INNOVATIVE UNIVERSITY OF ENGA

P.O BOX 387, WABAG, ENGA PROVINCE

PROCUREMENT SECTION

(Office of the President)

CALL FOR EXPRESSION OF INTEREST

Solar Power & ICT Infrastructure Installation in Four Rural Secondary Schools

Tender Number: IUE 2026 – 002

THE INNOVATIVE UNIVERSITY OF ENGA (IUE) INVITES EXPRESSION OF INTEREST (EOI) FROM SUITABLE, QUALIFIED TECHNICAL COMPANIES IN ENGA PROVINCE FOR SUPPLY, DELIVERY, INSTALLATION AND COMMISSION OF STAND-ALONE SOLAR POWER SYSTEM, ICT COMPUTER LABORATORY INFRASTRUCTURE, SATELLITE INTERNET CONNECTIVITY (STARLINK) AND COMUPTER LAB UPGRADES IN FOUR (4) RURAL SECONDARY SCHOOLS.

SCOPE OF WORKS

Selected Contractors will carry out works for supply, delivery, installation and commission of;

- **Stand-alone Solar Power System**
- **ICT Computer Laboratory Infrastructure**
- **Satellite Internet Connectivity (STARLINK)**
- **Computer Lab Upgrades and Maintenance (Security Doors, Windows, Security Grilles and Locksets).**

LOCATION

1. **PITIPAIS SECONDARY SCHOOL, TSAK VALLEY – WAPENMENDA DISTRICT**
2. **KOMPIAM SECONDARY SCHOOL – KOMPIAM DISTRICT**
3. **SIRUNKI SECONDARY SCHOOL – LAGAIP DISTRICT**
4. **KANDEP SECONDARY SCHOOL – KANDEP DISTRICT**

ELIGIBILITY

Registered Contractors/Companies are kindly asked to provide the following minimum requirements:

- Company Registration with relevant Authorities (Company Registration & IPA Registration)
- Valid Tax Registration with IRC and TIN Number - Current
- Valid Certificate of Compliance (COC) from IRC - Current
- Valid Insurance Coverage (Public Liability and Worker Compensation) - Current
- Proof of experience - Minimum of 5 years of demonstrated experience in solar power installation, ICT infrastructure deployment or similar electrical and network integration projects.
- Safety and Quality assurance
- Company Profiles and key personnel
- Physical Location of Company Operation Address in Enga Province

EOI from Contractors/Companies failing to provide the requested information will be disregarded. Eligibility will be based on point scoring system after evaluation of the Expression of Interest. Unsuccessful companies will be notified by email. Companies scoring above the Minimum required Points will be invited to tender and Tender Documents will be issued.

ENQUIRIES

General queries and site inspection, please contact Project & Infrastructure Director on phone: 83819711 or email: larry.minas@iue.ac.pg. Attention: Mr. Larry Minas.

CONDITION

The invitation is placed on behalf of the Innovative University of Enga (IUE) and does not accept any responsibilities from any consequences arising out of the invitation. This invitation does not entail any commitments. Innovative University of Enga (IUE) reserves the right to change or cancel this invitation and its requirements at any time.

SUBMISSION OF TENDERS

All tenders are to be submitted electronically through email the provided: solo.puru@iue.ac.pg

CLOSING DATE & TIME

All documents to be submitted 14 days from date 4th/11/2026 of this notice at the Office of the Innovative University of Enga (IUE), Irelya Campus, Wabag, Enga Province, in a clearly marked as **"Expression of Interest – *SOLAR POWER & ICT INFRASTRUCTURE INSTALLATION IN FOUR RURAL SECONDARY SCHOOLS"***

Issued Date: 4th/11/2026

Closing Date & Time: 18th/11/2026 at 4:06PM

Authorized by

DR. BRIAN DAVIS
IUE President

INNOVATIVE UNIVERSITY OF ENGA
P.O BOX 387, WABAG, ENGA PROVINCE

Computers and Solar Power System Installation in four remote Secondary Schools.

1. Introduction

The Innovative University of Enga (IUE) is committed to expanding access to information and communication technology (ICT) and digital skills across Enga and its surrounding regions. To kickstart this initiative, IUE has selected four remote secondary schools in Enga Province to pioneer its online learning courses:

1. **Pitipais Secondary School**
2. **Kompiam Secondary School**
3. **Sirunki Secondary School**
4. **Kandep Secondary School**

The primary objective is to establish standalone, solar-powered computer laboratories at these schools to deliver IT instruction to senior students and provide professional development for local teachers.

