Providing a sustainable living environment in not-for-profit retirement villages: A case study in Australia

Xin Hu[1], Bo Xia[2], Martin Skitmore[3], Laurie Buys[4]

[1] PhD Candidate, School of Civil Engineering and Built Environment, Queensland University of Technology, Garden Point Campus, 2 George Street, Brisbane QLD 4001, Australia. Email: x8.hu@outlook.com, Phone: +61 450 386 818 (Corresponding author)

[2] Senior lecturer, School of Civil Engineering and Built Environment, Queensland University of Technology, Garden Point Campus, 2 George Street, Brisbane QLD 4001, Australia. Email: paul.xia@qut.edu.au

[3] Professor, School of Civil Engineering and Built Environment, Queensland University of Technology, Garden Point Campus, 2 George Street, Brisbane QLD 4001, Australia. Email: rm.skitmore@qut.edu.au

[4] Professor, School of Design, Queensland University of Technology, Garden Point Campus, 2 George Street, Brisbane QLD 4001, Australia. Email: l.buys@qut.edu.au

Acknowledgements

Providing a sustainable living environment in not-for-profit retirement villages: A case study in

Australia

Abstract

Purpose - As a viable housing option for older people, retirement villages need to provide a sustainable living environment that satisfies their residents' needs in terms of affordability, life-style and environmental friendliness. This is, however, a significant challenge for not-for-profit developers owing to the high upfront costs involved in using sustainable practices. The purpose of this paper is to identify the sustainable features and practices adopted in not-for-profit retirement villages.

Design/methodology/approach - Due to the lack of quantitative historical data, a case study approach was adopted to identify the sustainable features and practices used in a not-for-profit retirement village in Sunshine Coast, Queensland, Australia. Data were collected based on interviews, direct observation and documentation, and collected data were analysed by using content analysis.

Findings - The research findings indicate that, similar to private developers, not-for-profit developers also have the capability to make their village environment sustainable. In this case, the sustainable practices cover various aspects including the selection of village location, site planning, provision of facilities and services, social life and living costs. Although the associated costs of adopting sustainable features is a concern for both developers and residents, some of the identified sustainable practices in this case do not result in significant cost increase but can improve the residents' quality of life substantially.

Practical implications - The research findings provide a number of practical implications on how to deliver sustainable retirement villages in a not-for-profit village setting.

Originality/value - This paper provides a first look at sustainable features and practices adopted in both the development and operation stages of a not-for-profit retirement village.

Keywords Not-for-profit, Sustainable practices, Sustainable living environment, Retirement villages, Case study, Australia

Paper type Case study

1. Introduction

Sustainable development has been widely accepted as an approach for dealing with the complicated links between environmental problems, socio-economic issues (e.g., poverty and inequality) and a healthy future for humanity (Hopwood *et al.*, 2005). As an integral component of sustainable development, communities need to provide people with a liveable, resilient, diverse and adaptable residential environment (Roseland, 2000). Consequently, sustainable community initiatives have been popularly proposed around the world, such as the *Sustainable Australia – Sustainable Communities* in Australia and the *Sustainable communities: building for the future* in the United Kingdom. Though the sustainable community is a context-based concept that has been defined differently in various government documents and academic research (Xia *et al.*, 2015a), it covers the issues involved in the environmental, economic and social sustainability of a community.

As a viable residential community for older adults, retirement villages in Australia support their independent living by providing various facilities and services (Gardner *et al.*, 2005). As with communities in general, it has also been suggested that retirement villages should embody the sustainability principle in their development and operation, to meet the residents' requirements in terms of affordability, life-style and environmental friendliness (Hu *et al.*, 2015; Xia *et al.*, 2015c). However, few developers currently consider environmental sustainability during the design and construction of retirement villages, resulting in the problem that many residents live in poorly-designed retirement villages that are harmful to their health and the health of the environment (Green Building Council of Australia, 2016). In addition, many retirement villages fail to respond to the residents' life-style changes, in terms of social interaction for example, and therefore problems such as social isolation and loneliness are often prevalent (Gardner *et al.*, 2005; Xia *et al.*, 2015c). The affordability of village living is also a common theme among potential

residents and many are concerned that they do not have enough money to secure their financially comfortable retirement after paying the entry contribution and on-going costs (Finn *et al.*, 2011).

In Australia, 40.1 per cent of retirement villages are not-for-profit, and in some states/territories the proportions are higher than 50 per cent, such as South Australia (69.1 per cent) and Tasmania (67.9 per cent) (Property Council of Australia, 2014). Unlike private developers who focus more on stakeholder profits, not-for-profit developers recycle profits back to residents by improving the quality of their provided services. Currently, both private and not-for-profit retirement village developers have taken actions to provide sustainable living environment for their residents (Xia *et al.*, 2015c; Zuo *et al.*, 2014). Nevertheless, not-for-profit developers face more challenges mainly because sustainable retirement villages need more financial resources (Zuo *et al.*, 2014), which is challenging for not-for-profit developers given their limited financial means. In addition, in comparison with residents living in private retirement villages, not-for-profit village residents are more concerned with the extra costs relating to the use of the sustainable practices and features in their villages (Barker *et al.*, 2013; Xia *et al.*, 2014).

It is therefore meaningful to explore strategies and approaches for providing a sustainable living environment, especially in not-for-profit retirement villages. However, few studies have been devoted to this issue to date. Therefore, this study aims to address this research gap by presenting a comprehensive case study of a not-for-profit retirement village in Queensland (QLD), Australia. It is expected that the study will benefit retirement the village stakeholders' understanding of the sustainability of a village project. It is also expected that the sustainable practices and features identified and employed in this case will identify the implications for future retirement village developments.

2. Retirement villages and sustainability in Australia

In Australia, retirement villages refer to an age-segregated community that provides diverse services and facilities to meet the residents' unique needs in later life. They are an age-built environment that has features of age-homogeneity, institutionalization and independent living for the residents. In 2014, 5.7 per cent of Australians at least 65 years old lived in retirement villages, and it is predicted that this will increase to 7.5 per cent by 2025 due to the increasing aged population and rising popularity of village living (Property Council of Australia, 2014).

The majority of residents experience a satisfied village life due to the benefits of village living, such as improved social interaction, enhanced independence and improved health conditions (Gardner *et al.*, 2005; Kennedy and Coates, 2008). However, retirement villages are not an antidote to an ageing society. They are also criticized as a place where social isolation is a necessary feature owing to the age-homogeneity of the village environment, where freedom and choice are denied due to the pressures on residents to conform with village rules and regulations, and privacy and autonomy are lost due to the village design (Gardner *et al.*, 2005).

