

Reflections of Apartment Design Guide 2015: Based on Selected Design Findings from an Empirical Study in Fairfield, Sydney.

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Introduction

More and more people living in major Australian capital cities choose to live in apartments due to lifestyle shift necessitated by changing demographics, housing affordability and choice. Hence strategic planning documents such as *Metropolitan Plan for 2036* (NSW Department of Planning, 2010) and *A Plan For Growing Sydney* (NSW Department of Planning and Environment, 2014a) encourages more high-density developments. Apartments currently constitute about 28.1% of aggregate housing stock in Sydney, which is twice the share of all other medium density housing forms at 14.1%. The dwelling stock in Greater Sydney is more than twice the share of flats in comparison to the national average of 13.1% (ABS, 2016a; ABS, 2016b). It is expected that by 2031 up to 45% of Sydney's total proposed housing stock will be in the medium density sector (Randolph, 2006). This is not surprising given that 50% of Sydney residents either own or live in apartments now (Urban Taskforce 2015, p.1).

Nevertheless, all major Australian capital cities are still highly suburbanised, automobile dependent and detached homes contribute largely to their overall dwelling stock (Forster, 2006). The early European heritage (Davison, 2006) and the government policies that favoured home ownership during the post Second World War period further encouraged suburbanisation (Forster, 2006). The cost of infrastructure provision on the city fringes and changing demographics encouraged the initiation of urban consolidation policies across major cities in Australia in the 1980s (Troy, 1996). Though flats were introduced into Australia in the late 19th century (Butler-Bowdon & Pickett, 2007) they only gained widespread attention as probable future housing solutions with the advent of urban consolidation policies. But Randolph (2006, p.477) comments that 'normalisation of apartment living' is quintessential for the success of urban consolidation policies and for future housing provision in Australia. As such, it is a choice necessitated by constraints in finance, tenure or location. For instance, new migrant families with children live in flats due to financial difficulties or older wealthy couples seeking a lifestyle change tend to live in expensive inner city apartment.

Baker (2013) asserts there is very limited research in 'lived residential experience' in high-density homes in Australia, despite the push for greater density. More importantly, there is limited in-depth research using a face-to-face household survey approach in Sydney to examine the attitudes of apartment dwellers. Over a quarter of a century has elapsed since the existing primary research in Sydney on this topic (Davies & Young, 1976). The most recent online study that reveals insights into the problems of apartment living (Easthope, Randolph & Judd, 2012) was done from the perspective of the strata owners or apartment owners. So a contemporary attitudinal study of the current residents using a face-to-face interview survey is long overdue in the wake of continuing urban consolidation policies. Also, it is expected that the findings from this study would provide some useful discussions to recently implemented State Environmental Planning Policy (SEPP) 65- Design Quality of Residential Apartment Development.

The paper aims to reflect upon the findings from a face-to-face household survey in Fairfield, one of the disadvantaged areas in Sydney undertaken as a part of the PhD thesis. Previously, the preliminary household survey findings (Sajan, 2013) and detailed findings and early discussion of the design implications for the multi-owned property developments have been discussed in relation to Building Code of Australia and draft Apartment Design Guide (Sajan, 2015). But the objective of this paper is to provide a more comprehensive discussion of the design findings from the analysis and draw useful lessons for policy in the context of the *Apartment Design Guide* (NSW Planning and Environment, 2015). Further, relevant design issues have been discussed in the context of the existing regulations of *Building Code of Australia* (ABCB, 2013) and feasibility of implementing design suggestions have been discussed in consultation with a practicing architect.

State Environmental Planning Policy 65 (SEPP65)

