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Department of Health and Ageing



Family &  
Community Services  
Ageing, Disability & Home Care

# A user appraisal of the contribution of built environment factors to the independence and wellbeing of older people in two NSW regional town centres

PEER  
REVIEWED

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[www.homemods.info](http://www.homemods.info)

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# 1 Introduction

This research project investigates, from the perspectives of older people, the configuration of regional town centres that most effectively support older residents. The appropriate design, construction and maintenance of town centre infrastructure are key concerns for the NSW Human Services and Health Departments. The NSW Ageing, Disability and Home Care (ADHC) Department, in partnership with the NSW Office for Ageing, have been concerned with promoting a Healthy Ageing Framework for NSW since 1998. More recent exploratory consultations undertaken across NSW in 2004-2005 provided some insights into what older people regarded as issues of concern, but much remains unknown (NSW Ministerial Advisory Committee on Ageing, 2006).

Most regional Local Government Authorities (LGAs) do not have the resources nor the appropriate tools required to understand and respond to the infrastructure needs of older people. Thus, few new regional infrastructure developments consistently and adequately address population ageing. Failure can be evident in both the numbers and placements of required amenities. For instance, new developments and significant retrofits seldom address wayfinding for cognitive impairment or provide accessible seating every 50-100m for those with cardio-vascular or arthritic issues. Yet both strategies are critical in enabling continued independence and autonomy in walking for older people (Bridge & Elias, 2010).

The World Health Organisation (WHO) has prioritised the identification of environmental and social factors that contribute to active ageing in urban settings, because an age friendly city is one of the most effective policy approaches for responding to demographic ageing (WHO, 2007b). A failure to respond to older people's need for a legible, accessible, safe and pleasant urban environment restricts their potential for participation in community activities. Since its release, the Active Ageing Framework has been used by the WHO as a basis for developing guidelines to make front-line primary health care services more 'age-friendly' – that is, more accessible and responsive to the specific needs of older people (WHO, 2002). The immediate built environment conditions and local neighbourhood circumstances of older people will be an increasingly critical factor in their overall wellbeing as trends towards ageing in place continue. An individual's need for support is related to their community environs and not just their impairment level (Wells, Foreman, & Ryburn, 2009). Judd, Olsberg, Quinn, and Demirbilek (2010) found that a wide range of neighbourhood factors were important to positive and active ageing, including the provision and design of pedestrian paths; transport infrastructure; availability of open space; provision of street furniture; and safety and security in public spaces.

Knowledge of what older people regard as issues of concern in their built environment is crucial to ensuring age-friendly towns. As part of a strategy to identify the most effective application of LGA resources to create age-friendly towns, this project developed a pilot system for auditing the built environment from the perspectives of older people. An iPad application was developed to allow people on the move to audit issues with the built environment when they are encountered, and collate the information for council action. This report outlines a new interactive system developed for auditing regional town centres, and presents the results of walk and talk auditing sessions run at Tweed Heads and Wollongong using this system.

## 1.1 Background

People over the age of 65 are an increasing demographic in regional cities, and there is a need for the built environment to be as supportive as possible for its older residents. Population ageing poses a number of challenges for regional planners and the number, location, health, disability (physical, sensory, cognitive) and age skew of the older population will impact everything from seating design and the width of footpaths, to transport, roads, amenities, public spaces and housing. There is a growing body of Australian research demonstrating that currently the majority of older people live in the community and never enter residential aged care, and that an enabling environment and healthy living practices increase the chances of continued community living as well as longer and higher quality life outcomes (Kendig, Pedlow, Browning, Wells, & Thomas, 2010).

Exploring the built environment conditions and local neighbourhood circumstances of older people is a critical factor in their overall wellbeing, and Wells et al. (2009) state that adopting strategies for enhancing wellness is advantageous not just for older people but also benefits all age groups. This is unsurprising given that low levels of physical activity are responsible for approximately 7% of the burden of preventable health problems and disability and up to 3% of direct health care expenditure (Hill, Schwarz, & Winbolt, 2009). Further, ageing is linearly correlated to a level of disability. In 2006 the Australian Bureau of Statistics (ABS) reported that long-term health conditions are more common with increasing age. In 2005 nearly 100% of people aged 65 years or more reported at least one long-term health condition (ABS, 2006) and this is likely to continue into the future as the oldest-old population cohort is ageing most rapidly. Indeed, the Australian Institute of Health and Welfare (AIHW, 2003) reports that the number of people over age 85 years is projected to increase fourfold over the next 40 years.

Population ageing is a demographic change that brings challenges and opportunities for NSW regional LGAs. Research has shown that regional populations in Australia are ageing faster and are more disadvantaged than urban populations (Crombie, Disler, & Threlkeld, 2009). LGAs are helping communities prepare for the impact of population ageing, which involves planning and implementing local solutions to ensure that changing needs are met by creating more accessible and age-friendly town centres, parks and facilities (NSW Government, 2012). LGAs have responsibility for ensuring the suitability of the built environment, primarily through monitoring minimum standards of design and construction for access and mobility. There are however shortcomings in this legislative approach. In many instances wider built environment outcomes have been reduced to compliance with a minimum standard as stipulated by the Building Code of Australia or Standards Australia (Australian Building Codes Board, 2002; Standards Australia, 2013). There has been insufficient attention paid to the needs of the 'the older user' within these standards, despite the existence of liability for environmental harm and the passing of the Disability Discrimination Act in 1992. The background study that informed the development of the Australian Standards only involved participants aged between 18 and 60 years, which means older people were in fact excluded from design considerations. Further, older people and people with disabilities are often viewed as a homogenous group of wheelchair users under these guidelines, which disenfranchises many other functionally impaired groups whom have hidden disabilities like emphysema and arthritis. Further, human functional and size variability is generally poorly understood and the failure of our current physical infrastructure to accommodate older people appropriately can be attributed to using a narrower range of variation than is in fact present in the population, as different

people with different impairments experience varying barriers and facilitators in the environment (Steinfeld, Maisel, & Feathers, 2005; Thapar et al., 2004).

There is a growing trend of older people moving to regional cities as they retire. The ABS reports that by 2056 there will be less than two working age people for every older person 65 years and over in non-city areas of NSW, VIC, SA and TAS, compared to 5 working aged people per older person in 2007 (ABS, 2009). Consequently, the immediate built environment conditions and local neighbourhood circumstances of this group will become an increasingly critical factor in their overall wellbeing, and the long-term costs for regional cities if they do not cater for their older population could be significant. Yet there has been little direct research on these issues in Australia. Research from a multidisciplinary and older person focused perspective lays an important foundation for healthy ageing in the development of 'age-friendly' societies; in other words, one that is optimally socially inclusive of older people. Understanding the complexities of rural healthy ageing is challenging, and acquiring a better understanding of urban design challenges and older people's responses to them is a part of developing this much needed empirical base. A better understanding of what is valued and what works for older people is required to give policy-makers the necessary knowledge to plan and legislate such that older people can continue to enjoy all the activities offered within their regional town centre.

## 1.2 Aims and research questions

The purpose of this study was to establish a clearer understanding of what aspects of the built environment are valued and function well for older people and what features restrict their access and diminish their wellbeing. The project aimed to collect and analyse data from older people concerning negative and positive elements of their local town centre in order to understand the impact of the built environment on older people's engagement, independence, participation and security. As such, it is anticipated that this report will be of most significance to LGAs, to facilitate cost effective changes to the local town centre and to improve the quality of life of older people living in regional areas of NSW.

The research questions that directed this project are:

1. Does good long-term planning make a difference to town centre outcomes for older people?
2. What makes the town centre age-friendly and attractive from the perspective of older people?

An adjunct aim was to develop innovative ways of collecting and collating the perspectives of older people about their local built environment. To this end, the research team developed a pilot auditing system based on an innovative new iPad application to allow active older people to audit issues with the built environment when they are encountered and collate the information for LGAs to action. This application is capable of capturing information about the built environment from the perspective of older people themselves, and generating graphical displays of this data for use by LGAs in addressing these issues. These graphical displays also form the basis for the presentation of data trends and further research.

This report will firstly outline the development and application of this new interactive auditing system as well as the other methodological tools utilised in Section 2, and secondly will present and discuss the results of the walk and talks and quality of life surveys tested at Tweed Heads and Wollongong using this system in Section 3. Limitations of the study and future steps will be discussed in Sections 4 and 5.

## 2 Methodology

This section is divided into two parts. The first part describes the overall research design and methodological approach adopted in this study, including how the regional cities were sampled for the pilot, the definitions used for 'town centres' and 'town centre walking zones', and the approach taken to community engagement in this study. The second part discusses the specific research methods and tools used to collect data in this project, describing the development and uses of the iPad application, the format of the walk and talks, and the survey questionnaire used to measure quality of life.

### 2.1 Research framework

One economically sustainable option to facilitate ageing in place is by maximising the support provided by the built environment. A better understanding of what is valued and what works for older people is required to give policy-makers the necessary knowledge to plan and legislate such that older people can and do continue to enjoy all the activities offered within the town centre. The World Health Organisation (WHO), using a participatory action-based form of research, has developed a comprehensive guide as to what constitutes an aged-friendly city (WHO, 2007a). A checklist of eight key age-friendly attributes was developed by the WHO for consideration when planning for age-friendly cities: 1) transportation; 2) housing; 3) social participation; 4) outdoor spaces and buildings; 5) community support and health services; 6) communication and information; 7) civic participation and employment and 8) respect and inclusion. Our analysis of the walk and talks in section 3 addresses the two WHO topic areas most relevant to our findings about the built environment by discussing them as distinct themes: 1) outdoor spaces and buildings, and 2) community support and health services.

#### 2.1.1 Regional cities sampling

Many older people live in regional areas in NSW. In some coastal areas such as Great Lakes and Tweed Heads, nearly 1 in 4 of the total population are already over 60 (ABS, 2010). The research team selected the regional cities of Tweed Heads and Wollongong to pilot the iPad application and associated auditing system to evaluate the perceptions of older people in these towns about their built environment and to thereby determine the degree to which the existing built environments facilitate accessibility and hence contribute to wellbeing. Tweed Heads and Wollongong were selected for this pilot study because each brings a unique geographical and historic perspective that forms an interesting basis for comparison.

Tweed Heads was selected as a pilot site because the Far North Coast is the fastest growing area for older people in NSW outside of Sydney, with an expected increase of 34% by 2031, and many older people in this region have little local family or support networks raising a number of issues in relation to accessing services (Northern Rivers Regional Development Board, 2005). Tweed Heads had an overall population of 81,953 people in 2006, 29% of whom were aged 60 years and over and 15% of whom were aged 70 to 84 years and over (Libreri & O'Reilly, 2008). In contrast, Wollongong had a total population of 183,632 people in 2006, 14% of whom were aged 60 years and over and only 2% of whom were aged 70 to 84 years and over (Libreri & O'Reilly, 2008).

Wollongong was selected as it has been the site of specific government initiatives regarding ageing. Healthy Cities Illawarra was established as a pilot program in 1987, initially funded by the Federal government along with Noarlunga (South Australia) and Canberra (ACT). The Healthy Cities program was first formed after the WHO's introduction of the Healthy Cities Movement in 1986 (WHO, 2013). Today Healthy Cities Illawarra is a non-government, community-based organisation operating from offices in Wollongong and Nowra. The fact that there has been such a longstanding community and government investment in this program allows us to test the Healthy Cities principles against actual built environment outcomes for older people.

## 2.1.2 Defining 'Town Centre'

In this research, the particular focus was on the town centre and main street area of the regional centres. There are many competing definitions of 'town centre' in academic literature due to their indeterminate boundaries (Thurstain-Goodwin & Unwin, 2000), and many ad hoc usages of 'town centre' terminology in policy and planning documents and in everyday use. In planning documents, town centres tend to be defined by geographic features, see for example this excerpt from the Tweed Heads Town Centre Master Plan: "Tweed Heads Town Centre is located at the mouth of the Tweed River and forms part of the southern edge of the Gold Coast conurbation. It is contiguous with the township of Coolangatta in Queensland, immediately to the north and west. The approximate area of the town centre is 85ha including the surface area of the Jack Evans Boat Harbour" (Tweed Heads Taskforce, 2004, p. 11). There can be many different centres within a town, differing in their key activities or cultural characteristics, for example a retail centre, an office centre, a tourist centre, and areas of high building density (Thurstain-Goodwin & Unwin, 2000). For this project, the research team decided on a definition that is most tailored to the needs of older people and takes into account limited mobility as well as traditional indicators such as retail and service density. For these reasons, we use a 400m walk zone that encompasses a variety of shops, services, and recreational areas as the basis of the town centre.

