**Concept Narrative:**

This project envisions a solar-powered land art installation in Fiji, inspired by the cultural significance of the kava bowl and the kava ceremony. It aims to harmonize with the natural landscape and local traditions while providing renewable energy and creating a multicultural community space that celebrates Fijian heritage and promotes environmental sustainability.

Drawing inspiration from the communal significance of the kava ceremony, particularly the kava bowl, the installation features a circular design resilient to cyclones. Elevated solar panels are installed on the structure, creating a dynamic visual experience while harnessing solar energy and ensuring continuous energy generation in both wet and dry seasons. The project incorporates sufficient energy storage for a stable, reliable microgrid system to maximise renewable energy output and ensure energy security.

The installation emphasizes sustainability by using locally available and environmentally friendly materials, including bamboo, coconut wood, and sago palm leaves. These lightweight, durable resources reflect traditional Fijian craftsmanship and minimize environmental impact. New battery energy storage systems (BESS) will be used for storing excess energy and backup to enhance energy security and promote a circular economy. Permeable walkways and constructed wetlands also support flood control, groundwater recharge, and wastewater recycling, promoting a balanced ecosystem.

Designed as a multifunctional community hub, the installation includes interconnected rooms for classes, conferences, and cultural gatherings. These spaces draw from traditional Fijian architecture, with natural ventilation and shading for comfort in all weather conditions. Visitors are immersed in an environment celebrating Fijian nature and culture, surrounded by lush green spaces, turquoise water features, and pathways adorned with Fijian tattoo patterns illuminated by kinetic energy generated by movement.

Beyond renewable energy generation, the installation offers co-benefits such as food security, biodiversity conservation, and educational opportunities. Floating green filters and permaculture gardens within the installation naturally recycle wastewater and produce fresh vegetables. These gardens, inspired by traditional Fijian agricultural techniques, attract diverse wildlife, including birds and frogs, fostering biodiversity and ecological balance. Rainwater harvesting and solar desalination systems provide a sustainable water supply for both the gardens and community use.

The project is co-created with the local community to ensure that the design reflects Fijian values and needs. Communal spaces are designed for cultural activities such as storytelling, dance, and kava ceremonies, promoting cultural preservation and social cohesion. Community members are actively engaged in the construction and maintenance processes, empowering them with skills in sustainable building and renewable energy management.

By integrating renewable energy systems, sustainable infrastructure, and cultural elements, our project enhances the resilience of Fijian communities to climate change while celebrating Fiji's rich cultural identity. This innovative approach demonstrates the potential of land art to inspire sustainable living and foster a harmonious relationship between people, culture, and nature.

**Technical Narrative:**

Our design incorporates a hybrid solar AC-DC bus system with a black start option, optimizing energy flow for immediate use and storage while ensuring resilience and efficiency. The system will support bidirectional energy flow, allowing batteries to charge during excess solar generation and provide power when solar irradiation is low or absent. This configuration will enhance efficiency by reducing conversion losses and minimizing single points of failure, improving system reliability. An Energy Management System will enable remote monitoring and control, simplifying performance tracking and system optimization.

The total installed photovoltaic capacity will be 88 kWp, distributed between AC and DC subsystems. The DC side will include a 35.2 kWp solar array coupled with 23 kW of solar charge controllers and 240 kWh of nominal energy storage capacity, managed through three 15 kVA bi-directional battery inverters. The AC side will consist of a 52.8 kWp solar PV array connected to a 33 kW PV inverter, ensuring a stable three-phase, 415 VAC, 50 Hz power supply. Given a specific yield of 4.234 kWh/kWp/day in Marou, the system is expected to generate approximately 373.4 kWh per day, totaling 137 MWh annually.

For water management, the system will integrate rainwater harvesting, stormwater collection, and desalination technologies to provide a reliable water supply for Marou Village. The 14,000 m² site, including land art elements, will collect approximately 3.4 million liters of rainwater during the six-month rainy season, averaging 0.2 meters of rainfall per month. Bioswales will capture and filter stormwater runoff naturally, improving water quality. A 5-million-liter reservoir will be constructed across stormwater channels to collect runoff from higher elevations, supplementing the supply.

