

Modern Homes Standards – Home renovation guideline

Guidance for alterations, additions,
and relocations of existing homes



Understanding compliance pathways under QDC 4.1 and QDC 4.5

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Scope

This guideline explains how the Modern Homes Standards apply to renovations of existing houses and townhouses (Class 1 buildings).

The Modern Homes Standards cover building requirements for residential energy efficiency and livable housing design, including Queensland-specific variations, concessions and compliance pathways that apply to renovation work.

Purpose of guideline

This guideline assists practitioners and homeowners with understanding and applying the Modern Homes Standards to home renovations.

It explains Queensland's residential energy efficiency, livable housing design and grade to floor waste provisions, available compliance pathways, concessions and building certifier discretions that apply to alterations, additions and relocated homes.

This guideline is not intended to address every possible renovation scenario. Anyone undertaking a renovation are recommended to obtain advice from appropriately qualified professionals relevant to their circumstances.

Legal status of these guidelines

This document provides guidance to assist with compliance with the *Building Act 1975* (BA) and the application of QDC 4.1 and QDC 4.5. It is not a statutory guideline made under section 258 of the BA and does not have statutory effect. Any statutory obligations must be determined by reference to the relevant legislation, applicable Queensland Development Code provisions and relevant statutory guidelines.

Building assessment provisions apply to the design and construction of building work, including home renovations. These provisions include the Queensland Development Code (QDC) and National Construction Code (NCC).¹

The Modern Homes Standards are supported by QDC 4.1 and QDC 4.5, which are prescribed under the *Building Regulation 2021* (BR) and form part of the building assessment provisions under the *Building Act 1975* (BA).

This document is intended to assist practitioners and homeowners to understand and apply the Modern Homes Standards to home renovations. It should be read in conjunction with the BA, the *Building Regulation 2021*, QDC 4.1, QDC 4.5 or the NCC. It does not replace, vary or add to any legislative or regulatory requirement.

Queensland's approach

Queensland supports homes that are comfortable, energy efficient, accessible and fit for modern living.

The Modern Homes Standards improve the energy performance and accessibility of new homes. When applied to renovations, Queensland's approach recognises that existing homes were designed and constructed under a range of historical building standards and can present practical constraints that do not arise with new design and construction.

The BA provides building certifiers with discretion to consider the circumstances of an existing home when assessing what applies to renovation work. Queensland's approach also includes concessions and flexible compliance pathways that support practical and cost-

¹ *Building Act 1975*, [section 30](#)

effective renovation outcomes while maintaining the policy intent of the Modern Homes Standards.

The Queensland Government has provided this guidance to improve clarity, support consistent decision-making and make the requirements easier to apply.

The guidance reflects Queensland's approach to home renovations by:

- recognising the diversity of Queensland's housing stock
- supporting practical and proportionate compliance outcomes
- recognising existing building and site constraints
- providing clarity with applying the provisions
- supporting the use of building certifier discretion where appropriate
- promoting cost-effective upgrades where practical

Key benefits of Queensland's approach

The key benefits of Queensland's approach are that it:

- supports practical renovation outcomes
- recognises existing building constraints
- provides flexibility for existing homes
- supports consistent decision-making
- reduces unnecessary compliance burden
- promotes cost-effective upgrades
- appropriately promotes energy efficiency and accessibility objectives.

Background

The Modern Homes Standards commenced in Queensland through staged implementation of the Queensland Development Code:

- 1 October 2023 for livable housing design; and
- 1 May 2024 for residential energy efficiency. The residential energy efficiency standards comprise of two aspects:
 - i. a minimum star rating for the dwelling's building shell (roof, windows, external walls and floors); and
 - ii. whole of home energy budget for the dwelling's major fixtures and appliances.

Unlike new homes, renovations are undertaken on existing buildings that were often designed and constructed under earlier building standards. Existing homes may present structural, site and design constraints that affect how contemporary building standards could be applied.

Queensland's approach recognises these practical considerations through a range of exemptions, concessions and building certifier discretions that may apply depending on the nature and extent of the renovation.

What is a home renovation

For the purposes of this guideline, a home renovation involves new building work for:

- an **alteration** e.g. re-configuring rooms, such as making an open-plan area of the kitchen and living room, or when lifting a home
- an **addition** e.g. extension for a new living area, such as an extra bedroom

- **relocated and removable homes** e.g. moving an existing home to another part of the same property or transporting a home to a different property.

Building applications

Under the BA all new building work is assessable development, unless otherwise prescribed as accepted development (self-assessable) or is exempt under the BR. Accepted development (self assessable) building work does not require a building approval, but must still comply with all relevant building codes and standards. Exempt building work does not require a building approval and does not need to meet building standards. This applies to both new buildings and renovations of an existing building.

Assessable development is development that requires an approval from a building certifier before the building work can be started.

Typically, a building application for a renovation is required where the proposed building work involves a structural change to the existing home. However, some minor structural work may be exempt from requiring a building application. For example, exemptions may apply where the work does not affect more than 20 per cent of the building's structure, such as replacing a like-for-like roof beam supporting up to 5m² of roof area. In some cases, a building application may also be required for more extensive repair work, such as work that involves repairing or replacing a structural component of the existing home.

A building application will generally not be required for minor repairs, maintenance and minor alterations, including:

- repairing or replacing kitchen cupboards, vanity units and floor coverings
- repairing or replacing internal wall linings
- replacing a broken wall panel
- replacing a house stump post
- refurbishing a kitchen or bathroom (where there is no structural work).

In accounting for a natural disaster, such as flooding, certain conditions can apply under QDC 4.1² and QDC 4.5³ for undertaking repair and maintenance of an existing home.

Application of the Modern Homes standards to accepted development (self-assessable)

While a building application is not required to start accepted development (self-assessable), the BA still requires self-assessable work to comply with the current building assessment provisions. This ensures that contemporary safety and structural standards are maintained. This also potentially includes calling up the Modern Homes standards.

Guidance to how the Modern Homes standards apply to accepted development (self-assessable) is included throughout this guideline.

Residential Energy efficiency

New houses (class 1 buildings), including any enclosed, attached garage (class 10a), and sole-occupancy units in apartment buildings (class 2), must comply with the residential energy efficiency building standards under QDC 4.1. Two aspects are required, these being

² Refer QDC 4.1, [Part 4 – Application](#).

³ Refer [Building and Plumbing Newsflash 626](#) (11 April 2024).

a minimum star rating and a whole of home energy budget.

Star rating (building shell)

The star rating system requires minimum energy efficiency standard to be met for the building shell of a house. The required star rating varies depending on the type of house. While a 7-star rating is generally required, concessions apply for some homes, including small houses, certain homes with raised-floor construction, and homes with unenclosed floors in climate zone 5. The energy efficiency standard takes into account the design and materials to be used for constructing the roof, external walls, windows and floor.

Generally, a building application will only be required when making significant changes to the home's building shell. For this reason, it will not generally be necessary to apply the minimum star rating to building work that does not require a building application.

It is important to note cosmetic changes to a home can have a significant impact on its energy performance and comfort. For example, changing colours of the roof and exterior walls from light to dark will increase heat gain during summer, and could contribute to the home overheating. To avoid this, homeowners can consider using lighter colours on external surfaces or seek advice from a house energy assessor on how to minimise the potential impacts of using a darker colour.

Whole of home energy budget (fixtures and appliances)

The whole of home energy budget depends on the energy efficiency of the home's major fixtures and appliances intended to be installed. To comply, energy assessors can either use a NatHERS software tool or the NCC Online Calculator as the elemental (DtS) pathway.

In an existing home, there are a range of things to consider. For example, its fixtures and appliances may be in good working order and not near their end of life for replacement when accepted development (self-assessable) is to commence. It may also be difficult to upgrade an existing appliance when it needs to be replaced. For example, there may not be enough space to fit a heat pump hot water system into a designated area.

Given these factors, it may be impractical or unreasonable to apply the whole of home requirements when undertaking building work.

Homeowners may wish to consider upgrading to more energy efficient appliances when they need to be replaced, which can reduce their operating energy costs and emissions. To support homeowners with choosing replacements, there are minimum energy efficiency standards that apply individually to many products⁴.

Livable housing design standard

Renovations of existing bathrooms and toilets that do not involve any structural changes can generally be completed without obtaining a building approval. Applying the Livable Housing Design Standard to these renovations could require structural changes that may be impractical or impossible.

For example, when renovating an existing toilet there may not be enough room to achieve the minimum space between the toilet rim and the door. It may also not be feasible to require a level entry into a bathroom that is being renovated, as this could require the floor joists

⁴ Refer to product energy ratings at www.energyrating.gov.au/consumer-information/products.

being cut or re-positioned, or part of the concrete floor to be removed for the floor to be lowered.

To address these issues, QDC 4.5 provides specific exemptions that apply to both accepted (self-assessable) and assessable development.

Under QDC 4.5, where the renovation involves a bathroom or toilet then the following provisions of livable housing design do not apply:

- a wider doorway if the existing doorway is not to be demolished
- level threshold into an existing bathroom
- circulation space if the existing room will not increase in size (floor area), and
- reinforcement of walls for future installation of grab rails if the wall frames are not to be exposed.

Further details on the application of these concessions are provided below in the section dealing with assessable building work, and specific examples are set out in the case studies.

Building certifier can assess self-assessable building work

In some cases, compliance with the Modern Homes standards for self-assessable building work may be either impossible or impractical. When this occurs a building application can be made to a building certifier who may be able to exercise their discretionary powers under the BA to vary the building work from the Modern Homes standards. Further information on this process is set out below.

Application of the Modern Homes standards to renovations that require a building approval

The BA allows building certifiers to assess the appropriateness of applying current building standards to existing buildings. It does so by providing certifiers with discretions based on whether:

- the general safety and structural standards of the building would be at risk if alterations were carried out using earlier building assessment provisions
- the alterations involve more than 50 per cent of the existing home's total volume.

As each renovation is different, the building certifier will need to determine which building assessment provisions apply and how the Modern Homes standards are to be applied to the proposed renovations and any affected part of the existing home.

A building certifier must also consider whether the building's general safety and structural standards would be affected. This may require consideration of matters such as structural adequacy, wind classification, flooding, bushfire and other natural hazards relevant to the building and its location.

Renovation is less than 50 per cent of the home's total volume

If the renovation involves less than 50 per cent of the existing home's total volume, the new building work associated with the renovation may not need to comply with the Modern Homes standards.

This is because, under section 61 of the *Building Act 1975*, a building certifier may approve alterations to existing building work on the basis of the earlier building assessment provisions used to assess the existing building work.

For the discretion to be exercised, the building certifier must be satisfied that carrying out the alterations under the earlier building assessment provisions would not put at risk the building's general safety and structural standards.

If the discretion is exercised, the building certifier will be required to adopt the earlier applicable building assessment provisions. For example, if the house was originally built to achieve a 5-star rating in February 2010⁵, the certifier will need to be satisfied that the home, as altered, continues to meet that earlier applicable standard.

Where compliance with the Modern Homes standards is not mandatory, homeowners may still choose to include practical measures to improve the energy performance and accessibility of their home. A renovation will often provide a cost-effective opportunity to incorporate these features with the new building work. For example:

- if the roof is replaced, this provides easy access into the roof space to install insulation
- if wall linings in a bathroom are removed, this provides an opportunity to install reinforcing for future grab rails.

Renovation greater than 50 per cent of the home's total volume

If a renovation, together with any previous structural alterations approved or completed within the previous 3 years, involves more than 50 per cent of the existing home's total volume, the Modern Homes standards apply to the new building work.

In these circumstances, section 81 of the *Building Act 1975* may also apply. Under section 81, a building development approval may include a condition requiring all, or a stated part, of the existing building or structure to comply with all, or a stated part, of the building assessment provisions as if it were a new building or structure.

Whether a condition is imposed under section 81 will depend on the nature and extent of the renovation and the certifier's assessment of the particular application. Each application must be assessed on its merits, and the certifier should document the reasons for the decision.

In considering whether to impose a condition under section 81, the building certifier may have regard to the extent of the renovation, the parts of the home affected by the work, and whether requiring additional work to the existing home would be appropriate in the circumstances.

For example, if the roof is being replaced as part of the renovation, it may be appropriate to require insulation to be installed throughout the roof and/or ceiling space. By contrast, it would generally not be appropriate to require insulation in external walls if the cladding is not being removed as part of the renovation.

⁵ Refer to Appendix C for historic changes to energy efficiency standards.

Under their [Code of Conduct](#), a licenced building certifier must perform building certifying functions in the public interest and must not take action that would compromise the health and safety of any person, or the amenity of any person's property.

General principle – where a building certifier is engaged

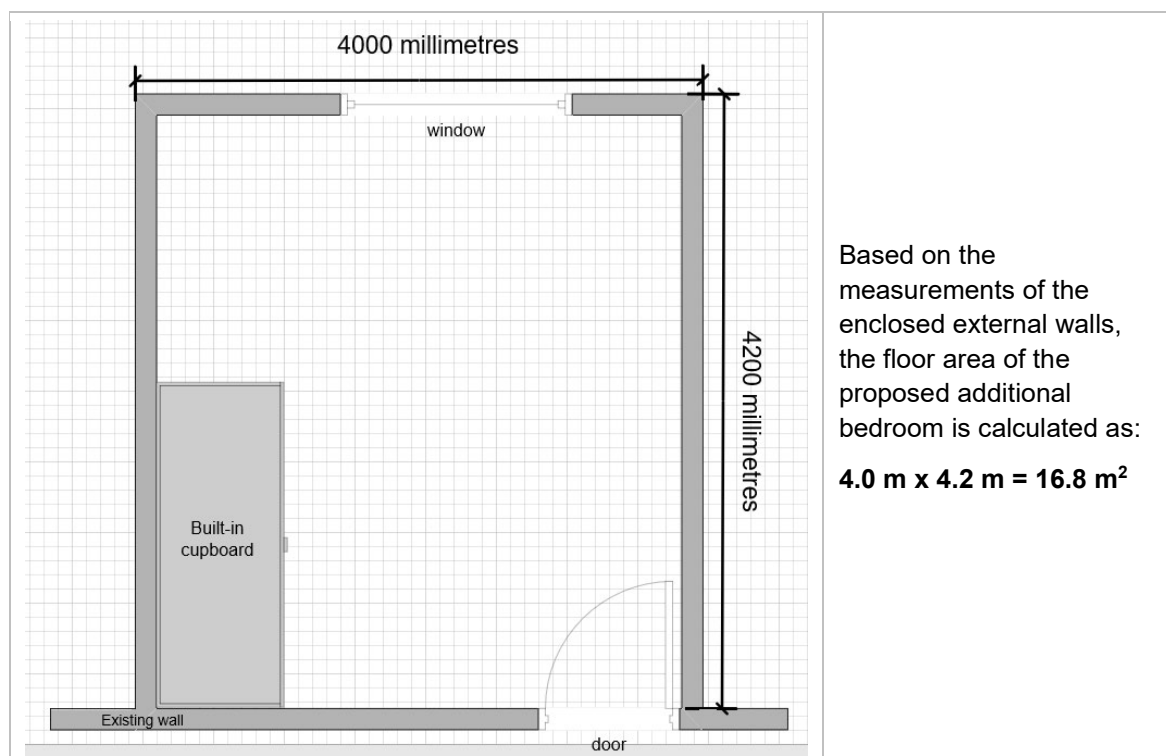
- Section 61 may allow alterations to existing building work to be assessed under earlier building assessment provisions, if the certifier is satisfied the building's general safety and structural standards would not be at risk.
- For alterations greater than 50% of the existing homes total volume Section 81 may allow a building development approval to include a condition requiring all, or a stated part, of the existing building or structure to comply with all, or a stated part, of the building assessment provisions as if it were a new building or structure.
- Sections 61 and 81 may both apply to the same building development application.

