





A View from the Top End

The new Menzies School of Health Research

Designing for Tropical Northern Australia

Session 4
Norfolk Room 2
Environment & Sustainability

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The Tropics

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"Torrid Zone"



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"**Torrid Zone**"

torrid

/ˈtɒrɪd/

adjective:

1. very hot and dry.

"the torrid heat of the afternoon"

synonyms: **baking, boiling, blazing, burning, blistering, roasting, sweltering, scorching, sizzling, stifling, suffocating, oppressive;**

2. full of difficulty.

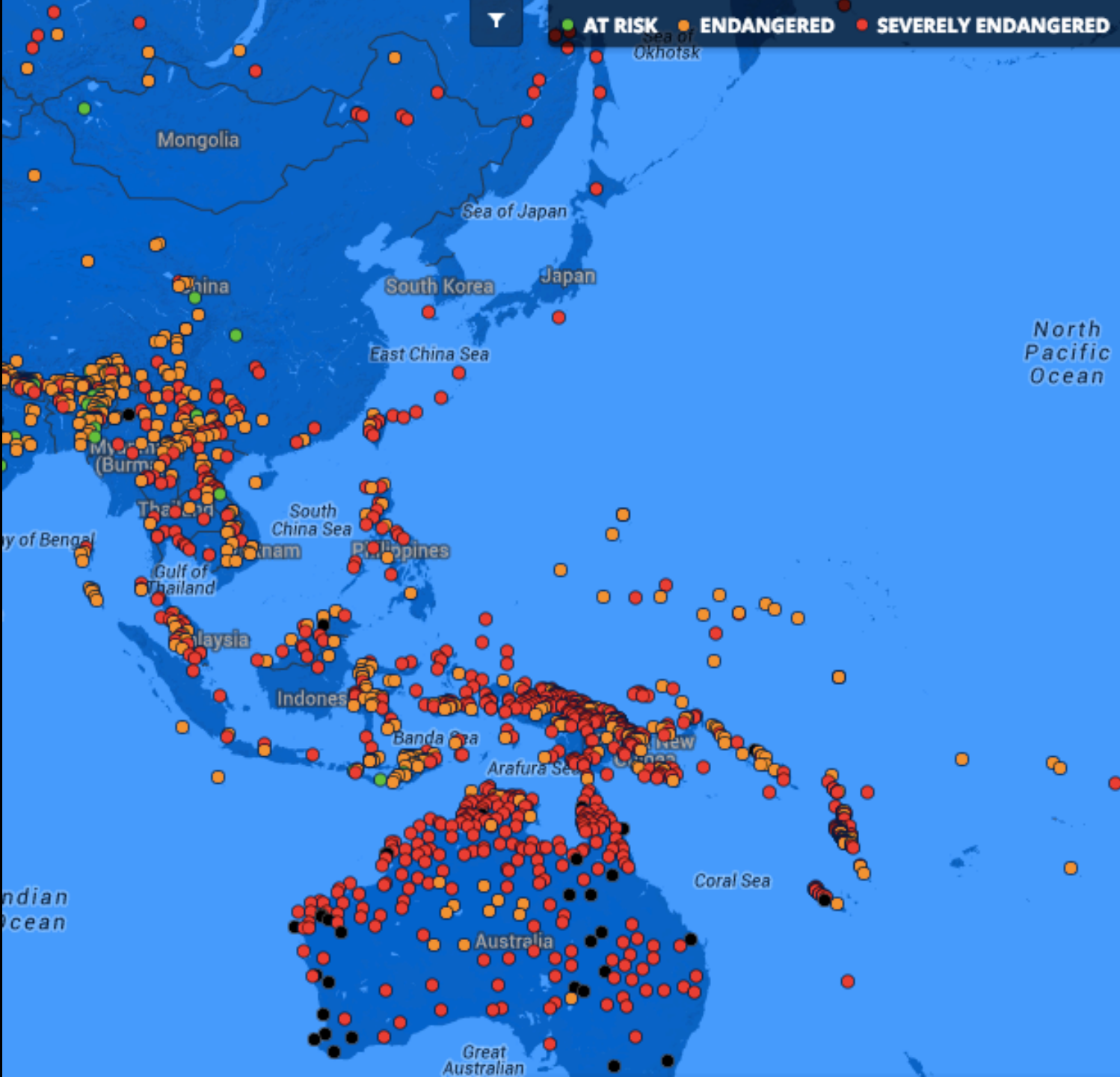
"he'd been given a pretty torrid time by the nation's voters"



The Tropics has the greatest diversity of plants and animals...

...hosting about 80% of the planet's terrestrial species and over 95% of its corals and mangroves.

Human communities derive all food and many medicines and industrial products from wild and domesticated components of biological diversity.



The Tropics has the greatest diversity of cultures...

Most of the world's languages are spoken in a broad area on either side of the Equator.

