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REQUEST FOR QUOTATIONS: DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE OF AN OFF-GRID SOLAR PHOTOVOLTAIC SYSTEM AT THE BUFFELSDRAAI LANDFILL SITE BUFFER ZONE

1 PROJECT BACKGROUND

Buffelsdraai Landfill SITE BUFFER ZONE is located in the northern area of the eThekweni Metro approximately 8 kilometres west of the small town of Verulam. The eThekweni Municipality's Environmental Planning & Climate Protection Department (EPCPD) is conducting a reforestation project in the buffer zone to enhance the biodiversity of the area and mitigate greenhouse gas emissions associated with the hosting of the 2010 FIFA Soccer World Cup. The EPCPD has established a dedicated site office for the project which consists of three stand-alone shipping containers. The site has no access to electricity and as a result the EPCPD wishes to install an off-grid solar photovoltaic system to electrify the site.



Figure 1: Aerial map of the Buffelsdraai Landfill Site Buffer Zone just outside Verulam, indicating the location of the PV site (Source: Google maps)

2 SCOPE OF WORKS

The scope of works for the solar installation is as following:

- 1) Design, supply, delivery, installation and commissioning of a stand-alone/off-grid solar photovoltaic system and monitoring equipment according to the requirements specified in this document.
- 2) Fixing the existing infrastructure (see Annexure 1 for details) as follows:
 - Welding of two anti-burglary vertical supports;
 - Replacing a damaged window stay;
 - Replacing a broken window pane; and
 - Replacing a broken door locker and handle.
- 3) Installation of two photocell-controlled flood lights to light up the yard
- 4) Maintenance of the installed photovoltaic system for a period of three years.
- 5) Basic staff training on system operation.

3 TECHNICAL SPECIFICATION

3.1 System Design

3.1.1 General

The solar photovoltaic installation is to meet the electrical load requirements of the Buffelsdraai site. The site is made up of three buildings, consisting of one office & kitchen container, one male bathroom container and one female bathroom container. The (AC) electrical load requirements for each building/container are provided below:

Table 1: Electrical loads for the Buffelsdraai site

Load Description	Quantity installed	Total power rating (W)	Estimated operation hours (h)	Total Wh
50W Flood light (AC)	2	100	10	1000
10W LED tube (AC)	7	70	4	280
2000W AC kettle (AC)	1	2000	0.2	440
90W Laptop (AC)	2	180	5	900
5W cell phone (AC)	5	25	6	150
Total		2575		2770
Add 30% for losses				831
Total daily demand				3601

The PV array is to be located on the kitchen/office container, with the charge controller, inverter and battery bank to be located inside the office or kitchen in a suitably ventilated and protected housing.

There is an existing stand (from previous installation) for battery bank, inverter and MPPT. It is anticipated and preferred that the stand be used on the new installation

