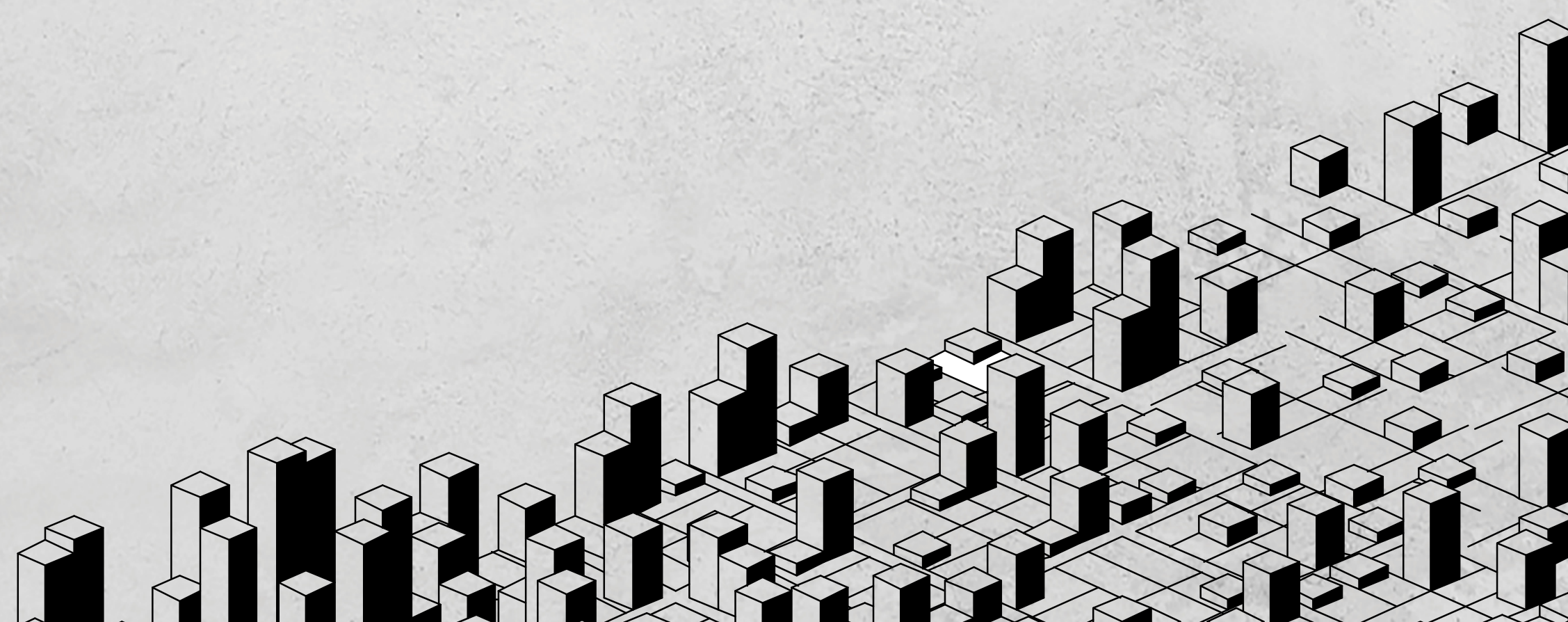# Active and Completed Projects

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Projects Snapshot

People, Practices and Culture

#17 The Implications and Opportunities from Industry 4.0 for the Building Industry
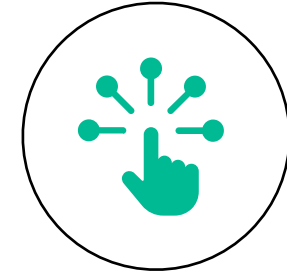
AMGC, all CRC parties, Monash University, Queensland University of Technology, University of Melbourne

#30 Critical Path IMPACT through Productisation

Lendlease Digital, Monash University, The University of Melbourne

#35 Prefab Housing Solutions for Bushfire & Disaster Relief

AMGC and Prefab Innovation Hub, Various Building 4.0 CRC Industry Partners, Monash University, The University of Melbourne, Queensland University of Technology

Digitalisation

 # 1 ePlanning and eApprovals – Scoping Study

Lendlease Digital, uTecture, Sumitomo Forestry, A.G.Coombs Group, Salesforce.com,Inc., Master Builders Association of Victoria, Victorian Building Authority, Victorian Government, Department of Environment, Land, Water and Planning, Monash University, The University of Melbourne

#2 Automated tracking of construction materials for improved supply chain logistics and provenance – Phase 1 Scoping Study

BlueScope Steel, Holmesglen Institute, Lendlease Digital, Monash University, Queensland University of Technology, Salesforce.com,Inc., Sumitomo Forestry, Master Builders Association of Victoria, The University of Melbourne, Victorian Building Authority, Ynomia

 # 3 Projects to Platforms: Investigating New Forms of Collaboration – Scoping Study

A.G. Coombs, BlueScope Steel, Hyne & Son, Lendlease Digital, Monash University, Sumitomo Forestry, The University of Melbourne

 # 4 Computational Design and Optimisation Tools for Prefabricated Building Systems – Phase 1 Scoping Study

M-Modular, The University of Melbourne, Queensland University of Technology

 # 6 Field data collation to support real-time operational management

Lendlease Digital, Ynomia, Standards Australia, Monash University, Queensland University of Technology, The University of Melbourne

#12 VR/AR Technologies in Vocational Education and Training (Scoping Study)

Holmesglen Institute, Master Builders Association of Victoria, Monash University, Queensland University of Technology

#22 Generative design and BIM-based Design Automation methods for Steel Framed Buildings – Phase 1 Scoping Study

BlueScope Steel, The University of Melbourne, Queensland University of Technology

 # 46 Data analytics for structural fibre resources optimisation

Hyne & Son and Queensland University of Technology

Projects Snapshot

Sustainability

 # 5 Automatic compliance and energy rating system

uTecture, Green Building Council of Australia, The University of Melbourne, Monash University, Queensland University of Technology

#11 Environmental Credentials for Building Technology Platforms

uTecture, Coresteel, Monash University

#18 Long-Span Low-Carbon Floor Systems

Lendlease Digital, Sumitomo Forestry, Monash University, The University of Melbourne

 # 27 Environmental Decision-Support for Structures

BlueScope Steel, Monash University, The University of Melbourne

Industrialisation

#8 Prefab, Integrated Wall Systems - Scoping Study

Bentley Homes, Ultimate Windows, The University of Melbourne, Monash University

#9 Implementing DfMA and Lean in Construction: Best Practice Guidelines through a Study of Building Services and Structure

A.G. Coombs, Lendlease Digital, Monash University, The University of Melbourne

#10 Product Platform for Volumetric Building (Scoping Study)

