

Heritage Buildings and Energy Efficiency Regulations

Purpose

To develop appropriate design strategies for the improvement of energy efficiency in heritage buildings to achieve the integration of sustainability and heritage conservation.

Objectives



Water conservation (Brod Street, DSE)

Placing tanks underground enhanced the energy efficiency without having an adverse impact on significant fabric.

To provide guidance on formulating design solutions for heritage buildings in order to satisfy the performance requirements of the Building Code of Australia (BCA) through:

- understanding how the energy efficiency requirements for different classes of buildings may be applied to heritage buildings
- recognising that the *BCA Deemed-to-Satisfy Provisions* may not be appropriate to heritage buildings
- understanding the scope for flexibility and employing innovative design solutions to achieve compliance
- considering cultural heritage significance in developing sustainable design solutions
- identifying solutions that optimise the traditional building performance
- including information on the Performance Assessment Report as part of an Alternative Solution
- incorporating Sustainability Measures as part of the Alternative Solution.

Introduction

In an effort to promote sustainable development, there are legislative requirements for building energy efficiency and water conservation in the *Building Regulations 2006*. The Regulations reference the *Building Code of Australia (BCA)* which contains many of the technical provisions that affect sustainable building work.

Any new building work (which includes alterations and additions) to a heritage building will have to comply with the Regulations. In some instances, where the building work exceeds 50% of the volume of the existing building, the existing building may also need to be brought into compliance.

Generally, the Regulations provide the Relevant Building Surveyor with discretion as to how these requirements are applied.

Just as changes to heritage buildings often require imaginative design solutions to retain their cultural significance, it is possible to develop alternative design strategies to the *BCA* prescriptive measures provided they meet the required level of performance.

This Technical Leaflet provides a basic understanding of the relevant parts of the Building Regulations and the *BCA* relating to energy efficiency, and ways in which alternative performance-based assessments may be achieved when carrying out building work on heritage buildings in Victoria.

1. Building Classification

The *BCA* establishes a classification system for all buildings. Any heritage building can be defined as a particular Class or multiple Class building. Single dwellings and boarding houses, guest houses, hostels or similar (which have a total floor area less than 300 m² and in which no more than 12 people permanently reside) are considered as Class 1a or 1b building. All other buildings fall within Classes 2 to 10. It is important that the classification of the heritage building is ascertained prior to considering any works, as there are different sustainability requirements for Class 1 and 10 and Class 2 to 9 buildings respectively.

2. Building Code of Australia (BCA)

The *BCA* is adopted by the *Building Regulations 2006* and essentially contains the minimum technical requirements for constructing buildings in Victoria. The *BCA* consists of two volumes:

- Volume One – applies to Class 2 to 9 buildings being residential and commercial buildings
- Volume Two – applies to Class 1 and 10 buildings being domestic construction
- The *BCA* is a performance based building code, which provides flexibility when designing buildings. The Performance Requirement is typically a broad statement of intent providing scope for innovation and must be followed in order to comply with the *BCA*.

In order to comply with the Performance Requirements the *BCA* allows for two alternative Building Solutions:

1. A Deemed-to-Satisfy Provision, which is a prescriptive “how to” requirement defined or referenced (such as a Standard) in the *BCA*.
2. An Alternative Solution, which is a design outside the Deemed-to-Satisfy Provisions (although an Alternative Solution may also include partial compliance with the Deemed-to-Satisfy Provisions).

Recycled material (Brod Street DSE)

Alteration to the heritage veranda and decking used recycled ironbark and monterey cypress timbers.



Sustainability Measures to Existing Class 1 Buildings

The *BCA* Volume Two requires all new building work including additions and alterations to existing dwellings (Class 1a and 1b buildings) to achieve an acceptable level of sustainability.