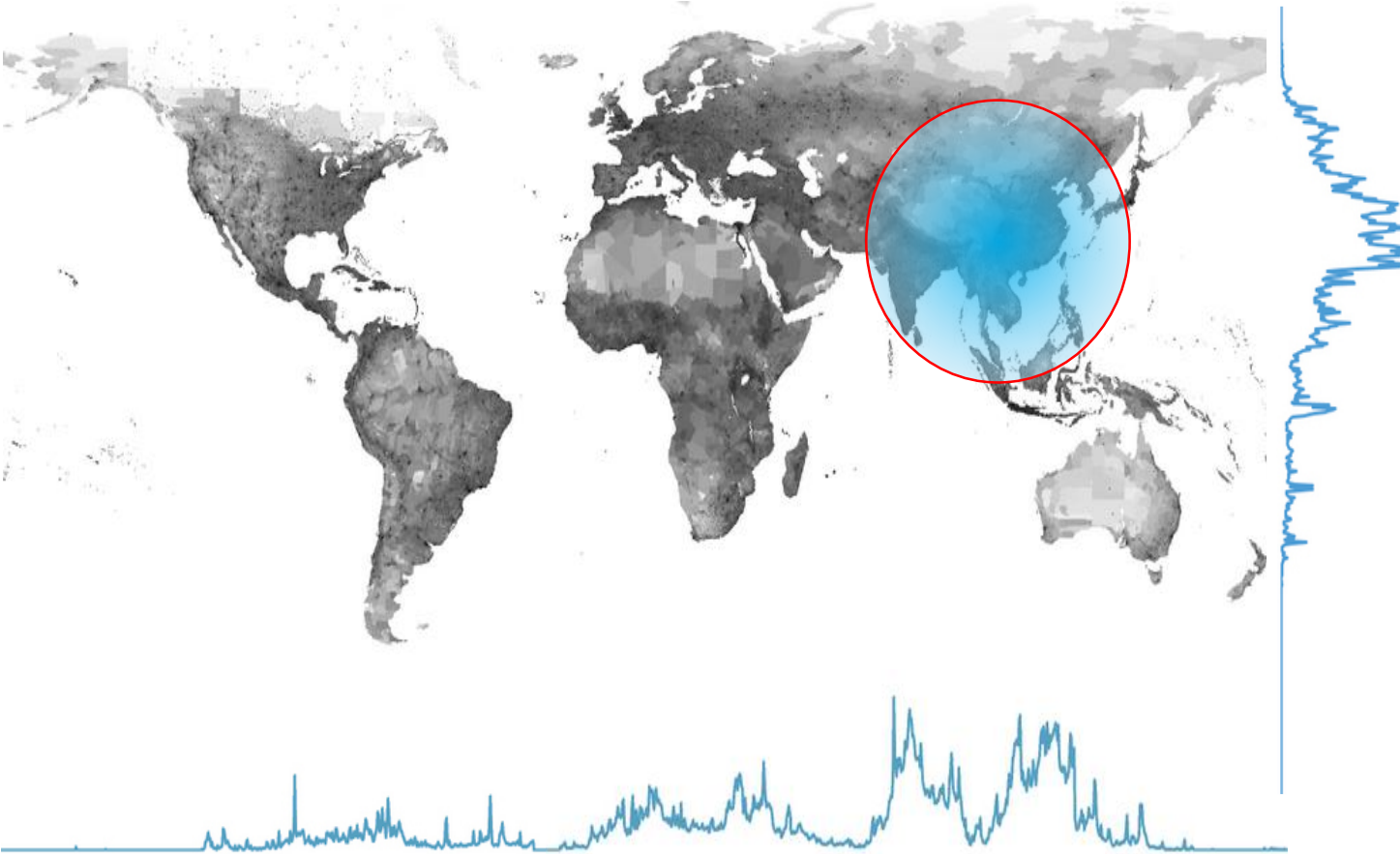
There are more than 2000 languages spoken throughout Africa, compared with just over 200 in Europe.

Diversity of culture is an asset for the tropics. The secrets to sustainable development in the tropics may well be found in the culture and languages of the people who reside there – rather than policies and solutions imposed from the outside.

The Tropics is where most of the people will be...

Around 40% of the world's population live in the tropics.

At current rates of population growth more than half of the world's people will live in the region by 2050.



André Christoffer Andersen created this interactive map



The Tropics is where most of the children are...

Just over half of the world's children under 15 years old currently live in a tropical region. By 2050 two out of every three will be living in the tropics.

A young, educated, working population has the potential to provide the demographic dividend needed to lift tropical nations out of poverty.

It is important that these young people can grow up in a place where they are able to participate and contribute meaningfully, and build productive and satisfying lives.



The Tropics is where technology is having the greatest impact...

Mobile telephony is the basic means of communications for many people in tropical countries.

The mobile phone and internet access is allowing people of the tropics to interact with each other and the rest of the world in a whole new way.

The next few years will see, alongside the growing availability and affordability of smartphones, the people of the tropics becoming part of the global conversation and driving policy change, rather than simply being the recipients of it.



The Tropics is where trade and investment is growing...

Growth in the value of trade in the tropics is more than twice that of rest of the world.

Before 2010, the largest cargo hub in the world was Memphis International Airport in the US. Since then however, the tropical Chek Lap Kok Airport in Hong Kong moves the largest amount of freight. In 2014 this equated to more than 4.4 million tonnes.

In the 30 years to 2010, foreign direct investment in the Tropics increased from 0.7% of GDP to 3.5%, while in the rest of the World it increased from 0.5% of GDP to 1.6%.



The Tropics is where wealth is increasing...

Over the past 30 years, economic growth in the tropics has outperformed the rest of the world by almost 20%.

By the end of this century, tropical nations such as India, Indonesia and Nigeria will be among the largest economies in the world. India's economy may well outgrow China's.

The Asia Pacific region already has a larger middle class than Europe and North America combined.

Understanding the nature of this growth, the demographics of tropical populations and the needs and aspirations of tropical people; particularly in relation to demand for goods and services, will be fundamental for sustainable development.



**The Tropics
is where Darwin is...**



Darwin is...

The only capital city in Australia located within the Tropics.



TROPIC OF CANCER

EQUATOR

TROPIC OF CAPRICORN

4 HOURS FLIGHT

Darwin is...

Closer to Asian countries such as Indonesia, Timor and Papua New Guinea than other Australian capital cities.

Closer to the equator than Bangkok.



Darwin

The population of Greater Darwin is 136,200 people.

This accounts for 57% of the NT's total estimated resident population of 240,800 people, and 1.0% of the total Australian population.

In 2012-13, the population of Greater Darwin increased by 3.0% (3,900 people), the second-fastest growth of all capital cities, behind Greater Perth (3.5%).



Darwin's buildings need to cope with...

High humidity

Mould; condensation; decreased thermal performance of building.

Cyclones

Severe strain on building material fixtures, claddings and fasteners; greater wind loading requirements.

Intense rainfall

Concentrated runoff; issues of structural integrity; drainage; dry and wet seasons.

Cultural expectations

Relaxed outdoor tropical lifestyle; casual clothing; 30% indigenous population; cultural diversity with over 180 different ethnic groups.

Menzies School of Health Research
Charles Darwin University



Menzies School of Health Research
Charles Darwin University



The Building...

Is located at Charles Darwin University's Casuarina campus.

It is a centre of scientific excellence in health research and health education focussed on promoting improvements in the health of all people in tropical and Central Australia.

It provides teaching facilities, clinical space, conference rooms, and office space for 180 institute and university staff.

2,700m²

2 levels









Tropical planting palette

ENTRY FORECOURT

Acts as a 'welcome mat' and gathering node to the facility with angular patterning of coloured concrete, contrasting against the local stone contained in two gabion walls. Advanced Livistona palm trees provide shade, scale and a focal point for the forecourt.

CHINESE GARDEN ACCESS

Views into the established landscape of the Chinese Garden are 'borrowed' and provide a green backdrop to the new building. A new path provides access into the upper area of the gardens.

COVERED PEDESTRIAN LINK

An extended roof overhang provides weather protection to pedestrian path that links the lower site with the existing upper student accommodation. Low planting, shade trees and a small area of irrigated lawn provides a private sitting area as well as a green outlook from within the building.

