structure adjacent to the offices could be implemented to increase density of the area in replace of the level parking space.

Structure 2: Church Parking

Existing	Development
Commercial Parking 2 Levels Limited Off-street Parking	Residential 6 Levels No Parking Adjacent Stream

A structure that curves with the stream to guide pedestrians along the edge would improve the flow of people through the space towards Courtenay Place

Structure 3: Elim Church

Existing	Development
Commercial 2 Levels Limited Off-street Parking	Commercial 2 Levels Limited Off-street Parking

Elim Church would require a minor redevelopment as the property currently has a small balcony that blocks the proposed pathway for the stream. Despite this the church would benefit from the changes as the surrounding site is transformed into an adjacent pedestrian friendly site.

Fig 6.509. Affected properties along Tennyson Street

Moderate Roadway Development Outcomes

This site removes two roadways to generate pedestrian activity within the site in the adjacent spaces, and increase the development opportunities. The large apartments in this space limit the structural changes that can be made, however, these contribute significant activity to the existing site and would benefit from a pedestrian improvement.

The removal of light industrial elements within the Ebor Street site can help to transition the site towards a pedestrian friendly area. Several residential properties would be improved through the addition of a stream close to the site. The removal of Ebor Street as a roadway restricts traffic through the site and creates a single point of entry along Jessie Street.

Tory Street's large structures will remain unchanged as the diversity of programme, and high density of these buildings, already contributes significantly to the city. The reduced movement through Tory Street should improve the accessibility of these structures for drivers moving through the space.

Tennyson Street businesses would benefit from improved pedestrianisation, as the offices within the space will have an improved view, while the supermarket will see increased foot traffic to the site. This will also improve the experience for residents living above the site.

6.6 Minor Roadway Site Plan

Urban Development

0 100 200 400
Fig 6.601. Reference Map illustrating
Minor Roadway development site

6.6 Minor Roadway Site Plan

Urban Development

Eva Street - Structures

Fig 6.602. Predominant structures that affect development opportunities within Minor Roadway Site

6.6 Minor Roadway Site Plan

N Urban Development

Eva Street - Features

Leeds Street Hannah's Apartments

- A
- Entrance to Upper Level Apartments
 - Busy Pedestrian Access Corridor
 - Covered Pedestrian Area

Eva Street Courtyard Parking

- B
- Narrow Pedestrian Corridor
 - Straight Parking

Eva Street Hannah's Factory Lane

- C
- Narrow Vehicle Corridor
 - Earthquake Prone Structure
 - Small Covered Walkway

Dixon Street Dream Girls

- D
- Earthquake Prone Structure
 - Evening Operating Hours

Dixon Street Te Aro Park

- E
- Exposed Seating Area
 - Poor Pedestrian Movement
 - Existing Exposed Water Features

0 20 40 80

Fig 6.603. Illustration of core elements within the site that will affect development opportunities

6.6 Minor Roadway Site Plan

Urban Development

Eva Street Strategic Outcomes

Fig 6.604. Illustration of development outcomes for Minor Roadway site

6.6 Minor Roadway Site Plan

Urban Development

Strategic Outcomes

Site 1: Leeds Street

Existing

1	Residential	8	On-street Parking Spaces
2	Commercial	49	Off-street Parking Access
2	Residential/Commercial	5	Business Loading Access
0	Public	1	Bus Stop

Development

0	Removed Structures	0	Road Access Removed
2	New Structures		Parking Spaces Removed
		0	Parking Building
		51	Individual Spaces

Pedestrian Amenities

Improved bus shelter
Improved Street Edge

- A New craft beer brewery that has already established itself as a popular destination and would benefit heavily from the implementation of the stream.
- B Large apartments that add significant density to the site.
- C This dance studio could be developed to occupy more of the site and potentially add a residential component to the site.

Fig 6.605. Strategic outcomes for Leeds Street aspect of Minor Roadway site

6.6 Minor Roadway Site Plan

Urban Development

Structure 1: Care Parking (Front)

Existing	Development
Commercial Parking Levels 0	Residential/Commercial Levels 4-5
Heavy Off-street Parking	Off-street Parking Levels 0
	Integrated Stream

Structure 2: Care Parking (Rear)

Existing	Development
Commercial Parking Levels 0	Residential Levels 2-3
Heavy Off-street Parking	Off-street Parking Levels 0
	Adjacent Stream

A large new development that could function as both residential to add density to the area and as a commercial store as the foot traffic is significant due to the adjacent bus stop and thoroughfare options,

This structure is much smaller and out of the way of core pedestrian movement. A smaller 2-3 storey building would function appropriately with the adjacent structures.

Fig 6.606. Affected properties along Leeds Street

6.6 Minor Roadway Site Plan

Urban Development

Strategic Outcomes

Site 2: Eva Street

Existing

3	Residential	0	On-street Parking Spaces
1	Commercial	19	Off-street Parking Access
4	Residential/Commercial	9	Business Loading Access
0	Public

Development

1	Removed Structures	0	Road Access Removed
1	New Structures		Parking Spaces Removed
		0	Parking Building
		3	Individual Spaces

Pedestrian Amenities

Improved thoroughfare opening

- A Apartment building that adds significant density to the area.
- B A restaurant and apartment building that adds density to the area while also providing a destination for people to enjoy.
- C Leeds Street Bakery benefits heavily from the increased pedestrian activity through the site and the improved ambiance of the space.
- D Golding's Bar benefits from the increased pedestrian activity.
- E Wellington's Chocolate Factory benefits from the increased pedestrian activity.
- F FatAngel and Eva Beva are both eateries and bars that benefit from the increased pedestrian activity.
- G This double storey structure with a single upper floor for apartments is extremely limited in how it would be positively affected by an improved public space and should look redevelopment.
- H A four storey apartment structure that could have a ground floor redevelopment to improve function adjacent to the stream

0 20 40 80

Fig 6.607. Strategic outcomes for Eva Street aspect of Minor Roadway site

6.6 Minor Roadway Site Plan

Urban Development

Structure 1: Dream Girls

Existing	Development
<div></div> Commercial Parking	<div></div> Residential/Commercial
2 Levels	4-5 Levels
Moderate Off-street Parking	0 Off-street Parking Levels
	Integrated Stream

Dream Girls occupies a grungy, dilapidated building that encloses the Eva Street walkway. Removing this for a larger and narrower structure will enable a semi-public space for a cafe or restaurant to occupy

Fig 6.608. Affected properties along Eva Street

Strategic Outcomes

Site 3: Te Aro Park

Existing

0		Residential	6	On-street Parking Spaces
4		Commercial	7	Off-street Parking Access
4		Residential/Commercial	3	Business Loading Access
1		Public

Development

0	Removed Structures	1	Road Access Removed
0	New Structures		Parking Spaces Removed
0			Parking Building
13			Individual Spaces

Pedestrian Amenities

Improved park space
Improved pedestrian corridor

- A A seven storey apartment building with a small ground floor commercial store can turn towards the Lukes Lane in order to generate activity within this back lane.
- B A four storey residential and commercial structure that could front be redeveloped into an eatery to allow pedestrians to enjoy the back lane.

Fig 6.609. Strategic outcomes for Te Aro Park aspect of Minor Roadway site

Minor Roadway Development Outcomes

Minor site changes are required for this development area as the high density and pedestrian focus of the site makes the space ideal for intimate spatial changes. The small laneway creates a back lane of activity, however, this transition can enhance the pedestrian experience and activity through the site as an alternative to Cuba Street.

The corner of Ghuznee and Leeds Streets has a large parking area that brings a significant proportion of the vehicle traffic to the site. The structures between Leeds Street and Eva Street need little improvement as the buildings have a high density and have mostly been renovated into large apartments.

