

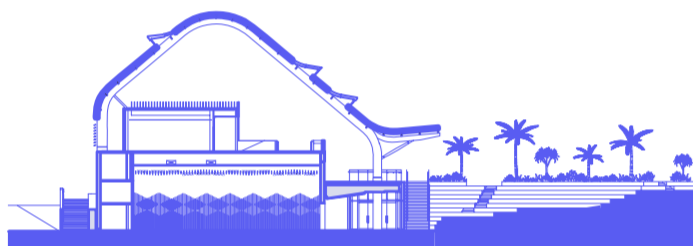
# KUTUBU CONVENTION CENTRE

GRIMSHAW



**Location** Papua New Guinea  
**Completion** 2018  
**Client** Stratum Group Unlimited  
**Awards** NZ wood timber design awards 2020

**Project Partner** Neil Stonell  
**Project Team** Grimshaw, Ignite Architects, Kirk Roberts NZ (Specialist Timber Engineer), BGT (Structural Engineer), NDY, RLB, AECOM, Landscape Architecture Aoteroa, Noble Fox



## SUSTAINABILITY AND REGENERATIVE DESIGN CASE STUDY

Kutubu is Papua New Guinea's first integrated commercial development - an aspirational project designed to host the Asia-Pacific Economic Cooperation Leaders' Meeting (APEC) in 2018. Located in the nation's capital Port Moresby, and is centrally sited on a 5-hectare sloping former stone quarry site. The site is organised around a central circular plaza which allows direct access to the buildings and is the primary entry and arrival space.

### Sustainable design performance summary

Kutubu, is the largest glued-laminated structure that has been designed by Grimshaw. Set over three levels, the 5,500 sq m convention centre is designed around a 650-seat state-of-the-art event space which is submerged to join the service building and give direct access to the amphitheatre. Hovering above is the monumental roof of Kutubu, inspired by the traditional timber long houses which form the heart of the country's rural villages. The roof is the visual landmark for the convention centre. Built of FSC certified gluelam timber, sustainably sourced from New Zealand plantations. As the visual landmark of the development, the roof spans 30m, rising to a height of 18m and with a curved cantilevered canopy - This 103m long completed structure includes specially designed glulam portals, purlins and connections.

The structure cantilevers on the north and south ends, and on the western edge it is lifted into a 6m deep cantilevered canopy opening towards the hotel and arrival spaces.

Through the materials, colours and patterns of the interiors of Kutubu pays homage to Papua New Guinea's traditional measure of currency, the cowrie shell, as well as the region's landscape and indigenous crafts.

With a planting scheme featuring over 12000 native species and indigenous art installations, Kutubu seeks to allow visitors and locals to experience and take pride in the culture, nature flora and fauna of the island.

Kutubu is a legacy project as part of the government's initiative to attract international travellers to explore the beauty of the island. The mixed development which includes a 5 star hotel, convention and performance centre provided free training and free health care for all staff during construction, and now employs local staff in all operations.

### Project design challenges

Working within the Australian building regulations and standards that apply in Papua New Guinea was challenging while coordinating multiple complicated structural elements. The complex geometry and detailed connections needed to be carefully crafted and designed with the specialist timber engineer to make sure the assembly was properly completed on site.

Acoustic design of the roof was a key design challenge in 2 ways:

- Due to the shape of the roof, noise generated during large gathering in the open function spaces could be magnified by the curvature.
- In the summer months there are periods of intense rainfall where the impact noise would make the outdoor spaces unusable.

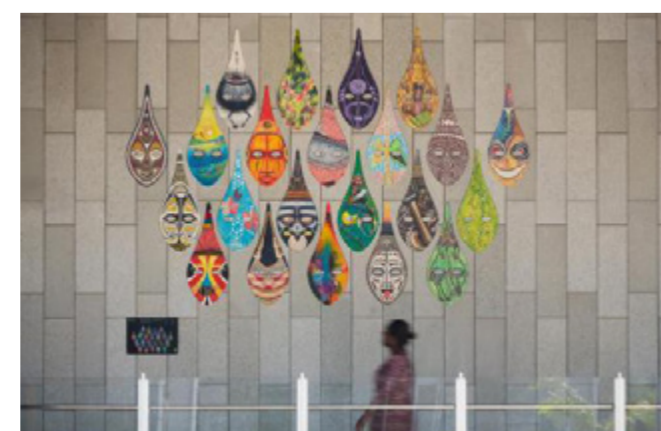
To solve these issues acoustic computer modelling informed the design of the roof build up to comprise a heavy internal insulation layer as well as a perforated internal lining panels with acoustic absorption.