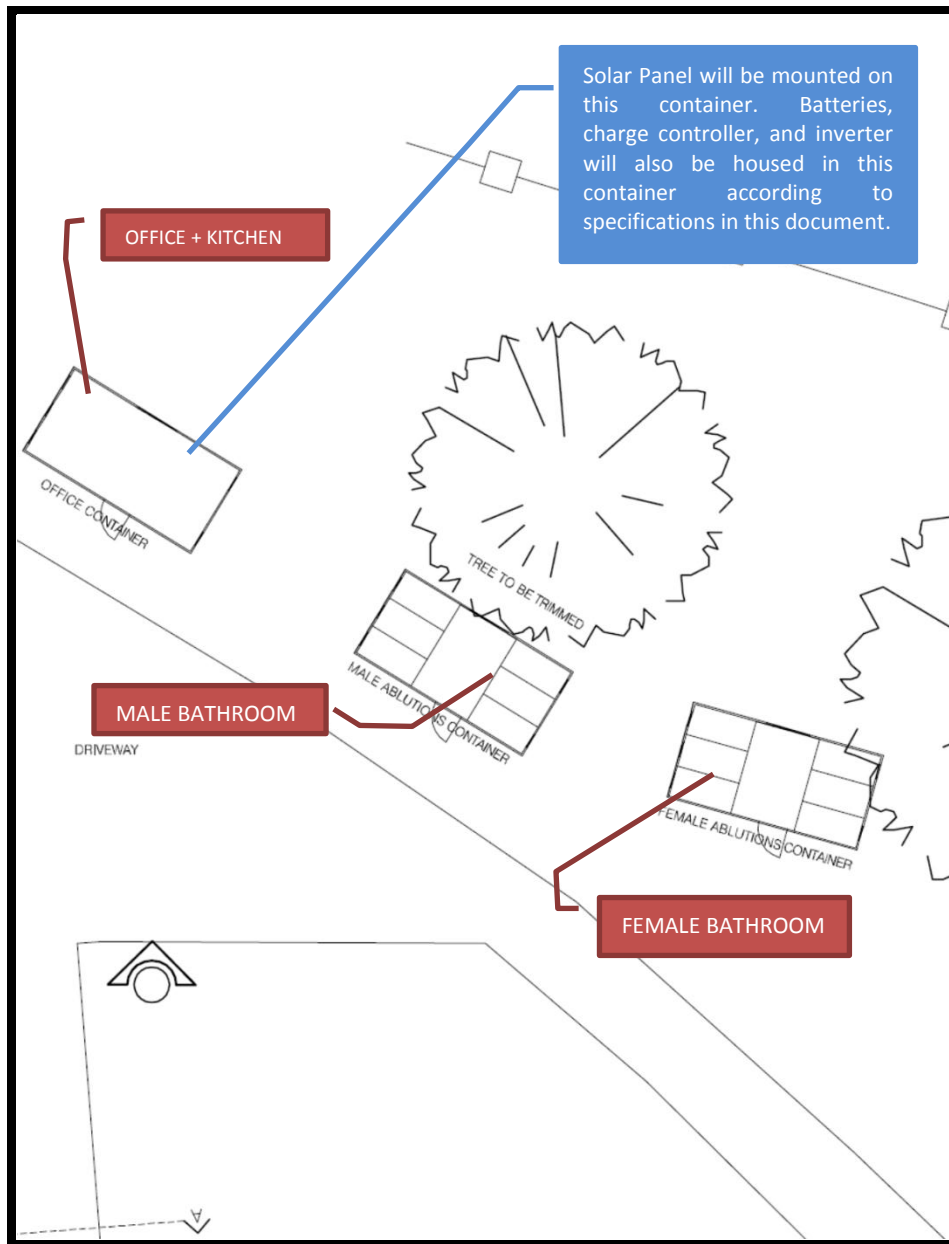


Figure 2: Site layout diagram.

The system shall be designed as a stand-alone solar PV system. The solar modules/ panels will be expected to meet the load requirement with any excess power reserved for charging the battery. Any load demand above the generated power at any particular point shall be offset by the battery. The system shall be programmed for optimal switching to battery back-up when the panels are not able to satisfy the load demand at any given time. All system operating points shall be set such that no compromise is made to system warranties, guarantees and rated performance over time.

A workmanship warranty of five years is required for all work carried out.

3.1.2 System sizing

The following section outlines the suggested system design. Deviations from this design will be considered on the condition that adequate justification is made.

The summary of the system design is provided below; these are sizing guidelines and deviation from these prescribed sizes must be motivated by calculations.