Opening up the entrance of Eva Street onto Dixon Street can provide a more obvious visual corridor to stimulate movement between the space from Te Aro park. This added movement through the space could create a shift towards Eva Street as a destination, rather than simply a thoroughfare. With the sounds of the stream below the walkway, the ambiance within the space will also be drastically improved.

Te Aro park redevelopment is designed to provide greater access through the site. The current space limits movement, however, the changes made ensure that several pathways intercept the triangular park while creating a larger plaza space for pedestrians to occupy.

6.7 Unoccupied Site Plan

Urban Development

0 100 200 400
Fig 6.701. Reference Map illustrating
Unoccupied Site development

6.7 Unoccupied Site Plan

N Urban Development

Bute Street - Structures

0 20 40 80
Fig 6.702. Predominant structures that affect development opportunities within Unoccupied Site

6.7 Unoccupied Site Plan

Detailed Design - Unoccupied Site

Bute Street - Features

Vivian Street

A

- Heavy Vehicle Traffic Flow
- Poor Pedestrian Coverage
- Difficult Pedestrian Crossing

Vivian Street Petrol Station

B

- Heavy Vehicles Use
- Electric Vehicle Charging
- Commercial Store

Bute Street Commercial Buildings

C

- Small Pedestrian Use
- Upper Level Apartments
- Off-street Parking

Bute Street Wilson's Parking

D

- Multiple Empty Sites
- Poorly Sealed Ground
- Small Thoroughfare to Garrett Street

Garrett Street

E

- No Exit
- Regular Pedestrian Thoroughfare
- Access to Off-street Parking

0 20 40 80

Fig 6.703. Illustration of core elements within the site that will affect development opportunities

6.7 Unoccupied Site Plan

Urban Development

Fig 6.704. Illustration of development outcomes for Minor Roadway site

6.7 Unoccupied Site Plan

Urban Development

Strategic Outcomes

Site 1: Vivian Street

Existing

0	Residential	9	On-street Parking Spaces
5	Commercial	0	Off-street Parking Access
1	Residential/Commercial	0	Business Loading Access
1	Public

Development

0	Removed Structures	0	Road Access Removed
0	New Structures	0	Parking Spaces Removed
		0	Parking Building
		12	Individual Spaces

Pedestrian Amenities

Stream barrier between footpath

- A This stationary store would not be heavily affected by the stream
- B This mixed use structure can already benefit from a stream implementation
- C,D,E These three storefronts would not benefit from increased pedestrian activity, this could be improved by adapting the store function.

0 10 20 40

Fig 6.705. Strategic outcomes for Vivian Street aspect of Minor Roadway site

6.7 Unoccupied Site Plan

Urban Development

Strategic Outcomes

Site 2: Bute Street

- A Eight storey recent development apartment building would require significant redevelopment to open up to the new Bute Street park.
- B Double storey apartment with a single upper level living space could be rejuvenated to function more with the improved pedestrian space.

6.7 Unoccupied Site Plan

Urban Development

Structure 1: Z Petrol Station

Existing	Development
Commercial	Residential/Commercial
1 Levels	4-8 Levels
Electric Vehicle Charging	0 Off-street Parking
Rear Loading Entrance	Adjacent Stream

Structure 2: Care Park

Existing	Development
Public Structure	Residential
0 Levels	4-8 Levels
Heavy Off-street Parking	0 Off-street Parking
	Integrated Stream

These structures would front the park and create a clean opening to the park. Planting can be used around the edge of the new structures to reduce the vehicles noise. This transition away from a petrol station will remove vehicles from the edge of the site.

These structures are placed adjacent to a new green space and can generate public activity adjacent to the stream. A small gap between the two developments enables access to existing cafe's on Cuba Street.

Fig 6.707. Affected properties along Bute Street

6.7 Unoccupied Site Plan

Urban Development

Strategic Outcomes

Site 3: Garrett Street

Existing

2	Residential	2	On-street Parking Spaces
2	Commercial	2	Off-street Parking Access
1	Residential/Commercial	2	Business Loading Access
0	Public

Development

2	Removed Structures	0	Road Access Removed
8	New Structures		Parking Spaces Removed
		0	Parking Building
		2	Individual Spaces

Pedestrian Amenities

Improved pedestrian access

- A This structure is attached to structure D however this used as an entrance to the off-street parking and should remain unchanged to enable the commercial offices above from losing parking.
- B Small residential apartments that would be greatly improved by the implementation of the stream
- C Kaffee les is a successful ice cream store and benefits from the increased pedestrian activity.
- D With an improved streetscape the small commercial buildings could be redeveloped to benefit from increased pedestrian activity.
- E This structure requires earthquake strengthening and a ground floor redevelopment to fully benefit from the large park space implemented to the rear of the building.

Fig 6.708. Strategic outcomes for Garrett Street aspect of Minor Roadway site

6.7 Unoccupied Site Plan

Urban Development

Structure 1: Wilson parking

Existing

Development

■ Commercial Parking	No Structure
1 Levels	0 Levels
Heavy Off-street Parking	0 Public Park
Garrett Street Entrance	Integrated Stream

This site is currently owned by Wilson Parking however could be integrated into a park space to enable fluid movement between Glover Park and the new Bute Street Park.

Structure 2: Historic House

Existing

Development

■ Residential	No Structure
2 Levels	0 Levels
No Off-street Parking	0 Public Park
Heritage Site	Integrated Stream

This historic structure could be relocated to enable the structure to be rejuvenated elsewhere while the property becomes an integral part of the Bute Street Park.

Fig 6.709. Affected properties along Bute Street

6.7 Unoccupied Site Plan

Urban Development

Unoccupied Site Development Outcomes

Creating a fluid pathway through the Bute Street site would enable this space to connect to Garrett Street, then onto Glover Park and Cuba Street. The structural potential of this site is significant due to the current poor use of space. Developing these elements will generate a more active pedestrian experience within the surrounding area.

Most of the structures along Vivian and Bute Street could easily be upgraded or renovated. These buildings require minor renovations to allow the programme to function with the new pedestrian spaces.

The implementation of the new Bute Street Park site would encourage new structures between the public space and Cuba Street to create a new face adjacent to the park. These buildings bring density and activity to the site in the form of businesses and housing.

The removal of the heritage structure along Garrett Street stimulates movement by opening the site to the public space, north of the site. This will bring people from this popular park space, into the new Bute Street site to grow this space as a destination, while allowing other areas to densify.

7.0 Spatial Development

Water Sensitive Urban Design

Water is a natural part of a city's life cycle. As a consistent factor water must be treated as a positive contributor to the city's landscape, and not as a waste product that requires rapid removal. By understanding how water treatment and removal has developed within urban settings, it is possible to reflect upon why streams have seen a rapid reduction in quality and function throughout their adaptation and implementation into built environments.

This reflection can be used to develop suitable design outcomes regarding all the components of the stream's interaction with urban components, such as culverts and roadways and edges. Contrasting the natural hydrological process with the existing urban hydrological process will provide greater understanding into how this method can be adapted.

The current model of conventional urban streams creates waste products that are harmful to the natural environment when they are discharged into local rivers and oceans. Ensuring that a water sensitive hydrological system is created within Wellington will help to clean up the Wellington Harbour, and create a safe space for locals to occupy and enjoy.

The existing model of urban streams creates poor natural environment for wildlife and low water quality due to scarce planting and limited control of water sources. Comparing the issues that have faced urban streams in the past can help to produce an understanding of how these spaces can be developed to create a successful habitat and ecosystem for flora and fauna.

