

AUDIT OF ACCESSIBLE FEATURES IN NEW BUILD HOUSE PLANS



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Executive Summary

The Australian Building Codes Board (ABCB) is nearing the end of consultations as part of a nation-wide assessment of options for minimum accessibility standards for housing for potential inclusion in the 2022 National Construction Code (NCC). Housing is social infrastructure that is with us for 30 or 40 years, so it is crucial that it meets the current and future needs of Australians with mobility impairment. This study audited 20 of the most popular house designs from Australia's most active volume home builders. It found that many features of the Silver, Gold and Platinum levels of Livable Housing Australia's (LHA) Livable Housing Design Guidelines are already incorporated into new dwellings produced by these builders. This study demonstrates that where these features are incorporated into house designs, some are above the minimum Silver level, and achieve Gold or Platinum levels. However, these accessibility features are not consistently or systematically incorporated into the new homes. Commonly, these features do not all line up in the one dwelling, which does not enable access by people with a mobility limitation. Given the high take-up of individual elements, and the consistent exceeding of minimum standards for some elements, this study suggests that the cost of accessibility has been factored into current designs to a significant extent already; however, not in a way that guarantees practical accessibility of the dwellings. All 20 of the houses audited included at least 6 of LHA's 15 Design Elements at Silver level, with two houses complying with 10 of the elements. However, no house in the study featured all of the elements, and none met the full criteria of either Option 1, 2 or 3 as proposed in the ABCB Options Paper. Photographs of best practice compliance with individual standards demonstrate that developers were able to maintain a consistent 'look' in the house designs while incorporating accessible features. An assessment of the cost implications of meeting the guidelines indicates that if consideration is taken at the design stage, the majority of the standards are deemed to require little or no additional cost, while only one (dwelling access), could possibly involve a substantial extra cost.

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Introduction

In October 2017, the Building Ministers' Forum (BMF) proposed to the Council of Australian Governments (COAG) that a national assessment be undertaken to consider applying a minimum accessibility standard for private dwellings in Australia through the National Construction Code (NCC). This was subsequently agreed by COAG. In September 2018, the Australian Building Code Board (ABCB) released an Options Paper, which set out a preliminary menu of options and sought broader community and industry input (ABCB, 2018). The ABCB is undertaking a Regulation Impact Assessment (RIA) of options for minimum accessibility standards for housing for potential inclusion in the 2022 NCC (ABCB, 2020).

The ABCB consulted widely with stakeholders, through:

- Consultation forums — ABCB held consultation forums in each capital city during October and November 2018
- Written stakeholder submissions — ABCB received 179 submissions from a wide range of organisations and individuals
- ABCB released a consultation report summarising stakeholder feedback on the Options Paper in April 2019

The consultation process provides a unique opportunity to improve the design of new residential housing for all Australians. The NCC has a three-year amendment cycle and the RIA consultation process is lengthy. The current consultation is in its final phase for potential changes commencing in 2022. Housing is critical social infrastructure that is with us for 30 or 40 years, so it is vital to get it right.

The twin Royal Commissions into aged care and disability demonstrate public and political will to address issues across both sectors and represent an opportunity for lasting change (Aged Care Royal Commission, 2019; Disability Royal Commission, 2019). Institutional housing that segregates people with disability and the frail elderly is not working. The recent challenges experienced by the aged care sector during the COVID-19 pandemic also highlight the importance of helping our ageing population to remain in their own homes for as long as possible. Universal design principles attest that well-designed housing that works for people with mobility impairments does not compromise the design of housing for the general population – rather, it enhances the built environment. Indeed, a 'willingness-to-pay' survey conducted by the Centre for International Economics (CIE) as part of its Consultation Regulation Impact Statement commissioned by the ABCB confirmed that people in households that do not currently contain any persons with limited mobility place considerable monetary value on the accessibility features (CIE, 2020). The current consultation process is an opportunity to consider the functionality of new housing for everyone and the need to future-proof Australian housing for an ageing population.

Aims of this study

The aims of this study are to:

1. Test the hypothesis that some accessibility features are already incorporated into the most popular house designs being built in Australia, but not in a systematic way that makes all new builds accessible.
2. Demonstrate that accessibility features are basic elements of good house design for the general population, and not the features commonly seen in public accessible toilets and institutions.
3. Indicate the likely cost of including accessibility features in new builds.

Method

An initial desktop search identified the ten largest residential developers in Australia in 2018-19, based on the total number of dwellings built. This search, complemented by phone calls, then identified each developer's ten most popular house designs, including which of these designs had a display home in greater Melbourne. An audit of 20 homes (maximum of three per developer) was conducted, and a preliminary analysis of the results is included below. The audit involved photographing, measuring, and assessing the presence of elements outlined in Livable Housing Australia (LHA)'s Silver, Gold and Platinum levels of design in these new builds. These three levels are determined by using the LHA's Livable Housing Design Guidelines, consisting of 15 Design Elements (see Table 1), most of which are also included in the CIE report for the ABCB (LHA, 2017; CIE, 2020).

- Option 1 includes 5 recommendations at Silver Standard – Elements 1 - 4 and 6.
- Option 2 includes 12 recommendations at Gold Standard – Elements 1 - 12
- Option 3 includes 13 recommendations at Gold Standard with some Platinum – Elements 1 – 12, and 14. With Elements 8 and 14 at Platinum Level.

The purpose of the photos is to provide evidence that accessible features do not need to be institutional or unsightly but can be routinely incorporated into contemporary new homes. Photos of features that did not comply were also taken.

Table 1. Livable Housing Australia’s 15 Livable Housing Design Elements

	LHA Design Elements	Performance Requirements
1	Dwelling Access	A safe, continuous, step-free pathway from the street entrance and/or parking area to a dwelling entrance that is level
2	Dwelling Entrance	At least one step-free entrance into the dwelling and the entrance should be connected to the safe and continuous pathway as specified in Element 1
3	Internal Doors and Corridors	Widths of the internal doors and corridors facilitates comfortable and unimpeded movement between spaces
4	Toilets (Accessible ground level)	The ground (or entry) level has a toilet to support easy access for home occupants and visitors with adequate circulation space
5	Shower (Accessible ground level)	A slip resistant, hobless shower recess should be featured in the corner of a bathroom in the dwelling
6	Reinforcement of Bathroom and Toilet Walls	The toilet and bathroom walls are reinforced to enable future installation of grabrails
7	Internal Stairways	Where installed, stairways are designed to reduce the likelihood of injury and enable safety pathway
8	Kitchen Space	The kitchen space is designed to support ease of movement between fixed benches and to support easy adaptation
9	Laundry Space	The laundry space is designed to support ease of movement between fixed benches and to support easy adaptation
10	Ground (or Entry Level) Bedroom Space	There is a space on the ground (or entry) level that can be used as a bedroom
11	Switches and Power-points	Light switches and powerpoints are located at heights that are easy to reach for all home occupants
12	Door and Tap Hardware	Level or D-Pull handle door hardware and taps located at a height that can be independently operate by all home occupants
13	Family-Living Room Space	The family/living room features clear space to enable the home occupant to move in and around the room with ease
14	Window Sills	Windows sills are installed at a height that enables home occupants to view the outdoor space from either a seated or standing position
15	Flooring	Floor coverings are slip resistant to reduce the likelihood of slips, trips and falls in the home

