▶ STATE HOUSING REVIVAL.

SUSTAINABLE REGENERATION STRATEGIES FOR POST-WAR SUBURBAN STATE HOUSING IN NEW ZEALAND.

*ELIZABETH DONOVAN 2014*

STATE HOUSING REVIVAL –
*Sustainable regeneration strategies for post-war suburban state housing in New Zealand.*
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## ABSTRACT

Government funded housing for people in need is a challenge many countries face around the world. This thesis investigates how to sustainably regenerate post-war suburban state housing in New Zealand and in particular the suburb of Glen Innes in Auckland. Existing state housing communities need to be revived in order to change the current path of deterioration they are heading down. Reviving the community and regenerating the buildings will together improve the overall quality of the neighbourhoods both socially and physically. Achieving this in a holistic sustainable manner illustrates that there is alternatives to demolition and new builds as the answer to the current problems.

Examining the history of state house in New Zealand and the needs of different cultures forms a base to better understand the context and current situation. A demand for flexible state housing for different cultures was established. Analysing four different state housing neighbourhoods from New Zealand, Scotland and Sweden revealed many findings that informed the design process especially that detached housing neighbourhoods can have a high population density. Comparing three different redevelopment schemes with those currently in underway – in Glen Innes North illustrated that there are many different ways to approach the redevelopment and provided informed inspiration. Together the conclusions drawn from these three parts create a toolbox and guidelines that can be applied generally to state housing in New Zealand to create more socially, economically and environmentally sustainable neighbourhoods.

The established guidelines and toolbox are applied to a specific neighbourhood at a master plan level and in-depth to an existing state house in Glen Innes. Creating a socially, economically and environmentally sustainable neighbourhood while also generating a more culturally flexible home, with environmental sustainable solutions to reduce financial and environmental pressures. The design proposal combines and retrofits two existing houses that have survived 70 years to regenerate one large family home of the same high quality that can stand for another 70 years. The history and familiarity of the neighbourhood is maintained while allowing new development and the revival of the community.

KEY WORDS
STATE HOUSING, SUSTAINABILITY, NEW ZEALAND, RETROFIT, REGENERATION

This thesis is written as part of the completion of the Masters of Science: Design for Sustainable Development at Chalmers University of Technology, Gothenburg, Sweden. It was undertaken during the spring semester 2014 within the Department of Architecture.

This thesis confronts the current dilemma New Zealand faces of what to do with its existing post-war state housing. It provides background research, as well as looking at different case studies of state housing communities and their redevelopments and concludes with different design and retrofit strategies and a final design proposal for a large family state house.

The importance of this topic occurred while studying in Chalmers and learning about the problems and issues that occurred with the construction of 'the million program'. It was reinforced while studying on exchange in Glasgow where similar construction of large social housing buildings occurred. Looking at these designs from the outside many years after construction it seemed so obviously why it failed and the problems that occurred. It was hard to comprehend how these designs were forecast to be successful. It was then apparent that New Zealand state housing was heading down the same unsuccessful path, planning to build large cheap high-rise state housing communities. This realisation helped cement an interest in the topic of state housing. This interest in state housing combined with an existing passion for old buildings which I discovered during my Bachelors of architecture degree at Victoria University of Wellington, New Zealand formed the basis for this thesis.

The more investigation that was done on the topic of state housing in New Zealand the more it was apparent that the new plans and redevelopment for state housing areas were not being received well by the inhabitants, politicians and public as well as there being obvious large issues in the design proposals. This gave me the inspiration to try find an alternative approach that included many issues I felt driven by such as cultural diversity, sustainability and giving life back to old buildings.

Researching and doing a design proposal on a very realistic scale has had its challenges and many benefits along the way. It has taught me many lessons about designing for the future. When setting out and choosing a building for the design proposal, I never would have guessed a simple roof could cause so much pain.

This pain was only bearable and successful because of the support and encouragement from a number of different people. Foremost, I would like to acknowledge my tutor Emilio Brandao for his guidance throughout this thesis. Secondly Krystyna Pietrzyk for examining this thesis and giving me invaluable feedback and lastly from Chalmers Professor Lena Falkheden, the director of the master's programme Design for Sustainable Development for being so incredibly welcoming, organised and supportive, especially for us international students.

I would also like to thank both my family in New Zealand and my new Swedish family for their support and encouragement everyday. Particular gratitude goes to Annina Lehikoinen for being my other half, keeping me very strictly focused and motivated and using her eagle eyes to make sure I haven't forgotten my windows. Also to Giandomenico for his love and support over the last four years and to Josh for motivating me and making me smile everyday.

In keeping with the domestic theme of this thesis, this large book is intended to be read as a coffee table book. It follows the order and process of my thesis but each chapter should be able to be read or flicked through independently of previous chapters. It is not designed to be read cover to cover in one sitting rather as a source of more thorough information of the particular topics covered.
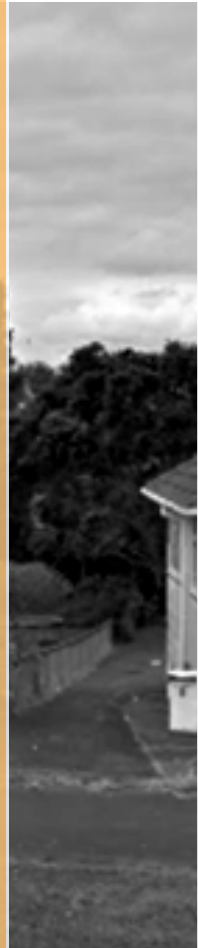
*How can culturally inclusive regenerative design revive post war suburban state housing in New Zealand?*

## INTRODUCTION

Since the first state (social) house was built in Wellington over 70 years ago, New Zealand has seen the failure and deterioration of many state housing models, while the demand for housing continues to increase.

Many state housing models are a quick fixes to immediate problems and generic clones pop around a city with no real understanding of the context or culture of each area. State housing is a world-wide issue and there are many examples to take the opportunity to learn from in order to prevent making similar mistakes.

Existing post-war state housing communities in New Zealand need to be revived in order to change the current path of deterioration they are heading down. Reviving the community and regenerating the buildings will together improve the overall quality of the neighbourhoods - socially, environmentally and physically. This thesis showcases an alternative redevelopment in Glen Innes, New Zealand by sustainably regenerating and retrofitting existing detached state-houses to create a large family home that supports a diversity of New Zealand cultures in addition to an overall redevelopment master plan of the neighbourhood.

## SIGNIFICANCE OF THIS THESIS

State housing is constantly under debate and is constantly changing. The government body responsible for state housing in New Zealand is, Housing New Zealand Corporation (HNZC), HNZC and the general media identifies many current issues which have urban and architectural implications.

- There is a high current demand for lower socio-economic groups. In 2011 there were 8 886 people on the HNZC waiting list.
- Over 20 000 of the 69 000 properties owned or managed by HNZC have been identified for redevelopment, reconfiguration, disposal, or disposal and replacement.
- HNZC plans to sell off low-demand and premium state housing areas to reinvest in high-demand areas.
- Housing demands have shifted and the existing archetypical three-bedroom home is no longer in demand. Rather two or four/five-bedroom homes for elderly, disabled, single-parents and large families are in demand.
- The Social Housing Reform Bill was passed allowing the removal of tenants tenure who can afford to pay market rent.
- Many three bedroom houses only have one person living in them and there are plans to demolish these to build smaller one bedroom homes.
- New 'warrant of fitness' assessment tool for buildings being tested which will alter the amount of healthy state housing building stock.
- 'First time buyers' initiative for private buyer

provides government subsidies for old state houses that are no longer in use.

In addition to these issues, prior state housing models have had their successes and failures resulting in the perception of state housing as not desirable places to live or visit. Many state housing suburbs have the reputation of being the worst areas in a city, making the development of these areas physically and socially challenging and even more important.

## AIM

This thesis aims is to find sustainable design strategies to revive state housing communities in New Zealand. Sustainable regeneration of the existing post-war building stock will be the driving force to achieve this. Finding intelligent ways to sustainably reuse and utilise the potential of existing building in a way that supports and encourages cultural diversity is important and therefore the aim of achieving sustainable regeneration not only refers to the physicality of the buildings but also the social and cultural aspects. These aspects will be considered in conjunction to achieve successful research and overall design.

## METHODOLOGY

This thesis is an equal combination of research and design. By thoroughly researching state housing not only on a local scale but on a worldwide scale, it provides the opportunity to produce a successful design proposal that aims to meet all of the occupants

cultural needs rather than mainly the governments budget.

Examining architectural design will drive the redevelopment of a state-owned suburban housing in New Zealand. To achieve a successful design proposal for an existing post-war state house, research and analysis of different successful social housing models in New Zealand, Australia, Scotland and Sweden have been undertaken. In conjunction with this, redevelopment examples are analysed and compared.

Collecting and summarising this information will form a strong platform to base design strategies on. This strategies are showcased on one state house to illustrate how the findings from the research could be applied to other buildings. As state housings issues extend beyond than the four walls of a house, to the community, the urban environment around will also be included in these strategies.

## DELIMITATIONS

- Outcomes are based on existing literature, case studies, field work.
- Existing HNZC guidelines are considered but this thesis it is not designed to test these guidelines or be limited by them.
- Urban and architectural character and context will be considered but heritage preservation is not the focus of this thesis.
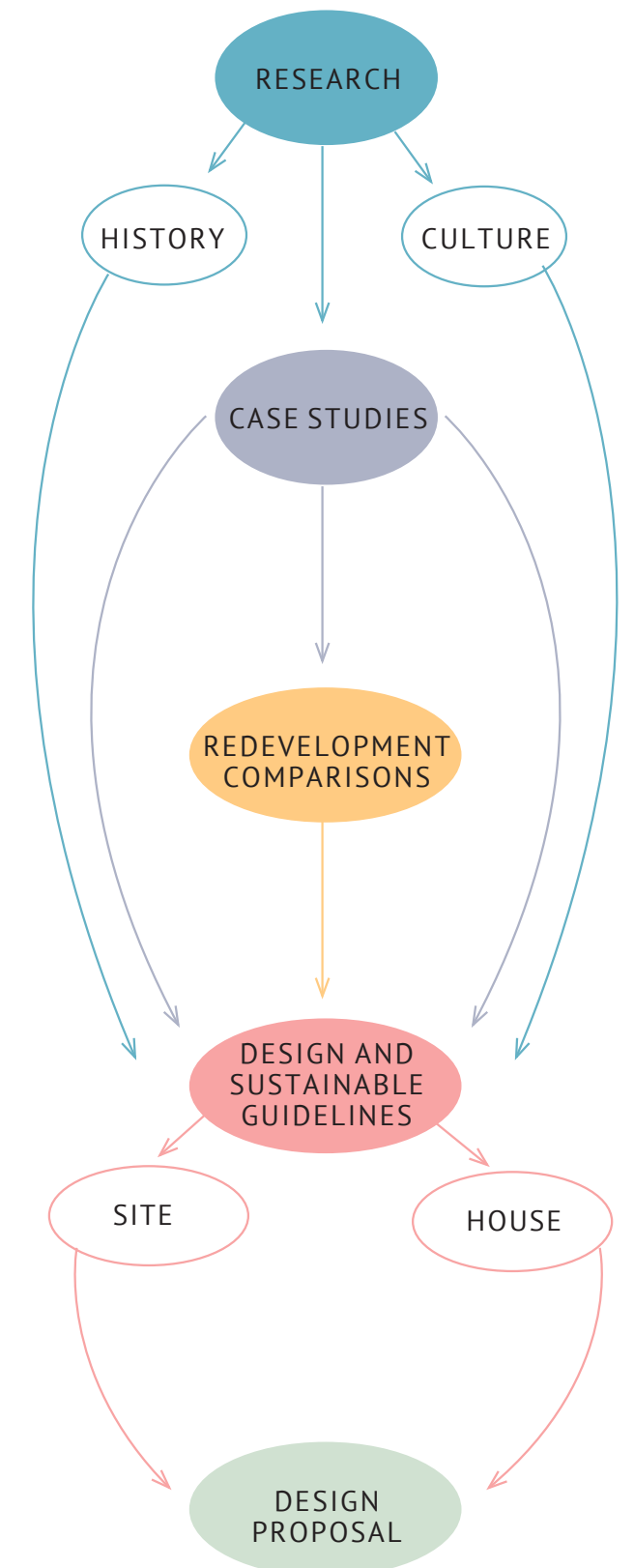
## LAYOUT OF THIS THESIS

This thesis is made up of seven parts, Part one introduces the thesis and topic which will then be followed by a series of essays in part two. These essays cover all the basic historic and social issues surrounding state housing in New Zealand.

The third part explores case studies and field work done in four different suburbs. Two explore different suburbs in New Zealand, the other two in Glasgow, Scotland and Malmö, Sweden. Evaluation of the areas are interpreted in terms of design issues and responses.

The fourth part explores sustainable redevelopment examples. They are compared in terms of planning, retrofit and new build redevelopments.

In response to the earlier chapters part five establishes sustainable regenerative design guidelines based on previous findings as well as retrofit strategies for both site and architectural energy design.

Continuing on from part five, part six goes in depth in the analysis and sustainable regenerative design of one state house in Glen Innes, Auckland, New Zealand. Applying in detail the methods and strategies explored earlier in part five. Part seven concludes and discusses all the findings and design conclusions with additional information in the references and appendix.



RESEARCH

HISTORY  CULTURE

CASE STUDIES

REDEVELOPMENT COMPARISONS

DESIGN AND SUSTAINABLE GUIDELINES

SITE  HOUSE

DESIGN PROPOSAL

## IN THE CONTEXT OF NEW ZEALAND

New Zealand (Aotearoa) is an island country in the south-western Pacific Ocean. The country geographically comprises two main landmasses – that of the North Island, or Te Ika-a-Māui, and the South Island, or Te Waipounamu – and numerous smaller islands. New Zealand is situated some 1 500 kilometres east of Australia across the Tasman Sea and roughly 1,000 kilometres south of the Pacific island areas of New Caledonia, Fiji, and Tonga. Because of its remoteness, it was one of the last lands to be settled by humans. During its long isolation, New Zealand developed a distinctive biodiversity of animal, fungal and plant life; most notable are the large number of unique bird species. The country's varied topography and its sharp mountain peaks owe much to the tectonic uplift of land and volcanic eruptions.

The population of New Zealand is approximately 4.5 million. New Zealand is a predominantly urban country, with 72 percent of the population living in 16 main urban areas and 53 percent living in the four largest cities of Auckland, Christchurch, Wellington, and Hamilton. New Zealand cities generally rank highly on international liveability measures (www. newzealand.com, 2014. For instance, in 2010 Auckland was ranked the world's 4th most liveable city and Wellington the 12th by the Mercer Quality of Life Survey.

In 1840 the British Crown and Māori signed the Treaty of Waitangi, making New Zealand a British colony. Immigrant numbers increased sharply and conflicts escalated into the New Zealand Wars, which resulted in Māori land being confiscated in the mid North Island. Economic depressions were followed by periods of political reform, with women gaining the vote during the 1890s, and a welfare state being established from the 1930s. After World War II, New Zealand joined Australia and the United States in the ANZUS security treaty, although the United States later suspended the treaty as a result of New Zealand's adoption of a nuclear-free policy. New Zealanders enjoyed one of the highest standards of living in the world in the 1950s, but the 1970s saw a deep recession, worsened by oil shocks and the United Kingdom's entry into the European Economic Community. The country underwent major economic changes during the 1980s, which transformed it from a protectionist to a liberalised free trade economy; once-dominant exports of wool have been overtaken by dairy products, meat, and wine (www.newzealand. com, 2014).

The majority of New Zealand's population is of European descent; the indigenous Maori are the largest minority, followed by Asians and Pacific Islanders. English, Maori and New Zealand Sign Language are the official languages, with English predominant. Much of New Zealand's culture is derived from Maori and early British settlers. The country's culture has also been broadened by globalisation and increased immigration from the Pacific Islands and Asia.

New Zealand is a constitutional monarchy with a parliamentary democracy, although its constitution is not codified. Elizabeth II is the Queen of New Zealand and the head of state. The Queen is represented by the Governor-General, whom she appoints on the advice of the Prime Minister.

## CLIMATE

New Zealand weather and climate is of paramount importance to the people of New Zealand, as many New Zealanders make their living from the land. New Zealand has mild temperatures, moderately high rainfall, and many hours of sunshine throughout most of the country. New Zealand's climate is dominated by two main geographical features: the mountains and the sea.

New Zealand has a largely temperate climate. While the far north has subtropical weather during summer, and inland alpine areas of the South Island can be as cold as -10 C in winter, most of the country lies close to the coast, which means mild temperatures, moderate rainfall, and abundant sunshine.

Because New Zealand lies in the Southern Hemisphere, the average temperature decreases as you travel south. The warmest months are December, January and February, and the coldest June, July and August. In summer, the average maximum temperature ranges between 20 - 30ºC and in winter between 10 - 15°C (www.newzealand.com, 2014).

This means that when building the north side is the sunny side and the southern winds are the cold winds blowing from Antarctica.

## HELLS ANGLES

The Hells Angels Motorcycle Club (HAMC) is a worldwide one-percenter motorcycle club whose members typically ride Harley-Davidson motorcycles and is considered an organized crime syndicate. The Hells Angels motorcycle club founded a chapter in Auckland in 1961 and has since taken over gangs in Wanganui. New Zealand had the first chapter of the Hells Angels outside the US.

## ONCE WERE WARRIORS

Once Were Warriors is New Zealand author Alan Duff's bestselling first novel, published in 1990. It tells the story of an urban Maori family, the Hekes, and portrays the reality of poverty, alcoholism and domestic violence in a fictional state housing neighbourhood in New Zealand.

## MAORI

Maori are the indigenous Polynesian people of New Zealand. The Maori originated with settlers from eastern Polynesia, who arrived in New Zealand in several waves of canoe voyages at some time between 1250 and 1300 CE.
Pacific people. They have their own language, a rich mythology, distinctive crafts and performing arts.

## WIDGIE AND BODGIE

Widgies and Bodgies refer to a youth subculture that existed in Australia and New Zealand in the 1950s, similar to the rocker culture in the UK or Greaser culture in the United States.

## RIMU

Also called New Zealand Red Pine, or Imou Pine, rimu (Dacrydium cupressinum), coniferous timber tree of the family Podocarpaceae, native to New Zealand. The rimu tree may attain a height of 45 metres (150 feet) or more. The wood is reddish brown to yellowish brown, with a distinctive figuring, or marking, of light and dark streaks.

## STATE HOUSING

State housing is the system of public housing offered to New Zealand residents on low to moderate incomes. Some 69,000 houses are managed by Housing New Zealand Corporation, most of which are owned by the government. In excess of 31,000 former state houses exist, which are now privately owned after large-scale sell-offs during recent decades.

A "state house" can also refer to the archetypal 1940s and 1950s state house: a detached 2–4 bedroom (usually 3) timber-framed house with weatherboards or brick veneer cladding and a steep gabled tile roof. Thousands of these houses were built across New Zealand as state housing, with many more built privately after the government started selling their drawings and plans in an attempt to hasten building construction. These houses are often very sought after by real estate buyers, especially after the leaky homes crisis of the 1990s and 2000s hit buyer confidence in newer stock.

## SOCIAL HOUSING

Social housing is an umbrella term referring to rental housing which may be owned and managed by the state, by non-profit organizations, or by a combination of the two, usually with the aim of providing affordable housing. Social housing can also be seen as a potential remedy to housing inequality.

## PUBLIC HOUSING

Public housing is a form of housing tenure in which the property is owned by a government authority, which may be central or local. Although the common goal of public housing is to provide affordable housing, the details, terminology, definitions of poverty and other criteria for allocation vary within different contexts.

## HNZC

Housing New Zealand Corporation

## FALE

Samoan house or building

## MARAE

Maori meeting house

## PINK BATTS

New Zealand company that produces recycled Glass wool insulation

## WARRANT OF FITNESS

New scheme to help establish healthy homes.

SWEDEN
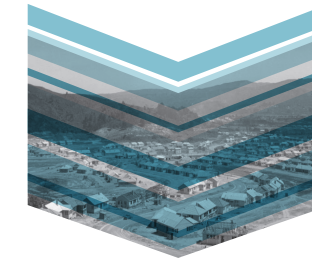
NEW ZEALAND

▶ PART TWO.

LITERATURE STUDY AND BACKGROUND INFORMATION OF STATE HOUSING IN NEW ZEALAND INCLUDING ITS HISTORY, THE PEOPLE AND THEIR HOUSES.



Part two forms the basis of the research completed in this thesis. It provides vital information to help understand state housing in New Zealand, the issues around state housing and the culture of the people who occupy these buildings. It also helps to understand the typology of not only the state houses but also New Zealand homes in general. As this thesis is based heavily based on New Zealand, this part is vital for the understanding of the New Zealand way of life. Sustainability is a major issue in this thesis both environmentally, culturally and socially and for this reason no only the history has been researched but also the occupants and their major cultures. Much of these findings are however based on generalisations of historic events, social and cultural concerns.

### 2.2 A BRIEF HISTORY OF STATE HOUSING IN NEW ZEALAND

This chapter examines literature and publications concerning the history of state housing in New Zealand and how it has developed over time to form the current housing situation. These findings help create a better understanding of New Zealand state housing, the New Zealand culture and they also help inform the design guidelines by highlighting what has been successful and failed in the past within New Zealand.

### 2.3 HISTORIC TIME-LINE

This summarises the events discussed in the previous chapter.

### 2.4 THE POST-WAR SUBURBAN STATE HOUSE

This chapter analyses the architectural qualities of the post-war suburban state house, from the concept of the houses through to the layout and materiality of them and how they are unique. It gives an understanding of the state houses that will be later the basis of the in-depth design in part 6.

### 2.5 CULTURAL DIVERSITY

This chapter looks at literature concerning three different cultures within the community of New Zealand. These cultures were selected based on the statistical profile of Glen Innes, Auckland. This chapter assess through general and historical research the predominant design characteristics of these three cultures. The findings create a basis from which design guidelines can be formed in relation to a dwelling that is inclusive of these cultures, their characteristics and needs.

New Zealand was not immune to the poor living conditions Europe and the rest of the world faced at turn of the 20th century. Large slums could be seen in all major cities around the country.

*These issues became the driving force for the government to create better living conditions for the poor and needy.*

Over 100 years later, our cities are once again full of what is perceived by the majority of the population as ghetto and slum neighbourhoods. The majorities of these slum neighbourhoods ironically are situated in what were once the successful and sort-after state housing neighbourhoods of the 1930s and 40s. Interestingly in a hundred years New Zealand has gone in a full circle and what was once the answer to the problem is now the problem itself.

In 1905, Liberal administrator John Seddon, in the form of the Worker's Dwellings Act, introduced the first concept of state funded housing. Although it never prospered, this planted the seed for what was later a reasonably successful state housing program. With the first Labour government in 1935 came the first state housing. The first house was completed in 1937 at 12 Fife Lane, Miramar, Wellington (Schrader, 2012). With each change of government came a change to state housing policy, some for the better and some for the worse. One thing that did maintain the same throughout each government party as discussed by Schrader, (2012) was the agreement on

wanting to provide homes for those New Zealanders who were unable to afford a home of their own. Helping create what was known as the 'New Zealand dream'.

In the last 100 years there has been some major changes in the policy, physicality and occupants of state housing. What has happened in the past, not only in terms of state housing but also looking at private sector housing and the country as a whole, tells a story of how New Zealand has got to the situation it is in today and can influence the decisions we make in the future. Looking briefly to the past can help answer:

- How does the history of state housing in New Zealand affect the way it is perceived today?
- How can it influence the design decisions we make today?
- What can be learnt or taken from our past to inform our future?


*Workers' Dwelling 1905 (McCracken, 2001)*

## NEW WORLD IMMIGRATION

When compared to European countries, New Zealand is a very young country. While much of Europe experienced the squalid slum conditions, which developed with the unparalleled population growth and industrialisation of the eighteenth and nineteenth century, New Zealand was portrayed to offer a New World reprieve from these conditions (Arps, 2011). The purist rural vision was promoted in the 1840's emphasizing 'a labourer's paradise,' in which 'towns were to be no more than embarkation points for the true purpose of emigration, rural settlement' (Ferguson, 1994). Edward Gibbon Wakefield and the New Zealand Company set out to create a 'Better Britain' (King, 2003). This was not the reality.

*The New World was not immune from poverty, inequality, and political conflicts that many had left behind in the Old World.*

Memories of the social and physical conditions of the Old World eventually shaped the colonial settlements. 'By the 1890s, with increased immigration and the concentration of settlement in developing towns, where land was subdivided into smaller allotments,' there was a perception that conditions in towns –

particularly housing – were declining, and that for the first time there was a feeling slums were becoming a permanent feature of the new colony' (Arps, 2011). The promise of a reprieve from the squalid conditions they left did not always ring true.

From the 1850s up until 1880s provincial governments were responsible for providing immigration barracks to 'accommodate new settlers for a short period while they found their feet and secured employment.' (Schrader, 2012) Conditions were basic and the new immigrants were fed and provided for 'when government recognised that negative reports could deter future immigrants' (Schrader, 2012). Around the 1880's the barracks were no longer needed and, while the government provided specialist accommodation such as military barracks and asylums, it no longer provided general housing. This remained the case until the 1890 election of the reformist Liberal government. Local councils were given the power to erect workers housing but they were busy constructing infrastructure like road and sewers so the state took on the project instead (Schrader, 2012). This led to what later became the Workers Dwelling Act and the start of state housing.


*Slums in Wellington, New Zealand.
(Orchiston, 1941)*

*Workers ' Dwelling, Petone, NZ (McCracken, 2001)*

homes was too high for working families (Derby, 2012). Bad locations in conjunction with rents too high for working families meant New Zealand's first venture into state housing did not prosper (Schrader, 2005). R. Hargreaves, T. Hearn, and S. Little (1985) States only 646 of the 5 000 proposed houses were built before the scheme ended in 1919. Although the scheme did not take off, it planted the seed for future successful state housings acts in 1919 and more knowingly with the first Labour government in 1935.

One of the reasons the Worker's Dwelling Act failed was because of the high rent prices, due to the high quality of materials and design. We can look back through the history of housing in New Zealand and especially at the low cost builds of the 1960's and 70's and can easily compare the two and can now call the 646 houses built under this act a success. The high quality of materials and design mean a large number of these buildings are still standing and although privately owned remain functioning homes.

*To avoid creating areas that would be 'slums-in-the-making' "the Liberals insisted that each house be architecturally designed, well built, and indistinguishable from comparable private houses."*

(Schrader, 2003). An example of the high quality was a Free Tudor style home featuring board and batten cladding, a rimu-panelled living room and tiled fireplaces in two of the three bedrooms (Schrader, 2003). Temple described the houses as including the latest conveniences, which was largely in response to the unhealthy conditions of the slums. It was the use of high quality native and locally sourced timber, well planned (for the time) designs, current amenities on parcels of land that were not too large to maintain and individuality that contributed to why they are still standing today.

### WORKERS' DWELLINGS

By the start of the 20th century, over-crowded city slums and the rising cost of living forced living conditions to drop considerably. Workers were trapped in squalid living environments to remain close to work. In response to this premier Richard John Seddon initiated the liberal governments Worker's Dwelling Act in 1905. Woburn Temple was appointed as the chief architect responsible for design and build. He aimed to create high quality 'workers houses' with large gardens on the outskirts of cities.

Their location beyond cities tram and train lines meant the commuting cost to these spacious healthy

### LABOUR GOVERNMENT 1935-49

The Labour government followed in the same direction as the previous Liberal government. The need for state funded housing was now even more crucial following The Great Depression and other events surrounding WWI. The new Labour government sought to provide housing for low- to middle-class families (Schrader, 2012) as well as wanting to stimulate the local industry and provide work for those left jobless after these events. The first state house built at 12 Fife Lane was seen as a defining symbol, promoting the new Prime Minister, Micael Savage as 'a servant of the people' (Schrader, 2012).

This new scheme was hugely successful and hit the ground running with 30 000 state rental units being constructed between 1935 and 1949. This accounted for 40 percent of the nation's new domestic building



*Savage carries coffee table into the first state home. (Alexander Turnbull Library - Unknow, 1937)*
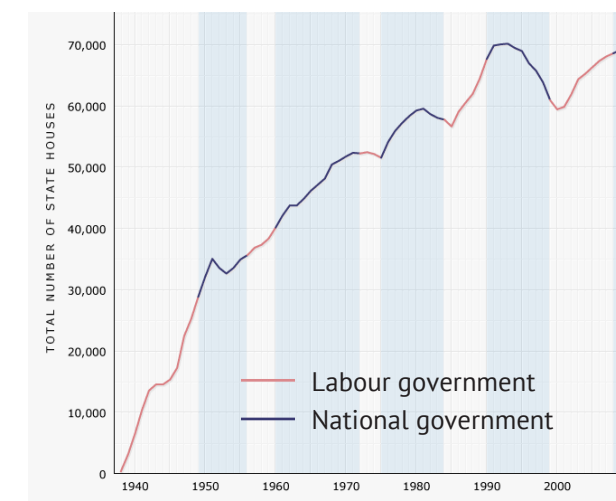


*Total number of state houses. The blue shaded area indicates years the National government was in power. (Housing New Zealand, 2009)*

in the 1930s and 28 percent in the 1940s (BRANZ, 2011). By 1939 the state housing waiting list stood at 10 000 (Schrader, 2012). One of the reasons this scheme was so successful was because, like the Liberals,

*labour wanted to create new homes and not expand the slums and therefore their design and materials were of the highest quality, to the degree that the private sector had to copy them to compete in the housing market*

(Ferguson, 1994). The standard of construction was so high it was criticised by the Nation MP Walter Broadfoot in 1940. He 'declared it too flash for ordinary folk'. He questioned whether the country could 'afford these luxuries – steel sinks, and so on.' He thought these houses started young people off where his generation left off after a lifetime of work (Ferguson, 1994).

These state houses were erected in large suburbs on the periphery of cities, the suburb of Glen Innes being one of the first. These suburbs where targeted at 'low– to middle-income nuclear families – partly to encourage breeding (Schrader, 2012).

*These new neighbourhoods were supported by neighbouring communities and considered a desirable place to live*

(Schrader, 2006). 'Pamure's centennial history predicted that the new state housing settlements at Glen Innes and Point England 'will, for all time, be a monument to its State Housing plan […] The citizens of Panmure welcome their new neighbours and friends and trust through the coming century they will always be able to work together for the good of all' (Schrader, 2006).

During the war-years the shortages of materials and labour restrictions meant the government was no longer able to continue along its successful construction path. 'In response to shortages, the government introduced legislation to control the sale and use of building materials and the issue of building permits. Only constructions considered to be essential was permitted. These controls

continued until well after the war. The government's contributions to the counties' new domestic buildings dropped to less than twenty percent in the 1950s and was even further reduced to below ten percent in the 1960's. However the need for housing was the opposite with many returning servicemen from the war putting even more pressure on the demand for new housing stock.(BRANZ, 2011) increasing demand on the housing market was not addressed with the same approach used earlier on in the 1930s.
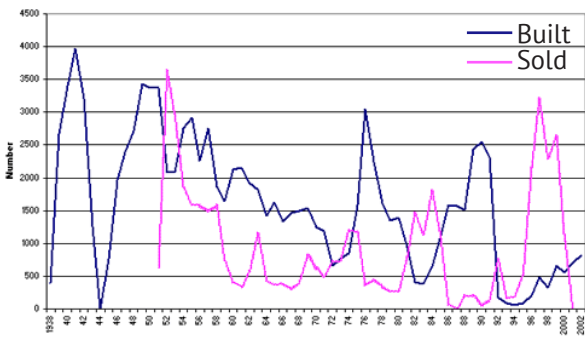


*Typical state housing family outside new state house. (NZ Herald, 1937)*



*State housing suburb with a cul-de-sac layout of detached houses. (White Aviation, 1947)*

*State housing flats in Pomare, NZ. (Nicholson, 1996)*


*Number of state houses built and sold from 1933 to 2002 (HNZC, 2003).*


*Gordon flats under construction- Wellington, NZ. (Evening Post, 1958)*

### NATIONAL GOVERNMENT 1949-57

The National government held different views of how to approach the issues and need for housing the poor in New Zealand. By the 1950's the situation in New Zealand was very different. The people of New Zealand were becoming less attached to their European heritage and created an identity of their own, becoming New Zealanders. The Maori's, who up until now predominantly lived in rural areas started migrating to the cities for work and a new 'Widgie and Bodgie' culture was emerging along with a general changing of times (Schrader, 2006). All of these factors combined meant the National government was facing a very different New Zealand than that of Labour government twenty years earlier. The general population began to see state housing as an unfair advantage to the poor and wanted more equality of support between classes. The National government responded to these outcries and agreed that the current scheme increased the poors dependence on the government for support (Schrader, 2012). 'The 1950s National government rejected state housing as a mainstream form of tenure, seeing it instead as a provision only for those unable to afford to house themselves. It introduced an income limit for new tenancies – filtering out middle-class applicants – and tightened allocation criteria to favour those most in need' (Schrader, 2012).

The National government implemented new state housing legislations. These legislations allowed for two major changes; the first, tenants could now purchase their state homes. (Schrader, 2012)

*They had generous terms of deposit and mortgage rates which resulted in thousands of tenants owning their own 'little piece of New Zealand'*

(Schrader, 2005). 'By 1954 state home loans accounted for 34% of all new-home mortgages. Demand for housing continued to outstrip supply' (Schrader, 2012).

Secondly, multi units were constructed by 'the Nash government' who pledged to limit urban sprawl, these units were seen as inferior to single dwellings' (Schrader, 2006). Mass-housing blocks in suburbs like Porirua and South Auckland were large, poorly built, fast to construct. These large blocks provided accommodation to solve the housing shortage by 1970 (Schrader, 2012) but failed to provide services and facilities for the occupants and were not integrated with private sector housing, resulting in a festering ground for crime and neglect.

Labour criticised these new flats by saying:
*'flats do not provide sufficient light or sufficient ventilation, and, generally speaking, they are undesirable for the housing of growing families'*

(Schrader, 2012). The 1971 Commission of Inquiry into Housing reprimanded the state for building these communities and recommended these developments cease. The government conformed to these suggestions and further developments '… were smaller and integrated into, or at least near, private housing' (Schrader, 2006). However by then it was too late, the slum label was already associated with state housing. The final straw that supported the public's poor perception of state housing was National restricting 'state housing to poorer applicants exacerbating social problems by creating single-class neighbourhoods.' (Schrader, 2006)

Neighbourhoods that were once sought after, well-constructed homes were now poorly constructed, blocks with no amenities to support the communities and segregated from private housing.

### 1960'S TO TODAY

This decline in perception has not been slow, short, or restricted to one government or policy. The 1960s saw state housing provided for only the most needy which included new groups of urbanised Maori and Pacific Island peoples. These new mass housing suburbs were intended to blend state and private housing, however low-income communities were what occurred.

*Social problems associated with poverty further changed the perception of state housing communities from desirable places to live to undesirable.*

This bad reputation was not always the perception of those who lived there (Schrader, 2012). State housing was now mainly lower-income communities that lacked community facilities and connections. This fostered a breeding ground for crime and gang activity. Schrader (2006) mentions an interview with one of the residents of Glen Innes. He states 'for John, Once Were Warriors could have been set in Glen Innes in the 1970s. He recalled 'major riots between the Hells Angels and the cops, with molotovs being thrown, the full works. [There was] a sea of glass in the morning afterwards. [It was] very, very threatening.' 'Fights also regularly occurred outside the local tavern on a Saturday night.' Glen Innes was not the only state housing suburb that had become an unsafe, crime riddled place to live. Reducing the desirability of these suburbs even more.

By the mid-1960s the 'slum' label had stuck. For example, in 1969 the Evening Post ran the headline, "Tons of Rubbish Left By Occupants of State House". Following a fire in a Naenae state house, the tenant had 'done a runner', leaving six truckloads of rubbish behind him, the paper reported" (Schrader, 2006). Another newspaper in 1985, The Dominion, told readers 'Palmerston North was being held to ransom by a gang of juvenile glue-sniffing thugs. The gang, which gloatingly calls itself the Highbury Hoods.' Highbury was the main state housing area in the city (Schrader, 2006).

Another interview conducted by Schrader (2006) tell the tale of Bronwyn's life in her Star Flat in Strathmore during the 1980s. As she explained: the negative public perceptions of state housing affected the way people treated her. She was accepted by


*Otara Street with run-down houses and car wrecks. (HNZC, 1970)*

other state house tenants but excluded by home-owners in her community.

Policies continued to change, the National government reform in 1991 saw the removal of income-related rents and established a government accommodation supplement instead. (Schrader, 2012) This increased some peoples rent by up to 300 percent. Labour argued against this that the state should intervene when the market cannot accommodate. Schrader (2012) explains that merely two years later, emergency housing workers in South Auckland reported that many people couldn't afford to pay rent, and were moving in with friends or family often in overcrowded conditions. One emergency worker, Sister Anne Hurley, told the New Zealand Herald that: It's little wonder there are so many vacant houses.

*Low-income families and beneficiaries can't afford them. […] The only choice many of these people have is whether to pay the rent or feed their children.*

In 1999, when the Labour Party was re-elected it reinstated income related rents by which eligible state house tenants paid no more than 25 percent of their total income in rent (Schrader, 2012).

The public's anxieties about state housing was further fuelled by the publication of Once Were Warriors, a novel set in a fictional state housing area called Pine Block, based on Duff's experience of Fordlands in Rotorua. The lead character, Jake 'the Muss', is a brutal drunk who terrorises his family and lives in a community characterized by violence, broken relationships and loneliness. This was the nail that sealed the coffin in the publics' eye. It would be difficult to find a more negative portrayal of state house life (Schrader, 2006).

Some former tenants believe it is the recent generations of tenants that contribute to this perception. An interview with a former tenant, Rex, states

*'It used to be considered a privilege to live in a state house, but now 'people want one as of right and don't give a damn once they get into it'.*
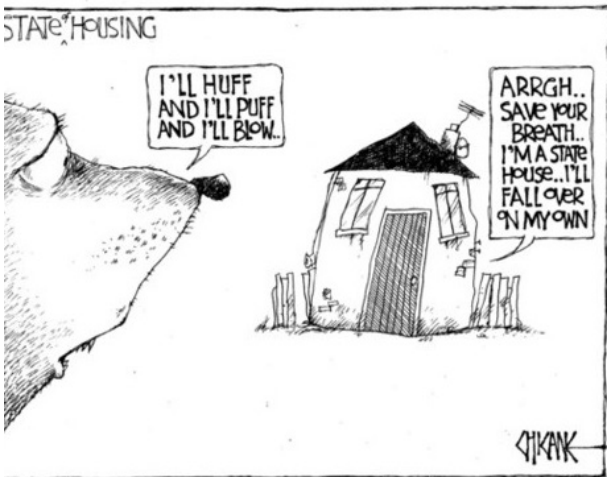
It is however not always the case and it seems it is a few bad tenants that ruin it for the rest of the people who are in need. For example another interview conducted by Schrader (2006)

Glen Innes residents protest state housing eviction. (Tamaki Housing Group, 2014)



Cartoon about the removal of tenure in state housing.
(Hawkey, 2002)



Cartoon illustrating the condition of some state
housing stock. (Winter, 2007)

with Tofa, a current resident, explains that 'she feels that some people do look down on her for living in a state house, particularly as it is a multi-unit. She feels that single units have higher status: 'But who cares? At least me and my kids are warm in my house... love this place.' It is the residents such as Tofa that need to be designed for and not those few that take advantage of the system and have no respect.

There has been new developments along with new controversy. This is mostly surrounding the removal of state housing tenure, the redevelopment of some communities and the reduction of state houses across the country.

In a current Labour Press release in April 2014, Phil Twyford, (2014) Labour's Housing spokesperson, states

*"The waiting list for State Houses has risen by over a thousand in the past three months... while sadly, with National having reduced the state housing stock by 700 in the past year, most of the people on the waiting list don't have a chance of getting a Housing NZ house."*

Twyfor (2014) continues to state that 'this is just gross mismanagement. Nearly 3,000 state houses

are boarded up and vacant. Meanwhile National is selling off state houses and land in privatisation by stealth. No one can now deny this is a housing crisis.' The combination of all these factors led communities to protest against the current management of state housing.

One community in particular, which has been protesting not only against new policies but also about the redevelopment of their community, is Glen Innes. The change in state housing tenure has allowed for a review of all contracts to assess who is the most 'deserving' poor. (Defend Glen Innes, 2014) This means that many elderly, pensioners, veterans and people with disabilities have had their tenure removed.

This has coincided with the redevelopment for Glen Innes where 84 homes have been demolished or relocated and 114 families, of which 27 are severely disabled families have already been relocated (Hill, 2014). The controversy continues as most reports and articles blanket the redevelopment by saying 156 state homes will be removed creating 260 new homes. Most articles fail to highlight that of these 260 new homes only 78 will be state homes. While the housing shortages continues to grow and the state housing waiting list is increasing every day, the number of houses is continuing to decrease. It is understandably why the community is protesting.

## THE SUBURBAN COMMUNITY

New Zealand is one of the most urbanized countries in the world with 86 percent of the population living in cities in 2006. A great majority of the population, however live in the suburbs around major cities. 'The growth of suburbs has been one of the most significant developments in shaping New Zealand society.' (Schrader, 2006) This preference for suburban life grew from early European settlement and their desire to escape the crowded slums they came from. In early colonial New Zealand 'land was relatively cheap, and houses were usually built of wood rather than more expensive and substantial stone. Single-storey homes on their own sections were the rule, even in the heart of the main cities.' (Schrader, 2006) Many suburbs were designed with 'garden suburbs' principals influenced by this movement of Britain and America between 1938 and 1945.

Schrader (2005) explains that the diagrammatic Garden City model is: 'divided into several residential wards and a civic ward. The focal point of each neighbourhood is a primary school, which also serves as a local community centre. Industry was located at the edge of the city and commercial and civic activities near the core. At the epicentre is a garden reserve. A green belt encircling the city is both an agricultural hinterland and a barrier to growth.' The bottom right figure shows that even within the smallest neighbourhood these elements can be seen.

The state housing suburbs of Labour that followed these principals 'experimented with road layouts' (Ferguson, 1994). "Curved streets and cul-de-sacs became standard features,' while they also 'showed concern for the comprehensive provision of services' these included shops and community buildings (Ferguson, 1994). 'Networks of parks and reserves within residential areas' and connections to commercial and industrial zone became commonplace. (Ferguson, 1994) Front yard fences were also removed to reveal the front garden. These gardens were 'not viewed from the cottage garden aspects alone, but as part of a large community garden.' (Firth, 1949)

*The houses were situated around a large park where children could safely play, free from hazards of the streets. Long afternoon evenings could also be spent with other gathering families. Local friendship might be forged and strengthened.*

Community means different things to different people, whether is having no contact with your neighbours or being good friends. These models aimed for the second, creating involved communities. This did not always prosper as not all suburbs actually built the community facilities and services because of The Great Depression following WW1.

This may have been an idealistic approach to communities at the time and many people said it failed. You can see in recent time with the protest in Glen Innes that there actually is a sense of community within the residents, both state housing and private sector. There is a desire and need to bring communities together and give them the facilities to be able to facilitate these meetings.



Tamaki state housing scheme Concentric crescents reflect Garden City planning principles (Tamaki Housing Scheme, 1946)



Glen Innes illustrating the garden city plans. (Google Maps, 2014)

*1930's family makeup - nuclear family (Pascoe, 1935)*


*Current family makeup - large extended family (Robinson, 2006).*


*Current family makeup - single mum. (Conway, 2005)*

## THE OCCUPANTS

Like the many governments, policies and building typologies have changed, in the same manner the occupants of state housing have also changed over the last century. The first workers' dwellings were designed for working families, the development of the 1935 labour state housing brought with it the ideal nuclear family to encourage breeding, the 1950s National government reform limited the occupants to the poorest and most needy, and now with new culture diversity large extended families, single parents and the elderly are those seeking state housing.

*'Workers' dwellings were built for Pakeha (New Zealand European) married couples with children. Maori, single people and the elderly need not apply'*

(Schrader, 2012). This was what was advertised at the beginning of the 20th century. The 1930 and 40s schemes also favoured nuclear families – parents with children above others in society (Schrader, 2012). The design was aimed at this target group. They were 'to provide suburban homes for families, a place where children could grow up in safe and spacious surroundings, away from the dangers of the inner city. This guided state housing policy from the beginning' (Ministry for Culture and Heritage, 2014). It was always difficult to get state housing tenancy but it became even more of an issue after WWII when returning soldiers flooded the market. Thousands of people were forced into cramped conditions.

*What changed in the 1960s was state housing changed from targeting struggling families to housing the poor and those who face discrimination in the private rental market, including Maori, Pacific islanders and solo mothers.*

This developed even further and in the 1970s fewer people lived in nuclear families and policy changed again to cater for single parent families (Schrader, 2012).

First labour government saw a two sizes fits all approach. Most houses having two or three bedrooms and was fine for families up to five. Government argued it was uneconomical to build large houses as not many people could afford them. By 1942 they acknowledged they needed more large houses and constructed 5 and 6 bedroom houses in the larger cities. Since 1980s most big families living in state housing have been Maori and Pacific Island people. Since 2000 HNZC started renovating existing houses to create large houses. Like removing dividing walls from semi-detached units. (Schrader, 2012)

It is now very evident that a diversity of state houses is needed while the majority of the housing stock is from the 1930s – meaning they are mostly two or three bedrooms houses. These houses can be too big for single pensioners and far too small for larger Maori or Pacific families. To be able to make a state housing more viable for the future these issues need to be addressed with future design.

## SUMMARY

This history of state housing in New Zealand has been on of many ups-and-down. For every success there has been equal failures and criticisms. (Arps, 2011). Despite this, state housing has shaped New Zealand not only in terms of its built form but also in regards to people themselves. Housing the poor and needy was a pressing issue in 1905 and it is still equally as important and relevant now and will continue to be for the foreseeable future.

There is no single answer to what went so wrong in the past for state housing areas to become slums – at least in the public mind. Even after the Liberal and Labour Governments tried so hard to prevent this, we have still gone in a full circle. The evidence suggest that while some of the issues are to do with planning and the physicality of the houses themselves it is more about the public perception about the people who live in them. This was worsened by horrific cases being exposed in the media which ruined the perception of state housing for those most in need. While, during the 1980s and 90s state housing areas were known for being crime breeding grounds and in some cases this was no exaggeration, even now, 20 years later, after huge improvements in many of these areas, state houses are still looked down on in the public eye. It is going to be many more years - providing they continue to improve - before state housing will be considered equal status.

While we have gone in a full circle it also means we can continue to the successful and positive part that we also went through in the past. The Liberal and Labour Governments strived to move away from the slums and in several ways they were very successful for many years. There were a lot of success similarities in their designs which can be extracted from the not so successful to be applied in the current development and redevelopment of state housing communities. Some of these successes are as follows:

- High quality and local materials were used.
- Building standards comparable to those of the private sector.
- Not being able to differentiate between private sector and state houses.
- Each house should seem different from its neighbours.
- New technologies utilised.

It was obvious with these designs that they were willing to invest more money in order to create a better building and quality of life for the occupants. This is something that could be better understood and implemented in current times. The entire life cycle cost of materials and process should be considered when designing. If consideration of the future of state housing is not considered it will just become mice running in the same wheel.

There have been many different failures and successes across many different aspects of state housing. How we respond to these dictates how we progress in the future. If we learn from our mistakes then we create a better tomorrow. This is however a very idealistic approach when dealing with any organisation that has government stakes involvement. It is evident that over the past century with the change of each government came another two steps backwards. Both main parties, Labour and National, have very different views on state housing. This has meant that common goals and agreements are not at the forefront of their thinking. Only, how can I one-up my opposition. This can be highlighted in the dips and dives of the number of state houses and the number of state houses built and sold.
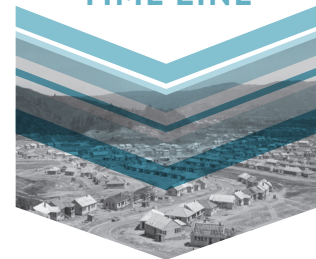
The demise of state housing has been rooted both physically and in the mind of the public for a long time now. Recent HNZC initiatives attempt to remedy some of these issues but these isolated developments have done little to relieve greater problems. As stated earlier this has not only to do with the physical design but also the urban and architectural environment of state housing is a significant contributor. Some of these factors are as follows:

- Some designs were experimental and executed poorly.
- Comprehensive plans were often abandoned leaving suburbs with no community services.
- Some dwellings did not meet the expectations of the public in terms of architectural typology, especially multi-units, flats and apartments.
- Many suburb streetscapes and sections were seen as barren and monotonous.
- Lack of variety of housing design with no real meaning.
- The sprawl of suburbs under 'the cult of the quarter-acre' (Schrader, 2005).
- The designs' lack of engagement with New Zealand's environmental conditions and lifestyle.

Learning from these factors is import to ensure neighbourhoods are executed at a high standard, guaranteeing good connection to community services, taking into account the public in the design process, ensuring designs are interesting, individual and diverse, and lastly providing designs for all New Zealand cultures.

