

Enabling Prefabricated Timber Building Systems

for Class 2-9 Buildings

Prepared for *Forest Wood Products Australia (FWPA)* by the Centre For Sustainable Architecture with Wood (CSAW).

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- Executive Summary & Introduction
- Construction & the Matrix of Prefabrication
- Prefabrication in Class 2-9 Building in Australia
- Current Prefabricated Timber Supply Chain
- Drivers Enabling Prefabricated Timber Building Systems
- Barriers to Enabling Prefabricated Timber Building Systems
- Case Studies
- Recommendations

Webinar Overview



- ***Drivers for*** and ***barriers to*** the increased use of ***Prefabricated Timber Building (PTB)*** systems
- *Increasing number of innovative PTB systems – suggests ongoing growth potential*
- *NCC 2016 allows Fire Protected Timber in mid-rise construction*
- *Growing awareness - Several tier one and two builders now build using PTB systems*
- *Market-ready PTB systems remain in formative stages*
- *Opportunity to leveraged of timber's well established benefits:*
 - ***Strength to weight ratio***
 - ***Design and construction flexibility***
 - ***Environmental benefits***
 - ***Prefabricated timber construction suits:***
 - ***Brownfield suburban & inner city sites***
 - ***Restricted access sites***
 - ***Sloping sites***

Project Introduction



Design:

'Prefabrication is not just about the making, both the architectural and engineering design intent and processes are paramount and must be considered'

Location:

'Manufacturing or the act of making pre-determined elements must be away from the final destination/position in a building or structure. This could be on the same site or at another location off site'

Purpose:

'Prefabrication is not the manufacture of 'blanks' but rather specific pieces intended for a specific task or series of tasks in a particular building or structure'

Singular Item or Entire Assembly:

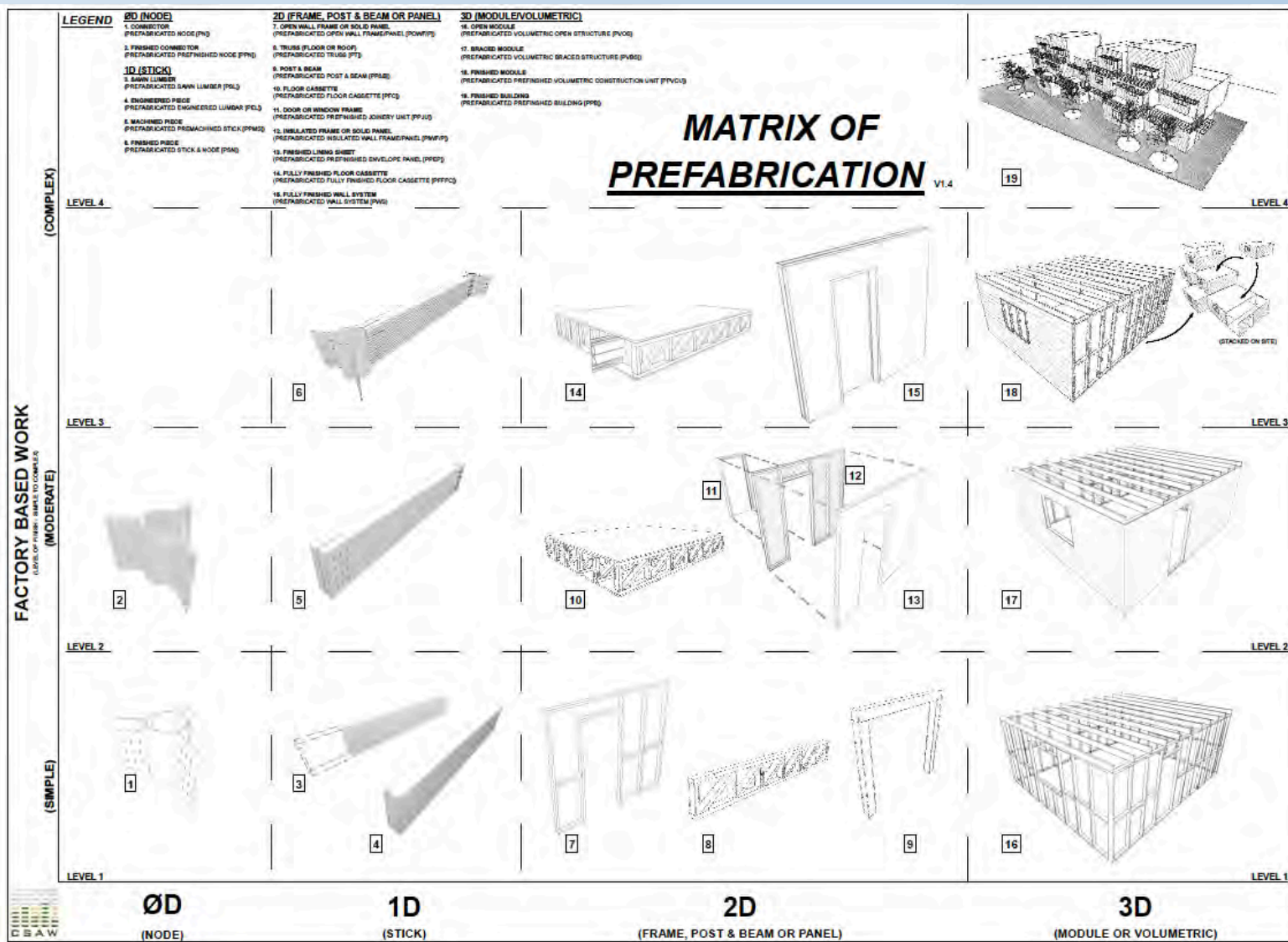
'The item being prefabricated can be a single component or an entire assembly of component'