Findings

Incorporation of assessable features in the sample assessed

The findings of the audit of the display homes, based on LHA’s Design Guidelines, is shown below (see Table 2). Dwellings are listed in order from the most to the least compliant. LHA elements are listed in order of the least often compliant (left) to the most often compliant (right). Two elements (E3 and E4) are broken into two parts – E3.1 Doors, E3.2 Corridors, E4.1 Toilet – walls and E4.2 Toilet – front because the two parts of these elements show quite different results. Element 6 which is the reinforcement of bathroom walls was not possible to assess. Element 15 was not assessed because it is not required for Option 1/Silver or Option 2/Gold accessibility and was difficult to assess using the study methodology.

Table 2: Display homes and their compliance with Livable Housing Design Elements

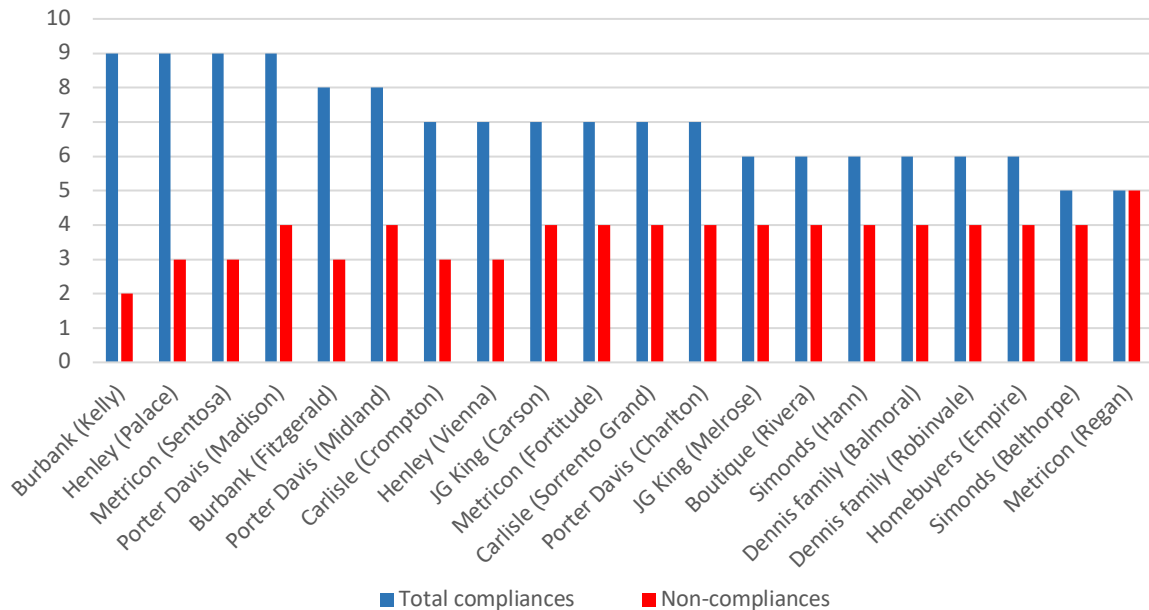
Dwellings Assessed	Livable Housing Design Elements														
	Doors	Toilet - front	Shower	Toilet - walls	Laundry	Stairs	Corridors	Kitchen	Entrance	Switches	Bedroom	Access	Windows	Taps & handles	Living
	E3.1	E4.2	E5	E4.1	E9	E7	E3.2	E8	E2	E11	E10	E1	E14	E12	E13
Henley (Palace)															
Porter Davis (Madison)															
Metricon (Sentosa)															
Burbank (Kelly)															
Porter Davis (Midland)															
Burbank (Fitzgerald)															
JG King (Carson)															
Carlisle (Crompton)															
Henley (Vienna)															
Metricon (Fortitude)															
Porter Davis (Charlton)															
Carlisle (Sorrento Grand)															
JG King (Melrose)															
Boutique (Rivera)															
Simonds (Hann)															
Dennis Family (Balmoral)															
Dennis Family (Robinvale)															
Homebuyers (Empire)															
Metricon (Regan)															
Simonds (Belthorpe)															

E1: Dwelling Access. E2: Dwelling Entrance, E3.1: Internal Doors, E3.2: Internal Corridors, E4.1: Width between walls either side of closet toilet, E4.2: Space in front of toilet, E5: Shower (Accessible ground level), E6: Reinforcement of Bathroom Walls, E7: Internal Stairways, E8: Kitchen Space, E9: Laundry Space, E10: Entry Level Bedroom Space, E11: Light Switches and Power-points, E12: Door and Tap Hardware, E13: Family Living Room Space, E14: Window Sill Height (Note that the study methodology does not allow analysis of E6 or E15)

Legend Platinum Level Gold Level Silver Level

The findings of the audit confirm the hypothesis of this study. While on average seven Design Elements were incorporated into the 20 display homes, none of the dwellings featured all of the elements (see Table 2).

Figure 1: Display home compliance with LHA’s Design Elements

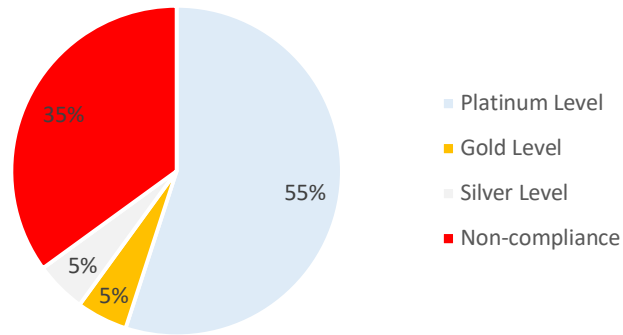


Individual analysis of elements incorporated in the case study designs

Element 1: Continuous step-free dwelling access from the street entrance

- 12 out of the 13 display homes that complied with the minimum accessibility standards (Silver level) also satisfied the Gold level or above.
- The housing designs that meet the standards of Element 1 have step-free accesses from the allotment boundaries. Two covered parking spaces are standard in these dwellings. This allows a person to open their car doors fully and easily move around the vehicle when the parking space is part of the dwelling access.
- Element 1 Platinum level display homes provide the widest pathways to the dwelling entrances among the 20 audited designs.