The objective of the State Environmental Planning Policy (SEPP) 65 is to improve the design standards of residential apartments in NSW. The State Environmental Planning Policy (SEPP) 65 - Design Quality of Residential Flat Development came into effect in 2002 to stipulate guidelines for design quality of residential flat buildings in New South Wales. Accordingly, a residential flat building comprises of a building in three or more storeys, but excludes the below ground level areas, which is less than 1.2 metres in height and is provided for car parking and/or storage. Further, it should contain four or more self-contained dwellings and the building could include shops, but excludes townhouses or villas. The State Environmental Planning Policy (SEPP) 65- Design Quality of Residential Apartment Development that came into effect in 2015 replaces its 2002 policy and retains all of the above components in its operational definition. Additionally, it includes shop top housing and mixed used developments with residential accommodation (SEPP65, 2015). An extensive review of its 2002 policy was undertaken through consultation with a range of key stakeholders including various authorities, residents and design professionals and found that implementation of Residential Flat Design Code (RFDC) improved the apartment design quality in NSW. There is a shift towards 'performance based approach' and the 'rules of thumb' in its previous policy is the new 'performance criteria, acceptable solutions and alternative solutions (NSW Department of Planning & Environment, 2014b). Gaden-Urbis (2015) notes renaming this policy from 'code' to 'guide' denotes flexibility in implementing design suggestions. Moore et al., 2015, p.2 notes that 'design guidelines like the State Environmental Planning Policy 65 – Design Quality of Residential Apartment Development sets minimum design quality requirements.' This is particularly useful at the lower end of the market.

Methodology

The research design uses a case study approach, where residential satisfaction of medium density apartment housing residents in Fairfield is examined as a single case study, representing similar socio-demographics elsewhere in Australia. Fairfield Statistical Area Level 2 (SA2), located in South Western Sydney, is ranked 6th in New South Wales in terms of Socio-Economic Indexes For Areas (SEIFA) Index of Relative Socio-economic Advantage and Disadvantage (IRSAD) (ABS, 2013). The seven high-rise apartments in 6 storeys and up under study are located in 4 Statistical Area Level 1 (SA1's) in the heart of Fairfield. The selection of the apartments and the data collection methods were discussed previously (Sajan 2013; 2015). The sample population is predominantly renting (75%), overseas born (80%) and only 40% of the population held a full time job.

The conceptual framework underpinning the definition of residential satisfaction is the overall satisfaction perceived (positive, neutral or negative) by the occupants in an apartment in relation to various attributes of habitability, location, accountability and wellbeing domains, with regard to their residential environment. The residential environment in the present study includes the individual dwelling and the apartment development (micro-urban space) and immediate neighbourhood, where the residents rely on services (micro-neighbourhood). The domains for the study are adapted from the quintuple bottom line model (Roberts, 2007) and were published elsewhere (Sajan 2013; 2015). A mixed methodology that entails both quantitative and qualitative methods of data collection and analysis is used for this research. Face-to-face structured interviews using questionnaires were conducted with 84 residents to record the responses. Further, semi-structured interviews examined the relocation experience of the affordable housing residents and are not further discussed here. The scaling questions related to habitability, accountability and wellbeing informs the discussion in the paper. The responses were scaled using a 5-point Likert scale: strongly disagree (1), disagree (2), neither agree nor disagree (3), agree (4) and strongly agree (5). Additionally, an open comments question was included to highlight the positives and negatives about living in the apartment. The overall living satisfaction index was also measured using the 5-point Likert scale. Furthermore, closed questions pertaining to demographics, housing history and dwelling attributes were included. Also, the opinion of an experienced and well known architect working in the field have been sought to consolidate design findings and to analyse the feasibility of implementing related suggestions. A colleague working within the faculty helped to identify the architect for this process.

Buildings Under Study

The building development applications approval for five buildings (Table 1) postdates July 2002 implementation of the Residential Flat Design Code (RFDC) standards associated with State Environmental Planning Policy 65 (SEPP65) legislation (NSW Planning 2002). But the approvals for two buildings (C & D) postdate the legislation immediately and the development applications were submitted before the implementation of the above legislation. The amendments (clause 32) to SEPP 65 (2002) exempts the building development applications submitted before the commencement of the SEPP 65 from the legislation. The buildings (A, B & G) are approved after RFDC 2002 policy

implementation. But all these buildings were built before the 2015 policy change. Fairfield is located in the outer ring of Greater Sydney Metropolitan area and therefore, median unit price (\$540,000) and median weekly rent (\$350-\$500; 2 Bedrooms) in this ring are lower than middle or inner rings of Sydney (m3property Strategists, 2016). So the apartments under study are likely to be in this price range.