The contractor will be responsible for supplying and installing all necessary equipment, including:

- **Solar Power Systems:** Solar panels, solar batteries, charge controllers, inverters, cables, switchboards, circuit breakers, fuses, earthing systems, lightning arresters, and related accessories.
- **ICT Infrastructure:** Computers, servers, network switches, cabling and related accessories.
- **Internet Access:** Starlink satellite internet terminals and configure internet access to computers.
- **Physical Security Upgrades:** Security doors, windows and locks.

All four schools have already designated a classroom for their respective ICT laboratories and require immediate installation of the solar system and computers with internet access.

2. Project Overview & Objectives

2.1 Project Objectives

Supply and installation of:

- **Solar Power Systems:** Solar panels, battery banks, charge controllers, inverters, cables, switchboards, circuit breakers, fuses, earthing systems, lightning arresters, and related accessories.
- **ICT Infrastructure:** Computers, servers, network switches, cabling, and related accessories.
- **Internet Access:** Starlink satellite internet terminals and configure internet access to computers.
- **Physical Security Upgrades:** Security doors, windows and locks.

2.2 Location

I. Pitipais Secondary School – Wapenamanda District, Tsak Valley
II. Kompiam Secondary School – Kompiam District
III. Sirunki Secondary School – Lagaip District
IV. Kandep Secondary School - Kandep District

2.3 Key Targets

Installation of stand-alone Solar system to power up 30 x computers including server in the laboratory. Configure internet access through starlink connection and upgrade physical security requirements.

3. Technical Specifications

Contractor must supply and install materials/equipment specified below.

3.1 Solay Power System

Materials/Equipment	Specification
Solar Pannels	• **Cell Grade:** Made with Grade A silicon cells that have zero visual or technical defects, leading to a slow degradation rate of about 0.3% to 0.5% per year. • **High Efficiency:** Typically feature 20% to 23% conversion efficiency to maximize power output on limited roof space. • **Low Degradation:** Retain roughly 89% to 95% of their initial rated power output after 25 to 30 years of operation. • **Industry Certifications:** Carry international safety and performance credentials like IEC, UL, and ISO standards. • **Solid Warranties:** Offer a 25-year (or 30-year) product and performance warranty.

	• **Reputable Manufacturers:** Produced by established brands.
Maximum Power Point Tracking (MPPT)/Charge Controller	• **Tracking Efficiency:** Typically, 98% to 99.5% for high-end models, converting extra panel voltage into usable charging amperage. • **System Voltage (Auto-detect):** Commonly 12V, 24V, 48V, or higher grid-tie/hybrid DC voltages. • **Maximum Output/Charging Current:** Renders anywhere from 10A to 100A+ depending on the battery bank and array size. • **Charging Stages:** Multi-stage adaptive charging—usually Bulk (Constant Current), Absorption, Float, and Equalization. • **Battery Compatibility:** Sealed, GEL, Flooded Lead-Acid, and Lithium (LiFePO4) with temperature compensation options. • **Self-Consumption:** Low standby power draw, typically 10mA to 25mA.
Batteries	• Sealed and Maintenance-free designs that prevent electrolyte evaporation. • **Operating temperature range:** 10°C to 30°C. • Lithium (LiFePO4) battery is best option
Inverter	**DC Inputs** • **Max DC Input Voltage:** Up to 500V–600V for single-phase models. • **Start-Up Voltage:** The minimum DC voltage required to turn the inverter on, allowing earlier generation in low-light conditions. • **Max Input:** The maximum amperage allowed per MPPT string from the solar panels. **AC Output** • **Output Voltage & Phases:** Single-phase (230V/240V / 50Hz). • **Total Harmonic Distortion (THD):** Must stay below 3% (ideally under 2%) for clean power quality. • **Power Factor:** Must be adjustable, ranging from 0.8 lagging to 0.8 leading. • **Peak Efficiency:** Must have Maximum conversion rate of DC to AC.