Fleetwood Building Solutions, Monash University

#19 Hybrid Timber-Steel Structural Systems for Mid to High Rise Buildings – Phase 1 Scoping Study

BlueScope Steel, Hyne & Son, Monash University, The University of Melbourne, Queensland University of Technology

#20 Systems and methods for robustness of mid-rise light gauge steel (LGS) buildings – Phase 1 Scoping Study

BlueScope Steel, The University of Melbourne, Monash University

#23 When prefab hits the ground: Barriers and opportunities in the Australian housing market

Fleetwood Building Solutions, Sumitomo Forestry, Monash University, Queensland University of Technology

#25 Operational Excellence framework of steel fabrication and processing in the OSM and prefabrication sector (Phase 1)

BlueScope Steel, Fleetwood Building Solutions, Monash University, The University of Melbourne, Ynomia

#26 New materials for windows of the future

Ultimate Windows , Monash University

#28 Componentised Internal Wall Systems for Multi-residential Applications

Lendlease Digital, Monash University, The University of Melbourne

**#31 Demystifying Volumetric Construction: A Study of the Bathroom Pod**

Lendlease Digital, Monash University, Queensland University of Technology, The University of Melbourne

#34 Acoustic flanking performance of mid-rise Light Gauge Steel (LGS) structures – Phase 1 Scoping Study

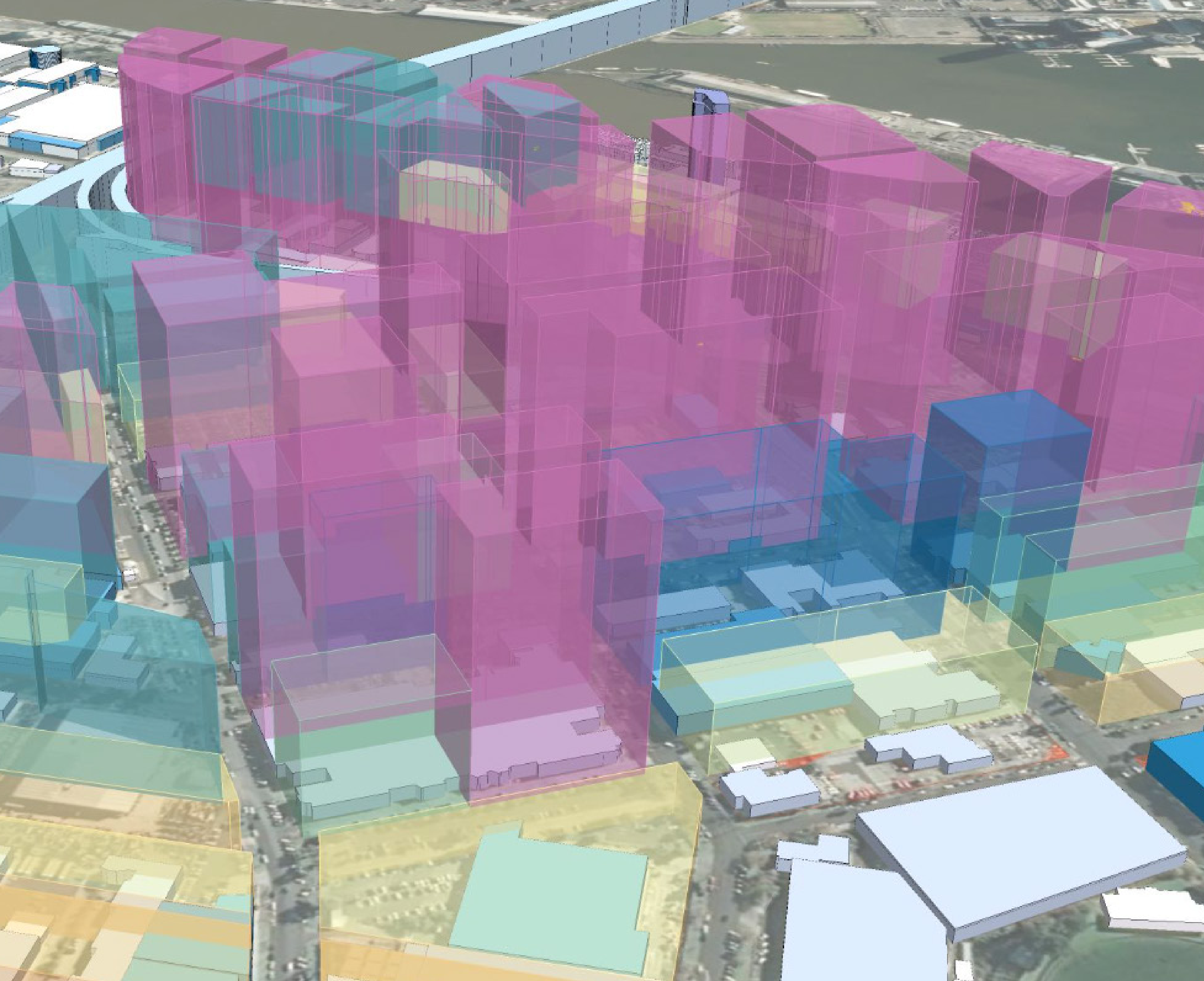BlueScope Steel, Monash University, The University of Melbourne

#42 Workflow Automation Tools for Home Designs Phase 1 Scoping Study

Bentley Homes, M-Modular, The University of Melbourne, Queensland University of Technology
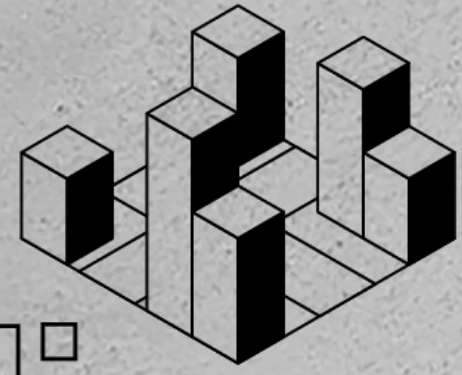
Active Projects

Project Number
#1

Project Title
ePlanning and eApprovals – Scoping Study

Focus Area
Digitalisation

Date Commenced and Duration
22 March 2021; 6 months

Project Parties
Lendlease Digital
uTecture
Sumitomo Forestry
A.G.Coombs Group
Salesforce.com,Inc.
Master Builders Association of Victoria
Victorian Building Authority
Victorian Government, Department of Environment, Land, Water and Planning
Monash University
University of Melbourne

Project Overview
Planning and building approval processes are still largely paper (PDF) based, which make them inefficient and time-consuming, imposing significant costs on both industry and government. Industry is effectively unable to test plan compliance against planning controls and building regulations, track progress of their applications, and efficiently track compliance through construction.