**1905** — Liberal government's WORKERS' DWELLINGS Act passed

**1906** — First workers' dwellings completed in Petone, Wellington; but scheme not a success, with only 126 houses built by 1910

**1912-28** — Reform government sells off remaining workers' dwellings, and PROMOTES PRIVATE HOME-OWNERSHIP through State Advances Corporation (SAC) loans

Election of FIRST LABOUR government — **1935**

Government launches major STATE HOUSING SCHEME; Department of Housing Construction established — **1936**

First families move into new state houses, including the McGregors at 12 Fife Lane, Miramar, Wellington — **1937**

**1940** — Completion of first multi-unit state flats, Centennial Flats in Berhampore, Wellington

**1942-44** — State house CONSTRUCTION VIRTUALLY CEASES due to wartime shortages

**1943** — Completion of 10-storey Dixon Street Flats in Wellington

**1947** — Opening of Symonds Street Flats and Greys Avenue Flats in Auckland

MAORI HOUSING scheme established, managed by SAC and Department of Maori Affairs — **1948**

**1949** — Election of National government, which in 1950s promotes SALE OF STATE HOUSES to tenants

12 Fife Lane bought by McGregor family — **1952**

HOUSING CORPORATION OF NEW ZEALAND FORMED, by merging SAC and Housing Division of Ministry of Works — **1974**

100,000th state house completed in Christchurch — **1978**

12 Fife Lane repurchased by Housing Corporation in recognition of its historic significance — **1983**

**1991** — New National government announces gradual introduction of FULL MARKET RENTS for state house tenants

New Labour-led government reintroduces INCOME-RELATED RENTS and moratorium on state house sales — **1999**

**2001** — HOUSING NEW ZEALAND CORPORATION ESTABLISHED

**2005** — CENTENARY of state housing in New Zealand

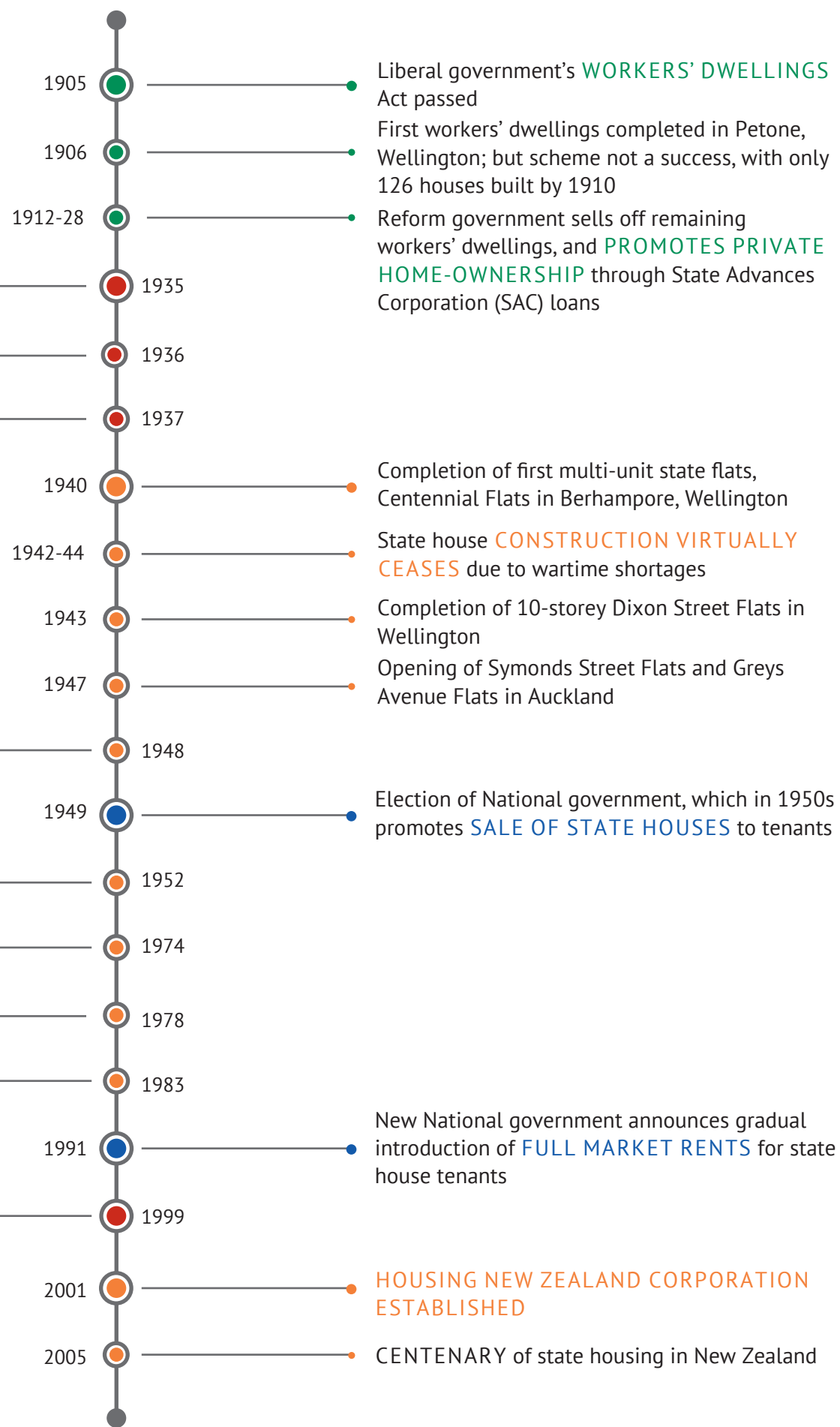*State Houses designed and constructed under the 1935 Labour government.*

The context and situation of New Zealand when Labour was voted into power had a great influence on the style of state houses that were to follow in later years. The desire to move away from slum living and that of the Old World are an important driver for these designs. Labour originally insisted that all houses be architecturally designed, sited on its own section, and that no two houses in a street would be exactly alike' (Arps, 2011). 'Rows of identical housing would have been immediately unpopular,' as would "huge barrack-like tenements of the Old World," proclaimed John A. Lee, Labour's Under-Secretary for Housing (As cited in Schrader, 1993).

*The English-style cottages that were proposed were familiar to the European population who still regarded Britain as 'home'.*

(Schrader, 2005). Architectural historian Peter Shaw (as cited in Schrader, 2005), also suggest that 'Labour didn't want to frighten the electorate' given public support of the state housing scheme 'was not guaranteed.' He adds that, 'building in an idiom that was foreign to local experience risked alienating people.' It is for these reasons that 30 000 timber frame English style cottages were constructed under the first Labour Government.

For many people, moving from the slums to a home with a flush toilet and electric stove was a considerable life improvement. These designed prospered in many aspects of design. However, in one way the state housing failed. According to the Architectural Group

was 'the English cottage style […] is inappropriate for New Zealand's indoor/outdoor lifestyle' (Schrader, 2003). Bill Toomath a Group member (as cited in Schrader, 2005) argued that although they are 'handsome little houses in themselves, all very elegant, beautifully proportioned [and] fine little exemplars of small English houses,' they are 'not New Zealand houses.' Instead he suggested the 'California bungalow (see figure bottom right) would have been a superior state house because its open planning and verandahs better suit local conditions.' (as cited in Schrader, 2003). The choice of this design was not made by the architects of the time blindly. There was disdain towards the 'jerry built' bungalow while the English cottage was perceived as having attributes of quality and good taste, and therefore the best way to raise housing standards (Schrader, 2003).

No two houses would be exactly alike so occupants would not be identified as state tenants […] State housing areas would contain both better off and poor workers to avoid single class neighbouroods.' Designed to last for 60 years. Kitchens would face the morning sun and living rooms facing north would form the centre of family life. Fireplace would be the heart of the home. "In every group of ten houses, each house was to have a different floor plan, and every house in a street was to have a different elevation and use different materials. Standard components such as joinery and fittings would be used in all houses to keep building costs low." These were all elements that together raised the standard of living. During and after WWII government financing rules meant that private sector housing closely resembled state housing.

In 2011 BRANZ published the book *Renovate: 1940-1960s*, written by Alide Elkink. This publication goes through the different design features of Labour state houses and offers renovation guidelines. The following information about these different aspects is taken from this book as well as observation and fieldwork.


*State housing street in Glen Innes. (Authors own image, 2014)*


*Labour State House 1930s. (Renovate, 2011)*


*Californian Bungalow, private sector. (Authors own image, 2014)*
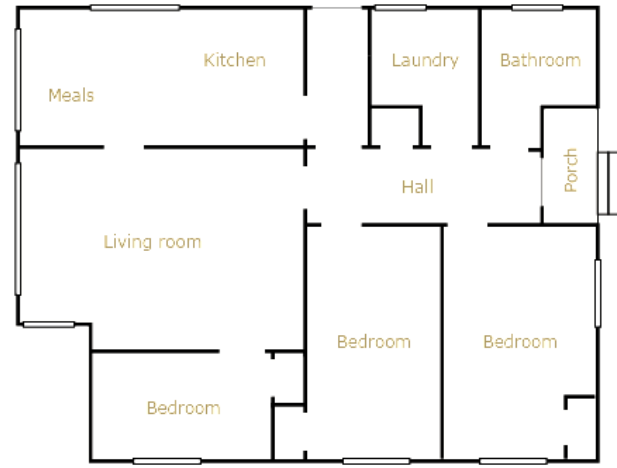
*Floor plan and elevation of a typical Labour State House. (Bateman, 1997)*

## THE CONCEPT

State house developments were filled primarily with single storey, detached units, but these could be interspersed with two-storey semi-detached or multi-unit houses. For stand-alone houses, sections were generally 1000 m2.

## THE PLAN

All the houses were generally rectangular in plan, and contained between two and five bedrooms. Roofs were generally simple hips or gables and tended to be moderately steeply pitched. Elevations were plain without decoration. Windows were small, multi-paned units, and doors were set back in shallow, recessed porches.

Houses were located nearer the front boundary, to provide a larger back yard. The house and fencing provided the separation between the front and rear areas. The side yard boundaries were a minimum of 1.5 m on one side and 2.7 m on the other to allow for car access.
Street frontages of state houses built during thep 1940s were often left unfenced in order to create a more unified street effect, and to maintain a sense of a large community garden.
The main point of difference between state and private housing was orientation on site. Private housing tended to be orientated towards the street, regardless of sun and views, whereas state house were often located and orientated to take advantage of sun and views.

## TYPICAL FEATURES

• a hipped or gabled roof with a pitch of 30–40°

• tile, asbestos-cement shingle or corrugated sheet roofing
• shallow, boxed eaves
• a suspended timber floor usually with a concrete perimeter foundation wall
• a single fireplace and chimney
• bevel-back weatherboard, brick veneer, stucco or Fibrolite (asbestos-cement sheet) cladding – sometimes more than one cladding material was used
• small, multi-paned, timber-framed casement windows
• recessed front and rear porches.

## THE LAYOUT

With early state houses, the internal layout ensured that all habitable rooms received sunlight for at least part of the day. The living room was located to receive maximum sunlight, kitchens were generally located to receive morning sun and bedrooms morning or afternoon sun.
By altering the layout of spaces within the dwelling and changing the position of porches and windows, a wide range of plan variations was possible.

## ENTRANCES

The design had both the front and back doors set in recessed porches that were positioned to provide shelter from the prevailing wind.
To minimise space devoted to circulation such as hallways, the front door opened either onto a narrow hallway or, in some cases, the front door opened directly into the living room.

## LIVING AREAS

The living room was the largest room in the house and intended to be the hub of family life.

## KITCHEN AND DINING AREAS

The first state houses were designed with a dining alcove in the living room, and the kitchen was used for food preparation and cooking only. However, an early survey indicated that tenants preferred to have cooking and dining spaces combined, so floor plans were soon adapted.

## BEDROOMS

The houses typically contained two or three small bedrooms, but one-bedroom as well as four and five-bedroom homes were also built.

## BATHROOMS AND LAUNDRIES

Rooms containing plumbing services – the kitchen, bathroom and laundry – were grouped together to reduce plumbing costs.
Access from the back door to the rest of the house was often through the laundry.

A lot of these design features seem common practice now, however during their time they were luxurious, especially for lower classes. They are now seen as small, basic homes but in their time they were forward thinking, and responsible for improving the standard of living for New Zealand. They are iconic to the development of housing in New Zealand and can be seen spread across the entirety of the country from the very north to the very south.

As already mentioned these houses were designed for New Zealand European families and now it is evident state housing needs to be designed for a wider variety of cultures. The following chapter discusses Maori and Pacific culture and housing and the differences between design needs are apparent.

## 2.5 CULTURAL DIVERSITY
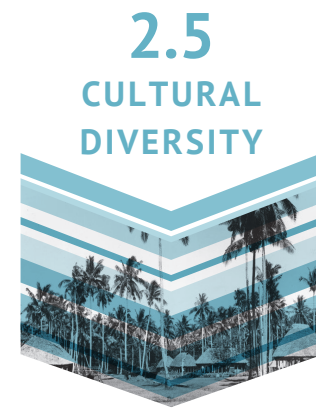


### CULTURAL DIVERSITY AND ITS RELATIONSHIP TO THE BUILT ENVIRONMENT IN NEW ZEALAND

New Zealand has a very vast cultural diversity with a range of different ethnic and cultural backgrounds, which is continuously increasing. While some of these cultures share similar general characteristics, cultural values are not held consistently among all individuals. This chapter aims to find general and common characteristics related to cultural diversity and housing. The conclusions from this chapter will be used to form the basis for design guidelines that are flexible and encompass as many characteristics from the three main ethnic groups in Glen Innes - Maori, Pacific People and New Zealand Europeans (Pakeha). These three are also the major ethnic groups in New Zealand as a whole and, therefore, this information can relate not only to the area of focus but also to state housing across the country.

For the purpose of this thesis, spatial planning and privacy needs of each culture is considered in a generalised manner. Currently, Glen Innes's population is made up of only 33 percent New Zealand Europeans, which mean 67 percent of the population come from different and diverse cultures which are not catered for in terms of state housing (Statistics NZ, 2006).

Paul Oliver (1997) explains that

*..every culture has particular expectations of a dwelling, and each arranges domestic space in ways that reflect social structure, traditions and the organization of his or her daily lives.*

Other aspects that evidently influence the spatial organization of dwellings is kinship patterns, environmental conditions and economic systems. Rapoport (1998) expands on this by stating that the cultural diversity across human groups places individual demands on the built environment, which, in turn, results, in a greater variety of built forms. Anthropologists have noted that people can adapt to their environment in non-genetic ways through culture. The common and individual needs for each ethnic group are when designing homes for them, for they play such an influential part in their lives.

This is very evident and supported when analysing Maori and Pacific history within New Zealand state housing. In the 1970s and 80s large numbers of Pacific People migrated to New Zealand from Samoa, Tonga and the Cook Islands in search of a better lifestyle. However, a better life was not necessarily what they got. The Office of Race relations in 1986 realised that discrimination against Maori and Pacific People was occurring with private rental landlords. They were limited to renting run-down houses in less desirable areas, with high rents resulting in occupants overcrowding.

Discrimination against non European New Zealanders was not new. As discussed in the previous chapter, up until the 1940s, Maoris were excluded from state housing and were, to some extent, kept segregated from New Zealand Europeans as they viewed their living standards to be too low. In 1948, the Government finally decided to build state houses for Maori. They were unsure how to integrate these two cultures and the solution that was implemented was to 'pepper pot'. At this time, it was thought this would improve the living conditions of Maori and Pacific People.

Pepper potting is the process of interspersing a minority group (in this case Maori and Pacific Islanders) among the majority (the New Zealand Europeans). The government of the time decided this was the best way to encourage the Maori and Pacific Islanders into the 'modern world' by learning to live like New Zealand Europeans. Pepper potting was based on the idea that 'People understand and appreciate one another better and mutually adjust themselves easier if living together as neighbours rather than if living apart in separate communities' (Cayford, 2009). The state was able to allocate tenants to certain houses to create what they believed to be balanced neighbourhoods.



*NZ European standard 'town hall'. (Authors own image, 2008)*



*Contemporary Samoan meeting house (malae). (Authors own image, 2007)*



*Contemporary Maori meeting house (marae). (Jenny, 2010)*

*Samoan women meeting threading flowers and talking in a fale (house). The openness of the walls illustrate casual and welcoming aspect of the fale. (Stecker, 2008)*

*Children and adults appear in this scene of a pā (village) in the late evening. A chief is making a speech in front of the meeting house on the left, while the storage frame to the right is loaded with preserved food. The people represent a wide range of ages and roles, suggesting that social activities were shared by many members of a tribe. (Stuart, 1923)*

This did not go to plan and the Maori resisted abandoning their customs. It might have worked if they were still able to maintain some of their customs instead they were thrust into foreign homes, within foreign communities with foreign cultures and foreign technology. Rather than immersing themselves in the community, they were inclined to hide away and isolate themselves. Later policies changed as they saw this approach was failing. What occurred after this was even more of a failure not only for Maori and Pacific People but also for the cities' development. Large concentrations of single ethnicities with low economic standing were emerging and, as discussed in an earlier chapter this worsened the negative perception of these neighbourhoods.

It can be assumed that if a greater understanding of Maori and Pacific cultures were considered at the time and regarded as important as New Zealand Europeans then a very different outcome would have occurred. The only need of these cultures that were met was the fundamental need to have a roof over their head and even then this was a very poorly built roof. It has taken many years and only in recent times more consideration has been given to other cultural needs, including them in the design of our environments.

There are more similarities between Maori and Pacific cultures than there are between them and New Zealand Europeans and for this, at times Maori and Pacific cultures are spoken about under the same umbrella. Cayford (2009) highlights these differences clearly explaining that New Zealand Europeans have been influenced greatly by their British heritage as well as by Europe and America. He continues to illustrate this stating

*"The Englishman's home is his castle armoured to keep out intruders – not so the Polynesians from the islands; his home is open with the warmth of his land in his heart for any who desire to come within."*

The understanding and incorporation of different cultural needs not only Maori and Pacific People is crucial in the development of suburban communities across the countries as the cultural diversity of New Zealand is only going to increase over time.
The typical cultural activities and lifestyle of Maori and Pacific families differ greatly from New Zealand Europeans. These range from family dynamics to cultural and ceremonial functions. The remainder of this chapter explores in depth the cultural needs in regards to housing for both Maori and Pacific people and touches briefly on New Zealand European culture.

## INTRODUCTION

Maori are the indigenous people of New Zealand. The Maori originated with settlers from eastern Polynesia, arriving in New Zealand by canoe between 1250 and 1300 CE. Over several centuries they have developed a unique culture with their own language, a rich mythology, distinctive crafts and performing arts. In later years a prominent warrior culture emerged. This culture of tribal war is the most recent in history prior to European settlement.

Maori way of life had a drastic change in the 17th century with the arrival of Europeans to New Zealand. Gradually they adopted many aspects of western society and culture. The relationship between the two cultures was not one of ease. A treaty was signed between the two cultures in 1840 to coexist as part of a new British colony. Conflict was inevitable as tension rose over disputed land sales in the 1860s. The combination of years of conflict and war and epidemics of introduced disease took a large toll on the Maori population and it declined dramatically up until the 20th century when it began to recover.

Today Maori culture is still an important part of culture in New Zealand not only for Maori but also New Zealanders as a whole. Maori is the second largest ethnic group (14%) and te reo Maori (Maori language) is the second official language in New Zealand, however only one in five Maori can hold a conversation in Maori (Statistics, 2006).

*The European settlers had a dramatic effect on the Maori population and culture with the confiscation of land, introduction of religion, guns and disease.*

Many tribes became very poor after the steady loss of Maori land by way of confiscation and purchase between 1840 and 1937 (see map on page 24). Poor and without land, tribes lived in unhealthy, over crowded conditions that allowed disease to spread (Schrader, 2012). The spread of European diseases caused the most fatalities, even above tribal wars that were caused by the introduction of Muskets. Muskets were traded for flax and potatoes in the 1820s and 1830s, which led to the tribal wars killing many of the Maori population. The third influence from European settlers was the introduction to Christianity, although they were slow to convert, religion became and still is, an important part of Maori life.

There is a disproportionate number of Maori facing economic and social obstacles. They have lower life expectancies and income compared to other New Zealand ethnic groups, coupled with higher levels of crime, health problems and educational under-achievement (Hall, 2008).

## DEMOGRAPHICS
The Maori population in New Zealand stood at 565



*Chefs house at the historic replica fishing village of Rewa's Village - Kerikeri, NZ. (Authors own image, 2005)*



*Food storage house in the background with food preparation house in the foreground at the historic replica fishing village of Rewa's Village - Kerikeri, NZ. - Highlights the separation of activities in traditional Maori living. (Authors own image, 2005)*

1860    1890

1910    1939

■ MAORI LAND HOLDING
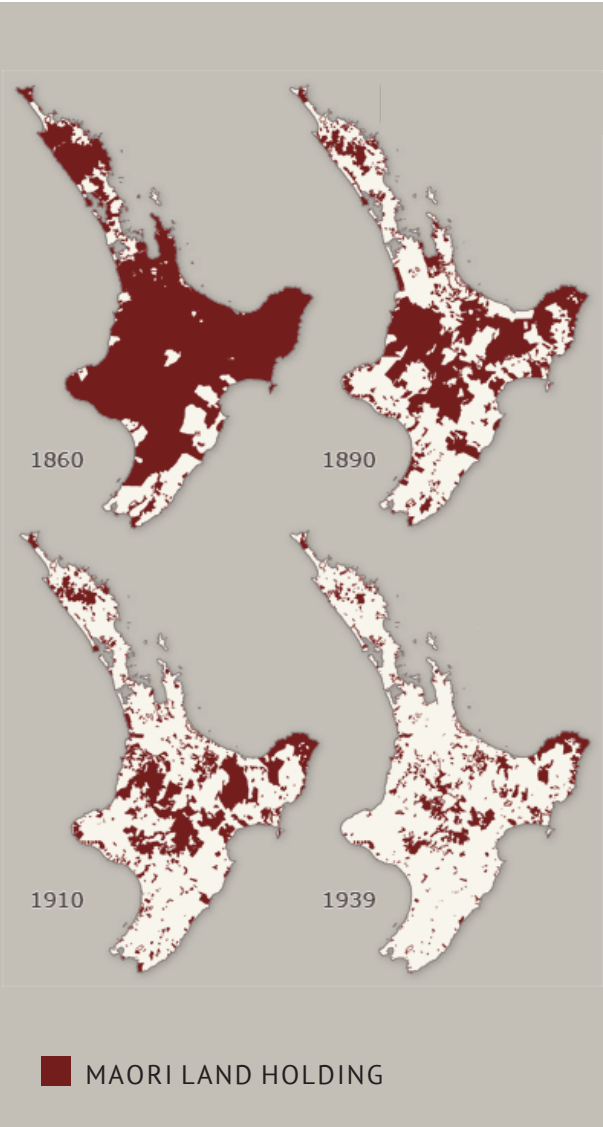
329 in 2006. 84 percent of Maori lived in urban areas and (circa) one quarter of these reside in the Auckland region. Prior to World War II nearly 90% of Maori lived in rural areas. This shift was due to the growth of the manufacturing and industrial sectors resulting in a higher demand for labour. The large amount of job vacancies in the urban areas contrast with the high rural unemployment. By 1961 a third (33%) of New Zealand's Maori population lived in urban areas and by 1970 this number had increased to 80 percent. This significant demographic shift had implications on the housing status and conditions for Maori. Maori have a relatively young age structure, with a third aged under 15 years, compared to 22% of the total population.

## TENURE STATUS
Prior to the 1950s many rural Maori owned their own land. For example, in 1951 approximately 54% of the Maori population owned their own home but



*(left) Parehaka Pa showing Maori houses with a new European building at the rear. (Richardson, 1880s)*

*(middle) Maori land holding in the North Island from 1860-1939 (Orange, 2001)*

by 1981 this figure had dropped to 45% (FCSPRU *et al.* 2006). This decline has continued to current times with higher home ownership rates among Maori living in rural areas are higher than those living in urban areas (Hall, 2008). The 2006 Census shows that only a quarter of Auckland's Maori population own their own home, which is considerably lower than the total regional populations (47.5%). This suggests that a majority of Maori are renting their home. The tenure status of Maori means that the high numbers of renting in private and state housing makes the consideration of their cultural needs in regards to housing very important and a pressing issue.

## CONCEPTS OF HOUSING – A HISTORICAL OVERVIEW
Within traditional Maori society a greater cultural and architectural emphasis is placed on the meeting house (marae) over individual dwellings. This is due to the society including the extended family (whanau) and well as clan (hapu) and tribe(iwi). This is in contrast with how NZ Europeans society is structured; centred on the nuclear family and therefore emphasis is placed on the private dwelling (Armitage, 1986). This can be further supported by the following segments taken from Hall (2008) 'For, if "home" means to the Pakeha the focus of family life, the basis of self-esteem, a base for political action, a place of love, a source of authority and discipline, the location of people to whom one belongs, a place of refuge, of sleep, of nourishment, of attention, discussion, disagreement, caring, shelter, accommodation of guests, approval and rejection, then for the Maori this has not been provided by the house but rather by the marae' (Austin, 1976 cited in Hall, 2008).

*There was limited understanding of Maori values by the first European settlers when they arrived in New Zealand. As a result Europeans styled housing was imposed on the Maori as a way of 'civilising' them.*

Wanhalla (2006) discusses how the poor health outcomes of Maori were often viewed as a manifestation of unhealthy customs and unsanitary living conditions. Many believed that by adopting western-style housing Maori social and cultural practices could be transformed. For this reason housing became 'a key site of official intervention and reform' (Wanhalla, 2006). Wanhalla (2006) also explored the issues that occurred from the very start of colonisation due to the differences between Maori and western-style houses. The Maori sleeping house (wharepuni) was built on the ground with the extended family sleeping together in one single room. The state and its officials had no regard for the extended family model and labelled it 'overcrowding' when they imposed small, individual, two-bedroom houses. Another cultural concept that was not considered by officials was the concept of tapu (restricted) and noa (accessible), which have cultural significance

in terms of where activities and belongings are located (Wanhalla, 2006). One example of this is the creation of different structures to sleep, eat, store food, clothes and other belonging that is very typical of the traditional Maori culture.(Kohere, 2004). This is not the case in Western-style houses, which have all of these activities under one roof, and very often they are beside each other (Kohere, 2004). These differences were emphasised when Maori moved to urban environments and the housing policy of the time enforced Maori households to be 'pepper-potted' among New Zealand European households. This is discussed further in the Pacific communities chapter following, however one different challenge that Maori faced during this transition was the absence of marae which had implications for how people function both socially and culturally (FCSPRU, 2006).

*Without a marae the ability to hold community gatherings, especially funerals became difficult and adaptations had to be made.*

This usually meant that houses often became a



*Contemporary marae -Te Rau Aroha Marae - Bluff, New Zealand. (Authors own image, 2013)*



*Te Hau ki Turanga. New Zealand oldest wharenui built in 1842, now house in the National museum - Te Papa (Authors own image, 2005)*

| | MAIN ENTRY | LAUNDRY | TOILET | BATH ROOM | LIVING ROOM | DINING ROOM | KITCHEN |
|---|---|---|---|---|---|---|---|
| BEDROOM | X | – | – | – | – | X | X |
| KITCHEN | – | X | X | X | ✔ | ✔ | |
| DINING ROOM | – | X | X | X | ✔ | | |
| LIVING ROOM | ✔ | X | X | X | | | |
| BATHROOM | X | – | ✔ | | | | |
| TOILET | X | X | | | | | |
| LAUNDRY | X | | | | | | |

✔ Essential
– Acceptable
X Unacceptable
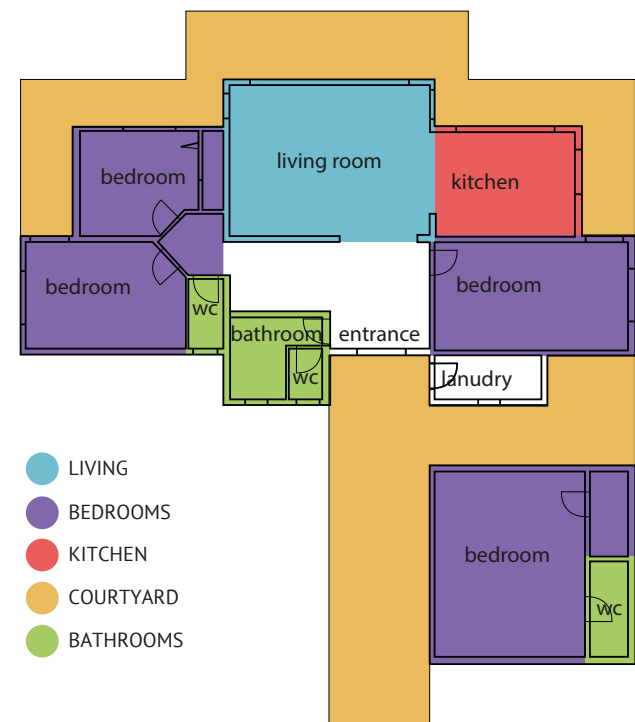
*House relationship matrix - The matrix is a quick reference guide to the basic design of a Maori housing solution. It hight lights what are Essential spaces that must be connected (noa) when designing Maori housing solution; Acceptable spaces that may be connected, but it is not essential in a Maori housing solution; spaces that should be avoided connecting (tapu).*
*(Adapted from Maori Housing Design Guide, 2002)*

'little marae' where often living spaces were cleared to make room for a funeral or for visiting guest to sleep, the building literally overflowed and cooking facilities would be set up outside and carports and garages would be used for eating (FCSPRU, 2006). The housing models 'do not value the social, spiritual, cultural, historical and economic aspects of housing will probably be inadequate in addressing issues for Maori housing expectations and aspirations (Hall, 2008).

## DESIGN NEEDS AND CHALLENGES

Recently a number of studies have been conducted to explore the housing design needs and preferences of Maori and also as discussed later for Pacific people. The most comprehensive publication was prepared for Housing New Zealand Corporation (HNZC) by Hoskins *et al.* (2002) entitled Kit e Hau Kainga: New Perspectives on Maori Housing Solutions. It is beneficial for planners and developers to inform and help consider the diverse needs of Maori. It includes design layouts for both individual homes as well as papakainga (community owned Maori land block or village). The design guidelines were based primarily on discussions with reference group members and key informants. A second report, which has developed guidelines mainly for new housing, was under the organisation of Otara Health Inc. and Housing Reference Group. They consulted approximately fifty community members to consider how housing in the Otara area might be changed to meet the local needs of the people. The third report by FCSPRU and RCMHD (2006) also includes sections on design



*Maori floor plan according to Housing New Zealand Guidelines - with sleep out. (Adapted from Pacific Housing Design Guide, 2002)*

- LIVING
- BEDROOMS
- KITCHEN
- COURTYARD
- BATHROOMS



Papakainga – community owned Maori land block or village centred around a marae. *(Schrader, 2006)*

issues by providing a brief literature review on the topic and conducting interviews and focus group discussions with key informants and individuals. These design guidelines were reviewed and found to be quite similar. The common findings have been incorporated and areas follows.

## CHARACTERISTICS
### HOUSING LAYOUT
Housing (in general) designed for whanau (family) should be open plan and adaptable to the changing needs of the family (whanau) and fluctuating occupancies. This can involve the inclusion of a sleep out, multi purpose rooms or removable walls in bedrooms and living rooms.

### OUTDOOR SPACE
Transitional indoor/outdoor living environments have a number of benefits including relieving pressure on internal areas and promoting healthy living as well as providing an area for large whanau gatherings and a covered area for children to play. Outdoor cooking and dining is an important part of Maori culture and a covered area, preparation bench, large washing trough and a hangi (underground oven) site is needed for this. A number of outdoor communal spaces were mentioned in all three reports including a play area where children can be monitored by more than one whanau home and a communal vegetable garden with small plots for individual whanau houses to maintain ancestral gardening skills and promote healthy activity and healthy eating.

### LIVING SPACE
*The living room is used for a variety of purposes including a space where guests are welcomed and sleep, meetings and celebrations take place and where a deceased family member (tupapaku) will lie.*

As such, the living room should be large (approximately 5m x 6m) and able to accommodate up to 20 people. A secondary living space may also be appropriate especially when guests are occupying the main living room. Teenagers and children could use this secondary space during whanau gatherings or as a spare bedroom for whanau who stay for an extended period of time.

### KITCHEN AND DINING AREA
The kitchen should be large enough to accommodate two or more people which is particularly important when catering for large gatherings. The kitchen should have adequate storage space for bulk food and large pots. The dining room should be large and connected to both the kitchen and living room.

### BATHROOMS, TOILETS AND LAUNDRY
There should be at least two toilets in a house and they should be separate from the bathroom/s. The bathrooms, toilets and laundry rooms should be separate from the kitchen area as having them located within close proximity is considered tapu.

### PASSAGEWAYS
These are often seen as wasted space and instead, bedrooms could be located off the main living room area.

### BEDROOMS
The bedrooms should be large enough for two or more children or two adults with a study space. While the maximum number of bedrooms will depend on the site, most can have a maximum of five bedrooms.

## KEY CHARACTERISTICS
The key characteristics can be grouped into two main concerns: pressures of larger families and spaces, and importance of Noa (accessible) and Tapu (restricted). These represented in figure above, diagrammatically the relationships between each space:



- LIVING
- BEDROOMS
- KITCHEN
- COURTYARD
- BATHROOMS
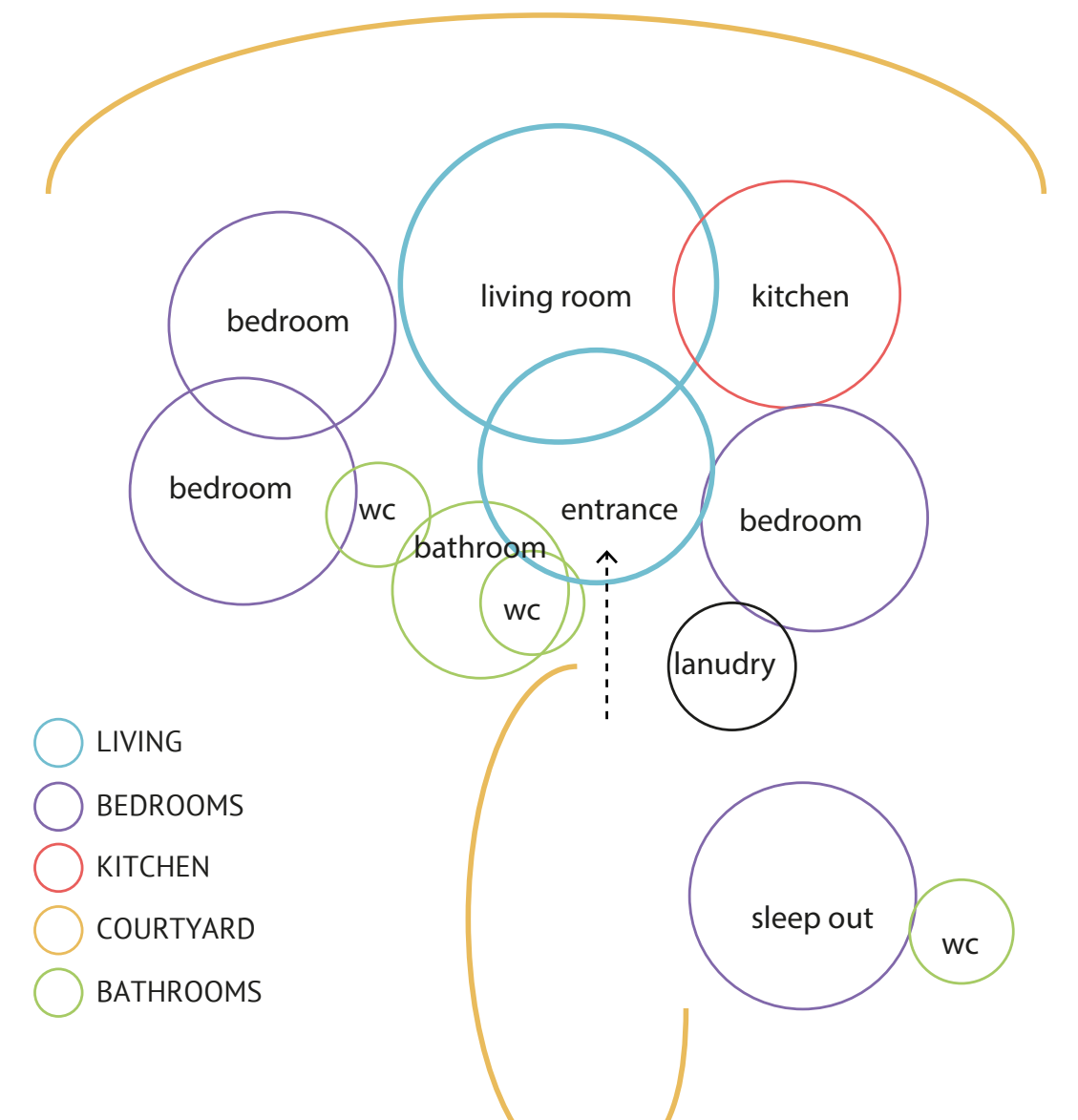
*Diagram of connections required between Maori housing spaces. (Authors own diagram)*

- Concept of Noa and Tapu – bathroom, kitchen, laundry all separate.
- Bedrooms big enough to accommodate communal living and extended family.
- Good relationship between indoor and outdoor.
- Large living space to large formal gatherings.
- Flexible multi-use spaces for gatherings for extended guests.

## CONCLUSION
Maori history has been unfair in terms of the suppression of culture and the imposition of western customs. A lot of history and culture has been lost or adapted over time and for this reason it is very important to provide housing and spaces that allow Maori culture to thrive. Maori are the native people to New Zealand and, in many respects, their culture is part of everyone's everyday life. However this is not usually the case in terms of housing and this is an area that greatly needs improving. While it is an important issue for the nation as a whole, it is especially relevant for state housing as the Maori population along with Pacific people account for a large amount of state housing tenants.

## INTRODUCTION

There are at least thirteen distinct cultural groups that represent Pacific People in New Zealand. The Pacific population is both people born in the Pacific Islands and New Zealand. The primary Pacific ethnicities represented in New Zealand are (in order of population) Samoan, Cook Islanders, Tongan, Niuean, Fijian and Tokelauan (Statistic NZ 2006).

A communal way of life is what traditional Samoan culture is based-on. It derives from Fa'a Samoan (the Samoan way) a unique socio-political culture.

*Most Samoan cultural activities are done together. They are broken into three main groups: faith, family and music.*

Traditional houses (fale) contain no walls and up to twenty people may sleep on the ground under one roof. During the day the fale changes functions and it used for chatting and relaxing. A person's family is an important part of a persons' life and this extends to the extended family living and working together. Elders have the highest stature within the family, and this is acknowledged through them having the best sleeping location and eating first on during the traditional Sunday umu (underground oven).

The high rate of inter-marriage between Pacific people and New Zealanders including Maori and New Zealand Europeans is one example of how Pacific people and communities are not static, they are constantly changing and redefining themselves. The Pacific population in New Zealand is notable younger than the overall New Zealand


*Samoan village of fales, (Hall, circa 1930s).*

population with 38 percent (100 344 people) under the age of 15 and a median age of 21.1 years, lower than the 35.9 years for the overall population. The pacific population is one that will constantly grow with time, in 15-20 years one in five New Zealand children will be of pacific descent.

## DEMOGRAPHICS

In 2006, 266 000 people in New Zealand were identified as belonging to a Pacific ethnic group (statistics New Zealand, 2006). This represents 6.9 percent of the total population. 27 percent of households with people of Pacific ethnicity experienced overcrowding because of their larger family size. Hall (2008) noted that often the number of people living in a dwelling could be up to fifteen (Housing New Zealand Corporation 2004). Has stated that state housing needs do not take into consideration the size of Pacific families, their cultural values and practical needs.

Large gatherings and hosting guests for both short and extended periods of time are cultural ties that are predominantly kept by many Pacific people. Accommodating large numbers of people is a very 'natural' aspect of their family life, but most houses in New Zealand are not designed to house such large gatherings. (Hall 2008)

## TENURE STATUS AND HOUSING ASPIRATIONS

Home ownership among Pacific people is low. The 2006 Census revealed that less than a quarter of all Pacific groups owned the residence in which they lived. this statistic nearly doubles when looking at the overall regional population. The assumption is


*Samoan beach fale made from a combination of traditional and contemporary building methods (Authors own image, 2007)*

supported by a study by Koloto and Associates Ltd. *et al.* (2007) on housing experiences of Pacific people, showed that in 2006, 67% of the Pacific population were renting. Of the 67% approximately 43% are private rentals while 37% are from Housing New Zealand (Koloto and Associates Ltd. *et al.*, 2007: 3). The study also showed there were many barriers that Pacific people faced when trying to own their own home, including financial (lower than average incomes), cultural (financial obligations) and lack of information.

## PACIFIC CULTURE AND HOUSING

Pacific culture requires unique housing needs. There are still strong ties between Pacific people living in New Zealand and their traditional cultures. There are three main cultural factors that impact these needs; they include larger-sized families, extended family living, frequent gatherings and certain cultural

*Samoan fale built of contemporary materials (Authors own image, 2007)*

obligations (Koloto and Associates Ltd. *et al.* (2006).

Housing New Zealand has already developed guidelines in relation to Pacific cultures. They state that a typical Pacific dwelling contains a large formal living space that is bordered by external decking to allow for overflow. Entry is directly into the main formal space where social gatherings occur. Bedrooms are located at the rear of the space with the possibility of combining multiple rooms to create larger sleeping areas. The kitchen is commonly connected to the informal space and sits towards the centre of the dwelling. There may also be a garage that can be used as a multi-functional space and offers possibilities to accommodate house functions or gatherings. Living areas within the dwellings face north to maximize solar gain. The size of the dwelling is large to be able to cope with the size of Pacific Island families.

## LARGER FAMILY SIZES AND EXTENDED FAMILY LIVING

As mentioned previously, Pacific people tend to have larger family sizes and live in extended family

households. This is one factor that has an immediate implication on their housing need. As the majority of state housing is two- or three-bedroom. Many Pacific households are also not fixed in terms of the number of people that reside there. (Otara Health Inc., 2001).

*An example of this is that it is not uncommon for households to accommodate multiple generations (Grey, 2001) or to host overseas guests for both short and extended periods of time*

(Koloto and Associates Ltd. *et al.*, 2006). This can be for a variety of reasons ranging from it being considered a very 'natural' aspect of family life, to provide mutual support for each other (Koloto and Associates Ltd. *et al.* 2006). Also for financial reasons for both the nuclear family and extended family and to take care of extended family (Poland *et al.* 2007). While some of the reason to live in extended families is by choice or cultural reasons, it is also clear that, for some, it is out of necessity due to affordability and constrained housing options (Grey, 2001).
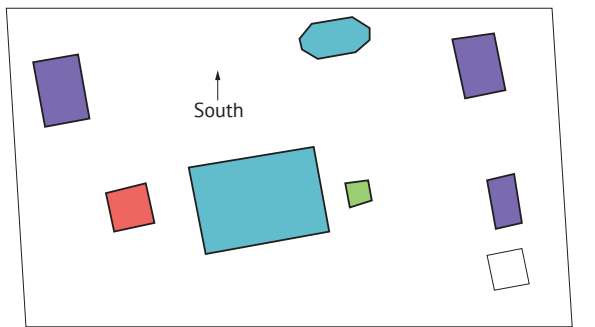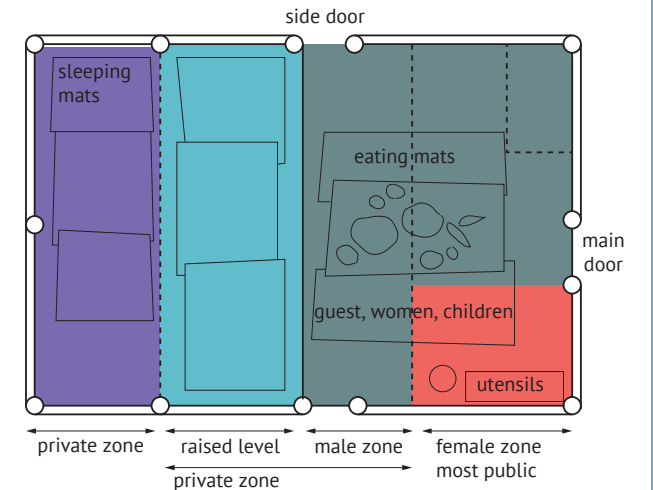

*Building relationship of traditional Fijian home and traditional site layout (Oliver, 1997)*

*FREQUENT GATHERINGS*

Pacific homes are often used to host large family gatherings and community activities such as funerals and meetings, these gatherings occur regardless of whether a house is small or inappropriately designed for such occasion (Hall, 2008). As discussed, earlier the existing building stock is not designed to cope with such large gatherings. Large gatherings and the general everyday use of a large family puts physical pressures on the facilities of the house. It can result in the overwork or cooking and hot-water systems leading to failures (Macpherson, 1997).

*FINANCIAL OBLIGATIONS*

This is a hard cultural factor for many people to understand and then take into consideration. There is a lot of uninformed stereotypes around Pacific people all being in the low economic bracket, while things like financial obligations that are not commonplace in New Zealand European communities are therefore not considered. The three main financial costs associated with cultural obligations are identified in Cheer *et al.* (2002) and include funeral costs, church donations and remittances. In their

| | MAIN ENTRY | LAUNDRY | TOILET | BATH ROOM | LIVING ROOM | FORMAL LIVING | KITCHEN |
|---|---|---|---|---|---|---|---|
| BEDROOM | X | – | – | – | – | X | X |
| KITCHEN | X | – | X | X | ✔ | X | |
| FORMAL LIVING | ✔ | X | X | X | ✔ | | |
| LIVING ROOM | – | – | X | X | | | |
| BATHROOM | X | – | X | | | | |
| TOILET | X | – | | | | | |
| LAUNDRY | – | | | | | | |

*House relationship matrix - The matrix is a quick reference guide to the basic design of a Pacific housing solution. It hight lights what are Essential spaces that must be connected when designing a Pacific housing solution; Acceptable spaces that may be connected, but it is not essential in a Pacific housing solution; avoided connecting unacceptable spaces.*
*(Adapted from Pacific Housing Design Guide, 2002)*

Essential ✔
Acceptable –
Unacceptable X

study, it was found that many Pacific people would go to extremes in order to fulfil these cultural obligations even if the needed finances were not available. In some cases, meeting cultural obligations resulted in taking out loans or 'discounting' food and utility bills (*Cheer et al.*, 2002).

## HOUSING DESIGN NEEDS AND PREFERENCES

A number of studies have been made to investigate the housing needs and challenges of Pacific people but often these focus on affordability, poor housing conditions and health implications rather than the design issues and preferences. The following section is based on information from two different reports; the first report is the Pacific Housing Design Guide (2002), which was developed by Faumuina, and Associates for HNZC. The second report is the Otara Health Inc. (2001) report that was also reviewed in the section on Maori community housing design needs.

### DURABILITY OF HOUSING

Durability of materials is not only limited to the structure of the home but also to internal fixtures and fitting. This is relevant because standard New Zealand homes have not been designed to cope with the pressure of large families that can be around 15 people in one home. (Cheer *et al.* 2002)

### LOCATION OF THE HOUSE

The positioning of the house on the site is important (Faumuina and Associates (2002). It should ideally be positioned to maximise exposure to the sun (north facing) to ensure maximum solar gain. Secondly a master plan should be made to plan and ensure provisions are there for extensions to the building. The Otara Health Inc. report (2001) also stated that houses should be positioned at ground level, as this will make the home more accessible. It also increases the ability for indoor/outdoor flow as well as helping keep the house warmer during the winter.

### OUTDOOR SPACE

Landscaping and vegetable gardens, outdoor cooking space and suitable fencing were three important aspects highlighted by the Pacific Housing Design Guide (Faumuina and Associates, 2002). Vegetable gardens are particularly important for economic, health and cultural reasons. For many Pacific people, an underground cooking space is important because it allows food to be cooked in a traditional way and to extend hospitality to guests during large gatherings. Suitable fencing is also important for both security and privacy reasons.

### KITCHEN AND DINING AREA

The kitchen is an important part of the house and should be big enough to cater for larger families and frequent visitors. It should ideally be big enough for two or three people to be working at the same time. I addition it should have adequate storage space for bulk supplies of food and cooking ware (Faumuina and Associates (2002).

### FORMAL LIVING ROOM

The main room or formal living room is a flexible space which can have a variety of different purposes which include a living room, meeting room, dining room, sleeping room and relaxing room (Otara Health Inc., 2001). It is essential that it be large and adaptable. Some features of the room has been suggested by Faumuina and Associates 2002) to ensure flexibility are:

- multiple entries to allow for visitors to depart formal occasions without causing inconvenience



*(left) Diagram of connections required between Pacific Island spaces*
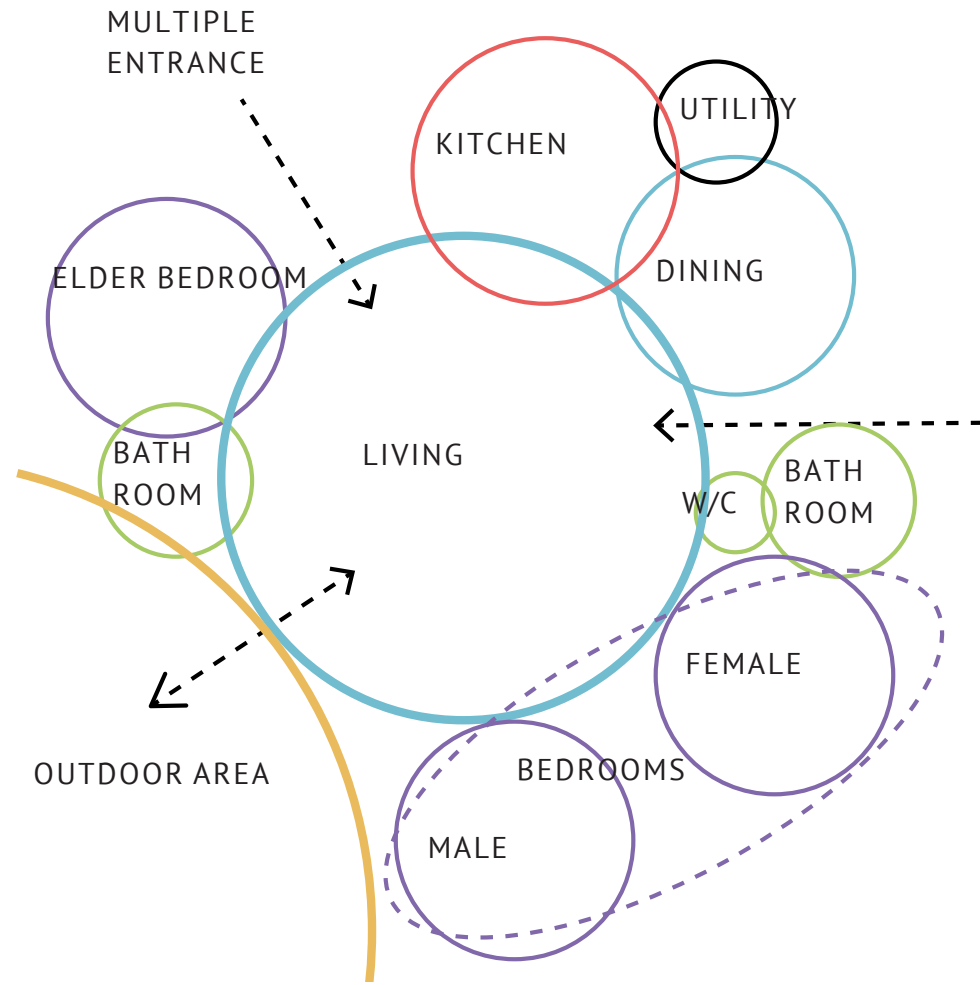
to others
- a visual and physical connection to outdoor areas to ease pressure on internal space and promote a healthier lifestyle. This is also useful so that adults can monitor children when they are playing outside
- the ability to temporarily separate formal and informal living areas so that both places can be used for different purposes or so that a larger space can be created
- be located separately from cooking spaces to avoid interruption during formal occasions.