Seawater and wells will provide an additional 5 million liters, purified as needed before distribution. The purification process will employ solar-powered reverse osmosis (RO) with energy recovery devices (ERDs), reducing energy consumption by 75% by utilizing residual energy in brine discharge. Once purified, water will be temporarily stored in a 10,000-liter cistern before being pumped to the village for consumption.

Wastewater treatment will be managed through green filters, using aquatic plants to naturally filter and recycle water. This method ensures effective wastewater treatment in areas with limited resources while promoting environmental sustainability. The combination of these technologies will generate approximately 10 million liters of clean drinking water annually, ensuring long-term water security.

Our hybrid solar AC-DC bus system will enable efficient and resilient energy generation, while our integrated water management approach will provide sustainable access to clean water. The system’s inputs will include solar energy, stormwater, seawater, and groundwater. Its outputs consist of a stable three-phase electrical supply and an annual water yield of approximately 10 million liters, supporting Marou Village effectively and sustainably.

**Prototyping and Pilot Implementation Statement:**

Our team will adopt a phased community-centric approach to both the prototyping and full-scale pilot implementation processes, ensuring cultural relevance, sustainability, and local ownership.

The prototyping phase will begin with design refinement and planning from August to October 2025. During this time, we will finalize the design while integrating cultural and environmental considerations. We will also develop a comprehensive prototyping plan, including budgets, execution strategies, and consultations with professionals such as local artisans, engineers, and quantity surveyors in Fiji. This early stage will ensure that our approach is technically sound and aligned with community needs.

From November to December 2025, we will conduct a land quantity survey and gather input from the local community following an art exhibition in Fiji. The team will organize workshops and focus groups with local artisans, engineers, and residents to refine the design based on feedback regarding functionality, aesthetics, and usability. By involving the community in this process, we aim to ensure that the final design is not only effective but also embraced by those who will use it. Insights and feedback from the LAGI committee will also further shape the project’s direction.

The mobilization and fabrication stage, from January to May 2026, will focus on procurement, training, and construction. We will source materials and train community members on installation techniques, fostering knowledge transfer and skill-building. Groundbreaking will mark the start of the physical implementation, with locals actively participating in the construction process. As the prototype takes shape, our team will integrate sustainable building techniques, renewable energy solutions, and maintenance training to empower the community to manage the infrastructure long-term. Once the prototype is complete, we will validate its design and functionality before scaling.

For full-scale implementation, we will first evaluate the prototype’s performance, identifying key lessons and areas for improvement. This will inform the development of a detailed implementation plan, including budgets, timelines, and sustainability measures. The pilot implementation will engage the community in both construction and capacity-building programs, equipping them with skills in sustainable construction, renewable energy management, and system maintenance. By prioritizing community involvement throughout the process, we ensure that the project remains locally driven and sustainable. By integrating local knowledge, engaging stakeholders in decision-making, and fostering technical expertise within the community, we aim to create a lasting impact that extends beyond the initial implementation.

**Operations and Maintenance Statement:**

The operation and maintenance of our design will be structured around proactive monitoring, routine upkeep, and active community participation to ensure long-term functionality and sustainability. The local community will play a central role in maintaining the energy, water, and built environments, with designated responsibilities for daily operations, periodic inspections, and system troubleshooting.

For the energy system, daily monitoring will track energy production and battery status to identify potential issues early. To maintain peak performance, photovoltaic (PV) modules will be cleaned and inspected biweekly to remove dust and debris that could reduce energy yield. Power converters and battery storage systems will undergo scheduled maintenance, either quarterly or biannually, to verify electrical connections and ensure continued functionality. Remote diagnostics will also be used for firmware updates, configuration adjustments, and system recalibrations when necessary. To support these efforts, detailed documentation outlining operational procedures for system startup, shutdown, energy response, and emergency handling will be provided. The onsite team will also maintain comprehensive logs to track system performance, troubleshooting history, and routine maintenance activities.