The development of sustainable retirement villages has been observed recently due to the increasing acceptance of village living and a rising public awareness of sustainable development (Barker *et al.*, 2013; Xia *et al.*, 2015c). A sustainable retirement village stresses the integration of financial affordability, social-friendliness and environmental sustainability in one setting (Hu *et al.*, 2015). First, financial affordability is crucial, as older people generally experience reduced financial circumstances after retirement (Finn *et al.*, 2011; Kelly *et al.*, 2015; Zuo *et al.*, 2014). This is especially true for non-home owners and pensioners, given their relatively low economic wealth (Finn *et al.*, 2011; Gardner, 1994). Second, as older adults still expect to be socially connected in their community after retirement to alleviate and prevent social isolation and loneliness (Cattan *et al.*, 2005), the socio-physical environment of retirement villages,

therefore, needs to be well tailored to facilitate an active and healthy life style by offering opportunities such as the establishment of friendship and participation in activities and civil affairs (Xia *et al.*, 2015c). Finally, residents are conscious of the consumption of unsustainable resources and prefer the environmental-friendliness of retirement villages (Barker *et al.*, 2013). Given the increasing number of older people as well as their unique lifestyle (e.g. spending more time in-door) (Kronenberg, 2009), the environmental sustainability of retirement villages needs to be centred on such issues as increasing energy and resource efficiency, minimising waste and the enhancement of indoor air quality (Hu *et al.*, 2015).

Currently, village stakeholders are paying increasing attention to the development of a sustainable living environment. The national leadership group of the retirement village sector, the Retirement Living Council, is working together with developers to provide a sustainable living environment for residents to promote their health and wellbeing (Retirement Living Council, 2014). The Green Building Council of Australia is also working together with developers to develop a Green Star rating tool specifically for retirement villages as a means of 'making villages green' (Green Building Council of Australia, 2016). In addition, both private and not-for-profit developers value the incorporation of sustainable features in the development and operation of retirement villages to provide an appropriate environment for their residents (Xia *et al.*, 2015c; Zuo *et al.*, 2014). Furthermore, residents are also taking part in a variety of daily activities to make their villages sustainable, such as the use of a rainwater tank for gardening and laundering (Xia *et al.*, 2014). All these efforts have contributed to the development of sustainable retirement villages in Australia.

Nevertheless, the development of sustainable retirement villages face various challenges in terms of housing design, affordability and housing design models (Zuo *et al.*, 2014). More challenges will be posed when the baby boomer generation commence their retirement phase. Baby boomers differ from their

parents significantly, with unique financial, social and environmental characteristics. Although baby boomers are wealthier than their parents when they enter into retirement, their sometimes financial irresponsibility makes it difficult for them to afford the lifestyle they expect (Quine and Carter, 2006). In addition, baby boomers expect more from retirement than their parents in retaining their independence, privacy and social networks (Barker *et al.*, 2013; Quine and Carter, 2006). The baby boomer cohort also a considerable diversity of needs and aspirations (Ozanne, 2009), which further challenges their provision of a sustainable village environment.

3. Research method

Due to the lack of quantitative historical data, a case study approach was adopted to identify the sustainable features and practices used in a not-for-profit retirement village. The case study approach is often employed to intensively study a phenomenon over time within its natural setting on one or more sites and is particularly suited to explanatory research where the experiences of participants and the context of actions are critical (Bhattacherjee, 2012; Zuo *et al.*, 2014). The case study in this research placed special emphasis on the sustainable features and practices used in the management and operation stage of the village site.

Two criteria to select the retirement village case were developed. First, the selected retirement village should be a not-for-profit one. In addition, the selected retirement village should have adopted mature sustainability features and practices in its management and operation stages. In the case study, a retirement village, developed and operated by an influential not-for-profit retirement village organization in Australia, was selected and used. The selected not-for-profit retirement village offers supportive services to develop a sustainable living environment that enables its residents to remain independent and keep active in the wider community for as long as possible.

The data obtained for case studies can be diverse such as documentation, archival resources, interviews, direct observation, participant observation and physical artefacts (Yin, 2003). In this study, data were collected based on the interview with the village manager, direct observation and documentation. First, data were collected from a semi-structured interview with the manager of the retirement community. The manager, who has worked in the retirement living sector for 20 years, has rich knowledge and experience associated with the development and operation of not-for-profit retirement villages. All the interview questions were open-ended (e.g., What aspects of the site planning elements do you think have been really good in supporting the daily lives of older people?) and the interview lasted for around one hour. The interview focused on the identification of sustainable features and practices used in the village site. In addition, direct observation of the retirement village site was also conducted to record sustainable practices. As a result, 153 village photos were taken to help record initial data used for further analysis. Moreover, documents concerning the retirement village, such as its site planning map, official website and brochure, were also collected for analysis. Following Bhattacherjee's (2012) warning that researchers may not validate case study data and this may lead to biased interpretations, the 2015 resident satisfaction survey results of the village were collected to evaluate the performance of sustainable features and practices indirectly. The resident satisfactions survey was conducted by the village developer in 2015 and covered different aspects of its residents' daily life (e.g., communication, management/staff, activity program, and maintenance and home environment). The response rate of the survey is 65.5%, which means that around 73 residents participated in the survey as 112 residents live in the retirement village. As one of the prerequisites of living in an Australian retirement village is that older people can live independently (Hu et al., 2017), all the participants of the questionnaire survey have the cognitive ability to answer the survey questions. The collected data therefore provides a relatively comprehensive picture of the development and operation of a sustainable not-for-profit retirement village.

In this case study, content analysis was adopted as a means of making valid inferences from the data in a systematic and objective way (Downe-Wamboldt, 1992). As three different kinds of data were collected in this study (interview record, site photos and documentations), the determination of the unit of analysis is based on the data category. These three kinds of data were reviewed orderly. In addition, a brief review of the collected data found that these data are mainly related to five aspects including site location, site planning, facilities and services, social life and living cost. These five aspects are therefore determined as the themes of analysis, and they cover the main used sustainable practices in village developments. The collected data were carefully reviewed manually, and the sustainable practices under the five scheme were identified. These identified sustainable practices were stored in an Excel document and each sustainable practice was summarized and expressed by using a concise phrase. The description of the sustainable practices under each theme can be found in the following section. After all the sustainable practices were identified, a further analysis of the identified sustainable practices was conducted to indicate their satisfied aged needs and determine if additional cost required when they are used.

4. Case study

4.1 Background and context

The retirement village aims to provide a lifestyle that enables residents to remain independent and keep active in the wider community for as long as possible, while living in a secure, supportive and social environment. It provides community-based aged care options available on-site to support the residents' ageing in place. The village site has 71 two- to three-bedroom independent living units, accommodating 112 residents. The mean age of the residents is 60 years old and the majority live independently with low or moderate assistance needs. Around 40 per cent are female.

4.2 Site location

The retirement village is located in the northwest of Sunshine Coast, QLD, and is not far from the Sunshine Coast city and airport. QLD has a subtropical climate with hot and humid summers and dry and moderately warm winters, with an overall temperature variability less than most other Australian areas, especially in winter. As older people prefer living in a thermally comfortable environment (Hoof and Hensen, 2006), the humid subtropical climate makes this village site a favoured place for retirement.