### BEDROOMS

There are two main factors relating to bedrooms in Pacific households:
- Most Pacific cultures separate the living quarters of single females and males.
- Pacific households tend to be fluid and, therefore, need to be flexible in terms of how many people the house can accommodate.

The Faumuina and Associates (2002) Pacific Housing Design Guide recommends that a minimum of five to six sleeping areas be available for busy times when there are lots of family members or friends visiting. Storage areas are also important so that large items such as fine mats can be stored when not in use.

### BATHROOMS AND TOILETS

The larger household-sizes of most Pacific people means that the separation between the bathroom and toilet will help to ease the pressure for their use. Bathrooms and toilets should also be located away from formal spaces, and at least one should be accessible for the disabled or elderly with a minimum width of 1.20m.

### PASSAGEWAYS/ENTRY

A wide main entry into the house is important especially when a death in the family has occurred because it allows for the coffin to be carried through the main entrance with ease. Ideally this main entry point should lead directly into the lounge. A secondary entrance way into the house is preferred as it can be used for informal occasions to preserve the sanctity of the main entrance (Faumuina and Associates, 2002). Further, corridors should be a minimum width of 1.10m.



*Samoan fale built with contemporary materials (Authors own image, 2007)*



*Samoan church with women dressed in their 'Sunday whites' - faith is still a very traditional and important part of life. (Brinkmann, 2013)*

*Samoan gathering playing volleyball outside a home in Samoa. - Highlights need for good indoor/outdoor relationship (Crayford, 2009).*



*Samoan community living with fales in the background (Crayford, 2009).*



*Pacific Island floor plan according to Housing New Zealand Guidelines (Adapted from Pacific Housing Design Guide, 2002)*
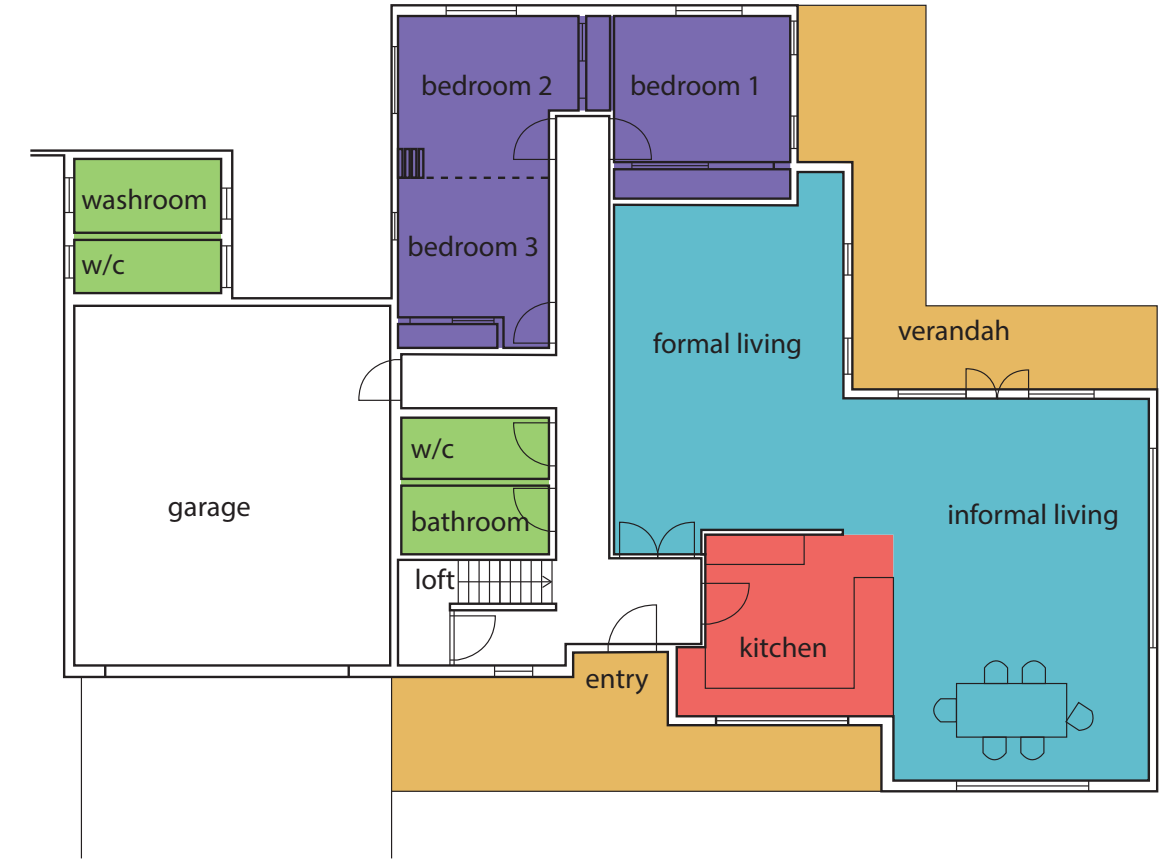
## KEY CHARACTERISTICS (see figure to right)

The key characteristics can be grouped into two main concerns: pressures of larger families and spaces, and importance of interior and exterior connections:

- large spaces with emphasis on the need to accommodate large formal occasions
- large sleeping spaces to accommodate extended family
- easy connections to the exterior
- open space available to allow formal occasions to overflow
- maximise sun and solar gains.

## CHALLENGES ASSOCIATED WITH HOUSING DESIGN IN NEW ZEALAND

There are many challenges faced by Pacific people; however, the fundamental challenges associated with New Zealand's housing design is the rigidity of the houses designed for New Zealand Europeans (Macpherson, 1997). The smaller, nuclear family designed houses do not meet the needs physically or socially of Pacific People. This mismatch in terms of what Pacific people want and what the market has supplied means that many Pacific people have resorted to the use of garages as a solution to the inadequacies of the standard New Zealand home. The evolution of this trend from 'garage space' to 'social space' has been documented in Macpherson (1997) for the Samoan community and 'Alatini (2004) for the Tongan community.

For these cultural groups (and others), the garage has been, and still is, a cost effective and simpler alternative to acquiring more indoor space. During earlier settlement for the Samoan community, garages were used as a space for unmarried men to sleep, informal entertainment, large meetings, informal living areas, social events, kava ceremonies, chapel services, language 'nests', bingo and music studios (Macpherson, 1997). However, as affordability becomes a greater issue, garages have been increasingly used as temporary accommodation for extended family members who are unable to afford their own place (Macpherson, 1997).

## CONCLUSION

Pacific communities are an important part of New Zealand society today. Their increasingly large population in New Zealand makes them one of the larger minority ethnic groups. They also make up a large amount of state housing tenants especially in the Auckland region. Their culture and way of living is also very different from New Zealand Europeans, and while they have adapted in many respects to Western customs there should be some flexibility in they way they live to be able to express and enjoy their traditional culture and activities. More consideration needs to occur when planning for Pacific communities in terms of the size of family units and also they way in while they use the house and its relationship to the outdoors.

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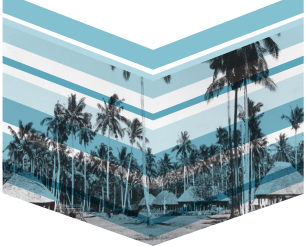
Contemporary are typically design with New Zealand Europeans in mind and Alison Drummond, author of At Home in New Zealand, remarks that New Zealanders have a distinct idea of a home as a detached house, surrounded by garden- flowers at the front, vegetables out back. The outside is often weatherboard with a painted corrugated iron roof (Drummond, 1984).

The main influence of they typical New Zealand home as talked about earlier came from New Zealand Europeans heritage and ideals. A number of Lockwood and design-build homes have been assessed to understand the current stock of New Zealand housing, particularly typical three to four bedroom dwellings. The conclusions of this is as follow.

The entry is located around the centre of the dwelling, merging into a large open plan living area containing the kitchen, dining and living areas. This space connects to an exterior courtyard/decking area, linking the interior and exterior. Moving further into the house to the private areas, one passes through a family space that can be opened as additional space to the living area. Through this space there is a corridor that contains four bedrooms, a bathroom, laundry and storage. One end of the corridor is connected to a large double garage. The dwelling is a single level and the spaces are generous in size.

## CHARACTERISTICS

Characteristics have been derived from the above case study and the HNZC Guide lines. The characteristics include:
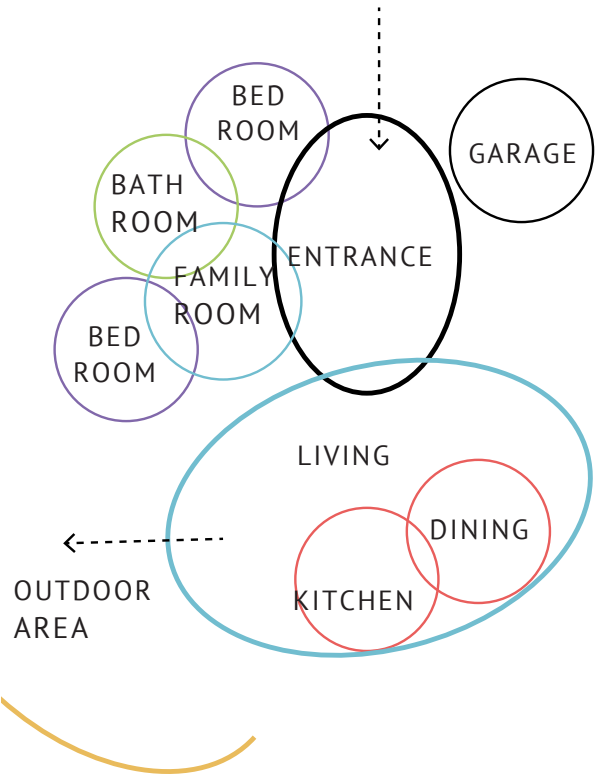


*Diagram of connections required between New Zealand European spaces*



*Typical NZ European 'Lockwood' home - Vision. (Lockwood, 2013)*



*Typical NZ European 'Lockwood' home - Papai. (Lockwood, 2013)*

### ENTRY
- one main entry visible from the street
- reception space inside, and separate from living spaces

### LIVING SPACES:
- visual or physical connection to the exterior
- shield noise-sensitive living areas
- reception space separate from main living area

### KITCHEN:
- easy connection to the living and dining area
- often acts as a hub to the living area

### BATHROOM AND TOILETS:
- away from main entry and kitchen
- limited views from exterior

### CIRCULATION:
- circulation simple and direct
- door swings minimise obstructions within rooms

### BEDROOMS
- large enough to contain a double bed
- access is easy through circulation
- away from living areas views and noise

### COURTYARD
- windows providing daylight and ventilation to circulation also provide a glimpse view of the outside

### OVERALL
- rooms large enough for their specific function
- windows positioned to restrict direct outlook so that the short-range view from one dwelling is not directly into the main internal living areas of any neighbouring dwellings.

## KEY CHARACTERISTICS
- open plan living areas
- outdoor living and connections to the exterior
- usually split into two main zones (living and sleeping) off a central entrance way
- rooms of sufficient size for functions.

## DISCUSSION
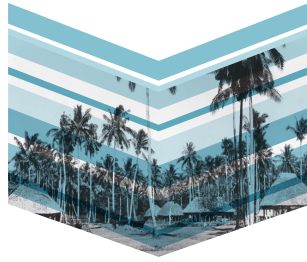
Cultural and demographic differences have implications on the housing designs required by both Maori and Pacific groups. For example the concept of tapu and noa in Maori culture, and the importance of extending hospitality in Pacific culture have impacts on space requirements. Differences in the demographic and household characteristics of these population groups also impact on housing requirements. Maori and Pacific households tend to be large and to have many children.

As discussed in Schrader (2005), many of the design elements required by Maori and Pacific people are compatible with other cultural groups and are not exclusively desired by Maori and Pacific people. In fact, the market does supply houses that meet their requirements, however, affordability is a big issue and generally these houses are located relatively far from family and associated communities. Thus, it appears that a mismatch exists because it is difficult to find a house that meets design requirements at an affordable price and appropriate location.

Oliver (1997) states that numerous dwellings have porches, verandas and upper storey balconies, which make spatial connections to the outside world, while preserving their functional purposes as extensions of living space and providers of privacy. How society regards the relationship of internal to external space is often a measure of the importance they place on privacy. There are many common spatial requirements that align across multiple cultures (see lessons learnt). However there are also many requirements, which are unique to a particular culture and these, should be addressed within a design.

Looking forward, it is anticipated that Maori and Pacific ethnic groups will continue to be a significant part of the Auckland regional population. According to Statistics New Zealand ethnic projections, New Zealand's Maori, Asian and Pacific populations are projected to continue growing faster than the European or Other (including New Zealanders) population. The growth of the Maori and Pacific populations is driven by births, which can be attributed to higher fertility rates and a young age structure.

The latter also provides a built-in momentum for future growth. By comparison, the expected slower growth of the 'New Zealand European or Other' population largely reflects lower fertility rates and an older age structure.

This thesis focuses on state housing and achieving a house that meets the cultural requirements for every culture while being low cost is unrealistic. Therefor the most common elements should be incorporated into state housing to meet at least the basic cultural requirements.

## 2.6    LESSONS LEARNT FOR DESIGN GUIDELINES

### 2.2 - A BRIEF HISTORY
- It is better to invest more and build higher quality, long lasting homes.
- There shouldn't be a visual difference between private sector housing and state housing
- Large plots of land can be good but it should not be too big to maintain and have a purpose
- Neighbourhoods need to be supported by community facilities.
- Types of tenants are constantly changing and the design should be flexible enough to accommodate different users in the future.
- Post war state housing is iconic in New Zealand and should be appreciated and looked after.

### 2.4 - HISTORIC TIME LINE
- Occupants and circumstances are constantly changing and state house should be flexible for this.

### 2.3 - THE POST-WAR STATE HOUSE
- Long lasting, durable materials are important to prolong the life of the building.
- Insulations is required everywhere.
- It is better to achieve more than the minimum standard of insulation required.
- The most up to date technology should be used to prolong the life of a building.
- Even in low cost buildings, individuality is important.
- Designing a building for a single user that is not adaptable is not leaves houses empty.
- There should be a better interaction between the indoor and outdoors.

### 2.5 - CULTURAL DIVERSITY
Different cultures have different needs and buildings should be flexible to meet these needs, while a mix of cultures should be looked at when designing to find a common solution. Common characteristics between Maori and Pacific housing needs are:
- Housing of larger families and extended families.
- Desire for connections with landscape and nature.
- Privacy and separation of formal and informal spaces.
- The placement of the bathroom away from the formal.
- Requirements for maximising solar gains to be able to heat the dwelling efficiently.

## ▶ PART THREE

PART THREE COVERS FOUR DIFFERENT CASE STUDIES OF STATE HOUSING NEIGHBOURHOODS FROM DIFFERENT CITIES AROUND THE WORLD. THESE INCLUDED NEW ZEALAND, SWEDEN AND SCOTLAND.
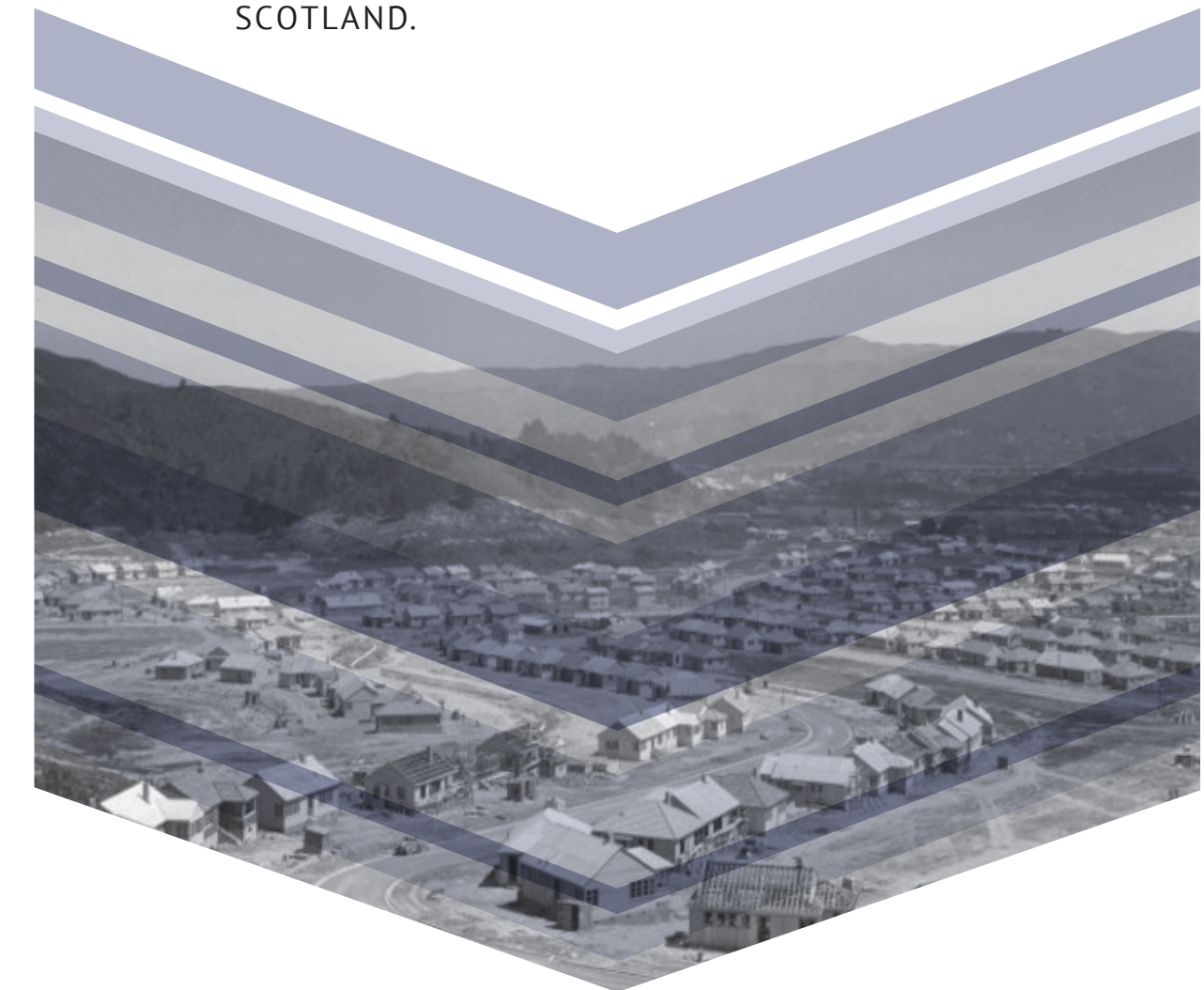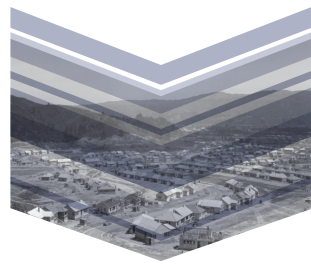
Many different state housing examples exist around the world, and while they are all very different they tend to show some similarities. This section will illustrate four different 'state housing' case studies, looking at an overview of the area, the demographics, historical and current situations, as well as general analysis of the area, concluding with a SWOT for each case study.

The four chosen areas are two neighbourhoods in New Zealand, Glen Innes (the area considered for the in-depth proposal in part 5 and 6) and Naenae, as well as the neighbourhoods, Govan, Scotland and Augustenborg, Sweden. These specific case studies were chosen for a variety of reasons to compare similarities and differences with the suburb of Glen Innes. The reason for this is to get a greater understanding of how Glen Innes, as a state housing suburb and community, sits within the other similar suburbs throughout the world.

In addition to providing interesting comparisons, each of the areas have been chosen from cities that I have a personal knowledge of so a greater understanding and connection can we made. Auckland is the closest city to where I grew up in, which is why Glen Innes is a relevant focus for me, while Wellington is the

city where I studied my bachelors degree and is also a familiar city. While completing my Masters in Sweden, I have lived in Gothenburg but currently live in Malmö, so I have, therefore, chosen a suburb in the area I am in. During the fall 2013, I spent a semester on ERASMUS exchange at the University of Strathclyde in Glasgow, Scotland. All of these different cities have had an interesting influence on my education as an architecture student and, therefore, using them as a base for my research into state housing suburbs seems fitting as they are relevant and accessible.

The case study of Naenae was chosen because it is built in the same historical and cultural environment, using the same style houses and techniques as Glen Innes. The designed had a slightly different approach with more focus on the garden city design principals. It has also had different development over the years with different demographics, and this illustrates interesting differences about the how the residence influence a suburb.

Govan, although it has a very different housing typology current has many of the same crime and gang related issues as Glen Innes. Also because of its location to the city, water and other developments it is starting to under-go many new developments

and redevelopments, threatening to gentrify the area similar to Glen Innes.

Augustenborg, similar to Govan has a very different housing typology to Glen Innes and can be compared in terms of contrasting approaches to the housing stock, but it shares a similarity in terms of culture. Both suburbs have a majority of international cultures, and while Glen Innes is only just starting to approach this in a harmonious way, Augustenborg has already established and embraced this diverse community. Augustenborg is also a successful example of redeveloping an area in a sustainable manner.

There are many differences between each case study, but there are also many common elements between all four of the suburbs. They are all suburbs of a major city. They were all planned or developed for state/workers/public housing and they all currently still have a large amount of active state housing.

The analysis and comparison of these four state houses is concluded with a discussion and the lessons learnt which later influence the design guidelines and in-depth design proposal.

## GLEN INNES
### AUCKLAND
### NEW ZEALAND

The Auckland metropolitan area, in the North Island of New Zealand, is the largest and most populous urban area in the country. Auckland has the largest Polynesian population of any city in the world.

Glen Innes is a suburb located in Auckland, often known by its inhabitants simply as "GI". It is located nine kilometres to the east of the city centre, close to the waters of the Tamaki River. It has for the most part been a low-income, working class area.

## NAENAE
### WELLINGTON
### NEW ZEALAND

Wellington is the capital city and second most populous urban area of New Zealand. It is at the south-western tip of the North Island, between Cook Strait and the Rimutaka Range.

Naenae is a suburb of the city of Lower Hutt in the North Island of New Zealand. It lies on the eastern edge of the floodplain of the Hutt River, four kilometres from the Lower Hutt CBD and 19km from Wellington CBD.

## GOVAN
### GLASGOW
### SCOTLAND

Glasgow is the largest city in Scotland, and one of the largest in the United Kingdom, and, the Scottish city with the highest population density with 3395 people per square kilometre.

Govan is a district and former burgh now part of southwest Glasgow. It is situated 4.0km west of Glasgow city centre. The area has had a reputation for poverty, partly due to the construction of housing estates in the 1930s to relieve the overcrowded slums.

## AUGUSTENBORG
### MALMÖ
### SWEDEN

Malmö is Sweden's third largest city by population. Malmö was one of the earliest and most industrialized towns of Scandinavia. It is Sweden's most southern city with 309 105 inhabitants.

Augustenborg is a public housing neighbourhood in Malmö. It is situated 4.5km from the city centre of Malmö. It recently underwent an award winning sustainable redevelopment.
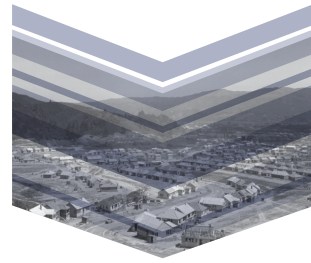
Glen Innes was part of the Tamaki state housing scheme that started after the election of the first Labour government and spanned for twenty-years from the early 1940's. The Tamaki scheme included neighbouring suburbs Glen Innes, Point England, and Northern Panmure.

It was designed to accommodate 30 000 people making it 'the most ambitious Department of Housing Construction scheme to date' (Schrader, 2006). The later construction of this part meant urban sprawl was a pressing issue and the area became a testing ground for new building types, including imported houses, multi-units, duplexes and housing for single people.

In the 1940's and 50's Glen Innes had a great reputation and state housing here was sort after, it's reputation soon began to deteriorate. After the National government, came into power many the poorest families especially from the slums moved into urban peripheries such as Glen Innes.

During the 1950's and 60's many Maori and Pacific people started moving into the area to be close to the booming industrial areas nearby. Many families could not afford housing so moved in with extended families and friends resulting in an overcrowded, single user community. By the 1970s, Glen Innes was a suburb riddled with crime and gang activity. Up until current times the perceived image of Glen Innes has been one of high crime, gang activity and poor inhabitants.

Recent gentrification, however, has led to more modern, developed housing in the area, including apartment-style properties, making the area even more desirable to live for higher income families.

### HISTORY
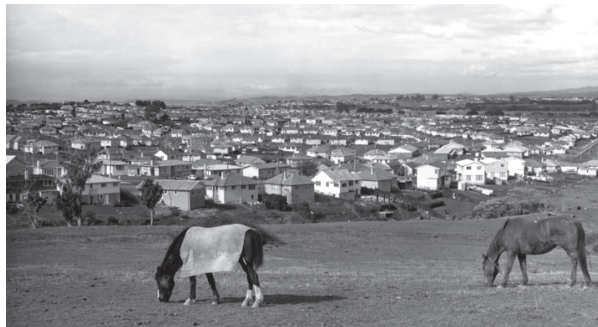

*Looking east over Glen Innes state housing with horses in a paddock in the foreground (National Publicity Studios, date unknown)*


*Glen Innes, Auckland. Including Pilkington Road and Talbot Park state housing blocks to the right. (Whites Aviation, 1965)*


*Glen innes 1959 - areal photo showing development of Glen Innes and Point England. Minimal development in what are now neighbouring suburbs. Interestingly a areal photo from 1940 shows the area was only farm land. (Whites Aviation, 1959)*

### CURRENT SITUATION


*Contemporary photograph of post-war detached state housing (1940-1950) in Glen Innes. Single storey timber weatherboard with hipped tiled roof. (Authors own image, 2014)*
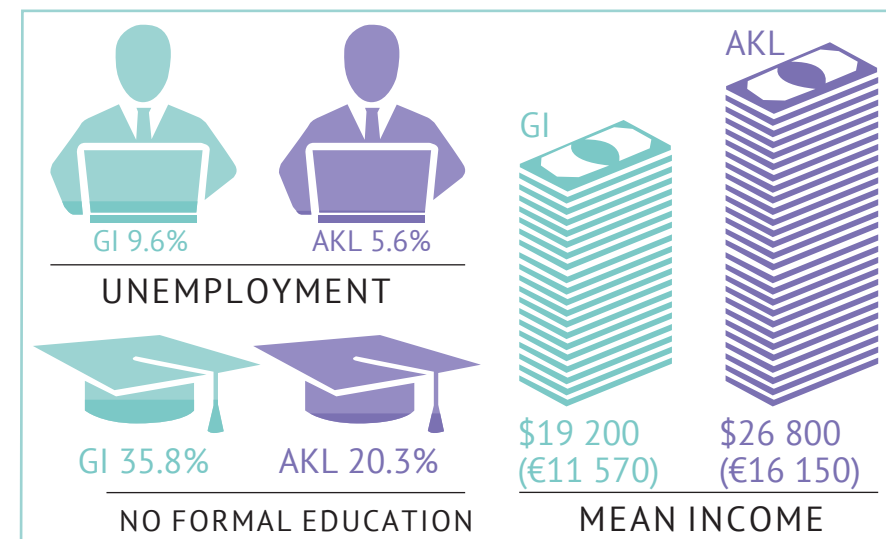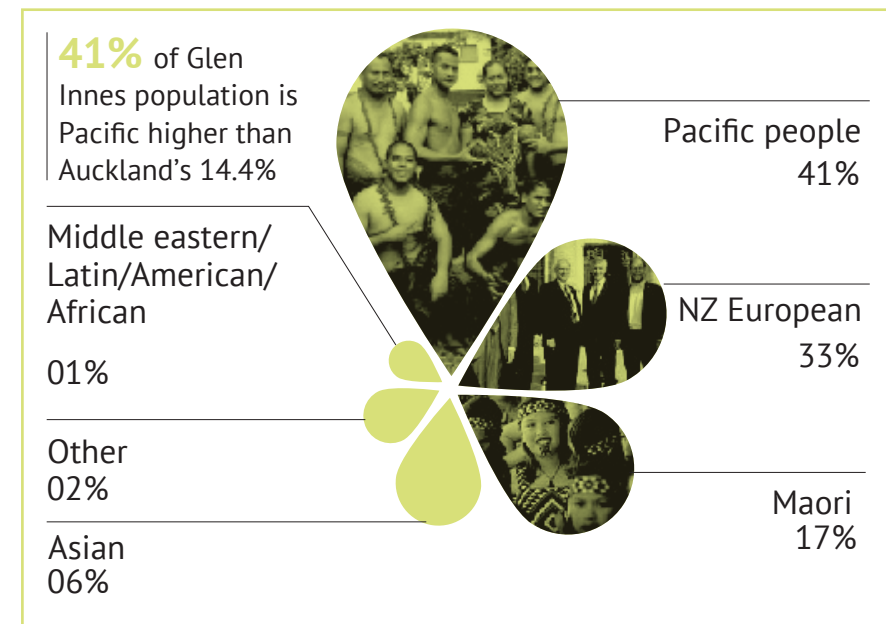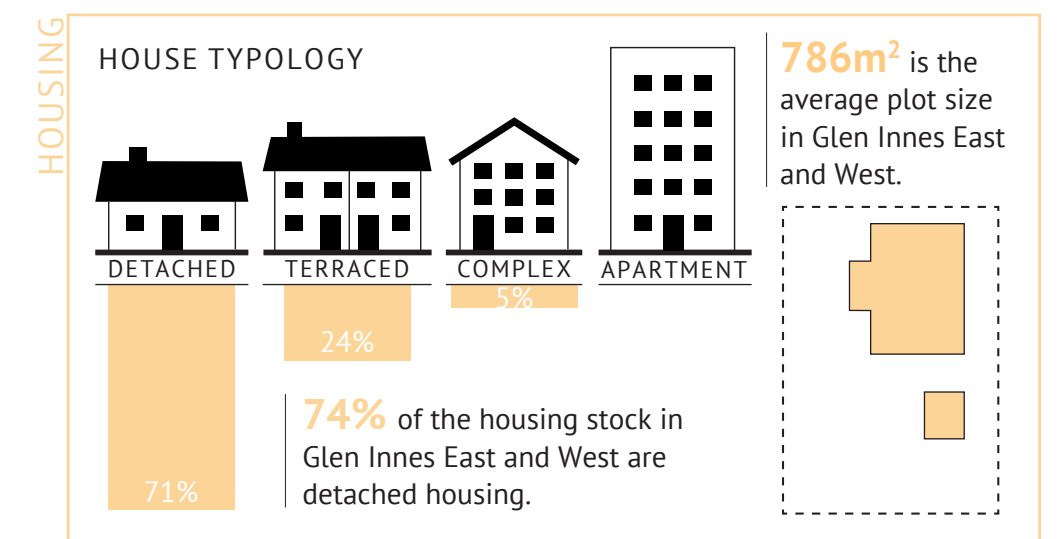

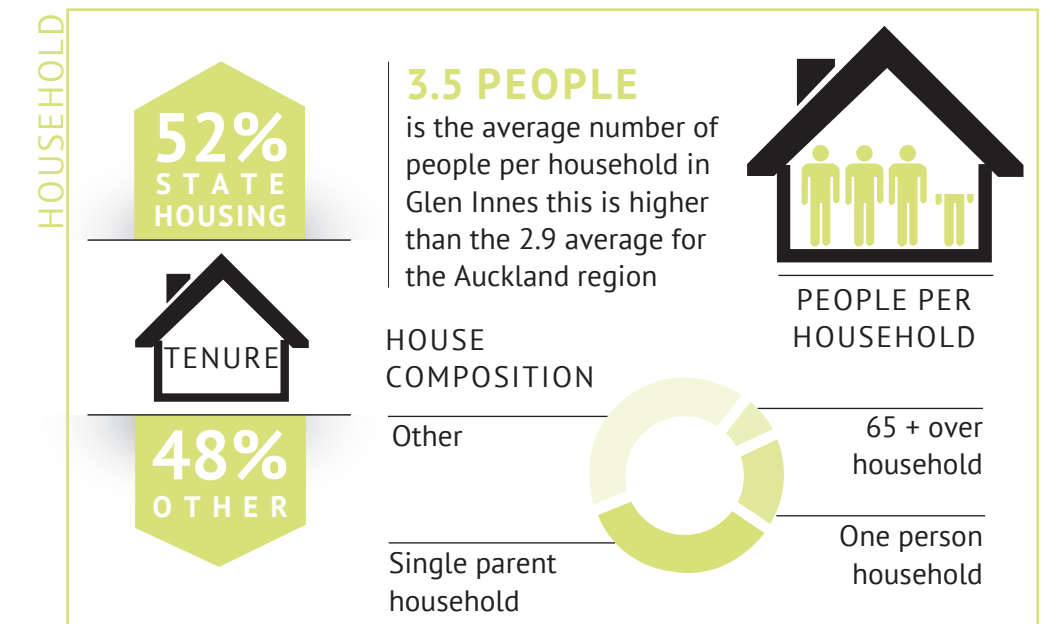*Glen Innes shopping area. (Authors own image, 2014)*


*Contemporary views of public inner-block reserves (green corridors). (Authors own image, 2014)*

### STATISTICS

**ETHNICITY**

**41%** of Glen Innes population is Pacific higher than Auckland's 14.4%

Middle eastern/ Latin/American/ African **01%**

Other **02%**

Asian **06%**

Pacific people **41%**

NZ European **33%**

Maori **17%**

**INCOME + EDUCATION**

GI 9.6%   AKL 5.6%
**UNEMPLOYMENT**

GI 35.8%   AKL 20.3%
**NO FORMAL EDUCATION**

AKL
GI
$19 200 (€11 570)   $26 800 (€16 150)
**MEAN INCOME**

*GI - Glen Innes AKL - Auckland*
*Statistics obtained from Statistics New Zealand's 2006 Census of Population and Dwellings.*

**DENSITY**

**2133** is the combined number of occupied dwellings in Glen Innes East and West. 0.48% of Auckland's housing stock.

**2133**
NUMBER OF DWELLINGS IN GLEN INNES

- *represents 1000 people*

GI DENSITY

**2867.9** *inhabitants per km$^2$* is the density for Glen Innes East and West, higher than the overall average density of 2200 inh/km$^2$ for the Auckland region.

**HOUSEHOLD**

**52% STATE HOUSING**

**48% OTHER**

TENURE

**3.5 PEOPLE** is the average number of people per household in Glen Innes this is higher than the 2.9 average for the Auckland region

PEOPLE PER HOUSEHOLD

HOUSE COMPOSITION

Other

Single parent household

65 + over household

One person household

**HOUSING**

HOUSE TYPOLOGY

DETACHED   TERRACED   COMPLEX   APARTMENT

71%   24%   5%

**786m$^2$** is the average plot size in Glen Innes East and West.

**74%** of the housing stock in Glen Innes East and West are detached housing.

## SWOT Diagram

**WEAKNESSES**
High crime rate
Industrial area
No community facilities
Low education
Low income
High unemployment

**STRENGTHS**
High population density
Community spirit
Some quality buildings
Location
Diverse culture

**THREATS**
Gentrification
Deterioration
Public transport not developed
House over crowding
Lots of single parents + 65 and over
Inhabitants being forced out of their homes

**OPPORTUNITIES**
Demand for more housing
Large plot sizes
Transport connection
Location - Sea views other 'good' suburbs
Large amount of housing owned by NZHC

**INTERNAL FACTORS**
There is a community spirit among state housing tenants and they want to stay in their neighbourhood.

**NEGATIVE FACTORS**
Area perceived as a 'bad' suburb due to large amount of state houses.

**POSITIVE FACTORS**
Large amount of good quality buildings exist.

**EXTERNAL FACTORS**
HNZC wanting to develop the suburb mostly for private sector housing.

Glen Innes is a community that faces many opportunities but also threats.

Currently due to new development by HNZC and its close proximity to sea views and other desirable Auckland suburbs gentrification is a realistic threat.

One major strength is its high population density. Despite the most common building typology being detached housing it has a high population density because of the high number of people per dwelling average. This is a strength but is also a threat because of over crowding and unhealthy living environments.

Many of the weakness are due to the inhabitants and their low education, low income and high unemployment, to stop these becoming threats many social changes need to happen in the community, however this is also an opportunity as there is already an existing sense of community that can be expanded. The existing railway connection to the city give Glen Innes has the opportunity for it's inhabitants to commute to the city centre for work, this increases job opportunities and quality of life.

The high ethnic diversity of the in habitants means there is a need for a diversity of housing both in size and shape but also flexibility for different cultures.

Crime and neglect are also two issues that have occurred because of the inhabitants but also because of poor planning that created unsafe, unused, neglected areas. To have a safer suburb these areas need to be developed.

## 3.3 NAENAE
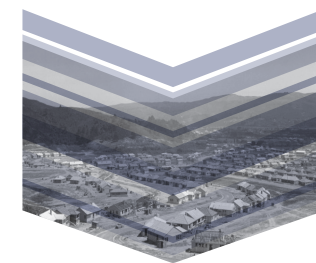
After World War II in 1945 under the Labour government, Peter Fraser chose Naenae as an ideal site to become a new state housing 'designer community'.

It was planned to be a model suburb where a suburban state housing estate would support a reasonable shopping centre, which would serve as a social hub for the area. The plan hoped nuclear family life could thrive in such an environment. Due to the high demand for housing, the shopping centre was only partially realized. Plischke's design for the Naenae community centre was 'based on Venice's social nexus, San Marco Square. [...] [He] hoped his scheme would become an equally buzzy and vibrant living space' (Schrader, 2005).

Although a strong sense of community was evidently forged in Naenae, it did not evolve as its planners had intended (Schrader, 2005). With non-existent footpaths, unpaved streets, and unfenced front gardens that were unsafe for children and devoid of trees, plants, and lawns, many people were brought together through common adversity resulting from the conditions of their new suburban environment. 'Today the suburb of Naenae houses a population who are some of the most deprived in the country and the centre reflects the associated social and economic problems' (Bowman, 2008). Despite this, it was evident from the case study that a sense of community still exists in Naenae, even with their strong social and cultural diversification. There are many areas within Naenae that are obviously brimming with pride and community spirit.

Naenae was a pilot area for a Neighbourhood Policing team in 2012 due to the high crime.


*Jutland Street, Naenae, circa 1945. Interestingly, one of the state houses is modernist in style, contrasting the neighbouring English cottage designs state houses. (Archives New Zealand, 1945)*


*Hillary Court opened in 1954 and was New Zealand's first pedestrian shopping mall. It occupies the site of Plischke's unrealised community centre and is consequently the focal point of Naenae (Hutt City Libraries, Heritage Centre Collection, date unknown).*


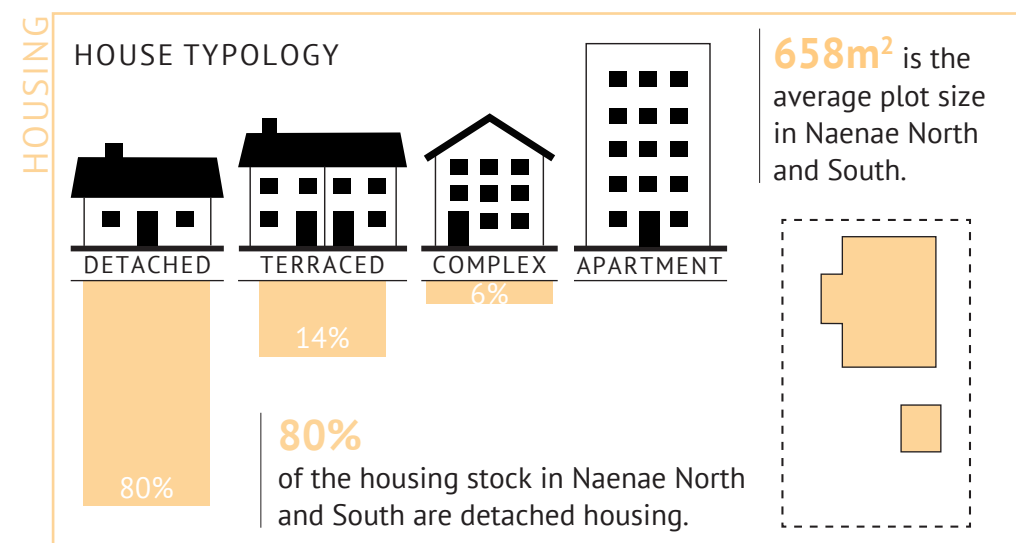*Naenae state housing suburb (Alexander Turnbull Library, circa 1940).*
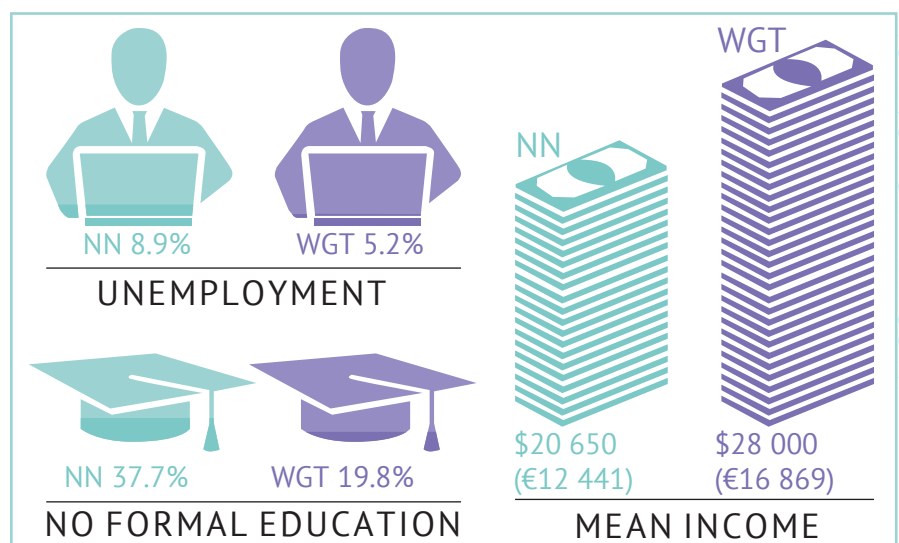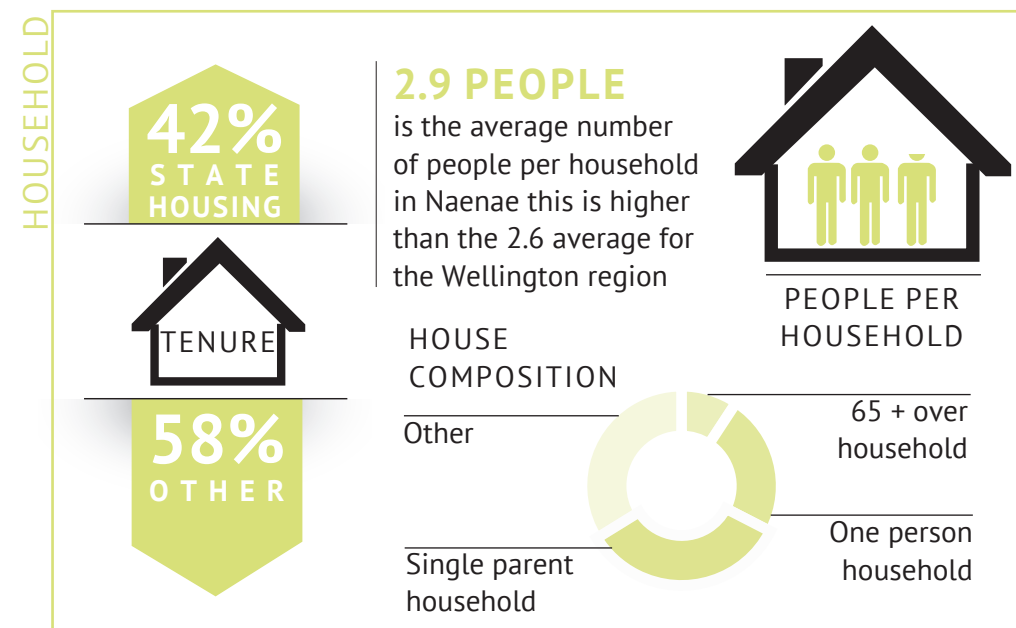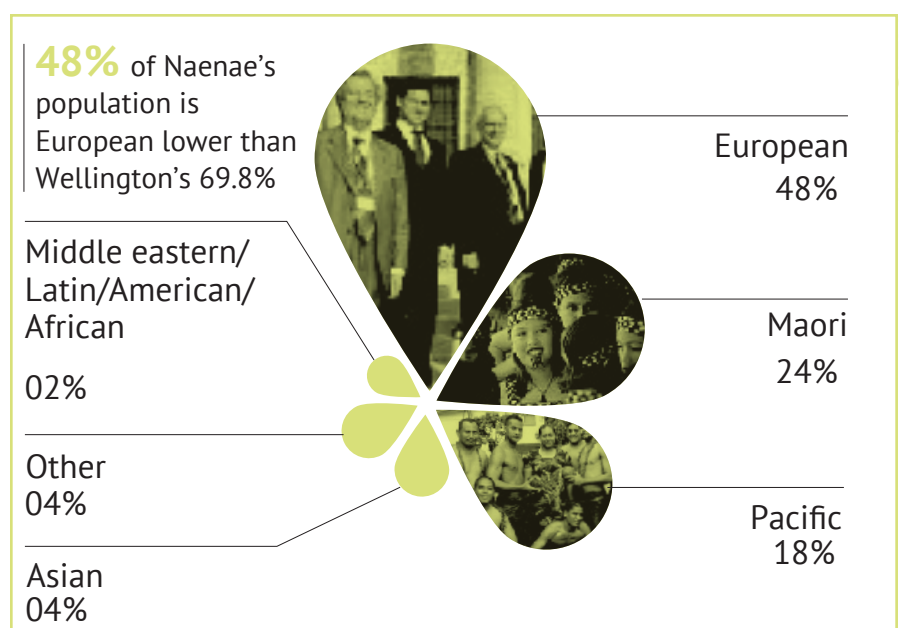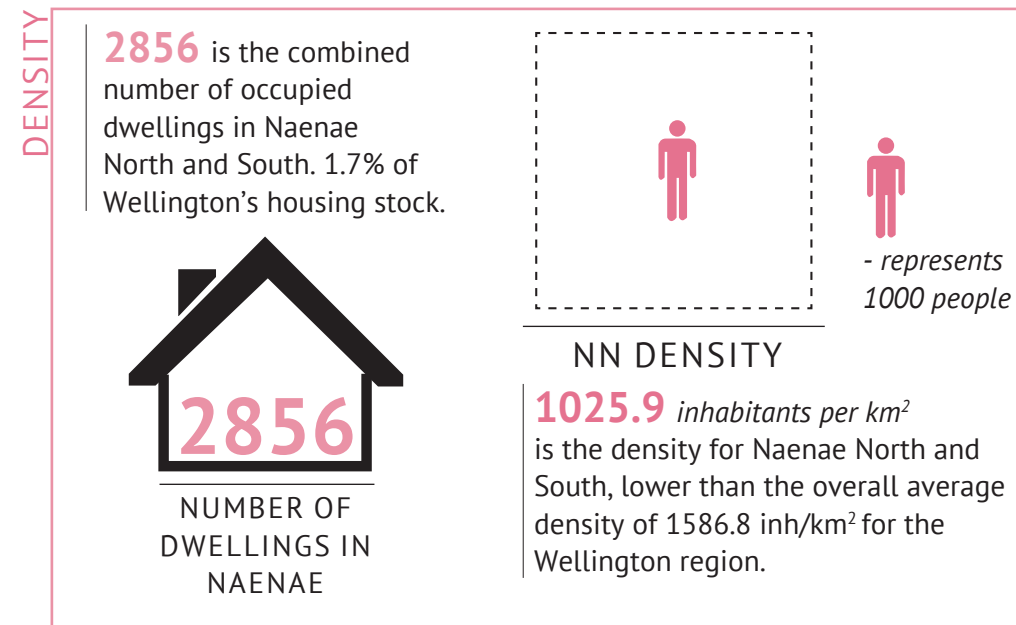
*Contemporary photograph of state housing. An interesting original feature of Naenae is that the telephone poles were located at the rear of sections resulting in a much tidier streetscape. (Arps, 2012).*


*Contemporary photograph of Hillary Court following recent urban design intervention. A community library is located at the far end while other community and recreational facilities, including an Olympic swimming pool, are located nearby. (Arps, 2012).*


*Contemporary views of public inner-block reserves (green corridors) within Naenae and Epuni. Underutilised, unstructured, and unsafe, they can be seen to be poor remnants of earlier planning. (Arps, 2012).*

## DENSITY

**2856** is the combined number of occupied dwellings in Naenae North and South. 1.7% of Wellington's housing stock.

- *represents 1000 people*

### NN DENSITY

**2856**

NUMBER OF DWELLINGS IN NAENAE

**1025.9** *inhabitants per km²* is the density for Naenae North and South, lower than the overall average density of 1586.8 inh/km² for the Wellington region.

## ETHNICITY

**48%** of Naenae's population is European lower than Wellington's 69.8%

European 48%

Middle eastern/ Latin/American/ African 02%

Maori 24%

Other 04%

Pacific 18%

Asian 04%

## HOUSEHOLD

**42% STATE HOUSING**

TENURE

**58% OTHER**

**2.9 PEOPLE** is the average number of people per household in Naenae this is higher than the 2.6 average for the Wellington region

PEOPLE PER HOUSEHOLD

HOUSE COMPOSITION

Other

65 + over household

One person household

Single parent household

## INCOME + EDUCATION

NN 8.9% WGT 5.2%

UNEMPLOYMENT

NN 37.7% WGT 19.8%

NO FORMAL EDUCATION

WGT

NN

$20 650 (€12 441)

$28 000 (€16 869)

MEAN INCOME

## HOUSING

HOUSE TYPOLOGY

DETACHED 80%

TERRACED 14%

COMPLEX 6%

APARTMENT

**658m²** is the average plot size in Naenae North and South.

**80%** of the housing stock in Naenae North and South are detached housing.

*NN - Naenae WGT - Wellington*
*Statistics obtained from Statistics New Zealand's 2006 Census of Population and Dwellings.*

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FINDINGS

**INTERNAL FACTORS**
Aging and stagnant population doesn't encourage growth

**NEGATIVE FACTORS**
Increase of migrants who are not catered for in terms of housing or community facilities

**WEAKNESSES**
High crime rate
Industrial area
Low population density
Low education
Low income
High unemployment

**STRENGTHS**
Some quality buildings
Location
Recent improvement to commercial area
Areas of pride
Community spirit for some areas
Olympic pool complex

**THREATS**
Deterioration
Single user group
Lots of single parents + 65 and over
Elderly dying and being replaced with immigrants
Stagnant population

**OPPORTUNITIES**
Large plot sizes
Transport connection
Location to Lower Hutt
Large amount of housing owned by NZHC
Changing tenant type
New crime prevention

**POSITIVE FACTORS**
Existing sense of community and pride

**EXTERNAL FACTORS**
Crime prevention pilots creating a safe community

A lot of the issues Naenae face are from the original planning and that there was no consideration of the context and users. This lack on contextual consideration resulted in spaces that were not used and spaces that were required but not provided. This shows how important it is to consider the context and design for the users. However, New Zealand is a young country with a constantly changing demographic and therefore new design solutions need to be flexible to accommodate for these changes to ensure the longevity of the area and the buildings.