Simple to Complex:

'Components or assemblies of components can vary in their complexity relative to the entire structure. They can form part of a structure or the entire structure'

The design and off-site manufacture of a *project specific component, assembly or system* that is utilised, in part or as a whole, to build a structure.

Prefabrication in Construction



Prefabrication Matrix





FACTORY BASED WORK

(LEVEL OF FINISH - SIMPLE TO COMPLEX)

(SIMPLE)

x

LEVEL 1

ØD
(NODE)

LEVEL 2

1



2

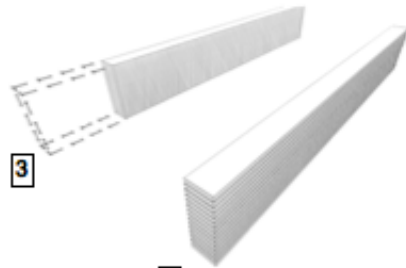


LEVEL 3

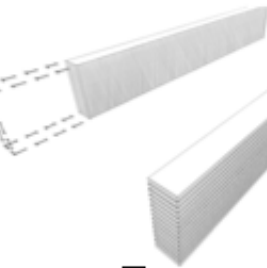
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1D
(STICK)

3



4



5



6

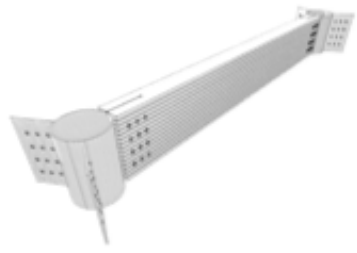
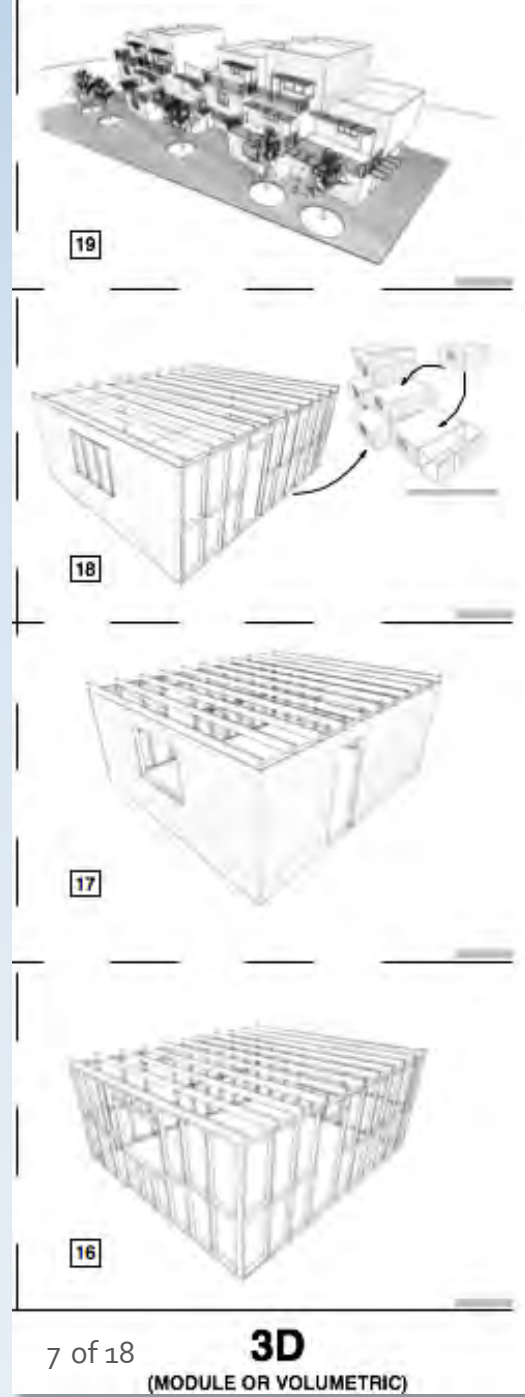
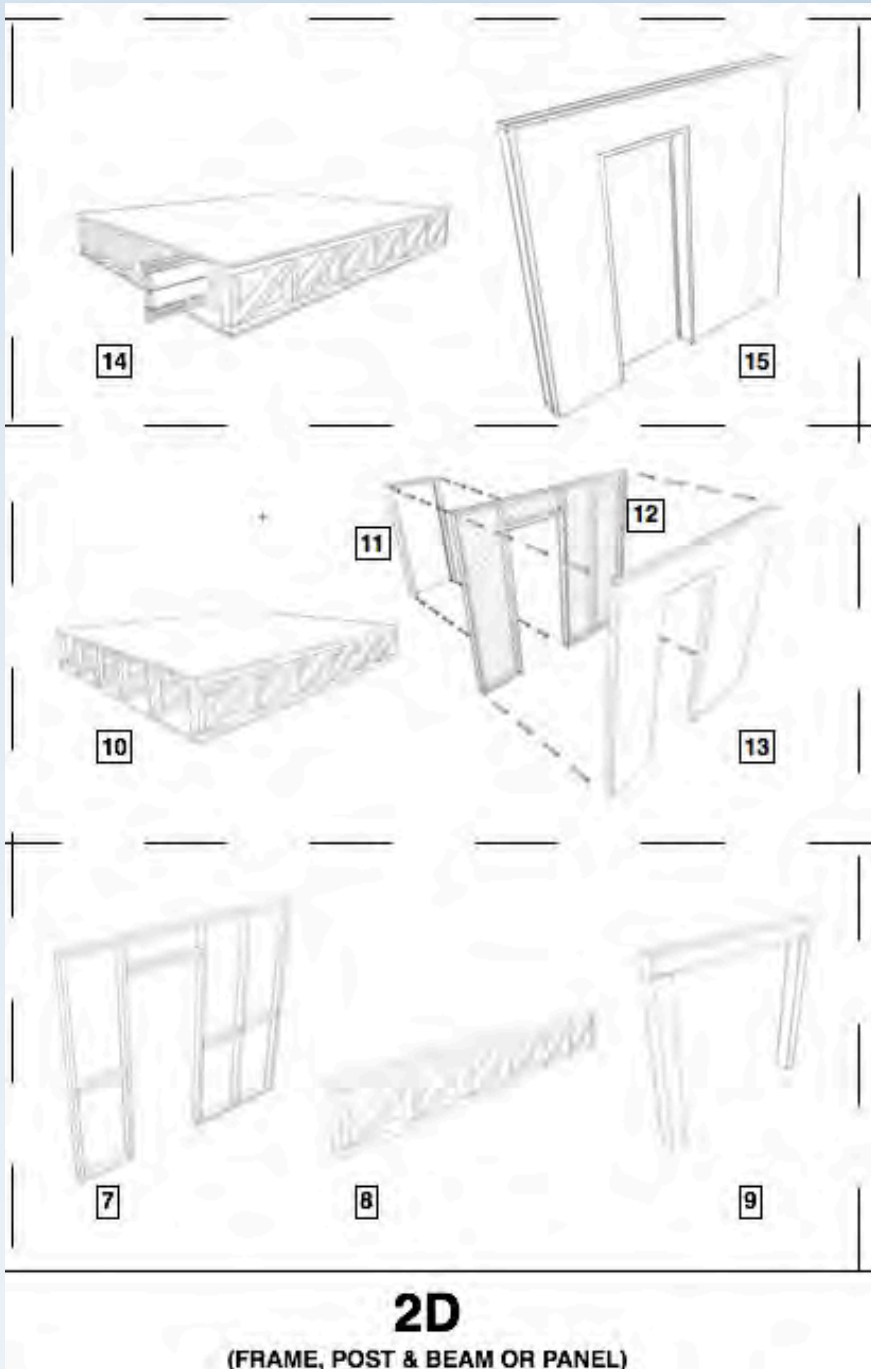


