

Redefining Brisbane

Developing a Subtropical Metropolis

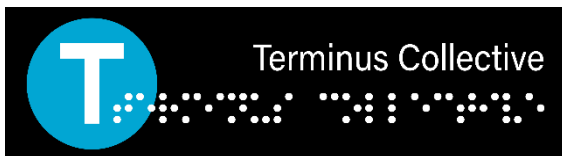
Forward

First released in 2008, this paper is has not been updated to reflect the current state of Brisbane's exponential growth, which has remained a constant attribute of the city throughout the last 30 years of post-Bjelke-Petersen maturing and modernisation.

Although some data contained within this paper is now outdated, the overall message remains as relevant now as it was in 2008. Large scale population growth and major development have continued, with limited planning policy enacted in the last decade to remedy the systemic issues identified within Redefining Brisbane.

Good planning, social and environmental policy will never be a detriment to any great city. Ours should be no different.

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Abstract

This paper is concerned with the development of Brisbane City, historically, presently and into the future, in particular the evolution of Brisbane from its previous attributes as a big country town, to its potential position as a subtropical metropolis.

The notion of the subtropical metropolis suggests more than a conventional city, more than simply a large population, urban structure or clustered high rises. Together the ideas of subtropical, and metropolis suggest much more. Subtropical identifies the character of the city, not simply in terms of location, but rather as a lifestyle induced by climate. Metropolis signifies a thriving urban landscape, with a structured framework that is systematically fine tuned. Together, these ideas create a vision.

Brisbane's previous description as a big county town is outdated. The Brisbane of today is the third largest Australian city, in a region with population growth rates among the nation's highest for over twenty-five years. Although Brisbane may have grown physically out of its big country town status, it is the attitude of governments, policy makers, planners and most importantly the residents that define a subtropical metropolis.

What actions Brisbane has taken to move away from the status of big country town, and the current state of planning and development across the City provide this study with a benchmark to assess Brisbane's existing situation with international development scenarios, and examples of best practice development and planning, including the reduced dependence of the private motor car as the dominant form of transportation.

In addition to the retrospective analysis of development, locally and internationally, the occurrence of climate change and how it will affect the way Brisbane develops in the coming decades is of great concern. The expected challenges Brisbane will face include longer periods of drought, contrasting with increased severe weather events, and higher intensity rainfall over short periods, resulting in flash flooding.

If Brisbane is to respond to the challenge of climate change, while addressing continued population growth, new approaches to development are required. This study uses the development scenarios of Smart Growth and New Urbanism to generate a more appropriate style of development for Brisbane, focusing on key indicators of how cities work, including urban hierarchy, density, and transportation systems.

The culmination of this study is the development of a robust set of criteria for an appropriate development scenario to outline a way forward for Brisbane as a maturing subtropical

metropolis. Focus areas of the development criteria include containment of Brisbane's urban footprint, redefinition of the city's urban hierarchy, and urban densification. An additional contribution arising through an application of these criteria is the development of the Brisbane House, a new housing typology designed to both reflect and facilitate the evolution of Brisbane as a subtropical metropolis. The contributions of this study are thus both conceptual and applied. Through implementation of the proposed development criteria, Brisbane will be able to better equip itself with the tools required to mature and prosper as subtropical metropolis.

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1.0 Introduction

Has Brisbane developed into a subtropical metropolis, mature and capable of appropriately confronting growth and adapting to change? Or can Brisbane be defined as an overgrown country town, unable to address major issues, such as sustained population growth and a changing climate?

Brisbane has previously been described as a big country town, due to the remote location, relaxed attitude to major issues, and long term political rule by farmers and country folk. This analysis, however, is an outdated one. The Brisbane of today is the third largest Australian city, in a region with population growth rates among the nation's highest for over twenty-five years. Brisbane may have grown, physically, out of its big country town status, but it is the attitude of governments, policy makers, planners and most importantly the residents, that define a city.

The notion of a subtropical metropolis suggests more than a conventional city, more than simply a large population, urban structure or clustered high rises. There are two important ideas here, first Subtropical, and second metropolis. Subtropical identifies the character of the city, not simply in terms of location, but rather as a lifestyle induced by climate. Metropolis signifies a thriving urban landscape, with a structured framework that is systematically fine-tuned. Together, these ideas create a vision.

A vision of Brisbane as a subtropical metropolis is an attractive one. A vision of urbanisation existing in harmony with climatic condition, where adapting to change comes with foresight, determination and charisma. A metropolis with efficient transport that is readily available, multi-modal and reliable, where the private motor car is not dominant. An environment dedicated to the human scale of everyday life, where the architecture embraces the climate, and is integral with the landscape.

Is this a vision Brisbane is striving for? Does the Brisbane of today resemble such a vision, and will the Brisbane of tomorrow possess these qualities? The purpose of this document is to assess where Brisbane currently is, in terms of its maturity as a subtropical metropolis, and where it is heading.

As with much of Australia, and the United States, Brisbane has been subject to the twentieth century urban model of conventional suburban development, stimulated by the private motorcar, resulting in urban sprawl. What challenges are faced by urban sprawl, and will this form of development have a role in creating a subtropical metropolis?

Through investigations into Brisbane's history from an isolated convict settlement to the existing condition as an urban landscape supported by an investigation into alternative models of urban development and how they have been used successfully in the international realm a position will be taken on how Brisbane reflects the notion of a subtropical metropolis . It will be argued that a development scenario is needed that best facilitates the continued transformation of Brisbane into a subtropical metropolis. These investigations will be undertaken through a review of literature, drawing on a diverse range of sources to develop a picture of what Brisbane was, what it is, and what it could be, by benchmarking against published case studies of best practice sustainable urban design in developing a subtropical metropolis.

These benchmarks will then be evaluated for their effectiveness in addressing the issue of climate change, both in terms of mitigation of greenhouse gas emissions, but also in terms of how well adapted and adaptable these designs are. Analytical data from local, State and Federal governments, international bodies, and commercial and community organisations, peak scientific bodies, including the Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO), and the United Nations Intergovernmental Panel on Climate Change (IPCC), will inform a position on what impacts climate change will have on South East Queensland, and how this will affect the development of Brisbane as a subtropical metropolis. This research is limited in its scope to the exploration of the built environment and its interaction with the physical natural environment. Broader social, cultural, spiritual and economic spheres may be touched upon, but are not the primary concern of this research. The physical extent of this research is also limited to the Brisbane City Council area and does not include in any detail the greater con-urbanisation within SE Qld that has Brisbane at its heart.

The contribution of this study will be the development of a robust set of criteria for an appropriate development scenario to outline a way forward for Brisbane as a maturing subtropical metropolis. Through the identification of the issues affecting Brisbane's development key indicators of how the city functions will inform the solutions required to achieve the vision of a subtropical metropolis. Armed with this criterion set a discussion can take place on how best to tackle the issues confronting the city as it moves into a crucial period of human development, in which sustainability and efficiency will play a vital role. An additional contribution arising through an application of these criteria is the development of the Brisbane House, a new housing typology designed to both reflect and facilitate the evolution of Brisbane as a subtropical metropolis.

The contributions of this study are thus both conceptual and applied.

The intended outcome of this study is to provide a platform to guide Brisbane toward the vision of a subtropical metropolis. This platform will be developed in this document through the examination of the Development Scenarios of Brisbane (Section 3), the global climate crisis

(Section 4), the existing character of the urban landscape (Section 5), global development scenarios and an international case study (Section 6) and culminating in the articulation of Appropriate Development Solutions in Section 7.

To best assess which direction the city should move toward, the path that has led Brisbane to this point should be explored, identifying the history and character of the city. Section 2 will provide this Historical Context for Brisbane.

2.0 Brisbane: A historical context

From humble beginnings as a penal colony, the isolated settlement of Brisbane achieved independence from New South Wales in 1859 soon after free settlement was granted. As the capital of the self-governing colony of Queensland, Brisbane quickly grew.

Over the following century Brisbane battled problems faced by many colonial towns. Poor sanitation, overcrowding and pollution from developing industry were part of everyday life in the city, which grew to a population of around 130,000 by the turn of the century (University of Queensland, 2005). At the time of federation, in 1901, Brisbane was the fastest growing city in Australia, with much of the city's prosperity due to the activity generated by the Brisbane River (Discoverbrisbane, 2008).

More recently, South East Queensland, supported by the economic centre of Brisbane City, has continually been recognised as one of the fastest growing areas in Australia.

2.1 Early Settlement

The area now known as Brisbane was traditionally inhabited by the Jagera and Turrbal peoples. The Turrbal people lived generally to the north of the Brisbane River, the Jagera to the south. It was the river that was a source of life for the indigenous inhabitants of the area, and so too had the highest of importance to the European settlers (BRISbites, 2008).

The first European discovery of the Brisbane River was made by three lost timber workers, blown north in a violent storm. Upon a chance encounter with the Surveyor-General of New South Wales, John Oxley who was in search of an appropriate site for a convict settlement in 1823 the men guided the exploration to mouth of the river (Holthouse, 1982).

It was the discovery of the river that gave cause for Oxley to locate the planned convict settlement, destined to house those considered to be the worst offenders. In 1825 the first convicts were relocated to the colony, named Brisbane in honour of the governor of the day, Sir Thomas Brisbane (Holthouse, 1982).

For fourteen years Brisbane was the site of what is considered by many to be the most harsh and brutal convict settlement in Australia. At the hands of Commandants such as Captain Patrick Logan, reinforced by a lack of funding and support from the government in Sydney, convicts were responsible for the construction of early Brisbane under the most appalling of circumstances (Holthouse, 1982).

The following excerpt is from a convict folk song, titled Moreton Bay, believed to have been written soon after Captain Logan's death in 1830;

"I've been a prisoner at Port Macquarie
At Norfolk Island and Emu Plains
At Castle Hill and at cursed Toongabbie
At all these settlements I've been in chains
But of all places of condemnation
And penal stations in New South Wales
To Moreton Bay I have found no equal
Excessive tyranny each day prevails

For three long years I was beastly treated
And heavy irons on my legs I wore
My back from flogging was lacerated
And oft times painted with my crimson gore
And many a man from downright starvation
Lies mouldering now underneath the clay
And Captain Logan he had us mangled
All at the triangles of Moreton Bay

Like the Egyptians and ancient Hebrews
We were oppressed under Logan's yoke"
(Folkstream, 2006)

In 1839 the Brisbane settlement's sole purpose of convict incarceration ended, and preparations were made for the area to be opened to free settlement, eventually occurring in May 1842 (Holthouse, 1982). With a rising population, increasing shipping trade, and steady development, Brisbane became the capital city of the self-governing colony of Queensland in 1859 (Ourbrisbane, 2008).

One of the greatest challenges for the young colonial town was the development of an appropriate architecture, capable of sheltering its inhabitants from the harsh Queensland climate. It is believed William Coote, an architect and civil engineer, is responsible for much of the reasoning behind the local vernacular, recognised today as the Queensland House, or more affectionately known as the Queenslander. In a lecture delivered to the Queensland Philosophical Society in 1862, Coote discussed the need for an architectural solution unlike the compact styles of English houses, siting detached dwellings capable of harnessing the cooling breezes, well shaded by large verandahs as a necessity (Evans, 2001).

It was the early work of Coote, and other members of the Queensland Philosophical Society that led immigrant architects to develop the local vernacular throughout the late nineteenth and early twentieth centuries, continually reacting to Brisbane's subtropical climate (Evans, 2001).

An influx of government sponsored migrants throughout the mid to late nineteenth century boosted the colony's population, soon becoming the fastest growing city in Australia. This however was not a blessing for the city (Holthouse, 1982). Brisbane's character throughout the late nineteenth and early twentieth centuries was of an overcrowded, dirty, and often unsafe city. With a vast divide between the wealthy and poor, Brisbane struggled to develop into a proud and prosperous city for all (Holthouse, 1982).