7.1 Detailed Stream Design

Spatial Development

Fig 7.101. Natural hydrological system

Fig 7.102. Conventional hydrological system

Fig 7.103. Sensitive hydrological system

7.1 Detailed Stream Design

Spatial Development

Fig 7.104. Implemented hydrological system Outcomes

Fig 7.105. Comparison of typical urban and non-urban Streams

7.1 Detailed Stream Design

Spatial Development

Urban Drainage Systems

Edge Collection Points

Fig 7.106. Edge water collection method

Central Collection Points

Fig 7.107. Central water collection method

Urban Water Management Tools

Permeable Paving

Fig 7.108. Paving Collection system

Rain Garden

Fig 7.109. Garden Collection system

Street Planting

Fig 7.110. Planting Collection system

Bioswales

Fig 7.111. Channel Collection system

Urban Stream

Fig 7.112. Stream Collection system

Constructed Wetland

Fig 7.113. Wetland Collection system

7.1 Detailed Stream Design

Spatial Development

Urban Drainage Systems

The current drainage systems within Wellington place all of the pressure from large weather events on the stormwater systems below the streetscape. To improve flood prevention throughout the entire city, several drainage methods can be implemented throughout the urban environment. Urban drainage within Wellington can be improved to work in conjunction with the adjacent stormwater system and stream to reduce the inflow of water into these systems.

Permeable paving can be used within close proximity to the stream's edge to improve the traction of the ground around the stream, as people moving out of the water increases the likelihood of slipping. In conjunction with rain gardens and street planting this can help to increase the drainage capabilities of the urban streetscape before the water reaches the stormwater network and stream.

While they have limited potential in Te Aro, Urban bioswales can be implemented in the form of park spaces to create temporary overflow spaces for water storage during large weather events. These temporary methods of emergency water storage have been successfully integrated within Copenhagen due to an urban renewal (Dreiseitl, 2014). The project aimed to integrate water sensitive design management systems to prevent flooding from halting the city. This method can be implemented within Wellington, as it focuses on strengthening the resilience of the urban landscape, rather than shifting and limiting the way the urban environment functions.

These urban water management tools can help to improve the resilience of the city. When used in conjunction with one another, the water issues that currently exist within Wellington can be dramatically reduced to prevent heavy rainfall from flooding in the ever increasing weather events (GmbH, 2011).

7.1 Detailed Stream Design

Spatial Development

Urban Water Management Tools

Fig 7.114. Paving Collection attributes

Fig 7.115. Garden Collection attributes

Fig 7.116. Planting Collection attributes

7.1 Detailed Stream Design

Spatial Development

- Increases Attenuation
- Increased Infiltration
- Increased Evapotranspiration
- Increased Detention/Retention
- Reduces Culvert Demand

Fig 7.117. Channel Collection attributes

- Increases Attenuation
- Increased Infiltration
- Increased Evapotranspiration
- Increased Detention/Retention
- Reduces Culvert Demand
- Increased Street Planting
- Decrease Surface Heating

Fig 7.118. Stream Collection attributes

- Increases Attenuation
- Increased Infiltration
- Increased Evapotranspiration
- Increased Detention/Retention
- Reduces Culvert Demand
- Increased Street Planting
- Decrease Surface Heating

Fig 7.119. Wetland Collection attributes

7.1 Detailed Stream Design

Spatial Development

- Sedimentation
 - Detritus Collection
 - Particle Screening
 - Sediment Removal
- Wetland Filtration
 - Natural Cleansing Treatment
 - Terraced Cleansing Treatment
 - Constructed Cleansing Treatment
- UV Filtration
- Grey-water Recycling

Fig 7.120. Natural undulating cleansing system

Fig 7.121. Constructed Terraced cleansing system

7.1 Detailed Stream Design

Spatial Development

Fig 7.122. Cleansing biotope cleansing system

Diagrammatic Treatment System

Fig 7.123. Illustration of treatment systems across the Te Aro

7.1 Detailed Stream Design

Spatial Development

Fig 7.124. Illustration of how water can be stored within the site to mitigate against flood risks

7.1 Detailed Stream Design

Spatial Development

Water Treatment and Storage

Wellington's stream intervention will be utilised to significantly improve the quality of the water runoff that enters the harbour. This shift towards a constructed stream will also significantly reduce the quantity of water flowing through the stormwater network below the city. The water from the aquifers that fed the streams that historically ran through Te Aro, currently flow through the existing stormwater network. Shifting this to a new stream would reduce the demands on the existing network.

As the aquifers below the city may have been contaminated during the urbanisation of Wellington, the water sources may need to be cleansed prior to entering the Te Aro stream system. This could be completed using a cleaning facility or a wetland further upstream. A wetland system is the preferred method of decontaminating the water entering the stream, as the cost of constructing a new cleaning facility at the city's edge may be implausible for a city council to implement.

Several methods of cleaning the water entering the stream, both from the aquifers and within Te Aro, will enable the water to be much cleaner as it flows through the urban landscape. Utilising a variety of artificial and natural cleansing treatments methods, will ensure the stream's resiliency to process any contaminants that enter the water.

Wellington's water storage capacity requires significant upgrades to prevent flooding from occurring more frequently within the streetscape. The implementation of the stream will significantly reduce the likelihood of this occurring. Other methods such as increasing culvert capacity and introducing more urban flood channels into the streetscape as sea levels rise, will be integral to ensuring the city remains flood resistant.

Road Collection Systems

Collection of water within the urban environment is fundamental to reducing the strain of increasing weather events on the existing infrastructure. This can ensure that the newly implemented stream reduces the risk of flooding of the stormwater network. Despite this expectation, contaminants entering the stream could reduce the ability of the space to function as an inhabitable aspect of the urban landscape.

Drainage from the stream illustrates how water on a roadway or large concrete space can function. Due to the large quantities of contaminants on roadsides and solid concrete surfaces, these urban landscapes will not enter the stream. This measure has been taken to ensure the water entering the stream has limited exposure to harsh pollutants, such as oil or chemicals that could negatively affect the ecosystem and habitat.

Drainage to and from the stream balances the contamination prevention with small urban space collection options. Spaces such as footpaths and small urban corridors can be utilised as entry points for urban water runoff as the threat of severe pollutants is slim. Barriers between the road and footpath can also be used to prevent any risk of large objects getting into the stream. Planting along the edge of the space can be used to ensure immediate contaminants, such as rubbish, can be picked up before entering the ecosystem. Other collection treatment systems, shown in Fig 7.121, can also create a barrier between the main flow of the stream and the new water entering the system.

Drainage towards the stream can be used along the edge of small roadways where the water entering is unlikely to be contaminated due to the small number of vehicles that use the space. This system still requires a significant natural barrier to ensure that the stream's ecosystem is safeguarded. This edge planting enables filtration of water before entering the stream, reducing any pollution from the adjacent space, while also providing an extra level of flood prevention.

Road Collection Systems

Drainage From Stream

- 1a Road Water Runs Away From Stream
- 1b Edge Prevents Water Flowing Into Stream
- 1c Constructed Base Prevents Infiltration

Fig 7.125. Contaminated water collection method

Drainage To & From Stream

- 2a Road Water Runs Away From Stream
- 2b Edge Shifts Pedestrian Focus Towards Stream
- 2c Path Water Runs Into Stream
- 2d Edge Planting Filtrates Debris
- 2e Water Infiltrates Into Soil and Water Table

Fig 7.126. Contaminated/light contaminated water collection method

Drainage Towards Stream

- 3a Road Water Runs Away From Stream
- 3b Road Water Runs Towards Stream
- 3c Perforated Concrete Edge Limits Water
- 3d Edge Planting Filtrates Debris
- 3e Water Infiltrates Into Soil and Water Table

Fig 7.127. Light contaminated water collection method

7.1 Detailed Stream Design

Spatial Development

7.1 Detailed Stream Design

Spatial Development

Culvert Directionality

Standard Culvert Exit

Enables Fast Movement of Water During Heavy Rainfall
Generates Tranquil noise of water

Water Sensitive Culvert Exit

Slows Water Flow
Creates Protective Areas for Aquatic Life

Fig 7.131. Method of reducing erosion

Energy Dissipater
Install rocks and natural material to
reduce water velocity
Width - 2x Culvert Diameter
Length - 3x Culvert Diameter

Inlet Protection
Install rocks and concrete base to prevent
water escaping stream system

Fig 7.132. Method of maintaining manageable water velocities

Stream Overflow

Intangible Overflow

Standard water Level

Flood water Level

Tangible Overflow

Standard water Level

Flood water Level

- Water Resistant Material
- Compacted Aggregate
- Reinforced Concrete
- In Situ Ground Material
- Concrete Culvert Material

Fig 7.133. Construction diagram of overflow edges

7.1 Detailed Stream Design

Spatial Development

Edge Development

Generating potential for pedestrians to interact with the stream can completely change the way they occupy the space. This interaction must be implemented with the consideration of the stream and its ability to cleanse the urban water that flows through it. While the spatial elements are crucial for the stream's success, the cleanliness of the water will be the determining factor to whether people can interact with the stream at all.

