

GARDEN HOUSE

SUSTAINABILITY DESIGN ELEMENTS

By: Rosalie Stollery Architects, January 2024

1. INTRODUCTION

With the client's mantra of "Nature First" the project has been designed from an alternative viewpoint to the traditional view of a building, with the principles of the Living Building Challenge closely aligned to our intention.

The buildings and their interiors have been scrutinized at every junction to assess whether they could be more "alive", more "giving", more "sustainable". Questions were raised, how can they be more "elegant", more "efficient", more "generating of energy on all levels".

The result is a group of buildings and landscape design that operates efficiently and guilt free, a true example of restorative sustainability, where resources are shared from one building to another and beyond to the on site food production and back to the restaurant kitchen.

The building is designed to capture and treat all its own water, generate all its own energy with renewable resources and treat all its own waste, with very little waste leaving the site.

Through the re-purposing of the building site, we see not only the opportunity to re-purpose abandoned piggery sheds, but also to understand the land more deeply, further increase soil fertility, re-establish the food supply chain, continue to add to the bio-diversity of the land and allow creative individuals an outlet for beauty and self expression as we follow through the process to building fitout and final operation.

These are all aspects of sustainability which should not be undervalued, sustainability of ourselves as inhabitants of our planet is part of the sustainability of the planet.

Our goals are high, but we hope that the results can be used as a model for future development within and outside the Byron Shire and for all types of development.

We will focus on an appropriate response to the site, its landform, its natural beauty, its scale and its diversity as well as appreciating the varied micro-climates within the site.

Due to the size and small percentage of new building work, the site provides an ideal opportunity for the project to be self sustaining within its boundaries.

2. LIVING BUILDING CHALLENGE

Overseen by the International Living Future Institute, the Living Building Challenge is divided into 7 performance categories and as their philosophy closely aligns with the design brief and implementation, I will use them here to demonstrate our commitment to this approach.

They are Place, Water, Energy, Health and Happiness, Materials, Equity and Beauty.

These aspects will be explored in greater detail during the documentation and material selection process, however, I will comment briefly here on how we have already begun to consider these aspects of the building design.

A. Place

GardenHouse is currently a successful example of environmental rehabilitation of a disused 8000sqm piggery, set on an 33 acre farm, 5 minutes from the centre of Byron Bay and the coastline of Northern New South Wales, Australia, owned by a local family for the last 18 years

Based on permaculture principles the once barren paddock with its sole fig tree is now a balanced eco system. This includes 4 large dams providing essential habitat to the native wildlife of Byron Bay.

With the planting of over 40,000 plants, trees and shrubs 30 acres of degraded land is now an established eco system. GardenHouse stands as a native flora and fauna sanctuary and will continue with the establishment of koala corridors and endemic native reforestation.

The next step in the GardenHouse project is to marry the architectural structures with native and edible gardens, our aim is to provide a small 45 seat by appointment only restaurant and artisan food and drink area, creating a space for the slow, reflective and intangible with a minimalist aesthetic of the architecture and landscaping.

The existing large on site agricultural sheds enclose the proposed restaurant site, providing protection from winds and privacy to neighbours. These buildings are abundant in space and yet simple in geometry and this will also be part of the architectural basis of the re-purposed sheds that form the restaurant spaces.

The existing on site buildings mirror the surrounding landform as the site itself is also surrounded by rolling hills to the south and west.

The proposal aims not to interrupt the natural flow of the land.

The placement of new buildings and carpark areas follow the contours of the land and there is a clear separation between pedestrian and vehicular movements throughout the site. Visitor cars are restricted to the Carpark adjacent to the site access and set down area for the restaurant.

More than 80% of the site is set aside for natural habitat to flourish for native flora and fauna.

The size of the site, approx. 33 acres, and the small amount of new building footprint, a tiny 0.35% of site area, allows us to uphold this commitment to the land.

Total new site coverage including carparking and driveways is still only an unbelievable 3.5% of the site area.

Working within the footprint of the existing buildings for most of the proposal, helps to slow down the sprawl of building development and in turn allows more green space.

The dominant element on site, apart from the regeneration of plant life, is water, the next category in Living Building compliance.

B. Water

Our approach to the water element of the project is to reconnect people with the value of water and its effect that it has on our well being and sustenance.

We shall treat it as a precious resource.

Our minds and bodies appreciate the presence of water.

Interventions that add the presence of water to spaces have several health benefits. Among the health benefits of being in the presence of water are lowered blood pressure, lowered heart rate, and memory restoration. Research has found that the presence of water increases feelings of tranquillity.

The project will supply 100% of its water needs through a close-looped system.

The scarcity of water is a real issue world wide, and the roof spaces will serve as catchments for large storage tanks below driveways and terraces. Water will be treated on site for re-use within the buildings, landscaping and restaurant food growing.

This is intended to help demonstrate a way toward a more resilient water future.

Historically, on site water was used in abundance to help clean the pig pens and purify effluent, however, the project design will re-establish the value it has today by highlighting its past use in the huge shed drains into a glass floor design to these areas to reveal the history below, and as a response to our new appreciation of its use and inherent value.

