Livable Housing Design Standard in Practice

Compliant Level Entry Threshold and Drainage Design

Stormtech

Integrating step-free access, reinforced walls and appropriate circulation space early in the design phase supports adaptability, enhances resale value and reduces the likelihood of disruptive and costly retrofits.

INTRODUCTION

Australia's demographic profile is shifting in ways that have direct implications for architectural design and specification. An estimated 5.5 million Australians live with disability, representing 21.4 per cent of the population.[1] The likelihood of disability rises significantly with age; more than half of Australians aged 65 years and over, approximately 52.3 per cent, live with some form of disability.[2] As the population ages and more people remain in their homes for longer, the demand for adaptable, accessible housing will intensify.

Despite this demographic reality, existing housing stock frequently fails to accommodate users with mobility limitations. An online survey conducted between February and March 2021, involving 145 participants in Australia, including 112 people with mobility impairment and 33 family members, found that 71 per cent were living in housing that did not fully meet their accessibility needs.[3]

For architects, this disconnect underscores the importance of scrutinising design decisions that influence circulation, reach ranges, fixture usability and long-term adaptability. The introduction of the Livable Housing Design Standard (LHDS) under the National Construction Code (NCC) has formalised minimum accessibility requirements for new Class 1a dwellings and Class 2 sole-occupancy units, embedding features such as step-free access and level thresholds. However, compliance is not always straightforward.

This paper examines whether the LHDS applies to your project and considers the unique challenges and misconceptions surrounding the level threshold requirements as they relate to the NCC's water management provisions. It presents solutions that assist architects in managing compliance while safeguarding durability, effective drainage and long-term usability.

WHAT IS THE LHDS?

The LHDS was incorporated into NCC 2022 to establish a national baseline for accessibility in new Class 1a dwellings and Class 2 sole-occupancy units. Based on the former Silver level of the Livable Housing Design Guidelines,[4] the Standard introduces mandatory design elements intended to improve safety, usability and adaptability for occupants with permanent disability, age-related mobility decline or temporary impairment. Its intent is not to create specialist housing but to embed fundamental access provisions within mainstream residential construction.

For architects, the LHDS translates into a series of measurable spatial and construction requirements that must be resolved at the concept and documentation stages. One of the most consequential of these relates to the provision of step-free access and level thresholds. At points of entry, the threshold must be level and free of steps, introducing technical considerations relating to slab set-downs, finished floor levels, drainage falls and weatherproofing interfaces.

The Standard also mandates reinforced bathroom and sanitary compartment walls to support the future installation of grabrails, alongside minimum circulation spaces that allow for mobility aid use within key areas such as entries, corridors and sanitary facilities. Doorway widths and clear openings are prescribed to ensure accessible movement between spaces. Collectively, these provisions require coordinated spatial planning and careful product specification, as compliance depends on how thresholds, door systems, floor finishes and structural elements are detailed and constructed.

IS THE LHDS MANDATORY?

The adoption of the LHDS is not uniform across Australia. While it was introduced into NCC 2022, implementation remains subject to state and territory regulation. Jurisdictions retain authority over whether and how the LHDS is enacted through local legislation. As a result, requirements differ across the country, creating variation in compliance obligations for residential projects. Notably, New South Wales and Western Australia have not implemented the LHDS in its current form.

This fragmented adoption landscape can create uncertainty for practitioners operating across multiple jurisdictions. It remains best practice for architects and designers to follow the LHDS as a baseline for accessibility to simplify compliance and reduce long-term risk. Demographic evidence indicates that there is approximately a 60 per cent likelihood that a new dwelling will be occupied by someone with a disability or accessibility need at some point during its lifecycle.[5]

Designing in accordance with LHDS principles, regardless of local implementation status, proactively anticipates changing occupant needs rather than reacting to them.

Integrating step-free access, reinforced walls and appropriate circulation space early in the design phase supports adaptability, enhances resale value and reduces the likelihood of disruptive and costly retrofits. According to a submission compiled for the Council on the Ageing Queensland (which references data provided by Master Builders Australia and HIA), base-level livable housing features at the construction stage add approximately $3,600 to $4,700 to the cost of a new house.[6] By contrast, major post-occupancy modifications, such as bathroom or kitchen alterations or ramp installation, average around $10,600 and may take up to 100 days to complete.[7]

LEVEL ENTRY THRESHOLD DESIGN UNDER LHDS AND NCC 2022

Entrance doors represent one of the most technically complex interfaces in residential design, with internal finished floor levels, external ground planes, structural systems and weatherproofing assemblies all requiring careful consideration. When level entry is required under the LHDS, this junction must accommodate accessibility requirements while continuing to manage rainfall, surface runoff and long-term durability. The threshold is therefore not a minor detail.

Poorly resolved thresholds can undermine otherwise compliant designs. An entry that satisfies circulation and gradient requirements but fails to manage water ingress creates ongoing maintenance risks and potential non-compliance under separate NCC provisions. Conversely, overly conservative weatherproofing solutions can compromise accessibility outcomes. When designed well, level entry is not merely an accessibility feature but also one that enhances safety, continuity of the space and occupant comfort.