The village location is ideal for the residents' independent living by maximizing access to neighbourhood services and facilities (Figure 1). It is adjacent to various off-site facilities and services, such as a hospital, medical specialists, allied health services, library, pool, clubs, shopping district, public transportation, park and cinema, easing the residents' daily life. The residents can make good use of nearby infrastructure and enhance opportunities for age-integrated activities. In particularly, the railway station is around five-minute drive from the village site, conveniently connecting this village site with the Brisbane and Gold Coast areas. It has been stressed that access to services and facilities from the wider neighbourhood of a retirement village supports the residents' active lifestyles (Nathan *et al.*, 2013), a feature that has been confirmed as attractive for the relocation of potential residents (Crisp *et al.*, 2013). A further attraction is that the location is also convenient for visiting family members, as family members play an influential role in helping in village selection when deciding to relocate and older people prefer retirement villages that are near to their family members (Buys, 2000; Knight and Buys, 2003).

<u>\<Insert Figure 1 about here></u>

4.3 Site planning

Age-friendly site planning practices have been incorporated into the site to provide the residents with a viable living environment (Figure 2). The site-planning pattern of this retirement village follows centralized principles. This centralized site planning pattern, as stressed by Carstens (1993), is particularly suitable for a large site with low-density development, not only helping promote the residents' sense of community and ownership but also helping in finding their way around. The community centre (Clubhouse) is located in the heart of the village site, providing ease of access for the residents by inter-linked drives and walking paths. Various facilities, services and common spaces for service provision are provided there, such as a library, table tennis table, function room, outdoor entertaining area, store, board games and bowls kit, computer hub, kitchen, barbeque area, covered terrace area and meeting room (see Figure 3). A small lake is additionally located in the middle of the site, with easy access for the residents and providing them with opportunities for social interaction. Independent living units are distributed on two sides of the community centre and the back, facilitating the residents' access to on-site social spaces. In this way, zones for different functions are well-defined on-site, including the residential zone and social life zone.

<Insert Figure 2 about here>

<Insert Figure 3 about here>

As a retirement village is a complex separated from its neighbourhood, its site entry/exit should be safe and easily identified by residents (Carstens, 1993). Best practices have been employed at the site entry/exit to provide the residents with a secure environment. For instance, the site entry/exit of this site is located at a minor road to avoid the heavy traffic of a major road in order to ensure the residents' safety. Lights are also provided to illuminate this area at night. Low ground cover provides an adequate sight distance and avoids obscuring the residents' vision to ensure their driving safety. Traffic-related design

detailing has also been adopted to ensure the residents' safety, including the provision of a reflecting mirror, traffic signs, a speed hump and yellow reflecting road studs. A site map is also provided to help the residents and visitors easily find their way inside.

The ring site connection and transportation makes it easy for the residents to find their way around and helps their access to on-site facilities and service provision areas, such as the community centre, lake and parking lots. In addition, lights are provided along the site drive to illuminate the village site at night so as to provide a safe environment. There are also various traffic-related signs (e.g., the speed hump sign, 15 KMH speed limit sign, "Watch out for pedestrians" sign and a fingerpost sign) on-site, ensuring the residents' security. To help residents' easy way-finding, fingerposts with road names and unit numbers are well designed at the crossroads.

The arrival court of the community centre is an important area for the residents, providing them with spaces for social interaction and service accessibility. Seating chairs are offered there to provide the residents with opportunities for communication and viewing activities and as a way of promoting their social interaction. Mailboxes are also provided, creating occasional communication opportunities for social connection. Community information (e.g., social activities and events) is posted on the community bulletin board, facilitating community information-sharing to ensure the residents are well informed and connected. In addition, a variety of practices have been adopted to make the community centre court safe. For instance, a small garden buffer is designed to separate the drop-off area of the community centre from the site drive so as to ensure safety. The porch is covered and extended over the drop-off area to protect the residents from inclement weather and ensure their easy pick-up. Benefiting from the layout of the community centre, staff can view the court indoors. This ensures the continued monitoring of the court and response to accidents (e.g., falls) in a timely manner. Other design detailing, such as the

provision of lights and bollards, also helps the delivery of a security environment to the residents. Given the important role the community centre court plays, the developer also tries to make it easy to be accessed by the residents. For example, its design follows the barrier-free design principle, and the arrival court is at the same grade with the site drive. Parking lots adjacent to the community centre are also available, which is convenient for the residents, staff and visitors.

The majority of villa entries at the village site face north to take full advantages of natural sunlight in the southern hemisphere. This practice maximises exposure to winter sun to keep the unit warm, which provides a means of achieving energy efficiency and reducing the residents' living expenses. Nevertheless, this practice can also result in a villa entries being hot, especially in summer. Fences and a covered porch are used to avoid direct sunlight to the villa entry, providing a shadowy place for communication and participation in activities. In addition, the fences separating villa entries from garages and grass areas help ensure the residents' safety and protect their privacy. The covered porch can also protect the residents from bad weather to provide a safe place where they can sit and watch outdoor activities, communicate with people and receive deliveries. In addition, the grassed area, located between the villa entry and site drive, ensures the safety and privacy of the villa entry. A small garden provides the residents with opportunities for enjoying a recreational life-style and participating in garden activities. The design of villa entry follows the barrier-free principle, reducing the possibility of the residents' falling and facilitating their mobility. The barrier-free walkway also connects the villa entry with its garage and the neighbouring villa entry. This practice not only helps the mobility of the residents in a convenient and safe way, but also helps protect their privacy and establish close relationships to ensure a sense of community.

Given that the majority of older people are still actively driving, having access to a car is crucial for their life quality (Banister and Bowling, 2004). In this retirement village, each villa is designed with a garage. In

addition, small parking lots next to the residents' villas and the community centre are also available, which provides easy access and use for the residents. This has been supported by designers who state that proximity to parking lots is a greater priority for greater security, surveillance and convenience (Carstens, 1993). The on-site parking lots have many features to facilitate the residents' daily life. For instance, the use of red colour paint has increased their visibility. In addition, angled parking makes it easier to turn into the stalls than a perpendicular parking type and reduces the chance of collisions with adjacent parked cars, while visual surveillance of several parking lots near the community centre also provides a secure residential environment. The parking lot type, layout and required direction for travel are also consistent with the overall layout of the on-site roads and drives, making the parking lots easier to use.

Shared outdoor social spaces, aimed at promoting social interaction, are well defined. For instance, a lake is located at the middle of the community, and various amenities such as seats, tables, a covered pavilion, a walking path, BBQ facilities and lights are provided there. It is therefore easy for the residents to use and offers a safe place where they communicate, share interests, and organize and participate in activities and events. In addition, the location of the lake makes it possible for the residents living nearby to sit and watch outdoor activities at the lake area from their units, making the residents feel a part of their community and promoting social interaction (Carstens, 1993). There is also a covered seating area located at an intersection of this site, which is a popular safe space for the resident to socialize, meet neighbours, and sit and watch activities.