Like many other state housing communities crime in Naenae is a big problem because of the lack of community facilities and the uneducated low income inhabitants. While new crime prevention pilots have been implemented by the police, these will only succeed if the are supported by the community facilities. It can be seen that the areas that are looked after and maintained are those with the most community involvement.

In order to get the community to respect and look after it, there needs to be a sense of ownership and responsibility over certain areas. The green belts in Naenae show how this has been unsuccessful. They do not serve a specific purpose and therefore do not have a particular user and left unused and unsafe. While they are flexible in ways that they do not provide and specific function they also create an environment where people are not sure if they are allowed or how to use it.
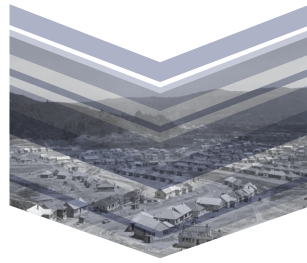
In the 18th and 19th centuries, textile mills and coal mining were important; in the early 19th century shipbuilding emerged as Govan's principal industry. In 1864, Govan gained borough status and was Scotland's fifth largest burgh. It was incorporated into the city of Glasgow in 1912 (Manly, 2012). However, the people of Govan often proclaim to be Govanites first and Glaswegians second.

19th century shipbuilding emerged as Govan's principal industry. In recent years, the decline of shipbuilding meant that the main industry in the area was winding down. This has defined the district, and not in a good way. More recently Govan has come a long way partly due to the opening of the Transport Museum and the construction of a new hospital complex. After shipbuilding drastically decreased, subsequent remedial approaches followed with a 'top down' approach to solving problems, distributing funding and maintaining housing. Housing maintenance spiralled out of control along with social problems. A large number of housing in Govan is council housing or social housing. The low economic band of the inhabitants has made turning the area around more of a challenge.

The tenement houses (mostly council/social housing) is only standing as an asset today because of the community in the 1970s. When inhabitants were told they were going to tear them down because they did not have the modern amenities – they still have to go outside to use toilet blocks – they rallied together and were the driving force to get toilets implemented in the buildings. It is the community involvement which save the iconic sandstone tenements which are still standing today.



*Back side of social housing tenement houses in Govan showing the air raid shelters and peoples washing (RCAHMS, 1930).*



*Back side of social housing tenement blocks. Recently refurbished visible through new timber to the brick facade and new windows (Google Street view, 2014).*
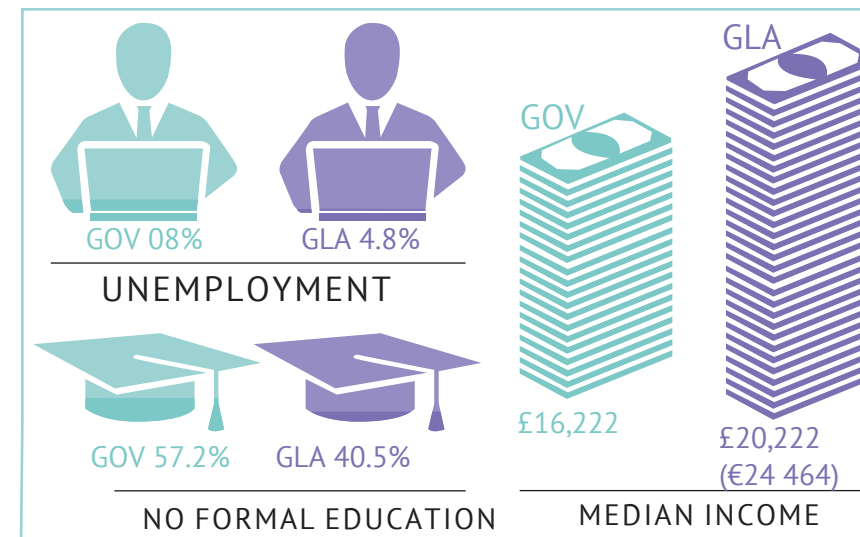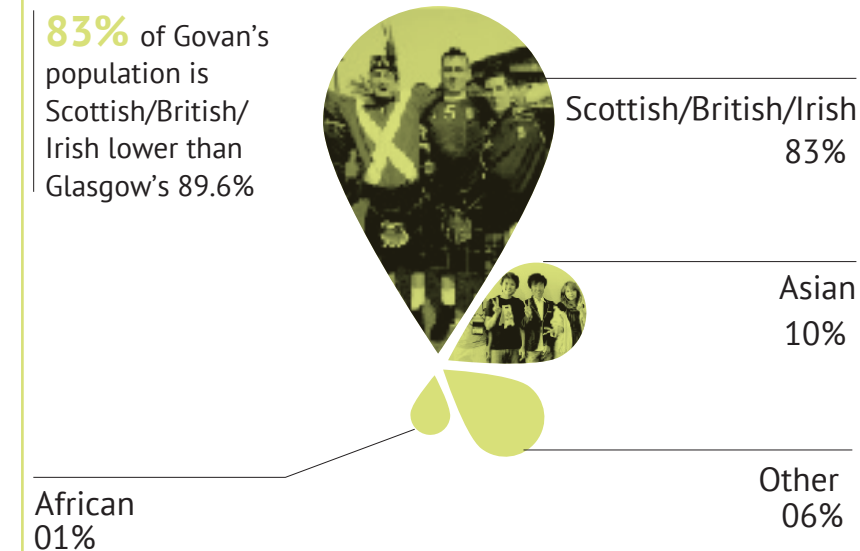


*Tenement housing on Ballater Street, Govan with shop on the ground floor and apartments on the upper levels (Hume - Canmore, date unknown)*



*New housing development that responds to the existing old tenements that are evident in Govan (Google Street view, 2014).*



*Govan, general view, showing Meadowside Granary and Upper Clyde Shipbuilding Yard. Oblique aerial photograph taken facing north showing rows of tenement housing (RCAHMS, 1936).*



*Contemporary photograph of refurbished tenement houses in Govan. Taken from the other side of the River Clyde. (Authors own image, 2014).*
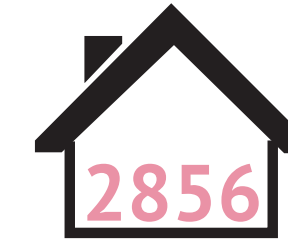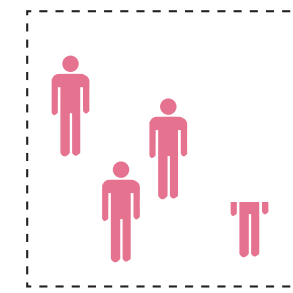
## DENSITY

**2856** is the number of occupied dwellings in the selected area of study in Govan. 01% of Glasgow's housing stock.

**2856**
NUMBER OF DWELLINGS IN GOVAN

GOV DENSITY

*- represents 1000 people*

**3562** *inhabitants per km²* is the density for Govan, lower than the overall average density of 3888.8 inh/km² for the Glasgow region.

## ETHNICITY

**83%** of Govan's population is Scottish/British/Irish lower than Glasgow's 89.6%

Scottish/British/Irish 83%

Asian 10%

Other 06%

African 01%

## HOUSEHOLD

**43% SOCIAL HOUSING**
TENURE
**57% OTHER**

**1.9 PEOPLE** is the average number of people per household in Govan this is lower than the 2.1 average for the Glasgow region.

PEOPLE PER HOUSEHOLD

HOUSE COMPOSITION
Other 26
Single parent household 14%
65 + over household 17
One person household 43

## INCOME + EDUCATION

GOV 08%    GLA 4.8%
UNEMPLOYMENT

GLA
GOV

GOV 57.2%    GLA 40.5%
NO FORMAL EDUCATION

£16,222    £20,222 (€24 464)
MEDIAN INCOME

## HOUSING

HOUSE TYPOLOGY

DETACHED 1.5%    TERRACED 15.8%    COMPLEX + APARTMENT

**82.7%** of the housing stock in Govan are flats, complexes or apartment type housing.

82.7%

*GOV - Govan GLA - Glasgow*
*Statistics obtained from Scottish Neighbourhood Statistics 2013*

## WEAKNESSES

High crime rate
Industrial area
No community facilities
Low education
Low income
High unemployment
No cultural diversity

**INTERNAL FACTORS**
There is a big community spirit that wants change.

**NEGATIVE FACTORS**
Crime is a big problem and there is a bad perception of the area.

## STRENGTHS

High population density
Community spirit
Some quality buildings
Location
Connection to city centre
History and culture

## THREATS

Gentrification
Deterioration
Lots of single parents + 65 and over
Crime increases
Community doesn't come together

## OPPORTUNITIES

Demand for more community facilities
Transport connection
Location - water views, other 'good' suburbs + land marks
Large amount of housing owned by council etc.

**POSITIVE FACTORS**
There is good existing resources and they are being utilised.

**EXTERNAL FACTORS**
Redevelopment in neighbouring areas are encouraging the redevelopment in Govan.

Govan has the reputation of being one of the most dangerous and crime riddled areas in Glasgow. Organisations and the community are working together to develop Govan out of this stereotype. The way in which they have chosen to move forward, making the most of the community spirit and the good resources they have is a smart and practical way of doing this as it means there is a lot of community involvement. Organisations are striving to build hundreds of new homes to help ease the affordable housing shortage. This is a community that for many years has been social or working housing and it is ingrained into their way of life. In many

ways the district has secluded themselves from Glasgow and consider themselves their own 'city' rather than belonging or identifying with Glasgow. This does make future development difficult as it is more difficult to bring new people and cultures into an existing tight-knit community. By building high quality housing they are making it more desirable to live in Govan and are in tern helping to expand the area from being a single user group.

The majority of housing is tenement housing which ranges from three to five storey apartment blocks, it provides the highest population density out of

all of the case studies. Interestingly while Govan's inhabitants are a dominant single ethnic group - Scottish/British/Irish. There are many subcultures within this. For example the two football in teams in Glasgow have such devoted supporters people are very often stabbed for wearing the wrong football colours in the wrong neighbourhoods. Issues like this are not often considered but have a huge impact on the success of a community.

# 3.5
## AUGUSTENBORG
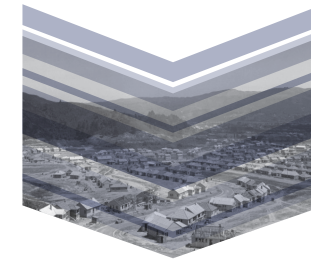
Augustenborg is a suburb well know to all residents in Malmö. Many have either lived in the area or drive past it along one of the busy streets that surround it. Augusenborg was built between 1948-1952 and is one of MKB's largest residential areas with over 1600 public housing apartments.

Augustenborg is an early example of "neighbourhood planning". Within their small community area, it was planned that they would have all the facilities and services they would need.

Included in this was a large number of shops, a centre, numerous recreational facilities, schools, central laundry, cinema, it's own fire department - all at close range. When Augustenborg opened in 1952, it strived to blur the class boundaries, preventing different social classes being divided around the city. For the initial years this was successful, many of the residents were workers and employees with a stable salary. Over the years, these tenants moved to larger homes in more attractive parts of the city. New groups moved into the area and with them came many social problems (Aunér, 2009).

As the population aged and children became older, it was evident that employment for youth was missing, it was not any longer about 'meaningful leisure'.

As the area started to change residents became to feel insecure. The turnover of tenants was increasing and by the 1990s, it was evident changes were required. In recent years that changes have been made and Augustenborg is now a sustainable city district.

**HISTORY**


*Road parallel to Augustenborg. Different sized apartments has been seen with off street parking. The apartments are large masses (Håkansson, 1960).*


*Apartment block in Augustenborg not long after completion in the 1950s. Each apartment block is the same in aesthetics and size (Bilderisyd, 1965).*


*The construction of Augustenborg in the 1950s. Many 'L-shaped' apartment blocks can be seen with green courtyard between (Rubin, 1949).*

**CURRENT SITUATION**


*Contemporary photograph of Augustenborg, the apartments still look very similar to when they were constructed (Authors own image, 2014).*
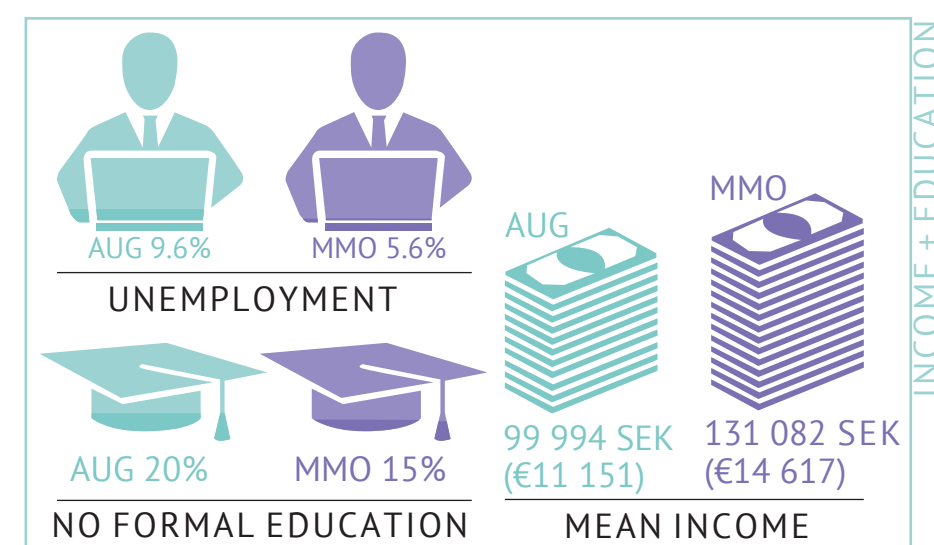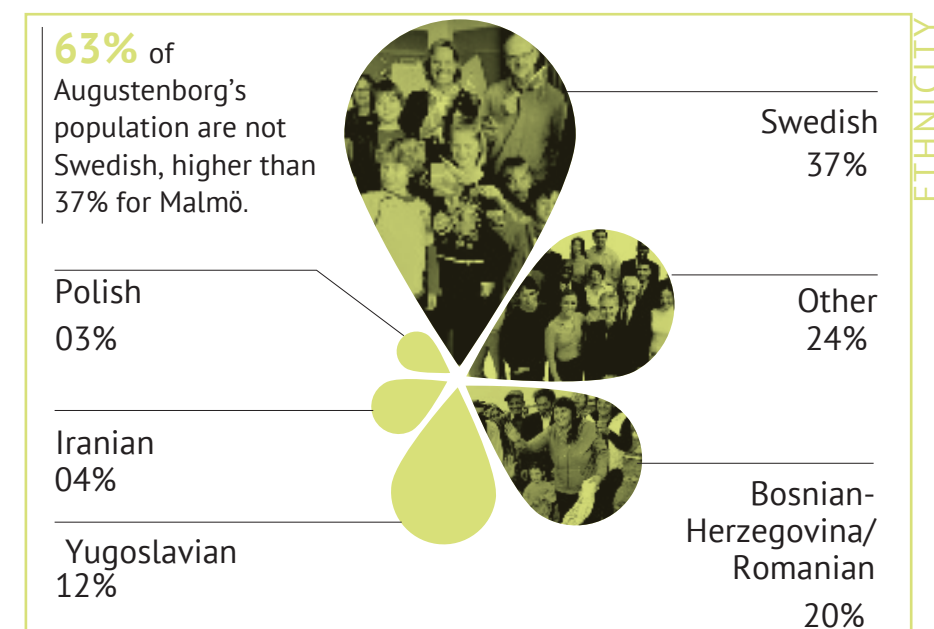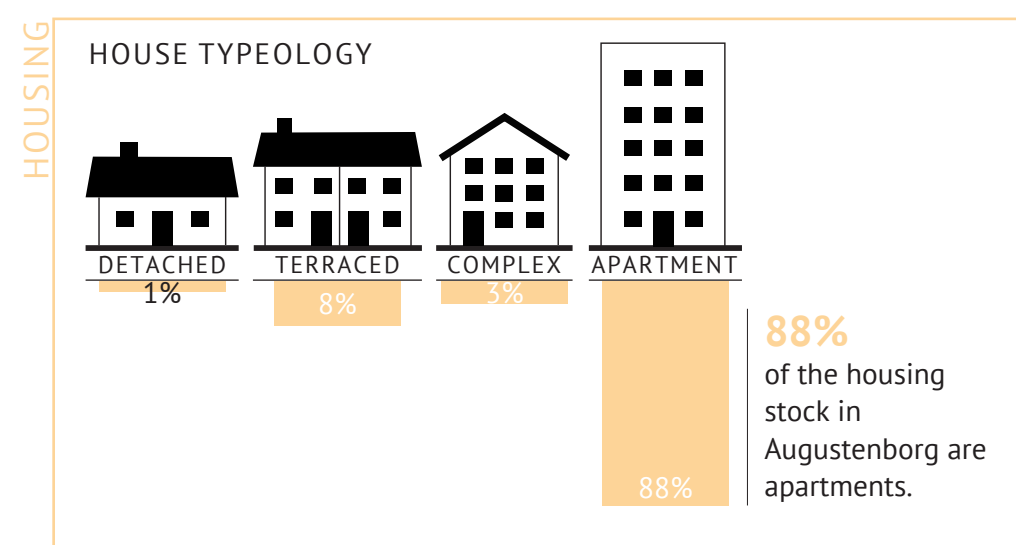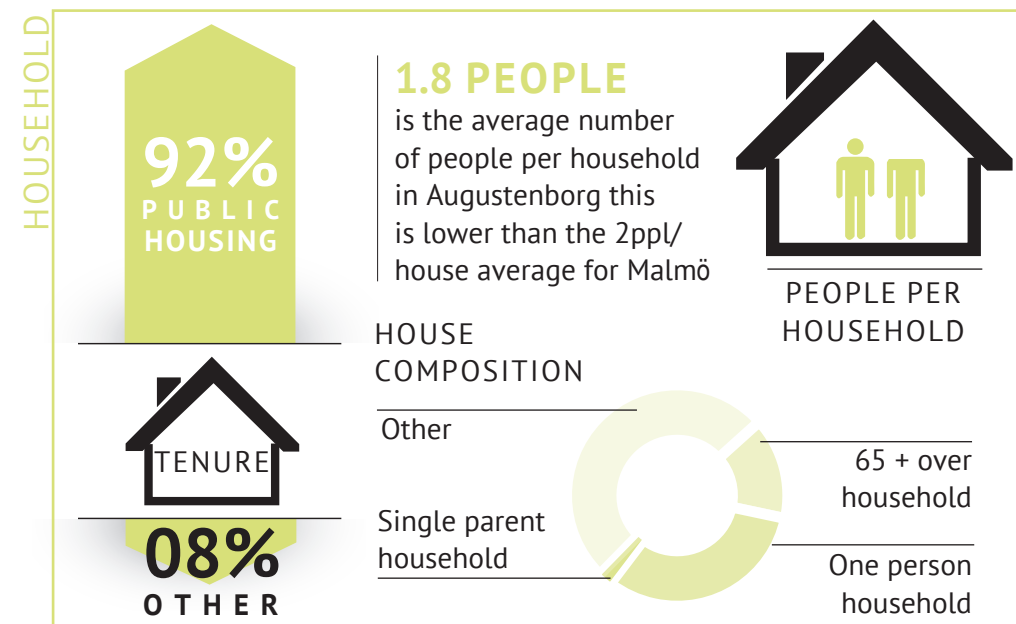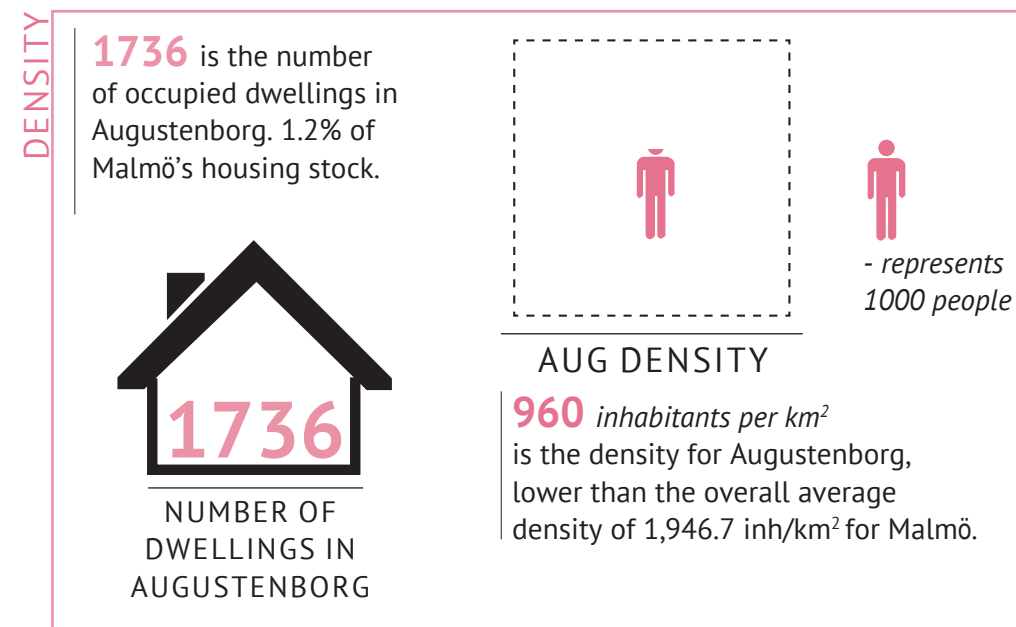

*Contemporary photograph of water management (open water channels and water gardens) and green spaces between apartment in Augustenborg (Authors own image, 2014).*


*Contemporary photograph of apartment blocks and new recycling centres in the courtyard of the apartment blocks - notice its green roof (Authors own image, 2014)*
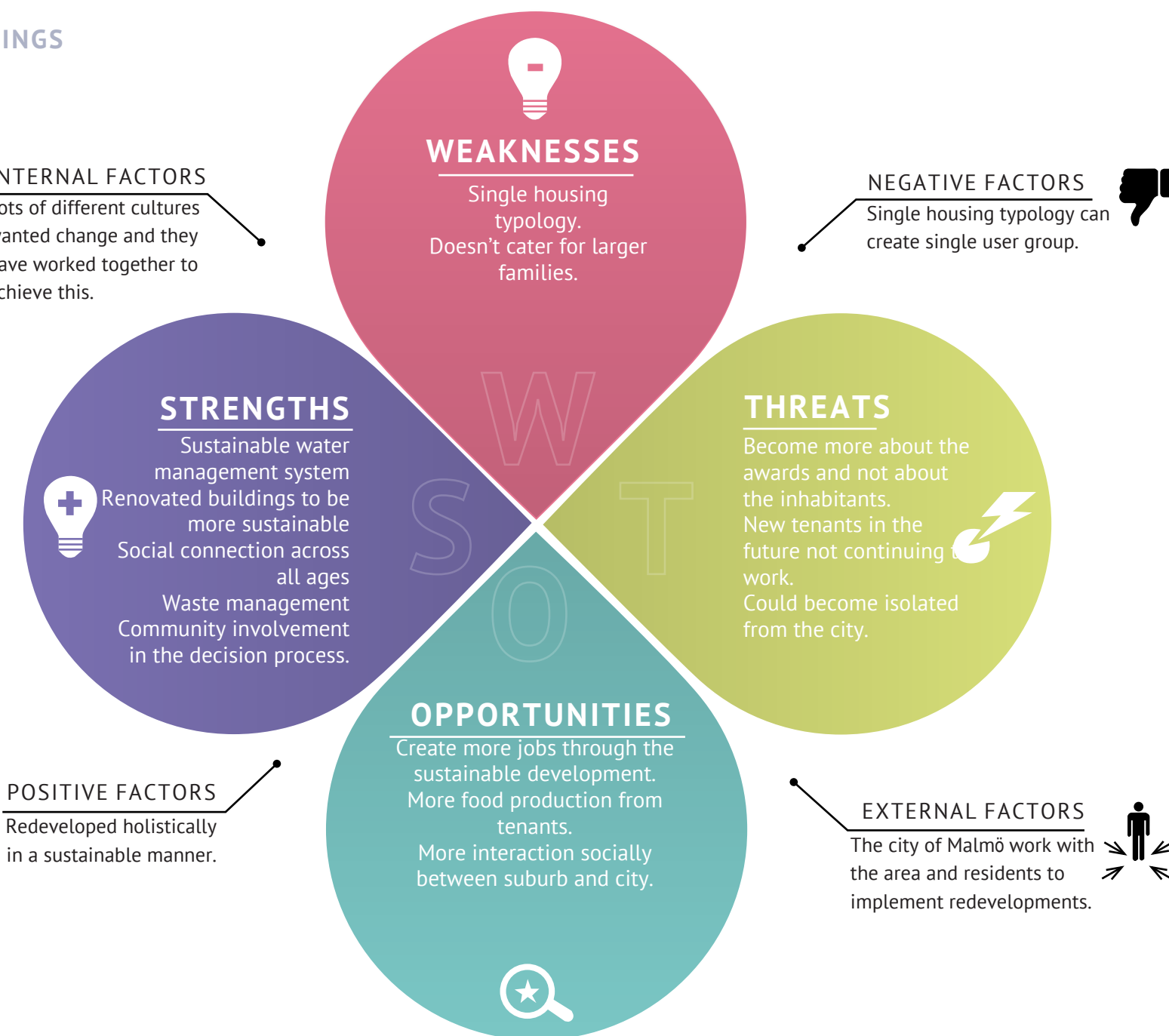
## DENSITY

**1736** is the number of occupied dwellings in Augustenborg. 1.2% of Malmö's housing stock.

*- represents 1000 people*

### AUG DENSITY

**1736**

NUMBER OF DWELLINGS IN AUGUSTENBORG

**960** *inhabitants per km²* is the density for Augustenborg, lower than the overall average density of 1,946.7 inh/km² for Malmö.

## ETHNICITY

**63%** of Augustenborg's population are not Swedish, higher than 37% for Malmö.

Swedish 37%

Polish 03%

Other 24%

Iranian 04%

Bosnian-Herzegovina/ Romanian 20%

Yugoslavian 12%

## HOUSEHOLD

**92%**
PUBLIC HOUSING

**1.8 PEOPLE** is the average number of people per household in Augustenborg this is lower than the 2ppl/ house average for Malmö

PEOPLE PER HOUSEHOLD

HOUSE COMPOSITION

TENURE

**08%**
OTHER

Other

Single parent household

65 + over household

One person household

## INCOME + EDUCATION

AUG 9.6%   MMO 5.6%

UNEMPLOYMENT

AUG 20%   MMO 15%

NO FORMAL EDUCATION

AUG   MMO

99 994 SEK (€11 151)   131 082 SEK (€14 617)

MEAN INCOME

## HOUSING

HOUSE TYPEOLOGY

DETACHED 1%   TERRACED 8%   COMPLEX 3%   APARTMENT

**88%** of the housing stock in Augustenborg are apartments.

88%

*AUG - Augustenborg MMO - Malmö*
*Statistics obtained from Avdelningen för Strategisk utveckling, Malmö Stadskontor 2008-Områdesfakta.*

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**INTERNAL FACTORS**
Lots of different cultures wanted change and they have worked together to achieve this.

**WEAKNESSES**
Single housing typology.
Doesn't cater for larger families.

**NEGATIVE FACTORS**
Single housing typology can create single user group.

**STRENGTHS**
Sustainable water management system
Renovated buildings to be more sustainable
Social connection across all ages
Waste management
Community involvement in the decision process.

**THREATS**
Become more about the awards and not about the inhabitants.
New tenants in the future not continuing work.
Could become isolated from the city.

**OPPORTUNITIES**
Create more jobs through the sustainable development.
More food production from tenants.
More interaction socially between suburb and city.

**POSITIVE FACTORS**
Redeveloped holistically in a sustainable manner.

**EXTERNAL FACTORS**
The city of Malmö work with the area and residents to implement redevelopments.

Augustenborg is an example of how public housing/ state housing neighbourhoods can be redeveloped successfully so that the community is involved and their neighbourhood is indistinguishable from private sector neighbourhoods. They have taken two problems they had; flooding and social issues and turned both of them into new features that enhance the area. The problem of flooding was address by creating visually appealing sustainable systems that enhance the aesthetics of the entire area in combination with green roofs that has transformed the neighbourhood creating jobs, education, getting recognition through awards and being a showcase redevelopment all on top of solving the original issue of flooding.

To improve the area and its sustainability the used the inhabitants input and involved them in the process. This not only helped solve some of the social issues and brought the community together it also helped develop a stronger and more successful design. Bring the community together for this also acted as a platform for more social improvements to happen. Now the community feels like they have more responsibility for their community and have implemented many social changes the include many cultures and age groups.

Creating an overall more sustainable neighbourhood was one of the driving forces for this redevelopment and including it early on in the process as well as community input is evident in the success of the project.
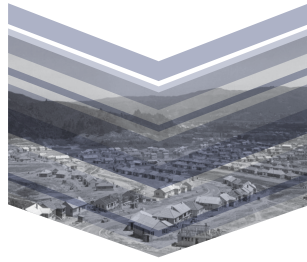
By comparing these four different case studies conclusions can be drawn and lessons learnt from each country's and city's approach to their state housing. There are many similarities and differences between each case study and it is these findings help form well thought-out design guidelines.

They all dealt with different cultures and contexts however it was clear with each case study that there was a key theme to the issues or success of the area. The four themes taken from the case studies are:
• Culture
• Design and context
• Community
• Sustainability

The different cultures in Glen Innes is very important and it has not been integrated into planning or houses so far, to have successful neighbourhoods in the future this needs more considerations like in Govan. Govan is only dealing with one main ethnic groups, but they do have to consider different cultures within that and through throughout community involvement in redefining their identity they are succeeding.

It is evident in Naenae how important design that considers the context is. If it had been planned for a New Zealand town rather than a Venetian town there may have been more success in the project. Understanding the place and people is key to creating a successful design.

Community refers to: sense of community, community involvement and the actual community and its assets. Govan deteriorated after the industries stopped, they realised that their strengths were their community and community spirit - even if it was coming together for bad things, the existing building and their heritage. Using these for the driving force they

have started turning their district around in a holistic manner.

Sustainability refers to environmental, social, financial and cultural sustainability. Augustenborg has manage to redevelop what was a problem public housing neighbourhood into a thriving public housing neighbourhood that functions sustainably across all four sections. By including all of these elements in early stages of the design process and using it as a driving force for the design they have managed to develop a very successful and functioning neighbourhood for people in need.

Each suburb fails and succeeds in different ways but

lessons can be learnt from all of them to help inform design strategies in part 5 and to create a more holistically sustainable final in-depth design in part 6. This understanding of how Glen Innes sits within the context of other state housing communities has been crucial in forming strategies for future development to insure that it is the most sympathetic and understanding design approach for the location and inhabitants.

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## 3.7 LESSONS LEARNT FOR DESIGN

### 3.2 - GLEN INNES
• New development shouldn't push existing tenants out.
• New development should involve more community engagement.
• Crime prevention should be incorporated into the planning.
• Different cultures should be catered for.
• Sustainable connections to public transport should be encouraged.
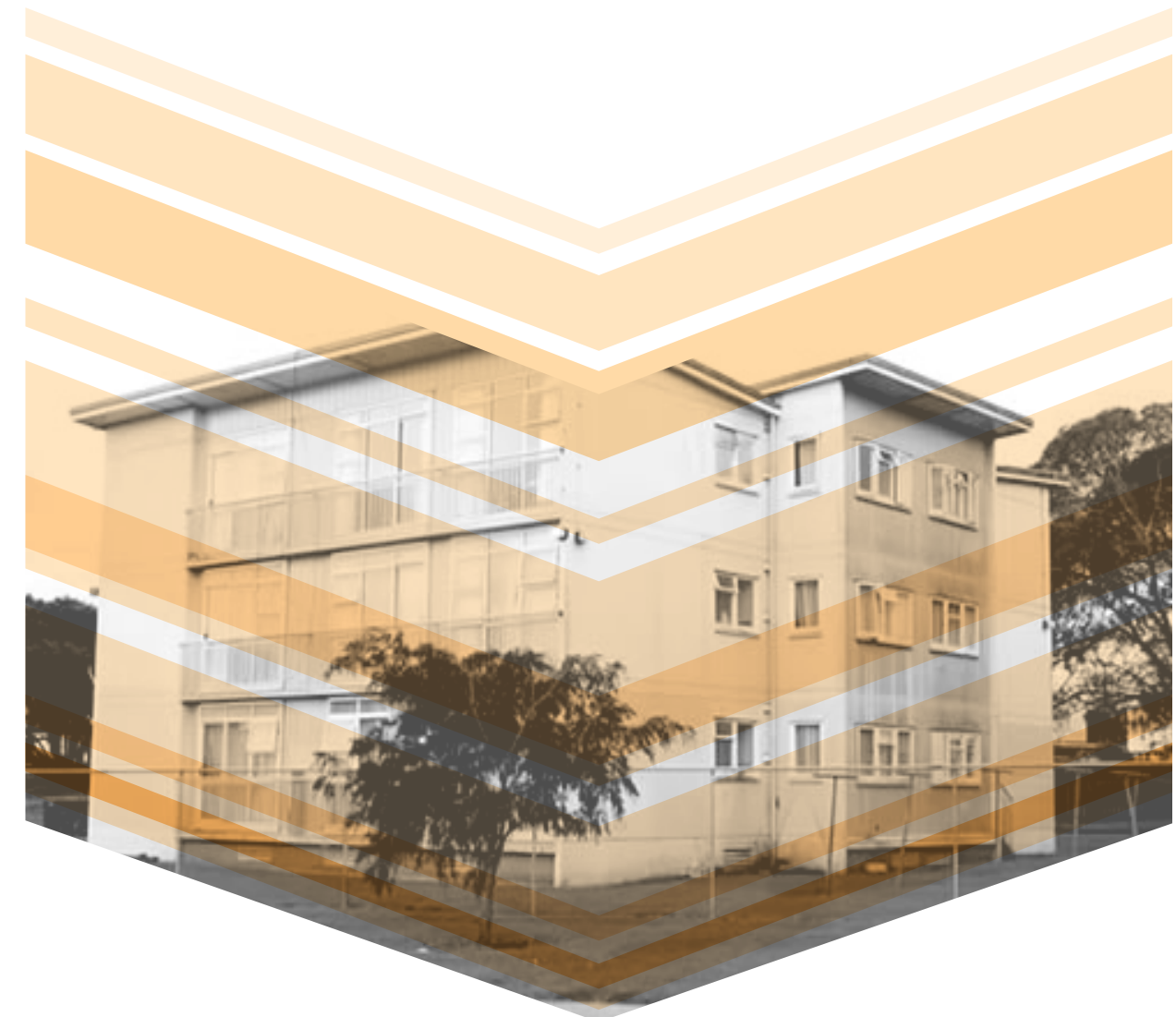• High population density can be achieved with detached housing.

### 3.3 NAENAE
• Ownership over areas to give a sense of responsibility.
• Community involvement is needed.
• Planning and implementation of entire master plans is important.
• The consideration of context and the user.
• Forward thinking.

### 3.4 - GOVAN
• Culture should be utilised to make neighbourhoods unique and interesting.
• There is a choice to take the best out of a bad history and highlight it or turn your back and pretend it didn't happen.
• Use the assets and resources that have been inherited.
• Community involvement can reawaken the soul of a place.
• Community established what the identity of a place can be.
• If the community is involved there are less protest about development.
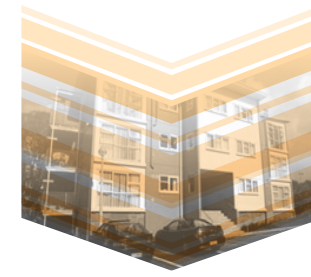
### 3.4 - AUGUSTENBORG
• Sustainability should be implemented in a holistic manner.
• Community involvement is important.
• Redevelopment can create permanent jobs and education.
• Redevelopment should thrive for the best not just band-aids.
• Sustainability can be implemented creatively.
• Utilise issues as a driving force for solutions.
• Sustainability should be integrated from the start of the design process not stuck on after.

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▶ PART FOUR.

CONTINUING FROM PART THREE THIS SECTION ANALYSES AND COMPARES DIFFERENT PLANNING, RETROFIT AND NEW BUILD REDEVELOPMENT EXAMPLES.

## GLEN INNES
### AUCKLAND
### NEW ZEALAND

The Northern Glen Innes housing redevelopment project aims to provide more houses and healthier homes, for a growing Auckland.

Creating Communities has contracted to buy and redevelop 156 existing sites from Housing New Zealand. Most housing, though, will be free-standing. Less than 50 homes (15%) of the proposed housing to be terrace housing.

## LILYFIELD
### SYDNEY
### AUSTRALIA

Lilyfield redevelopment project was the first multi-unit residential project in Australia to be awarded a 5 star Green Star rating and the first social housing scheme in Australia to gain a Green Star rating.

Lilyfield redevelopment project involved the demolition of 40 low rise residential dwellings and the construction of an 88 dwelling multi unit housing facility.

## GOVAN
### GLASGOW
### SCOTLAND

Building new housing and improving the quality and desirability of the existing housing are the two actions that form the back bone of the Central Govan Action Plan.

Together, these interventions are breathing new life into the town centre and attracting more people back to live in the community. There is a combination of new build, retrofit and urban redevelopment.

## AUGUSTENBORG
### MALMö
### SWEDEN

In 1998, the Augustenborg residential area faced social and economic problems as well as physical degradation of buildings and outdoor areas.

Green roofs and increased green areas played an important part in the refurbishment, as the area suffered from problems with flooding during heavy rains.

# 4.1
## INTRODUCTION

Redevelopment projects can be small or large ranging from a single building to entire new neighbourhoods. Some redevelopment projects have been incredibly controversial. Controversy usually results either from the use of eminent domain, from objections to the change in use or increases in density and intensity on the site or from disagreement on the appropriate use of tax-payer funds to pay for some element of the project. The redevelopment in Glen Innes North is one that has caused a large amount of controversy. The controversy is over state housing tenants being forced to move from their homes (some elderly have been in their state home for 50 years) in order to create this new development which will be mostly for the private sector gentrifying the area. The redevelopment its self does not seem to improve the community enough to outweigh the hardship it causes to people already in need.

This part examines and compares three different 'state housing' redevelopment design (excluding Glen Innes) that have recently been implemented in three different areas. The examination and comparison of these different redevelopments is important for three reasons. Firstly there is no other large state housing redevelopments in New Zealand at the present time, so it is not possible to make comparisons. Also because of how isolated New Zealand is, often thinking and design in very inward and not always the most successful solution. Secondly the state housing redevelopment comparisons are a continuation from part three where the suburbs as a whole were analysed. Thirdly this thesis aims to illustrate an alternative redevelopment in Glen Innes and therefore there are many conclusions and findings that can be found by examining and comparing these examples.

The way in which this part is structured is that it provides an overview of each redevelopment project and then each project is compared to the redevelopment of Glen Innes on three different levels. On a planning level Augustenborg highlights the lacking of sustainable consideration in Glen Innes. The comparison of the retrofit in Glen Innes and in Govan illustrates how retrofitting can we done in a way that modernises the buildings technology as well as aesthetics. Thirdly as there is no redevelopment in Naenae, Lilyfield in Sydney, Australia has been chosen to compare how new build redevelopment can be sustainable and creative. These comparisons will illustrate different things that can be learnt for the existing redevelopment in order to make part five and six of this thesis for successful.

The conclusions drawn from this part in combination from the other research will help form design guidelines and inform the final in-depth design.

*(left). Redevelopment master plan (Creating Communities, 2012)*

*(below) Star-flat' retrofit. (Users own image, 2014)*

## THE PROJECT

The Northern Glen Innes housing redevelopment project is a partnership between Housing New Zealand (government body) and Creating Communities (private body) to provide more houses and healthier homes, for a growing Auckland. Creating Communities has contracted to buy and redevelop 156 existing sites from Housing New Zealand. The total development area is approx. 13 hectares. Creating 260 new homes of which only 78 will be state housing.

Some of the sites are zoned to permit construction of apartment buildings however Creating Communities thinks that there is more demand for modern terrace housing in Glen Innes, than for apartments. Most housing, though, will be free-standing. We expect less than 50 homes (15%) of the proposed housing to be terrace housing.

## THE DESIGN

According to the creative communities website, they thrive to achieve the best urban outcomes including the houses engaging with the street and open spaces – contributing to a safer neighbourhood. Other principals they include are diversity, character and context, safety and sustainability. Some of these aspects are as followed:

- Context will be considered in terms of density.
- Each home will have access to quality outdoor space at ground level.
- The use of materials will be considered in terms of longevity.
- Use of mixed building materials to create variety.
- Mix of sizes: Stage 1 homes will include 2-5 bedroom homes.
  - Mix of family units to meet the needs of a



*New terraced housing in Glen Innes redevelopment. Two-storey weatherboard with single pitch roof. (Authors own image, 2014)*



*New terraced housing in Glen Innes redevelopment. Two-storey stucco and stone with single pitch roof. (Authors own image, 2014)*

wide range of family sizes and situations.
- Mixed tenure – The majority of our home sales will be to the private market, however there will also be modern state-housing.
- Sets a standard for the future.
- The new homes face the street and respond sensitively to the site contours.
- Garages and driveways are discreetly placed to avoid dominating the street.
- The clear shapes and forms of the houses will provide an interesting roof scape.
- Front yards are designed to be unified as much as possible.
- A variety plants, specifically chosen, will be planted in the front yards to create a unified appearance from the street.

- Fencing will also be designed to be consistent and in keeping with the local setting.
- Incorporate Crime Prevention through Environmental Design (CPTED) aspects into the designs of the homes.

## SUSTAINABILITY

- New houses will have modern living standards, where the building is warm and dry. Upgrades to storm water infrastructure.
- Landscaping will take into account plants that thrive locally.
- Fruit trees and sites for vegetable gardens will be included in designs.

## THE PROJECT

The Lilyfield redevelopment project was the first multi-unit residential project in Australia to be awarded a 5 star Green Star rating and the first social housing scheme in Australia to gain a Green Star rating. This project sets a new standard for social housing developments and demonstrates that environmental, economical and social sustainability outcomes are achievable.

The project involved the demolition of 40 low-rise residential dwellings in and the construction of an 88 dwelling multi unit housing facility. The selection of the site was based on stock condition, safety concerns, location and size. The redevelopment provides additional housing in an inner city location and was designed to meet current and future housing priorities.

## THE DESIGN

The new dwellings are located in six separate low-rise, two and three-storey buildings, which are arranged around the perimeter of the site. The buildings consist of one, two and three-bedroom configurations with entries oriented to the street and private balconies or courtyards oriented to the large central courtyard.

- This layout provides a high level of engagement and good community integration.
- The redevelopment is wheelchair accessible.
- Some units are designed for disabled access to ensure accommodation is also available to wheelchair users.
- Low energy and water consumption and greenhouse gas emissions.
- Visually appealing, safe, functional and user friendly.



*Site Plan  (HBO+EMTB, 2011)*

- Provides a strong sense of community and encourages an active lifestyle.
- 24 one-bedroom units, 58 two-bedroom units and 6 three-bedroom units
- The project features passive solar design attributes, with all units having north or east facing living areas and natural cross ventilation.
- Photovoltaic cells for solar hot water and the on-site production of electricity.
- Gas boosted solar hot water systems is also incorporated into the north facing roof forms over the access stair wells.
- The built form is fully integrated and in keeping with the character of the neighbourhood
- The introduction of bright, contemporary colours echo Sydney's 'vibrant cities manifesto'.
- Recessed balconies and projecting balcony slabs create articulation and shadows and add visual depth to the facades.
- ESD considerations, assisting in the control of solar penetration.
- Generous open spaces and courtyard.
- Each dwelling has private open space in the form of a ground level courtyard or at least one balcony with optimum solar orientation north/east aspect.



*Lilyfield Housing Redevelopment (Sierins, 2011).*



*The Lilyfield redevelopment sets a new standard for sustainable social housing in Australia (Housing NSW, 2012)*

## GOVAN OVERVIEW

There are several groups an organisations focusing on implementing positive change in the streets, buildings and public spaces of Govan. There has been a significant focus on the heritage buildings, which has spearheaded a lot of the current efforts. Although there is a high cost and further investment to achieve this, saving the heritage can greatly benefit the area.

Along with the physical history they have tried to reclaim the 'true identity for Govan' (Manly, 2012). With many different partnerships, they plan 'to sustain a culturally planned future where the considerations of all groups within the community are respected and channelled into its development' (Manly, 2012). This concept has been echoed through different redevelopments that recognise Govan's inherent assets and resources. The redevelopments try to showcase everything positive about Govan, and it's unique history.

'Govan is rich in stories. It's people, resilient and strong. From the Rent Strike campaigns during the First World War, to the loss of shipbuilding and associated prosperity, the demise of local cultures and tradition has hit the community hard. Despite such strong connection to Glasgow, the area has suffered extensive neglect' (Manly, 2012).

The tenement houses (mostly council/social housing) is only standing as an asset today because of the community in the 1970s. When inhabitants were told they were going to tear them down because they did not have the modern amenities – they still have to go outside to use toilet blocks – they rallied together and were the driving force to get toilets implemented in the buildings. It is the community involvement which save the iconic sandstone tenements which are still standing today.

Ambitions aims are set to create a high well-being and low carbon community. Organisations are trying to achieve this by 'promoting grass roots, people-centred approaches to engage younger, often marginalized sections of the community, within a vision for bettering themselves and acquiring necessary skills and respect for gaining a sense of belonging, purpose and value for Govan' (Manly, 2012).

The considerations of the history of the area and cultural ideas have been considered and future development aims to entwine these two ideas while also ensuring both economic and cultural enterprise is mutually beneficial.

Existing Glasgow Housing Association property has been given a new lease of life with this £6m project on the Riverside Estate. The complete renovation involved re-roofing and cladding of properties. The redevelopment also included fitting new kitchens and bathrooms and all the houses have been rewired.



*Riverside retrofitting in Govan. Photo takes from the other side of the River Clyde (Authors own image, 2014).*



*Redevelopment of the area surrounding social housing Govan (Authors own image, 2014).*



*Retrofitted existing tenement social housing in Govan (Authors own image, 2014).*



*Redeveloped waterfront area surrounding the retrofitted tenement social houses (Authors own image, 2014).*

## AUGUSTENBORG OVERVIEW

In addition to the social issues that were occurring in Augustenborg another issue was flooding during heavy rain (Aunér, 2009). To solve this problem they integrated flood protection into beautiful outdoor environments by building dams and open water channels that were aesthetically functional to lead the water away. This was the first sustainable measure that was implemented, and they wanted to continue to see Augustenborg develop in s broader ecological context.

Ekostaden Augustenborg developed as is a collaboration between the organisations, agencies, associations and companies in the area. 'Extensive work with the change in farm environments, vegetation and common areas began with the residents' (Aunér, 2009) wishes first. There is also a communal activity, called Green Roofs, which organizes conferences and lectures with ecological themes' (Aunér, 2009). There are also many other collaborations with many different cultures and age groups that have improved the social sustainability of the community as well as making use of the resources they have.

For example, 'from the start residents were given a leading role in the project. They were engaged via surveys, workshops, and festivals. They contributed to the design of the waste separation system, green spaces, and Malmö's first carpool, and to choosing the renewable energy sources. One-fifth of the residents participated actively, and 40 people who were educated in sustainable development later got jobs' (WWF, 2012).

In addition to flood protection and social redevelopment they also renovated 1600 MKB apartments improving their energy efficiency, improving their waste management as well as implementing renewable energy sources (WWF, 2012). These apartments are predominantly seven storeys and while it is dense in buildings it has a very low population density as many people live in smaller families or alone.

This pioneering project which included water management, green roofs and social transformation are why 'In 2010, Malmö received the UN's prestigious World Habitat Award for its Ecodistrict Augustenborg'

(WWF, 2012). What was a low-income public housing area with many social and environmental problems has transformed into a sustainable city district. It has become a centre for green roofs and home of the Scandinavian Green Roof Association with the world's first botanical roof garden, with a living exhibition of green roofs and a sustainably inclusive community (WWF, 2012).



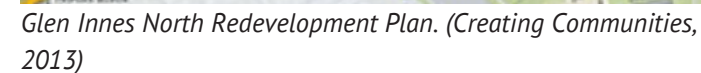*Youth community gardens. (Authors own image, 2014)*



*Green roofs. (Authors own image, 2014)*



*Open water channels and swales. (Authors own image, 2014)*

The two neighbourhoods of Augustenborg in Malmö, Sweden and Glen Innes North in Auckland, New Zealand share many similarities while being on the other-side of the world. They were both originally state housing communities with a very diverse ethnic make up of inhabitants. While the redevelopment of Augustenborg has been more of a sustainable retrofit of the buildings, the land and the community Glen Innes is very opposite as it is some retrofit but mostly new build. 'New is better' is something far to many people consider as true, but as you can see with the comparison of these two neighbourhoods, Glen Innes could improve a lot by learning from what has taken place in Augustenborg.

The most obvious difference between these two plans is level at which sustainability has been considered. Augustenborg had one main problem, its flooding. The way they approached the redevelopment of this was not just to extend there infrastructure but to consider the problem holistically and work out how to accommodate this issue in a sustainable manner within the community as a whole. The result of this is a very environmentally and socially sustainable community which no longer has a flooding problem and in turn has a improved community. This is not the case with Glen Innes while they talk about the sustainability of the project it is just smoke and mirrors. Some credit is due for taking a step in the right direction however, that is all that has been done. Single level sustainable concepts have been formed but they have only been implemented on one level. For example car parks have been reduced which is great however there is still huge impermeable car park surfaces and they have hierarchy over other forms of transport. Simply it is a step in the right direction, with room for a huge amount of improvement.