It may have been Brisbane's isolation, particularly from other Australian settlements that limited the effectiveness of successive governments to develop the City. This coupled with the frustrations of colonial settlement in such an unforgiving climate would have given cause for many of the failures attributed to the early settlement of Brisbane. Despite the hardships faced by the city, much of the groundwork had begun and Brisbane was on track to become a prosperous subtropical city, providing suitable governance continued its development.

2.2 Stunted Planning

Planning strategies across Brisbane, for much of the city's history, were not adequate for society's needs. Indifference between state and local governments, and inaction on major issues caused planning in Brisbane, and across South East Queensland, to lag behind nationally and globally leading cities.

According to Peter Spearritt (2002, September 26), Executive Director of the Brisbane Institute and respected academic at Monash University and the University of Queensland, being widely viewed as a 'Big Country Town' until recently, caused Brisbane to undertake major steps toward citywide planning at a slower pace than more metropolitan cities in Australia.

Kevin Yearbury (1994), former Director General of the Queensland Department of Local Government and Planning, states historically there has been no formal link between strategic intentions of state and local plans. Hamnett & Freestone (2000), supported by Yearbury, believe this has resulted in delays in approval processes and have prevented implementation.

Hamnett & Freestone (2000) noted that historical failures to achieve key milestones for the city have prevented Brisbane from implementing best practice planning strategies. An example of this is the long term work carried out during the 1930-40's, including extensive surveying, by the Greater Brisbane Council in effort to have a zoning ordinance enacted. The efforts were quashed by the state government of the time, as an act of restricting the council's power and authority. Brisbane was among the last of Australia's capital cities to legislate a planning scheme. After years of work, a planning scheme for Brisbane was eventually gazetted by the

state government in 1965, despite being approved by the council in 1959. This put Brisbane some 14 years behind Sydney, where the County of Cumberland plan was passed in 1951. Similarly, although not having a dedicated plan, in Victoria the Melbourne and Metropolitan Board of Works had government legislated jurisdiction over planning matters (Hemnett & Freestone, 2000).

Although early implementation of a public transport system across Brisbane had been successful, Spearritt (2002, September 26) believes acceptance of the private motor vehicle as the dominant mode of transport was enforced in the 1960-70's, when the expansive tram system was closed and dismantled, and with the construction of the Riverside Expressway. During this time, a pro-development state government facilitated rampant sprawl, with little regard for long-term planning.

This period reinforced a Brisbane stereotype as an overgrown country town, attracting a reputation for a lack of strategic vision. The continued failures of Brisbane's leaders were placing the concept of the subtropical metropolis further out of reach.

2.3 Late Revival

In 1991, after undertaking the Brisbane Plan for Brisbane City Council, Robert Stimson, now Director of the Centre for Research into Sustainable Urban and Regional Futures at the University of Queensland, concluded that planning in Brisbane had generally failed, sighting a number of factors including a lack of political will to implement plans, and a failure to change sectors of society and the economy through the plans.

It is suggested the Brisbane Plan, although not a planning scheme, can be considered a turning point for the city (Hemnett & Freestone, 2000). Yearbury (1994) supports this, stating that in addition to the citywide planning rebirth, state government initiatives began in the early 1990's, including formulation of SEQ2001 to address strategic planning at a regional level, and the implementation of the Integrated Development Approval System (IDAS) (Queensland Department of Infrastructure and Planning, 1997), along with the introduction of state legislation requiring public transport be planned strategically (Queensland, 1993).

Due to factors such as successive government changes through the 1990's, Hemnett & Freestone (2000) believe Brisbane failed to take definitive action on planning in the city, despite numerous studies, reports and plans sighting the benefits of urbanisation, less dependence on the car, and Transit Oriented Development. Further, the continuing tensions between the state and local council still play a large role in stunted planning policy and implementation. A recent

example of such tensions has been exhibited in the planning process of the Hale Street Link, a new bridge close to the city centre, with the State Government refusing to give approval for the project championed by Brisbane City Council (Courier Mail, 2007).

Despite not undertaking broad scale changes, such as addressing increasing traffic congestion or inner city housing affordability, during the 1990's the inner city suburbs of Brisbane received vast sums of public funding, aimed at driving an urban renewal across the city. In turn, the private sector invested in those communities, creating a surge of urban renewal projects and urban consolidation (Baum, Et Al, 2000).

According to the report *Inner-City Renaissance*, published by the University of Queensland (Baum, *et al.* 2000), approximately \$4 billion was invested in the inner city areas of Brisbane, by both public and private sectors, during the 1990's. Major investments were made in the construction of office space, education and health facilities, and densification of residential areas.

Projects such as the master planning of Brisbane's inner-northern suburbs by Brisbane's Urban renewal task force, established in 1991 under Lord Mayor Jim Soorley, have reportedly created thriving communities in areas previously struggling to retain business, industry or residents (BCC, 2008). Now known as Urban Renewal Brisbane, the task force has been responsible for the revitalisation of more than 700 hectares of land to the north of Brisbane's CBD. Vacant land, derelict industrial facilities and poor connectivity, have been replaced with high density residential and mixed use areas, greater access to public transport, and an increased sense of community (BCC, 2008). Similar renewal projects have taken place in South Brisbane, and are currently planned for West End and Woolloongabba, with additional sites in Albion and Bulimba also being targeted for renewal (BCC, 2008).

The efforts taken by both the Brisbane City Council and Queensland Government in recent years have been some of the more positive in the city's history. The maturing of the city into a metropolis may be considered to have begun. There are however many areas requiring improvement that will have to be addressed before Brisbane can truly consider itself a subtropical metropolis.

3.0 Development Scenarios

Lester R. Brown (2007), founder and President of the Earth Policy Institute and globally recognised as a leader in environmental policy, believes a good indicator for the liveability of a city can be the amount of park space, compared with car park space. Cities that give priority to people, over private motorcars, provide a better quality of life for their residents.

The greater the number of quality transit modes available to a community, the less congestion and over use of any one mode will be experienced. Despite this being proven in various cities across America, and Europe, budgetary allocations for motor vehicle transport remain far greater than that for public transport globally (Brown, 2007). Locally, although recent efforts from Brisbane City Council have seen an increase in the budgetary allocation for public transport (BCC, 2007, June 13), local and state government funding for roads is far greater, continuing the facilitation of the private motor car as the dominant mode of transport (Queensland Government, 2007).

Urban sprawl is a condition facilitated by the motor vehicle, driven from a desire to escape the traditional industrialised city, and raise children in a clean environment. Ironically, due to the technological revolution of the mid twentieth century, it is suburbia, sustained by the motor car that has created unliveable and unsustainable cities (Steuteville, 2004). Contemporary global trends in urban growth have moved away from urban sprawl which requires major investment in widespread public infrastructure and services, toward the more sustainable models of Smart Growth and New Urbanism, focusing on community development, through densification and character improvements.

The development models of Smart Growth and New Urbanism represent best practice development strategies for regional and local growth. Through these strategies, better services can be provided to a more centralised urban footprint, focusing on developing communities, rather than suburbs.

3.1 Conventional Suburban Development

With the early twentieth century's polluted cities, a result of the industrial revolution, and the freedom of post war life in the 1940's, a growing desire to return to open space, and healthier environments to raise a family was being felt across the United States and Australia.

The Suburb was the answer. The promise of clean air, a revival of community spirit, and reduced crime gave a generation of families a new outlook. The unforeseeable future of environmental

degradation, global warming and peak oil was not the intention of conventional suburban development, but rather salvation for wrongs of the early to mid-twentieth century.

Unfortunately, the urban model of conventional suburban development, stimulated by the private motorcar, led to urban sprawl. Generally void of a town centre, this low density form of development necessitates a high land use, disproportionate to population increases, with heavy reliance on the private motorcar for transportation (Steuteville, 2004).

Humstone (2004), defines urban sprawl as low density development, on the periphery of an urbanised area, with inefficient land use frameworks, reducing open space and increasing the coverage and cost of providing services. The European Environment Agency defines urban sprawl as:

“The physical pattern of low-density expansion of large urban areas under market conditions into the surrounding agricultural areas. Sprawl lies in advance of the principal lines of urban growth and implies little planning control of land subdivision. Development is patchy, scattered and strung out, with a tendency to discontinuity because it leap-frogs over some areas, leaving agricultural enclaves.”

(European Environment Agency, 2007)

David Owen (2004), in his widely acclaimed article ‘Green Manhattan’, published in the New Yorker, argues urban sprawl is detrimental to the liveability of our cities, stating that sprawl facilitates the motor car: *“A car is speed and sex and power and emancipation. It makes its driver a self-sufficient nation of one. It is everything a city is not.”*

(Owen, 2004)

Generally, automobile traffic congestion is supplemented by new or larger roads, only causing a greater congestion problem for the future. Owen (2004) continues, adding public transport in a congested area reduces the road congestion, making driving more attractive again. Public transport has to be implemented, along with strategies such as reducing road size, increasing footpath size and reducing the amount of available parking space. Owen also states, that in order to introduce public transport, a threshold of around seven dwellings per acre exists, in which a reasonably frequent bus system can be supported.

John Sterman (2000), director of the System Dynamics Group at the Massachusetts Institute of Technology Sloan School of Management, in his publication System Dynamics: System Thinking and Modelling for a Complex World, argues that system dynamics modelling can be used to show the feedback mechanism that produces urban sprawl. In a related publication Sterman states:

“The results of our actions define the situation we face in the future. The new situation alters our assessment of the problem and the decisions we take tomorrow.”

(Sterman, 2001)

3.2 Smart Growth

Smart Growth, as defined by the Brookings Institute, a Washington DC based independent non-profit public policy organisation, is development actively limiting an increase to the urban footprint, encouraging greater density and mixed use. Together these attributes reduce travel distance and time, while promoting reuse and renewal of existing urban areas, retaining adjacent green space (Humstone, 2004)

Pace, one of the largest public transport services in North America, based in Chicago, defines Smart Growth as:

“Environmentally sensitive land development with the goals of minimizing dependence on auto transportation, reducing air pollution, and making infrastructure investments more efficient.”

(Pace, 2007)

In areas where Smart Growth has been implemented, a reduction in public infrastructure requirements has been achieved. As an example, focusing development in ‘Priority Funding Areas’, which are designed to lure residents into higher density population centres, allows governments to provide improved centralised services, with lower expenditure. In contrast, in areas where traditional sprawling growth continues, maintaining increased public spending is required to accommodate exponentially expanding urban footprints (Humstone 2004).

According to the City of Portland Planning Commission — recognised internationally as a leader in Smart Growth policy and implementation — the introduction of development growth boundaries promotes inner city growth (2006). Defining a growth area allows services and infrastructure to be better directed, while development and investment is attracted by a more centralised population, providing greater patronage and tenancy rates. In addition to development growth boundaries, strategic planning should define key density targets, and implementation should be aided by steering committees, accountable for the achieved outcomes. Together these elements can actively foster density, preventing urban sprawl. However, without maintaining clear objectives, and having a commitment to implementation, these policies can fail.

Mayer & Provo (2004) advocate Smart Growth, suggesting urban growth boundaries support neighbourhoods by ensuring the population is sustained by growth in existing areas. As a

counter to the urban areas, the surrounding area, protected from development, attracts agriculture and nursery industries, allowing greater diversity in industry and open green space close to the population centre. Further, education of the process and policies is key, because empowering the people with knowledge, allows them to have a greater sense of pride and ownership of their community and city.

Cities comprised of neighbourhoods and districts rather than suburbs have stronger communities. Smaller than suburbs, neighbourhoods allow residents to have a better connection to their community, often forming groups to facilitate the changes and achieve the mood they want for their neighbourhood.

