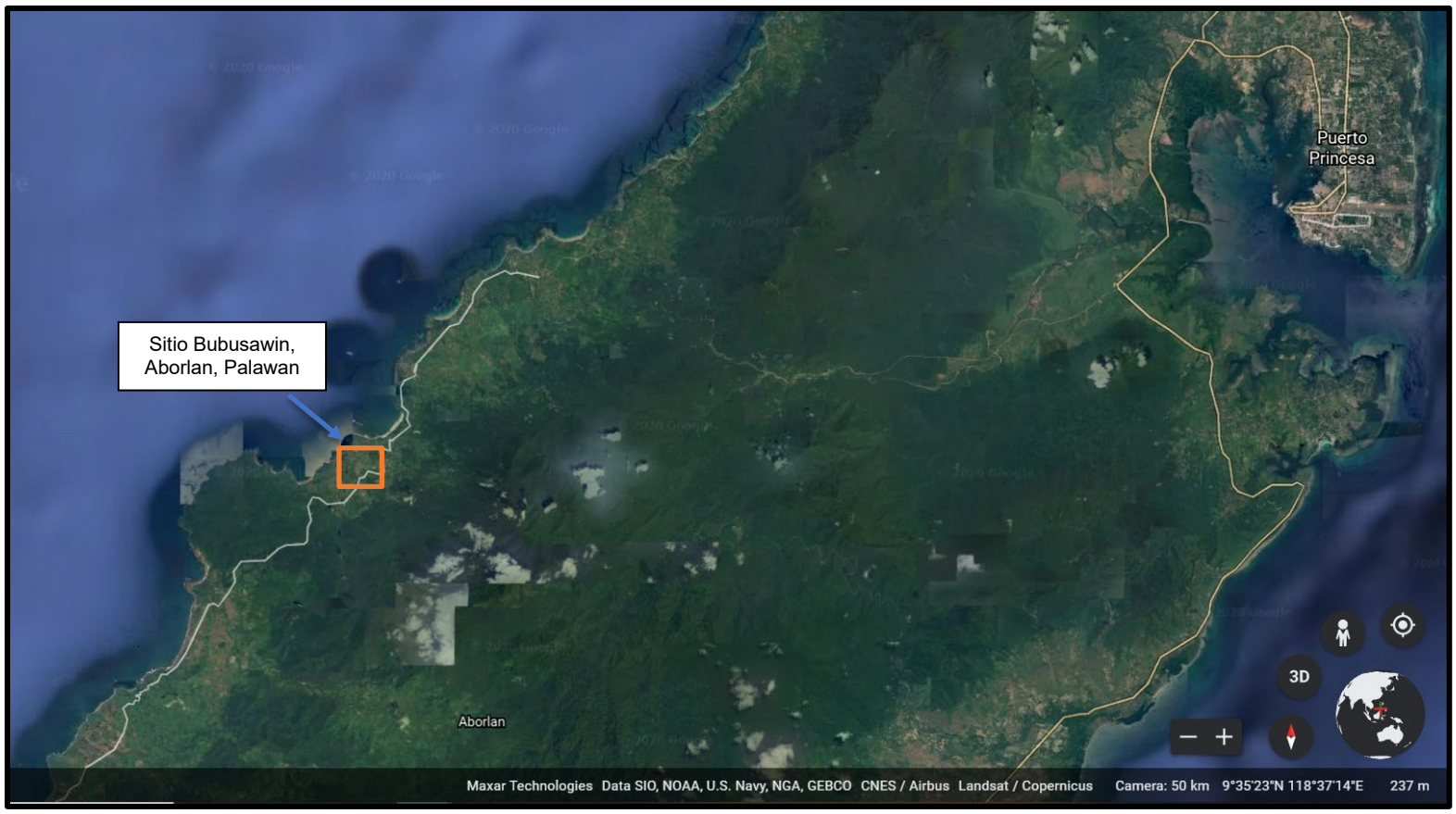
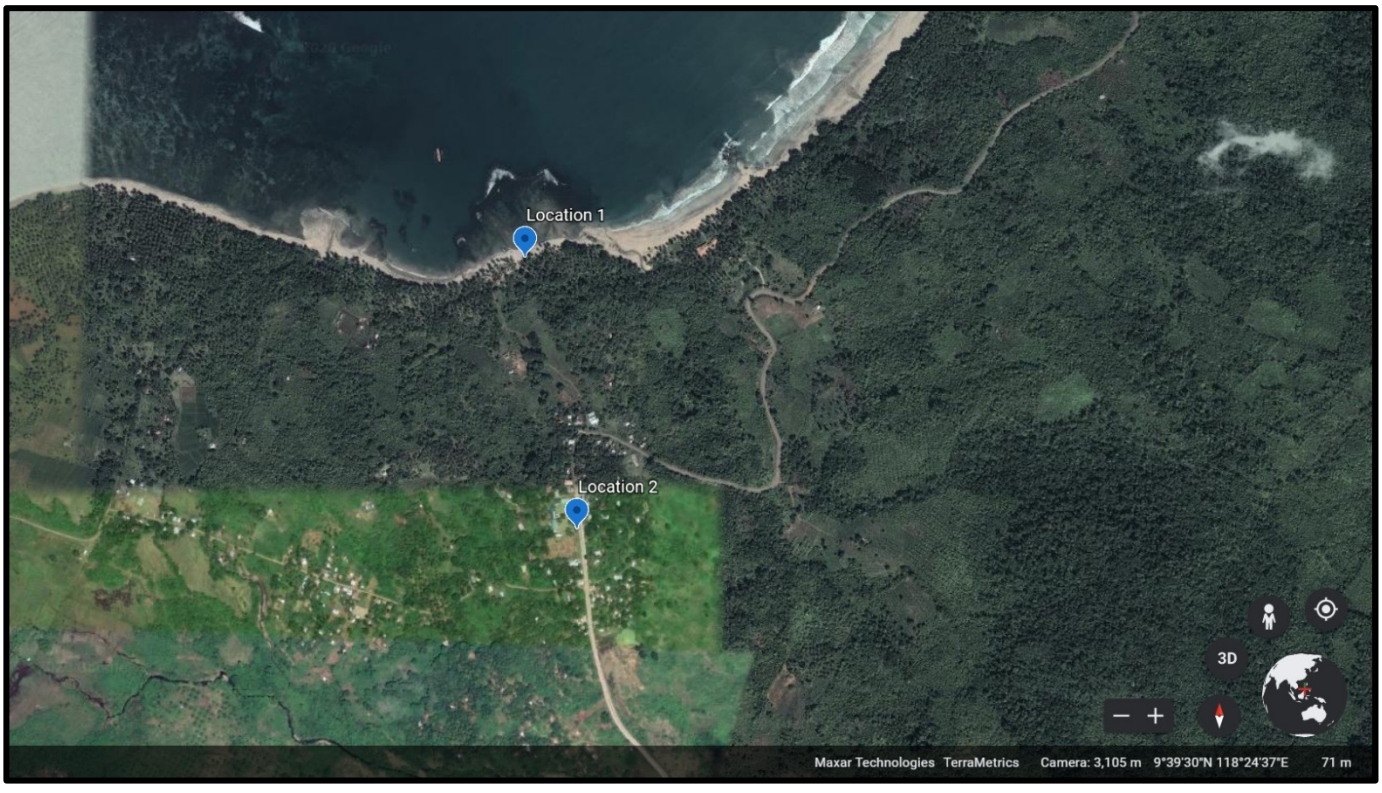
ANNEX A
Map of the proposed installation sites – Rooftop setup for DC Smart Grid and Ground mounted for Solar Irrigation System