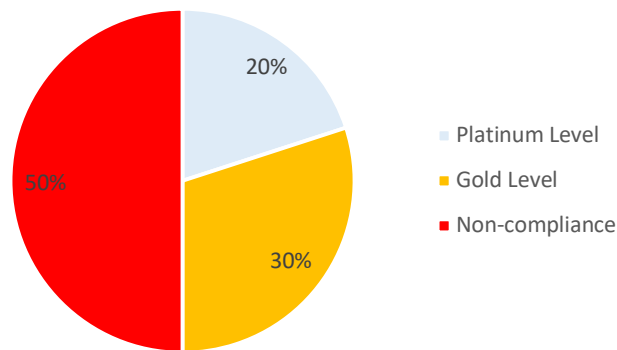
Figure 2. Results for audit of Element 1 (n=20)



Element 2: Level (step-free) dwelling entrance

- Overall 50% of the display homes met the Silver level.
- Two of the display homes provided step-free entrances.
- The clear opening of the entry doors in 3 of the display homes were narrower than 800mm, which was below the minimum requirement set by the LHA Design Elements (820mm) and the ABCB Options (800mm).

Figure 3. Results for Element 2 (n=20)



Element 3: Internal doors and corridors that facilitate comfortable and unimpeded movement between home spaces

- Despite 14 of the 20 display homes providing wider than 1000mm internal corridors throughout (the minimum requirement stated by the LHA and the ABCB Options), all the display homes' internal doors had a clear opening less than the minimum required width of 820mm.
- Hence, none of the display homes complied with the accessible internal doors and corridors element.

Figure 4a. Results for Element 3, internal doors and corridors (n=20)

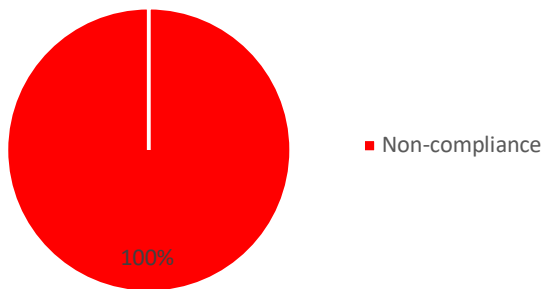


Figure 4b. Element 3.1: Clear opening width of internal (n=20)

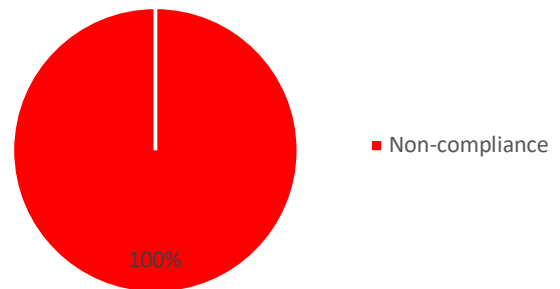
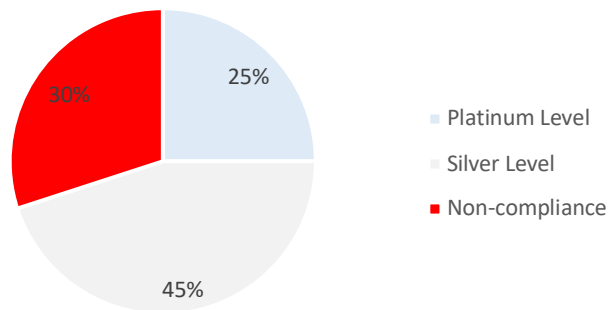


Figure 4c. Element 3.2: Width of internal corridors (n=20)



Element 4: Accessible toilets on the ground (or entry) level

- 9 of the 20 inspected display homes were double-storey.
- All the display designs had a toilet on the ground/entry level.
- 40% of dwellings had ground level toilets with at least 900mm clearance between the walls on either side of the toilet (see Figure 5a).
- Only one of the toilets satisfied the requirement of providing a 1200mm or above circulation space between the front edge of toilet and the arc of the door (see Figure 5b).

Figure 5a. Results for Element 4.2: Wall clearance in toilets (n=20)

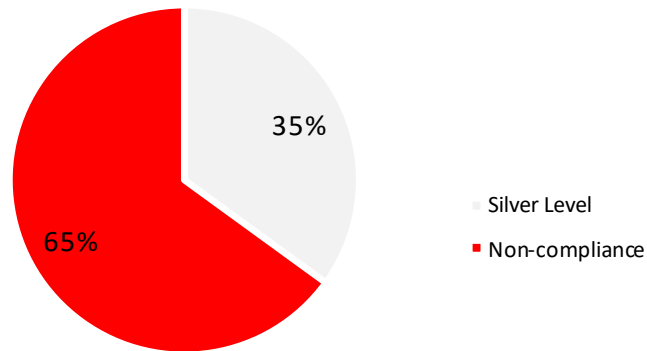
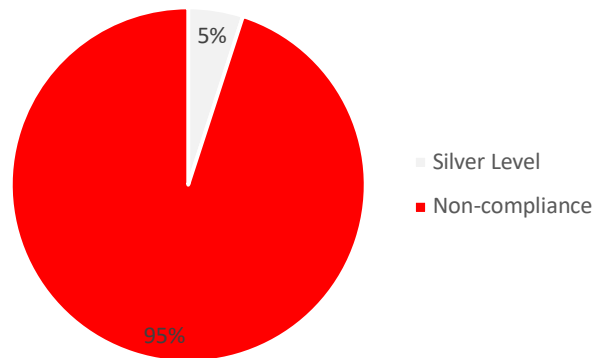


Figure 5b. Element 4.1: Circulation space in toilets (n=20)



Element 5: Accessible bathrooms and showers for easy and independent access for all home occupants

- Only one of the shower recesses in the display homes had the built-in hobless design (see Figure 6a) with the shower screen easily removable at a later date. A removable shower screen is installed separately, once floor surfaces are in place. This allows the ready removal of the screen without causing damage to surfaces or waterproofing integrity (see Figure 6b; Ryan, 2017).
- Option 1 in the CIE Report (2020) does not include an accessible shower.

