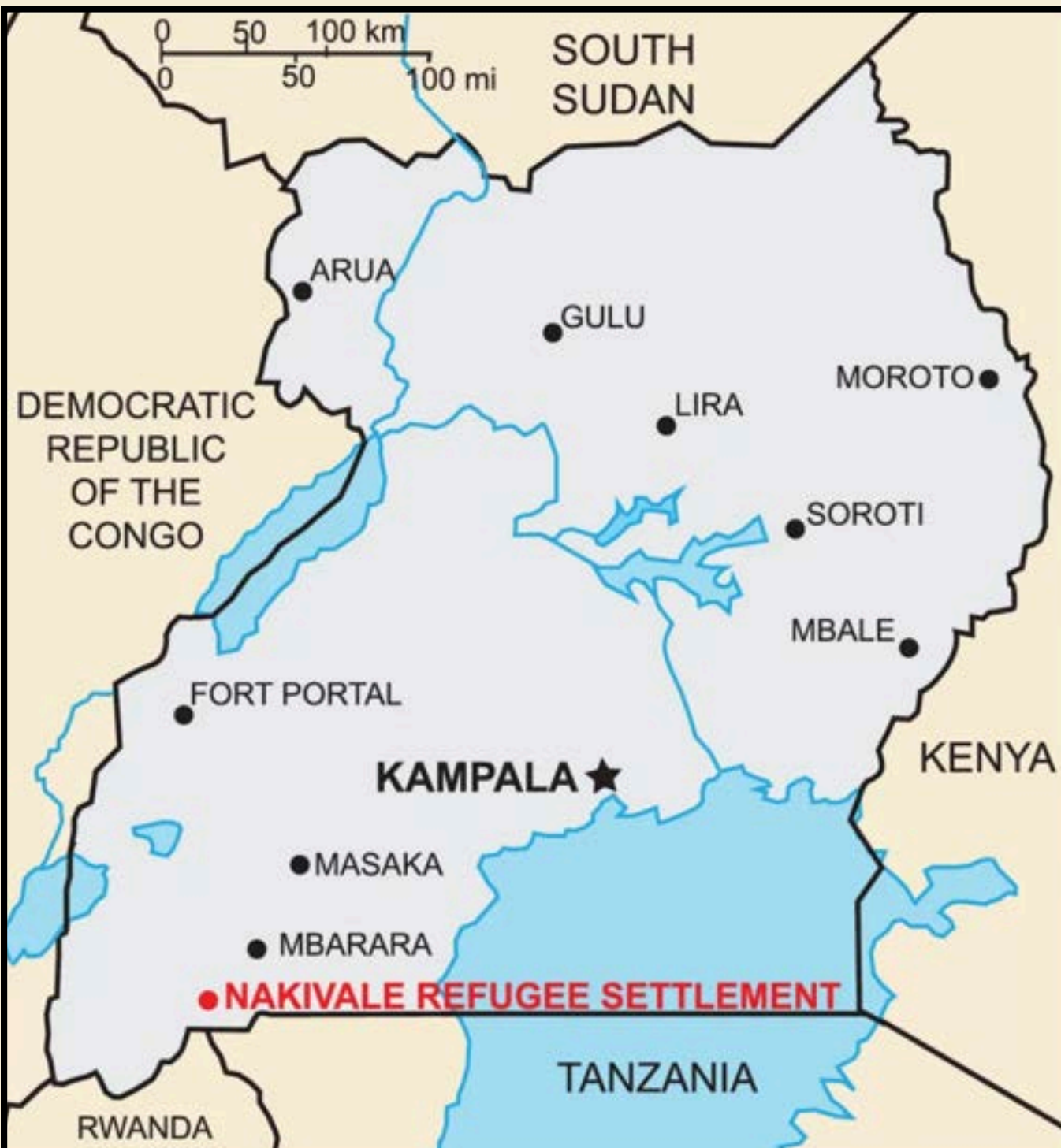




Nakivale Refugee Settlement Lodging and Community Center



01. Introduction & Problem Definition

The Nakivale Refugee Settlement is located in South-Western Uganda and is one of the oldest refugee settlements in Africa. Shared Action Africa (SAA) is a non-profit organization that advances women's financial education and reproductive health at Nakivale. With no nearby accommodations for visitors and volunteers or designated office and outreach space for SAA, our project provides a multifunctional design that meets the cultural, economic, and health needs of the local community and those working for SAA.

02. Design Specifications

The facility is composed of four distinct parts:

- Multipurpose room able to fit 100 people
- Office for 10 SAA employees and two 30-person meeting rooms
- Social hotel with five private rooms and a hostel space able to sleep five people
- Kitchen and gardens to supply food for 40% of the occupancy

Local building regulations/codes, available water and electricity sources, climate information, and natural resources were taken into account during the design process.

- Building codes dictated the minimum room sizes by their uses
- The location of the sun during likely times of use was taken into account in determining building orientations

The hotel/hostel buildings are constructed from shipping containers, while the remaining buildings are made of compacted mud bricks.

