house of bamboo
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AMRF
First Building

Advanced Manufacturing Research Facility

Badgerys Creek,
Western Sydney Aerotropolis

Western Parkland City Authority | client
Hassell Studio | architect
Taylor Construction | builder
Hi-Tec Windows Pty Ltd| facade contractor

Architectural Case Study

Insight

The objective of AMRF First building was to provide the first-ever flexible and adaptable state-of-the-art building that utilises unique modular disassembly components that carry out from concept to execution.

Advocate for Change. Using this building as an example for leading change for more sustainable/innovative projects towards a viable future. **Designing for Country.**

Project Description

Built from prefabricated timber modules and inspired by the movement of water, the light-filled design was led by architecture firm Hassell in collaboration with the Indigenous designer Danièle Hromek of Djinjama, a First Nations cultural research and design practice.

With the goal of reaching high-end sustainability benchmarks, the project aims for a NABERS Energy rating of 5.5 stars, a 6-Star Green Star certification, and the strict guidelines of the Living Project Challenge. These objectives highlight the building's pioneering role in sustainable architecture inside the Aerotropolis, a forward-thinking new urban district located in Western Sydney.

Project Description

AMRF First Building is a collaborative space for government, industry and research to nurture and develop innovative manufacturing projects. It is the first building designed for the Aerotropolis, the new urban region in Western Sydney.

The AMRF First building is a workplace and will feature a visitor centre, public viewing spaces and is designed to showcase the real-time building progress of Australia’s newest sustainable, connected city.

Project Case Study

First Building Gross Floor Area: 2,800sqm

Designing for flexibility was at the core of the project. The building has been conceived as a ‘kit of parts,’ featuring a timber structure and a bamboo façade made up of prefabricated modular components. These components are mechanically fixed together, allowing for disassembly, expansion, and even relocation.

The proposal seeks to create a material lifecycle that aligns with the natural rhythms of ecology, addressing the urgent need for sustainable materials within the future community’s ecological framework. This approach emphasises a regenerative cycle that gives back to the environment.

In collaboration with Hassell Studio, the House of Bamboo specifically focused on integrating engineered bamboo into the façade solutions. Bamboo is a highly sustainable alternative to traditional timber, as it grows rapidly (some species can reach maturity in just three to five years) making it a renewable resource that can be harvested without harming ecosystems. Its impressive strength-to-weight ratio and flexibility enable innovative designs that fulfil performance and aesthetic goals.

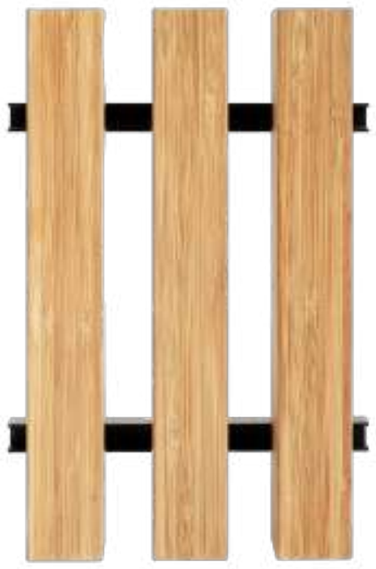
The House of Bamboo's collaboration with Hassell Studio involved extensive exploration of batten size, screen design, and manufacturing techniques to ensure ease of installation as prefabricated modular systems. The engineered bamboo batten screens not only provide façade articulation and shade to the high-performance glazed walls but also reflect a commitment to sustainability, reinforcing the project's holistic approach to environmentally responsible design.

The project aims to achieve 6-star Green Star and Living Building Challenge certifications, marking a significant step towards a sustainable future.

Technical Specifications

Total area clad with House of Bamboo engineered bamboo screens: 1,059m^2.

Installed on black custom anodised aluminium channels (no pre drills.)