Figure 6a. Results for Element 5 Accessible shower (n=20)

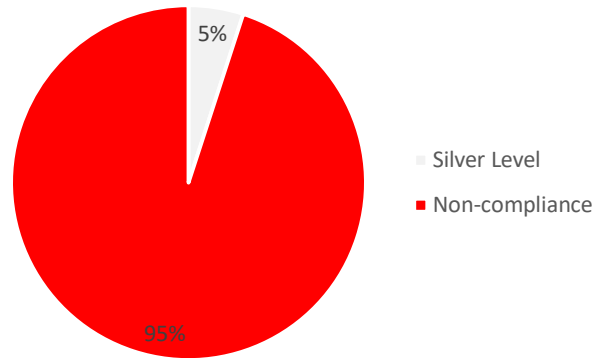
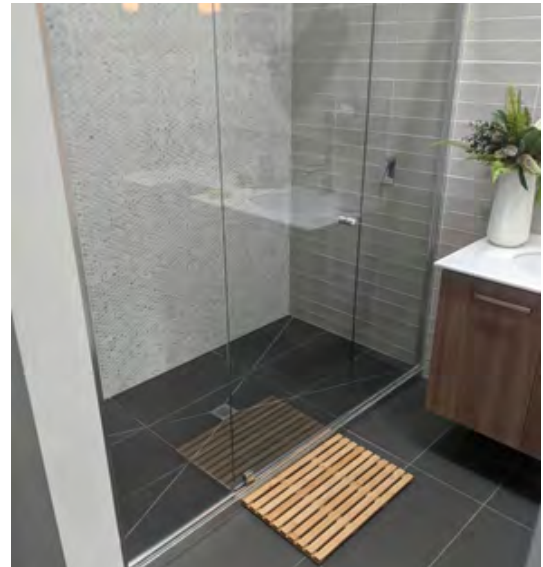


Figure 6b: Hobless shower with removable shower screen (Ryan, 2017)



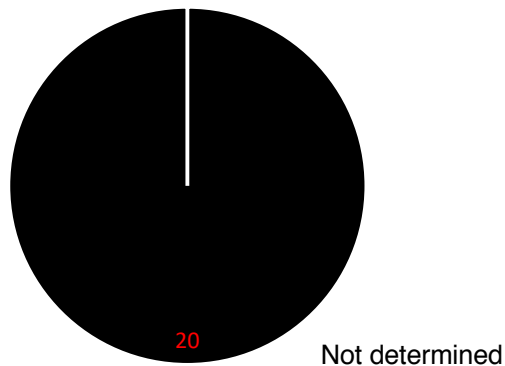
Figure 6c: Shower recess with hob



Element 6: Reinforcement of bathroom and toilet walls built-in to enable the installations of grabrails

- No engineering drawings of the display homes were provided to determine the existences of additional reinforcements built into the bathroom and toilet walls to enable future installation of grabrails
- The ABCB Options do not specify the construction of reinforcements

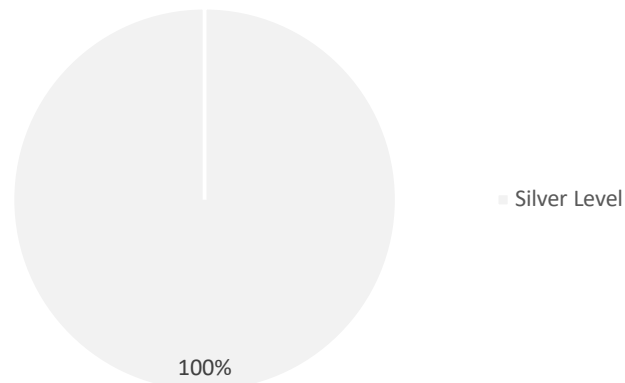
Figure 7. Results for Element 6 Wall reinforcement (n=0)



Element 7: Safe internal stairway designs

- The Silver level specifications stated by LHA is a requirement for all new homes under the National Construction Code (NCC).
- Stairways in the 9 double-storey dwellings featured a continuous handrail on one side of the stairway where there was a rise of more than 1m, which satisfies the Silver level requirement.

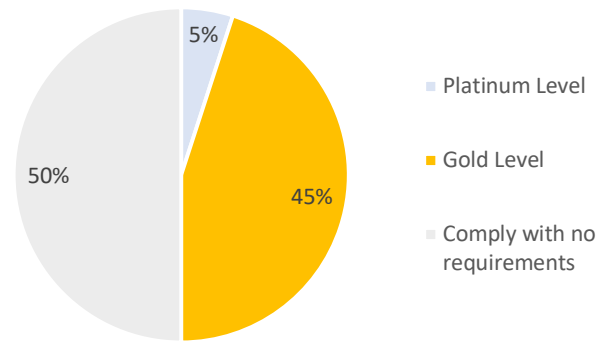
Figure 8. Results for Element 7 Stairs (n=9)



Element 8: Ease of movement in kitchen spaces

- No requirements for Silver level/Option 1
- The floor finishes of the kitchen spaces in all the inspected display homes are considered slip resistant as this is a requirement for all new homes under the NCC.
- 9 of the display homes provided no less than 1200mm (but no greater than 1500mm) clearance in front of fixed benches and appliances (excluding handles).
- One display home provided a 1830mm clearance in the kitchen, which is above the Platinum level's 1550mm clearance requirement (as well as the 1500mm requirement for the corresponding Option 3 requirement)

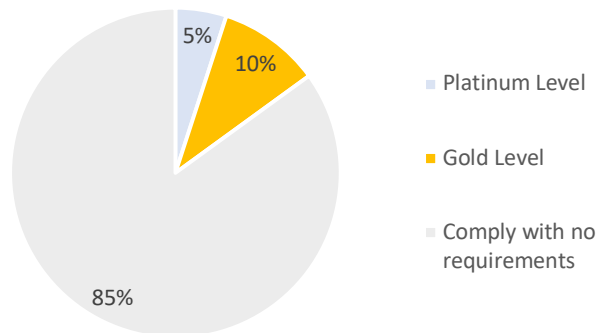
Figure 9. Results for Element 8 Kitchen (n=20)



Element 9: Ease of movement in laundry space

- No requirements for Silver level/Option 1
- The floor finishes of the laundry spaces in all the inspected display homes are considered slip resistant as this is a requirement for all new homes under the NCC.
- 2 of the display homes provided no less than 1200mm (but no greater than 1500mm) clearance in front of fixed benches and appliances (excluding handles).
- One home offered a 1860mm clearance in the laundry, which was above the Platinum Level and Option 3's 1550mm clearance requirements