Details	Specification/Size
PV array size	> 900Wp
Inverter size	> = 3300 VA
Charge controller	60 A @ 40°C
System voltage	24V
Storage capacity	430 Ah @ 24V

3.1.3 PV Modules

Solar panels should be of the monocrystalline type and shall be mounted in a suitably sized aluminium frame. The specification for the panels is given below:

Table 2: Specification for photovoltaic panels

Details	Specification
Frame Warranty	10 years
Solar panel performance guarantee	Performance guarantee for 25 years or more
Frame construction	Adjustable (20°- 40°) Aluminium or stainless steel

3.1.4 Battery

Batteries should be lead-crystal **deep cycle** solar batteries and be sized to provide a minimum of three days autonomy. The quality of the batteries supplied should be designed for a life cycle of more than 1600 cycles at a depth of discharge of 50% or expected life of 5 years or more.

Lithium ion batteries will also be accepted provided they meet the minimum depth of discharge life cycle requirements.

3.1.4.1 Battery monitor

A dedicated battery monitor must be supplied and must meet the following specifications:

Monitored parameter	Resolution
Battery capacity	20-2000Ah
Current range	+/-500A
Battery voltage (V).	+/- 1mV
Operating Temp	-20 to 50 °C
Battery charge/discharge current (A). (0-200Ah)	+/-10mAh
Ampere-hours consumed (Ah).	+/-0.1Ah
State of charge (0-100%).	+/- 0.1%
Battery Temperature (0-50 °C)	+/-1 °C
Time to depletion at the current rate of discharge	-
Accuracy of voltage Measurement	+/-0.3%
Accuracy Of current Measurement	+/-0.4%

3.1.5 Inverter/charger and Solar Charge Controller

The inverter/charger should adhere to the specification provided below or better:

Table 3: Specification for inverter/charger

Description	Requirement
Inverter (Pure Sine Wave)	
Nominal battery voltage	24V
Input voltage range	21V -34V
Continuous power@25°C	>= 3000VA
Power 30 min. @ 25°C	>= 3300VA
Power 5 sec. @ 25°C	Min. 2 x nominal power
Efficiency	>= 97%
Output voltage	230Vac (+0%/-10%)
Output frequency	50Hz (+/- 05%)
Total harmonic distortion	<= 4%
Dynamic behaviour	<= 5ms (on load change 0% to 100%)
Battery charger	
Charging current adjustable	0-45A
Input AC voltage range	230 Vac
Input frequency	45-65Hz
Power factor correction	EN 6100-3-2
General	
Min transfer time	<= 40 ms
Warranty	>= 5 years
Protection	IP20

Charge controller specification:

Table 4: Specification of stand-alone charge controller

Description	Requirement
Type	Maximum Power Point Tracking (MPPT)
NEC Recommended Solar Maximum Array STC Nameplate	12 VDC systems 750 Watts 24 VDC Systems 1500 Watts 48 VDC systems 3000 Watts 60 VDC Systems 3750 Watts
Output current	60 A @ 40°C with adjustable current limit
PV Open Circuit Voltage (VOC)	150 VDC absolute maximum coldest conditions / 145 VDC start-up and operating maximum
Standby power consumption	< 1 W
Power conversion efficiency	> 95 % @ 60A at 48 VDC system voltage
Charging regulation	Five stages; bulk, absorption, float, silent and equalisation
Equalisation charging	Programmable voltage set point and duration
Data logging	Last 128 days of operation: Amp Hours, Watt Hours, Time in Float, Peak Watts, Amps, Solar Array Voltage, Max. Battery Voltage, Min Battery Voltage and

	Absorb, Accumulated Amp Hours, and kW Hours of production
Warranty	>= 5 year warranty
Operating Temperature Range	-40 to 60°C (power automatically derated above 40°C)

3.1.6 Maintenance

The service provider is to responsible for the maintenance of the PV system for a period of three years and the cost submitted for this component is to cover all routine maintenance. Non routine maintenance shall be carried within the terms of the warranty provided. The following aspects for maintenance shall be expected from the service provider:

- 1) Inspection of system components in 3 months intervals.
- 2) Battery inspection and adjustments where necessary in 3 months intervals.
- 3) Cleaning of solar panels in 3 months intervals.
- 4) Annual inspection of system integrators and make adjustments where required.

