



Residential acoustic amenity in 'vibrant' mixed use areas

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ABSTRACT

The 'compact city' is a focus of many sustainable urban development models around the world. With higher density mixed-use development a central element, developments that were previously separated to reduce potential conflict (such as from noise) are now being brought closer together. This research investigated noise impacts between commercial and residential uses, in the context of New South Wales (NSW) planning policy, where fine-grain and vibrant mixed-use development is promoted. A single site case study, which included resident and business operator surveys, was used to gather information on expectations and experiences with regard to noise impact. The case study was supplemented by a policy and academic literature review. The results of the research suggest that NSW planning policy does not adequately address the expectations of residents and business operators in mixed-use areas regarding noise impact, or the objectives of their strategic planning policies concerning the creation of vibrant mixed-use sites. It is concluded that strategic planning objectives for the promotion of vibrant/active mixed-use areas, particularly those with late night trading premises, should only be set if suitable design responses are available, as the development of incompatible uses may ultimately restrict development or reduce the quality of life for inhabitants in urban areas.

Keywords: Mixed-use, Amenity, Residential I-INCE Classification of Subjects Number(s): 52.1, 69.5, 85 A1 - education / policy

1. INTRODUCTION

An urgent global challenge is how urban spatial form can facilitate and contribute to sustainable development objectives of environmental preservation, social equity and economic development (1). The 'compact city', while not initially intended to be a blueprint for sustainability, has become a significant focus of many urban development models around the world, contributing positively to many sustainability objectives including more efficient use of resources, urban vitality and social cohesion (1,2,3). However, with mixed-use development and high residential densities being a central element of the compact city model, a primary issue is that developments that were previously separated to reduce potential conflict (such as from noise) are now being brought closer together (1,2). Conflicts between development uses can be expected to be most pronounced in fine-grain mixed use development, which sees the mix of development at the building, block and street scale, rather than simply at the larger neighbourhood or city scale.

This research investigates the factors surrounding noise impact between commercial and residential uses, set in the context of New South Wales (NSW), Australia planning policy, and more specifically the City of Sydney Council (CofS) local government area (LGA), where fine-grain mixed use development is promoted. The issues surrounding potential noise conflict are compounded by current NSW and CofS planning objectives for creation of vibrant and active neighbourhoods in areas of urban intensification (4,5,6,7). Consistent with guidance provided by the NSW Urban Development Advisory Service, these policies encourage a mix of entertainment, leisure, commercial and residential development so as to create busy and lively places for the community (8). Gathering information in this area is critical given that research has identified that noise conflicts between different users in mixed-use areas are a significant disadvantage of urban intensification policy, particularly in areas also aiming to support the night time economy [eg. (3)].

With current NSW planning policy placing the onus of noise control solely on the commercial premise (noise generator) (9), there are contradictory expectations for commercial premises in

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mixed-use areas, as they are expected to both contribute to the vibrant and active nature of an area, while also provide suitable amenity for residential occupancy.

Experience of the author with acoustic assessment of mixed use developments has identified aspects within the current NSW planning system that can result in noise and operational conflicts in mixed-use developments. To enable more 'vibrant/active' development, particularly in mixed-use areas, a review of current planning policy and noise criteria is required.

The research presented in this paper therefore focused on gathering information regarding both resident and commercial expectations to acoustic amenity in mixed-use areas. The research also considered other aspects such as the planning, building and engineering response to the issue of meeting the objectives of both residential amenity and commercial operations in mixed-use areas.

While of limited scope, the research undertaken focused on the planning policy and implications within the CofS LGA. A single site case study approach was adopted for the research project, from which the views of both residents and business operators were surveyed.

The research aimed to identify whether current NSW and City of Sydney (CofS) planning policy correspond with the expectations of both residents and business operators in mixed use developments

2. LITERATURE REVIEW

2.1 Current planning policy

The strategic plans at the NSW and City of Sydney Council (CofS) level set objectives for the creation of vibrant mixed-use development sites in response to economic, social and environmental sustainability objectives (4,6,10,11), however do not acknowledge any of the potential conflicts between uses, let alone present strategies as to how these might be addressed.

Within the CofS Development Control Plan (DCP) 2012 (12), while 'active' commercial street frontages are identified in strategic locations and acoustic treatment of residential dwellings recommended in those areas (only within 10m of ground level), no criteria are outlined, and any treatment to residential premises does not permit more noise to be generated in the area.