Augustenborg has also used the problems they had as a driving force for better solutions. They have gone beyond just fixing the problems and have utilised them to create new jobs, more education and to make the area and attraction from all over the world. They have made a real long term investment in the neighbourhood where Glen Innes seems like a quick fix solution.

### GLEN INNES



*Glen Innes North Redevelopment Plan. (Creating Communities, 2013)*

**STRENGTHS**
Building diversity.
Lots of green space.
Diversity of users but only medium-low incomes.
Some environmental considerations made.
Considered different cultures in design.

**WEAKNESSES**
Large car park areas.
Undefined green spaces.
Large underutilised spaces.
Still seen as state housing development.
Not a holistic approach to sustainability.

### AUGUSTENBORG



*Plan of Augustenborg (Google maps, 2014)*

**STRENGTHS**
Lots of green space and green roofs.
Social/financial sustainability considered.
Sustainable flood protection.
Considered lots of different ethnicities.
Award winning.

**WEAKNESSES**
Different cultures not considered in terms of buildings design.
Lots of undefined public green space.

Retrofitting is usually perceived as being as waste of money especially with older buildings. Researching state housing that has been retrofitted has been a challenge as in most cases new build has been the desired goal. Retrofitting offers many positive however and not just because you are extending the life cycle of a building. It keeps the same context in the building fabrics and reduces gentrification and gives the community a sense of familiarity. When it does come to retrofitting in general not just for state housing it all tends to be very minimal and functional not adding much to the aesthetics of the building.

In the case of Glen Innes when you compare the before and after photos there is not a huge amount of different between the two and even the choice of colour in the new building can look as if it was already old instead of being completed in recent years. The approach at Glen Innes has also been very unobtrusive and cheap to do. No major issues were tacked only minor things such as insulation and upgrading windows as we as surface things like a new coat of paint.

Similarly in Govan the retrofit of this building leaves a lot for the imagination. While it has tacked some major functional issues the aesthetics have not been considered. While in the new build redevelopment in Govan there is a lot of lively bright architecture popping up it is not the case here. By added more colour or some form of customisation it would create greater pride of the building and the area. One positive to this retrofit is it extended past just the building and a lot of care has gone into upgrading the surrounding public green space at the same time. The combination of these two together is what makes this redevelopment successful. There is also a very strong sense of community in Govan and they have had involvement in a majority of the redevelopments in Govan which has reduced in more well received design. While there was come community involvement in Glen Innes it was the wrong kind now that work is being completed the community is coming together to protest. While this has encouraged a sense of community it is better that this is established in a positive way rather than an angry one.

### GLEN INNES



*New retrofitted star flats in Glen Innes. (HNZC, 2013)*

**STRENGTHS**
Cheap and fast to do.
Kept existing building stock.
Residents could still live there while completed.
Doesn't gentrify.

**WEAKNESSES**
Didn't aesthetically improve
Will date fast.
Looks like state housing
Interior not changed.
Dull and not exciting.
Not for mixed users.
Not many sustainable features added.

### GOVAN



*Recently retrofitted 4 storey flats in Govan. (Riverside development, 2013)*

**STRENGTHS**
Through retrofit including kitchen and bathroom.
Surrounding site also considered and redeveloped.
Community involved in the process.
Doesn't gentrify

**WEAKNESSES**
Not very bright and lively.
No sustainable features have been added.
Will date fast.
Doesn't considered social changes.

## 4.5
### NEW BUILD COMPARISON

New build developments gives freedom of choice that is not always available to retrofitting older sites. While the wasted resources and embodied energy is high in demolishing existing building stock sometimes what can be achieved with new build redevelopment can outweigh or at least have a significant impact on the future use of the site. In order to achieve this the long term picture needs to be accessed. Designing for the future and not for the present is something that is always an issue and especially when it comes to state housing when these redevelopments are funded by the state or similar group. It is often about what is the cheapest, quickest solution that will see change the fastest. While this can be seen as a necessity for the government bodies or organisations so it is perceived that they are doing something about current issues. It is not always the most environmentally, financially or socially correct solution.

Lilyfield has set new standards for public housing developments in Australia. It demonstrates that highly sustainable state housing outcomes are both realistic and achievable in terms of function, project demographics and housing affordability.
The project features passive solar design attributes, with all units having north or east facing living areas and natural cross ventilation. Solar design features include photovoltaic cells for solar hot water and the on-site production of electricity. The latest technology in gas boosted solar hot water systems is also incorporated into the north facing roof forms over the access stair wells.

Glen Innes however has taken the less committed approach and states "Solar water heating and rainwater collection units are being currently monitored to assess the likely cost reductions to tenants and HNZC" when it is already proven in many pieces of literature both in New Zealand and nationally that both these measures contribute to being more financially and environmentally sustainable. It is another example of designing for now and not for the future.

*New build terraces houses (Authors own image, 2014).*

### STRENGTHS
Cheap and fast to build.
Similar style to existing building in area.
Diversity of buildings in different areas.
Affordable for private sector to buy.

### WEAKNESSES
Boring and cheap looking.
Will date fast.
Looks like state housing.
Car ports intrusive.
Fence is uninviting.
Doesn't encourage social interactions.

### LILYFIELD


*LilyField redevelopment internal courtyard (Sierins, 2011).*

### STRENGTHS
Colourful and cheerful.
Doesn't look like S.H.
Desirable for many different users.
Flexible + accessible.
Sustainable site design.
Welcome street frontage.
Inviting.

### WEAKNESSES
Doesn't allow for much personalisation.
Doesn't cater for many different cultures.

## 4.6
### DISCUSSION
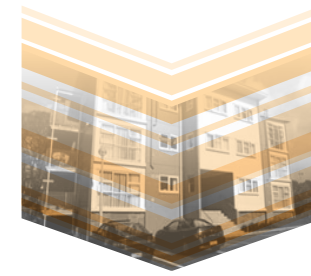
Through-out this part the many different approaches to redevelop have been discussed in depth. The variety of options is even more vast than those just covered in these four examples . It is evident that there is not only one successful solution for how to redevelop the neighbourhood of Glen Innes. It is obvious that it needs to be a combination of many different approaches to become successful. Also the most successful redevelopments are those that the community have stood behind and have pride in.

One of the major conclusions drawn for this part is that in the end the need for community involvement in the design is a lot more beneficial and successful for the overall design. It is not received well and feels like it is being pushed on the occupants then there is protest and there is no beneficial outcome.

The most obvious thing highlighted are the shortcomings that can be seen in Glen Innes's redevelopment plan. While of course there are successful aspects but when compared with other examples it is lacking. This is due to there being minimal involvement from the community, and in stead of creating a well built exciting place that the inhabitants can we proud of, low-cost cheap housing is constructed. In the short term this helps to aid the need for affordable housing but it doesn't help prolong the life of these buildings. Similarly to the previous case studies each areas seems to have a theme of success and they have played to their strengths as a community to make it flourish.

The redevelopment of Augustenborg forces on turning their weaknesses and threats into positives which have now been developed even further and make it an even more successful neighbourhood in terms of the environment, create jobs and also integrating many different cultures.

Lilyfield have utilised their new build to become a highly sustainable rated neighbourhood which goes beyond the basic sustainable needs for a building. The sustainable concepts where driving forces and not after thoughts and for this, it has made the redevelopment like Lilyfield very successful. The inclusion of solar panels bike storage and recycling areas, means that not only is it promoting a sustainable building but also a sustainable way of life.

Retrofit examples are often the less exciting development as budgets are low and plans are often as less invasive as possible. The Govan retrofit redevelopment is the least exciting development happening in the area mostly because it is basic. While it is not very exciting there has been a large community involvement and it is good that some of the familiar and existing building stock remains aesthetically similar to reduce too much gentrification. In addition to the retrofit of the buildings the surrounding landscape has also been redeveloped and this helps to create a more holistic and complete development to the area.

## 4.7   LESSONS LEARNT FOR DESIGN GUIDELINES

### GLEN INNES
- It is better to invest more for better results and longer life spans.
- How something ages should be considered more.
- The overall design should be sustainable in all areas not just quick fixes.
- Quick fixes are not the best solution.
- Sustainability needs to be encouraged in building design and every day life.
- Cars should no longer have hierarchy over green spaces and pedestrian routes.

### 4.3 - PLANNING COMPARISON
- Threats and weakness can become opportunities and strengths.
- Threats should be looked at as challenges.
- There are many different ways to achieve standard solutions that can be much more beautiful.
- Go beyond fixing problems and work out how these can give back to the people and the community.
- Cars should not have hierarchy in the plan.

### 4.4 - RETROFIT COMPARISON
- It is important to redevelop not only the building but also the surrounding area.
- Community should be used as much as possible to keep a successful design.
- Retrofit should be more than just functional.
- Colour can add more life to a retrofit development
- There should be involvement from the community.
- It should encourage a sustainable every day life.

### 4.5 NEW BUILD COMPARISON
- Create a place to be proud of.
- Colour can easily bring life.
- Sustainability should be a driving concept not after thought.
- It is possible to have affordable sustainable state housing.
- Removing car parking can be successful and should be encouraged.
- Investment for a long life cycle of the building is important.

# ▶ PART FIVE.

PART FIVE COMBINES THE FINDINGS FROM THE PREVIOUS RESEARCH TO FORM GENERAL DESIGN GUIDELINES AND THEN ILLUSTRATES HOW THEY CAN BE APPLIED TO A SPECIFIC SITE. IN ADDITION IT EXPLORES ENERGY RETROFIT STRATEGIES IN GENERAL AND APPLIED TO A SPECIFIC SITE.

## 5.1
### INTRODUCTION
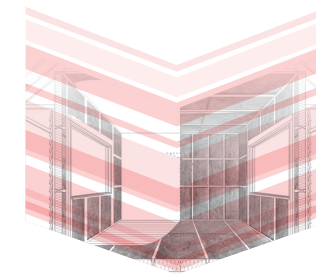
The purpose of part five is to take all of the conclusions, findings and lessons learnt from the previous research to form general regenerative design guidelines for post-war state housing in New Zealand. The design and sustainability guidelines are 'general' so the benefits can be applied to a wider group. The state housing typology across the country is very similar (apart from some climatic conditions that can be easily managed in the design protocol). Therefore these guidelines can be applicable for state housing and private sector housing across the country. In addition to this 5.7 showcased how these design guidelines can be applied to a specific site - in this case it is the site of 7 Leybourne Circle, Glen Innes, which will be used for the in-depth design proposal in part 6. This also shows generally the design concept and strategies for the proposal in part 6.

These guidelines are important to help cohesive designs be created and ensure that sustainable regenerative design principals are considered from the conceptual level. In addition to this, design guidelines look at the wider picture and help ensure that the redevelopment considers the site as well as the building.

The guidelines are based on findings from the previous research in combination with the guidelines set by HNZC as well a regenerative design principals and sustainability principals based on the book "*A Green Vitruvius*" with further research related specifically to New Zealand.
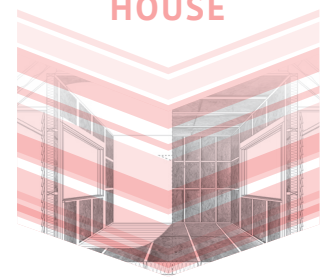
In addition to regenerative design guidelines the start of this part explores energy retrofit strategies to first understand how to make the existing building stock healthy and give it new life. This part is organised with introductory information about 'the typical New Zealand home' and the condition they are in as well as their main energy use. Following the introductory information there are arguments behind retrofit versus demolish and rebuild and then a brief introduction to regenerative design to help explain why this design approaches have been chosen.

Sustainable retrofit strategies explore in-depth strategies specially for light weight timber frame homes. All of these strategies aim to meet the New Zealand Building Code and go beyond it where possible. The retrofit strategies are also accompanied by a cost effective analysis to demonstrate clearly the differences between each strategy. These strategies like the guidelines are explained in general and then how they can be specifically applied to the chosen site of 7 Leybourne Circle.

The combination of both regenerative design guidelines and energy retrofit strategies forms a very solid foundation of information to then build a cohesive and successful design concept on.

Typical New Zealand timber frame 'villa' house. (Ray White, 2014)

## HOUSE STOCK, TYPE AND SIZE

The general housing stock in New Zealand is lightweight timber frame buildings with next to no thermal mass. The national housing stock is around 1.6 million households and 30 000 new homes are being built each year (Storey *et al.* 2004). The 2006 Census showed that of the total number of houses in New Zealand 81% of them are detached houses (Statistics New Zealand, 2007). Mithraratne (2007) shows that private sector houses in New Zealand change ownership about every seven years, and it is this change of ownership that give opportunities for upgrading. In order to change the performance of the existing housing stock in New Zealand - improving the energy performance is key (Saville-Smith 2008). The private sector has more opportunities for improving the energy performance of a home compared to state housing that has one owner, but constantly changing tenants. Looking at the existing post-war state housing stock, you can see that many of them have had next to no improvements and only in recent years some have been fitted with under floor and ceiling insulation.

The housing stock for both private and state housing is very similar in terms of dwelling size and type. There are some variations in terms of style, construction and materials – this means that many generalisations can be made about the majority of buildings and strategies can be applicable for much of New Zealand's building stock. Mandatory insulation policies were enforced in 1978. Pre 1978 there were no insulation requirements for housing in New Zealand. While these are still minimal even now, they divide the housing stock into two categories: prior insulation and post insulation.

Beacon Pathway has carried out much house retrofit studies. One piece of their research gave house typology breakdown as follows (Page and Fung, 2008):

- Early housing (pre-1890)
- Villa (1880–1920)
- Bungalow (1920–1935)
- Art deco (1925–1935)
- **State house and mass housing (1930–1970)**
- 1960s multi-units
- 1970s house (pre-1978 insulation)
- 1980s house (1978–1989)
- Early 1990s (1990–1996 before code upgrade)
- Last decade (1996–2007, after code upgrade)

A house retrofit feasibility ranking system based on the houses physical characteristics was developed by Page and Fung (2008). The physical characteristics considered were factors such as access of ceiling and floor, construction features of wall and windows and the possibility to replace space heating systems and more. The research concluded that villas, 1920 bungalows and 1940to 1960s state housing groups were among the most favourable to retrofit (Page and Fung 2008). The state housing that is focused on within this thesis is mostly constructed in the 1950s, and this research confirmed the relevance of retrofitting these buildings to make them more energy efficient.

Houses typology in New Zealand is very similar, and this continues to cladding, roof materials and windows. BRANZ (2005) surveyed house conditions with 611 interview samples spread around New Zealand. Commonly used house cladding types found were:

- Wall - Timber weatherboard (51%)
- Roof - Galvanised painted steel (31%)
- Windows – Timber frame (44%)

Mithraratne *et al.* carried out research on life cycle analysis of New Zealand houses (see appendix) to define common construction type of New Zealand houses. It shows that 89% of external wall and roof structures are timber with 65% of floor structures to also be timber. Timber structural systems have positives and negatives and while they act as thermal bridges causing an increased heat loss the spacing between members also provide opportunities for insulation retrofit.

From the information collected the most generic construction and the typical house is a one storey lightweight timber-framed house with the following details:

- Particleboard floor on suspended timber framing;
- Timber framed exterior walls with weatherboard cladding;
- Pitched timber truss roof with corrugated metal cladding;
- Single glazing windows.

The houses that this thesis will explore in-depth for the design proposal fit into this category and, therefore, the conclusions drawn are applicable to a wide range of houses in New Zealand.

Generalisations have been made to find the 'typical New Zealand home' and with this there are also some common issues about the state of these houses as they all have similar construction and material details. The New Zealand Business Council for Sustainable Development's 2008 New Zealand Housing Survey did a survey across 3526 houses in New Zealand. The survey covered the current state of their home and what their future improvement preferences are. Some of these findings are:

- 45% of existing homes are mouldy.
- 16% of homes have no insulation at all.
- 21% of people aged 18–24 say their home is cold and uncomfortable.
- 84% of households say they do not have the financial means to make energy-saving renovations.
- 60% of homes in New Zealand were built before insulation became a legal requirement in 1979— just over one million properties.
- 25% of the nation's homes could be making their occupants ill.
- 75% of people who rented or bought a home in the past two years did not check insulation, hot water cylinders, heaters and other water and energy efficiency appliances.

Many of the state of homes in New Zealand are not healthy. While they are physically sound, they are in desperate need of retrofitting to make them dry and warm. Affordability is a big hindrance to the work being initiated. There are some government subsidies for insulation, but it is not always enough. This research suggests that the typical house in New Zealand is a single storey, detached, cold and damp home. For this reason, it is even more important for this thesis to include sustainable cost effective ways to retrofit.

Due to the poor insulation in New Zealand homes, they generally waste energy. It is only since the 1970's that insulation has become mandatory in the building code and, therefore, much of the older building stock has inadequate insulation and uses a lot of energy to heat and run.

12% of New Zealand's total energy use is from its homes. In 2008, NZ$2.5 billion was spent by households just on electricity. So far the largest, most accurate house energy use project is HEEP (Household Energy End-Use Project). HEEP indicates that average household energy use can be broken into three parts; space heating, hot water heating and appliances. BRANZ (2008) research also indicates that are rough equal in how much energy they are responsible for using. See figure below.



- 30% Water heating
- 29% Space heating
- 12% Electronics and other
- 11% Refrigeration
- 08% Lighting
- 06% Cooking
- 04% Other
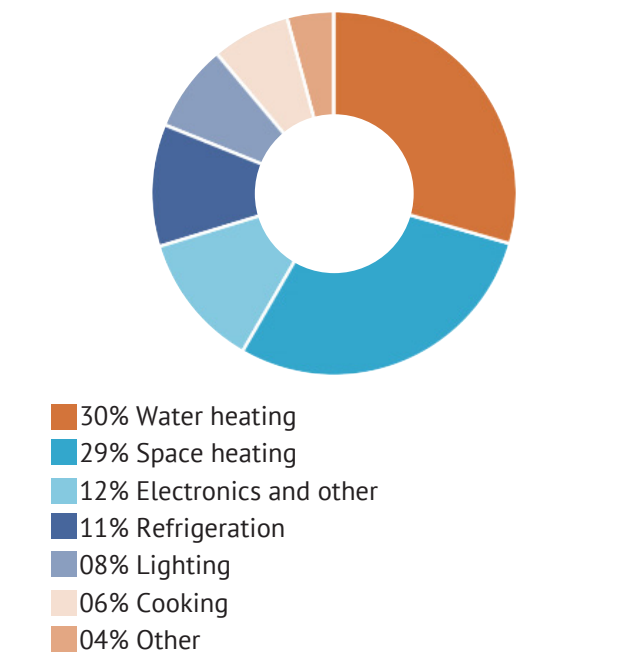
*Average family household energy use in New Zealand (BRANZ, 2008)*

This shows that water heating is the biggest single contributor followed by space heating and lighting, appliances and refrigeration all about 10% that makeup the remainder 37%. This presents a clear picture of what are issues and also indicates three important areas in which change needs to be made.

They are as follows:

### SPACE HEATING RETROFIT

The amount of energy used in space heating has a very direct relationship with the location and building envelope. Correct location provides heat gain while the building envelope allows for heat to be retained. These two factors need to be balanced correctly as they play an important role in thermal comfort. Ideally the building envelope should have minimal heat loss (increased thermal resistance level) in order to reduce space heating energy use while maintaining comfortable indoor temperatures. Another factor is also the efficiency of space heating equipment themselves. To reduce the amount of space heating energy used it can not, therefore, be broken into two points: building fabric retrofits and heating equipment retrofits.

### HOT WATER HEATING RETROFIT

This accounts for approximately one third of household energy use and the most common system for heating hot water is electric run hot water cylinders.

### APPLIANCES AND LIGHTING RETROFIT

Appliances and lighting are often overlooked; however, they are big and simple energy saving areas. New technology is growing and becoming more affordable making it possible for simple to implement features to be installed.

All of these features are cost and energy saving with space heating also affecting the comfort of the home. These are all this that are very important particularly for state housing as the states budgets are often low, and the occupants are from low income brackets, so, therefore, homes that are healthy and cheap to run are very important.

## NEW BUILD VS RETROFIT

*"It can take between 10 and 80 years for a new energy-efficient building to overcome, through more efficient operations, the negative climate change impacts that come from construction. Environmental savings from re-use are between 4 and 46 percent over new construction when comparing buildings with the same energy performance level."*
(Hughes, 2012)

Currently in Auckland buildings use up to around one third of the city's energy and produces about the same percentage of green house gas emissions. For these reasons it is a key focus of Auckland Council. They aim to reduce emissions to 40 per cent below 1990 levels by 2040. Even if the city was to remain stagnant in size and population this would be a tough challenge. This issue is even more pressing when 'the present rate of energy demand and with the population projected to grow, it's estimated that by 2025 Auckland's carbon emissions will be 46 per cent higher and, by 2040, energy use will have climbed by almost two-thirds' (Doesburg, 2014). Therefore retrofitting the existing housing stock will be the key to helping reduce the city's carbon emissions and energy use to achieve these ambitious targets.

For some houses, particularly the older ones, it may not be feasible to retrofit or the cost to improve them to a better thermal performance level can be too high. This can be the consequence of poor maintenance and the age of the house. It may raise the necessity of demolition and a rebuild a new dwelling with a higher standard of performance.

BRANZ estimate that there are about 2000 (0.13% of the total house stock) house demolitions every year (Page, 2008). This indicates that we are not so much replacing our housing stock as adding to it. This means that the problem with substandard houses is not fixing itself over time, but rather that as older houses deteriorate, the problems will get worse unless we take timely action. Storey *et al* (2004) mentioned that no official data have been collected on the numbers, age, location, condition, or the reason for demolition of NZ houses, and there are big variations in the estimated annual number of house demolitions (1000-7000). Little is known of the profile of the demolished houses, their age, type, size, location, ownership, etc. A survey to find out these factors would be valuable in assessing the impact of demolitions on the housing stock.

Since insulation became statutory in 1978, energy efficiency has been improved in new houses. The Building Act 2004 includes sustainability as one of its key principle and requires energy efficiency and conservation be taken into consideration for each clause of the new regulations (Storey *et al*, 2004).

It can be seen that the requirement of building element R-value has been gradually increased, since insulation became mandatory in 1978. Insulation requirement for glazing was just introduced in the most recent (2007) Building Code upgrading. Compared with other building elements the R-value for glazing is significantly low. This is why glazing areas are normally very weak points for reducing heat loss. The HEEP project discovered that houses built after 1978 are averagely 1°C warmer than the ones built before 1978. This result also showed the importance of government's Interventions in sustainable house development.

Older houses are not required to be upgraded to meet the current Building Code, but in some cases roof and floor have been voluntarily insulated at the code required level. It is thus obvious that existing houses that do not have this level of insulation could be deficient.

The scheme currently occurring in Glen Innes is that the government is removing old state houses and selling them as relocatable houses and developing on the empty plots. This has merits because they are recycling the buildings and not demolishing them, but it also means communities are undergoing more turmoil than necessary.

It can be hard to come to a black and white conclusion on which is the most appropriate course of action, as every case is different and every house is different. Where possible, retrofit should be the first tactic when dealing with redevelopment, followed by relocation. Only when there are no other options, should demolition occur and if so, should be done in a sustainable manner, utilising the materials.

*"The negative environmental impact of retro green for human health was between 12 and 38 percent less than for new construction. It is more clear than ever that there are human health reasons to reuse rather than rebuild."*
(Hughes, 2012)

Recycling old state housing materials is especially important as a majority of them were built while imperial measurements where still used as therefore modern replacements do not match so imperials sized materials from post-war state houses are very sought after. Native timber was also predominantly used i the flooring and it is also important that this is recycled and maintained.

*The Greenest Building report states that retrofits won the contest [financial payback] when it comes to returns on investments, showing a 19.2 percent increase in returns on investments for retrofits versus 9.9 percent for new buildings.*
(Hughes, 2012)

It is important to look after the investments and resources we have before investing in new things and wasting all the embodied energy and filling up our landfills.

## REGENERATIVE DESIGN

A website on regenerative design (Regenerative, 2012) explains regenerative design as 'a concept based on process-oriented systems theory approach to design.

*The term "regenerate" means, "to create again, restore, renew or revitalize.'*

A regenerative system makes no waste; its output is equal to or greater than its input, and part or all of this output goes toward creating further output — in other words, it uses as input what in other systems would become waste.' It aims to create sustainable systems that integrate the needs of society with the integrity of nature.

Regenerative design is part of sustainable living although it is not the same as sustainable design. 'Sustainability implies something that endures over time without degrading, but it does not regenerate itself or create anything new. A plastic bottle sustains; a plant regenerates.' (Regenerative, 2012)

Regenerative design uses the biomimicry and study of ecological systems to help find solutions to problems created by humans. Biomimicry uses all species within a system and according to regenerists who explain it is better to recognise that humans are part of the ecosystems and then to be incorporated into it rather than segregating humans and nature. This is similar to permaculture and other models for sustainable living that rely on synergies. While a lot of regenerative design research is focused on the landscape, it can also be applied to the built environment.

'Natural building emphasizes sustainability and minimal environmental impact without sacrificing the health or comfort of the human inhabitants. It too makes use of the site's climate and conditions to reduce the amount of energy required for ventilation and temperature control.' (Regenerative, 2012) By obtaining goals like this, it means human can take a symbiotic role in their environment rather than a destructive one. While it is not possible to have a closed loop system that 100% regenerates itself, it is possible to strive for close to this.

Regenerative design principals (Lyle 1994):
- Letting Nature do the work.
- Considering Nature as both model and context.
- Aggregating not isolating.
- Seeking optimum levels for multiple functions not the maximum or minimum level for anyone.
- Matching technology to need.
- Using information to replace power.
- Providing multiple pathways.
- Seeking common solutions to dissipate problems.
- Managing storage as a key to sustainability.
- Shaping form to guide flow.
- Shaping form to manifest process.
- Prioritizing for sustainability.
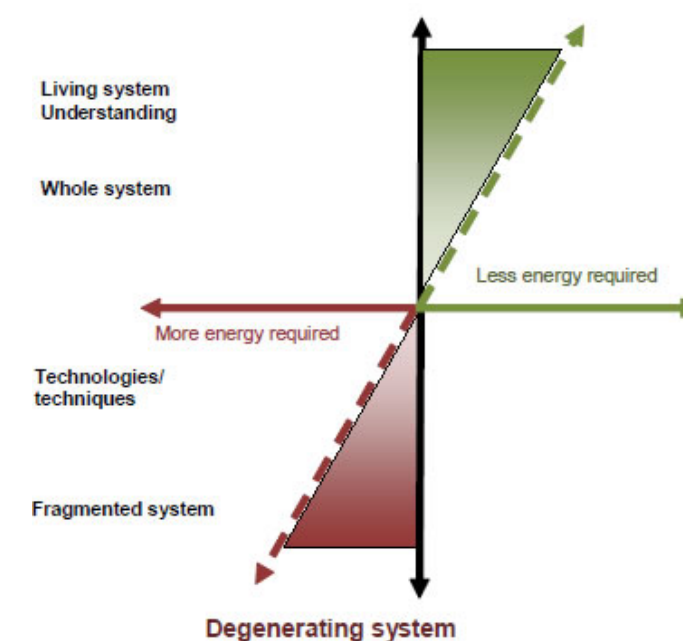


*This figure replicates Reed's trajectory of environmentally responsible design (adopted from Reed, 2007b), which shows how society might move through the concepts towards a regenerative environment. As Reed (2007b) points out, 'these are not necessarily steps but more like an evolutionary spiral because the process continually evolves in a gradual unfolding or emergence as the field changes'.*

### HOW THIS CAN BE APPLIED TO DESIGN.

*CONSIDERING NATURE AS BOTH MODEL AND CONTEXT.*
- Connecting existing and green and blue structure where possible.

*SEEKING OPTIMUM LEVELS FOR MULTIPLE FUNCTIONS NOT THE MAXIMUM OR MINIMUM LEVEL FOR ANYONE.*
- Houses should be design for a variety of cultures
- When personal gardens are not feasible additional community gardens should be provided
- Families should have flexibility within their homes.
- Climate shell energy produces protection

*MATCHING TECHNOLOGY TO NEED*
- Utilise solar heating and shading, natural ventilation.
- Minimise needs.

*USING INFORMATION TO REPLACE POWER*
- Community involvement with decision-making and the design process.

*SEEKING COMMON SOLUTIONS TO DISSIPATE PROBLEMS*
- On-site water treatment to reduce pressure on infrastructure.
- Water harvesting
- Use storm water for irrigation

*SHAPING FORM TO MANIFEST PROCESS*
- Visible solar panels and water harvesting and treatment.

*PRIORITIZING FOR SUSTAINABILITY*
- Educate the community so that there is a demand on the society and government to change its priorities.

## HOUSE ENVELOPE RETROFIT STRATEGY LIGHT WEIGHT STRUCTURE

The refurbishment of our homes and buildings is one of the greatest challenges we face. The majority of our existing stock requires some level of retrofit to enable us to live and work more sustainably.

As concluded earlier the typical New Zealand house is mainly built of timber structure with weatherboard wall cladding and metal roof cladding. The buildings focused on for the in-depth design proposal are similar to this with tiles roof cladding instead of metal.

### INSULATION LEVEL

New Zealand Building Code clause H1, Energy Efficiency-Third Edition (2007), specifies minimum levels of insulation to be achieved for new houses, and it does not require insulation to be applied to the houses constructed before the implementation date. However, to ensure better building energy performance, the R-value required by H1 can be used as a threshold level for building element insulation retrofit. It is recommended that, for house insulation retrofit, benefits to the occupants should be realized by providing more than the minimum.

Insulation is applicable in four main components of a building envelope: ceilings, walls, windows and floors. Insulation works by reducing the transfer of heat by means of a thermal barrier. The measure of insulation level is expressed as heat flow resistance value (R-value). R-value or thermal resistance gives a measure of how difficult it is for heat energy

to flow through part of a building. The rate of heat transfer is inversely proportional to the R-value. Therefore for each building element, insulation level displays diminishing return effects (McChesney et al, 2008). In an unheated house, the level of insulation will determine how much the temperature inside is raised above that of the environment.

Within a building, heat loss is determined by the total loss from each element of the building envelope, and the loss from each element is proportional to its area. Also, diminishing return principles apply to each building element. This means that insulated elements cannot be compensated by applying higher insulation level to other elements (McChesney et al, 2008). A modest level of insulation throughout all of the building elements is better than a high level in one building element and nothing in other ones, as heat will be lost at the uninsulated area.
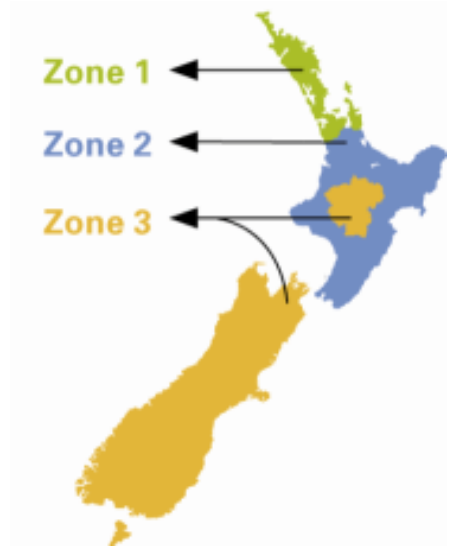


### ZONE 1 AND 2

| | |
|---|---|
| Roof | R2.9 (U 0.35) |
| Walls | R1.9 (U 0.53) |
| Floor | R1.3 (U 0.78) |
| Heated floors | R1.9 (U 0.53) |
| Windows | R0.26 (U 3.84) |
| Skylights | R0.26 (U 3.84) |

*Timber-framed house insulation requirements for New Zealand. Auckland is in Zone 1 (NZ Building Act, 2004).*

### THERMAL COMFORT

New Zealand houses are reported to be constantly below WHO (World Health Organisation) recommendations for indoor environments, showing that low temperatures are widespread in New Zealand houses. The WHO recommended comfortable

temperature band is between 18°C to 24°C (WHO, 1987). French et al (2006) discovered that heating type, climate, and house age are the main drivers of indoor temperatures.
The HEEP project monitored the winter temperature for 397 houses around New Zealand, and found that the average winter living room temperature is 17.9°C with the mean range from 10°C to 23.8°C (Isaacs et al, 2006).

### BUILDING ENVELOPE RETROFIT

Generally, in energy-related house retrofit situations, thermal mass, window size and position, orientation and location of existing houses are hard to modify. Therefore insulation upgrading is the major area for building envelope retrofit. The key benefit of building envelope retrofit is being able to reduce the amount of energy used for heating while maximising the internal comfort levels.

The same theory is applicable to the whole house-partially or uninsulated rooms will result in big heat loss. Therefore, from the whole building envelope point of view, all of the elements should have a certain basic level of insulation to achieve better performance, and partially or non-insulated elements should be avoided. This principle plays a very important role in house envelope insulation retrofit, because numerous existing houses are only partially insulated in ceiling or floor. Clark et al (2005) found out that 15% of houses had either no ceiling insulation at all, or it was installed in less than half of the roof area. McChesney et al (2008) estimated that about 650,000 houses without floor insulation would be able to be insulated. The potential for small trade-offs exists between the different building elements.

By installing more insulation, for instance, a thicker layer for ceiling insulation, the thermal performance will be improved greatly with extra cost due only to the increased material cost. In addition, insulation material durability is something of which one needs to be aware and it needs to be improved. Material that is insufficiently durable may cause insufficient insulation and cut down the thermal effect.
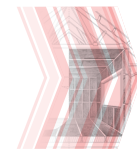
### GENERAL

BRANZ 2005 House Condition Survey shows that 60% of ceiling insulation is insufficient therefore it is assumed that if post-war state houses have existing insulation it is probably minimal and should be increased to above the minimum standards. The New Zealand Building Code requires a basic level of insulation of R2.8 while the optimum level of insulation for the roof and ceiling that is sort after in this thesis is R4.6. This can be achieved by two layers of basic insulation or one layer of 195mm Pink Batts ULTRA (PINK BATTS, 2010). In addition to this where the soft board ceiling is in good condition it will be maintained with a new layer of GIB board placed on the underside to further increase insulation levels.

### SPECIFIC TO THE IN-DEPTH SITE

Both roof structures at 7 and 5 Leybourne Circle are 25 degree hipped roofs with ceramic tile cladding. It is assumed there is access to the attic space through the ceiling, which is currently soft-board. R4.6 can be achieved by two layers of basic insulation or one layer of 195mm Pink Batts Ultra can be used if no insulations exists (see figure below).

R4.6 Insulation ⎯ Truss bottom chord

Ceiling batten

Existing ceiling softboard

GIB plaster board
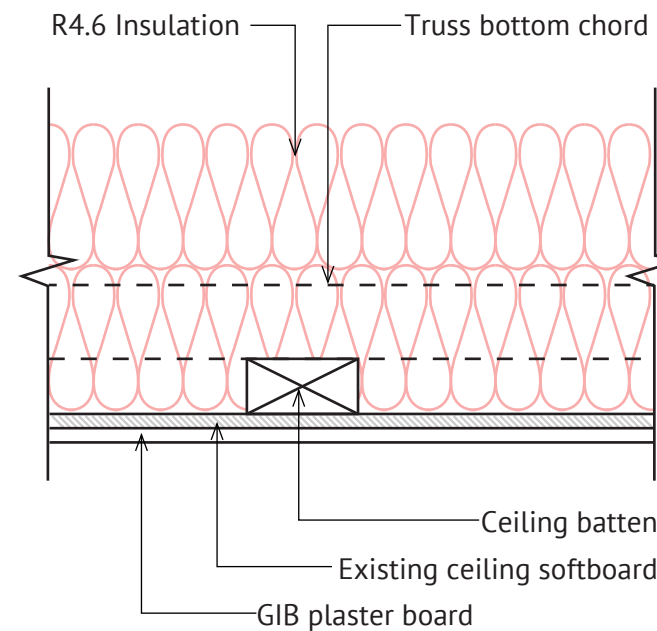
*Ceiling Insulation Retrofit Detail*
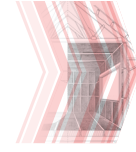
### GENERAL

It is usually more difficult to retrofit existing walls than roofs and floors. It can be fitted from both the inside or outside. Each process has pros and cons depending on the condition or the interior or exterior cladding. The New Zealand Building Code requires a wall R value of R2.0.

Insulation retrofit carried out from the inside involves removing the internal lining (generally plaster board) and infilling the timber frame gaps with insulation. This process is more invasive as it involves reinstalling the internal lining, repainting and inspections, while it is more expensive, the new lining can improve airtightness and the quality of insulation can be ensured. Due to the size restrictions of the timber stud and dwangs, the maximum thickness is 90mm. An insulation rating of R2.4 can therefore be achieved with this method.
One fast method for insulating from the exterior of the wall is achieved by filling the wall cavity with polystyrene beads or other insulation material, which is blown in through holes in the cladding. This method is less invasive and saves building work however special consideration is needed around waterproofing the holes in the cladding. An example of this method is AIRFOAM, which is implemented by injecting liquid foam into the wall cavity through into the wall cladding. With a 90mm deep gap a R-rating of 2.8m2 K/W can be achieved. This process has been criticised because it is not possible to verify if the insulation has been fully insulated or not and therefore the insulation rating is only as estimate based on successful instillation. It has also been criticised because of the type of material that is used and it can cause the walls to sweat.

### SPECIFIC TO THE IN-DEPTH SITE

As the internal plasterboard in both 7 and 5 Leybourne Circle are original and are in bad condition and need to be replaced and therefore the first option although the most invasive is the more efficient. R2.4 can be achieved by removing the existing soft-board and filling it with bulk insulation then re lining the wall with materials such as 'Ecorock' and painted with low VOC paint.



*Option 1 - 90mm of Pink Batt insulation installed between timber frames from the interior. R2.4 is achieved.*



*Option 2 - Exterior AIRFOAM Wall Insulation. Timber studs are filled with AIRFOAM via small holes in the exterior cladding.*
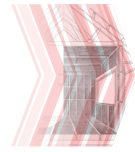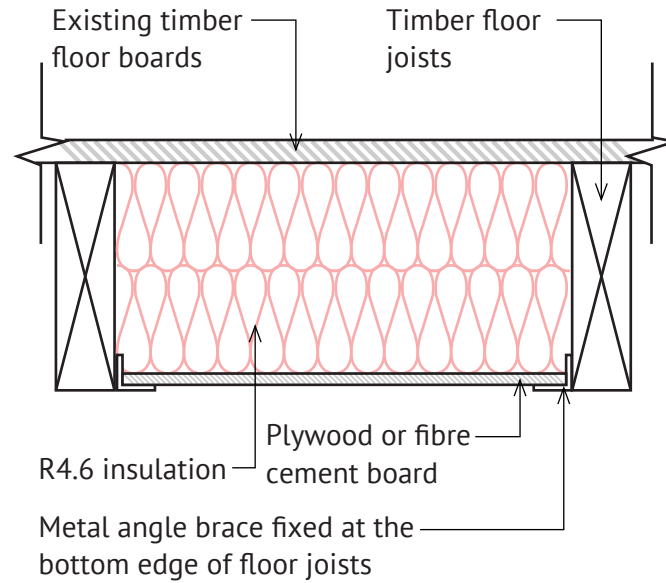
## GENERAL

The majority of post-war state housing has a suspended timber frame floor. They are usually raised off the ground and while this reduces insulation levels it allows for easier insulation retrofitting. At least 400mm deep space is needed for the installation of insulation materials. Common floor retrofit insulation materials are fibreglass bulk insulation or polystyrene sheet insulation. Both of these can be installed into the spaces between the floor joists.

Polystyrene is commonly either supported by a friction fit, or with clips. Bulk insulation can be supported by netting or a sheet of lining material fixed at the bottom of the floor joists. This sheet-lining layer not only acts as support for the insulation material, but also helps to reduce air infiltration heat loss to the house. Normally, a layer of polythene is laid to cover the natural earth under the house to give some dampness control for the under floor area. Retrofitting insulation to an existing timber frame floor provides some extra benefits: improve airtightness, giving warmer floor surfaces and reducing condensation and mould risk.

The amount of insulation installed between the floor joists depends on the depth of floor joists. It is assumed that common timber floor system is 190mmx45mm joists at 400mm spacing. Bulk insulation R4.6 with fibre cement board fixed at floor joist bottom. A layer of polythene covering can be put on the natural ground to provide some moisture control. As the figure (top middle) shows, metal angle brace is fixed at the bottom edge of floor joist. A layer of plywood supports bulk insulation. The advantage of this solution is that bulk insulation is easily fitted in and the bottom board can be tilted and removed for future check or service pipe maintenance.

### SPECIFIC TO THE IN-DEPTH SITE

7 Leybourne Circle are raised 600mm off the ground so insulation is possible. When number 5 is relocated to the new site it will be 1200mm off the ground which allows for easier insulation instillation. this means that the optimum level of insulation is possible for both buildings.

Existing timber floor boards  
Timber floor joists



R4.6 insulation  
Plywood or fibre cement board  
Metal angle brace fixed at the bottom edge of floor joists

*Underfloor insulation retrofit detail*
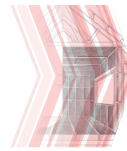
### GENERAL

Heat loss through windows and other glazing areas are a significant part of total heat loss for a well insulated house. Although upgrading of windows is difficult, because it is hard for them to be insulated sufficiently to make them as effective as wall or roof, it is also important as part of the building envelope retrofit. Also, the type of frame can affect the energy efficiency of windows. For existing houses, aluminium and timber is the most common window framing materials. Their performance in heat loss and air tightness varies. Aluminium frame needs low maintenance, but it also acts as a thermal bridge with its higher conductivity. Timber frame needs regular maintenance, and timber shrinkage can easily reduce airtightness.

Many old timber frame state house windows suffer from weak airtightness, which makes excessive amount of infiltration heat loss. Therefore, reducing air infiltration through windows will be a particularly important part for retrofitting. Draught seal strips can be a low cost solution for reducing existing windows infiltration heat loss.

Double glazing was introduced in the 2007 Housing Insulation Standard. Typically, double glazing can reduce heat loss from 1KWh/m2/day to 0.55KWh/m2/day (BRANZ, 1995). Further thermal performance improvement for double glazing window can be made by adopting low emissivity (Low-E) coating panes, which would reduce radiant heat transfer through the window.

Currently, there are a range of options for retrofitting double glazing (Amitrano *et al*, 2006) including:
- Magnetic framed acrylic windows to add to the inside of aluminium frames
- Plastic film – taped and heat-shrunk to the inside of windows
- Frames with acrylic glazing screwed to the outside of existing window frames.



Steel Mounting frame  
Existing Window  
Magnetic Tape Strips  
Acrylic Window  
Steel Mounting frame
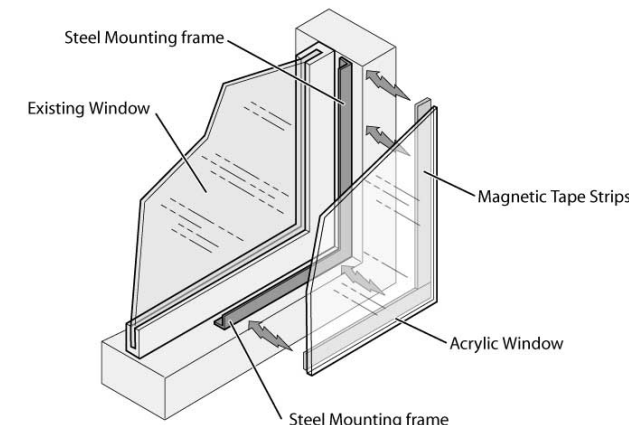
*Magnetic strip acrylic windows. (Soundproofing, 2013)*

New Zealand based MagicSeal' claims that magnetic attached acrylic sheet secondary glazing has an R-value of 0.37m2K/W (MagicSeal, 2007). The inconvenience of this option is that one whole layer of acrylic attached inside of the window frame makes the window effectively fixed. Also, air tightness control of this option is not as good as new window unit. So, the thermal performance of attached acrylic sheet secondary glazing is probably less effective than that for a replacement window. Although, some work can be done on the existing windows by fitting another pane in the existing window frame, Lloyd's house upgrading study (Lloyd and Callau, 2006) indicated that window retrofit work by fitting in a second pane was more expensive than replacing with new double glazing window units. New window frames also reduce air infiltration heat loss.

### SPECIFIC TO THE IN-DEPTH SITE

The windows at 7 and 5 Leybourne Circle are the original single glazed, timber frame windows. All of the mentioned options are possible for these windows however replacing them with retrofitted or new timber frame double glazed units will have the best thermal comfort levels.

## GENERAL

Ventilation is essential for indoor air quality and normally it is not a major consideration in house retrofit. Currently, New Zealand house ventilation is either too much or too little in most homes. New housing shows a trend of more airtightness in construction due to the usage of sheet material internal linings and accurately manufactured building components (Bassett, 1992). Achieving proper ventilation is as important in achieving healthy homes as insulation. Air infiltration occurs around doors and windows and through joints between building elements. An open fireplace can be another big item causing air infiltration and may allow a heat loss of 1.5 KW (BRANZ, 1995).

Air infiltration is both an energy efficiency and an indoor air quality issue. Although airtightness and ventilation can be conflicting factors to achieve energy efficiency and indoor air quality, the rule of thumb is to make the building as air-tight as possible in terms of the building junctions, internal lining and opening details, so as to avoid unwanted infiltration of cold air, and then to deliberately ventilate as needed.

Air infiltration is another primary item that causes heat loss. This happens in the four basic building envelope elements (roof, wall, windows and floor). For a well insulated house, air infiltration heat loss can be larger than that from any of the four building elements. On the other hand, ventilation helps improve indoor air quality by diluting a wide range of indoor contaminants. In this point, a building should keep a reasonable level of ventilation. NZS4303 provides a guide of the required ventilation for different type of buildings. For residential buildings, this standard requires a house wide average ventilation rate of 0.5 ACH as background level.

Gaps around doors and windows can be sealed at very little expense. A wide range of draught-stripping materials for doors and windows is available on the market.

Once a reasonable level of insulation is installed in the building fabric, air infiltration becomes the largest element of heat loss. However, a certain rate of ventilation is necessary to provide air for the occupants living in the building. Draught sealing materials are available for retrofitting to openings around doors and windows, where most of the air leaks in a house occur. Airtightness is also dependent on construction and age.

Occupied rooms require from 0.5ACH to 1 ACH to provide fresh air and remove moisture (BRANZ, 1995). Too little ventilation will result in condensation problems, but too much ventilation will result in much heat loss. New Zealand standard (NZS 4218:2009) recommends that minimum infiltration shall be 0.5 air change per hour for housing.

Mechanical heat recovery and ventilation systems can also be implemented to ensure there is a good quality of air flow in the buildings.

### SPECIFIC TO THE SITE

Air tightness are two issues that need to be addressed with 7 and 5 Leybourne Circle, however with increased insulation in the floor,walls and ceiling as well as new windows with draught proofing this will improve is drastically without needing a large amount more. However there is also a risk of the houses becoming too airtight and consideration needs to made in order to prevent condensation. As there are a large amount of open-able doors and windows natural cross ventilation can occur and a mechanical heat recovery system can be installed to ensure a good air quality is maintained.



*Draft proofing windows. (Ventrolla, 2014)*
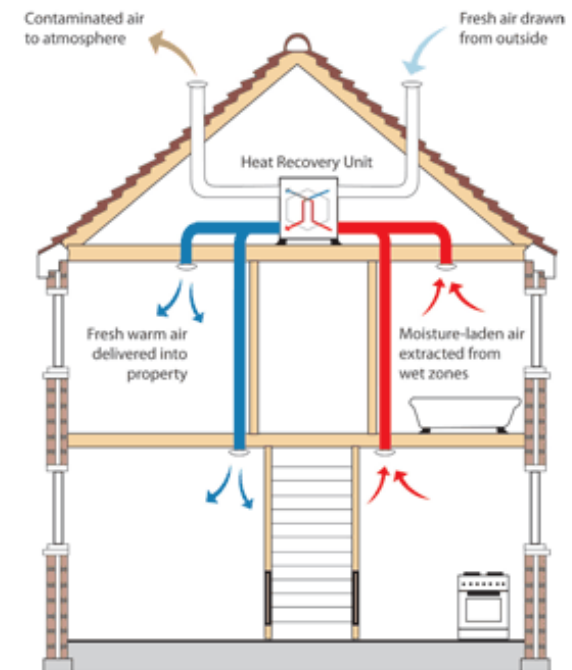


*Heat Recovery ventilation.*
*This is a centralised system, normally located in the loft space of a house or a utility room in an apartment. It works using the principles of both supply and extract ventilation. Warm and moisture-laden air is extracted from the bathroom, kitchen, WC and utility room of a property which is drawn into the main system and passes over a heat exchange cell before being ducted outside to atmosphere. At the same time, fresh air is drawn from outside into the system, collecting up to 90% of the heat from the extracted air as it passes over the heat exchange cell. This fresh, filtered and tempered air is then supplied into the living room areas of the home, the bedrooms, living and dining areas. (EnviroVent, 2014)*

The previous section analysed the improvement in thermal comfort and heating energy with different retrofit strategies. As this thesis focuses on state housing, which is constantly under pressure to be as cost effective as possible, considering the cost is an important part in making appropriate decisions. The cost in conjunction with life cycle cost and effectiveness are considerations in the final selection of retrofit strategies. Due to the hypothetically nature of the design proposal all costs calculations are educated estimates collected from *Rawlinsons Handbook 2009*, as well as from phone calls with materials supply companies.

Each step of retrofit work generally includes the cost of material and labour work. Some retrofit work also incurs some extra costs for building inspection required by the local building authority or for a secondary process, such as removing existing wall internal lining and installing insulation retrofit, and then re-lining the wall.

There are many different ways and levels of insulation that can be achieved, however, this comparison only deals with the minimum building code requirement and the chosen optimum levels chosen from previous information.

### WALL

There are two methods for wall insulation retrofit considered in this thesis. Option one is using AIRFOAM insulation. Option two needs the removal of the internal lining before insulation material can be fitted in between wall studs and noggins. For this wall insulation retrofit option, R-value can be assured by installing bulk insulation.