Measuring the renovation's floor area

This section provides guidance on how to measure the total volume of a home and any proposed renovation.

For the purposes of this guideline, where the home has the same floor to ceiling height throughout, the renovation's floor area may be measured proportionally to the home's total floor area. The home's 'floor area' (as defined under the BA) means the gross area of all floors in the building measured over the enclosing walls, other than the area of an outdoor living area (e.g. verandah or patio), garage or carport in or attached to the building.

Figure 1 shows how the floor area is measured for an additional bedroom.

Figure 1: Measuring the floor area of an addition

The critical threshold under the BA is whether the new building work (for alterations and additions) involves more than 50 per cent of the existing home's total volume. A building certifier must assess whether the renovation is "more than half the total volume of the existing building, measured over its roof and external walls" (BA, section 81).

If the dwelling does not have a consistent floor-to-ceiling height throughout, the building certifier will need to calculate the volume of the relevant parts of the building to determine whether the 50 per cent threshold has been reached. When applying the 50 per cent threshold, the building certifier must also consider any alterations or additions undertaken within the previous three years.

The case studies provide further guidance on the application of the 50 per cent rule to different renovation scenarios.

Relocated and removable homes

This section provides guidance on how the Modern Homes standards can be applied to relocated and removable homes.

Where an existing home is relocated either to another part of the same property or to a different property, with no change to its size or layout, the Modern Homes standards may not apply where the building work is limited to relocation only and does not include renovations. However, some requirements may still apply, such as step-free access to an entrance door, depending on the height of the home and construction type, although ramp-ready provisions or other concessions may be available in some circumstances. Homeowners are also encouraged, where practical, to incorporate cost-effective features that improve energy performance and livable housing design, such as ceiling and wall insulation, ceiling fans, and relevant bathroom upgrades. If alterations are proposed to a relocated home, the building certifier may exercise the discretions under sections 61 and 81 of the BA to determine whether earlier building assessment provisions are used. This may allow some or all of the building work to be assessed against the building provisions that applied when the home

was originally approved.⁶ The certifier will also determine whether any part of the existing home must comply with current requirements.

Where the alterations, together with any relevant structural alterations approved or completed within the previous three years, involve more than half of the existing home's total volume, the certifier may require all or part of the existing home to comply with the Modern Homes standards.

Refer to the Case studies 7 and 8 for worked examples of a relocated home.

Impacts on general safety and structural standards

Where an existing home is moved to a different location, the building certifier must also consider likely impacts on the general safety and structural standards of the building. This will require assessment of natural hazards such as flooding, bushfire, storm surge, cyclonic and other wind loads to determine if its existing structure is capable of performing safely in the proposed location.

For example, where a home is moved from a non-cyclonic region to a cyclonic region (coastal areas north of Bundaberg), compliance with the relevant wind loading standards will be required. In this situation a building certifier could impose a condition requiring the roof structure to be upgraded to current standards to withstand higher wind loads expected at its new location.

Residential energy efficiency for existing homes

This section provides guidance on when residential energy efficiency standards may apply to existing homes and how to comply.

Benefits of energy efficient housing

An energy efficient home may not look any different to other homes, but can provide better comfort for occupants and improved energy performance.

A renovation presents an opportune time to improve the home's energy performance and add to its market value. Inclusion of energy efficient or 'passive design' features will improve the home's comfort level and energy performance. Some energy efficiency features can be included at little or no extra cost with a renovation. Improving a home's energy efficiency can result in reduced operating costs for its energy bills and emissions.

Homeowners looking to improve the energy efficiency of their home are recommended to engage early in the design process with their building designer, architect or house energy assessor to identify cost-effective features.

Minimum star rating

The minimum star rating requirement for new houses and townhouses, including any enclosed attached garage, applies to the design and construction of the dwelling's building shell, including its roof, walls, windows and floors. A 7-star rating is generally required. However, alternative requirements apply in some circumstances, including for small homes (less than 50 m² floor area), houses with raised-floor construction (for example, Queenslander-style homes), and homes with unenclosed floors in climate zone 5. Optional credits may also be used towards achieving compliance.

The assessment takes into account the regional climate, house orientation and room layout,

⁶ Refer Appendix C for historic changes to energy efficiency standards.

construction materials, insulation, ventilation and shading, window design, ceiling fans and the colour of the roof and external walls.

The residential energy efficiency provisions can also require separate heating and cooling annual load limits to be met for some locations in Queensland⁷ when using the house energy rating software method. These load limits improve the year-round performance and occupant comfort of the dwelling by ensuring it is not too hot in summer, or too cold in winter.

Air-conditioners used for home cooling and heating are one the largest users of electricity, typically responsible for 40 per cent of total annual household energy use⁸. Therefore, it is beneficial to focus on designing an energy efficient building shell when undertaking a home renovation to reduce reliance on air-conditioners and minimise energy bills.

Optional credits

Under QDC 4.1, optional credits are available for use towards the minimum star rating. These apply where the design includes a compliant:

- outdoor living area (such as a covered verandah, deck or patio) = ½ star
- outdoor living area plus ceiling fan = 1 star.

The optional credits can be taken into account when assessing the rating of a renovation under either the software, or elemental pathways. For an optional credit to be considered, the outdoor living area must comply with the requirements of A1(8)-(10) of QDC 4.1.

Where the existing home already has a compliant outdoor living area with ceiling fan (1-star), this can count towards the star rating of the home. This applies under both:

- NatHERS software pathway as the minimum rating (Nsr) is reduced by up to 1 star for the building shell
- elemental (deemed-to-satisfy (DtS)) pathway as the new part of the house can comply with the 6-star requirement using the more prescriptive provisions in NCC 2019.

Refer to the Case study 6 for a worked example of a renovation with an outdoor living area.

Whole of home energy budget

The whole of home energy budget applies to its major fixtures and appliances including air-conditioners, hot water systems, artificial lighting and pool/spa pumps, as well as any on-site renewable energy system, such as solar photovoltaic (PV). For houses, a minimum score of 60 out of 100 is required to be achieved when the NatHERS software method is used for compliance.

Depending on the nature and extent of the renovation, a building certifier may require a whole of home assessment of its major fixtures and appliances and, in some cases, this could require some to be upgraded.

The better the energy efficiency of the appliances, the better the whole of home energy budget will be. There are many appliance combinations that can be used to achieve compliance with the whole of home energy budget.

In addition to air-conditioners, hot water systems can also be high energy users. Energy efficient hot water systems, such as heat pumps and solar, use much less energy than other types of systems. Inclusion of solar PV systems that produce energy can also improve the whole of home score.

⁷ See: [NatHERS Heating and Cooling Load Limits Standard](#).

⁸ Source: Australian Government, [Your Home](#), Energy/heating and cooling page accessed 1 July 2026.

The relationship between a home's energy star rating for the building shell and its whole of home score means that a higher star rating will also improve its whole of home score. This is because the heating and cooling energy needs will be lower in a home with a higher energy star rating.

Energy efficiency features

For Queensland, a renovation can improve the energy efficiency of an existing home by:

- designing rooms to account for solar access and prevailing breezes, and locating utility areas (e.g. garage and laundry) on the western side
- minimising the area of western and eastern facing walls and windows
- providing well-located and designed windows to capture breezes, with higher ventilation opening areas in warmer climates
- selecting high-performance glazing for west facing windows that are likely to have high heat gain during the summer. This could include as low-emittance ('low-e') glass, tinted windows or double-glazed windows.
- shading most of the glazing that is exposed to the sun in summer, for example a patio adjacent to balcony door, with roof eaves and installing window treatments (e.g. awnings, adjustable external blinds or shutters) to manage sun exposure
- selecting lighter coloured roof and external walls colours to reflect heat
- installing insulation in the roof or ceiling space and, where possible, to external walls
- in climate zones 1 and 3, ventilating the roof space by installing roof vents (static or active) and eave vents
- installing ceiling fans in living areas and bedrooms to promote air movement
- improving air-tightness by upgrading door and window seals to reduce heat losses and gains
- providing a well-designed outdoor living area e.g. a covered deck or verandah with good orientation and siting relative to the house's internal layout and neighbouring properties
- installing energy efficient fixtures and appliances e.g. air-conditioners, hot water systems, artificial lighting, pool pumps, and a solar photovoltaic (PV) system.

Not all the above features need to be included with the renovation to comply with the energy efficiency requirements. Also, it may not be possible to incorporate some features due to the design or structural constraints of the established home.

The energy efficient design features to be included with the renovation need to be carefully considered so they can be properly integrated with the existing home's overall design. Optimising the thermal performance of a home can be complex given likely interactions between the passive design features. No single energy efficient design feature will maximise a home's thermal performance, but collectively they influence its comfort level.

Finally, it is important to remember that some renovation designs can significantly reduce the energy performance of a house. For example, including a room with large windows facing due west in Queensland will likely capture unwanted summer heat that will make the house less comfortable and can result in higher energy costs.

Identifying cost-effective features at the beginning of a renovation project is important. This will enable the renovation to improve the home's comfort and energy efficiency and be completed within its expected budget.

Residential energy efficiency assessment methods

The two most common assessment methods used to demonstrate compliance are:

- i. **Software method** – using a software tool accredited under the Nationwide House Energy Rating Scheme (NatHERS) to assess the dwelling's building shell (out of 10 stars). [Under NatHERS](#) four software tools are accredited – AccuRate Home, BERS Pro, FirstRate5 and Hero; or
- ii. **Elemental (deemed-to-satisfy (DtS)) provisions** – using the more prescriptive design requirements of the NCC to determine specific building aspects to be included. For houses, the elemental (DtS) provisions are contained in NCC 2022 Volume Two, Part H6, H6D2(1)(b), and in the associated ABCB Housing Provisions Standard (Parts 13.2, 13.3, 13.4 and 13.5).

Both assessment methods take into account the climatic differences across Queensland. A compliant design will ensure the renovation is suitable to its particular climate zone.

Refer to Appendix A, Table A1 for assessment method options, their compliance pathways and evaluation criteria under QDC 4.1.

Software method

A house energy assessor uses software to model the proposed design of the building shell to predict its energy performance (star rating) for thermal comfort. Software is generally considered to be a more flexible compliance option than the elemental (DtS) assessment method as trade-offs can be made between different design features. For example, designs with a lighter coloured roof (that deflects heat) in hotter areas may be able to have a lower level (R-value) of insulation in the roof space to achieve compliance.

When using the software method for a home renovation, two software assessments will be needed to get star ratings for:

1. **existing home design only, and**
2. **existing home design with the proposed renovation.**

The software assessments must be undertaken in accordance with the modelling techniques under the current [NatHERS Technical Note](#). Upon completion of each assessment, a NatHERS Certificate or report is produced (see Appendix B). For more details about the software method, see Guideline for Queensland Development Code MP 4.1–Sustainable buildings.

Typically, a home renovation alone will not achieve the required star rating when it is assessed in combination with the existing house's building shell. As most existing houses were designed and constructed before the residential energy efficiency standard was first introduced in September 2003 in Queensland, most existing homes will not meet current requirements (see Appendix C).

Proportional star rating for a home renovation

For the software method, the new building work associated with the renovation needs to be considered relative to the existing home's energy rating. This can be done by using a proportion formula to calculate a 'required star rating' for the entire dwelling inclusive of the proposed renovation.

Formulas to calculate the required star rating

The formulas in the box below provide the calculation method for the required star rating (Rsr) of the renovation and the existing home when software is used to demonstrate compliance with QDC 4.1.

The formulas provide the required star rating as a proportion of the minimum star rating. Note a lower star rating applies to small homes (5-star rating); and for houses with raised floor construction (6-star rating). This needs to be accounted for the relevant rating when using the formula for the renovation. One of the following formulas needs to be used for the different renovation scenarios:

1. Addition only (a new external area to the existing home)
2. Both an addition and an alteration (structural changes to the internal area of the existing home).

The workings used to calculate the renovation's required star rating (Rsr) must also be submitted with the two software assessments.

Formulas for calculating the required star rating (Rsr)

1. For an addition only:

$$\frac{(E_v \times E_{sr}) + (N_v \times N_{sr})}{(E_v + N_v)} = R_{sr}$$

where for the measurements:

E_v = volume of existing home

N_v = internal volume of new building work with the addition

and for the star ratings:

E_{sr} = existing home's star rating

N_{sr} = minimum required star rating

R_{sr} = required star rating for the entire house with new building work for the addition

Worked example for an addition only

Volume of existing home is: $E_v = 528 \text{ m}^3$

Existing home's star rating is: $E_{sr} = 3.0$ stars

Volume of new building work for the addition is: $N_v = 120 \text{ m}^3$

Current star rating required: N_{sr} = Generally 7 stars unless raised floor construction or small home (noting 1 star towards this standard is available with inclusion of a compliant outdoor living area under QDC 4.1)

Calculated star rating required with the addition (Rsr) is:

$$\frac{(528 \times 3.0) + (120 \times 7)}{(528 + 120)} = 3.74$$

Therefore, the required star rating (**Rsr**) is **3.7-stars** (as 3.74 is rounded to the nearest single decimal for the software assessment).

Note: if only the floor area (m^2) is given on house plans, then to obtain the volume (m^3) of the home multiply the floor area by 2.4, where 2.4 metres (or 2400 millimetres) is the floor to ceiling height throughout the home. Alternatively, for homes with a 2.7 metres (2700 millimetres) floor to ceiling height, the multiple is 2.7 (where the ceiling height is the same throughout the home).

2. For an addition and an alteration to the internal area of existing home:

Where the renovation involves an alteration to the internal area of the existing home plus an

additional room, the internal alteration's volume also needs to be included in the formula:

$$\frac{[(Ev - Nlv) \times Esr] + [(Nv + Nlv) \times Nsr]}{(Ev + Nv)} = Rsr$$

Where:

Nlv = volume of new building work for the alteration of the internal area

Rsr = required star rating for the entire house with new building work for both the addition and the alteration

Worked example for an addition and an alteration

Using the dimensions from the worked example above for the addition only, an alteration to the internal area of the existing home is also proposed, which has new building work (Nlv) = 115.2 m³.

The required star rating (Rsr) for all the new building work (addition and alteration) is calculated as:

$$\frac{[(528 - 115.2) \times 3.0] + [(120 + 115.2) \times 7]}{(528 + 120)} = 4.45$$

↓

$$\frac{1238.4 + 1646.4}{648} = 4.45$$

Therefore, the required star rating (**Rsr**) is **4.5-stars** (as 4.45 is rounded to the nearest single decimal for the software assessment).

Elemental (deemed-to-satisfy (DtS)) method

The elemental (DtS) method can be used to assess a home renovation against the more prescriptive provisions of the NCC. It may be preferred for a particular aspect of a renovation e.g. relevant level of roof insulation (R-value) to be installed when only the roof is to be replaced. Particular specifications are also provided for other aspects, such as shading, roof colour (solar absorptance), ventilation and glazing, as relevant to the type of home and its NCC climate zone. Under the NCC, there are four (4) climate zones in Queensland⁹.

The elemental (DtS) method allows for either:

- 7-star building shell only, by using NCC 2022 provisions
- 6-star building shell, by using NCC 2019 provisions, plus using the optional credit (1-star) for a compliant outdoor living area with a ceiling fan, or
- for homes in NCC climate zone 5 (Toowoomba-Darling Downs region) with floors over an unenclosed space, the alternative building shell requirements under QDC 4.1, including reflective floor insulation with a minimum R-value of 2.5 installed facing downwards.

Software versus Elemental (DtS) method for renovations

Using software may provide more flexibility for renovations as it takes into account changes made to the original house that cannot be accounted for under the elemental (DtS) method.