Heavy planting edges will be used at several points throughout the stream, as dense planting will help to cleanse and slow the water as it moves through the city. Several wetland areas located throughout the city illustrated in Fig 6.203 and Fig 6.204 will be fundamental to cleansing the water as it enters the stream throughout Te Aro. Dense planting throughout the stream at non-interaction points along it will also be used to control the velocity of the current, whilst cleaning and filtrating the water.

The fundamental determinant as to whether each space is successful is pedestrian interaction with the stream. Fig 7.134 illustrates how constructed edges can be utilised to encourage pedestrians from occupying the spaces created beside the stream. These elements will limit the water that can be cleaned, as hardscaping on the stream's surface will be needed to ensure people wishing to enter the water are protected.

The subsurface infrastructure can be uniform for both of these edge conditions, as the pedestrian space adjacent to the stream can be consistent throughout the urban realm. The infiltration within the constructed edge conditions is extremely limited as the sites require reinforced earth works to ensure the structural stability of the space adjacent to the stream.

7.1 Detailed Stream Design

Spatial Development

Edge Conditions

Fig 7.134. Edge condition types

Constructed Edge Types

Hard Edge

Stream remains visible
No safety features
Edge height limits tactility

Fig 7.135. Spatial programme of straight edge

Balustrade Edge

Creates Obvious barrier along edge
Limits risk to pedestrians
Water is confined

Fig 7.136. Spatial programme of balustrade edge

Cantilevered Edge

Creates hidden waters edge
Increased fall risk
Water is touchable

Fig 7.137. Spatial programme of cantilevered edge

7.1 Detailed Stream Design

Spatial Development

Raised Edge

Pedestrians at unique height to stream
Reduced fall risk
Edge can be used for seating

Fig 7.138. Spatial programme of raised edge

Small Lip Edge

Creates awareness of the edge
Added safety next to stream
Water is difficult to touch

Fig 7.139. Spatial programme of small lip edge

Platform Walkway

Stream remains visible
Safety is maximised
Water is confined

Fig 7.140. Spatial programme of small platform edge

7.1 Detailed Stream Design

Spatial Development

Angled Entrance Edge

Limited movement into water
Specific transition into water
Edge invites activity

Fig 7.141. Spatial programme of angled entrance edge

Straight Entrance Edge

Open movement into water
Safety features are removed
Edge invites activity

Fig 7.142. Spatial programme of straight entrance edge

Steps to Edge

Creates large transition to water
Limited Safety along edge
Creates large seating area

Fig 7.143. Spatial programme of steps to edge

7.1 Detailed Stream Design

Spatial Development

Edge Development Conclusions

The implementation of these design components enables variety in how the issues within hydro-urban conditions can be resolved. Varying edge conditions have been used to provide a range of solutions for addressing the different environments that exist within Te Aro. This type of design development ensures pedestrians are driven towards sites that facilitate the best response to the space, in accordance with dominant site factors.

Several design responses can be used at difference points through each space to enable the appropriate pedestrian response. Creating spaces for pedestrians to occupy the adjacent areas is the most common edge condition, as these spaces are thoroughfares where lingering beside the water is discouraged. The edges that create movement along the edge of the stream are shown in Fig 7.35 to Fig 7.140. All of these create different response options when the water is a visual element, rather than spatial.

Movement into the water has been encouraged using edge conditions that allow people to occupy the space beside the water shown in Fig 7.141, Fig 7.142, and Fig 7.143. While these elements will be limited throughout the design, they can be utilised to illustrate that entering the water is possible within the space.

By affording certain responses from pedestrians using the stream edges, the user is enabled to discover spaces as they are revealed to them. The differing edges can be used to control the experience of the pedestrian, ensuring they feel invited into the right parts of the design. This will also help to avoid people feeling uncomfortable as they move through new spaces. By restricting contact with the water's edge at certain points, the connection to the water's edge can create a more memorable experience.

7.1 Detailed Stream Design

Spatial Development

Fig 7.144. Spatial Implementation Conditions

7.1 Detailed Stream Design

Spatial Development

Spatial Implementation Conditions

With the understanding developed from the detailed stream development, the development conditions will be designed utilising the considerations learnt through the research process. The lessons learnt from the spatial investigations undertaken, both within Wellington and in the different precedent analyses, can benefit all of the factors of the intimate spatial design. The redevelopment of the Te Aro will benefit from the reapplication of these design elements within the appropriate environments of the new stream design.

The spatial implementation conditions that will be utilised within the development process, shown in Fig 7.144 have been categorised based on the senses. The pedestrian experiences varies throughout Te Aro, so ensuring the effect of each space targets the appropriate response will help to create the a more comfortable inner city space.

Sight spatial conditions have been implemented where the sites have either a lack or overload of interesting elements. This can help to minimise the visual noise that can be very prominent through the urban landscape, or improve the environment's visual aesthetic.

Sound spatial conditions have been implemented for two core reasons. The positive qualities of the stream include the tranquil and relaxing sounds of water flowing. Creating areas along the stream where the sound has been accentuated, can generate comfortable conditions for pedestrians to stop and linger. The other spatial reason is to reduce the sound of traffic within the space. This is a very prominent issue within all of the urban parks throughout Te Aro, limiting the effects vehicles have on the new spaces can contribute positively to the urban realm.

Touch spatial conditions are focused on enhancing the positive reactions around the stream, and limiting the negative reactions throughout the city. Once again this is mainly due to the negative impact of heavy vehicle movement through the city. These elements enhance the experience of interacting with the stream, while reducing the impact of this movement within each development.

Main Roadway Initial Concepts

Inner City Bypass

Fig 7.201. Inner City Bypass concept render

Cable Street

Fig 7.202. Cable Street concept render

Cambridge Terrace

Fig 7.203. Cambridge Terrace concept render

Wakefield Street

Fig 7.204. Wakefield Street concept render

These main roadways affect the flow of traffic within the entire region of Wellington. Creating pedestrian spaces adjacent to this should aim to reduce the impact of these contrasting factors upon each other.

7.2 Main Roadway Site Spatial Programme

Spatial Development

0 100 200 400
Fig 7.205. Reference Map illustrating
Main Roadway Site spatial design

Sherbourne Common, Canada

The waters edge has been formalised using concrete steps against the entire edge to indicate when the edge and water is accessible. This could be used as a way to direct people to the waters edge, and also prevent use when not desirable.