DC Cables	• **Voltage Rating:** 1000V DC (mainstream residential/commercial) or up to 1500V DC. • **Temperature Range:** Continuous operating temperature of -40°C to +90°C (with peaks up to 120°C to 250°C short-circuit tolerance). • **Lifespan & Durability:** Designed for a 25 to 30-year outdoor operational life, featuring high UV, ozone, moisture, and flame resistance.
AC Cables	• **PVC (Polyvinyl Chloride):** Standard indoor insulation cables. • **Conductor Material:** Solid or fine-stranded copper wire with flexibility and high conductivity. • **Rated Voltage:** Typically, 1100V (or 600V/1100V low-voltage rating) suitable for 240VAC supply.
Switch Boards	• Typically rated up to 600V–1000V AC with busbar ratings up to 6000 A. • Copper or high-conductivity aluminium alloy busbars designed to handle thermal and electromagnetic forces during fault conditions.
Circuit Breakers	• Standard application for domestic installations (Residential, homes, offices, and similar light buildings).
Lightning Arresters	• Heavy-duty, station-class, gapless zinc oxide / metal-oxide varistor blocks hermetically sealed in porcelain or polymer housing.
Earthing System	• Copper plates, copper-bonded steel rods, or galvanized steel driven vertically into low-resistivity soil. • Bare copper tape stranded hard-drawn copper, or PVC-insulated copper cables joined via high-pressure crimps.
Power Outlets (GPOs) and Lightings	• GPO and lightings (fluorescent tubes and fittings) shall be standard and are commonly used in domestic households.
Other Accessories	• Bolts, nuts, screws, insulation tapes, solar brackets, lugs, conduits, heat strings, glands etc.

3.2 Information and Communication Technology (ICT) System.

Materials/Equipment	Specification
30 x computers (desktop)	• **Processor (CPU):** Intel Core i5 (13th or 14th Generation). • **Memory (RAM):** 8GB to 16GB DDR4 or DDR5 RAM. • **Storage (SSD):** 512GB to 1TB Solid State Drive (SSD). • **Graphics:** Integrated Intel UHD / Iris Xe Graphics or AMD Radeon. • **Operating System:** Windows 11 Pro or Windows 11 Home (64-bit). • **Monitor / Display:** 23.8-inch to 27-inch LED/LCD Full HD (1920 x 1080) display, with integrated webcam and speakers on All-in-One models. • **Peripherals**: Wired or wireless 104-key QWERTY keyboard and optical mouse. • **Ports & Connectivity:** USB-A and USB-C ports, HDMI or DisplayPort, RJ45 Gigabit Ethernet, and built-in Wi-Fi / Bluetooth
Server	• **Processor (CPU):** Very fast to handle multi-client routing, DHCP, DNS, and traffic inspection. • **Memory (RAM):** 16 GB to 32 GB ECC DDR4/DDR5 RAM (scales higher if running local virtualization or heavy classroom management image syncing). • **Storage:** Must have maximum capacity (256 GB – 512 GB). • **Network Interface Cards (NICs):** Dual or Quad-port Gigabit (1 GbE) or 10 GbE PCIe network adapters (one for WAN/Internet input, one/more for the internal lab LAN/switch trunk).
Network switch	• Maximum of 48 ports. • **Switch Type:** Managed or smart-managed switch.
Network cables	Internet cables such as cat6 and cat6A.
Starlink terminal	• Starlink antenna mounting kits. • Starlink router • Starlink satellite dish • Cables and other accessories
Other accessories	Brackets, bolts, nuts, network cable lugs, connectors, cable ties etc.

4. Installation

Prior to submitting the equipment and material lists, each bidder must submit a detailed solar system design proposal featuring 3 hours of battery autonomy to power:

- 30 desktop computers
- Battery charging current
- Server
- Starlink router
- Laboratory lighting (fluorescent tubes)

School Status:

Requirement	Sirunki	Kandep	Kompiam	Pitipais - Tsak Valley
Suitable building	In place (needs repainting, insulation)	In place (large library building)	In place (existing lab, well insulated)	In place (existing lab, poorly insulated)
Desks	In place (library tables)	In place	In place	In place
Chairs	Missing	chairs will be made	In place	In place
Window grids	In place (needs glass)	In place	In place	In place
Door grid	Missing	Missing	Missing	In place
30 computers	Missing	Missing	50 computers installed and ready to use	25 computers Installed last year,
Solar panels and batteries	Missing	Missing	Missing (death solar panels and batteries)	Missing
Inverter	Missing	Missing	Missing	Missing
Starlink	Missing	Missing	Missing	Missing
Wiring and lighting	Wiring to light only, no fitting (GPOs)	Wiring to one power point (GPOs)	Existing wiring to each computer	Existing wiring to each computer
Server and battery room	No Separate room for Server and battery	In place (separate room)	In place (separate room)	In place (separate room)

4.1 Pitipais Secondary School

This school already has a computer laboratory and is equipped with 25 new computers. While all electrical wiring, lights, and power points are fully installed and ready to go, the workstations are currently non-operational due to a lack of power to the room.