EXTERNAL FOYER

A large, covered gathering space that visually extends on the internal foyer with the potential to be used for outdoor lectures and informal study groups.

LOWER TERRACE

Grassed terraces for informal seating with mature Livistona palms providing filtered shade. The palms provide a green backdrop to the foyer from within the building. Low retaining walls and concrete stepping stones provide access to the lower areas of the site.

UNDERCOVER WALKWAY

Large platform stairs and a disabled access ramp provide pedestrian access between the lower and upper site. An overhead roof provides weather protection.

TROPICAL PLANTING

A diverse mix of tropical species creates a vibrant, year round display of foliage and flower colours and textures.

PEDESTRIAN PATH JUNCTION

Rationalisation of the main existing and proposed pedestrian paths and existing landscape areas.



Materials palette - concrete, stone and timber

SCREEN PLANTING

Tall, dense tropical species provide a vibrant green aesthetic to the front of the building as well as screening views of the carpark from within.

SCREEN PLANTING

Tall, dense tropical species planted to screen the blank plant room walls and provide further amenity to the adjacent pedestrian paths and parking area.

THE BACKYARD

An open irrigated lawn area surrounded by dense vegetation provides a private garden space for passive or active recreation.

NATIVE PLANTING

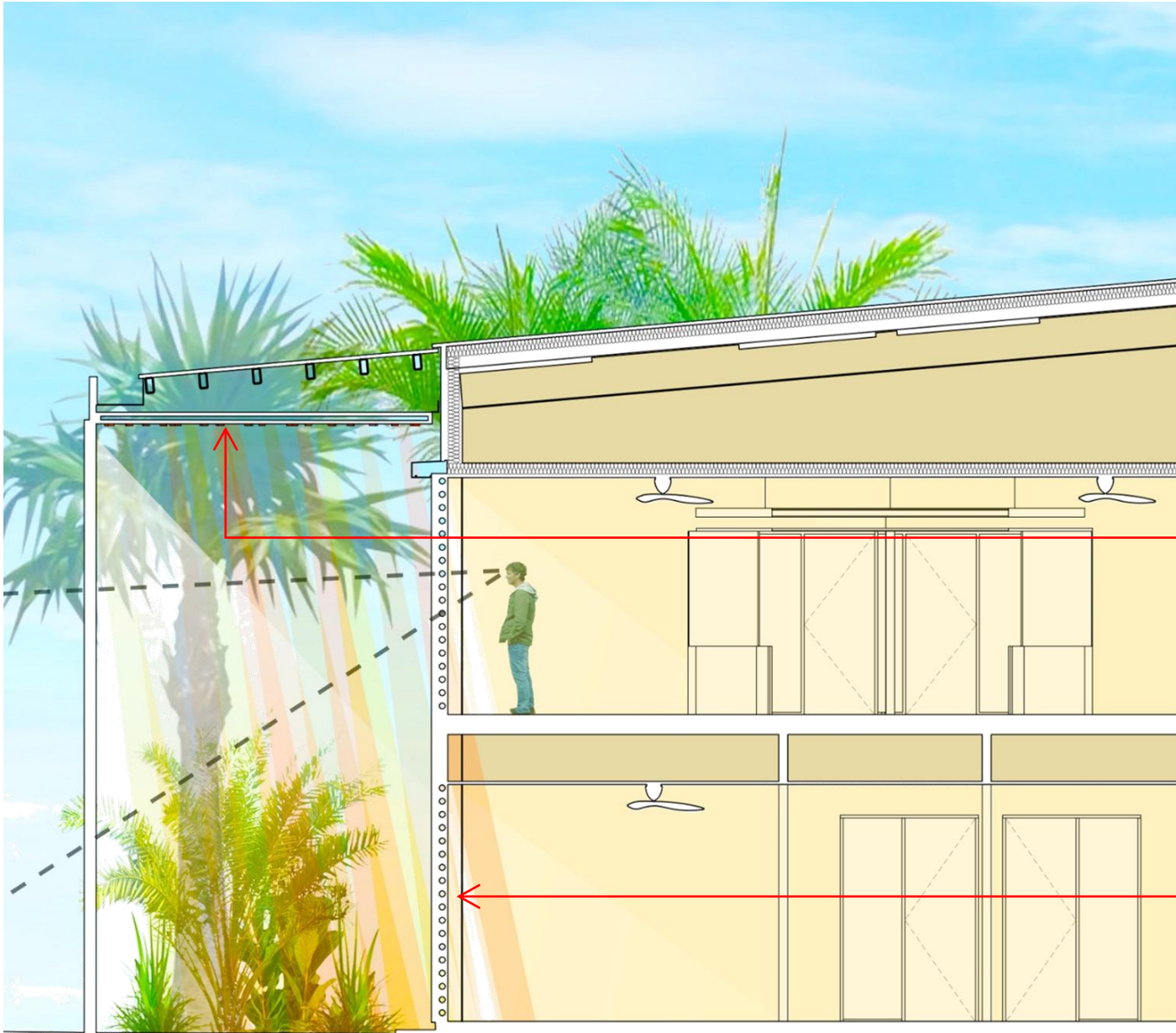
A diverse mix of Top End native plants provides a dense backdrop to the backyard and library courtyard areas as well as including numerous bush tucker species.

LIBRARY COURTYARD

A shaded, outdoor courtyard for use by library patrons for quiet reading or small group gatherings. Separate from the Menzies landscape, the courtyard is designed to be inward facing with a dense, green boundary and small shade trees growing from within the deck space. A dry creek bed surrounded by vibrant tropical planting creates a quiet oasis with various seating options including bench seats, tables and an irrigated lawn.



