Infill Development for Older Australians in South East Queensland

An Analysis of the Preferences of Older People in the Urban Environment

Exploring innovative approaches in affordable, sustainable and liveable neighbourhoods and homes

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We welcome you to share this research and the designs contained within it, however we request you acknowledge this report as the source. This book can be cited as follows:

Glossary

**Accessible Housing**
A product, housing or environment that is ‘accessible’ meets prescribed government standards and regulations or agency requirements for being physically accessible to people with disabilities.\(^1\)

**Active Ageing**
Active ageing is the process of optimising opportunities for health, participation and security in order to enhance quality of life as people age.\(^2\) Active ageing depends on a variety of influences or determinants that surround individuals, families and nations. They include material conditions as well as social factors that affect individual types of behaviour and feelings, such as health and social services, economics, personal determinants, and the physical environment. All of these factors, and the interaction between them, play an important role in affecting how well individuals age.

**Adaptable Housing**
This housing is designed in such a way that it can be easily and relatively cheaply modified in the future to meet changing needs of occupants and visitors including those people who use a wheelchair. Compliance with the Australian Standard AS 4299-1995 Adaptable Housing must have at least one entry point that allows for wheelchair access.\(^1\)

**Affordable Housing**
Affordability is related to the income compared to the cost of housing. It can include the operational costs of a home as well as the initial cost/rental of house and land. As a rough guide, housing itself is considered affordable when low to moderate income earning households pay no more than 30% of gross household income on rent and no more than 35% for home purchase.\(^3\)

**Affordable Living**
Affordability is related to the income compared to the cost of living and not exclusively related to the value or cost of housing. It can include transportation and the operational costs of a home as well as the initial cost/rental of house and land.\(^4\)

**Age Friendly City**
An age friendly city is one that has an inclusive and accessible urban environment that promotes active ageing.\(^2\)

**Aged Care Facility**
Levels of aged care are defined as:
Residential aged care is a facility which provides accommodation that includes meals, cleaning services, furniture and equipment, as well as personal and/or nursing care. Low and high care are determined after assessment by an assessment team (ACAT in most of Australia). Low care includes services such as meals, laundry and cleaning as well as additional help with personal care and nursing care if required. High care refers to needing almost complete assistance with most daily living activities. It includes accommodation services as well as personal care. Medical needs are managed by nursing staff.\(^5\)

**Ageing in Neighbourhood**
Ageing in neighbourhood is the ability to continue to live in one’s neighbourhood, in a familiar environment, safely, independently and comfortably regardless of age or ability. A prerequisite is availability of choice in housing and access to services so that people can move to accommodation that is more suitable as they age.

**Ageing in Place**
Ageing in place is the ability to remain living in one’s own home independently even if care needs change.\(^6\)

**Ecologically Sustainable Development**
While there is no universally accepted definition of ecologically sustainable development (ESD), the Commonwealth Government has adopted the following definition: ‘using, conserving and enhancing the community’s resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased’.\(^7\) Two main features which distinguish an ecologically sustainable approach to development are: considering, in an integrated way, the wider economic, social and environmental implications of our decisions and actions for Australia, the international community and the biosphere; and taking a long-term rather than short-term view when taking those decisions and actions. This latter concept is expanded in the widely accepted Brundtland Commission (1987) definition of sustainable development as ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’.

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1. Quinn J et al, 2009
2. WHO, 2007, p.1
3. SCRC 2010, p.54
4. DIT 2010a, p.46
5. Productivity Commission 2011, p.xvi
6. Productivity Commission 2011, p.xvii
7. CoA 1992, p.6
Housing Density
Housing density at the micro scale\(^8\) is concerned with the measurement of the housing type as an indicator of the number of residents it could potentially house. Housing density is generally classified into three main types: low density (detached houses), medium density (semi-detached dwellings, row or terrace houses and townhouses) and high density (flats, units and apartments) and are constructed for the purposes of providing long term accommodation\(^9\). See Next Generation Planning Handbook for examples of these housing typologies\(^{10}\). Housing density at the macro scale is concerned with measuring dwellings per hectare at a city or regional scale\(^5\).

Human Scale Environments
A Human scale environment allows pedestrians to comfortably walk from one location to another and interact with the built environment; creates an appropriate relationship between human beings and the size/function of surrounding buildings; and emphasises building features and characteristics which can be observed in close proximity, at the speed a pedestrian would travel\(^{11}\).

Infill Development
New development that occurs within established urban areas where the site or area is either vacant or has previously been used for another urban purpose. The scale of development can range from the creation of one additional residential lot to a major mixed use redevelopment\(^{12}\).

Liveable Housing Design
Liveable housing design means ‘designing homes to meet the changing needs of occupants across their lifetime’. This includes, at minimum, core features that make home easier and safer to use for all occupants. A liveable home is designed to: be easy to enter and move around in; be capable of cost-effective adaptation; designed to respond to the changing needs of home occupants. The six core design elements are: safe level path of travel from parking area to entrance; step-free entrance to dwelling; unimpeded movement through doors and corridors; ground floor toilet; step-free shower recess; and reinforced walls in bathroom to support installation of grabrails at a later date\(^{13}\).

Liveability or Liveable Cities
Liveable cities offer a high quality of life, and supports the health and wellbeing of people who live and work in them. Liveable cities are socially inclusive, affordable, accessible, healthy, safe and resilient to the impacts of climate change. They have attractive built and natural environments. Liveable cities provide choice and opportunity for people to live their lives, and raise their families, to their fullest potential\(^{14}\).

Universal Design
The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialised design\(^{15}\). The seven principles of UD are: equitable use; flexibility in use; simple and intuitive; perceptible information; tolerance for error; low physical effort; and size and space for approach and use. The Australian Disability (Access to Premises—Buildings) Standards 2010 set out requirements and technical specifications for ensuring dignified access to, and use of, public buildings, businesses and other types of buildings for people with disability and to ensure access to all. New buildings must comply with the Building Code of Australia and the Access to Premises Standard when they are constructed and older buildings must comply when the owner, person or business using the building does major renovations or changes. This way, over time all public buildings will become accessible. Other reference information for new buildings includes Australian standards AS1428.1 Design for Access and Mobility and AS4299 Adaptable Housing. The Building Code of Australia references these Australian standards as the minimal response for adaptability and accessibility for all members of the public\(^{16}\).

Visitability Housing
Housing that has three essential features which will allow a person in a wheelchair to visit. These are: a path of travel that is without steps to enter the dwelling, an entrance doorway and internal doorways that are wide enough for a wheelchair to fit through, and a wheelchair-accessible toilet on the entrance level of the dwelling.

Other design features (not part of the definition) that increase the visitability of housing include having power outlets, thermostats and light switches at a height that can be reached by a wheelchair user, having reinforcement in the bathroom walls so that grab bars can be installed, and having lever handles on doors\(^{17}\).

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8 Wright K, 2010, p.5  
9 ABS, 1999  
10 Council of Mayors (SEQ), 2011a, p.41  
11 EWGCOG 2007  
12 DIP 2009, p.166  
13 NDUHD 2011, p.3-4  
14 DIT, 2010, p.13  
15 Centre for Universal Design, 1997  
16 Queensland Government 2012  
17 Quinn J et al, 2009
Executive Summary

This research aimed to identify liveable, affordable and sustainable ways to accommodate older people in communities that are becoming more densely populated. The study used participatory methods with seniors: PhotoVoice to identify key supportive mechanisms and challenges for seniors in the built environment at both the neighbourhood and accommodation levels; as well as Charrettes to engage seniors in the design process. More than 42 people over 55 years and older from Brisbane and the Sunshine Coast participated in this study throughout its several stages for over a year, starting early in 2011. The resulting principles and accommodation typologies not only confirm seniors’ innate understanding of some commonly accepted urban design principles, but they paint a vivid picture of what older people in a sub-tropical environment find appealing and supportive as they age.

Moreover the research identified that a new approach to seniors housing is needed. One that produces a holistic model of infill development to actively support ageing. The research proposed a new strategy called ‘ageing in neighbourhood’ discussed in more detail later.

Design principles

By far the features that were most photographed by seniors were aspects relating to universal and accessible design in the home. In addition, important features were well-maintained safe walkways; outdoor environments including outdoor private space (patios and balconies); passive and active environmental features in the home; diverse housing options; places to meet; and access to services.

Participants prepared a presentation of these values for the design team to consider during the Charrettes. Their photos were translated into a collective vision of 15 principles that could be used to guide future design of neighbourhoods and accommodation for seniors. The principles, challenges and opportunities are described in detail on pages 21 to 71 and are not repeated here. Justification for these principles is founded both in the seniors’ contributions and the academic literature.

What would a sustainable, affordable and liveable neighbourhood future look like for older people? Our participants certainly hoped for a future where inclusive, multi-generational communities predominate in our towns and neighbourhoods: where the contribution and presence of elders is respected, valued and celebrated. They wanted to be able to move with ease from their universally designed home, along evenly graded, well maintained and shaded walkways, that are safe from passing cars and cyclists in a peaceful green neighbourhood. As a time may come that they cannot use their car (or choose not too), it was important that shops, services and facilities are in close proximity. Human scale environments were important to our senior participants, so “village style” shops, services and facilities were a clear preference for ease of access (usually with public transport and car parking at level).

Their home would be on one level, ideally two bedrooms and a study which can be adapted to changing needs, and a number of private and shared outdoor spaces to be social or to relax, and to provide pleasant outlooks from the home. These homes would be sustainably designed: capturing prevailing breezes for through ventilation, natural sunlight, provide for privacy and noise considerations in higher density and provide solar and rainwater harvesting systems to save natural and financial resources. A safe and secure home and neighbourhood were also important. Although aged care was not in the forefront of the seniors’ mind when considering a suitable neighbourhood and dwelling, choice, independence, integration and dignity were consistent themes discussed throughout a range of topics, including access to care services.

Also consistent with these themes was a need for sense of purpose and keeping mentally stimulated, and this manifested differently between participants; some preferred hobbies using a room at home, their garage or a home office. Others accessed extra resources and facilities externally such as at Mens’ Sheds, or a public library. Others volunteered in their community, studied through University of the Third Age (U3A) or helped to care for grandchildren. This has implications for the importance of sufficient and adaptable space in dwellings, and consolidates the importance of universal design, which is safe for young children too. This also emphasises the importance of community facilities as key places for older people to be creative and engaged with others and the importance of recognising their contribution.

Comparison with existing policies

In comparing our principles with international, national and more local standards, several themes were notably absent from these broader standards that are particularly relevant. These thematic areas could be used to extend current policies and guidelines particularly relating to seniors in a sub-tropical environment:

- proximity to public and shared outdoor space and generous accessible private outdoor space (patios, decks).
- shade – along walkways, public seating, viewpoints, and transport stops
- visual amenity and human scale of design
- physiological importance of through ventilation and natural sunlight throughout the year
In addition, an outstanding feature of the PhotoVoice findings was the prominence given to universal design features in the home. In spite of an increasingly aged population and voluntary commitments by developers and government agencies, minimal targets are barely being achieved. Including such features in the home translate to savings to the Australian economy simply by reducing fall hazards in homes, which in turn results in lower health care costs, reduced cost of government-subsidised home modifications, and less need for aged care residential accommodation or in-home assistance. If key features are designed in homes up front, then universal housing could be achieved with almost no additional cost and certainly much cheaper than modifying conventional housing at a later date. Arguably, universal housing design represents a more sustainable housing product over the life cycle of the asset, as it is predicated on accessible design for all ages and abilities, and therefore broadens the potential market segment for builders and developers alike. Contemporary universal design approaches are also attractive.

**Comparing perceptions of participants from the two communities**

An important finding was from the comparison of perceptions of seniors in the city of Brisbane and the sprawling regional community of the Sunshine Coast. The differences directly responded to the characteristics of the environment in which residents found themselves. Concerns about security at both a neighbourhood and dwelling level in Brisbane most likely reflect more diverse and mobile communities, less familiarity with neighbours, and thus less sense of community in a big city. This suggested that the concept of ‘ageing in neighbourhood’ is of benefit in terms of fostering social inclusion in familiar surroundings. If the sense of community needs of seniors are being met, then those of other age groups may be met as well.

Likewise noise and air pollution and traffic congestion, accompanied by good public transport were characteristics of larger cities and commented on by Brisbane participants. On the other hand, the Sunshine Coast residents valued the open green space characteristic of this area, and were the greatest advocates of useable private open space as well. These seniors also relied on their vehicles and rarely used public transport due to connectivity and frequency issues, so the issues of trading-off car park spaces to achieve greater affordability, was not quite as appealing.

**Design challenges and collaborative design outcomes**

The design principles imposed the following key challenges on the design brief, prompted discussion of trade-offs, and consequently influenced the resulting accommodation typologies.

The physiological need for light and through-ventilation gave rise to a perimeter form of design, that is, units built around the perimeter of the block, surrounding a courtyard, that are one unit deep to allow for through-ventilation. This had implications for the height of complexes due to shading and maintaining visual contact with the ground.

The number of units in a complex influences the ability to foster a sense of community. This in turn affects the size, scale, and design of multiple dwelling developments. For instance, larger complexes might be divided into medium rise clusters that have separate entries, therefore facilitating opportunities to know your neighbours. While not unanimous, most participants tended to favour complexes with less than 25 units.

To achieve affordable dwellings, trade-offs may be required between provision of car spaces and communal on-site open space. This makes sense in areas close to public transport but other alternatives were investigated for places such as the Sunshine Coast where public transport is not as well developed.

Accessibility and universal design has implications for two or more storey developments with stairs or lifts. The typologies included a range of options.

Consideration of the location of open space on smaller lots is needed in order to achieve through-ventilation, light, casual surveillance, and passive environmental design.

Consideration of through-ventilation influenced design in other ways. To achieve adequate privacy in units, common corridors where people walk past units need to be limited. Providing a second bedroom with good air circulation needs thought.

The cost of land in areas with access to services and public transport (typically calculated as a 400–800m or 5 minute walk) may affect the economic return and therefore the density or height. Noise in such areas is also a prime concern of seniors.
Emergence of the “ageing in neighbourhood” concept

Generally, housing choice for older Australians provides choices on opposite ends of the housing continuum: residential aged care (ranging from low to high care) or ageing in place (remaining in one’s home even if care needs change). In light of the academic literature and the outcomes of this research, it would appear that a viable model of housing for older people would be the provision of a range of options within a community. The neighbourhood model that incorporates a range of housing typologies to allow “ageing in neighbourhood” is one of the key conceptual outcomes of this research. This concept stems from a range of research findings which says that location is vitally important to seniors not just the dwelling itself. An attachment to locality or a community that is familiar is important to older people as age increases. Other factors mentioned above are also important to health and well-being outcomes.

The advantage of this model is that these typologies could be developed in a suburb over time, overlayed with home care and support services that already exist in the suburb. It is important to note that the neighbourhood characteristics should closely satisfy the principles agreed by the senior participants. Shady streets, evenly graded and well maintained footpaths in flat areas and character housing contribute to the attractiveness of such environments. Thus the concept is broadly applicable to locations which meet some basic prerequisites, which can then be supported by an increasingly greater choice in housing.

Conclusion

Infill development is by its nature, piecemeal, and unless managed carefully, will not deliver desirable outcomes for a neighbourhood such as improved connectivity, security, adequate outdoor space, and sense of community. These elements of neighbourhood are relevant to all ages, not just older people.

- Low to medium rise development and clustering of small numbers of units can facilitate relationship building and contribute to sense of community and sense of security, supported by design that enables opportunities for interaction.
- Sustainable and universal design features can give a viable economic return on investment.
- Embracing and using the natural environment in the neighbourhood, multi-dwelling complexes and in the home, contributes visual amenity, shade, privacy, noise reduction, and a comfortable lifestyle in the subtropics. Physiological needs are the drivers for design that makes use of natural light and prevailing breezes.
- Perceptions of visual amenity may be related to human scale development and line of sight.
- Active seniors may eventually need to transition to greater care, so dwelling design needs to be responsive, flexible, and ‘universal’ to support ‘staying in neighbourhood’. A spectrum of infill options which responds to the diverse range of needs and preferences of individuals, at an appropriate density for the neighbourhood, will provide housing choice. In absence of being able to predict the future, additional choice goes a long way towards ‘future-proofing’ a neighbourhood.

Planners, developers and care providers should take heed, because as seniors become more aware of the range of possibilities, their expectation is that their voiced needs will be addressed.

Given the marked difference in housing preferences and amenity drivers between metropolitan Brisbane and the Sunshine Coast, how the ‘ageing in neighbourhood’ concept is applied will differ in each location. ‘Ageing in neighbourhood’ implies that there is likely to be a shift in the way providers select sites and deliver services in future, focusing on existing communities with services and infrastructure in place.
Introduction

‘No other person can be as expert about your life, your values, your hopes than you are. And any process that tries to define the future and does not find a way to include your expertise on your life is doomed to fail.’

Gary Lawrence, former chief planner for the city of Seattle

This report is based on a research project conducted in partnership with people 55 years and older in Southeast Queensland to design liveable, affordable and sustainable neighbourhoods and accommodation in infill areas. The research shares a new-found understanding of older people’s needs and preferences for shaping the built environment in the sub-tropics. Importantly, it illustrates the preferences of older people through their own photos and words, and provides examples of innovation achieved through a collaborative design process.

This book is intended to be used by developers, non-profit care providers, planners, builders, and policy-makers as a guide to how to meet the challenge of providing liveable safe spaces for older people in a densifying community. It provides justification for a change from ‘business as usual’, to delivering an accessible product to an increasingly knowledgeable and discerning seniors’ market.

Emerging issues...

The global trend in consolidating growth within urban centres (often referred to as smart growth and new urbanism) has been widely accepted by Australian policy-makers as a way to reduce our carbon footprint, improve sustainability, and protect existing green space. However, this has, to some extent, contributed to the scarcity of land on the urban fringes in some areas, in turn affecting housing affordability. Consolidating growth often means increasing density of dwellings in urban cores and encouraging mixed used development. Some approaches have been less than successful as they do not create a liveable, human scale environment. Adequate open space, a pedestrian-friendly environment, traffic-calmed side streets and ‘urban oases’ provide a suitable backdrop for higher-density housing that is integrated into existing urban landscapes through an inclusive planning process.

Each of Australia’s major cities have targets of at least 50% of new housing to be provided by infill redevelopment over the next 20 years. However putting this into effect requires a major cultural shift from the car dependent and job poor dispersed outer suburbs. With backyards becoming smaller and houses bigger, Australians have generally resisted higher density living. So what will entice Australians to move into higher density neighbourhoods or into multiple dwelling complexes? Clearly such neighbourhoods will need to provide the amenity of access to services and transport. Housing complexes will need to be designed to meet the ongoing needs of permanent residents, not just short-term renters.

Furthermore a key barrier to infill development is the higher price of appropriate and sufficient land and the higher construction costs of multiple dwelling units. Delivering affordable housing in a compact urban form requires a conscious effort to both avoid inner city ghettos of lower standard accommodation, and prevent gentrification of the inner city due to higher cost units. Planning regulations have a strong role in delivering socially diverse communities.

To this can be added the challenge of accommodating the active and involved ‘boomer’ generation, the bubble of older people currently approaching or in early retirement. This relatively well educated group may wish to ‘downsize’, but not by much, and will put pressure on community planning, the housing market, and service delivery systems due to a strong desire to age in-community. Many seniors prefer to age in place with only 5.3% of people aged 65 years or over living in retirement villages; for those 75 and over, the current market penetration rate is around 10%. A number of ‘push-pull’ factors have been documented as reasons older people move to age-segregated retirement communities. Pushing factors...

20 Beer et al. 2007, p.16
21 Gehl 2010
22 Alexander & Tomato, 2002, p.404
23 National Housing Supply Council 2010, p.110
24 Hall 2010, Maher 1995, p.8-9
25 National Housing Supply Council 2010, p.110
26 Murray 2011
28 Productivity Commission 2011
29 Bekhet et al 2009
include failing health, reducing responsibility and maintenance, little support, and loneliness. ‘Pull’ factors are location and attractiveness of the facility, familiarity and reputation of the facility, security and friendships. Of great importance though is that older people feel in control of the decision that they make, and that they feel they have choice. In many communities in Australia however, the choice is limited with few options other than staying in an unmanageable house or moving to a retirement village.

Globally agreed direction on how to address this planning issue is found in the World Health Organisation’s Guide for Age-friendly Cities and its Checklist which aim to make cities friendly for people of all ages. Its Framework for Active Ageing argues that older people must direct their future lifestyles, as social participation and inclusion are connected to good health and well being.

These challenges provide the motivation and inspiration for this study. How can older people be accommodated in infill areas of communities in ways that are liveable, sustainable and affordable? How can they be involved in this research, give voice to their perspectives, and so influence their future living environment? The remainder of this book responds to these questions. This study aims to develop liveable housing options for seniors which enable staying in their neighbourhood.

The next chapter, ‘Context’ explains the rationale for choosing the case studies and their characteristics, the methods chosen, and scope of the work given existing policies and guidelines. The chapter on ‘Design Principles’ report on priorities for achieving liveable communities, developed in collaboration with the age 55+ participants using PhotoVoice. Their perspectives are supported with contemporary evidence-based research. The challenges and opportunities of each principle for designers are presented to provoke thought in moving to the participatory design workshops also referred to as Charrettes. The ‘Design Outcomes’ chapter illustrates the iterative process used in engaging the older participants with a design team of architects and planners, and the challenges for the designers, developers and planners in delivering housing products to the market that are affordable, liveable, and sustainable. A range of design solutions are offered, an outcome of collaboration between the senior participants and the design team. These include single level ‘backyard’ infill, a version of ‘secondary dwellings’, and a range of two to six storey developments in different settings, some on the Sunshine Coast; some in Brisbane. Each design is annotated to explain how it meets the principles and accompanied by an explanation by the designers about the intent and challenges. An outcome of the research is the identification of neighbourhood characteristics that are compatible for seniors, illustrated by one particular suburb in Brisbane.

The book concludes with a discussion about the significance of this work for large cities, regional centres, as well as small towns, and the special features identified for sub-tropical environments. The benefits of the research methods are also elaborated. Planners and developers are encouraged to incorporate these ideas in new developments to meet the existing and foreshadowed need. Only in this way will infill communities be developed that are attractive to older people based on closer integration of accommodation with the services, facilities, and transport while establishing a vibrant village style living.

30 WHO, 2007
31 WHO, 2002
Context

The Case Studies

Two case study locations were selected for this study, Brisbane and the Sunshine Coast in Queensland Australia (Figure 1\textsuperscript{32}).

![Case Study Site Locations](http://feww.wordpress.com/category/environmental-disaster/); Brisbane image - http://www.railsnw.com/tours/australia/australia_tours_brisbane.htm; Sunshine Coast image - courtesy of Sunshine Coast Council

Brisbane, with a population of over a million, is a metropolitan area characterised by low density suburbs sprawled over an area of 1,340.3 km\textsuperscript{2}. The community is preparing for rapid changes with Council policy steering towards higher density living. This appears to appeal to those residents who wish to live close to a vibrant inner city with its services and activities, but is received with hesitation by others accustomed to a low density suburban lifestyle and wary of potential social issues around higher density living. Its vision includes terms such as ‘a youthful and enthusiastic city’, delivering ‘active and healthy communities ... and an enduring legacy of livability for future generations’\textsuperscript{33}.

In contrast, the regional city of the Sunshine Coast of 330,000 population has an even lower density, with rural landscapes and national parks a feature of this coastal community. Its Council aims to be ‘Australia’s most sustainable region - vibrant, green, diverse’\textsuperscript{34}. It is comprised of predominantly low density three to four bedroom detached housing, and demographics suggest a significant housing mismatch, given its large proportion of single or dual occupancy households\textsuperscript{35}, many of whom are over 55 years old. As a sea change location, the Sunshine Coast is already home to a larger than average older population: 17\% in 2010, compared to Brisbane’s 11\%, and the trend is expected to continue (Table 1). A significant impact is that the number of potentially frail aged people 75+ is estimated to nearly double over the projection period\textsuperscript{36}.

The differences in size, spatial arrangements, densities, housing types and demographics of these two communities offer the opportunity to understand values and the ability to test design ideas in different settings within a sub-tropical environment.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{case_study_locations.png}
\caption{Case Study Site Locations.}
\end{figure}

\textsuperscript{32} SEQ map – http://feww.wordpress.com/category/environmental-disaster/; Brisbane image - http://www.railsnw.com/tours/australia/australia_tours_brisbane.htm; Sunshine Coast image - courtesy of Sunshine Coast Council
\textsuperscript{33} BCC 2005
\textsuperscript{34} SCRC 2009a, p.5
\textsuperscript{35} SCRC 2009b
\textsuperscript{36} SCRC 2009b, p.71
Table 1: Comparison of Demographics: Brisbane and the Sunshine Coast

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Brisbane</th>
<th>Sunshine Coast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population as at 20 June 2010 (37)</td>
<td>1,067,279</td>
<td>330,934</td>
</tr>
<tr>
<td>% Queensland total</td>
<td>23.6%</td>
<td>7.3%</td>
</tr>
<tr>
<td>Population 65+ as at 30 June 2010 (38)</td>
<td>122,610</td>
<td>56,163</td>
</tr>
<tr>
<td>% Region total</td>
<td>11.5%</td>
<td>17%</td>
</tr>
<tr>
<td>Projected population in 2031 (39) (all age cohorts)</td>
<td>1,272,272</td>
<td>508,177</td>
</tr>
<tr>
<td>Projected population over 65 in 2031</td>
<td>212,486</td>
<td>116,730 (40)</td>
</tr>
<tr>
<td>% Region total</td>
<td>16.2%</td>
<td>23%</td>
</tr>
<tr>
<td>Area km(^2)</td>
<td>1,340.3</td>
<td>3,126.3</td>
</tr>
<tr>
<td>% of Qld (41)</td>
<td>.1%</td>
<td>.2%</td>
</tr>
</tbody>
</table>

Approach

The investigation used a case study approach with two qualitative research methods, PhotoVoice and design Charrettes. It allowed engagement in a dialogue around images taken by participants over 55 years of age about what are desirable aspects of neighbourhood and home environments and what aspects may provide challenges as they get older. It thus provided an in-depth understanding about liveable and sustainable communities from the perspectives of older people in two different geographical locations in Southeast Queensland, Australia\(43\). The participants built consensus about the ideas and images that were most important to them. They briefed the design professionals about these views and partnered with the designers during Charrettes to develop designs for real neighbourhoods in the case study areas.

Thus the research involved two stages with a different method used at each stage:

- to gain understanding of older peoples’ perspectives using PhotoVoice and develop principles to guide design, during May and June 2011; and
- to apply the principles and embed participants’ perspectives in design typologies using a two-phase design Charrette process, during August and September 2011.

Why use PhotoVoice and Charrettes?

Involvement of older adults as partners in the research process itself is still relatively rare. A small but growing body of studies, however, suggests that participatory research with older adults may help in understanding and addressing some of the complex health and social problems faced by elders. Furthermore, with the growing emphasis on incorporating the preferences of elders in service delivery and public policy decision making, such approaches offer many benefits, including better meeting needs, individual and community capacity building and empowerment\(44\).