4.1.1 Solar Power System.

All Installation must strictly comply with AS/NZS 3000 (Wiring Rules) and IEC 60364 & IEC 60502 (power cabling) standards.

a) Solar Panels

- Solar panels/arrays must be properly sized according to the required maximum demand to charge the batteries and take on the maximum load demand at peak hours.
- Properly and neatly mount the solar panels on the classroom rooftop ensure clearly exposer to sunlight without any obstruction from trees.
- Make sure solar panels are installed at the right angle/degree to absorb maximum sunlight.
- Install non-penetrating or properly sealed structural mounts, anchor bolts, and aluminium interlock rails.
- Seal all roof penetrations and fastener points to prevent leaks.
- Fasten solar panels to the mounting framework and wire them in series/parallel strings according to the design.
- The output from the solar arrays must be carefully connected to Charge controller (MPPT)

b) Charge Controller (MPPT)

- The Charge Controller (MPPT) must be sized to utilize the maximum total current output from the solar panels/arrays.
- The Charge Controller (MPPT) must be capable of charging battery and taking on loads at the same time.

- Mount the charge controller vertically on a stable, non-flammable surface, leaving adequate clearance.

- Ensure the area is clear of corrosive battery fumes, direct moisture, rain, and flammable liquids.

- Connect the battery positive and negative cables to the controller's battery terminals, ensuring correct polarity. This allows the controller to auto-detect system voltage.

c) Solar Battery

- Install batteries in racks or cabinets.

- Connect batteries in series and parallel to match required voltage and current.

- Keep room temperature stable to protect battery health.

- Select cable sizes based on load demand and charging current.

d) Inverter

- Match the inverter capacity (kW/kVA) to the solar panel array peak output and load demands.

- Secure the inverter bracket and unit onto a well-ventilated wall, mounting frame, or dedicated pad.

- Connect DC (system voltage) to the inverter inputs. Connect AC output wiring to the main distribution board.

- Wire and configure the connection between the inverter and battery storage bank.

e) Distribution Board

- Upgrade the existing to 12 pole AC distribution board with circuit breakers.

- Complete the Multiple – Earth- Neutral (MEN) system and the main earth cable must be firmly bolted/screwed on the copper earthing rod which is buried in the ground.

f) **Protection System**

- Bond all solar panel frames, iron mounting brackets, and exposed metal structures to the main earthing system.
- Install the lightning arrester at the highest point of the structure or array to capture and safely discharge direct strikes. *Note: Keep lightning earthing separate from electrical or inverter earthing to prevent back-surges.*
- Drive a galvanized or copper-bonded earth rod vertically into the ground so that at least 90% (or the full length per code) is buried deep in the soil.
- Fasten the earth clamp tightly to the rod to ensure a permanent, low-resistance grip on the grounding cable.

4.1.2 Information and Communication Technology (ICT) System.

All ICT installation must comply to National Information and Communications Technology Authority (NICTA) requirements and international standards -**International Cabling Standards: ISO/IEC 14763** and **ANSI/EIA/TIA-568.**

a) **Server**

- Install the laboratory server in a separate room to restrict entry to authorized personnel.
- Place the server in a cool, well-ventilated room with proper airflow.
- Mount the server in a standard rack and neatly organize all cables.

b) **Network Switch**

- Mount the network switch in an easily accessible rack for ICT staff.
- Route all cables through a cable tray and secure them neatly with cable ties.
- Connect the network switch and the server with the standard network cable.

c) **Starlink Terminal**

- Mount the Starlink dish securely on the laboratory rooftop in an area with optimal signal reception.
- Place the Starlink router in a safe, protected room and connect it to the dish using the Starlink cable.
- Connect the router to the server.
- Connect the network switch to the server using a network cable.

4.1.3 Physical Security Upgrades

- Grid Windows to protect the internal louvers and blades.
- Carefully cover the windows with green mosquito net wires.

4.2 Kompiam Secondary School

This school already has a computer laboratory and is equipped with 50 computers. The laboratory is currently offline due to a not working solar power system. While the existing wiring from the distribution board to the computer benches remains intact for reuse, all major solar components including panels, charge controllers, cables, batteries, inverters, and distribution boards must be completely replaced.

4.2.1 Solar Power System.

All Installation must strictly comply with AS/NZS 3000 (Wiring Rules) and IEC 60364 & IEC 60502 (power cabling) standards.

a) **Solar Panels**

- Solar panels/arrays must be properly sized according to the required maximum demand to charge the batteries and take on the maximum load demand at peak hours.

- Properly and neatly mount the solar panels on the classroom rooftop ensure clearly exposer to sunlight without any obstruction from trees.

- Make sure solar panels are installed at the right angle/degree to absorb maximum sunlight.

- Install non-penetrating or properly sealed structural mounts, anchor bolts, and aluminium interlock rails.

- Seal all roof penetrations and fastener points to prevent leaks.

- Fasten solar panels to the mounting framework and wire them in series/parallel strings according to the design.