The *BCA* compliance methods for dwellings address the thermal performance of the building fabric, energy efficiency and water conservation. Compliance with the *BCA* can be achieved by:

1. Specifically complying with the prescriptive requirements in the *BCA* as defined in Part 3.12.
2. Developing an Alternative Solution assessed using a Verification Method which relies on computer modelling programs such as FirstRate and AccuRate to determine a minimum 5 Star standard.
3. Providing an Alternative Solution that demonstrates that the proposal meets the relevant performance requirements defined in Part 2.6 using an appropriate assessment method.
4. Seek a modification of the regulations from the Building Appeals Board, established under the Building Act 1993.

Energy Efficiency Measures to existing Class 2 to 9 Buildings

The energy efficiency provisions for residential and commercial buildings are contained in Section J, Volume One of the *BCA*. These requirements apply to all new building work and when considering the application of the energy efficiency provisions to existing buildings there are four options:

1. Specifically complying with the prescriptive requirements in Section J of the *BCA*.
2. Developing an Alternative Solution assessed using a Verification Method defined in Section J which relies on computer modelling programs. For Class 2 and 4 residential buildings FirstRate and AccuRate can be used, while for other commercial buildings more sophisticated modelling programs will be required.
3. Providing an Alternative Solution that demonstrates that the proposal meets the relevant performance requirements defined in Section J using an appropriate assessment method.
4. Seek a modification of the regulations from the Building Appeals Board, established under the Building Act 1993.

3. Performance Based Solutions and the Building Regulations 2006

From a heritage viewpoint, possibly the most beneficial way of achieving compliance for alterations and additions to existing heritage buildings is to develop an Alternative Solution. As previously discussed, the *BCA* provisions are performance-based, providing flexibility when determining the most appropriate design solution. Using this approach, the retention of perceived thermally inefficient building fabric for heritage reasons may be considered if it can be compensated by innovative design strategies.

As well as the use of the Performance Requirements in the *BCA*, Building Surveyors have discretion when considering the application of the *BCA* energy efficiency provisions to building work on an existing building under Regulation 608.

Regulation 608 is a particularly important regulation as it provides direction to the Relevant Building Surveyor on how to administer the Regulations and *BCA* in regards to alterations to an existing building. *Alterations* include internal building work, extensions and relocation of existing buildings.

Regulation 608 allows partial compliance with the legislation after consideration of:

- The structural adequacy of the building.
- The requirements necessary to make reasonable provision for:
 - The amenity of the building and the safety and health of people using the building; and
 - Avoiding the spread of fire to or from any adjoining building.

Where the building work includes an addition to an existing building, the Building Surveyor may only consent to partial compliance of the addition if the floor area of the addition is not greater than the lesser of:

- 25% of the floor area of the existing building; or
- 1000 m².

This Regulation may also require the existing elements of a heritage building unaffected by building work to comply with the new *BCA* provisions if the proposed alterations and additions are over 50% of the original building volume. This has the potential to adversely impact on the cultural significance of the heritage building. Compliance with the *BCA* energy efficiency measures may have an adverse impact on significant fabric, especially where they are contrary to the original building design. From a heritage perspective, the retention of the significant building fabric will often outweigh any potential benefit obtained from making changes to comply with the *BCA* Deemed-to-Satisfy Provisions. However, other sustainability measures should be considered as part of an Alternative Solution.

In considering an Alternative Solution, justification is required to substantiate why the proposed design meets the Performance Requirement. According to the Australian Building Codes Board, the Performance Assessment Report should include a written submission consisting of:

- building description
- the Deemed-to-Satisfy Provisions that are not being complied with
- the relevant *BCA* Performance Requirements
- *BCA* Assessment Method used.

The Performance Assessment Report should also include an analysis of the proposal and (where appropriate) consist of:

- methodology used
- proposed Alternative Solution
- calculations to support the Alternative Solution
- assumptions in the analysis
- conclusions justifying the Alternative Solution
- sources of information including specifications, relevant data and research upon which the Alternative Solution is based.