While PhotoVoice has been used extensively in the past in community development and health studies to influence decision-makers\(45\), more recently it is being used by planners and researchers to understand community values and perspectives to input into planning processes\(46\). PhotoVoice involves participants taking photos according to a theme and discussing and reaching a consensus in a group about the message they wish to convey to decision-makers, using their photos and storyline or captions. This “participant elicited data” provides a richer insight into often complex, contextual issues and puts the participants in control of the responses. Furthermore, visual data has been found to identify problems and strengths.
omitted from data gathered using other means\textsuperscript{47}. The visual images evoke emotional engagement. A large sample is not as important as the quality of the participation and capturing the dialogue to distill important points.

While PhotoVoice has been used in research with youth, children, and minority groups\textsuperscript{48}, to our knowledge, it has only once been specifically used with older persons in relation to the built environment – to assess barriers to walkability for older people in Ottawa Canada\textsuperscript{49}. Previous studies commonly used questionnaires, focus groups and in depth interviews to seek seniors’ views.

The second method used, the design Charrette is another participatory method. It is defined as a ‘time-limited, multiparty design event organised to generate a collaboratively produced plan for a sustainable community’\textsuperscript{50}. It brings together key stakeholders, often with opposing views, to become members of the design team in an atmosphere of mutual respect, to create a design for a neighbourhood or complex. Charrettes are often run in staged workshops, over weekends or for a couple of days with a few days’ break for designers to do further work which is then brought back to the larger “team” for input. Charrettes create a common language for solutions, are efficient and inexpensive, and reveal policy contradictions\textsuperscript{51}, as evidenced in this project.

Charrettes have been used with entire communities, key stakeholders, children, design students, and people with disabilities. In a case in Atlanta, the goal was to design diverse communities that would provide better lifestyles for all generations, particularly the elderly. On a completely different scale from our research, it involved 1500 architects, urban planners, transportation and mobility professionals, health professionals, ageing and accessibility experts, developers, land owners and government officials in a 9-day Charrette. The participants developed a set of guidelines, based on the principles of new urbanism, that emphasized lifelong mobility, social interaction, healthy living, dwellings and services. However it did not directly involve seniors\textsuperscript{52}.

Similarly a comprehensive process of Charrettes were used in Southeast Queensland to develop the ‘Subtropical Design in Southeast Queensland Handbook’ which applied principles in developing practical on the ground solutions. However that set of Charrettes involved creative teams of design experts working together collaboratively, not with the potential inhabitants of the dwellings.

Feedback about the methods from our participants revealed that they felt valued, their views were taken into account, and they learned a lot about their own needs as well as future options as a result of being involved in the research (see pages 104 to 106).

**Stage One – PhotoVoice**

In each of Brisbane and the Sunshine Coast, participants aged 55 years and older were sought from a range of organisations associated with older people including University of the Third Age (U3A) and National Seniors. Twenty-four people aged 55+ participated in the PhotoVoice process on the Sunshine Coast and 18 people in Brisbane. While a mix of age groups and socio-economic backgrounds was sought, participants were neither targeted nor excluded on the basis of income or assets. Over half of the participants were aged 65–74 but ages ranged from 55 to 92 (Table 2).

<table>
<thead>
<tr>
<th>Age Bracket</th>
<th>Brisbane</th>
<th>Sunshine Coast</th>
</tr>
</thead>
<tbody>
<tr>
<td>55-64</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>65-74</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>75-84</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>85+</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18</strong></td>
<td><strong>26</strong>*</td>
</tr>
</tbody>
</table>

*Two participants could not continue

\textsuperscript{47} Lorenz and Kolb 2009
\textsuperscript{48} Carlson et al 2006; Castleden et al. 2008; Strack et al 2004
\textsuperscript{49} Lockett et al 2005
\textsuperscript{50} Condon 2008 p.1
\textsuperscript{51} Condon 2008
\textsuperscript{52} Saporta 2009
The participants were given two weeks in which to use digital cameras to take up to 20 photographs around four questions that illustrate their perceptions of the built environment:

**at a neighbourhood level** –
1. What makes a neighbourhood or street a good place to live in?
2. What are the barriers to having a good neighbourhood or street to live in?

**and at the accommodation level** –
1. What kind of housing design features (internal and external) will you need to support you as you get older?
2. What are the barriers in the home environment as you get older?

![Figure 2: Briefing of participants in Brisbane.](image)

These photos were then discussed in a workshop environment in each of Brisbane and the Sunshine Coast. Participants shared and discussed their photos in small groups led by a trained facilitator. Each group selected photos and attached captions to develop a visual narrative to illustrate their shared perspectives on preferred accommodation and neighbourhood concepts. Following the PhotoVoice workshops, the researchers turned the narrative into powerpoints and three volunteer participants from each group refined them into a presentation to be presented at the first Charrette. The PhotoVoice images, themes and dialogue were thus used as input into stage two of the research.
Meanwhile the researchers thematically classified each photograph from the presentations in the context of its caption, according to WHO’s Age Friendly Cities criteria\(^53\). The WHO criteria were developed on the basis of focus groups of older people, caregivers, and service providers in 33 cities in developed and developing countries. The number of photographs in each criteria (or theme) was tallied. In some cases, the photo and comments were not reflected in any of the WHO criteria and a new theme was created e.g. private outdoor space. The themes were also tagged according to the three main project categories (sustainability, affordability and liveability). Each photo was coded to identify location (BNE or SC), the question to which it responded, and to retain anonymity of participants. Thus outcomes from each case study location also provided a comparison between a city and smaller regional centre. The method used to identify patterns in content and link visual images with verbal narratives about place, was similar to that used by Baldwin\(^54\). The outcomes resulted in design principles to test with the participants during the Charrettes.

### Stage Two – Charrettes

In each of Brisbane and the Sunshine Coast, two participatory design Charrettes were held with seniors and design professionals and facilitated by the researchers. Each Charrette lasted about six to seven hours with breaks for coffee/tea and lunch. In the first design Charrette, a representative of each ‘design table’, presented the group’s selected photos by theme.
Participants were asked to work with the design team in groups to develop innovative housing designs for four hypothetical sites. The sites were selected to provide different opportunities to test typologies of different scale and context.

**On the Sunshine Coast the rationale for each case study site was as follows:**

- A site near the University of the Sunshine Coast (USC) Campus – explores integration of integrating older people in an intergenerational learning environment, adjacent to a future town centre.
- A cluster of four contiguous low density housing sites – explores a collaborative form of secondary dwellings in a neighbourhood of single family detached housing.
- A central city site - explores a location close to the centre of town, with good access to facilities and the beach.
- The 7 ha not-for profit organisation site in a newer suburb – allows age-segregated independent living and higher care in an intergenerational ‘campus’ setting.

**In Brisbane, the following case study sites were chosen:**

- An inner city site near Brisbane General Hospital in a higher density urban renewal area.
- A cluster of four contiguous low density housing sites in a middle suburb.
- A Transit Oriented Development (TOD) site in an inner suburb close to public transit and the Brisbane River.
- Locations in a middle suburb, typical of low scale infill in the older suburbs.

By the end of the first Charrette, the designers had produced sketches for each site based on the advice of the participants. In addition, participants were asked to complete a short preference survey to explore ‘trade-offs’ about themes such as density, shared communal space, and parking. To gain further insight into priorities about neighbourhood and home environments, participants were asked to allocate 15 dots on butchers paper about themes identified in the PhotoVoice workshop analysis.

Two weeks after the first Charrette, the design team presented draft housing models to the participants in a second Charrette, and asked further questions to test the assumptions about the trade-offs older people may weigh up when deciding on where to live should their needs change. Following further dialogue, each design group of seniors and designers refined the designs and presented the resulting visual models to the remainder of the forum for feedback and comments. The participants also critiqued the housing designs against the draft principles for neighbourhoods and dwelling environments, which directly informed the chapter on ‘Design Principles’.

Three months later, the participants in each location reassembled to review and comment on the typologies that the design team had developed based on outcomes of the Charrettes. Discussion of the typologies and participants’ reactions are described in Chapter Four.
Scope of the Research

The intention of this research is to provide guidance to planners, developers and decision-makers about how to create liveable, affordable, and sustainable infill development that appeals to older people and enhances their quality of life. A number of policies at all levels of government and internationally support this broad intent. In addition, comprehensive guidelines already exist that give direction for good practice design in a range of circumstances. To ensure that the outcomes of this research contribute to and expands on this already voluminous work, the following overview highlights some of the existing work of particular relevance to the built environment for those aged 55+ and discusses how this study substantively adds to the work. It is not intended as a comprehensive review of international policies and literature supporting sustainability, ageing and affordability in general.

Policies

Much of the inspiration for this work is based on WHO’s Guide for Age-Friendly Cities which states that in order to be sustainable, cities must support their residents’ needs to ensure their wellbeing and productivity. Older people in particular require supportive and enabling living environments to compensate for physical and social changes associated with ageing. Additionally, older people must be consulted and included on discussions and decisions that affect them in the urban and regional settings.

Valuable policy approaches at the National and State level in Australia support this intent to different extents. Nationally the most significant recent policy direction is provided by Our Cities, Our Future. Its Action Plan proposes to facilitate the supply of ‘affordable and accessible housing in attractive, inclusive developments, located close to centres and public transport’; increase the supply of ‘adaptable housing that is built to universal design standards to ensure access for the elderly...’; and ‘support urban developments that supports ageing in place, is socially inclusive and is integrated with surrounding community facilities’. As part of this, the Council of Australia Governments (COAG – federal and State government representatives) has agreed to national criteria for strategic planning of capital cities. If implemented, this will significantly improve the living conditions for older people in these major centres. The next logical progression is to extend the program to include all urban settlements in the country.

The Australian Local Government Association (ALGA), in its policy directive, Age-friendly Built Environments, acknowledges the role of local governments in shaping age-friendly communities through the planning, assessment, and building approval responsibilities of its members, Local Councils. Strategies propose improved walkways, signage, lighting, shape, safer street crossing, mixed use developments on a human scale, mobility and alternative transport options, as well as a recommendation that seniors input to design.

55 WHO, 2007
56 DIT 2011, p.83
57 ALGA 2006
While some coordinated efforts to advance age-friendly communities have surfaced, such as by ALGA and the National Dialogue (referred to under guidelines below), there is no national approach or commitment to best practice in achieving age-friendly communities across the three levels of government. With the National Strategy for an Ageing Australia now more than ten years old, there appears to be a role for COAG, in extending the positive initiatives of Our Cities, Our Future to include seniors in ensuring a revised policy direction meets their needs.

Similar to other States in Australia, the Queensland government’s policy stance on affordability issues is expressed in a Housing Affordability Strategy. It foresaw a State Planning Policy for Housing and Residential Development which requires larger communities to undertake a housing needs assessment as a basis for future planning. It also led to the formation of the Urban Land Development Authority (ULDA) with a mission to bring housing to the market quickly and deliver a diverse range of housing options for the changing needs of the community including housing that is affordable for households on low to moderate incomes. The ULDA is a planning and development authority that also works with external developers and other stakeholders to deliver its outcomes. The ULDA employs both regulatory and non-regulatory approaches and targets in relation to accessible housing. Positively Ageless, the Queensland Seniors Strategy 2010–20 values the contribution that seniors make and espouses a vision “to encourage the development of age-friendly communities that suit varying needs, choices and levels of participation, and for the right services to reach the most vulnerable and disadvantaged seniors at the right time.” While it includes valuable actions to support awareness raising and participation in civic affairs, there are no actions directly related to improving the built environment for older people.

At a regional level, the South East Queensland Regional Plan 2009–2031 provides generic direction and overarching support for seniors’ (and others’) well-being through its vision for SEQ. It articulates a future that is affordable, prosperous, liveable and resilient to climate change, with inclusive communities; sustainable, well designed development that reinforces the subtropical character; valued and protected ecological and culturally significant landscapes; and access to a range of quality open space and recreational opportunities.

Also at the regional level, the Liveable Compact Cities Project put forward measures for greater uptake of medium density development, including best practice guidelines (described below), policy and engagement tools, and market based recommendations. Of particular relevance to this project about infill development, is the suggestion to:

- further explore the development of voluntary Queensland Planning Provisions (QPP) compliant code provisions, to enable greater diversity of medium density development including, for example, medium density development on 600–800m² blocks.

In the city of Brisbane, one of our case study locations, Council’s draft Seniors’ Strategy 2012–2017 incorporates some of the recommendations of the Lord Mayor’s Taskforce into Retirement and Aged Care, which was tasked with investigating opportunities for Brisbane City Council to support older citizens to ‘age-in-place and participate more fully in their local communities’. The outer ring suburbs of Brisbane are highlighted as priority area for ageing-in-place; it was suggested that services, facilities and planning processes will need to pay particular attention to people in different stages of ageing over the next 30 years. Brisbane City Council has drafted strategic priorities, based on research findings and consultation, that suggested older residents in the Brisbane area were, amongst other things, increasingly at risk of social isolation, seeking more variety of local door-to-door transport options and ‘affordable universal housing options that support “ageing in place”, better walkways, opportunities for inter-generational and inter-cultural skills exchange and are willing to be involved in meaningful volunteering and in making the city a better place’. In support of this, Brisbane City Council has a range of initiatives and programs that underpin the intent of the strategic priorities.

In addition, Council has also recently released the Draft Brisbane Access and Inclusion Plan 2012–2017, which focuses on practical ways of making services, facilities and infrastructure accessible, and how attitudes towards disability can create inclusion in events, activities and programs.

At our other case study location, the Sunshine Coast Council has been comprehensively addressing the range of relevant issues. The Affordable Living Strategy was informed by a Housing Needs Assessment and other Council research which identified the area as having the highest levels of housing stress in Queensland, as well as a need for greater housing...
choice and adaptable housing. Most importantly the Affordable Living Strategy recognises that affordability requires consideration of a range of interrelated elements, including housing choice, location and access to essential services and facilities, public and active transport, and energy efficient design. It includes targets to achieve greater housing diversity, affordability, aged care accommodation, and importantly, ‘to increase universally designed and adaptable housing to 19% of housing stock on the coast by 2031’. Furthermore Council’s Positively Ageing Strategy includes actions to ensure that older people’s needs are incorporated into place-making and projects; and that planning supports age-friendly communities through access to infrastructure, facilities, recreation and public transport, and walkways. Council’s Access and Inclusion Plan 2011–2016 applies to people of all ages but commits to five main areas in order to improve access and inclusion: pedestrians, parking and transport; community facilities, amenities and open space; planning and services; training, employment and participation; and communication and community.

Guidelines

A range of recent voluntary guidelines provide advice on designing for age-friendly communities. For the most part they are produced collaboratively, recognising the need for multi-party agreement in order to achieve adoption.

This project has underlined the importance of universal design as a mechanism to better enable people to remain independent in their communities and age-in-place. In spite of evidence of the increasing need for, and benefits of, universally designed homes, builders have been reticent about incorporating such features in building stock. Even the recent Productivity Commission’s report encourages voluntary adoption rather than regulation, in contrast to pleas from care providing associations.

The Productivity Commission’s rationale, based on purported additional costs however, is not confirmed in other literature. Building industry representatives have advised that if the Key Design Features are designed in up front, then universal housing could be achieved with almost no additional cost. It has been estimated that if 20% of new homes included universal housing design, the cost savings to the Australian health system would range from $37 million to $54.5 million per annum; with 100% adoption this increases to $187 to $273 million per annum. The reduction in costs to government health and community sector spending is primarily due to reduced fall hazards in homes, resulting in reduced health care costs, reduced community sector spending is primarily due to reduced fall hazards in homes, resulting in reduced health care costs, reduced community care costs, reduced cost of government-subsidised home modifications, and reduced need for aged care residential accommodation or in-home assistance. Furthermore as grandparents provide care for 18% of all children aged 0–11 years, universal housing will help them to stay living in their own homes for longer.

One of the most significant achievements in progressing accessible housing nationally, is a collaborative process, the National Dialogue on Universal Housing Design (NDUHD), which brought together industry associations such as the Housing Industry Association and Master Builders, large developers such as Lend Lease and Stockland, and non-profit associations. They agreed on an aspirational target that all new homes will be of an agreed Universal Housing Design standard by 2020, with interim targets to be set within that 10-year period. The NDUHD has produced useful Liveable Housing Design Guidelines (NDUHD 2011). Its members ‘hope that home owners will see the benefits of Universal Housing Design principles when renovating an existing home’. They recommend that all ‘government providers of social housing should commit to delivering all new public housing to an agreed Universal Housing Design standard’.

Landcom, a government development authority and social housing provider in NSW, utilises a non-regulatory approach with an aim to include a proportion of universal housing in each of its projects, with the proportion varying according to location. It recognises for example, that a greater proportion of universal housing may be more appropriate in areas with direct and convenient access to services that would particularly benefit older people. Where topography is steep however less universal housing might make sense. Landcom aims is to influence the design of mainstream housing so that a greater proportion of new homes built will be suitable for older people to live in for a longer period of time. The Key Design Features and best practice principles in Landcom’s guide are derived from the Australian Standard for Adaptable Housing (AS 4299–1995).

At a broader level, developing age-friendly communities is also a feature in Healthy Spaces and Places which involved collaboration of ALGA, the National Heart Foundation of Australia and the Planning Institute of Australia, supported with...
Government funding. This national guide aims to support and complement planning and design initiatives of the three levels of government. It recommends that retirement accommodation should be integrated into the community, well placed to encourage active living by residents including walking to facilities and using public transport.

In Queensland, the Smart and Sustainable Housing Design Objectives\(^{84}\) and the Urban Land Development Authority’s (ULDA) Accessible Housing Guidelines provide design objectives, acceptable outcomes and planning and design elements respectively\(^{85}\). In addition, consolidated development is supported by Queensland government’s Transit Oriented Development: A Guide to Community Diversity\(^{86}\).

One of the most recent policy guides to inform planning and development in SEQ is the Next Generation Planning Handbook, which provides guidelines at different scales (district, neighbourhood, street, lot) and form-based codes that can be used in planning schemes\(^{87}\). It aims for a consistent approach in planning schemes to address affordability and encourage smart growth.

In a subtropical climate, successful design allows people to manage how they experience the local climate. Design will be increasingly required to deliver solutions for climate variation and adaptation in response to peak weather events such as drought, flooding and severe storms. The pre-eminent document on subtropical design, the Subtropical Design Handbook, is increasingly referenced by municipal planning schemes as it articulates design principles that aim to ensure development is ‘sustainable, well-designed, and the subtropical character of the region is recognised and reinforced’\(^{88}\). Key design principles that resonate with our study include integrating with nature, developing outdoor meeting places, and diversifying the build environment.

**Implications for our Research**

A number of excellent policies and guidelines exist however none are specifically oriented to infill development; neither are they specifically oriented to older people. In addressing issues and needs for older people, designs that improve how we consolidate development will improve the lifestyle, health and well-being for all ages.

This study addresses three drivers for designing for seniors: liveability, affordability, and sustainability. The previously mentioned policies and guidelines also address these themes with ULDA’s approach focussed on housing diversity and affordability, subtropical design addressing sustainability issues, and liveability addressed in the Next Generation Handbook, Universal Design and WHO’s guidelines. During the study we elicit input from our elder participants to understand their perspectives and to design neighbourhoods that address these issues.

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84  DPW 2008  
85  ULDA 2011c  
86  DIP 2010  
87  Council of Mayors (SEQ) 2011a  
88  Centre for Subtropical Design 2010, p.2  

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18  Infill Development for Older Australians in South East Queensland
Design Principles

‘When one tugs at a single thing in nature, he finds it attached to the rest of the world.’

John Muir

The design principles that follow draw directly on outcomes of the PhotoVoice workshops. They were iteratively refined during the Charrettes and afterwards in conjunction with the study participants, partners and design team. Further insight and elaboration of the principles are based on a review of evidence-based research literature. Each principle is illustrated with photos taken by seniors. For each principle, the challenges and opportunities for designers and planners are identified.

Table three illustrates the number of photos in each location analysed by theme. The photos selected represent the consensus view of each group but it must be emphasised that it is not indicative of all of the photos taken by the participants, nor of those shared in the PhotoVoice workshops. They were the photos chosen to tell the story each group wanted to convey. Thus it provides an indication of priorities, which were further tested in the Charrettes.

Table 3: Number of photos in the most frequently identified themes (with both positive and negative associations) by location

<table>
<thead>
<tr>
<th>Neighbourhood</th>
<th>Total</th>
<th>Sunshine Coast</th>
<th>Brisbane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pavements maintained, accessible, unobstructed</td>
<td>34</td>
<td>30+</td>
<td>4</td>
</tr>
<tr>
<td>Outdoor environment and aesthetics</td>
<td>30</td>
<td>15</td>
<td>15#</td>
</tr>
<tr>
<td>Meeting places that include older people *</td>
<td>29</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>Accessible services, close proximity to housing **</td>
<td>27</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Green spaces – accessible</td>
<td>25</td>
<td>18+</td>
<td>7</td>
</tr>
<tr>
<td>Fostering interaction*</td>
<td>21</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Local gathering places*</td>
<td>21</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>Outdoor seating</td>
<td>20</td>
<td>16+</td>
<td>4</td>
</tr>
<tr>
<td>Housing close to services **</td>
<td>18</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Built amenity</td>
<td>17</td>
<td>6</td>
<td>11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accommodation</th>
<th>Total</th>
<th>Sunshine Coast</th>
<th>Brisbane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal design</td>
<td>88</td>
<td>44</td>
<td>44</td>
</tr>
<tr>
<td>Housing meet environmental conditions</td>
<td>36</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td>Range of suitable housing options in local area</td>
<td>32</td>
<td>10+</td>
<td>22</td>
</tr>
<tr>
<td>Appropriate design, well structured</td>
<td>30</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Sufficient space</td>
<td>28</td>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>Safe in the home</td>
<td>24</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Affordability</td>
<td>22</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Private outdoor space</td>
<td>18</td>
<td>11</td>
<td>7</td>
</tr>
</tbody>
</table>

* indicate themes similar to each other
+ reveal large differences in perceptions between the two locations
# Brisbane participants mainly reported negative aspects

Many of the principles derived from the ‘voices’ of seniors align with the widely recognised principles from best practice planning policies and guidelines reviewed in the previous chapter. These included ensuring connectivity via well maintained level walking paths to public transport, services and facilities; sense of community; and features enabling accessibility personal security both in home and neighbourhood. In fact, the greatest number of photos illustrated characteristics of universal design, although many participants were not familiar with the term at the beginning of the study. They provided photos of positive aspects of universal design such as ramps, hobless showers, lever taps and windows at an appropriate height, as well as negative features in a home such as narrow, winding, or patterned stairs, and difficult-to-reach kitchen cupboards and power points. However our participants also identified additional matters of interest to them that are not components of the WHO or other policies and guidelines.

We tentatively suggest that these additional themes partly reflect the sub-tropical location of the case studies and therefore incorporate those features that take advantage of mostly year-round comfortable temperatures, but also protect from extremes of rainfall and sunshine. Examples follow.

- Private outdoor space useable for gardens, relaxation or entertaining, such as good sized patios and balconies were considered important to extend their living space and provide fresh air.
- In spite of the potentially long-term return on investment, several participants had installed sustainability features such as solar power or rainwater tanks and indicated that a factor was the immediate cost savings. In addition, though, many also sought to maximise the benefits of environmental conditions such as natural light and cross ventilation, and to minimise energy use such as through using a clotheslines rather than a dryer. Again economics was a component of the rationale.
- The desire for sufficient indoor space for hobbies or interests extended the idea of sufficient space and privacy mentioned in the WHO criteria. The need for shade in relation to outdoor spaces and bus shelters extended WHO’s idea of ‘shelter’.
- Attractive built visual amenity and human scale developments including local shopping centres were appealing to seniors. Differences were apparent between photos taken by Sunshine Coast and Brisbane residents. The big city residents were more security conscious both on the street and in the home – this was illustrated with photos of security screens around patios and high fences preventing street surveillance. City dwellers were also more concerned with traffic congestion and air and noise pollution from a number of sources. On the other hand, Sunshine Coast residents valued their green outdoor spaces and natural amenities but complained about the poor public transport options, characteristic of a community with a dispersed population.

The following are divided into eight neighbourhood scale and seven accommodation scale principles. This does not mean that neighbourhood principles are the only ones to be addressed by urban planners, and the accommodation scale by architects. Design at one scale affects the other. For example, providing a large window for ventilation which exposes an unattractive view only partly contributes to quality of life. Building a sense of community can reduce fear from crime and avert the building of home fortresses. Thus a range of expertise is needed to plan and develop a vibrant liveable infill community.

Likewise many principles reflect all three themes of liveability, affordability and sustainability and illustrate the complex interrelationship between them. For instance, level shady tree walking paths and open space: enable exercise and physical well-being and reduce social isolation (liveability); reduce need for vehicle transport and therefore green house gas emissions (sustainability); and minimises costs in physical and emotional health care to the individual and the public purse (affordability). This became even more apparent at various stages when participants deliberated about photos to illustrate a theme during the Charrettes.

Importantly the following principles are illustrated with photos taken by the senior participants. The photos demonstrate rich meaning for the participants, derived from their own experience, knowledge, and thoughtfulness, demonstrating more than simply numbers of photos taken on a theme. Participants were motivated to share their photos, hoping that this will lead to improved living conditions for older people.
Neighbourhood Scale

The first set of principles reflect photos taken to illustrate what makes a neighbourhood or street a good place to live and what are the barriers to having a good neighbourhood or street to live.

At the Neighbourhood Scale, the principles are:

**Principle 1** – Walking Paths and Walkways

**Principle 2** – Proximity to Services and Facilities

**Principle 3** – Outdoor Environment and Use of Green Space

**Principle 4** – Public Transport and Connectivity

**Principle 5** – Pedestrian Safety in Neighbourhoods and Towns

**Principle 6** – Safety for Older Motorists in Neighbourhoods and Towns

**Principle 7** – Sense of Community

**Principle 8** – Perceptions of Personal Safety

Figure 8: Shaded neighbourhood park (B).
**Principle 1**

**Walking Paths and Walkways**

Sufficiently wide and well-maintained paths provide essential active transport connections between services, facilities, housing and outdoor spaces in our communities.

- Essential links are provided between services, facilities, housing and outdoor spaces.
- Accessible well maintained walkways have even grades and smooth surfaces with shade and seating.
- Walkways have a minimum width of 1.8 metres; adjoining verges are at level with footpaths to minimise uneven surfaces and risk of falls.
- Pedestrians should be physically separated from bicycles, mobility scooters, and vehicles, with clear signage.

Figure 9: Shady footpath with seating (SC).
What the participants told us...

Well maintained, even graded and accessible walkways provide connectivity between places as well as opportunities for exercise and relaxation. However, shade and seating to rest along the way is essential.

Steep streets were well documented as barriers for older people in the neighbourhood. Numerous images in both locations demonstrated how steep residential streets, some with cars parked along either side and/or without walkways presented a significant obstacle for older people walking to transport, services or facilities within their neighbourhood.

Concerns were raised about pedestrian/vehicle/cyclist road use conflicts – which are particularly valid in light of the academic literature documenting the vulnerability of older people as pedestrians. This issue is also captured from a pedestrian/vehicle perspective under Principle 5: Pedestrian Safety in Neighbourhoods and Streets.

What the research tells us...

Well built and maintained walking paths in neighbourhoods, town centres and outdoor spaces contribute to seniors’ social interaction and involvement in the community as well as their health and well-being. Participation in regular physical activity improves older people’s physical capability through enhancing muscle strength, aerobic capacity, balance and flexibility, and minimises the physiological changes associated with ageing. It enhances cognitive functioning and has a positive effect on negative emotions90.