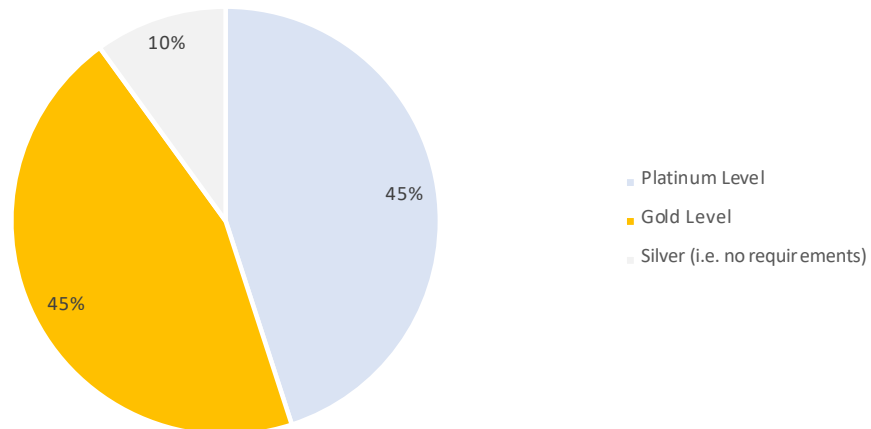
Figure 10. Results for Element 9 Laundry (n=20)



Element 10: Ground (or entry level) bedroom space

- No requirements for Silver level/Option 1
- Two double-storey display homes did not include a bedroom or space on the ground/entry level that could be used as a bedroom
- Two double-storey display homes included studies without a door on the ground/entry level that could be used as a temporary bedroom with a screen. These studies would need to be enclosed and have a door installed if this space was to be used for a permanent bedroom.
- All the other display homes had at least one bedroom on the ground/entry level. These bedrooms satisfied at least the Gold level and Option 3 requirements

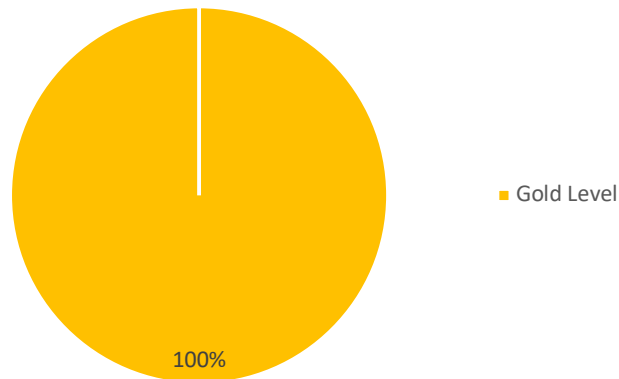
Figure 11. Results for Element 10 Bedroom (n=20)



Element 11: Accessible switches and power-points for all home occupants

- No requirements for Silver level/Option 1
- The light switches in the 20 display homes were located at 1050mm to 1100mm above the floor levels, which satisfied the requirements of Option 3 and the Gold level
- The power-points in the 20 display homes were installed at heights of 300mm to 350mm above the finished floor levels
- The Platinum level for Element 11 requires that the light and power-point switches be rocker action, toggle or push pad in design with a recommended width of 35mm. While all the display homes featured toggle or push pad switches, none of them had a width of 35mm or above.

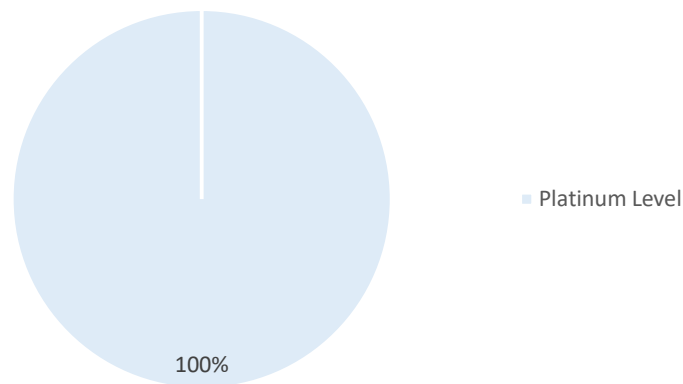
Figure 12. Results for Element 11 Light and power-point switches (n=20)



Element 12: Accessible door and tap hardware

- Door handles in all of the audited display homes were installed at between 1000mm to 1050mm above the finished floor, which complied the positioning requirements of Option 3 and the Platinum level. The LHA Design Elements and the ABCB Options recommended the door handles to be installed at between 900mm – 1100mm above the finished floor.
- The doorways also featured lever or D-pull style door hardware, satisfying the LHA Design Elements' door handle designs requirement
- Basins, sinks and tubs in all of the display homes featured lever or capstan style tap hardware with a central spout, meeting the Platinum level criteria for tap hardware

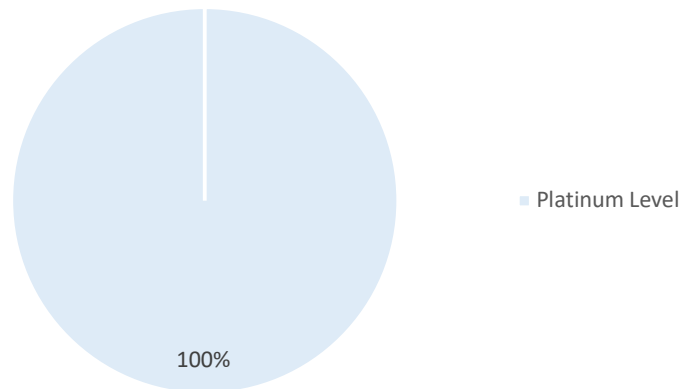
Figure 13. Results for Element 12 Door and tap hardware (n=20)



Element 13: Family living room space with clear space for ease of movement

- All 20 display homes featured generous free space in the family living room on the ground floors, with no less than 2250mm in diameter and enabled ease of movement clear of furniture placements.

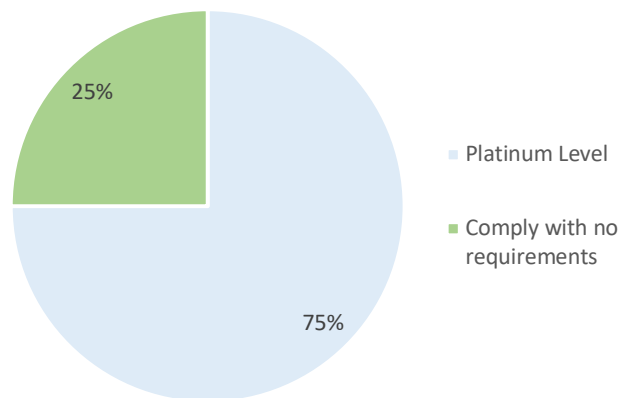
Figure 14. Results for Element 13 Family living room (n=20)



Element 14: Window sills installed at a height that enables home occupants to view the outdoor space

- 15 display homes had ground/entry level window sills installed no higher than 1000mm above the finished floor level. This enabled home occupants to view the outdoor space from either a seated or standing position.
- The measurements did not include windows in the bedrooms and toilets or shower rooms.