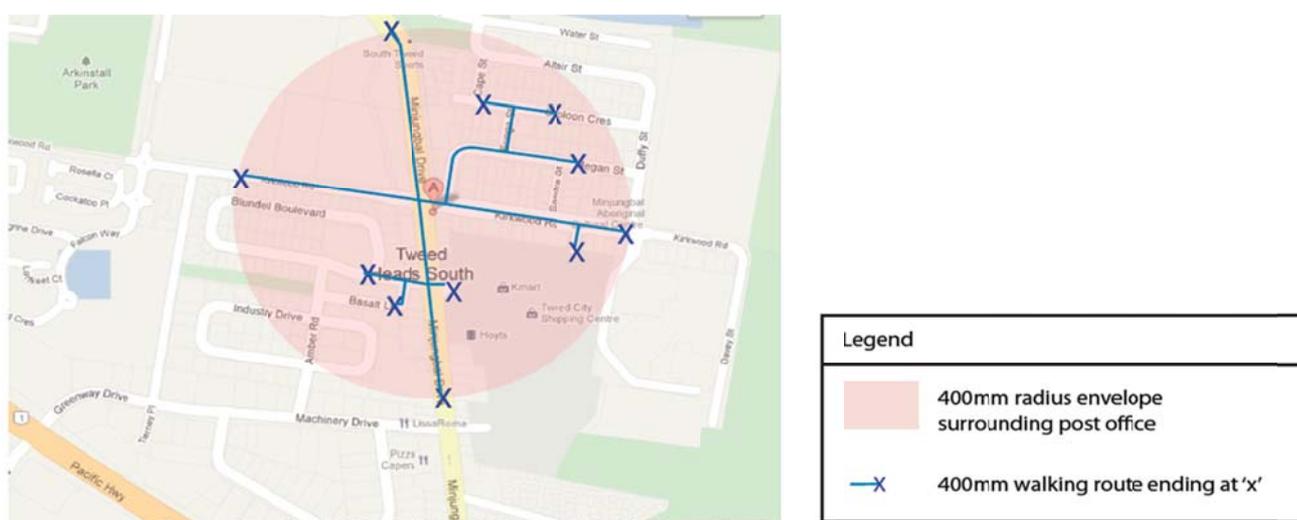


Figure 1: Example of 400m walk zone at Tweed Heads

Planning NSW states that "Potential walkability is defined by a circle of radius 400m or 5 minutes' walk around a centre" and "Actual walkability is defined by drawing a line along all streets up to 400m or 800m distance and by identifying all sites

accessible to that line” (NSW Government, 2004, p. 19). The selection of this length walk zone in particular (one average square block in a commercial district) is further supported by the general urban planning assumption that that people of all ages will comfortably walk approximately 400 meters to reach a transport link or other important destination (Hess, 2009). Further, for many older people 400m is the maximum comfortable walk limit (American College of Rheumatology, 2011).

### 2.1.3 Town centre walking zones

Older people tend to drive less, but also be less physically mobile. As people grow older, their spatial area will often shrink to the vicinity of their home or immediate neighbourhood, and therefore resources within the community become increasingly important (Weiss, Maantay, & Fahs, 2010). Further, age-related diseases, as well as cognitive and physical changes, may decrease the ability of older people to cope with environmental stress (Weiss et al., 2010). Therefore, the ‘walkability’ of the town centre in the area in which older people live is very important. The concept of ‘walkability’ involves firstly, a built environment that is both barrier-free and supports a need for limited physical activity, and secondly, a high density of centralised shops and services. It also involves pedestrian-friendly streets, with direct and safe connections between places of interest or demand (Frank, Kerr, Rosenberg, & King, 2010), safety from traffic and crime, and aesthetics (Weiss et al., 2010).

While nationally and internationally, a range of measures of built environment quality exists, there are several distinct approaches to the study of environmental gerontology relevant to this work. There are approaches that examine perceptions of the person and environment as separate entities. For example, simplistic ‘geocode’ metrics evident in the ‘walkscore’- a web/phone application take a residential address and apply geo-spatial metrics to calculate a walkability score ranging from 0-100, derived from proximity to commercially listed shops and facilities. There are also approaches that measure or assess the ‘fit’ or ‘mismatch’ between the person and the environment. Existing built environment measures that adopt this approach cover a range of phenomena from general neighbourhood satisfaction (Day, 2008) to street audits (Allen & Clark, 2008; Giles-Corti et al., 2008; Inclusive Design for Getting Outdoors, 2009; Millington et al., 2009). While distinctions amongst these approaches have fundamental implications for theory, measurement, and the subjective experience of participants, previous research has generally treated these approaches as interchangeable. For instance, Edwards, Cable, Williamson, Schurer-Lambert, and Shipp (2006) argue that importance, familiarity, concreteness, measurement error, order and conceptual bias all impact on outcomes and that for this reason it is critical that more work is done. Consequently, for this project the research team have chosen to focus on a ‘mashup’<sup>1</sup> that incorporates older people’s perceptions of the walk and talk through different modes including geo-coded data and photos and text and audit information recorded via the iPad application.

### 2.1.4 Local government community engagement

Traditional methods for engaging the community in the decision making processes of LGAs have been characterised by traditional town hall meetings and face to face

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<sup>1</sup> A mashup, in web development, is a web page or web application that uses and combines data, presentation or functionality from two or more sources to create new services. The main characteristics of a mashup are combination, visualization, and aggregation.

surveying. However, these methods of civic engagement may be more difficult for older people and people with disabilities to access and attend due to their health and mobility concerns and social and economic status (McBride, 2007). Growing uptake of personal computing and communication devices such as smartphones and tablets with advanced capabilities such as text, audio, and video opens new avenues for engaging citizens in their local communities. Such devices not only allow personalisation and customisation in disseminating local information (e.g. location specific garbage collection schedule, development applications, etc.), but also allows for various forms of information collecting, such as soliciting feedback on specific local government issues and enabling residents to report problems in their local area (Grady & Bateson, 2012).

There is a small but growing trend of LGAs using technology in innovative ways to engage with members of the community. One of the ways in which LGAs are engaging more with their communities is through the use of phone applications or 'apps' (Grady & Bateson, 2012). Apps are Internet based applications that run on smartphones and other mobile devices. Some LGAs have developed reporting systems in which residents can report issues and provide feedback using their smartphones, which results in increased portability and swiftness of interaction than would be found in traditional reporting mechanisms. For example, 'FixVegas' is a free mobile phone application that allows users to submit photos and reports to their local council in Brisbane (QUT Urban Informatics, 2013). This application was created by the Queensland University of Technology Urban Informatics Research Lab and relies on existing support by councils to sort and compile the reports. 'Snap Send Solve' is an Australia-wide smartphone application "that lets you report issues and provide feedback to your local council in under 30 seconds" (Outware Mobile, 2013). The app automatically determines which local council the report should be submitted to via the mobile's inbuilt GPS and it is then submitted to the existing reporting mechanisms councils have in place. Several other LGAs in NSW, for example Randwick, Willoughby, and Parramatta have begun to offer personalised services for residents via apps, such as for waste collection bookings, shuttle bus tracking, parking availability, local events, and problem reporting (Moses, 2012).

However, these apps are generally not integrated with existing LGA reporting systems, and many just send feedback from residents to a generic council email account. These existing applications are also aimed at the general population and have not been tailored for the use of older groups in the community and therefore may be inaccessible to many older people and are unlikely to address the specific issues they may experience with the built environment. The most significant difference in the app developed for this project is the ability to *tailor* the data received to relate to existing built environment standards, guidelines, and strategic plans. LGAs can thus use the app to monitor their progress in achieving strategic outcomes related to ageing, accessibility, and the maintenance and quality of the built environment.

There are many benefits associated with the use of smartphone apps, which can represent innovative ways of creating and sharing content, and provide a bidirectional information exchange between governments and citizens (Grady & Bateson, 2012). Social media, including phone apps, "enables a two-way communication, allowing people and organisations to create and share content in the form of words, pictures, audio or video, in real time, almost anywhere" (Howard, 2012, p. vii). Furthermore, most staff in local councils believe that the use of social media such as phone apps should be integrated with their community engagement strategies, to complement more traditional methods of engagement like letters and

face to face contact (Howard, 2012). LGAs that currently take a strategic approach to engaging with social media have reported success with outcomes such as reaching out and communicating with hard to access groups in the community, and consulting the community about problems in their local area to gain feedback (Howard, 2012), both issues that are of primary concern to this project.

## 2.2 Research Methods and Tools

Two key research strategies were used in this pilot study to effectively solicit older people's perspectives on the built environment in their regional town centre and explore the relationship between the built environment and independence and wellbeing outcomes. Firstly, an iPad application was developed that captures information inputted by users about the environment directly around them. Secondly, 'walk and talks' were held in two regional cities, Tweed Heads and Wollongong, in which members of the project team led small focus groups of older people in walks around the town centre, collecting their views and perceptions of the built environment with photos and commentary using the iPad application. Finally, an adapted Quality of Life (QOL) survey was administered to the participants in the walk and talks, and the results collated and analysed to measure wellbeing outcomes. The QOL survey was used to explore any connections between built environment satisfaction, social participation, and sensory functioning.

### 2.2.1 iPad application

For this project, the research team developed an iPad application that assists in capturing aspects of the outdoor environment from the point of view of older people. There is some evidence to suggest that older people prefer to use iPads than smartphones, because they are larger, easier to use, and more intuitive (Kobayashi et al., 2011; Werner, Werner, & Oberzaucher, 2012). The app was developed to be used for walk and talk sessions with volunteer groups of older people in the regional town centres of Tweed Heads and Wollongong, and a version for individual use is currently being further developed and tested. As the individual user or group moves along a pre-determined walking route through the town centre, a map view of the surrounding environment is displayed on the iPad interface using Google maps, and a list of all 'objects' within a certain proximity (20 meters by default) is also displayed (see Figure 2). Objects are classified as 'spaces' (e.g. buildings, parks), 'links' (e.g. roads, footpaths), 'access points' (e.g. doorways, stairs), or 'services' (e.g. toilets, benches). For further information on these categories and the data model used for this project in Microsoft Access relational databases please see Appendix 1.

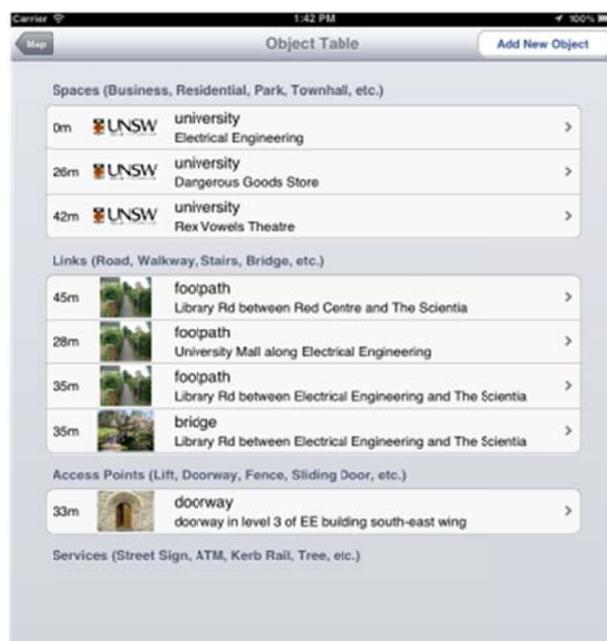


Figure 2: The iPad interface - list of objects

Selecting an object will allow the user to 'audit' the item, as shown in Figure 3. The user can enter general audits with text, audio, and video annotations, for example by typing a text statement such as "litter in park" or uploading an image of a street pothole (See Figure 2). The audit entries can also be pre-populated with information from any existing checklist. In this study, we used information derived from the Australian Standards Accessibility Suite (AS1428 series). The underlying information model is based on work originally developed for computer assisted accessibility auditing, developed by Bridge and Simoff (2000).

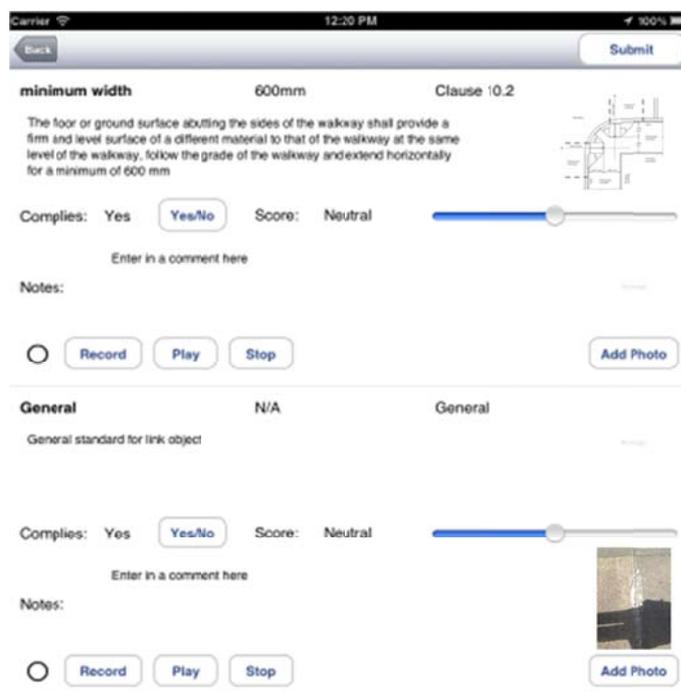


Figure 3: The iPad interface - audit entries



The audit data (including all descriptive text, audio-visual material, and ratings for objects in the walk and talk session) entered by a user is geo-tagged, time-stamped, and uploaded in real-time and stored in a MySQL database on the University of New South Wales server. An overview of this aspect of the app's operation can be seen in Figure 5.