Table 1 Description of Apartment Buildings Under Study

Statistical Area Level 1 (SA1)	Building Code	Approval of Development Application	Description of development	Number of Storeys	Number of Dwellings
1151512	A	September 2004	Mixed-use Tower development	6,7 & 9 storeys in 3 towers	106
1151519	B	January 2006	Mixed Commercial/ Residential	1 tower in 8 storeys	37
1151516	C	November 2002	Mixed-use Residential & Commercial Tower development	2 towers in 8 & 9 storeys	65
1151517	D	August 2002	Mixed Commercial/ Residential	12 storey tower	100
1151517	E	July 2001	Mixed Commercial/ Residential	1 tower in 8 storeys	39
1151517	F	January 2001	Mixed Commercial/ Residential	2 towers in 8 storeys	96
1151519	G	January 2006	Commercial and Residential Flat Building	6 storeys	45

Source: Development applications documentation for selected projects examined at Fairfield Council Office, July 2015

Thesis Survey Findings

The thesis survey findings have been published previously (Sajan 2013; 2015) and three key findings inform our discussion (Table 2). Majority of the residents (76%) reported relatively high overall living satisfaction. The coherent resident narratives complement the statistical analysis in this mixed research design.

Table 2 Key Thesis Findings

Variables	Analysis	Findings
Overall living satisfaction index and pool of 20 variables used to scale residential satisfaction	Logistic regression	Provision of sufficient green areas in apartment buildings, night safety of the lifts, night safety of the development and good neighbours Chi-square= 31.17, degrees of freedom=4, N=84, p < .001 R-square estimates indicate 31% or 46% in whether residents are likely to report low or high residential satisfaction using above four predictor variables
Variables that commanded top 5 spots for dissatisfaction	Simple frequencies	Storage (55%), vandalism in the building (49%), housing affordability (expensive rent/strata levy) (45%), lifts (37%) and cooking smell from nearby dwellings (36%).
Two most negative aspects of living in	Simple frequencies	Lift breakdown (19%) and safety issues (10%)

apartments (open response)		
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Source: Data analysis (Author)

Similar themes have emerged previously in the Australian studies: safety and need for open area provision in the neighbourhood (Buys & Miller, 2012) safety aspects (Kelly, Walsh & Weidmann, 2011, p.12) landscaping and storage (Davies & Young, 1976, p.109), issues with lifts, dissatisfaction with strata levy, and problems caused by cooking smell (Easthope, Randolph & Judd 2012, pp.66, 80, 87). There is very little evidence in Australian literature in relation to lift breakdown as a pertinent problem in apartment buildings. Nevertheless, defective machines (lifts and air cons) account for 12% of the building defects in Strata Owners Survey (Easthope, Randolph & Judd 2012, p.66). Besides, miscellaneous issues cited from residents' narratives with regard to other given variable statements are also discussed. Nonetheless, they have no statistical relevance.

Reflection of Apartment Design Guide based on the Findings

The interview surveys with 84 apartment residents and the researcher's own observations of the design attributes of the buildings, while undertaking the research inform this discussion. This paper aims to reflect upon the Apartment Design Guide (ADG) (NSW Planning & Environment, 2015) based on selected design findings gathered from an empirical study in Fairfield. Also, a comparison is drawn with Residential Flat Design Code (RFDC) to highlight the key changes affecting selected design findings. Further, feasibility of implementing design suggestions has been discussed with a practising architect.

Green areas in apartment buildings

The survey findings suggest more efforts are needed to provide adequate green areas in the buildings. The consulting architect notes that green area provision in buildings is affected by developer discretion. The Buildings A, B, C and G (Table 1) tend to have well established green terraces or roof top gardens or podiums compared to other three older buildings that were approved before the implementation of RFDC 2002. The RFDC (NSW Planning, 2002) stipulates that 25% of total open space area of a site should be associated with deep soil zones, which contain natural soil to promote diversity of vegetation, to improve water quality and so on. Also, it further allocates another 25-30% of the total site area for open space provision. Further, it encourages planting on structures like podiums, roofs, basement car parks etc. and dimensions are specified in relation to soil provision for different plant types. The ADG (NSW Department of Planning and Environment, 2015) recommends a proportionate allocation of deep soil zone in relation to site area and suggests a minimum requirement of 7% of the site area. For instance, for larger site areas with 1500-meter square, the suggested requisite is 15%. Also, it stipulates a minimum requirement of 25% of the site area as communal space. Alternative planting solutions in roofs, podiums and green walls are promoted, if this area is unmet due to density constraints and more effective design guidelines are suggested in relation to designing the building structure to adapt plants. It also suggests combining deep soil zones with communal open space to provide a bigger open area for the residents to access. So with more effective design guidelines and proportionate allocation of deep soil zone to match site area or combining deep soil zone with open space provision in apartment buildings, the quality of green space in apartments is likely to improve further.