Noosa Custom Battens

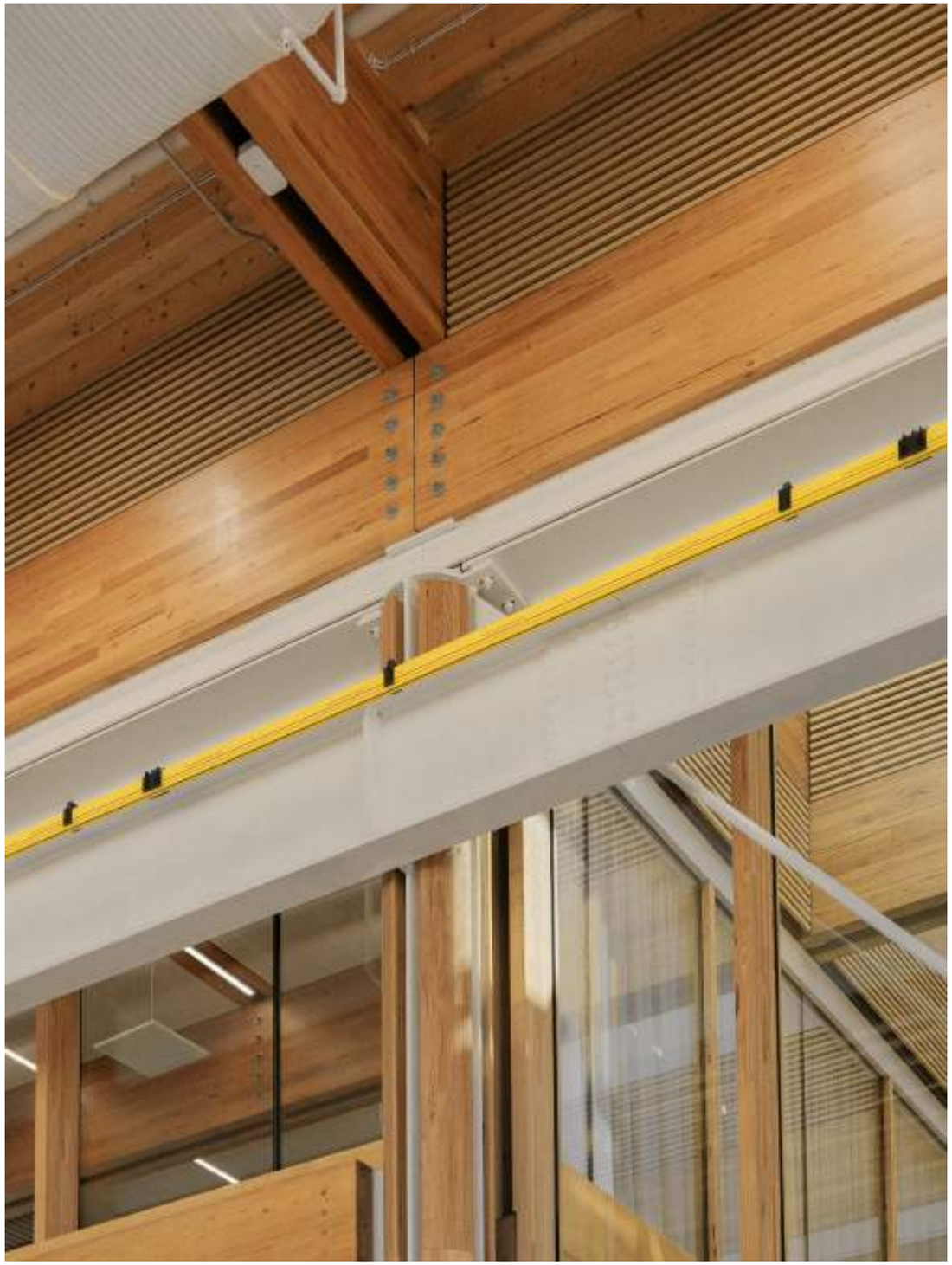
30mm wide x 50mm deep x 30mm gap and 30mm wide x 30mm deep x 30mm gap made into modular screens.

Cottesloe Profiles

40mm wide x 25mm deep x 28mm gap made into modular screens.

Cottesloe Screen

40mm x 28mm with gap 28mm Angled Louvres at 45degrees.



Technical Specifications

Finishes

Internally 2 coats of Woca clear oil. Externally screens were coated with a white wash Woca oil plus 2 coats of Woca clear oil plus a UV protective coating.