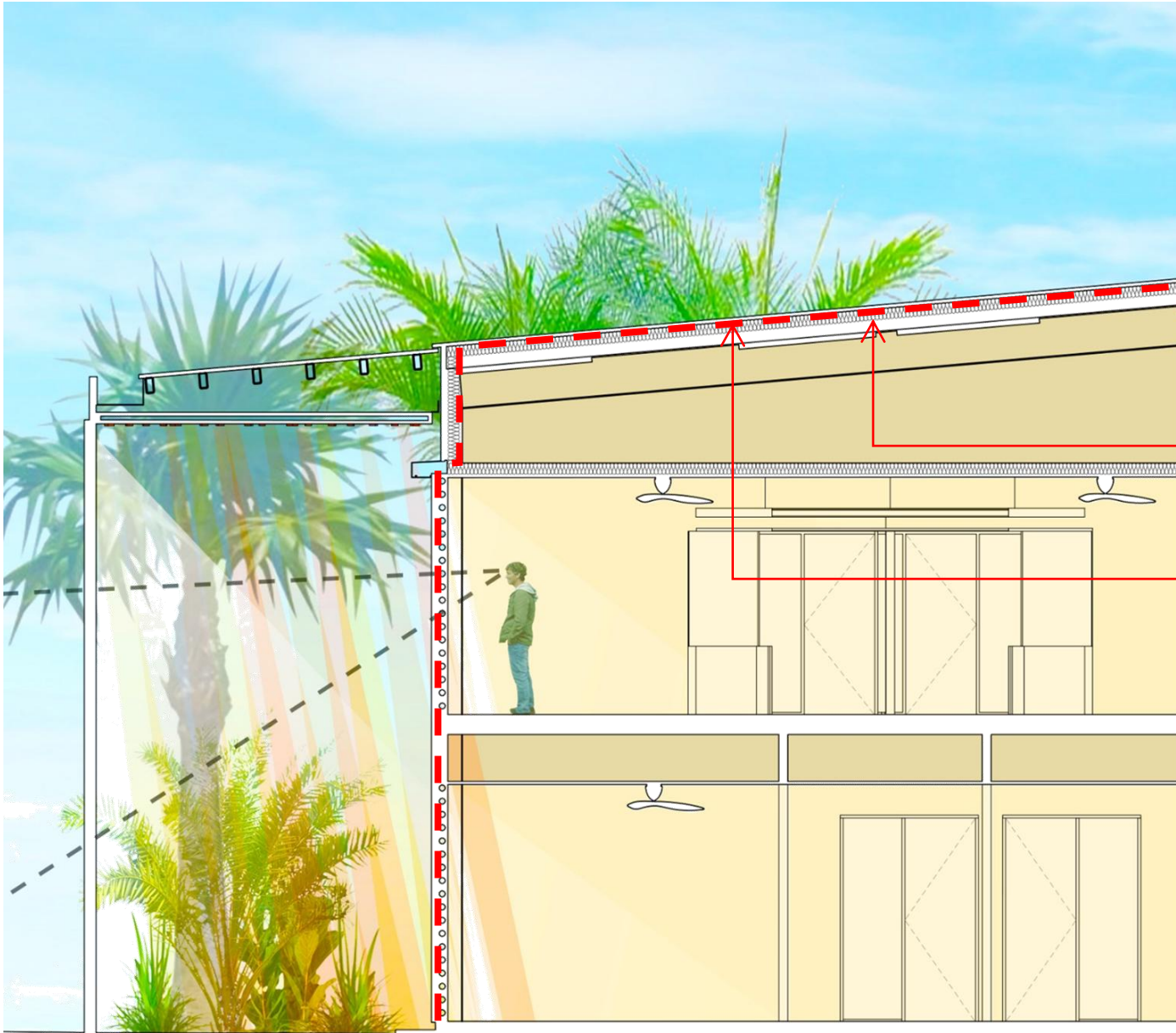
The Building...



Orientation and external sun shading minimises solar gain.

High ceilings and floor to ceiling glass maximises natural daylight.

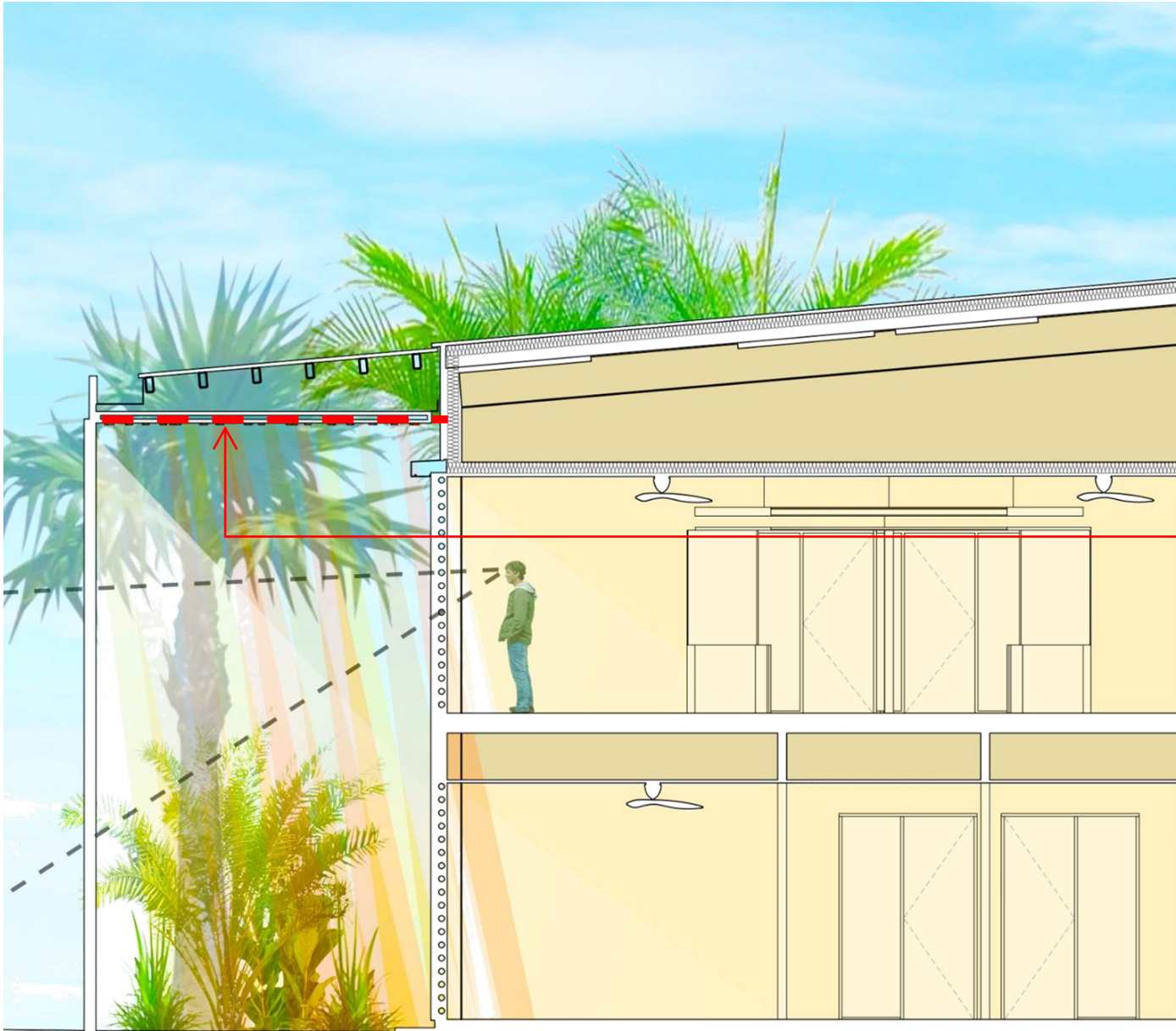
The Building...