Figure 15. Results for Element 14 Window sill height (n=20)



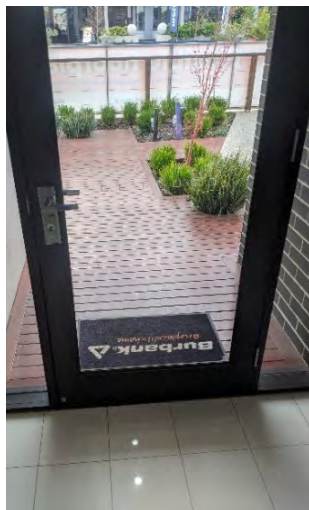
Examples of compliance and non-compliance with LHA Design Elements

Elements 1 & 2: Dwelling access and entrance accessibility

The 'Fitzgerald' and 'Kelly' designs in Wollert by Burbank Group

- ✓ Platinum Level dwelling access
- ✓ Platinum Level dwelling entrance

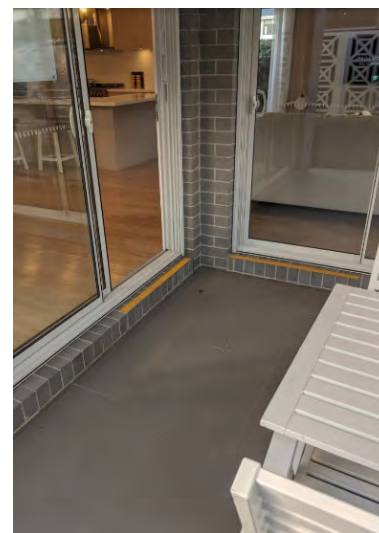
The 2 houses provided a safe, continuous, step-free pathway from the street entrance and parking area to the dwelling entrance that is level. Both the designs also incorporated step-free entrance doors into the dwelling. They were the only designs that connect the level entrance to the safe and continuous pathway as specified in Elements 1 and 2.



The 'Sorrento Grand' in Wollert by Carlisle Homes

- ✗ Non-compliant dwelling access
- ✗ Non-compliant dwelling entrance

There was a step from the allotment boundary to the dwelling entrance. The doors served as entrances to the dwelling were not step-free and continuous. There was also a step on the path from the car parking space to the dwelling entrance, which meant no continuous step-free pathway could be relied upon when entering the dwelling from the street entrance.



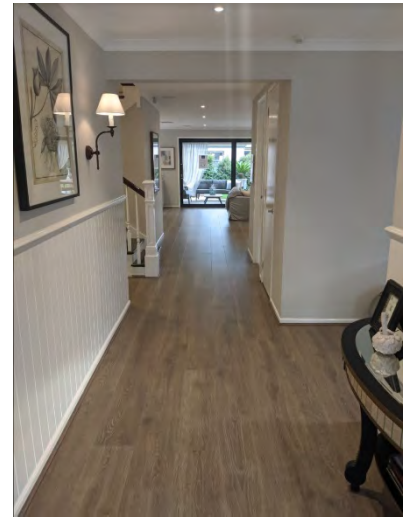
Element 3: Internal doors and corridors designs

The 'Charlton' design in Kalkallo by Porter Davis Homes

X Non-compliant door opening

✓ Platinum-standard corridor width

The internal doors on the ground floor had a unified opening width of 760mm, which was below the minimum required width of 820mm. However, the width of the internal corridor in the house was 1400mm, wider than the optimal width requirement (1200mm) (LHA, 2017; CIE, 2020).



Element 4: Toilet accessibility

The 'Empire' designs in Donnybrook by Homebuyers

✓ Silver Level clear width between a wall and amenities

X Non-compliant circulation space

The toilet closet was positioned with a width of 1180mm between the walls of the toilet space. This is above the 900mm clear width Silver level requirement. However, like all other ground/entry level toilets inspected, the circulation space between front edge of the toilet and arc of the internal door is less than the 1200mm minimum requirement (LHA, 2017).

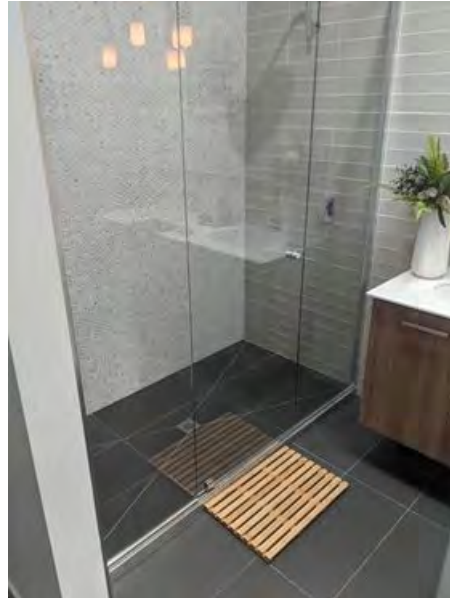


Element 5: Accessible shower designs

The 'Kelly' design in Wollert by Burbank Group

X Non-compliant shower recess design (required by Silver Level and Option 1)

The shower screen was considered not easily removable, though the recess is located in the corner of the bathroom as required to enable the installation of grabrails at a future date. The shower recess was not regarded as hobless because it did not provide a flat entry. A hobless shower recess should be prepared before the floor finishes are applied. A strip drain is also required (LHA, 2017; CIE, 2020).



The 'Sentosa' design in Point Cook by Metricon

✓ Silver Level shower design

An opening beside the glass shower screen provided a level entry to the shower recess. The shower recess was hobless as there was no dam or curb at the boundary and a strip drain was installed (refer to Figure 6c for comparison). This shower space fell short of Gold level compliance only because it is narrower than 900mm (870mm in width).



Element 8: Kitchen space

The 'Charlton' design in Kalkallo by Porter Davis Homes

✓ Gold Level kitchen space

The clearance in front of fixed benches and appliances (excluding handles) in the kitchen space is measured at 1400mm. Gold Level requires at least 1200mm clearance (LHA, 2017). Large clearances support ease of movement between fixed benches and easy adaptations.