More specific CofS planning policies, relating to outdoor dining (13) and late night premises (14), discuss noise primarily in terms of protecting residential amenity rather than how such premises may be enabled. Neither policies outline specific noise criteria or control strategies.

The standard noise criteria imposed by CofS, consistent with broader NSW noise policy, places the onus of noise control on the commercial operator, requiring specific criteria to be met at the boundary and within nearby residential premises (with windows of residential premises open) relative to the background noise level of the area (9). The criteria do not make consideration of any acoustic treatment provided to residential buildings, even where this is required for other environmental noise sources (such as road traffic or aircraft).

2.2 Resident expectations

In regard to resident expectations, high density residential and mixed use development, characteristic of the compact city, typically has a negative perception with regard to neighbourhood satisfaction (1,15). While research indicates that residential satisfaction may not be directly associated with the objective density of an area, unwanted noise is a major contributor to dissatisfaction (1,15,16). In Rowley's broad review of mixed-use planning policy, inclusive of the US, UK and European context, it was noted that the minority prefer city centre living, with most people preferring to 'sample occasionally rather than dwell permanently', with few people likely to choose to 'live over a café or next to a workshop' (17). In Buys & Miller's study of residents in inner urban Brisbane, Australia, the second most desired improvement to urban dwellings related to noise, both in limiting noise between dwellings and also external sources such as community noise (15). The Open Sydney Discussion Paper also identified that many residents found noise to be one of the most challenging problems of living in or near late-night trading areas, with some desiring better building standards for dwellings and others wanting quiet zones after 11pm on weeknights and 1am on weekends (18).

The expectations of residents therefore need to be well understood, not least to avoid experiences such as in Britain, where inadequate planning and management for the night-time economy occurred, with the needs of residents being ignored by planners who assumed that 'only willing participants live in city centres' (19). Presumptions that residents will accept trade-offs in amenity for the convenience and other lifestyle benefits must therefore be avoided.

3. METHODOLOGY

3.1 Overview

This research employed a combination of literature review, surveys within a case study site and interviews. The primary research was limited to the City of Sydney Local Government Area (LGA). The CofS LGA was deemed the most significant locality in NSW with respect to mixed-use development policy, with 73.6% of occupied residential dwellings being flats, units or apartments, compared with the NSW wide rate of only 18.8% (20). The residential population of 169,505 residing in 94,341 private dwellings also represents the second highest residential density, behind only Waverley LGA, NSW, which does not have the extent of commercial development and has a lower proportion of the population in high density development (20).

3.2 Case study site: St Margarets, Surry Hills, New South Wales

With regard to residential expectations and experiences, a single mixed-use site was selected as a case study. The site is known as St Margarets, being an adaptive reuse and redevelopment of a former hospital site in Surry Hills, NSW completed in 2002 (21). Surry Hills is an inner city suburb of Sydney, NSW approximately 2km south east of the Central Business District (CBD), as shown in Figure 1. Figure 2 presents a satellite image which shows the site composition of four primary buildings ranging from three to 15 storeys with commercial uses at ground level and residential apartments above.

While a single site presents limitations in regard to conditions such as varying environments, building quality and socio-economic factors, the limiting of variables also enables differences and similarities in responses to be more readily correlated. The constant environmental condition of the site can potentially highlight the range of responses and expectations of participants, which may have otherwise been the result of varied conditions between different sites. Being a moderate scale holistically designed mixed-use development, the site allowed consideration of the overall design intent where a 'new environment' is essentially created for both businesses and residents.

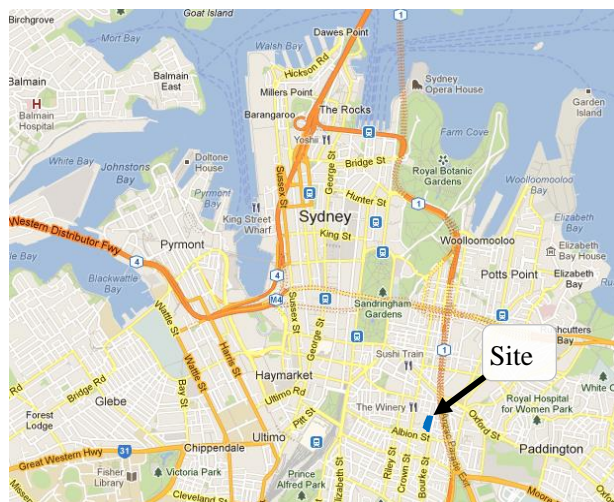


Figure 1 - Site Location in Sydney CBD
(Source: Googlemaps 2014)