Dissatisfaction with lifts and associated issues

The findings suggest lift break down, waiting time to access lifts or constantly engaged lifts are some of the major reasons for dissatisfaction with lift provision. The residents' narratives seems to suggest a positive association between lift break down and periods of active use like weekends or warm weather when more people lead active outdoor life. That implies over use of single lifts is causing more frequent lift break down. Waiting times to access lifts is a problem for many residents. Moreover, relocation is a regular occurrence in high-rise buildings and constantly engaged lifts during this shifting process affect other residents. So there should be an ideal people-lift ratio in apartment buildings to minimise waiting times to access lifts and to provide sufficient cover during lift breakdown. The architect agrees that an additional lift would provide sufficient cover during lift breakdown.

The Australian Building Codes Board (ABCB) (2013a, p.287) provision EF 3.2 is not insisting on a mandatory second lift in residential buildings above 25 metres. But the London Design Guidelines

(London Development Agency 2010, p.38) standard 3.2.6 dictate the provision of one wheelchair accessible lift for all dwellings entered at the fourth floor (fifth storey) and at least two lifts to address lift breakdown issues for all dwellings entered at the seventh floor (eighth storey). Ideally, only 25 dwellings should be serviced per lift core. The RFDC (NSW Department of Planning, 2002) doesn't stipulate any specific number of lifts or dwellings per floor from a single core. The feedback on the review of the existing RFDC submitted to the Department of Planning and Infrastructure (2012, p.19) regarding lift provision, quotes the recommendations from the *London Design Guidelines* (2010). The ADG (NSW Planning and Environment 2015, p.97) imposes a restriction of eight dwellings per floor from a core and encourages more vertical circulation points. Further, it suggests for buildings with more than 10 storeys, maximum number of apartments served by a single lift should be 40.

The residents living in buildings A & D (Table 1) had access to two lifts. However, 100 or more residents accessed them. Though these residents had a back up during lift break down, longer delays in accessing lifts and instances of holding up of lifts are reported. The Building A is approved post SEPP and is under 10 storeys, while building D is approved before SEPP and is more than 10 storeys. Meanwhile, two buildings with twin towers had one lift each for each tower. So one building had relatively higher ratio of 48 dwellings per lift (Building F, pre SEPP) compared to the other one (Building C, post SEPP) with 30-35 dwellings per lift. Nevertheless, lift break down associated with over use is reported from the latter one. The former one had an onsite building manager who made prompt efforts to restore the lifts immediately. A little less than 40 dwellings in another two eight storey residential apartment buildings (Building B, post SEPP and Building E, pre SEPP) had access to just one lift. But these buildings reported lift break down and constantly engaged lifts, particularly during shifting. The building with the most generous ratio of lift to dwelling was the affordable housing building (Building G, post SEPP), where 15 dwellings had access to one lift and there were three similar separate blocks. Though there are 3 lifts for 45 dwellings, none of the dwellings had access to a second lift. So lift break down was a major issue in this new building, housing less mobile residents. In a nutshell, it is worth debating whether the lift to dwelling ratio takes into account issues related to lift break down and waiting time to access lifts. Generally, access to a second lift is useful in apartment buildings. So we could conclude, a lift serves between 40-50 apartments in all these buildings, except for the affordable housing building. So there is not much change in the ADG in regard to the provision of lifts, except that there is a restriction of 40 apartments per lift for buildings ten storeys and over. Given that all of them, with the exception of Building D are under ten-storeys, it is debatable whether dwellings entered at seventh floor (eighth storey) should be served by two lifts to combat issues with lift breakdown as insisted by London Design Guidelines (London Development Agency, 2010).