The longer-term objective of the CRC's work in this area is to embrace the opportunities that digital workflow and digital twin technology provide to design, develop and deliver an innovative digital platform to facilitate effective, efficient and timely planning, building permits, approvals, ongoing compliance with planning controls, building regulations and other regulatory requirements.

Project Number
#2

Project Title
Automated tracking of construction materials for improved supply chain logistics and provenance – Phase 1 Scoping Study

Focus Area
Digitalisation

Date Commenced and Duration
July 2021; 6 months

Project Parties
BlueScope Steel
Holmesglen Institute
Lendlease Digital Australia Pty Limited
Monash University
Queensland University of Technology
Salesforce.com, Inc.
Sumitomo Forestry
Master Builders Association of Victoria
The University of Melbourne
Victorian Building Authority
Ynomia

Project Overview
Recent highly publicised building failures have been compounded by an inability to trace non-conforming materials. Further, project performance is limited by a lack of supply chain visibility.

New modes of data capture are required to register compliance, track materials to site, track construction progress, and provide ongoing traceability.

This project will investigate the building supply chain and assess tracking technologies for sectoral appropriateness. Recommendations for the implementation of automated material tracking will seek to improve project performance and establish provenance data. Technologies will be assessed against a sectoral shift towards smart contracts and an ecosystem- based, rather than linear, supply chain.

Project Number
#3

Project Title
Projects to Platforms: Investigating New Forms of Collaboration – Scoping Study

Focus Area
Digitalisation

Date Commenced and Duration
September 2021; 12 months

Project Parties
A.G. Coombs
BlueScope Steel
Hyne & Son
Lendlease Digital
Monash University
Sumitomo Forestry
The University of Melbourne

Project Overview
Construction practice is rooted in project-based thinking as organisations use temporary teams to create one-off products in response to unique and changeable site conditions.

As a result, product platforms have begun to emerge in construction. However, the introduction of broader, platform-based business models promises fundamental and holistic change to traditional construction.

Such business models leverage a combination of strategies in terms of product and process that require investigation, definition, critique, and adaptation for their potential use in construction.

This project examines construction's disparate ecosystem to consolidate the broader network of actors through an examination of industry-wide business-level platforms.

Project Number
#9

Project Title
Implementing DfMA and Lean in Construction: Best Practice Guidelines through a Study of Building Services and Structure

Focus Area
Digitalisation

Date Commenced and Duration
June 2021, 6 months

Project Parties
A.G. Coombs
Lendlease Digital
Monash University
The University of Melbourne

Project Overview
The use of Design for Manufacture and Assembly (DfMA) and Lean production principles in construction projects can lead to reduced construction costs and time, minimised waste and risk, while also improving quality and safety.

However, attempts to implement these approaches in the Australian building industry have not yet delivered their full potential benefits.

This project will investigate the major challenges and opportunities for the effective implementation of DfMA and Lean production principles in construction, specifically through the lens of coordinating building structure and services. The project will identify and develop best practice guidelines for further testing in future projects.

Project Number
#10

Project Title
Product Platform for Volumetric Building (Scoping Study)

Focus Area
Industrialisation

Date Commenced and Duration
October 2020, 12 months

Project Parties
Fleetwood Building Solutions
Future Building Initiative, Monash University

Project Overview
Product platforms have demonstrated success in manufacturing and construction to integrate design and production. This approach can drive efficiency improvements with design responsiveness. Product platforms deliver commonality in 'assets' that are defined as physical components, business processes, knowledge management, and stakeholder interactions. Defining common approaches to these assets allows variety to emerge through configuration while focusing resources on each asset to monitor performance and target continual improvement.

Fleetwood Building Solutions currently supply volumetric prefabricated buildings to the education, resources, housing, custodial, and commercial sectors. Designs are highly customised, responding to changing sites and client briefs. Working with the Future Building Initiative at Monash University, Fleetwood will develop a common organisational product platform for their built solutions to improve production efficiency while driving flexible designs that continue to deliver high quality design solution outcomes for customers.

Project Number
#11

Project Title
Environmental Credentials for Building Technology Platforms

Focus Area
Sustainability

Date Commenced and Duration
March 2021; 12 months

Project Parties
uTecture
Coresteel
Monash University

Project Overview
There is a growing need for environmental credentials to support B2B and B2C communication in the building industry.

Solutions based on the Life Cycle Assessment (LCA) methodology are the most comprehensive, covering all the stages of the building's lifecycle – from extraction of raw materials to their end-of-life stages.

Despite the potential efficiencies of loosely-coupled supply chains, distributed decision-making, and increased levels of digitalisation, there are no readily available methods to systematically assess the environmental impacts of building technology platforms.

This project will develop an ISO-compliant LCA framework to quantify and communicate these impacts using the uTecture and Airbuildr platforms as cases.

"The collaboration offered through Building 4.0 CRC is enabling MBAV to help build the innovation training ecosystem that will underpin Australia's future workforce capacity development in the building industry."

PHILIP ALVIANO, SUSTAINABLE BUILDING ADVISOR, MASTER BUILDERS ASSOCIATION OF VICTORIA

Project Overview
Vocational Education and Training (VET) is a major part of Australia's education system. It is crucial to train practitioners with innovative technologies to gain fundamental skills in critical and creative thinking, ICT capability, and intercultural understanding for meeting Australia's future workforce. This project aims to explore the integrated utilisation of VR/AR technologies in the VET system. Innovative vocational education based on VR/AR can provide initial skilling and help workers to retrain as jobs and industries evolve. The scoping study will be used to define desirable extended reality technologies for design and development/evaluation of appropriate skill training platforms in building construction.

"As the world turns to digital, we must be prepared for the technical, social, and operational change that comes with it. The collaboration offered through Building 4.0 CRC is enabling MBAV, as a Peak Industry Association partner, to combine the skills and knowledge of our training leaders from the Building Leadership Simulation Centre and Holmesglen Institute, with research experts from Monash University and QUT, to build the innovation training ecosystem that will underpin Australia's future workforce capacity development in the building industry."

PHILIP ALVIANO, SUSTAINABLE BUILDING ADVISOR, MASTER BUILDERS ASSOCIATION OF VICTORIA

Construction 4.0 Roadmap

Unmanned aerial systems

Cloud based project management

Machine learning & AI

Cybersecurity

Blockchain

BIM

AR/VR

Digital twins

IoT Sensors & actuators

Additive manufacturing

Robotics and Automation

Wearables and exoskeletons

Equipment with IoT

Political

Economical

Technological

Social

Legislative

Environmental

Data driven decision making for process and products

Planning, designing, and prototyping

Operations - smart buildings and infrastructure

Supply chain management and logistics

Project Overview
The Australian construction industry has faced severe challenges over the past two decades. Spiralling costs of building materials and construction have made housing less affordable. Productivity, sustainability, health and wellbeing, and safety imperatives, together with the market-wide expectation for high-quality design, have further challenged traditional construction.