Generally Smart Growth communities are comprised of medium density residential pockets, structured around main streets, lined with commercial activity. This structure localises the neighbourhood, further reinforcing the sense of community, rather than exporting it to a nearby shopping centre (Mayer & Provo, 2004). The concept of reinforcing the community through the urban hierarchy is incorporated in section 7.1 Development Criteria, as a method of guiding Brisbane toward the model of a subtropical metropolis.

Contrary to the wide belief that Smart Growth is the solution to urban sprawl, Randal O'Toole (2007), an economist and expert in public policy based in Portland, Oregon for many years, and now a member of the Washington DC based Cato Institute, believes Smart Growth is the cause of many problems in the urban condition. Densification and urban renewal, as a result of Smart Growth planning policy, reduces housing affordability, and facilitates migration to nearby regional centres with lower housing prices. O'Toole (2007), disputes Smart Growth further, stating areas that restrict sprawl, with limitation such as development growth boundaries, facilitate sprawl in surrounding areas at a greater rate.

Todd Litman (2007), a member of the Victoria Transport Policy Institute, an independent research organisation that focuses on transport planning and policy in British Columbia, in the recent Evaluating Criticisms of Smart Growth report, suggests there are only two factors that may increase housing cost directly from Smart Growth policy. Firstly, implementation of development boundaries leads to a decrease in the amount of greenfield sites available to developers. Of lesser concern, the second factor is increased design requirements, putting limitations on the type of allowable development. The report argues the benefits of Smart Growth outweigh these factors, with increased density allowing a greater number of dwellings to be built on smaller lots, tax incentives for infill and multi-residential development, and a broader range of housing types allowing greater diversity and affordability across the housing market. Another concept with similarities to Smart Growth is New Urbanism.

3.3 New Urbanism

Combating urban sprawl, Robert Steuteville (2004), editor of the New York based New Urban News, defines the theory of New Urbanism as development aimed at a more manageable human scale, with communities based around a town centre, serviced by walkable amenity in a mixed use framework.

It is widely recognised that New Urbanist theory is centred around:

“the power and ability of traditional neighbourhoods to restore functional, sustainable communities.”

(Steuteville, 2004)

According to Douglas Kelbough (2005), Dean of the School of Architecture and Urban Design at the University of Michigan, the trend of New Urbanism should be implemented to combat urban sprawl in our cities. New Urbanism, rather than Smart Growth’s macro strategy, also looks at the micro, focusing on improving social aspects within our cities. Kelbough further describes New Urbanism as compact, street oriented, with mixed use, rich with interactions and encounters between its inhabitants. New urbanism gives monumentality to civic buildings, supported by various smaller uses, to create a defined hierarchy in the public realm.

New Urbanism is also supported by Michael Speaks (2005), celebrated for his academic work in the fields of architecture and urban design in various North American Universities, stating New Urbanism can actively reshape the city, with an ability to reclaim ambition and intervention in the urban form.

Steuteville (2004) states New Urbanism sits within the realm of Smart Growth, as an integral part of an overall urban development strategy. Principles of New Urbanism include development focused around a town centre; variety of dwelling typologies; commercial and retail amenity sufficient for general weekly activity; educational facilities and amenity; generally located within a walkable distance. Various methods of development can be associated with New Urbanism, including the two most dominant methods of urban infill and Transit Oriented Development. Urban infill attempts to better use existing urban areas, increasing density and amenity in a community. Transit oriented development focuses high density, mixed use development around transit nodes, decreasing reliance on the private motorcar.

O’Toole (2007) argues that Transit Oriented Development, although viewed as successful by planners globally, often requires a large amount of incorporated car parking to draw in residents and commercial tenants. Further, to date it is debatable if Transit Oriented Development has

had any major impact on travel behaviour of its users. It is however arguable that if developments that are labelled as Transit Oriented still incorporate a large amount of car parking, they will not facilitate a shift away from the dominance of the private motor car. Such developments may better be described as 'near the station' rather than 'transit oriented'.

Litman (2007), directly criticises O'Toole, questioning his arguments regarding areas such as Transit Oriented Development, stating his reports look only at selected data, with a bias intent of gaining a predetermined outcome. Further, in many cases, additional assessment of individual case studies and ideologies put forward by O'Toole can result in beneficial outcomes toward New Urbanism.

3.4 Subtropical Metropolis Development

As Brisbane matures and attempts to tackle the challenges presented by urban sprawl and is influenced by the effects of climate change (as outlined in the following chapter) a new development scenario needs must be developed. Using Smart Growth and New Urbanism as a benchmark, previously demonstrated as best practice development scenarios, the development scenario of the subtropical metropolis will be centred around a focus on community, sustainability and adaptability.

Elements incorporated from Smart Growth and New Urbanism would include communities of medium density development, serviced by walkable amenity. Domestic architecture appropriate for such a community will be supported by localised retail and commercial opportunities, reducing the existing dependence on 'big box' shopping centres, reducing reliance on the private motor car.

Arguments supporting this new development scenario will be made throughout the following chapters, culminating in set of appropriate development criteria in section 7.1 Development Criteria, designed to guide Brisbane toward the vision of a subtropical metropolis. This new development scenario will allow Brisbane to combat urban sprawl, while addressing the challenges of climate change.

4.0 Global Crisis

During the twentieth century industrialised countries across the world increased energy consumption and the use of mechanised industry, and transportation, among other practices. This led to exponential growth in the amount of fossil fuel being consumed, and in turn the release of ever increasing amounts of gases harmful to the Earth's atmosphere. These gases are known as greenhouse gas, and include carbon dioxide, methane and nitrous oxide. As the counties of the world have developed, so too has the amount of greenhouse gases released into the atmosphere. Today, the level of greenhouse gas in the Earth's atmosphere is higher than any point in our history (Flannery, 2005).

It is the consensus of many leading scientists, including Australia's Tim Flannery, and Professor Ian Lowe, that the continued release of greenhouse gas into the Earth's atmosphere has resulted in global warming. Global warming, the increase of the Earth's lower atmosphere temperature, has in turn resulted in human induced climate change.

The United Nations Intergovernmental Panel, winner of the 2007 Nobel Peace Prize for their related work, defines climate change as;

“A statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period... ..attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods”

(IPCC, 2006)

Many members of the global community, including scientists, religious believers, and business leaders refute global warming, suggesting there is not conclusive evidence to suggest human impacts are the cause of changes in the Earth's climate. Dennis Avery, Senior Fellow of the Hudson Institute, a North American Based policy think tank, in a 2007 assessment, suggests up to five hundred scientists in North America refute human impacts as the cause of global warming (Skeptical Science, 2008).

Despite varied opposition to the causes of global warming, it is clear that global consensus on the occurrence of climate change has increased. In 2006, Nicolas Stern released a report commissioned by the British Government, outlining the economics of climate change. The report outlined the effects of climate change on the global economy, stating the longer the issue of climate change was ignored, the more it would cost to resolve. This report is seen by Cameron Hepburn and Elizabeth Wordsworth, research fellows in economics at Oxford University, as a turning point in how the world viewed climate change (Cambridge University Press, 2008). Since

the release of the Stern report, many governments internationally, following the lead of Britain, have accepted climate change as a reality.

One of the greatest challenges resulting from climate change is a rise in sea levels, due to a number of factors including ice cap and glacier melts, and thermal expansion of sea water (Flannery, 2005).

The Climate Change 2001: Synthesis Report, published by The United Nations Intergovernmental Panel on climate change, predicts that over the coming century between seventy-five million and two hundred million people could be subjected to coastal flooding as a result of sea level rise. Many of the affected areas are within the Asia-Pacific region, including small Pacific Island countries, and the large low lying delta areas of South East Asia.

As a large, generally affluent country, with a relatively small population, what role will Australia play in aiding the many millions of environmental refugees? If, as the traditions of Australia's short history suggest, a large number of the displaced peoples of the Pacific and South East Asia regions are welcomed into the country, where and how will the population increase be handled? In addition to increased population, the global situation will require all societies to be living reduced carbon situation lifestyles, with heavy pressures placed on resources, food supply, and energy use. If during the twenty-first century Australia's population increases two or three fold, in the context of a world where resources must be used with absolute efficiency, will Australia's, and more predominantly Brisbane's urban structure be capable of managing and sustaining the required changes?

4.1 Climatic Change

As the stability of the global climate is compromised by global warming, Brisbane's postcard climate, often referred to as 'beautiful one day, perfect the next', will be increasingly under threat. The Australian Bureau of Meteorology has been recording and analysing the country's climate since 1908, with some data previously recorded since the arrival of the first fleet in 1788. The Annual Australian Climate Statement 2007, published by the Bureau of Meteorology (2008), states average temperatures across the country in 2007 were the sixth warmest. The five warmest years in a century of recorded history, in descending order, were 2005, 1998, 1980, 1988, and 1992.

Figure 4.1.1 shows Brisbane temperatures since 1970 are trending upwards, suggesting the local climate is getting warmer. In addition to the increased temperature, figure 4.1.2 shows longer term rainfall in the coastal areas across Queensland are trending downwards.

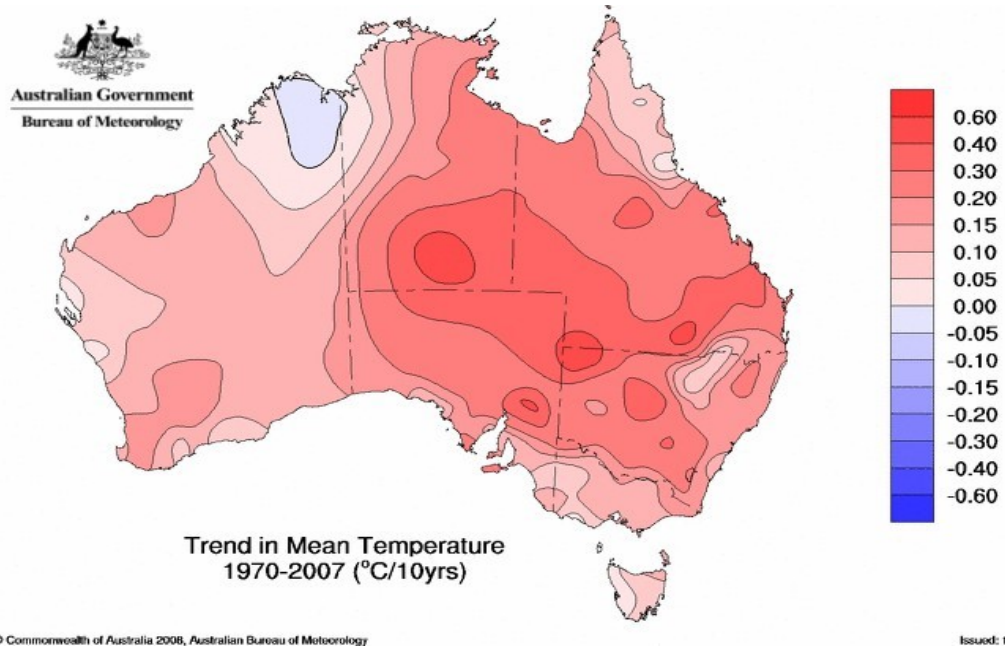


Figure 4.1.1 Trend in Mean Temperature, for the period 1970 to 2007 (Bureau of Meteorology, 2008).
Trend in Annual Total Rainfall 1900-2007 (mm/10yrs)