Figure 2 - St Margarets Site Image (Source: Googlemaps 2014)

3.3 Resident surveys

Residents were surveyed to gain an understanding of their expectations and experiences with regard to acoustic amenity within their dwelling. An online survey was issued via bulk email by the Building Management to all residents following approval by the building committees. The survey included questions of demographics, duration of tenure and questions relating to their initial expectations, current experience, and changes in tolerance to noise that may have occurred over the duration of their tenure. The majority of the survey questions were closed and had respondents rate a number of statements about their experiences on a 5-point Likert scale (being strongly disagree, disagree, neutral, agree and strongly agree). One open response question was set, which sought to gain more detailed insight to any specific feelings or experiences the residents had with regard to acoustic amenity and living within a mixed use development.

3.4 Business operator surveys

Business operators within the St Margaret's development were surveyed in order to gain an understanding of their expectations and experiences with regard to acoustic issues in the development.

The businesses approached for the survey were isolated to potential noise generating developments such as restaurants and cafes and excluded retail businesses such as a florist, clothing store and butcher. Participants were requested to complete a pen/paper survey that was to take approximately 10-15 minutes. The survey included questions regarding demographics, years of experience in the hospitality industry along with questions relating to their business operations experience with any noise related complaints or restrictions on their business. The majority of the survey was closed or short-answer questions. Some open response questions were however set in order to gain more detailed insight to any specific thoughts and experiences with regard to the operation of a business in a mixed-use area.

3.5 Interviews

One face to face semi-structured interview with a Strategic Planner at the City of Sydney Council (CofS) was secured for the research. Interviews with the building strata managers and commercial estate agent could not be obtained. Contact with the commercial estate agent was primarily sought as at the time of research, five retail tenancies were identified as vacant.

4. RESULTS AND DISCUSSION

4.1 Current policy response

The literature review revealed that current planning policies and assessment framework of the CofS lacked robust mechanisms to address potential noise conflict in mixed-use areas. This analysis was ultimately confirmed in the interview with the CofS Strategic Planner who advised current policies, particularly the latest DCP (12) did not present any new or specific measures to address the noise conflicts raised in the 2011 Open Sydney discussion paper (18), being ultimately a consolidation and rationalisation of multiple DCPs following recent incorporation of other LGAs into the Sydney LGA.

Noise conflict is however considered by the CofS to be an important and challenging area, with the Planner identifying that they had recently employed their own acoustic specialist.

Whether the current planning policies meet the expectations of both residents and businesses, the Planner considered both sides are unlikely to be completely satisfied, and that it may be unreasonable to judge policies by whether they meet the expectations of both parties. It was however revealed that CofS were looking for new ways of addressing the potential noise conflicts in mixed-use areas, particularly entertainment precincts such as Kings Cross, but could not confirm any policy changes.

In regard to CofS own research, the Planner's view was that while CofS had encouraged a lot of mixed-use development and intensification, the expectations of residents was 'probably one area where we are not fully across what the issues are' and the extent of research on resident expectations was 'probably not as much as we could do' and 'not as much as we intend to do', thus confirming the relevance of the research topic to the current policy challenges.

4.2 Resident expectations and experiences

A total of 33 residents of the St Margarets development, comprising 26 males and 7 females responded to the online survey. Participants included both owners and renters (Own = 26, Rent = 7) with a range in tenure from less than 1 year to more than 5 years (mode = 1 to 3 years, 20 respondents).

The survey included a range of questions relating to whether they had been impacted by noise, what types of noise disturbs them, how they deal with noise impact and also questions relating to their expectations prior to moving into their current apartment. While the majority of questions were closed answer questions, participants were also given an opportunity at the end of the survey to provide further detail regarding their thoughts and experiences with regard to acoustic amenity.

It is acknowledged that the sample size is not significant and cannot be used to generalise about experiences of all residents in the St Margarets development, let alone mixed-use areas across NSW and the Sydney LGA. With an average household size of 1.9 in the Sydney LGA (ABS 2013), over the 215 apartments, it is estimated that only 8% of the St Margarets resident population was sampled. However the extent and focus of the questionnaire with regard to acoustic amenity provides an insight to some of the issues faced by residents which may be common to other sites.