03. Methods

Design of Required Interior Spaces

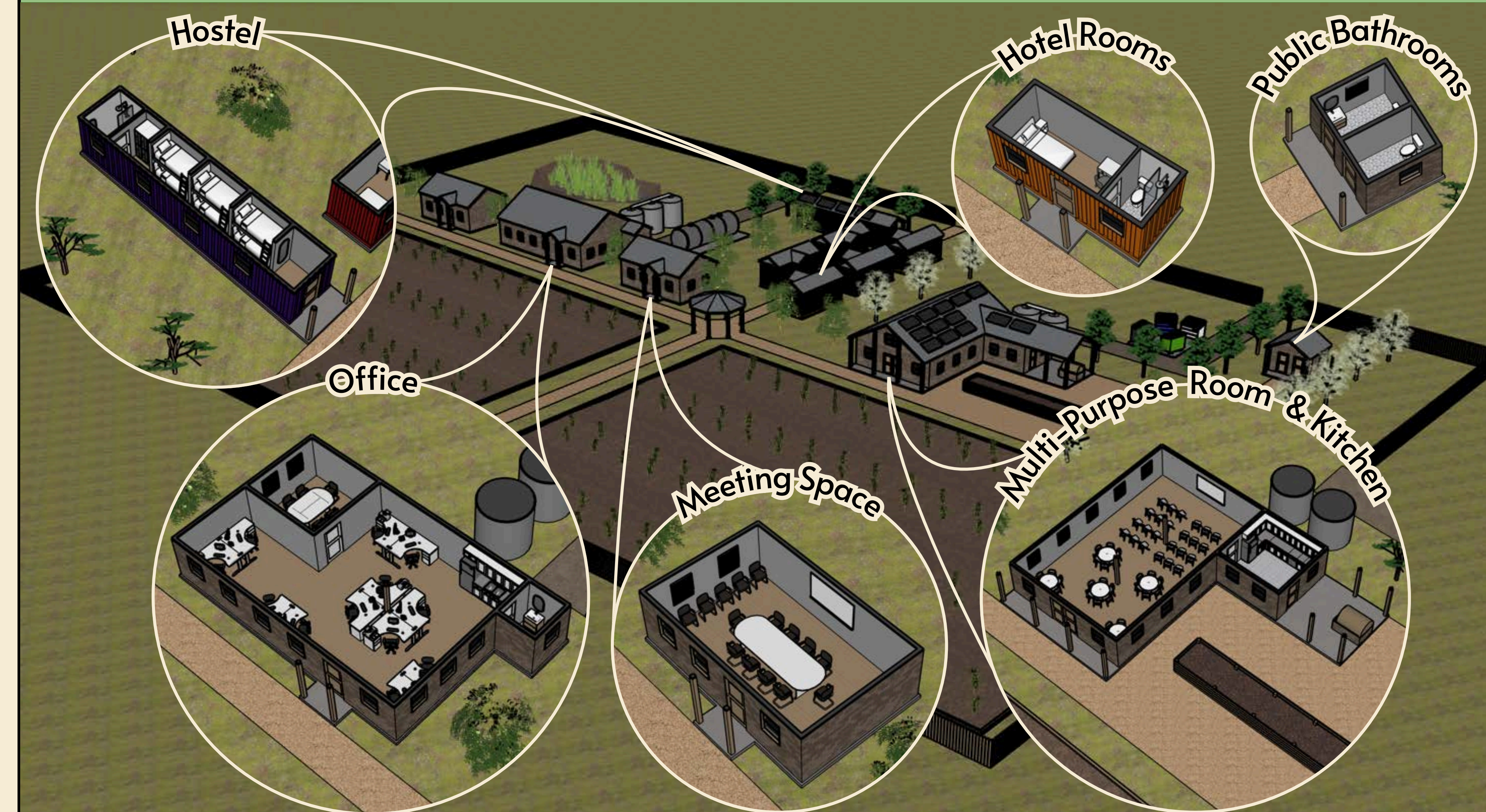
Design of Required Exterior Spaces

Development of 3 Design Options

Design Review Meeting

Finalized Design and Rendering

04. Site Design



05. Utilities

Solar Power

- Step 1: Average kWh Daily Usage:
- 76 kWh per day
- Step 2: Estimate the Amount of Sunlight Solar Panels Will Receive:
- 14.5 kW solar array at 4 degrees
- Step 3: Account for Inefficiencies:
- Assume 20% inefficiencies = 17.5 kW solar array
- Step 4: Determine how Many Solar Panels are Needed and Price:
- $17500W \times \frac{1(\text{panel})}{575W} = 31\text{panels}$
 - $31\text{panels} \times \frac{\$127.33}{1\text{panel}} = \$4,000$

Solid Waste

- Step 1: Trash breakdown in Uganda:
- 88.5% organic (500 kg/m³)
 - 11.5% other (235 kg/m³ average)
- Step 2: Assumed Constants:
- 0.6 kg/person/day trash generation
 - 100-person occupancy
 - Weekly trash collection
 - 7-month compost turnover
- Step 3: Estimated trash volumes
- 22 m³ of compost
 - 574 liters of other waste
- Step 4: Cost of available materials:
- \$517

Wastewater

- Step 1: Daily Wastewater Flow
- Total System Flow: 2.762 L/day
- Step 2: Treatment Design
- BOD Load: 575 g/day
 - Wetland Area with SF = 1.5: 50 m²
- Step 3: System Sizing
- Septic Tank: 6 m³
 - Constructed Wetland: 50 m²
 - Cesspit: 15 m³
- Step 4: Performance Check
- Retention Time: 13 days
- Step 5: Estimated Cost
- \$6,750 - \$6,900

Rainwater Collection

- Step 1: Water usage per space
- Hotel bathroom = 306L/room/day
 - Hostel bathroom = 74L/day
 - Office bathroom = 466 L/day
 - Kitchen = 25 L/day
- Step 2: Annual water consumption
- Hotel occupancy = 120 days/year
 - Total = 451,915 L
- Step 3: Tank cost estimate
- Assuming five 15,000-L tanks
 - 10% cost buffer for piping and runoff collection
 - $(5\text{tanks} \times 3400\frac{\$}{\text{tank}})1.1 = \$18,700$

06. Takeaways

Through a collaborative and iterative design process, a sustainable lodging and community center was developed for the Nakivale Refugee Settlement. This design offers spaces for accommodation, gathering, work, and sustenance, all supported by sustainable utility systems.