Walking is one of the most popular physical activities among older adults, and the presence of a walking path makes a major contribution to residents' social participation (Carstens, 1993; Nathan *et al.*, 2013). A waking path is provided on-site. In response to recommendations for safety interventions to combat age-related changes such as in reduced physical abilities (Tournier *et al.*, 2016), the barrier-free design is used

to eliminate walking obstructions and handrails are provided to help the residents' way-finding and ensure their safety. Other design detailing along the walking path, such as seats and lights, is additionally provided to ensure the residents' safety.

4.4 Facilities and services

Facilities are an important component in the provision of sustainable retirement villages, and the presence of on-site facilities can facilitate residents' active living (Nathan *et al.*, 2013; Xia *et al.*, 2015b). To create a supportive environment that can facilitate social interaction, diverse on-site facilities are provided to enrich its residents' retired life. Table I summarises the facilities and services provided on-site.

<Insert Table I about here>

A range of quality home care and community services (such as personal care, meals, social support and activities) are available to extend the residents' independent living as long as possible (Table I). Through its community care programs, the village tries to providing the best support for its residents. This is an important way of ensuring "on-going continued care". For instance, home care packages are individually tailored to the residents' choices and preferences, and planned with the residents to meet their specific care needs. They can be delivered on a consumer-directed basis, offering the residents more choice in when and by whom the care is delivered. Of the services provided, access to health care and support is crucial, as health-related issues are usually combined with people's ageing process. Having access to health care and support has been confirmed as an attractive factor that contributes to prospective residents' relocation to a retirement village (Buys, 2000). Other services (e.g., home maintenance support) are valued by the residents in supporting their daily responsibilities and meeting their need for low

maintenance, which is also an important factor encouraging prospective residents' relocation to retirement villages (Buys, 2000; Crisp *et al.*, 2013).

4.5 Social life

Older adults expect to be socially-engaged after retirement, though factors such as life cycle transitions and declining capacities can change their social participation patterns (Bukov *et al.*, 2002). Participating in activities is an effective way of keeping socially-connected (Bukov *et al.*, 2002). The developer encourages the residents to organize and participate in activities, such as those organized in the community centre. The developer also provides information relating to social activities (e.g., forthcoming films) on the bulletin board located in the community centre to keep the residents informed. Additionally, the residents can join in village affairs; for instance, in taking part in the resident satisfaction survey to express their opinions on the quality of services provided, to enable further improvement of the village.

Contacting with family members and friends is an effective way of helping the quality of older adults' social life (Nocon and Pearson, 2000; Shanas, 1979). As confirmed in prior retirement village studies, family members and friends provide residents with social support to reduce loneliness and isolation (Buys *et al.*, 2006; Buys, 2001). In this retirement village, family members and friends are welcomed to visit the site to provide the residents with social support. The residents can meet their family/friends in their own unit or on-site facilities (e.g., the Clubhouse), and can stay with them in their village homes up to 30 days over a continuous period. Additionally, as the physical environment is consistently associated with social life (Humpel *et al.*, 2002), the developer tries to provide a physical-friendly environment to facilitate social interaction. For instance, various on-site facilities offer places and opportunities for social connection and participation (Nathan *et al.*, 2013). The presence of an on-site walkway provides opportunities for

communication while walking, another way of helping the residents' social-connectedness (Nathan *et al.*, 2013).

4.6 Living cost

Residents of retirement villages expect a financially comfortable environment (Finn *et al.*, 2011). In this retirement village, there are four different entry options comprising a Standard in-going contribution, no exit fees, lifestyle choices and capital gain. This ensures the flexibility to meet different needs, in contrast with other retirement villages that use only a three-tiered payment program of in-going contribution, general service cost and exit fee. Table II compares of these four entry options. For instance, it is suggested that if the residents expect to have more cash and a lower entry option, they can choose the entry option of Lifestyle choices.

<Insert Table II about here>

The in-going contribution is the amount payable by a resident for the right to reside in a retirement village, which is similar to the purchase price of a home. In this retirement village, based on the size of the unit (from two-bedroom homes to three-bedroom homes), the amount of in-going contribution is up to AUD 385,000, with a mean value of AUD 315,000. The general service cost refers to the recurring charges involved in the day-to-day running of the village site, which is payable for each unit. This covers the costs of the administration, management and staff, all rates (land and water), the maintenance reserve fund contribution, building repairs and maintenance, 24-hour emergency response system, insurance (buildings and public liability), community electricity, maintenance of all common areas, lawn mowing and gardening, rubbish removal and recycling, external pest control, village facilities and activities, and access to the village bus. The general service cost of the retirement village is AUD 121 per week. The exit fee is

used to help cover the initial investment of the village development and is paid when the residents leave the village. This fee is considered to be an exchange for a discount on the entry contribution, which is a way of making the village living affordable. In this retirement village, as shown in Table II, its amount is calculated based on different entry options. For instance, under the Standard In-going Contribution and Capital Gain contract, its amount is calculated based on the in-going contribution and the period of village living - up to 35 per cent of the in-going contribution if a resident lives there for six years or more. Regarding other options, the residents either do not need to pay or need to pay a higher exit fee. In addition, it is only under the Capital Gain contract that the residents can share in the capital gains arising from the sale of their village unit to take the full advantage of market growth.

5. Discussion

The study identified various sustainable practices in retirement village development and operation in terms of both physical and social environment. The results depict a comprehensive picture of specific strategies to support the development of a sustainable living environment in a not-for-profit retirement village setting. Other village developers can learn from these practices to address issues encountered during the delivery of sustainable living environment to residents.

The performance of these sustainable practices can be evidenced to some extent from the results of the 2015 resident satisfaction survey (see Table IV). There are high scores for the overall satisfaction of the residents with the assistance provided by the developer (4.1 of 5.0) and the residents' feeling that their life quality has been improved by moving into the village (4.0 of 5.0). The majority of the residents (86 per cent) would like to recommend the developer to others. In addition, the residents' satisfaction with the specific aspects of the village were also investigated, covering areas of entry, communication, management/staff, privacy/dignity, activity programs, maintenance and home environment, and

additional support. For instance, the residents are satisfied with the financial information from staff upon entry (4.1 of 5.0). They also have satisfactory communications as, for example, they are kept informed of things that might affect them as a resident of the village (4.2 of 5.0). The residents also agreed that their family members and friends are always made welcome when visiting (4.4 of 5.0), and staff are knowledgeable and helpful in delivering quality services (4.3 of 5.0). The residents are socially-interactive due to the support of the retirement village in maintaining social networks and friendships (3.9 of 5.0), amount and variety of activities (3.9 of 5.0) and support to attend activities (3.9 of 5.0). The residents also agree that the community facilities are comfortable, suitable for their needs (4.1 of 5.0) and well maintained (4.3 of 5.0). The full results of the satisfaction survey are shown in Table IV. Overall, these adopted sustainable practices can enhance the residents' quality of life by improving both the social and physical environment of the retirement village, which is an important aim in developing sustainable retirement villages (Hu *et al.*, 2015; Xia *et al.*, 2015c).

