1. **Concept Narrative**

Our design concept starts (and ends) with the circle. This simple, elemental unit is used to spotlight two areas, the shoreline and the site where the energy generation for the village will be happening.

We are interested in exploring the idea of ecological adaptation for the community, given that the rising sea level is going to make existing shoreline habitation increasingly difficult in the coming years. Our design centers around the idea of ‘retreat,’ and ways of facilitating a beautiful and practical experience at both the shoreline and the energy site for the village currently. We aim to create a ‘responsive’ landscape, one that can be configured to meet the needs of people now, and can be flexible and adaptive enough to grow to meet the needs of people in an increasingly unpredictable future.

The upland area will include a stone wall based on the weaving pattern found in Indigenous Fijian building practices, with rocks being installed to intentionally emulate the herringbone weave pattern found on structural walls and ceilings. This wall will serve a function as a piece of public art but also as a buffer for potential landslides and rainwater from the mountains. A community center with solar paneled roofs (that will also capture rainwater to be cleaned and used by the community for drinking) will sit opposite the wall. Embracing the traditional building approach of Yavu, the mass of the wall and the sub-structure of the community center will use dry stack rocks, on a base of crushed stone to form the foundation. Along the wall portion, the Yavu will be flanked by charcoal to filter water passing through the wall as it travels down-grade. The water captured by this system will be used to fuel community agriculture in this area by means of french drains emanating from the wall base, to a central garden space.
Our vision with this community center is to create a new space that can become the center of the village as residents may need to seek shelter further inland from the shoreline. This space we envision being used as shelter in times of need, as a central food garden for community use, and as a space where electricity and water can be stored for communal use.
At the shoreline, we have created a dock where people from neighboring villages (and islands) can come and access both drinking water and electricity to charge devices on their boats. Within the dock structure we are creating, we will have a nursery for shoreline-stabilization mangrove trees, which have been recommended for use by the Fijian government as a strategy to prevent erosion in vulnerable coastal areas.The floating dock which is constructed from proven materials is both modular and moveable to suit the changing needs of the community it will serve. It will provide both an extension of community, and a linkage to new ones as well.

1. **Technical Narrative**

The community center is draped with a Thin Film Non-Silicon copper indium gallium selenide (CIGS) photovoltaic weave, with an assumed conversion efficiency of 16%. This technology was chosen to be applied to the unique surface of the shelter roof, reduce the gross weight and transportation costs to install the imported material and to maximize photovoltaic efficiency. The covered portions of the dock will utilize standard photovoltaic solar cells at an assumed conversion efficiency of 20%. Standard, heavier photocells will require less logistical effort to install off-shore than deeper inland. Power will be distributed throughout the community by a simple electrical grid.The community center and dock photovoltaic systems will collectively generate up to 133 kW of electricity. 90 kW of power will be generated within the solar site itself. This is supplemented by an additional photovoltaic array on the dock, providing power to marine activity and near-shore structures.

Water is captured by simple means: water is shed from roof structures into gutters and diverted to seal rain-barrels for use. Surface water is collected by the natural topography of the site and absorbed by a sub-grade French drain adjacent to the shelter wall. Water is directed below grade, under gravity, to a central garden/farming space to facilitate healthy plant growth. The water harvesting methods were chosen to embrace the simplicity and materiality of indigenous strategies. They are proven, low cost and meaningful to the community. The water collection of the design is contingent on rainwater, surface runoff and groundwater patterns.

1. **Prototyping and Pilot Implementation Statement**

Our design incorporates local materials and embraces a ‘low-tech’ implementation that will not require any heavy machinery on the island. Given that most of our design has been inspired by the existing building practices used on the island, we hope that the community can be collaborators in the pilot process and share their knowledge of best practices for implementing this system on the island. Construction of Yavu elements supporting the wall and community center should occur first, with consideration for where surface and below grade water might move under seasonal, daily and extreme weather conditions. The community center structure will follow traditional construction approaches, with modern reinforcements. The application of photovoltaic film on the community center can be applied in phases to test cost, effectiveness and meet the demands of the community over time. Adjacent to this construction, establishing the dock structure and leveraging its ability to offload resources to support upland construction should be a priority. Photovoltaic panels on the dock should be installed and tested secondary to the community center, as this is supplemental to the current power needs of the community. The piloting of the standard photocells on the dock may require less testing than the unique form draping the community center.

1. **Operations and Maintenance Statement**

The concept of responsive landscapes and circular systems that have guided the development of our design requires the ongoing engagement from residents within the Village of Marou. This will include committed communication between the design team and residence throughout the lifespan of this project.

Targeted education will begin with a focus on several representatives from the community who can be integrated into the operations and maintenance process. Operations duties will include first and foremost observation and monitoring of the functioning of the power system, water ducts, and other lines of energy flow. Our design aims to provide as simple and straightforward a microgrid system as feasibly possible given the intermittent properties of solar power and energy storage requirements. Primary installation of the panels and storage system will involve the selected community representatives, who can then proceed to transfer this knowledge to other engaged inhabitants of Marou. Unfortunately, the Republic of Fiji currently does not have the manufacturing infrastructure to construct the high efficiency flexible solar panels used in this design, but they can be involved in supplementary maintenance and installation of the infrastructure.

Besides replacement of panels after a 20 year timeframe and after potential damages, ongoing maintenance will be similar to what the villagers do for their solar panels in current operation, including cleaning of debris and replacement of dead cells. We hope that our design can foster curiosity amongst the students in the village, and that this project can be used to teach about the growing importance of decentralized renewable energy systems.

1. **Environmental Impact Assessment**

Our design works to capture stormwater and redirect it away from the village. Our design is low-impact in the landscape, and we will be using materials such as wood and hybrid concrete using waste from agriculture instead of aggregate to create as gentle a system on the landscape as possible. Using rain gardens and french drains to collect and filter water will allow for less intervention in the landscape.

The dock structure may have an impact on wildlife at the shoreline, especially given the implementation of the mangrove nursery. We will ensure that no coral reefs or vulnerable habitats underwater are affected by the dock, scaling it up or down as needed to accommodate these. Additionally, the floating structure of the docks should allow for them to be as minimally invasive as possible in the water.

Installation use of the docks will have a minimal impact on the health of the shoreline and aquatic environment compared to the benefits provided to the village of Marou and neighboring communities. Much of the impact will occur during the installation period, resulting in temporary shoreline instability from anchoring the docks. The instability will recover after a short period of time, and may vary in severity based on if any vegetation will need to be cleared. Most likely impact to occur is increased sediment load in the waters near the shoreline, however this can be mitigated with prober fibre filters surrounding the site of installation. Over the lifespan of the project, the propagation of mangroves along the shore, and the ability to hitch boats to the docks rather than physically drag them ashore will increase shore stabilization.