Fig 7.206. Sherbourne Common precedent qualities that can be utilised within spatial design

7.2 Main Roadway Site Spatial Programme

Spatial Development

Spatial Design

- Surface Stream
- Submerged Stream
- Culverted Stream
- New Structures
- Roadway
- Planting
- Grass Area

Fig 7.207. Diagrammatic plan of implemented stream design

Fig 7.208. Rendered section of Chaffers Street design intervention

Fig 7.209. Rendered section of Blair Street design intervention

7.2 Main Roadway Site Spatial Programme

Detailed Design - Main Roadway Site

Feature Implementation

-

1 This area of the design is too close to the main roadway and therefore requires a barrier as pedestrians will be focused on fast moving vehicles rather than an edge to the water.
-

2 A drop in water levels will create a small waterfall to distract from the noise of fast moving vehicles. The level change also allows for a transition below the roadway and into the existing wetland within Waitangi Park.
-

3 Chaffers Street no longer have a parking barrier between pedestrians and vehicles. The implementation of a physical barrier and dense planting prevents the large drop off between the roadway and stream from being visible for motorists.
-

4 A soft planted edge between the slow moving traffic within the parking and the pocket park will help shift pedestrian focus towards the stream.
-

5 The Stream has been designed to be occupied by pedestrians. The use of multiple barriers allows for pedestrians to occupy this space without feeling exposed.
-

6 This level change adjacent to the stream is enough to ensure that the pedestrians focus is on the stream and will encourage interaction through activity or sitting.
-

7 The transition down to the waters edge creates an option for people to either utilise the space as a thoroughfare or occupy and enjoy the streams edge to interact with the water.
-

8 Planting at the edge of the stream before the pedestrian crossing is used to help guide pedestrians towards the thoroughfare, away from the vehicles in the centre of the space.
-

9 The walkway uses the stream as a barrier between the parking and the thoroughfare as the space provides an option for either comfort or sunlight depending on what edge of the stream people would prefer to walk beside.
-

10 During the evenings after the parking is less occupied an interaction with pedestrians across the water is possible.

Fig 7.210. Rendered plan of implemented stream design

7.2 Main Roadway Site Spatial Programme

Detailed Design - Main Roadway Site

Planting used to reduce vehicle noise from surrounding roadways. Terraced edge enables layered noise reducing barriers.

Fig 7.211. Spatial diagram of Chaffers Street Stream

The steps generate interaction with the slow moving waters at the Wakefield Street crossing.

Fig 7.212. Rendered image of Main Roadway stream design

7.2 Main Roadway Site Spatial Programme

Detailed Design - Main Roadway Site

Main Roadway Movement & Access

Pedestrian movement through Blair Street has been shifted from the right side of the street to the left, in order to align the pedestrian corridor with the waterfront, rather than the car park for New World Supermarket (1).

The stream along Blair Street now creates a barrier between vehicles and pedestrians to generate a more comfortable experience (2).

This shift enables the pedestrian crossing to shift to away from the corner of Wakefield Street and now gives pedestrians more time to cross safely (3).

0 20 40 80
Fig 7.210. Diagrammatic illustration of how pedestrian movement changes post implementation

Parking along Chaffers Street has been entirely removed to allow for the widening of the pedestrian space and stream intervention (1).

The western entrance along Chaffers Street has also been shifted across to create a larger area for pedestrians to occupy by the stream, as the stream section to the north of this entrance is too close to the roadway (2).

Parking has been limited to angled parking along the western edge of the Blair Street and the movement is now one way towards Courtenay Place. This reduces programme of the street as a parking location (3).

0 20 40 80
Fig 7.211. Diagrammatic illustration of how Vehicle movement changes post implementation

Development Conclusions

Wakefield Street development has been used to investigate how Main Roadway sites can be altered in a way that enables pedestrians to safely occupy these spaces without disrupting heavy traffic through the site. As these roadways are fundamental to the flow of vehicles through the city, it is important that they are not disrupted, however, this can be done in a way that encourages pedestrian movement across this space.

The remaining Arterial Roadway areas within Te Aro could utilise these methods of development as these streetscapes all deal with issues of limited development opportunities. This model focuses on developing surrounding sites adjacent to the roadways in order to generate public activity. This understanding is also applicable within other daylighting projects, as the focus of this method considers the factors that affect this street typology.

7.3 Arterial Roadway Site Spatial Programme

Detailed Design - Arterial Roadway Site

Arterial Roadway Initial Concepts

Courtenay Place

Fig 7.301. Courtenay Place concept render

Victoria Street

Fig 7.302. Victoria Street concept render

Ghuznee Street

Fig 7.303. Ghuznee Street concept render

Taranaki Street

Fig 7.304. Taranaki Street concept render

The design of any new implementation within arterial roadways should occupy the adjacent spaces within the site. Any disruption to the traffic that crosses the roadway could limit the flow of traffic which would negatively affect congestion within these spaces.

7.3 Arterial Roadway Site Spatial Programme

Spatial Development

0 100 200 400
Fig 7.305. Reference Map illustrating
Arterial Roadway spatial design

Deichgärten and Donaupark, Germany

The relationship of these parks in Germany to the waters edge create a tactile relationship between the pedestrian and the stream. This is done by utilising different edges to create unique responses to the water. A gradual transition to the water can be substituted for stepping stones across it when the correct atmosphere is created.

Fig 7.306. Deichgärten and Donaupark precedent qualities that can be utilised within spatial design

7.3 Arterial Roadway Site Spatial Programme

Detailed Design - Arterial Roadway Site

Spatial Design

7.3 Arterial Roadway Site Spatial Programme

Detailed Design - Arterial Roadway Site

Feature Implementation

-

1 This micro wetland is used to clean and slow the water within the site as it passes into the Taranaki Section of the stream.
-

2 This aspect of the space is the first interaction from Knigges Avenue, the steps to the water ensure people can enjoy the stream in the sunshine.
-

3 The bridge across the stream is used to guide people towards the commercial ground floors of the new structures.
-

4 This private driveway to a youth hostel has several parking spaces and therefore a planting barrier has been used to ensure any contaminants cannot flow directly into the stream.
-

5 This planting barrier has been used to safely control where people are able to stand while they cross the roadway.
-

6 The steps down to the water face north to have the most sun and enable a tactile interaction from the water.
-

7 The trees have been used at this point to enable a more natural interaction at the waters edge with a softer shaded point within the trees.
-

8 This planting barrier has been implemented to ensure that the parking adjacent to the site is hidden.
-

9 Small level changes have been used to generate sound and an interesting interaction adjacent to the stepping stones.
-

10 This crossing option creates a point of interaction for the pedestrian in the centre of the stream. This is designed to create a unique point of contact with the water.
-

11 This small gap between two large structures limits the options for movement and a stream so the stream has been submerged below a steel grate to maintain a visible connection.

Fig 7.310. Rendered plan of implemented stream design

7.3 Arterial Roadway Site Spatial Programme

Detailed Design - Arterial Roadway Site

Knigges - Taranaki Thoroughfare is separated into a thoroughfare and two destination spaces either side.

Fig 7.311. Spatial diagram of Knigges - Taranaki thoroughfare Stream

This park space reaccentuates the historic church on the site while creating a fluid landscape that functions adjacent to a busy arterial roadway

Fig 7.312. Rendered image of Arterial Roadway stream design

7.3 Arterial Roadway Site Spatial Programme

Detailed Design - Arterial Roadway Site

Arterial Roadway Movement & Access

The western pedestrian park now generates movement through the site from both Knigges Avenue and Wigan Street (1).

The eastern park has been designed to create an interaction with the water, and therefore focuses on the curve of the stream, and the steps down to the edge (2).

The stream has generated a need for a safer pedestrian medium in the centre of the roadway to prevent pedestrians who jaywalk from feeling overly uncomfortable and exposed (3).

0 20 40 80

Fig 7.313. Diagrammatic illustration of how pedestrian movement changes post implementation

As Taranaki Street is an arterial roadway, the core movement of the street has been left constant. This is also why another pedestrian crossing could not be placed to directly connect the two micro-park spaces (1).

Knigges Avenue parking has been removed to enable the connection between the three roads to take place (2).

The eastern property parking has been entirely removed to ensure that space is fully pedestrianised (3).