Walking is the main form of physical exercise for older Australians but older people are concerned about the speed and inability to hear cyclists and mobility scooters on shared pathways91. Many studies indicate that diminishing visual acuity and lack of exercise are factors most associated with falls in the elderly population92. A clear safe ‘path of travel’, separated from traffic, enables access to a local transport stop, social activities, retail and health services. Uneven paths and steps increase risk93. Safe, even graded and well maintained walking paths are important because even if an older person lives within walking distance to services, a path of travel that is hazardous will inhibit use. The lack of footpaths in many residential neighborhoods mean that people walk on the road or nature strip, increasing the risk of falls or traffic accidents.

Accidents are a major cause of concern for older people, with falls being the most common reason for moving to residential aged care94. Older people represent a large proportion of pedestrian fatalities and serious injuries due to age-related mobility and perceptual impairment95. Falls can be minimised by ensuring that walking surfaces are slip-resistant, glare-free, of uniform texture and colour with clearly distinguishable borders and good contrast between the pavement and its immediate surrounds96. In addition, for ‘shufflers’, lack of coordination and balance can also be a problem so walkway surfaces should be non slip even when wet.

Figures 10 and 11: Left - Poorly maintained path is hazardous (SC); Right – Open space along the River (B).

90 Alves and Sugiyama 2006
91 Quinn et al 2009
92 Brawley 2002
93 Joseph and Zimring 2007
94 Quinn et al 2009
95 Oxley et al 2006
96 Brawley 2002
Figures 12 and 13: A characteristic of both the Sunshine Coast and Brisbane is the attractive treed areas that are too hilly for comfortable walking for seniors and often do not have footpaths. (Left – SC; right – B).

**Challenges**

- Increased costs to Local Governments to provide adequate separation of pedestrians and cyclists as it is anticipated more people (including children) will use bicycles in the future, especially for commuting. Priorities will need to be identified for locations where this is feasible. It might not be practical at the neighbourhood scale.
- Topography and distance are key factors influencing provision and maintenance of sufficient and appropriate paths in both Brisbane and the Sunshine Coast.

**Opportunities**

- Councils could prioritise walkway maintenance programs in an 800m radius of centre facilities, services and transport stops and in areas with suitable topography.
- Methods that physically segregate pedestrians from vehicles and bicycles could decrease the exposure of older people to potentially dangerous road use conflict scenarios.
- New developments should allow sufficient space for street trees for shade and seating or rest areas in a subtropical climate.
Principle 2

Proximity to Services and Facilities

Housing for seniors is located in close proximity to safe and accessible services and facilities that are important to them.

- Housing suitable for older people is located in close proximity to small scale shopping facilities and services. Particularly important are health services.
- Housing suitable for older people is located in close proximity to or easily accessible by public transit to sporting, fitness and recreation facilities, libraries, and Community Centres, to promote active ageing and participation in the community.
- Services and facilities are safe and accessible for older people (ideally without steps or stairways).

Figure 15: Apartments integrated with shops and services (B).
What our participants told us...

According to participants in both locations, features of a good neighbourhood involved living in close proximity and easy pedestrian access to services and facilities such as banks, post office, medical, cafes, community or recreational centres, and churches. A distinct preference was for small scale, low rise services and facilities in a “village style” setting. This was mostly associated with the need for ease of access (by public transport or car parking within close proximity of the facility) and ease of sourcing goods and services closer to home in an environment that was less congested with traffic and people than larger shopping complexes. Participants recommended efficient, safe, reliable and frequent public transport to and from large shopping facilities as well as “seniors only” parking zones.

What the research tells us...

Design of the urban environment has a major influence on older adults’ independence, safety, involvement in social activities, and access to services. Recent studies suggest that locational features are more important for older people than the dwelling itself, that is, being near family and friends, general health services, activities, and local shops97. Further, attachment to locality or a local community that is familiar appears to be more important with increasing age98. In Australia, 59% of seniors live within 15 minutes travel distance to a friend and 33% to one of their children99. “Baby boomers” intend to transition to retirement by working part-time,100 and workforce participation among older people is increasing101. Volunteering, both formal and informal, is a way for older adults to remain productive and involved in their communities. While the community benefits from a rich resource, older volunteers also tend to live longer102.

Livable communities foster involvement in community decision-making and intergenerational activities, an active lifestyle, and lifelong learning103. About 25% of older Australians are involved in formal or informal learning104 at a community centre, academic or religious institution, or at home via the internet or distance learning105. Such “later life learning” (or “leisure education”) has economic, social and health benefits106. Thus maintaining access to facilities and transit is crucial to retaining one’s independence and connections with the community, particularly as mobility decreases. In fact, it is clear that older people will take advantage of services and facilities if accessible on foot or by public transit107. Living within an 800m or 10 minute walking distance to facilities or public transport is generally considered acceptable by people of all ages108.

Figures 16, 17 and 18: from left – access to village type shops with service e.g. doctors, banks etc all in one place (B); small scale local shopping area (B); Individual neighborhood shops (B).

97 Weidmann and Kelly 2011, Oldsberg and Winters 200
98 Boldy et al 2009
99 Booth and Lopez 2011
100 Humpel and O’Dwer 2009
101 Quinn et al 2009; Spoehr et al 2009
102 Warbuton and Lovell 2005
103 Hwang et al 2008
104 Engelbrecht 2010
105 Arsenault 1998
106 Engelbrecht 2010; Skladzien and O’Dwyer 2010
107 Carp 1980
108 ALGA et al 2009
Challenges

- Managing noise impacts are a challenge in mixed-use developments and generally when housing is in close proximity to facilities and transport.
- Where seniors have to travel long distances to access services, it can be a significant expense. Extensive low-rise development in a neighbourhood does not foster walkable catchments.
- Cost of car parking is an issue with implications for design and market appeal in smaller centres where there is a limit on density and height of development.
- Rising land costs will inhibit current low-rise development into the future.
- At grade car parking (as opposed to more costly basement car parks) could involve unsightly overlooking of cars and imbalance of landscaping to tarmac. Site size influences type of development.

Opportunities

- Strategic spatial planning of services and facilities can take into account proximity needs of older people by designating land within 800m of small scale facilities and transport in quiet, accessible locations as age-friendly in Planning Schemes. Incentives (planning bonuses) could be offered for age-friendly dwellings constructed in these areas.
- Mixed use developments and housing above shops and offices may achieve sufficient density and resolve proximity issues. Partnering between not-for-profits, public institutions and/or private developers might facilitate multi-use developments.
- Mixed-use development (over a certain size) generally necessitates basement car parking which allows for a better street interface and communal open space. Off-peak car park sharing, car pooling and sharing schemes can reduce car accommodation which reduces housing/development costs.
- Larger shopping centres or community organisations could provide specialised concierge shopping services which assist seniors or other members of the community with navigating the centre, provision of mobility aids (if required), assisting with their shopping requirements and carriage of goods and transport to and from home. This could become even more important in the future if developments try more innovative approaches to mixing retail or commercial services with residential dwellings for older people.
- “Village” scale centres and neighbourhoods can facilitate relationships between residents and shop-keepers, and thus foster a caring sense of community.
- Human scale developments that welcome pedestrians can contribute to street vitality.

Figures 19 and 20: Left – Village atmosphere, trees and seats (SC); Right – Opportunities to socialise (SC).
Principle 3

Outdoor Environment and Use of Green Space

Natural places with shade, shelter and seating provide opportunities for social interaction, observation, exercise, and relaxation.

- Outdoor environments and green spaces provide opportunities for social interaction, observation and rest through shelter, shade, and seating.
- Residential areas, particularly those of higher density, have easy access to green open space.
- Attractiveness is enhanced through views of trees, water and wildlife.
- Neighbourhood living is generally free of pollution (air, water, land, noise).

Figure 21: View points with seats – but no shade (SC).
What the participants told us...

Sunshine Coast participants placed a strong importance on natural and scenic amenity, views, tranquility, and green open spaces with walkways that have seating to rest along the way and are well shaded, maintained, and accessible. This may reflect the level of land use change and development on its path to urbanism. In contrast, Brisbane participants emphasised safety, access, and interaction in ‘organised’ public spaces, such as neighbourhood parks. They were also concerned about land, water, noise and air pollution from litter, traffic and industry.

What the research tells us...

Extensive research has demonstrated the restorative and stress-reducing effects of the natural environment\textsuperscript{109} and \textsuperscript{110} and the positive effects of access to green spaces on health and longevity of older people\textsuperscript{111}. Early research on the relationship between ageing and nature found ‘that nature, defined as yards, trees, shrubs, gardens, parks, and landscaped settings, was valuable for elderly residents’ who lived in apartments and played a much more significant role for the elderly than developers and policy makers first thought\textsuperscript{112}. Certain environmental features influence older people’s choice and use of green open space and parks: seating, cafes, and shelters which facilitate social interaction or observation; toilets; quality of trees and plants; attractive views including wildlife and water features (fountain, river, beach); low nuisance (dog droppings and undesirable people); and easy access to the site (including public transport, car park, light traffic, short walk)\textsuperscript{113}.

Figures 22 and 23: Left – Litter detracts (B); Right – Beautiful places (SC).

\begin{itemize}
  \item \textsuperscript{109} Kaplan 1995
  \item \textsuperscript{110} Grahn and Stigsdotter 2003
  \item \textsuperscript{111} Takano et al 2002; de Vries et al 2003
  \item \textsuperscript{112} Talbot and Kaplan 1991 cited in Wright and Lund, 2000
  \item \textsuperscript{113} Joseph and Zimring 2007; Grahn and Stigsdotter 2003; Thompson et al 2007
\end{itemize}
Challenges

- In existing infill areas, the location and structure of open space is often already set and additional open space can only be provided by a private developer or at Council expense. This may limit the ability to maintain quality of life for older people as density increases.
- Effort is needed to retain, make use of, and enhance shade, trees, and views in existing older neighbourhoods.
- As the size of complexes and private outdoor space reduces, people will need to have access to more public open space. Public open space will need to accommodate an increasing variety of needs.

Opportunities

- Neighbourhoods subject to infill development should protect existing open space and in particular provide shaded areas and ensure useability through design of parks and walkways/trails.
- Infill developments can provide public or semi-public space for the existing neighbourhood to enjoy and attract demographically mixed users onto a site. This could involve housing that overlooks either public space or a communal courtyard.
- Green roofs, that is a roof that is partially or completely covered with vegetation, can provide thermal regulation, contribute to biodiversity and play a role in a hierarchy of communal or private open space. However rooftop gardens with sufficient substrate for larger plants add cost and complexity to the construction process due to need to provide for additional load bearing capacity.
- Public open spaces should provide for a diversity of ages, lifestyles, abilities and preferences. As neighbourhoods densify, there will be greater demands on the versatility and utility of public open space and shared open space. Active uses, spaces for quiet contemplation or relaxation and interaction should be designed to co-exist and be stimulating for all ages and not limited to playgrounds for children.
- Interactive public open space options that might appeal to older people include community gardens/vertical gardens/green walls, interactive art/outdoor studio/classroom space, outdoor amphitheatre, wall for screening outdoor movies, dog parks, and giant chess.

Figure 24: Close to a quiet park in a safe area (B).
Principle 4

Public Transport and Connectivity

Seniors’ independence is supported through reliable, frequent, efficient and affordable public transport options, with comfortable and safe transport stops.

- Public transport is reliable, efficient, frequent and affordable.
- Public transport stops are within close proximity to housing.
- Transport stops have adequate seating, shelter and shade from the weather.

Figure 25: Close to good public transport (B).
What our participants told us...

Brisbane participants generally showed positive images about frequency and reliability of transit service, and adequacy and access to bus stops. In contrast, those in the Sunshine Coast presented a negative view of public transport due to concerns regarding frequency, reliability, efficiency, and connectivity. Other concerns included the lack of protection from weather by poorly designed public transport shelters. These became dangerous when people moved behind the shelter to find shade, due to drop offs or uneven surfaces. Some older participants also expressed concern about safety on public transport, such as the risk of a fall embarking/alighting from public transport (possibly due to an increasing difficulty in depth perception associated with age).

Public transport is important for older people in Brisbane, particularly if they wish to live affordably and/or sustainably. As older people become more frail, other community based alternatives to public transport become increasingly important in order to remain active and engaged within their community. One Sunshine Coast participant shared that, following a fall on a bus due to the driver starting to move the bus before she was seated, she was too frightened to use public transport after she recovered from her injuries. She now relies on friends and community care to help her to get to her volunteering job and pick up the groceries due to the steep hills around her home in the hilly hinterland village of Woombye.

What the research tells us...

An Australian study indicated that while 85% of older home owners had access to public transport of some form, the vast majority depended on private cars, partly due to the freedom and independence they offer\textsuperscript{114}. In both Victoria, Australia and the USA, research suggested that public transport accounts for less than 10% of all journeys by older adults\textsuperscript{115}. The barriers to using public transport are reported to being related to schedules prioritised for commuters; unsuitable routes; excessive distance or difficulty in accessing transit stops; lack of services (in some areas); irregular or unreliable services; logistics of boarding and alighting; lack of seating at bus stops; transfer/waiting times between transport modes; crowding; and concerns about crime and safety\textsuperscript{116}.

Public transport in many areas of Australia is limited and unviable due to low population densities. For older people in rural areas, loss of a driver’s licence often means a move into town, while for suburban residents public transport service levels may be poor. Loss of a driver’s license can impact on mobility with consequences for independence, social connection, self-esteem and depression, particularly in absence of adequate public transport\textsuperscript{117}.

The proximity to transit service increases older people’s transit use. Activity clusters of commercial and service facilities are advantageous to older suburban populations who age in place\textsuperscript{118}. The relationship between where a home is located and where jobs, facilities and services are located generates transport demand\textsuperscript{119}. In areas where public transport is limited, the majority of household travel is by car. This has impacts on the affordability of living due to vehicle operational costs and has collateral effects such as decreasing air quality through car emissions. For older people, proximity to reliable, efficient, frequent and affordable public or community based transport is particularly important so they can continue to be active and independent, even if they no longer use a vehicle.

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\textsuperscript{114} Judd et al 2010 p.11
\textsuperscript{115} McKenzie 2002, Kim 2001
\textsuperscript{116} Kim 2001, Quinn 2009, Judd et al 2010 p.12
\textsuperscript{117} McKenzie 2002
\textsuperscript{118} Kim 2001
\textsuperscript{119} Infrastructure Australia 2010
 Challenges

- Frequent public transport is not economically viable in existing low density areas suitable for infill. Peak services are often only provided to or within activity centre catchments. Off peak frequency of services (when seniors may be more likely to travel) is an issue for timetabling, particularly on the Sunshine Coast.
- Location of residences close to public transit can have mixed effect on amenity due to noise and air quality and can increase land use costs for infill development.
- Bus transport has greater challenges for seniors than trains which may account for perspectives on the Coast where buses predominate. As the proportion of older people increases, the number of priority spaces for older people on public transport needs to be reconsidered\(^\text{120}\).
- Some locations simply do not provide an environment suitable for transitioning to public transport for seniors.

 Opportunities

- Mixed land use, that is, locating key facilities such as shops and schools, close to homes and on the most convenient path of travel between major activity centres is key to ensuring a high level of active transport, and will also help ensure the sustainability of commercial activities\(^\text{121}\).
- Location of housing close to public transport stops support access in two ways, i.e. more visitors for seniors and seniors leaving home to be involved in social interaction.
- Mixed-use development and an increase in density is a natural driver of public transport hubs.
- Where public transport cannot meet the needs of older people, other community-based transport should be considered. Services could include specialised community transport services such as small off peak buses, priority seating/parking for seniors, and subsidised taxi services.
- Training programs for bus drivers should include the importance of courtesy, obeying traffic rules, stopping at designated transport stops, waiting for passengers to be seated before driving off, and parking close to the curb so that it is easier for older people to step on and off the vehicle\(^\text{122}\). This would benefit people of all ages.
- Weather in subtropical locations can be variable, and greater innovation in the design of public transport shelters could provide adequate shade and more effective protection from sun, wind and rain.

Figure 28: Proximity to bus stop and permeability (B).  

\(^{120}\) Quinn et al 2009  
\(^{121}\) ALGA et al 2009a  
\(^{122}\) WHO, 2007
Principle 5

Pedestrian Safety in Neighbourhoods and Town Centres

Safe pedestrian infrastructure contributes to seniors’ confidence and independence.

- Pedestrian activated street crossings provide sufficient time to cross safely.
- Non-slip, easily accessible gutter crossings are not too steep for mobility support devices.
- Traffic islands and pedestrian crossings are located to provide sufficient visibility for drivers and provide time for older pedestrians to cross safely.
- Traffic calming devices promote slower speeds in local streets.
- Cul-de-Sacs provide safe ‘no thoroughfare for vehicles’ streets as well as pedestrian connectivity.
- Provision of infrastructure for motorised scooters does not conflict with vehicular, pedestrian or cyclist users.
- Access to public buildings needs to meet AS 1428.1 standards.

Figure 29: Pedestrian Island (SC).
What our participants told us...

In both case study locations, participants expressed concern with personal safety around pedestrian/vehicle/cyclist road use conflicts. Shared footpaths are becoming increasingly dangerous places for older pedestrians due to cyclist traffic. The need for footpaths that can accommodate mobility scooters was raised. In addition, streets should also be safe and quiet, with traffic calming devices or cul-de-sacs to prevent noise from through traffic. Pedestrian activated crossings are required that provide sufficient time to cross and are designed and engineered to allow safe ingress/egress for pedestrians using mobility devices through a shallow ramp angle. Roundabouts were seen as dangerous for pedestrians to navigate.

What the research tells us...

A recent South Australian study found that for older adults, maximising the attractiveness or safety of a walking path is more important than minimizing the distance to destinations. The biggest limitation to walking for everyday activities and exercise was a concern for safety, mainly busy and trafficked streets and unsafe street crossings123.

Non-intentional injuries from falls and road crashes are typically the most common events leading to injuries among older people. Pedestrian crossings need to consider the slower speed of crossing for people with mobility difficulties and to have a smooth transition from footpath to roadway124.

People with mobility restrictions still have some difficulties with inaccessible public buildings and recommendations are that design criteria in AS 1428.1 also need to be revisited to ensure they meet the needs of people aged over 60.

Older adults may have difficulty with wayfinding due to vision and hearing impairments and dementia. Familiarity with the neighbourhood, clear signage, logical routing, distinctive landmarks (a tree, garden, sculpture), distinctive doorways, and adequate lighting can all assist wayfinding125. This planning for ‘legibility’ needs to include the range of senses to provide cues: visual distinction and colour, materials with tactile differentiation, sound and acoustic design and smell (e.g. flowers and trees)126. There is a general desire among people, even with dementia, to remain living at home for as long as possible so it is important that the design of their local community supports their independence. The familiarity of their home and local neighbourhood has been shown to assist them to better cope with their mental and physical symptoms127. Small and discrete neighbourhoods are easier to find one’s way around.

Figures 30 and 31: Left – Steps interrupt public path (SC); Right – Pedestrian unfriendly bridge (SC).

123 Sivam, A 2011, p.9
124 Quinn et al 2009
125 Quinn et al 2009; Vic Health 2010
126 Judd et al 2009
127 Sheehan et al, 2006
Challenges

- Roads are barriers to pedestrians.
- Shared zones can sometimes cause confusion or frustration between road and pedestrian users if the rules of the shared zone are not clear.
- Provision of cul-de-sacs in neighbourhood design are debated by professionals. On one hand, they can impact on the connectivity of streets for vehicles and pedestrians, may cause confusion for visitors or emergency vehicles, and can be an inefficient use of land and more costly road construction option than through-streets. On the other hand, especially in areas where there are no footpaths, cul-de-sacs are seen as safer for pedestrians as there is no through-traffic and cars travel at slower speeds. They also clearly define a small group of neighbours which contributes to sense of community.
- Manage noise impacts and street interfaces.

Opportunities

- Increasing the density in neighbourhoods can provide the impetus for addressing the needs of the increasing numbers of pedestrians and for slowing vehicles\textsuperscript{128}.
- Priority should be given to pedestrians at local shopping areas, public transport stops and stations by requiring reduced vehicular speed and alternative routes.
- A clear road network hierarchy can delineate and link wider arterial and carrier streets with narrower local neighbourhood streets and cul-de-sacs.
- Streets are a fundamental element of public space which can contribute to urban amenity and social contact.

Figure 32: Quiet cul de sac.

\textsuperscript{128} Gehl, J 2010
Principle 6

Safety for Older Motorists in Neighbourhoods and Towns

Appropriate traffic design contributes to all motorists feeling safe and confident.

- Age friendly traffic design provides traffic signals, maximises visibility and assists motorists in judging distance and speed safely at intersections, turns and on-ramps.
- Options and incentives to minimise car use and ownership in infill neighbourhoods would reduce parking requirements.

What the participants told us...

Participants expressed discomfort and confusion in busy traffic, merge lanes, and at roundabouts. They also raised concerns about lack of parking spaces close to facilities or places such as the beach and difficulties in parking.

What the research tells us...

Older people are generally safe and cautious drivers and have fewer crashes than younger people\(^{129}\). However they are over-represented in serious injuries and fatalities in traffic accidents because of physical vulnerability in particular to restraint impacts during crashes\(^{130}\). They have also been found to be at risk due to issues such as slower responses to traffic hazards, difficulty judging distance from other vehicles and reduced ability to recognise hazards, especially multiple hazards\(^{131}\).

The primary problem for crash-involved older drivers was gap selection. This problem arose in two basic situations, namely, at intersections controlled by stop or give way signs, or at intersections controlled by traffic lights\(^{132}\). At intersections controlled by ‘stop’ or ‘give-way’ signs, the main problem for older drivers is selecting safe gaps to merge into traffic. Provision of a roundabout in place of intersections controlled by ‘stop’ or ‘give-way’ signs can greatly enhance safety (not only for older drivers, but for drivers of all ages). It is simpler than estimating a gap in two streams of traffic. Further, in a crash, injuries are less severe because of lower impact speeds and more favourable collision angles\(^{133}\).

At intersections controlled by traffic signals, research supports the introduction of fully-controlled turning signals to assist older drivers to make safe right-turns. In addition, longer sight distances at intersections would give older drivers more time to select a safe gap in which to turn across or enter traffic. Sight distances may be improved in a number of ways including removal of vegetation, utility poles, or signs that obstruct the view of approaching traffic\(^{134}\).

Older drivers are often aware of their decreasing physical, sensory and cognitive functioning and modify or “self-regulate” their driving to compensate. An Australian study found that the most commonly avoided situations were driving at night (25%), on wet nights (26%) and in busy traffic (22%). While the majority did not adopt such avoidance behaviour, those that did had certain characteristics. They were female, 75 years and older, not the principal driver in the household, had been involved in a crash in the last two years, reported vision problems and had lower confidence\(^{135}\). It has been recommended that older people select routes that reduce exposure to tricky intersections\(^{136}\).

\(^{129}\) National Ageing Research Institute, 2001 p.85
\(^{130}\) Welsh et al 2006
\(^{131}\) Oxley et al 2006
\(^{132}\) Austroads, 2000 p.85
\(^{133}\) Oxley et al 2006
\(^{134}\) Oxley et al 2006
\(^{135}\) Charlton et al 2006
\(^{136}\) Langford and Koppel 2006
Challenges

- Older drivers may experience difficulty in judging distance and speed in negotiating traffic as a motorist.
- Older drivers report avoidance of driving in certain conditions (i.e. when it’s dark or wet).
- As areas increase in density, traffic congestion will increase stress for seniors when driving.
- Parking can become increasingly difficult in more densely populated areas.

Opportunities

- Driver Safety programs targeting older people, such as the free Driver Wiser Course for Seniors run by Frankston City Council in Victoria, allows older drivers to ‘upgrade their knowledge about changing road rules, opportunities to upgrade their skills, keeping cars roadworthy, alternatives to driving, and coping when the time comes to give up the drivers licence’.\textsuperscript{137}
- Roundabouts and traffic signals with turn arrows assist older motorists with issues of gap selection.\textsuperscript{138}
- Separating the purchase or rent of a dwelling unit from a car parking space in new multi-density developments may encourage residents to re-consider car ownership. This might be facilitated by car sharing arrangements within the complex. Minimising car parking spaces can reduce development costs but would need to be negotiated through the development assessment process if the proposal does not comply with planning scheme requirements.

137 Frankston City Council 2011.
138 Austroads, 2000:88
Principle 7

Sense of Community

Opportunities to bring together people of all ages contribute to a shared sense of pride, community wellbeing, and capacity to enjoy “ageing in neighbourhood”.

- Neighbourhoods provide a vibrant and active village atmosphere with a range of places and events to meet, socialise and work with people of all ages and backgrounds.
- Discrete neighborhoods with identifiable boundaries and meeting places contribute to a sense of community.
- Opportunities to voice perspectives and participate contribute to a healthy, equitable, sustainable and liveable neighbourhood for all ages and abilities.
- A mix of age groups that include older people ageing in community, as well as seniors-only housing, contribute to social inclusion.
- Older people are valued and respected in the community.
- Well landscaped, maintained and aesthetically pleasing streets that are free of litter and graffiti contribute to amenity and sense of pride.

Figure 35: Dog parks make good meeting places (SC).
What the participants told us...

Participants in both locations emphasized the importance of a vibrant village atmosphere in their local neighbourhood – a place where they can meet people in their networks or connect to people of all ages in the broader community. Some participants suggested that this mix provides an active and diverse public realm that is desirable to access and participate in from time to time.

Some participants preferred a mix of age groups in their street, while others favour a peaceful street with neighbours who share a similar lifestyle with less potential for noise and other conflicts. Participants in both locations suggested that leafy, well landscaped and maintained, aesthetically pleasing streets were important elements of a good neighbourhood to live in. This suggests that active, social spaces in the neighbourhood need to be balanced with differences in lifestyle habits between people at different stages of their life cycle.

Housing diversity and lot sizes within a neighbourhood are critical to being able to move to more suitable housing as needs change. The majority of the participants would prefer to ‘age in neighbourhood’, particularly if a liveable, affordable, easy to maintain alternative to retirement village living was offered. However, the notion of a seniors ‘community’ as part of a neighbourhood had some attraction due to similar lifestyle habits which might prevent some of the issues such as noise that older people identified when living with people of different age groups in multiple dwelling developments.

What the research tells us...

Built form can contribute to a sense of community no matter what the type of community: a community of ‘place’ with delineated spatial boundaries such as a suburb or street; or communities of ‘interest’ such as a church, school, club, or sporting community. Residents can be part of a number of different communities simultaneously, many of which are within their neighbourhood. Recent Australian research indicates that locational features are more important to older people than the dwelling itself139. Ageing within their neighbourhood means they can maintain familiar relationships and activities. Active participation in social, physical and cognitive activities is recognised as contributing to older adults’ quality of life140.

An overarching desire or concern among metropolitan residents is for urban environments to be ‘humanised’ as much as possible, which means living in neighbourhoods which embody clear signs of thriving, harmonious communities142. A mix of housing styles and densities mean that people of different ages and stages of life can be accommodated. Connecting new neighborhoods to existing facilities with a network of paths, trails and routes improves access and use142. Discrete well-sized neighbourhoods not only foster community but are understandable and easier to get around143. Research suggests that an aesthetically pleasing neighbourhood also reassures older people who may otherwise be reluctant to leave their homes, as together with fear of accidents, a perception of crime and intimidation is one of the major concerns of older people accessing the built environment144.