Please note that the maintenance intervals will stay the same for the entire 3 year contract period.

3.2 Standard Specifications

The installation must adhere to the following specifications

3.2.1 Photovoltaic Modules

- 1) IEC-EN 61724: Photovoltaic system performance monitoring – Guidelines for measurement, data exchange and analysis
- 2) IEC-EN 61727: Photovoltaic (PV) systems - Characteristics of the utility interface
- 3) IEC/EN 61215: Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval
- 4) IEC 61646: Thin-film terrestrial photovoltaic (PV) modules - Design qualification and type approval
- 5) IEC/EN 61730: Photovoltaic (PV) module safety qualification

3.2.2 Batteries

- 1) IEC-EN 60086: Primary batteries
- 2) IEC-EN 61427: Secondary cells and batteries for photovoltaic energy systems (PVES) – General requirements and methods of test
- 3) EN 50272: Safety requirements for secondary batteries and battery installations
- 4) IEEE 485: IEEE recommended practice for sizing lead-acid batteries for stationary applications

3.2.3 Installation

- 1) SANS 10142-1:2009: “The Wiring Code’ (The wiring of premises Part 1: Low voltage installations): Installations smaller than 1,000,V a.c. or 1,500V d.c
- 2) NRS 052-3:2008: Off-grid solar home systems
- 3) IEC-EN 60870-5-102: Telecontrol equipment and systems – Part 5: transmission protocols – section 102: Companion standards for the transmission of integrated totals in electric power systems
- 4) IEC-EN 62056: Electricity metering – Data exchange for meter reading, tariff and local control

- 5) NRS 057-4: Electricity metering Part 4: Code of practice

3.2.4 Small-scale renewable energy generation standards

- 1) IEEE 1547 Parts 1 -6: IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems
- 2) NRS 097: Grid interconnection for embedded generation: Installations <100kW
- 3) NRS 048-2: Electricity supply - Quality of supply Part 2: Voltage characteristics, compatibility levels, limits and assessment methods
- 4) NRS 048-4: Electricity supply – Quality of supply Part 4: Application guidelines for utilities

4 ADJUDICATION PROCESS

4.1 General

The procurement will be done in terms of the Section 18 of approved Supply Chain Management Policy, “Procedures for procuring goods or services through written or verbal quotations and formal written price quotations¹”.

The quotations will be assessed according to a two-step process. The first step is a functionality assessment and bidders must score a minimum of 80 points (out of 100) in order to be assessed any further. Step 2 is adjudicated according to price and preferential procurements.

Step 1: Functionality (100 points)

- 1) Experience in supplying and installing grid-tie or stand-alone solar PV systems. **The submission document should include brief details of successful installations commissioned and provide project reference contact details.** (60 points)
- 2) The quality and duration of warranties and guarantees on system (20 points)
- 3) Local representation (20 points)

Companies/Individuals must score a minimum of 80 points for “Step 1: Functionality” in order to be evaluated for “Step 2: Price and Preferential Procurement”. Please refer to Table 5: Breakdown of scoring for Phase 1: Functionality Assessment **Step 2: Price and Preferential Procurement (100 points)**

- Price (80 points)
- Preferential Procurement (20 Points)

A template for providing the cost information is provided in “Annexure 1: Bill of Quantities” of this RFQ.

Table 5: Breakdown of scoring for Phase 1: Functionality Assessment

Criteria Number	Criteria	Point Allocation
1	Experience in supplying and installing grid-tie or stand-alone solar PV systems	60
1.1	Designed, and commissioned 2 or more off-grid or grid-tie PV systems \geq 200W	20

¹ <http://www.durban.gov.za/durban/government/scm/strategy/Approved%20SCM%20Policy.pdf>