For example, an original home that has large windows facing due west will experience significant heat gain during summer. Applying a treatment to these windows (e.g. installing

⁹ see map in Appendix D.

an awning to provide shade or using a tinted film on the existing glass), or replacing them with low-e glass on that sun exposed aspect, is likely to result in a significant improvement to the overall energy efficiency of the renovated home.

Another cost-effective option is to install insulation in the existing roof space where it is easily accessible e.g. when replacing the roof or installing via a ceiling portal.

Using software to model the home's star rating before and after the renovation allows improvements to its existing fabric to be taken into account. Using software will allow the most cost-effective pathway for compliance to be identified. This is because the elemental (DtS) method only considers new construction and does not holistically take into account the design and materials used for the existing home.

Application of the whole of home energy budget to home renovations

For home renovations, application of the whole of home requirements will depend on the nature and extent of the changes proposed to the home's appliances.

Where the renovation is retaining the majority of the existing appliances, including artificial lighting, hot water system, air-conditioning and pool pumps, it would be impractical to require a whole of home assessment.

However, for more extensive renovations, a whole-of-home assessment may assist in identifying a practical and cost-effective pathway for demonstrating compliance with the Modern Homes standards, particularly where major energy systems, such as air-conditioning or hot-water systems, are being replaced. Whether all or part of the existing home must comply with current building assessment provisions is a separate matter to be determined by the building certifier under section 81 of the BA.

Refer to the case studies to show how whole of home may be considered with the renovations.

Livable housing design

This section provides guidance on how a renovation may need to comply with the liveable housing standards.

New houses (class 1 buildings), including any enclosed, attached garage (class 10b), and sole-occupancy units in apartment buildings (class 2) must comply with Livable Housing Design Standard under the NCC, Volume Two and, where relevant, QDC 4.5.

Benefits of livable housing design

The Livable Housing Design Standard ensures that new homes are designed to meet the changing needs of the occupants through the various stages of life, such as young families with prams and strollers, older people and people with a mobility-related disability. The Standard supports residents to age-in-place and promote more inclusive communities.

A renovation can present an opportune time to improve accessibility of the home and add to its value.

Livable housing design features

Inclusion of livable housing design features in a renovation can improve the accessibility of a home, as well as ease of movement inside the dwelling for occupants and visitors.

The accessibility of a home can be improved by including:

- a safe path of travel from the street or parking area to an entrance that is level, continuous and step-free
- at least one step-free entrance into the dwelling
- internal doors and corridors that are wide enough to allow ease of movement between spaces including for anyone using a mobility device or wheelchair
- a toilet on the ground (or entry) level that allows easy access and use
- a bathroom that contains a hobless and step-free shower
- reinforced walls in the accessible toilet and bathroom to allow the safe installation of grabrails at a later date, if required.

Application of the Livable Housing Design Standard to renovations will depend on where the new building work is to be undertaken as specific provisions apply to particular rooms and areas in the dwelling.

It may not be practical or possible to include some livable housing design features into an existing home due to the design constraints of its structure.

It is important to recognise that some alterations could affect a home's continued compliance with the Livable Housing Design Standard. For example, if a garage provides the home's required step-free path to an entrance, converting the garage to a bedroom could remove that path. The renovation design would therefore need to retain the existing step-free path or provide an alternative compliant path to ensure accessibility into the home is not reduced.

Queensland Development Code 4.5 (QDC 4.5)

To support implementation of the Livable Housing Design Standard, Queensland introduced QDC 4.5 to provide:

- clarification on how the Livable Housing Design Standard applies to:
 - repairs and maintenance
 - bathroom and toilet renovations
- flexibility around the location of an accessible toilet when there is no habitable room/s on the entry level
- alternative, cost-effective compliance pathways for hobless and step-free showers
- a "ramp-ready" option for elevated homes, allowing a compliant ramp to be installed when it is needed in the future
- greater flexibility in accessible bathroom design
- new practical solutions to support compliance with step-free entry, weatherproofing and termite-management requirements.

Repairs and maintenance

QDC 4.5 adopts a like-for-like approach to repairs and maintenance. If the part of the building being maintained or repaired complied with the Livable Housing Design Standard before the work, then it must comply after the work is completed.

In all other cases there is no requirement for maintenance or repair work to comply with the Livable Housing Design Standard.

Bathroom and toilet renovations

Many bathroom and toilet renovations are limited to improving the aesthetics of the room. This is often limited to just replacing fixtures and fittings, replacing tiles and re-painting walls, and does not include structural work. As a result, there will often be insufficient room to meet minimum door width and circulation requirements required under the Livable Housing Design Standard. As this type of building work generally is accepted development (self-assessable), and does not involve a building application, it would ordinarily be required to comply with the current building assessment provisions, including the Modern Homes standards.

QDC 4.5 recognises that it may not be practical to apply the Livable Housing Design Standard to all aspects of bathroom and toilet renovations. It deals with this by providing specific concessions depending on the extent of work to be undertaken for the renovation. The concessions provided by QDC 4.5 apply to both assessable and accepted development (self-assessable) building work.

Doorways

Under QDC 4.5, unless the renovation involves demolition of the existing doorway then there is no requirement to comply with the Livable Housing Design Standard requirements for clear opening width of the doorway.

Bathroom and toilet renovations

Under QDC 4.5, unless the renovation increases the size of the toilet (sanitary compartment) then there is no requirement to comply with the Livable Housing Design Standard requirements to provide a minimum circulation space between the toilet rim and the entry door.

Reinforcement of bathroom and sanitary compartment walls

Under QDC 4.5, the Livable Housing Design Standard requirements to reinforce walls to support grab rails only apply where the wall linings are to be removed and clear access to the wall frame is provided. If only part of the wall frame is exposed, then reinforcement only has to be provided to that part of the wall.

Bathroom Threshold

Under QDC 4.5, there is no requirement to provide a step-free level entry threshold at the doorway of a renovated bathroom. This concession reflects that providing a step-free access will generally require cutting into floor joists or a concrete slab to allow tiles, bedding and floor panels to be installed at the necessary levels. Cutting into floor joists, or concrete slabs has potential to impact on the structural stability of the home, and for this reason it is considered to be impractical in these cases.

QDC 4.5 refers to “renovations to a [...] or bathroom”. This leaves open the question of how to deal with a renovation that results in all or part of an existing room being converted into a bathroom. The same concerns about structural stability apply to cutting into floor joists or concrete slabs, regardless of whether the room was originally a bathroom or another type of room. For this reason, a building certifier should not require a level entry to be provided at the threshold of a doorway to a bathroom in the existing part of a home.

Location of an accessible toilet

The Livable Housing Design Standard requires that an accessible toilet must be provided on the lowest floor of a home, regardless of whether there is a habitable room on this floor. To address concerns around the practicality of this requirement, QDC 4.5 allows for the accessible toilet to be on either the ground or entry level or the lowest level of the home that has a habitable room.

Under QDC 4.5 a habitable room is a room used for normal domestic activities, and—

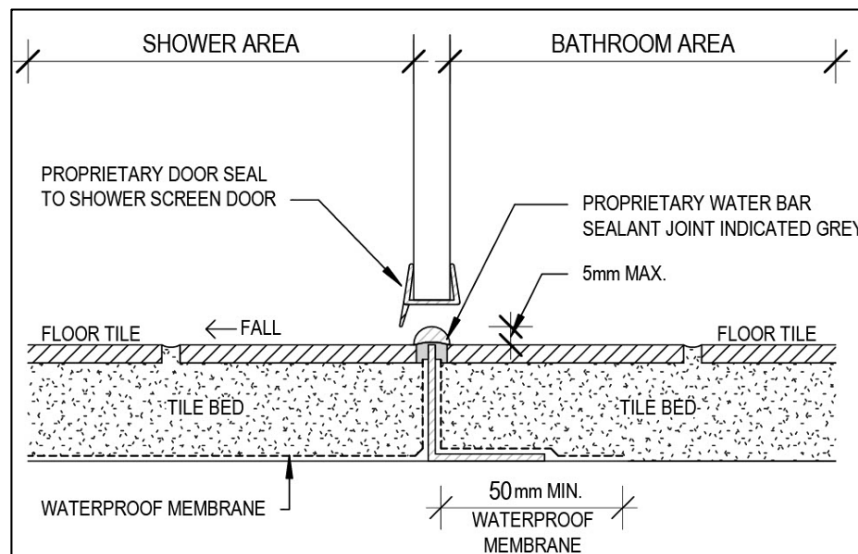
- a) includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room, home theatre and sunroom; but
- b) excludes a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes-drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods.

Alternative, cost-effective compliance pathways for step-free showers

To provide greater flexibility around compliance with the requirement for a step-free shower, QDC 4.5 provides three additional compliance pathways that are deemed to meet the requirements of an enclosed shower for the purposes of AS 3740:2021– Waterproofing of domestic wet areas (AS 3740:2021), clause 2.2.1 and in the ABCB Housing Provisions 10.2.17 in the BCA.

The pathways can require use of:

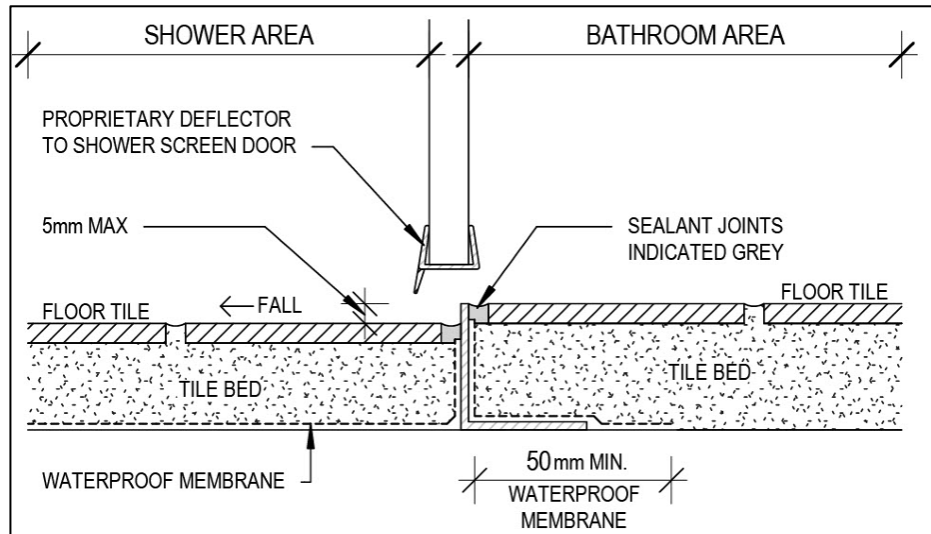
1. **water bar, with a maximum height of 5 millimetres installed above and sealed to the water-stop at the shower entry and a shower screen door with a deflector.**



So long as the water bar that is installed has a max height of 5 millimetres, the installation will be deemed to comply with the step-free entry requirements. This will be the case regardless of the actual height of the water bar above the tiles.

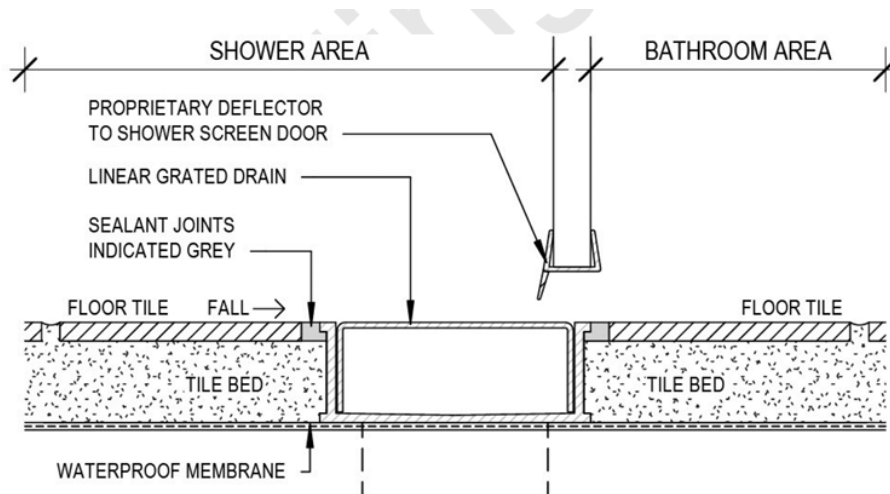
For example, due to variations in the tile surface there could be a 2 millimetre gap between the bottom of the water barrier and the top of some of the tiles. This could result in a 7 millimetre lip at this point. However, because the QDC 4.5 acceptable solution specifies the use of a 5 millimetre bar, this will meet the requirements and can be deemed to be compliant.

2. a step-down into the shower area must have a lip with a maximum height of 5 millimetres at the shower entry



This option involves potential issues with compliance. This is because the 5 millimetre lip may be difficult to achieve due to either normal tolerances in manufactured tiles or achieving the required precision for their installation. Where either of these issues are present, reliance on a water bar or a linear drain may be a more effective solution.

3. a linear drain at the entry of the shower



So long as a linear drain is installed, the installation will be deemed to comply with the step-free entry requirements. This will be the case regardless of whether the linear drain is exactly flush with the top of all of tiles along the drain.

For example, in extreme cases due to variations in the tile surface there could be a 6 millimetre gap between the top of the linear drain and the top of some of the tiles. This could result in a 6 millimetre lip at this point. But because the QDC acceptable solution specifies the use of linear drain, this will meet the requirements and can be deemed to be compliant.

Floor wastes and the requirements to grade floors

This section provides guidance on how a renovation can comply with the requirement for floors to be graded to floor wastes.

Definitions of terms

- **Floor waste gully** – is a drainage gully installed inside a building for use with a floor waste grating or waste outlet fitting on a riser pipe and with provision for connection of waste pipes for fixtures. A floor waste gully is a type of waste outlet.
- **Floor waste** – is a grated inlet within a graded floor intended to drain water from the floor.
- **Wet area** as defined in the National Dictionary of Building and Plumbing Terms – is an area within a building supplied with water from a water supply system, which includes bathrooms, showers, laundries and sanitary compartments, and excludes kitchens, bar areas, kitchenettes or domestic food and beverage preparation areas.
- **Riser** – is a vertical extension of the inlet leg of a trap to floor or ground level. A straight length of pipe fitted to a trap to extend it. It may allow connections of pipes.

Under the NCC, with the exception of a floor waste in a shower recess, there is no requirement to install a floor waste within a wet area of a house (class 1 building). However, a floor waste will commonly be installed within a wet area as a voluntary measure.

Under the NCC it is a requirement for floors to be graded to floor wastes when a waste is installed. The requirement applies:

- where a floor waste is installed because of a mandatory requirement (e.g. showers, rooms with a urinal and bathrooms above the ground floor in a sole-occupancy unit of an apartment building (class 2))
- in other wet areas that the NCC does not have a mandatory requirement for a waste NCC e.g. laundries and bathrooms of a house (class 1 building).

Design features

The floor waste will be connected to a floor waste gully via a riser. The floor waste gully provides a means to disconnect the floor waste from the sanitary plumbing or drainage system so as to avoid sewer gases and odours from infiltrating a building. The floor waste riser can also be utilised to receive the discharge from another waste fixtures within the same room such as a basin, bath or shower.

Benefits of graded floor waste

The benefit of the grading to floor waste provisions in the NCC is to safeguard occupants from illness or injury, and protect buildings from damage caused by—

- internal water from wet areas; and
- the accumulation of internal moisture in the building; and

- protect other property from damage caused by water flowing out of wet areas.

Application of graded floor waste to a home renovation

Accepted (self-assessable) development

For accepted development (self-assessable) renovation work, the requirement to grade a floor to an existing waste in a renovation will depend on the scope of work undertaken in a bathroom or laundry.