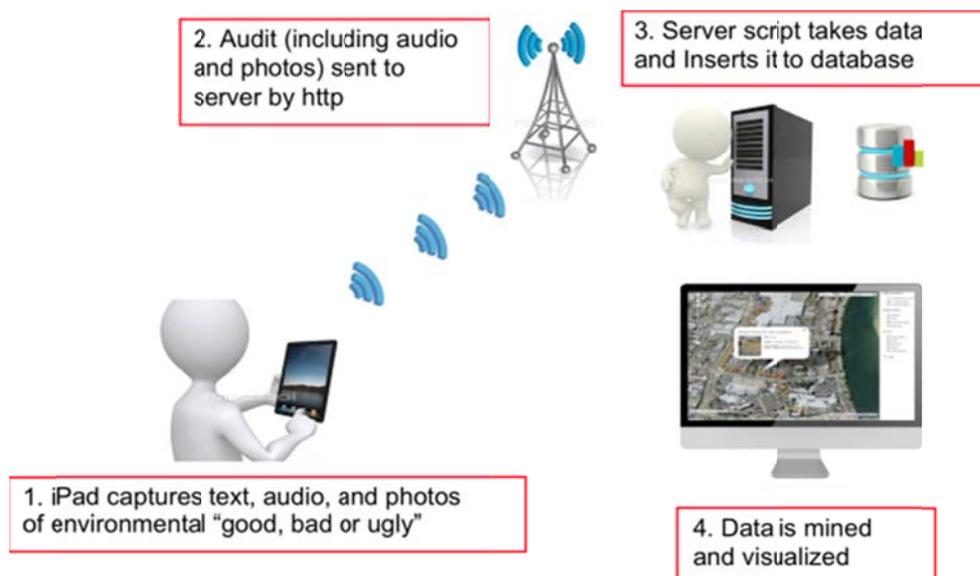


Figure 5: The iPad in action

After the iPad app was used in the Wollongong and Tweed Heads walk and talks, the data collected from the audits was analysed and mapped visualisations produced of the results. This allowed the research team to map the aspects of the built environment that concerned the older participants the most, and the areas in which these were concentrated.

The visualisations of results in this report and at the project's website (<http://www.liveable.eng.unsw.edu.au>) were produced through <http://www.gpsvisualizer.com>, a free, easy-to-use online utility that creates maps and profiles from GPS data, as well as the functions available through Google Maps Javascript. These tools made it possible to display the walk and talk data on a Google map and filter data by session, object type, and rating. GPSVisualisation.com and the functions made available through [function.js \(http://maps.gpsvisualizer.com/google maps/functions.js\)](http://maps.gpsvisualizer.com/google%20maps/functions.js) were used to display the data on a map and offer filtering options to the user. As can be seen from Figure 6, the data is displayed on a Google map, which allows the user to zoom in and out.



Figure 6: Audit locations visualised on map

Clicking on any data point in Figure 6 will bring up the corresponding audit data, including image, name, IDs, description including the session the data was collected in, and a link to the audio. The column to the right of the map shows a list of all the audit entries and their data grouped by Object Type while the list on the far right shows the filtering option available. The data can be filtered according to which session the data was collected in, the object type of the audit, and the score associated with each comment.

The five point score that is allocated to every audit entry is translated to a specific colour marker for easy identification as defined in Table 1.

Table 1: Colours identify audit scores on the map

Numerical Score	Text Description	Associated Colour
1	Very Bad	Red
2	Bad	Orange
3	Neutral	Yellow
4	Good	Green
5	Very Good	Blue

These scores can indicate a need for maintenance or re-design of aspects of the built environment. A consistent approach to the identification of asset conditions is a key objective of the NSW Government's integrated planning and reporting reforms. While the assignment of any asset to a particular asset category will require the professional judgment of LGA personnel, a uniform grading framework will provide a better picture of the state of the asset stock within NSW LGAs.

A suggested five-category model for assessing the condition of LGA assets is displayed in Table 2, and this model was used in the pilot study. Future condition

categories can be determined by LGAs at their discretion as they become more familiar with the app.

**Table 2: Audit scores associated with need for maintenance**

Numerical Score	Condition	Description
1	Very Good	No work required (normal maintenance)
2	Good	Only minor maintenance work required
3	Average	Maintenance work required
4	Poor	Renewal required
5	Very Poor	Urgent renewal/upgrading required.

The information collected via this iPad application can thus guide LGAs in planning and prioritising improvements for these local areas. This system can also help encourage and facilitate greater input from community on their local environment, and analytics on this data can reveal insights, priorities, and trends that might otherwise not have emerged. Further, there are a number of opportunities presented to LGAs by this iPad app for innovatively engaging with the community:

- The app can solicit (i.e. 'pull') information about specific objects from users in addition to letting them 'push' information about arbitrary issues that they notice, meaning that traditional 'town hall' discussions can be done virtually via the app rather than physically at a site
- The app is able to obtain user input in a structured format addressing specific aspects (such as from the WHO standards), in addition to free-format information that users can enter, which will aid in better data mining as the database grows in size over time
- Further tools can be developed to automate the analysis of the data collected through this app. For example, map visualisation using council GIS data can identify and prioritise immediate faults such as potholes and slip hazards and their inter-relationships, whereas trend analysis (using learning algorithms) can identify long term preventable issues and help graph improvements over time.

## 2.2.2 Walk and talks

'Walk and talk' sessions were held in the two regional cities focused on in this study with two separate groups of older people, recruited from local walking groups. Walk and talks are an innovative method of obtaining qualitative research and are beginning to attract increasing attention from researchers. For example, Jones, Bunce, Evans, Gibbs, and Hein (2008) discuss the benefits of 'walking interviews' as a research method, including being able to rigorously connect what participants say with where they say it. In this case, the walk and talks involved walking along a 400m pre-defined walking route in the town centre, auditing the built environment from the older people's perspective, and identifying possible hazards or problems as well as features of the town centre that were pleasant and/or supportive. This allowed the older people who participated to have a structured conversation about what they see as the positive and negative aspects of the town centre in relation to active ageing and what they view as possible solutions to any problems.

Before each walk and talk, members of the research team met the groups of older people at the pre-arranged start point of the walk route. The aims and purposes of the project were explained further, and consent forms and the quality of life survey were administered to participants. The group then followed the nominated walking route, pausing often to audit the built environment, take photos, and discuss positive and negative aspects of the town centre. In the walk and talks the older people themselves did not use the iPad application and instead members of the project team entered data as the volunteers commented on objects along the route.

### 2.2.3 Quality of life indicators

Quality of life is critical to successful ageing (Hilton, Kopera-Frye, & Krave, 2009), and in line with our intention to relate our data to wellbeing we have drawn on Quality of Life measurement methods to analyse this dimension of older people's experience. 'Quality of Life' is multidimensional in nature and thus imprecise and difficult to measure, however it has become an increasingly important concept to researchers and policy-makers alike. As a consequence, a considerable number of scales exist, one of the most promising being the WHOQOL-OLD based on the World Health Organisations Quality of Life measure (WHOQOL) (Struttman et al., 1999; WHOQOL Group, 1998). The WHOQOL has become one of the standard QOL measures as it demonstrates excellent reliability and validity and so has been extensively used in a variety of settings around the globe. The WHOQOL-OLD is a newer instrument, tailored to assess quality of life specifically in older people. Twenty-two centres from around the world including Melbourne, Australia carried out focus groups with older adults and other stakeholders to identify gaps in the coverage of the generic WHO quality of life instruments, the WHOQOL-100 and WHO-QOL-BREF (Power, Quinn, Schmidt, & WHOQOL-Old Group, 2005). It is a 24-item questionnaire structured in six domains or facets:

- 1) Sensory Performance (the participant examines the impact of sensory impairment in their daily quality of life and the extent to which any impairment interferes with their ability to participate in activities and interact with others)
- 2) Autonomy (independence, the ability and freedom to live unattended and make their own decisions)
- 3) Past, Present, and Future Activities (satisfaction with accomplishments in life and goals to be achieved)
- 4) Social Participation (participation in the activities of daily living, especially in the community)
- 5) Death and Dying (concerns and fears about death and dying)
- 6) Intimacy (being able to have personal and intimate relationships).

**Table 3: WHOQOL-OLD content**

<i>Facet</i>	<i>Abbr.</i>	<i>Concept / content</i>
<i>Sensory Abilities</i>	SAB	Sensory functioning, impact of loss of sensory abilities on quality of life
<i>Autonomy</i>	AUT	Independence in old age; being able or free to live autonomously and to take own decisions
<i>Past, Present and Future Activities</i>	PPF	Satisfaction about achievements in life and at things to look forward to
<i>Social Participation</i>	SOP	Participation in activities of daily living, especially in the community
<i>Death and Dying</i>	DAD	Concerns, worries and fears about death and dying
<i>Intimacy</i>	INT	Being able to have personal and intimate relationships

The older people involved in this project were surveyed on all these aspects, leading to an overall quality of life score. One of the hypotheses with regards to quality of life was that as the groups of older people were active, social participation would be high but that some of the facets like Sensory Abilities would be less so. Thus we focused analysis in the later sections of this report on the specific domain scores for Sensory Performance and Social Participation, as impairment and ability to participate in community life were most relevant to the built environment issues of creating an age-friendly city.

### 3 The Pilot Study

The pilot study involved two regional NSW cities, Tweed Heads in the Far North Coast, and Wollongong in the Illawarra region of the South Coast. This section will describe the sample groups of older people from each city, the results of the quality of life surveys conducted and their implications, and the results of the town centre walk and talks. It then discusses and compares the results of the two locations and summarises the recommendations to councils that can be extrapolated from the iPad application audits.

#### 3.1 Tweed Heads

Eight older people participated in the pilot study at Tweed Heads, comprised of seven women and one man. The average age was 68, with ages ranging from 53 to 75. All participants were quite physically fit as they were all part of the local walk group. The average length of time the participants had lived in the town of Tweed Heads was 17 years. However, this ranged considerably; with a number of people being relative newcomers moving into the area in the past 3 – 6 years, and one participant having lived in the town for over 50 years.

**Table 4: Demographic information – Tweed Heads participants**

<b>Age</b>	<b>Sex</b>	<b>Length of time in local area</b>
72	F	12
53	F	3.5

75	F	29
72	M	6
74	F	12
73	F	52
58	F	12
67	F	6

### 3.1.1 Quality of life survey

A quality of life survey was conducted to measure the perception of quality of life perceptions in the sample of older people who participated in the Tweed Heads pilot study. All the data collected is reported as group data due to the small sample size and to preserve participants' anonymity. As outlined in the Methodology section, the older people sampled in this pilot study were surveyed using the WHOQOL-OLD survey developed by the World Health Organisation. The participants were surveyed on six domains (Sensory Performance; Autonomy; Past, Present, and Future Activities; Social Participation; Death and Dying; and Intimacy), the scores of which are combined to form the overall quality of life score, displayed in the last row of Table 5. The specific domain scores for Sensory Performance and Social Participation are displayed in the first two rows of Table 5, as impairment level and the ability to participate in community life are most relevant to the built environment issues of creating an age-friendly city. Domain scores are out of a total of 20 points, and the six domains combined create a total score out of 120 points. A higher score in each case denotes better self-assessed quality of life, while a lower score indicates lower quality of life. Mean scores for all 8 participants are presented first, then the minimum score, maximum score, and standard deviation.

**Table 5: Quality of life survey results – Tweed Heads participants**

Quality of life domain	Domain description	Mean	Min.	Max.	Std devn.
<i>Sensory abilities (range 0-20)</i>	Sensory functioning, impact of loss of sensory abilities on quality of life	15.88	7	20	4.19
<i>Social participation (range 0-20)</i>	Participation in activities of daily living, especially in the local community	16.75	13	20	2.55
<i>Overall quality of life (range 0-120)</i>	Combination of all 6 quality of life domains (see Table 2 for descriptions)	93.63	76	113	13.68

There was some correlation between sensory abilities, social participation and overall quality of life in the individual score results, with people scoring high in one domain likely to also score higher in the other domain and in overall quality of life.

However, due to the small sample size this should be seen as indicative or suggestive rather than as statistically reliable. As can be observed in Table 5, there was considerable variation between the minimum and maximum scores reported by participants, with the lowest score for the Sensory Abilities domain a 7 (out of a maximum of 20) and the highest score a 20. However, participants who scored low on the domain Sensory Abilities did not score as proportionately low on the domain Social Participation (the lowest score for Sensory Abilities was 7, compared to the lowest score for Social Participation, which was 13), indicating that limits to sensory functioning did not necessarily mean that the older people in the sample group also experienced limited social opportunities. It should be noted again that participants were recruited for the study via a community walking group for older people, so were generally well-connected in their local community and participated in regular group social activities.

### 3.1.2 Walk and talks

The walk and talk in Tweed Heads North occurred on the afternoon of Monday 12th and morning of Tuesday 13th March 2012, and both involved walking the route shown in Figure 7. The older participants were split into a group of five and a group of three. Rain preceded the walk on the 12th, and the 13th was sunny but cool. A pre-walk was done before the session walk, in which members of the research team completed some of the LGA audits.