The 'Empire' design in Donnybrook by Homebuyers

✗ Does not comply with Gold or Platinum Level kitchen space requirements

The clearance in front of fixed benches and appliances (excluding handles) in this kitchen space is measured at 980 mm. Gold level requires at least 1200mm clearance in front of fixed benches and appliances (excluding handles) (LHA, 2017).



Element 9: Laundry space

The 'Madison' design in Michelham by Porter Davis Homes

✓ Platinum Level laundry space

1860mm clear width was provided in front of the fixed benches and appliances (excluding handles). A 600mm deep recessed area is provided for the installation of a washing machine. Platinum Level requires a minimum 1550mm clearance in front of the fixed bench in a laundry room to support ease of movement and easy adaptations. 600mm minimum deep recessed area is required for laundry room appliances (LHA, 2017).



The 'Belthorpe' design in Wollert by Simmonds Group

✗ Does not comply with Gold or Platinum Level laundry space requirements

900mm clear width was provided in front of the fixed benches and appliances (excluding handles). A 600mm deep recessed area is provided for the installation of a washing machine (though not aligned with the fixed bench). Gold Level requires a minimum 1200mm clearance in front of the fixed bench in a laundry room (LHA, 2017).



Cost implications of assessable features

This study did not include a detailed quantity survey of the cost of compliance with the individual options or inclusion of particular LHA elements. However, the inclusion of each element was assessed against expected changes in cost for the developer (see Table 3). Where green is no additional upfront cost (e.g. having lower window sills), orange is a small additional upfront cost (e.g. a larger door and stronger hinges), and red is a significant potential upfront cost (e.g. Step-less access on a sloping site – although exemptions are proposed for this).

Table 3. Anticipated cost burden of incorporating additional Livable Housing Design Elements

Design Elements	Cost		
	min	low	high
1 Dwelling Access			
2 Dwelling Entrance			
3 Internal Doors and Corridors			
4 Toilets			
5 Shower			
6 Reinforcement of Bathroom and Toilet Walls			
7 Internal Stairways			
8 Kitchen Space			
9 Laundry Space			
10 Ground (or Entry Level) Bedroom Space			
11 Switches and Powerpoints			
12 Door and Tap Hardware			
13 Family-Living Room Space			
14 Window Sills			
15 Flooring			

When assessed at the initial design stage, most additional costs of the proposed design element requirements are either negligible (lower window sills) or modest (extra noggins in bathroom walls, additional tiles in larger bathrooms). The element with the largest potential cost increase, Element 1 Dwelling Access, will depend on the slope of the plot of land being developed. This has been recognized in the Options paper with a proposal for possible exemptions for houses on sites that slope greater than a set limit – a proposal that should avoid extreme cost imposts for difficult sites.

A key consideration of cost is perception. A small additional cost for an individual item (for example a larger front door that may cost an extra \$1000 dollars), will be viewed through the prism of multiple houses built by a volume builder (and so assessed as an additional cost of \$100,000 for front doors if they build 100 houses a year). When many small additional costs are tallied then, larger doors, step-less showers, extra tiles in larger bathrooms, larger light switches and power-points, and so on, the costs can seem considerable. However, in practice these costs are merely delayed and passed on to a new party, as inappropriate housing needs to be modified by the home user, often at a far higher cost than if the features were included in the original build. By embedding the standards in the Building Code of Australia requirements, the additional costs are both minimized, and shared between the consumer (who pays more but for a better, more appropriate house), and the developer (who must absorb some cost to stay competitive in the market).

Discussion

All 20 of the display homes assessed in this audit had at least six of the 15 Livable Housing Design Elements incorporated into their design. More than half of the homes had eight or more elements overall, and nine of the homes had five or more Platinum elements. The compliance of the homes across Options 1, 2, and 3 are discussed in more detail below.

Option 1: Requirement of Elements 1, 2, 3, 4 and 6

Assessment of house plans against the requirements for Option 1 (Silver) demonstrates the extent of partial but not full compliance with accessible design. Most (95%) of the dwellings complied with either Dwelling Access (E1) or Dwelling Entrance (E2) requirements, but few (20%) included both – yet both are essential for someone with a mobility impairment entering a home. This is consistent with the CIE report which concluded that 5-10% of new stock meets Silver level based on previous estimates and stakeholder feedback (CIE, 2020).

No dwellings met the Internal Doors and Corridors (E3) requirements. However, there are two parts to this element – internal corridor space and internal doors. Of the 20 dwellings assessed, 14 (70%) met the internal corridor space standards (E3.2) but none complied with the internal door dimension standard (E3.1). Although there would be some initial change over costs, once wider standard doors become standard, the incremental cost of wider doors is minimal.

The Accessible Ground Floor Toilets (E4) element also has three parts – a ground floor toilet, a minimum width of 900mm (E4.1), and sufficient space in front of the toilet (E4.2). All of the dwellings included a ground floor toilet, but only one had a toilet of sufficient dimensions to comply with Option 1 (minimum 1200mm between pan and door swing). More than a third (35%) complied with the silver wall-to-wall width of 900mm. These findings suggest that many of the individual requirements to comply with Option 1 are already present in new builds and are accepted industry practice. However, they are incorporated into the designs in a random way that does not make the dwellings consistently accessible.

Note that the requirement for Element 6 could not be established using the current methodology.

Option 2: Requirement of Elements 1 to 12

To qualify for Option 2 (Gold), building plans must meet 12 of the Design Elements. This includes the five elements that constitute Option 1 (but at a Gold, not Silver standard), plus Element 5 to 12. In reference to Elements 6 to 12, all of the buildings in the sample included at least three of these in their designs (Three-elements = 20%; four-elements = 60%; five-elements = 20%). However, similar to the situation with Option 1 compliance, no building plan included all of the additional Option 2 elements.

None of the buildings met all of the requirements of Element 5 (Accessible Bathrooms and Showers). This element consists of several components:

- Ground floor level shower
- Shower position (in corner)
- Minimum shower size (900 mm²)
- Minimum area around shower (900 mm² or 1200 mm²)
- Hob-less or step-less shower with removable shower screens

Of the nine two storey dwellings, five had a shower on the ground floor. Of the 16 ground floor showers that were assessed for compliance, all included a shower in the corner of the room. The minimum shower size of 900 mm² included in the CIE report for the ABCB (CIE, 2020, p. 61 table 3.1) seems to be an error – this corresponds to a shower 30 mm x 30 mm in size. It is probable that the recommendations refer to minimum dimensions of 900 mm on each side of the shower (that would be consistent with LHA guidelines for Gold level). Using those criteria - none of the showers assessed conform because at least one dimension is 850, 860 or 870 mm in every case.