Where the scope of work only involves on the floor finish (e.g. replacing tiles), this can be completed without affecting the underlying flooring and substrate. As the scope of work does not involve the underlying flooring and substrate that sets the grade of the floor there is no requirement to grade the floor to the waste.

If the underlying flooring and substrate is replaced, then the floor must be graded to the waste, or by one of the additional compliance options provided by QDC 4.5.

Assessable development

When a building certifier is engaged, they can exercise a discretion to allow the work to comply with earlier building assessment provisions. This could include allowing a bathroom floor not being graded to a waste. In exercising this discretion the certifier would take into account whether it would be reasonable to require the floor to be graded. They should also consider whether it would be reasonable to require one of the additional compliance options provided by QDC 4.5 to be adopted.

Required fall to a floor waste

The NCC requires that where a floor waste is installed:

- the minimum continuous fall of a floor plane to the waste must be 1:80
- the maximum continuous fall of a floor plane to the waste must be 1:50.

These requirements apply regardless of whether the floor waste installation is mandatory (e.g. showers) or voluntary (e.g. laundries and bathrooms).

QDC 4.5 provides a concession by allowing grades to comply with the requirements in AS 3740:2021 that provides the fall of a floor plane to the waste must have a:

- minimum continuous fall of 1:100, and
- maximum continuous fall of 1:80.

Alternative compliance options provided by QDC 4.5

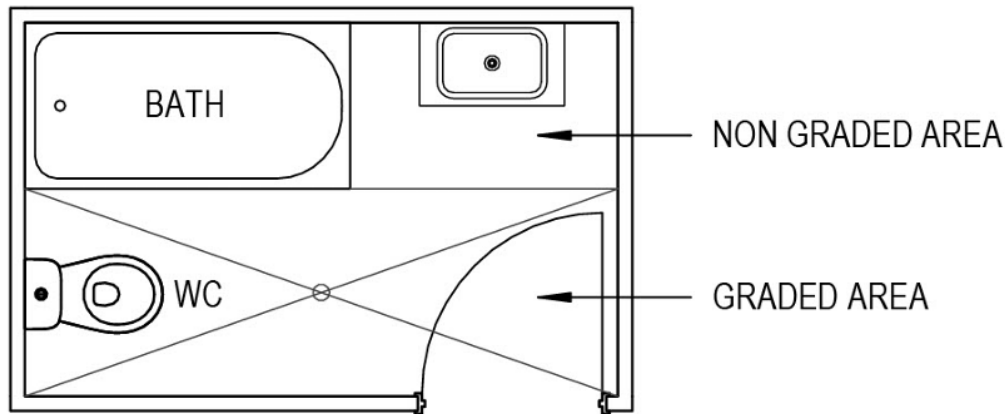
The reason that NCC requires floors to be graded to floor wastes is to ensure that homes are not damaged by water flowing out of wet areas that are protected by a floor waste.

QDC 4.5 maintains the underlying intent of the NCC by identifying alternative compliance pathways which provide greater flexibility to industry while still preventing potential damage to homes. This includes options that do not require the floor to be graded.

The alternative compliance pathways in QDC 4.5 require the use of:

- a weir located at the threshold to the room that is at least 10 millimetres above the height of the floor waste to prevent water flowing out of the room; or
- a linear drain located at the threshold to the room that prevents water flowing out of the

- room; or
- c) a combination of internal overflows for vessels (such as a basin or bath) and cisterns, and flood stop safety valves approved under WMTS-479 fitted to flexible hose assemblies. Together, they will prevent water flowing out of the room; or
 - d) providing a graded area within the room that will prevent water from flowing out of the room, even if the rest of the balance of the floor is not graded.



These additional compliance options provided for graded floor wastes are related to the concession to not require step-free access into a bathroom renovation. Waiving the requirement to provide step-free access makes it easier to achieve the falls necessary to grade the floor to a waste. Building certifiers should take this into account when considering whether it is practical to require floors to be graded to a waste in a bathroom renovation.

Case studies for applying Modern Homes standards to renovations

The following case studies provide different types of home renovations. They are examples of the types of development and the compliance pathways used for energy efficiency. Relevant aspects for livable housing design are also contained within each of the case studies.

They start with smaller projects through to larger and more complex renovations.

Case study	Type of development and compliance pathway used*
1. Renovation of internal rooms for open-plan living	Self-assessable development, not applicable
2. Renovation of existing bathroom and kitchen	Self-assessable development, not applicable
3. Addition of a single bedroom	Assessable development, elemental (DtS) provisions
4. Consideration of a recent renovation	Assessable development, elemental (DtS) provisions
5. Internal alteration and an additional room	Assessable development, software method

6. Converting a low-set home to two-storeys with an outdoor living area	Assessable development, software method
7. Relocation of an existing home, no additions	Assessable development, elemental (DtS) provisions
8. Relocation of an existing home, adding rooms	Assessable development, software method

* the compliance pathway used relates only to the energy efficiency aspect of the Modern Homes standards. For ease of reference, the existing home is assumed to have the same floor to ceiling height throughout and therefore the floor area can be used instead of the total volume.

Case study 1 – Renovation of internal rooms for open-plan living

Owners of an existing 1970s-style home are looking to create an open-plan living area between their kitchen and living room that is separated by a 2.9-metre-long wall. While there will be no changes to the home's total floor area and ceiling height with the alteration, the building work will involve removal of the separating wall (non-load bearing). The owners are considering whether the Modern Homes standards will apply to their renovation.

The builder confirmed that removing the 2.9 metre separating wall will not have a significant effect on the structural integrity of the home's building frame as it was a non-load bearing wall only (and not used for bracing or tie-down), and that no extra floor area will be added to the home.

Given it has a truss roof, the builder identified that an appropriate support beam or binder can be installed to stabilise the ceiling between these two rooms to compensate for the removal of the non-load bearing wall.

As the renovation is accepted development (self-assessable):

- a building development application is not required, and a building certifier does not have to be engaged, and
- the work must comply with the current building assessment provisions including, where applicable, the Modern Homes standards.

Energy efficiency

The renovation does not involve any changes to:

- building shell of the house (roof, windows, walls and floors), or
- major appliances (including air-conditioners, hot water system, artificial lighting).

As a result, there is no need to consider the energy efficiency provisions.

Livable Housing Design Standard

The scope of the renovation does not affect any of the elements of the home covered by the Livable Housing Design Standard, including:

- step-free path from street to an entrance
- step-free entrance into dwelling
- internal doors and corridors
- accessible toilet and bathroom, including step-free shower
- reinforcing for grab rails in a toilet and bathroom.

The builder also confirmed that the floor between the two rooms is level, the step-free access will be maintained and that there will be no alterations to any existing doors.

As a result, there are no applicable requirements under the Livable Housing Design Standard.

General advice

Other building code requirements may apply such as maintaining the minimum ceiling height for the open-plan area, as well as the installation and position of smoke detectors.

Case study 2 – Renovation of existing bathroom and kitchen

The owners of a 1930s home want to renovate the existing bathroom and kitchen.

The proposed work for the kitchen involves:

- *removing all cabinets and patching any holes on the wall lining*
- *removing existing linoleum flooring and replacing with ceramic tiles*
- *plumbing and electrical work.*

The proposed work for the bathroom involves:

- *removing the existing bathtub and vanity, and replacing it with a new shower and vanity*
- *removing existing wall linings to expose the wall studs and re-sheeting the walls, installing a waterproofing membrane and fixing ceramic wall tiles*
- *removing existing vinyl floor tiles and substrate and installing a new substrate, waterproofing membrane and laying ceramic floor tiles*
- *plumbing and electrical work.*

It is not proposed to make any changes to any existing doors.

In addition, they are considering replacing the existing hot water system.

The owners are considering whether the Modern Homes standards will apply to their renovation.

The builder confirmed that the proposed renovations to the kitchen and bathroom will not have any effect on the structural integrity of the home's building frame as existing wall frames will not be affected and that no extra floor area will be added to the home.

As the renovation is accepted development (self-assessable):

- a building application is not required, and a building certifier does not have to be engaged, and
- the work must comply with the current building assessment provisions including, where applicable, the Modern Homes standards.

Energy efficiency

The renovation does not involve any changes to the building shell of the house (roof, windows, walls and floors).

While it is intended to replace the existing hot water system, this will not trigger a whole of home assessment as it is only one fixture. It would not be reasonable to require upgrades to the remaining fixtures and appliances.

As a result, there is no need to consider the energy efficiency provisions for this renovation.

Livable Housing Design Standard – Kitchen

There are no requirements in the Livable Housing Design Standard that apply specifically to kitchens. As a result, no changes need to be considered for the kitchen design.

If the owners want to voluntarily incorporate accessibility features into their kitchen design they could consider adopting features identified in the Gold or Platinum levels set out in the [Livable Housing Design Guidelines](#) (as published by the former Livable Housing Australia). Homeowners may also refer to the [ABCB Voluntary Standard for Livable Housing Design: Beyond Minimum](#), which is based on many of the accessibility features included in the Gold level of the Livable Housing Design Guidelines.

Livable Housing Design Standard – Bathroom

The renovation of the bathroom will affect the following elements that are covered by the Livable Housing Design Standard:

- accessible bathroom – step-free threshold and minimum door widths
- accessible shower – step-free (hobless)
- reinforcing – grab rails in a bathroom.

Under QDC 4.5, application of the Livable Housing Design Standard has been amended specifically to deal with renovations.

Applying QDC 4.5 to this renovation means that:

- a step-free threshold into the bathroom **will not be required**. This ensures that the structural stability of the home is not affected by cutting into floor joists or the slab.
- a step-free threshold into the shower **will be required** as QDC 4.5 does not affect the requirement of the Livable Housing Design Standard to provide at least one shower with a hobless and step-free entry. This will apply unless the home already has a compliant accessible shower.
- reinforcing walls for grab rails **will be required** as the wall frames will be exposed for the installation of the new wall lining and tiles.

Grading to floor waste – Bathroom

The renovation involves removing existing vinyl floor tiles and substrate and installing a new substrate, waterproofing membrane and laying ceramic floor tiles. Because the work is self-assessable, and the scope involves the parts of the floor that can be graded (e.g. the substrate), it must comply with the grading to floor waste requirements.

Under QDC 4.5, application of the NCC grading to floor waste requirements have been amended.

Applying QDC 4.5 to this renovation means that either:

- grade the floor to the waste, or
- apply one of the alternative compliance pathways provided by QDC 4.5.

General advice

As the existing hot water system is still working, a replacement is not urgent. The owners have sufficient time to research energy efficient options such as a heat pump or solar hot water system and if they have an appropriate location for installation.

Case study 3 – Addition of a single bedroom

A couple recently purchased a single-storey house that has a total floor area of 136 m² and which is located in south-east Queensland (NCC climate zone 2). It was approved and constructed in 2004 and complied with the 3.5-star residential energy efficiency standard that applied at that time, and there were no livable housing standards applicable.

They want to add a new bedroom for the upcoming arrival of their baby. The total floor area of the proposed bedroom is 16.8 m². They are checking with their building designer how the Modern Homes standards will apply to their additional bedroom.

The building designer advised that the new building work is 'assessable' development. This is because the addition of a new bedroom involves structural work that falls outside of accepted (self-assessable) development.

As the renovation is assessable development:

- a building development application is required
- a building certifier must be engaged, and

- the building certifier had to consider whether the Modern Homes standards could be applied to the renovation.

The building designer confirmed that the renovation will involve additional floor area of 16.8 m² which is less than 68 m² (i.e. 50 per cent of 136 m²).

As the floor area of the new building work is less than 50 per cent of the home's total volume the building certifier should decide that:

- the Modern Homes standards do not apply to the new building work for the new bedroom
- the work will however have to comply with the building assessment provisions that applied when the home was originally constructed.

Energy efficiency

The addition involves changes to the building shell of the house.

As the original house was constructed to meet the 3.5-star standard, the building certifier should require the new bedroom be built to this standard.

This can be achieved by either using the elemental (DtS) provisions that applied at the time or the NatHERS compliance pathway.

While the additional bedroom does not trigger compliance with the Modern Homes standards, the building designer suggested measures that could be practically included to improve the energy performance of their home and assist with achieving or exceeding the required 3.5-star standard. The measures are based on the current NCC elemental (DtS) provisions, and include:

- locating the new bedroom to the eastern side of the house to minimise its exposure to the hot afternoon summer sun on the western side
- insulation to the roof space via reflective foil (sarking) under the new roof and bulk (batts) in the entire ceiling
- combined insulation product (reflective and bulk) to the new external walls
- external windows placed on the eastern and northern sides of the room to allow crossflow ventilation in summer. Also, for the sun exposed windows, the appropriate size and type of glazing
- roof eaves of 600 millimetres for shading the new external walls
- ceiling fan to promote air movement
- lighter colour for the roof and to the new external walls.

Note: not all of the above measures would be required for the renovation, just those deemed applicable by the building certifier.

Livable Housing Design Standard

The scope of the renovation does not affect any of the elements of the home covered by the Livable Housing Design Standard.

While not mandatory, the building designer suggested the following voluntary liveable housing design standard features:

- maintaining step-free access to the new bedroom
- providing a clear internal door opening width of at least 820 millimetres to the bedroom
- ensuring the bedroom doorway threshold is not more than 5 millimetres.

General advice

When planning the addition of a new bedroom, it is essential to ensure compliance with applicable building code requirements beyond energy efficiency and livability standards. This includes verifying the room meets minimum ceiling height requirements, ensuring proper installation and positioning of smoke alarms, confirming the structural adequacy of the addition and the existing home. Actively

addressing these considerations can assist with integrating energy efficiency and liveability improvements where feasible.

Case study 4 – Consideration of a recent renovation

A couple own a house that originally had 190 m² total floor area. Two years ago, they added a new room that had a floor area of 28 m². They are now looking to undertake further renovations by adding a new bedroom and reconfiguring their internal living room to be adjacent to a new kitchen area. The total floor area of all the new building work is 68 m².

The owners want to know how their building certifier will consider both the previous and proposed renovations, and if this will result in Modern Homes standards also being required to their existing home?

The building designer advised that renovation involves 'assessable' development. This is because the addition of a new bedroom involves structural work that falls outside of accepted (self-assessable) development.

As the renovation is assessable development:

- a building development application is required
- a building certifier must be engaged, and
- the building certifier had to consider whether the Modern Homes standards could be applied to the renovation.

As the total new building work within the past 3 years (96 m²) is greater than 50 per cent of the home's floor area (190 m²), the building certifier:

- is required to apply the Modern Homes standards to the new bedroom, and
- has a discretion to apply the Modern Homes standards to all or part of the existing home.

Energy efficiency

The renovation involves change to the building shell of the house.

Following discussions with the building designer and house energy assessor on ways to improve the energy performance to comply with the energy efficiency standard, it was decided to proceed with the elemental (DtS) provisions to the bedroom, as the existing house did not have an energy rating.

The required measures for the additional bedroom are based on the elemental (DtS) provisions and could include:

- locating the new bedroom to the eastern side of the house to minimise its exposure to the hot afternoon summer sun on the western side
- installing eastern and northern facing windows for the new bedroom to allow crossflow ventilation in summer
- using treated glazing (such as low-e glass) for external windows that would be subject to high heating loads in summer
- roof eaves of 600 millimetres for shading the new external walls
- installing combined insulation product (reflective and bulk) to the new external walls and where any panels are to be replaced in the existing external walls
- installing a ceiling fan in the new bedroom, promoting air movement
- providing a shading hood over windows to minimise heat entering the room in summer.

Note: not all of the above measures would be required for the renovation, just those deemed applicable by the building certifier.