Under the NCC 2022 Housing Provisions, Clause 3.3.3 sets out specific requirements for external door thresholds, including a minimum 50 mm step-down to reduce the risk of water ingress. In parallel, the LHDS, particularly Clauses 2.2 and 2.4, requires at least one step-free entrance path and a level threshold at that entry. Read together, these provisions require careful interpretation and coordination.

Extract from ABCB Housing Provisions

3.3.3 Surface water drainage

Surface water must be diverted away from a Class 1 building as follows:

(a) Slab-on-ground — finished ground level adjacent to a building: the external finished surface surrounding the slab must be drained to move surface water away from the building and graded to give a slope of not less than (see Figure 3.3.3a) —

(i) 25 mm over the first 1 m from the building—

(A) in low rainfall intensity areas for surfaces that are reasonably impermeable (such as concrete or clay paving); or

(B) for any reasonably impermeable surface that forms part of an access path or ramp provided for the purposes of Clauses 11(2) or (4)(c) of the ABCB Standard for Livable Housing Design; or

(ii) 50 mm over the first 1 m from the building in any other case.

(b) Slab-on-ground — finished slab heights: the height of the slab-on-ground above external finished surfaces must be not less than (see Figure 3.3.3a) —

(i) 100 mm above the finished ground level in low rainfall intensity areas or sandy, well-drained areas; or

(ii) 50 mm above impermeable (paved or concrete) areas that slope away from the building in accordance with (a); or

(iii) 150 mm in any other case.

(c) The ground beneath suspended floors must be graded so that the area beneath the building is above the adjacent external finished ground level and surface water is prevented from ponding under the building (see Figure 3.3.3b).

Source: https://ncc.abcb.gov.au/editions/ncc-2022/adopted/housing-provisions/3-site-preparation/part-33-drainage

Extract from Livable Housing Design Standard

2.2 Threshold

The threshold of an entrance door that is subject to Clause 2.1 must—

(a) be level; or

(b) have a sill height not more than 5 mm if the lip is rounded or bevelled; or

(c) have a ramped threshold that—

(i) does not extend beyond the depth of the door jamb; and

(ii) has a gradient not steeper than 1:8; and

(iii) is at least as wide as the minimum clear opening width of the entrance door; and

(iv) does not intrude into the minimum dimensions of a landing area that is required by Clause 2.3; or

(d) where the requirements of (a), (b) or (c) cannot meet the weatherproofing requirements of the NCC, for external entrance doors containing a raised door or sill—

(i) have no lip or upstand greater than 15 mm within the sill profile; and

(ii) have no more than 5 mm height difference between the edge of the top surface of the sill and the adjoining finished surface.

Source: https://ncc.abcb.gov.au/editions/ncc-2022/adopted/housing-provisions/3-site-preparation/part-33-drainage

ACHIEVING COMPLIANT LEVEL ENTRY THROUGH INTEGRATED DRAINAGE

The required 50 mm step-down does not necessarily translate to a visible or perceptible step in the user experience. It may be achieved through slab set-downs, recessed door frames or integrated threshold drainage systems, provided the overall assembly satisfies NCC performance requirements. In this context, the step-down is resolved within the structural and drainage detailing, rather than appearing as a visible or perceptible change in level at the doorway.

The term “level entry” is often misinterpreted as meaning zero vertical change. In practice, it describes a safe, accessible indoor-outdoor transition that accommodates mobility while complying with water management provisions. A threshold drain, which refers to a linear drainage channel positioned at the doorway interface, intercepts and removes surface water before it can cross into the building, enabling step-free access without compromising performance.

By capturing water at the threshold line, a properly designed drainage system reduces reliance on vertical separation alone as the primary means of weather protection. This integrated approach allows architects to reconcile LHDS level entry requirements with the 50 mm step-down provisions in NCC 2022 Housing Provisions and achieve a deemed-to-satisfy outcome under Clause H2D2 of Volume 2.