1.2	Designed, and commissioned 3 or more off-grid or grid-tie PV systems >=200W	20
1.3	Designed, and commissioned 5 or more off-grid or grid-tie PV systems >=200W	20
2	The quality and duration of warranties and guarantees on system	20
2.1	>= 20 year performance guarantee on PV panels	5
2.2	>= 3 year warranty on inverter and charge controller	5
2.3	>= 5 year warranty on inverter and charge controller	3
2.4	>= 3 year warranty on battery	2
3	Local representation	20
3.1	Head office in eThekweni Municipal area	10
3.2	Satellite office in eThekweni Municipal area	10
	Total for Phase 1: Functionality	100

5 SUBMISSION REQUIREMENTS

Quotations should be submitted electronically (preferably) or by post and **must** include the following where necessary:

- 1) Annexure 3 - Bill of Quantities (BOQ) (to be completed by the supplier, respondents may submit their own BOQ, however it must fully itemised)
- 2) Annexure 4- Signed declaration
- 3) Total price inclusive of VAT
- 4) Copy of VAT clearance certificate
- 5) Details of equipment such as manufacturer, technical specifications and features etc.
- 6) Details of guarantee or warranties
- 7) Company profile and BEE status
- 8) Focused Procurement Lite registration details (if not registered proof of application must be provided) (<http://fplite.durban.gov.za/>). **Companies which have registered on FPLite through an online registration will need to provide the original documentation required for registration with their submission.****

6 Timeframes

- The work is to be implemented by the 31st of January 2016.
- Final Invoice to be submitted by the 31st of March 2016
- Quotations to reflect the necessary detail for each item stipulated above (see scope of works)
- Quotations **must** be submitted by the **28 of October 2015, 11h00.**

7. Compulsory Site Visit

A compulsory site-visit will be held on the **(21 October 2015)** at **(11:00am)** at the Buffelsdraai Landfill site (GPS location provided in Figure 1). Tenderers who do not attend the Compulsory Site Visit may not submit tender proposals.

Before a final decision is taken, the eThekweni Municipality may call bidders in for presentation of their proposals. The eThekweni Energy Office does not bind itself to accept the lowest or any quotation, and reserves the right to accept a portion of any quotation, unless the supplier expressly stipulates otherwise in their quotation. The eThekweni Energy Office does not undertake to consider quotations received after the due date and time unless clear evidence of dispatch is available (e.g. postage stamp with date). Please also note that companies must be registered on the eThekweni Municipal Focused procurement system (<http://fplite.durban.gov.za/>) in order to be eligible for procurement.

Each service provider must submit a quotation (preferable electronically) or by post clearly marked **“Design, supply, installation and maintenance of an off-grid solar photovoltaic system at the Buffelsdraai landfill site”**

Quotations/proposals need to be submitted to:

E-mail: Sindy.Majola@durban.gov.za

Delivered to: Energy Office

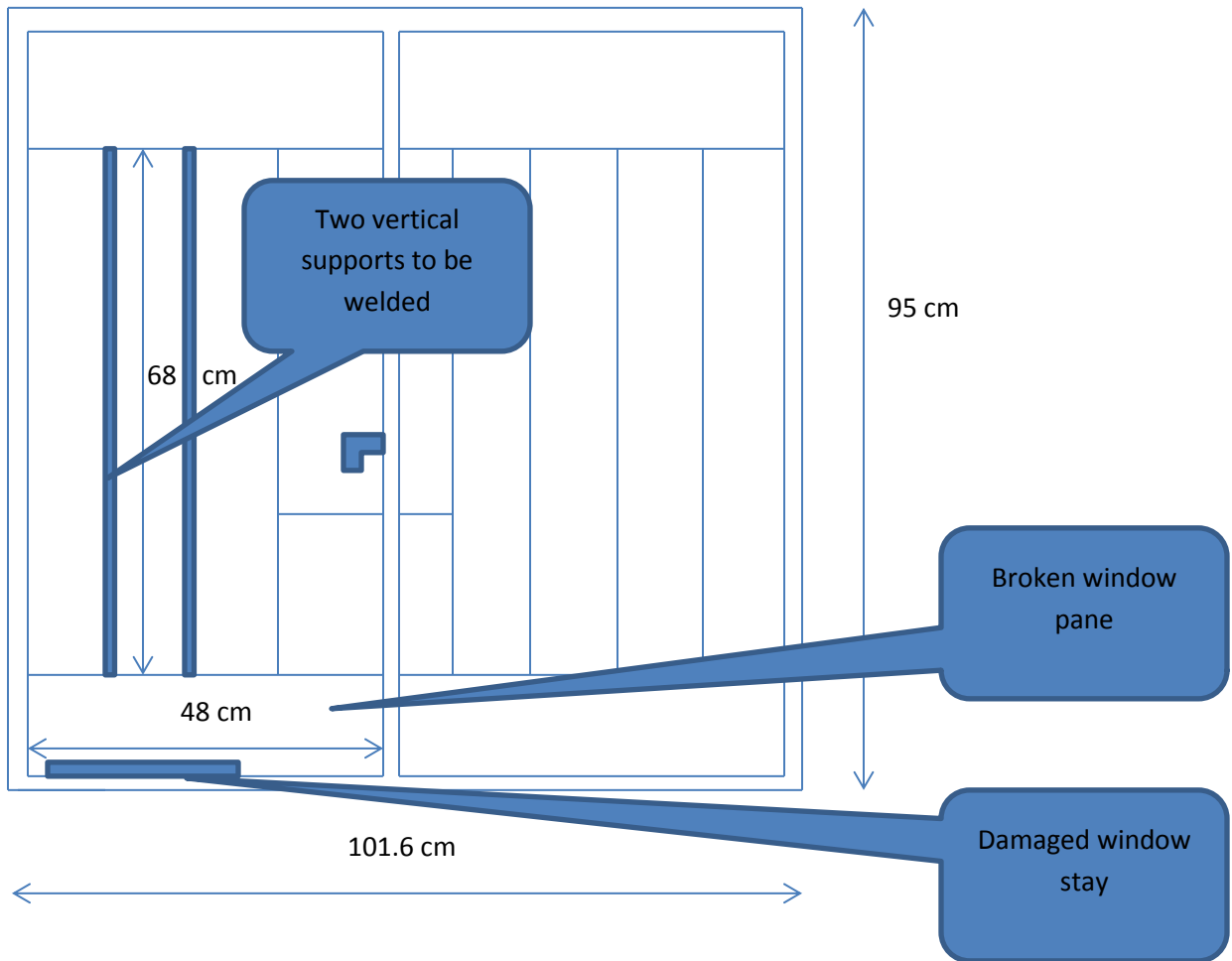
Tel: 031 322 2925

For Technical Queries contact

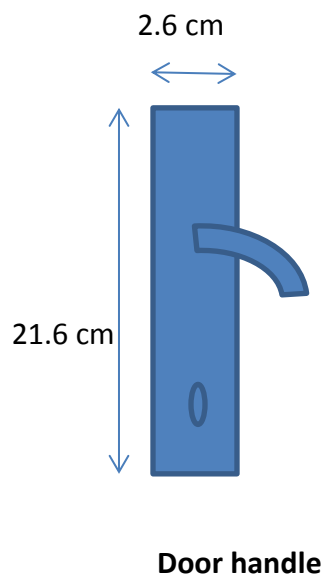
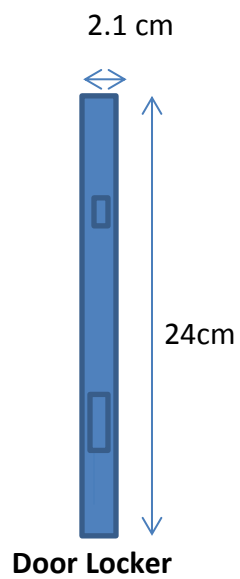
Mazwi Mkile (Mazwi.Mkile@durban.gov.za)