4.2.1 Resident experiences

Of the 33 respondents, 28 (85%) identified they had been, or were currently, impacted by external noise within their apartment. The 28 respondents were also asked what noise sources disturb them within their apartment (see Figure 3). The primary response was pedestrians (19 responses), followed by patrons from ground floor retail (15 responses) and then noise associated with the nearby Beresford Hotel (8 responses). Responses relating to the nearby Hotel, children, and other residents were compiled from the ‘Other’ responses on the survey. The results suggest that addressing noise only via mitigation and control of commercial operations within a development may not address all resident concerns, particularly general pedestrian noise.

While the CofS DCP 2012 requires acoustic controls to be incorporated into residential apartments within 10m of the ground level of active street frontages, responses to experience of external noise impact against apartment floor level indicate noise impact is not limited to lower levels (Figure 4).

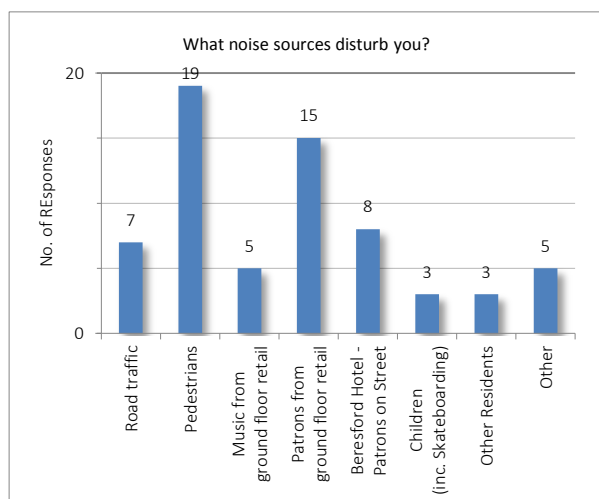


Figure 3 - Resident survey: Sources of noise disturbance (multiple responses permitted)

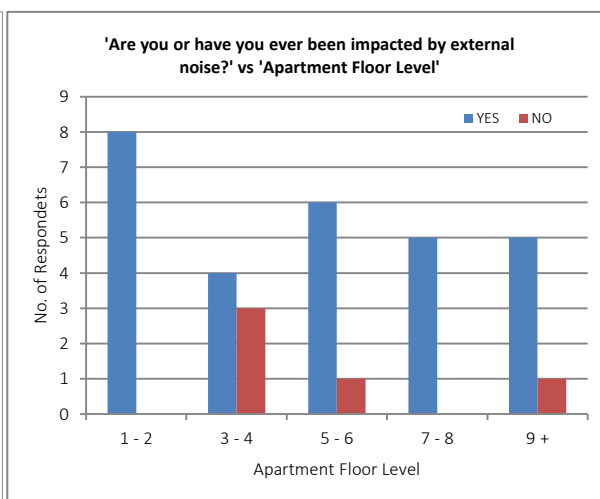


Figure 4 - Resident survey: Noise Impact vs Floor Level

The time at which respondents are impacted to noise is relevant in evaluating CofS late night trading objectives. Of the residents that were impacted by noise, most were disturbed between 10pm and 7am (Figure 5), with noise often disturbing the sleep of 45% of respondents (Figure 6). Additional research would be required to quantify the noise level exposure and establish whether residents are exposed to more noise during the night time period, are more sensitive to noise, or simply expect reduced noise exposure at night. Notwithstanding, many respondents noted pedestrians and people located outside, rather than inside late night trading premises as the sources of that noise.

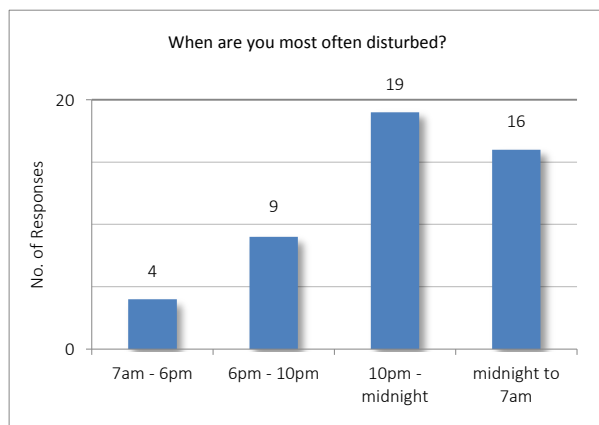


Figure 5 - Resident survey: Time when most disturbed by noise (multiple responses permitted)