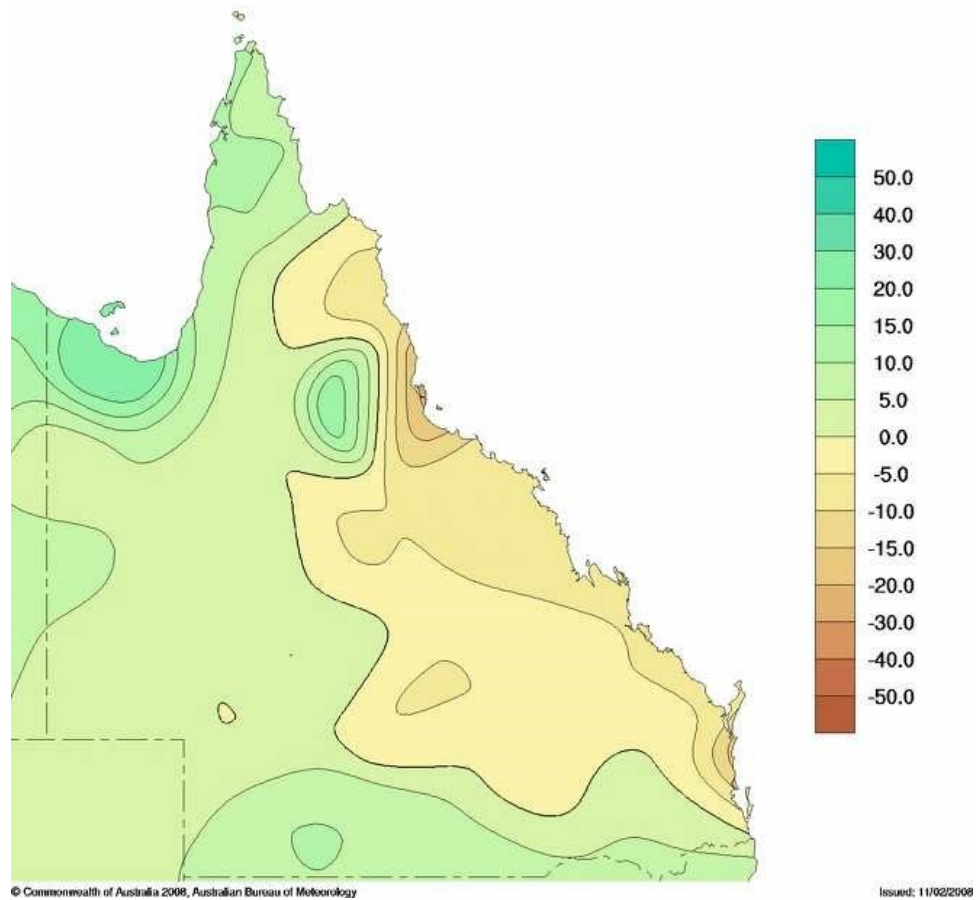


Figure 4.1.2 Trend in Annual Total Rainfall across Queensland, for the period 1900 to 2007 (Bureau of Meteorology, 2008 [2]).

The immediate effects of climate change, such as increased temperature and decreased rainfall are easily gauged and well documented. However, it is the instability of climatic conditions that pose a greater threat to the way communities are structured, and their need to respond to environmental change. It is feared that within decades, major coastal communities could be under threat from the effects of climate change, not through a steady rise in sea levels, but through catastrophic weather events, causing major damage to communities, infrastructure and endangering lives.

Australia's peak scientific body, the Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO) (2002), predicts the variation of existing climate events such as tropical storms and rainfall will become more pronounced as a result of human induced climate change, including larger and more frequent cyclonic events, and higher frequency rainfall events, resulting in increased storm surges and coastal flooding.

The greatest concern for Australia, resulting from climate change, is the vulnerability of the coastal based population. Between 1996 and 2001, Australian census data recorded approximately one quarter of Australia's total population lived within three kilometres of the coastline (CSIRO, 2002).

4.2 Implications for South East Queensland

Large population centres have developed in the coastal zone in South East Queensland, with people lured by postcard perfect beaches and attractive climate. According to Australia Census data from 2006, the coastal areas of South East Queensland (Brisbane, Gold Coast, Sunshine Coast) accounted for 64.5% of the 3,904,532 residents of Queensland (ABS, 2008). In the Gold Coast and Sunshine Coast regions, the majority of the population live on the coastal plain. In the Brisbane area, large numbers of people live in low lying areas along and close to the Brisbane River and its tributaries.

The CSIRO (2002), suggests climate change will impact the coastal areas of South East Queensland in various ways. Supported by data from the IPCC, predictions place the amount of sea level will rise over the twenty-first century at between 0.09 and 0.88 metres, on top of the approximate 0.20 metre increase experienced in recent decades (IPCC, 2001).

Although sea level rise should be considered a great threat to coastal communities, the intensity and frequency of severe weather events, intensified by higher sea levels, is the major concern for the communities of South East Queensland. Brisbane City Council's Climate Change and Energy Taskforce final report, titled A Call for Action (2007, March 12), outlines a variety of impacts that can be expected as a result of climate change. Of key concern are the predictions

of an increase in drought, lower average rainfall, increase in the number of extremely hot days, increased intensity of storms, and larger storm surges.

The report also states, as a measure of energy and water security, that a diverse range of renewable energy sources be considered across the city, reducing the reliance on large scale energy production isolated from the population (BCC, 2007, March 12).

The implementation of small and medium scale energy and water services production and reticulation across Brisbane will form part of the development criteria, outlined in section 7.1 Development Criteria.

4.3 Response to Climate Change

The impacts of climate change present a variety of challenge to Brisbane, and its communities. To successfully develop and maintain Brisbane as a subtropical metropolis, two areas of adjustment are required. The first, mitigation, requires every effort to be taken in order to reduce the impact of climate change, including significant reduction in greenhouse gas emissions. The second, adaptation, requires new approaches in the way Brisbane plans and builds communities.

A Call for Action, Brisbane City Council's (2007, March 12) Climate Change and Energy Taskforce final report, calls for zero net greenhouse gas emissions by the year 2050, with interim targets outlined to achieve the ambitious goal. The report also suggests Brisbane City Council should become a leader in water and energy efficiency, to set an example for the community.

If Brisbane is to mature into a subtropical metropolis, implementation of strategies such as those outlined by Brisbane City Council's Climate Change and Energy Taskforce will have to become a way of life, rather than be viewed as ambitious or long term concepts.

Much of the contemporary architecture in the Brisbane area is not suitable for the effects of climate change. Various factors, including appropriate resistance to severe storm events, excessive winds and flooding, as well as the inappropriateness of slab on ground and masonry construction in a subtropical climate, are likely to have consequences as the effects of climate change are felt in Brisbane (Centre for Subtropical Design, 2005).

The development of an architecture suited to a climate where severe weather events and low energy and water consumption are common place is required. The Centre for Subtropical Design, Part of the Queensland University of Technology, has completed extensive research into appropriate and sustainable design solutions for the subtropical climate of Brisbane. A report titled *The New Queensland*, published by the Centre for Subtropical Design (2005),

states the importance of timber as a sustainable building material. As an existing part of Brisbane's architectural vocabulary, the use of timber as a primary building material should be embraced as part of a new housing typology, appropriate for a changing community. The proposed housing typology of the Brisbane House will allow Brisbane communities to address the concerns of development density, and energy efficiency, while retaining much of the character of the traditional Queenslander. This typology is associated with part of development criteria, and will be outlined in more detail in section 7.1 Development Criteria. It is salient to contrast this proposed housing typology with the existing situation across Brisbane, which will be presented in Section 5.

5.0 Existing Situation

From the post war boom of the mid twentieth century, Brisbane developed in a regular pattern. The older suburbs, close to the city's centre, gradually matured and densified in times of strong economic and population growth. Brisbane's urban footprint steadily advanced, increasing the extent of the city's infrastructure requirements and creating the era of the commuter. Additional suburban subdivisions, broad in nature and relatively void of alternate or mixed land use, pushed the city limits further from its foundation stones on the city peninsular.

Following global trends, Brisbane embraced the ideals of the 'big box' shopping centre, developing large retail hubs north (Chermside), south (Garden City), east (Carindale) and west (Indooroopilly) of the city. Today these centres are thriving, aided by sprawling suburbs lacking localised retail and commercial opportunities; major shopping centres across Brisbane can be considered the heart of many communities.

Brisbane's urban condition is unlike the European model, as exists in many of Melbourne's urban areas, consisting of high streets with small scale retail and commercial land uses, distributed across the urban landscape, surrounded by patches of low to medium density residential areas. Brisbane's suburban condition consists of a much more monoculture approach to development, lacking localised diversity and amenity.

The suitability of Brisbane's urban condition from both a sustainability and climate change perspective, in addition to the vision of a subtropical metropolis is questionable. As outlined in section 4.3 Response to Climate Change, one of the challenges of climate change is the need to change the way houses are constructed in Brisbane. However, in recent years attempts have been made to create a more liveable Brisbane, including the work of Urban Renewal Brisbane in the New Farm Teneriffe area. These efforts have given the city a new approach to urbanisation.

5.1 Characterising the Urban Landscape

A young city, self governing for approximately 150 years, Brisbane's urban landscape is not irregular in structure, style, or scale. Inner city suburbs have become denser, while surrounding and outlying suburban areas have remained moderate in density and character.

Sera Rohan (2006), a South East Queensland based land use planning officer, states:

"Brisbane's residential character depends on its low density, the evident lack of multi-unit dwellings and the timber and tin architecture of traditional housing."

(Rohan, 2006)

The dependence of Brisbane's character on low density is questionable. Such a view suggests a lack of confidence in the design community, symptomatic of limited architectural vocabulary, and seemingly unable to incorporate medium density dwellings with the traditions of the local vernacular. Traditional building types do have an important place in the character of Brisbane's urban landscape, however, this does not restrict the ability of medium density to integrate in areas considered high in character.

The importance of traditional building typologies in a young city such as Brisbane can be embraced as well as dismissed. If the region does not have a wealthy history the significance of tradition may be lost to an eclectic character. Alternatively, if the region's character is reinforced by such traditions, they may be critical to defining the history.

In Brisbane's context, 'historical' is a reference to a period of only a few generations, rather than a few centuries. Any sense of history the city has today is limited, due to a lack of protection of historical sites, many being lost to developers driven by progress and monetary reward (Spearritt, 2002).

As a result, Brisbane's character may be defined by its topography, landscape and intrusive infrastructure.

5.2 Housing Typologies

Brisbane's housing is traditionally recognised by its lightweight timber and tin architecture, large verandahs and backyards. However, as Brisbane has matured, population increases have led to a reduction in dwelling size and increase in density toward the inner city. Coupled with a need to live closer to the city, demographic change is causing a shift in the size and type of new developments.

Australian Bureau of Statistics data from 2001 shows that of Brisbane's approximate 500,000 dwellings, 18.1% were classed as multi-residential (Brown, 2006). This number has been rising in recent years, and is driving an inner city revival.

Brisbane can be categorised into five dwelling typologies:

- Traditional (pre 1946)
- Post war detached
- Post war multi-residential
- Contemporary detached
- Contemporary multi-residential

Traditional housing in Brisbane consists of two housing styles. The first, the 'Queenslander' style, as found across the state, is most common, consisting of timber construction, high pitched tin roofs, large verandahs and often high set (see Figure 5.2.1). The second is a more European style, consisting of a combination of timber and masonry construction, high pitched tiled roofs, and a generally more classical, ornate appearance (see Figure 5.2.2).

The traditional Queenslander house is one of the more appropriate styles of domestic architecture; as stated in section 2.1 Early Settlement, the development of the Queenslander was a direct response to the local climate, providing well ventilated and shaded spaces.



Figure 5.2.1 Typical Queenslander traditional housing, New Farm Brisbane (By Author).



Figure 5.2.2 Typical European traditional housing, Coorparoo Brisbane (By Author).

Post war population booms, and rehousing strategies for returned soldiers, saw large investment in public housing stock during the late 1940's and 1950's, generally with only one housing model, resulting in many areas of Brisbane possessing a typology of mono-culture neighbourhoods (Queensland Department of Housing, 2005). Over time these neighbourhoods have developed diversity, with many of the dwellings having been extended or altered over the years. Despite possessing similar characteristics to the traditional Queenslanders, such as elevated post and beam construction and high pitched roofs (see Figure 5.2.3), the post war detached house was a mass production solution, and was not site specific.