Sitio Bubusawin, Aborlan, Palawan



ANNEX B
Estimated Bill of Materials

ITEM	UNIT	QTY	**WARRANTY PERIOD**
MAJOR COMPONENTS			
Pod Controllers	pcs	120.00	
Solar Panel 300W	pcs	24.00	25 years on performance and indicate linear degradation/year
Solar Panel 200W	pcs	-	
Solar Panel 150W	pcs	30.00	
Solar Panel 100W	pcs	77.00	
Solar Panel 70W	pcs	-	
Battery 200Ah	pcs	13.00	2 years
Battery 150Ah	pcs	-	
Battery 100Ah	pcs	30.00	
Battery 65Ah	pcs	-	
Battery 50Ah	pcs	77.00	
2C 2.5sqmm TPS cable	m	2,899.79	25 years on performance and indicate linear degradation/year
2C 4sqmm TPS cable	m	45.00	
2C 6sqmm TPS cable	m	95.50	
MOUNTING & PROTECTION			

Poles + hardware	pcs	101.00	
20mm uPVC MD conduit	m	2,899.79	
3 way junction box (for joining share cable)	pcs	10.00	
Cable clips (for wall mounting)	pcs	720.00	
Solar Panel Mount - Pole	pcs	65.50	
Pole U-Clamp	pcs	131.00	
Solar Panel Mount - Flush kit	pcs	65.50	25 years on performance and indicate linear degradation/year
Steel roof flashing	pcs	65.50	
Battery terminal lugs	pcs	240.00	
MC4 connector pair	pcs	131.00	
25mm screws (for controller mounting)	pcs	480.00	
HOUSEHOLD & CONSUMABLES			
Junction Box (for household)	pcs	120.00	
Cigarette Car Charger x3 outlets	pcs	120.00	
Cigarette Plugs (for appliances)	pcs	360.00	
Share rail SPD (1 for 30HH)	pcs	4.00	
Plastic Distribution Box (for SPD)	pcs	4.00	

1C 4sqmm earth cable	m	8.00	
1.8m earth rod + clamp	pcs	4.00	
Other Consumables (see list below)	pcs	12.00	
APPLIANCES			
2 Lights + holders + cable	pcs	-	
Fans	pcs	-	
TVs	pcs	-	
Satellite TV Receivers	pcs	-	
Freezers	pcs	-	
LABOUR AND SHIPPING			
Installation Labour (4 personnel x 90 man-days each)	man-days	360.00	
Shipping	cbm	34.28	
Sub-Total			
OTHER MATERIALS AND CONSUMABLES	**UNIT**	**PER 10 HH**	
Drill bit masonry 3/8''	PC	1.00	
Drill bit masonry 3/16''	PC	1.00	
Drill bit metal 1/8''	PC	1.00	
Hole Saw 2" for metal	PC	1.00	
Soldering Lead	ROLL	1.00	

Soldering Cream	PC	1.00	
Pencil Torch	PC	1.00	
Lug Screw, 5/16" x 3"	PC	32.00	
Lead Tox / Expansion Shield (3")	PC	32.00	
Concrete Nail, 4"	PC	16.00	
Plastic Cable Ties 12", pack of 100	PACK	2.00	
Elastomeric Sealant	SACHET	6.00	