Continuous insulation minimises heat gain through the building envelope.

A continuous vapour barrier provides a high level of building air tightness.

The Building...



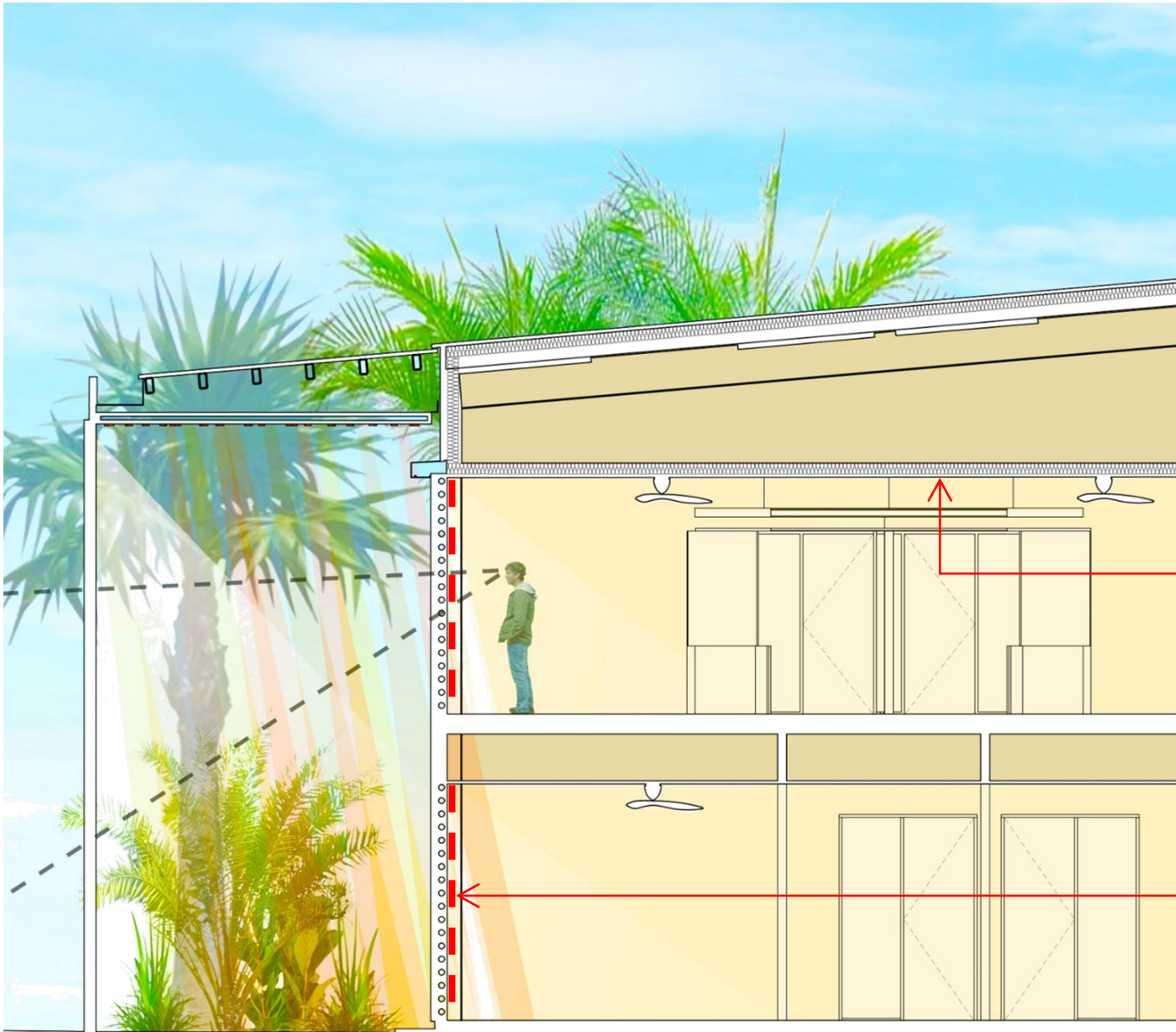
Glazing and facades are protected from rain and cyclonic winds by deep external sunshades.



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The Building...



Ceilings are at 3000.

Internal blinds provide glare control.



Air

Zoning of the building is based on heat load, solar orientation and area usage to minimise energy consumption.

Air conditioning operation is via timed push-button controls for intermittently used spaces.

CO₂ in outside air introduced via the air conditioning system is controlled to match occupant demand.

Outside air is pre-conditioned using heat recovery exchangers which also enable optimised and energy efficient removal of excess humidity.



Air

Low turbulence ceiling fans provide improved air movement and occupants can control the air flow.

The fans allow air conditioning to operate at a higher room temperature - 27 deg C in lieu of 24 deg C.

Fans are commonplace in Darwin, and are particularly effective with the change of seasons when the space can be sufficiently cooled by either ceiling fans or air-conditioning.



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Outside air intakes are located to transfer cooler air from the microclimate zones around the building.





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The fans allow air conditioning to run at a higher room temperature - 27 degrees rather than 24.





Water

Tapware with a maximum flow rate of 4.5 litres (6 WELS rating) in all bathroom facilities.

Dual flush toilets with capacity of 3/4.5 litres (4 WELS rating).

Showers with a maximum flow rate of 7.5/9 litres (3* WELS rating).

Urinals 0.8L/flush (6* WELS rating) automated proximity/flow sensor flushing.