<Insert Table III about here>

<Insert Table IV about here>

These sustainable practices offer a sustainable living environment where the requirements of older people such as safety/security, social interaction, convenience, a sense of community, energy efficiency and affordability can be satisfied. These requirements have been strongly emphasized in delivering sustainable retirement villages in prior studies (Hu *et al.*, 2015; Xia *et al.*, 2015c; Zuo *et al.*, 2014) owing to their positive influences on resident life quality (Gardner *et al.*, 2005; Kennedy and Coates, 2008). Prior studies also suggest that older adults prefer living in an age-friendly environment where they "*are actively involved, valued, and supported with infrastructure and services that effectively accommodate their*

needs" (Alley *et al.*, 2007). To achieve this, it is important that the older adults' residential environment, in terms of both social and physical aspects, should be well designed and planned (Alley *et al.*, 2007; Lui *et al.*, 2009). The findings of this case study are consistent with this. In this retirement village, sustainable practices in terms of both the social environment (e.g., the services provision and activities organization) and physical environment (e.g., the site planning) have been adopted to shape a liveable environment. This can be explained from an ecological perspective in that older adults' wellbeing is closely associated with multiple dimensions of the physical and social environment in which they reside (Novek and Menec, 2014).

The sustainable practices adopted in the village help to develop a socially connected and supportive, environmentally friendly and financially comfortable environment. Compared with a previously investigated private retirement village project in QLD (Xia *et al.*, 2015c), the cost of living in this retirement village is relatively low. As explained in Xia *et al.* (2015c), not-for-profit retirement villages target older people with middle to low incomes and living mainly on pensions, which is different from private villages, in which affordability does not appear to be a concern to their residents. Despite this, the results in Table III indicate that some of the adopted sustainable practices will not result in significant additional costs for not-for-profit developer and residents. This is consistent with the research findings of Zuo *et al.* (2014), which found that some environmentally sustainable features and practices used during the construction stage of a not-for-profit retirement village in South Australia did not result in significant escalated costs for the developer or residents.

6. Conclusions

A sustainable living environment in retirement villages needs to satisfy their residents' needs in terms of the affordability, social and environmental friendliness. The sustainable features incorporated into the

case study village cover diverse aspects such as the selection of village location, site planning, provision of facilities and services, social life and living cost arrangement. These identified sustainable practices provide an age-friendly environment to meet aged needs, such as safety/security, social interaction, convenience, a sense of community, energy efficiency, and affordability. Some of the sustainable practices were obtained without any significant additional costs to the developer or residents. This provides great encouragement for the future development of sustainable retirement villages, as developers are naturally concerned about the high initial investment involved and residents expect a financially comfortable environment.

Although the case selected has its own uniqueness, the findings of the study provide valuable implications for the development of sustainable retirement villages in the future. First, all the sustainable practices identified can be retrieved and reused in the future development of sustainable retirement villages. Nevertheless, given the difficulties involved in their direct reuse, assistance tools, such as experience mining system, should be developed to help developers learn from existing development experience and practices. Developers who have the financial concern of developing sustainable living environment can also make their village environment green by reusing some sustainable practices that do not require additional cost. In addition, the research findings imply that sustainable features should be included into both the physical and social environment of a retirement village. In particular, the physical environment should be designed based on older adults' aged needs in the early stages of development given its profound impact on residents' daily life. Once the physical village environment is constructed, it is hard to change and will involve additional resources if it fails to meet residents' needs. Furthermore, incorporating sustainable practices in the development of retirement villages can be used as a market strategy to attract perspective residents given that an increasing number of older people prefer to living in a sustainable

living environment after retirement. This is a feasible way of obtaining competitive advantages in the

Australian retirement village industry.

References

Alley, D., Liebig, P., Pynoos, J., Banerjee, T. and Choi, I.H. (2007). "Creating elder-friendly communities", *Journal of Gerontological Social Work,* Vol. 49 No. 1-2, pp. 1-18.

Banister, D. and Bowling, A. 2004. "Quality of life for the elderly: the transport dimension", *Transport Policy,* Vol. 11 No. 2**,** pp. 105-115.

Barker, J., Xia, B., Zuo, J. and Zillante, G. (2013). "Sustainable retirement living: what matters?", *Australasian Journal of Construction Economics and Building-Conference Series,* Vol. 1 No. 1**,** pp. 56-61.

Bhattacherjee, A. (2012). *Social Science Research: Principles, Methods, and Practices*, Global Text Project, Florida, USA.

Bukov, A., Maas, I. and Lampert, T. (2002). "Social participation in very old age: cross-sectional and longitudinal findings from BASE", *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences,* Vol. 57 No. 6**,** pp. P510-P517.

Buys, L., Miller, E. and Barnett, K. (2006). "The personal, practical and policy implications of older Australians' residential choice", *Journal of Housing For the Elderly,* Vol. 20 No. 1-2**,** pp. 31-46.

Buys, L.R. (2000). "Care and support assistance provided in retirement villages: expectations vs reality", *Australasian Journal on Ageing,* Vol. 19 No. 3**,** pp. 149-151.

Buys, L.R. (2001). "Life in a retirement village: implications for contact with community and village friends", *Gerontology,* Vol. 47 No. 1**,** pp. 55-59.

Carstens, D.Y. (1993). *Site Planning and Design for the Elderly: Issues, Guidelines, and Alternatives*, John Wiley & Sons, Canada.

Cattan, M., White, M., Bond, J. and Learmouth, A. (2005). "Preventing social isolation and loneliness among older people: a systematic review of health promotion interventions", *Ageing & Society,* Vol. 25 No. 1**,** pp. 41-67.

Crisp, D.A., Windsor, T.D., Butterworth, P. and Anstey, K.J. (2013). "What are older adults seeking? Factors encouraging or discouraging retirement village living", *Australasian Journal on Ageing,* Vol. 32 No. 3**,** pp. 163-170.

Downe-Wamboldt, B. (1992). "Content analysis: Method, applications, and issues", *Health Care for Women International,* Vol. 13 No. 3**,** pp. 313-321.

Finn, J., Mukhtar, V.Y., Kennedy, D.J., Kendig, H., Bohle, P. and Rrwlings-Way, O. (2011). "Financial planning for retirement village living: a qualitative exploration", *Journal of Housing For the Elderly,* Vol. 25 No. 2**,** pp. 217-242.