Safety/amenity issues within apartment buildings

Providing electronic access to both buildings and lifts would be a useful strategy to improve safety of the lifts and building safety. The practicing architect agrees that building security is a major problem in all buildings, irrespective of the socio-economics of the area. Only Building G had electronic access for lifts. Also, apartments situated in the lower floors and podium are more prone to illegal trespassing and intrusions when a roller shutter breaks down or when residents either leave the fire exit doors or main entrance door open, which is a regular occurrence in many buildings. The ADG (NSW Planning and Environment 2015, p.67) encourages the provision of electronic access cards to improve security, a new addition to RFDC standards. So this provision could be extended to lifts as well as for building entry from the onsite car parking provision to improve safety.

The narrow internal corridors or passageways within large apartment buildings are not ideal as noted by residents in Building A (post SEPP approved). The residents' use them to access lift from their apartments and it is also a fire safety issue. The internal corridors should facilitate safe evacuation during an emergency. The RFDC (NSW Planning, 2002) does not clearly state any specific dimension for corridors. The review of the RFDC 2002 submitted to the Department of Planning and Infrastructure (2012, p.19) notes more information should be provided in relation to dimensions of corridors and lift lobbies. The ABCB (2013a, pp. 184 & 291) guidelines (E3.5 on access and egress to and from lift well landings) state that provisions in section D must be adhered to. The deemed to satisfy provision in section D 1.6 stipulates a dimension of not less than one metre for the path of travel to an exit under general circumstances. The ADG (NSW Planning and Environment 2015, p. 97) recommends a dimension greater than one metre for internal corridors, especially near apartment entry doors or lift lobbies. For longer corridors greater than 12m from the lift, multiple foyers with windows and spaces for seating are recommended. So these new recommendations definitely addresses issues related to long narrow corridors and make it more inviting space for the users.

Designs to combat letterbox vandalism should be envisaged for future developments, particularly those located in socio-economically disadvantaged areas. The residents in three out of the seven surveyed buildings reported letterbox vandalism. The RFDC (NSW Planning, 2002) advises placing letterboxes perpendicular to streets on adjacent walls near building entry points for aesthetics. There is no change in ADG (NSW Planning and Environment, 2015, p.99) in relation to this aspect and suggests that the aesthetic placement of letterboxes near the main entrance doors enhances convenience and encourages social interaction. But it fails to take into account prevalence of letterbox vandalism in lower socioeconomic areas. So there should be design strategies in place to secure letterboxes in apartment buildings. A strategy adopted in one of the apartment building under study was to locate the letterboxes within the building complex and providing Australia post with keys to access the building for letter delivery. This is just an example, but other possible solutions/ideas should be debated.

Provision of sufficient roof cover over balconies would address issues related to rainwater or water spillage or waste and/or cigarette butt droppings from upper floors. The residents living in both pre and post SEPP approved buildings reported these issues. This is a safety issue for residents on the lower floor, particularly for families with small children who are likely to put cigarette butts in their mouth. Some other residents reported instances of being drenched with water from upper floors. The residents living in lower floors that have a relatively bigger balcony than the upper floors are more likely to experience these problems. Besides, stuffy rooms are reported when a combination of insufficient window awnings and sufficient roof cover in the balcony during rain forced some residents to keep the balcony door closed. The ADG (NSW Planning and Environment 2015, p.95) stipulates the provision of adequate sunscreens, pergolas or shutters and operable screens with balustrades on the balconies to provide increased amenity and protection from natural weather elements. The operable screens have the additional benefit of concealing storage or laundry in the balcony in addition to weather protection. These measures would prevent rain or waste or water spillages into lower balcony floors as well as enhance the use of balcony as a pleasant, private outdoor space. Further, overhanging roof design that offers better protection from sun is recommended. Additional suggested methods like awnings or louvres for windows would provide shade as well as rain water protection. The architect believes that the features like operable screens in the balcony, adds to the construction cost. So in socio-economic areas often they are not provided, as it is not financially feasible due to high land cost. Good design always provides sufficient roof cover.