Figure 7: Map of walking route in Tweed Heads

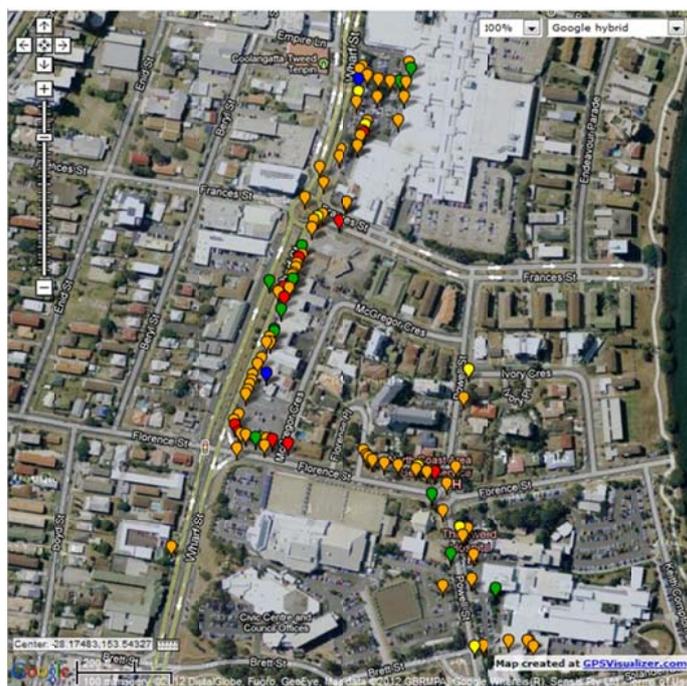


Figure 8: Visualisation of Tweed Heads audit results

Each Audit has a score from 1 to 5 with 1 being very bad, and 5 being very good (see Table 2). In practice, scores of 4 and above were positive, and of 3 and below were negative.

Table 6: Summary of Tweed Heads audit results

	Total Comments	V. Poor	Poor	Neutral	Good	V. Good
TH0 <sup>2</sup>	40	17.5%	62.5%	5%	12.5%	2.5%
TH1	41	14.5%	58.5%	9%	14.5%	3.5%
TH2	53	9.5%	77.5%	4%	7.5%	1.5%

Table 6 presents the number of audit comments made during each Tweed Heads walk. TH1 and TH2 indicate the walk and talks conducted with older residents, and TH0 indicates the pre-walk undertaken by the research team. The total number of comments from each walk is displayed first, followed by the percentage that commented on a poor, very poor, neutral, good or very good feature in the built environment. Tweed Heads had an overall rating of 15% positive comments and 85% of comments 'neutral' or negative. Examples of 'very poor' and 'very good' audit entries are below in Figures 9/10 and 11/12.

<sup>2</sup> TH0: Tweed Heads pre-walk undertaken by the researchers



Figure 9 and Figure 10: Tweed Heads example of 'very poor'

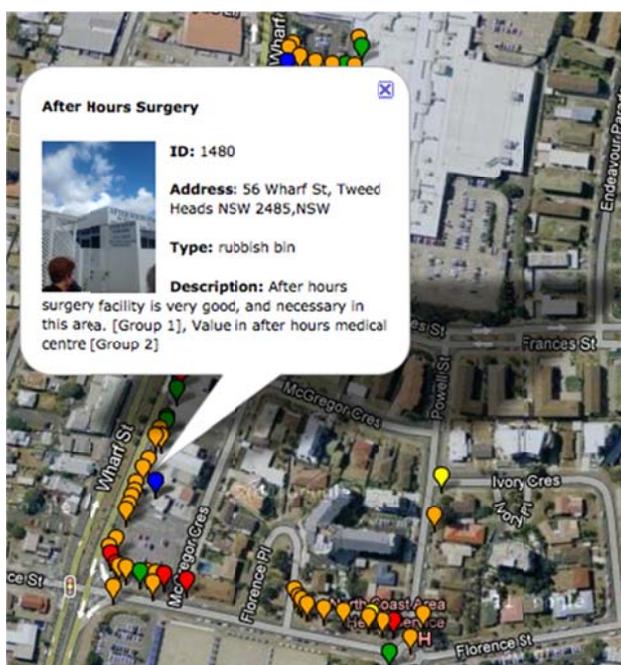


Figure 11 and Figure 12: Tweed Heads example of 'very good'

The majority of comments (53%) were made about objects classed as a link (linking aspects of the built environment such as roads, footpaths and other walkways). This was followed by objects classed as 'services' (publicly provided infrastructure for use by individuals, such as public toilets and park seating or benches), which received 37% of comments.

Most comments about links were negative (given a score of 3 or less). Comments relating to links were primarily concerned with various trip, slip or fall risks (54%), ramp slopes (18%) and the need for indicated pedestrian crossings (20%).

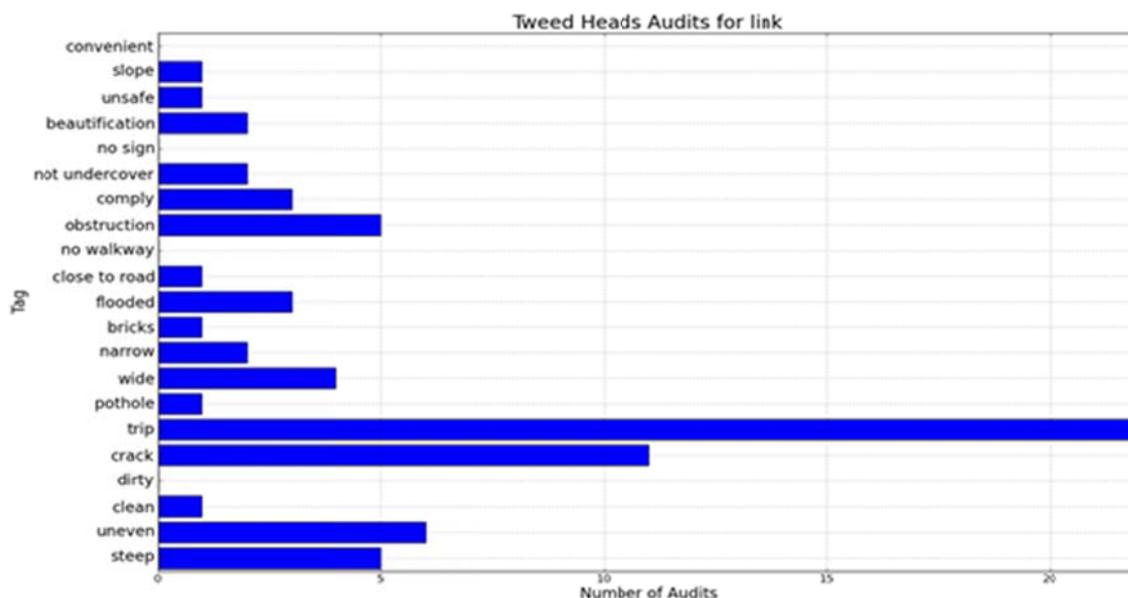


Figure 13: Key word count of comments

Trip hazards, which concerned 28% of the comments, were attributed to 1) uneven surfaces, caused by changes in material types or poor maintenance; and 2) temporary obstructions, such as fallen palm branches, trolleys and construction fences. There were a large number of comments on the vegetation, including trees and shrubs. Negative comments centred on the need for maintenance of fallen branches etc. along the walk route. However, some of these trip hazards had been flagged by the council as present and in need of attention at the time.

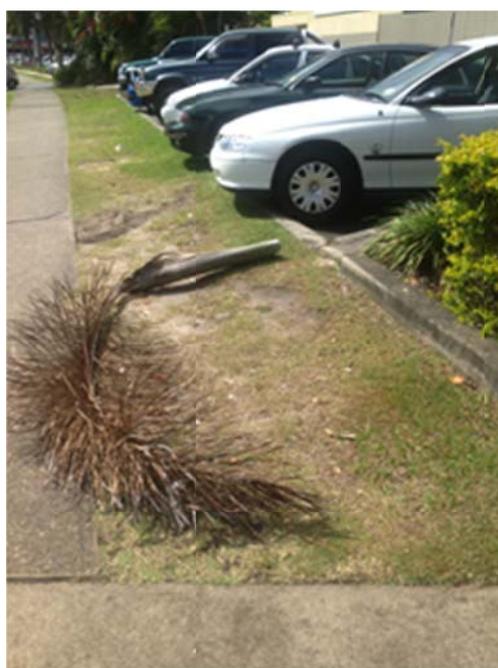


Figure 14 and Figure 15: Tweed Heads – walkway hazards

Positive comments centred on the wide walkways provided by pedestrian paths, as well as colour indication for slopes. One participant indicated that the colour indicated kerb ramps were a supportive built environment feature, stating “The yellow stands out for people who haven’t got very good sight and it just points out there’s a bit of a slope and you have to watch out for it.”



Figure 16: Colour-indicated kerb ramps

The participants were very positive in their comments about the businesses and services along the walk route, and their close proximity to each other, allowing for ease of access. Both walk groups in Tweed Heads particularly noted the After Hours Surgery on Wharf St as very valuable. However, in terms of public services, a number of comments made by the walking groups as they progressed along the route were concerned with the lack of benches and rubbish bins or the insufficient

amount of street lighting provided. One participant commented that “Street lighting needs to be alternated either side of the road, instead of just one side of the road, to light up pathways both sides.”

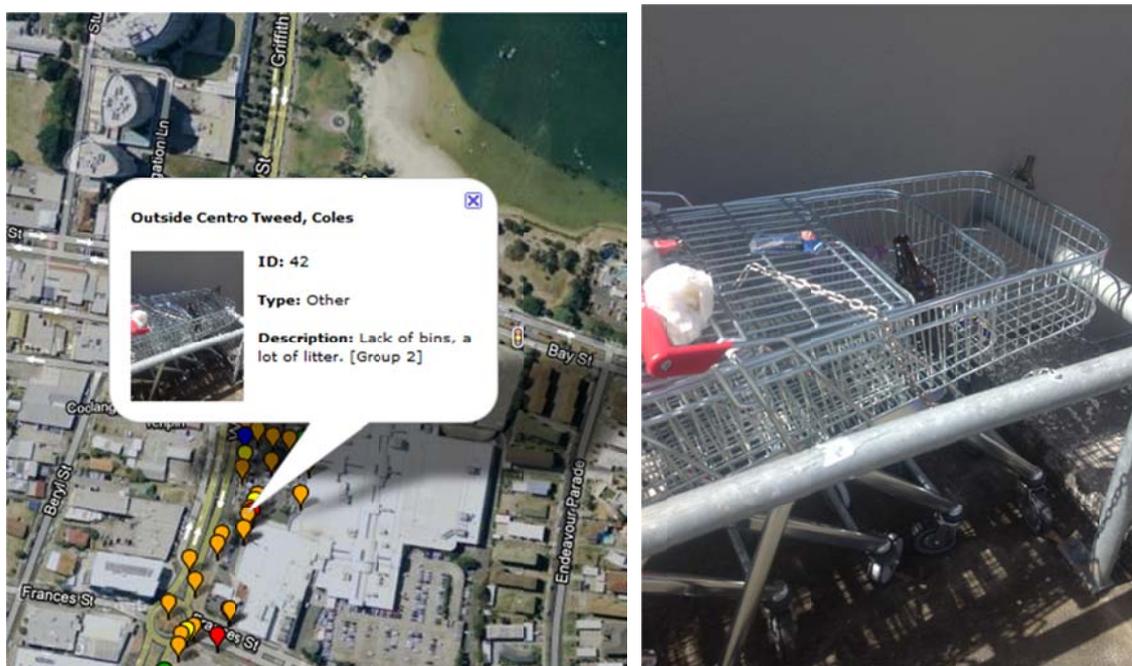


Figure 17 and Figure 18: Example of ‘ugly’ – Tweed Heads

### 3.2 Wollongong

There were 8 participants in the pilot study at Wollongong, 5 women and 3 men. The average age was 72 (age range was 69 years to 76 years), which was higher than the Tweed Heads participants, but like the Tweed Heads participants the Wollongong participants were reasonably physically active as they were recruited from a community group for older people. The participants had lived in the local area much longer on average than their Tweed Heads counterparts, as the average duration of living in Wollongong was 47 years (minimum duration 25 years, and one participant had lived in Wollongong his whole life).

Table 7: Demographics information – Wollongong participants

Age	Sex	Length of time in local area
75	F	25
72	M	48
70	F	52
69	F	42
75	M	44
70	F	40
76	F	55
72	M	72

### 3.2.1 Quality of life survey

Table 8 presents the results of the quality of life survey conducted with participants of the Wollongong walk and talk session, before the audit began. The specific domain scores for Sensory Performance and Social Participation are displayed in the first two rows of the table, while the last row displays the overall quality of life score comprised of the 6 domains surveyed in the WHOQOL-OLD questionnaire (Sensory Performance; Autonomy; Past, Present, and Future Activities; Social Participation; Death and Dying; and Intimacy). Mean scores for all 8 participants are presented first, then the minimum score, maximum score, and standard deviation.