#### WALL RETROFIT COST

| Total Area (existing exterior walls only): 227.5 m² | Studs @600-Dwangs @800 Timber 14% = 31.9 m² Space  86% = 195.6 m² | |
|---|---|---|
| | OPTION 1 | OPTION 2 |
| | AIRFOAM injection - exterior | Interior retrofit |
| MATERIAL/ m² | - | Insulate. $22 Other $64.45 |
| LABOUR/ Hr | - | $30 |
| HOURS/ m² | - | 0.71 |
| RUBBISH | - | $150 |
| FEES | - | $538 |
| ELECTRICS | - | $600 |
| TOTAL COSTS | $3812 | $23 811.40 |

### FLOOR

Similar to ceiling insulation retrofit, costs of two different floor insulation options were calculated for Building Code level and optimum level. These floor insulation retrofits can be carried out with the assumption of under floor accessibility. For optimum level, bulk insulation R4.6 with fibre cement board fixed at floor joist bottom. A layer of polythene covering can be put on the natural ground to provide some moisture control. The calculation did not include polythene covering.

#### FLOOR RETROFIT COST

| Total Area (including new build): 258m² | 190mm Joist @ 400 Timber 11.30% = 29.2 m² Space  88.70% = 228.8 m² | |
|---|---|---|
| | OPTION 1 | OPTION 2 |
| | Building code - reflective foil underlay | Complete R4.6 Bulk insulation |
| MATERIAL/ m² | $7.20 | $71 |
| LABOUR/ Hr | $30 | $30 |
| HOURS/ m² | 0.12 | 0.94 |
| TOTAL COSTS | $2786.4 | $20 431.8 |

### WINDOWS

For window retrofit, two options were compared. Option one gives a double glazing solution by adding a layer of acrylic at the inside edge of the window frame secured by magnetic tape. Secondly replacing with new double glazing window units. New window frames also reduce air infiltration heat loss. This solution is adopted as option two for double glazing retrofit.

#### WINDOW RETROFIT COST

| Total Area: 60m² | | |
|---|---|---|
| | OPTION 1 | OPTION 2 |
| | Magnetic attached acrylic | Replace with new dbl glazing |
| MATERIAL/ m² | $106 | $440 |
| TOTAL COSTS | $6 360 | $26 400 |

### CEILING

For a house with pitched hip roof, ceiling insulation retrofit can be done by access into the roof attic. Options can be chosen with different levels of insulation materials.
Option one is one layer of basic level insulation, R2.8, as required by the Building Code. Option two is the optimum level insulation of R4.6. Apart from more insulation material cost, labour and delivery costs of the two options should be the same.

#### CEILING RETROFIT COST

| Total Area (including new build): 258m² | | |
|---|---|---|
| | OPTION 1 | OPTION 2 |
| | Code required R2.8 | Optimum solution R4.6 |
| MATERIAL/ m² | $15 | $23 |
| LABOUR/ Hr | $30 | $30 |
| HOURS/ m² | 0.1 | 0.1 |
| TOTAL COSTS | $4644 | $6708 |

### AIR TIGHTNESS

Currently, there are many draught seal strips on the market with reasonable price. This is also a simple house upgrading solution and can be done by householders. The required length of seal strips was calculated with the gap dimension of windows and doors.

#### AIR DRAUGHT RETROFIT COST

| Total Length: 180.2m | |
|---|---|
| | OPTION 1 |
| | Draught control seal strips |
| MATERIAL/ m² | $4.70 |
| TOTAL COSTS | $847 |

## RETROFIT INSULATION LEVELS WITH DRAUGHT CONTROL

| | ROOF | FLOOR | WALL | WINDOW |
|---|---|---|---|---|
| CONSTRUCTION | Ceramic tiles with timber truss | Suspended timber floor | Timber frame with weatherboard cladding | Timber frame |
| BUILDING CODE | R2.9 (bulk insulation) | R1.3 (Dropped foil | R1.9 (bulk insulation) | Double glazing |
| | AIR INFILTRATION | | | |
| | 1.2 ACH | 0.9 ACH | 1.2 ACH | 0.9 ACH |
| OPTIMUM INSULATION | R4.6 (bulk insulation) | R4.6 (bulk insulation) | R2.4 (bulk insulation) | Double glazing |
| | AIR INFILTRATION | | | |
| | 1.2 ACH | 0.9 ACH | 1.2 ACH | 0.9 ACH |

## SUMMERY

The tables and graphs in this section illustrate the large difference between energy retrofit solutions that just meet the building code standards and the optimum level of insulation. It also shows the contrast in cost between them. While the optimum level has a substantially higher cost it delivers a greater level of comfort and quality. Therefore the optimum level of insulation is chosen. It is a largest investment but in the long term it would give the biggest payoff in energy savings as well as extending the building life not only of the retrofit but also the buildings as a whole. Another consideration is the building code is always changing and insulation levels will only increase therefore to only meet standard levels, this investment would become redundant quickly and in fitting with sustainable design principals and research from the case studies in part 3 it is evident that it is better to invest more for better and longer lasting results, especially when considering creating healthy homes.
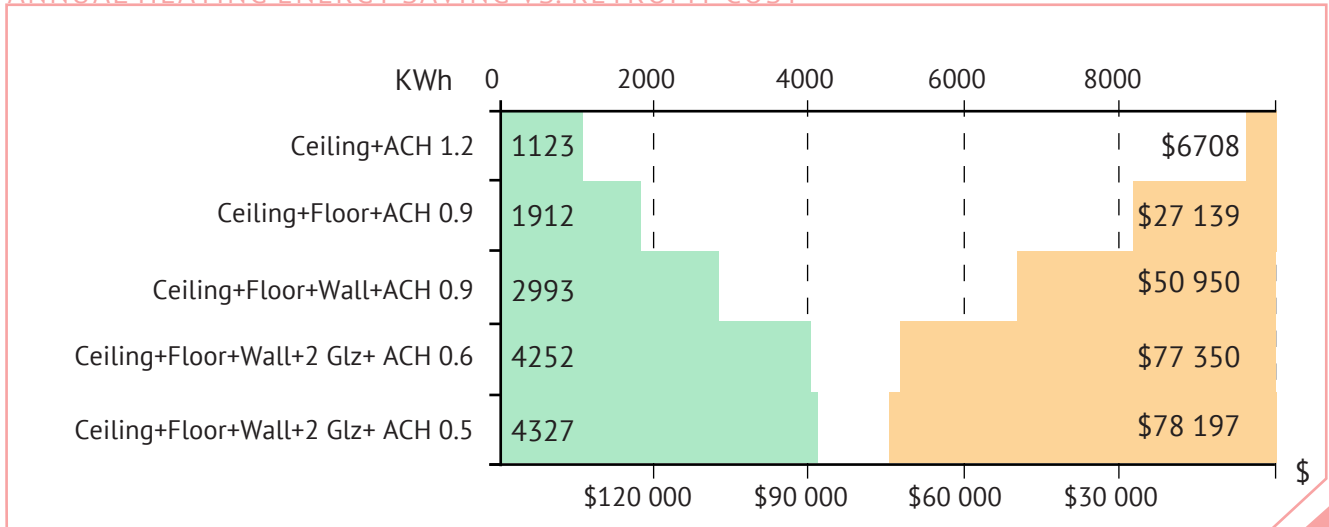
### RETROFIT ELEMENT COST



Legend: Building Code level / Optimum level

Ceiling insulation retrofit: $4644 / $6708
Floor insulation retrofit: $2786.4 / $20 431.8
Wall insulation retrofit: $3812 / $23 811.40
Double glazing retrofit: $6360 / $26 400
Air tightness retrofit: $847 / $847
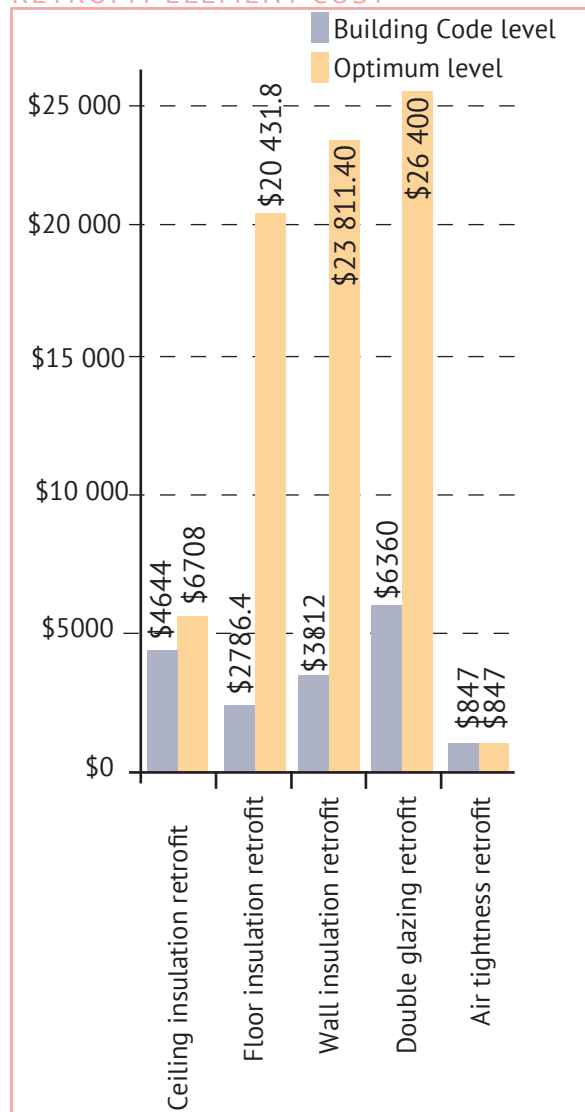
### RETROFIT COMBINATION COST



Legend: Building Code level / Optimum level

Ceiling+ACH 1.2: $4644 / $6708
Ceiling+Floor+ACH 0.9: $7430 / $27 139
Ceiling+Floor+Wall+ACH 0.9: $11 242 / $50 950
Ceiling+Floor+Wall+2 Glz+ ACH 0.6: $17 602 / $77 350
Ceiling+Floor+Wall+2 Glz+ ACH 0.5: $18 449 / $78 197
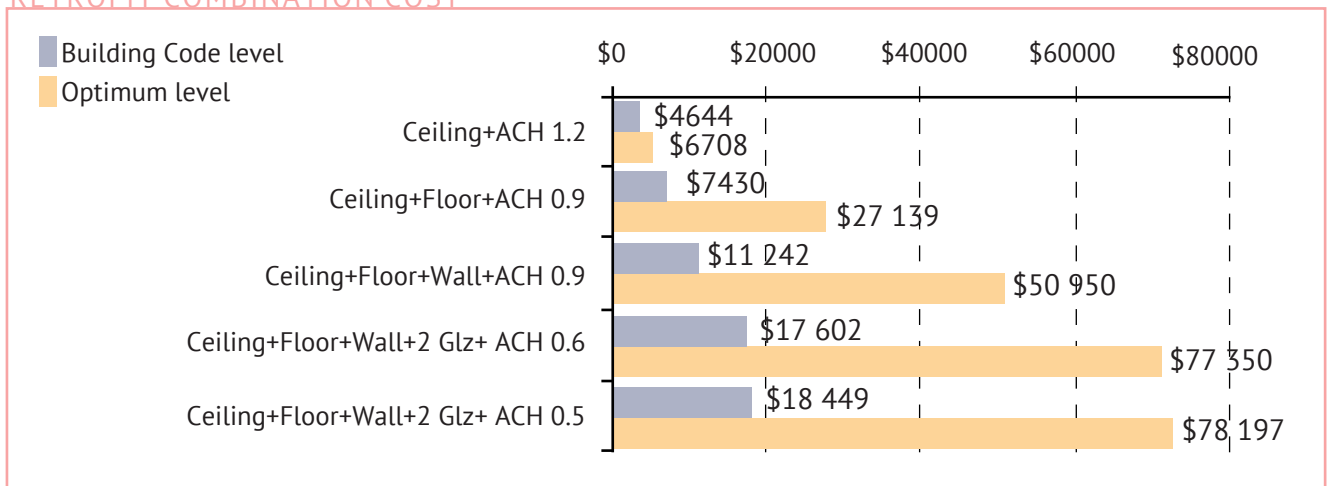
### ANNUAL HEATING ENERGY SAVING VS. RETROFIT COST



Ceiling+ACH 1.2: 1123 / $6708
Ceiling+Floor+ACH 0.9: 1912 / $27 139
Ceiling+Floor+Wall+ACH 0.9: 2993 / $50 950
Ceiling+Floor+Wall+2 Glz+ ACH 0.6: 4252 / $77 350
Ceiling+Floor+Wall+2 Glz+ ACH 0.5: 4327 / $78 197

# 5.6
## GENERAL DESIGN GUIDELINES-SITE

### HOUSE LOCATION
- Locate facing to maximise exposure to the sun and north facing outdoor areas, ensuring maximum solar gain and natural warmth.
- Located to minimise prevailing wind
- North facing glazing for solar gain and making eaves and shading devices more effective.

### FRONT YARDS
- Where children will play in front yards appropriate fencing must be provided. Careful division between vehicle access and child play areas to avoid accidents.
- Provide visually interesting fences, or planting, prevent the edge of the site from appearing barren.
- Demarcate the public/private edge.

### REAR YARDS
- Fencing should add to the security and privacy of the rear yard.
- Where private outdoor space is provided in a rear yard, fencing should contribute to the outdoor space.

### PRIVATE OUTDOOR SPACE
- Sited to receive good sun through much of the day and towards rear of the site.
- Sufficient shade for people to be outside protected from strong prevailing winds and sun.
- Usable size for outdoor furniture and to provide a children's play area.
- Private from neighbours.
- Direct access to indoor living areas.
- At least partially hard landscaped (e.g. paved or decking)
- 

### SIDE FENCES
- Side and rear fences may need to be higher than front fences to provide security and/or privacy.

### WASHING LINE
- Washing lines provided to minimise energy usage, positioned to receive good drying air movement.

### OUTDOOR COOKING
- Space for 'hangi' or 'umu' cook. Requires space for cooking underground with fire.

### DISABLED ACCESS
- Ramp for disabled access

### EXTENSIONS + ADDITIONS
- Carport allows for future extensions to the house and additional structures.

### WINDOWS
- Windows not directly facing windows of a neighbouring dwelling.
- Windows not directly overlook neighbouring private outdoor space.
- Windows are positioned to overlook the street and the approach to a neighbouring property.
- 

### SECURITY
- Visual connection between the street and the house
- The approach to the house from the street overlooked from within the house, and well lit.
- Areas of loose gravel can add to site security, as the noise of footsteps can indicate an intruder.

### VEHICLE CROSSING/PATHS
- Vehicle crossings not taking up prime outdoor area.
- Physical and visual separation between vehicle access and children's play areas.
- Combined pedestrian and vehicle access to minimise hard surfaces.
- Paths use hard even non slip surfaces - especially to front door of dwelling.

### URBAN HEAT ISLAND EFFECTS
- Provide shade within landscape installation.
- Cover structures with solar photovoltaic panels, vegetated roofs, and/or surfaces with a solar reflectance index (SRI) of at least 29.
- Use paving materials with an SRI of at least 29.
- Use an open-grid pavement system (e.g., concrete-grass lattice).

### GARDENS AND PLANTING
- Provide vegetable garden for economic, health and cultural reasons.
- Provide gardens for a more natural and sympathetic border between neighbouring properties and shelter outdoor living spaces from prevailing winds.
- Provide gardening and compositing infrastructure on-site for household food waste and plant clippings.
- Access to community gardens for further gardening facilities and shared knowledge.

### COMMUNITY GARDENS
- Provide access to community gardens when garden space is limited at a site.
- Encourage communal activities at the gardens - especially between different ages.
- Provide good establish facilities such as compost and irrigation.

### VEGETATION
- Maintain and restore vegetation.
- Minimise any disruption to existing habitats.
- Use vegetation that promotes a regional identity and a sense of place.
- Use native and appropriate non-native plants adapted to site conditions and climate.
- Place vegetation in strategically.
- Low maintenance vegetation.
- Existing trees maintained where possible.
- New trees native species.

### STORM WATER
- Maximize permeable surfaces.
- Design site to capture, slow, and treat storm-water runoff by reducing impervious surfaces, harvesting rainwater, and directing remaining storm-water runoff to soil- and vegetation-based water treatment methods, such as vegetated bioretention facilities, rain gardens, wetlands, and bioswales.

### WATER USE
- Recycling grey water for toilet flushing and irrigation.
- Site designed to minimize or eliminate use of potable water for irrigation.
- Plants grouped with similar water needs to maximize irrigation efficiency.
- Rain water harvesting for portable water. (Common in NZ)

## GENERAL DESIGN GUIDELINES- HOUSE
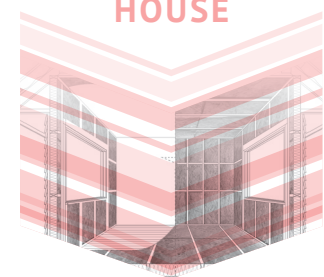
### ENTRANCE
- Obvious, Welcoming
- Two entrances (front and back)
- Large covered entry porch for receiving guest (north)
- Secondary entry (south) for refuse/storage

### LIVING ROOM (FORMAL)
- Heart of the house (modern Marae)
- Where visitors are received/welcome/sleep
- For formal meetings/private
- Accommodate 20 people
- Connection to outdoors

### KITCHEN + DINING
- Large for more than 2 people
- Ability to watch children play from kitchen interior + exterior
- Joining dining and social space
- Separate from formal living space

### LIVING ROOM (INFORMAL)
- Not disturb formal living room. Join dining room
- Connected to outdoors

### BEDROOMS
- Big enough for 2 or more people
- Adaptable for large families and visitors
- Elderly always in doors (most important room)
- Separation of young single males and females. Positioned away from main living areas

### MATERIALS
- Ecological
- Respect for nature, Natural look and feel, Durable, Security and familiarity
- Long lasting and not easily outdate

### LAUNDRY
- Separate from kitchen and bathroom. Access to outside

### BATHROOM
- Toilet separate from bathroom
- 2 toilets, 1 one with easy Access from outside
- Bath for young children

### SOLAR
- Solar panels north facing at 30 degree angle. (4kWp)
- North facing solar hot water system.

### SOLAR GAIN
- Direct heat gain through correctly orientated windows.

### SOLAR SHADING
- Reduce heat gain and glare during the day, and heat loss at night.
- Eave act as external shading reducing heat gain by 80%

### VENTILATION
- Open-able windows for natural ventilation.
- Mechanical heat recovery system.

### RAINWATER COLLECTION
- Rainwater collection from roof through gutter system to storage tank.
- Grey water recycled and used for irrigation and flushing toilets.

### MATERIALS + FINISHES
- When possible use recycled materials first.
- Use local materials.
- Use long life, low embodied energy materials
- Use low VOC paint such as 'Resene eco paint'.
- Plasterboard replaced with sustainable alternative such as 'Ecorock'.
- Existing timber floors renovated.

### ENCLOSE SUB-FLOOR
- Enclosing timber sub-floors improves the house energy rating for lightweight cladding systems.
- Totally enclose the sub-floor and insert wall vents at the correct spacings.

### MISCELLANEOUS
- Duel flush toilets.
- Compact florescent lighting.
- Resource efficient appliances.
- Visible energy use metre.

### CEILING INSULATION
- 195mm of 83% recycled glass wool insulation. R4.6
- Installed via opening in ceiling.

### WALL INSULATION
- 90mm of 83% recycled glass wool insulation. R2.4
- Installed from the interior by removing existing plasterboard.

### FLOOR INSULATION
- 190mm bulk insulation (83% recycled glass wool insulation) supported on sheet of lining to reduce air infiltration heat loss. Additional layer of polythene to cover ground, controlling dampness.
- Installed via access from below the house.

### WINDOW INSULATION
- Existing windows replaced with Low-E and argon double glazing. R1.5, Light transmission 77%, solar transmission 65%.
- Resorted or replaced timber window frames. R2.7

# APPLIED REGENERATIVE DESIGN GUIDELINES - SITE

**HOUSE LOCATION**

Located facing north east to maximise exposure to the sun and north facing outdoor areas, ensuring maximum solar gain and natural warmth.
Located to minimise prevailing wind
North facing glazing for solar gain and making eaves and shading devices more effective.

N

**VEHICLE CROSSING/PATHS**

Vehicle crossings moved to not taking up prime outdoor area.
Visual separation between vehicle access and children's play areas.
Minimise hard surfaces.

**FRONT YARDS**

Careful division between vehicle access and child play areas to avoid accidents.
Visually interesting fences, and planting, prevent the edge of the site from appearing barren.
Public/private edge demarcate.

**SIDE FENCES**

Side and rear fences higher than front fences to provide security and/or privacy.

**WASHING LINE**

Washing lines provided to minimise energy usage, positioned to receive good drying air movement from prevailing wind.

**EXTENSIONS + ADDITIONS**

Carport allows for future extensions to the house and additional structures.

**OUTDOOR COOKING**

Space for 'hangi' or 'umu' cook.
Requires space for cooking underground with fire.

RELOCATED    NEW    EXISTING

**SECURITY**

Visual connection between the street and the house
The approach to the house from the street overlooked from within the house, and well lit.

**PRIVATE OUTDOOR SPACE**

Sited to receive good sun through much of the day and towards rear of the site.
Sufficient shade for people to be outside protected from strong prevailing winds and sun.
Usable size for outdoor furniture and to provide a children's play area.
Private from neighbours.
Direct access to indoor living areas.
At least partially hard landscaped - decking

**DISABLED ACCESS**

Ramp for disabled access

**REAR YARDS**

Fencing adds to the security and privacy of the rear yard.
Rear yard, fencing visually contributes to the outdoor space.

**GARDENS AND PLANTING**

Vegetable garden for economic, health and cultural reasons.
Trees shelter from prevailing winds.
Low maintenance vegetation.
Gardening infrastructure provided.

**WINDOWS**

Windows not directly facing windows of a neighbouring dwelling.
Windows not directly overlook neighbouring private outdoor space.
Windows are positioned to overlook the street and the approach to a neighbouring property.

---

# APPLIED REGENERATIVE DESIGN GUIDELINES - SITE

**GARDENS**

Infrastructure for vegetable gardens provided.
Compositing infrastructure on-site for household food waste and plant clippings.
Access to community gardens for further gardening facilities and shared knowledge.

BENEFITS
Access to fresh produce. Save time and money. Complete control over the chemicals and products used during the growing process. Positive environmental impact. Recycle certain kitchen and yard waste. Reduces the waste and provides natural fertilizer. Stress-relieving, good for overall mental health. Gives family a chance to work together. Offers social interaction. Moderate outdoor exercise.

**URBAN HEAT ISLAND EFFECTS**

Shade provided within landscape installation.
Roof covered with solar photovoltaic panels, and/or surfaces with a solar reflectance index (SRI) of at least 29.
Open-grid pavement system  used (e.g., concrete-grass lattice).

BENEFITS
Reduce energy consumption.
Lower maintenance costs.
Lowers surface and air temperature, greenhouse gas emissions, energy demand and air pollution.

**STORM WATER**

Maximize permeable surfaces.
Site designed to capture, slow, and treat storm-water runoff by reducing impervious surfaces, harvesting rainwater, and directing remaining storm-water runoff to soil- and vegetation-based water treatment methods, such as vegetated bioretention facilities, rain gardens, wetlands, and bioswales.

BENEFITS
Reduces potable water consumption on site, leading to reduced public and private utility costs and energy expenditures for pumping, cleaning, and processing water.
Reduces combined sewer overflow, thus minimizing effects on aquatic habitat.
Reduced infrastructure requirements for storm-water collection and treatment.

S-W PREVAILING WINDS

LEYBOURNE CIRCLE

**WATER USE**

Recycling grey water for toilet flushing and irrigation.
Site designed to minimize or eliminate use of potable water for irrigation.
Plants grouped with similar water needs to maximize irrigation efficiency.
Rain water harvesting for portable water. (Common in NZ)

BENEFITS
For the average family of four, approximately 30 percent of the water used daily is devoted to outdoor uses such as watering lawns and gardens. Reduces portable water needs and cost. Reduces pressure on water infrastructure

**VEGETATION**

Minimised disruption to existing habitats.
Vegetation that promotes a regional identity and a sense of place.
Native and appropriate non-native plants adapted to site conditions and climate.
Vegetation placed strategically.

BENEFITS
Pollutant interception, water absorption, greenhouse gas regulation, and micro-climate regulation.
Vegetation used as windbreaks can result in heat energy savings of up to 40 percent.
Vegetation insulates buildings, by reducing wind velocity and air movement into buildings.

**COMMUNITY GARDENS**

Access to community gardens.
Encourage communal activities at the gardens - especially between different ages.
Good establish facilities such as compost and irrigation provided.

BENEFITS
Increase a sense of community ownership
Increase crime prevention
Encourage different cultures and activities
Offers education
Encourages healthy eating
Improve the environmental conditions of the neighbourhood.
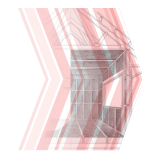
## KITCHEN + DINING

Large for more than 2 people
Ability to watch children play from
kitchen interior + exterior
Joining dining and social space
Separate from formal living space

## LIVING ROOM (FORMAL)

Heart of the house (modern Marae)
Where visitors are received/
welcome/sleep
For formal meetings/private
Accommodate 20 people
Connection to outdoors
Flexible and can increase in size.

## ENTRANCE

Obvious, welcoming
Three entrances (front, carport and
back)
Large covered entry porch for
receiving guest (north)
Secondary entry (south) for refuse/
storage

## LIVING ROOM (INFORMAL)

Does not disturb formal
living room.
Joins dining room
Connected to outdoors

## BATHROOM

Toilet separate from
bathroom
3 toilets, 1 one with easy
Bath for young children
Bathroom separate from
kitchen and laundry

## LAUNDRY

Separate from kitchen and
bathroom. Access to outside

## MATERIALS

Ecological
Respect for nature, Natural look and feel,
Durable, Security and familiarity
Long lasting and not easily outdated

## BEDROOMS

Big enough for 2 or more people
Adaptable for large families and
visitors
Flexible for elderly to be in the
most important room
Flexible for separation of young
single males and females.
Positioned away from main living
areas
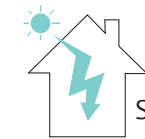
## SOLAR

Solar panels north-east facing at
30 degree angle. (4kWp)
North-east facing solar hot water
system.

## VENTILATION

Open-able windows for natural
ventilation.
Mechanical heat recovery system.

## CEILING INSULATION

195mm of 83% recycled glass wool
insulation. R4.6
Installed via opening in ceiling.
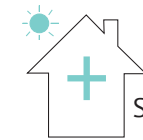
## SOLAR GAIN

Direct heat gain through
north orientated windows.

## RAINWATER COLLECTION

Rainwater collection
from roof through gutter
system to storage tank.
Grey water recycled and
used for irrigation and
flushing toilets.

## SOLAR SHADING

Reduced heat gain and glare during
the day, and heat loss at night.
500mm eave act as external
shading reducing heat gain by 80%

## WALL INSULATION

90mm of 83% recycled glass wool
insulation. R2.4
Installed from the interior by
removing existing soft-board.

## MISCELLANEOUS

Duel flush toilets.
Compact florescent lighting.
Resource efficient appliances.
Visible energy use metre.

## WINDOW INSULATION

Existing windows replaced with Low-E
and argon double glazing. R1.5, Light
transmission 77%, solar transmission
65%.
Resorted and replaced timber window
frames. R2.7
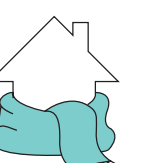
## ENCLOSE SUB-FLOOR

Enclosing timber sub-floors improves the house
energy rating for lightweight cladding systems.
Totally enclose the sub-floor and insert wall vents
at the correct spacings.

## MATERIALS + FINISHES

Recycled materials first.
Local materials used when possible.
Long life, low embodied energy materials
Low VOC paint such as 'Resene eco paint' used.
Plasterboard replaced with sustainable alternative
such as 'Ecorock'.
Existing timber floors renovated.

## FLOOR INSULATION

190mm bulk insulation (83% recycled glass wool insulation)
supported on sheet of lining to reduce air infiltration heat
loss. Additional layer of polythene to cover ground,
controlling dampness.
Installed via access from below the house.
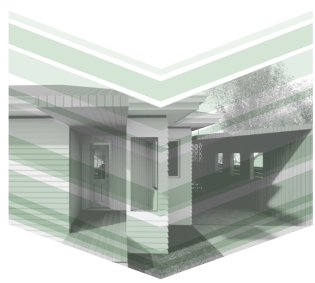
# ▶ PART SIX.

THIS PART SHOWCASES THE PREVIOUS DESIGN CRITERIA APPLIED TO AN IN-DEPTH DESIGN PROPOSAL FOR ONE LARGE FAMILY STATE HOME IN GLEN INNES, NEW ZEALAND.
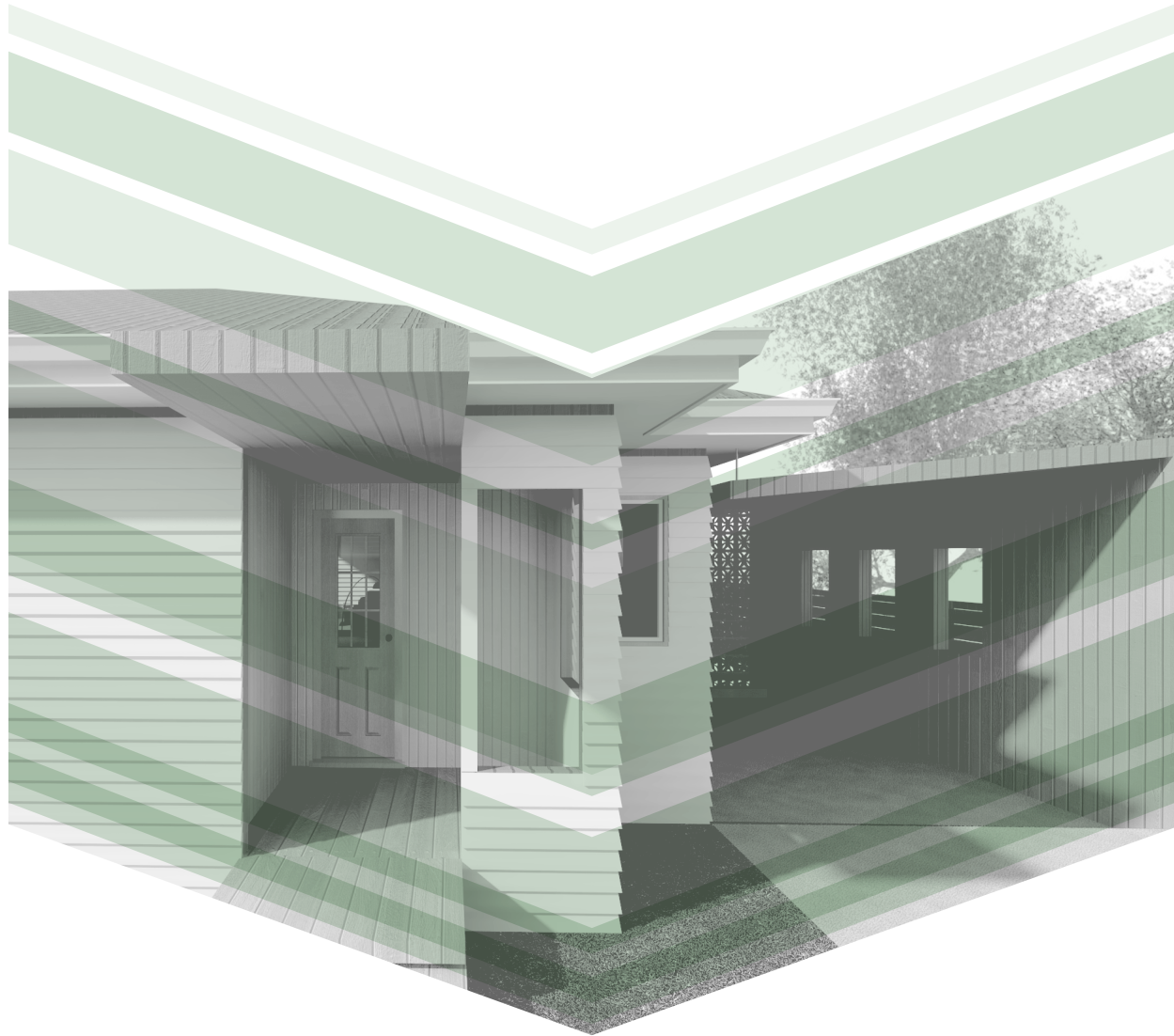
Part six explores how all the previous regenerative design guidelines can be applied to an existing building and site in a successful way to create a new home for a large Maori and Pacific state housing family.

The guidelines from part six are showcased both in a master plan level of the neighbourhood and also in depth in one specific property - 7 Leybourne Circle.

This section includes background information about the brief, the family and the limitations of the district plan for the area as well as site analysis and the some of the conceptual process to reach the final design proposal. Plan, sections, elevations and renders illustrate the in depth design proposal on a multiple of levels. It is then concluded with the cost evaluation that verifies the success of this approach.

The specific site of Leybourne Circle was chosen because it is close to other areas that are planned for or already undergoing state housing redevelopment. This specific neighbourhood also has a high number Maori and Pacific Islanders currently residing there in conjunction with a high number of existing state houses.

This design proposal is however a hypothetical proposal and while it is based on many real facts it still remains a fictional project. In order to analyse the site and the existing structure many generalisations have had to be made.

# BACKGROUND
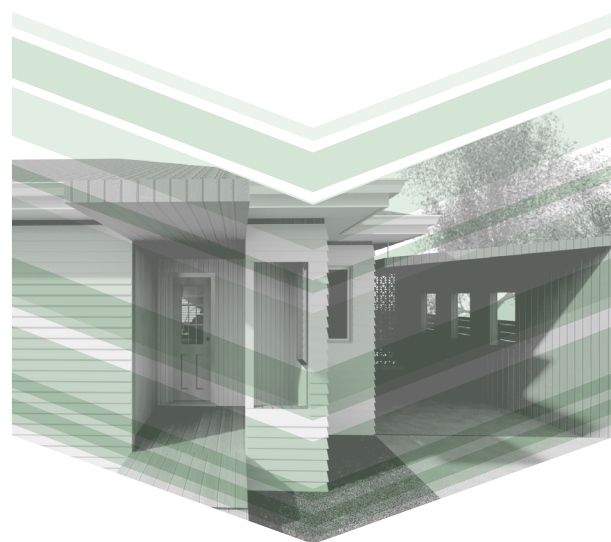
## BRIEF

This project concerns the design of a state housing large family home for an large extended style family. It is to be sited in one of the existing state housing plots on Leybourne Circle or Ridgeway Place in Glen Innes, south of Auckland city centre.

Glen Innes has a large Maori and Pacific population and there is a lack of state housing that can accommodate large extended families which are common among these cultures.

Taking into consideration the different cultures and their unique needs while considering the flexible needs of state housing as it will not always be occupied by the same family or culture.

### THE SITUATION.

A large family with both Pacific Island and Maori ties require a state house for their large family. The family consists of Mother and Father, their four children aged between 6-17 years-old. The mothers elderly parents and two cousins that are currently staying with then long term while visiting from Samoa. It is likely the cousins family will also come to visit for extended periods at a time. As there are elderly people, disability access needs to be considered.

### SCHEDULE OF ACCOMMODATION
5+ Bed rooms
2 Bathrooms with separate toilets
Laundry
Kitchen
Formal living area + Informal living area
Multiple entrances
Storage
Covered outdoor space
Outdoor cooking area
Option for vegetable gardens

GRAN-DAD

COUSIN

CHILD

CHILD

COUSIN

MUM

DAD

CHILD

GRAN-MA

CHILD

THE FAMILY

## AUCKLAND DISTRICT PLAN
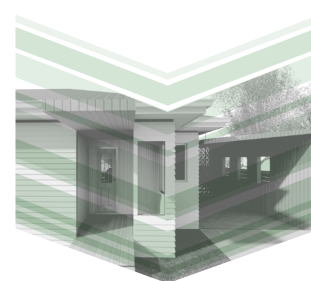
### AUCKLAND DISTRICT PLAN
The district plan is a legal document which sets out the council's policies and strategies for managing the natural and physical resources of the Auckland Isthmus for the future.

The plan imposes various rules to control the effects of activities and development on the Auckland Isthmus.

The plan is made up of a set of maps and a written document (the text). The maps show all properties on the Isthmus.
They show the various zonings which limit the activities and development allowed on a property.
They also show any other limitations which may apply to particular properties (e.g. special height restrictions, protected trees, public works).

### ZONING
Zoning is used as the primary management techniques determining the future distribution of residential activities on the Isthmus. It takes a traditional approach to the extent of identifying specific locations, but the distribution pattern is performance orientated. It is based on the actual physical characteristics and functions of activities and their effects on the local environment. This approach will ensure that the level of development permitted in each locality is compatible with the ability of the area to cope with additional development.

The zoning provisions are orientated towards providing greater flexibility for developers appropriate to the local environment, while attempting to maintain or even enhance the amenity values experienced by the local community.

The distribution of the residential zones across the Isthmus has been determined by the interaction of the following principal factors:

• Infrastructure constraints (in particular, drainage and roading);
• Access to services, shopping, and leisure opportunities;
• Local environment (topography, existing development);

The zoning pattern is qualified by the identification of exceptional areas which warrant special controls or safeguards. There are certain areas where controls are applied to maintain the particular elements or qualities which give each area its character, such as development intensity and form, lot sizes, building style, mature trees, etc.

RESIDENTIAL 1 (BUILT)
RESIDENTIAL 2 (BUILT/FLORA)
RESIDENTIAL 3 (BUILT/LANDFORM)
RESIDENTIAL 4 (FLORA DOMINANT)
**RESIDENTIAL 5 (LOW INTENSITY)**
RESIDENTIAL 6 (MEDIUM INTENSITY)
RESIDENTIAL 7 (HIGH INTENSITY)
RESIDENTIAL 8 (STRATEGIC GROWTH MANAGEMENT AREAS)

### ZONE 5
The site and the surrounding area is all zone 5.

#### OBJECTIVE
To protect and maintain the low intensity character of certain areas:
i) in order to secure their generally appreciated pleasantness and coherence;
ii) in selected locations to assist in preserving the overall integrity of the special character zones by ensuring developments occurring in adjacent residential neighbourhoods are sympathetic;
iii) in order to reflect the limited capacity of the existing environment to sustain additional developments.

The Residential 5 zone has been applied generally to areas characterised by detached homes, mainly low rise (1-2 storeys), at lower densities (1-2 units per site) on sites with relatively generous areas of open space to accommodate landscaping and leisure activities. These areas exhibit a pleasantness and aesthetic coherence which is particularly appreciated by the resident community. The purpose of the zone is to maintain or even enhance the environment of these areas. In certain areas, while development is unlikely to be constrained by aspect and slope, access to public transport, community facilities and business areas is poor. In addition, some areas are also constrained by drainage infrastructure that is operating at capacity and are experiencing isolated storm water problems and minor sanitary drainage problems.

### ZONE 5 REGULATIONS
• DENSITY RESTRICTION
  1 residential unit per 500m$^2$ gross site area
• MAX HEIGHT
  8m
• HEIGHT IN RELATION TO BOUNDARY
  (taken from 2 metres)
  East and west boundary 45$^0$
  Southern boundary 35$^0$
  Northern or road boundary 55$^0$
• MAX. BUILDING COVERAGE
  35% of net site area.
• MINIMUM LANDSCAPED PERMEABLE SURFACE
  Not less than 40% of net site
• MAXIMUM PAVED IMPERMEABLE SURFACE
  Not more than 25% of any net site area
• FRONT YARD
  4.5 metres except that on sites other than rear sites not less than 50% of that part of the site between the road boundary and a parallel line 6 metres there from shall comprise landscaped permeable surface.
• PRIVATE OPEN SPACE
  All units shall have an outdoor living area complying with the following -
  • Minimum size: 100m$^2$.
  • Minimum dimension: 3m measured at right angles to the perimeter of the area.
  • Each area must be capable of containing a 6m diameter circle.
  • Obstructions - Private open space shall not be obstructed by buildings, parking spaces or vehicle access and manoeuvring areas.
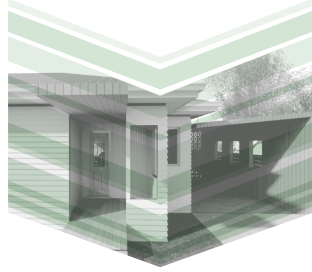
## DESIGN GOALS

### CULTURE
State housing is designed for and supports a diversity of cultures.

### DESIGN AND CONTEXT
State housing responds to the existing context in terms of location, style, size and liveability.
State housing utilises its existing resources as a first response.

### COMMUNITY
State housing supports and encourages community activities and involvement.

### SUSTAINABILITY
State housing and their neighbourhoods are durable, healthy places to live with a long building life span.

## STAKE HOLDERS
- HNZC (Housing New Zealand Corporation)
- Existing tenants
- WINZ (Work and Income New Zealand)
- New Zealand Government
- New Zealand residents with low incomes
- Communities with a large state housing population

## ACTORS
- HNZC
- WINZ
- New Zealand Government
- Existing tenants

## THE CONCEPT

### INTENSIFICATION THROUGH EXISTING BUILDING STOCK.
The neighbourhood of focus has an existing high population density per building because of the high number of people per building. However, the land is still under utilised and many small two or three bedroom houses are on 800m$^2$ plots. By reducing the plot size in half it allows for more manageable plots and increase density. Rather than building new stand alone house in these second plots, relocating existing buildings to them is a better use of resources. Plots where these buildings were can then be used to develop larger new buildings for young professionals or the elderly that don't require a 'family' home. House relocation is cheap, easy and common practise in New Zealand. The process is as follows:
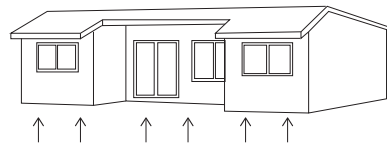
The house is lifted with hydraulic jacks and the house trailer backed under
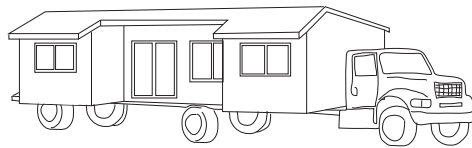
House arrives on site, jacks are set up and the house trailer is pulled out.
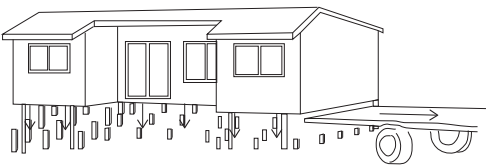
The piles installed, the building is lowered onto its foundations
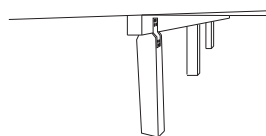
Tied down with stainless steel fixings

House relocated - ready for services and baseboards.

### REGENERATIVE DESIGN
Regenerative design principals heavily apply to the environment and how buildings interact with it. Their core ideas about reusing the existing to create new and prolong the life and life cycle of an object can be applied to this specific design concept. The concept for this design is not only to regenerate state housing physically but also to regenerate the image and the perception around it as well as regenerating suburbs that have been in decline and giving the occupants the ability to expand and flourish socially and culturally. By using regenerative design communities can be supported and enhanced while having smaller impacts on the environment. The idea of having things as closed loops and integrated is also an important aspect in the design. Rain water harvesting in New Zealand is common practise and is even used as portable water but these systems can be expanded and connected with other systems to create more holistic approaches toe building and site.

### CULTURALLY INCLUSIVE
As spoken about earlier in this thesis, the culture of the inhabitants is very important. It is also important to make sure many different cultures are considered so that in years to come if the ethnicities in the area switch there isn't buildings left unusable. In saying that this thesis design focused on designing a house for a large Pacific and Maori family. Aspects in how this effect the design is how it is laid out, and the relationship between different spaces. How each space is used and the number of people that will be using it. The flexible and changing nature of the household and giving the occupants a sense of control over the house. The physical needs of the house in order to cope with so many inhabitants. The variety of ages within the house and the needs for each one of them.

## THE SITE
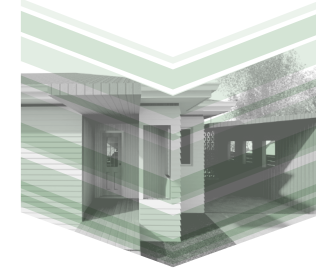


N
↑ AUCKLAND, NEW ZEALAND
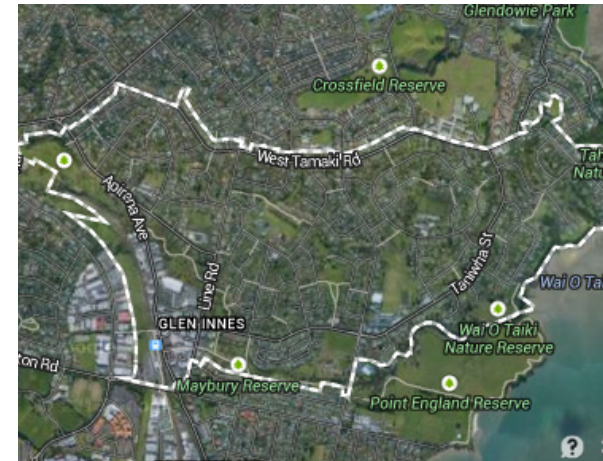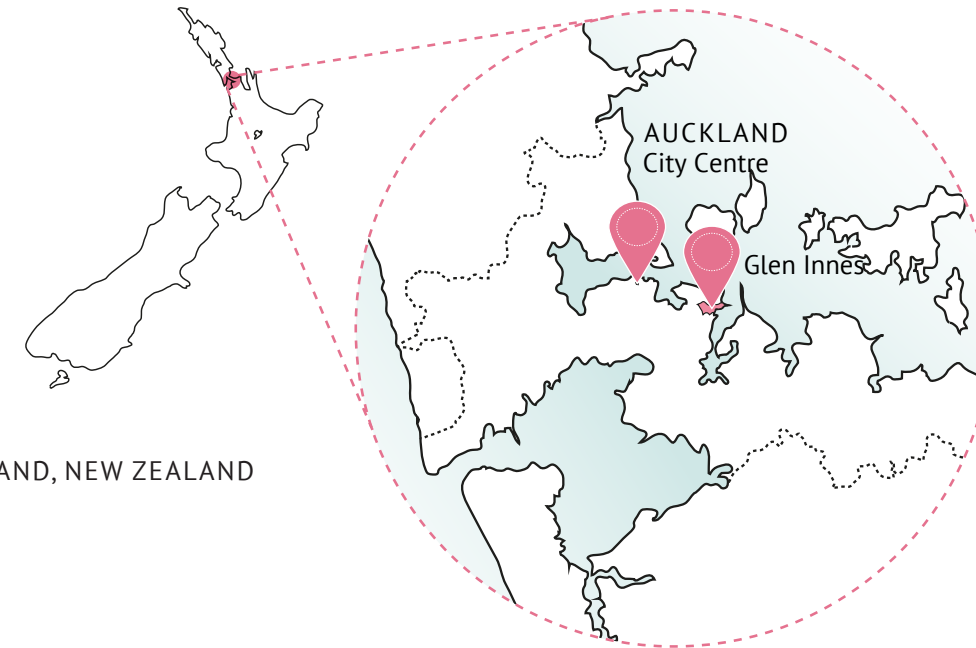


Glen Innes (Google maps, 2014)
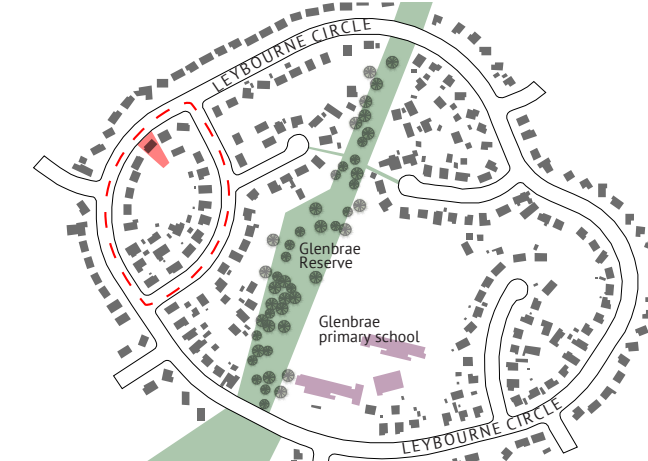


Larger neighbourhood - Leybourne Circle (Google maps, 2014)



Neighbourhood and site (Google maps, 2014)



Number 5 and 7 Leybourne Circle, (Authors own image, 2014)

## CURRENT SITUATION IN GLEN INNES

Glen Innes is currently under going a state housing redevelopment which the inhabitants and residents are not happy about. There has been many protest and they are still on going even now. There are many different factors that have played a role in this situations but plainly put Glen Innes is being gentrified and the inhabitants are not happy.

It has been an on going process but a lot of what was told to the community can now be seen as twisting of the truth. One of the starting factors that has prompted this turmoil is the policy that allows tenure status to be reviewed. The government announced that there were many people abusing the system such as a man in the South Island who was earning 100 000 dollars annually but remained in his state house while he had tenure. Outraged by these few examples this policy was passed. However, in reality it can be seen now, that it was just propaganda to get the policy passed as the majority of tenants that have been evicted or relocated after it was passed is elderly and veterans especially in the areas of redevelopment.

