NEXT KIT HOME

NEXT KIT HOME STRATEGIES FOR DESIGNING YOUR HOME IN THE COOK ISLANDS

When designing a house in the Cook Islands, it's crucial to respond to the climate effectively. As climate change is expected to increase temperatures, adapting your home to the tropical environment becomes even more important.

Cost is often an overriding factor, and we can show you ways to build your dream home on you budget without compromising the build quality, or construction materials.

Key design principles for the Cook Islands climate include proper orientation, solar shading using veranda roofing, and passive or active ventilation which are core elements of consideration here in the Cook Islands.

Window placement and type are particularly important; strategically positioning windows helps achieve optimal thermal comfort without relying on air conditioning. Double glazed windows and doors prevent heat transfer from outside to the inside, the use of louvers in certain spaces to encourage airflow are especially important.

Material choices for roofs and walls are also vital, as they influence heat transfer into your home.

Water access and retention, power - either solar or mains grid, site access and data services must be considered at the design stage to prevent budget blowouts during your build.

Additionally, incorporating well-designed outdoor spaces can enhance functionality and comfort.

Follow us as we show you how we can help you achieve your dream home.

SITE ORIENTATION

Your home's orientation on the site determines how well it uses the prevailing winds and protects against sun exposure. These factors are dependent on your home's location in the Cook Islands. Our sun rises from the east and tracks its way through to the to the west. Trade winds from the east prevail 75% of the time so the placement of your home can take advantage of the natural cooling effect this brings.

The heat from the sun, especially during mid - late afternoon, tends to be very hot and intense (typically, from the north). Also, because of the sun's low angle at those times, homes can be difficult to shade.

Prioritise rooms that need the most ventilation and locate them towards prevailing winds.

SHADING

Shading from the sun prevents walls and other surfaces from heating up and transferring that heat to interior spaces. Direct sunlight through openings can significantly increase the internal temperature. Shading to stop direct sunlight from entering your home is ideal.

Verandas are a great way to keep the sun off the walls when the sun is at its highest during the middle of the day. This keeps the wall and decking cool and creates a cooler area to sit and relax. The larger the veranda, the more cooling you can help create.

Trees and shrubs are another great way to create shade.

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VENTILATION

Having a constant flow of air moving through your house is critical for creating a comfortable indoor temperature. You can achieve this movement by allowing cool air to pass from one side of a room to the other. This action is called cross ventilation and occurs when air has an unobstructed path through a room or building.

Ideally, there should be **at least two openings in each room**. They should also be on two different sides of the room. You should also position them to encourage air movement throughout the entire room and not just one corner.

Having large windows and doors are good, but also consider the type of window or door.

Louvers can be secured while being left open and allow 100% of the opening for ventilation, however if air conditioning is being considered, open windows will allow the cool air inside to escape.

Careful consideration should be given depending on how you would like to cool your home in the future.

WALL MATERIALS AND CONSTRUCTION

Lightweight materials are generally better for house designs in tropical climates for their thermal qualities.

Concrete blocks, in-situ (cast-in-place) concrete, are preferred in some cases for their inherent strength, however this option can prove expensive and can have unexpected consequences such as sweating when the weather moves from a cold cycle to a warm humid cycle. You would have seen tiled floors become slippery on humid mornings during these events.

Materials such as WPC (wood plastic composite), wood, metal and cement boards on a framed construction system cool down rapidly. This process creates a more comfortable environment at night as these materials tend not to store heat.

Concrete walls when shaded appropriately can reduce the amount of heat they store. Likewise painting walls light colours can reduce the amount of surface heat transferred. *Dark and dull colours can absorb up to 70-90% of the sun's radiant energy, transferring this into the home.*

ROOF DESIGN

The roof is the single most exposed area to the sun's rays of any building and, as such, has the potential to radiate a lot of heat into a house.

Light-coloured, reflective roof covering materials reduce the amount of heat that passes through.

A double roof system also has benefits in reducing the heat that enters your home. Double roofs comprise two layers of roof. An air space typically separates the two layers. Hence, the upper roof layer protects the lower roof from direct sun exposure. This system significantly reduces the heat gain on a roof. A roof mounted solar system would count as a double layered roof.

High roofs and steep pitches allow the heat gained at that level to be a safe distance away from people occupying the space below, however this introduces extra costs, build time and complexities.

Roofs with a low pitch provide a more economical approach, however they take longer to get rainwater from them. With proper installation this is easily managed.

Large roof overhangs also help protect open windows from rain entering inside. Hence, the windows can stay open when the rain is falling. However, this situation depends on the direction the window and roof overhang face.

AVERAGE MONTHLY RAINFALL IN RAROTONGA

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall	172.1mm	169.4mm	129.8mm	143.6mm	123.1mm	59.2mm	62.8mm	51.0mm	63.0mm	80.1mm	103.5mm	133.8mm

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WATER AND ENERGY EFFICIENCY

Climate change has heavily affected the world we live in, with experts forecasting that environmental conditions will worsen.

Those issues and the changing rain patterns we are experiencing across tropical regions are serious concerns that will impact our future when designing your home in the Cook Islands.