Whole of home

The proposed renovation will not involve any changes to the hot water system, air-conditioning unit or lighting (other than new lighting to the bedroom and alteration to the existing lighting in the living room). As a result, it would not be reasonable to require upgrades of the remaining fixtures and appliances and there will be no requirement to undertake a whole of home assessment.

Livable Housing Design Standard

As the renovation involves greater than 50 per cent of the home, the building certifier may require upgrades to parts of the existing home as part of the approval process, including changes for the new bathroom. However the scope of the renovation does not affect any of the elements of the home covered by the Livable Housing Design Standard.

As there are no livable housing provisions for kitchens, the space should be designed to support ease of movement between fixed benches and to support easy adaption. Also, as the bathroom, shower and sanitary facilities are not being changed there are no livable housing design provisions required for the work.

Additionally, while step-free access between rooms will be maintained, the homeowners need to be mindful of the requirements within QDC 4.5 and the Livable Housing Design Standard and if they are able to integrate these features into their build for futureproofing.

General advice

Other building code requirements may apply such as ensuring structural adequacy, maintaining the minimum ceiling height for the bedroom, and the installation and positioning of smoke detectors.

Case study 5 – Internal alteration and an additional room

A family wants to reconfigure their internal living area and bathroom that has a combined floor area of 52 m² (alteration (Nlv)). This will involve the bathroom being moved to a different part of the existing home, as well as new wall framing for internal walls to be installed on the slab.

They also intend to build a new bedroom which will add an extra 18 m² to the floor area (addition (Nv)). The existing home is a slab on ground construction and has a total floor area is 120 m² (Ev) with a typical 2400 millimetres (2.4 metres) floor to ceiling height throughout. The home was approved and constructed in 1999, which was prior to any requirements for energy efficiency or accessibility.

A software assessment was recently undertaken for the home's originally approved plans, and it was rated at 2.5-stars (existing home star rating (Esr)). The owners now want to know the required star rating (Rsr) for their proposed building work and what features of the Modern Homes standards could be included with the design?

The building designer advised that the renovation is 'assessable' development. This is because the addition of a new bedroom involves structural work that falls outside of accepted (self-assessable) development. Given this:

- a building development application is required
- a building certifier must be engaged, and
- the building certifier had to consider whether the Modern Homes standards could be applied to the renovation.

As the building work (70 m²) is greater than 50 per cent of the home's floor area (60 m²), the building certifier:

- is required to apply the Modern Homes standards to the new bedroom, and
- has discretion to apply the Modern Homes standards to all or part of the existing home.

Energy efficiency

The new proposed addition involves changes to the building shell of the house.

The building designer recommended using the software method to achieve compliance with the energy efficiency standard. Consequently, an updated energy assessment **will be required** for both the existing home and the proposed alterations. This assessment will determine the required star rating (Rsr), incorporating both the internal area changes and the addition of the new bedroom. The formula applied to calculate this is:

$$\frac{[(Ev - Nlv) \times Esr] + [(Nv + Nlv) \times Nsr]}{(Ev + Nv)} = Rsr$$

Firstly, all floor areas (m²) needed to be converted to volume (m³) so they were multiplied by 2.4 metres (given the 2400 millimetres floor to ceiling height) so these values could be used for the formula. These were calculated as:

$$Ev: 120 \text{ m}^2 \times 2.4 = 288 \text{ m}^3 \quad Nv: = 18 \text{ m}^2 \times 2.4 = 36 \text{ m}^3 \quad Nlv: 52 \text{ m}^2 \times 2.4 = 124.8 \text{ m}^3$$

and **Esr** = 2.5-stars and **Nsr** = 7-stars

The cubic metre values were then used in calculating the required star rating (Rsr) for the entire house design with the internal alteration and addition, as such:

$$\frac{[(288 - 124.8) \times 2.5] + [(36 + 124.8) \times 7]}{(288 + 36)}$$

↓

$$\frac{408 + 1126.6}{324} = 4.74$$

Therefore, the required star rating (**Rsr**) is **4.7-stars** (4.74 is rounded to the nearest single decimal).

Following discussions with their building designer and house energy assessor on possible ways to achieve 4.7-stars, several energy efficient design features were considered. For the additional bedroom, these options included:

- locating the new bedroom to the eastern side of the house (if possible) to minimise its exposure to the hot afternoon summer sun on the western side
- eastern and northern facing windows for the new bedroom to allow crossflow ventilation in summer
- using treated glazing (such as low-e glass) for external windows that would be subject to high heating loads in summer
- designing roof eaves of 600 millimetres for shading the new external walls
- installing combined insulation product (reflective and bulk) to the new external walls and where any panels are to be replaced in the existing external walls
- installing a ceiling fan in the new bedroom for the internal alteration, promoting air movement.
- carefully designing windows, including a combination of louvres, to can capture cooling breezes and using low-e glass for the larger external window that faces north-west in the living room to minimise heat entering the room in summer
- providing a window awning over the north-western window to minimise heat entering the room in summer.

Note: not all of the above measures would be required for the renovation, just those deemed applicable by the building certifier.

In addition to energy efficiency measures for the additional bedroom, the house energy assessor also recommended installing bulk ceiling insulation into the entire roof space. This would reduce the

need to use air-conditioning and benefit the home's overall comfort and energy performance. The energy assessor also suggested replacing the roof which would have a lighter colour.

Following advice from the building designer and the house energy assessor, the owners were able to identify a cost-effective pathway. The entire house was re-assessed as achieving a 5.2-star rating (which was above the Rsr of 4.7).

Whole of home

The proposed alteration and addition will not involve any changes to the hot water system, air-conditioning unit or lighting (other than within new lighting to the reconfiguration and addition areas). As a result, there will be no requirement to undertake a whole of home assessment.

Livable Housing Design Standard

Because the renovation exceeds 50 per cent of the existing home's volume, the building certifier may require parts of the existing dwelling to be upgraded to meet current standards, including accessibility requirements for the new bathroom.

The renovation of the bathroom will affect the following elements that are covered by the Livable Housing Design Standard:

- accessible bathroom – step-free threshold and minimum door widths
- accessible shower – step-free (hobless)
- reinforcing - grab rails in the bathroom.

In Queensland application of the Livable Housing Design Standard has been amended specifically to deal with renovations by QDC 4.5.

Applying QDC 4.5 to this renovation means that:

- a step-free threshold into the reconfigured bathroom will not be required. This ensures that the structural stability of the home is not affected by cutting into the slab.
- the new door into the reconfigured bathroom will be required to comply with the minimum door widths required by the Livable Housing Design Standard. This is because the existing bathroom door frame will be demolished and replaced in a different location.
- a step-free threshold into the shower will be required as QDC 4.5 does not affect the requirement of the Livable Housing Design Standard to provide at least one shower with a hobless and step-free entry. This will apply unless the home already has a compliant accessible shower.
- reinforcing for grab rails will be required as new and existing wall frames will be exposed for the reconfiguration of the bathroom.

Grading to floor waste – Bathroom

The renovation involves removing the existing bathroom flooring and drainage and reinstating services and new flooring into the reconfigured bathroom. The building designer suggested that the owner could avoid having to grade the floor to the waste by installing a combination of internal overflows for vessels (such as a basin or bath) and cisterns, and flood stop safety valves approved under WMTS-479 fitted to flexible hose assemblies. Together, these measures will prevent water flowing out of the room.

General advice

Other building code requirements may apply such as ensuring structural adequacy, maintaining the minimum ceiling height for the bedroom and the installation and positioning of smoke detectors. Proactively addressing these considerations will help integrate energy efficiency and liveability improvements where feasible. These features enhance occupant comfort, efficiency, accessibility, and functionality, aligning with livable housing principles and supporting the home's long-term adaptability.

Case study 6 – Converting a low-set home to two-storeys with an outdoor living area

The owners of an old Worker's Cottage located on a steep hill in tropical north Queensland want to raise their single-storey, 5-stair walk-up home, on a new stumped/undercroft structure to gain a small amount of additional bedroom accommodation, while leaving the majority of the space beneath the existing home open as an unenclosed carport and storage undercroft. The existing home's total floor area is 118 m² (Ev) and is setback 6 metres from the front boundary.

The existing level will be raised on a new understorey structure. Of the total under-house footprint of 118 m², only 36 m² will be enclosed — comprising a new bedroom, ensuite bathroom with shower, and an enclosed internal staircase. The remaining 82 m² will be left as an open, unenclosed carport and storage undercroft, with no walls or doors enclosing this space, providing vehicle parking and general storage. The new enclosed level will retain the 6-metre setback and continue to be 5 stairs off ground level. The existing kitchen will be updated; however, it will not involve any changes to the internal structure on that floor.

The owners would also like to add a covered outdoor living area (14 m² floor area) at the back of the ground-level which will be adjacent to the new kitchen. The covered outdoor living area will have a north-eastern orientation, so it is not exposed to the hot western afternoon sun.

The owners have also decided to replace their existing split system air conditioner with a new ducted system to service the whole home. They will also be replacing the electric storage hot water system with a new heat pump.

The existing low-set home has no insulation in the roof space and the large living room faces east. It is constructed with lightweight building materials and has casement windows that provide access to prevailing breezes. As an older Queenslander-style home, it also has higher ceilings throughout at 2.7 m. A software assessment was undertaken for the existing home and gained a star rating of 3.2-stars. For the whole of home assessment, the NCC Online Calculator would be used.

The building designer advised that the renovation involves 'assessable' development. This is because the raising of the single-storey home to two storeys involves building work that falls outside of accepted (self-assessable) development.

As the renovation is assessable development:

- a building development application is required
- a building certifier must be engaged, and
- the building certifier had to consider whether the Modern Homes standards could be applied to the renovation.

Having considered the nature and extent of the proposed building work, and in exercising discretion available, the building certifier:

- requires the Modern Homes standards to the new ground level habitable space, and
- has determined the Modern Homes standards need not be applied to all or part of the existing home.

Energy efficiency

The new proposed addition involves changes to the building shell of the house. The building designer has recommended using the software method to achieve compliance with the 7-star energy rating. The energy assessor has evaluated only the habitable area of the new ground-level addition (excluding the garage as it is non-habitable), treating this area solely as an addition only.

Total floor area of the renovated building will be **154 m²** [118 m² (existing upper level) + 36 m² (new lower-level addition)]

Total unenclosed area floor area of the renovated building will be **118 m²** [82 m² (remaining part of

existing upper level that is not above the 36 m² addition) + 36 m² (new unenclosed addition)]

This equates to 76.7% of the building being unenclosed. [118 m² ÷ 154 m² = 76.6% (rounded to 76.7%)]

As more than 50% of the building's total floor area is located above an unenclosed space, the building qualifies as raised floor construction under QDC 4.1. Accordingly, the concession in A1(4) of QDC 4.1 applies, resulting in an Nsr of 6 stars.

The applicable formula for this scenario is:

$$\frac{(\text{Ev} \times \text{Esr}) + (\text{Nv} \times \text{Nsr})}{(\text{Ev} + \text{Nv})} = \text{Rsr}$$

Firstly, all floor areas (m²) needed to be converted to volume (m³), so these were multiplied by 2.7 metres (given the 2700 millimetres floor to ceiling height) to determine the relevant values in the formula. These were:

$$\text{Ev: } 118 \text{ m}^2 \times 2.7 = 318.6 \text{ m}^3 \quad \text{Nv: } 36 \text{ m}^2 \times 2.7 = 97.2 \text{ m}^3$$

with **Esr** = 3.2-stars and **Nsr** = 6-stars

These values were then used to calculate the required star rating (Rsr) for the entire house design as raised with the renovation, as such:

$$\frac{(318.6 \times 3.2) + (97.2 \times 6)}{(318.6 + 97.2)} = 3.855$$

Therefore, the required star rating (**Rsr**) is **3.9-stars** (3.85 is rounded to the nearest single decimal).

The energy efficient design features for the new ground-level could include:

- configuring the new rooms to account for solar access and prevailing breezes. This includes locating the un-enclosed garage, ensuite bathroom and laundry on the western side.
- combined insulation product (reflective foil and bulk) to the new external walls and raised floor
- good window design i.e. placement, type, glazing and awnings
- adjustable external window blind over the western facing window
- lighter-coloured new external walls
- ceiling fans in the internal living room and the entertainment room.

The practicalities of upgrades to the existing home needed to be considered. For example, it would not be technically practical to include wall insulation to the upper storey as no internal plasterboard wall linings will be removed. Replacing the existing external glazing in the casement windows with new high-performance glazing (low-e glass) was also considered to be overly costly as they were all still in good condition and functioned well. Additionally, the home could not be re-oriented to a more northerly position on the property given site boundary constraints. The building certifier did however identify that ceiling insulation could be installed to the roof space as a cost-effective inclusion.

A software assessment was undertaken for the house with only some of the energy efficiency features listed above. The entire house achieved a 3.5-star rating for the building shell, which is below the Rsr of 3.9-stars.

However, as the owners are also including a new covered outdoor living area with a ceiling fan on the lower level, an additional 1-star optional credit was available under QDC 4.1. By combining the building shell rating of 3.5-stars with the 1-star credit for the compliant outdoor living area, the entire renovation will achieve 4.5-stars (which is above the Rsr of 3.9-stars). The building certifier can approve the renovation using this compliance pathway.

Whole of home

For this renovation, the building certifier noted that the existing:

- split system air conditioning unit will be replaced with a ducted system, and
- electric storage hot water system was being replaced with a heat pump hot water system.

As this represents the two most energy intensive appliances the certifier required a whole of home assessment to be applied to the home's fixtures and appliances.

Under the NCC, a whole of home energy budget is used to assess the dwelling's major fixtures and appliances, these being air-conditioning, hot water, artificial lighting, pool/spa pumps and any onsite solar PV system.

The energy assessor chose to use the [NCC Online Calculator](#) to assess the whole of home component as an elemental (DtS) compliance pathway.

As the house is located in NCC climate zone 1 and will have a total habitable floor area of 154 m² (combined lower and upper levels), using the NCC Online Calculator it has a deemed net equivalent energy usage allowance of 5.4 (maximum). Using the appliances listed in the following table, the house passed the NCC calculator whole of home assessment with an actual usage score of 5.3, resulting in a 'pass'.

Equipment details (as relevant)	Type (from drop down selections)
Main space cooling type	Ducted heat pump
Star Rating (using 'GEMS 2013')*	<3 stars
Main water heater type	Heat pump (standard)

* GEMS = Greenhouse and Energy Minimum Standards, which provides energy star ratings for appliances.

This result could be improved by adding solar photovoltaic panels to generate electricity onsite.

Livable Housing Design Standard

Lower level:

The Modern Homes standards will apply to new building work on the lower level. As a result the work **will need to comply** with the following requirements of the Livable Housing Design Standard:

- dwelling entrance door clear opening width of 820 millimetres and compliant level threshold
- slightly wider internal doors and corridors
- step-free access into the ensuite bathroom
- step-free access into the new shower
- a compliant circulation space in front of the new toilet and
- reinforcing of bathroom and toilet walls to allow for handrails.

The Livable Housing Design Standard provides an exemption from the requirement to provide level access into the home where the access path is too steep or there is insufficient space to provide a compliant pathway. The Department published a report that contains [ramp calculator tools](#) and supporting [case studies](#) that provides guidance on how to design compliant step-free access into a home.

As the first floor is 950 millimetres above the ground level the home **will not have to comply** with the Livable Housing Design Standard requirement to provide level access entry.

Upper level:

As the renovation work does not exceed 50 per cent of the house's volume, section 81 of the Building Act does not apply. In addition, the proposed renovations do not include modifications to the bathroom, shower or sanitary facilities on the upper level. Applying the Livable Housing Design

Standard to these areas would require significant alterations to existing building elements. Consequently, it would be reasonable for the building certifier not to require compliance with the Livable Housing Design Standard for the upper level.