The review of the RFDC submitted to the Department of Planning and Infrastructure (2012, p. 19) recommends that open balconies are not advisable for upper floors, even as low as the seventh floor, due to strong winds that can make the space user-unfriendly. This resonates with the thesis survey findings, where some residents pointed out that strong draft of wind could rip off fly screen doors and makes the balcony space unusable. The ADG (NSW Planning and Environment 2015, p.93) suggests designing alternative measures like enclosed wintergardens or operable screens or juliet balconies or bay windows for apartments located in 10 storeys and up to combat wind or noise and so on. All these improvements in comparison to RDFC 2002 standards, if implemented would certainly improve user convenience.

Some residents perceive glass balcony balustrades to be unsafe. In particular, families with children are particularly worried about the wider gaps between the walls and the balustrades or low height of the balustrades. Good quality balustrades and superior workmanship in installing them enhances safety perception in the upper floors. The mandatory height requirement in building code (ABCB, 2013) for the balustrades including upper floors is only 1 metre. So the architect agrees that balcony height is not really safe for small children, who tend to climb. There is no specification in relation of height requirements in both RFDC and ADG. But the ADG (NSW Planning and Environment 2015) encourages designing child and pet friendly balconies. Discouraging the use of full glass balustrades or suggestions to install balustrades away from the building/balcony edge or combining solid or partially solid balustrades address issues of privacy and safety. Besides, provision of operable screens and shutters to secure balconies from elements of weather could make balconies more children friendly.

Lack of essential facilities

Firstly, provision of a car washing space in big apartment developments would be useful for apartment residents. This problem was highlighted by residents in Building D. There are no guidelines for this provision in the RFDC 2002. But the ADG (NSW Planning and Environment 2015, p.73) recommends the provision of car washing bays within the parking area. So future apartment buildings are likely to

have car-washing bays. Secondly, though there are no specific guidelines for insect screen or fly screen installation for balcony doors in the ADG, such a provision could increase amenity for residents.

Miscellaneous design issues

Storage is an important aspect (Table 2) for many apartment residents. The ADG (NSW Planning and Environment 2015, pp.100-101) recommends proportionate allocation of storage in relation to dwelling size. Thus bigger dwellings are likely to have more storage space and advise on a range of possible storage options with a minimum quota of 50% within the apartment. This varies from separate rooms or in-built storage provision in apartments or storage in balconies and car parks. Further, it provides more effective guidelines on better screening of storage provision from public eye in the basement compared to RFDC 2002. Besides, undercover storage provision for bikes is suggested. Thus with the new design guidelines, future apartments are likely to have more storage facilities.

Adequate cross-ventilation in apartments and provision of a good exhaust fan or range hood in the kitchen could minimise the impact of cooking smells from nearby dwellings. The ADG (NSW Planning and Environment, 2015, pp.82-85) encourages the provision of natural ventilation. Some of the key measures include to minimise building depths or to include dual aspect apartments or to install operable balcony screens to regulate the natural flow of air. The measures facilitating natural ventilation could lessen the impact of cooking smells within apartments.

Provision of rubbish disposal chutes on each floor could potentially resolve issues of leaving rubbish bags inside lifts and on common property as noted in multiple buildings. Also, it would be convenient for residents as noted particularly in Building G. The ADG (NSW Planning and Environment, 2015, p. 131) advises that garbage chutes be provided on each floors for waste disposal in big developments. Further, it encourages provision of holding areas for bulky waste like mattresses in residential developments. Nonetheless, there is always a limit to such provisions. These are all new measures not included in the RFDC (NSW Planning, 2002). Also, RFDC (NSW Planning, 2002) advises that bins rooms should be located away from the building entry for aesthetics and convenience. The ADG (NSW Planning and Environment, 2015, p.131) suggests that garbage rooms are located away from the front of the development or in the basement car park. But when apartment buildings have dual entrances, with the rear entrance facing a shopping centre car park (as in the case of Building B) or any public domain, it is necessary for rubbish rooms to be hidden away from the public view to minimise misuse by members of the public. Also, if garbage rooms are situated in the basement car park, it should be located away from the corridors accessing car park as it causes inconvenience for residents as in Building D (pre SEPP building).