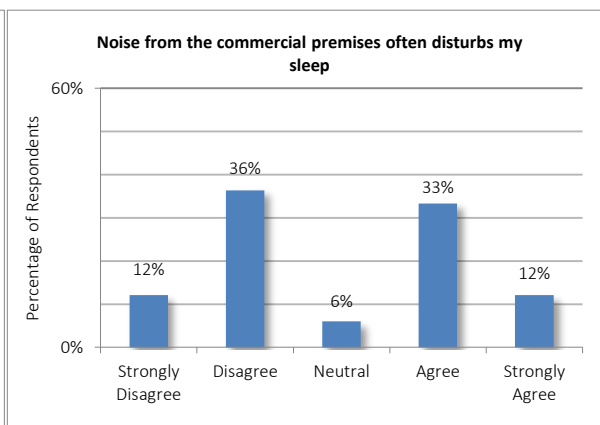


Figure 6 - Resident survey: Noise disturbing sleep permitted)

Residents were also asked to indicate how they dealt with the noise when impacted. A range of predefined answers were provided, and an opportunity to indicate an ‘other’ response was given. The results, presented in Figure 7, indicate that the majority of respondents impacted by noise close their apartment doors and windows (22 responses, 81.5% of respondents). Of those that close their doors and windows, 13 residents also indicated other responses such as approaching the business, contacting their strata manager or calling security, suggesting that the residents considered that the noise was not acceptable and closing their windows and doors was not a reasonable solution, or, as indicated by the results in Figure 8, the closing of windows and doors did not completely address the noise impact, with a large proportion of residents still impacted even with their windows closed (48% of respondents).

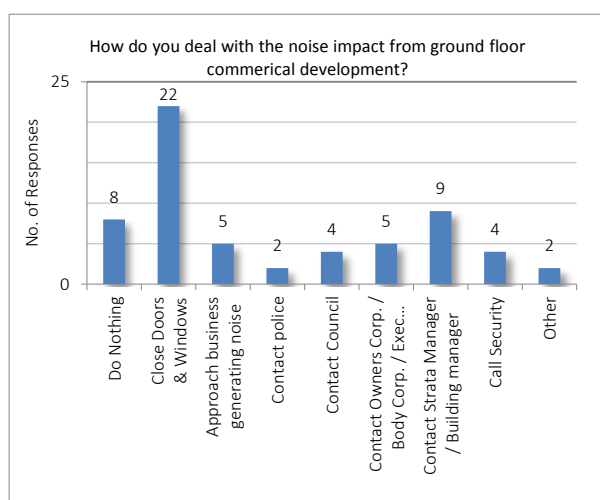


Figure 7 - Resident survey: Dealing with noise (multiple responses permitted)

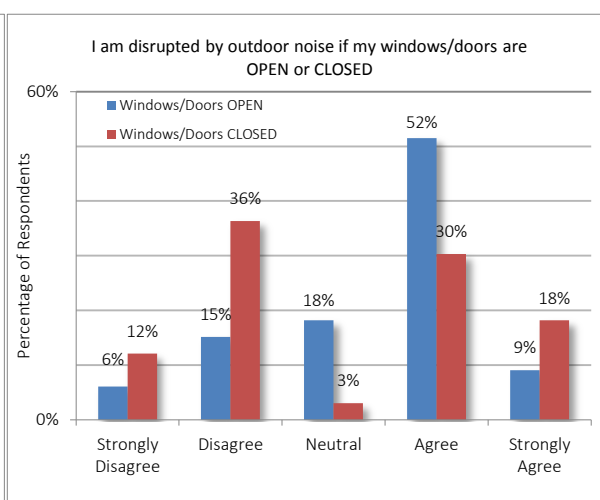


Figure 8 - Resident survey: Disruption with apartment windows/doors open or closed

While the results indicated a level of noise impact, participants were also asked if noise from restaurants and cafes adversely affected their quality of life in their apartment, of which the majority of respondents (60%, see Figure 9) considered that it did not. However 24% considered that noise did affect their quality of life (agree and strongly agree responses) and some respondents also clarified in open responses that noise from the restaurants and cafes in the St Margarets does not contribute adversely to noise impact, and that noise associated with the nearby Hotel was a more significant issue. The question, and thus responses should not be used as an indication of whether or not outdoor noise in general adversely affects the quality of life of residents. The open answer responses suggest that the level of dissatisfaction is higher than that indicated in Figure 9.