0 20 40 80

Fig 7.314. Diagrammatic illustration of how Vehicle movement changes post implementation

7.3 Arterial Roadway Site Spatial Programme

Detailed Design - Arterial Roadway Site

Development Conclusions

Taranaki Street development has been used to investigate how Arterial Roadway sites can be developed in a way that enables the development of space around heavy roadways. As movement through arterial roadways is fundamental to linking traffic through the central city, development opportunities are very limited. This process relied on structural and site opportunities to enable a successful implementation strategy.

The remaining Arterial Roadway areas within Te Aro could utilise these methods of development as these streetscapes all deal with issues of limited development opportunities. This model focuses on developing surrounding sites adjacent to the roadways in order to generate public activity. This understanding is also applicable within other daylighting projects, as the focus of this method considers the factors that affect this street typology.

Moderate Roadway Initial Concepts

Manners Street

Fig 7.401. Manners Street concept render

Abel Smith Street

Fig 7.402. Abel Smith Street concept render

Marion Street

Fig 7.403. Marion Street concept render

Tory Street

Fig 7.404. Tory Street concept render

These roadways must be designed to transition the spaces towards a more suitable space between both pedestrians and vehicles utilising the streetscape. These areas are not ideal for full pedestrianisation as they provide important links through the city

7.4 Moderate Roadway Site Spatial Programme

Spatial Development

0 100 200 400
Fig 7.405. Reference Map illustrating
Moderate Roadway spatial design

Saw Mill River, USA

Fig 7.406. Saw Mill River precedent qualities that can be utilised within spatial design

The lowered stream at Saw Mill River creates a feeling of observation for pedestrians as they can slowly walk adjacent to the stream and admire the open spaces. This feeling of tranquil observation could be replicated within Tennyson street as a space away from fast vehicle movement.

7.4 Moderate Roadway Site Spatial Programme

Spatial Development

Spatial Design

- Surface Stream
- Submerged Stream
- Culverted Stream
- New Structures
- Roadway
- Planting
- Grass Area

Fig 7.407. Diagrammatic plan of implemented stream design

Tennyson Street Channel

Fig 7.408. Rendered section of Tennyson Street design intervention

Tory Street

Fig 7.409. Rendered section of Tory Street and Harvey Norman Parking design intervention

7.4 Moderate Roadway Site Spatial Programme

N Spatial Development

Feature Implementation

- 1

The buildings placed at the edge of the stream have been used to frame the attention of pedestrians towards the stream.
- 2

Sound has been used to distract from the noise of vehicles at this transition point between road and pedestrian spaces.
- 3

The Structure and the stream create an intimate and enclosed space for pedestrians.
- 4

Vehicle movement is restricted to specific areas using bollards to ensure that their speeds are significantly reduced around pedestrians
- 5

The elevated edge creates a unique experience along the stream where the stream and planting is significantly lower than the pedestrian area.
- 6

The separation of the two edges by the stream creates two contrasting spaces either side of the stream. This can also enable observation for pedestrians when stationary.

Fig 7.410. Rendered plan of implemented stream design

7.4 Moderate Roadway Site Spatial Programme

Spatial Development

Tory Street now enables fluid pedestrian movement across the road and disincentivises fast vehicle movement.

Fig 7.411. Spatial diagram of Tory Street pedestrian crossing and Stream

Tennyson Street Boulevard now creates a comfortable tranquil experience within the city centre.

Fig 7.412. Rendered image of Moderate Roadway stream design

Moderate Roadway Movement & Access

Development Conclusions

The development of Tory Street has illustrated that the Moderate Roadways within the site remain a fundamental artery of the city. While restricting traffic flow through the site has been possible due to the lack of congestion through the northern area of Cambridge Terrace. This has allowed for a shrinking of the streetscape to limit vehicle movement through the site and restore the street to a pedestrianised hub that connects the stream between Courtenay Place and Taranaki Street.

The remaining Moderate Roadway areas within Te Aro could utilise these methods of development as these streetscapes all provide opportunities to increased pedestrianisation. This understanding is also applicable within other daylighting projects, as the focus of this method considers the factors that affect this street typology.

Fig 7.412. Moderate Roadway development opportunities

Minor Roadway Initial Concepts

Ebor Street

Fig 7.501. Ebor Street concept render

Leeds Street

Fig 7.502. Leeds Street concept render

Lukes Lane

Fig 7.503. Lukes Lane concept render

Eva Street

Fig 7.504. Eva Street concept render

The design of these roadways is enabled by the lack of intense vehicle traffic that passes through the site. This creates an opportunity to greatly improve the quality of these sites from a pedestrians from a pedestrian perspective.

7.5 Minor Roadway Site Spatial Programme

Spatial Development

0 100 200 400
Fig 7.505. Reference Map illustrating
Minor Roadway spatial design

Banyoles Old Town, Spain

Banyoles Old Town has used channels of water to revitalise narrow laneways within the urban centre. While these lack coherency throughout the entire town, the channels add an atmosphere to the spaces that can only be used as a thoroughfare.

Fig 7.406. Banyoles Old Town precedent qualities that can be utilised within spatial design

7.5 Minor Roadway Site Spatial Programme

Spatial Development

Spatial Design

- Surface Stream
- Submerged Stream
- Culverted Stream
- New Structures
- Roadway
- Planting
- Grass Area

Fig 7.407. Diagrammatic plan of implemented stream design

Developed Space

Fig 7.508. Rendered section of Eva Street design intervention

Enclosed Stream

Fig 7.509. Rendered section of Hannah's Laneway design intervention

7.5 Minor Roadway Site Spatial Programme

N Spatial Development

Feature Implementation

- 1

The water placed at a tangible level for pedestrians so that a connection to the water is reinforced. This is amplified by the covered aspect of the stream through Eva Street.
- 2

A physical barrier between pedestrians and vehicles is necessary and helps to slow vehicles with a narrower access point.
- 3

Planting has been used as a barrier between the pedestrian thoroughfare and exterior dining area adjacent to the new structure.
- 4

The foliage helps to narrow the view for pedestrians within the site to enable a sharper focus on down at the stream.
- 5

The tall structures around the pedestrian thoroughfare help to shift the gaze of pedestrians towards the stream.
- 6

The stream has been placed below the walkway due to the narrow nature of the pathway so that access does not become limited.

Fig 7.510. Rendered plan of implemented stream design

7.5 Minor Roadway Site Spatial Programme

Spatial Development

Eva Street entrance presents an opening for either a thoroughfare or a destination for pedestrians

Fig 7.511. Spatial diagram of Eva Street thoroughfare entrance and Stream

Eva Street now opens up onto Manners Street to encourage more people to move through the site

Fig 7.512. Rendered image of Minor Roadway stream design

7.5 Minor Roadway Site Spatial Programme

Spatial Development

Minor Road Movement & Access

Pedestrian access through the site remains almost unchanged, however, a pedestrian crossing to ensure pedestrians can move easily across the road and towards Te Aro park will slow vehicles and enable pedestrians to feel comfortable in both spaces (1).

0 20 40 80
Fig 7.513. Diagrammatic illustration of how pedestrian movement changes post implementation

Service entrances to structures throughout Eva Street are essential to maintain, as vehicles require fast access to the rear of buildings in order to effectively supply these small businesses. The changes to the flow of vehicles through the site have been made to ensure less traffic moves through the Dixon Street entrance to the site (1).

0 20 40 80
Fig 7.514. Diagrammatic illustration of how Vehicle movement changes post implementation

Development Conclusions

Eva Street is an example of a narrow Minor Roadway site that can easily be transitioned to a pedestrianised space using a stream. The density of the space restricts the opportunity to implement a successful daylighted stream, however, the covered stream creates a subtle compromise to this problem. By lowering the stream below the walkway, the space can maintain loading access to the surrounding businesses, ensuring they are not negatively affected by this intervention.