Where the building certifier does not require the Livable Housing Design Standard for the upper level, the owner may still wish to explore options to enhance the accessibility of this area.

General advice

Other building code requirements may apply such as the installation and positioning of smoke detectors, structural adequacy of the dwelling, and the requirements necessary to make reasonable provision for the amenity of the dwelling and the safety and health of people using the building.

Case study 7 – Relocation of an existing home, no additions

An existing single-storey home (130 m² floor area) is to be relocated from a suburban area in Gympie to a semi-rural property near Yeppoon. It will be the primary residence on the property, be re-established with new footings and connected to infrastructure services for water and electricity.

No additional rooms, verandahs, carports or other structures are proposed to the dwelling with its re-location. The floor plan and building footprint will remain unchanged.

However, the existing metal roof will be removed to facilitate transportation to its new property. Due to its age and condition, the owner will be replacing the roof in its entirety before the dwelling is re-established and occupied.

The building designer advised that the relocation involves **assessable development**. This is because re-locating a dwelling to a new site involves building work that falls outside of accepted (self-assessable) development. Given this:

- a building application is required
- a building certifier must be engaged, and
- the building certifier must consider whether the Modern Homes standards should be applied to the building work.

As no additional floor area is being created and no extensions are proposed, the building work does not exceed 50 per cent of the existing home's total volume, as the volume of the building remains unchanged.

Energy efficiency

The re-location of the home does not involve any increase in its floor area, however:

- the existing roof is to be removed (to facilitate transportation)
- its roof will be replaced in its entirety before the dwelling is re-established, and
- the roof space will be easily accessible during the building work.

The building certifier considers that the roof replacement provides a reasonable opportunity to improve the home's energy efficiency. As a result, the building certifier exercises discretion to require ceiling insulation to be installed within the roof space before the new roof is installed. As it is a single aspect, the certifier uses the insulation level (R-value) prescribed in the NCC, Volume Two – Housing Provisions Standard for climate zone 2 (sub-tropical), as based on the roof type and colour.

Livable Housing Design Standard

The scope of the relocation does not involve:

- additional floor area or habitable rooms
- alterations to the internal layout of the dwelling

- changes to internal doors or corridors
- modifications to toilets or bathrooms
- construction of a new step-free shower, or
- wall reinforcement for future grab rails.

While the dwelling is being relocated, the building certifier considers that requiring a step-free path of travel and a step-free entrance in isolation would not achieve the broader objectives of the Livable Housing Design Standard, as the remaining accessibility features within the existing dwelling would remain unchanged.

As a result, the building certifier does not apply the Livable Housing Design Standard to the relocated dwelling.

Wind loads for housing

As the home is being moved to Yeppoon, located on the coast of Central Queensland (mapped as Wind 'Region C' under AS/NZS 1170.2:2021– Structural design actions, Part 2: Wind actions), and the roofing work will involve the replacement of more than 20 per cent of the existing roof, a building approval will be needed from a building certifier before the contractor can undertake work.

The building certifier will ensure the roofing system is suitable for its intended purpose and compliant with current standards, including the roof's structural elements. In issuing the approval, the certifier required elements of the roof and walls to be upgraded with increased rod tie downs to the top plate as per an engineer design to meet the requirements for increased wind. They also required the use of galvanised metal strap bracing and cyclone-rated fasteners. These measures will improve the roof's ability to withstand high-wind loads, including during a tropical cyclone.

Case study 8 – Relocation of an existing home, adding rooms

A recently retired couple want to subdivide their 1200 m² hinterland property into two 600 m² lots. They have a traditional 1920s-single storey Queenslander home with 130 m² total floor area and 2 bedrooms, which sits in the middle of the property. They want to remain on one of the lots and sell the adjacent one. They have decided to keep their existing home and move it over to one of the subdivided lots.

They have been speaking to their project team about elevating their existing home to provide two extra bedrooms, a bathroom and a kitchenette underneath (total of 54 m²) on a slab on ground foundation. They also would like to add an additional bedroom (16 m²) at the back of these rooms on the ground-level and an attached double garage that enters direct into the living area. They have also decided to add split system air conditioners to all five bedrooms and upgrade to a larger-sized hot water system, to be solar. They also will be installing a solar PV system to cover the extra energy used for the new air conditioners.

The balance of the floor area on the ground-level would be uninhabited space for a garage and storage.

The owners want to know how the Modern Homes standards would apply to their home when it is moved over to the subdivided lot and lifted to be two-storeys?

The building designer advised that the renovation involves 'assessable' development. This is because the relocation and raising of the single storey to two storeys involves building work that falls outside of accepted (self-assessable) development.

As the renovation is assessable development:

- a building development application is required
- a building certifier must be engaged, and
- the building certifier has to consider whether the modern homes standards could be applied to

the renovation.

As the new building work (70 m²) is greater than 50 per cent of the existing home's floor area (130 m²), the building certifier:

- is required to apply the Modern Homes standards to the three additional bedrooms, the new bathroom and new kitchenette, and
- has a discretion to apply the Modern Homes standards to all or part of the existing home.

Energy efficiency

The renovation involves an increase to the home's floor area and changes to its building shell. The building designer has recommended using the software method to achieve compliance with the 7-star energy rating.

In cases such as this, relocating the home to a new location presents the best opportunity for potentially improving the home's orientation to take advantage of solar access and prevailing breezes.

The building designer also identified other energy efficient features that could be included:

- replacing the old rusty tin roof and re-painting the external walls, both with lighter colours
- including reflective insulation (sarking) and adding ceiling insulation (bulk) under the new roof sheets as this space will be open when the roof is being replaced
- adding a roof vent to assist with removing hot air out of the roof space
- adjustable external blinds over the western facing windows to limit hot afternoon summer sun entering the rooms
- installing ceiling fans in the living rooms and the bedrooms.

The original house achieved a 3.5 star rating, and a second software assessment must be undertaken for the proposed home on the subdivided lot. This will account for the home's improved orientation, as well as inclusion of the above design features. Given the home is being moved and adding new habitable rooms, the total floor area covered by the new building work is 70 m² (**Nv**).

The formula to be used is:

$$\frac{(\text{Ev} \times \text{Esr}) + (\text{Nv} \times \text{Nsr})}{(\text{Ev} + \text{Nv})} = \text{Rsr}$$

Firstly, floor areas (m²) were converted to volume (m³), so these were multiplied by 2.7 metres (given the 2700 millimetres floor to ceiling height) to determine the relevant values in the formula. The calculated figures were:

$$\begin{aligned} \text{Ev: } 130 \text{ m}^2 \times 2.7 \text{ m} &= 351 \text{ m}^3 & \text{Nv: } 70 \text{ m}^2 \times 2.7 \text{ m} &= 189 \text{ m}^3 \\ \text{with } \text{Esr} &= 3.5\text{-stars} & \text{and } \text{Nsr} &= 7\text{-stars} \end{aligned}$$

These values were then used to determine the required star rating (Rsr) for the entire house design as relocated:

$$\frac{(351 \times 3.5) + (189 \times 7)}{(351 + 189)} = 4.73$$

Therefore, the required star rating (**Rsr**) is **4.7-stars**.

With better orientation and inclusion of some of the above design features, the relocated and renovated home received a 5.5-star rating (which is above the Rsr of 4.7-stars).

Whole of home

Given the addition of the split system air conditioners to the five bedrooms and the change of hot water system, the building certifier applied a whole of home assessment to the renovation. The existing home obtained a score of 25 out of 100. When assessed for the inclusion of the 5-kilowatt

solar PV system to cover the extra energy use from air conditioning, as well as the new solar hot water system, it gained a score of 63 (which exceeds the minimum score of 60 required for a new house).

Livable Housing Design Standard

Elevating the home and constructing two bedrooms, a bathroom and a kitchenette underneath creates new habitable floor area at ground level. As the proposal increases the building volume by more than 50%, the new work must comply with the Livable Housing Design Standard (LHDS).

The building certifier assesses the new work against the relevant LHDS requirements and ensures the design incorporates the required accessibility features, including:

- a step-free path of travel from the parking space through the attached garage into the dwelling, or alternatively a step-free path from the site boundary to the new dwelling entrance
- a dwelling entrance door with a clear opening width of at least 820 mm and a compliant level threshold
- internal doorways and corridors that achieve the required clear widths and circulation spaces
- step-free access to the ground floor bathroom
- a shower with a hobless, step-free entry
- a toilet with the required circulation space
- reinforced bathroom and toilet walls to support the future installation of grab rails.

General advice

Even if the Building Certifier determines the upper level does not need to be fully compliant with the livable housing provisions, subject to discretion, the homeowner could consider the various requirements of QDC 4.5 and the NCC Livable Housing Design Standards and if they are able to integrate these features, where possible, into their existing home for futureproofing and adaptability.

Other building code requirements may apply such as the installation and positioning of smoke detectors, structural adequacy of the dwelling, and the requirements necessary to make reasonable provision for the amenity of the dwelling and the safety and health of people using the building, and also avoiding the spread of fire to or from any adjoining building.

Design compliance

Modern Homes standards

All relevant design specifications for the renovation's compliance with the Modern Homes standards should be identified on the approved and dated house plans, including any upgrades to be undertaken to the existing home. These can include the site and floor plans, elevations and sections, level entry access areas, door and corridor widths, reinforcement method for grab rails, circulation spaces, north point for orientation, affected rooms, materials documentation, insulation (type and level), placement and style of windows (via a window schedule), any ceiling fans, any thermal breaks for metal frames and trusses, and an outline of the neighbouring properties and buildings.

The building certifier needs to confirm the renovation to be constructed is consistent with the design that has building approval. The renovation plans that were assessed for compliance should be stamped, signed and dated on all pages by the relevant person. This avoids substitution of later versions of the plans which may have been amended to include a design variation. Any variation, such as change in roof colour (with energy efficiency), or door width

(with accessibility), to the originally approved plans could compromise the renovation's compliance.

For energy efficiency, any change to the building shell will need to be re-assessed by the house energy assessor and approved by the building certifier. Equally, any change that could affect compliance with the Livable Housing Design standard needs to be approved by the building certifier.

Building Form 15 - Compliance certificate for building design or specification (Form 15)

To confirm that an aspect of building work or specification can comply with the relevant building assessment provisions of the Modern Homes standards, the building certifier may request a '[Form 15](#) – Compliance certificate for building design or specification' from competent person.

In these cases, the building certifier can deem a house energy assessor or an access consultant as a 'competent person' (design-specification) to confirm the design complies, and they can rely on this form (as per Part 6 of the Building Regulation 2021). A Form 15 is typically used to demonstrate compliance for an aspect of the building assessment provisions for the building certifier. For more details, refer to the [Guideline for the assessment of competent persons](#) (July 2023).

Likewise, if a structural engineer is used in the design process, the building certifier may also request a Form 15 to confirm their specialist input. For example, to confirm the structural adequacy of the existing building's frame where it is intended to be altered as part of the building work associated with the renovation, as assessed by a structural engineer who is a Registered Professional Engineer of Queensland (RPEQ).

Construction compliance

The building certifier is responsible for ensuring compliance with the building approval. For a renovation, the work must be inspected at all stages as stated on the building approval. These inspections can include:

- **footing:** foundation material and reinforcing steel before the concrete is poured.
- **slab:** bearing capacity of soil, moisture-proof barrier and reinforcing steel before concrete is poured.
- **frame:** including timber sizes, fixing, tie-down and bracing before the cladding or wall linings are fixed, and any waterproofing.
- **final inspection:** completion of the building work including checking on any previous outstanding items, as well as the collection of relevant certificates such as termite protection, wet area membrane installation, glazing and certification of engineer designed elements such as roof trusses.

A notice for inspection must be given by the builder to the building certifier for each stage of building work that applies to the renovation. For example, if the renovation is to the frame of an existing home, the inspection must occur at the frame stage, including the associated aspects of this stage.

The following building forms can be required to be completed and signed for approval by the building certifier, or a competent person in a specialised field for an aspect (e.g. an RPEQ engineer), with a renovation:

Building Form 12 - Aspect Inspection certificate (Appointed Competent Person) (Form 12)

A [Form 12](#) used by an appointed competent person certifies that an aspect of the work has been completed and complies with the building approval.

This form may also be used to confirm that a component of the renovation complies with a specification referenced in a Form 15 regarding a particular building design aspect, and it can be relied upon without further checking. For example, insulation to a certain R-value has been installed behind walls (even though it can no longer be sighted for inspection after the wall's construction).

Building Form 16 - Inspection certificate (Form 16)

A [Form 16](#) is required to state a stage of work is compliant with the renovation's building approval, and to enable the next stage to progress.

Building Form 21- Final inspection certificate (Form 21)

A [Form 21](#) must be signed for approval by the building certifier to certify that all building work for the renovation was inspected and complies with its building approval.

Building Form 43 - Aspect certificate (QBCC licensee) (Form 43))

A [Form 43](#) – used from a QBCC licensee to state that an aspect work, such as energy efficiency and accessibility, for a single detached class 1a building and class 10 building is compliant with the renovation's building approval.

Other matters to consider with a home renovation

Other building and planning related matters may also be relevant when undertaking a home renovation. These include:

Planning scheme requirements and development approvals

Local governments may have planning scheme requirements and development approvals triggered by a proposed renovation where it is subject to a building development application. This includes siting and design requirements such as minimum boundary set-backs for the street frontage and from neighbouring properties. For a renovation, in some cases an application for a relaxation from these planning requirements may need to be made to the local government.

The planning scheme may also have an 'overlay code' for character housing in certain neighbourhoods e.g. areas with 'timber and tin' Queenslander-style homes. The renovation will need to incorporate these requirements so that the home's appearance continues to reflect a particular style of residential design for its location.

Resilience and structural improvements

There may be an opportunity to strengthen the existing dwelling's structure by upgrading to current building standards.

For example, homes within 50 kilometres of the coast north of Bundaberg are located in a tropical cyclone region. If roof or wall linings are to be removed as part of the renovation, then access could be gained to those structural elements. The building designer and engineer can consider cost-effective options such as improving the dwelling's ability to withstand high-wind loads including the use of galvanised metal strap bracing; rod tie-downs; and cyclone-rated fasteners.

See the QBCC guideline [Repair Of Sheet Metal Roofs In Cyclonic Areas](#) for more details.

Minimum floor heights under the 'Flood Code' (QDC 3.5)

For home renovations, Queensland Development Code 3.5—Construction of buildings in flood hazard areas ([QDC 3.5](#)) only applies to additions or alterations to an existing house where the building work is greater than 50 per cent of the floor area or where an existing home is to be re-located. The 'Flood Code' contains building measures to minimise the impact of flood events to dwellings, including minimum floor heights.

Bushfire provisions

NCC contains provisions to improve the resilience of dwellings located in designated [bushfire prone areas](#) from igniting during a bushfire.

When renovating, materials and construction methods should be chosen based on the property's Bushfire Attack Level (BAL). This includes making sure roofs, walls, doors, and windows can withstand ember attacks, radiant heat, and even direct flames.

Low-interest loans for energy efficiency upgrades

The [Household Energy Upgrades Fund](#) (HEUF) provides low-interest loans to homeowners for a range of energy efficient fixtures and appliances including solar PV systems, heat pump hot water, battery storage, induction cooktops and window treatments. Several finance providers offer these discounted home upgrade loans which are easily accessible for applicants.

Artificial lighting

As part of the NCC whole of home energy budget, [artificial lighting](#) is included as part of its assessment for the dwelling's major fixtures and appliances.

For a home renovation, it is recommended energy efficient light fittings be installed for parts of the home that will be included as new building work. Where possible, homeowners can also consider upgrading the dwelling's existing lighting.