Gardner, I.L. (1994). "Why people move to retirement villages: home owners and non-home owners", *Australian Journal on Ageing,* Vol. 13 No. 1**,** pp. 36-40.

Gardner, I.L., Browning, C. and Kendig, H. (2005). "Accommodation options in later life: retirement village or community living?", *Australasian Journal on Ageing,* Vol. 24 No. 4**,** pp. 188-195.

Green Builidng Council of Australia. (2016). "Green Star for retirement living", avaliable at: https://www.gbca.org.au/uploads/152/2712/GBCA015_Framework_Final_SinglePages.pdf (accessed 15 August 2016).

Hoof, J.V. and Hensen, J.L.M. (2006). "Thermal comfort and older adults", *Gerontechnology*, Vol. 4 No. 4, pp. 223-228

Hopwood, B., Mellor, M. and O'brien, G. (2005). "Sustainable development: mapping different approaches", *Sustainable development,* Vol. 13 No. 1**,** pp. 38-52.

Hu, X., Xia, B., Skitmore, M. and Buys, L. (2015) "Conceptualizing sustainable retirement villages in Australia", *in proceedings of the 31st Annual ARCOM Conference, 2015*, Association of Researchers in Construction Management, Lincoln, UK, pp. 357-366.

Hu, X., Xia, B., Skitmore, M., Buys, L. and Zuo, J. (2017). "Retirement villages in Australia: a literature review", *Pacific Rim Property Research Journal*, Vol. 23 No. 1, pp. 101-122.

Humpel, N., Owen, N. and Leslie, E. (2002). "Environmental factors associated with adults' participation in physical activity: A review", *American Journal of Preventive Medicine,* Vol. 22 No. 3**,** pp. 188-199.

Kelly, J., Dixon, T., Witham, H. and Baldwin, R. (2015). "The Future of Housing for Older Australians Position Paper", avaliable at: https://opus.lib.uts.edu.au/bitstream/10453/36459/1/ACSA%20Housing%20Position%20Paper%20January%202015.pdf (Accessed 17 May 2016).

Kennedy, D.J. and Coates, D. (2008). "Retirement village resident satisfaction in Australia: a qualitative enquiry", *Journal of Housing For the Elderly,* Vol. 22 No. 4**,** pp. 311-334.

Knight, S.C. and Buys, L.R. (2003). "The involvement of adult children in their parent's decision to move to a retirement village", *Australasian Journal on Ageing,* Vol. 22 No. 2**,** pp. 91-93.

Kronenberg, T. (2009). "The impact of demographic change on energy use and greenhouse gas emissions in Germany", *Ecological Economics,* Vol. 68 No. 10**,** pp. 2637-2645.

Lui, C.W., Everingham, J.A., Warburton, J., Cuthill, M. and Bartlett, H. (2009). "What makes a community age-friendly: A review of international literature", *Australasian Journal on Ageing,* Vol. 28 No. 3**,** pp. 116-121.

Nathan, A., Wood, L. and Giles-Corti, B. (2013). "Environmental factors associated with active living in retirement village residents: findings from an exploratory qualitative enquiry", *Research on Aging,* Vol. 35 No. 4**,** pp. 459-480.

Nocon, A. and Pearson, M. (2000). "The roles of friends and neighbours in providing support for older people", *Ageing and Society,* Vol. 20 No. 3**,** pp. 341-367.

Novek, S. and Menec, V.H. (2014). "Older adults' perceptions of age-friendly communities in Canada: a photovoice study", *Ageing & Society,* Vol. 34 No. 6**,** pp. 1052-1072.

Ozanne, E. (2009). "Negotiating identity in late life: diversity among Australian baby boomers", *Australian Social Work,* Vol. 62 No. 2**,** pp. 132-154.

Property Council of Australia. (2014). "National overview of the retirement village sector", avaliable at: http://www.retirementliving.org.au/wp-content/uploads/2015/03/National-overview-of-the-retirement-village-sector-Grant-Thornton.pdf (accessed 15 August 2016).

Quine, S. and Carter, S. (2006). "Australian baby boomers' expectations and plans for their old age", *Australasian Journal on Ageing,* Vol. 25 No. 1**,** pp. 3-8.

Retirement Living Council. (2014). "Village becomes sustainability pioneer", available: http://www.retirementliving.org.au/news/village-becomes-sustainability-pioneer/ (Accessed January 26, 2016).

Roseland, M. (2000). "Sustainable community development: integrating environmental, economic, and social objectives", *Progress in Planning,* Vol. 54 No. 2**,** pp. 73-132.

Shanas, E. (1979). "The family as a social support system in old age", *The Gerontologist,* Vol. 19 No. 2**,** pp. 169-174.

Tournier, I., Dommes, A. and Cavallo, V. (2016). "Review of safety and mobility issues among older pedestrians", *Accident Analysis & Prevention,* Vol. 91**,** pp. 24-35.

Xia, B., Chen, Q., Skitmore, M., Zuo, J. and Li, M. (2015a). Comparison of sustainable community rating tools in Australia. *Journal of Cleaner Production,* Vol. 109**,** pp. 84-91.

Xia, B., Skitmore, M., Zuo, J. and Buys, L. (2015b). "Review of community facilities in Australian retirement villages: a content analysis", *Australasian Journal on Ageing,* Vol. 34 No. 3**,** pp. 144-148.

Xia, B., Zuo, J., Skitmore, M., Buys, L. and Hu, X. (2014). "Sustainability literacy of older people in retirement villages", *Journal of Aging Research,* Vol. 2014.

Xia, B., Zuo, J., Skitmore, M., Chen, Q. and Rarasati, A. (2015c). "Sustainable retirement village for older people: a case study in Brisbane, Australia", *International Journal of Strategic Property Management,* Vol. 19 No. 2**,** pp. 149-158.

Yin, R.K. (2003). *Case Study Research: Design and Methods (third edition)*, SAGE Publications, California, USA.