Employment and volunteering help to contribute to a sense of worth. Older people provide important roles in the community through volunteering and multi-generational caring (e.g for grandchildren)145.

139 Weidmann and Kelly 2011
140 Horowitz and Vanner 2010
141 DIT 2010(b), p.95
142 ALGA et al, 2009a
143 Judd et al 1998
144 ILC  2007, p.19
145 Hwang et al 2008
Challenges

- Perceptions of older people by the broader community and/or society often do not match the range and extent of their largely untapped skills and abilities. Employment or volunteering is a key part of interaction and feeling worthwhile. How to introduce opportunities in single-use or residential areas has traditionally been a barrier for Councils and communities.
- Contemporary life can be complex, stressful and extremely busy for large segments of the community. Changing family relationships and work migration patterns see older people increasingly less able to spend time with family or grandchildren, or to reside with a family member temporarily while they are ill.
- In Australia much post-war development was designed for cars rather than to be walkable. Infill development usually occurs in existing neighbourhoods where the boundaries, size and shape are already defined. So there is less opportunity to delineate a ‘smaller’ age-friendly environment. Infill brings about a change in built form character which can be a threat to existing residents. In addition, some areas are more suitable to infill than others.
- Even when residents are demographically similar to one another, their values, lifestyles and expectations may be quite different, potentially contributing to neighbour disputes\(^{146}\).

Opportunities

- The stress of moving is much less when moving within neighbourhood, where there is the ability to retain existing relationships and visit familiar facilities and services.
- Integration of residential uses into community uses is an emerging area of innovation. Smaller mixed-use centres provide a way of enabling social interaction and engagement in volunteering and other activities. Traditional single-use community buildings and spaces are being increasingly opened up to provide unique opportunities for seniors to interact with each other and with other age groups, such as libraries, educational facilities, churches and church grounds. This multiple use of community spaces leads to breaking down of traditional barriers/norms.
- Larger sites can be reconfigured to provide better access, variety and clustering of built form, which brings community onto the site.
- A community Co-op could provide space for community services or a business incubator for small business providing services to the community. This might include “welcome to the neighbourhood” services, a local service exchange service (handyman skills swapped for meal) or co-ordinated assistance to the elderly (Centrelink, in-home care provision, Meals On Wheels, shopping and chores assistance).
- Pride in sense of community may be addressed by pro-active strategies about improved maintenance, street management, plantings and litter and graffiti removal.
- Denser communities may make it logistically easier for care agencies to service clients who choose to “age in neighbourhood”
- Councils should be considering how to retain amenity in areas designated for infill development.

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146 Easthope and Judd 2010
Principle 8
Perceptions of Personal Security

Design and good networks contribute to personal and neighbourhood security.

- Good neighbour relations help to make safe and secure streets.
- Good street lighting and open, uncluttered streets and housing with high visibility make safe and secure streets.

Figure 40: Our annual court gathering nurtures ongoing relationships (B).

147 In this project, we use “security” to refer to being safe from crime, and use the term “safety” to refer to reducing physical risk from falls and unintended consequences of design.
**What the participants told us...**

Perception of security was a significant point of difference between Sunshine Coast and Brisbane participants. Participants in Brisbane mentioned security in parks and open spaces and illustrated the need for home security with images of security gates, fences and secure outdoor enclosures. In contrast, participants on the Sunshine Coast presented very few images around issues of security.

Participants recommended that streets should be well lit and not be blocked by high fences or on-street car parking to allow for passive surveillance of the street. They suggested that establishing better relationships and links to neighbours would enhance perceptions of security.

**What the research tells us...**

The vast majority of older Australians living independently in the community are not fearful for their personal safety, either in their home and neighbourhood\(^{148}\). While they generally tend to have a higher fear of crime than the general population, they are also less at risk of being crime victims than other age groups\(^{149}\). Of all the crimes committed against older people, investment and insurance fraud is the most common\(^{150}\). It is suggested that the perception of security for older people may be more about their changing vulnerabilities due to factors associated with ageing rather than a genuine risk in public and private spaces. In fact fears for the future for self as a senior revealed mostly concerns about physical health (becoming disabled), experiencing a fall), loss of independence, and nursing home admission\(^{151}\).

As well as environmental design to prevent crime, older people benefit from measures which assist them to be more active and involved in their community, which has been shown to reduce their anxiety about crime\(^{152}\). Improvement in the valuing and support of older people in our society and communities should emanate from two factors: a change in the attitude of the elderly about themselves and recognition by the general public of the dignity and worth of Australian senior citizens\(^{153}\).

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148 Quine & Morell 2008  
149 AIC 2005; Quinn et al 2009  
150 Muscat et al 2002  
151 Quine & Morell 2008  
152 Quinn et al 2009  
153 Pinkerton 1992
Challenges

- Providing neighbourhoods that remain secure as people get older without feeling closed in.
- Perceptions of lack of personal security among older people in the community are disproportionate to the actual crime statistics. Concerns are often related to young people’s activities.

Opportunities

- Greater security could be enhanced through better connections and relationships with neighbours and the community (including community programs to address security issues).
- Neighbourliness in a diverse but small population cluster may provide an antidote to fear.
- Increased levels of personal security could be enhanced by education campaigns and free legal or body corporate advice and assistance provided to older people to protect them from unsound consumer practices.
- The design response can ensure housing overlooks communal spaces and views from/to home are retained.
- Appropriately scaled developments can promote familiarity and fostering of a communal understanding of acceptable behaviour – a social contract. This can be reinforced by a capable and active body corporate.

Figure 43: Street lighting improves sense of security.
Accommodation Scale

Photos were also taken by seniors to represent the kind of housing design features (internal and external) needed to support people as they get older as well as the barriers in the home environment. These principles are:

**Principle 9** – Density and Visual Amenity of the Built Form

**Principle 10** – Universal Design

**Principle 11** – Sustainable Design Features

**Principle 12** – Private and Shared Outdoor Space

**Principle 13** – Versatile Spaces

**Principle 14** – Maintenance

**Principle 15** – Security in the Home

Figures 44 and 45: Above – direct at level access from garage; Below – manageable garden space.
Principle 9  

Density and Visual Amenity of the Built Form

Human scale development with variation in massing and building materials facilitate views and sustainable design and minimise effects of noise and pollution.

- Multiple dwelling developments have an intimacy of human scale designed with a variety of height, orientation, layout, materials massing or clustering of dwellings (e.g. stark concrete finishes are limited).
- Multiple dwelling developments have a range of exit options and safety plans in the event of an emergency or power failure e.g. lifts with temporary power.
- Dwellings provide visual amenity and views for residents to enjoy through a combination of private outdoor space and access to communal outdoor space onsite and nearby public open space. Good design helps to ensure an increase in density does not compromise views or amenity for residents or the community.
- Multiple dwelling developments are located in places close to services, facilities, public transport and green space.
- Good sound attenuation from internal and external noise needs to be considered in multiple dwelling units.
- Multiple dwelling developments are well managed to address residents’ concerns about noise from other residents, parking, privacy, and costs for maintenance of communal facilities.

Figure 46: Small parks separate different types of dwellings (SC).
What the participants told us...

Participants in both locations were concerned with loss of natural and visual amenity through contemporary architectural approaches using minimalist “block style” multiple residence towers. Participants in both locations showed similar photos expressing their dislike for concrete “slab, block style” apartment complexes, as well as photos of a preferred apartment complex style, with a mix of massing and orientation of groups of apartments, generous private outdoor space, spaces between groups of apartments, and the exterior appearance softened by the use of timber features.

Participants stated that affordable housing should not be poorly designed and they expressed clear ideas of what this encompassed. Negative aspects of multiple dwelling developments were reported as: being too dark and needing lights on during the day time; no cross ventilation as the dwelling unit is ‘sandwiched’; no private outdoor space or pleasant outlook; insufficient insulation between dwellings to provide thermal comfort and acoustic privacy between neighbours; and located on busy transit corridors (vehicle/train) with associated noise and pollution if a window is opened for ventilation or if using a balcony or patio.

In addition to concerns about the human experience and the visual amenity of multiple unit developments, participants raised potential conflicts over noise and parking that could be experienced living in a multiple dwelling development with residents of differing ages and lifestyles. Many were also concerned about costs associated with strata titled developments and conflicts within the body corporate governance structure. This presented a sufficient enough risk to a participant’s quality of life in their home environment that it was another reason for avoiding multiple dwelling living.

A final key concern was about personal safety in the event of an emergency if power was to fail and the lifts were not available; they would feel trapped if it was difficult to exit quickly and safely, given potential mobility problems.

Participants were resoundingly against living in high rise developments, but indicated that two storey terrace housing and four storey apartments might appeal, providing they did not comprise a large number of units and had sufficient private outdoor space as well as access to outdoor green spaces, both shared onsite and in nearby public parks.

What the research tells us...

While contemporary approaches to urban planning suggest higher density is the solution to issues of urban sprawl and loss of green space, it may be that there is a threshold at which higher density housing becomes less liveable for residents, from an economic and experiential perspective.

Architectural design should use scale, proportion and detailing to convey a sense of individuality, personality and warmth, as well as a capacity for intimacy and small scale connections. A variety in dwelling size and form appeals to a range of different demographics and stages in the human life cycle. Visual stimulation and attention to detail are important considerations. Given that the attributes of a development are also one of the main reasons for relocation, landmarks, meeting places and smaller scale signatures, should have greater prominence in the built form as these elements ‘have always played a role in the life and design of cities’.

Furthermore, the setting location should offset some of the disadvantages of living in a smaller dwelling unit by judicious use of vegetation and access to private, shared and public outdoor space. This is important for the liveability of the dwelling and provides positive associations with wellbeing and mental health outcomes (see Principle 12, Private and Shared Outdoor Space). However good design of these spaces is essential to not compromise privacy. Architecture should convey a sense of individuality, personality and warmth, as well as facilitate small scale connections.

High density housing could in fact contribute to increased energy consumption when energy is being used for lighting in daytime, and cooling or heating when natural sunlight or breezes cannot thermally regulate the dwelling, and energy consumptive common facilities.

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154 Andrea Young Planning Consultants et al. 2008
155 Gehl 2010
156 Wright 2010, p.7
Research conducted in 2010 found that the majority of resident disputes in a strata titled development were about use of common property, breaking of by-laws, parking and noise\textsuperscript{157}. A study of people living in relatively new medium density accommodation in Newcastle, Australia, found a high level of satisfaction with their living arrangements, partly due to reduced maintenance (primarily exterior), and partly for lifestyle or necessity reasons\textsuperscript{158}. The newness of dwellings reduced maintenance and the need to renovate. Most felt that neighbourly relations were harmonious and relied on ‘striking a balance’ between privacy and contact, a balance which was not the same for each resident. Tensions that arose within the development were mainly due to noise, frequently attributed by owner-occupiers to younger renters. A study of high density residents in Brisbane found limited tolerance for behaviours not deemed as acceptable particularly in relation to noise and parking\textsuperscript{159}. In a country where high density living is a relatively recent experience, there is a need to improve ‘in-built consciousness’ and consideration of others, possibly through introduction of ‘Good Neighbour Protocols’, by-laws, and a building manager conciliation system.

\textbf{Figures 47, 48, 49 and 50: Clockwise from top left – Ugly streetscape (SC); Enclosed dark space (B); Houses too close together lead to neighbour disputes (B); Stalag 30 - boring and socially isolated.}

\textsuperscript{157} Easthope & Judd 2010, p.20
\textsuperscript{158} Baker T 2011
\textsuperscript{159} CSD & NDG 2009
**Challenges**

- Multiple storey buildings are more expensive to construct in comparison with single storey detached dwellings however the land/unit ratio is improved and depending on the location, can compensate for the additional cost. Providing at-level car parking or fewer car parking spaces can reduce costs, although at-grade car parking might detract visually.

- Concrete block style construction is quicker and more cost effective to construct, but not always visually appealing.

- Design needs to be respectful of privacy and view from the street and other dwellings. Clotheslines on balconies can be an issue.

- Residents may have to deal with lifts breaking down which makes access difficult. The cost of elevators are often given as a reason for not building medium rise buildings, as it is generally accepted that residential buildings over 2 storeys require a lift.

- Depending on the size of the developable area, four to five storeys might be the maximum height to prevent too much shading of a central courtyard.

- Residents of multiple dwelling developments may have to deal with a body corporate and may experience conflicts with neighbours due to noise and car parking. The cost of on-site management to reduce conflict and maintain quality of life can be prohibitive.

**Opportunities**

- Increasing density is considered the best alternative to minimising urban sprawl, reducing the footprint of buildings, and reducing impact on green space, and therefore, the energy and environmental resources needed for housing.

- Multiple use of buildings in which residential floors are located above commercial and office uses that operate mostly during the day, might provide ease of access to facilities and compensate for costs of lifts. Functions might include lecture theatres/tutorial rooms, community meeting spaces, office space for voluntary organisations, telecommuters and small local businesses. Timing of uses might minimise noise attenuation requirements. Mixed tenure buildings can provide affordable housing in areas that are otherwise unaffordable as it can be cross-subsidised by the other housing.

- Multiple dwelling developments can have better acoustic insulation, and floor plans can be mirrored or offset to maximise the distance between the living spaces in units to minimise noise impact.

- Small scale dual aspect units in multiple dwellings can allow cross ventilation, natural light and outlook on communal space. Perimeter built form allows outlook on inner shared space or courtyard as well as surveillance and good views to exterior of complex.

- Concrete block style constructions can be ‘softened’ and ‘warmed’ by adding timber or other finishes that animate the façade. A variety of new materials and construction types continue to change. Visual amenity can be improved by use of human scale features and incorporating different designs within the same complex.

- These elements could also serve dual purpose as sustainable design features, i.e. external walls that allow for rainwater harvesting or propagation of plants for shade or amenity. Green walls can be used in this way to provide vertical planting spaces for residents and attenuate noise or undesirable views.

- Solar power systems could be used for communal or shared facilities such as common area lighting and power, offsetting the costs of the incorporation of a lift in a four storey development. Other water and energy savings features can be built into multiple dwelling buildings to provide cost efficiencies for residents.

- Security and good access for people with mobility issues can be designed into the building. It can provide a sense of community. Seniors can move within the same neighbourhood if they want to downsize. A smaller unit can be an affordable option for singles and couples. It can reduce the cost of maintenance.

- Communal or shared cars can reduce the car parking spaces needed. Separating ownership or rental of a dwelling unit from ownership or leasing of car parking space can provide flexibility and cost savings for residents.
Principle 10

Universal Design

Dwellings are usable by people of all ages and abilities, maximising the longer term sustainability of the dwelling and saleability to a broader market segment.

- Dwellings are universally designed\(^{160}\) to provide for safe and easy access to facilitate ageing in place, but also for people of all ages. The following are specific to provide clear guidance.
- Entrances are accessible, for a wheelchair or walking frame, with ability to modify any steps with ramps and handrails. Access paths should have a maximum gradient of one in eight over a distance of less than 1.5 metres and a maximum gradient of one in 14 over longer distances\(^ {161}\).
- Doorways should be at least 920mm wide and entry thresholds to all rooms in the dwelling should be level (no more than 10mm change). Passageways should be at least 1200mm wide\(^ {162}\).
- If vehicle parking is provided, access from the space to the dwelling should be level, with no more than a 10mm change. Parking space dimensions should be (at a minimum) 3800mm by 5500mm clear of walls and other obstructions such as posts\(^ {163}\).
- Dwellings should be single level living, or if two storeys: linear internal stairwell design to accommodate chair lift (if required), and/or sufficient floor space for the installation of a suitable affordable lift\(^ {164}\), water lift or dumb waiter for carriage of goods between floors.
- A bedroom should have a circulation space with a minimum width of 1550mm that is clear of obstructions and living area should have a central circulation space with a minimum width of 2250mm that is clear of obstructions\(^ {165}\). Key elements are provided on entry-level floor: kitchen, living/dining area, at least one bedroom, bathroom, and laundry.
- At least one bathroom and toilet should have:
  - minimum internal dimensions of 2250mm by 2300mm to accommodate a basin/cabinet, toilet and hobless shower and central area with a width of 1550mm clear of obstructions;
  - if a separate toilet, minimum internal dimension of 1800mm by 1500mm;
  - doors that open outwards or slide, with sufficient room for a wheelchair to access and manoeuvre; non slip tiles, hobless shower with screen or curtain to prevent overspray;
  - structural plywood or similar on walls to enable flexible and easy retrofitting of mobility aids such as hand rails and mixer tapware.
- The main kitchen should be ideally designed to provide access to other areas in the dwelling, with a minimum width of 1550mm that is clear of benches, storage cabinets, fixed appliances and other furnishings\(^ {166}\).
- Kitchens include features such as:
  - oven at bench height with side opening door.
  - good access and visibility to storage space with drawers and “lazy susan” rather than cupboards.
  - width of kitchen bench limited to 700mm so that kitchen windows remain accessible to control ventilation and temperature.
- Sufficient power points are at waist height.
- Windows/lighting should enable views from seated position and provide natural lighting.

\(^{160}\) “The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialised design”. (Centre for Universal Design, 1997).
\(^{161}\) ULDA 2011c
\(^{162}\) ULDA 2011c
\(^{163}\) ULDA 2011c
\(^{164}\) One Brisbane based company quoted $25,000 for a basic externally fitted lift, $30,000 for a unit that can be installed internally or externally and approx $45,000 for a hydraulic model that can go to 3 levels. Service fee for all models is approximately $200 per annum. Manual dumb waiters installed cost $6,000 with no service program or costs (Pers. comm “Aussie Lifts”, 22/02/11).
\(^{165}\) ULDA 2011c
\(^{166}\) ULDA 2011c
Figures 52, 53 and 54: Top – Kitchen and doorways wide enough to manoeuvre walking frame and wheelchair (B); Bottom left – Cups in drawers are easy to reach; Bottom right – Accessible shower.
What the participants told us...

Participants in both locations strongly supported universal design as a key design framework in supporting people to age-in-place safely. Even without many of the participants being familiar with the actual term “universal design”, relevant features were highly represented in their selected photos. They included: at level entry; hobless shower, non-slip tiles, mixer style tapware, hand rails and handrails in the bathroom; a side-opening oven at waist height and drawers instead of cupboards below waist height in the kitchen; easy to reach powerpoints; doors and corridors wide enough to allow a wheelchair or walking frame to manoeuvre; ramps; and no stairs. If there are stairs, they should be linear and wide enough to accommodate a chair-lift. In particular, participants told us that carpeted stairs with a pattern and open staircases were an issue as they pose perceptual difficulties and increase the risk of falls in the home. In addition, participants emphasised the importance of good natural lighting if possible, as they age.

What the research tells us...

With an ageing population that prefers to remain living at home, an increasing issue is that most of existing housing stock in Australia is not accessible to people with mobility difficulties. This has implications for modifications to existing housing and for increasing the proportion of new housing that is accessible or adaptable, usable and safe for older people. Safety and independence for older people can be enhanced through design in homes that enables people of all ages and abilities to confidently navigate their surroundings.

The term “Universal Design” refers to design that incorporates features when a home is built which can accommodate changing health conditions and abilities of older residents (as well as those of any age with disabilities). It minimises the need for later custom modifications. Alternatively, design can be “visitable”, so that a person of any age with mobility challenges may visit, or “adaptable”, where the house can be adapted to provide other features such as hand rails if it is required.

Key features recommended in a variety of available guidelines generally include:

- easy step-free access to the entrance from the street or a garage.
- living space, bathroom & toilet and a bedroom space on the entry level to the dwelling.
- all internal and external doorways (920mm) and corridors (1200mm) wide enough for wheelchairs, crutches and walking frames.
- light switches, electrical outlets and thermostat controls in an easy to reach spot for a person sitting or standing.
- lever door handles.
- reinforcing the walls in the bathroom, shower and toilet to allow installation of grab rails if required.
- slip-resistant flooring throughout, especially in wet areas such as kitchens, bathrooms and laundries.
- kitchens with an open floor area with adjustable shelving and pull-out storage drawers. Lever handles on all taps to allow use with minimum force.
- sufficient floor space in bathrooms and toilets for access, and level entry to the shower recess. A hand held/height-adjustable showerhead for people sitting or standing.
- in two storey accommodation, extra space at internal stairs for later installation of a lift or stairclimber if needed.
- easy operable door and window controls.

Implementation of universal design around the world and in Australia has been limited, mainly restricted to demonstration homes often in combination with environmental sustainability such as Queensland’s Smart Housing program.
Infill Development for Older Australians in South East Queensland

The alternative, “Adaptable Design” (AS 4299) is increasingly being adopted in Australia for a small proportion of housing. However, it is of limited use for visitors or for residents with temporary health impairment. While having the potential to increase safety and access so that older adults can be independent and remain at home, it is a costly option, often organised at a time when a person is more vulnerable, and is often not feasible for rental tenure. A low rate of compliance with modifications recommended by healthcare professionals has also been found.169

The costs and benefits of universal versus adaptable design at the construction stage, and in comparison with later modifications to an existing dwelling, are debated among designers. Though making modifications to the home can make it safer and more accessible for a resident with reduced abilities, perceived disadvantages include cost, unattractive appearance, reduced dwelling value, and difficulty of implementation. However a cost-benefit analysis comparing Visitable Design, Adaptable Design and Universal Design with later home modifications or retrofitting indicated that allowing for access in the initial construction of a dwelling involves reduced initial design time and cost compared to the planning, future costs and otherwise unnecessary replacement of fixtures and fittings.170 In some cases retrofitting is the easiest or most economical solution and the Queensland government provides useful suggestions in ‘Over 100 ways to improve access at home’171.

According to a Victorian government estimate, inclusion in the initial dwelling design adds minimal cost and is far more cost-effective than modifying conventional housing – up to 22 times cheaper.172 When comparing the Adaptable and Universal Design approaches, Universal Design (i.e. designing in all of the accessible features prior to construction) was preferable in terms of the cost and the design time.173 Some of the costs of Universal Design in new housing are little different from conventional housing, such as door handles, adjustable height shelves or rails, lowering the height of light switches, raising the height of powerpoints, and moving the bathtub controls closer to the outside edge. Advocates argue that the cost increase in providing wider doors is offset by the corresponding saving in wall material. When additional circulation space is required in areas such as bathrooms, it could be borrowed from cupboards or utility spaces.174 Specific areas that need to be considered when designing for wheelchair access upfront are: site layout, ramps, carparking, overall unit area, sanitary fixtures, reinforcement to bathroom walls and lifts.

Advocates for people with disability and older people in Australia have been calling for regulation for many years to ensure a reliable supply and adequate standard of accessible housing, as voluntary initiatives have not met the need.175 In the UK it has been found that over time regulation was absorbed into building practice with minimum disruption.176 In Australia, the Housing Industry Association argues that builders offer these features to consumers who ask for them and that builders have the skills to deliver.177 Thus consumers need to be more knowledgeable about the characteristics of Universal Design and demand such features. In order to facilitate uptake of universal design, Australian researchers Quinn and Judd178 also recommend that, among other things:

- design guidelines are communicated in a self-contained document with only the critical requirements in order to reduce complexity and ambiguity, minimise design time (and therefore cost) and allow flexibility to cater for the widest range of dwelling configurations; and
- product availability is considered in the development and the updating of design criteria, with opportunities for new products in the Australian market highlighted. e.g. measurable performance standards are needed for non-slip flooring.

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169 Quinn et al 2009: 7
170 Quinn and Judd 2010
171 Dept of Housing
172 NDUHD 2010, p.10
173 Quinn et al 2009
174 Quinn and Judd 2010
175 Ward et al 2011, p.1
176 Imrie 2006 cited in Ward et al 2011
177 ABC 2010
178 Quinn and Judd 2010
Figure 55 and 56: Left – Typical Queensland home with poor access for seniors (B); Right – Added external water-weighted lift to move groceries from ground to first level (SC).

Figures 57 and 58: Left – Poorly placed power points (SC); Right – Power points at higher level – easy solution at no additional cost (B).

Figures 59 and 60: Left – Impossible stairs (B); Right – Hazardous stairs (B).
**Challenges**

- Perception in the construction industry that universal design is expensive and makes a home look institutional.
- Perceptions of consumers of housing, e.g., aversion to hand rails etc due to association with diminishing health and nursing homes.
- Regulatory vs voluntary/non-regulatory approaches.
- The cost and maintenance of lifts adds expense in multiple storey dwellings.
- There is little accessible housing available in the private rental market.
- Existing housing stock is often hard to modify.
- Topography can make the design of accessible housing difficult.

**Opportunities**

- Participants’ high priority for universal design features suggest an unfulfilled market demand. Given that the construction industry claims to respond to market demand, it is essential to raise awareness of older people about universal design so that they voice their requirements.
- New products that improve accessibility now have a domestic quality. Inclusion of such features in new housing, even if initially targeted at younger people, increases its future marketability given the increased proportion of older people possibly wanting to move to accessible dwellings.
- The advantage of living quarters on one level can increase the attraction of multi-storey dwellings over two storeys, providing elevators can continue to run in a power failure. Medium density housing can support a lift.
- Universal design reduces social isolation by enabling older people to remain in their neighbourhood and access the external world.
- All government housing programs should include minimum requirements to provide a certain percentage of universally designed dwellings. The Australian Government has committed $1 million seed funding over three years 2011–12 to 2013–14 to work with industry, the disability, aged and community sectors to promote liveable housing design. The Liveable Housing design initiative may be one of the most significant opportunities to increase the proportion of housing incorporating accessible design features, given the federal government led approach with major industry partners signed up to voluntary targets. New public housing funding allows for 20% adaptable housing.
- Future potential for the liveable housing guidelines to be incorporated into the BCA as regulatory elements as opposed to voluntary elements. Trends in open plan living increase mobility around a dwelling. Minimum requirements for future adaptations to wheelchair access include: one entrance that is level with the street, circulation space through doors and corridors, and internal circulation space within a bathroom.

Figure 61 and 62: Left – Ramp is easy modification; Right – Straight up staircase is wide enough for stair-lift if needed later.

179 FaHCSIA 2010
Principle 11
Sustainable Design Features

Residents harness natural sunlight, ventilation, and natural resources to maximise the comfort and enjoyment of their environment in response to climate at minimal cost.

- Buildings should be sited in keeping with passive design principles. In Southeast Queensland, a northeasterly aspect takes advantage of breezes and sun movement. Use of overhangs can reduce direct sun in summer and permit light into dwellings during winter. Private outdoor space and living areas should maximise northerly aspect.
- Design can foster efficient resource use and reduce the ecological footprint. Good cross ventilation and passive heating and cooling reduces need for air-conditioning and provides optimal thermal comfort.
- Large windows and skylights provide natural light and minimise use of artificial lighting. Large windows can also provide views which increase amenity and enable surveillance for security purposes.
- Use of renewable energy such as solar power and solar hot water and rainwater tanks (the latter linked into laundry and toilets) reduce operational costs.
- External clothes lines take advantage of natural sunlight and breezes and minimise energy use. They might need to be covered to enable use during rainy season or screened if potential security issues.
- Noise sources need to be considered during design through orientation of living area and private outdoor space, and use of building materials that reduce noise such as high mass dense materials, insulation, and soft connecting and interior materials.
- Space should be allocated at the design stage for recycling waste facilities to be located in proximity to units or available on each floor in multiple dwelling buildings.
- Garden areas should be planned to limit need for watering, while providing amenity and shade.

Figures 63 and 64: Left – Natural lighting with louvres for shade (SC); Right – 5000 L water tank connected to house (B).
What the participants told us...