To provide fire safety in the roof space, downlights may need to be installed with gaps from the ceiling insulation. This can reduce the ceiling insulation's performance and so a higher level ('R-value') can be required to compensate for this loss.

Promotion of natural daylight in high-use areas should be also considered with the renovation's design to minimise the need to use artificial lighting through the day.

Condensation management

Condensation in buildings is the result of interactions between the environment, building design and materials, and occupant behaviour. The NCC has requirements to reduce the likelihood of condensation or water vapour build-up in walls and roof spaces that can cause illness from mould build-up, injury or loss of amenity for occupants.

The NCC references the Australian Standard 4200.1:2017 – Pliable building membranes and underlays materials for the external wall of houses. In climate zone 5 (warm temperate), the NCC has an additional requirement for external wall materials to comply with a vapour permeance level. See here for more information about [condensation management](#).

Water efficient fixtures

Installing higher star rated water efficient appliances and fixtures such as shower heads, toilets and tapware can minimise household water use. A water efficient shower head will also minimise energy costs associated with hot water systems as less heated water is needed to supply the shower.

Most household appliances and fixtures are rated under the [Water Efficiency and Labelling Standards](#) scheme (WELS), with 0 stars being the least efficient and 6 stars being the most efficient.

Plumbing installations ('Notifiable work')

If the renovation involves routine plumbing work, like the installation of fixtures such as toilets, showers and sinks, or providing a new bathroom with an additional room, a licensed plumber can typically undertake the relevant work as '[notifiable work](#)' (via a Plumbing Form 4–Notifiable Work).

The plumber needs to provide a copy of the completed Form 4 to the homeowner to confirm this work.

Asbestos

Older homes can contain asbestos with building materials and finishing products used in their construction.

Extra precautions need to be taken by occupants to minimise their risk of asbestos exposure when renovating a home. This even includes minor work such as drilling or preparing surfaces for painting. Asbestos fibres, which can be very small, can cause severe health effects if they are disturbed, become airborne and breathed into the lungs.

Generally, homes built before 1990 are likely to have some building materials with asbestos. These can be found on the interior and exterior of homes. Typical building materials that could contain asbestos include corrugated roof sheeting, guttering, wall cladding, plasterboard, soffit sheeting, internal fibro walls and ceiling sheeting, and some vinyl floor tiles and backing to vinyl floor sheeting. It is important to realise these materials may be covered by finishing products such as paint, wallpaper or ceramic tiles.

In Queensland there are laws relating to the management and removal of asbestos. These apply to home renovations, and therefore any work with asbestos that is to be undertaken by tradespeople or homeowners must be done in accordance with these laws.

See here for more information about [asbestos and home renovations](#).

Lead-based paint

Removal of paint from an existing home can often be required when undertaking a renovation. This usually involves scraping, hand-sanding or sanding/grinding with a power tool. Where lead-based paints were used, extra precautions must be taken as some paint layers may still contain high levels of lead.

Paints with high lead content were commonly used in homes built before 1970. While the percentage of lead in paint has dropped significantly over time, homes built after 1970 might still contain some lead. Since 1997 the maximum amount of lead in paint has been reduced to 0.1 percent. Homes with lead-based paint should be assessed and treated by trained professionals prior to undertaking any renovations.

Lead-based paint can be found inside and outside the home on surfaces where enamel paints were generally used. This can include exterior walls, doors, window frames, skirting boards, gutters and piping, metal surfaces, fascia boards and soffits, interior walls, kitchen and bathroom cupboards and ceilings. Also, the pink and red undercoats (primer) that were used can contain lead.

Lead is a toxic substance, even if exposed to small amounts. It can be absorbed from ingestion or from breathing in lead dust. If it is not removed and handled properly, dust, flakes and paint chips containing lead can remain in the home or garden for years after the work is completed.

For tradespeople, the Queensland Government's WorkSafe website provides more information on [working with lead-based paint](#).

For homeowners, the Commonwealth Government's booklet [Lead Alert: The 6-step guide to painting your home](#) provides more information.

Heritage and character homes

A heritage-listed home may be listed on the [Queensland Heritage Register](#) for state significance or on a local government heritage register. These homes have documented historic values that need to be carefully considered when undertaking a renovation in order to maintain their style, structural integrity and historic appearance. Similarly, for character-listed homes (e.g. built pre-1946), planning scheme provisions may apply. Specialists are typically needed to provide expert advice on the design and construction of a renovation, including how to best incorporate energy efficiency and accessibility features.

Dwellings covered by a body corporate or covenant

Where a property is covered by [body corporate](#) or covenant arrangements, building owners

may need to notify them of their intended renovations. The renovation works may also need to adhere to specific designs and styles in accordance with these arrangements.

However, under the BA, a body corporate generally cannot prevent certain energy efficient features being included to an existing home, such as having a light-coloured roof, energy efficient windows and roof collectors for a PV system or solar hot water system. See here for more information about [covenants and body corporate by-laws for sustainability](#).

Further information

Professional organisations

Architects and building designers

- [Australian Institute of Architects](#) (AIA)
- [Building Design Queensland](#) (BDQ)

House energy assessors (accreditation organisations)

- [Australian Building Sustainability Association](#) (ABSA)
- [Design Matters National](#) (DMN)
- [House Energy Raters Association](#) (HERA)

Livable housing design

- [Access Consultants Association](#) (ACA)
- [Occupational Therapist Australia](#) (OTA)

Building upgrade finance, organisations and compliance

- [Household Energy Upgrades Fund](#)
- [Housing Industry Association](#) (HIA)
- [Master Builders Queensland](#) (MBQ)
- [Queensland Building and Construction Commission](#) (QBCC)

Building certifiers

- [Australian Institute of Building Surveyors](#) (AIBS)
- [Royal Institution of Chartered Surveyors](#) (RICS)

Technical resources

- Queensland's [Sustainable housing laws and codes](#)
- Queensland's [building forms](#) and [plumbing forms](#)
- [Australian Building Codes Board](#) – includes NCC Volume Two and supporting resources such as Handbooks and glazing calculators
- [Home Energy Rating](#) (program formerly known as 'NatHERS') – includes star rating for homes
- [Your Home](#) – includes 'Renovation and additions'
- [Livable Housing Australia Design Guidelines](#) – includes 'Silver', 'Gold' and 'Platinum' levels
- [Bureau of Meteorology](#) – includes average monthly climate data for localities
- [Australian Glass & Window Association](#) – includes Window Energy Rating Scheme (WERS)
- [Insulation Council of Australia and New Zealand](#) – includes Insulation Handbook – 'Part 2: Professional Installation Guide' (May 2024) and 'Insulation Guidelines for Existing Homes'

General information

- [Australian Housing Data](#) – includes the CSIRO's data for house energy ratings
- [Energy Made Easy](#) – includes 'Tips for saving energy at home'
- [Energy information](#) – includes a range energy efficiency items with detailed information
- Local governments and community organisations also publish relevant materials, such as:
 - [Brisbane City Council](#)
 - [Cairns Regional Council](#)
 - [City of Gold Coast](#)
 - [Logan City Council](#)
 - [Moreton Bay Regional Council](#)
 - [Noosa Shire Council](#)
 - [Rockhampton Regional Council](#)
 - [Sunshine Coast Council](#)
 - [Toowoomba Regional Council](#)
 - [Cairns and Far North Queensland Environment Centre](#)

Appendix A: Assessment methods and compliance with 7-star energy efficiency

The following two assessment methods are typically used for compliance with a home renovation:

Energy rating software

Use of an accredited NatHERS software is the most common compliance method used to assess the energy efficiency of the building shell. A house energy assessor uses the software to model the dwelling's design to produce a star rating (out of 10). The software predicts the annual energy load (heating and cooling) for the design and location of the home. The assessment is generated on a 'NatHERS Certificate' which includes the dwelling's star rating and whole of home score, as well as its energy efficiency features (see Appendix B).

Software tools are approved under NatHERS, with four available:

- AccuRate Home¹⁰,
- BERS Pro¹¹,
- FirstRate5¹² and
- Hero¹³.

Each software tool has a different user interface and house energy assessors are trained in the use of their one. All tools are benchmarked against the CSIRO's Chenath software engine to provide consistency across assessments and star ratings:

A software assessment can allow greater flexibility between design features compared to the more prescriptive elemental (DtS) provisions of the NCC as different design options can be emphasised. For example, a darker coloured roof (that attracts heat) in hotter areas can be compensated by improvements with other features, such as increased insulation, wider roof eaves for shading or better window design, while still achieving compliance.

For a home renovation using the software compliance method, the entire dwelling will need two design assessments, one pre-renovation (i.e. existing home only) and another post-renovation (i.e. existing home with the proposed renovation). A star rating cannot be generated for the proposed renovation area only.

NatHERS Technical Note

The NatHERS Technical Note¹⁴ sets out the acceptable industry practice when conducting a software assessment for regulatory purposes. The building certifier must confirm the software assessment complies with the current version of the NatHERS Technical Note.

When the software method is used, the building certifier must also ensure that other associated NCC energy efficiency requirements are appropriately incorporated with the building's design and construction. These include the installation of insulation, thermal breaks for metal frames and trusses, and building sealing. For instance, without thermal breaks the insulation's effectiveness can be reduced by up to half with some forms of construction¹⁵.

¹⁰ [AccuRate Home](#) is provided by Energy Inspection

¹¹ [BERS Pro](#) is provided by Energy Inspection

¹² [FirstRate5](#) is provided by the Victorian Department of Energy, Environment and Climate Action

¹³ [Home Energy Rating Optimisation](#) (Hero) is provided by Hero software

¹⁴ [NatHERS Technical Note](#) (currently 23 October 2024)

¹⁵ Source: [ABCB Handbook](#) – Energy efficiency, NCC Volume Two 2019, page 82

Elemental (DtS) method

The elemental (DtS) method can be used to assess a home renovation against the more prescriptive provisions of the NCC. For example, particular standards apply for insulation in the roof space and to external walls, shading, ventilation and glazing for the dwelling's relevant NCC climate zone. Under the NCC, there are four (4) climate zones in Queensland (see Appendix D).

Compliance pathways

Table A1 presents the two common assessment methods and the four possible compliance pathways available under QDC 4.1, along with the relevant evaluation criteria. It shows how the energy rating (software) or the elemental (DtS) method can be used only or in combination with the optional credits available for inclusion of a compliant outdoor living area.

Table A1: Assessment methods and compliance pathways available under QDC 4.1

Assessment method	Compliance pathway	Evaluation criteria
1a. Software rating only	Star rating for the building shell only using software	Building shell only to achieve the required star rating (Rsr)
1b. Software rating and optional credit	Star rating for the building shell using software + QDC 4.1 optional credit (1-star)	Star rating for the building shell + outdoor living area & ceiling fan# to achieve required star rating (Rsr)
2a. Elemental (DtS) only	Elemental (DtS) provisions for the building shell only using the NCC provisions	Building shell only to comply with the NCC provisions
2b. Elemental (DtS) and optional credit	Elemental (DtS) provisions for the building shell using NCC 2019 (6-star) + QDC 4.1 optional credit (1-star)	Building shell to comply with relevant BCA 2019 provisions + outdoor living area & ceiling fan#

must comply with the minimum design specifications under QDC 4.1 for the optional credit (1-star).

Confirmation of the dwelling's energy efficiency assessment method and design aspects must be documented. For example, the building shell's star rating (via the NatHERS Certificate) and any optional credit used to achieve compliance with the 7-star rating.

House energy assessors

For a software assessment, the building certifier will need to confirm that the house energy assessor is a 'competent person' to perform the assessment. Under NatHERS, a house energy assessor may be accredited with one of the three following Assessor Accrediting Organisations (AAOs):

- Australian Building Sustainability Association (ABSA)
- Building Designers Association of Victoria (BDV)
- House Energy Raters Association (HERA).

If a non-accredited assessor has performed the assessment, before the building certifier can accept they are competent, they will need to confirm that the assessor has:

1. suitable training and skills e.g. Certificate IV in Home Energy Efficiency and Sustainability or Certificate IV in NatHERS Assessment

2. used appropriate assessment practices i.e. current NatHERS Technical Note
3. used an approved NatHERS software tool i.e. current version of AccuRate Home, BERS Pro, FirstRate5 or Hero.

For more details about energy assessments for residential dwellings and use of software, refer to the department's Guideline for Queensland Development Code MP 4.1—Sustainable buildings.

Appendix B: Examples of the NatHERS Certificate and report

Below are examples of a 'NatHERS Certificate' and 'Report' (sample front page only) that is generated and provided by the house energy assessor. It shows the star rating (out of 10) assessed for the proposed design of the dwelling. In addition to the property's details, they also show:

- if the software assessment was prepared by an:
 - accredited assessor—colour print-out with their accreditation number and AAO, and NatHERS logo displayed
 - non-accredited assessor—black and white print-out, no NatHERS logo displayed
- design features and the specifications for windows, walls, floors, ceiling and roof
- a unique certificate number to enable confirmation via a QR code that it is a valid assessment.

Note: Samples shown are the front page only.

Accredited assessor = certificate

Certificate is in colour, with the NatHERS logo and assessor's accreditation details

of

2022 Certificate examples (November 2022)

Nationwide House Energy Rating Scheme®
NatHERS® Certificate No. #000000000-00

Generated on [date] using [software and version]
 [other boilerplate text other boilerplate text other boilerplate text other boilerplate text other boilerplate text]

Property
 Address [100 Street, Suburb, State/Territory, Postcode]
 Lot/DP [number]
 NCC class* [number]
 Floor/all Floors [dwelling entrance floor of [total no. of floors] floors (new/removal/existing)]
 Type [plan number, version & date]
 Prepared by [name of preparer of plans]

Plans
 Main plan [plan number, version & date]
 Prepared by [name of preparer of plans]

Construction and environment
 Assessed floor area [m²]
 Conditioned* 000.0
 Unconditioned* 0.0
 Total 0.0
 Garage 0.0
 Exposure type [exposure]
 NatHERS climate zone [number, town/suburb]

Accredited assessor
 Name [assessor name]
 Business name [business name]
 Email [email address]
 Phone [00 0000 0000]
 Accreditation No. [0000 000 000]
 Assessor Accrediting Organisation [name of Assessor Accrediting Organisation]
 Declaration of interest [declaration]

NCC Requirements
 BCA provisions [Volume 1/Volume 2]
 State/Territory variation [Yes/No]

National Construction Code (NCC) requirements
 The NCC allows the use of NatHERS accredited software to comply with the energy efficiency requirements for houses (Class 1 buildings) and apartments (Class 2 sole-occupancy units and Class 4 parts of buildings). The applicable requirements for houses are detailed in Specification 4.2 of NCC Volume Two. For apartments the requirements are detailed in clauses J303 and J3015 of NCC Volume One.
 NCC 2022 includes enhanced thermal performance requirements for houses and apartments. It also includes a new whole-of-home annual energy use budget which applies to the major equipment in the home.
 The NCC, and associated ABCB Standards and support material, can be accessed at www.abcb.gov.au.
 Note, variations and additions to the NCC energy efficiency requirements may apply in some states and territories.