**Table 8: Quality of life survey results – Wollongong participants**

Quality of life domain	Domain description	Mean	Min.	Max.	Std devn.
<i>Sensory abilities</i> (range 0-20)	Sensory functioning, impact of loss of sensory abilities on quality of life	17.25	13	20	2.66
<i>Social participation</i> (range 0-20)	Participation in activities of daily living, especially in the local community	18.63	17	20	1.30
<i>Overall quality of life</i> (range 0-20)	Combination of all 6 quality of life domains (see Table 2 for descriptions)	100.63	96	114	5.73

Participants in the Wollongong sample group reported consistently higher quality of life scores than their Tweed Heads counterparts, for the domains of Sensory Abilities and Social Participation as well as the total quality of life score. There were also lower standard deviation scores across all domains, indicating higher consistency amongst the Wollongong group in the scores they reported.

As in the Tweed Heads quality of life survey results, there was some correlation between sensory abilities, social participation, and overall quality of life in the individual score results, with people scoring high in one domain likely to also score higher in the other domain and in overall quality of life. Like the Tweed Heads participants, Wollongong participants scored higher on average in the Social Participation (18.63) domain than the Sensory Abilities domain (17.25), and the lowest score for Social Participation (17) was considerably higher than the lowest score for Sensory Abilities (13). This indicates again that limits to sensory functioning did not necessarily mean the person also experienced limited social opportunities.

### 3.2.2 Walk and talks

Two walk and talk sessions occurred in Wollongong on the 11th May 2012, which was a particularly sunny day. There were 2 groups with 4 people in each, one in the morning and another in the afternoon.



Figure 19: Map of Wollongong walk route



Figure 20: Visualisation of Wollongong audit results

Table 9: Wollongong summary of results

	Total comments	V. Poor	Poor	Neutral	Good	V. Good
W1	83	2.5%	35%	2.5%	56.5%	3.5%
W2	65	3%	57%	0%	40%	0%

The comments in the Wollongong audits were more positive than in Tweed Heads, with the overall proportion of positive comments 51%. 'Neutral' or negative comments comprised 49% of overall comments. Examples of 'very poor' and 'very good' aspects of the Wollongong centre built environment are provided below.



Figure 21 and Figure 22: Example of 'very good' – Wollongong

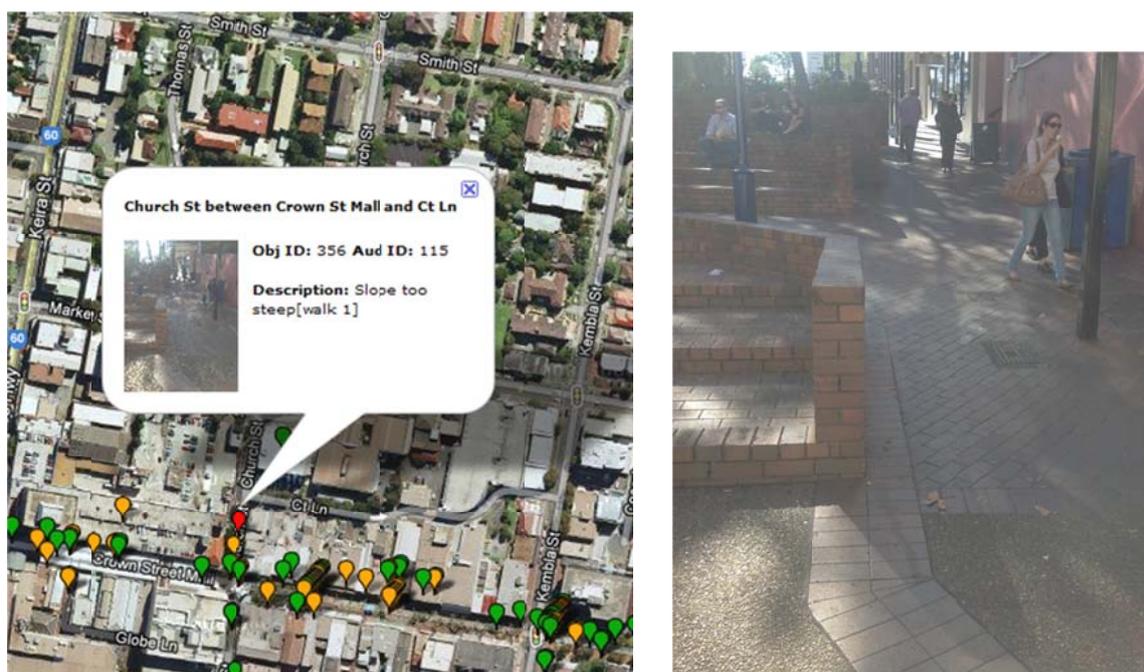


Figure 23 and Figure 24: Example of 'very poor' – Wollongong

The majority of audit comments (39%) were about spaces (defined as any public space such as a building or park services), 33% of comments were about services, and 28% were about links. In terms of links (footpaths and other walkways), as in Tweed Heads, the vast majority of comments were negative. Of these negative comments, many (57%) concerned trip hazards, mainly associated with brick being used as a primary footpath/walkway building material and not being properly maintained for loose segments. However, other Wollongong participants noted that the brick material used was locally sourced, potentially explaining its usage over other materials.

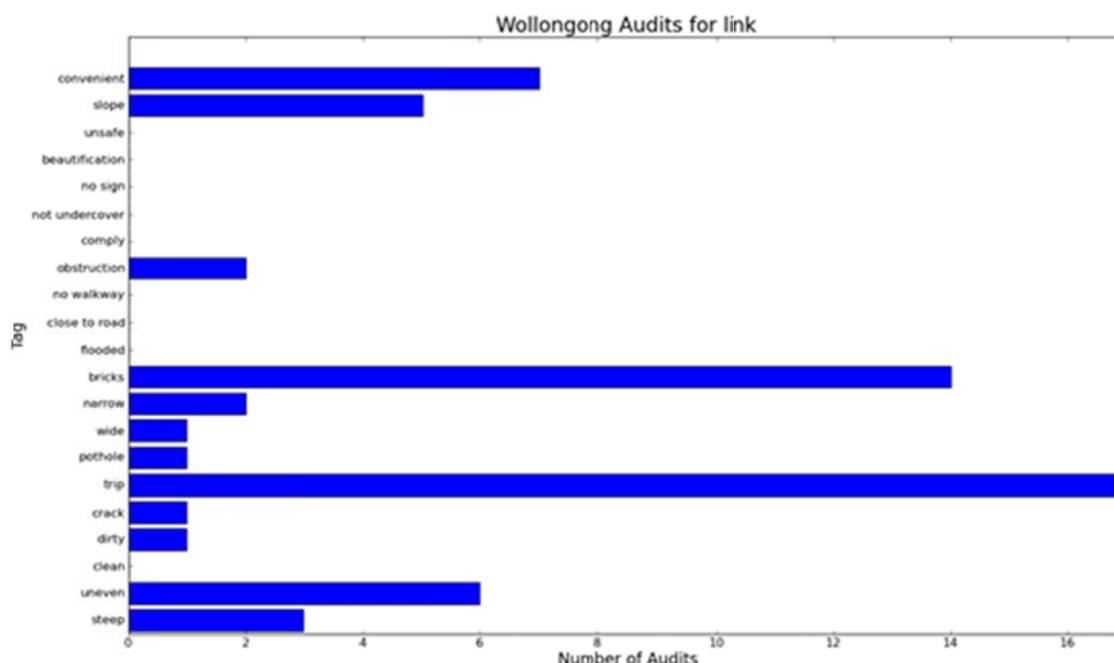


Figure 25: Keywords in comments for Wollongong links

Positive comments about links focused on the wide walkways that allow prams, shopping trolleys and mobility aids easy access to footpaths, and on scramble intersections. Participants commented positively on public signage indicating security, such as the presence of the police station and 24hr security of the street mall. Audit comments were negative about the reputation of some parts of Crown St. There was an indication that the signage acted as a deterrent to this perceived threat. The Wollongong groups also commented that the disappearance of pubs in the area reduced public access to toilets in the evenings.

There were also a large number of comments concerning the historical importance of the Wollongong town centre, and the benefits of preserving historical sites and buildings. The participants of the walk and talk groups were generally positive about preservation of building facades, and negative about businesses such as pubs and bookstores disappearing. Commenting on the shops west of Crown St mall, one participant said that there are “Quite a few shops and things but they’re very daggy. The footpaths aren’t very good.”

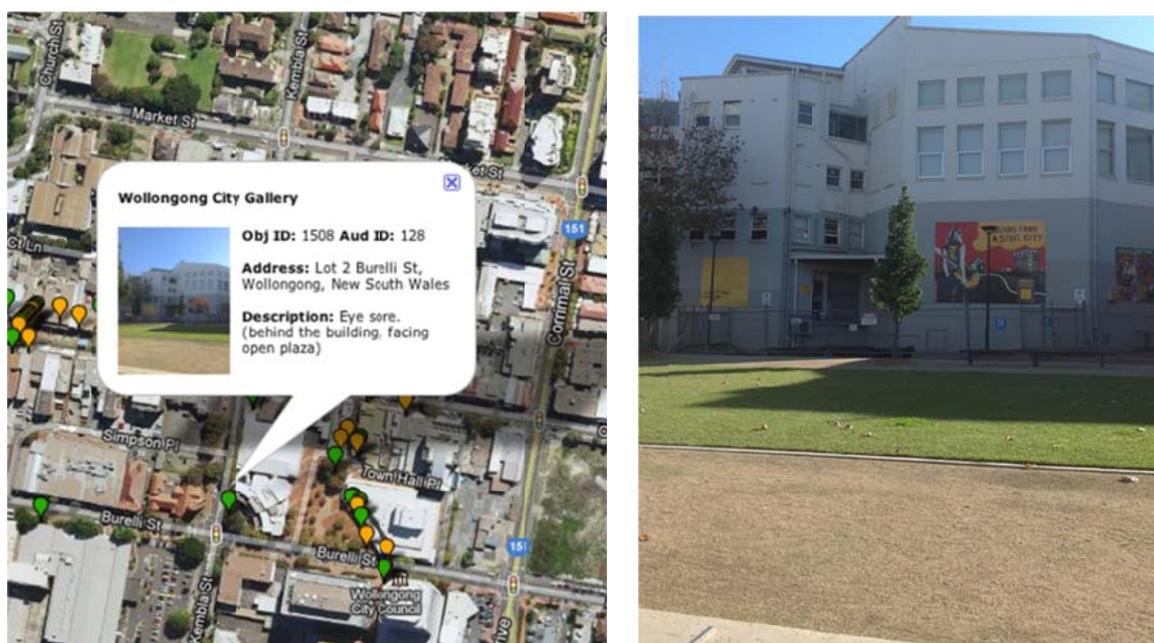


Figure 26 and Figure 27: Example of 'ugly' – Wollongong

Participants were divided on the 'bird cage' structure in the town centre: some felt that the structure was out-dated, provided no cover, made the area cluttered, and was "depressing" in winter; while a few others disagreed. One of the participants who did not feel positively about the Bird Cage stated: "Don't like any part of it, all the poles and that... Never did like it... But I mean if it's raining they don't help, they're only dripping mud and whatever on to you." In Wollongong both walk groups commented on the Chessboards on Church St as being a good meeting spot. This evidenced the value participants placed on community activities and social interaction.

### 3.3 Discussion: the walk and talks

Tweed Heads and Wollongong are two very different coastal town centres. Tweed Heads has a rapidly growing older population, while Wollongong has an older population that is growing with the city. By contrasting the two locations we hope to identify potential solutions to problems in the built environment that were identified by the older people who live in these cities. In this section, the findings from both locations are divided into two major themes, drawn from the essential features of an age-friendly city identified by the World Health Organisation (WHO, 2007a): 1) outdoor spaces and buildings; and 2) community support and health services. A summary of recommendations about these two key areas based on the audit results is then presented.

As a very general overview, the comments made in the Wollongong walk and talk were more positive than in Tweed Heads, with the overall proportion of positive comments 51%. In Tweed Heads, in contrast, only 15% of comments were positive, and 85% of comments were 'neutral' or negative. This could be due in part to Wollongong's participation in the Healthy Cities program; however there are some other environmental factors that also need to be taken into account. The Wollongong walk and talk route through the main retail area and Wollongong mall may have prompted more comments about 'spaces', and given that the mall is specifically designed for pedestrian access, may have also resulted in less negative comments about 'links' (footpaths) than were made in the Tweed Heads walk and talks. The role

of the weather in highlighting different aspects of the built environment during each of the walk and talks should also be highlighted. In Tweed Heads, rain before the morning walk lead to participants commenting about the steepness of kerb ramps as they filled with water, and to comments about the inappropriate placement of seats and benches as they got wet in the rain and were therefore unable to be used. In Wollongong, by contrast, it was a very sunny day for the walk and talk, which meant that participants were wearing sunglasses and made comments about how the town centre needed more shelters and trees to offer shade to pedestrians.