Advanced manufacturing of prefabricated housing is a viable alternative. The building industry in Australia has recognised the productivity and efficiency gains that advanced manufacturing and Industry 4.0 techniques can offer.

Advanced Manufacturing Growth Centre (AMGC) is engaging with Building 4.0 CRC to develop a roadmap for Smart Prefab and Industry 4.0 for the broader Australian building industry. The project will effectively bring together leading companies and research organisations to develop the pathway for the growth of prefab buildings in Australia, and the adoption of the Industry 4.0 approach.

Project Number
#18

Project Title
Long-span Low-Carbon Floor Systems (Scoping Study)

Focus Area
Sustainability

Date Commenced and Duration
TBD, 6 months

Project Parties
Lendlease Digital
Sumitomo Forestry
Monash University
University of Melbourne

Project Overview
The last two decades have seen mass timber emerge as a viable, desirable, and sustainable construction material for both commercial and large-scale residential developments.

This scoping study lays the groundwork for developing a low carbon, suspended floor system capable of spanning 8m or more, and satisfying a range of additional criteria necessary for large-scale application in multi-storey mass timber projects.

Existing product solutions in this field tend to be isolated, project-specific, and detached of market and customer requirements. This scoping study will survey and benchmark the systems available on the market, with the aim of delivering a detailed design brief for future development.

Project Number
#19

Project Title
Hybrid Timber-Steel Structural Systems for Mid to High Rise Buildings – Phase 1 Scoping Study

Focus Area
Industrialisation

Date Commenced and Duration
July 2021; 6 months

Project Parties
BlueScope Steel
Hyne & Son
Monash University
University of Melbourne
Queensland University of Technologyy

Project Overview
Mid-to-high-rise buildings in Australia are mainly constructed using reinforced concrete structures and have large carbon footprints.

Advanced manufacturing of engineered timber products, such as CLT and Glulam, as well as cold formed steel/high strength steel, with high strength-to-weight ratio, have paved the way for construction of those buildings, using hybrid timber-steel structural systems with a reduced carbon footprint.

Lightweight hybrid timber-steel systems may also enable a reduction in construction cost and time by allowing a DfMA approach to be taken to design and construction, and allowing the manufacturing of building components offsite. Despite the potential of hybrid structures, and unlike North America and Europe, the high-rise building market in Australia is still dominated by concrete structures, and the use of steel and timber has made few in-roads into this market.

This project will review developments in hybrid timber-steel buildings and identify the barriers to the take-up of this technology in Australia, with a focus on medium and high-rise buildings.
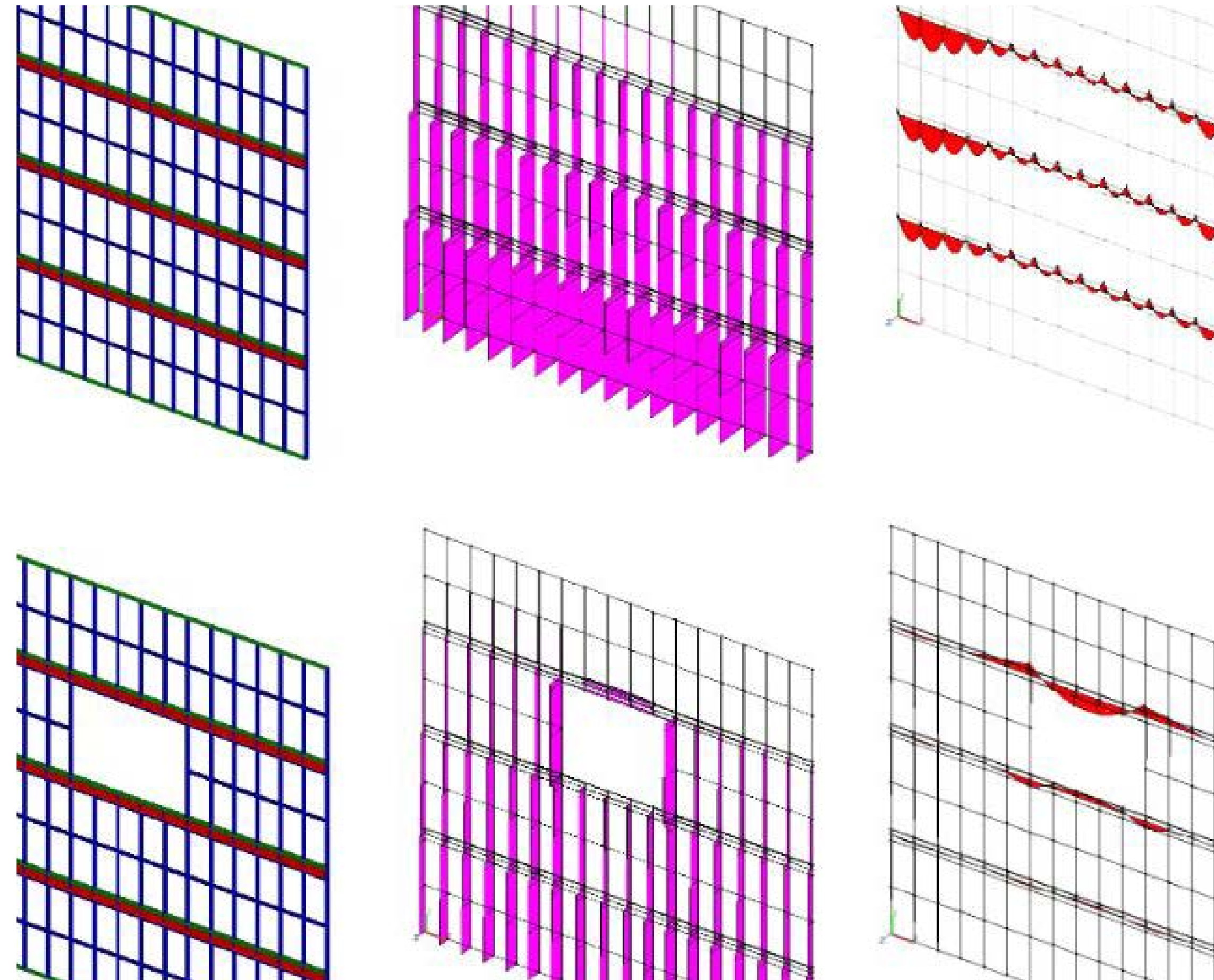
Project Overview
Unlike hot-rolled steel buildings, where the robustness requirement can be easily met with the use of bolted or welded joining methods with high tensile resistance for connecting structural members, the connections in LGS buildings are made in the form of screws and rivets with low tensile resistance, and thus they are usually vulnerable to progressive failure.