Image Credit: pinterest.com/explore/wood-features/







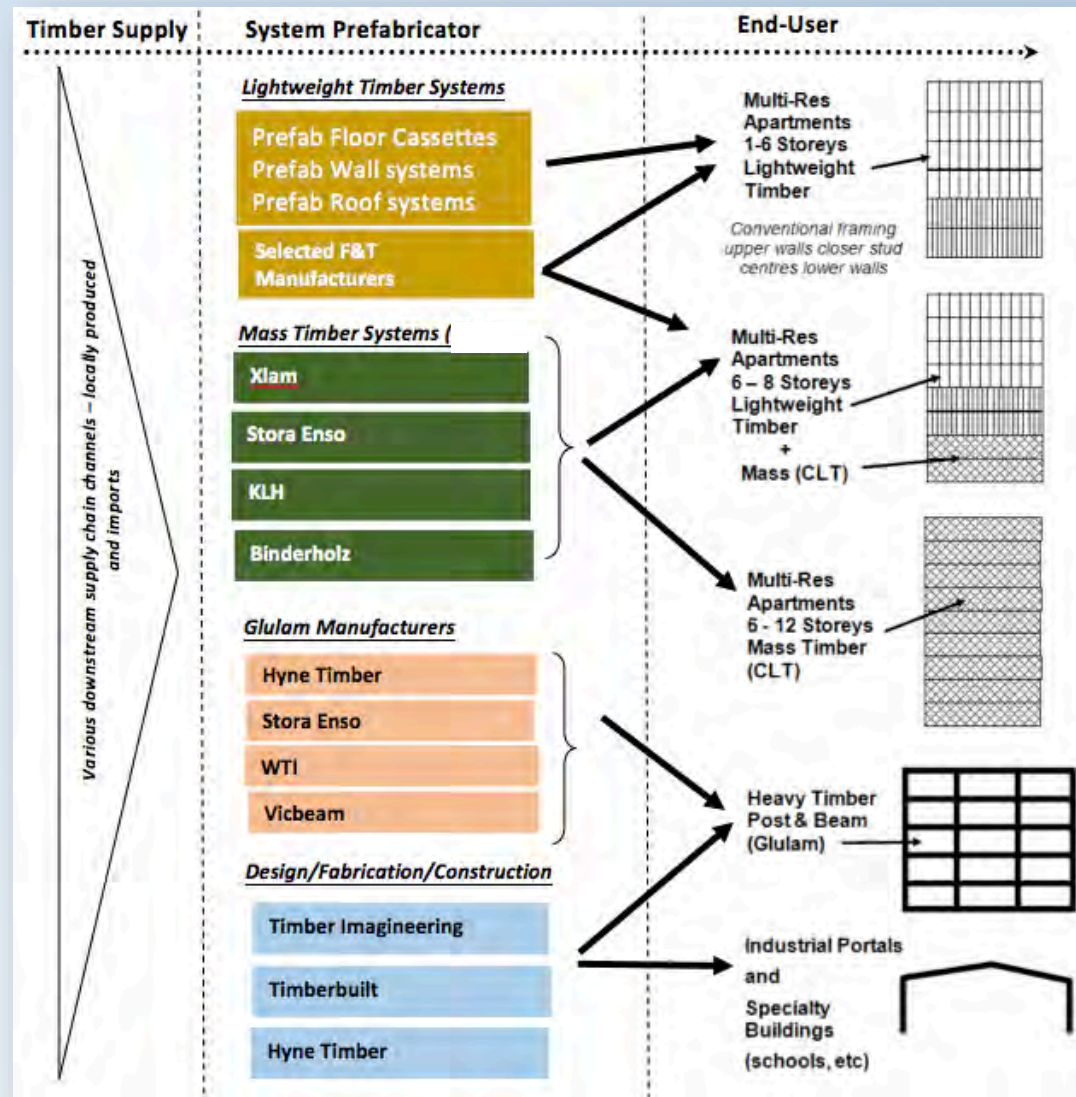
Forte` Living - Docklands



The Green - Parkerville

Prefabrication in Class 2-9 Buildings





Prefabricated Timber Supply Chain

- D1 – Cost & efficiency advantages over traditional alternative construction methods
- D2 – Inherent quality manufacturing & site impact advantages of prefabricated timber construction systems
- D3 – Increases in medium density dwelling construction in urban infill areas
- D4 – 2016 NCC 'Fire Protected Timber' Deemed-to-Satisfy provisions for Class 2, 3 & 5 buildings
- D5 - Timber's inherent structural, fire, thermal and acoustic properties
- D6 – Interest in environmentally friendly materials and wood encouragement policies
- D7 - Increased interest in using low-grade wood resource in higher strength engineered wood products