A good apartment design should take into account the layout of the rooms in relation to adjacent apartments and make the design user-friendly. For instance, the location of the balcony of an adjacent dwelling next to a bedroom window or location of living rooms and bedrooms of adjacent dwellings next to each other are highly inappropriate. The ADG (NSW Planning and Environment, 2015) recommends operable screens in balconies for visual privacy, grouping rooms with similar functions for acoustic privacy and location of living areas and bedrooms on the external face of the building. So apartment lay out is likely to improve for future buildings. Also, apartment buildings located in busy streets should have better sound proofing to reduce health hazards like lack of sleep and anxiety. The ADG (NSW Planning and Environment, 2015) encourages adequate sound proofing for buildings located near busy transport routes. Some of the suggested techniques like locating residential buildings on the podium or providing enclosed balconies with operable acoustic/glass louvres or double glazing of windows or providing acoustic seals are all steps in the right direction.

Conclusion

Selection of multiple study sites with different socioeconomic areas would have given a better understanding of design issues associated with living in apartments. But the time and resource constraints of an unfunded PhD study restricted the scope of this study to a lower socio-economic area. The reflections suggest the changes in the new design guide is a step in the right direction, although there are few issues that need further attention like providing an additional lift or increasing the height of balcony balustrades or initiating design strategies to combat letter box vandalism or to enhance building safety features and green area provisions.. But as architect notes some of these changes like green area provisions for instance, are subjected to developer discretion in terms of cost

effectiveness, especially in lower socioeconomic areas due to the advisory nature of the RFDC. Nonetheless, the new design guide that is better linked with SEPP65 is likely to enhance the design quality of the lower end of the apartment market. So a future study should examine buildings approved before RFDC, post RFDC and after the implementation of ADG to draw lessons for policy.

References

- Australian Building Codes Board (ABCB) 2013, *National Construction Code Series (Volume one): Building Code of Australia (Class 2 to Class 9 Buildings)*, Australian Government and States and Territories of Australia, Canberra.
- Australian Bureau of Statistics (ABS) (2013), 'Data cubes: Statistical Area Level (SA2), Table 2', in *Socio- economic indexes for areas (SEIFA) 2011*, cat. no. 2033.0.55.001, ABS, Canberra.
- Australian Bureau of Statistics (ABS) (2016a), *Census QuickStats: Australia*, viewed 3 July 2017, http://www.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/036?opendocument
- Australian Bureau of Statistics (ABS) (2016b), *Census QuickStats: Greater Sydney, Greater Capital City Statistical Area (GCCSA), NSW*, viewed 3 July 2017, http://www.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/1GSYD?opendocument
- Baker, T. (2013) Home-making in Higher Density Cities: Residential Experiences in Newcastle, Australia, *Urban Policy and Research*, 31 (3), pp. 265-279.
- Butler-Bowdon, C. & Pickett, C. (2007) *Homes in the sky: apartment living in Australia* (Carlton, Vic., Sydney : Miegunyah Press in association with Historic Houses Trust).
- Buys, L. & Miller, E. (2012) Residential satisfaction in inner urban higher-density Brisbane, Australia: role of dwelling design, neighbourhood and neighbours, *Journal of Environmental Planning and Management*, 55(3), pp. 319-338.
- Davies, A. & Young, S. (1976) Survey of users of five medium density housing types in Sydney, in R. Thorne (Ed.), *Medium Density Housing in Sydney- 2 surveys: attitudes of users and non-users* (Ian Buchan Fell Research Centre, University of Sydney).
- Davison, A. (2006) Stuck in a Cul-de-sac? Suburban History and Urban Sustainability in Australia, *Urban Policy and Research*, 24 (2), pp. 201-216.
- Department of Planning and Infrastructure (2012), *Review of SEPP 65 and the Residential Flat Design Code Response to Discussion Paper*, viewed 22 November 2014, council@cityofsydney.nsw.gov.au
- Easthope, H., Randolph, B. & Judd, S. (2012) Governing the Compact City: The role and effectiveness of strata management, (City Futures Research Centre, Faculty of the Built Environment: University of New South Wales).
- Forster, C. (2006) The challenge of change: Australian cities and urban planning in the new millennium, *Geographical Research*, 44 (2), pp. 173-182.
- Gaden-Urbis. (2015). Changes to SEPP 65 Seminar 30 July 2015, viewed 19 June 2017, https://urbis.com.au/app/uploads/2015/08/Gadens_Urbis_-SEPP-65- Seminar_30July2015.pdf
- Kelly, J.F., Weidmann, B. & Walsh, M. (2011) *The Housing We'd Choose*, (Grattan Institute, Melbourne).