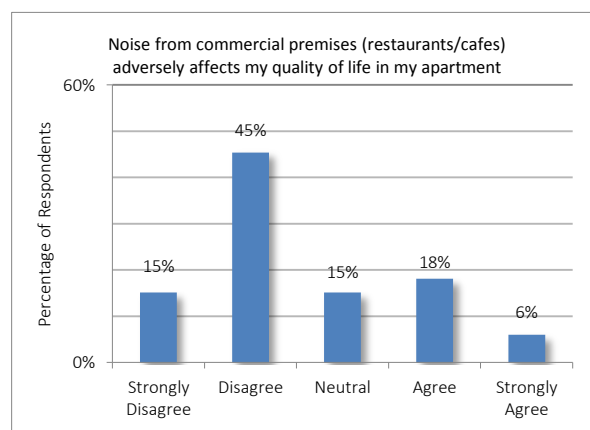


Figure 9 - Resident survey: Effect of noise on quality of life

4.2.2 Resident Expectations

The expectations of participants in relation to acoustic amenity and also their desire to live in a mixed-use area were also examined through the survey.

In seeking to understand whether living in a mixed use development is desirable, the survey asked residents whether they wanted to live near cafes and restaurants. The majority of respondents (25 respondents, 76%) either agreed, or strongly agreed, with only one respondent disagreeing and no respondents strongly disagreeing (Figure 10).

Notwithstanding, potential noise impact was still a concern, with 42% of respondents either agreeing or strongly agreeing that noise was an important consideration in selecting their apartment (Figure 11). Only 18% of respondents disagreed or strongly disagreed with this statement, while the majority responded neutrally (39%). In addition, the majority of respondents (79%) also expected some noise impact from the outdoor premises (Figure 12).

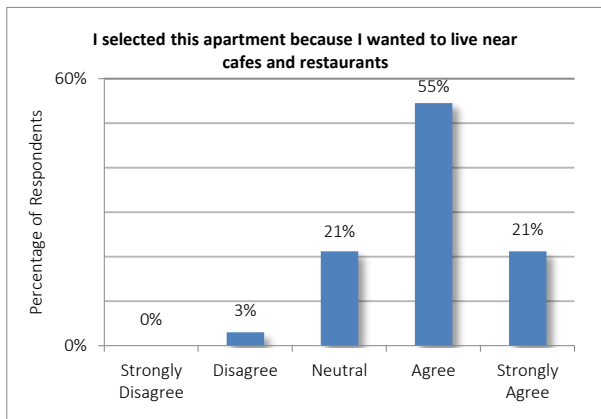


Figure 10 - Resident survey: Desire to live near cafes and restaurants

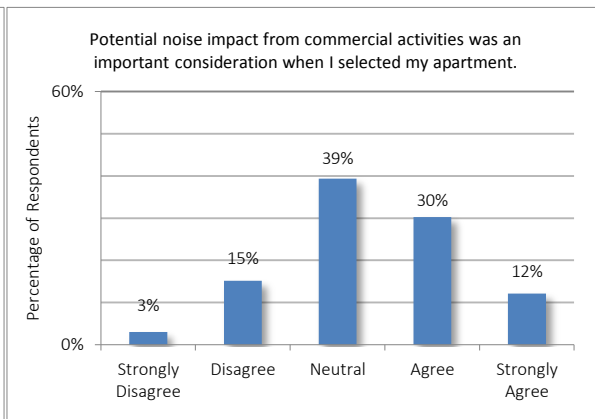


Figure 11 - Resident survey: Importance of noise when selecting apartment

Resident expectations of potential noise prior to moving in, with either their windows open and closed, was also surveyed. Results indicate that residents in mixed use areas expect to hear noise from outdoor premises with their windows open or closed (Figure 13). However a reduction in response for the windows closed scenario, could suggest that some residents, while expecting noise with windows open, expected being able to close windows to address noise impact.