Participants in both locations demonstrated a keen awareness of the advantages of sustainable housing design features such as solar power and hot water, use of recycled or tank water for non-potable uses such as flushing the toilet or watering gardens, natural light through skylights, options for good cross ventilation and appropriate positioning of the dwelling on the building envelope to take advantage of passive design principles.

Of interest was the fact that most participants were primarily motivated by the opportunity to save money that sustainable design features offered. However, some participants made the point that the cost of installing these expensive sustainable options did not provide a good return on investment unless they planned to age in place. Participants also noted that having well-lit spaces preferably with natural light was essential with deteriorating eyesight.

In addition, tenure has an impact on whether design features such as these can be installed to take advantage of cost savings. People who have a body corporate arrangement in place require agreement for installation and provisions for allocating and metering usage. For renters, such an investment would unlikely be considered worthwhile. In the future, issues related to tenure need to be addressed to enable greater sustainable resource use and a reduction in housing operating costs.

What the research tells us...

Living affordably has become increasingly difficult in many parts of Australia over the past decade because a growing number of households are experiencing financial stress related to rising housing and living costs. Living costs can be minimised by sustainable design features that also reduce the ecological footprint.

Designers and developers of multiple dwelling buildings often assume that the provision of air-conditioning and artificial lighting will provide optimal comfort for residents but research suggests that residents prefer to regulate thermal control of their environment naturally. Features of the dwelling environment that are desirable for this reason include balconies and open spaces, the orientation of the building related to climate and the importance of natural air-flow and ventilation. A survey of high density residents in Brisbane found that over one-half believed it was important to conserve water and energy but that building infrastructure needs to be improved and costs are an impediment. It was also found that if residents needed to close their doors or windows to control external noise, this could have the undesirable effect of reduced natural air-flow.

According to our design team investigations, the current ‘feed-in’ tariff, which encourages solar photovoltaic, means that a one bedroom unit with a 1KW system can currently make money. A one to two bedroom unit should allow for a 2KW PV system. Multiple dwelling unit owners could band together as a single purchaser of energy and negotiate a bulk purchase of power at a cheaper rate. Alternatively a body corporate could pay for maintenance and access, negotiate to purchase power more cheaply, and distribute it using a master metering system (with individual meters). The savings on power or income generated from feeding power back into the grid could be used to offset other body corporate costs. However the ability to provide sufficient solar power is limited by the orientation and size of a complex and number of units in relation to required roof space.

Figure 65: Solar panels feeding electricity back to the grid (B).

180 Robinson and Adams, 2008
181 Buys et al. 2008
182 CSD & NDG 2009
**Challenges**

- In some cases, the economics of the ‘highest and best use’ of the land and local context makes siting to a north-easterly aspect difficult: it might mean less dwellings can be accommodated on a site.
- Dwellings in the middle of multiple unit developments often miss out on natural sunlight and ventilation as do complexes with a number of one bedroom or studio apartments.
- The payback period for upfront costs of installing solar power can be long and developers might not experience the financial benefits in terms of reduced ongoing costs. Clothes lines are often prohibited in the external spaces of multiple unit dwellings.

**Opportunities**

- An upfront investment into both passive and active environmental features can reduce operational costs over the longer term. Information about life cycle costs and period of return for investment in sustainability features needs to be continually updated and made available to developers and consumers.
- Planning Schemes and Councils could provide incentives such as reduced development assessment time or application fees, for those developments that can demonstrate a high level of sustainability, including NE aspect where practicable, to offset costs of construction.
- A potential market demand is in developing products in the solar and rainwater harvesting industry that have individual meterage capability in community title dwellings. Operational costs of shared infrastructure (outdoor lights) could be offset by use of sustainable energy and water sources.
- A market demand is for affordable architectural solutions to ‘sandwiching’ of dwellings and associated loss of environmental sensory elements.
- A market demand is for innovative approaches to outdoor drying solutions for multiple dwelling residences in a manner that still provides privacy and does not detract from the aesthetic values of the complex.

*Figure 66: Undercover clothes drying saves electricity.*
Principle 12

Private and Shared Outdoor Space

Crucial transitional spaces between indoors and outdoors facilitate enjoyment of nature, socialising, entertaining and hobbies.

- Patios, balconies and verandahs are of sufficient size to be useable as an outdoor ‘room’ (as an extension of indoor floor space) for relaxation and entertaining.
- Private individual outdoor space provides fresh air and is protected from the elements.
- Raised garden beds on the ground floor provide ease of gardening; or sufficient space is provided for planter boxes on balconies.
- A shed is provided for storage or tools.
- Shared or communal vegetated and safe outdoor space is provided in multiple dwelling complexes.

Figure 67: Private courtyard with greenery (B).
What the participants told us...

Participants in both locations illustrated the importance of private open space with photos of tiled and shaded patios and verandahs, outdoor table settings, raised garden beds and views from inside to green outdoor space. It was valued for relaxation and visual amenity, to entertain and socialize, to provide additional breezes in summer, and to connect with nature.

Participants in both locations preferred private outdoor space when given the option to choose between shared outdoor spaces with minimal private outdoor space or private outdoor space with less communal space. This suggests that amongst older people at least, a generous outdoor private space that is adaptable for a range of uses will be an important and appealing feature if they were to consider relocating to a smaller dwelling.

Participants also commented on the transparency of balcony railings and the importance of privacy, and not feeling one is on display.

What the research tells us...

Densification of cities to minimise urban sprawl may have unexpected negative health consequences unless sufficient outdoor space can be provided. Outdoor space in close proximity to the residence, including private space attached to the dwelling (balcony) or communal space in a multi-dwelling complex, has been found to provide benefits to health and well-being.

In multi-dwelling accommodation, sensitively designed shared outdoor space, can provide a critical transition between private dwellings and public open space. Shared outdoor space (that is, space that is owned by a group and usually accessible only to members of that group) provides for casual social interaction and strengthening social networks; children’s play and intergenerational contact; and enhancing a sense of responsibility and safety in the neighborhood.

Two factors need to be taken into account when designing for higher density living in comparison to lower density: the close physical proximity of neighbours to one another; and sharing of built features and facilities (common areas) with neighbours. In regard to the former, certain design and construction techniques can assist: location of ‘sound sensitive spaces’ such as bedrooms away from noise generators; and double glazing of windows and insulation. In addition, by-laws can also be used to manage behaviour.

Design of common areas can have a significant influence on resident interactions and social relationships; it can contribute to sense of safety, sense of belonging and community, and social networks. Yet poorly designed areas with poor visibility and access, and little green space affect safety and well-being. Integration of vegetation affects perceived quality of shared spaces and can reduce residents’ perceptions of crowding and foster a more satisfying residential environment. Such spaces should cater for the range of needs and lifestyles of residents and allow for multiple uses. For example an indoor common room could include a kitchen and be attached to an outdoor area to allow for overflow of groups or children to play. It also found that although over two-thirds of respondents in high density dwellings had a swimming pool in their complex, 31% never used the pool and 10% used them every day. This study concluded that shared spaces need to be private and secure within the development, accessible, comfortable and incorporate vegetation.

These outdoor spaces should be designed along with pedestrian circulation systems to foster informal social encounters and physical activity, while protecting the privacy of individual. Gardens designed for ageing residents and those with Alzheimer’s could have meandering paths that return residents to the beginning, sensory stimulation that is rich in association, and a safe and secure area with appropriate paving surface that allows independent mobility. Such freedom has been found to reduce agitation in those with Alzheimer’s disease.
Gardens have a calming influence on residents and visitors and open space in general provides other meaningful activities such as picnics. Deteriorating health and related issues such as reduced ability to look after oneself and/or the house/garden, have been identified as important factors influencing people’s housing decisions and choices as they age. Among the reasons given for moving house by individuals over 75 years was the size of the garden and associated maintenance. These same people sought a place with sufficient space and privacy and a small easy to maintain garden.

The quality of private open or outdoor space such as balcony, patio, courtyard attached to the individual dwelling has been found to affect resident satisfaction. Buys et al. study of higher density housing in Brisbane found the balcony to be one of the most important features. In Australia many balconies in higher density housing have been too small and poorly designed to be useful. Other studies have shown the importance of balustrade materials (glass vs lattice) on balconies or walls and screening of patios to ensure privacy. These studies were of the general population, so it is noteworthy that it coincides with what seniors identified as important.

Figures 68 and 69: Top – Outlook to garden (SC); Bottom – No steps - garden, path, patio, house on one level (SC).

190 Boldy et al 2009
191 Buys et al 2008
192 Easthope and Judd 2010
Challenges

- The perception is that provision of private and shared outdoor space incurs extra costs by taking away from the developable area and increasing the floor area of a dwelling.
- Provision of private outdoor space creates design challenges in terms of privacy and noise, and is affected by size of complex, site factors, and location.
- Communal outdoor spaces in multiple dwelling complexes raise management and design issues of equitable access and safety and provision of shade, ventilation, and light. Poorly designed common areas are often not used and therefore can become a waste of space or encourage antisocial behaviour.
- As dwellings become smaller the need for communal areas, both internal and external becomes greater.

Opportunities

- Well-designed, private outdoor spaces can extend liveable space and provide a valuable and versatile space to enjoy leisure time.
- Floor plans can be designed to be offset, mirrored or flipped on the shared wall to minimise issues of privacy and noise.
- Building materials and design techniques are used that provide noise attenuation inside the dwelling, between windows (to allow for air circulation) and private open spaces.
- A range of design responses are available to provide shared outdoor space e.g. otherwise unused surfaces such as rooftop gardens. As dwellings get smaller, communal areas can be used for gathering and encouraging a sense of community. These often work best when there is a reason to use them e.g. next to a communal laundry, mailbox.
- Communal spaces can be designed to enable intergenerational transfer of skills and learning e.g. growing food; computer rooms. Gardens can have dual purposes: growing edibles as well as ornamentals.

Figures 70 and 71: Left – Community garden (B); Right – Raised garden beds are easier for seniors to manage (SC).
Principle 13

Versatile Use of Space

Wider choice and flexible designs ensure that smaller dwellings meet seniors’ needs.

- Greater choice in dwelling size and layout acknowledges diverse needs. Two bedrooms can accommodate couples who prefer separate sleeping quarters or space for a guest or carer.
- A private space is needed for computer, books, craft, woodwork or other hobbies. For some people, a well-designed nook may be sufficient.
- Some people may require access to offsite or communal facilities for equipment or hobbies that take up larger amounts of space. Places such as “men’s sheds”, art studios or community office spaces or multi-functional community spaces are great places to meet, create and network.
- Innovative concealed features and functions can be provided: bike hooks, moveable weatherproof storage seating, parking space as an office, gym or art studio.

Figure 72: I’ve downsized my home but not my brain – computer or sewing room (SC).
What the participants told us...

Participants in both locations told us that if they were to downsize it would be to avoid the burden of home and garden maintenance and perhaps to access care if they needed it. They agreed that the minimum dwelling size for a couple would be two double bedrooms plus a study or office space. This is because some older couples require separate bedrooms due to preferences or sleep disturbances as they age (apnea, snoring). One bathroom would be suitable if a second separate toilet was provided. In considering the trade-offs the participants might consider if downsizing, options would have to be attractive and convenient.

Participants in both locations identified the need for a private space for a computer or office, for books, craft or other hobbies. Most people preferred a separate room rather than a well designed ‘nook’ for a computer. They explained that they needed places for storage, filing of paperwork or generous desk space in addition to a workstation. Some other participants expressed interest in additional space external to the dwelling, such as garages, sheds and workshops. Participants illustrated how they had made space adaptable for their purposes, using their double garage as a place to sit, observing the street and passers-by and as a workshop space.

What the research tells us...

An implicit assumption in planning has been that older people need less space than other generations, whether in the home or in the community. This ignores the reality of life-long interests in activities, hobbies, exercise, social networks and community involvement193, as well as continuing part-time work. Some older residents may experience a constantly changing household, with temporary or semi-permanent co-habitation with adult children, a frail elderly parent, grandchildren (on holidays or extended care), a live-in carer, or extended visits from relatives. Roles such as caring for grandchildren require child-safe homes.

“Flexible Design” involves designing housing so that it can be adapted to a ‘household’s changing size, structure and lifestyle: becoming larger or smaller, changing the sizes and functions of rooms and even converting between single and multiple dwellings”194. Excess space in larger dwellings can be better used or smaller dwellings can be made more space efficient to accommodate temporary changes in household size and interests. A spare room can be used as a home office, a living room or a bedroom at different times with little modification. A garage can be converted to a studio, lounge or bedroom.

Adding an independent unit or granny flat onto the dwelling might provide privacy and independence for an ageing parent or adult children. In this case, older home owners benefit from the ability to remain in their home and re-configure a large family home into two or more self-contained dwellings, one of which can be rented out to provide additional disposable income. Alternatively the additional dwelling can provide cost-savings to related co-habitants, by assisting with care for pre-school grandchildren or avoiding retirement home fees for an elderly parent. However, planning requirements usually regulate the type, size, and nature of “accessory” or “secondary” dwellings.

Figure 73: Flexible uses of garages – Workshop or men’s shed (B).

193 ILC UK, 2007
194 Quinn et al 2009, p7
Challenges

- Adding a secondary dwelling can be an efficient means of providing additional income or assisting relatives. It can increase density while maintaining amenity. In general such additions require a planning approval.
- Mis-match of housing size with number of occupants in a community can be misleading. Older people, like any other age cohort, are diverse in their lifestyles, interests and spatial requirements.

Opportunities

- Planning schemes could be amended to allow secondary dwellings as-of-right in particular locations, if they meet certain requirements. Temporary or relocatable homes could be added as a secondary dwelling.
- Creative, adaptable floor plans and furniture could provide greater utility of floor space. Designs therefore could focus on innovative concealed (and potentially mobile) storage ‘walls’ so that floor plans can be adapted readily by the user.
- Use requirements of the dwelling could be considered in the context of what must be provided onsite versus offsite conveniently, providing greater economies of scale i.e. can creative or office spaces be provided offsite in close proximity as part of the purchase/lease price more cost effectively, and could this have broader positive implications for the community?
- Dwellings need to be designed with the entire life cycle in mind so that inhabitants can transition easily as they age.

Figure 74: Flexible uses of garages – Easy access socialising (B).
Principle 14
Maintenance

Dwelling construction and design minimise the ongoing requirement and cost of maintenance.

- Internal and external products and materials are durable to minimise maintenance.
- Compact houses, smaller lot sizes and easy to manage landscaping (including raised garden beds) minimise maintenance.

Figure 75: Small is beautiful.
What our participants told us...

Participants expressed concern about their ability to maintain their homes and their yards as they grew older. Sunshine Coast participants in particular showed images of lawns, palm trees and deteriorating fencing, all of which require ongoing effort and cost to upkeep.

What the research tells us...

In an Australian Housing and Retirement Survey study, one of the main reasons given for initiating a move in the future was house and garden maintenance, particularly on the death of a spouse or declining health\textsuperscript{195}. Another study found that a move usually involved a mix of reasons, one of which was to reduce time spent on house and garden maintenance in order to have more free time to pursue other interests or enjoy a different lifestyle\textsuperscript{196}.

The age of a dwelling can have a direct bearing on the need for, and cost of, repairs and maintenance. The Home Maintenance and Modification (HMM in New South Wales; HACC for Commonwealth program) service is provided by the Commonwealth government to people aged over 65 to assist them with four main services; structural modifications, non-structural modifications, repairs and improvements and maintenance (such as lawn mowing). The program can be instrumental in allowing people to continue to live in their homes and communities for longer. For example, the NSW Home Modification Information Clearinghouse found that ‘... maintenance and modification interventions have been shown to be effective in decreasing accidents and injury with a reported seven-fold reduction in reported morbidity .... Further, lack of access to appropriate housing’, is a cost to taxpayers and government especially if institutionalisation results\textsuperscript{197}.

Figures 76 and 77: Left – Lawns require high maintenance (B); Right – High maintenance cladding (SC).

\textsuperscript{195} Olsberg & Winters 2005
\textsuperscript{196} Bolty et al
\textsuperscript{197} Bridge, 2005
**Challenges**

- The cost of outsourcing home and garden maintenance can be significant once it becomes too difficult to manage.

**Opportunities**

- Awareness about the Home Maintenance and Modification (HMM) Service provided by the Commonwealth Government could be better promoted to older people by a range of health, community and support organisations.
- Well designed higher density living can reduce maintenance through use of new or robust materials (e.g. masonry) and more compact garden.
- Older people would be more likely to consider multiple dwelling developments (i.e. between 2–20 units) and thus reduce maintenance if:
  - Issues of noise and parking conflicts were thoughtfully dealt with;
  - A high standard of communal shared amenities and outdoor space was provided;
  - A suitable sized, universally designed dwelling is provided (2brm + study and adequate private outdoor space).
  - Provision for extra storage or extra room for hobbies is considered, even if provided offsite (i.e. caravans, sheds, office space, art studio).

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Figure 78: Easy to maintain garden; low water needs (SC).
Principle 15

Security in the Home

Accommodation security features protect against crime and reduce perceptions of vulnerability.

- Principles of ‘Crime Prevention through Environmental Design’ (CPTED) are implemented i.e. design and effective use of the built environment reduces fear and opportunities for crime and nuisance. Features include surveillance, control of access, territorial reinforcement.
- Features at the home or development such as fences, security gates, intercom and security screens clearly define and protect private and communal areas.
- Landscaping does not restrict views for surveillance from home to external environment, or within the complex grounds.
- Adequate lighting is provided for passageways and entrances.

Figure 79: Low-rise units with good balconies, attractive railings, and secure entrance with intercoms (B).
What our participants told us...

Participants indicated that security gates and intercoms on a multi-dwelling complex fostered a feeling of security. Some illustrated the importance of having an outdoor private space such as a courtyard that was enclosed or a large window that enabled surveillance of their yard or street. Lighting in the street and around the dwelling was important and assisted neighbours to look out for each other. This helps to build rapport among neighbours and increase the sense of safety. However, there was an awareness that high fences can also provide a visual barrier for surveillance to the street or by neighbours.

In addition, women, particularly single women, expressed a greater feeling of vulnerability, with one indicating that she would not sleep in a ground floor bedroom. Others mentioned the desire to have two exits from their dwelling for security reasons.

What the research tells us...

Among the factors influencing adults over 75 years to move was safety and security198. Those people most involved in their communities were least likely to be anxious about security. Policies to improve security for older people in the community and their home are centred around education and community based solutions199. The Confident Living Program is one such education tool for older people that have a strong crime prevention message as well as a healthy living message, and seek to identify and address concerns that prohibit older people from feeling safe and secure. One of the topics, “Living confidently in your home” covers avoiding accidents and personal injury, fire safety, how to improve the security of your home, security devices and personal safety.

Figures 80 and 81: Left – Good security (B); Right – High security for garden (B).

198 Boldy et al 2009
199 James et al. 2002, p.62
**Challenges**

- Security screens and locks, as well as stairs can sometimes provide safety issues in the event of an emergency such as fire.
- Vegetation that improves the amenity of a site needs to be well planned so that it does not affect line of sight.
- Stair and lift access to underground parking garages needs to be restricted to residents, with separate parking available to guests.
- Difficulty in providing two safe exits from a unit in two plus storey complex.

**Opportunities**

- Higher density living (up to 20 units in a complex) can provide sense of community where neighbours know each other and look out for each other. Development and support of community-based solutions for safety and security of older neighbours in their home and neighbourhood.
- Implementation of CPTED principles can enhance amenity if done well.
- Higher density living can build in technological solutions to security such as restricted access more easily than detached houses. Technology such as call buttons and special phones can provide solutions for security for those ageing in place.

Figures 82, 83 and 84: Top – View to garden from upstairs provides line of sight security (SC); Bottom left – Technology provides security (SC); Bottom right – Access to community via secure gate.
Implications for Designing for Seniors in Infill Locations

A review of relevant design policies and guidelines at the international, national, state and Brisbane/Sunshine Coast Council local government level illustrated that there is wide coverage of diverse policies which address affordability, sustainability, and liveability. Yet in comparing them to our principles, it also revealed that not one of the documents were able to integrate all the principles in this study. The WHO Age-friendly Guidelines do not mention private open space; whereas Healthy Spaces and Places does not refer to sustainable design features of buildings or visual amenity. The national Liveable Design guidelines focus on universal design. Few State or local government policies or guidelines refer to private open space, maintenance or security in the home. This research, then, is a way of consolidating those principles with greatest impact on seniors to highlight ways that their needs in particular can be addressed.

In comparing our participant-derived principles with the widely accepted principles and design guidelines mentioned in chapter two, a clear message is that older people also advocate many of these good practice design principles and for a reason. They make sense: connectivity and access to services and facilities contribute to safety, security, and sense of community and reduce social isolation. Walking paths and proximity to public outdoor space positively influence health and well-being. Concerns that older people have with high density living, such as noise, correspond with those of other age groups. So if these issues are addressed through planning and design practice, seniors will be amongst those who benefit. However there are some differences. A number of the published policies and guidelines do not address all issues of importance to older people or in a way that satisfies their needs. Our seniors identified that sustainability, visual amenity and outdoor private spaces were important to them. Designing for appropriate climatic orientation not only provides thermal regulation and physiological comfort but minimises household costs in a subtropical environment. This reinforces broader research on high density living and sustainable design in the sub-tropics. Being ‘environmentally correct’ seemed to be less of a factor in decision-making than cost-savings and affordability, at least for our participants.

Of greatest importance to the participants was implementation of universal design. While relevant policies and guidelines exist, there is little consistent implementation even by agencies which should be setting an example or directly meeting the needs of this client group. This affects overall liveability for this demographic group more than most others.

In summary, some key points arising from the consideration of senior’s photos, their presentations and resulting principles are:

- Infill development is by its nature, piecemeal, and unless managed carefully, will not deliver desirable outcomes for a neighbourhood such as improved connectivity, security, adequate outdoor space, and sense of community;
- Low to medium rise development and clustering of small numbers of units can facilitate relationship building and contribute to sense of community and sense of security, supported by design that enables opportunities for interaction;
- Perceptions of visual amenity may be related to human scale development and line of sight;
- Active seniors may eventually need to transition to greater care, so dwelling design needs to be responsive, flexible, and ‘universal’ to support ‘staying in neighbourhood’. A spectrum of infill options which responds to the diverse range of needs and preferences of individuals, at an appropriate density for the neighbourhood, will provide housing choice. In absence of being able to predict the future, additional choice goes a long way towards ‘future-proofing’ a neighbourhood.
- Sustainable design features need to give a viable economic return on investment.
- Embracing and using the natural environment in the neighbourhood, multi-dwelling complexes and in the home, contributes visual amenity, shade, privacy, noise reduction, and a comfortable lifestyle in the sub-tropics. Physiological needs are the drivers for design that makes use of natural light and prevailing breezes.

As communities become more consolidated and compact, planners, architects, developers, and care providers need to be more proactive in striving to achieve these principles. Consumers, that is, the increasing ‘bubble’ of seniors, need to demand appropriately designed accommodation and encourage Councils to set priorities to achieve an age-friendly community. Embracing principles is only a first step; the real challenge is in delivery. Local governments have a strong role in ensuring that infill development is well managed.

The next chapter explores how to implement these principles through designs at both a neighbourhood and dwelling level. It identifies planning constraints and possible approaches to achieve the seniors’ principles. As a result, the design team embraced the challenge of working with seniors to achieve affordable, sustainable and liveable built environments.
Design Outcomes: Designing with Older People

‘The common pool is created, where people begin suspending their own opinions and listening to other people’s ... At some point people begin recognising that this common pool is more important than their separate pools’

David Bohm

This chapter illustrates the results of the iterative process used in engaging participants aged 55+ with a design team of architects and planners. It identifies the challenges for the designers, developers and planners in delivering housing products to the market that are affordable, liveable, and sustainable. A range of design solutions are offered, an outcome of collaboration between the senior participants and the design team. These include single level ‘backyard’ infill (a version of ‘secondary dwellings’), and a range of two to six storey developments in different settings, some on the Sunshine Coast; some in Brisbane. Each design is annotated to explain how it meets the principles and achieve affordability, liveability and sustainability. Each is accompanied by an explanation from the designers about the intent and challenges. An outcome of the research is the identification of neighbourhood characteristics that are most compatible for seniors, illustrated by one particular suburb in Brisbane.

Ageing in Neighbourhood

A key challenge of the research design brief for both participants and designers was how to increase density through infill while still retaining key elements of liveability. This dilemma was raised frequently during the PhotoVoice phase and forced the design team to examine trade-offs to meet this challenge. The majority of workshop participants were comfortable with lower-density housing options and the corresponding set of amenities they currently experience. While they accepted that some change will be required in the level of support or care necessary for a continuous quality of living as one ages, many participants did not necessarily equate this with a need for a change in their current housing situation. Most indicated they would prefer to modify their home if required before seeking out alternative housing options. However, it was also agreed that not all seniors may have own their own home and have the freedom to modify it, or that circumstances may change on the death or illness of a partner.

In response to the locations and settings provided in the Charrette process, a range of low-medium infill housing options emerged. These were evaluated against the principles. While higher density housing over eight storeys was definitely not supported, medium housing densities were found to provide a range of amenities that can support the ageing process well. Based on the evidence collected throughout the project (surveys and Charrettes), it was found that to enable greatest flexibility for future ageing, the participants preferred low to medium density housing with walkable access to public transport and human scale shops and services within an age-diverse community.

The project team has coined the term ‘ageing in neighbourhood’ to describe the complex set of preferences expressed by participants. The term ‘ageing in neighbourhood’ acknowledges that significant change can occur in the ageing process, but that any corresponding uncertainty and stress experienced by seniors may be reduced if they can stay in familiar surroundings and a ‘whole of neighbourhood’ approach is taken. The term implies that ‘care’ is not just a technical or medical term but one that draws on the strength of co-located facilities and shared community concern and necessarily includes the nature and structure of neighbourhoods.

When considered in the context of infill housing, the ‘ageing in neighbourhood’ concept implies that a range of housing options and amenities (employment, shopping, social, community and transport services) can be accessed by the ageing, over an extended period of time and within a geographical area. This in turn offers significant advantages to seniors. It is clear that an ‘ageing in neighbourhood’ approach will also deliver benefits for a broad range of people and is necessary to deliver a ‘community’ in its truest sense. This is well illustrated in the neighbourhood layout shown in this chapter (figure 102). However first, we explain how the designs emerged and the challenges that the designers experienced in delivering outcomes to meet the agreed principles.

The design principles imposed the following key challenges on the design brief and consequently influenced the resulting accommodation typologies.

- The physiological need for light and through ventilation gave rise to a perimeter form of design, that is, units surrounding a courtyard that are one unit deep to allow for through-ventilation.
- The number of units in a complex influences the ability to foster a sense of community. This in turn affects the size, scale, and design of multiple dwelling developments. For instance, larger complexes might be divided into medium rise clusters that have separate entries.
- To achieve affordable dwellings, trade-offs may be required between provision of car spaces and communal on-site open space.
- Consideration of location of open space on smaller lots is needed in order to achieve through-ventilation, light, casual surveillance.
- Accessibility and universal design has implications for two storey developments with stairs or lifts.
- To achieve adequate privacy in units while allowing through-ventilation, there needs to be limited common corridors where people walk past units.
- Impacts on through ventilation due to preference for a second bedroom (as opposed to a study or office).
- The cost of land in areas with access to services and public transport (typically calculated as a 400-800m or five minute walk) may affect the economic return and therefore the density or height.