The remaining Minor Roadway areas within Te Aro could utilise these methods of development as these streetscapes all provide opportunities to transition under utilised roadways into pedestrianised areas. This understanding is also applicable within other daylighting projects, as the focus of this method considers the factors that affect this street typology.

Unoccupied Site Initial Concepts

Ghuznee Street Parking

Fig 7.601. Ghuznee Street concept render

Taranaki Wharf

Fig 7.602. Taranaki Wharf concept render

Cuba Street Parking

Fig 7.603. Cuba Street concept render

Bute Street Parking

Fig 7.604. Bute Street concept render

The design of these sites is dependent on the pedestrian use and the proposed development of the site. When a site is under utilised due to a lack of proposed development than the site can be reintegrated into the urban fabric through its development.

7.6 Unoccupied Site Spatial Programme

Spatial Development

0 100 200 400
Fig 7.605. Reference Map illustrating
Unoccupied Site spatial design

Catharina Amalia Park, Netherlands

This site in the Netherlands has created a moderate constructed wetland within a park space. Implementing this type of traversable, modern wetland without losing functionality would allow for close interaction between pedestrians and the water.

Fig 7.606. Catharina Amalia Park precedent qualities that can be utilised within spatial design

7.6 Unoccupied Site Spatial Programme

Spatial Development

Spatial Design

- Surface Stream
- Submerged Stream
- Culverted Stream
- New Structures
- Roadway
- Planting
- Grass Area

Fig 7.607. Diagrammatic plan of implemented stream design

Suspended Walkway

Fig 7.608. Rendered section of Garrett Street design intervention

Park Space

Fig 7.609. Rendered section of Bute Street Park design intervention

7.6 Unoccupied Site Spatial Programme

N Spatial Development

Feature Implementation

- 1

A tangible interaction with the water at the top of the site is created by a raised section of water to create a unique interaction
- 2

The different levels on the site are used to oxygenate, and slow the water as it passes through the wetland but also to generate sound to distract from the noise of Vivian Street traffic.
- 3

This height difference is created to ensure that the water remains slow moving, therefore the pedestrian experience is affected.
- 4

Ensuring pedestrians are above vehicles ensures that people feel comfortable within the site by created a visual barrier between the two mediums.
- 5

The implementation of large structures on the eastern edge of the site help to shift the focus of pedestrians towards the water.
- 6

Water has been used to draw attention away from the parking, to shift the focus inwards and distract from the vehicles.
- 7

Using planting to hide the level shift allows a softer edge to reduce any potential flood risk.
- 8

This planting has been used to limit the noise of vehicles within the site and has been done safely due to the single direction of traffic on Vivian street

Fig 7.610. Rendered plan of implemented stream design

7.6 Unoccupied Site Spatial Programme

Spatial Development

Layered park space creates different perspectives for unique interactions with the water dependent on how pedestrians chose

Fig 7.611. Spatial diagram of Eva Street thoroughfare entrance and Stream

Bute Street park and wetland walkway beside new apartments

Fig 7.612. Rendered image of Unoccupied Site stream design

Unoccupied Movement & Access

Movement through the site has become more fluid and directed through to Garrett Street and Glover Park, due to the pedestrian crossing and removal of any site barriers (1).
The removal of the parking and implementation of the wetland now creates a consistent and controlled edge for pedestrians to navigate (2).
New structures on the edge of the site create a controlled edge while adding new destinations against the wetland for commercial and residential use (3).

0 20 40 80
Fig 7.613. Diagrammatic illustration of how pedestrian movement changes post implementation

The small parking area at the top of Bute Street has been maintained, as this is mainly used by surrounding businesses, however, could be replaced by a structure in the future (1).
The wetland replaces a large site for daytime parking for commuters. This could be offset by private implementation of parking, or could help to reduce congestion caused by commuters (2).
The Z station removal reduces the traffic entering the site, however, does not change the quantity of vehicles along Vivian Street (3).

0 20 40 80
Fig 7.614. Diagrammatic illustration of how Vehicle movement changes post implementation

Development Conclusions

The spatial development of this Unoccupied Site transitions a poor backstreet into a pedestrian thoroughfare and open park space with several new apartment developments. This development has removed vehicle orientated elements from the central Te Aro site, in favour of a pedestrianised space. This enables population growth adjacent to a new park within the Wellington to increase density without sacrificing quality of living.

The remaining Unoccupied Site areas within Te Aro could utilise these methods of development as these sites are all suitable to significant development in the immediate future. This understanding is also applicable within other daylighting projects, as the focus of this method considers the factors that affect this street typology.

8.0 Conclusion

Research Driver

How can a stream be used as a tool to generate public space within urban environments?

Research Conclusions

The introduction of daylighted streams within urban environments is a limited method of improving the urban realm. This research has illustrated how methods of understanding streams and their function within public space is limited. The way in which streams exist, and have been re-established within urban space, has been limited by the preconceived notions of urban hydrology. This perceived limitation propelled the research to critique all of the elements of the urban realm and of streams, to enable a successful integration of these elements.

The daylighting process within urban environments has been restricted in scope, due to the understanding of what is plausible within developing an urban space. By removing these limitations within the research, the outcome has led to a radically different approach to the integration of water as a resource within the urban realm. Integrating the stream as a redevelopment tool to strategically target spaces within the city, creates a vastly different outcome to the standard daylighting model.

The stream as a public element can connect people and create active stakeholders within urban communities as contributors to the vibrancy of the city. This is due to the focus of this research of growing the city, rather than improving a single space within it. By shifting the focus to the urban scale, the spaces impacted are those that required the most significant disruption. Understanding that water can be more than feature of a space, but rather a tool for developing a network of spaces, has created the opportunity for significant growth within the city.

The idea of the conventional Kiwi lifestyle held by Wellingtonians becomes harder to achieve as house prices skyrocket, and the population increases. This requires a shift in the way New Zealanders perceive urban living. This research approach has implemented an urban model for Wellington that would change urban life. Drastically increasing the amount of green spaces within the city, addressing several congestion issues, while increasing density, is a significant step towards improving the willingness of Kiwis to shift inwards to the centre of the urban realm.

8.0 Conclusion

Wellington is not unique in regards to the problems it faces with flooding and contamination of water. This model can be utilised for generating growth within cities and other environments looking to expand, while re-establishing pedestrians at the forefront of the urban realm. As climates and sea levels change, the consistent element is the increase in water within public space. Increasing the urban environment's resilience to water means integrating methods of removal into the core of the city. Adapting this method by diversifying the flood water management system has protected against increasing weather events, ensuring this has been achieved reduces the city's susceptibility to climate change.

The core element of this research was aimed at the human and urban interactions that occur within Te Aro. This exploration has enabled an in-depth critique into how pedestrians respond to space, in and around the elements of a stream. The focus on the human element within the urban realm was to enhance the focus of the city as a place of residence for the people. This focus has led to a limited investigation of the way in which planting, and other methods could be used to improve the cleansing process of the water within urban environments. This element of research could be explored further to ensure that the entire daylighting process is effective in reducing pollutants while improving the quality of space.

This thesis provides a platform for future development projects within growing urban areas, as cities look to reduce the negative effects of urbanism and densification on waterways and local ecology. This design led research portfolio has used the understanding of how humans respond to space to implement a series of designs within varying scales to illustrate how people might respond to the interventions outcomes explored within this thesis. This thesis provides a platform for how streams can be daylighted successfully on both an urban scale and human scale, and that this understanding will be taken into consideration in future projects that look to improve the quality of expanding cities.