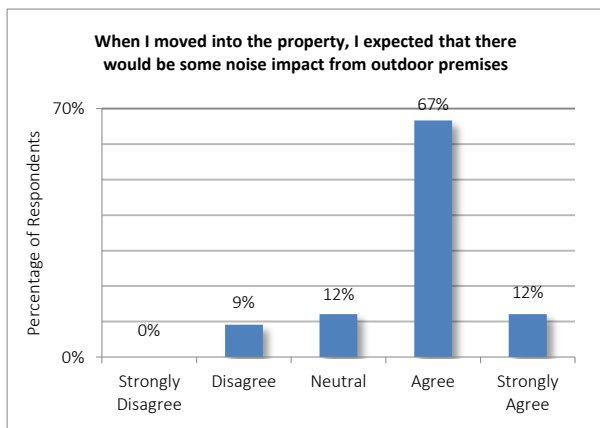


Figure 12 - Resident survey: Expectation for some noise impact from outdoor premises

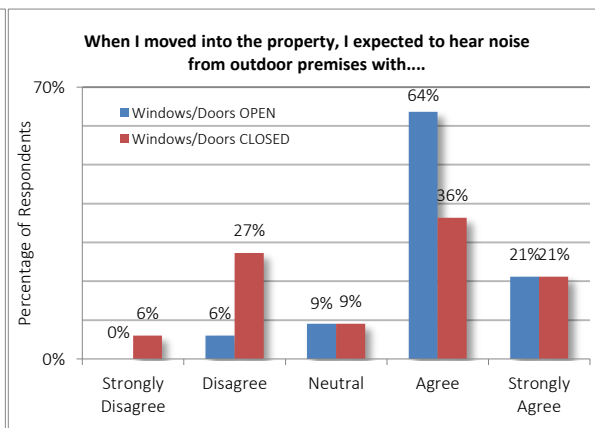


Figure 13 - Resident survey: Expectation for outdoor noise with windows open & closed

Although the majority of residents expected to hear noise from commercial premises, and desired to live near restaurants and cafes, the majority of respondents believed it was the commercial operators responsibility to control noise (88% agreed or strongly agreed, Figure 14), but also felt that the apartments should have been better designed to block out external noise (Figure 15).

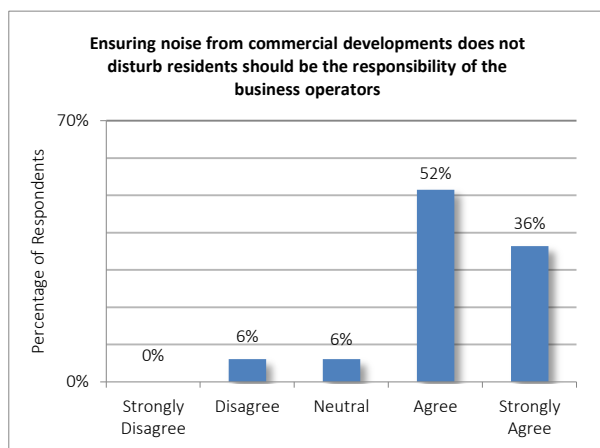


Figure 14 - Resident survey: Noise control is the responsibility of commercial operators

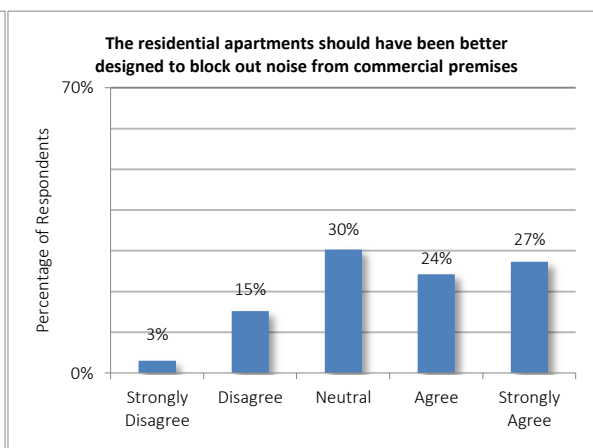


Figure 15 - Resident survey: Apartments should have been better designed to block out noise

4.3 Business expectations and experiences

Three of the five potential cafes/restaurants within the development participated in the survey. Two businesses had operated for more than five years at the site, and the other between three and five years. Business 1 was operating as a restaurant between 6pm and 11pm 7days with no outdoor seating (as a result of wind). Business 2 operated as a café between 7:30am - 4pm, Mon-Fri and 8am-4pm weekends with both indoor and outdoor seating. Business 3 operated between 10am to 6:30pm 7 days with 30 outdoor seats available.

While the limited response and variation in business type and operating hours limits the ability to generalise the findings, the businesses that identified no limitations or perceived restrictions as a result of noise were those that did not have late night trading (closing prior to 6:30pm). Only Business 1 identified having to address a specific noise complaint, and while details of the complaint were not identified, it was identified as a valid complaint and rectified by the business operator. Business 1 also identified that they were required to reapply to Council every three years in order to maintain trading after 10pm. The operator considered this unreasonable, as it presented an ongoing uncertainty for the operation of the business, and in their opinion was a bias towards residents. The operator considered that restricting hours to 10pm would not be commercially viable. Given that the resident surveys highlighted the key time period for potential noise impact was after 10pm, and that the late night trading operator considered such hours essential to commercial viability, there is potential incompatibility of late night premises and residential uses in such settings.