This project will develop cost-effective systems and design methods to achieve suitable robustness in LGS buildings. The success of this study will promote the practical application of LGS to mid-rise construction markets.

Project Number
#22

Project Title
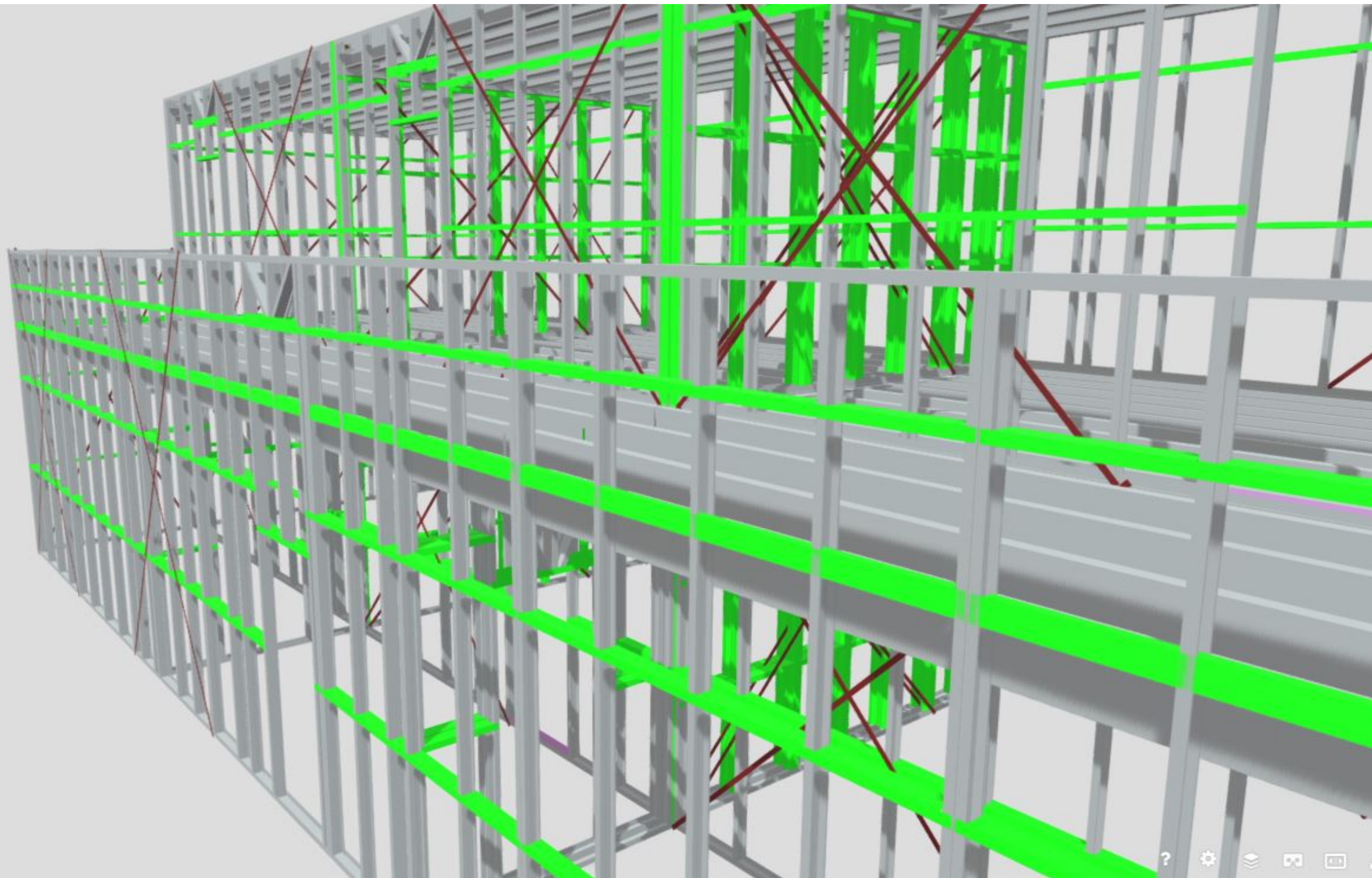Generative design and BIM-based Design Automation methods for Steel Framed Buildings – Phase 1 Scoping Study

Focus Area
Digitalisation

Date Commenced and Duration
July 2021; 6 months

Project Parties
BlueScope Steel
The University of Melbourne
Queensland University of Technology

Project Overview
Light gauge steel (LGS) offers significant advantages over other materials including lightweight, quicker construction times, non-combustibility and resistance to rotting, shrinking, warping and termite attack.

Today, it is not clearly understood which tools and inputs should be considered at
the early planning phase in order for an LGS solution to be considered a viable structural construction alternative to timber, steel and other structural systems, particularly in mid-rise building applications.

This project will develop computational design and optimisation tools for generating LGS building systems with excellent structural/fire performance that will be benchmarked against an existing project that has employed traditional methods.to quantify time and cost savings.

Project Number
#25

Project Title
Operational Excellence framework of steel fabrication and processing in the OSM and prefabrication sector (Phase 1)

Focus Area
Industrialisation

Date Commenced and Duration
November 2021; 9 months

Project Parties
BlueScope Steel
Fleetwood Australia
Monash University
The University of Melbourne
Ynomia

Project Overview

In the manufacturing of modules off-site, steel fabrication often comes with many challenges, including supply chain reliability and clarity, the need for efficient production at both the steel producer and the modular builder end, and the flexibility for customisation.

This project seeks to find new methods of efficient production and new ways of collaborating in the steel fabrication supply chain.

Phase 1 of this project is a scoping exercise to review the current state of the market and a comprehensive technology review.

"We are pleased to be involved in the CRC consortium, the channel through which we can bring the ambition to improve the speed and quality of construction in Australia to fruition."

BRENDAN POPE, HEAD OF DESIGN & INNOVATION, FLEETWOOD

Project Number
#23

Project Title
When prefab hits the ground: Barriers and opportunities in the Australian housing market

Focus Area
Industrialisation

Date Commenced and Duration
April 2021; 6 months

Project Parties
Fleetwood Building Solutions
Sumitomo Forestry
Monash University
Queensland University of Technology

Project Overview
Traditional construction practices in Australia have been criticised for their focus on the reduction of upfront construction costs at the expense of quality, performance and flexibility. Current and emerging prefabrication processes could provide the efficiency and quality of construction to the traditional built-to-sell market, however by incorporating the possibilities to cater for the recently developing built-to-rent sector is considered to drive it even stronger.This is because Build-to-rent shifts the housing profit model from capital gains to one based on ongoing rental income, with viability tied to minimising ongoing expenditure.This scoping study seeks to examine the intersection of these assets and prefabrication processes, to identify opportunities for the housing and construction sector to reduce ongoing greenhouse gas emissions and increase the quality of stock.