Figure 5.2.3 Typical post war detached housing, Canon Hill Brisbane (realestate.com.au, 2008).

Post war multi-residential dwellings, commonly referred to as 'six-packs' for their efficient six dwelling configuration, can be characterised by a lack of aesthetic rationale, humanist design or extravagance. Built for economy, rather than beauty, the typical configuration consists of ground floor garage and ancillary areas, supporting twin floors of three accommodation units (see Figure 5.2.4). Often the only external area is a common verandah used as circulation space. Tectonically, a combination of off-form concrete, concrete block and brickwork is typical. This style of development has varying levels of suitability in the local context. Although increasing densities in areas previously void of medium density development, the overarching economic drivers for the development limited verandahs and shading, with minimal opening sizes to restrict noise between dwellings also restricting natural ventilation.



Figure 5.2.4 Typical post war multi-residential housing, Coorparoo Brisbane (By Author).

The contemporary detached dwelling has two domains, and subsequent typologies. The evolution of the post war detached house has resulted in mass production, resulting in urban sprawl on the suburban fringe. Increasing in size with every generation, these dwellings have been referred to as McMansions (SMH, 2003). The contemporary suburban fringe dwelling is single or two storeys, combination brick and timber construction, designed to maximise floor area, with a street façade generally dominated by the garage (see Figure 5.2.5).

The second, more sustainable, contemporary detached typology can be found in existing neighbourhoods, resulting from urban renewal, urban infill, and densification. Although sometimes possessing characteristics of the suburban fringe typology, the urban detached dwelling can be characterised by either single or two storeys, less aggressive street frontage, and greater diversity in materiality (see Figure 5.2.6).



Figure 5.2.5 Typical suburban fringe contemporary detached housing, Murarrie Brisbane (By Author).



Figure 5.2.6 Typical urban contemporary detached housing, Hawthorne Brisbane (By Author).

Contemporary multi-residential dwellings range from smaller complexes consisting of as little as three units, to large precinct style developments and high rise apartment towers (see Figure 5.2.7). Varying in design from brutalism to luxurious resort style complexes, the contemporary multi-residential dwelling is a result of economics. Maximising floor space and marketability and minimising construction cost is the common goal of developers.



Figure 5.2.7 Typical contemporary multi-residential housing, New Farm Brisbane (By Author).

In 2003 Brisbane City Council release a document titled A Statistical Portrait of Brisbane, incorporating data from the 2001 Australian Census. The report shows a reduction in household size generally across the Brisbane area, and predicts the number of singles and childless couples living in Brisbane may already outnumber families (Brisbane City, 2003).

The City South Housing Study, completed by Sinclair Knight Merz (2005) for Brisbane City Council, states future housing stock, not only in the inner city, but also Brisbane's suburban areas, will be required to accommodate smaller households, in much greater numbers. This is supported by the Queensland Smart State Council 2007 report Rethinking the City Centre, which also states these demographic trends will create a desire for compact housing across the city. The findings of the two reports are indicators that Brisbane's neighbourhoods are approaching a beginning in a citywide restructure, requiring a more dense and accessible city.

Dr Dominic Brown (2006), a researcher with the Queensland University, believes the shift toward smaller households across the city, will result in smaller housing typologies becoming dominant in the number of new dwellings being constructed in Brisbane. Further, suggesting that on a broader scale Brisbane should move toward densification through urban renewal, similar to that experience in the New Farm–Teneriffe area, where multi-residential dwellings are now the dominant typology.

Reconfiguration of an urban condition on such a scale will require a multifaceted approach, including smaller lot sizes, reduced restrictions on dwelling height and site coverage, relaxations on the number of dwelling units per lot, and the acceptance of alternative housing typologies such as three storey detached dwellings. Changes such as these will allow Brisbane to approach development with a greater emphasis on sustainability, creating medium density communities, suited to the vision of a subtropical metropolis.

The challenge of climate change, with the predictions of more intense weather events, will require the way

Brisbane constructs its houses to reassessed, to determine if the current provisions for withstanding high winds and flooding are adequate. The combination of intense rainfall events, rising sea levels and larger storm surges, puts doubt on the suitability of slab on ground construction, particularly in low lying and coastal areas.

A new housing typology will be required to address both the challenges of creating a subtropical metropolis, and climate change. The notion of the Brisbane House, a new typology for the city will be discussed further in section 7.1 Development Criteria. In addition to the creation of a new housing typology, new legislation and planning frameworks may also need to be developed.

5.3 Planning Initiatives and Legislation

As stated in the Smart Cities: Rethinking the City Centre report, produced by Queensland's Smart State Council (2007), Brisbane is ranked 32 on the Mercer Quality of Life survey of global cities in 2007, noticeably behind every larger or similarly sized city in Australia. A contributing factor to this may be, as Day (2002) argues, that Queensland Governments, state and local, were not delivering physical solutions. Until recently regional planning had not been achieved through state government lead approaches, capable of broad scale implementation.

Brisbane's recent approaches to planning and growth management, undertaken by local and state governments, have begun an urban renaissance across the city. A number of significant reports and pieces of legislation have been the forefront of this revival, including the South East Queensland Regional Plan 2005-2026, the South East Queensland Infrastructure Plan and Program 2005-2026, Smart State Council Smart Cities: rethinking the city centre report (2007), and the Brisbane City Council Inner City Masterplan (2006).

In 2006 the Brisbane city council release a long awaited masterplan for the Inner City. The focus of the masterplan was to give the city centre a vision for the coming two decades. A key indicator of the Brisbane City Council's attempts to deal seriously with the challenges facing the city was the inclusion of an action plan.

According to Sonia Kirby (2007), a Principle of Tract Consultants with a broad background in community and environmental planning and sustainability, Brisbane had previously lacked supporting strategies such as action plans, when delivering new policies.

Low Choy (2005), supports Kirby, suggesting Brisbane had lacked a vision based approach to planning. He believes an approach of developing a vision for the desired future environment, will facilitate the required changes.

Although positive moves are being taken, some areas are lacking an overall vision. As a result of the procedures outlined in the Queensland Regional Plan 2005 – 2026, there are presently 30 identified growth areas across the city. Unfortunately, each growth area is being planned individually, with no attempt to connect with, or complement one another. The Smart Cities Council (2007), suggests consolidating the planning process, to achieve a more consistent approach to that currently undertaken by Brisbane City Council.

The Rethinking the City Centre report (Smart State Council, 2007) calls for the definition of four super precincts, accommodating all of the 30 individual growth areas, with the aim of better providing services and approaching issues like energy consumption and public transport at a community level. To reduce the traditional delays caused by the planning process, Super

Precinct Taskforces could be put in place to facilitate local approvals, under an overarching system of guidelines.

In addition to Queensland Government studies, Brisbane City Council's Climate Change and Energy

Taskforce's final report, *A Call for Action* (2007, March 12), is the first in depth study undertaken by Brisbane's governing body on the effects of climate change. Although not relating to any legislation at this time, the report may lead to stronger actions by Brisbane City Council on the challenges of climate change. The findings and recommendations of all these reports have implications for a number of urban renewal projects across Brisbane, including the case study examined in Section 5.4.

5.4 Urban Renewal Case Study: New farm, Teneriffe

In 1990, after the election of the state's first centre-left government in over three decades, a series of planning policy changes occurred. At this time that state and local Labor governments worked together, focussing on creating a liveable city; actions not seen in Brisbane's history.

The establishment of Brisbane's Urban renewal Taskforce aimed to breed life back into certain areas of the inner city area, which has become dilapidated after the closure of light industry and demographic shift resulting from the suburban development occurring in outer city areas (BCC, 2008).

The New Farm Teneriffe Urban Renewal Area, to the north of the city's central business district, encompassing areas of Albion, Bowen Hills, Fortitude Valley, New Farm and Teneriffe, was established to create a new inner city precinct, high in cultural diversity, with a mixed use platform, to prevent the high vacancy previously experienced in the area.

According to information from the taskforce — now known as Urban Renewal Brisbane (2008) — the Taskforce set about transforming the area into a metropolitan community through a process of densification, introducing a more diverse range of community and cultural facilities, open space and increased public transport services.

The New Farm Teneriffe area was historically a working class area. Streets lined with small worker cottages, and a culturally diverse migrant population gave the area a greater sense of character much earlier than many communities in Brisbane. The establishment of Fortitude Valley's Chinatown in 1987, and the area's rich live music culture, present throughout the 1980's and 1990's, produced social and demographic diversity not seen in other parts of the city.

As Brisbane re-embraced the Brisbane River as a pivotal element of the city's personality character and culture during the 1990's, the industry and wharves along the Teneriffe Reach gave way to new development, driven by a desire to be closer to the river, once the lifeline of the city.

The closure of the Light Street bus depot in Fortitude Valley, and closure of adjacent industry opened large areas of brownfield sites for the anticipated flood of development. Key industrial landmarks were demolished across the urban renewal area, including the State Canning Factory and Boral Gasworks at Teneriffe, and the Carlton United brewery adjacent to the Story Bridge. Other sites of greater historical value such as the New Farm Powerhouse and Colonial Sugar Refinery at New Farm, and Teneriffe wool stores were retained for adaptive reuse (BCC, 2005). Today these buildings house a variety of uses, including theatres, galleries, restaurants, and luxury apartments.

As suggested by Brisbane City Council's (2003) report, A Statistical Portrait of Brisbane, these processes have come together to re-brand the New Farm Teneriffe area, making it a haven for young urbanites and wealthy older professionals.

With urban renewal came wealth, and with the rising wealth came a serious social side effect, generic with urban renewal. Housing affordability diminished, and with it so did the elements of the social diversity that had been responsible for the area's character. According to The University of Queensland report An Inner City Renaissance (2005), providing more affordable housing should be a key priority when undertaking urban renewal projects.

One of the more famous side effects of the urban renewal process in Brisbane's inner city, which came to a head in the late 1990's, was the conflict between the residents of newly constructed apartments and the existing live music scene. To protect the area's new image of a liveable inner city precinct, the Brisbane City Council imposed restrictions on live music in the area. The government's choice to side with the small number of residents was not taken lightly by the community, and became the driver for a shift in the consciousness of Brisbane. As the community embraced the entertainment sectors, taking up arms against the new, and to some extent unwelcome inhabitants of the densified developments, the social consciousness of the city chose cultural diversity over development and perceived prosperity. The restrictions were reviewed and 'The Valley' has continued to be the heartland of Brisbane's music, night club and entertainment scenes.

Although some elements of the urban renewal process required review, in many areas the program has been an overall success. Teneriffe Village, formerly wharves and wool stores,

comprises a combination of heritage and new buildings, with mixed-use amenity varying from small businesses and restaurants, to luxury apartments. The healthy business centre is recognised as a success in community development, with a strong trend toward a localised economy and urban living.

The urban renewal process in the New Farm Teneriffe area has aided in reducing the rate of urban sprawl on Brisbane's periphery. According to 2006 census data, across the statically local areas of Fortitude Valley, New Farm and Newstead, the number of people housed increased approximately 91% since the 1991 census (ABS, 2008).

Although the processes implemented in the New Farm Teneriffe area have been positive, in order to gauge their success, further examples of positive development scenarios should be considered from the international community.

6.0 Global Development Scenarios

Traditionally Brisbane has not been at the forefront of development initiatives and planning strategies at an international level. This however, has meant cities implementing the latest planning approaches and strategies can be studied, allowing local initiatives to be based on exemplar projects, rather than theoretical proposals.

Unfortunately, because population growth in South East Queensland is so rapid Brisbane may be considered a case of too little, too late. Delays in radical development containment and support solutions can lead to last minute thinking, and oversights. Adding to the problem, when initiatives are taken, they often do not go far enough to address the issues, or studies into appropriate solutions are discarded when an estimate of the cost of the project is revealed.