- The output from the solar arrays must be carefully connected to Charge controller (MPPT)

b) Charge Controller (MPPT)

- The Charge Controller (MPPT) must be sized to utilize the maximum total current output from the solar panels/arrays.

- The Charge Controller (MPPT) must be capable of charging battery and taking on loads at the same time.

- Mount the charge controller vertically on a stable, non-flammable surface, leaving adequate clearance.

- Ensure the area is clear of corrosive battery fumes, direct moisture, rain, and flammable liquids.

- Connect the battery positive and negative cables to the controller's battery terminals, ensuring correct polarity. This allows the controller to auto-detect system voltage.

c) Solar Battery

- Install batteries in racks or cabinets.

- Connect batteries in series and parallel to match required voltage and current.

- Keep room temperature stable to protect battery health.

- Select cable sizes based on load demand and charging current.

- Battery bank must be perfectly connected to the charge controller (MPPT).

d) **Inverter**

- Match the inverter capacity (kW/kVA) to the solar panel array peak output and load demands.
- Secure the inverter bracket and unit onto a well-ventilated wall, mounting frame, or dedicated pad.
- Connect DC (system voltage) to the inverter inputs. Connect AC output wiring to the main distribution board.
- Wire and configure the connection between the inverter and battery storage bank.

e) **Distribution Board**

- Upgrade the existing to 12 pole AC distribution board with circuit breakers.
- Complete the Multiple – Earth- Neutral (MEN) system and the main earth cable must be firmly bolted/screwed on the copper earthing rod which is buried in the ground.

f) **Protection System**

- Bond all solar panel frames, iron mounting brackets, and exposed metal structures to the main earthing system.
- Install the lightning arrester at the highest point of the structure or array to capture and safely discharge direct strikes. *Note: Keep lightning earthing separate from electrical or inverter earthing to prevent back-surges.*
- Drive a galvanized or copper-bonded earth rod vertically into the ground so that at least 90% (or the full length per code) is buried deep in the soil.
- Fasten the earth clamp tightly to the rod to ensure a permanent, low-resistance grip on the grounding cable.

4.2.2 Information and Communication Technology (ICT) System.

All ICT installation must comply to National Information and Communications Technology Authority (NICTA) requirements and international standards - **International Cabling Standards: ISO/IEC 14763** and **ANSI/EIA/TIA-568.**

d) Server

- Install the laboratory server in a separate room to restrict entry to authorized personnel.
- Place the server in a cool, well-ventilated room with proper airflow.
- Mount the server in a standard rack and neatly organize all cables.

e) Network Switch

- Mount the network switch in an easily accessible rack for ICT staff.
- Route all cables through a cable tray and secure them neatly with cable ties.
- Connect the network switch and the server with the standard network cable.

f) Starlink Terminal

- Mount the Starlink dish securely on the laboratory rooftop in an area with optimal signal reception.
- Place the Starlink router in a safe, protected room and connect it to the dish using the Starlink cable.
- Connect the router to the server.
- Connect the network switch to the server using a network cable.

4.2.3 Physical Security Upgrades

- Heavey duty grid doors with locks and key sets.
- Grid Windows to protect the internal louvers and blades.
- Carefully cover the windows with green mosquito net wires.

4.3 Sirunki Secondary School

The school is currently without a computer laboratory and IUE has taken the initiative to establish one. To support this project, the school has assigned a newly built classroom for the laboratory. While the main interior electrical wiring is finished, the room still requires final touches such as lighting, power outlets (GPOs), and external fittings before computers can be installed.

4.3.1 Solar Power System.

All Installation must strictly comply with AS/NZS 3000 (Wiring Rules) and IEC 60364 & IEC 60502 (power cabling) standards.

a) Solar Panels

- Solar panels/arrays must be properly sized according to the required maximum demand to charge the batteries and take on the maximum load demand at peak hours.
- Properly and neatly mount the solar panels on the classroom rooftop ensure clearly exposer to sunlight without any obstruction from trees.
- Make sure solar panels are installed at the right angle/degree to absorb maximum sunlight.
- Install non-penetrating or properly sealed structural mounts, anchor bolts, and aluminium interlock rails.
- Seal all roof penetrations and fastener points to prevent leaks.
- Fasten solar panels to the mounting framework and wire them in series/parallel strings according to the design.
- The output from the solar arrays must be carefully connected to Charge controller (MPPT)

b) Charge Controller (MPPT)

- The Charge Controller (MPPT) must be sized to utilize the maximum total current output from the solar panels/arrays.
- The Charge Controller (MPPT) must be capable of charging battery and taking on loads at the same time.
- Mount the charge controller vertically on a stable, non-flammable surface, leaving adequate clearance.