"Driving the continued expansion of prefabrication offerings, whether components or whole systems, has the potential to improve the speed and quality of construction in Australia. The resulting increase in the quality and durability of buildings offers communities a safer and more sustainable choice. We are pleased to be involved in the CRC consortium, the channel through which we can bring these ambitions to fruition."
BRENDAN POPE, HEAD OF DESIGN & INNOVATION, FLEETWOOD

Project Title
Environmental Decision-Support for Structures

Focus Area
Sustainability

Date Commenced and Duration
June 2021, 6 months

Project Parties
BlueScope Steel
Monash University
The University of Melbourne

Project Overview
There is a growing demand for reliable methods to rapidly assess and compare the environmental impacts of alternative building solutions. Approaches based on the Life Cycle Assessment (LCA) methodology are most commonly recognised by industry and academia; however, producing accurate results under this framework requires highly specialised skills and research effort that prevents their ready incorporation into the design of most buildings.

The main objective of this project is to generate a knowledge base to inform the development of decision-support systems, supporting environmentally efficient building design.

Project Number
#28

Project Title
Componentised Internal Wall Systems for Multi-residential Applications

Focus Area
Industrialisation

Date Commenced and Duration
July 2021; 6 months

Project Parties
Lendlease Digital
Monash University
The University of Melbourne

Project Overview
Internal wall systems in multi-residential applications continue to rely on labour intensive and wasteful on-site processing despite advances in prefabrication and other aspects of multi-res construction.

Described performance requirements for internal walls rely heavily on craftsmanship and supervision – when these fail, significant and costly legacy issues arise.

A different approach is required to the design of internal walls; one which considers modularity rather than customisation, which provides a model for costing legacy and life-time value, and which allows services and performance-based criteria to be integrated in a controlled, off-site environment.

Project Number
#30

Project Title
Critical Path IMPACT through Productisation

Focus Area
People, Practices and Culture

Date Commenced and Duration
July 2021; 12 months

Project Parties
Lendlease Digital
Monash University
The University of Melbourne

Project Overview
The critical path coordinates and supports construction planning and execution and defines the prioritisation and interdependence of tasks.

The resulting build program establishes a timeline, informed by the production modes, plans and management practices.

New building production systems and planning arrangements have only partially resulted in achieving the construction phase productivity gains and performance improvements promised by their introduction.

This project will examine what the roadblocks are to the effective impact on transforming construction programs, to establish the context and conditions of future project timelines.

Project Number
#31

Project Title
Demystifying Volumetric Construction:
A Study of the Bathroom Pod

Focus Area
Industrialisation

Date Commenced and Duration
July 2021; 12 months

Project Parties
Lendlease Digital
Monash University
Queensland University of Technology
The University of Melbourne

Project Overview
Potential benefits of volumetric construction include faster builds, improved quality, and reduction in waste. However, increased transportation costs, structural redundancy, and increased overheads can dilute these benefits, limiting their uptake.

Within the Australian construction industry, the bathroom pod is one of the few volumetric assemblies that has become commonplace, and widely considered an acceptable method of delivering bathrooms in multi-storey buildings. However, the degree to which manufacturing methodologies have been adopted in the design and delivery of bathroom pods varies.

This project unpicks the complexities of a volumetric construction through the lens of the bathroom pod.

Project Number
#34

Project Title
Acoustic flanking performance of mid-rise Light Gauge Steel (LGS) structures – Phase 1 Scoping Study

Focus Area
Industrialisation

Date Commenced and Duration
July 2021; 12 months

Project Parties
BlueScope Steel
Monash University
University of Melbourne

Project Overview
Light Gauge Steel (LGS) structures have great advantages in terms of lower weight, easier to transport, minimum construction wastes and shorter construction time.

Although the resistance of various light gauge systems, including floor and wall systems, under different loading cases has been widely recognised and tested, there is very limited information on the acoustic flanking performance of LGS structures.

This scoping study lays the groundwork for developing a robust methodology for assessing the acoustic flanking performance of LGS buildings.

Legend

Bushfire Risk Areas

- Low — LBRA
- Hazardous — HBRA
- High — REFCL
- Highest — Electric Line Construction Area
- Victorian State Boundary

0 25 50 100 Km

Date: 20/04/2016
Cartography: www.geomatic.com.au

Source: DELWP https://www.audit.vic.gov.au/report/reducing-bushfire-risks?section=#33658--5-powerline-bushfire-safety-program
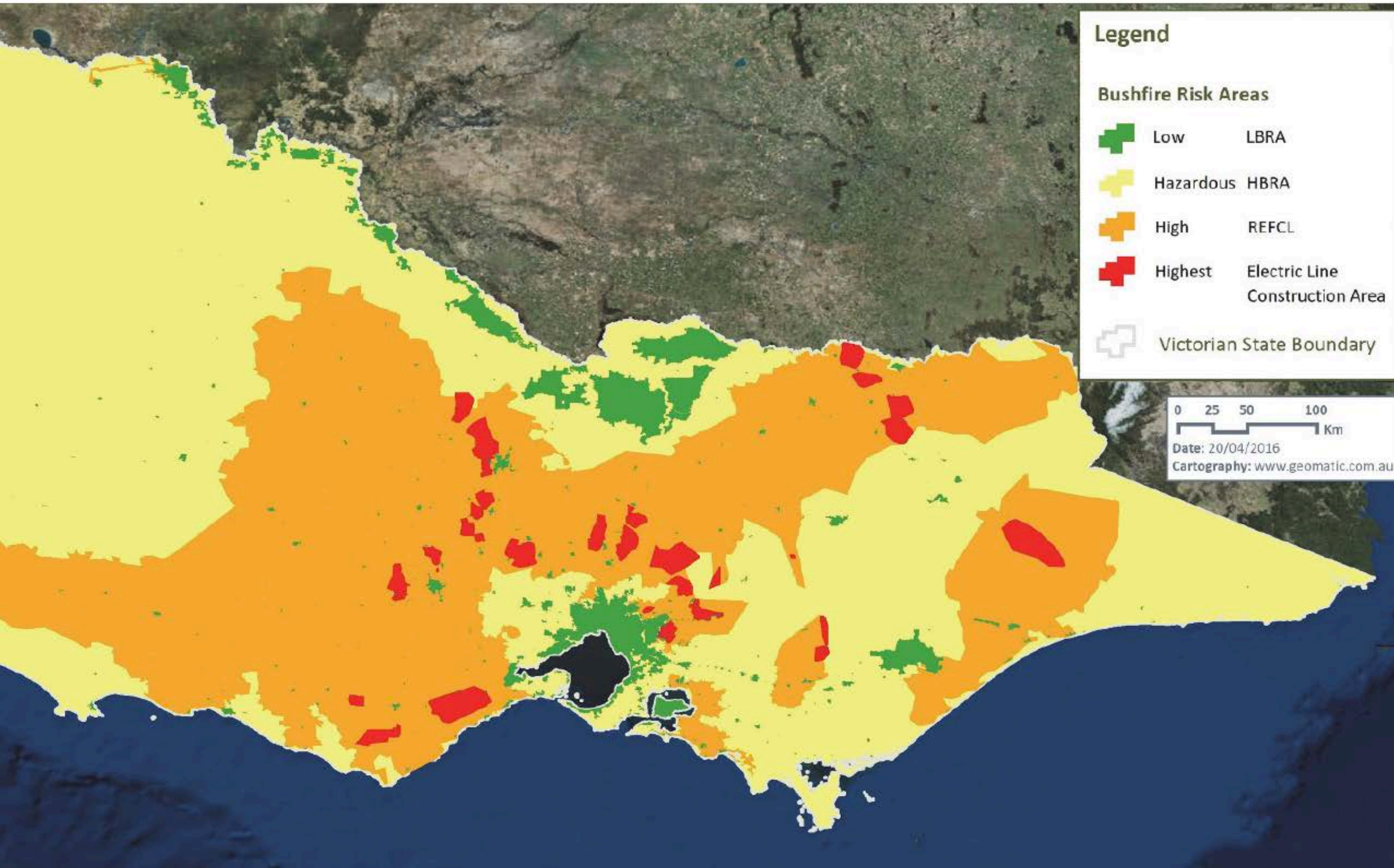
Project Number
#35