The next event that happened was the community was asked to take part in the early planning process where they were told that 156 state houses would be relocated to make room for a new development of 270 houses. The community was happy with this plan believing that they would be getting new homes and even more than there were originally. What was not made clear to the residents was that of these 270 houses only 78 would be state houses meaning many people would have to relocate to other parts of the city. The government has completed the first stages of the redevelopment and is in the process of relocating more houses to make room for further development. The governments argument for relocating old houses and building new houses is that the current ones are cold and damp and in very bad condition, however, they are advertising the relocated houses for sale as in good condition and great houses. There has been a large amount of misleading information and much of this is what is causing controversy.
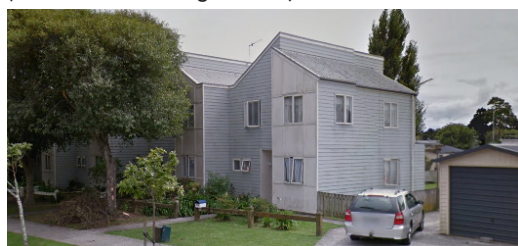
# 6.3
# ANALYSIS



## HOUSING TYPOLOGY



*Post war detached state housing. With weatherboard cladding to the left and brick cladding to the right. (Authors own image, 2014)*
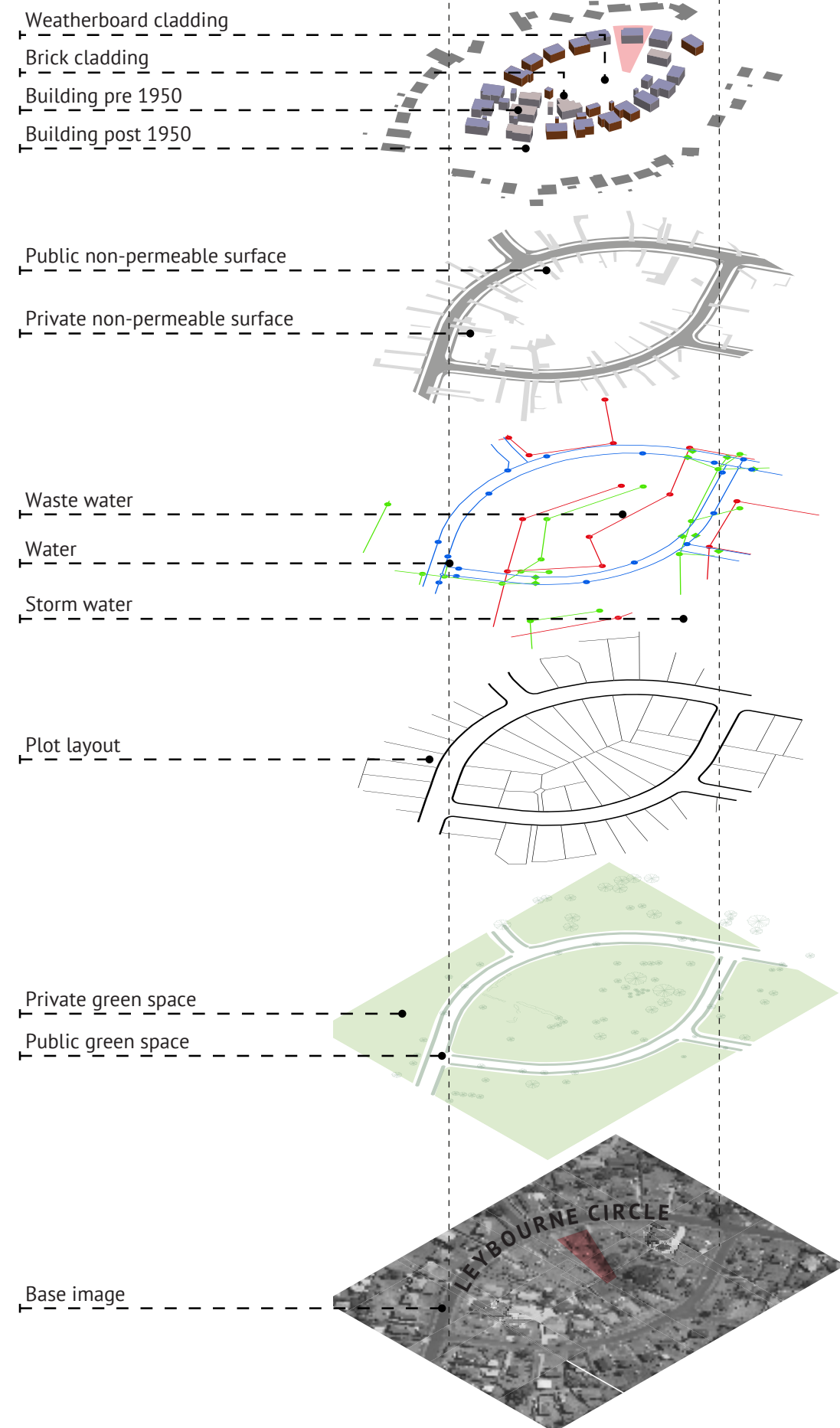


*State housing units (1960-1970). Two storey with a mix of vertical and horizontal timber boards with corrugated iron pitched roof. (Authors own image, 2014)*
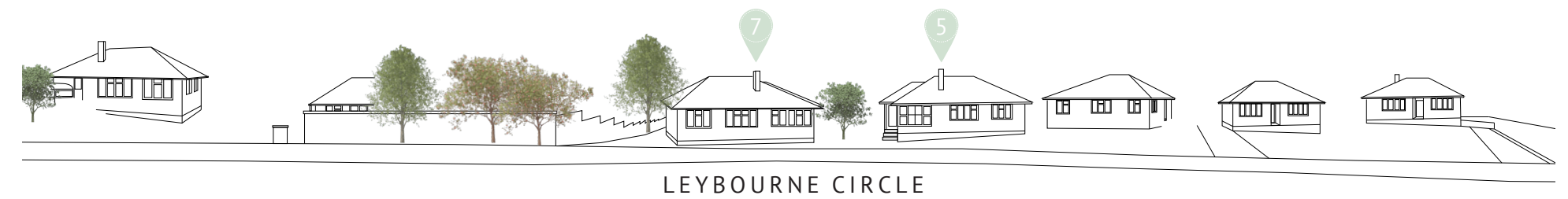


*Terraced state housing (2000s). Two storey with timber weatherboard, vertical panels and corrugated pitched roof. (Authors own image, 2014)*
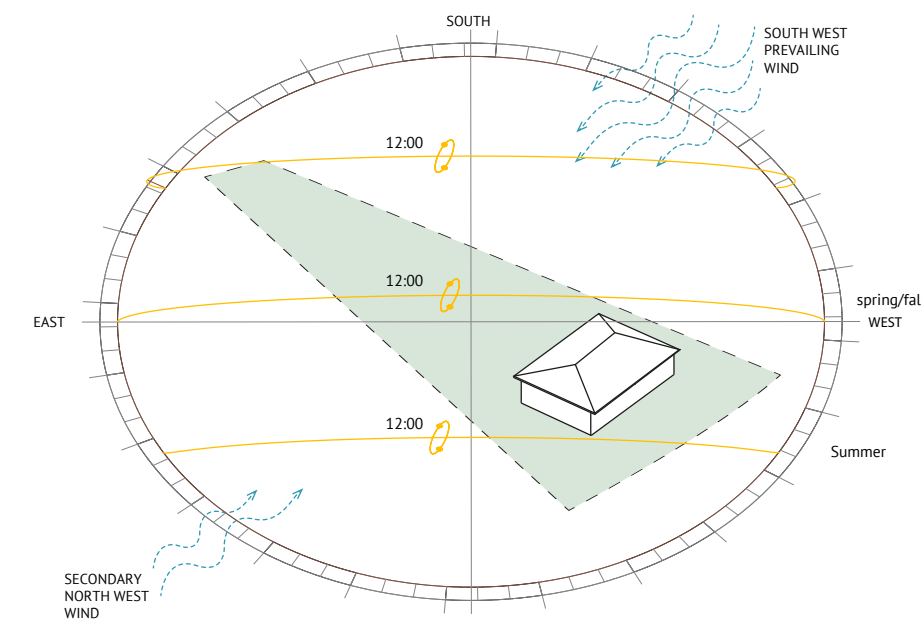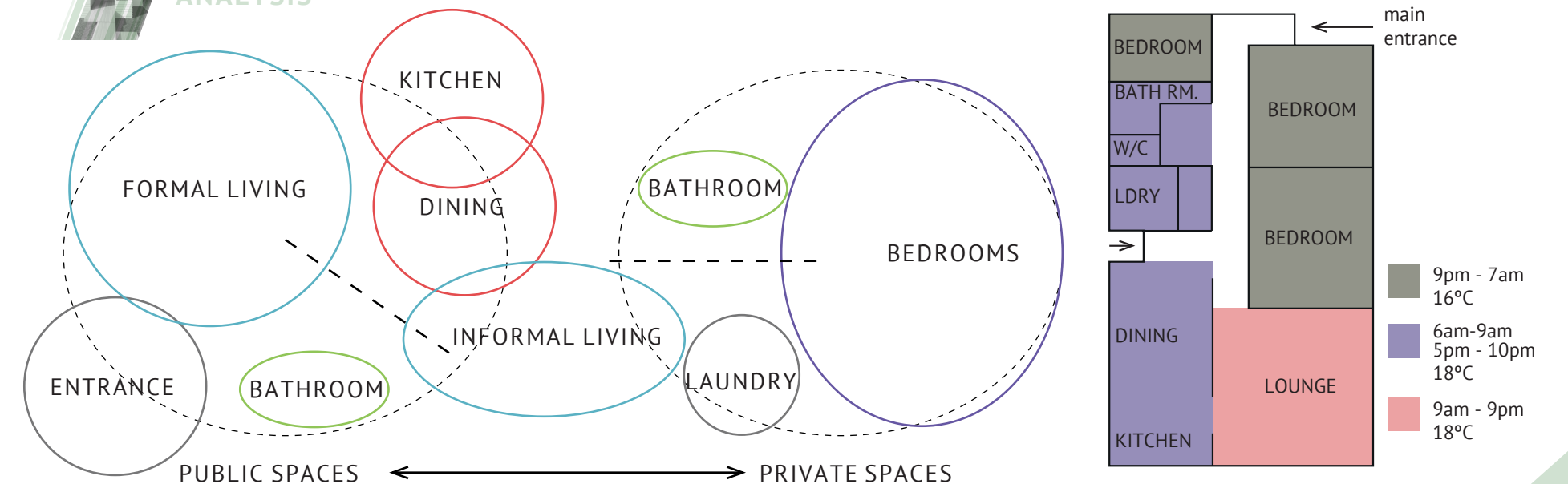
## NEIGHBOURHOOD ANALYSIS

Weatherboard cladding
Brick cladding
Building pre 1950
Building post 1950

Public non-permeable surface

Private non-permeable surface

Waste water
Water
Storm water

Plot layout

Private green space
Public green space

LEYBOURNE CIRCLE

Base image

## LEYBOURNE STREET ELEVATION

LEYBOURNE CIRCLE

## SUN AND WIND ANALYSIS

SOUTH
SOUTH WEST PREVAILING WIND
12:00
12:00
EAST
spring/fall WEST
12:00
Summer
SECONDARY NORTH WEST WIND

The Auckland region enjoys a warm, coastal climate without any extremes of temperature.

Summers in Auckland are generally warm with high humidity, while winters are mild and damp. Plenty of rain is experienced throughout the year, but mainly in winter (June, July, August).

The average daily temperature in Auckland during the summer is 23°C, while winter temperatures are on average 14°C.

Auckland is one of New Zealand sunniest regions with 2060 annual sunshine hours. The region is also very lush, with a mean annual rainfall of 1240mm.

## ROOM RELATIONSHIP ANALYSIS

KITCHEN
FORMAL LIVING
DINING
BATHROOM
BEDROOMS
INFORMAL LIVING
ENTRANCE
BATHROOM
LAUNDRY

PUBLIC SPACES ← → PRIVATE SPACES

main entrance
BEDROOM
BATH RM.
BEDROOM
W/C
LDRY
BEDROOM
DINING
LOUNGE
KITCHEN

9pm - 7am 16°C
6am-9am 5pm - 10pm 18°C
9am - 9pm 18°C

existing vehicle crossing

LEYBOURNE CIRCLE

foot path

Front yard setback
4.5m

EXISTING HOUSE

56m

a
100m²

6m Diameter

52m

storm water

waste water

5m

**ADDRESS: 7 LEYBOURNE CIRCLE**
N    Lot 110 DP 43138

TOTAL SITE AREA    844m²

|  |  | *Required* | *Existing* |
|---|---|---|---|
| ▨ | BUILDING COVERAGE | 35% | 11% (97m²) |
| ▩ | LANDSCAPED PERMEABLE SURFACE | Min. 40% | 85.5% (717m²) |
| ▩ | PAVED IMPERMEABLE SURFACE | Max. 25% | 3.5% (30m²) |
| --- | FRONT YARD | 4.5m | 9m |
| ⬚ *a* | PRIVATE OPEN SPACE 100m² | | + 100m² |

Many of the problems that may occur when retrofitting is that when they were built NZ was still using the Imperial System and now we use the metric.

The original design and layout and subsequent unsympathetic or poorly carried out alterations may need to be addressed to rectify issues such as:

a desire for better indoor/outdoor flow arrangement of rooms to benefit from passive solar heating lack of a variety of living spaces that are associated with more modern houses lower natural indoor light levels poor relationships between spaces – for example, proximity of bathroom and bedrooms inadequate services such as insufficient power outlets lack of vehicle access and/or garaging.

All common problem specific for both the house at 7 and 5 Leybourne Circle are enclosed in a green hashed line



framing
T&G flooring
skirting
wall plate
joists
4 x 3" (100 x 75 mm) bearer
galvanised wire tie 8 x 4" (200 x 100 mm)
concrete pier
precast concrete vent
¼" (6 mm) spacing rods
6" (150 mm)
9" (230 mm)

4½" (114 mm) brick veneer
vermin-proof mesh
damp-proof course
plaster facing
3/8" (9.5 mm) reinforcing for a single storey
½" (12 mm) reinforcing for two storeys
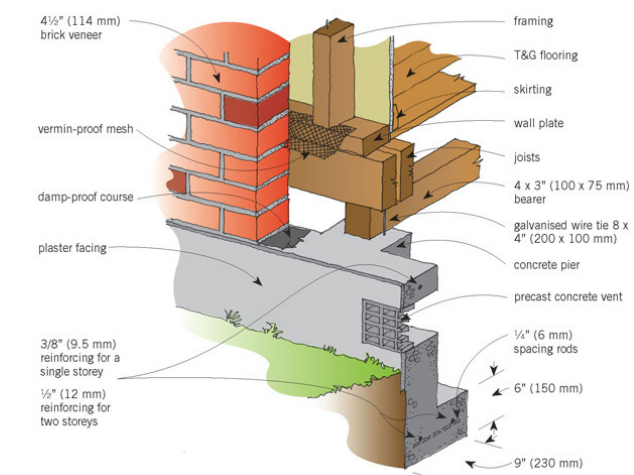
*Concrete sub-floor with timber fram floor (BRANZ, 2012).*

## FOUNDATION AND FLOORING

Generous ground clearances and generally good sub-floor ventilation of houses with suspended timber floors mean that the underfloor is likely to be dry. Although deterioration of sub-floor framing is unlikely to be a major problem as dry timber is less susceptible to fungal or insect attack, the sub-floor framing should still be checked.

Settlement of foundations or internal evidence of settlement may indicate that the house was built on unsuitable ground such as:

• deep organic topsoil
• peat
• soft or expansive clay
• uncompacted backfill.

Poor ground bearing or soft ground may be the result of wet soil which should be addressed if possible.

Existing piled foundations (without any in-situ concrete foundation walls) are not likely to have the level of lateral support required by the current version of NZS 3604. Those with foundation walls are likely to have resistance to lateral loads, but the condition of the fixings of the floor structure to the foundation should be checked to ensure that they are not corroded.

If there has been a failure of the foundations, it will be evident in the unevenness and movement (springiness) of the floor. A floor that is not level may be due to:

• soft ground that has resulted in settlement
• piles or bearers that have been removed during a previous alteration
• the floor not being levelled when the building was re-piled
• the floor joist span being too great for the size of the joists
• damaged floor joists.

Insufficient sub-floor ventilation or very wet soils may result in damp to the underside of flooring and higher moisture levels in the house, and may cause specific problems such as 'cupping' of the top surface of floorboards due to a lower moisture content on the upper surface than the underside of the boards.

## STRUCTURE

Undersized framing or inadequate bracing, particularly due to the removal or modification of load-bearing walls

Where the structure has been modified by the removal of an internal wall or by installing a larger window this may have affected the amount of bracing provided. Bracing requirements for houses of this period were also less than that required now.

## ROOFING
### STEEL

The metric corrugated roofing profile is different to the imperial size roofing that may still be in sound condition. Where one or two sheets need to be replaced, new material can be used, but for larger areas of replacement, the profile difference cannot be accommodated.

Second-hand material may be available; if not, the roof will generally need to be replaced. The use of new long run roofing eliminates the need for end laps which have a greater risk of deterioration. Note that new zinc/aluminium alloy roofing should not be used in direct contact with or above the original galvanised steel roofing.

### TILE

Current concrete and clay roof tiles may be manufactured to a different size. If this is the case, it may be possible to source a small number of matching tiles, but where a significant number of tiles need replacing, new tiles are likely to be required.

### CORROSION

Metal windows, roofing, claddings, fixings, flashings or accessories (hinges) may be corroded. This is more likely to be a problem closer to the coast and in geothermal regions, and in industrial areas. It is also more likely to be a problem for metal components that are not rain washed or cleaned regularly. Rust may chemically attack timber around corroded fastener – this is referred to as 'nail sickness'. It presents as dark staining around nails in older timber and although it is unsightly and indicates a slightly weakened part of the timber, it does not generally pose a structural risk.

## WALL CLADDING

### BRICK

Historically, older brick veneer houses have not performed well in major earthquakes. This is because the ties fixing the veneer to the timber frame were made from bent wire which corroded over time (see Corrosion), resulting in the nails or the staples fixing the wall ties to the framing to fail.

Corroded ties may also pull out of the mortar joints. Without removing and replacing the brick veneer cladding, it is impossible to assess the extent of the corrosion or replace the wall ties.

### TIMBER

Horizontal timber weatherboards that have been well maintained are likely to still be in sound condition. Any deterioration is likely to occur at running joints in boards and at mitred corners which were more susceptible to water entry.

Vertical shiplap and board and batten cladding, while likely to still be sound, may have cupped which can allow water in.

Other problems that may need to be addressed with timber cladding are:

- corrosion of metal flashings and fixings
- timber deterioration at the bottom of the wall
- surface checking or splitting of plywood and cupping of cover battens.

Where existing claddings are damaged, a decision must be made whether to retain or replace the cladding and to what extent. Damaged weatherboards such as split, bowed and cupped boards may compromise the weather tightness of the building and will need to be replaced.

The decision as to whether or not to replace boards must take account of the availability of matching materials to make the repair, and of the risk of further damage to boards during removal.

The original timber species used for the weatherboards and finishing timbers may not be available or only available in limited amounts, although this is not a problem for painted weatherboards as the timber is concealed by the paint coating.

One difficulty when continuing a line of weatherboard cladding with a different species is that the two species will move differently in response to changes in the relative humidity different species and where the difference in moisture movement is great the effect may be noticeable.

Modern standard timber cladding profiles are metric, not imperial, so an exact match may not be possible. Other options for matching weatherboards include:

- having matching weatherboards made as a special run
- obtaining an exact match replacement from a demolition yard
- increasing the lap so that bottom edges line up for bevel-backed boards
- making the change from old to new timber at an external corner (where other corners in the weatherboard are not mitred)
- masking the change with a coverboard to make the difference in size less obvious.
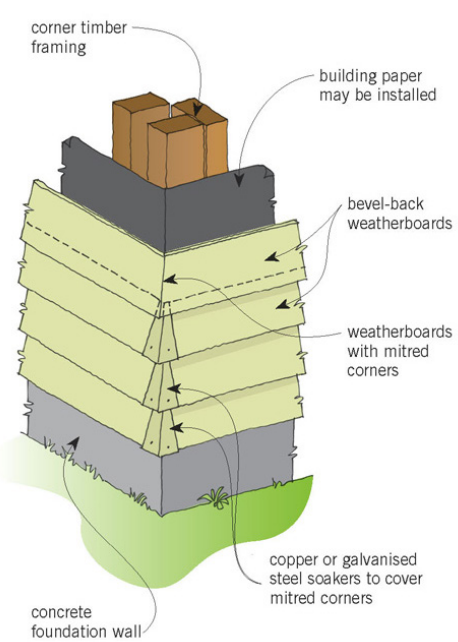


*Timber weather board cladding (BRANZ, 2012)*

## WALLS

Where wallpaper was used, the original surface of the walls may not be suitable for a paint finish – a full skim coat may need to be applied first.

Plasterboard joints may not have been reinforced, and it is common for the vertical sheet joints to crack. Typically this was hidden under the wallpaper, but where a paint finish is used, cracks will be visible.

### FRAMING

The dimensions of new framing timber differ to old framing. Original timbers are usually rough sawn and will vary in size including sometimes being slightly larger than the nominal size. For example, a 4 x 2" (100 x 50 mm) timber could actually be 4 1/4 x 2 1/8" (108 mm x 55.25 mm). Current nominal 100 x 50 mm framing is 94 x 47 mm green gauged and 90 x 45 mm dried.

### WALLS OUT OF PLUMB

If walls are not square or plumb but are stable that in itself is unlikely to cause a problem but incorporating new work is more difficult.

Standard interior timber moulding profiles such as skirtings and architraves that are now available are in metric, not imperial, which makes an exact profile match where they abut difficult. Also sheet lining materials may not exactly match the original even though the composition is similar.

## CEILINGS

Damage to ceilings is not common, but cracking may have occurred if there has been building movement. If the ceiling is secure, the only repair required is cosmetic.

A plasterboard ceiling may be preferred to replace a softboard ceiling, in which case the softboard may be left in place and covered with plasterboard to retain the insulating and sound absorption benefits of the softboard.

## WINDOWS

### FRAMES

Well maintained timber window frames and sashes may still be in good condition. Poorly maintained windows may be affected by rot at sash and frame junctions and need replacement. Hardware such as stays and hinges are likely to be worn or poorly fixed into the timber.

If sashes have warped and jammed, or have generally deteriorated, it may be due to building settlement, rot, or paint build-up

### THERMAL EFFICIENCY

Windows will be single glazed unless they have been replaced very recently. Single glazing has poor thermal performance and can result in internal condensation problems. Retrofitting insulated glazing units (IGUs) is the best option for improving the thermal efficiency of windows but can be costly.

### AIRTIGHTNESS

Timber window frames and sashes are better insulators than similar-sized aluminium frames that are not thermally broken. However, timber windows tend to be relatively air leaky and therefore less efficient in terms of maintaining and retaining heat within the building.

Rough framed openings for windows were constructed to give sufficient gap between the window and the framing to allow the window to be installed plumb and square using folding wedges. This gap was then covered with architraves on the inside and facing boards on the outside. The gap can be a significant source of air leakage. To reduce the air leakage, remove the architraves insert a suitable diameter PEF rod and apply an expanding foam air seal as detailed in Acceptable Solution E2/AS1.
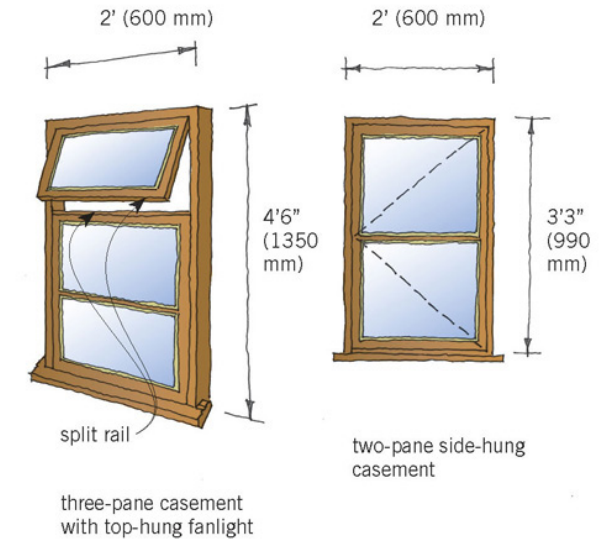


*Typical casement window units (BRANZ, 2012).*
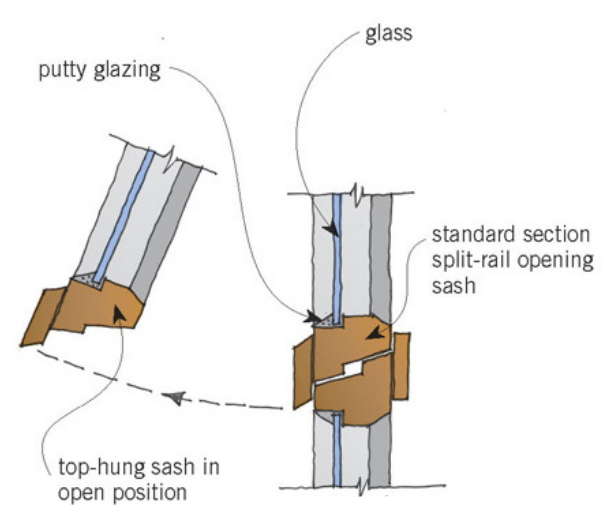


*Joinery details of split rail and glazing bar (BRANZ, 2012).*
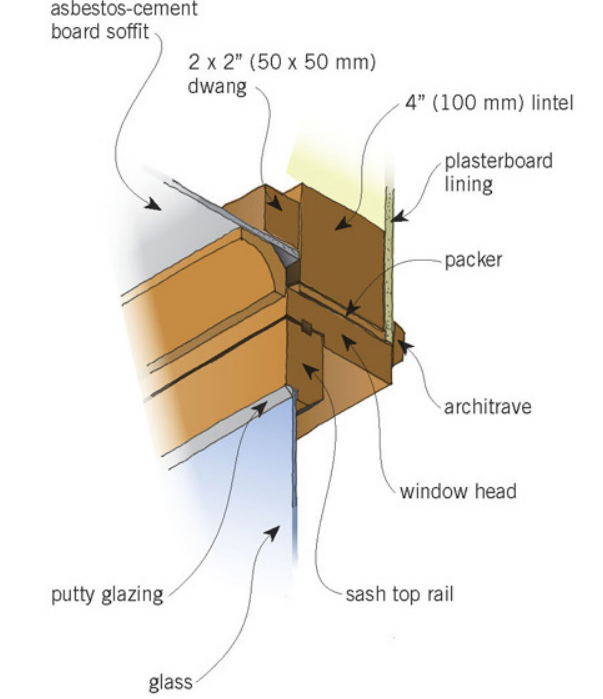


*Window head (BRANZ, 2012).*

## MOISTURE

### WEATHER TIGHTNESS + EXTERNAL MOISTURE

The housing built during the 1940s-60s generally had few significant weathertightness issues.

However, some houses built later in the period, particularly those without eaves or with new cladding materials and glazing systems, may have had some weathertightness problems.

Once insulation or modern windows are installed, the house becomes more airtight, so consideration must be given to how the principles of Acceptable Solution E2/AS1 External moisture can be incorporated into any renovation that is carried out.

### WINDOW FLASHING

Traditional window and other head flashings have simply been inserted into the lap or joint of the weatherboard immediately above the opening. As long as the flashing remains in good condition, the detail appears to have generally worked well at protecting the top of the window.

Acceptable Solution E2/AS1 requires the flashing to be lapped under the wall underlay; this cannot be applied to an existing wall unless the cladding is being removed. BRANZ also believes that, where a window matching existing is being inserted into an existing wall, and the existing windows have performed well, to use the same detail is a logical solution.

### INTERNAL ENVIRONMENT

Older, less airtight houses have fewer internal moisture problems than more airtight houses because the air leakage through gaps around windows and doors generally removes internal moisture generated from cooking, washing, unflued gas heaters and clothes dryers.

As a house becomes more airtight through renovations and alterations, internal moisture can become a problem. Renovation work will generally make a house more airtight. Systems to remove moisture must be included in the design solutions.
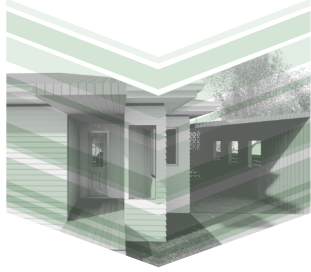
## IMPORTANT FEATURES

- Both of these state houses are relatively unique in the fact that they are backwards. No many of state houses were orientated this way to the street. The majority have a central entrance and the door to the side would have been the rear entrance for the back yard.
- Rimu timber is extremely valuable and hard to come by now. It should be preserved and maintained.
- The windows in state housing are key features to tell them apart form private sector housing as they were all made in New Zealand and usually have smaller casement windows to the sides. This style of window should be maintained in the building.

### 7 LEYBOURNE CIRCLE





ADDRESS: 7 Leybourne Circle, Glen Innes, Auckland
WHAT: Single-storey-detached timber-frame house.
CONDITION:
- No modifications of layout or walls.
- Original rimu floors and doors in good condition
- Weatherboard cladding in okay condition.
- Ceiling soft board in good condition - can remain and plaster board we attached over for added insulation.
- Foundation wall in good condition but will be placed on new timber foundation when relocated.
- Structurally sound.
- No signs of dampness.
  - Amenities need upgrading
    - Windows need maintenance.

### 5 LEYBOURNE CIRCLE
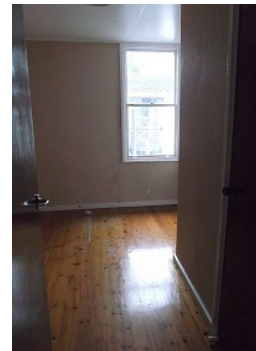




ADDRESS: 5 Leybourne Circle, Glen Innes, Auckland
WHAT: Single-storey-detached timber-frame house.
CONDITION:
- Hasn't been modified since construction
- In need of upgrading
- Original rimu floors and doors
- Structurally sound.
- Maintenance needed on roof tiles and some weather boards (nothing big).
- Foundation needs to be braced better after relocation
- Window style unique to state housing and should be maintained.
- In dry condition no damp.
- Original soft board interior lining needs replacing.
- Window frames in good condition.

## 6.4
## CONCEPTS





### NEIGHBOURHOOD GARDENS

The focus of the design proposal in on the in depth design of the large family home at 7 Leybourne Circle, however a master plan for the area has also been explored because it is important to considered everything in a wide picture as well. these sketches illustrate some simple examples of how new development could tie in with the existing context to create a more interesting street scape and different ways in which they could be formed so they have some individuality. The idea around the new development is it would be for the elderly or people without families that are low maintenance and also that they do not need big houses with big yards. Having the option to be able to garden is a another big concept in this thesis to bring the community together and this would be provided in a central local for the neighbourhood.



HOUSE RELOCATION
MASTER PLAN
CONCEPT

Large family homes
New terraced buildings
Relocated homes
Existing homes on smaller section



ONE AND TWO STOREY TERRACED HOUSES

TERRACED HOUSES
CONCEPTS



Large family home
New terraced buildings
Relocated home
Existing home

LEYBOURNE CIRCLE
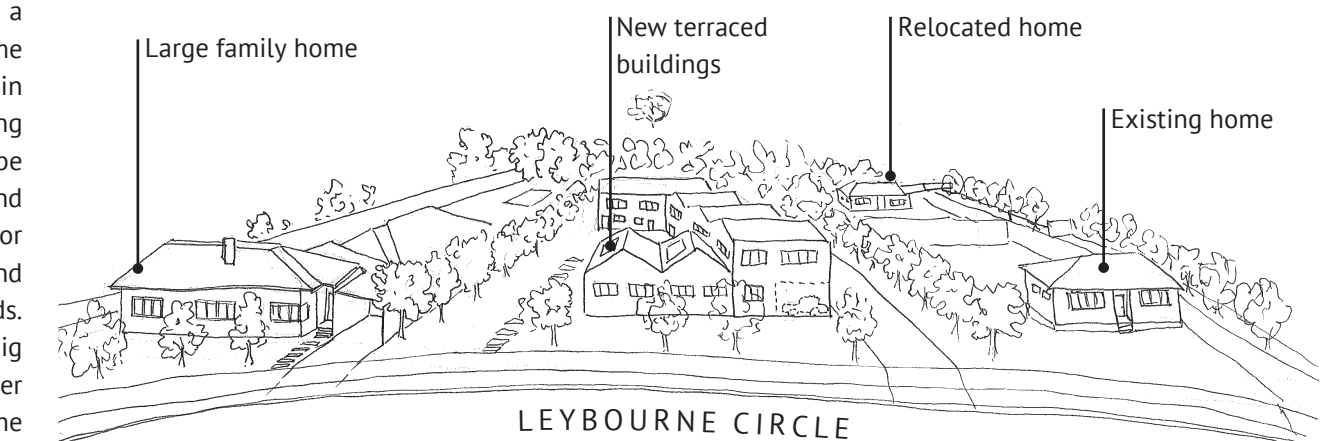
The concept of taking two existing and in this case neighbouring houses and relocate them onto the same site to form one large family home is the driving force for this concept. By doing this it reduces the demolition and transportation cost of relocating a house and allows empty lots for HNZC to develop with new build terrace housing for state housing and to be sold to the private sector to have a mix of users in the neighbourhood. Choosing to regenerate not only the existing buildings but also to add something

to the community in terms of built structure and socially and culturally is very important. The cultural needs of the inhabitants as spoken about earlier is another important aspect in how these buildings are rearranged on the new site. A combination of efficiency and utilisation of the site is very important to find the most successful design solution.
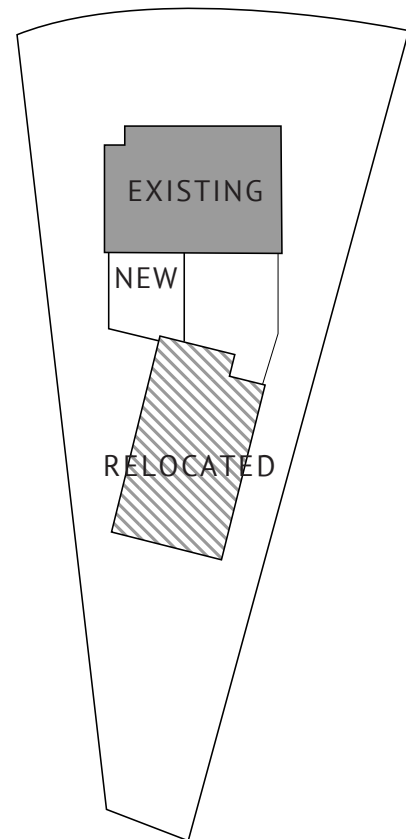


Bad positioning, limited north facing garden, larger north facing deck
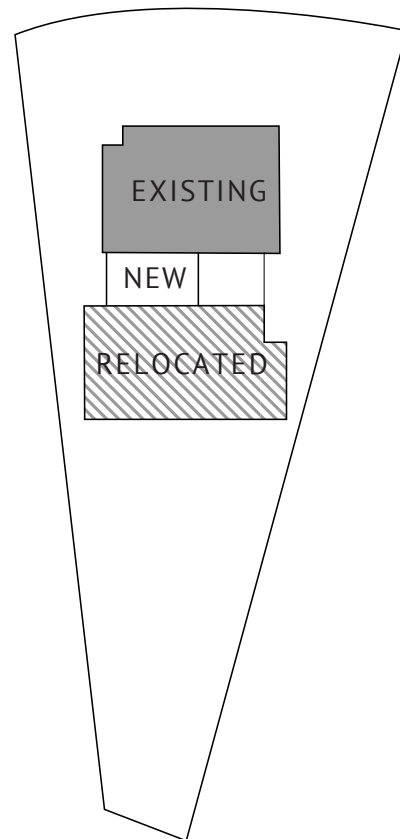


Smallest footprint, small outdoor area
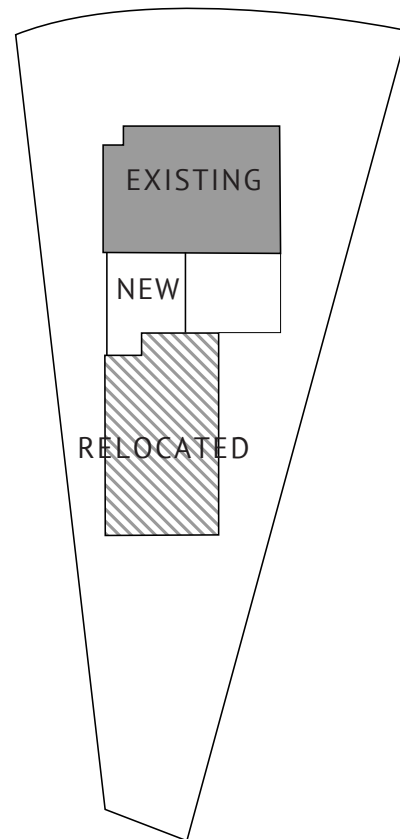


Easiest, cheapest to build because of right angles in new addition
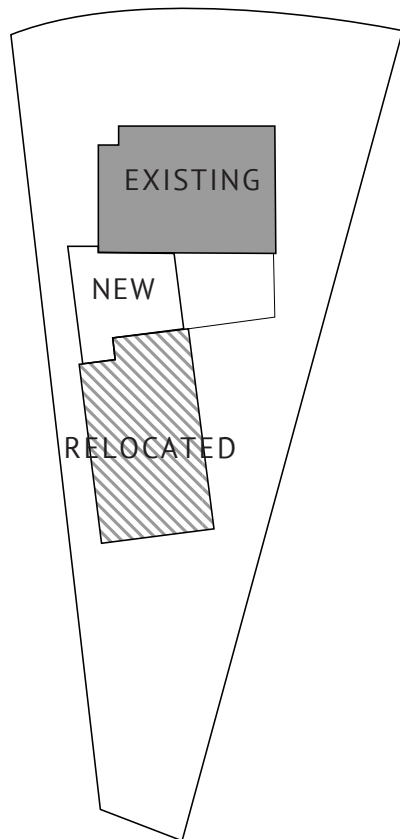


Best land use and solar gain
Not overly expensive is exterior angles less that 70 degrees
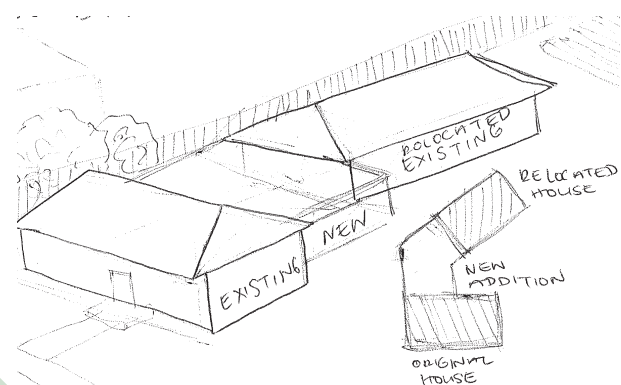


JOINING THE TWO EXISTING HOUSES
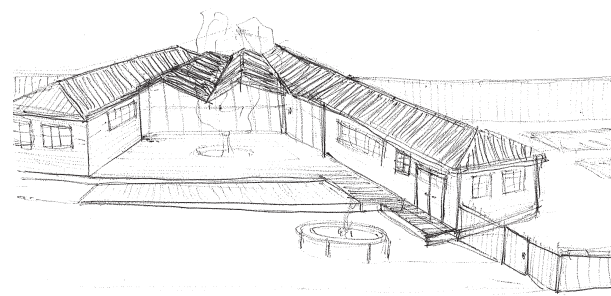


CREATING A 'COURTYARD'



THE CONNECTING ROOF

EXISTING ENTRANCE AND CARPORT



OUTDOOR LIVING WITH RAMP ACCESS



LEYBOURNE CIRCLE

FORMAL LIVING

ENTRANCE

KITCHEN/DINING

OUTDOOR LIVING

BATH ROOM

ENTRANCE

BATH ROOM

INFORMAL LIVING

LAUNDRY

BED ROOM

BED ROOM

BED ROOM

BED ROOM

BATH ROOM

BED ROOM

OUTDOOR COOKING

Access to communal gardens



CONNECTING NEW BUILD AREA AND OUTDOOR LIVING.
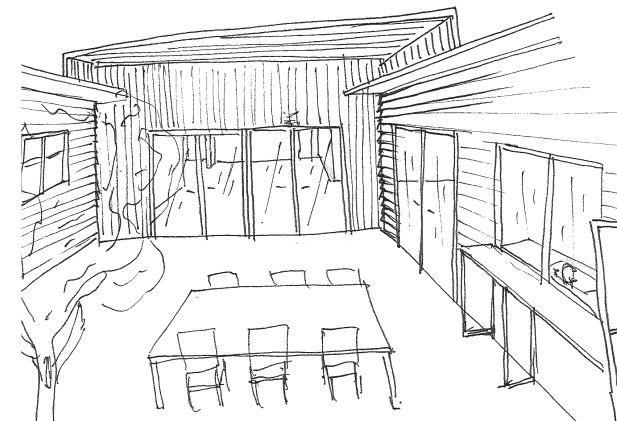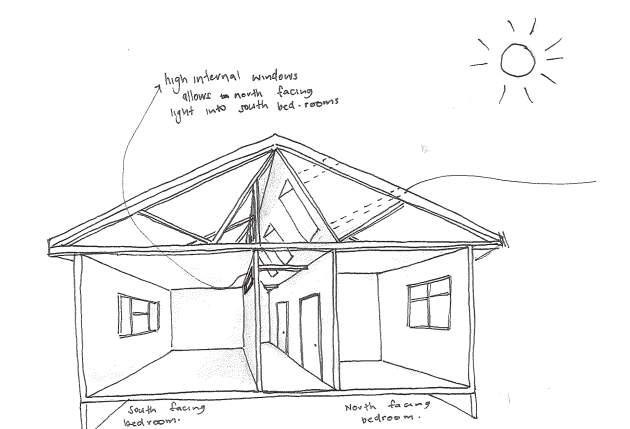
BRINGING NATURAL LIGHT INTO THE HALLWAY.
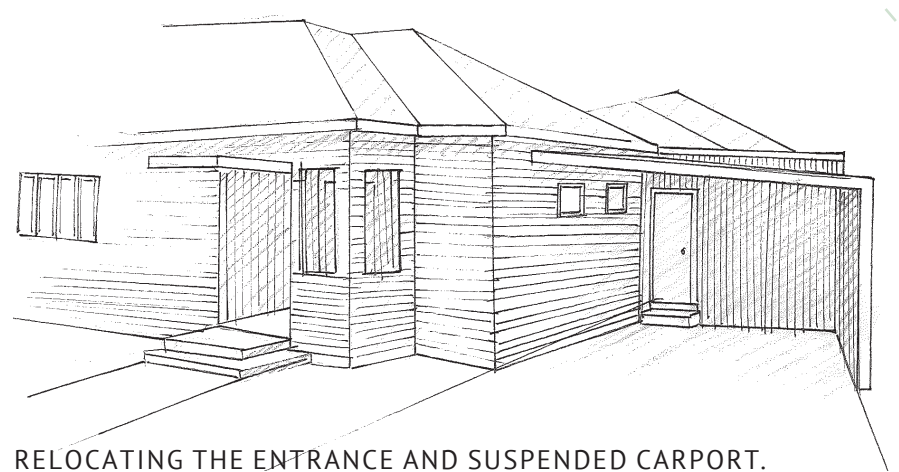

RELOCATING THE ENTRANCE AND SUSPENDED CARPORT.
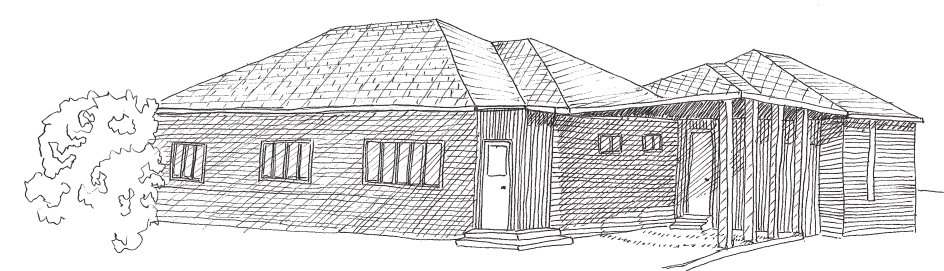

FILLING IN THE EXISTING ENTRANCE WITH AN OPEN CARPORT.
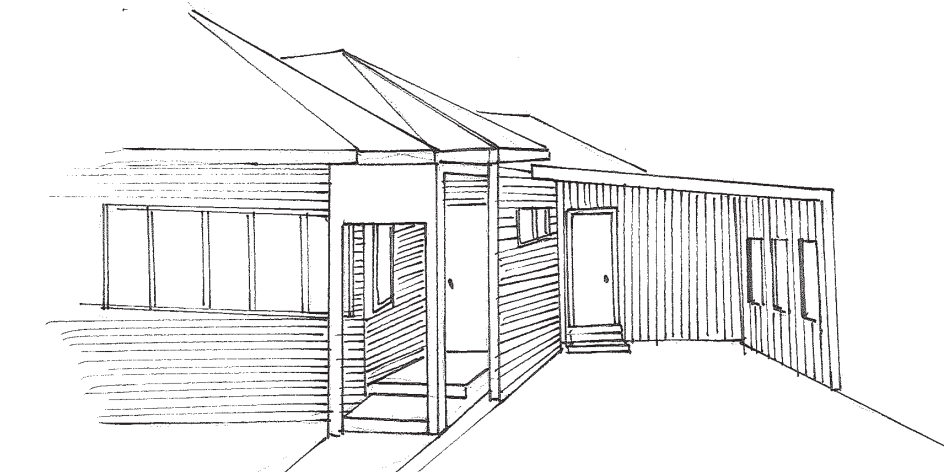

CREATING A FRAMED ENTRANCE THRESHOLD.
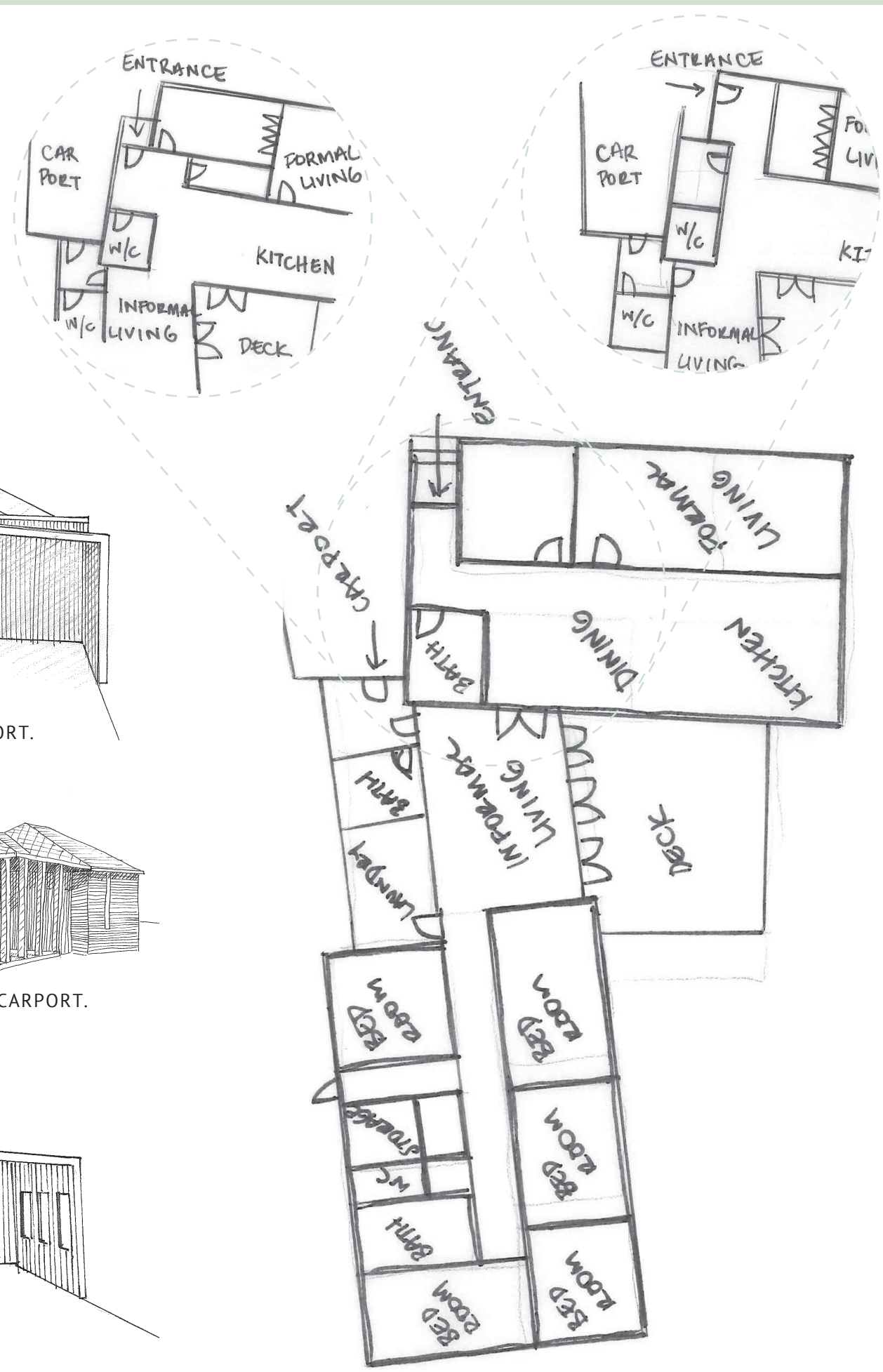

FLOOR PLAN DEVELOPMENT

# 6.5 DESIGN PROPOSAL



### NEIGHBOURHOOD MASTER PLAN

N

|10m        50m|

■ EXISTING BUILDING

▦ EXISTING RELOCATED BUILDING

□ NEW BUILDING

---- NEW SITE SUBDIVISION

···· PLOT OUTLINES
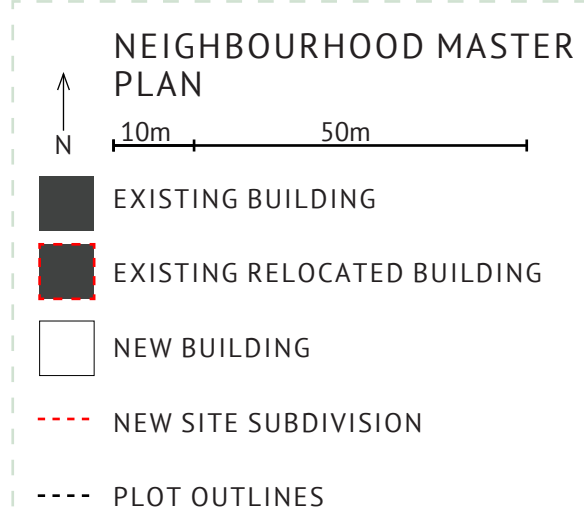
## EXISTING NUMBER OF HOMES:
• 23 TWO-FOUR BEDROOM DETACHED HOMES

## PROPOSED NUMBER OF HOMES
• 19 TWO-FOUR BEDROOM DETACHED HOMES
• 2 FIVE TO SIX BEDROOM DETACHED HOMES
• 20 ONE AND TWO BEDROOM TERRACED HOMES (ONE AND TWO STOREYS HIGH)
• LARGE NEIGHBOURHOOD GARDEN



Large 5 bedroom family home for Maori and Pacific families

1 and 2 bedroom terraced houses for elderly and younger people without families

Existing home in same location only retrofitted and site reduced to fit two buildings.

Relocated and retrofitted house on manageable sized site (approx. 400m² site)

Neighbourhood garden for detached homes and terraced houses with reduced yards. Includes raised gardens, compost and storage facilities common fruit trees, bbq/ picnic area, play area for children.