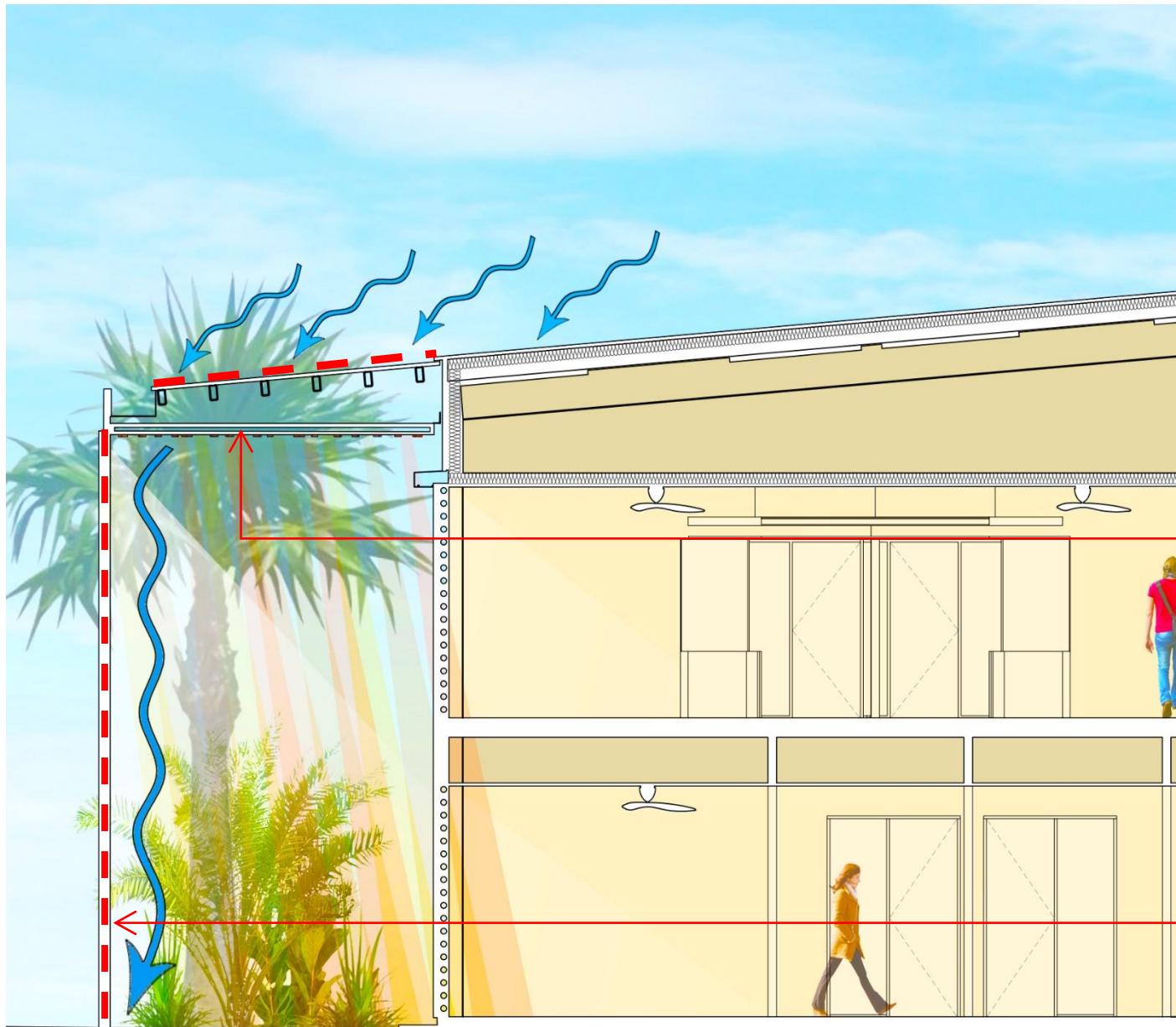
Sub metering of water uses including hot water, amenities, washdown, landscape irrigation.

Insulation of hot water plant and pipework.

Connected to existing university central chilled water system.

Passive treatment of storm water run off to improve discharge water.

Water



Gutters are located well away from the external walls.

Open rainwater channels allow for storm surge rainfall.

Water



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The building needs to cope with cultural expectations...

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30% indigenous population.

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The tree...

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Galamarrma – The Tree of Knowledge in the centre of Darwin - is an ancient Banyan tree that is culturally significant to the Larrakia Aboriginal people as a meeting place and community notice board.

It was a place where youths met with and learned from their elders, and where wisdom was gained in its shade.



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The analogy of a tree with spreading shade was used in discussions with stakeholders to develop an appropriate design language.



How the building responds to cultural expectations...

The tree canopy has been re-imagined with deep sheltering eaves made of colourful 'Tiwi' battens creating patterns of dappled light across the facades.

Transparency and light make the building interiors open and inviting.

Keeping the building to two storeys was a key factor in scaling the building appropriately and fostering interactions within.

The landscape merges with the building to create a comfortable transition.



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desert



tropical



coastal



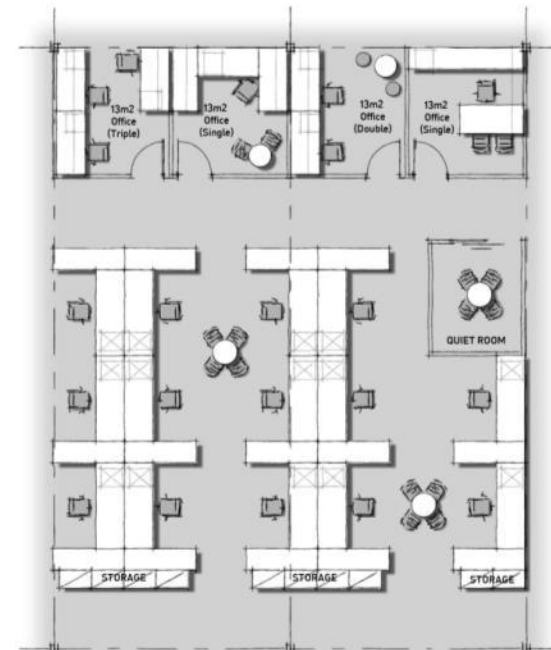
Interiors

One of Menzies' core values is the appreciation, support and acknowledgement of the indigenous communities that form the foundation for their research.

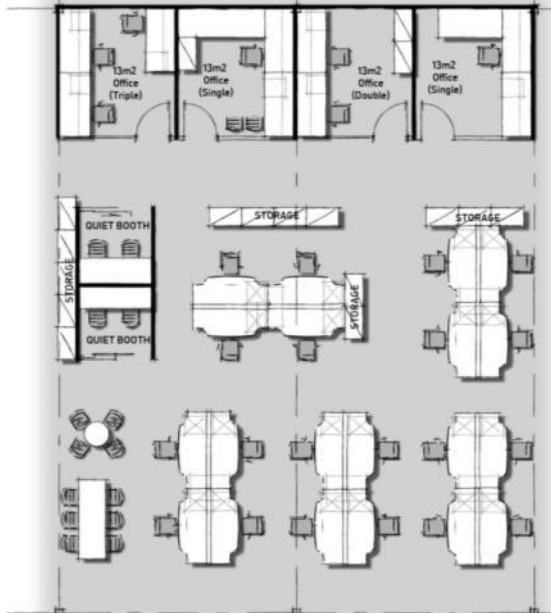
The interiors in the new building seek to explore and represent the links between indigenous groups and their association with distinct land regions such as the Desert, Tropical and Coastal areas.