In regards to the minimum space around the shower, Option 2 requires a minimum of 900 mm x 900 mm, and Option 3 requires a min of 1200 mm x 1200 mm (same misunderstanding in table 3.1, which states that adjacent space to the shower recess should be at least 900mm² for Option 2 and 1200mm² for Option 3) (CIE, 2020, p. 61 table 3.1). There was a high level of compliance with the space around the shower with five showers complying with Option 2 and a further nine complying with Option 3.

However, according to the LHA guidelines, Gold level standard for shower access is 1200 mm x 1200 mm adjacent to shower. Platinum level access is a space of 1400 mm x 1400 mm adjacent to the shower. Options 2 and 3 for showers do not correspond to Gold and Platinum LHA. However, 4 of 16 homes met Gold level standard and 5 of 16 met the LHA Platinum level standard. Only one dwelling (6%) meeting the requirement for the shower to be step-less or hob-free.

Despite low compliance across some Option 2 requirements, others accessible features are more common. For instance, 90% of buildings included Element 10 (ground level bedroom), including 7 of 9 two-storey dwellings. Most (80%) dwellings had bedrooms that met either Gold (8 dwellings) or Platinum (8 dwellings) level requirements. All 20 dwellings included Elements 11 and 12 (accessible switches and power-points; and accessible door handles and tapware). So, as was the case with Option 1, none of the examples in the case study met *all* Option 2 requirements. However, many of the elements were either fully or partially present in the homes, and therefore are already part of current industry practice.

Option 3: Requirement of Elements 1 to 12 plus 14

The additional requirements for a dwelling to qualify for Option 3 (assuming they comply with the Option 2 requirements), is the addition of Element 14 (lower window sills in habitable areas), and additional space requirements for Element 8 (kitchen space – 1500mm clearance in front of fixed benches, up from 1200mm for Option 2). Low window sills were common, with 75% of the homes already including this feature in the living room, while 50% complied with the higher space standard of Element 8.

Silver level versus Gold/Platinum levels

The Livable Housing Design Elements focus on features of a dwelling that may or may not be present (e.g. step-less entry, ground level toilets, and frameless showers), or must meet designated space standards such as dimensions of front and internal doors, bathrooms, and bedrooms. Overall, the display homes showed a consistent pattern of exceeding some minimum Silver level requirements. When considering the space standards of elements that are common to all houses – including bedrooms, kitchens, living rooms, and bathrooms – the 20 audited homes demonstrated that current industry practice is capable of routinely meeting space standards at Gold levels. Internal stair dimensions in the 9 of 20 dwellings that were two-storey are the only element that is consistently at Silver level and not higher. However, conspicuous non-compliance is found in internal door dimensions (0%), ground level toilet dimensions (0%), frameless shower (5%), and front door dimensions (50%) which failed to meet Silver level requirements.

The first five accessible features (E1-E5), which constitute the bulk of requirements for compliance with Option 1 (Silver), are less often included in the existing housing plans than some of the features required for Option 2 (Gold). However, where they are included (E1 and E2) or partially included (e.g. internal corridor dimensions in E3.1), components of current house designs consistently exceed minimum levels.

In part, compliance with some Gold and Platinum level elements most likely reflects the fact that the dwellings assessed consist of suburban, detached family houses which in Australia are among the largest in the world in spatial terms. While caution should be used in assuming similar levels of compliance in inner city townhouses or apartments, the vast majority of new homes in Australia are built by volume home builders in new and existing suburbs.

While it is realistic for nearly all new homes to be built at the Option 2 level (Gold), there are going to be geographically complex sites where this will be near impossible or the costs will be prohibitive. Therefore, a simple, transparent and timely process is needed for obtaining an exemption based on the gradient and/or size of a house block.

A note on costs

This study did not explicitly attempt to quantify the additional cost of including the LHA's Design Elements at different space standard levels. However, the consistent exceeding of minimum (Option 1 or Silver) requirements across multiple design elements, coupled with the assessment of the likely scale of cost increases when elements are considered at the design stage as noted in Table 3, suggests that the cost of compliance has been factored in to current designs to a significant extent.

Conclusion

This study suggests that consistently incorporating accessible features into the building code for all new dwellings would not be a significant impost on volume builders of residential housing in Australia. Indeed, the country's biggest builders are already incorporating most of these features in some new builds because they are consistent with good design. Surprisingly, the audit of 20 display homes found that *all* the house designs had at least 5 elements that complied with either the Gold or Platinum levels. However, a notable example of widespread non-compliance is the width of internal doors. That being said, changing the standard width of doors is a common-sense change that is effectively cost neutral. Therefore, despite some compliance with the LHA's Livable Housing Design Guidelines in the 20 display homes, accessible elements related to the width of doors, the dimensions of the ground level toilet and a frameless shower were the most consistent barriers for people with mobility impairments.

The findings of this study support the idea that well-designed housing that works for people with mobility impairments does not compromise the design of housing for the general population – rather it enhances the built environment. The current ABCB consultation process is a unique opportunity to improve the functionality of new housing for everyone and future-proof Australian housing for our ageing population.

References

- Aged Care Royal Commission. (2019). *Royal Commission into Aged Care Quality and Safety*. Retrieved from <https://agedcare.royalcommission.gov.au/publications/interim-report>
- Australian Building Codes Board (ABCB). (2020). *Consultation RIS: Proposal to include minimum accessibility standards for housing in the NCC*. Retrieved from <https://consultation.abcb.gov.au/engagement/consult-ris-accessible-housing/>
- Australian Building Codes Board (ABCB). (2018). *Accessible housing options paper*. Retrieved from <https://www.abcb.gov.au/Resources/Publications/Consultation/Accessible-Housing-Options-Paper>
- The Centre for International Economics (CIE). (2020). *Proposal to include minimum accessibility standards for housing in the National Construction Code: Consultation regulation impact statement*. Retrieved from <https://www.abcb.gov.au/News/2020/07/06/proposal-to-include-minimum-accessibility-standards-for-housing-in-the-ncc>
- Disability Royal Commission (2019). *Royal Commission into Violence, Abuse, Neglect and Exploitation of People with Disability*. Retrieved from <https://disability.royalcommission.gov.au/system/files/2020-05/First%20Progress%20Report.pdf>
- Livable Housing Australia (LHA). (2017). *Livable housing design guidelines (4th Edition)*. Retrieved from <https://www.abcb.gov.au/News/2020/07/06/proposal-to-include-minimum-accessibility-standards-for-housing-in-the-ncc>
- Ryan, S. (2017). *Designing for Inclusion and Independence – An Explanatory guide to support the briefing and design of accessible housing*. Melbourne, Vic.: Summer Housing Ltd.