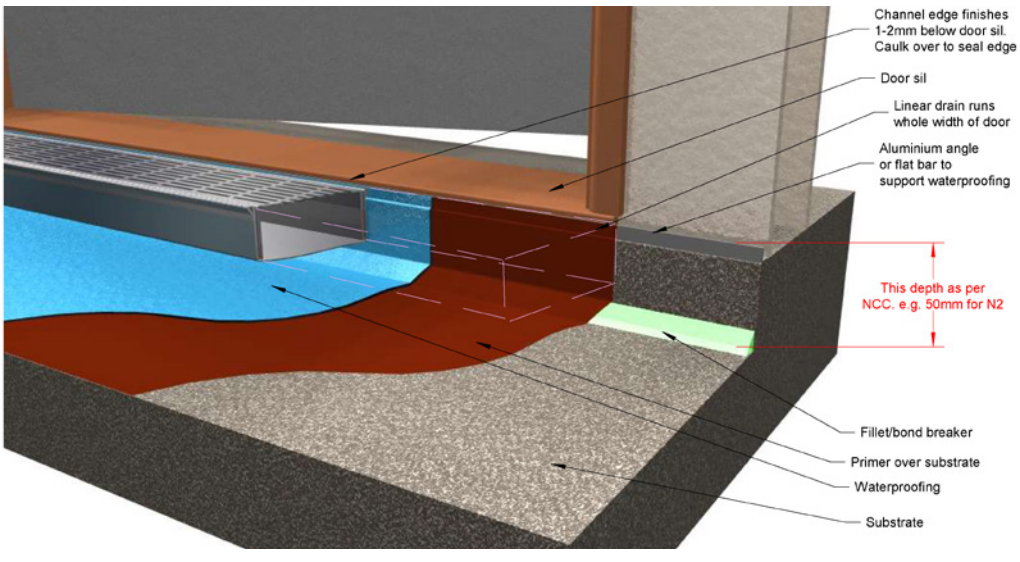
SPECIFYING THRESHOLD DRAINAGE

When specifying threshold drains, shallow or generic channels may appear compliant on drawings yet fail to achieve the required depth or hydraulic performance once constructed. Insufficient coordination between channel depth, door frame profiles, slab set-downs and finished floor levels can result in thresholds that are technically non-compliant despite sound design intent.

A compliant solution requires a drainage channel that meets the width of the entrance and provides a minimum 50 mm deep channel. For hinged door applications, purpose-built threshold drainage systems provide a clear pathway to compliance. Stormtech’s i50 Linear Drainage Range has been developed specifically to address the 50 mm minimum step-down requirement at entrance doors. The system incorporates a 50 mm deep rebated channel, enabling a deemed-to-satisfy solution while maintaining a level, step-free threshold.

Manufactured in Australia from certified low embodied carbon 316 marine-grade stainless steel, the i50 offers corrosion resistance, structural integrity and durability suitable for exposed residential environments. Each unit is made to length for precise installation, with an overall width of 107 mm and depth of 53 mm. Multiple outlet sizes are available, including DN40, DN50, DN65 and DN80, supporting integration with hydraulic design requirements. A range of grate styles, including architectural, wave, tile insert and standard profiles, allows alignment with the architectural language of the project without compromising performance.

In addition to the i50 system for hinged doors, Stormtech offers a suite of threshold drainage products specifically developed for sliding and bifold door configurations, where wider openings and continuous tracks increase exposure to wind-driven rain and surface runoff. Manufactured to length and Watermark certified, these systems support precise coordination with door frame widths, finished floor levels and external paving, allowing architects to resolve accessible level entry conditions within a compliant, performance-based threshold assembly.



MORE THAN JUST THRESHOLDS

Drainage systems influence far more than water management; they directly affect safety, hygiene and the long-term durability of the building fabric. Poorly resolved drainage at entry points can create slip and trip hazards, contribute to moisture accumulation and mould growth, and accelerate structural deterioration. These outcomes reduce amenity and can significantly impact occupants with mobility limitations, undermining the intent of accessible design.

Beyond threshold design specifications, several interrelated technical factors influence long-term performance. External surface falls must be carefully graded to ensure positive drainage away from the building envelope, reducing the risk of ponding at the doorway interface. This includes coordinating paving levels, slab set-downs and landscaping to prevent water from tracking back toward the threshold. Hydraulic capacity should also be considered, particularly in high rainfall regions, to confirm that the selected drainage system can manage peak flow conditions without surcharge.

Material selection is also important. Drainage components exposed to weather must offer appropriate corrosion resistance and structural integrity over time. Stainless steel grades, protective finishes and compatible fixings should be assessed in relation to coastal exposure, urban pollution or aggressive environments. Load ratings must align with expected traffic conditions, whether purely pedestrian or occasionally subject to maintenance equipment or light vehicular loads.

Slip resistance of adjacent floor and paving finishes plays a complementary safety role. Even where drainage performs effectively, inappropriate surface treatments can increase the likelihood of slips during wet conditions. Specifying compliant slip resistance classifications, while ensuring smooth transitions between internal and external surfaces, strengthens overall risk management.

ABOUT STORMTECH

Stormtech is an Australian manufacturer of architectural linear drainage systems, established in 1989 and specialising in made-to-length solutions for residential and commercial projects. Manufactured locally from 316 marine-grade stainless steel and Watermark certified, Stormtech products are engineered to align with NCC performance provisions and relevant Australian Standards. The company's threshold drainage systems are specifically designed to integrate with contemporary door assemblies, supporting coordinated detailing across slab set-downs, door frames and finished floor levels.

When designed well, level entry is not merely an accessibility feature but also one that enhances safety, continuity of the space and occupant comfort.

REFERENCES

1 Australian Disability Network. “Disability statistics.” ADN. https://australiandisabilitynetwork.org.au/resources/disability-statistics (accessed 15 February 2026).

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7 Ibid.