The design language reflects the cultural characteristics via textures, materiality, colour palettes and forms.

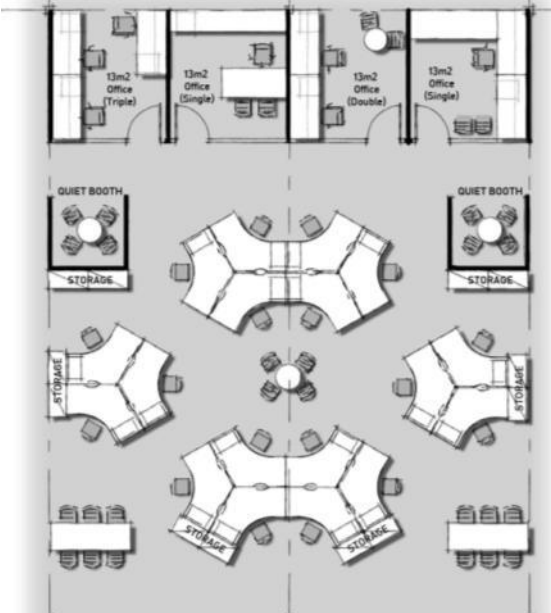
Workplaces have been designed to be flexible and encourage collaboration.



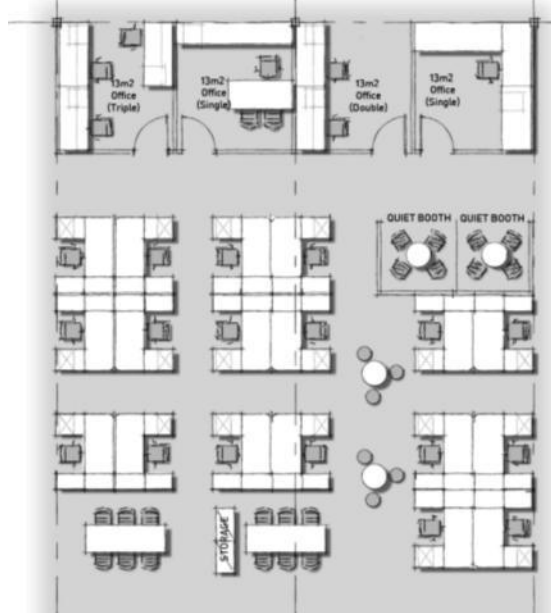
Test Plan (NTS)



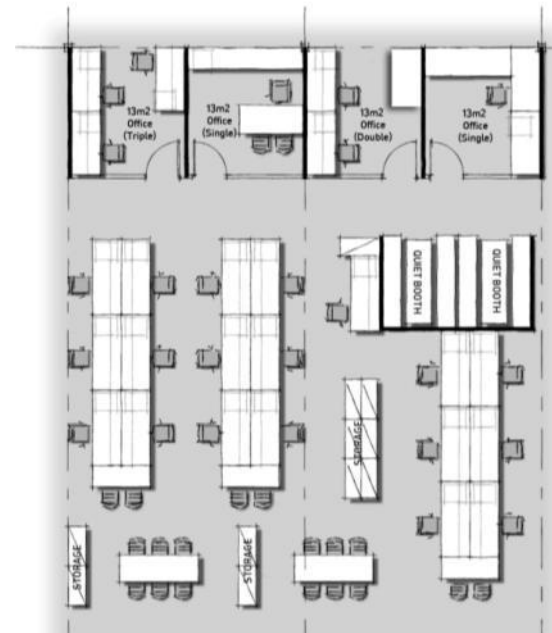
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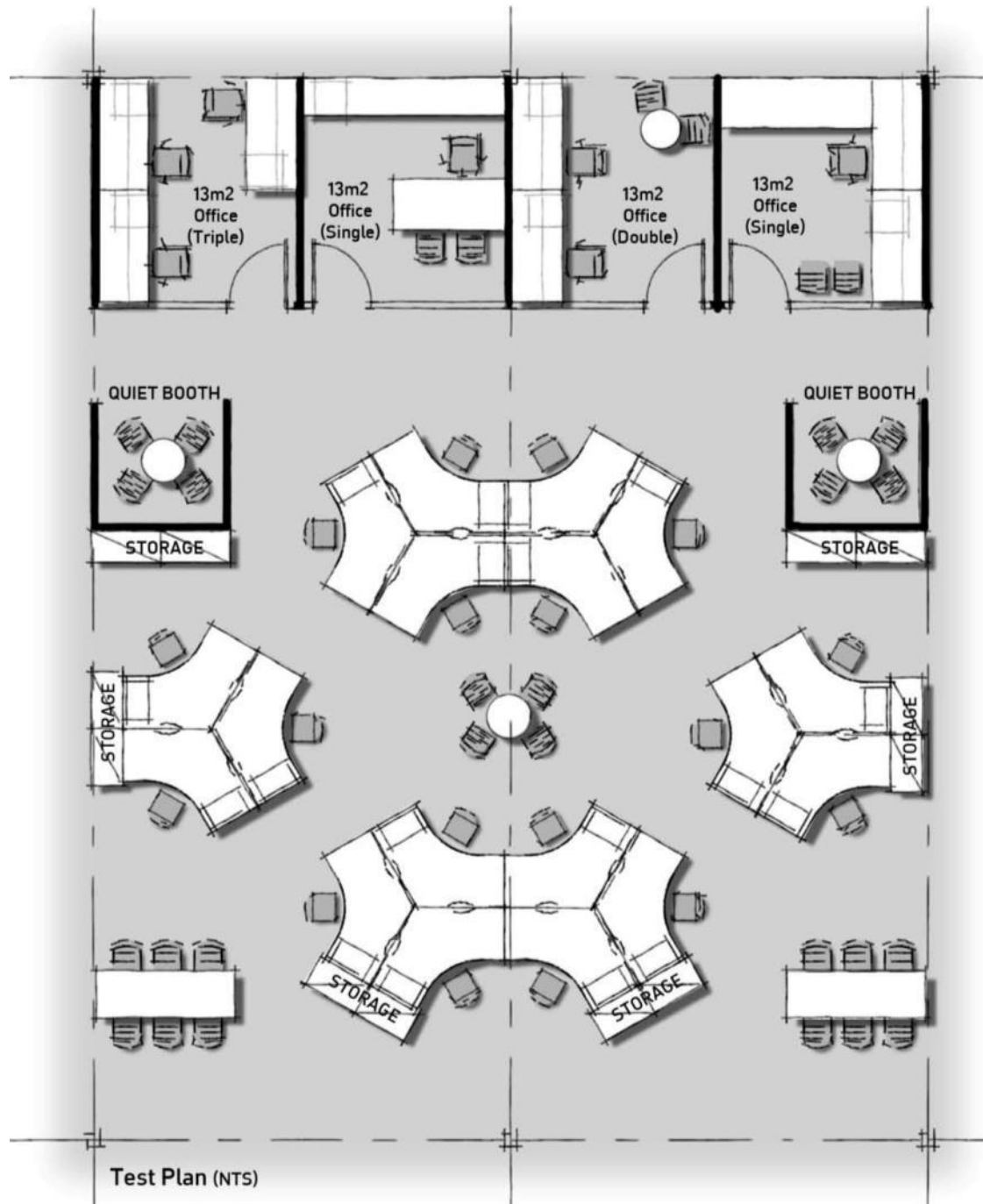
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Commercial Office, 140 William St Perth