For example, various state and local governments have undertaken as many as four light rail (LRT) studies for Brisbane's inner city, all resulting in an immediate negative reaction from government, based on cost. Yet with each additional study showing implementation at the time of the previous study would have resulted in a far more cost effective system.

The most recent study, Brisbane City Council Lord Mayor's Taskforce Brisbane Mass Transit Investigation: Options for consideration, released in late 2007, is the first of the studies to consider high patronage Bus Rapid Transit (BRT), as used successfully in many cities globally since the 1990's. The report revealed that the cost of a bus based system would be less than 20% of a light rail system.

This is an example of Brisbane's policy makers reacting to globally proven initiatives well after they should have been considered. In order to move forward successfully Brisbane needs to become proactive in researching and understanding existing systems and initiatives occurring internationally, and implementing them swiftly and with rigor.

6.1 Rethinking Urbanisation

The twentieth century model of a centralised business and commerce centre, surrounded by a sprawling suburban landscape, facilitated by the abundance of private motor cars and cheap fuel, may be seen as becoming redundant, with a renewed approach to development taking place internationally. Until recently, Australia thrived with a low population and a seemingly endless supply of habitable and productive land. 'The Lucky Country' in its original context as penned by Donald Horne in 1964 as a statement based on the irony of our fortunes, rather than

our abilities, remained true for quite some time. Australia's development has followed in toe behind some of the world's leading countries, to create the situation we are in today.

Australian Cities, including Brisbane have been developed, on two principles; the right to personalised travel, and the abundance of energy. As a result the dominance of the private motor car, has caused huge amounts of public funding to be used for maintaining and upgrading roads, rather than public transport systems, at unsustainable levels.

In May 2007 the Queensland Government released the South East Queensland Infrastructure Plan and Program, for the period 2007 to 2026. This document outlines the government's commitment to South East Queensland, stating as a key priority the plan:

“Seeks to reduce traffic and limit congestion on the road system by encouraging communities to access goods and services, jobs and leisure within their sub-regional or local areas, wherever possible”.

(Queensland Government, 2007, p. 9)

Despite this key priority, the areas of spending tabled in the document show transport is by far the largest funding area, attracting an estimated \$35.2 billion outlay between 2007 and 2026, almost five times greater than water, the second largest infrastructure class. Transport is equal to approximately two thirds of all other spending, including water, energy, health education, vocational training, sport and recreation, and justice services (Queensland Government, 2007).

However, in the Greater Brisbane Area spending relating to public transport, pedestrian and cycle based modes of transport will attract an amount equal to approximately 39% of the funding for road upgrades, better road connections and new roads, not including maintenance of the existing system.

In the Western Growth Corridor, encompassing Wacol, south west to Ipswich and the surrounding areas, viewed by the government as being an answer to controlling growth in South East Queensland, this figure reduces to approximately 11% (Queensland Government, 2007).

Brisbane must reduce its dependence on the private motor vehicle. Supplementing road congestion with larger roads has proven to lead to greater congestion in the future (Owen, 2004). Comparatively, cities investing in multi-modal public transport systems have reduced existing congestion and offset future congestion (Warsi, 2006).

The second principle driving development in Australia, the abundance of energy, has created a power hungry society. Residential, commercial and industrial sectors consume an increasing amount of energy, supplied by large power stations located away from populated centres. This

system has proven to be reliable in static environment situations. However, major vulnerabilities are present in such as guarantee of supply during severe weather events.

In South East Queensland, Climate Change will bring instability to the climate, and increase the occurrence and intensity of severe weather events (CSIRO, 2002). Currently, in an average Brisbane thunderstorm tens of thousands of homes and businesses can lose power, sometimes for days. If severe storms become a more common occurrence in South East Queensland, entire communities may be affected by power shortages, and could be disconnected from supply for extended periods of time.

An increase in clean renewable energy is also a large requirement of reducing the effect climate change has on societies. Unlike large scale coal power stations, traditional used in Queensland, there are numerous power sources, including solar and wind, that can be safely installed close to population centres, emission free. Such installations could be incorporated into the urban landscape, providing a localised power source for communities, to both provide a clean energy source, as well as reduce dependence on large scale power stations in times of crisis. In many ways, Brisbane's urban structure, much like the supply and distribution of energy, need to move to a more decentralised model.

The geographic constraints of the city peninsular, coupled with the increased pressures of transportation networks, and limitations of commercial opportunities in the central business district, will become more exacerbated as the population increases further.

By decentralising services and businesses away from the central business district, into smaller centres, and linking such centres with quality multi-modal transport connections, future stress may be alleviated.

The concept of multiple central business districts is supported by the Smart State Council, in the Smart Cities: Rethinking the City Centre report, released in 2007. The report proposes a second central business district to be located at Bowen Hills, in an area previously used for light industry, warehousing and railway goods yards. The proposal included incorporating green space at a scale similar to New York's Central Park, and connections to the river via Breakfast Creek (Smart State Council, 2007).

The key to successfully decentralising a city's downtown is to provide an adequate public transport structure, and urban structure that allows local access to amenity. New York's Manhattan Island is an example of large-scale multiple business districts. Although located relatively close to one another, the island's downtown and midtown districts host a wealth of commercial and retail opportunities, supported by the adjacent dormitory communities of Upper and Lower Manhattan. The role of public transport in facilitating the urban structure is

incorporated in section 7.1 Development Criteria, identified as a being a key element of developing a subtropical metropolis.

6.2 International Case Study: Portland Oregon

Portland Oregon has experienced three decades of progressive development planning, addressing the issues of sprawl, increasing inner city density, and providing alternative transport solutions, making it a recognised leader in urban planning and community based development.

Although Portland is not a subtropical city, its proximity to the coastline and location along the Willamette River warranting an outdoor lifestyle in the warmer months (see Figure 6.2.1), and its similar sized population to Brisbane, make Portland a relevant study area. It is Portland's leadership in planning, urban renewal and sustainable transport systems that will form the focus of this case study.



Figure 6.2.1 Portland's South Waterfront district, allows connection to the Willamette River close to the city centre, much like Brisbane's Southbank (Portland Ground, 2006).

Many believe Portland achieved its status as a leader in urban planning through restrictions on where development could occur, protecting green field sites. In 1979 Portland implemented a citywide growth boundary, effectively defining the city's future footprint (see Figure 6.2.2).

Although generally accepted as a success, the city's planning commission has been criticised for not expanding the growth boundary as the city has matured over the three decades since it was introduced.

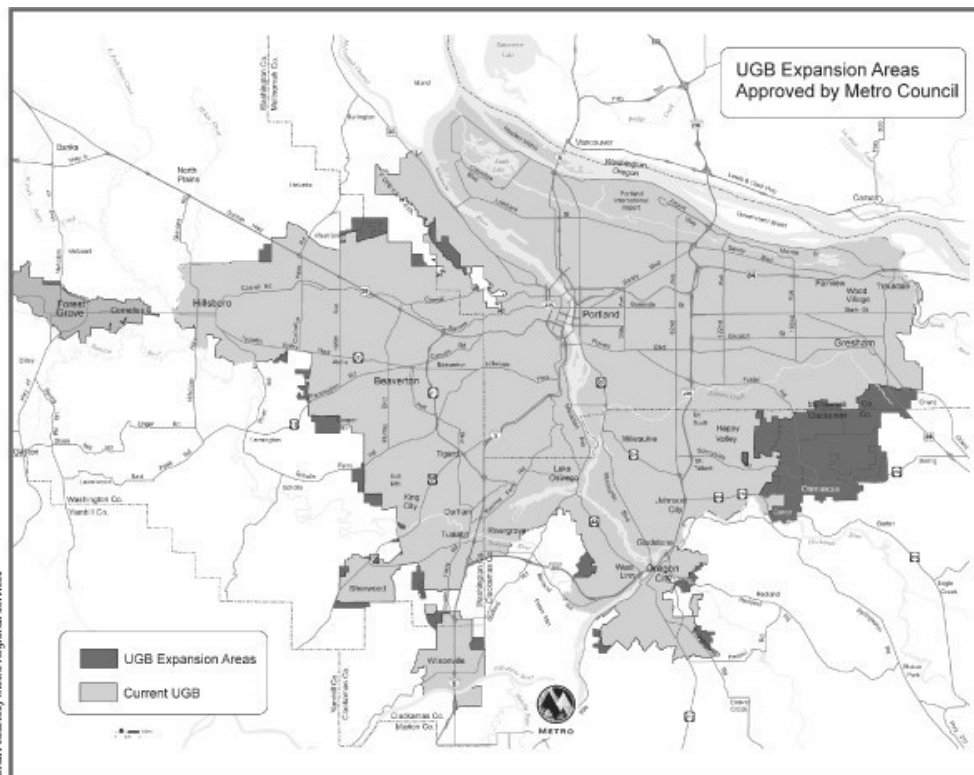


Figure 6.2.2 Portland’s Urban Growth Boundary, with future expansion areas (SPUR, 2003)

However, Chang-Hee Christine Bae (2004), believes Portland Metro, the seven member elected body, charged with managing the city’s plans, has managed development well. Together with the Portland Planning commission, key density targets have been built into ambitious strategic plans. These measures, Bae (2004) suggests, have enabled Portland to successfully create an urban environment that actively fosters density.

Unlike Brisbane’s sprawling footprint, Portland’s development growth boundary, known as the “Mixed Use Area”, promotes inner city growth. By defining a growth area, Portland is able to better direct services and infrastructure, while development is attracted by a more centralised population base, providing greater patronage and tenancy rates (City of Portland, 2006).

In a 2006 progress report, Portland City’s Planning Commission stated that since beginning citywide planning strategies in the late 1970’s, Portland City has remained focused, maintaining clear planning objectives and committed implementation through the Toward 2040 strategic plan. Today Portland is viewed globally as an exemplar for city development (City of Portland, 2006).

The Toward 2040 strategic plan for Portland City achieves its directives with four areas of focus – ‘Central City’ facilitates CBD renewal projects, ‘Neighbourhood Infill’ facilitates rebuilding on vacant lots and increasing density on larger lots, ‘Main Streets’ identifies community growth

areas and transit corridors along major thoroughfares, and 'Centres' aims to achieve additional smaller business and community centres to decentralise the city's CBD (City of Portland, 2006). Each of these four focus areas, if implemented in Brisbane, would initiate the development of a subtropical metropolis, fostering densification of areas close to the city centre, while decentralising business districts to reduce car based commuting.

Mayer & Provo (2004) support Portland's progress, stating, in addition to the government commitment, Portland residents are highly aware of the planning strategies and policies implemented by the city, through two decades of continued media coverage and community consultation.

By empowering the people with knowledge, a greater sense of pride and ownership of the city has been achieved.

Despite a population similar to that of Brisbane, with over 500,000 in Portland City, and approximately 2,000,000 in the surrounding six-county region, Mayer & Provo (2004) believe a strong sense of community is present across the city, aided by community groups and government reaction to resident's ideas and needs.

A contributing factor to the success of Portland, as a community, is the structure of the urban condition. Mayer and Provo (2004), state that Portland City is comprised of neighbourhoods, rather than suburbs. These neighbourhoods combine to form districts, giving a layered structure to the community. Smaller than a traditional suburb, Portland's neighbourhoods allow their residents to have a connection to and ownership of the community. As a result in many neighbourhoods community groups are formed, helping to facilitate the changes, and achieve the desired mood of their neighbourhood.

Mayer and Provo (2004), further explain the make-up of Portland's neighbourhoods, sighting they are generally comprised of medium density residential pockets, each structured around main streets. The main streets account for the commercial activity of the neighbourhood, often lined with small business and services. Counter to the low density model of Brisbane, Portland's urban structure further reinforces the sense of community within the neighbourhood, rather than exporting it to a centralised shopping centre.