Zuo, J., Xia, B., Barker, J. and Skitmore, M. (2014). "Green buildings for greying people: a case study of a retirement village in Australia", *Facilities,* Vol. 32 No. 7/8**,** pp. 365-381.
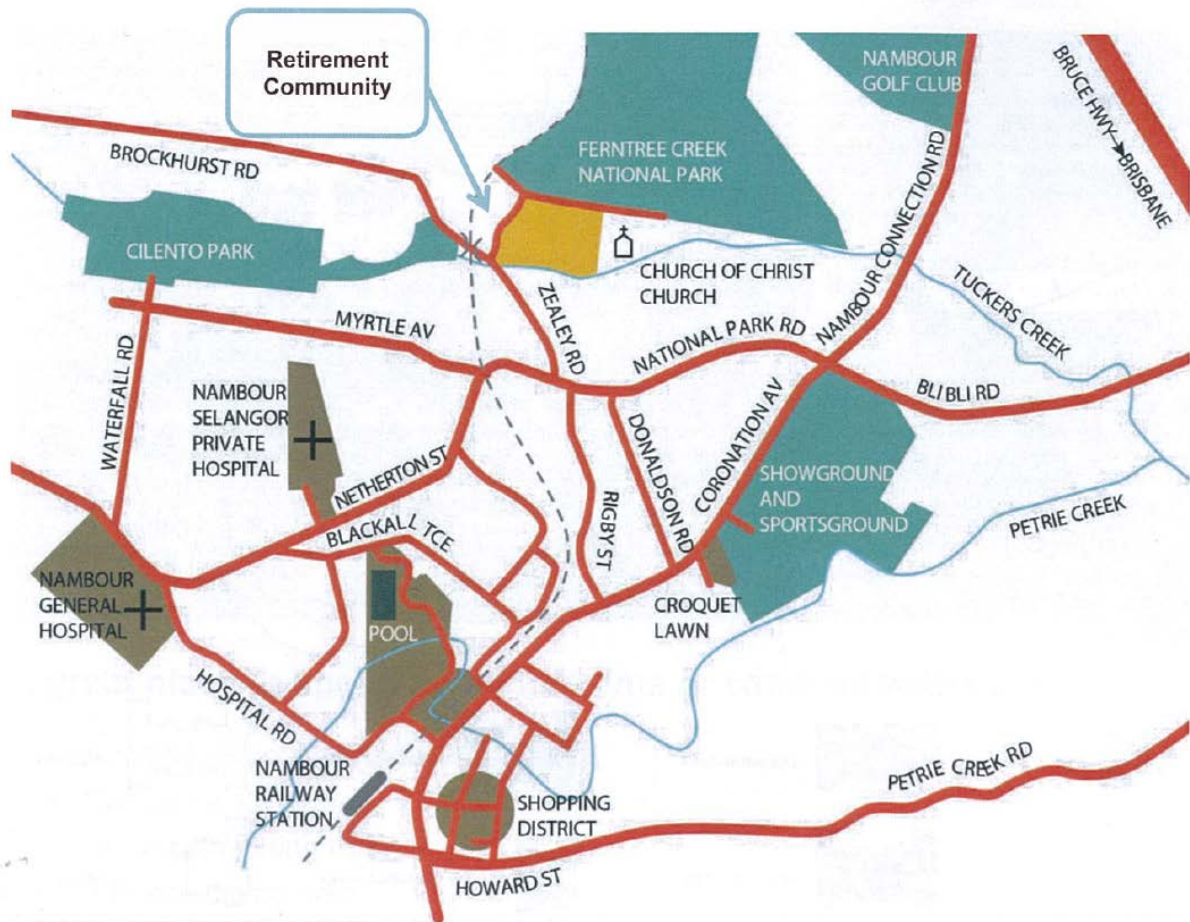
Figure 1.

Location of the retirement community

Figure 2.

Site planning map
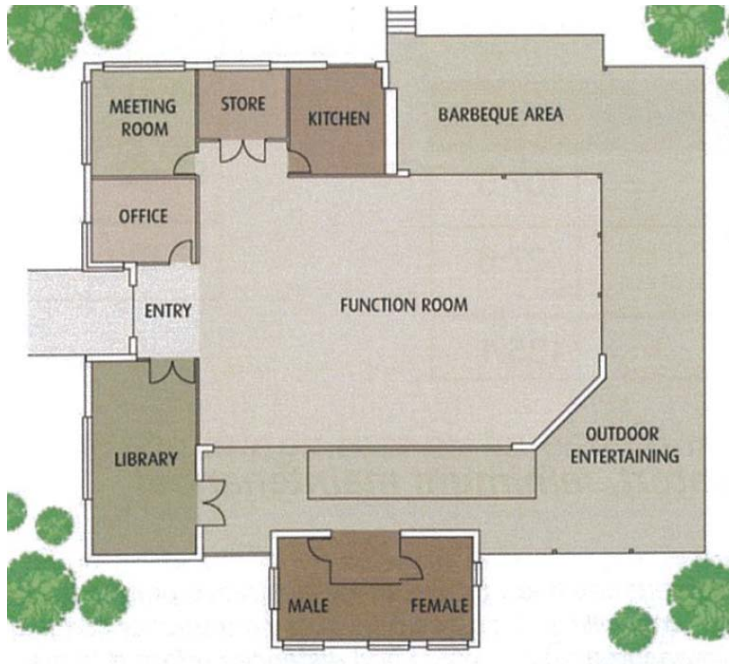
Figure 3.

Layout of the community centre

Table I.

The on-site facilities and available services in the retirement village

	Items
Facilities	Ferntree Haven Community Centre (Clubhouse), village bus, 24-hour emergency response system, undercover barbeque area and gazebo, lake, undercover deck area, craft room, library, residents' lounge and TV area, residents' kitchen room, dining room, computer hub with broadband, printer and skype access, table tennis table, board games, bowls kit, natural billabong, parking lot, function room, meeting room, store.
Services	Home care packages, personal care (e.g., bathing and getting dressed), meals, social support and activities, goods and equipment, nursing care, domestic help, transport, respite care, allied health support, home maintenance and modification, after-hospital care, fortnightly general services (e.g., all common areas maintained, external pest control, access to village bus);

Table II.

The four entry options

Code	Entry option	Description
1	Standard in-going contribution	Paying the standard in-going contribution amount for the unit; an exit fee of up to 35 per cent of the in-going contribution when leaving (starting at five per cent and increasing with each year of occupancy up to six years)
2	No exit fees	Avoiding paying exit fees; a higher in-going contribution (150 per cent of the standard in-going contribution)
3	Lifestyle choices	Retaining five or ten per cent of the standard in-going contribution amount and offsetting the equivalent amount by paying a higher exit fee when leaving
4	Capital gain	Paying the original standard in-going contribution; a maximum exit fee of 35 per cent of the greatest amount of the new standard in-going contribution and the original standard in-going contribution

Table III.