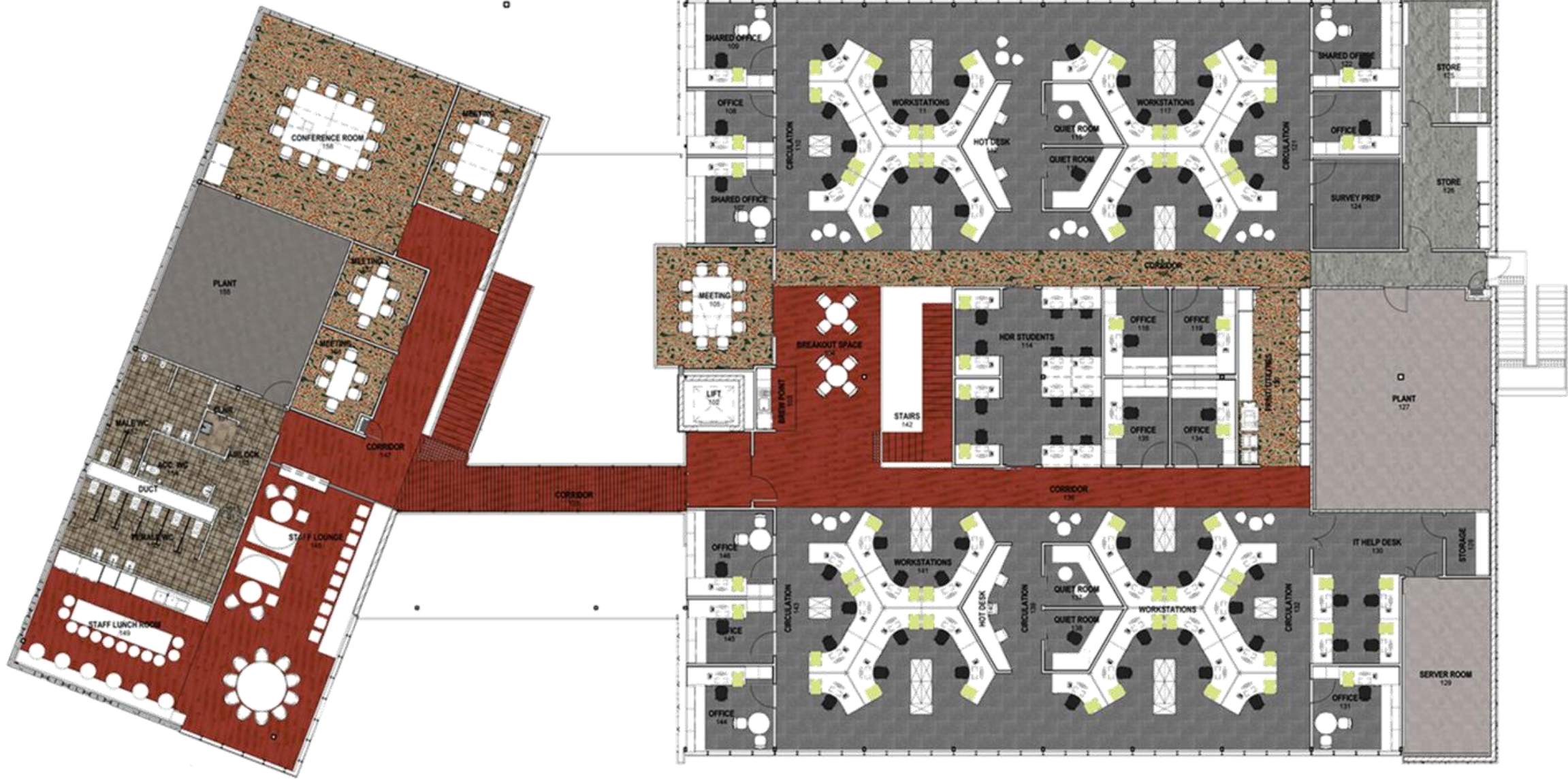


Schiavello, Centric Workstations



Formway, Hum Workstations













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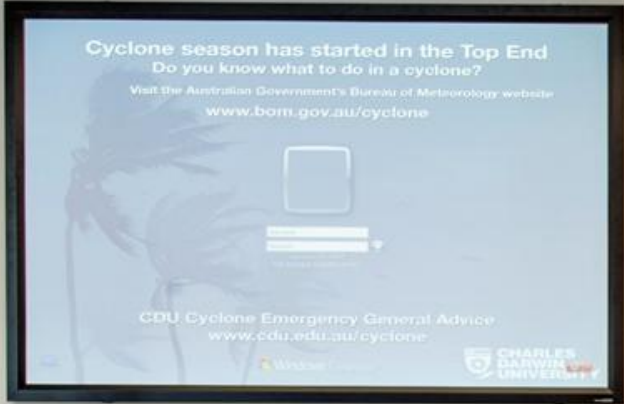


Cyclone season has started in the Top End
Do you know what to do in a cyclone?
Visit the Australian Government's Bureau of Meteorology website
www.bom.gov.au/cyclone

CDU Cyclone Emergency General Advice
www.cdu.edu.au/cyclone

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