Project Title
Prefab Housing Solutions for Bushfire & Disaster Relief

Focus Area
People, Practices and Culture

Date Commenced and Duration
July 2021; 12 months

Project Parties
AMGC and Prefab Innovation Hub (Funding body)
Various Building 4.0 CRC Industry Partners (submissions and contributions will be received from all Industry Partners in the CRC)
Monash University
The University of Melbourne
Queensland University of Technology

Project Overview
This project aims to develop prefab housing designs that are fire safety compliant and resilient to different natural hazards, low cost and sustainable for both temporary and long-term accommodation.

The team will bring together the leading experts in the field to develop prefab housing solutions for bushfire & disaster relief in Australia and to provide recommendations and strategies for improving disaster preparedness. A coordinated approach by the AMGC Prefab Innovation Hub will be used, and the research team will work closely with the other projects on Sustainability and DfMA.

The outcome will also contribute to lowering the carbon footprint of housing in Australia and improving the resilience of building industry against natural hazards.

Project Overview
The current process of home designs used by industry is fragmented, providing opportunity for improvement. This project aims to develop workflow automation tools for improving the home design process.

The outcomes of this project will provide industry with a time and cost-efficient solution to quickly customise the design to meet the changes and variations requested by clients, reduce time spent on the iterative design process, and achieve faster and more efficient tendering outcomes.

Project Number
#46

Project Title
Data analytics for structural fibre resources optimisation

Focus Area
Digitalisation

Date Commenced and Duration
October 2021; 12 months

Project Parties
Hyne & Son
Queensland University of Technology

Project Overview
Growth in demand to produce sawn timber products cannot be met if current practices continue.

On the one hand, the sector is being squeezed by increasing consumer demand. On the other hand, irreversible changes to the raw material, due to unforeseen climatic events and change in resources management, is challenging supply.

The main aim of this scoping study is to find promising avenues, through a data analytics approach, which will contribute to optimising the use of the timber resource and better meet the future needs of the building industry.
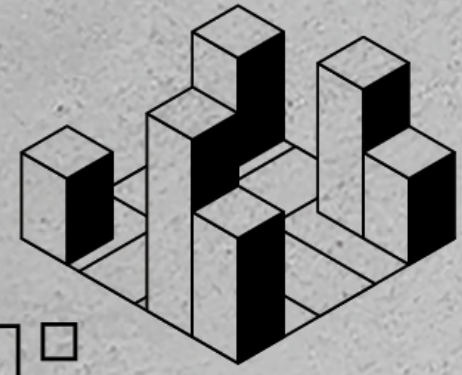
Completed Projects

Project Number
#4

Project Title
Computational Design and Optimisation Tools for Prefabricated Building Systems – Phase 1 Scoping Study

Focus Area
Digitalisation

Date Commenced and Duration
February 2021; 6 months

Project Parties
M-Modular
University of Melbourne
Queensland University of Technology

Project Overview
The objective of this project is to develop a computational framework for producing optimised design options for modular façade and floor systems, which are both structurally and thermally efficient, early in the conceptual design phase.

Given the multi-objective criteria (both structural and energy), several designs will be presented to the client in a format that is intelligible to engineers for them to make an informed decision on the option that meets the constraints of their projects.

The time/cost efficiency of these building systems will be ascertained by benchmarking them against existing case studies of building systems (façade and floor) designed using traditional manual techniques.

"This CRC project, and the industry-research-government collaboration that brought it to success, has been the first important step in a transformative journey for green buildings of the future."

HELEN BELL, RESEARCH AND DEVELOPMENT MANAGER, GREEN BUILDING COUNCIL OF AUSTRALIA

Project Number
#5

Project Title
Automatic compliance and energy rating system

Focus Area
Sustainability

Date Commenced and Duration
December 2020, 6 months

Project Parties
uTecture
Green Building Council of Australia
University of Melbourne
Monash University
Queensland University of Technology

Project Overview
This project will transform the current manual process of energy compliance checks for new residential homes by integrating existing rapid digital building software with Australia's building regulation and performance assessment requirements.

The outcome is intended to be a fully integrated and seamless workflow with home design and subsequent implications, and energy performance assessment performed in real time.

"The ability for people to better understand the energy performance of the home they choose to build in real time is a win-win for home buyers, the sellers, and the environment. This CRC project, and the industry-research-government collaboration that brought it to success, has been the first important step in a transformative journey for green buildings of the future."

HELEN BELL, RESEARCH AND DEVELOPMENT MANAGER, GREEN BUILDING COUNCIL OF AUSTRALIA

Project Number
#6

Project Title
Field Data Collation to support real-time operational management

Focus Area
Digitalisation

Date Commenced and Duration
To commence 2020, 6-month duration

Project Parties
Lendlease Digital
Ynomia
Standards Australia

Project Overview
Accurate and timely information about construction processes is essential to provide greater visibility and understanding of project progress and therefore deliver the projects on-time and on-budget.