9.0 Bibliography + List of Figures + Appendices

9.1 Bibliography

- Agency, E. P. (2015). Sustainable Urban Waters: Opportunities to Integrate Environmental Protection in Multi-objective Projects. Office of Research and Development:
- Bank, D. (2017). Mapping the World's Prices 2017. Retrieved from Deutsche Bank Markets <https://www.finews.ch/images/download/Mapping.the.worlds.prices.2017.pdf>
- Beca. (2017). Ministry for Environment Research to support guidance on Future Development Strategies.
- Blaschke, P. (2014). Science in support of a water - sensitive Wellington. Retrieved from University of Otago, Wellington:
- Chislock, M. F. (2013). Eutrophication: Causes, Consequences, and Controls in Aquatic Ecosystems. <https://www.nature.com/scitable/knowledge/library/eutrophication-causes-consequences-and-controls-in-aquatic-102364466>
- Consultants, O. (2011). Courtenay Place - Kent/Cambridge Terrace Study. WCC <https://wellington.govt.nz/~media/services/parking-and-roads/bus-priority/files/buspriority-cambridgekent.pdf?a=en>.
- Council, G. W. R. (2003). Fish-friendly culverts and rock ramps in small streams. In.
- Council, G. W. R. (2006). Water Supply Annual Report. http://www.gw.govt.nz/assets/council-publications/GW_H2O_AR06.pdf
- Council, G. W. R. (2014). Water Supply Annual Report.
- Council, H. C. (2007). Stormwater Solutions for Hamilton City. <http://www.hamilton.govt.nz/our-services/water/stormwater/Documents/Managing%20Stormwater.pdf>
- Council, W. C. (2013). Wellington City: Population and age structure. <https://forecast.idnz.co.nz/wellington/population-age-structure>
- Council, W. C. (2014). Wellington Urban Growth Plan: Urban Development and Transport Strategy.
- Council, W. C. (2014). Wellington Urban Growth Plan: Implementation Plan.
- Council, W. C. (2015). Wellington Urban Growth Plan. Retrieved from Wellington City Council: <https://wellington.govt.nz/~media/your-council/plans-policies-and-bylaws/plans-and-policies/a-to-z/wgtn-urban-growth/wgtn-urban-growth-plan2015.pdf>
- Council, W. C. (2015). Wellington City Council's Long-term Plan 2015-2025. <https://wellington.govt.nz/~media/your-council/plans-policies-and-bylaws/plans-and-policies/longtermplan/2015-2025/2015-25-longtermplanvolume1.pdf>
- Division, F. S. (2009). Introduction to Road Stream Crossing. Retrieved from Oklahoma City:
- Dreiseitl, R. S. (2014). Copenhagen Strategic Flood Masterplan. <http://www.dreiseitl.com/en/portfolio#copenhagen-strategic-flood-masterplan>
- Environment, M. f. t. (2016). Climate change projections for the Wellington and Wairarapa region. <http://www.mfe.govt.nz/climate-change/how-climate-change-affects-nz/how-might-climate-change-affect-my-region/wellington>
- Environment, M. f. t. (2017). Adapting to climate change in New Zealand: Stocktake report from the Climate Change Adaptation Technical Working Group.
- Environment, M. f. t. (2017). Responsive planning - Guide on producing a Future Development Strategy.
- Fore-Ground. (2018). The water is coming for Copenhagen; good design could be its best defence. <https://www.foreground.com.au/planning/water-coming-copenhagen-good-design-best-defence/>
- Future, C. E. (2018). What is Water Pollution? <https://www.conserve-energy-future.com/sources-and-causes-of-water-pollution.php>
- GmbH, j. j. V. (2011). Water Sensitive Urban Design: Principles and Inspiration for Sustainable

9.1 Bibliography

Stormwater Management in the City of the Future. Retrieved from Hamburg, Germany

Government, N. Z. (2015). New Zealand Household Travel Survey. Wellington.

Grace, M. (2010). Wai Māori - Māori values in Water. Document 819878, Volume 2(10.449).

idCommunity, D. R. (2013). Wellington City, Number of cars per household.
<https://profile.idnz.co.nz/wellington/car-ownership?WebID=10>

Indicators, E. (2018). Atmosphere and climate: Annual and seasonal rainfall. New Zealand

Environmental Reporting.
http://archive.stats.govt.nz/browse_for_stats/environment/environmental-reporting-series/environmental-indicators/Home/Atmosphere-and-climate/annual-rain.aspx

Jacques Boubée, I. J., Shirley Nichols, Erica Williams. (1999). Fish Passage at Culverts: A review, with possible solutions for New Zealand indigenous species. Department of Conservation:

James Grellier, M. P. W. (2014). BlueHealth: a study programme protocol for mapping and quantifying the potential benefits to public health and well-being from Europe's blue spaces. 7(article e016188).

Keith Bowers, C.-W. L., Adrian Benepe. (2015). The Nature of Cities.
<https://www.thenatureofcities.com/2015/03/17/daylighting-and-restoring-urban-streams-ponds-and-wetlands-can-provide-huge-ecological-and-social-benefits-are-such-restorations-worth-it-what-are-the-pitfalls-how-can-we-demonstrate-these-ben/>

Leopold, L. B. (1968). Hydrology for- Urban Land Planning. Washington: United States Department of the Interior.

Martin, W. (2017). Major cities with the highest quality of life in the world.
<https://www.businessinsider.nl/world-cities-with-best-quality-of-life-deutsche-bank-mapping-the-worlds-prices-index-2017-5/?international=true&r=UK>

Mayhew, M. (2009). Urban Creek Daylighting in Seattle: Community Building and Ecological Restoration. Paper presented at the ASLA National Conference, Chicago.

Metropolen, M. (2016). Copenhagen Climate Change Adaption Plan. Miljø Metropolen:
http://en.klimatilpasning.dk/media/568851/copenhagen_adaption_plan.pdf

Michael J. Paul, J. L. M. (2001). Streams in the Urban Landscape.

Miloš Rozkošný, M. K. k., Jan Šálek, Igor Bodík, Darja Istenič. (2014). Natural Technologies of Wastewater Treatment. Retrieved from

Research, C. f. E. P. (1995). The Economics of Sustainable Development (A. W. Ian Golding Ed.). Cambridge: Cambridge University.

Review, W. P. (2017). Wellington Population 2017
<http://worldpopulationreview.com/world-cities/wellington-population/>

Rivers, A. (2017). Daylighting Streams: Breathing Life into Urban Streams and Communities.
<https://www.americanrivers.org/conservation-resource/daylighting-streams-breathing-life-urban-streams-communities/>

Temps, C. (2017). Rainfall/ Precipitation in Wellington, New Zealand.
<http://www.wellington.climateemps.com/precipitation.php>

Therkildsen, L. (2015). Copenhagen: Climate Resilience Program for Water Supply, Stormwater and Sewer Services. Paper presented at the International Water & Climate Forum, San Diego

Tom Hunt, G. C. (2017). Wellington homes now even further out of reach for first-home buyers.

Warnes, P. (1993). ALTERNATIVE WASTEWATER DISPOSAL METHODS. Retrieved from

Water, R. (2018). Causes of Water Pollution. Water Wise.
<http://www.waterwise.co.za/site/water/environment/causes-of-water-pollution.html>

9.1 Bibliography

Ways, N. W. (2013). Introducing water sensitive urban design: Tree pits

WREDA. (2017). Wellington facts & figures. Life in Wellington.
<https://www.wellingtonnz.com/life-in-wellington/facts-and-figures/>

Zealand, S. N. (2013). 2013 Census QuickStats about a place: Wellington Region.
http://archive.stats.govt.nz/Census/2013-census/profile-and-summary-reports/quickstats-about-a-place.aspx?url=/Census/2013-census/profile-and-summary-reports/quickstats-about-a-place.aspx&request_value=14322&tabname=

Zhang, H. F. M. (2015). Global land moisture trends: drier in dry and wetter in wet over land.
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Appendices A-I are unavailable. Please consult the print version for access.

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