All of the designs are consistent with relevant planning schemes for Brisbane City Council and Sunshine Coast Council in terms of height and density. Building setbacks and parking facilities are within the scope of matters that are often subject to negotiation.

Selected sites

Four sites in each of the Sunshine Coast and Brisbane were chosen to demonstrate regional and metropolitan housing preferences in low density middle suburbs and higher density inner city locations under pressure to densify. Although real sites were used for the design exercise with the senior participants, and they are only hypothetical scenarios, we do not identify them in this report in order to minimise concerns of local people about potential development. For each scale of development, the site context is illustrated with an aerial map. The sketches made during Charrettes and perspectives of accommodation made between Charrettes are illustrated.

Low Density: Garden House

This typology provides a transition to increasing density while retaining character in existing higher amenity multi-generational neighbourhoods. A fairly common approach to infill in low density suburbs is through subdivision of a larger lot into two to allow an additional home, or construction of a ‘secondary’ dwelling of 45-60 sm on a larger size lot. Definitions of secondary dwellings vary but generally have three elements in common. They are subordinate to the principal dwelling; on a single lot; and cannot be separately titled.

An advantage of ‘secondary dwellings’ is that they allow a house to be used in a more flexible form. They provide an income to the landowner and affordable yet home-like accommodation to a renter, or a granny flat for a relative. Alternatively the homeowner could move into the secondary dwelling and rent the main house in order to increase income and reduce maintenance. Another benefit is that they can be introduced in heritage or character neighborhoods without overtly detrimentally affecting these qualities.

A number of local governments do not require planning approval (i.e. as-of-right) if secondary dwellings meet certain requirements. Rules about secondary dwellings vary among local governments, some specifying a maximum size such as 60sm, occupation by a relative or staff, design must be consistent with local character, and off-street parking provided. Secondary dwellings are normally not allowed to be subdivided to receive their own title or become strata titled, however a development application for Dual Occupancy could be lodged and may have to meet additional requirements. This option could provide a more immediate return to the landowner rather than an income stream, and would enable the purchaser of a secondary dwelling to invest in relatively low cost housing.

A major criticism of infill via secondary dwellings is the cumulative effect of many secondary dwellings in a suburb resulting in increased number of cars parked on-street, reduction of private open space and backyards, greater site coverage leading to increased run-off, and an additional demand on infrastructure services. Undertaken in a piecemeal fashion, little provision is made for collective benefits for the broader community, for example through additional allocation of open space.
Importantly this approach to infill has been found to achieve ‘inadequate density and quality to contribute to the sustainable regeneration of established suburbs’\textsuperscript{203}. A precinct-approach to infill redevelopment in the middle suburbs could provide a diversity of housing types that responds to the market yet allocates adequate public open space, improved social amenity, infrastructure upgrades and higher residential yields\textsuperscript{204}. This reinforces the project team’s concept of a planned approach to ‘ageing in neighbourhood’ to deliver affordable, sustainable, and liveable outcomes.

There are two key barriers to incorporating secondary dwellings to achieve higher but compatible density: planning terminology applying to secondary dwellings is confusing (e.g. Brisbane)\textsuperscript{205}; and inconsistent rules apply within local government areas, a legacy of historical boundaries (e.g. Sunshine Coast).

A unique variation on the ‘secondary dwelling’ was tested in the Charrettes in a beach suburb on the Sunshine Coast and middle suburb location in Brisbane – suburbs with older housing stock and appropriately sized lots of 670m$^2$. The Garden House design involves parts of four lots backing onto each other being subdivided into one new lot, which could be jointly owned, or sold to a third party such as a housing authority or care provider. While our participants queried the logistics of this occurring, they proposed features for a design which provided a compromise of privacy and independence, yet the support that might be needed by the type of people attracted to this facility. One scenario suggested that ageing house owners (neighbours) could jointly develop the dwelling complex and move into it and sell or rent their houses, removing the burden of maintenance while staying in the same neighbourhood. Alternatively, this design response could be flexible and temporary if necessary, by ‘dropping’ in a prefabricated unit.

### Sunshine Coast and Brisbane Sites

This hypothetical site in a high amenity low density residential beach suburb on the Sunshine Coast comprised four parcels of traditional 670m$^2$ privately owned lots (2700m$^2$ total). The land has good access to highly desirable open space (beach), high property values, and strong reasons for seniors to remain within community. Car use is a current priority although bus access is good. The hypothetical site in Brisbane was in a middle suburb with high amenity and included four lots at 600m$^2$ (total 2400m$^2$). The Charrettes explored issues of ageing in community with multi-generational users and character issues of attached housing infill within a suburban model. There is a chance to explore options for reinvesting existing private equity to redevelop sites for future capital gain (for the next generation) and a model of sharing of seniors’ resources within one facility that may be linked or services as part of a network. The following schematics show the evolution of the design for this site through the first and second Charrettes on the Sunshine Coast. The Brisbane design was similar but not refined in the second Charrette so only the Sunshine Coast version is shown.

![Figures 85 and 86: Left - Sunshine Coast site; Right - Brisbane site.](image)

\textsuperscript{203} Murray 2011, p.2  
\textsuperscript{204} Murray 2011  
\textsuperscript{205} BCC 2000, chapter 3, p.71 and p.74
Charette team explored a range of communal housing types with separate access. Preferred type was communal house centrally located to ‘parent’ lots with access to existing houses. Shared cooking, dining, lounge area with 4 ‘studio’ rooms with private open space. Range of tenure, provider delivery and care options available including live-in carer.

Key Learnings

- Range of formats possible in this setting attached and semi-attached
- Degree of attachment and format relies on level of co-operation between lot owners – ‘intentional community’
- Formats not dependent on car access but assume independent access from each lot with some reliance on host dwelling
- Low-scale built form supported
- Support services considered necessary for format - care requirements at lower end of spectrum
- Degree of future flexibility/re-use depends on format
- Requires policy change from local govt although not incompatible with ‘granny flat’
- Tenure issues regarded as impediments.

Key Design Issues

- Ownership, lot reconfiguration, boundary setbacks/BCA issues limit
- Attachment. Separate ‘granny flats’ explored but not supported
- Not having street frontage limits flexibility and requires relationship with parent lot
- Double of density, possible 25-30 du/Ha (nett) – not a strategy for density increase
- Format suitable as transitionary use and suitable for prefab
How the design team responded to the challenges

A number of issues were raised during the Charrette process which the designers tried to accommodate.

- A ‘drop-in’ kit formation in a modular design could allow flexibility in application;
- If the model was sited at end of the block access to the lot from the street could provide a sense of independence and privacy.
- The articulated or separated buildings with private open space could give the four individuals independence and privacy, while providing shared space for companionship.

How the designs rated according to the principles...

In Southeast Queensland, safe well maintained shady streets and walking paths generally exist in suburbs with older infrastructure (P1) although this typology might not be located within easy walking distance to shops and services (P2). However access to public transport may be within 800m (P4). Existing vegetation may need to be modified to enable development, so landscaping design would need to ensure sufficient shade and privacy at the dwelling level (P3). As such developments will likely be scattered throughout the neighbourhood, no major changes would be needed to road and intersections (P6). It provides an option for residents whose home may no longer be suitable for them and modification is not practicable or economical, yet enables them to stay in their neighbourhood (P7). Familiarity with surroundings, existing services, neighbours and personal networks would promote personal security (P8).

At the dwelling scale, the level of consolidation and density would be acceptable. Visual amenity is retained by keeping the dwelling designs consistent with the surrounding single family detached dwellings. A separate road entry could provide access to the site (P9). The accommodation could incorporate universal design and access on one level yet avoid an institutional environment (P10). In fact it could accommodate those who need medium to high level of support provided by a non-profit organisation model due to cost effective service delivery. Site configuration can be flexible and should be able to cater for northerly aspect and incorporation of rainwater tanks and solar power. Most importantly separate buildings allow for cross ventilation or separate air-conditioning as care needs change. (P11). The design caters for private outdoor space for each unit, as well as shared indoor and outdoor spaces (P12). The Garden House provides a range of possible floor plan formats – attached and semi-detached. This can be designed dependent on the level of co-operation between owners or on the basis of higher care needs in a domestic environment, with an optional live in or part time carers room (P13). Maintenance could be economically coordinated by residents or through either a Body Corporate or care provider (P14). Security will be enhanced by overlooking neighbours, fellow residents and technology (P15).

During the focus groups in Brisbane and the Sunshine Coast, participants endorsed the shared house yet independent living elements of the concept but were not convinced that delivery across four individually owned lots were feasible. It was suggested that it might be appropriate for single people, and might also work for students. A covered walkway would be needed between units and common area in case of inclement weather.

A review of local government planning schemes may be required to enable this solution. Local governments and not-for-profit care providers could even play a direct role by leasing ‘drop-in’ modules and units.
Infill Development for Older Australians in South East Queensland

Low to Medium Rise Designs

Medium density housing includes townhouses and multiple dwelling complexes up to 4-6 storeys. One of the biggest drivers for this level of density is retaining access to local shops and services, public transport, and familiar networks for those wishing to age in their existing neighbourhood. This theoretically achieves the need for social networks while delivering a dwelling with less maintenance. However it might involve trade-offs in order to keep the complex affordable: car parking spaces and lifts increase construction and maintenance costs.

While the concept of townhouses was quite acceptable to the senior participants, the two storeys and staircases were not in keeping with universal design principles. This could be addressed by having one bedroom and bathroom on the ground floor or single storey terrace housing. Building standards require installation of lifts in any building of three storeys and over, but providing lifts in buildings of 4–6 storeys are more economical. Thus participants were encouraged to consider four storeys and above. They were also asked specifically to think about the need for and use of communal space, both indoors and outdoors. While some concerns were raised about lifts in event of emergency, they allow for 100% visitability with the opportunity for wheelchair accessible dwelling on all floors.

Some of the biggest conflicts within multi-density strata title developments in Australia are use of common property, breaking of by-laws, parking, and noise. In addition, a recent study in Newcastle found that more than any other factor, tenure affected the greatest differences between residents of multiple dwellings. Renters were perceived by owner-occupiers as taking less care with both common property (including lifts, foyers, pools, and gardens) and private property. Apart from tensions around tenure, however most residents felt that their neighbourly relations allowed them to feel respected and that the environment was harmonious. Such experience was dependent on ‘striking a balance’ between privacy and contact with the balance not being the same for each resident. The possibility of titling to allow for a number of different housing providers could be considered.

Another factor is determining the right sized group to negotiate and interact with in this type of development. Clustering of apartments (i.e. 12 dwellings) with a shared entry point may provide a more manageable and personal scale of interaction in low to medium rise developments. In addition, many of our participants clearly favoured inter-generational living. These complexes could be restricted to older people, but within the context of a multi-generational neighbourhood; or multi-generational residents of workers, students, and seniors.

Sunshine Coast and Brisbane Sites

The Sunshine Coast parcel is a 1.37Ha of flat land located on the edge of the University within the emerging Town Centre. The hypothetical site affords access to university services, existing schools and retirement villages, future retail and community services. Within this site is the opportunity to explore seniors and student/carer mixed accommodation, mixed-use development (offices, shops), intergenerational living and education as an investment attractor.

In Brisbane three different sites were explored in the same neighbourhood.

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206 Easthope and Judd 2010
207 Baker 2011
208 Baker 2011
In Brisbane, one of the medium density sites consists of two traditional single detached residential parcels (total 1500m²) in an emerging medium density residential area. It is located within a short walk to local shops and with good access to the train station and 800m to the Brisbane River. Two to three storey low-medium density residential development is possible. In exploring the issues of ageing within community, the groups considered the types of affordable medium density housing for seniors with access to public transport and the role of cars. Low-rise requires a cost effective development scenario and exploration of apartment types, lifts, and unit numbers. This design featured a two storey walk-up development where each unit is on one floor.

The charette team explored the idea of a 5 storey, mixed-use development on university land in a JV between the university, a NFP housing provider and a commercial third party. Buildings included street based retail, ground floor university admin (3000m²), U3A learning space, second floor ‘kinesthetic teaching/learning zone’ with communal green roof and 3 levels of apartments.

**Key Learnings**
- Strong support for seniors living ‘on campus’
- Co-location with town centre, U3A and mix of attractors (coffee shops, cinemas, wi-fi, visiting academic accom) considered highly desirable
- Connection with younger people considered attractive means to ‘staying young’
- Need to provide ‘active/doing spaces’ to balance thinking spaces
- Opportunity to teach and learn with all age groups
- Market will attract high-end
- Need for upper level common areas
- Proximity to aged support/health services considered important
- No direct relationship with aged-care facility necessary although could be co-located
- Regular public transport and mix of uses needed before car ownership not necessary
- Market demand likely to be high therefore need to mixed tenure important.

**Key Design Issues**
- Education as a use and a community is a strong amenity
- Model reliant on interaction in shared public space
- Collaborative work/learning/employment spaces important
- Clustering of units (around 20) necessary to ensure intimate communities and legible street address – manages concerns about student noise
- 5 storeys considered an appropriate scale
- Shared car accommodation OK
- Storage for downsizers critical.

Figure 90: Low to medium rise near university, Sunshine Coast.
Figure 91: Brisbane A—two storey low rise.

The second site was 3650m² in the same suburb and currently includes an existing takeaway shop and 70’s brick apartments. The land is a short walk to the train station, other shops, church and community uses, a library and schools. Bounded by 3 streets, the corner block has principal frontage to a major road, the ‘main street’. The investigation explored the vertical and horizontal mix of residential and retail uses over 3 and 5 storeys. Questions about the optimal clustering of apartments, preferred apartment access (lift, stairs or balcony), and the location and format of car parking were discussed.

Key Learnings

- Desire for smaller clusters of units (e.g. 12)
- ‘Seniors only’ was a preference for this group as site was located within an existing neighbourhood which provided access to a range of other community members
- Straight stair to entrance of 2nd storey units shared between 2 units and could be retrofitted for stair lift and/or dumb waiter to assist with mobility issues
- Light and cross-flow ventilation key design issues for seniors to allow ease of reading and climatic adjustments
- Orientation is a key concern
- Communal open space highly valued asset
- Desire for additional private open space (deck, balcony etc) still high
- Car parking not essential when located close to existing services and transport. Seniors wanted choice. Option of parking separately titled to individual units.

Key Design Issues

- 2 storey unit format limited. Straight stair allowed for access, lifts would be required for additional levels
- On-site green space requires larger sites or less car parking
- Car parking requirements vs. seniors’ desire for cars. Current standards require additional spaces which may not be wanted/used by seniors

This group explored a seniors only apartment complex option overlooking a central private communal green space. The small cluster (12) of 2 storey units were arranged to allow light and ventilation with parking reduced as a trade off for increased amenity and sense of place.
The third site was 3250m² and currently houses a Club with a large carpark. The land faces a ‘park and ride’, is across the street from the train station and is surrounded by existing shopping, church and community uses, library, schools. The site is designated as mixed-use development up to 5 storeys, Charette work explored issues of proximity to rail (‘How close is too close?’), amenity trade-offs, mixed-use development of 3 and 5 storeys, and the impact and format of car parking.

Two groups examined opportunistic infill, mixed-use development to 3 and 5 storeys facing the major road. Group 1 explored the whole of the site testing the extent of retail uses, car parking an upper level seniors living. Group 2 explored a similar suite of uses but focusing on a side street.

**Key Learnings**

- A mix of uses was supported by seniors
- Perimeter format at 5 storeys challenging on these sites due to car parking and side setbacks
- Double-loaded units considered by group most efficient form of layout
- At grade car parking is possible up to around 25 units (40 x 60m site)
- Outlook over at grade car parking is not acceptable
- Rooftop communal open space is acceptable but not equitable above 3 storeys
- Mixture of 3 storey walk-up and 5 storey lift is acceptable given tenure and market mix
- Reduction in car numbers is an acceptable ‘trade off’ in a well serviced location.

**Key Design Issues**

- Mix of heights and amenities offers choice
- Corner sites offer best chance of achieving seniors principles in 5 storeys
- Car parking, onsite open space and the perimeter format is a “triangular tussle” constraining density. Car parking requirements need to be reduced below 1 space per unit) for seniors ‘principles’ to be achieved, otherwise communal open space is compromised or expensive basement car parking required
- Car parking layout limits design flexibility and location of lifts/fire stairs
- Efficient layout balanced against achievement of seniors preferences
- Two or more ‘six-pack’ sites required which may limit viability unless incentives offered
Two charrette groups examined opportunistic infill development around a community club site. Group 1 explored the opportunity for 5 storey, perimeter from, mixed use development on the assumption the community club and some at grade parking might stay. Group 2 explored a staged development rebuilding the community club as part of a mixed-use facility with aged care and independent living units (ILU).

**Key Learnings**

- Close proximity to range of particular services highly desirable
- A range of 3 and 5 storey perimeter form, mixed-use infill buildings are possible and consistent with seniors’ expectations and the character of the neighbourhood
- Clustering of around 20–35 units respectively consistent with preferred scale
- Perimeter form is consistent with seniors demands for on site communal space, ventilation and light. 1 bed + studio ‘seniors apartments’ suit perimeter form
- Leveraging of existing community parks is critical to achieving outlook/amenity
- Mixed use at ground level helps shield at grade car parking
- Combination of aged care/assisted apartments with suite of community club facilities attractive to seniors, provided ILU apartments also on offer.

**Key Design Issues**

- Minimum dimension for sites is around 35–40m with preferred site size 40 x 60m
- Need for single lift imposes additional balcony access/common area
- Central courtyard requires concrete deck over at grade car parking adding costs
- Car parking, onsite open space and the perimeter format is a ‘triangular tussle’ constraining density. Car parking requirements need to be reduced for seniors’ ‘principles’ to be achieved, otherwise expensive basement car parking required
- Basement parking suits “commercial” mixed use developments (such as a community club) but seriously impacts on the affordability of seniors ILU apartments.
How the design team responded to the challenges...

As far as possible, the design team responded to the seniors’ physiological needs with ‘dual aspect’ apartments which allowed through ventilation and natural light around internal courtyards, known as ‘perimeter design’. It enabled ‘perimeter surveillance’ (views both externally and internally to the complex), as well as privacy as no-one would need to walk past another’s door. Limiting the sizes of each cluster aimed to provide a greater sense of community and security. A main apartment with an adjacent studio unit, referred to as a ‘dual-key unit’ design, could be applied across a range of accommodation configurations.

The university site on the Sunshine Coast was designed to illustrate intergenerational living as well as specialist amenity attractors such as education.

A townhouse or terrace design was explored with participants, but the sketch was not progressed in Charrettes as it was not considered different enough from the norm. Both a single and two-storey version are included in the final typologies (pages 92, 93) as terrace housing does provide freehold title, does not require a body corporate, and has ground level entry and garden space. In the townhouse design, the staircase was straight to accommodate insertion of a chair lift if required as a transitional arrangement. In addition a flexible storage space was provided in which a lift could be installed if needed.

The design team reduced the amount of car parking in order to deliver both communal and private open space, yet maintain affordability. This would need to be negotiated with Council, based on proximity to public transport.

How the designs rated according to the principles...

As the area in the vicinity of the university is undergoing development, measures such as pathways, public transport, pedestrian and driver safety and security (P1,4,5,6,8) could be put in place to meet key neighbourhood principles.

The location is in close proximity to new shopping facilities, university activities, and green open space on the grounds of the University (P1,2,7). At the dwelling scale, the complex is divided into clusters to achieve higher density while minimising concerns with size and consequent noise (P9). The northerly aspect and the size can take advantage of sustainable design features (P11). Shared and private open space can provide good views of the university grounds (P12). All other principles can be met, with one of the buildings intended to be universally designed (P10).

Participants considered the university site favourably, with multi-generational living within the same complex if not within the same building. The possibility of volunteering at the university and inter-generational and cultural exchange appealed. Families could be accommodated in larger units at the ends of apartment blocks.

The Brisbane sites A, B and C (figures 91, 92, 93) are in an existing suburb, adjacent to the centre of town, shopping, library and transport (P2, 4). Since parks are still a few blocks away, on-site communal green space would be beneficial (P3). Existing footpaths at both locations, some not well shaded, enable access to public open space within walking distance (P1, 3). Special provisions are needed to mitigate noise from the busy streets and address pedestrian and driver safety (P5,6, 9). Some of the complex designs take advantage of the northerly aspect and all are of a size that enables incorporation of sustainability features (P11). Again other principles can be met, with compromises in car parking to enable sufficient communal open space (P12).

The two-storey terrace house in Brisbane was considered by many participants as not being ‘inherently applicable to older people’. Stairs were not suitable for seniors in spite of a stair-climber option (difficult to carry a walker) or lift (expensive). Some however enjoyed the sense of space, exercise, and a feeling of security sleeping in an upstairs bedroom.

The Brisbane A two storey low rise complex appealed to the focus groups held in both Brisbane and the Sunshine Coast due to each unit being on one floor and the relatively small size of the complex. Those who could not cope with stairs would aim to live on the ground floor. Participants suggested re-orienting the complex on the site to take better advantage of the northerly aspect and reduce noise from the main street. Concerns were raised about the amount of car parking and the need for secure mobility scooter parking. As this might be suitable for people of all ages, an on-site manager might be needed.

The dual key option was a popular feature of the three-storey courtyard as it would allow the ability to transition within the complex with space for a carer. Operational costs of lifts might be offset by solar power feed to the grid. Similar to the previous sites, concerns were raised about noise and the possible need for an on-site manager.

There was little support for the Brisbane site C complex, mainly because of its proximity to the train and active multiple uses typical of a club venue. Concerns were also raised with 3-5 storey mixed development due to lack of through ventilation and noise, and car parking vs open space trade-offs. Preference was for the 5-6 storey perimeter courtyard units.
High Rise Designs

Higher density living is not as widely accepted in Australian cities as in many other countries. So few seniors have experienced the associated lifestyle. None of the higher density designs in either Brisbane or the Sunshine Coast appealed to our participants yet they illustrate concepts such as TOD and inner city living that might be more acceptable and worthy of consideration in other circumstances. Participants commented on the lack of familiarity with living in such spaces and how older residents from more densely populated countries might find it quite acceptable. They suggested that over the next generation a transition might occur with greater acceptance of high rise in Southeast Queensland.

The issue of trade-offs was part of the conversation. Participants commented that if a high-rise dwelling had a great view of the ocean or river, the perceived negative aspects could be accommodated. Likewise if this was all that was available at an affordable price, some older people would make the compromise.

Of interest was that high density (that is, over 6 storeys) was not acceptable among our participants in either the ‘big city’ or regional community. This was clear during the Charrettes, as well as the final review focus group. While we have included the results of the Charrettes, we did not develop a final ‘typology’ as this was not considered by our participants as appropriate or attractive to seniors.

Sunshine Coast and Brisbane Sites

The inner city site (8700m²) in the centre of a Sunshine Coast town is adjacent to shops, supermarket, community facilities, health services, and public transport. It currently fills an important role as low-cost rental accommodation. It was selected to test the issues of ageing within community. The charrette process explored the integration of private commercial uses, retail/big-box shopping and higher density private/public housing within a regional town centre. A mix of small lot and terrace housing provided a useful mix on this large site. It could provide both non-profit and for-profit delivery possibly in partnership with Local Government.

The two Brisbane sites are proposed for urban renewal. Site A is a large single parcel of sloping land (total 4800m²) within an emerging urban TOD community with shops, employment, services, major hospital and future supermarkets. It has good access to public transport with a station nearby. A 12–20 storey development is possible with a mix of uses. This challenging site was deliberately selected to explore issues of affordable mixed-tenure housing for seniors and integration with the city centre. Preferences for a high-density typology housing format, the role of a high care service with high amenity/views across Brisbane was topical. The ‘trade-offs’ between integrating community/seniors health/care services in sloping area with noise impacts are important issues.

The second Brisbane site B is a constrained inner city parcel likely to be developed by a not-for profit company for mixed tenure housing. A 9–10 storey development is possible with some mix of uses. Several issues (noise, density) constrain development but the site is within an emerging TOD community with new housing, shops, supermarkets and offices and a high amenity open space park. The Charrettes interrogated issues of desirable, affordable, high density, mixed-tenure housing typology with amenity trade-offs.

Figures 94, 95 and 96: Left – Sunshine Coast inner city site; Right – Brisbane inner city urban renewal site A; Brisbane inner city redevelopment site B.

The following schematics illustrate the evolution of design through the Charrettes.
The workshop team explored a medium to high-density mixed use development with residential/retail/commercial uses for seniors. The tower might contain hotel uses (with some permanent stay) with seniors access to associated recreation facilities (pool, spa, gym). An internal street allows small lot and terrace houses provide tenure and scale diversity.

**Key Learnings**
- Support for co-location with hotel and mix of uses
- Co-location with a mix of uses within the town centre considered desirable
- Access to on site open space considered essential, however support for sharing facilities with other uses
- Mixed-tenure housing supported, market will likely require broad range
- Proximity to aged local support/health services considered important
- No direct relationship with aged-care facility necessary although could be co-located
- Health resort idea supported (informal aged care)
- Terrace/townhouses and 1 bed & 2+1 units
- Private car ownership not considered necessary
- Not “business-as-usual”

**Key Design Issues**
- Dual key unit typology coined to maximise flexible use, tenure, care options
- Urban setting allows for density and strong urban form
- Reduced reliance on car travel allows for consolidated basement parking
- Legibility and street address an issue requiring internal ‘public’ street
- Mix of housing types help integrate surrounding uses
- Single small lot housing without stairs preferred by men
- Two-storey terraces (with potential for travelator) preferred by women
- Site size determines tower type and minimises options for clustering
- Hotel typology (double-loading) does not easily deliver passive ESD outcomes
The team explored a high density perimeter form of development comprising of 4 buildings ranging 5-15 storeys, providing approx. 230 apartments. Despite significant amenity challenges, the development has access to a train station, services and employment. The design facilitates views to Mt Cootha, the River and CBD. The perimeter form is centred around a communal courtyard.

Key Learnings
- Urban location close to city and heavy rail station
- Design controls allow a very high density development
- Hill top location enables impressive views from upper levels
- Scale of project provides many opportunities for living options and tenures
- Development in perimeter form creates a strong edge to a new park
- Perimeter form creates a private shared open courtyard space that can incorporate community facilities, BBQ, aviary etc
- Scale of project enables cost effective provision of community rooms, cafes, gym, located to overlook park and a mens shed in the basement car park

Key Design Issues
- Expensive form of construction in an expensive area may limit affordability
- Not too close to services, with challenging slope for seniors
- Unlikely scale of development for a community housing provider
- Little precedent for private sector support for all ages housing incorporating special facilities for older persons
- Complex tenures

Figure 98: Inner city urban renewal site A, Brisbane.
The workshop group examined a development on the premise of mixed tenure, mixed size (building form and dwelling size) and mixed generations. A third of the 90–100 apartments were dedicated to seniors.

**Key Learnings**

- Mixed tenure arrangements could support a range of affordable housing options NRAS funded affordable housing, NFP owned units or subsidised housing for key workers
- Desirable access to rail station, bus services, open space, community garden, shops and employment – all within walking distance
- Universally designed apartments for ‘ageing in place’ with bedroom and living room decks and views
- Mixed community of ages with families (possibly intergenerational)
- 2 building clusters with separate addresses
- Good security
- Community spaces/common room on every second floor for residents (reading room/library, gym, lounge area, roof garden, games room, study space)
- Significantly reduced parking provided for service providers, visitors, residents and caretaker (reduced costs)

**Key Design Issues**

- Dual aspect form gives good ventilation and helps manage noise amenity issues
- Communal open space compromised by at-grade car parking
- Building height and form does not support onsite open space
- Dual building approach compromises efficiency
- Model illustrates the importance of active frontages and strong street presence
- Scale of development challenging to many seniors and does not foster intimate clustering

Figure 99: Inner city urban redevelopment site B, Brisbane.
How the design team responded to the challenges...