Consider using renewable energy sources like sunlight. You can use solar thermal panels for heating water. Also, solar/photovoltaic (PV) panels could generate electricity to run your lights and appliances.

Next Kit Homes all come with low-wattage lighting such as LED bulbs and energy-efficient appliances. We encourage water storage tanks, water-saving devices such as catching rainwater to store in your water tank, efficient toilets and shower nozzles.

All our homes will have the options to have water filtration systems which include a mechanical filter to filter out materials in the water down to .1um and a UV filter delivering potable water directly into your kitchen.

BELOW ARE SOME GRAPHS AND DATA SHOWING TYPICAL WEATHER SPECIFIC TO THE COOK ISLANDS.

AVERAGE TEMPERATURES AND RAINFALL IN THE COOK ISLANDS

AVERAGE HIGH AND LOW TEMPERATURES IN RAROTONGA

Average	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High	29°C	29°C	29°C	28°C	27°C	26°C	25°C	25°C	25°C	26°C	27°C	28°C
Temp.	26°C	27°C	27°C	26°C	24°C	23°C	22°C	22°C	23°C	23°C	25°C	25°C
Low	24°C	25°C	25°C	24°C	22°C	21°C	21°C	20°C	21°C	22°C	23°C	24°C

The percentage of days in which various types of precipitation are observed, excluding trace quantities: rain alone, snow alone, and mixed (both rain and snow fell in the same day).

Days of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rain	13.3d	13.3d	11.6d	11.3d	10.2d	5.7d	6.2d	6.0d	6.7d	8.1d	8.8d	11.0d

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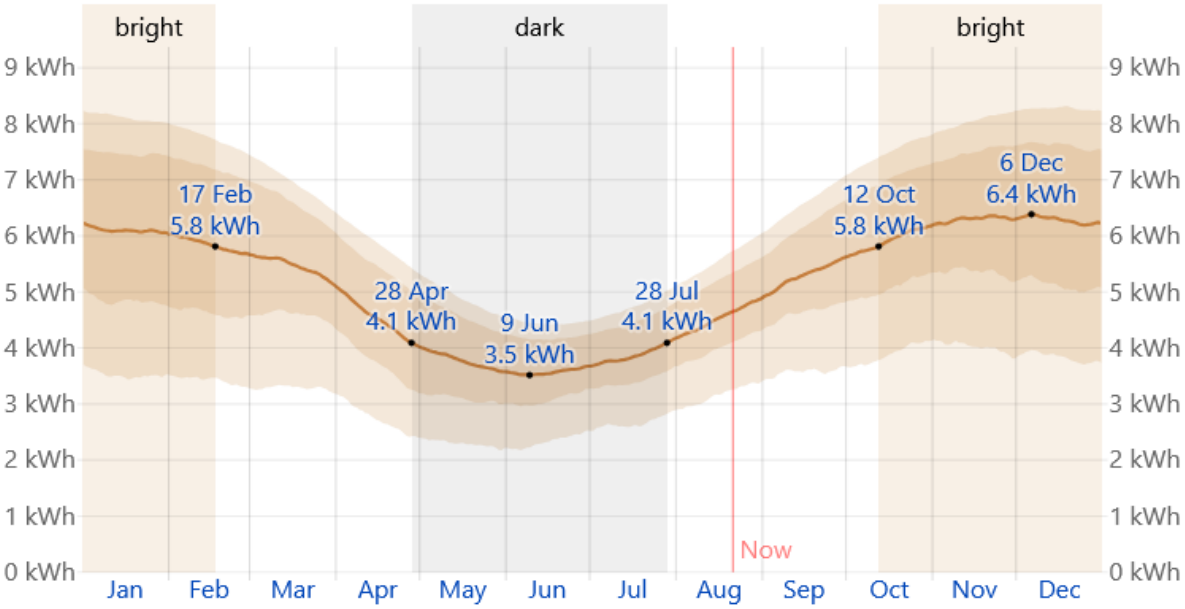
HOURS OF DAYLIGHT IN RAROTONGA

Hours of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daylight	13.3h	12.8h	12.2h	11.6h	11.1h	10.9h	11.0h	11.4h	12.0h	12.6h	13.1h	13.4h

AVERAGE DAILY INCIDENT SHORTWAVE SOLAR ENERGY IN RAROTONGA



The average daily shortwave solar energy reaching the ground per square meter (orange line), with 25th to 75th and 10th to 90th percentile bands.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Solar Energy (kWh)	6.1	5.8	5.5	4.5	3.8	3.6	3.9	4.5	5.3	5.9	6.3	6.3