Controller Specifications

Electrical		Battery Configuration	
PV Port		12V	24V*
Max. input power	-	300W	600W*
Max. PV open circuit voltage	50V	-	-
Battery Port			
Charge protocol	Bulk-Absorption-Float	-	-
Supported Battery Chemistry	-	Sealed Lead Acid (Gel, AGM)	LiFePO4 lithium*
Max. output current	-	75A	75A
Max. charge current	-	50A	50A
Operating temperature range	-10°C to 50°C	-	-
Load Ports			
'USB' max. power	-	5V, 2 x 2A, 20W	
Essential (ESSL) port control for max. power	-	12V, 5A, 60W	
Primary' max. power	-	12V, 25A, 300W	
USB + Essl + Prim total max. power		300W	
'Prod' max. power	-	12V, 50A, 600W	24V*, 50A, 1200W
Remote port enable/disable	Yes	-	-
Grid Port			
Sharing Voltage	-	45V to 50V	
Sharing I/O max. power	-	300W	
Protection			
Over Voltage Protection (OVP)	Circuit and software protection on: Grid, PV, Batt, Prod, Prim, Essl, USB		
Over Current Protection (OCP)	Fuse and software protection on: Grid, PV, Batt, Prod, Prim, Essl, USB		
Over Temperature Protection (OTP)	Software protection on: Grid, PV, Batt, Prod, Prim, Essl, USB		
Short circuit protection	Circuit protection on: Grid, PV, Prod, Prim, Essl, USB		
Reverse polarity protection	Circuit protection on: Grid, PV, Prod, Prim, Essl		

Solar Module Specifications

Specification				
Type: Monocrystalline				
Rated Maximum Power(Pmax) [W]	300	200	150	100
Open Circuit Voltage(Voc) [V]	39.05	45.62	43.2	21.5
Maximum Power Voltage(Vmp) [V]	32.23	37.26	34.4	17.5
Short Circuit Current(Isc) [A]	9.9	5.66	4.87	6.11
Maximum Power Current(Imp) [A]	9.31	5.37	4.36	5.71
Module Efficiency [%]	18	15.67	13	13.1
Power Tolerance	+1.5	+/- 3%	+/- 3%	+/- 3%
IEC 61215 Compliance with Test Certificate				

Solar Water Pumping System Specifications

Item	Description	Quantity	Warranty Period
I	**2700Wp to 3000 Watt-peak solar power**	I	10 years on manufacturing 25 years on performance
	minimum of 435Wp, mono crystalline, Tier I		
	IEC 61215 Certification		
	Rated Maximum Power: 450Wp per solar module		
	Open Circuit Voltage (Voc): 53.58V		
	Short Circuit Current (Isc): 10.48 Amperes		
	Maximum Power Voltage (Vmp): 45.61V		
	Maximum Power Current (Imp): 9.89 Amperes		
	Solar Module Efficiency: 20.7 percent		

II	**Submersible Pump**	I	2 years on manufacturing
	A. Capacity of 100 cu.m per day as per the following conditions		
	a. Total Dynamic Head (h): 20m (minimum)		
	b. Pump efficiency: 70% (minimum)		
	c. Stainless Steel Casing		
	d. DC voltage input: 90VDC to 460VDC		
	e. Material		
	e1. Outlet: 304 stainless steel		
	e2. Pump Head: 304 stainless steel		
	e3. Pump Body: 304 stainless steel		
	e4. Impeller: 304 Stainless steel		
	e5. Motor: Permanent magnet dc brushless motor		
	6. Cable: 2meter		
	e7. Cooling: Oil		
	e8. MPPT function controller		2 years on manufacturing
	e9. Can be installed horizontally or vertically		
	e10. Dry-running protection of the pump and motor included		
	e11. DC circuit breaker and DC Surge protection device included		
	e12. AC circuit breaker and DC Surge protection device included		
	e13. Distance from the pond to the rice paddy is assumed to be a maximum of 20 meters. However, bidder needs to inspect the site for better estimate of the piping and cabling needs of the solar pump		
	f. Other information		

	f1. Stainless steel casing for the pump protection as the pump needed to be submerged in a pond or irrigation canal		
	f2. The whole solar panel and controller is to be mounted on a movable trailer since the solar pump system needed to be transferred from one rice paddy to another		
	f3. The Bidder may design their own trailer to fit the solar pumping system		
	f4. The Trailer can be moved with mechanical power, e.g. jeepney, a small truck, ELF or equivalent or by carabao		
	f5. Q-H-P-curve shall be included in the submission of the Bid		
	f6. Brochures and Technical Specifications have to be submitted of the Bid		
	f7. Galvanized steel mounting structure		