Acknowledging that high rise was not a preferred choice for seniors, the designers queried how to make the typology more liveable and attractive. Communal spaces were designed on each level of the Brisbane Site B, and the Brisbane Site A complex featured a ground floor common area opening onto outdoor shared space.

How the designs rated according to the principles...

The Sunshine Coast High Rise is close to the community centre (P7) and thus walking paths (P1) and public transport (P4) are available. Since the beach is a few blocks away, communal green space would still be required (P3).

The Brisbane Site B typology setting could meet most of the neighbourhood principles: its best features are accessibility – to outdoor riverside boardwalk (P3), public transport (P4), and future shops and other facilities (P2). Depending on how the general area is developed, personal security may become an issue (P8). Brisbane Site A was an exception in that steep slopes would need to be negotiated in much of the neighbourhood. This would particularly affect access to public transit and the hospital which would be the major attraction for residents moving to this site (P1, 2, 4, 5). Currently there are no shops nearby, however the entire area is under redevelopment so new neighbourhood amenities may be provided.

In terms of dwelling principles, appropriate features and management would need to be included to reduce impacts of noise and nuisance behaviour from high density living (P9). Such complexes could deliver Universal Design (P10) and versatile spaces, visual amenity, security and maintenance (P9, 13, 14, 15). However building of over 6 storeys are problematic in delivering sustainability features (P11) and the site would need to be large enough to accommodate sufficient communal indoor and outdoor space (P12).

None of these sites appealed to the senior participants, indicating that while there may be a need for this type of housing, it would have to be very affordable to attract the elderly. The topography and view of a ‘concrete jungle’ were criticisms of Site A.

Large Site Multi-use Complex

Finally a large 8 hectare hypothetical Sunshine Coast site provided scope for multiple uses and a range of affordable accommodation types suitable for all ages. While the site is not typical of constrained ‘infill’ opportunities, it is surrounded by an existing low density residential community, has significant vegetation, and is proposed for development.

The parcel is adjacent to a school (P12) and traditional retirement village and is 600m from a future train station with retail and housing uses approved nearby. The land was selected to explore issues of integration and active engagement with school and community uses, the impact of a mixed care/service provider model on built form, and relationships between and arrangement of a range of low-medium density uses. Sketches illustrating the design process through the Charrettes follow.
Groups explored the layout of a range of seniors housing types, community and shop uses across the 8 ha parcel. Existing vegetation and overland flow constraints are used for amenity features and wayfinding.

**Key Learnings**
- Large parcel of land allows for a positive range of housing types and uses
- Significant population can be housed using current building format which makes it difficult to challenge ‘business-as-usual scenario’
- Community facilities, hall, coffee shop, nursing home, apartments, affordable and low-rise houses all possible and community integration generally supported.
- The site is challenging due to vegetation and connections onto site.
- Seniors found it difficult to move away from ‘business as usual’ (BAU) view of a more dense retirement community
- Opportunity to view superlots with a range of cooperative providers
- Questions raised as to how might the site become a true community focal point?

**Key Design Issues**
- Large infill sites reinforce BAU for housing and insular approach to local neighbourhood
- Integration of use mix likely to be horizontal not vertical unless useful Constraints on development are present, or site divided up into a number of parcels
- Real opportunities for interaction with community is the key challenge
- Whether these are ancillary to the housing use or provide destination/focus for neighbourhood critical issue to success of integration
- Sites without a street based/public mix of uses mean the delivery of these services/uses falls to site developer or NFP provider
- Opportunity for larger infill sites to deliver infrastructure/change outcomes to benefit local community.

*Figure 101: Large site multi-use complex, Sunshine Coast.*
How the design team responded to the challenges...

The size of the site allowed the design team greater flexibility. While multiple uses were proposed for the site, participants tended to advocate for traditional segregation of independent living units from higher levels of care. The natural features of a waterway, treed areas, and small hill were incorporated into the design with meandering shaded pathways.

How the designs rated according to the principles...

This large site provides the opportunity to ensure most of the design principles are met, such as walkways, outdoor open space, and security (P1,3,5,8). Some facilities such as cafe, community centre, and health services might be located on-site and will contribute to sense of community (7), however it is further from public transport and shopping (P2,4). Parts of the complexes are north facing and are at the maximum height for sustainability features such as solar power (P11).

Participants indicated that the position, the scenic amenity, open space and sustainable design features would be important. Attractive features were multi-aged and multi-generational living, ability to transition to higher care, or for couples who have different care needs. Ground floor cafe and communal areas are essential.

The Suite of Age-Friendly Designs

Following the development of a range of site specific designs, the design team and seniors then collaboratively reviewed the new 3 dimensional models against the Design Principles; derived from the PhotoVoice phase. The strategic impact that such principles have on the shape and configuration of housing is complex. The Charrette process allowed the seniors to appreciate these complex relationships, and choose design strategies that best suited an ageing client group. A range of issues such as ownership, building height and character, mixed-use, unit design, communal open space, access to natural light and ventilation, car use and accommodation and solar power, were considered. The resultant 3D models were then critiqued by seniors and a series of building typologies for low to medium density housing emerged. These typologies provide several integrated solutions to the challenges of infill development as expressed by the senior participants.

Whilst the initial designs were inspired by an individual site context, it should be noted that the following typologies are not specific designs for individual sites. They should be regarded as generic housing models. A range of innovative ideas are featured below and are intended to promote further discussion about preferred infill housing for seniors. They may then become useful as a starting point for a design to be tailored to a specific site.

Each typology is described and rated on seven factors:

- **Maintenance** refers to the requirements for individuals or a body corporate to maintain the site and buildings and is affected by building materials and amount and size of common areas, either walkways or ground area.
- **Proximity to services** refers to how close the accommodation is likely to be to services and facilities. Ratings assume that a higher rise building is more likely to be located near services because of zoning provisions.
- **Private outdoor space** refers to the inclusion of one or more adequately sized balconies or patios in the design.
- **Sense of community** directly reflects the number of units and their groupings in a complex.
- **Sustainable design** represents how the building design enables residents to live without reliance on active (generally carbon-intensive) energy systems such as mains water and power, electrical heating, cooling and drying, and private car ownership. This approach also considers the embodied energy of construction materials and efficiencies of unit numbers.
- **Versatile flexible space** refers to a flexible floor plan that enables the adaptive use of apartments over time to accommodate a range of users or support services. This includes moveable (non load-bearing) walls, dual-key apartments and multi-use rooms.
- **Density and character** refers to the number of units per site and the appearance and amenity of the building within its context (ie: the street.).

There is an implicit assumption that all typologies incorporate the principles of universal design.
Shared Care  TYPE 1 — garden house

DESCRIPTION
- 40-50m deep "parent lots" are pooled in 2 or 4
  and subdivided to provide a rear communal lot
  of approx. 30 x 30m. The remaining lots are 25 to
  35m deep.
- Communal housing at the rear of existing
detached house lot with 2 or 4 studio dwellings
each suitable for seniors with care provided
- Each has own bathroom and patio area with
  shared kitchen, dining and lounge facilities.
- Allows existing lots owned by seniors to be
  retained and equity leveraged for shared care

LOCATION
- Traditional, established residential suburbs, with
  high scenic amenity and strong property values
- Within 400m of local convenience shopping and
  greater distances from a neighbourhood centre
- Simple infill dwelling form provides housing
  variety within detached housing precincts
  compatible with scale of surrounding houses.
  - Possible mid-block. Ideally with street frontage.

LOT SITE & DIMENSION: 300m² total parent lots
- 900m² lot developed at the rear
HEIGHT: Single storey

DWELLING SIZE
- 32m² studios with own bathroom and patio area

DENSITY: Typology only marginally increases
density across neighbourhood.

SUITABILITY
- Highly suited for seniors who need higher care,
  but want to remain "in neighbourhood" with
  family and friends nearby.

CAR PARKING
- 1 parking space provided for each studio,
  accessed from street frontage or via parent lot

TITLING
- Community title, reconfiguration or alternative
design scheme required
- Range of tenure, provider delivery and care
  options available including live-in carer.
Compact Freehold Living  TYPE 2A — 1 storey seniors terrace house

**DESCRIPTION**
- Single storey freehold terraces with rear lane access.
- May incorporate Type 1 ‘garden house’ at the rear in a redevelopment.
- Single level without stairs but with perception of decreased security typically preferred by male participants.

**LOCATION**
- On quieter residential streets.
- 3-5 minute walk from local or neighbourhood centres (250-400m) and public transport.

**LOT SIZE & DIMENSIONS:** 156m² (8.0m x 19.5m)
- Clusters could be developed on urban residential sites 30-40m wide x 40m deep (1200-1600m²) with central lane way.
- **HEIGHT:** Single storey.

**DWELLING SIZE**
- Terraces 100-110m².
- Can be configured as 2 bedroom dwelling or as 1 bedroom plus studio.
- Dual key option possible, and allows a variety of ownership options for seniors (couples, singles, with carers).

**DENSITY:** 30-40 ds/ha.

**SUITABILITY**
- Allows good accessibility on a single level.
- Allows for private garden.
- Feedback from seniors suggest it is more suitable for men than women.

**CAR PARKING**
- Single car park provided in car port accessed via rear lane.

**TITLING**
- Freehold title or as part of a community title.
- Groups of terraces clustered with access via rear lane.
Compact Freehold Living  TYPE 2B — 2 storey seniors terrace house

DESCRIPTION
- Compact 3 bedroom row house
- 8m wide access from rear lane
- Planning arrangement enables 3 bedroom upstairs only with a generous open plan living room

LOCATION
- On busier streets or quieter streets
- 3-5 minute walk from local or neighbourhood centres (350-400m) and public transport

LOT SIZE & DIMENSIONS: 132m² (6m x 22m)
- Clusters could be developed on urban residential sites 30-40m wide x 40m deep (2200-3600m²)

HEIGHT: 2 storeys

DWELLING SIZE
- Terraces 110–125m²
- Can be configured as 3 bedroom dwelling or as 2 bedroom plus studio
- Dual key option possible and allows a variety of ownership options for seniors (couples, singles, with carers)

DENSITY: 40-50 da/ha

SUITABILITY
- Very cost effective solution
- Designed for 2 storey townhouses, lifts if necessary
- Allows for private garden
- Feedback from seniors suggest it is more suitable for women than men due to stairs and better security outcomes

CAR PARKING
- Single car park provided in car port access via rear lane

TITLING
- Freestanding title or as part of a community title
- Groups of terraces clustered with access via rear lane
Communal Open Space v. Cars  TYPE 3 — 2 storey apartment complex

DESCRIPTION
- Medium density development of 12 units comprising 2 storey ‘fourplexes’ (2 ground floor, 2 upper floor).
- On-grade shaded parking (reduced provision) towards the front of the site.
- Can be configured as all 2 bedroom dwellings or as 2 bedrooms plus studio.
- Site planning enables creation of shared outdoor gathering places.
- Access to dwellings from within the site and from the street.

LOCATION
- Between 3 - 5 minute walk (250-400m) of neighbourhood centres, located on busier streets.

LOT SIZE & DIMENSION: 400m² (40m x 40m)
- Can be developed on 2 large residential lots.

HEIGHT: 2 storeys.
- Scale keeping with surrounding detached houses.

DWELLING SIZE
- 12 units approx 80-100m² each.

DENSITY: 50-70 du/ha.

SUABILITY
- Cost effective development form with minimal common areas requiring maintenance.
- Ground floor accessible units for disabled.
- Low-cost body corporate further offset by PV solar.

CAR PARKING
- 50% parking provision (12 units, 6 car parks).
- On-grade car parks provided in carport to reduce costs.
- Streetscape of car parking needs careful consideration.

TITLING
- Units part of a community title scheme.
- Car parking may be separately titled to units.
Balanced Approach (Low Rise)  TYPE 4 — 3 storey courtyard units

DESCRIPTION
- Compact apartment arrangement creating upper level naturally ventilated shared courtyard space above ground car parking with building over
- Naturally ventilated, single levelled apartments clustered in a balcony access from around an upper floor courtyard
- Can contain mixed-use at ground level

LOCATION
- Close to or adjacent to developments of similar types such as mixed use facing busy streets
- Within 3 minute walk / 250m from neighbourhood centres and public transport
- On streets where medium density development is appropriate that directly lead to neighbourhood or higher order centres

LOT SIZE & DIMENSION: 1600m² (40m x 40m)
- Developed on 2 residential lots as a small scale infill development

HEIGHT: 3 storeys of apartments

DWELLING SIZE
- 14-17 units each 80-110m²
- Apartments can be configured as 3 bedroom dwellings or as 2 bedroom plus studio
- Dual key allows a variety of ownership options for seniors (couples, singles, with carers)

DENSITY: 65-75 du/ha

SUITABILITY
- Relatively cost effective solution with the cost of lifts spread between 17 apartments
- Lifts allow good access to units for disabled
- Format suitable for PV solar to offset costs

CAR PARKING
- Street facing apartments or mixed-use screen on-grade car parking areas behind

TITLING
- Units part of a community title scheme
- Car parking may be separately titled to units
Mixed Use  TYPE 5A — 3-5 storey mixed use courtyard units

DESCRIPTION
- Infill 3-5 storey development
- Integrating retail on the ground floor together with residential units above
- Could incorporate ‘seniors only’ section with separate entry and shared lift
- Communal open space located on rooftop

LOCATION
- Close to or adjacent to developments of similar nature such as mixed use facing busy streets
- Within 3 minute walk/250m from neighbourhood centres and public transport
- On streets where medium density development is appropriate that directly lead to neighbourhood or higher order centres

LOT SIZE & DIMENSION: 2700m² (45m x 60m)
- Developed on 2-3 residential lots as a small scale infill development

HEIGHT: 3-5 storeys

DWELLING SIZE
- 24-28 units 80-110m²
- Can be configured as 1 bedroom dwellings or as 2 bedrooms plus studio
- Dual key allows a variety of ownership options for seniors (couples, singles, with carers)

DENSITY: 70-80 du/ha

SUITABILITY
- Relatively cost effective solution with the cost of single unit lifts spread across apartments
- Lifts allow good access to units for disabled
- Format suitable for PV solar array to offset body corporate costs
- Design allows for mixed tenure and clustering

CAR PARKING
- On-grade (1 per unit) parking sleeved behind retail and screened from secondary street

TITLING
- Units as part of a community title scheme
Mixed Use  TYPE 5B — 5 storey mixed use courtyard units

**DESCRIPTION**
- Compact apartment arrangement creating upper level naturally ventilated shared courtyard space above ground car parking with building over.
- Naturally ventilated apartments clustered in a balcony access from around an upper floor courtyard.
- Contains mixed use at ground level.

**LOCATION**
- Close to or adjacent to developments of similar types such as mixed use facing busy streets.
- Within 3 minute walk /225m from neighbourhood centres and public transport.
- On streets where medium density development is appropriate that directly lead to neighbourhood or higher order centres.

**LOT SIZE & DIMENSION:** 1600m² (40m x 40m)
- Developed on 2 large residential lots as a small scale infill development.

**HEIGHT:** 5 storeys

**DEWLLING SIZE**
- 28 - 30 units 80-111m²
- Can be configured as 3 bedroom dwellings or as 2 bedroom plus studio.
- Dual key allows a variety of ownership options for seniors (couples, singles, with carers).

**DENSITY:** 110-120 du/ha

**SUITEABILITY**
- Relatively cost effective solution with the cost of lifts spread between 28 apartments.
- Lifts allow good access to units for disabled.
- Format suitable for PV solar to offset costs.
- Maximum cluster of units preferred by seniors.

**CAR PARKING**
- Street facing apartments or mixed-use screen on-grade car parking areas behind.

**TITLING**
- Units as part of a community title scheme.
Infill Development for Older Australians in South East Queensland

Specialist Integration  TYPE 6 — 5-6 storey mixed use apartment complex

- Medium to high density mixed aged care facility
- Vertical stacking of aged care, offices, community cafe and independent living in a single complex
- Footprint scaled to suit 32 room aged care module on one level with dementia

LOCATION
- Urban scaled project appropriate for larger sites in strategic locations within new or existing urban centres
- Within 3 minute walk / 250m from neighbourhood centres and public transport

LOT SIZE & DIMENSION
approx. 640cm² (80m x 80m)

HEIGHT
3-5 storeys

Dwelling Size
- 18 - 27 independent living units 80-110m²
- Can be configured as 3 bedroom dwellings or as 2 bedrooms plus studio

- Dual key allows a variety of ownership options for seniors (couples, singles, with carers)

DENSITY
150 - 170 du/ha

SUITABILITY
- More expensive form of construction which suits care provider delivery
- Large scale project, suitable response to high value urban site
- Mixed of funded aged care beds and mixed tenure independent living units
- Enables flexible housing and choice throughout ageing to suit a range of users
- All care amenities can be serviced vertically to ILUs as well as aged care to enable transitional delivery of care options

CAR PARKING
- Basement parking required
- Service delivery through front access

TITLING
- Mixed tenures
Discussion of Key Findings

A key outcome of this research was an emerging understanding that most of the typologies could be accommodated in a neighborhood that is transitioning to a somewhat higher density. Planning and design issues and dilemmas associated with liveability, sustainability and affordability (including density and diversity) became apparent and are discussed. The significance of this work for large cities, regional centres, as well as small towns is elaborated especially in terms of the special features identified for sub-tropical environments. The chapter concludes with a discussion about the benefits and drawbacks of the participatory research approach and the limitations of this study.

Infill development enables a transition to ‘ageing in neighbourhood’

The principles were translated through the Charrette-developed typologies and support the concept of ‘ageing in neighbourhood’. An important outcome of the research is that the typologies not only reinforce our participants’ preferences, but when collectively arranged deliver a holistic model of a neighbourhood which could be a supportive and caring community, one which allows ‘ageing in a caring community’.

While sites in four different locations in each of Brisbane and the Sunshine Coast were the subject of the design Charrettes, it became clear that most of the typologies could be portrayed in a typical middle suburb location to demonstrate liveability in the neighbourhood context. Such a typical suburb might include a main street with local shopping, a supermarket, small-scale medical services, a library, an RSL or similar, churches, a school and a train or bus station. In such a neighbourhood, the existing range of centrally located housing is low to medium density within a 400m radius (a 5 minute walk) and includes single detached houses, 2 storey townhouses, and 3 storey ‘6-pack’ apartments. Within the broader suburb are single family character housing, parks along either the Brisbane River, a Creek or beach, as well as assisted retirement living and high care complexes.

The following diagram locates seven different low to medium density-housing typologies on infill development sites within such a suburb in Brisbane. The opportunistic placement of the buildings responds to the existing street structure, character and density pattern. Importantly it demonstrates that the existing lot pattern and development opportunities of this neighbourhood naturally support a more diverse medium density housing future that would be suitable for seniors. It is important to remember that each of the typologies were developed collaboratively with seniors participants in the Charrettes and they respond directly to the issues and principles raised during the PhotoVoice sessions.

This infill pattern illustrates the concept of ‘ageing in neighbourhood’ and adopts the following characteristics:

**Density and arrangement**
- Several building typologies with a range of housing types and densities from 40–150 dwelling units/hectare (du/ha) (net);
- Existing lot pattern and neighbourhood centre or community hub function naturally cap medium density thresholds;
- Arrangement of typologies reinforces existing patterns with lower density on perimeter, and higher density towards the centre.

**Existing structure/character**
- A range of built form intensity from 1–5 storeys, arranged to be compatible with and respectful of existing neighbourhood character;
- ARRangement of typologies focus on key amenity areas – existing parks and open space connections, main street hierarchy, retail and community services, clubs and public transport (station and bus) stops;
- Response to lot patterning and 3–5 storey development allows at-grade car parking behind buildings and can optionally include mixed-use to grow neighbourhood services and employment commensurate with housing growth.

**Built form/character and access**
- All typologies acknowledge the primacy of the street with its principal orientation and residential entry points;
- All development respects residential setbacks to facilitate on-site vegetation, light and air access;
- Medium density development in dual aspect perimeter form with a central community courtyard space promotes passive sub-tropical design principles;
- Unit typologies aim to be accessible, universal and encourage multi-generational use.

**Parking and Compliance**
- Development generally complies with current local government requirements, but manages a transition to reduced car parking based on TOD principles;
- General reduction in onsite car parking requirements (0.5–1.0 per unit including visitors) consistent with reduced car demand in return for public transport amenity;
- Existing specialist care sites to 5 storeys may permit basement car parking;
- Typologies respect natural market-based development thresholds.
Specialist care services

- Assisted living care services are a potential part of all typologies and more easily delivered in a more consolidated environment;
- Specialist high-care facilities are possible within the neighbourhood, in an integrated built form intended to limit perceived impacts of ‘aged-care ghettoism’;
- Structure acknowledges that autonomous retirement uses and hospital-based care is located on the fringe of the neighbourhood, but within the suburb.

This outcome demonstrates that the principles developed by this project have produced a range of meaningful new infill building housing typologies for seniors. Moreover, it shows that when these same typologies are arranged at a neighbourhood level, which respect the existing ‘place’ identity and structure consistent with the neighbourhood principles, the results can produce a holistic model of infill development that actively supports ageing. The broader applicability of this concept is discussed later, but first we illustrate how a range of typologies or scales of accommodation might be incorporated in a neighbourhood to provide a diversity that provides choice for older people. The different designs illustrated in this neighbourhood are the Shared Care Garden House; Compact Freehold Living one and two storey seniors terrace units; Communal Open Space vs Cars illustrated in a two storey apartment complex; Balanced Approach of three storey courtyard units; Mixed Use Courtyard Units of three to five storeys; and Specialist Integration in a 5–6 storey mixed use complex. Each has been described above and compared with the principles.

![Figure 102: Choice of housing typologies enable ‘ageing in neighbourhood’](image-url)
In light of the academic literature and the outcomes of this research, a viable model of housing for older people could ensure the provision of a range of options within a community. The extent to which all options are provided in the same neighborhood as in Figure 102, depend on the spatial area, topography, locational characteristics and population. The neighbourhood model that incorporates a range of housing typologies developed as part of this research is one of the key conceptual outcomes of this research. The ageing-in-neighbourhood approach could be developed as a neighbourhood strategy by or in collaboration with local government. The advantage is that the range of housing typologies could be introduced over time, overlayed with home care and support services that already exist in the suburb.

It is important to note that the middle suburbs chosen were considered particularly appropriate for this hypothetical scenario as the neighbourhood characteristics closely satisfied the principles agreed by the senior participants. Lack of hills, shady streets, and character housing contribute to the attractiveness of the environment. Nevertheless the concept is broadly applicable to locations meeting some basic prerequisites, where seniors value the characteristics of their existing neighbourhood and familiarity with local services and networks. These too should also be supported by greater choice in housing.

"Hot spots" for older people

In the 2006 Census, 3.5% of Brisbane residents stated they had a disability that required assistance some of the time and 9.2% of Brisbane residents stated they spent time providing unpaid care or assistance to a person because of a disability, illness or old age. Thus accessible and supportive communities and dwellings would benefit a sizeable portion of Brisbane residents on a regular basis, most of whom live in the middle to outer suburbs209. In addition to those immediately impacted, children and young families would also be beneficiaries of accessible and supportive design in homes and communities. The ability to age-in-place, as confirmed by gerontology research, is associated with personal well-being in later age. For long-time elderly residents, neighbourhood life may substitute for family contacts210 and provide opportunities for seniors to be part of diverse, multi-generational neighbourhoods211. However, despite evidence of the needs of specific groups and benefits of proactive design, time-standardised practices have produced “Peter Pan” neighbourhoods built to serve residents who will never age, will never face unexpected disabilities or economic fallouts, will always be able to count on substantial affluence and valid driver’s licenses, acting according to frozen-in-time lifestyles212.

In Brisbane, the top 10 neighbourhoods where larger populations of older and disabled people reside have been identified as Brighton, Taigum-Fitzgibbon, Chermside, Nudgee, and Wooloowin on the North side, Wynnum West on the East side, Carina Heights, Rocklea and Inala on the South side and Kenmore Hills on the West side213. Referred to in North American literature as Naturally Occurring Retirement Communities (NORCs), they are generally defined as communities with a large proportion of older persons residing within a specified geographic area, and differ from retirement living in that NORC communities were not designed with the provision of services to older persons in mind214. Such neighbourhoods evolved as a generation aged together. Such information, though, can be used advantageously by care providers and Councils and thus benefit residents. For example, as Municipal Council capital works and asset maintenance budgets are limited and subject to change, works programs in areas with high senior and disabled populations could prioritise works that support age-friendly communities by applying our seniors’ Design Principles. This would contribute towards ensuring residents have a pleasant and accessible neighbourhood to live in with a range of housing options to age in neighbourhood, as a starting point for an age-friendly city.

Outcomes in relation to the three themes

Participants in this research had clear ideas about the types of neighbourhoods and dwellings that appealed to them, and whilst there were a range of differences, the principles contained in this book are an expression of consensual ideas. Some of the challenges in achieving these aspirations in the built form and in the neighbourhood context were instructive. They revealed the barriers that exist from the perceptions of developers, planners, and even older people themselves; each a discrete group wrestling with their own expectations, often with differing priorities in terms of desired outcomes.

An important finding was from the comparison of perceptions of seniors in the city of Brisbane and the sprawling regional community of the Sunshine Coast. The differences directly responded to the characteristics of the environment in which residents found themselves. Concerns about security at both a neighbourhood and dwelling level in Brisbane reflect more diverse and mobile communities, less familiarity with neighbours, and less sense of community often characteristic of a big city. This suggested that the benefits of ‘ageing in neighbourhood’ are universal in that if the needs of seniors are met, then those of other age groups can be met as well. Likewise noise and air pollution and traffic congestion, accompanied by good

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209 BCC 2011, pp.17-18
212 Antoninetti, 2008, p.349
213 BCC 2011, p.17
214 Colello K, 2007, p.1
What is evident from the findings of this research is that there is a need for greater choice and flexibility in the housing models that are available. There is also a need for accessibility and adaptability of the design (universal and adaptable design), the types of tenure, and greater security and confidence for owner-occupiers and renters in strata title regimes. The transition to other models of living can be difficult for older people, more so, if this coincides with the death of a partner, illness or mobility issues, all of which can present significant threats to independence and safety at home as one becomes more frail. Therefore, flexible options and being empowered to select the type of housing, care services and the environment that suit an individual’s lifestyle will be attractive, and not just for older Australians.

An unexpected outcome was discussion around an ideal size of ‘community’. While not unanimous, most participants tended to favour complexes with less than 25-30 units.

Liveability

Connectivity and Walkability

Participants emphasised the importance of safe, evenly graded and maintained walking paths for exercise; opportunities to interact with people of all ages and to access services, facilities and public transport. Walking or cycling provides tangible health benefits by increasing daily physical activity levels, improving social wellbeing and other benefits such as less cars on the road and a greater sense of community215. Whilst planning policy encourages walkable, pedestrian friendly neighbourhoods, the provision for car spaces also contributes to the expense of dwellings, particularly in high amenity urban infill areas. One of the ways to best facilitate uptake of active transport is through mixed use planning and a permeable path network, which significantly increases the preference for residents to walk instead of drive.