LEYBOURNE CIRCLE

RIDGEWAY PLACE

The site of 7 Leybourne Circle has one existing state house, the second house from the neighbouring site of 5 Leybourne Circle is relocated onto the rear of the site creating one large family home. The original house is left in its original position while the house from 5 Leybourne Circle has been positioned to receive the most north facing light. Fruit trees run along the northern boundary to provide fruit for the family and also create a green barrier between the neighbours. Also running along both boundaries is an open water channel that collects water run off from the road and site and then feeds it down to a rainwater garden at the rear of the section helping reduce pressure on the existing infrastructure. At the rear of the site is raised garden beds and gardening infrastructure to help promote gardening within the community. On the south side of the site is the carport and rear entrance as well as refuse areas and storage. All the water from the roof is collected through the gutter system in stored in water tanks under the house.

7 LEYBOURNE CIRCLE

Open water channel running along the length of the boundary

Original house at 7 Leybourne Circle

Fruit trees line the boundary fence

Rain water collected in a gutter system that is stored in water tanks under the house

New addition joining the two houses

House relocated from 5 Leybourne Circle

Solar panels

Solar tubes

Clothes line

Drive way and carport

Open water channel running along the length of the boundary

Outdoor storage for recycling etc.

Out door cooking - hangi/umu pit

Raised bed vegetable gardens

Rain water garden

SITE PLAN 1:200

1m          10m

## EXTERIOR RENDERS



**VIEW LOOKING NORTH WEST OVER BACK YARD.**
The very rear of the site has garden facilities and a hangi pit as well as smaller fruit trees (such as citrus and feijoa) which line the right boundary and larger fruit trees that can act as wind breakers on the left.
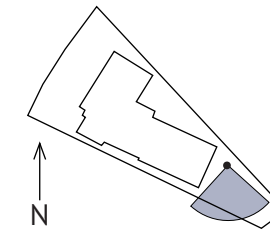


**VIEW OVERLOOKING A TRADITION HANGI PIT AND RAISED GARDEN BEDS.**
The rear garden is terraced down to create flat areas. The hangi pit is covered in a timber cap with seating so it can be used to sit on when not being used for cooking.
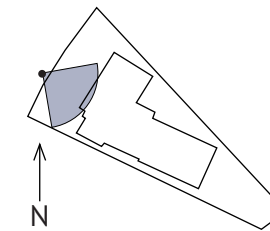


**VIEW FROM THE FOOTPATH TO THE FRONT ELEVATION OF THE HOUSE**
From the front of the house the new car port addition and entry can be seen. The driveway has also been shifted from the north to south side of the front yard to allow for more north facing grass space.

## FLOOR PLAN



| 1m | 10m |
| --- | --- |

| TOTAL AREA (including carport and deck): 329.4m² | |
| --- | --- |
| LIVING SPACE | 75.9 m² |
|   Formal living | 15.9 m² |
|   Informal living | 28.3 m² |
|   Flexible space | 15.4 m² |
|   Dining | 16.3 m² |
| PRIVATE SPACE | 69.2 m² |
|   Bedroom 1 | 19.5 m² |
|   Bedroom 2 | 14.3 m² |
|   Bedroom 3 | 12.5 m² |
|   Bedroom 4 | 11.6 m² |
|   Bedroom 5 | 11.3 m² |
| UTILITY SPACE | |
|   Laundry | 07.3 m² |
|   Storage | 08.1 m² |
|   Entries | 13.9 m² |
| KITCHEN | 20.0 m² |
| BATHROOMS | 19.9 m² |
| OUTDOOR LIVING | 41.5 m² |
| CARPORT | 21.7 m² |

The proposed floor plan for this large family is split in two with a third joining space. The front existing house (7 Leybourne Circle) has the main entrance and most of the public areas including a formal living space which connects to the flexible space to allow for expansion of the formal living space when needed.

The rear house (5 Leybourne Circle) has mostly private sleeping areas. These two spaces are joined by a new addition which is the informal living spaces a bathroom, laundry and secondary entrance of the new carport.

## DEMOLITION PLAN



| 1m | 10m |
| --- | --- |

| — | EXISTING |
| — | NEW |
| --- | DEMOLISHED |
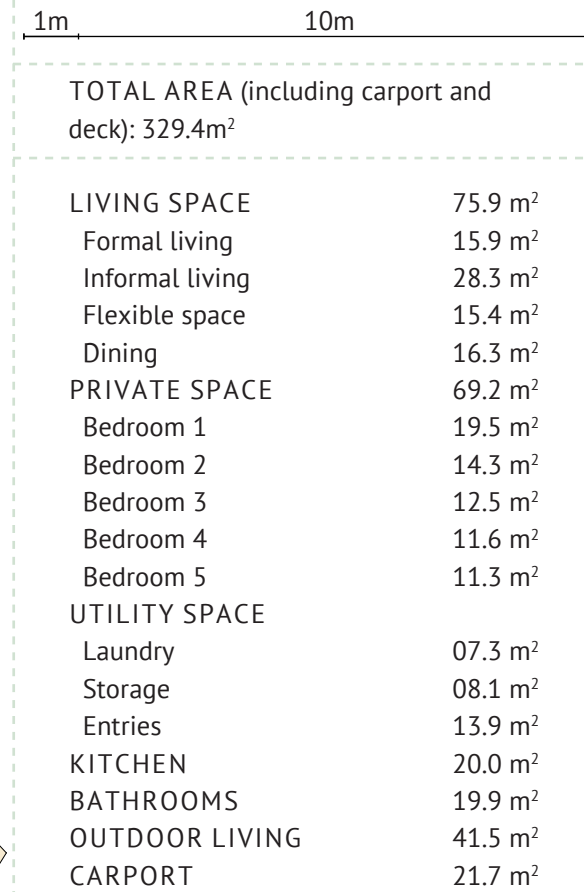
Combining two separate buildings means that the removal of some walls is inevitable in order to have a functional house. The majority of the demolition (pink lines) to interior walls will occur in the front house to create an open-plan living environment to cater for the large families and also so it is flexible to be able to function during large gatherings. The bathroom and kitchen remain in the same place to reduce cost with re-plumbing. Windows in the front left facade will be removed and replaced with the main entrance to allow for the large number of inhabitants and to be more welcoming.

In the rear house very few walls are removed and the existing plan remains largely unaltered with the bathroom remaining in the same place and additional walls closing off what was the kitchen and living space to create more bedrooms. New walls (in grey) Join the two buildings creating new living spaces as well as a carport and secondary entrance

## ROOF PLAN



| 1m | 10m |
| --- | --- |

| | EXISTING |
| | NEW |

The two existing roof structures are hipped gables with a complex roof over where the corner of the building is cut-out. They have an over hang of 500mm and because of this adding an addition to this is difficult. The existing ceiling height is also 2600mm which adds further to the problem.

The new roof structure is a split butterfly roof with water collecting in the centre join. The roof structure over the deck at its lowest point sits flush with the existing roofs and the second roof over the carport sits 300mm below this to fit under the existing eaves.

The carport roof is cantilevered from the south side and suspended at the north side to the existing roof structure with steel rods.
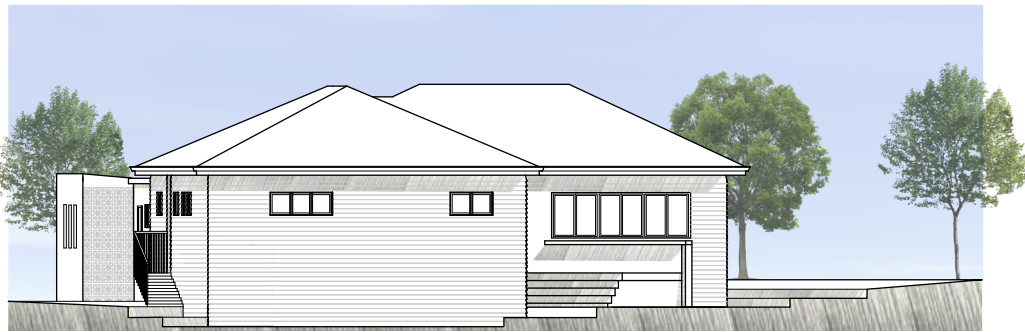
In the rear house sun tubes have been added to allow natural light to pass into the hallway.
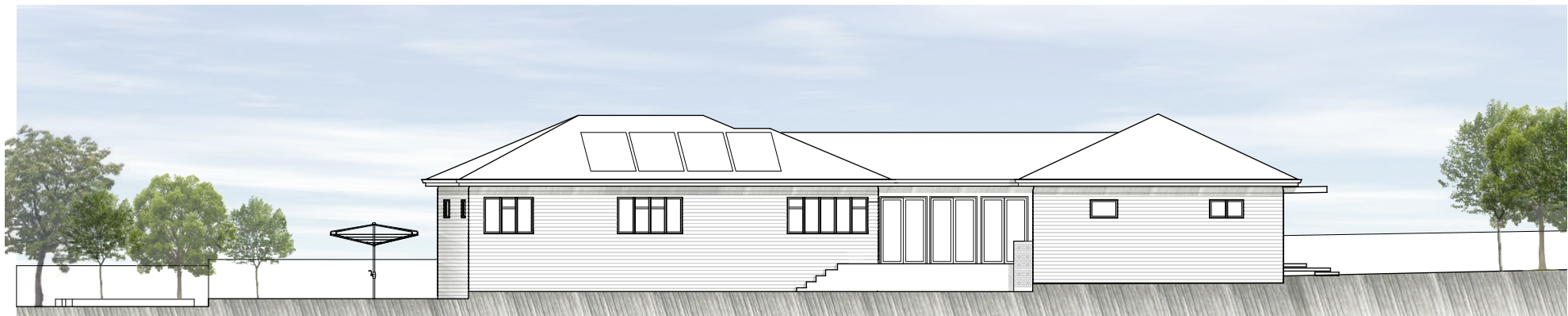
All of the elevations have been keep in similar style to the existing houses design. The north-west street facade aims to respect the existing context of the street keeping minimal exposure of the large home. The south-west and north-east boundaries are lined with permeable fencing to provide privacy, security, safety and as a wind breaker. While the street facade is lined with large trees to keep the existing open feel of the street while marking the threshold between private and public. The largest facade faces north east with the biggest windows while smaller windows are placed on the southern sides of the building.

NEW VERTICAL TIMBER CLADDING

EXISTING TIMBER WEATHER BOARDS



NORTH-WEST ELEVATION

1m 10m



SOUTH-EAST ELEVATION
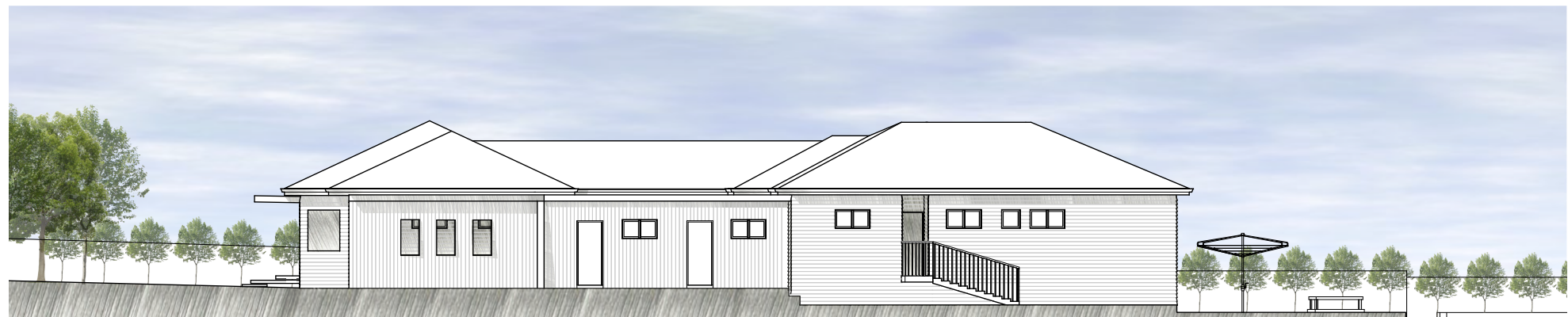
1m 10m



SOUTH-WEST ELEVATION

1m 10m



NORTH-EAST ELEVATION

1m 10m

2600

+0.6

A

A

N

+0.0

KITCHEN 13500 DINING 3600 CARPORT
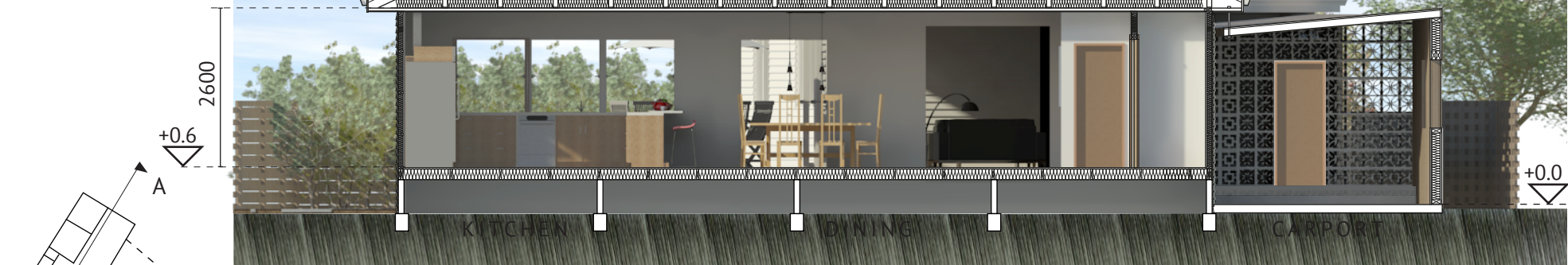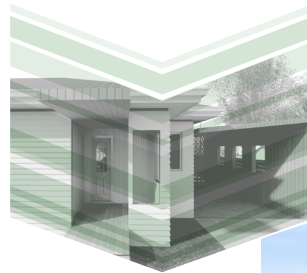
17300

LONGITUDINAL SECTION (AA) THROUGH 7 LEYBOURNE CIRCLE AND NEW CAR PORT

1m 5m



+0.0 +0.6

2600

PATIO ENTRANCE DINING INFORMAL LIVING BEDROOM BEDROOM
1600 2200 4200 5500 5600 4000

27500

B

B

N
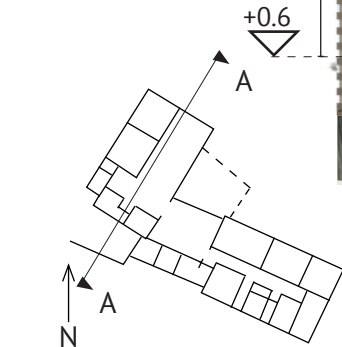
LONGITUDINAL SECTION (BB) THROUGH ENTIRE BUILDING

1m 5m

2600

2600

+ 0.6
+ 0.3

+0.0

-0.3

BATHROOM
2200

INFORMAL LIVING ROOM
4900

OUTDOOR LIVING AREA
6600

14000

TRANSVERSE SECTION (CC) THROUGH NEW BUILD.

1m          5m

N

C
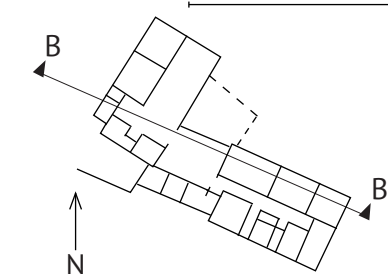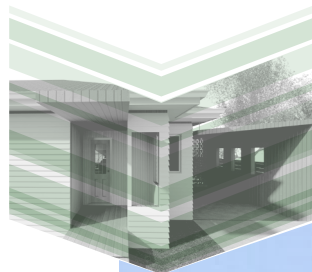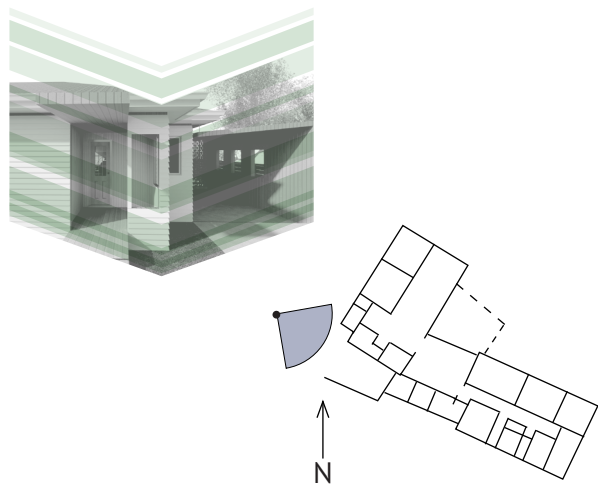
### VIEW LOOKING INTO NEW CARPORT
Main entry to the right and a secondary entry at the back of the car port. Roof is cantilevered and suspended on the existing roof with steel ties. Cut-outs in the car port walls allows for future windows to be added when converting into an enclosed space.
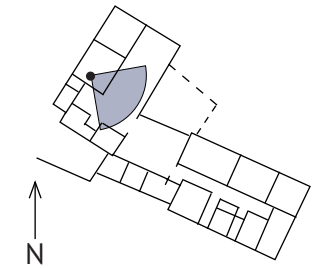
### VIEW FROM MAIN ENTRY
Looking through to the informal living area in the background. Parts of the existing internal walls have been demolished to make a framed entry point at the entrance and then again in the existing external wall to connect to the new informal living and to create a threshold between spaces as they get less public.
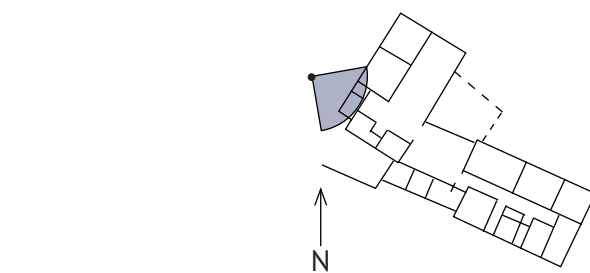




### VIEW LOOKING INTO NEW MAIN ENTRY
Existing windows and walls are removed to make a covered patio entry with an extended cantilevered awning and suspended timber steps.
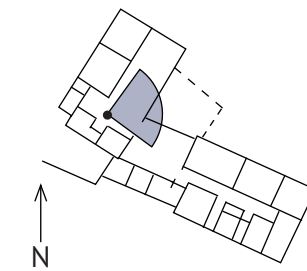
### VIEW OF KITCHEN AND DINING
Looking out through open doors onto outdoor living area. Internal walls are removed to create open plan living and allows for large numbers of people. Doors open out onto the deck to create a open relationship with the outdoors and windows from the kitchen also open out onto an outdoor bench to allow for food and things to be passed through directly from the kitchen and allow interactions.
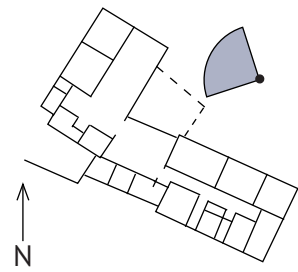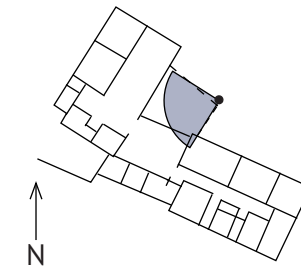
**VIEW LOOKING ONTO MAIN DECK**
Raised outdoor living area creates and extension of internal spaces to accommodate an over flow of people and allow greater outdoor living. Seats line the deck to create permanent furniture and for safety reasons. Views from the kitchen and informal living allows children to be watch while they play outside.
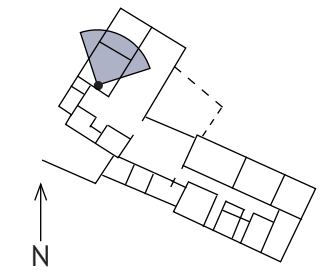


**VIEW LOOKING THROUGH FORMAL LIVING INTO FLEXIBLE ROOM**
The formal living area is a flexible space with large doors that can open to form one main space or be closed off into two smaller rooms when needed. This creates a space that can function for large events or also be used as additional sleeping spaces.



**VIEW LOOKING ONTO MAIN DECK**
Doors and windows off the main living spaces open up to form a continuation of living spaces. The new roof extends to provide sun protection and shelter from the rain. Below the kitchen windows a bench cantilevers out to allows food to be passed through and for people to sit and interact with people in the kitchen.
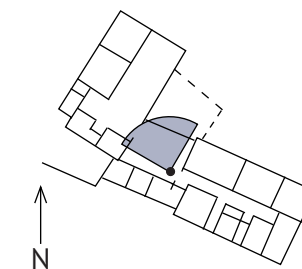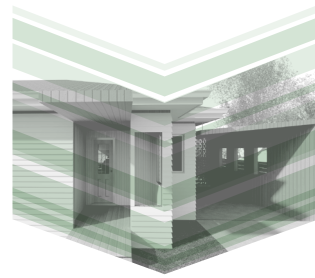
**INFORMAL LIVING SPACE**
The informal living space occupies the new build area the joins the two existing buildings. It is a informal transitional space that joins the public and private spaces. Large double doors open up onto the outdoor living space to blur the definition between indoor and outdoor spaces.
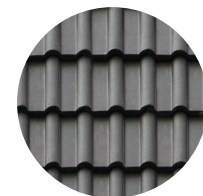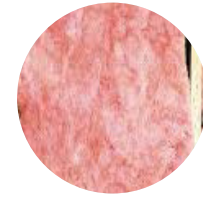
EXISTING BUILDING SECTION
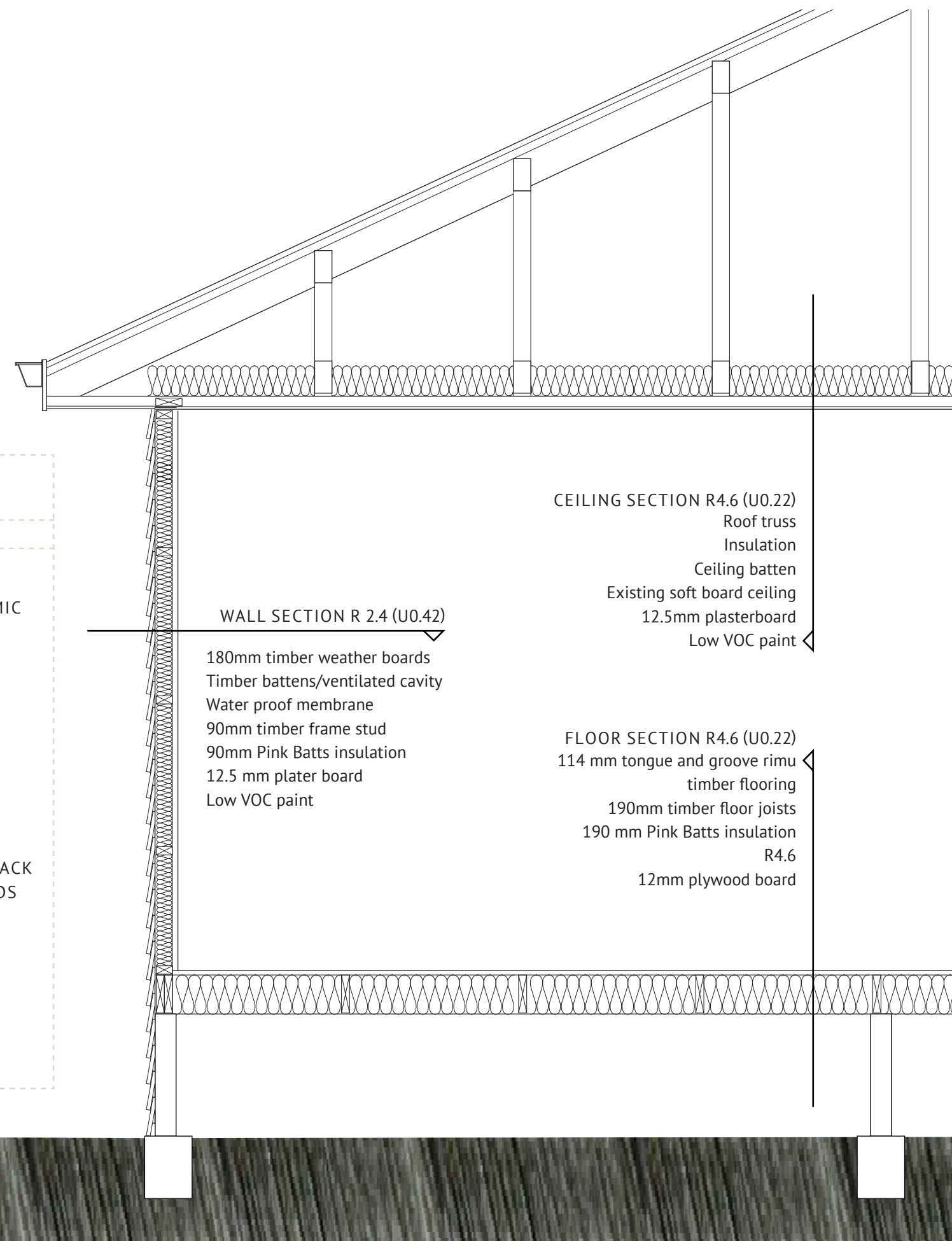
0.5m          1m

MATERIALS

EXISTING CERAMIC
ROOF TILES

PINK BATTS
INSULATION

TIMBER BEVEL BACK
WEATHER BOARDS

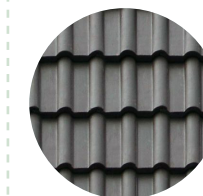RIMU TIMBER
FLOORING

WALL SECTION R 2.4 (U0.42)

180mm timber weather boards
Timber battens/ventilated cavity
Water proof membrane
90mm timber frame stud
90mm Pink Batts insulation
12.5 mm plater board
Low VOC paint

CEILING SECTION R4.6 (U0.22)
Roof truss
Insulation
Ceiling batten
Existing soft board ceiling
12.5mm plasterboard
Low VOC paint

FLOOR SECTION R4.6 (U0.22)
114 mm tongue and groove rimu
timber flooring
190mm timber floor joists
190 mm Pink Batts insulation
R4.6
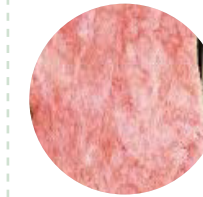12mm plywood board

NEW BUILDING SECTION

0.5m          1m
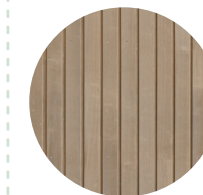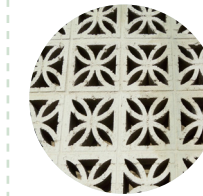
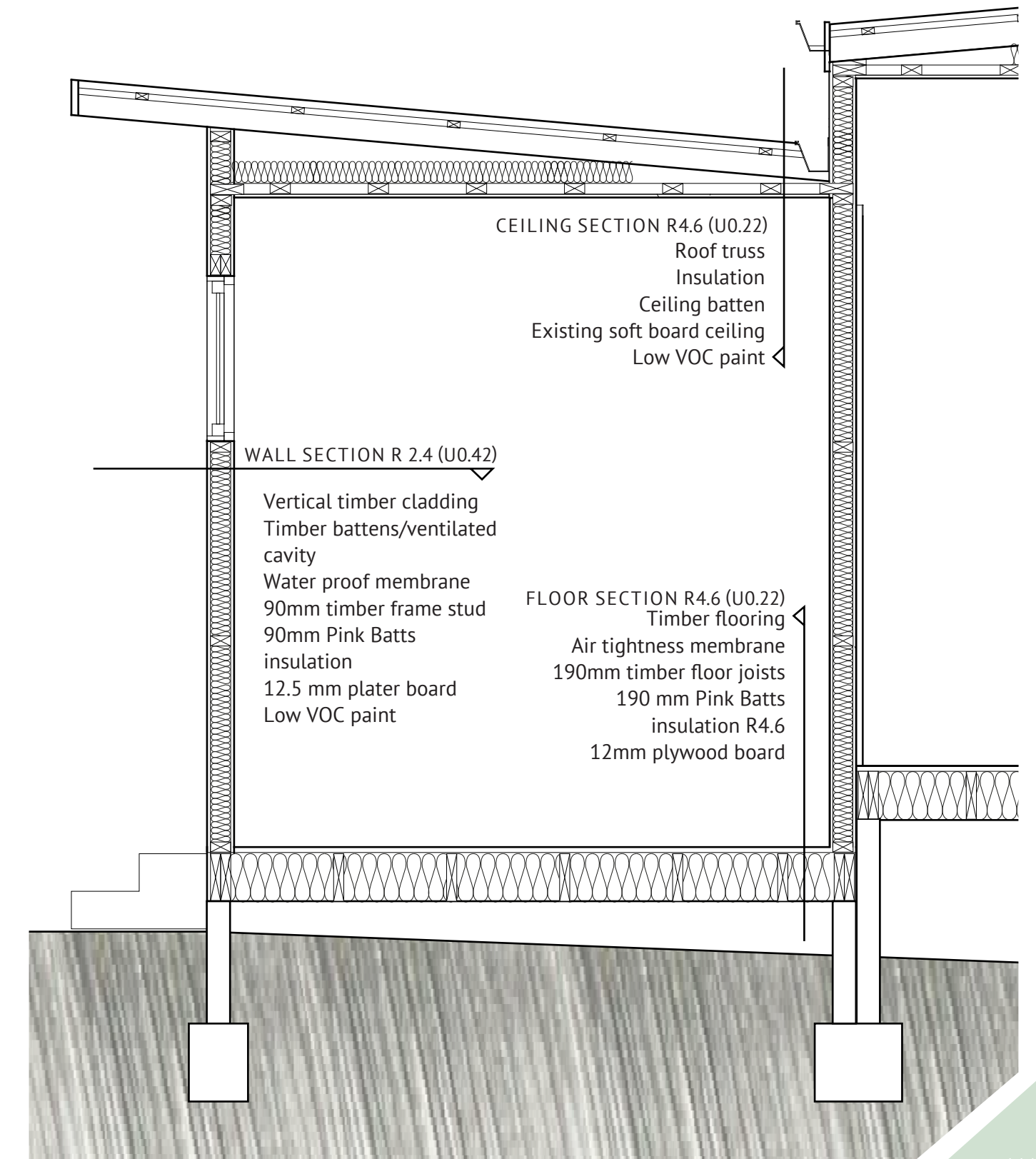MATERIALS

EXISTING CERAMIC
ROOF TILES

PINK BATTS
INSULATION

VERTICAL PINE
TIMBER CLADDING

PINE TIMBER
FLOORING

DECORATIVE
CONCRETE BRICKS

WALL SECTION R 2.4 (U0.42)

Vertical timber cladding
Timber battens/ventilated
cavity
Water proof membrane
90mm timber frame stud
90mm Pink Batts
insulation
12.5 mm plater board
Low VOC paint

CEILING SECTION R4.6 (U0.22)
Roof truss
Insulation
Ceiling batten
Existing soft board ceiling
Low VOC paint

FLOOR SECTION R4.6 (U0.22)
Timber flooring
Air tightness membrane
190mm timber floor joists
190 mm Pink Batts
insulation R4.6
12mm plywood board

ADDRESS: 7 LEYBOURNE CIRCLE
Lot. 110 DP 43138

TOTAL SITE AREA     844m²

| | Required | Proposed |
|---|---|---|
| BUILDING COVERAGE | Max. 35% | 34% (287.5m²) |
| LANDSCAPED PERMEABLE SURFACE | Min. 40% | 51% (429m²) |
| PAVED IMPERMEABLE SURFACE | Max. 25% | 15% (127.5m²) |
| FRONT YARD | 4.5m | 9m |
| *a* PRIVATE OPEN SPACE | 100m² | + 100m² |

LEYBOURNE CIRCLE

foot path

new vehicle crossing

Front yard offset 4.5m

56m

52m

5m

*a*
100m²

6m diameter

HEIGHT IN RELATION TO BOUNDARY INFRINGEMENTS

New height in relation to boundary infringment

Existing height in relation to boundary infringment

Existing height in relation to boundary infringment

45°  45°  45°

2000  2000  2000

## 6.6
## COST
## EVALUATION

The overall cost evaluation for the proposed in-depth design is based on findings from books, websites and rough quotes from contractors and suppliers. It is supplied as an indicator rather than a detailed cost breakdown as it was not possible with my limited knowledge of the area and due tot he hypertheical nature of the project.

The main sources for this information was collected from *Rawlinsons Handbook 2009* and www.tradebox.co.nz with additional information from many different contractors and supply websites to verify these findings.

**TYPICAL NEW BUILD (WITHOUT LAND AND LANDSCAPING)**

TOTAL BUILDING AREA: 329m²
    MAIN BUILDING: 266m² x $1575/m²
    Cost: $419 265.00
    DECK: 41.5m² x $220/m²
    Cost: $9 130
    CARPORT: Single carport = $4200

**TOTAL COST: $432 595 (SEK 2 435 380)**

**DESIGN PROPOSAL (WITHOUT LAND AND LANDSCAPING)**

RELOCATION COST
    Relocation 5 Leybourne Cicrle: $15 000
    Facility reconnection: $25 000

RETROFIT/RENOVATE
    Insulate wall, floor, ceiling, Double glazing + draught proofing:
    Cost: $78 197
    Exterior painting: 262.5m² x $36.20/m²
    Cost: $9 502.50
    Redo timber flooring: 210m² x 30/m²
    Cost: $6331
    Bathroom: 2100/m² x 15 m²
    Cost: $31 500
    Kitchen:2100/m² x 20 m²
    Cost: $42 000
    Wall removal: 25.5m² x $960/m²
    Cost: $24 480
    New interior walls: 166/m² x $17/m
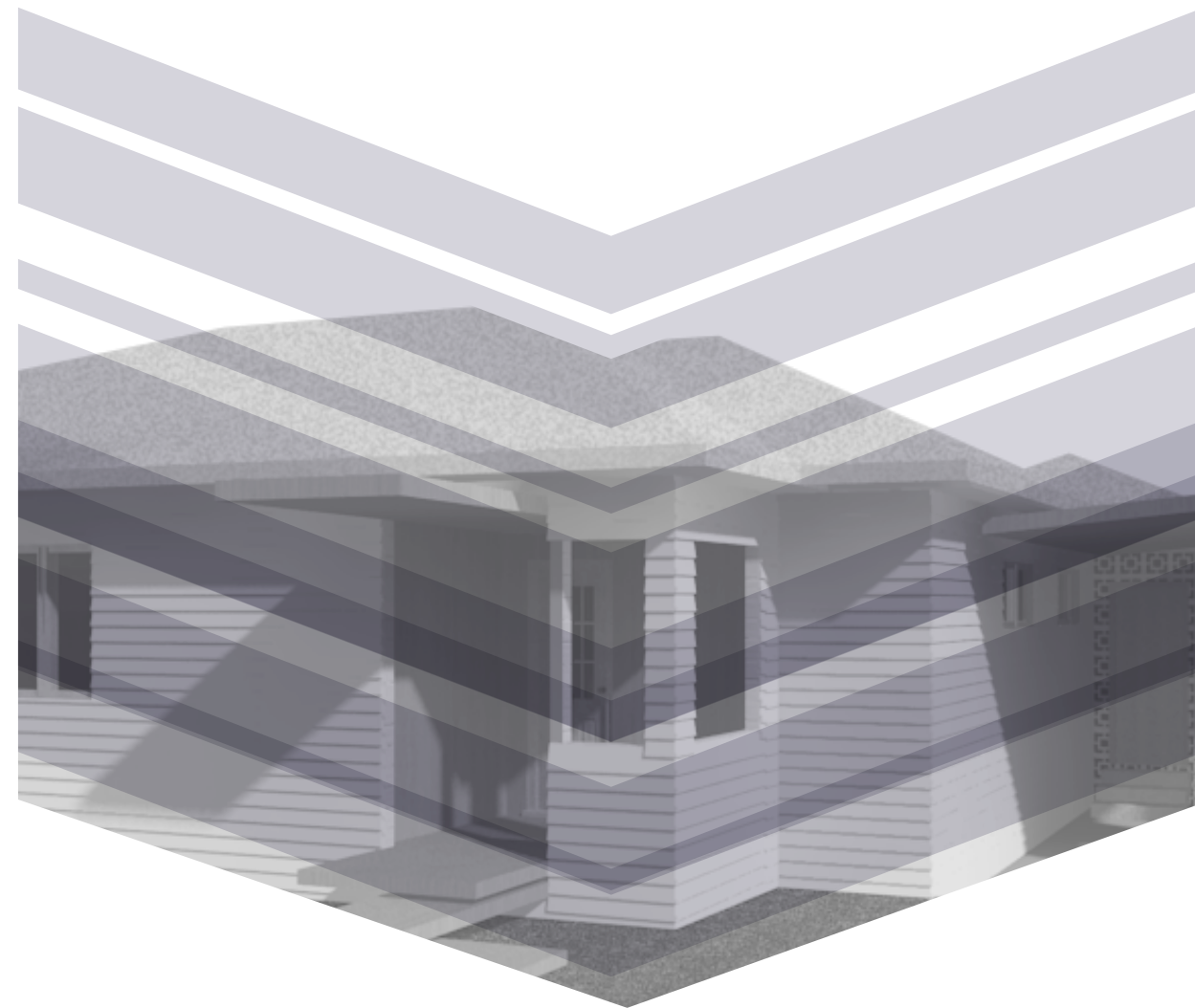    Retrofit wall: 56m
    Cost: $21 822

NEW BUILD AREA
    HOUSE: 47m² x $1575/m²
    Cost: $74 340
    DECK: 41.5m² x $220/m²
    Cost: $9 130
    CARPORT: Single carport = $4200

SOLAR PANELS
    6 x 4 kW
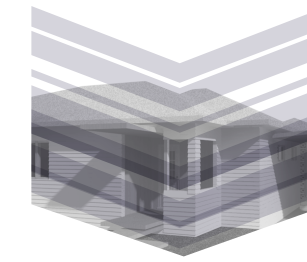    Cost: $9795
WATER TANKS:
    2 x 3400l tanks
    Cost: $7000

**TOTAL COST: $362 487 (SEK 2 057 548)**

# ▶ PART SEVEN.

THIS PART DISCUSSES AND CONCLUDES ALL OF
THE WORK COVERED IN THIS THESIS AND HOLDS
ADDITIONAL INFORMATION ABOUT MY SOURCES.

This thesis has examines the history, cultures, redevelopments and design strategies of post-war suburban state housing in New Zealand. It establishes general design guidelines and showcases them in an in-depth regeneration master plan of a neighbourhood in Glen Innes and subsequently in the design and retrofit of a large five-bedroom family home with this neighbourhood. Through the analysis of existing literature, case studies, fieldwork and redevelopment comparisons this thesis has identified and justified the need for redevelopment in Glen Innes, New Zealand. It provides a proposed redevelopment solution to address the neighbourhood's shortcomings, residents' desires, societal changes and the contemporary needs. In contrast it has also identified the lack of development within the suburb and in particular in the buildings themselves and therefore the inadequate and undesirable environments that can result. Coupled with the high current demand and predicted increasing future need for accommodation for low income groups, as well as the shifting housing demands, it is evident that the maintenance, provisions, and improvement of state housing are significant issues for HNZC.

Sustainable regeneration and retrofit offers one way by which these concerns can be address. It is explored through design strategies and the subsequent design showcase. Sustainable regenerative design and retrofit acknowledges the original investment and embodied energy in post-war suburban state housing and has the ability to lengthen the life span of these homes through a variety of improvements. Sustainable regenerative design has many potential benefits and these can be grouped into three categories – suburban environments, state properties, and state houses.

This thesis identifies that the sustainable regeneration of suburban environments can:
• Enable more efficient land use and reduce urban sprawl.
• Increase higher dwelling densities and allow for a variety of dwelling types and sizes
• Create safer, more functional and aesthetically pleasing environments.
• Provide new amenities and strengthen existing ones.
• Respond to site-specific context and different cultures and demographic groups.
• Integrate with existing conditions sympathetically.
• Create facilities to encourage gardening and growing food.
• Enable environments for social meeting and where relationships between different cultures and ages groups can foster.
• Improve pedestrian and biking connections.

It also identifies that the regeneration of state-owned properties can:

Integrate new or relocated dwellings.
Make more manageable section sizes by reducing the size and increasing density.
Improve boundary demarcation and the relationship between properties, as well as between properties and the street.
Provide better site structure, incorporating sheds, garages or carports.
The site allows for extensions and additions of the building.
Provide better landscaping structure – including features such as vegetable gardens and landscaping

that could also accommodate tenant personalisation and create a sense of ownership.
Incorporate sustainable water features within the site such as rainwater harvesting, water recycling, water treatment through swales and rainwater gardens.

In addition, it has also been identified that the sustainable regeneration and retrofit of state houses can:
• Incorporate existing houses to create larger family homes
• Improve efficiency and flexibility, as well as enabling the compliance with contemporary building codes.
• Provide different building sizes and types to allow for different family sizes.
• Provide a better quality of life through healthier homes
• Allow for a variety of different cultural activities and needs.
• Respond better to New Zealand's environmental conditions and way of life.
• Maintain existing building structure and envelope.
• Create environments that support tenants such as reducing operational costs through solar panels.

The second point this thesis addresses is the potential of densification through relocating houses within the neighbourhood in order to free up land to create a larger redevelopment and therefore a diversity of building types and sizes. This is distinctive from the vast majority of previous HNZC redevelopments, which aim more for new build over retrofit or renovation. As established the better utilisation of

existing resources both built and land can allow for a richer redevelopment.

While the benefits are similar to sustainable regenerative design they also include:
- Enabling more efficient land use and reduce urban sprawl.
- Incorporate new housing or other uses
- Allow and support a wider variety of users and cultures.
- Reduce plot sizes to correspond to house sizes in order to be more manageable for the tenants – especially for the elderly or people without children.
- Allow for tenants to stay in their neighbourhoods.
- Increases the housing stock for both state owned and the private sector.
- Allows for a more comprehensive development by creating master plans for entire neighbourhoods.
- Create more integration between state housing tenants and private sector tenants.
- The character of the neighbourhoods is maintained.
- Improved communities facilities and therefore increased interactions.
- Reduce the amount of demolition and therefore waste.

However, the ability to acquire state-owned land and in some cases privately owned land in order to have a more comprehensive development is always going to have its limitations. The chosen neighbourhood and site for this thesis has a majority of existing state-owned land which is adjacent to each other. This is the optimal situation however in other cases this would not be possible and consequently further research could be undertaken to incorporate these limitations. In addition more research could be done creating a master plan for a greater area with smaller piecemeal developments such as proposed in this thesis within it to create a more cohesive neighbourhood, which thrives for common goals and objectives.

This thesis acknowledges the vast range of ethnicities and cultures within New Zealand and specifically the suburb of Glen Innes, the final main point of thesis is the necessity of more culturally appropriate regenerative design of post-war suburban state housing. This is an issues that is currently being address by HNZC with things such as existing guidelines with regards to urban and architectural design for Pacific

and Maori people. This is relevant as Pacific peoples account for a quarter of all HNZC tenancies (Housing New Zealand Corporation, 2009, p. 20). This thesis addresses this issue through the showcase design of a large family home. Pacific and Maori families account for the majority need of larger homes and therefore it provided an opportunity to display these design principals in conjunction with regenerative design principals to create a more flexible and culturally accessible home. There is a significant scope for further research into other additional cultural designs as this thesis focuses on Maori and Pacific communities because of the demographics of the chosen suburb. Other suburbs have large Indian and Asian populations and while they may be mostly in private sector housing over state housing their presence within a community changes the need for overall urban design.

In addition to Maori and Pacific cultures the New Zealand European and the general culture of New Zealand needs consideration, as it was not taken into account when these post-war suburban houses were designed and constructed. As previously mentioned rooted in British feudalism, ' the erection of English cottage–style state houses was criticized as they were "not New Zealand houses" (Schrader, 2005), and were 'inappropriate for New Zealand's indoor/outdoor lifestyle' (Schrader, 2003). Through regenerative design strategies and the design showcase it is illustrates that open plan living can be created and indoor/outdoor connectivity can be improved with ease. These reasons justify the potential for these buildings and to increase the life of the original investment. While this thesis focuses on an extensive design, creating a large family home there is potential for future design proposals to showcase how these guidelines and principals can be applied to a single dwelling. These improvements enable the dwellings to more appropriately respond to New Zealand's culture in general, as well as environmental conditions.
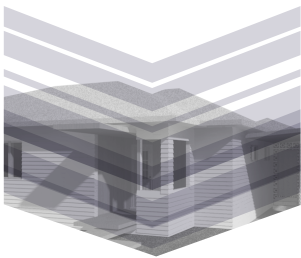
There have been a number of limitations to this thesis. One of the most pressing limitations has been the cost of regeneration of suburban environments, state properties and state houses; it has not been able to be addressed on an accurate scale of what is ultimately a hypothetical project.

While the site of this thesis is in New Zealand and it has been written while in Sweden another limitation to a certain extent has been the top-down method of inquiry. While this method has a sound analysis of existing literature, case studies, fieldwork and redevelopment examples, it is lacking user input. This input is achieved through a bottom-up process; it would have been hard to achieve not being in New Zealand. If more users input were achieved it may have identified outstanding or subjective that could be of significance to the regeneration process. It could have also provided users an opportunity for involvement in the process. However, the project is both hypothetical and large-scale, so a bottom-up method on inquiry would have been difficult to execute, especially being away from the site and without the backing of HNZC
The lack of backing from HNZC is also another limitation that has reinforced the hypothetical nature of this thesis.
Despite these limitations, this thesis has identified the potential of sustainable regeneration and retrofit of post-war suburban state housing through design strategies and the design showcase. While state housing may never again represent in every sense the 'very heart of the New Zealand dream' (Ferguson, 1994, p. 117), through regeneration and retrofit it can, once again, set the standards for housing both in terms of healthy homes and a better quality of life in New Zealand.
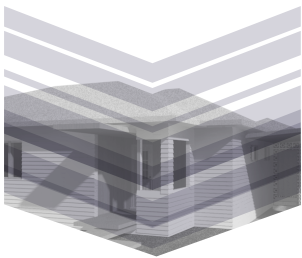
## CRITICAL REFLECTION OF THE PROCESS
There are many limitations that affected the outcome of this thesis in both a positive and negative way. Some of the main things that had an influence on the work was the very small time frame in which to develop, produce and present the thesis and location in terms of choosing not to study in Gothenburg during this time. This limited my exposure to other students work and influence as well as limiting some tutoring opportunities, in contrast to this it did mean that their were less distractions and the amount and quality of work I was able to achieve was higher.

One personal goal I set myself was to try and set realistic goals in terms of what I could achieve. While I know I have made a step forward in this personally their is still room for improvement and that can been seen in not all work having the time to be finished to the same standard of work.

A second personal reflection and lesson I learnt from this masters thesis process was the importance to have more belief in my abilities and way of working. By trying to conform to the way of working that was suggested - multi-tasking between research and design - I know my work has suffered and is a bit chaotic in its thinking as it developed in a non linear manner but needed to be written in a linear manner. Reflecting back I regret not standing by my own personal why of working which is a more linear way of working and finishing things completely to different draft versions. I think if I had stuck to this I would have had a more cohesive and understandable thesis. In saying this the suggested way of working did mean that my design was not left to the last minute and forgotten about.

## CRITICAL DESIGN REFLECTION
The aim of this thesis was to find sustainable design strategies to revive post-war suburban state housing in New Zealand. This was achieved through both general regenerative design guidelines and the in-depth proposal showcased that this is a possible, interesting and cost effective solution for the existing state housing stock. It however only one alternative solution and of course with any design project their are many different solutions.

As this thesis dealt with existing buildings there are always many issues that occur. One of the major issues with the in-depth design was the joining roof. This became an issue because of the existing gable roofs with 500mm over hangs and low ceiling heights of 2600mm - limiting the number of possible solutions. The initial solution was a more modern mono pitch roof that sat above the existing roof (see images below), while this roof hand more architecture presence it raised the question of how to effectively make it weather tight and connecting it to the existing roofs became complicated and costly. The final roof design

in the end resorted back to a very basic gable roof connecting into the existing tiled roofs. This was the final chosen solution because it was the most cost effective and simple to construct and these were very important factors as this is state funded housing and money is always and issue. While the end result was very generic in aesthetics, it did tie the house together more cohesively and the combination of all of these made it the winner in the end.

A second issue that could have been explored more is the idea of making the design more modular so it can be replicated more easily. This was a challenge and it would have been the next design issue tackled if there was more time. It was complicated because all state housing sites are different shapes and slopes and all state houses are slightly different in size, layout and shape. However, it is something that could have strengthen the design further. Looking at it from a general perspective in terms of the area focused on it has responded to and proposed a solution that is a sustainable and cultural design strategies that revives state housing in the community
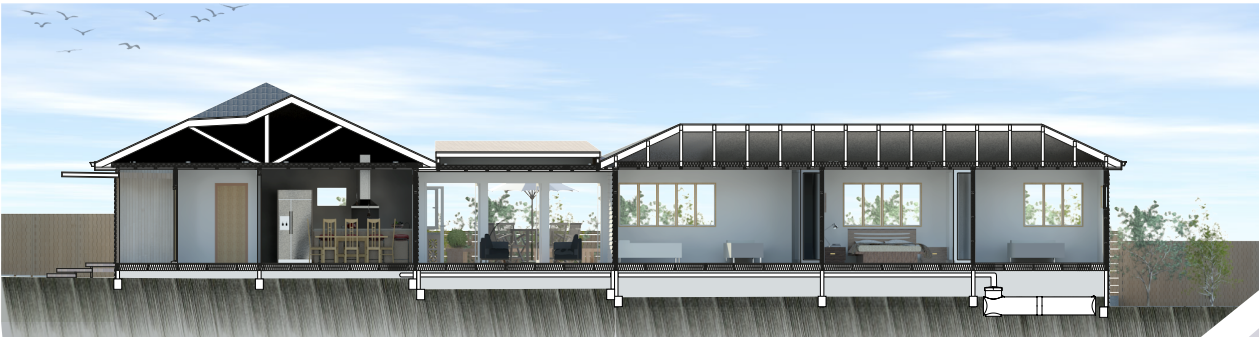
## REFERENCES
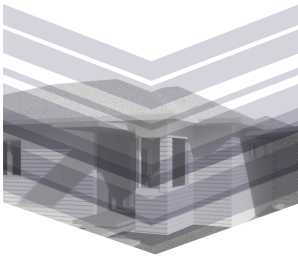
### PART ONE

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### PART TWO

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