### What we did differently

Through a collaborative approach, the project team has created a significant timber structure, which is exceptional in terms of its scale and environmental relevance. The projects used a 5-axis gantry CNC from NZ. Prefabricated sections were laid out in the factory and assembled to ensure that all would go together once on-site assembly began. This process significantly reduced waste on site and provided a safer and efficient construction process.



**Masterplan** ↑  
Full development plan view including Hilton hotels and Kutubu convention centre



**Local Artwork** ↑  
Artwork displayed at the foyer

### Alignment with UN Sustainable Development Goals



**SDG 3 GOOD HEALTH AND WELL-BEING**  
 Natural and locally sourced materials: 75% locally sourced materials such as stones in floors and walls, timber used throughout and local artists artworks incorporated making Kutubu an inspiring building for the local community.

**Natural ventilation:** The large roof allows outdoor function spaces to be used year-round, reducing energy consumption, while the internal areas can be switched to natural ventilation mode when appropriate.



**SDG 11 SUSTAINABLE CITIES & COMMUNITIES**  
 Site was regenerated from a former gravel quarry and now has over 12,000 native species planted in the new landscaped zones. Kutubu hosts many social, political and educational events which promotes socio-economic growth for PNG.



**SDG 8 GOOD JOBS AND ECONOMIC GROWTH**  
 During construction the project set a new benchmark for the nation through its care of the over 600 local employees engaged on the site. The project team sought to improve the standards of construction in PNG by up-skilling the local workforce while providing all meals and free healthcare. Eye health in PNG is notoriously poor, and this program enabled nearly 300 staff and their families to receive prescription eyeglasses.



**SDG 12 RESPONSIBLE CONSUMPTION AND PRODUCTION**  
 The project uses timber which is FSC (Forest Stewardship Council) certified from NZ Plantations. Certified glued laminated timber replants more storage sources for carbon and generation of oxygen than any other construction material. Glulam is the only renewable construction material; uses 14 times less energy to produce than equivalent steel beam.

Whilst providing shelter from the intense tropical sun and rain, the long-roof captures and stores enough water during the wet season to enable the site to operate independently.

**“I feel this is my project and I see all of PNG here; this is from my country.”**

**Ragan-PNG National, Chief Concierge Hilton**

### Key Sustainability Facts

**PROJECT SITE**  
Greyfield

**TRANSECT ZONE / CLIMATE ZONE**  
Tropical savanna climate

**ECOREGION**  
Australasia



**Amphitheatre** ↑



### Exploded axonometric diagram →

1. **FSC Gluelam NZ timber structure** - 103m long completed structure including Glulam portals, purlins and connections.
2. **Façade** - Double glazed facade and timber louvre system throughout protecting from direct sunlight.
3. **Restaurants** - Restaurant facilities using timber interiors throughout and local artists decorations.
4. **Landscape design which regenerates a former gravel quarry** - A gardening team of 6-8 staff was established, supplemented by up to 20 labourers assisting during planting.
5. **Roof rainfall collection** - It includes:
  - Roof area: 4,100m<sup>2</sup>
  - Annual rainfall on site: 1,017mm
  - Six tanks holding approximately 2.4 megalitres total
6. **Heat & ventilation** - The roof insulation protects the outdoor function spaces from the intense tropical heat. Louvres run the length of east and west sides of the roof to allow for cross ventilation and indirect light.
7. **Event space** - The pre-function and the adjacent multi-purpose banquet hall can be switched to a naturally ventilation mode, and opened to join with the outdoor amphitheatre to create a continuous event space