- D8 – Governments encouraging innovation and off-site manufacturing and prefabrication
- D9 – Building Information Modelling (BIM) and digital manufacturing
- D10 – Increased training & education opportunities in prefabricated systems design, manufacture and supply
- D11 – Established heavy lifting and transport logistics industry

Drivers to Enabling Prefabricated Timber



B1 – Risk to existing businesses

B2 – Financial models

B3 - Timber industry's interest and capacity to supply

B4 - Industry fragmentation and lack of coordination

B5 – Competition with other materials

B6 - Establishing a culture of prefabrication

B7 – Perceptions of timber and prefabricated systems

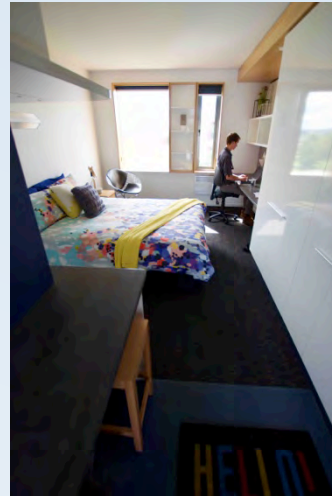
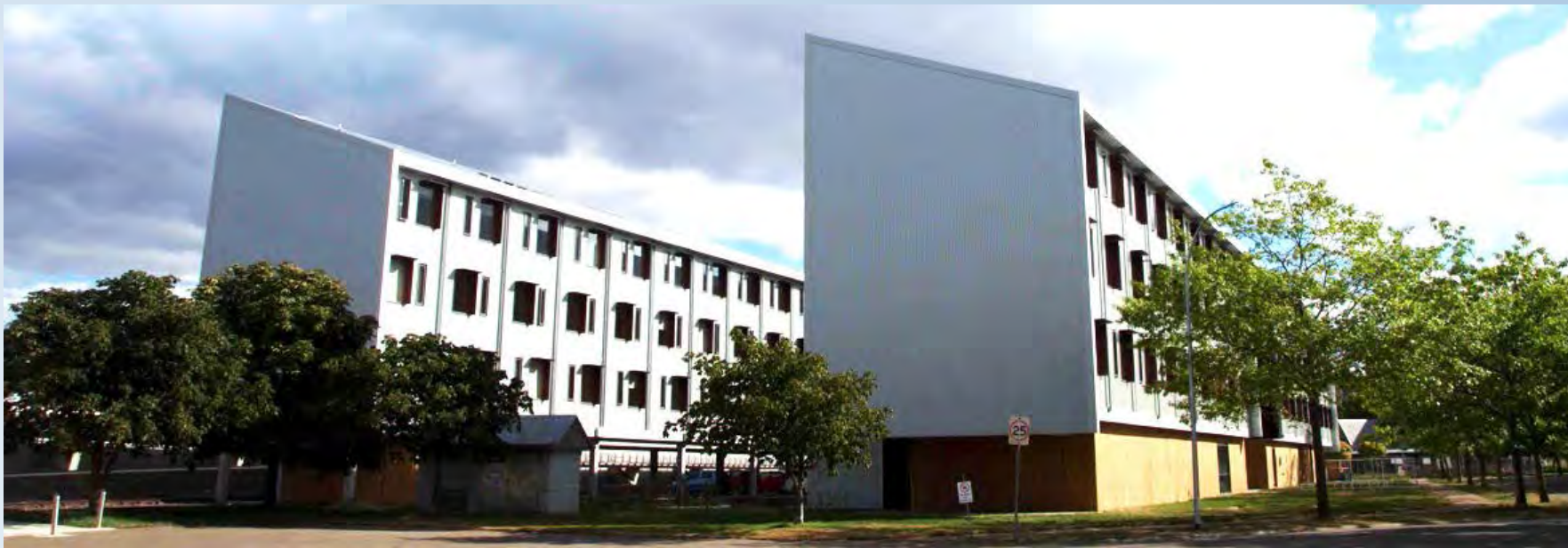
B8 – Costs in establishing prefabrication facilities