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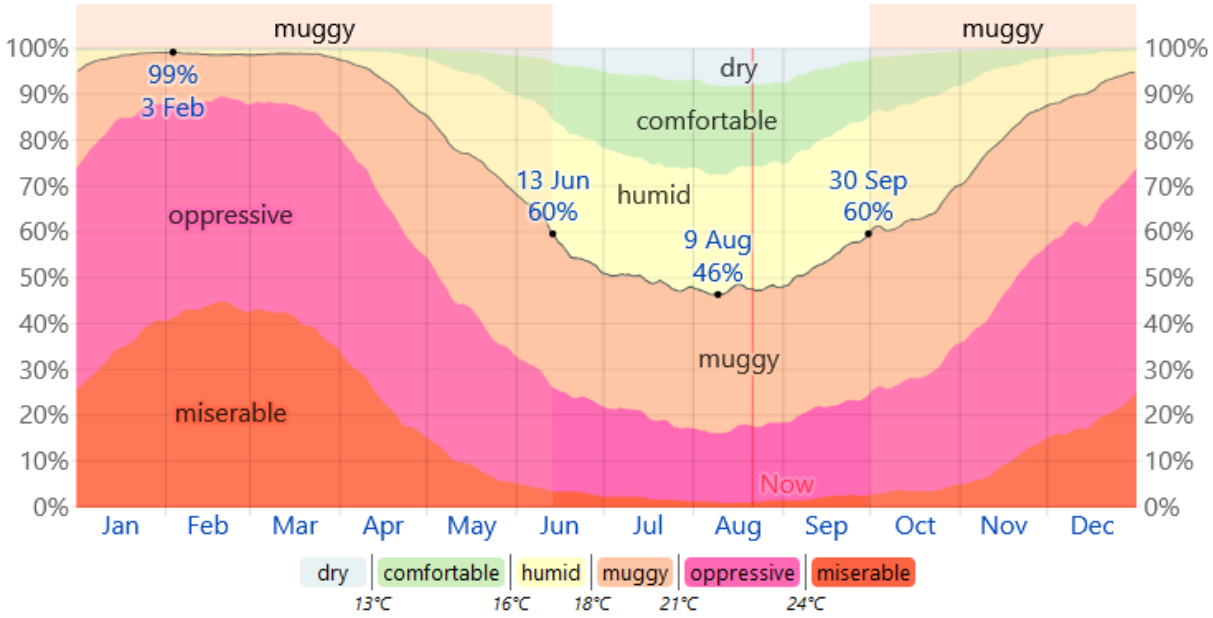
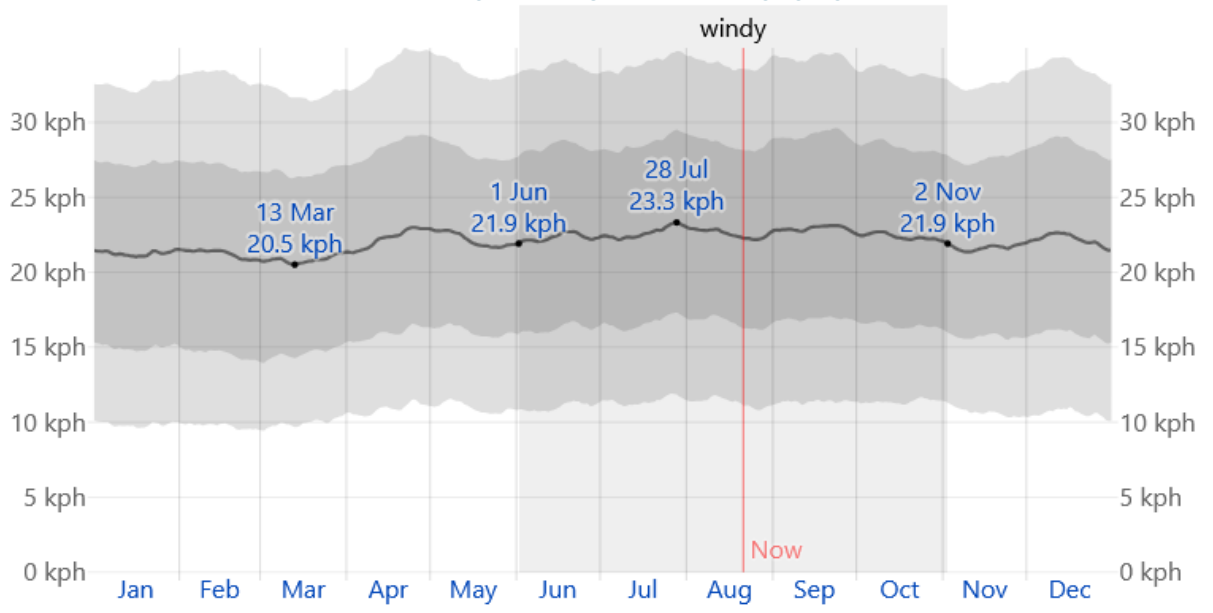
HUMIDITY COMFORT LEVELS IN RAROTONGA



The percentage of time spent at various humidity comfort levels, categorized by dew point.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Muggy days	30.4d	28.7d	30.6d	27.7d	23.7d	17.6d	15.3d	14.7d	16.1d	19.7d	24.0d	28.3d

AVERAGE WIND SPEED IN RAROTONGA



The average of mean hourly wind speeds (dark gray line), with 25th to 75th and 10th to 90th percentile bands.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind Speed (kph)	21.3	21.2	20.9	22.3	22.2	22.3	22.7	22.6	22.9	22.4	21.7	22.2

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