This project seeks to make significant advances in the knowledge and practice of acquiring and managing real-time operation data.

More specific objectives include 1) understanding how passive data collection can improve the management and coordination of on-site activities, 2) conducting field tests to assess and validate the key assumptions underlying the development of the framework, and 3) developing a technical implementation roadmap for a potential product prototype.

Project Title
Prefab, Integrated Wall Systems – Scoping Study

Focus Area
Industrialisation

Date Commenced and Duration
November 2020, 12 months

Project Parties
Bentley Homes
Ultimate Windows
The University of Melbourne
Monash University

Project Overview
This project seeks to design a high-performance wall system exceeding the performance of a 7-star dwelling, with window systems that can be manufactured in two weeks and wall systems that can assembled on-site (lockup stage) in four weeks, and can be manufactured, delivered and installed in a cost-effective manner.

The initial phase consists of a technology review and scoping exercise that will lead a detailed design phase and a manufacturing systems design phase.

Project Number
#26

Project Title
New materials for windows of the future

Focus Area
Industrialisation

Date Commenced and Duration
May 2021; 2 months

Project Parties
Ultimate Windows
Monash University

Project Overview
Double-glazed windows are a norm in many countries across Europe, Asia and North America due to their effective reduction of heat loss (-30%) compared to single-glazed windows.

However, in Australia, only 10% (approx.) of current window installations are double-glazed. This is in part owing to the temperate climate across many parts of Australia, but equally the high cost of double glazing. Material science has made rapid progress over the last two decades resulting in the development of many new advanced materials and coatings.

This project is focussed on providing a critical assessment of the opportunities to apply new materials and coatings to reduce the cost, and improve the performance and ease of installation of double-glazed windows.

Active and Completed Projects Summary

Project No.	Title	Participants	People, Practices and Culture	Sustainability	Digitalisation	Industrialisation
Active projects						
1	ePlanning and eApprovals – Scoping Study	Lendlease Digital, uTecture, Sumitomo Forestry, A.G.Coombs Group, Salesforce.com,Inc., Master Builders Association of Victoria, Victorian Building Authority, Victorian Government, Department of Environment, Land, Water and Planning, Monash University, The University of Melbourne			*	
2	Automated tracking of construction materials for improved supply chain logistics and provenance – Phase 1 Scoping Study	BlueScope Steel, Holmesglen Institute, Lendlease Digital, Monash University, Queensland University of Technology, Salesforce.com, Inc., Sumitomo Forestry, Master Builders Association of Victoria, The University of Melbourne, Victorian Building Authority, Ynomia			*	
3	Projects to Platforms: Investigating New Forms of Collaboration – Scoping Study	A.G. Coombs, BlueScope Steel, Hyne & Son, Lendlease Digital, Monash University, Sumitomo Forestry, The University of Melbourne			*	
9	Implementing DfMA and Lean in Construction: Best Practice Guidelines through a Study of Building Services and Structure	A.G. Coombs, Lendlease Digital, Monash University, The University of Melbourne				*
10	Product Platform for Volumetric Building (Scoping Study)	Fleetwood Building Solutions, Monash University				*
11	Environmental Credentials for Building Technology Platforms	uTecture, Coresteel, Monash University		*		
12	VR/AR Technologies in Vocational Education and Training (Scoping Study)	Holmesglen Institute, Master Builders Association of Victoria, Monash University, Queensland University of Technology			*	
17	The Implications and Opportunities from Industry 4.0 for the Building Industry: towards smart prefab	AMGC and Prefab Innovation Hub (Funding body), Various Building 4.0 CRC Industry Partners, Monash University, The University of Melbourne, Queensland University of Technology	*			
18	Long-Span Low-Carbon Floor Systems	Lendlease Digital, Sumitomo Forestry, Monash University, The University of Melbourne		*		
19	Hybrid Timber-Steel Structural Systems for Mid to High Rise Buildings – Phase 1 Scoping Study	BlueScope Steel, Hyne & Son, Monash University, The University of Melbourne, Queensland University of Technology				*
20	Systems and methods for robustness of mid-rise light gauge steel (LGS) buildings – Phase 1 Scoping Study	BlueScope Steel, The University of Melbourne, Monash University				*
22	Generative design and BIM-based Design Automation methods for Steel Framed Buildings – Phase 1 Scoping Study	BlueScope Steel, The University of Melbourne, Queensland University of Technology			*	
23	When prefab hits the ground: Barriers and opportunities in the Australian housing market	Fleetwood Building Solutions, Sumitomo Forestry, Monash University, Queensland University of Technology				*
25	Operational Excellence framework of steel fabrication and processing in the OSM and prefabrication sector (Phase 1)	BlueScope Steel, Fleetwood Building Solutions, Monash University, The University of Melbourne, Ynomia				*
27	Environmental Decision-Support for Structures	BlueScope Steel, Monash University, The University of Melbourne		*		
28	Componentised Internal Wall Systems for Multi-residential Applications	Lendlease Digital, Monash University, The University of Melbourne				*
30	Critical Path IMPACT through Productisation	Lendlease Digital, Monash University, The University of Melbourne	*			
31	Demystifying Volumetric Construction: A Study of the Bathroom Pod	Lendlease Digital, Monash University, Queensland University of Technology, The University of Melbourne				*
34	Acoustic flanking performance of mid-rise Light Gauge Steel (LGS) structures – Phase 1 Scoping Study	BlueScope Steel, Monash University, The University of Melbourne				*
35	Prefab Housing Solutions for Bushfire & Disaster Relief	AMGC and Prefab Innovation Hub, Various Building 4.0 CRC Industry Partners, Monash University, The University of Melbourne, Queensland University of Technology	*			
42	Workflow Automation Tools for Home Designs Phase 1 Scoping Study	Bentley Homes, M-Modular, The University of Melbourne, Queensland University of Technology				*
46	Data analytics for structural fibre resources optimisation	Hyne & Son Queensland University of Technology			*	
Completed Projects						
4	Computational Design and Optimisation Tools for Prefabricated Building Systems – Phase 1 Scoping Study	M-Modular, The University of Melbourne, Queensland University of Technology			*	
5	Automatic compliance and energy rating system	uTecture, Green Building Council of Australia, The University of Melbourne, Monash University, Queensland University of Technology		*		
6	Field data collation to support real-time operational	Lendlease, Ynomia, Standards Australia, Monash University, Queensland University of Technology, The University of Melbourne				
8	Prefab, Integrated Wall Systems - Scoping Study	Bentley Homes, Ultimate Windows, The University of Melbourne, Monash University				*
26	New materials for windows of the future	Ultimate Windows , Monash University				*