Water features will be provided adjacent to the interior spaces to remind the visitor of its value and benefits in its stress reducing and calming effects.

Already the aerating fountains in the existing dams are helping to not only remediate the water quality on site, but are also creating a botanical garden type feel to the site. This is intentional.

Potable water will not be used for irrigation.

To minimize surface water run off in the car parking areas, extensive planting areas are planned throughout the parking areas. There is a maximum of 4 car spaces before a planting area is located. The parking bays themselves will be paved and semi-permeable, to allow for some surface penetration and avoid large run off from hard stand areas.

All stormwater run-off will be slowed via retention tanks before it is returned to the ecosystem as designed by the hydraulic engineer.

An on site effluent system will be in place to deal with all grey and black water with underground irrigation to the allocated disposal areas with no connection to the Council sewerage system necessary. Pump energy will be supplied via renewable energy sources.

C. Energy

The architect and client have made a conscious decision to move away from combustion based energy sources.

There will be an extensive array of solar roof mounted panels and battery storage to help harness and store renewable energy on site. It is not intended that energy requirements will be required from the grid system, on the contrary, the project will operate year round in a pollution free manner.

This will demonstrate to the community that energy needs can be met in a sustainable way and can be reproduced on a smaller scale at home.

All energy use will be metered and monitored in an effort to continually reduce energy use.

Interior materials will be selected on a basis that they embody a lower than average embodied energy level.

Fossil fuels for individual cars will be discouraged and a pick up service will be offered to those visiting the restaurant or booking into the Artisan area.

An electric car ride sharing service shall also be part of the booking process to assist in reducing carbon emissions from those visiting the site. This is a strong design element and commitment for the ongoing operation of the project and will be linked to each booking request.

2 electric vehicle charging stations shall be provided in the visitor carpark area to begin the process of being “zero ready”.

Carbon sequestering materials shall be prioritized in the construction.

D. Health and Happiness

Right from the outset of the design process, health and well being has been a prime motive in the design of the building and spaces.

Special attention has been paid to the flow of the landform and how it benefits the project buildings along with the actual connection between nature and the people using the spaces, consuming the produce and visiting the site.

The form, size, materials, outdoor to indoor transition spaces and placement of the buildings all help to slow down the visitor so that they have time to appreciate the beauty and energy giving aspects of the project through the strong natural elements featured in the design and nature generally.

There will be frequent opportunities for direct human-nature interaction throughout the building.

Nature is in abundance here and the project will benefit hugely from the strong connection established between the built and natural forms.

By supporting and encouraging the natural ecosystems on the site, including the remediation of the large fauna attracting dams and the seasonal production of on site fruit & vegies for use in the restaurant and Artisan area, a return to healthy ecosystems will in turn aid in increasing an awareness of good individual health and its basis.

Human responses to biomorphic patterns and arrangements seen in nature, are preferred by the human brain and have been implemented in the landscape layout and plant selection. Browning explains that examples of this include the Fibonnaci sequence, which often appears in nature in leaf arrangements and spirals. This use of patterns and fractals in design has been repeated in the layout of the site geometry and is just one piece of a holistic approach to biophilic design.

Light is a part of our rhythm.

Maximizing natural light benefits people as well as energy bills. A lighting system that either naturally or artificially changes throughout the day to mimic our circadian rhythm helps link people to the outdoor environment and, essentially, keep us on track with our natural 24 hour cycle. Maximizing natural light and changes throughout the day also enhances visual comfort as well as general happiness.

Daylight is in abundance throughout with large glazed areas that allow the surrounding green spaces to be a part of the internal spaces.

Courtyards have been created within and around the buildings to help with natural light penetration to work and sitting spaces, again to enhance the connection for both visitors and workers. These

internal courtyards also help to slow down the visitors as they will be encouraged to appreciate the nature based works of art on display within them. This will be hugely beneficial to the occupants of the building

It has been proven that appealing to multi-sensory experiences improves the health of the individual greatly, so to be able to see nature, hear it in the dam fountains and water features, and experience the food through taste and smell as well as material textures will also decrease the stress levels and therefor increase health of those that visit the project.

The intensity of flavour and quality of the food served at the restaurant will reveal how a greater connection to the land, chemical free production and reduced transportation distances can produce superior food in terms of taste and health benefits.

In addition to the above, a connection to the seasons also aids in overall health and wellbeing. This will be aided by the seasonal growing and use of produce in the restaurant and Artisan areas. Seasonal vegies will be a part of the artisan sales area.

No petrochemical fertilizers or pesticides will be used in the growing of food for the restaurant or in maintaining the landscaped areas.

A commitment to a healthy interior environment must be long lasting, so a Healthy Indoor Environment Plan will be in place to address cleaning protocols and products and provision of direct exhaust for kitchens, bathroom and janitorial areas.

Access to views and daylight from 95% of regularly occupied spaces will be implemented.

In addition, there will be sufficient operable windows to provide natural ventilation for at least 6 months of the year as well as workers within the building being able to control their own air flow/temperature.

