

Existing Buildings — Shed to Dwelling



The Performance Requirements of the National Construction Code (NCC) can be met using a Performance Solution, a Deemed-to-Satisfy (DTS) Solution, or a combination of both. The following demonstrates the performance-based design process, aligning with the ABCB's Performance Solution Process guidance document.

Scenario

A family wishes to convert an existing farm shed into a dwelling. The shed is located in a rural setting in a bushfire prone area. The shed is a conventional rectangular farm shed, consisting of steel portal frames with corrugated steel cladding. The building has large openings for vehicle access, a dirt floor and a ceiling height of 3.5 metres. The family wishes to retain the building structure and envelope and convert the interior into a two-level dwelling, complete with its own off-grid water, plumbing, drainage and electricity systems.



Prepare a performance-based design brief

What are the design objectives?

To convert a farm shed to a dwelling whilst maintaining the family's aspirations for the building. As per Part A6 in Section 1 of NCC Volume Two, the building will undergo a change in building classification to meet legislative requirements. This means changing the building from a non-habitable farm shed (Class 10a) to a habitable dwelling (Class 1a).

Who should be consulted?

The client, builder, architect, structural engineer and the regulatory approval authority (generally a building surveyor). In some instances, specialist consultants may also be relevant.

What is the basis of the Performance Solution?

As the project intends to convert an existing non-habitable building to a habitable building, the existing building presents constraints which do not meet DTS requirements related to health, safety, amenity and sustainability. The relevant NCC Volume Two Performance Requirements and DTS Provisions are identified and decisions made about the parts of the project that would use DTS Solutions or Performance Solutions. Compliance benchmarks are also defined and agreed.

What evidence is proposed?

The stakeholders prepare, and agree to, a table listing all the relevant Performance Requirements and possible DTS and/or Performance Solutions that are to be used to demonstrate compliance, which is used to identify relevant Assessment Methods and evidence of suitability. It is agreed that Expert Judgement and Verification Methods are to be used as the Assessment Methods. These include for:

- P2.1.1 (Structural stability and resistance) — Verification Method V2.1.1 (report and calculations from the structural engineer).
- P2.4.2 (Room heights) — Expert Judgement (report from the architect and ergonomics specialist).
- P2.4.4 (Lighting) — Verification Method (report from the architect, using a non-NCC Verification Method considering average daylight factors for the habitable rooms in the building).
- P2.4.5 (Ventilation) — Verification Method V2.4.5 (report from an indoor air quality specialist).
- P2.6.1 (Energy efficiency — Building) — Verification Method V2.6.2.2 (report from an energy efficiency expert).
- P2.7.5 (Buildings in bushfire prone areas) — Expert Judgement (report from a consultant bushfire specialist).

What DTS Provisions are used?

The DTS Provisions contained within Part 3.7 (Fire safety), Part 3.8 (Health and amenity), Part 3.9 (Safe movement and access), and Part 3.12 (Energy efficiency — Services) relate to Performance Requirements met using a DTS Solution to meet the relevant Performance Requirements.

What Performance Solutions are used?

Performance Solutions are used to comply with all or part of Performance Requirements P2.1.1 (Structural stability and resistance), P2.4.2 (Room heights), P2.4.4 (Lighting), P2.4.5 (Ventilation), P2.6.1 (Energy efficiency — Building), and P2.7.5 (Buildings in bushfire prone areas). The stakeholders, including the building surveyor, agree the compliance benchmarks for each.

Note: For brevity, the applicable Performance Requirements and DTS Provisions have been limited. When determining which Performance Requirements and DTS Provisions are applicable, consideration should be made to the latest edition of the NCC. This solution may also impact other Performance Requirements and DTS Provisions and must be considered in accordance with Part A2 of NCC 2019.

Documentation of the Performance-Based Design Brief (PBDB)

The architect collates the points identified and agreements reached as set out above, and circulates a draft PBDB for review. Once agreed, a final PBDB is issued to each of the stakeholders.



Carry out analysis

Which Assessment Methods are the most suitable and where can they be found?

Assessment Methods are listed in A2.2 of Part A2 in Section 1 of NCC Volume Two, and state that any Assessment Method, or a combination of them, may be used to determine that a solution complies with the Performance Requirements. In this scenario, Expert Judgement and Verification Methods are used as the Assessment Methods. Each of the design team and specialist consultants undertake any testing or modelling required, and prepare reports reflecting the results of this process. Design documentation is then prepared based on the information generated by this process.



Evaluate results

The design documents, test and modelling reports are collated by the architect and evaluated to ensure there are no conflicting issues, assumptions or details contained in the proposed Performance Solutions. In evaluating the reports, the architect found that the external wall system specified by the energy efficiency expert for thermal insulation purposes would not be compatible with the bushfire protection measures suggested by the bushfire consultant. As a result, a round table discussion is held to develop a solution appropriate for energy efficiency and bushfire purposes, keeping within the structural parameters expected by the structural engineer.

When the individual reports are finalised, the architectural drawings, specification and consultant reports are distributed to the stakeholder group for final evaluation. The purpose of the evaluation is to ensure all appropriate DTS Provisions and Performance Requirements have been satisfied. The architect obtains additional certification data from the manufacturer of the cladding product specified to address weatherproofing and condensation compliance.



Prepare a final report

Drafting and finalisation of the report

The architect, having collated and evaluated the results, then prepares and distributes a draft report to the stakeholders for final review. On confirmation that the report accurately reflects the work done, a final report is generated for issue with the final submission. The report documents the overall building and its compliance with the relevant Performance Requirements. This report includes:

- The scope of the solution, stakeholders involved and methodology used as set out in the PBDB. This section also contains a note outlining that there is a change in NCC building classification.
- A table outlining how the Performance Requirements are to be met —using a DTS Solution, a Performance Solution, or a combination of both.
- Individual consultant reports including calculations, testing, modelling, and any other supporting documentation. Each individual report as a minimum identifies the applicable Performance Requirements, whether a DTS Solution, Performance Solution or combination is used, and which Assessment Method/s are used to demonstrate compliance, together with the qualifications and experience of the person providing any certificates or reports as Expert Judgement.
- A set of architectural drawings and specifications which include requirements on how the relevant DTS and Performance Solutions must be implemented.
- Confirmation that the solutions demonstrate compliance.

What should be in the final submission?

- The final report produced by the architect.
- Any design documentation required to be provided pursuant to local legislation.
- Any documentation requested or required by the regulatory approval authority.