- Ensure the area is clear of corrosive battery fumes, direct moisture, rain, and flammable liquids.

- Connect the battery positive and negative cables to the controller's battery terminals, ensuring correct polarity. This allows the controller to auto-detect system voltage.

c) Solar Battery

- Install batteries in racks or cabinets.

- Connect batteries in series and parallel to match required voltage and current.

- Keep room temperature stable to protect battery health.

- Select cable sizes based on load demand and charging current.

- Battery bank must be perfectly connected to the charge controller (MPPT).

d) Inverter

- Match the inverter capacity (kW/kVA) to the solar panel array peak output and load demands.

- Secure the inverter bracket and unit onto a well-ventilated wall, mounting frame, or dedicated pad.

- Connect DC (system voltage) to the inverter inputs. Connect AC output wiring to the main distribution board.

- Wire and configure the connection between the inverter and battery storage bank.

e) Distribution Board

- Upgrade the existing to 12 pole AC distribution board with circuit breakers.

- Run right size cable from the DB to the Power Outlets (GPOs) to power up the computers and server.

- Complete the Multiple – Earth- Neutral (MEN) system and the main earth cable must be firmly bolted/screwed on the copper earthing rod which is buried in the ground.

f) Power Outlets (GPOs) and Lightings

- All GPOs must be mounted against the wall and along the middle computer benches where it is easy to plug and power up the computers.

- All light fittings must be securely screwed on the ceiling with fluorescent tubes.

g) Protection System

- Bond all solar panel frames, iron mounting brackets, and exposed metal structures to the main earthing system.

- Install the lightning arrester at the highest point of the structure or array to capture and safely discharge direct strikes. *Note: Keep lightning earthing separate from electrical or inverter earthing to prevent back-surges.*

- Drive a galvanized or copper-bonded earth rod vertically into the ground so that at least 90% (or the full length per code) is buried deep in the soil.

- Fasten the earth clamp tightly to the rod to ensure a permanent, low-resistance grip on the grounding cable.

4.3.2 Information and Communication Technology (ICT) System.

All ICT installation must comply to National Information and Communications Technology Authority (NICTA) requirements and international standards - **International Cabling Standards: ISO/IEC 14763** and **ANSI/EIA/TIA-568.**

a) Computers

- Position all 30 desktop computers with adequate ergonomic spacing for user comfort and accessibility.

- Conceal all power and network cabling to prevent exposed or dangling wires along walls and floors.

- Configure and accommodate all 30 units neatly within the designated room layout.

b) Server

- Install the laboratory server in a separate room to restrict entry to authorized personnel.
- Place the server in a cool, well-ventilated room with proper airflow.
- Mount the server in a standard rack and neatly organize all cables.

c) Network Switch

- Mount the network switch in an easily accessible rack for ICT staff.
- Route all cables through a cable tray and secure them neatly with cable ties.
- Connect the network switch and the server with the standard network cable.

d) Starlink Terminal

- Mount the Starlink dish securely on the laboratory rooftop in an area with optimal signal reception.
- Place the Starlink router in a safe, protected room and connect it to the dish using the Starlink cable.
- Connect the router to the server.
- Connect the network switch to the server using a network cable.

4.3.3 Physical Security Upgrades

- Heavey duty grid doors with locks and key sets.
- Grid Windows to protect the internal louvers and blades
- Carefully cover the windows with green mosquito net wires.

4.4 Kandep Secondary School

The school is currently without a computer laboratory and IUE has taken the initiative to establish one. To support this project, the school has assigned an old library building for the laboratory. While all electrical wiring, light fittings, and a power point are fully installed and available.

4.4.1 Solar Power System.

All Installation must strictly comply with AS/NZS 3000 (Wiring Rules) and IEC 60364 & IEC 60502 (power cabling) standards.

a) Solar Panels

- Solar panels/arrays must be properly sized according to the required maximum demand to charge the batteries and take on the maximum load demand at peak hours.
- Properly and neatly mount the solar panels on the classroom rooftop ensure clearly exposer to sunlight without any obstruction from trees.
- Make sure solar panels are installed at the right angle/degree to absorb maximum sunlight.
- Install non-penetrating or properly sealed structural mounts, anchor bolts, and aluminium interlock rails.
- Seal all roof penetrations and fastener points to prevent leaks.
- Fasten solar panels to the mounting framework and wire them in series/parallel strings according to the design.
- The output from the solar arrays must be carefully connected to Charge controller (MPPT)

b) Charge Controller (MPPT)

- The Charge Controller (MPPT) must be sized to utilize the maximum total current output from the solar panels/arrays.
- The Charge Controller (MPPT) must be capable of charging battery and taking on loads at the same time.
- Mount the charge controller vertically on a stable, non-flammable surface, leaving adequate clearance.