Food served in the Restaurant or Artisan area will be chemical free, with some heirloom varieties helping to lean away from genetically modified varieties, thus returning to a simpler healthier food supply.

E. Materials

Throughout the life cycle of building materials, the materials themselves can be responsible for loss of health, biodiversity, habitat, pollution and resource depletion.

We therefore commit to re-use of building materials where possible and selection from a low risk source where not.

The project is committed to encouraging locally based solutions and regional economy.

- 20% or more of the construction materials will be sourced within 500 kilometres of the site.
- 30% or more of the construction materials will be sourced within 1000 kilometres of the site
- 25% or more of the construction materials will be sourced within 5000 kilometres of the site.
- The remaining 25% or less may be sourced from any location.

Wood and steel removed from the pig sheds will be re-used in the construction of the new buildings and vegie growing areas.

Recycled timber will be used for external cladding of the new buildings as noted on plans.

Also, a large part of the Artisan and Farm Shed will be recycled timber.

80% or more of all wood will be FSC (Forest Stewardship Council) certified or recycled, the remaining 20% being from low risk sources, or receive a FSC Project Certification.

We will also be prioritizing materials with low volatile organic compounds for interior materials.

Other sustainable material considerations are the use of the existing pig pen panels as wall cladding and paving, using recycled bricks and stonework, lower carbon concrete, use of recycled steel and other metal products, building windows from the recycled rafters from the existing sheds recently demolished and stored on site for re-use, prioritize suppliers that commit to a zero carbon emissions plan, request and/or prioritize suppliers that have recyclable packaging

80% of the construction waste material will be diverted from landfill.

Extensive knowledge and research shall be employed to ensure that low levels of waste will be removed from site during operation.

Most food scraps will be composted on site, recyclable packaging will be prioritized, glass shall be crushed and re-used off site, left over cooking oils will be re-purposed off site by a local company, to name a few initiatives already in place.

F. Equitable

It is intended that the project will provide stable, safe and high paying job opportunities for many locals of the Byron shire.

The project will be accessible and welcoming to all.

Staff and visitors to the site will have equal opportunity to work and enjoy the natural environment so that it can be of best benefit to all.

While the restaurant area will have a business model that coincides with the low number of seats, the Artisan area will be more affordable for all.

Both parts of the project have been designed with equal connection to nature, fresh locally or on site food production and appreciation of the site's inherent beauty.

The project presents opportunities for everyone to be involved in sampling locally grown fresh food and products emanating from these chemical free and in some instances heirloom variety fruit, vegetables and herbs.

Excess food sharing with local community charities, including the homeless, also ensures that all tiers of the community will be able to engage on some level with the project and its benefits of healthy local food.

Those planning to visit or work in the project will find it fully accessible throughout.

G. Beautiful

People and Nature are connected.

The key to producing a beautiful building is to produce a building that honors and respects nature.

The materials and forms used in the buildings are a combination of restrained modernist forms, contemporary detailing and recycled materials.

I include quotes from the architect's statement here as beauty through Sustainability flows through every decision and is worth inserting again here:

The building form is a blank canvas of simplicity to allow nature to be seen in its best light.

Through this new nature based ideology, we have created a new way of decision making for a new way of building.

The spaces within shall:

- Provide a moment in time to rest
- Provide a space to contemplate our place in nature
- radiate a sense of calm
- encourage serenity
- create a tension between the mass and a lightness, strength and spirit
- provide a place for the body, for the mind and for the senses
- create a place for nourishment on all levels
- educate us on how we can incorporate these aspects into our everyday lives
- remind us to appreciate one of the most valuable resources on earth...water

Through:

- Nature first
- Water as the main and most precious element
- The use of organic materials and incorporating large rocks and rare existing plants planted many years ago
- Beauty of proportions
- Simplicity of detailing
- Providing a tension between the historic and the contemporary, scale and intimacy
- A depth of appreciation of the materials used and their intrinsic qualities and strengths
- Contrasts that make you stop

The easy pedestrian flow through the site and by following the physical water flow from roof to storage to channels within the structure and floor, ponds and courtyards and beyond to the remediated effluent ponds

The graceful execution of the building project will in itself generate a beauty that can already be felt on site through the work the owner, Maggie and family, have already done over the last 18 years.

The built environment will help to magnify this effect beyond all expectations.

It has been the intention from the outset for the building to nurture the human spirit through its connection to a highly held esteem for the natural world.

3. SUSTAINABILITY CERTIFICATIONS

As the Byron Shire's population increases, there is more pressure on the shire's green space. This proposal makes use of an already built environment, by re-purposing the spaces and can be used as a model for similar developments in the future.

This project will further encourage the ecological regeneration already begun by the owners and enhance the site's function in a way that is truly sustainable from many viewpoints.

As the project progresses we will also be seeking certification from the Green Building Council of Australia to gain a Green Star Rating for the project.

It is also the intention of the owners to register with the Living Building Challenge and Certification as we progress, which recognizes the highest level of sustainability and regenerative design worldwide.

Other International Living Future Certifications which the project will seek are Core Green Building Certification , Zero Energy Certification and Zero Carbon Certification to name a few.