Thermal performance star rating
7.0
 The more stars, the more energy efficient

NATIONWIDE HOUSE ENERGY RATING SCHEME®
107.9 MJ/m²
 Predicted annual energy load for heating and cooling based on standard occupancy assumptions
 For more information on your dwelling's rating see: www.nathers.gov.au

Thermal performance (MJ/m²)
 Limits taken from ABCB Standard 2022

	Heating	Cooling
Modelled	0000.0	0000.0
Load limits	0000.0	0000.0

Features determining load limits
 Floor type [Type]
 Floor (lowest conditioned area) [Y/N/NA]
 NCC climate zone 1 or 2 [Y/N/NA]
 Outdoor living area [Y/N/NA]
 Outdoor living area ceiling fan [Y/N/NA]

Whole of Home performance rating
60 out of 100
 Net zero target

Verification
 To verify this certificate, scan the QR code or visit hstar-dev.azurewebsites.net/QR/Generate?m=MaicPqJ
 When using either link, ensure you are visiting hstar-dev.azurewebsites.net

* Refer to glossary.
 Generated on [date] using [software] for [address]

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(this sample certificate is for a **house**, noting **60 out of 100** score for its whole of home energy budget)

Non-accredited assessor = report

Report is black and white only, and has no NatHERS logo

Residential energy rating report Non-accredited No. 0005396560
Class 2 summary

Generated on 18 Dec 2025 using CSIRO AccuRate Home v1.4.3.24

This report was created using NatHERS accredited software but the non-accredited assessor (rater) is not accredited under NatHERS and this report is not accredited as being compliant with NatHERS. Reliance on this report is accordingly at your own risk.

Property
 Address 500 WOH-LLC2 NatHERS Sap Way, Darwin, NT, 800
 Lot/DP Lot 1 DP 1
 NatHERS Climate Zone 01 Darwin

Thermal performance star rating
7.0
 Average star rating

Rater**
 Name Jo Doe
 Business name CSIRO
 Email jo.doe@csiro.au
 Phone 555 CSIRO

The rating above is the average of all dwellings in this summary

Verification
 To verify this certificate, scan the QR code or visit hstar-dev.azurewebsites.net/QR/Generate?m=MaicPqJ
 When using either link, ensure you are visiting hstar-dev.azurewebsites.net

NCC heating and cooling maximum loads MJ/m².p.a.
 Limits taken from ABCB Standard 2022

	Heating	Cooling
Modelled block average	0	368
Maximum block limit	N/A	N/A

National Construction Code (NCC) requirements
 The NCC allows the use of NatHERS accredited software to comply with the energy efficiency requirements for houses (Class 1 buildings) and apartments (Class 2 sole-occupancy units and Class 4 parts of buildings). The applicable requirements for houses are detailed in Specification 4.2 of NCC Volume Two. For apartments the requirements are detailed in clauses J303 and J3015 of NCC Volume One.
 The NCC, and associated ABCB Standards and support material, can be accessed at www.abcb.gov.au.
 Note, variations and additions to the NCC energy efficiency requirements may apply in some states and territories.

Whole of Home performance rating
95 out of 100
 The rating above is the lowest of all dwellings in this summary

Summary of all dwellings

Certificate number and link	Unit Number	Heating load [load limit] [MJ/m².p.a.]	Cooling load [load limit] [MJ/m².p.a.]	Total load [MJ/m².p.a.]	Star Rating	Whole of Home Rating
0005396561	620	0 (N/A)	368.0 (N/A)	368.0	5.5	95

Version 2025.0
 Nationwide House Energy Rating Scheme (NatHERS) is an initiative of the Australian Government and territory governments. For more details see www.nathers.gov.au
 Generated on 18 Dec 2025 using CSIRO AccuRate Home v1.4.3.24 for 500 WOH-LLC2 NatHERS Sap Way, Darwin, NT, 800

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(this sample report is for a **unit**, noting **50 out of 100** score for its whole of home energy budget)

Appendix C: History of changes to Queensland's energy efficiency standards and NatHERS improvements

3.5/4-star houses (1 September 2003 – 28 February 2009)

Queensland first adopted the BCA building standard for energy efficient houses (building shell for class 1 buildings only) on 1 September 2003. Although the national standard was introduced on 1 July 2003, Queensland delayed its introduction to allow industry time to undertake training and education.

In Queensland, a 3.5-star standard applied in NCC climate zones 1 (tropical), 2 (subtropical) and 3 (hot arid), while a 4-star rating applied in climate zone 5 (warm temperate) (refer to Appendix D).

5-star houses (1 March 2009 – 30 April 2010)

Queensland adopted the 5-star standard for houses on 1 March 2009, which applied statewide.

Although the higher national standard had commenced on 1 May 2006, Queensland delayed its introduction due to concerns about what impact the standard would have on new houses being appropriately designed for the climate, and on concrete block houses prevalent in North Queensland. These issues were subsequently addressed through amendments to the BCA 2008, with changes made to the density and total R-value required with concrete masonry for walls.

- *Introduction of optional credits for an outdoor living area*

An optional credit of up to 1-star was introduced under QDC 4.1 to support the 5-star standard as it reflected Queensland's housing design and lifestyle. The credit of 1-star became available for inclusion of a compliant outdoor living area, such as a covered verandah with a ceiling fan, or a credit of ½-star without a ceiling fan. The credit was gained if the design was assessed using software for compliance and only applied in NCC climate zones 1 (tropical) and 2 (subtropical) (refer to Appendix D).

The outdoor living area optional credit was introduced as NatHERS software only models the thermal performance of the dwelling's building shell (roof, walls, windows and floor). In practice, this meant a house design could have a 4-star software rating (building shell) and include a compliant outdoor living area with ceiling fan to gain the 1-star credit, thereby achieving compliance with 5-star energy equivalence.

6-star houses (1 May 2010 – 30 April 2024)

The 6-star rating applied statewide to new houses and townhouses between 1 May 2010 to 30 April 2024. The following aspects also applied during this time:

- *Introduction of additional optional credit for photovoltaic (solar) energy system*

Optional credits were introduced for inclusion of a photovoltaic (PV) solar energy system (1-star) and these applied statewide (in addition to those for an outdoor living area).

The house's building shell had to meet a minimum baseline rating (i.e. rating for the building shell only without any optional credits) as specified in QDC 4.1. The minimum baseline rating was dependent on the assessment method used (software or elemental (DtS)) and relevant NCC climate zone. In NCC climate zones 1, 2 and 5, a minimum baseline rating of 4.5-stars was required, and in climate zone 5, 5-stars was required.

- *Inclusion of cooling and heating load limits with star rating (1 March 2021)*

Reflecting the NCC requirement, QDC 4.1 introduced separate heating and cooling annual load limits when using the house energy rating software method (star rating) to comply with the residential energy efficiency requirements. The load limits were an additional requirement with the dwelling's star rating, and apply in particular locations for both concrete and timber floors. The load limits improve the year-round performance and occupant comfort of the dwelling by ensuring they are designed to be neither too hot in summer nor too cold in winter.

NatHERS improvements – 1st generation and 2nd generation software tools

In 2003, NatHERS software tools were first introduced as a compliance option with the commencement of the BCA's energy efficiency housing standards. These tools are commonly referred to as '1st generation' software.

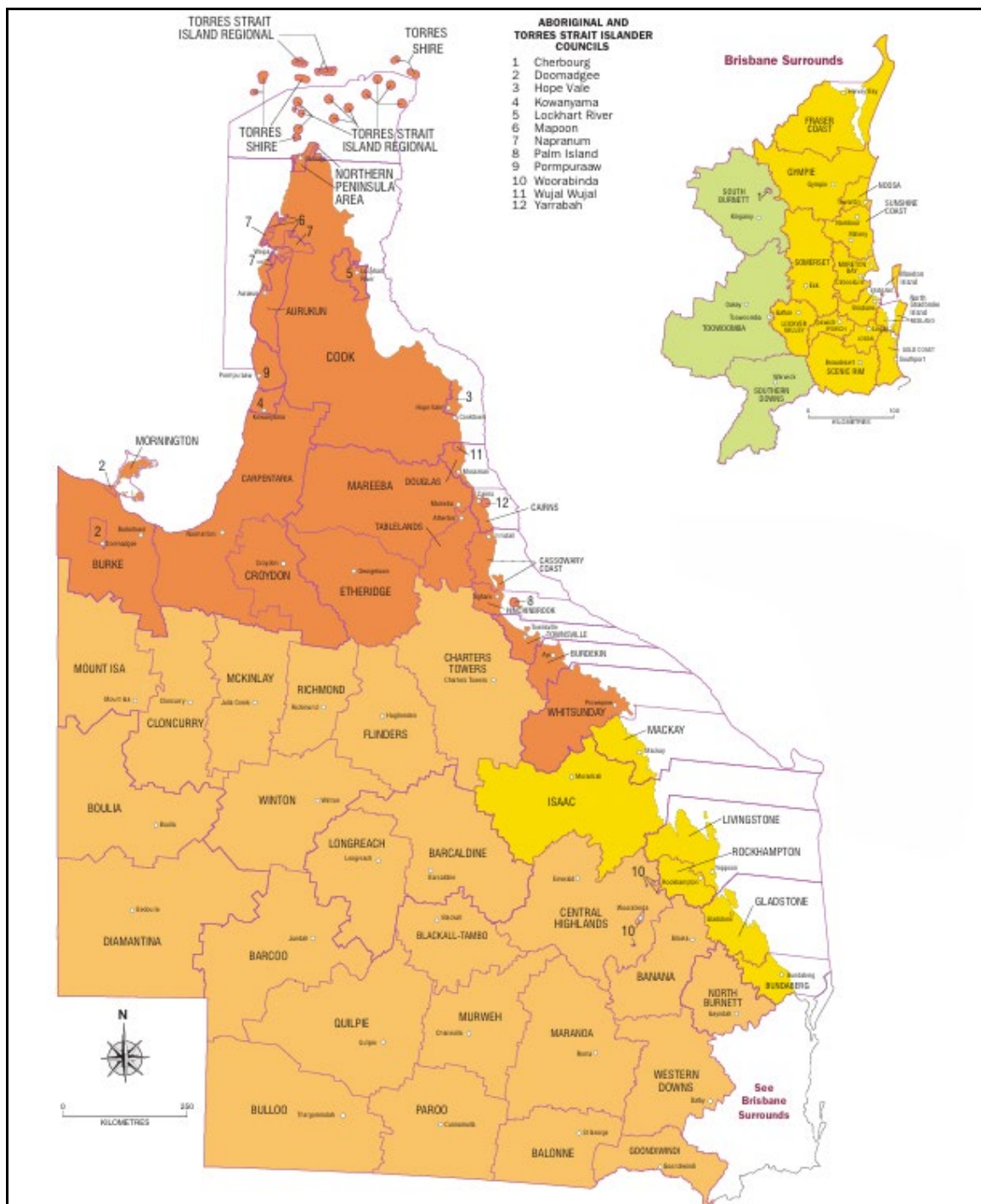
Since then, NatHERS software tools have been continually improved to enable better modelling of housing design across all Australian climates. The 1st generation software tools were phased-out from 2006 and superseded by '2nd generation' tools. These were subsequently included with BCA 2009.

Improvements with 2nd generation software provided more realistic modelling of the benefits of natural ventilation and the cooling effects of ceiling fans, heat flows in underfloor and roof spaces and between attached dwellings. These changes were particularly relevant to Queensland as 2nd generation tools more appropriately reflect the prevailing climatic conditions and housing designs. The 2nd generation tools also expanded the number of NatHERS reference locations nationally from 28 to 69 climate files.

It is important to note that a star rating gained from a currently approved 2nd generation software tool will most probably differ from a star rating gained from using a 1st generation tool i.e. pre-2009.

In 2024, changes were made to NatHERS software to support NCC 2022 residential energy efficiency requirements. These included updating the NatHERS climate files with more recent climate data (1990 to the end of 2015, instead of 1970 to 2005); updating of star bands, which required no net impact on average across Australia for representative house designs; and introduced the separate whole-of-home energy budget to cover major fixtures and appliances (with a score out of 100).

Appendix D: Map of Queensland's NCC climate zones



Source: Australian Building Codes Board (ABCB) Climate Zone Map. Licensed under CC BY 4.0.

BCA climate zone*	Prevailing climatic conditions
Zone 1 – Tropical	Hot humid summer, warm winter.
Zone 2 – Subtropical	Warm humid summer, mild winter.
Zone 3 – Hot arid	Hot dry summer, warm winter days and cold nights.
Zone 5 – Warm temperate	Warm summers, cold winters.

* BCA climate zone boundaries are based on current local government areas. Note: Queensland does not have an area covered by BCA climate zone 4.

To check for a specific location, see the ABCB's [Interactive climate zone map](#).

Appendix E: Checklist for a home renovation

☐	• Research – get ideas for your renovation from various sources such as local examples around your neighbourhood, home shows and display homes, as well as websites. See how energy efficiency features and livable housing design could be included for your project and discuss ideas further with relevant professionals.
☐	• Budget – consider your budget and the maximum price you can afford for the renovation. • Check if your finance institution offers a 'green loan' for energy efficient renovation that has a lower interest rate.
☐	• Quotes – obtain quotes from building designers or architects who are experienced in energy efficiency and livable housing design to design your renovation. Quotes will also be required from other professionals including builders, building certifiers, house energy assessor, structural engineer, electrician, plumber, and painter. Carefully review their scope of work and ensure that their registration or licence details are appropriate and current. For large and complex renovations, an access consultant may be able to assist with recommending mandatory and desirable livable housing features to include in the design.
☐	• Contracts – confirm the scope of work with the selected builder and associated professionals. • All domestic building work, including home renovations, priced over \$3300 will require a written contract and will be covered by the Queensland Home Warranty Scheme. If the work is priced over \$20,000, the QBCC's 'Consumer Building Guide' must be provided before the contract is signed for domestic building work. The guide also includes major building issues and how best to avoid disputes.
☐	• Site analysis – shows various aspects of the property that can influence the renovation's design e.g. boundary setbacks. It identifies the existing home's context with neighbouring properties and buildings, its orientation, prevailing breezes, slope (contours), solar access, and utility services like gas, electricity, water supply and sewage, and stormwater drainage. The contour plan can assist with determining step-free access to the house through the front door or garage. Identification of load bearing walls within the existing dwelling can assist when considering opening up the floor area for better space utilisation (e.g. open plan), with wider doors for access.
☐	• Project brief – work-up the renovation's design concept and details with your design team. While some energy efficiency and livable housing features may add cost to the project, they can provide ongoing savings by pre-planning and building for the future needs. • Confirm if the renovation will be less than or greater than 50 per cent of the existing home. If it is greater, ask the building certifier about the upgrades that may be required to the existing home. • Confirm the preferred assessment method for the renovation to comply with the 7-star rating e.g. software assessment or elemental (DtS) provisions. • For project management purposes, confirm who is the 'Principal Consultant' and 'Principal Contractor,' as well as any sub-contractor(s) to be used throughout all stages of construction.
☐	• House plans – confirm the renovation's design and specifications against the project brief, including all energy efficiency and livable housing features. Where relevant, the house plans also need to identify any upgrades to be made to the existing home. Make changes to the renovation's plans as required. • If the software method is used, confirm the existing home with the renovation meets the calculated required star rating (Rsr). The house energy assessor will assess the two designs (without and with the renovation) and provide the NatHERS Certificates showing their respective star ratings. • If the elemental (DtS) provisions are used, confirm the relevant provisions of the NCC have been fully incorporated to the renovation's design. • The building certifier typically requests a building 'Form 15–Design or specification' from the energy assessor ('competent person') and, where relevant, another one for its structural aspects from an engineer.
☐	• Building development approval – submit the documentation including the final house plans to the building certifier and/or local government, and obtain all required building and/or planning approval(s).
☐	• Construction phase – confirm the start date with builder and timing for other professionals to be on-site, and thereafter when all construction is undertaken. • Construction stages and relevant building aspects are monitored and inspected as required by the building certifier to ensure all building work complies with the approval documents including the renovation's plans e.g. level of floors, width of doors and corridors and reinforcing for grabrails (if included).
☐	• Building materials – confirm the exact specifications of all materials to be used (e.g. level of insulation ('R-value')) and window types, so the items installed are the same as those presented with the building approval.
☐	• Construction completed – obtain the approved building 'Form 21–Final inspection certificate' and all other inspection documents from the building certifier.