- Ensure the area is clear of corrosive battery fumes, direct moisture, rain, and flammable liquids.

- Connect the battery positive and negative cables to the controller's battery terminals, ensuring correct polarity. This allows the controller to auto-detect system voltage.

c) Solar Battery

- Install batteries in racks or cabinets.

- Connect batteries in series and parallel to match required voltage and current.

- Keep room temperature stable to protect battery health.

- Select cable sizes based on load demand and charging current.

- Battery bank must be perfectly connected to the charge controller (MPPT).

d) Inverter

- Match the inverter capacity (kW/kVA) to the solar panel array peak output and load demands.

- Secure the inverter bracket and unit onto a well-ventilated wall, mounting frame, or dedicated pad.

- Connect DC (system voltage) to the inverter inputs. Connect AC output wiring to the main distribution board.

- Wire and configure the connection between the inverter and battery storage bank.

e) Distribution Board (DB)

- Upgrade the existing AC Distribution Board to 12 pole Distribution Board with circuit breakers.

- Run right size cable from the DB to the Power Outlets (GPOs) to power up the computers and server.

- Complete the Multiple – Earth- Neutral (MEN) system and the main earth cable must be firmly bolted/screwed on the copper earthing rod which is buried in the ground.

f) Power Outlets (GPOs) and Lightings

- All GPOs must be mounted against the wall and along the middle computer benches where it is easy to plug and power up the computers.

- All light fittings must be securely screwed on the ceiling with fluorescent tubes.

g) Protection System

- Bond all solar panel frames, iron mounting brackets, and exposed metal structures to the main earthing system.
- Install the lightning arrester at the highest point of the structure or array to capture and safely discharge direct strikes. *Note: Keep lightning earthing separate from electrical or inverter earthing to prevent back-surges.*
- Drive a galvanized or copper-bonded earth rod vertically into the ground so that at least 90% (or the full length per code) is buried deep in the soil.
- Fasten the earth clamp tightly to the rod to ensure a permanent, low-resistance grip on the grounding cable.

4.4.2 Information and Communication Technology (ICT) System.

All ICT installation must comply to National Information and Communications Technology Authority (NICTA) requirements and international standards - **International Cabling Standards: ISO/IEC 14763** and **ANSI/EIA/TIA-568.**

a) Computers

- Position all 30 desktop computers with adequate ergonomic spacing for user comfort and accessibility.

- Conceal all power and network cabling to prevent exposed or dangling wires along walls and floors.

- Configure and accommodate all 30 units neatly within the designated room layout.

b) Server

- Install the laboratory server in a separate room to restrict entry to authorized personnel.
- Place the server in a cool, well-ventilated room with proper airflow.
- Mount the server in a standard rack and neatly organize all cables.

c) Network Switch

- Mount the network switch in an easily accessible rack for ICT staff.
- Route all cables through a cable tray and secure them neatly with cable ties.
- Connect the network switch and the server with the standard network cable.

d) Starlink Terminal

- Mount the Starlink dish securely on the laboratory rooftop in an area with optimal signal reception.
- Place the Starlink router in a safe, protected room and connect it to the dish using the Starlink cable.
- Connect the router to the server.
- Connect the network switch to the server using a network cable.

4.4.3 Physical Security Upgrades

- Heavey duty grid doors with locks and key sets.
- Grid Windows to protect the internal louvers and blades.
- Carefully cover the windows with green mosquito net wires.

5. Test and Commission

- Conduct on-site prechecks and pretests prior to completion to verify that all systems are perfectly installed and ready to energize.

- Schedule the official testing, commissioning, and document handover once the pretests are successfully completed.

6. Training, Maintenance, and Support

- Comprehensive hands-on training for these four schools' staff regarding solar cleaning, battery maintenance and basic ICT training.

7. Operations Manuals

- Provision of detailed digital and physical Standard Operating Procedures (SOPs), troubleshooting guides, and safety protocols.

8. Warranty Period:

- Clearly specify the comprehensive warranty period for solar panels, batteries, inverters, charger controllers, network switch, server, computers and starlink terminal sets.

9. Contractors/Bidders requirement

9.1 Pricing & Bill of Quantities (BOQ)

The contractor must provide a detailed itemized breakdown of all materials, equipment, logistics, and labor, including total costs.