For water management, regular inspections of the bioswale will be conducted, especially after heavy rains, to identify erosion, sediment buildup, or clogging. The community will remove debris, litter, and sediment to maintain proper water flow. Inlets, overflows, and outlets will be checked frequently to prevent blockages, and undesirable plant growth, such as weeds and tree saplings, will be removed throughout the growing season. The reservoir will undergo periodic maintenance, including silt removal to preserve storage capacity, inspection for cracks and leaks, and monitoring of water levels to prevent overflow. The reverse osmosis (RO) water purification system will require daily flushing with fresh water by the Marou Village community to extend membrane lifespan and prevent frequent replacements. RO membranes will be replaced every 3-5 years to maintain filtration efficiency, and system pressure and water flow rates will be monitored to detect operational issues. Additionally, purified water entering the 10,000-liter cistern will be carefully regulated to prevent overflow, while the cistern itself will be cleaned regularly to ensure water quality.

For the land art and design site, ongoing maintenance will involve regular cleaning of the buildings and surrounding areas to preserve the aesthetics and usability of the space. This will include routine inspections for structural integrity, upkeep of pathways and public spaces, and ensuring that the site remains welcoming for both residents and visitors.

The local community will be deeply involved in all aspects of operations and maintenance. By taking responsibility for daily monitoring, cleaning, and inspections, they will ensure the long-term success of the project. This collaborative approach fosters a sense of ownership and self-sufficiency, allowing the community to maintain the project sustainably while benefiting from its continued operation for years to come. Through regular engagement and skill-building, we aim to create a system where the community is both the primary beneficiary and the steward of the project’s success.

**Environmental Impact Assessment:**

Our project positively impacts the local ecosystem by promoting biodiversity and reducing carbon emissions. The use of renewable energy in Marou eliminates approximately 137,000kg of CO2 annually, contributing to Fiji’s Low Emissions Development Strategy 2018-2050. The permaculture gardens and floating green filters create habitats for local flora and fauna, enhancing biodiversity and ecological resilience. However, while the completed project will provide long-term ecological benefits, the construction and installation process may temporarily disrupt natural ecosystems, particularly soil and water systems.

One major concern is the potential contamination of surface and groundwater due to improper waste disposal, sediment runoff, and chemical leaks from construction activities. To mitigate these risks, we will implement proper waste disposal practices, manage stormwater runoff, and use erosion control measures such as vegetative buffers and silt fences to minimize sediment from stormwater runoff. Furthermore, the incorporation of rainwater harvesting systems and bioswales will help maintain natural drainage patterns and promote groundwater recharge, ensuring minimal disruption to local water systems.

Another potential environmental impact is soil disturbance. The construction process may lead to soil erosion, making the land more vulnerable to wind and water erosion. Soil compaction can also reduce its porosity, affecting its ability to retain water and support vegetation. The removal of topsoil could also deplete nutrients, leading to decreased fertility and loss of biodiversity as habitats for soil organisms are disrupted. To counteract these effects, we will implement erosion control measures such as planting ground cover vegetation, minimizing unnecessary soil disturbance, and ensuring proper waste management to prevent soil contamination. We will also restore disturbed areas by replanting native vegetation, helping to rebuild soil fertility and maintain ecological balance.

Disruption of local ecosystems, particularly flora and fauna, is another concern. Land clearing for construction may displace plant and animal species, affecting biodiversity. To mitigate this, we will minimize land clearing as much as possible and ensure that the permaculture gardens and floating green filters provide alternative habitats for displaced species, supporting ecological resilience. We will ensure to work closely with the LAGI team and local experts to schedule construction activities outside of the breeding seasons for sensitive species, reducing the risk of disturbing critical reproductive cycles.

Air pollution is also a potential issue during construction, as dust and emissions from construction equipment could degrade air quality, affecting both human and animal health. Dust can settle on plant surfaces, reducing their ability to photosynthesize, while airborne pollutants may interfere with the respiratory systems of birds, mammals, and insects. Increased pollution levels could also disrupt insect behavior, potentially affecting pollination and food chains. To address this, we will implement dust control measures such as regularly damping down the site with water, using locally available materials to reduce transport-related emissions, and planting trees and vegetation buffers to absorb and filter air pollutants.

By integrating these mitigation strategies, we aim to balance sustainable development with environmental protection, ensuring long-term ecological benefits while minimizing short-term disturbances.