B9 – Australia's geography and isolated populations

B10 - Research and knowledge sharing

Barriers to Enabling Prefabricated Timber





Production/Installation:

- Approximately 9 months

Unique features:

- Fully finished timber framed prefabricated modules
- CLT corridors and flooring in all upper level public areas
- Nail plate roof trusses assembled with roof cover on ground

Case Study- NRAS Inveresk – UTas Student Accommodation





Case Study- NRAS Inveresk – UTas Student Accommodation

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Image Credit:
danda.be/gallery/btv_wolfurt/3/



Case Study- NRAS Inveresk – UTas Student Accommodation

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Unique features:

- Bespoke prefabricated modular buildings with a focus on design quality
- Timber and steel framed volume modules
- Potential to be demounted and relocated

Case Study- Caulfield Grammar – The Learning Project



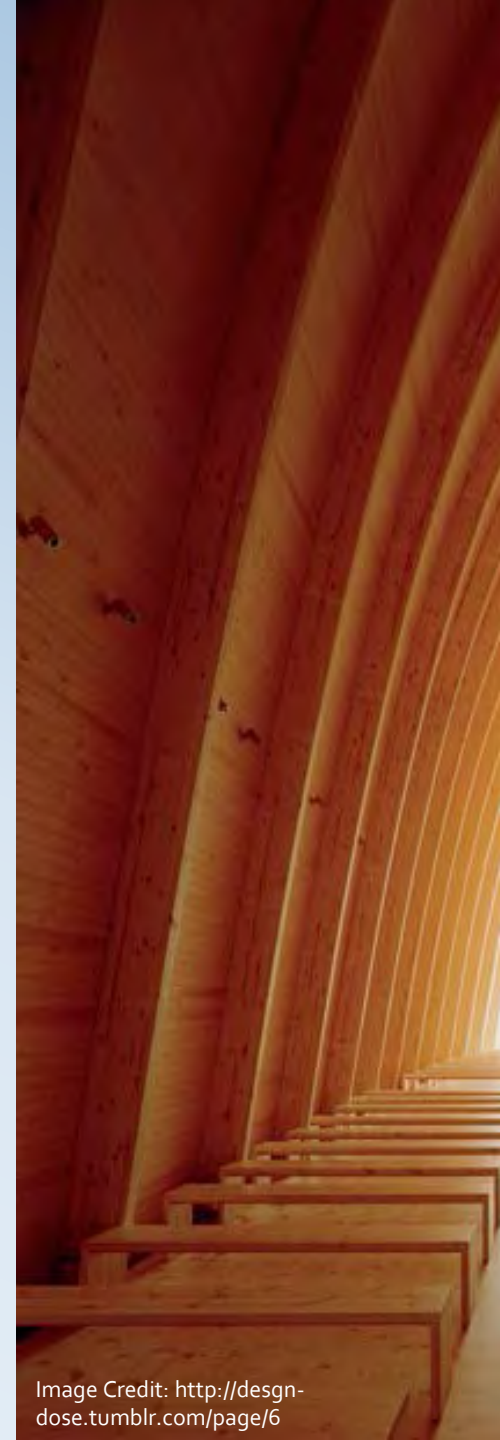
Case Study- The Green

Unique features:

- Five storey building with 57, 1, 2 & 3 bedroom apartments
- 'Hybrid' construction utilising Tecbeam timber cassette floors, prefabricated wall frames and SIPS external cladding
- Overall project cost was 25% lower than traditional construction
- Largest floor cassette – 2.7m x 8m
- Most prefabricated wall frames were 3.6m long
- Sub-contractors sourced from residential sector
- Appears as a traditional rendered multi-storey building

- R1 - Class 2-9 Prefabricated Timber Systems Market Implementation Group
- R2- Network and leverage technical support and promotion with other system component suppliers
- R3 - Assist Truss and Frame manufacturers to expand
- R4 - Urban densification developer
- R5- Increase technical support for design professionals, builders and prefabricators
- R6- Develop a database of current timber-wise design professionals
- R7 - Regular industry site visits to new Class 2-9 buildings
- R8 - Develop detailed case studies of all significant new Class 2-9 projects constructed
- R9 - Encourage the use of Building Information Modelling (BIM)
- R10 - Support value-adding research into out-of-grade softwood and plantation hardwood resource
- R11- Actively support the off-site and prefabrication sector
- R12- Encourage R&D and University Centres of Excellence
- R13 - Expansion of NCC DtS Provisions to other commercial building classes and taller builders

13 Recommendations



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