Portland's urban structure of neighbourhood and districts is supported by the City's urban growth boundary, ensuring the population of neighbourhoods is sustained by prioritising growth in existing areas. The surrounding areas of Portland, protected from development by the urban growth boundary, attract agriculture and other green space industry, such as nurseries. As the area's fertile farming land is not under threat from encroaching development, greater growth and diversity in related industries is possible. Mayer and Provo (2004), believe this scenario of

agricultural and sustained open space close to the population centre can only be beneficial, providing a counter to the urbanised city landscape.

A major issue for most cities is traffic congestion, caused by private motor vehicle use. Portland has made various attempts to reduce the use of private cars across the city, to varying success. During large urban renewal programs in the 1980's and 1990's, the Portland Planning Commission encouraged developers with reduced car parking requirements in development close to existing and planned public transport facilities, or the inclusion of cyclist facilities (O'Neil, 2000).

To encourage such development citywide public transport initiatives were implemented, using a variety of transit modes, including all stop and express bus services, 'MAX' light-rail (refer Figure 6.1.3), a streetcar loop (refer Figure 6.1.4), and more recently commuter rail services to neighbouring counties. These modes combine in the downtown area, along a transit mall, allowing interconnections between the various modes, and alternative uses for commuters at the heart of the central business district (TriMET, 2008).

The introduction of new services, and continued improvements to Portland's existing multi modal public transport has resulted in a highly successful system. In 2007 passenger numbers were the highest on record, with approximately 96.9 million passenger trips (TriMET, 2007), equivalent to every person in the Portland Metro area (also referred to as the tri-county area) using the service more than 41 times. TriMET (2007) promotional material states their combined services eliminate approximately 63.2 million private motor car trips annually. These and other initiatives have meant Portland City remains an accessible user friendly city, with continuing investments helping to offset predicted traffic congestion (Warsi, 2006).



Figure 6.1.3 Portland's MAX light rail public transport system (Flickr SP8254, 2007)



Figure 6.1.4 Portland's Streetcar light rail public transport system (Flickr PDX Pete, 2007)

Portland's whole system approach to creating a liveable city has been recognised by countless governments, academics, and urban research groups as being highly successful. The key initiatives of defining a the urban boundary, protecting the existing greenfield and open space,

encouraging urban renewal and densification, and supporting the redefined urban landscape with a broad multi modal network of reliable public transport, should be embraced by Brisbane. These initiatives are vital to developing the vision of a subtropical metropolis into a reality.

6.3 Extreme Urbanism

Although medium density has been proven to generate a balance between urban and human scales, in some circumstances this solution is not suitable. Areas where significant populations occupy comparatively small areas of land generate urbanism at its extreme.

Internationally many examples of extreme urbanism exist. Contributing factors such as geographic constraints, resource rich areas, and overpopulation, can lead to large scale, high density urban environments. These cities often have a reputation for being crowded and dirty places, and are unattractive to many. Alternatively, there are portions of the global community that thrive in these environments, as they provide a wealth of experiences and social opportunities, as represented in some areas of modern popular culture.

New York City, located on the North-Eastern coast of the United State of America, due to geographic, economic and social factors, has become an example of extreme urbanism and densification. Although often viewed as an ecological nightmare, New York, when compared with most American cities may be considered a model of environmental responsibility.

Owen (2004) believes density is the key to New York's environmental credentials. Manhattan Island has a population density more than 800 times greater than the United States of America average. Taken as a whole, New York City has a higher population than all but eleven of the United States of America. If it were to become a state, it would rank lowest in consumption of energy out of every state in the United States of America.

Ginsberg (2003) supports this argument, stating New York resident's use of mass transit is well above other population centres, with 52.58% patronage across the city, and 59.6% on Manhattan Island.

Comparatively, Los Angeles has a mass transit patronage of 6.6%, San Francisco 31.1%, Chicago 17.3%, and a national average of 4.7% (Ginsberg, 2003). When looking at non private motor vehicle transport, in particular commuter habits, 82% of Manhattan residents use alternatives to travel to and from work, including public transport, cycling and walking (Owen, 2004).

Owen (2004), states because New York City is so densely populated, it is viewed as an urban crisis zone. Per square metre New York City generates the highest amount of greenhouse gases, solid wastes and uses more energy than any other American city. However, when measured per resident or household, it is among the lowest.

If the 8 million residents of New York City were to live at the same density as most small towns in Northwest

Connecticut, for example, they would cover an area the size of the six New England states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut, plus New Jersey and Delaware (Owen, 2004).

The urban condition experienced in Manhattan, and in some areas of New York's other four boroughs, is a result of historically serendipitous accidents, rather than successful planning, according to Owen (2004).

First, geographically Manhattan was a port with more water frontage per square mile than other American port cities, making it attractive at a time when shipping was quite prosperous. Therefore, allowing strong development backed by economic security.

Second, the city grid was designed by merchants, looking for economic efficiency, rather than tree lined boulevards and open space. This brought everything closer, making it more accessible.

Third, by the time the motor car was causing cities to build large roads to sprawling suburbs, Manhattan already had enough density to prevent such highways being constructed across the island (Owen, 2004).

Comparatively to the ideas of Owen and Ginsberg, Strauss (2002) believes that socially, Manhattan Island is an example of urban diversity. Within 2.4 square kilometres of the former World Trade Centre site, the thriving community of Lower Manhattan incorporated office space, residential buildings, industry, cultural and community facilities, 12 schools (kindergarten to grade 12), 7 higher education facilities, museums, a library, hospital, 3 police stations two fire stations. In addition Lower Manhattan's urban density is supported by approximately 80 acres of publicly accessible open space, including waterfront parks and a diverse array of squares, gardens and courts (Strauss, 2002). Ginsberg (2003) supports the idea that New York City a model of diversity, stating that in some neighbourhoods the economic spectrum between household incomes can vary by over \$500,000.

International consensus is that a successful urban community is a 24hr community. New York City is an ideal example of a 'round-the-clock community', allowing workers, residents and visitors to continuously access amenity and create a safer community in general (Strauss, 2002).

For most people an urban existence, such as that of New York City, is unattractive. Urban environments on such large scales, at urbanisms extreme, restrict connections with the natural landscape, and overwhelm the senses. It is for reasons such as these that despite the wealthy base of knowledge supporting New York City's success, it is often viewed as an exception, rather than an example by urban planners and environmentalists (Owen,2004).

Although urbanism at such an extreme level is not an appropriate solution for a Subtropical Metropolis, the effects of climate change and a reduced carbon emission society may require future urban areas to consider densification at a scale similar to that seen in New York City. This however, may be viewed as a last resort, and a more appropriate development scenario for developing Brisbane into a subtropical metropolis is discussed in section 7.

7.0 Appropriate Development Solutions

Brisbane is a young city, born out of a brutal history that enveloped many of the earliest European settlements across Australia. Early challenges have given way to broad scale development and urban sprawl facilitated by, and now suffering from, the dominance of the private motor car.

A predicament experienced by all of Australia's cities, a perceived endlessness of developable land and low fuel prices have fortified public expenditure on increasingly larger road networks. In turn, the low density development scenario of urban sprawl has limited the feasibility of public transport, giving cause for limited capital expenditure and aging systems.

As the global consciousness becomes more aware of the occurrence of climate change and the reduction of carbon emissions and resource depletion forces fuel prices to increase, the twentieth century model of urban sprawl will become increasingly irrelevant.

With a renewed emphasis on efficiency and economy, the way cities are developed will become increasing localised and compact. Citywide service reticulation may become unreliable and inefficient. To offset the threat of citywide system failure, implementation of localised service production and reticulation should occur, limiting the impacts of natural disasters and other crisis's, while reducing base load demands on existing systems.

As the community moves toward a lifestyle focused on sustainability, rather than consumption, the urban sprawl concept of the suburb will be replaced with more emphasis on local community. To achieve this, an urban hierarchy similar to the Portland City model should be implemented, providing everyday services and amenity, within a walkable community.

7.1 Development Criteria

The set of development criteria outlined in the following sections have been formed from the findings of the research presented in previous Sections. The Development Criteria relate to community development, addressing appropriate design solutions to facilitate the evolution of a subtropical metropolis, incorporating the overarching ideas of:

- Urban Containment
- Facilitating Communities
- Connecting Communities
- Urban Densification
- Service Provision and Security

Each of the overarching ideas has been identified in the previous Sections as being of significance to the development of a subtropical metropolis. They are presented here as series of benchmarks against which the suitability of any particular development project might be judged or modified. For these development criteria, each of the overarching ideas will be accompanied by a development strategy, as an example of how the criteria could be met.

7.1.1 Urban Containment

As a result of recent development booms caused by a healthy economy, large areas of Brisbane's outlying greenfield sites have become victim to urban sprawl. As outlined in section 3.4 Subtropical Metropolis Development, Brisbane must move away from the scenario of urban sprawl.

The region of South East Queensland is often viewed as one entity, rather than a cluster of individual areas; because of this green space can be overlooked at a local level.. To protect the remaining open space, agricultural land and green field sites across the Brisbane municipal area, action is required to contain sprawling development.

Development Criteria:

Urban Containment: The development does not contribute to urban sprawl, the existing urban footprint, or use of private transport as the primary mode of transport. The development decreases the pressures that cause urban sprawl, facilitating diversity in land use through density.

Development Strategy:

Urban Development Boundary: To facilitate the development of Brisbane into a subtropical metropolis by:

- Clearly defining the developable footprint of Brisbane City;
- Protecting existing open space through development restrictions and monetary reimbursement or carbon trading allocations for land owners;
- Outlining core development areas, to promote urban densification and business centres away from the city centre;
- Development controls in low lying areas, to limit the effects of coastal flooding as a result of climate change.
- Consideration of water catchments, vegetation corridors and infrastructure connections between Brisbane City and surrounding municipal areas.

7.1.2 Facilitating Communities

Due to a radial development pattern, facilitated by the twentieth century model of conventional suburban development, Brisbane's urban infrastructure is focused on the city centre, restricting the development and structure of communities. As discussed in section 3.2 Smart Growth, a new approach to the way Brisbane is structured would assist the development of communities.

Criteria:

Facilitating Communities: The development increases connection between community and amenity, providing greater access to services at a local level. The development enhances the identity of the community, defining an individual character and sense of place at a local level, and benefits the common consciousness of the community.

Urban Hierarchy: Revising the structure of communities by facilitating planning and development strategies that:

- Develop neighbourhoods as the base level of the urban hierarchy, replacing the concept of suburb. Each neighbourhood precinct should be approximately 1-3km² in scale, with an emphasis on fostering individuality and character, and capable of providing goods and services to the neighbourhood required on a weekly or daily basis.
- Develop districts as the middle level of the urban hierarchy, comprised of multiple neighbourhoods. Each district with a defined town centre, to act as a focal point of the district, as well as a business centre capable of providing goods and services required on a less frequent basis.
- Develop central business districts as the upper level of the urban hierarchy. Complementing the existing centre of Brisbane City, additional central business districts capable of reducing the radial structure of the city, promoting a transport and infrastructure network.

7.1.3 Connecting Communities

As identified in section 6.1 Rethinking Urbanisation and 6.2 International Case Study: Portland Oregon, high quality transportation systems have a large role in facilitating urban communities. The structure of Brisbane's urban infrastructure, in particular the public transport network, is focused on the city centre, limiting the connectivity between communities. With a revised urban hierarchy, Brisbane's transport systems can be redefined.

Development Criteria:

Connecting Communities: The development does not require private transport solutions, emphasising community connectivity at a local level and alternative transport solutions for broader connectivity.

At the systems level, transport infrastructure is centres based, providing peak volume connectivity between community hubs, town centres and business centres, rather than broad coverage networks with a common focal point.