9.2 Schedule

- The project requires a rapid kick-off, and all listed materials and equipment must be locally available to ensure timely completion.
- Work will commence immediately upon the signing of the contract between IUE and the contractor.

9.3 Health and Safety

- Provide a comprehensive Health and Safety Policy alongside a project-specific safety plan that clearly details your risk-mitigation strategies.

10. Assigned Computer Laboratory - Visual Reference

10.1 Sirunki Secondary School



Downstairs room assigned for computer laboratory.

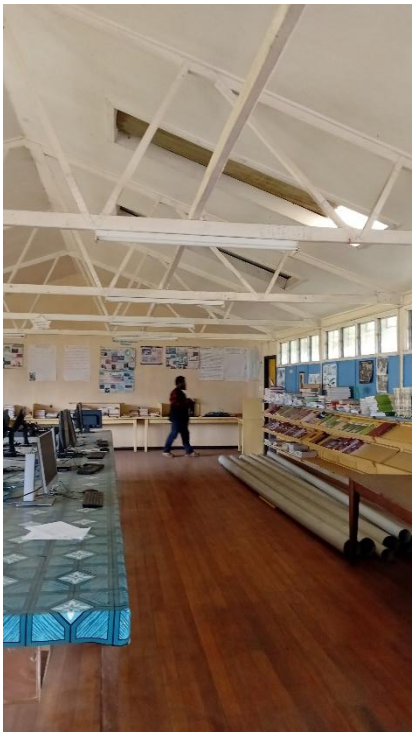


Inside the laboratory.

10.2 Kandep Socondary School



Old Library assigned for computer laboratory.

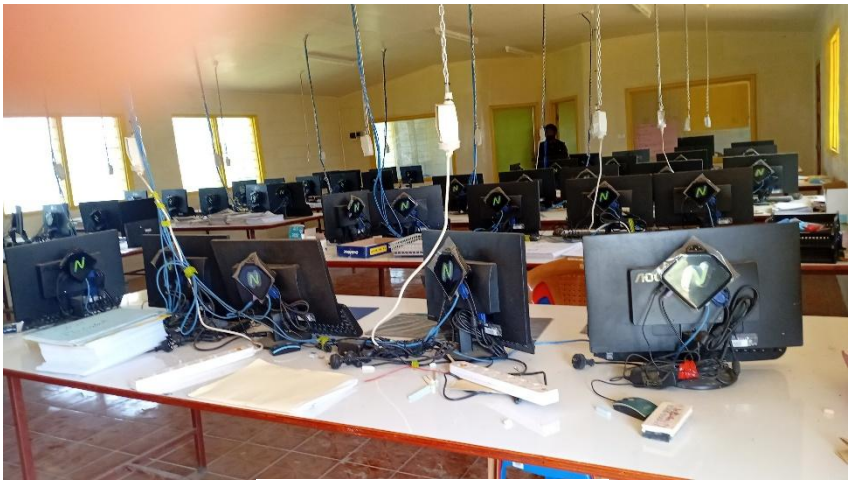


Inside the laboratory.

10.3 Kompiam Secondary School



Existing computer laboratory.

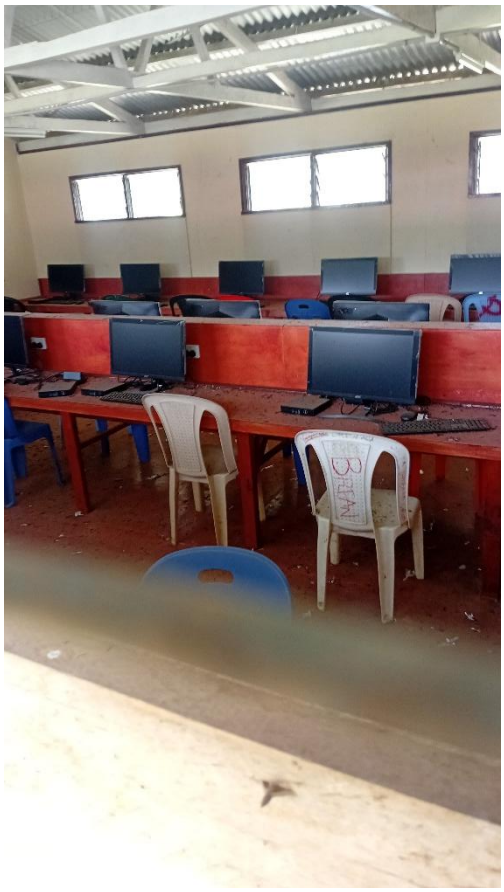


Inside the laboratory.

10.4 Pitipais Secondary School – Tsak Valley



Upstairs existing computer laboratory.



Inside the laboratory.