The businesses that operated during the daytime period generally catered for breakfast and lunch only and considered the mixed-use setting and close proximity of residents benefited trade and contributed to the success of their business.

Overall, the limited results suggest that the hours of use may be a critical factor in determining the compatibility of noise generating development in mixed-use developments. Should outdoor and late night trading commercial premises be part of the strategic objectives for the City of Sydney, particularly for the Global City status, alternative planning policy specific to addressing the potential conflicts will be necessary. This may involve identifying areas to which such development are more suited or providing alternative design standards for residential developments in these areas.

5. SUMMARY AND CONCLUSION

The current NSW and City of Sydney Council (CofS) strategic plans aim to meet the objectives of sustainable population growth, economic prosperity and improved living standards by adopting the ideals of the compact city model, with vibrant and active fine-grain mixed-use development precincts promoted as the ideal environments for cohesive and lively communities (4,6). While acknowledging the benefits of the compact city model, this research focussed on potential conflicts resulting from noise generated by commercial premises and its impact upon co-located residential premises.

To evaluate the current policy response to noise amenity in mixed-use areas, the research gathered information regarding the expectations of residents and business operators in mixed-use developments,

and reviewed the current planning framework surrounding the design and control of noise.

While the research was limited to the surveying of residents and businesses in a single mixed-use development site in the CofS LGA, NSW, the data obtained suggests that while residents desire to live in proximity to cafés and restaurants, and acknowledge that the nature of the environment results in some outdoor noise impacting their residence, there was a limit to their noise tolerance, particularly during the night-time period (10pm to 7am). The results suggest that late night premises are less compatible with the expectations of residents, however further research is required to quantify the level of noise that is acceptable to residents and whether this changes by time of day.

In regard to the expectations of business operators, while results were limited due to the number of respondents, they supported the resident surveys by suggesting that late night trading of premises was less compatible with the co-located residential premises. However, as the surveyed late night trading premises did not include outdoor seating, the compatibility of such use could not be readily evaluated.

The two daytime operating premises did include outdoor seating and neither identified any issues with their operation. Both premises indicated that the proximity of residents was beneficial to their businesses, unlike the night time trading premise which indicated that the proximity of residents resulted in limitations on operations and restrictive development approval conditions.

The resident responses indicated that the majority of noise disturbance was associated with activities outside of commercial premises, such as pedestrian noise, suggesting that the design response to noise conflict cannot focus solely on the commercial premises. This issue was primarily associated with late night trading premises, and therefore challenges the strategic policy objectives of improving the late night economy of Sydney and development of fine-grain mixed-use areas.

In relation to current NSW and CofS planning policies, there are contradictory expectations for commercial premises in mixed-use areas; being expected to contribute to the vibrant and active areas as well as the late-night economy, while also protecting the acoustic amenity of residents. The research results suggest that these objectives are not practical or achievable, as commercial development is either restricted, incompatible or residents are impacted by associated noise in the public domain. To deal with this challenge, both the design and planning of residential developments in mixed-use areas will need to be modified, or the acoustic amenity expectations of residents must be reduced.

Noise policy needs to be more robust to address the expectations of residents, business operators and the strategic planning objectives of urban areas. It was also acknowledged by a Strategic Planner within the CofS that changes to current noise policy were required to ensure more certainty for development and in order to progress the strategic vision for the city.

While the incorporation of noise mitigation to residential premises may be of concern due to the additional cost to development, particularly if adopting a conservative worst-case approach, government must consider this against the objectives of fine-grain mixed use development, the late night economy and residential acoustic amenity.

If vibrant/active precincts are to be developed, particularly those with late night trading premises, the planning and design objectives must be well defined at the strategic planning level and consistent design intent and criteria outlined across all government planning policies. Planning objectives should only be set if suitable design responses are available. The presumption that land-use planning needs to be less prescriptive and 'flexible' to allow it to respond to market forces and allow a fine-grain mix of uses to develop may be short-sighted, as the unplanned development of incompatible uses may ultimately restrict uses or reduce the quality of life for inhabitants.

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