For heritage places, the Assessment Method for an Alternative Solution may include additional information such as:

- Why the *BCA* Deemed-to-Satisfy (DTS) Provisions are not appropriate. This needs to be justified by providing information that clearly shows that full compliance with the *BCA* DTS will have an adverse impact on significant heritage building fabric. The underlying cultural values of the building therefore need to be articulated and integrated as part of the analysis.
- An estimation of the embodied energy savings as a result of the retention and continued use of the existing heritage building. Assessment from first principles may be difficult and in many instances reference to authoritative texts will be sufficient.
- How the solution optimises traditional building performance.
- Estimated reduction in energy consumption. This may be valid in more complex projects where there is sufficient information to accurately estimate real energy use values.

In Victoria, the extent and type of reporting when preparing an Alternative Solution is at the discretion of the Relevant Building Surveyor issuing the building permit. Accordingly, it is essential that during preliminary design stages a suitably qualified building surveyor is consulted to determine the most appropriate strategy to preserve the integrity of the heritage building while satisfying the building legislation.

4. Building Commission Practice Note 2008-55

In relation to the *BCA*, the Building Commission Practice Note 2008-55 provides guidance to the community and building industry on how to comply with the requirements of the Regulations. Item 8.3 of the Practice Note is particularly relevant to heritage buildings. This guidance on the application of Regulation 608 introduces the concept of cost effectiveness; that is to say, the proposed solution must not be more expensive than the long-term benefit to the building.

The Practice Note also provides clear direction on changes to existing building fabric such as windows and walls. In many instances, because of the complexities of compliance, changes to existing elements to meet the provisions will be considered unreasonable. Although the Practice Note is not specific to heritage buildings, it introduces important design concepts that ultimately will assist the application of current *BCA* requirements in a logical and sympathetic manner for heritage buildings.

5. Sustainability Measures as part of the Alternative Solution

When preparing an Alternative Solution there are a number of energy efficiency and broader sustainability measures which can be utilised to achieve a compliant building.

The BCA Performance Requirements address both energy efficiency and, for Class 1 buildings, water conservation. In instances where building fabric targets cannot be achieved, it may be acceptable to offset these with increased water conservation or the use of more energy efficient services.

Solar power (Brod Street, DSE)

New interventions such as solar panels can reduce energy consumption but need to be located to minimise impact on heritage significance.



A number of energy efficiency options have been outlined in the Technical Leaflet: *Heritage Buildings and Sustainability*, which should be cross-referenced with this Technical Leaflet. Other options include:

- **Embodied Energy Conservation.** The embodied energy savings in the retained building fabric (in situ) may be considered. Evidence can include existing studies on the issue and, in some instances (where it is warranted), assessment based on sustainability software calculations. The data from the calculations should then be rationalised with other proposed energy efficiencies and the need to retain the significance of the heritage building. Refer to list of references on the recognition of embodied energy.
- **Optimising Existing Traditional Building Performance.** Many heritage buildings have very different thermal performance in comparison with more modern buildings. Optimising traditional building performance of existing heritage buildings could be considered as part of an Alternative Solution. For instance, the relationship between heavy mass inner and outer walls and lower internal temperature fluctuations over short periods mean that occupants' dependence on air-conditioning will be reduced.

- **Reducing Energy and Water Consumption in Existing Buildings.**
An Alternative Solution may include the installation of new sustainability measures such as energy efficient heating and cooling, hot water systems, water tanks and other components that may offset some of the less energy-compliant fabric and features of the heritage place.
- **Maximising Sustainability in New Work to Existing Buildings.** The *BCA* requirements for energy efficiencies and water conservation in new work to existing buildings can be complex and need to be considered with regard to the significance of the existing heritage fabric. Strict compliance with the *BCA* Deemed-to-Satisfy Provisions by altering heritage fabric to meet some or all of the more contemporary requirements should be considered as a last resort. There are other more benign design solutions that can be adopted which will not adversely impact heritage significance while simultaneously avoiding any additional energy or water consumption in the future through unnecessary remedial works.
- **Monitoring of Energy Consumption.** It may be possible to include a plan for monitoring future energy consumption as a result of the new work as part of the Alternative Solution.

Embodied Energy References

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General References

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For further information and assistance, visit our website at www.heritage.vic.gov.au

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