All panels, external and internal, included our standard mould treatment and coating.

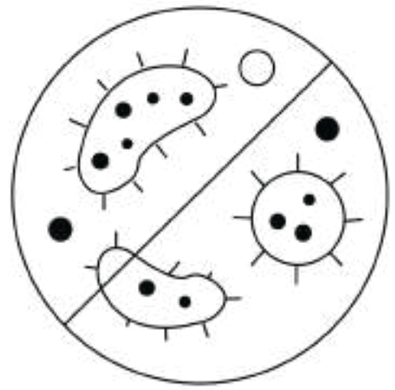
Samples were carefully prepared with subtle shade variations and presented to Hassell Studio. The aim was to blend with the Victorian Ash tones that were installed for the structural beams.

Technical Specifications

FSC Certified

Global GreenTag Certified -Level A

Global GreenTag HealthRate - Platinum



Mould proof treated - H3 as per Australian Standards AS1604

All panels, external and internal, included our standard mould treatment coating.

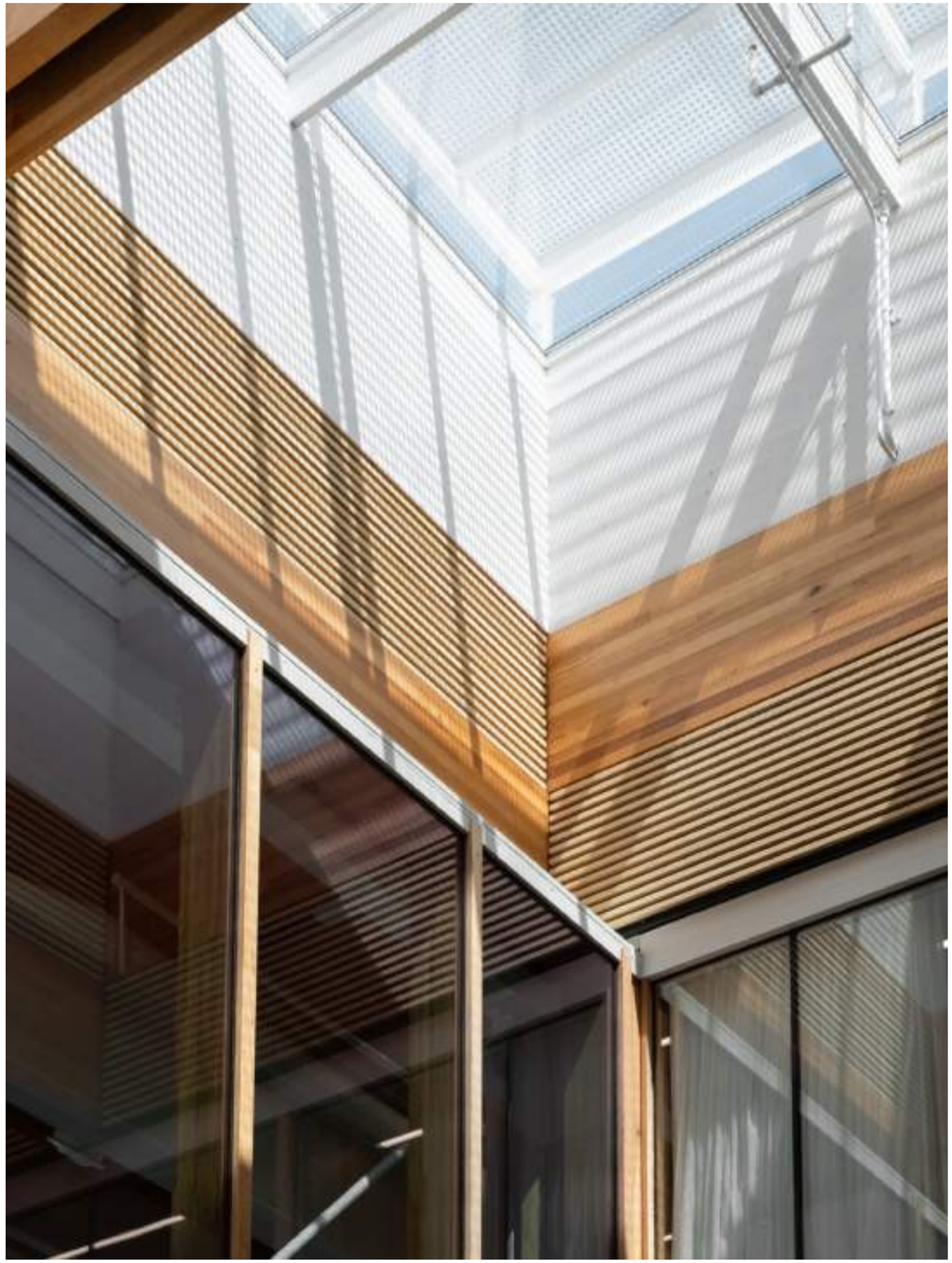
Design and Manufacturing Challenges

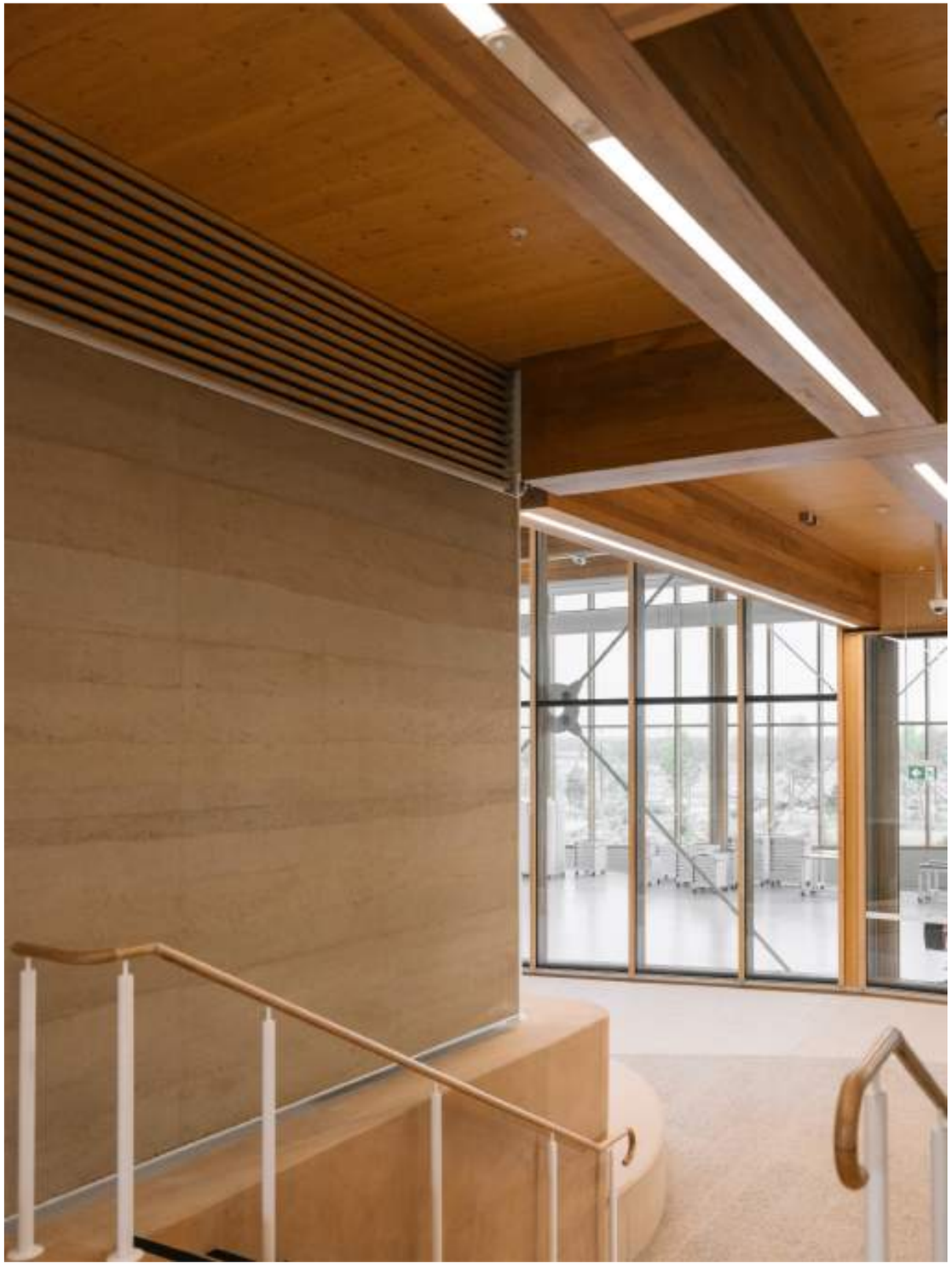
Changing the Specification:

The Projects Architects originally wanted to specify Victorian Ash but that selection became unfeasible and engineered bamboo was selected for its sustainability credentials, FSC and availability.

Bamboo engineered screens to cover a total façade area of 1037m^2.

The engineered bamboo battens screens are located externally and internally including cladding on chimneys and external lanterns.





Design and Manufacturing Challenges

Solving modular design for mechanical fixing:

Phased Shipping: The project delivery was manufactured in 7 batches to align with the projects phased installation timescales:

Batch 1 - Upper & Lower Manufacturing Hall
Batch 2 - Internal Upper & Lower Screens
Batch 3 - Plantroom upper & Lower Screens
Batch 4 - Roof Lanterns (with curved corners)
Batch 5 - Rooftop Chimneys
Batch 6 - Internal Screens in lower workplace
Batch 7 - Manufacturing Hall internal doors

Packages were carefully grouped and labeled for easy identification on site to assist with main contractors site organization and installation sequence.

Designed for greater site installation tolerances:

Standard pre-drilled fixing holes in screen back bars removed as manufacturing began before substructure design was finalised by engineers and fixings can be coordinated and aligned later onsite once subframe locations had been confirmed.

Careful modularisation of screen to identify optimum horizontal and vertical

The engineered bamboo screens are designed to the mm to accommodate the clients specification for site tolerances of +/- 2mm.

Design and Manufacturing Challenges

Innovations and Solutions

Flexible and adaptable programs were embedded into the fabric of the building. Reimagining the construct of a traditional building through providing modular panels that would work in conjunction with the site.

Designed to match modular and disassembly building concept.

A building material alternative with reduced embodied carbon:

Embodied Carbon (kg Co2/1 cubic metre of material) Comparison

Cross Laminated Bamboo (Engineered)	
Unit	**Embodied Carbon** (kg Co2/1 cubic metre.)
1m3	307.00 kg CO2
Note: Average A1 to B3 & C1 to D embodied carbon factors	
Source: https://www.moso-bamboo.com/wp-content/uploads/20170315_EPD_INT_Moso_Solid_EN.pdf	

Average Timber (Inc Eucalyptus)	
Unit	**Embodied Carbon** (kg Co2/1 cubic metre.)
1m3	417.00 kg CO2
Note: Average A1 to D embodied carbon factors	
Source:https://www.sciencedirect.com/science/article/abs/pii/S0360132322001871	

Manufacturing Technique:

The project utilised 3 dimensional BIM Software to model the complex geometry to ensure an exact match with Hassell Studio general arrangement designs and reflected ceiling plans. Utilising BIM to help preempt any construction issues that may arise prior to installation to ensure any issues are eliminated.

Sourcing & Products

Living Building Challenge requirement :
50% of timber cost to be FSC.

Battens	House of Bamboo	FSC
Flooring & Treads	House of Bamboo	FSC

Project Impact

The use of sustainable materials like bamboo and rattan not only aligns with Western Parkland City Authorities environmental goals but also showcases the potential of these materials in complex, high-end commercial settings.

Conclusion

The engineered bamboo facade on the AMRF project exemplifies House of Bamboo's expertise in merging sustainability with innovative design solutions.

By overcoming significant engineering challenges, the team delivered a building facade that is both visually striking and environmentally responsible, setting a new standard for future projects in the Badgerys Creek, Western Sydney Aerotropolis.

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