Audit comments made by the Tweed Heads participants focused mainly on links (53% of total comments) and services (37% of comments) while the comments made by the Wollongong walk and talk groups focused mainly on spaces (39% of comments) and services (33% of comments). In terms of the WHO categories discussed below, 'links' (predominately walkways and pathways) and 'spaces' (buildings, parks, etc.) fall into the first category of outdoor spaces and buildings, while 'services' will be discussed in the category community support and health services.

### 3.3.1 Outdoor spaces and buildings

The issue of most concern to older participants in both locations was the quality and safety of walkways and footpaths along the walking route. The older participants in both Tweed heads and Wollongong made many comments during the walk and talks about trip or slip hazards within their town centres. These comments were all negative ones, rated 'poor' or 'very poor', with many participants rating these objects as 'very poor' due to the risks they pose for injuries amongst older people and people with mobility impairments. Additionally, the design of many kerb ramps in both locations was seen to be cause for concern because of their steepness; this was identified more as a problem in Tweed Heads (see Figure 13) than in Wollongong (see Figure 25). Service covers on the footpaths in both town centres were almost always pointed by the older participants as trip hazards.

The major reasons for trip hazards as identified by the walk and talk participants were obstructions and uneven surfaces. In Wollongong, uneven surfaces were the primary problem, caused by brick being used as a primary footpath/walkway building material and not being properly maintained for loose segments. In Tweed Heads, temporary obstructions, such as fallen palm branches, trolleys, and construction fences caused more issues for older people. It is understandable that slip and trip hazards would be identified by older people as a major source of concern, because the incidence of falls increases with age, with between 30-50% of community living older people reporting a fall incident (Hill et al., 2009).

Participants from both Tweed Heads and Wollongong commented positively on large width walkway areas when they were present in the town centre, because they allow for the comfortable passage of pedestrian traffic and mobility aids, as well as prams. The Tweed Heads walk and talk groups highlighted a need for more indicated pedestrian crossings, but also noted that colour indication for surface slopes were very beneficial for people with visual impairments. The many comments made by the Wollongong groups about the need for preservation of historic character in the town centre may have been influenced by the route chosen for the walk and talk, and the fact that Wollongong participants had on average lived in their local area much longer than the Tweed Heads participants.

Walk and talk participants from both cities also commented positively about the various tree species along walkways on the town centre routes. Tweed Heads

participants responded positively to native species, and negatively towards poorly maintained vegetation. The Wollongong participants were very positive about the presence of deciduous tree species, but noted that fallen leaves from overhanging trees and other unmaintained vegetation on walkways posed a dangerous slip hazard.

### **3.3.2 Community support and health services**

Centralised services and businesses were clearly identified during the walk and talk sessions as a factor that greatly improves older people's experiences of their local town centre, promoting independence and wellbeing. Participants from both Tweed Heads and Wollongong were very positive in their comments about the number of businesses and services along the walk routes and their close proximity to each other, which allowed for greater ease of access for older people and people with limited mobility. The walk and talk groups held at both locations noted the availability of public phone booths as a very positive element of service provision in the town centre, as participants pointed out that mobile phones are not ubiquitous or infallible.

The participants in both locations commented extensively on the availability of benches and other seating. The Tweed Heads walk and talk groups noted that there were no benches along most of the walk, except for outside the main shopping centre. The Wollongong group, on the other hand, highlighted the number of benches along the walk route as a positive thing; however noted protruding bolts on the benches and the presence of smokers in the area as factors that decreased the availability of viable benches. The participants in both locations also indicated that signage was a problem. Shared walkways (shared bike and pedestrian areas in Tweed Heads; and shared bike, pedestrian and car areas in Wollongong) did not have enough visible signage. Signs to indicate road names and notify people of directions in both cities were mainly for the use of road traffic and not easily visible to pedestrians. The availability of public toilets at all times of the day was also highlighted as an important community service that needed to be improved by both groups.

Walk and talk groups at both locations commented on cleanliness and the availability of bins. While there were positive comments about the number of bins in Wollongong, participants stated that there were still not enough to control cleanliness optimally. A distinct lack of bins was noted in Tweed Heads, however the higher proportion of comments relating to lack of amenities during the Tweed Heads walk and talk as compared to the Wollongong group could also be due to the routes selected. Some issues raised by the walk and talk groups that were specific to the particular towns and walk routes selected included the very valuable after-hours surgery in Tweed Heads, and the public signage at Wollongong mall that indicated security services, such as the presence of the police station and 24 hour security patrols.

### **3.3.3 Summary of audit recommendations**

The key issues identified by the older people who participated in the walk and talks can be summarised to produce some general recommendations about how LGAs could respond to the needs of older people concerning the built environment in their town centre precincts. As can be seen from the audit results, some concerns expressed by older people were universal whereas others are specific to the location and route of the walk and talk and therefore particular issues encountered on the day.

In Tweed Heads, the walk and talk sessions produced the following recommendations:

- Trip hazards could be greatly reduced through the removal of temporary obstructions such as fallen vegetation, trollies and construction fences
- The slope and direction of the placement of kerb ramps need to be further considered at the design stage in order to be safer and more accessible for older people
- Increase signage near pedestrian crossings
- Implement additional benches and rubbish bins along walkways and footpaths

In Wollongong, the walk and talk sessions produced the following recommendations:

- Consider replacing brick as the primary material for walkways and footpaths, and/or ensure effective maintenance of brick walkways to repair areas that may pose trip and slip risks
- Regularly clean up leaves, particularly in autumn, to reduce slip hazards
- Make public restrooms available at all hours of the day (in balance with other safety and security concerns)
- Ensure that there is consultation with older people about the preservation of historic buildings

These and future recommendations produced through further use of the iPad auditing system can assist in forming guidelines for constructive planning and implementation of policies and procedures designed to improve age friendliness outcomes in regional towns.

### 3.4 Discussion: QOL survey results

Table 10 displays the results of the quality of life survey for both sample groups in Tweed Heads and Wollongong, in order to draw out some comparisons between the two locations and between these samples and other Australian and international quality of life norms for older people. As in the previous tables, the scores for the domains of Sensory Performance and Social Participation are displayed first, followed by total quality of life. All values are presented as mean scores.

**Table 10: Quality of life survey results – comparison**

Quality of life domain	Domain description	Tweed Heads (Mean)	Wollongong (Mean)	Combined (Mean)
<i>Sensory abilities</i> (range 0-20)	Sensory functioning, impact of loss of sensory abilities on quality of life	15.88	17.25	16.56
<i>Social participation</i> (range 0-20)	Participation in activities of daily living, especially in the local community	16.75	18.63	17.69
<i>Overall quality of life</i> (range 0-120)	Combination of all 6 quality of life domains (see Table 2 for descriptions)	93.63	100.63	97.13

Comparison of these scores shows that Wollongong participants consistently reported higher quality of life scores than Tweed Heads participants, across all domains. Importantly, both groups scored higher on Social Participation than on Sensory Abilities, showing that although participants may experience impairments and loss of sensory functioning, they were still able to participate in activities of daily living in their local community.

Field trials of the WHOQOL-OLD survey which were held in twenty cities internationally, including Melbourne, Australia, can provide some quality of life older population norms for comparison against these results. The field trial in Melbourne involved 376 people with an average age of 76, 84% of whom self-reported as healthy, with more females (58%) than males (Power et al., 2005). The average score for the Sensory Abilities domain was 16.32 (Power, Schmidt, & WHOQOL-Old Group, 2006), very similar to the combined mean score from Tweed Heads and Wollongong participants in our sample (16.56), slightly higher than the mean score for the Tweed Heads participants (15.88), and a little lower than the mean score for Wollongong participants (17.25). The average score across all 20 cities in the WHOQOL-OLD field trials for Sensory Abilities was 15.60 (Power et al., 2006). The average score for Social Participation in the field trial in Melbourne was 15.34, and 14.57 across all field trial sites (Power et al., 2006). Our sample groups therefore reported much higher scores for Social Participation than the Australian norm and the international norm - 16.75 in Tweed Heads, 18.63 in Wollongong, and 17.69 combined. This high Social Participation score in our sample also led to higher total quality of life scores than both the Australian norm and international norm. Total quality of life score in the Melbourne field trial was 91, and total overall score across all the field trials internationally was 87.57 (Power et al., 2006), while the Wollongong sample scored highest with 100.63, Tweed Heads participants scored 93.63, and the combined mean score was 97.13.

As the participants were recruited via local community groups for older people, and the Tweed Heads participants were part of a local walking group, those surveyed in this study are healthy active older people which may skew the results, particularly in terms of their self-assessed Sensory Functioning and Social Participation scores. A limitation of the study in regards to the quality of life surveys was the small sample size: therefore, the results presented in this report are indicative only but nonetheless provide a useful overview of how the older participants in the study view their overall quality of life.

## 4 Future Steps

The project team is currently investigating several ways to expand this study beyond the pilot stage. We are developing an Android-tablet version of the app so it is not operating system-dependent and will have a greater reach amongst both LGA employees and local residents. The project team is also in negotiation with councils to import their database of objects (features of the built environment) into the application's database system. This can serve the dual purpose of pre-populating objects so that users do not need to identify them and create categories on-the-fly, and also so that reported issues can be more easily tied back to the database systems used by the LGA's engineering and maintenance divisions. We also plan to conduct focus group meetings with several councils to train them on usage of the app so that they will be able to use it for themselves and encourage uptake amongst their residents. The team is also enhancing the app in a number of ways to provide a more engaging user-experience, by including features such as the ability to see other

people's comments, the integration of opinion surveys into the app, and linking to existing social networking websites.

There are two other key priorities to explore in future work: firstly, better customising the application for our target population, and secondly, exploring further data mining options. We will explore how to create a more robust and easy to use iPad interface designed specifically for older people who may have impairments, by adjusting the user interface to make it simpler, more engaging, and more user-friendly. As the system gets used more often and more data is collected, we intend to explore more sophisticated automated analysis options such as automatic generation of reports. Incorporating more sophisticated reporting methods that use big-data analytics packages will also enable the long-term tracking of trends.

## 5 Conclusion

Improved neighbourhood design that better satisfies the needs of older people will not only increase their active participation and the capacity of older people to age in place but will also enhance the accessibility, safety, and hence the social sustainability and cohesion of the wider community including those with disabilities. Addressing the accessibility of the built environment in regional cities is particularly urgent as they are ageing faster as people retire and move away from urban areas. Regional cities are also more disadvantaged than their urban counterparts, due to lower budgets and lack of resources to address these concerns.

The smart city of tomorrow cannot rely just on legislation and minimum standards to create age-friendly town centres, parks and facilities. It should instead engage actively with the community to develop everything from seating design and the width of footpaths, to the planning of transport, roads, amenities, public spaces and housing. This requires governments to have tools that allow them to actively engage with residents to develop an empirical base of what works and does not work in their local community, and to act upon such accumulated information to make optimum decisions. This paper described in detail the development of an iPad application that empowers citizens and governments to create age-friendly cities in a collaborative manner. This app provides a vehicle by which LGAs can crowd source over time much more information about the suitability of the built environment than was previously possible when using traditional town hall meetings, phone calls and spot surveys.

The NSW *Towards 2030* Plan emphasises the need to review planning criteria to “encourage a walkable and wheelable community with local public spaces that are safe, pleasant and people use” (NSW Government, 2008, p. 21). This project has and will continue to facilitate collaboration among researchers, practitioners, and policy-makers by collating information about the influence of built environment features on older peoples wellbeing and the implications of town planning solutions.

Further, this work is timely because it has the potential to impact on other regional strategies that are being introduced, such as the regional plans currently under preparation for the Far-north Coast, Illawarra, and Western Regions. This research contributes to better understanding of the impact of the built environment and ageing and urban policy on older people's engagement, participation, independence and security, through strategies that are replicable in other Australian cities. Ensuring that policy initiatives surrounding walkability, wheelability, and sustainability are compatible and well integrated is critical if older people are to enter and participate in

communal and productive occupations within major sea change and tree change destinations.