The importance of universal design

The largest number of photos taken on any one theme represented aspects of universal design. There is empirical support for the assumption that environmental factors are not only related to negative health events, such as falls216, but also to positive health-related outcomes such as subjective well-being and independence in daily activities217.

Clearly this is a message that cannot be ignored. Some major developers claim to provide accessible and/or universally designed dwellings at an affordable price point. Industry support for the Liveable Housing Design Guidelines and the 10% target across the Urban Development Areas (UDAs) by ULDA are an indication of progress. However, this contribution to new housing only, will unlikely address the need when 25% of the Australian population will be over 75 years old by 2030. Promising inroads towards more age-friendly neighbourhoods can occur, with State and Local government collaborating with seniors to provide greater housing options. Goals and incentives for age-friendly neighbourhoods and housing can be built into strategic goals and performance measures of planning schemes and development assessment codes. Other planning tools can be used such as community improvement or local area plans facilitating redevelopment of areas; as-of-right secondary dwellings in certain areas; building height, density, and application fee incentives in exchange for facilities, parkland and streetscaping; and development conditions on site layout and building features218. Developers (including non-profit or public housing providers) and purchasers need to recognise that the future on-sale market will be reduced for buildings without at least adaptable design features.

Valuing age diversity

Our participants were almost evenly split between those who find age-segregated communities (i.e. retirement villages) attractive for their peace and security, and those who seek vibrancy of intergenerational interaction in a multi-demographic neighbourhood. Cultural background and physical health may play a large part in these views.

The concept of ‘diversity’ is often celebrated in the lexicon of planning and urban design professionals as the virtuous mix of ages, cultures, genders, housing (in terms of size and architectural massing), incomes and lifestyle. It often also refers to a diversity of land uses, such as adequate space for public parks and gardens as well as housing, proximate public transport, preservation of natural assets and heritage, and employment provided by nearby industry. Benefits of diversity are promotion of mutual understanding among populations of different backgrounds and providing a vibrant active neighbourhood through different but compatible lifestyles and land uses.

However, while diversity may be a commendable goal, it will not be achieved simply by provision of increased housing choice.

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215 ALGA et al 2009, p.1
216 Gitlin 2003
217 Oswald et al 2007
218 MMAH and OPPI 2009
or appealing to a diverse demographic. Implicit in the notion of diversity are inter-related concepts of moral commitment, positive social contact and solidarity. It appears that ‘social diversity’ and ‘place diversity’ are important and inter-related aspects that are rarely considered in unison by the planner, with the danger of mixed developments becoming commodified ideals of a village atmosphere but without the supporting social infrastructure. Building a sense of community relies on strong social networks and positive social contacts supported by good urban design. Standard planning scheme templates adopted in many jurisdictions, while delivering structural consistency and streamlined processes, risk devaluing the uniqueness and vitality of neighbourhoods.

The challenge of density and livability for seniors

“Density” is a term that can refer to the macro-scale of a neighbourhood and micro-level of a multiple dwelling complex (see glossary). The rationale for consolidating town centres is to provide more efficient economical services such as public transport to a consolidated population which in turn is considered more environmentally sustainable. Such densification is intended to prevent extension of urban sprawl into good quality agricultural land and valuable green open space. Infill development is a way to achieve this.

Individual perceptions vary about higher density living. On the macro-scale, most of our participants valued access to services and facilities, but also to green space. Some favour the convenience of CBD locations due to the locational advantage to work or city life. To others, poorly designed higher density developments hold deeply embedded stigmas associated with the concrete towers of social housing of the 1970’s in the outer suburbs of some Australian and international cities. Having access to services, though, means living in a more compact environment which raises certain challenges at the micro-scale: privacy, noise, negotiation about common space, and sustainability. To our participants, increased density seemed acceptable to some extent, providing that negative aspects of noise and pollution could be avoided.

Noise conflicts are a particular concern with higher density living; different lifestyles, age groups and expectations contribute to noise conflict in higher density living. Reliable and fair modes to co-exist harmoniously and reconcile differences is important. Design needs to allow people to get to know each other in communal spaces while retaining a sense of privacy. Studies have shown that residents that spoke to and helped each other had less complaints. A well-managed body corporate and an agreed set of by-laws, ideally decided in participation with the residents is essential. Our participants raised concerns about the cost, complexity, and effectiveness of body corporates, elaborated with entertaining stories of conflicts.

We invited conversation about what is a good size for a neighbourhood. On the dwelling scale, participants strongly objected to buildings over 5-6 storeys high and generally favoured complexes of 12 to 25 units, designed to ensure privacy yet knowing your neighbours. The crux of the issue may also be to design for a human scale that enables visual contact with the ground.

Affordability

It has been argued that higher density can exacerbate segregation by housing type and class because laws, lending policies, and industry behaviour favour large, uniform types of developments. As urban areas become more attractive to people of all ages (referred to as “proximity-related benefits”), competition becomes greater, and market forces in turn determine a higher price per dwelling. The risk is that low income or senior residents will be excluded from the neighbourhood as affordable housing and universal design are not a priority in a competitive housing market. Part of the brief for this study, and one of its greatest challenges, was to find ways of delivering affordable housing in infill areas. Many factors influence affordability: the location and amount of land, size of dwelling, number of walls, and building materials. In addition, small dwellings on small freehold lots can minimise maintenance while avoiding body corporate fees. In searching for solutions, we focussed on potential areas where trade-offs could be made - the number of storeys and units in a complex, car parking, and lifts, all of which contribute to per unit cost of a dwelling.

The two storey townhouses and two storey walk-up unit development in a middle suburb exemplified cost efficiency and a low risk profile. Both could easily be built by small-scale local builders. Savings resulted from no basement, no lift or pool (around $7-10,000/annum alone savings on total body corporate fees), and minimal common areas which mean less contract cleaning areas. Security costs can be minimised by including CPTED provisions from the start.

One of the critical factors in providing affordable housing is the cost of car parking spaces in multi-dwelling developments. The space that car parking subserves in high value infill land means that multi-dwelling developments may have to be built to higher levels (8 storeys) to sell more apartments. It could also mean building out the maximum developable area with limited provision for shared open space at ground level other than entry areas and cursory landscaping treatments.

It was estimated that the cost for two storeys without basement cars may be around $1300/1800 per square metre (m²), whereas three to four storeys and higher might be around $2400/m². The general difference between construction costs of...

219 Talen 2006 p234
220 Talen 2006, p245
221 Easthope & Judd, 2010:22
222 Gehl 2010
223 Pendall and Carruthers 2003
at grade ($600/m²) and basement ($1200/m²) parking is an additional saving of $250/m² per apartment. Thus savings are greater if less than one car space per unit is provided, and at grade.

This project responded by providing just half the car parking spaces in one of the typologies, titled separately from the dwelling. This would not comply with Council requirements for car parking; however, it meant that more land could be contributed to high quality private and/or shared open spaces and residents could determine whether a car was in fact an economical or necessary option, in light of the proximity to services, facilities and public transport. Options for stimulating ready take-up by seniors might include access to:

- a communal car;
- community shuttle bus;
- recouping costs spent on car accommodation they will not use by leasing spaces to local retailers/local commerce;
- assistance with daily tasks outside of the home such as grocery shopping; and
- a safe, well connected and maintained walking and cycling network.

It should however, be noted that none of these factors are really under the control of the developer. It could be reasonably argued that local and state governments and not-for-profit organisations have a critical role in achieving quality increased density outcomes in infill areas, by taking a leadership role in provision of alternative options to support affordable housing. Councils may need to revisit the 1:1 car parking to dwelling ratio in planning schemes for locations that are attractive not only to seniors but to other users (couples, single parent families).

**Sustainability**

While it is assumed that increased density is the solution to the environmental problems of urban sprawl, there seems to be a point where increased density can compromise energy efficiency—particularly if the complex is poorly designed and air conditioning is required much of the time. For example, according to one study, high-rise developments in Sydney had higher greenhouse gas emissions per person than detached dwellings or townhouse/villas due to the energy consumption of common areas such as lifts, corridors and pools and the lower occupancy rates of apartments. In contrast, townhouse/villa developments had the lowest greenhouse gas emission levels compared to other dwelling types when measured per household or per capita. This does not mean that density is always counter-productive to energy efficiency. The operational costs and Greenhouse Gas Emissions (GGE) can be affected by the design and can either enhance energy efficiency or burden residents with its costs. High density, for example, might have little place for drying clothes so all units might need a dryer; on the other hand, each complex might provide a bank of communal washers and dryers, which save on embedded energy and life cycle costs of equipment. Appliance ownership, household size, dwelling size and dwelling type all affect energy consumption. Of course, these emissions might be balanced by the savings from lower individual transport demands and solar power purchased in bulk.

The advantages of using solar photovoltaic (PV) on medium density complexes means that unit owners can band together as a single purchaser of energy and negotiate a bulk purchase of power at a cheaper rate. Clearly medium density has more purchase power than lower density duplexes. A body corporate could negotiate power purchase, distribute it using a master metering system (with individual meters), pay for maintenance, and the savings on power fed back into the grid could be used to offset communal area costs.

The use of solar PV on units is not limited by the number of units but by the amount of roof space, the orientation and the metrics associated with how it is controlled and maintained.

A 2KW system preferable for a two-bedroom unit, requires about 12 panels and occupies approximately 20-24m² of roofspace. The three storey perimeter courtyard unit typology would have a total roof area of about 800m² (on a 35x40m² site). If a conservative roof area of 24m² per unit is applied for each unit, there is enough room on the roof for around 30-33 units. Our three storey typology has around 14-17 units, a 5 storey version around 28-31 units. It therefore appears that for the perimeter form of development, which satisfies many of the seniors’ sustainability preferences, there is an upper limit to using PV on smaller infill sites. This also coincides with the seniors’ preference of medium density housing of 3-5 storeys or 14-30 units.

**Feedback on the process**

Participatory research is intensive and requires a strong commitment to involving participants throughout the study. It demands respect for participants, to value their input. It also requires effective interaction and explanation of terminology that might not be familiar to non-planning professionals. From the researchers’ and design team’s perspectives, participatory approaches contribute an additional dimension of understanding and in-depth insight into the issues, challenges, and potential solutions. It makes the research ‘real’ and more useable.
Feedback from participants (B=Brisbane; SC=Sunshine Coast) through direct comments at workshops and 19 responses to a final survey indicated that the participatory research approach was greatly appreciated. The process was rewarding, informative, and broadened their horizons.

I think the whole exercise was well conducted and of greater help than anticipated.... I really enjoyed taking part in this research. (SC)

It was very interesting and informative. I found the simulated planning and discussion fascinating and enlightening. (B)

I thoroughly enjoyed participating I learned a great deal with more to consider later. (B)

It was terrific to hear about all the possibilities and opened my eyes to the incredible range of things that different people came up with, especially future needs. (SC)

It’s certainly broadened my views and given me some insight into what’s involved in future planning. (SC)

It opened up many issues that I had not realised and helped me realise the whole process is extremely complex. (B)

In particular, participants valued being able to express their views and to debate ideas within the small groups and with the project team.

You took great care to capture what we portrayed. (SC)

...our ideas and photos were captured with respect. (SC)

Photovoice process was both clear and comprehensible. It was also an enjoyable task ... our ideas and photos were captured with respect. (SC)

Everybody was able to have their say and good discussion followed. (SC)

it was good to interact with people involved in working in town planning and council representatives. (SC)

...the fact that most of us were eager to attend each meeting and that we were happy to do what was asked of us, is proof of the pleasure and educative benefits derived from the whole process. (SC)

I was pleasantly surprised that there was so much consensus among the groups about the things that were important to us, and many photos were of similar things. (SC)

I enjoyed interaction with design professionals. (B)

...benefits from sharing concepts with others in a group - a positive exercise with interesting people with diverse ideas. (B)

The design staff ... did an exceptionally good job of drawing plans to represent group’s suggestions. They were able to interpret and represent our ideas in a clear professional manner. Very good team. (B)

I appreciate the design staff listening with my opinions and joining in on ensuing discussions. worthwhile experience thoroughly enjoyable. Would love to be involved in future projects. (B)

Cassie was excellent in interpreting our ideas on paper and helping us solve difficult aspects of the design. Full marks to Cassie. (B)

Many people underestimated what they could contribute, as illustrated by this participant:

I felt at the beginning that I wouldn’t have much to contribute. As others started the process, though, it was surprising how it got me thinking about my preferences. (SC)

Participants fed back some useful suggestions about the process:

Perhaps there was insufficient time to explore options for the designs. (B)

I was able to photograph buildings, parks, roads, and features of houses however some things could not be easily captured in a photo, e.g. a floor plan, a site plan, or a problem like “not enough natural light”. (SC)

I would have loved to be given some parameters and allowed to work on a design all by myself! Maybe take it home and bring it back to the next session. I doubt that the time allowed at the workshop really accomplished much. (SC)

Some things were difficult to capture in a photo e.g floor plans of good design, north facing aspect, good natural lighting. (SC)

I can appreciate that social and economic constraints do have a place in design but, in the end I did feel that these issues prolonged the whole workshop, maybe the process should be divided into two stages? (B)

The group was not representative across the socio-economic spectrum. (B)

In terms of outcomes, comments from participants indicated that they felt better prepared for their future. They learned a lot about development constraints and options and what to ask for when changing homes.

Since being involved with this research, I have looked at our home and seen where changes could be made to make it more suitable if we have problems with mobility as we get older. (SC)

If I had to move out of my present home then I think I would have a better idea of what to look for in new accommodation. (SC)

It gave me greater understanding of what can be done to improve facilities in different types of living conditions both for single people and couples ... If the ideas are adopted, I think it will greatly benefit older people. (SC)

I was able to take on board the idea of possible problems in years to come e.g. stairs which turn at right angle, getting food shopping upstairs. (SC)
... I learned of some new and innovative ideas that might meet those [my] needs. (SC)

It was interesting to see how the ideas we had discussed in the photovoice process could be put into practice in design. Not everyone is looking for the same type of accommodation so various types were considered....I am looking at the design of my home and planning changes which might need to be made in the future.(SC)

I have a much clearer concept of what would be most important to me and what compromises I may need to make. (B)

It started me thinking about alternatives. (B)

It made me more optimistic of alternative models being developed, not only for myself but for other seniors, particularly those with greater financial challenges. (B)

If the study brings results from Council and developers then it will have been very worthwhile. (SC)

I consider that many of the designs could be implemented into future homes and environment. (SC)

While considerable feedback was gained about individual typologies at the final focus groups in February 2012, some written comments about the typologies were as follows.

One design stood out for me from rest of the other submissions and that was the design for Corinda. May I add not because it was at that suburb but I felt it was ideally suited for an infill in most places and was a design that would lend itself to most of the ideas the group submitted.(B)

Special Mention to Deike Richards for putting in their time and effort, some of the designs submitted had areas which were appealing but for me personally the simple design won out. (B)

They also felt that their input was taken on board, as illustrated by the following:

The dot exercise was an added feature to cement design principles. Well thought out.(B)

The final session on 15th February was excellent, I was really pleased to learn that our ideas and input have been taken account of, and incorporated in the designs that were put forward.(SC)

Aspects that were of concern are described by the following comments. It should be noted that some of these were received prior to final focus group where the typologies were presented and explained.

I saw nothing that was creative or innovative... (SC)

Housing for lower income seniors were close to noisy environments which were disappointing. (B)

I’m not sure how many of the principles that were decided on earlier were incorporated into the end results. (B)

I feel that most of the ideas were lost between the Charrette and the design stage, looking at what was produced ended up mostly standard commercial designs; where was the focus placed on the essential items highlighted in the Charrettes such as, fire safety, housing, stairs & lifts, ventilation, lighting, noisy environments, and security. (B)

For the project team, our own preconceived ideas about the benefits of densification were tested, and designing to achieve the very worthwhile principles, combined with seniors’ preferences, proved to be complex and stretched our abilities. The principles confirmed the strong and urgent messages for developers about the importance of private outdoor space, visual amenity and universal design – also that concepts of natural aspect and sustainability are important to seniors, because of perceived cost-savings, as well as for physiological and ethical reasons. Concepts about flexibility were also tested. The use of sustainable design features have implications for long-term residents and housing providers who can offset lifecycle costs.

Our group of participants was not representative of all seniors in all ages, locations, and contexts. For example, only a very small number of the participants were from a low socio-economic status, possibly because we invited candidates to self-select or volunteer through seniors groups and local networks. This may have been the reason that affordability and rental issues did not feature as prominently as expected. While the general consistency of our results with other studies is reassuring, future participatory work of this nature might consider targeting older people from lower socio-economic backgrounds, possibly through housing provider groups. Future studies could also explore perceptions of older people living in high rise buildings.

In addition, in future work of this type, taking participants on a tour of display accommodation or a development that features excellent universal, sustainable, and affordable design and includes diversity in high and low rise might provide tangible experience to draw on in discussions about the range of possibilities.

Finally, a challenge in participatory research is keeping participants engaged throughout the project. We were fortunate that 95% of our participants stayed with us through the Photovoice and Charrettes, with about half attending the final feedback focus group.
Conclusion

“We are happier in many ways when we are old than when we are young. The young sow wild oats, the old grow sage.’

by D Enright, The Wicked Wit of Winston Churchill

What would a sustainable, affordable and liveable neighbourhood future look like for older people? Our participants certainly hoped for a future where inclusive, multi-generational communities predominate in our towns and neighbourhoods: where the contribution and presence of elders is respected, valued and celebrated. They wanted to be able to move with ease from their universally designed home, along evenly graded, well maintained and shaded walkways, that are safe from passing cars and cyclists in a peaceful green neighbourhood. As a time may come when they cannot (or choose not to) use their car, it is important that shops, services and facilities are in close proximity. Human scale environments were important to our senior participants, so “village style” shops, services and facilities were a clear preference for ease of access (usually at level, with public transport and at level car parking) and social networking.

Many of our participants preferred a home on one level, ideally two bedrooms and a study which can be adapted to changing needs, and a number of private and shared outdoor spaces to be social, to relax, and to provide pleasant outlooks from the home. These homes would be sustainably designed: capturing prevailing breezes for through ventilation, natural sunlight, provide for privacy and noise considerations in higher density and provide solar and rainwater harvesting systems to save resources and money. A safe and secure home and neighbourhood was also important. Although aged care was not in the forefront of the seniors’ minds when considering a suitable neighbourhood and dwelling, choice, independence, integration and dignity were consistent themes discussed throughout a range of topics, including access to care services.

In summary, the senior participants indicated that the following feature were of most importance to them:

- A sense of community in neighbourhoods and opportunities for multi-generational interaction
- A universally designed home and neighbourhood
- A variety of green, clean and safe public open spaces, natural amenities and facilities.
- Safe, evenly graded, well maintained and shaded walkways providing active transport options that are important for health, enjoyment and connectivity to shops, facilities and public transport (particularly if no longer driving)
- Village style shops, services and facilities in close proximity to home
- Adequate space at home, ideally with the option to adapt the floorplan as needs changed
- A choice of shared and private outdoor space in accommodation
- A home that provides through ventilation, natural sunlight wherever possible, solar and rainwater harvesting systems as they all save money and resources
- A home that considers options for privacy and noise attenuation in an urban or a higher density area
- The importance of security features at the dwelling level and perceptions of personal safety in the neighbourhood

These were largely expressed through the Principles developed in collaboration with the seniors. Additional key messages included:

- Expression of individual identity through housing choice, diversity and differing needs for social contact and privacy at the accommodation level
- Human scale’ of accommodation translated through visual design and in appropriate numbers and massing of units in medium density housing
- A preference for a ‘pick and mix’ aged care services, case managed so that the overall care is co-ordinated, with seniors making independent choices on the options that best suit their needs at any given time.

This research aimed to identify greater diversity of housing choice for seniors through a range of new housing typologies, particularly in neighbourhoods that matched their preferences. One of the unexpected watershed moments for the research and design team from analysis of the outcomes of both the PhotoVoice and Charrette phase was that, from a design and planning perspective, the housing typologies most preferred by the senior participants were actually the best fit (in terms of grid layout and average lot size) with a neighbourhood that also met their needs (see Figure 102). This means that not only do age-friendly infill neighbourhoods and dwellings have practical application in a spatial context, they are also well within reach.

There are however some challenges and potential solutions for planners and policy makers, design and development professionals and seniors themselves to consider, as outlined below.
The future age-friendly infill neighbourhood

Given the wealth of policies and guidelines that already exist at the two scales of neighbourhood and the home, the obvious question then becomes why have we not been able to achieve affordable and sustainable infill developments thus far, especially those that are liveable for seniors?

This research has revealed the clear and important relationship people have between their neighbourhood and home: it affects their happiness, wellbeing, sense of security and sense of place. However few mechanisms actually work to support the importance of this relationship at the neighbourhood and housing scale. A strategic design framework for achieving a range of housing and care options in-neighbourhood is ideal. This research likewise confirms the relationship between affordable, liveable, sustainable development of infill areas. It is indisputable that Australian homes built with a northerly aspect that allow natural light and ventilation, enabling individual control over resource consumption, in socially inclusive safe neighbourhoods with shady green spaces, are more liveable and affordable.

Visions for the future embrace the logic of age-friendly neighbourhoods and increased housing choice, that go beyond the current of options of residential villages or ageing in an unsuitable home. There is currently a gap in the spectrum of modes of living for older people which are in some ways on opposite ends of the scale. Older people should be enabled to transition easily to the mode of living that suits them depending on their needs, whether they choose to re-locate or have care services come to them, in a way that is not financially prohibitive. Location and housing choice are at the core.

Planning regulations

One way to effect positive change towards age-friendly communities might be more adaptable and responsive planning regulations and building codes which can respond to demographics and associated needs, which fluctuate over spatial and temporal scales. For example, the principles of smart growth are accepted and supported at a national and state level in Queensland planning. However, while smart growth encourages consolidated urban forms around key transport nodes (to encourage greater public transport use and therefore more sustainable outcomes), development assessment has not generally provided for relaxation of parking space provision requirements per dwelling for nearby developments. Because car parks add a significant construction cost to the dwelling, trade-offs are often made on visual and natural amenity, shared and private outdoor space, and environmentally sustainable features, all design aspects so critical to seniors – and perhaps the vast majority of people given the choice. These risk being lost through the need to meet parking requirements.

The Brisbane City Council allows for flexibility in on-site car parking provision for residents and their visitors in medium and high density living. In the medium and high density Codes, resident and visitor parking must be provided according to: the number, size and type of dwellings proposed; the availability and acceptability of kerbside parking adjacent to the site; local traffic or parking management; and the likely preference of the occupier or target market. However in both Codes, the resident parking provision may be reduced from the rate specified in the Acceptable Solution where public transport is available within a reasonable walking distance. In addition, off-street parking may be provided where qualifying for a subsidy for aged persons or persons with disabilities accommodation at a rate of 1 car space per 3 dwellings. Consideration could also be given to relaxation on car park requirements in areas where community or flexi-car options are provided.

Finally, suburbs with high senior populations or identified as potentially age-friendly, could provide priority zoning for universally designed dwellings within a walkable catchment to services, facilities and public transport. Planning scheme policies should reflect their strategic intent for more affordable living and walkable communities. Support of this policy by industry could be encouraged by providing incentives such as reduced timeframes or application fees for universally designed (or a percentage thereof) developments. This has the additional benefit of using price mechanisms to respond to strategic intent rather than rely on the temporal scale imposed on changes to planning schemes.

How to make it happen

Significantly, each stakeholder needs to take responsibility for their part in achieving these goals.

*Potential residents* need to be clear about what they want and demand it from the market. No more internal staircases. Easy access from a garage. Universal or adaptable design. Useable private outdoor space. Accessibility to services with modifications to reduce noise if necessary.

*Developers and the construction industry* need to be proactive and start providing standard design features that improve resident comfort and enjoyment as well as reduce operational costs. Universal design and passive and active sustainability features are clearly affordable in the long-term and broaden the future appeal and marketability of accommodation.

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227  BCC 2000, p.192
228  BCC 2000, p.182
**Planners and policy makers** at various levels of government need to identify potential age friendly communities – being locations (centres) that fulfill the neighbourhood level principles – i.e. access to services and facilities, walkability (considering typography), and public transport. Local government planners and policy-makers need to proactively plan for infill development that acknowledges the relationship between the neighbourhood and the home to provide more accessible, enjoyable human scale environments. This includes small scale services and facilities in close proximity to meet everyday needs that are easily accessible by foot or public transport, as well as retaining and enhancing nearby open space. Incentives could be provided in municipal planning schemes through reduced application fees for developments that are age-friendly within 400m to 800m to key services, facilities and transport, or for housing development that demonstrates universal design, commensurate with the percentage of dwellings that are universally designed. Maintenance of walking paths, age-friendly public and community transport and opportunities for increased civic engagement and multi-generational mentorship could be prioritised in the budget.

Finally, urban designers and architects need to stretch themselves and their clients to meet sometimes incompatible goals. Only in this way will infill communities be developed that are attractive to older people based on closer integration of accommodation with the services, facilities, and transport while establishing a vibrant village style living.

The gradual acceptance of medium density development reflects an emerging Australian trend in the residential mix where such neighbourhoods and accommodation are gaining legitimacy as ‘homes’. This means that ‘although the suburban dream is still alive and well, it is no longer the only permissible dream’\(^{229}\).

\(^{229}\) Timms 2008, cited in Baker 2011 p.2
References


BCC (Brisbane City Council), 2011, *Draft Senior Strategy: Delivering a seniors-friendly city 2012-2017*: Brisbane City Council’s commitment to enabling seniors to benefit from and contribute to our shared vision for the future of Brisbane.


Council of Mayors (SEQ), 2011a, Next Generation Planning: A handbook for planners, designers and developers in South East Queensland, Brisbane.


DIP (Queensland Department of Infrastructure and Planning), 2007, Housing Affordability Strategy.

DIP (Queensland Department of Infrastructure and Planning), 2009, South East Queensland Regional Plan 2009-2031.

DIT (Department of Infrastructure and Transport), 2010a, *Our Cities: Discussion Paper*, Major Cities Unit, Canberra, Australia.

DIT (Department of Infrastructure and Transport), 2010b, *Our Cities: Background and Research Paper*, Chapter 6, Liveable Cities, p.95, Major Cities Unit, Canberra Australia.


Easthope H and Judd S, 2010, *Living Well in Greater Density*, City Futures Research Centre, University of New South Wales, Shelter NSW.


ILC (International Longevity Centre) UK, 2007, *Towards Lifestyle Neighbourhoods; Designing Sustainable Communities for All*, Department of Communities and Local Government.


OESR (Office of Economic and Statistical Research), 2010a, *Estimated resident population by local government area, Queensland, 2000–2010*.

OESR (Office of Economic and Statistical Research), 2010b, *Projected population (medium series) by local government area, Queensland 2006-2031*.


SCC (Sunshine Coast Council), 2009b, Housing Needs Assessment: Background Study, August 2009.

SCC (Sunshine Coast Council), 2010, Affordable Living Strategy.

SCC (Sunshine Coast Council) 2011a, Positively Ageing Strategy.

SCC (Sunshine Coast Council) 2011b, Sunshine Coast Access and Inclusion Plan 2011-2016.


ULDA (Urban Land Development Authority), 2011a, Housing Strategy, version 2, August 2011.


ULDA (Urban Land Development Authority), 2011c, Accessible Housing, ULDA guideline no. 02, Nov 2011, ULDA.