The sustainable practices used in the retirement village

Code	Sustainable practices	Aged requirements addressed	Additional cost needed
1	Village located in a subtropical climate;	Comfort; Energy efficiency;	No
2	Village location for convenient access to off-site facilities and service providers;	Convenience; Social interaction;	Yes
3	Convenient village location for visiting family members and friends;	Convenience; Social interaction;	Yes
4	Centralized site planning pattern;	A sense of community; Easy way-finding;	Yes
5	Well-defined on-site zones (including the residential zone and social life zone);	A sense of community; Easy way-finding; Social interaction;	No
6	Orientation of the site entry/exit toward a minor street;	Safety/Security;	No
7	Lights provision at the site entry/exit;	Safety/Security;	No
8	A private property warning sign at the site entry/exit;	Safety/Security;	No
9	Low ground covers at the site entry/exit	Safety/Security;	No
10	Traffic-related design detailing (e.g., the provision of a reflecting mirror, traffic sings, a	Safety/Security;	Yes

	speed hump, and yellow reflecting road studs) at the site entry/exit;		
11	A well-designed village sign with contrasted font and background at the site entry/exit;	Easy recognition;	No
12	The provision of a site planning map at the site entry/exit;	Easy way-finding;	No
13	The ring site connection and transportation;	Easy way-finding; Easy access;	Yes
14	Provided lights along the site drive	Safety/Security;	No
15	Well-marked traffic signs along the site drive (e.g., the speed hum sign, speed limit sign, and watch pedestrians sign);	Safety/Security;	Yes
16	Clearly-marked fingerposts at the site crossroads showing road name and unit number information;	Easy way-finding;	Yes
17	Seats provision at the arrival court of the community centre;	Social interaction;	No
18	Located mailboxes at the arrival court of the community centre;	Social interaction;	No
19	Community information posted in the bulletin board at the community centre court;	Being informed; Social interaction;	No

20	A small garden buffer separating the drop-off areas of the community centre from the site drive;	Safety/Security;	Yes
21	Traffic-related signs at the arrival court of the community centre (e.g., the speed limit sign, no parking sign and no entry sign);	Safety/Security;	Yes
22	Covered porch extended over the drop-off area at the community centre;	Safety/Security; Easy pick-up; Social interaction;	Yes
23	Visual surveillance of the community centre arrival court from in-door;	Safety/Security;	No
24	The provision of lights and bollards at the community centre court;	Safety/Security;	No
25	Barrier-free design at the community centre court, with the arrive court being at grade with the site drive;	Easy access; Safety/Security; Convenient mobility;	Yes
26	Parking lots adjacent to the community centre;	Convenience; Safety/Security;	No
27	Unit orientation to make full use of natural sunlight;	Energy efficiency; Affordable living;	Yes
28	Fences and covered porch at the villa entry area;	Safety/Security; Privacy; Comfort;	Yes

		Social interaction;	
29	Designed grass area located between the villa entry and site drive;	Safety/Security; Privacy;	No
30	Designed small garden areas next to the villa entry;	Social interaction; Comfort;	No
31	Barrier-free walkway connecting with neighbourhoods;	Social interaction; Privacy; Safety/Security; Convenient mobility;	Yes
32	Design detailing at the villa entry area (e.g., the light, villa number);	Easy way-finding; Safety/Security;	No
33	Parking lots next to the residents' villa;	Convenience;	No
34	The special treatment of painting lots with red colour;	Visibility;	Yes
35	The angled parking lot type;	Easy to use; Convenience;	No
36	Located lake located at the middle of the site supporting its nearby residents' sit and watch outdoor activities occurred at the lack area;	Social interaction; A sense of community;	No
37	Diverse amenities provided at a covered pavilion next to the lake (e.g., BBQ facilities, seats and lights);	Social interaction; Safety/Security;	Yes

38	A covered seating area located at the intersection of the site;	Social interaction; Safety/Security	Yes
39	Presence of barrier-free walking paths;	Social interaction;	Yes
40	Design detailing along the walking path (e.g., seating areas, handrails and lights);	Safety/Security; Convenient mobility; Social interaction; Easy way-finding;	Yes
41	Provision of diverse on-site facilities and their accessibility;	Social interaction;	Yes
42	Provision of diverse home care and community services and their accessibility;	Social interaction; Safety/Security; Peace of mind;	Yes
43	Organization and provision of social activities/events;	Social interaction;	Yes
44	Encouragement of community activities/evens and participation;	Social interaction; Companionship;	No
45	Encouragement of visits from family members and friends;	Social interaction; Companionship;	No
46	Programs for the sustainable improvement of this site (e.g., resident satisfaction survey);	Social interaction;	Yes
47	Different entry options;	Affordable living; Respect;	No
48	No exit fee under the contract of "No exit fees";	Affordable living;	No

49	Retaining five or ten per cent of the in-going contribution under the contract of "Lifestyle choices";	Affordable living;	No
50	Capital gains sharing under the contract of "Capital gain";	Affordable living;	No
51	Transparent fee arrangements;	Keeping informed;	No

Note: "Additional cost needed" means the increase of initial investment or the operation and maintenance costs for the corresponding sustainable practices.

Table IV.

The resident satisfaction survey results (2015) of this retirement village

	Statements	Score
Entry	1. My initial enquiry was answered appropriately and in a timely manner	4.2
	2. The information provided upon entry was useful	4.2
	3. The village tour was informative	4.2
	4. I was satisfied with the explanation of financial information from staff upon entry	4.1
	5. How to provide feedback and complaints has been explained to me	4.0
Communication	6. I know how to make a maintenance request	4.4
	7. I know how to contact the service when I need to	4.3
	8. I am satisfied with information provided through meetings	4.3
	9. I am kept informed of things that might affect me as a resident of the village	4.2
	10. Staff are accessible when needed	4.2
	11. My feedback and complaints are actioned in a timely manner	4.0
	12. I feel comfortable providing feedback or making a complaint	4.0
Management/Staff	13. Management are knowledgeable and helpful in delivering quality services	4.4
	14. Family and friends are always made welcome when visiting	4.4
	15. Staff are knowledgeable and helpful in delivering quality services	4.3
	16. Staff are both sensitive and responsible to the customs and traditions of my culture, beliefs and background	4.3

	17. Management take my concerns seriously	4.2
	18. I feel valued and understood by the staff and management	4.1
Privacy/Dignity	19. My privacy and dignity are respected	4.3
	20. My personal information are treated confidentially	4.3
Activity programs	21. My choice to not attend an activity is respected	4.2
	22. The community facilities are comfortable and suitable for my use	4.1
	23. I am satisfied with the amount and variety of activities	3.9
	24. I am supported to attend activities offered	3.9
	25. I am support to maintain social networks and friendships	3.9
	26. I am encouraged to contribute ideas for activities	3.7
Maintenance and Home environment	27. I can move safely around the village	4.4
	28. I feel secure in the village environment	4.4
	29. I feel satisfied with the level of privacy offered in my unit/apartment	4.3
	30. The community facilities in this village are kept clean and tidy	4.3
	31. The emergency response system is easy to use	4.3
	32. The village offers peaceful/private areas	4.2
	33. I am confident the emergency response system will be answered promptly in an emergency	4.2
	34. My concerns about the safety of my living environment are addressed promptly	4.2
	35. I am satisfied with the quality of the maintenance services	4.1
	36. The village has a good community feel	4.1
	37. The grounds and gardens are always well-maintained	3.6

Additional support	38. Level of satisfaction with the Chaplaincy Service/Pastoral Care Program	3.8
Overall satisfaction	39. Overall satisfaction with the assistance provided by Churches of Christ Care	4.1
	40. I feel that my quality of life improved by moving into the village	4.0