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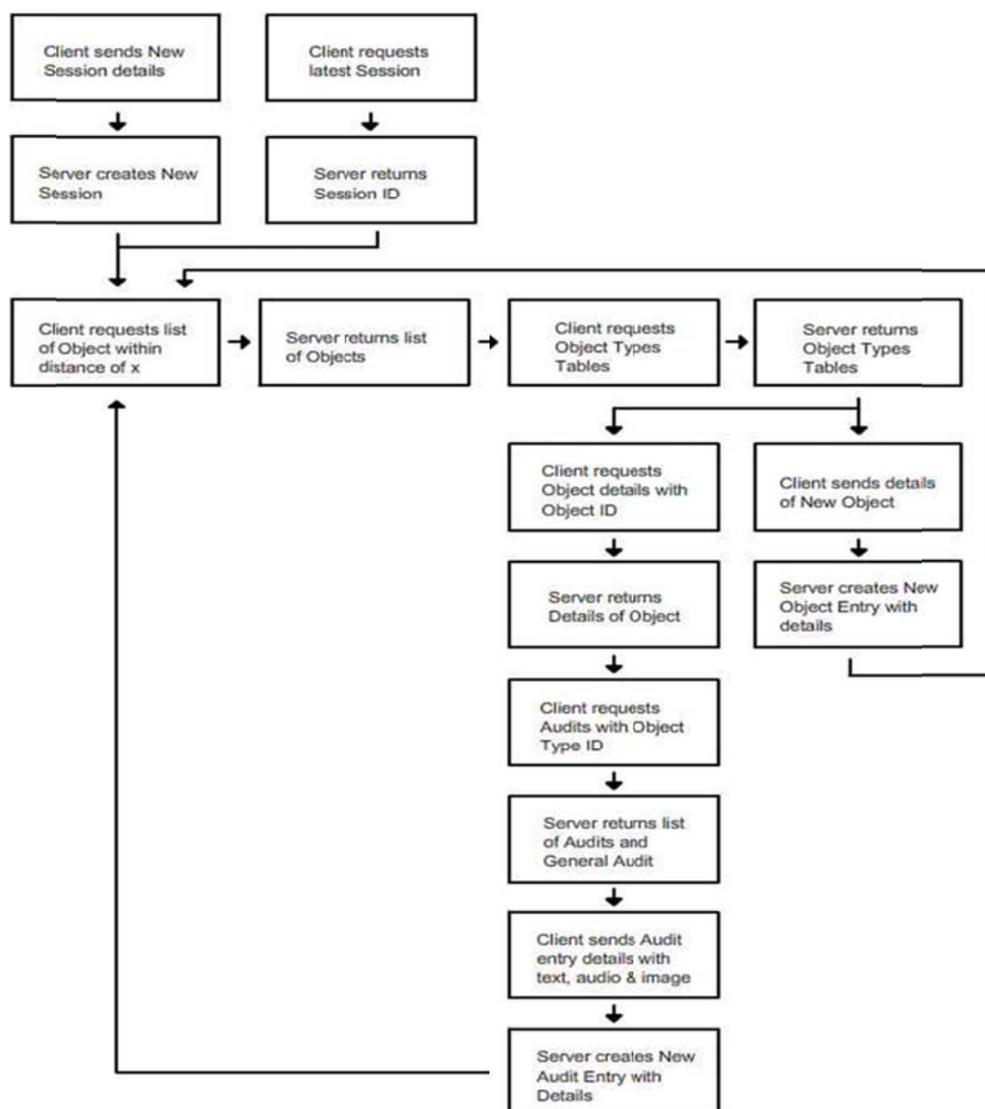
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## 7 Appendices

### iPad application design: further details

The iPad application provides the interface that the user interacts with and efforts were made to design with simplicity and practicality to meet the demands of field use. An overview of the operation of the application and its interaction with the server can be seen from Figure 28.

Figure 28: The iPad interface and interaction with server



There were a number of specific design choices made during the development and testing of the iPad application aimed to improve usability and practicability in field use, which are detailed below.

### Location Accuracy and battery life

The location of audit entries created by the iPad user is calculated by GPS, cell tower triangulation and IP-location. One issue encountered by the developers was that

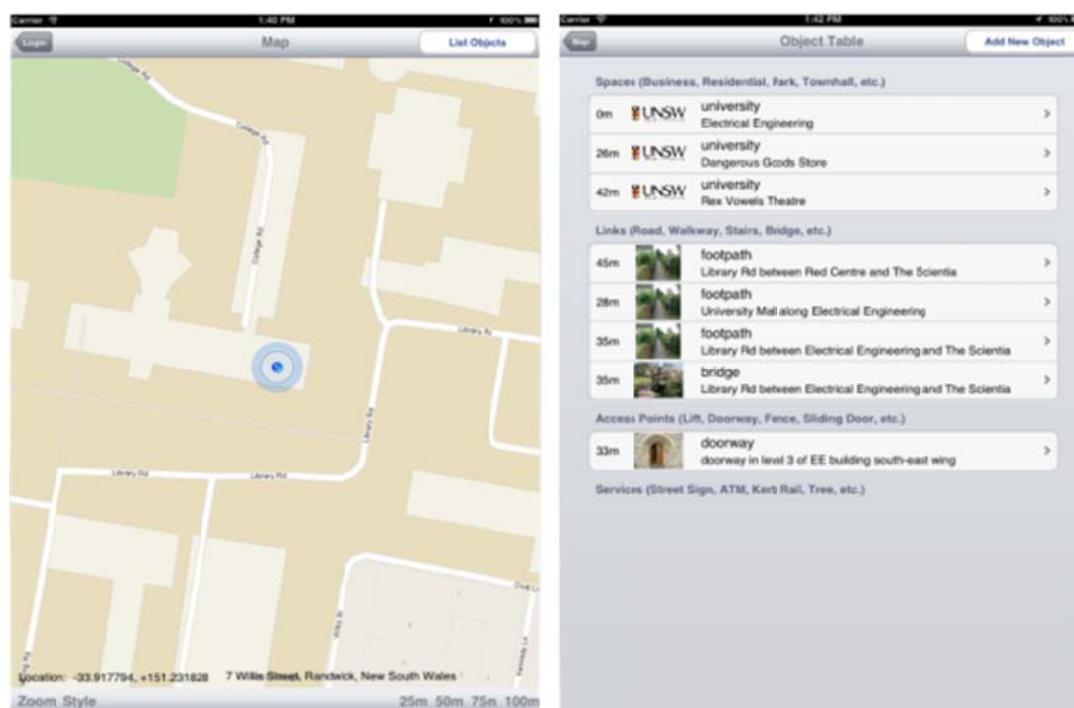
highly accurate location pinpointing takes significantly longer to compute, requiring more 3G data and consuming more power. During the Wollongong walk and talk the application (which was in use the entire time) reduced the battery to 25% capacity after 3.5hrs of use, with a total estimated running time of 4.7 hours. This means the battery capacity while using the app is 60% that of normal use. This was sufficient for the purposes of this project, but power saving measures may need to be taken if the app is used for council audits.

Table 11: Battery life of iPad with different uses

Max battery (hours)	Application battery (hours)	Normal battery (hours)
10	4.7	7.5

Some changes to make this process more efficient were implemented, for instance location data is now only polled if the device is moved a specified distance. To account for this necessary trade off in accuracy, nearby objects were displayed as a list in the interface, allowing the user to select the object they wished to audit (see below in Figure 29). With more accurate location, nearby objects would be mapped with pins on a map, however the GPS was particularly inaccurate on ground levels, inside buildings or among tall buildings. We found listing the object in a table along with an approximate distance to its location was less confusing than an inaccurate pin location on the map.

Figure 29: Nearby objects displayed as a list in the user interface



## Stateless design

A stateless design that does not rely on information about users being stored between interactions was incorporated into the iPad app from the beginning. A stateless design was chosen as it was unknown how robust the first design would be,

and also there would be little or no data lost if the application was to spontaneously cease working. This means that the application operates by uploading and downloading data synchronously rather than reconnecting users with each session setting.

## Upload/download time considerations

In order to use synchronous upload and download it was necessary to reduce the file sizes being transmitted through the app. Images were scaled to a smaller size before being uploaded, but it was found that they retained a sufficient resolution level to clearly view any issues in the built environment being reported by the user.

Table 12: Reduced file sizes using compression

	Audio	Image
Initial Size	1 - 3 MB	1 - 1.5 MB
Final Size	270 - 860 KB	200 - 500 KB

Audio files were reduced in size by compressing the Core Apple Format (CAF) using IMA4, a compression program that is capable of reducing files to 1/4 of their previous size without losing sound quality. The file extension did not change in this process, so audio files can still be played using the Apple Quicktime Player. Changing the audio format to MP3 was considered, however if this application were ever to be distributed via the Apple App Store the application would require a licence in order to use MP3 encoding, so this was left for future consideration.

## Data model and database design

We developed a data model and designed a database for capturing relevant information, taking into account existing data models used in Facilities Management. We identified three basic groups of objects – Space, Link and Service – which based on their common characteristics, can represent all other objects found in the town centre built environment.

- Space: a three-dimensional hypothetically or physically bounded space that enables one or more common activities undertaken in the town centre. This definition accommodates both closed and open spaces, for example, the same common modelling attributes can be defined for a room in a building, a park, and a car park space.
- Link: a three-dimensional hypothetically or physically bounded space, which only function in the model is to provide a travel path from one space to another. Corridor, stairway, vehicular crossing are examples of links.
- Service: an object that provides necessary services for supporting activities of residents in the town centre. Rubbish bins, ATMs, shops, health clinics, public telephones, and post boxes are all examples of services.

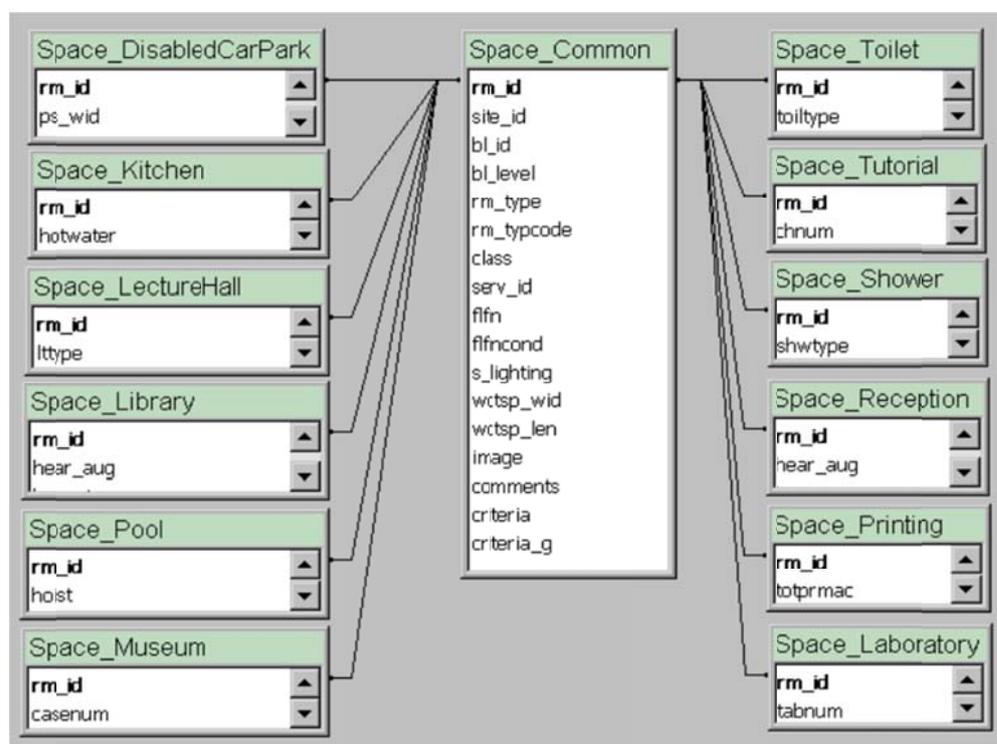
These three basic object types have the expressive power to represent different facilities to be audit. A level in a building is a collection of spaces and links and may contain associated services, and a car park can be represented in its entirety as a service, or as a collection of links and individual parking bay spaces for a more specific audit. Either of the objects 'Space' or 'Link' can have many services attached

to them, and vice versa. Each 'Space' can have many 'Links' connecting it to other spaces and services. The accessibility of objects therefore needs to be assessed in association with other objects. For example, a service is only accessible to people with disabilities if the connected spaces and links also meet the necessary requirements for accessibility.

To effectively represent the variety of spaces, services and other elements from the town centre environment in one of the three categories, we have split the attributes in the data model of each object into two groups: common and specific. The purpose of using two sets of attributes is to preserve the simplicity of basic model while still capturing the necessary amount of specific details. This schema allows flexibility in using the details of each object to note audit evaluation criteria and to use the common part of each entity for macro-queries about the accessibility of particular facilities.

The data model was built on the relational database functions in the Microsoft Access database management system. All tables that describe a particular object category start with the name of that category. For example, the names of the tables with the common attributes of the three entities are 'Link\_Common', 'Service\_Common' and 'Space\_Common'. Specific type tables follow a similar naming convention. For example, the table which includes the specific attributes of entry areas of buildings is called 'Space\_Reception'. Some entity types do not have specific attributes, thus there are no separate type tables for them.

Figure 30: 'Space' category tables displayed in Microsoft Access



## Project Information Statement

Date: 27th March 2012

Project Title: Regional town centres and the independence and wellbeing of older people:  
Views from older persons

Approval No.: 125022

### Participant selection and purpose of study

You are invited to participate in a study of your town centre. This will help us to assess how well paths, seats and infrastructure matches older users' needs, and will assist us to identify ways to improve building design, performance and fitness for purpose. You were selected as a possible participant in this study because you are a person aged over sixty years and who is familiar with your town centre.

### Description of study

If you decide to participate, you will participate in a single 400 metre walk and talk around your town centre to assess its age friendliness. During the walk and talk we will ask you to identify attributes of streets, paths, signage, and facilities, which you believe are good, bad and or 'ugly'. The walk and talk will take about an hour and a half of for each group, and will be conducted at a time that is convenient to the group with the researcher. We cannot and do not guarantee or promise that you will receive any benefits from this study.