Development Strategy:

Public Transport Hierarchy: Providing varying levels of interconnected transport systems, facilitating rapid movement between centres, supported by local feeder networks, by creating;

- Local transport network, through the introduction of shuttle services connecting neighbourhood and district town centres, linked to;
- Trunk line services, providing fast heavy-load connectivity between district town centres, removing the radial transport structure, reducing the need to enter the central business district to travel between district town centres, and acting as primary feeder routes for;
- Inter-urban services, connecting district town centres with central business districts, through rapid transport systems, capable of providing heavy capacity passenger movement at minimum period departure intervals.

In addition to the structure of Brisbane's public transport systems, the capacity of the system needs to be addressed. Recent efforts to increase capacity in the Brisbane City Council bus fleet have not achieved best practice outcomes (see Figures 7.1.1, 7.1.2 and 7.1.3).

Studies into Brisbane public transport systems are in favour of bus rapid transport (BRT) systems, rather than traditional heavy rail systems (BCC, 2007, September 12). These systems can be introduced into existing urban environments with less disruption than traditional heavy rail, and are more adaptable to change. Further investigations into the use of bus rapid transport as a primary transport system across Brisbane should be undertaken.



Figure 7.1.1 Man NG313 articulated bus, operated by Brisbane City Council.
Capacity 85 passengers (BTBuses, 2008)



Figure 7.1.2 Caio Induscar, Mondego LA articulated bus, operated in Santiago, Chile.
Capacity 160 passengers (Caio, 2008).



Figure 7.1.3 Advanced Public Transport Systems (APTS), Phileas bi-articulated bus with hybrid engine, operated in Netherlands and France. Capacity 185 passengers. (APTS, 2008).

7.1.4 Urban Densification

As the demographic of Brisbane's community moves toward smaller households, coupled with the need for a reduced carbon built environment, the need for large houses in inner city areas will decrease. As outlined in section 5.2 Housing Typologies, the reduction in household size will require alternative ways to house Brisbane's community. European and North American models of row or terrace housing is not suited to Brisbane's subtropical climate. In Brisbane there exists a great need to maximise natural ventilation and while allowing a blurring between the lines on inside and outside, to facilitate the subtropical lifestyle. Higher densities need to be achieved, while retaining the character and lifestyle provided by the traditional Queenslander house.

Development Criteria:

Urban Densification: The development increases site specific density or diversity, enhancing community amenity at a local level, aiding the urban containment at a citywide level. Site density, defined by the number of contained units (residential or commercial) is increased by a factor of two, or more.

Development Strategy:

The Brisbane House: This housing typology combines the traditional detached dwelling with multi-residential to provide medium density neighbourhoods, characterised by;

- Height of three stories, with a similar styling and building footprint to existing traditional dwellings in the inner city area;
- Consisting of either a single dwelling on each of the three levels, or two dwellings of varying size for diversity;
- Application of traditional practices such as lightweight building materials, high roof pitch, broad overhanging eaves, and maximising natural ventilation for a subtropical climate;
- Generous boundary setbacks prevent enclosure of the lower levels, while allowing traditional characteristics to be retained;
- Brisbane's rolling topography allows breezes to permeate the building, reducing the need for mechanical ventilation;
- Broad verandahs on each level to encourage outdoor living in varying climatic conditions;
- Communal backyards with space for large shade trees, retaining a sense of open space, and reinforcing the ideals of the neighbourhood through social connectivity.

Increasing the dwelling ratio two or three fold, the Brisbane House would limit the need for urban sprawl, while retaining much of the character and lifestyle that is considered precious in Brisbane. The below graphic representation of the Brisbane House (see Figure 7.1.4) demonstrates an example of the aesthetics and characteristics of the proposed typology.

Brisbane House Typology

Typical Configuration: 3 dwellings

- 3 storey timber construction
- roof pitch 15° minimum
- dwelling height 11-13m

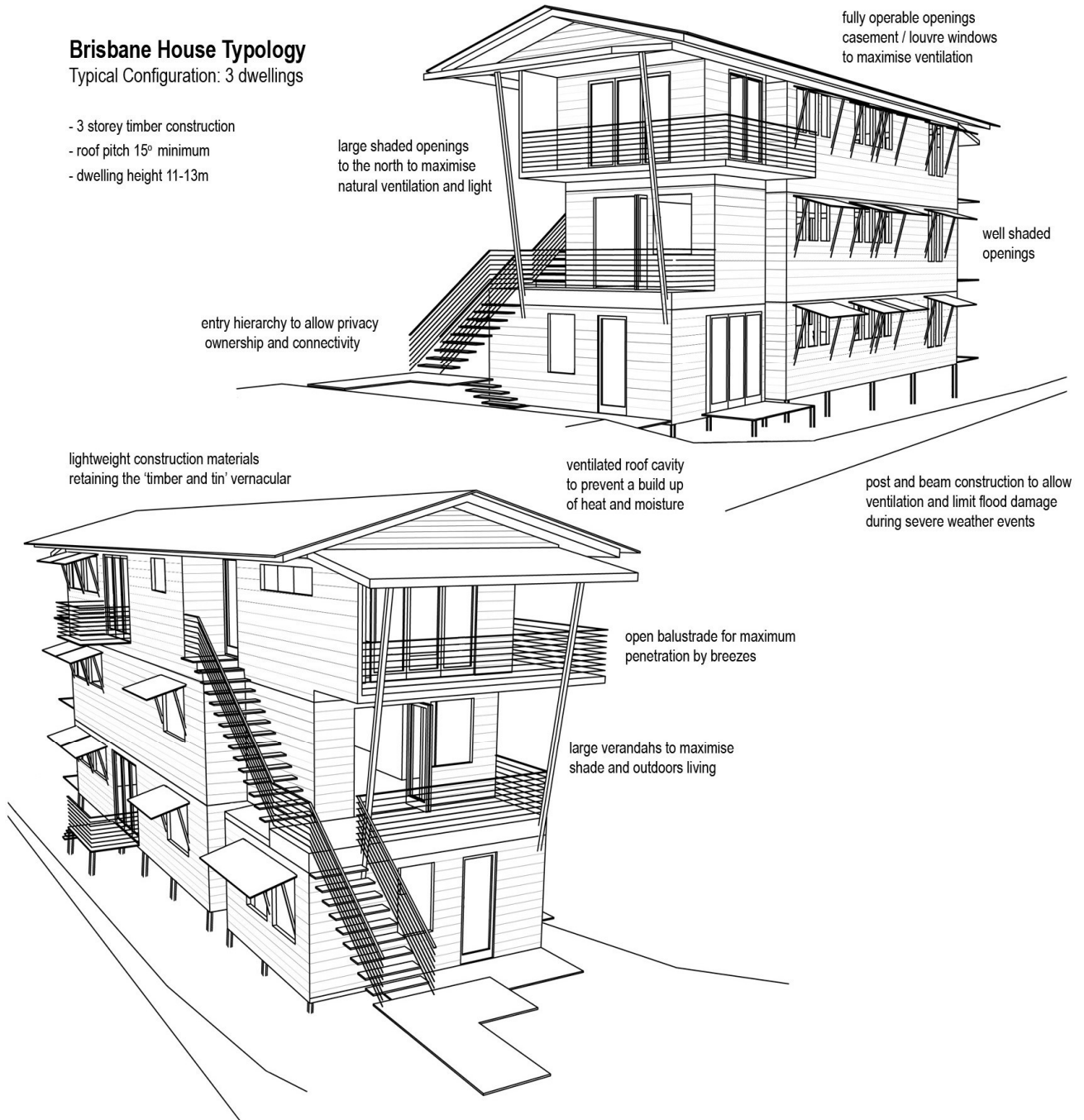


Figure 7.1.4 New housing typology - Brisbane House diagram (by Author)

7.1.5 Service Provision and Security

In a reduced carbon emitting urban environment the reliance on large coal fired power stations will become increasingly unfeasible. Coupled with the increased threat of severe weather events as a result of climate change, as identified in section 4.2 Implications for South East Queensland, the security of power and water services will be less stable. Limiting the reliance on fossil fuel, and vulnerability of broad scale service networks will be a critical part of securing community service provisions.

Development Criteria:

Service Provision and Security: The development (per contained unit), requires a service provision equal to or lower than the provision previously required for the site. The development ensures the essential water and energy provisions in the event of service disruption, for a suitable period.

Development Strategy:

Local Service Production and Reticulation: In order to combat the issues arising from both a need for greater renewable energy production and increased risk of supply failure from centralised networks, at the neighbourhood level provide:

- Less reliance on large scale power stations to supply vast areas of the urban landscape, through;
- A range of small to medium renewable energy supplies, capable of providing power to essential services in the event of a crisis, while reducing the required output of existing large scale power stations during periods of standard operation;
- Using a variety of renewable energy sources, such as solar, wind and ocean wave and tidal, to decrease the risk of total system failures in the event of a crisis, weather related or otherwise;
- Increased development of new and alternative technologies to ensure more efficient production techniques are available;
- Focus development in areas that use the built environment more efficiently or for multiple uses, such as using the surface of roads to heat water, either for reticulated use or energy production.
- Use of localised energy production to ensure water supplies in the event of a crisis.

8.0 Conclusion

Conceived as an isolated settlement and raised under brutal circumstances, Brisbane's early history gave way to a century of challenges that matured a town into a city. From the banks of the Brisbane River the indigenous inhabitants of the land lived for countless generations. So too was it the river that gave cause for European settlement of Brisbane, and has continued to be a life line for the colony, and symbolises the lifestyle of the city's inhabitants.

Ironically it is the river that created Brisbane that will be the cause of much concern and possibly devastation in coming decades. The effects of climate change on the coastal and low lying areas around the Brisbane River may cause flooding of entire communities and leave once prosperous areas vacant. The threat of climate change is considered forefront in the need to address the way Brisbane approaches development, requiring change to ensure the city matures into a subtropical metropolis.

Through studies into the historical role planning has played in Brisbane's development, it has been shown that for much of the city's history, efforts by Brisbane City Council and the Queensland Government failed to address major issues such as development control and urban sprawl, and facilitated a city dominated by the private motor car.

The recent efforts of both the Brisbane City Council and Queensland Government have been more effective in delivering a united approach to the development of the city. However, the dominance of the private motor car as the primary mode of transport throughout Brisbane continues to be reinforced at both a local and state level. In order to develop Brisbane into a subtropical metropolis, greater emphasis needs to be given to the role public transport has as the primary transport mode throughout Brisbane.

The impending threat of climate change has been shown as a major concern for Brisbane over the coming century and beyond. More action is needed to address the way Brisbane's communities will approach and adapt to the effects of climate change, including an increased threat of severe weather events, and sea level rise.

The existing condition of the urban landscape has been shown to be limited in its capability to develop the vision of a subtropical metropolis, without significant restructuring. Traditional housing, developed by early settlers to suit Brisbane's subtropical climate, has been overlooked in favour of mass produced houses characterised by cheaper, less labour intensive building techniques, with climatically inappropriate designs supplemented by air conditioning. In a

reduced carbon emission world, traditional building techniques and sustainable timber construction will be required. The proposal of a new housing typology, the Brisbane House, has been presented as a way forward, addressing the issues of urban sprawl through densification, and climate change through appropriate and sustainable building techniques.

The development of the medium density housing typology of the Brisbane House is suited to best practice development scenarios, as shown in studies into Smart Growth and New Urbanism, considered to be a more appropriate solution to urban development than the twentieth century model of the conventional suburban development.

The additional development criteria for Brisbane have been proposed to address the concerns raised by the preceding studies, as an attempt to guide the city toward the vision of a subtropical metropolis. The issues those proposals address are considered to be of greatest importance to the city over the coming decades, as the city's population increases and the effects of climate change are felt. Through implementation of the proposed development criteria, Brisbane will be able to better equip itself with the tools required to mature and prosper as subtropical metropolis.

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