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London Development Agency (2010) *London Housing Design Guide*, viewed 23 November 2014, <http://www.lda.gov.uk/publications-and-media/publications/design-guide.aspx>

m3property Strategists. (2016) Sydney Apartment Market, *Comm3ntary*, Spring 2016, viewed 31 October 2016, <http://www.m3property.com.au/wp-content/uploads/2016/09/NSW-Residential-Comm3ntary-report-Spring-September-2016.pdf>

New South Wales (NSW) Department of Planning (2002). *Residential Flat Design Code*. Viewed 12 June 2017, <http://www.planning.nsw.gov.au/~media/Files/DPE/Manuals-and-guides/residential-flat-design-code-2002-02.ashx>

New South Wales (NSW) Department of Planning (2010) *Metropolitan Plan For Sydney 2036*, NSW Department of Planning.

New South Wales (NSW) Department of Planning and Environment (2014a) *A Plan for Growing Sydney*, NSW Government

New South Wales (NSW) Department of Planning and Environment (2014b) Design Quality of Residential Flat Development (SEPP65): Proposed amendments to SEPP 65 and the Residential Flat Design Code, viewed 19 June 2017, http://125.255.86.103/EBP/Open/2014/10/CCL_28102014_AGN_Attachment_3057_1.htm

New South Wales (NSW) Planning and Environment (2015). *Apartment Design Guide*, viewed 12 June 2017, <http://www.planning.nsw.gov.au/Policy-and-Legislation/Housing/~media/7ED8E40113064120AEE3432457390171.ashx>

Moore, T., Alves, T., Horne, R. and Martel, A. (2015) 'Improving Design Outcomes in the Built Environment through Design Review Panels and Design Guidelines', in P Burton & H Shearer (eds), *Proceedings of the State of Australian Cities National Conference*, 9-11 December, Gold Coast, Queensland, viewed 3 July 2017, <http://apo.org.au/system/files/63346/apo-nid63346-66526.pdf>

Randolph, B. (2006) Delivering the compact city in Australia: current trends and future implications, *Urban Policy and Research*, 24 (4), pp. 473-490.

Roberts, B.H. (2007) Changes in urban density: its implications on the sustainable development of Australian cities, *Proceedings of the State of Australian Cities National Conference*, Adelaide, pp. 720-739, viewed 20 November 2015, <http://soac.fbe.unsw.edu.au/2007/SOAC/changesinurbandensity.pdf>

Sajan, J. (2013) Predictors of Overall Living Satisfaction in Medium Density References 260 Residential satisfaction in medium density apartment housing in Sydney: A case study of Fairfield Housing: Results from a Household Survey, in K Ruming, B Randolph & N Gurrans (eds), *Proceedings of the State of Australian Cities National Conference*, 26-29 November, Sydney, viewed 13 December 2014, <http://www.soacconference.com.au/wp-content/uploads/2013/12/Sajan-Social.pdf>

Sajan, J. (2015) Design implications for multi-owned properties from a household survey, *International Journal of Housing Markets and Analysis*, 8 (4), pp.502- 518.

State Environmental Planning Policy (SEPP65) (2002) Design Quality of Residential Flat Development, viewed 19 June 2017, <http://www.legislation.nsw.gov.au/#/view/EPI/2002/530/historical2002-07-26/part1/cl3>

State Environmental Planning Policy (SEPP65) (2015) Design Quality of Residential Apartment Development, viewed 19 June 2017, <http://www.legislation.nsw.gov.au/#/view/EPI/2002/530/whole>

Troy, P.N. (1996) *The Perils of Urban Consolidation: A Discussion of Australian Housing and Urban Development Policies* (Sydney, The Federation Press).

Urban Task Force (2015) Who lives in Apartments? *Urban ideas* (May, Issue 13), viewed 12 October 2016, <http://www.urbantaskforce.com.au>