### Confidentiality and disclosure of information

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission, or except as required by law. Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission, or except as required by law. If you give us your permission, we plan to publish the results with relevant organisations and journals. No identifying information will be submitted for publication.

### Your consent

Your decision whether or not to participate will not prejudice your future relations with The University of New South Wales or other participating organisations. If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without prejudice by completing the statement below and returning this entire form to Dr Catherine Bridge.

If you have any questions, please feel free to ask please contact Associate Professor, Dr Catherine Bridge (freecall telephone: 1800 305 486) If you have any additional questions later, Dr Catherine Bridge will be happy to answer them.



Dr Catherine Bridge.  
Associate Professor Faculty of the Built Environment  
CityFutures Research Centre at UNSW

## Project Consent Form

Project Title: Regional town centres and the independence and wellbeing of older people: Views from older persons

Approval No.: 125022

You are making a decision whether or not to participate in a research project.

This PROJECT CONSENT FORM enables you to indicate your preparedness to participate in the project. By signing this form, your signature indicates that you have decided to participate.

You will be given a PROJECT INFORMATION STATEMENT that explains the project in detail, and that statement includes a revocation clause for you to use if you decide to withdraw your consent at some later stage. The PROJECT INFORMATION STATEMENT is your record of participation in the project.

This PROJECT CONSENT FORM will be retained by the researcher as evidence of your agreement to participate in this project.

Please complete the information in this box.

Please indicate which of the following options you agree to by ticking one of the following options:

- I consent to being quoted and identified
- I do not want to be quoted or identified but am prepared to participate anonymously

.....  
Signature of Research Participant

.....  
Please PRINT name

.....  
Date

Name of researcher: Associate Professor, Dr Catherine Bridge

## Photograph Release Consent Form

**Title: Regional town centres and the independence and wellbeing of older people: Views from older persons**

### Information statements

1. This research requires photographs for the illustration and usage of the walk and talk protocol. It has been explained to me that photographs may be taken as part of research, and that they may be used for the purpose of illustration in the research documents associated with this research.
2. I understand that my likeness may be available in publications relating to this project and that they may be used in other research activities such as publication in journals and conference presentations.
3. I understand that no person in any photograph taken for use within this project will be able to be identified visually by facial recognition or by name in any photographs used (unless I request otherwise), and that no personally identifying material will be stored or used in any publication(s) coming out of this research.
4. I understand that I am not obliged to give my consent, but that once I do this release is irrevocable.

### Participant's Permission and Rights Granted

By signing this release, I hereby grant full permission to the University of New South Wales to use, reproduce and disclose photograph of my likeness and ramp products with surrounding built environments in any publication of this research without payment or any other consideration. This consent also serves to waive all rights of privacy and compensation which I may have in connection with the use of the photographs. I understand and agree that images in photographs will become the property of the University of New South Wales. I hereby irrevocably authorise the University of New South Wales to edit, copy, exhibit, publish or distribute this photo for the purposes of research.

I agree that I have no rights to the images, and all rights to the images belong to the University of New South Wales. I waive the right to inspect or approve the finished product, including written or electronic copy, wherein my likeness appears. I will make no monetary or other claim against the University of New South Wales for the use of the photographs.

I have read this release before signing below and I fully understand the contents, meaning, and impact of this release.

.....  
Signature

Date

.....

## WHOQOL-OLD Survey

The WHOQOL-OLD module – manual

The following questions ask about how much you have experienced certain things in the last two weeks, for example, freedom of choice and feelings of control in your life. If you have experienced these things an extreme amount circle the number next to “An extreme amount”. If you have not experienced these things at all, circle the number next to “Not at all”. You should circle one of the numbers in between if you wish to indicate your answer lies somewhere between “Not at all” and “Extremely”. Questions refer to the last two weeks.

1. (F25.1) To what extent do impairments to your senses (e.g. hearing, vision, taste, smell, touch) affect your daily life?

Not at all 1	A little 2	A moderate amount 3	Very much 4	An extreme amount 5
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2. (F25.3) To what extent does loss of for example, hearing, vision, taste, smell or touch affect your ability to participate in activities?

Not at all 1	A little 2	A moderate amount 3	Very much 4	An extreme amount 5
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3. (F26.1) How much freedom do you have to make your own decisions?

Not at all 1	A little 2	A moderate amount 3	Very much 4	An extreme amount 5
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4. (F26.2) To what extent do you feel in control of your future?

Not at all 1	Slightly 2	Moderately 3	Very 4	Extremely 5
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5. (F26.4) How much do you feel that the people around you are respectful of your freedom?

Not at all 1	Slightly 2	Moderately 3	Very 4	Extremely 5
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6. (F29.2) How concerned are you about the way in which you will die?

Not at all 1	A little 2	A moderate amount 3	Very much 4	An extreme amount 5
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7. (F29.3) How much are you afraid of not being able to control your death?  
Not at all | Slightly | Moderately | Very | Extremely  
1 | 2 | 3 | 4 | 5

8. (F29.4) How scared are you of dying?  
Not at all | Slightly | Moderately | Very | Extremely  
1 | 2 | 3 | 4 | 5

9. (F29.5) How much do you fear being in pain before you die?  
Not at all | A little | A moderate amount | Very much | An extreme amount  
1 | 2 | 3 | 4 | 5

The following questions ask about how completely you experience or were able to do certain things in the last two weeks, for example getting out as much as you would like to. If you have been able to do these things completely, circle the number next to “Completely”. If you have not been able to do these things at all, circle the number next to “Not at all”. You should circle one of the numbers in between if you wish to indicate your answer lies somewhere between “Not at all” and “Completely”. Questions refer to the last two weeks.

10. (F25.4) To what extent do problems with your sensory functioning (e.g. hearing, vision, taste, smell, touch) affect your ability to interact with others?  
Not at all | A little | Moderately | Mostly | Completely  
1 | 2 | 3 | 4 | 5

11. (F26.3) To what extent are you able to do the things you’d like to do?  
Not at all | A little | Moderately | Mostly | Completely  
1 | 2 | 3 | 4 | 5

12. (F27.3) To what extent are you satisfied with your opportunities to continue achieving in life?  
Not at all | A little | Moderately | Mostly | Completely  
1 | 2 | 3 | 4 | 5

13. (F27.4) How much do you feel that you have received the recognition you deserve in life?

Not at all 1	A little 2	Moderately 3	Mostly 4	Completely 5
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14. (F28.4) To what extent do you feel that you have enough to do each day?

Not at all 1	A little 2	Moderately 3	Mostly 4	Completely 5
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The following questions ask you to say how satisfied, happy or good you have felt about various aspects of your life over the last two weeks. For example, about your participation in community life or your achievements in life. Decide how satisfied or dissatisfied you are with each aspect of your life and circle the number that best fits how you feel about this. Questions refer to the last two weeks.

15. (F27.5) How satisfied are you with what you have achieved in life?

Very dissatisfied 1	Dissatisfied 2	Neither satisfied nor dissatisfied 3	Satisfied 4	Very satisfied 5
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16. (F28.1) How satisfied are you with the way you use your time?

Very dissatisfied 1	Dissatisfied 2	Neither satisfied nor dissatisfied 3	Satisfied 4	Very satisfied 5
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17. (F28.2) How satisfied are you with your level of activity?

Very dissatisfied 1	Dissatisfied 2	Neither satisfied nor dissatisfied 3	Satisfied 4	Very satisfied 5
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18. (F28.7) How satisfied are you with your opportunity to participate in community activities?

Very dissatisfied 1	Dissatisfied 2	Neither satisfied nor dissatisfied 3	Satisfied 4	Very satisfied 5
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19. (F27.1) How happy are you with the things you are able to look forward to?

Very unhappy 1	Unhappy 2	Neither happy nor unhappy 3	Happy 4	Very happy 5
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20. (F25.2) How would you rate your sensory functioning (e.g. hearing, vision, taste, smell, touch)?

Very poor 1	Poor 2	Neither poor nor good 3	Good 4	Very good 5
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The following questions refer to any intimate relationships that you may have. Please consider these questions with reference to a close partner or other close person with whom you can share intimacy more than with any other person in your life.

21. (F30.2) To what extent do you feel a sense of companionship in your life?

Not at all 1	A little 2	A moderate amount 3	Very much 4	An extreme amount 5
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22. (F30.3) To what extent do you experience love in your life?

Not at all 1	A little 2	A moderate amount 3	Very much 4	An extreme amount 5
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23. (F30.4) To what extent do you have opportunities to love?

Not at all 1	A little 2	Moderately 3	Mostly 4	Completely 5
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24. (F30.7) To what extent do you have opportunities to be loved?

Not at all 1	A little 2	Moderately 3	Mostly 4	Completely 5
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Do you have any comments about the questionnaire?

**THANK YOU FOR YOUR HELP**

**WHOQOL-OLD (BREF FORMAT)**

*Instructions*

**This questionnaire asks for your thoughts and feelings about certain aspects of your quality of life and addresses issues that may be important to you as an older member of society.**

**Please answer all the questions. If you are unsure about which response to give to a question, please choose the one that appears most appropriate. This can often be your first response.**

**Please keep in mind your standards, hopes, pleasures and concerns. We ask that you think about your life in the last two weeks.**

**For example, thinking about the last two weeks, a question might ask:**

**How much do you worry about what the future might hold?**

Not at all	A little	A moderate amount	Very much	An extreme amount
1	2	3	4	5

**You should circle the number that best fits how much you have worried about the future over the last two weeks. So you would circle the number 4 if you worried about your future “Very much”, or circle number 1 if you have worried “Not at all” about your future. Please read each question, assess your feelings, and circle the number on the scale for each question that gives the best answer for you.**

Thank you for your help

The WHOQOL-OLD module – manual

The following questions ask about **how much** you have experienced certain things in the last two weeks.

		Not at all	A little	A moderate amount	Very much	An extreme amount
1 (F25.1)	To what extent do impairments to your senses (e.g. hearing, vision, taste, smell, touch) affect your daily life?	1	2	3	4	5
2 (F25.3)	To what extent does loss of, for example, hearing, vision, taste, smell or touch affect your ability to participate in activities?	1	2	3	4	5
3 (F26.1)	How much freedom do you have to make your own decisions?	1	2	3	4	5

		Not at all	Slightly	Moderately	Very much	Extremely
4 (F26.2)	To what extent do you feel in control of your future?	1	2	3	4	5
5 (F26.4)	How much do you feel that the people around you are respectful of your freedom?	1	2	3	4	5

		Not at all	A little	A moderate amount	Very much	An extreme amount
6 (F29.2)	How concerned are you about the way in which you will die?	1	2	3	4	5

		Not at all	Slightly	Moderately	Very much	Extremely
7 (F29.3)	How much are you afraid of not being able to control your death?	1	2	3	4	5
8 (F29.4)	How scared are you of dying?	1	2	3	4	5

		Not at all	A little	A moderate amount	Very much	An extreme amount
9 (F29.5)	How much do you fear being in pain before you die?	1	2	3	4	5

The following questions ask about **how completely** you experience or were able to do certain things in the last two weeks.

		Not at all	A little	Moderately	Mostly	Completely
10 (F25.4)	To what extent do problems with your sensory functioning (e.g. hearing, vision, taste, smell, touch) affect your ability to interact with others?	1	2	3	4	5
11 (F26.3)	To what extent are you able to do the things you'd like to do?	1	2	3	4	5
12 (F27.3)	To what extent are you satisfied with your opportunities to continue achieving in life?	1	2	3	4	5
13 (F27.4)	How much do you feel that you have received the recognition you deserve in life?	1	2	3	4	5
14 (F28.4)	To what extent do you feel that you have enough to do each day?	1	2	3	4	5

The WHOQOL-OLD module – manual

The following questions ask you to say how **satisfied, happy or good** you have felt about various aspects of your life over the last two weeks.

		Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
15 (F27.5)	How satisfied are you with what you have achieved in life?	1	2	3	4	5
16 (F28.1)	How satisfied are you with the way you use your time?	1	2	3	4	5
17 (F28.2)	How satisfied are you with your level of activity?	1	2	3	4	5
18 (F28.7)	How satisfied are you with your opportunity to participate in community activities?	1	2	3	4	5

		Very unhappy	Unhappy	Neither happy nor unhappy	Happy	Very happy
19 (F27.1)	How happy are you with the things you are able to look forward to?	1	2	3	4	5

		Very poor	Poor	Neither poor nor good	Good	Very good
20 (F25.2)	How would you rate your sensory functioning (e.g. hearing, vision, taste, smell, touch)?	1	2	3	4	5

The following question refer to any **intimate relationships** that you may have. Please consider these questions with reference to a close partner or other close person with whom you can share intimacy more than with any other person in your life.

		Not at all	A little	A moderate amount	Very much	An extreme amount
21 (F30.2)	To what extent do you feel a sense of companionship in your life?	1	2	3	4	5
22 (F30.3)	To what extent do you experience love in your life?					

		Not at all	A little	Moderately	Mostly	Completely
23 (F30.4)	To what extent do you have opportunities to love?	1	2	3	4	5
24 (F30.7)	To what extent do you have opportunities to be loved?					

*Do you have any comments about the questionnaire?*

**THANK YOU FOR YOUR HELP**