Tel: 031-322 2926

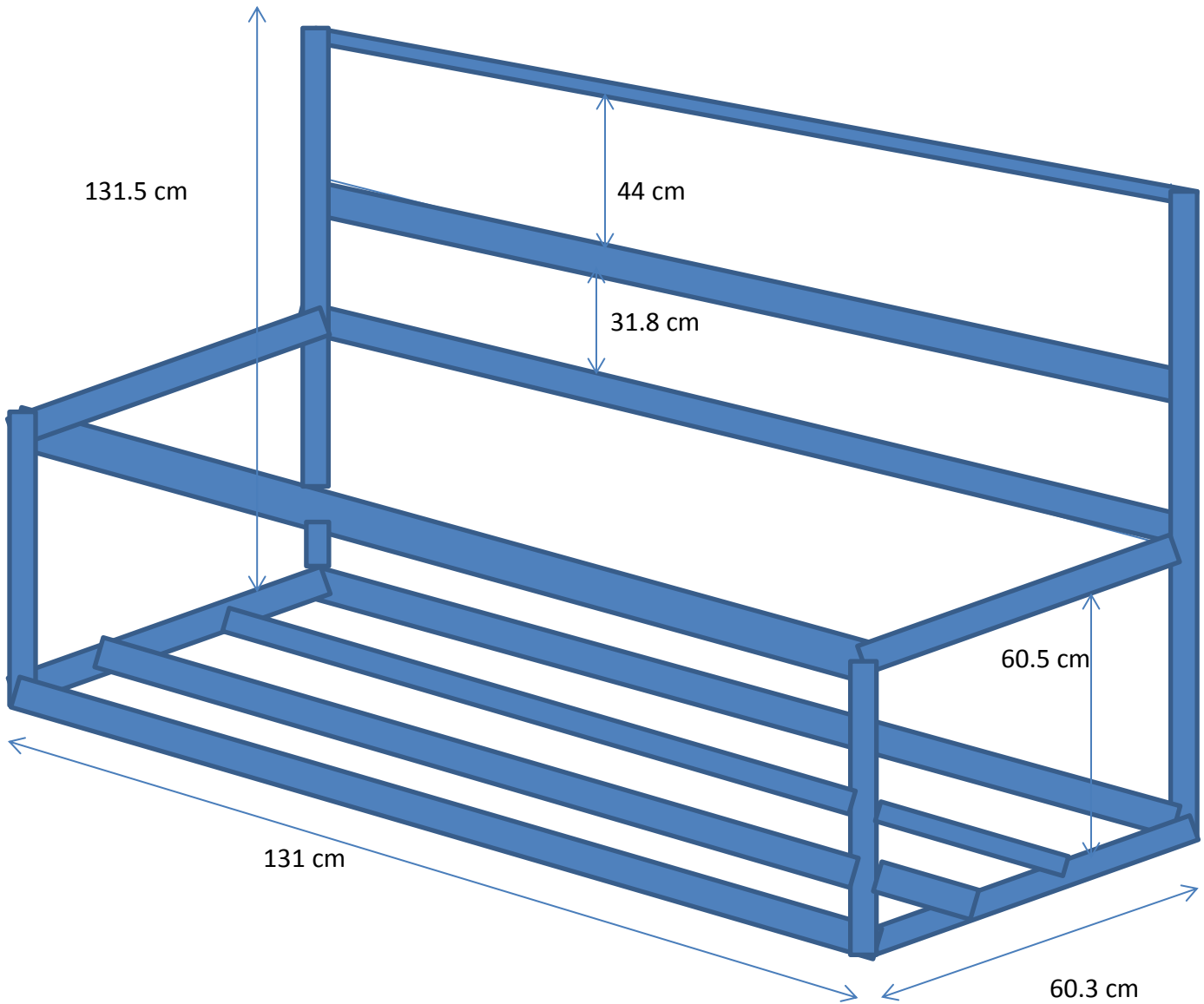
Annexure 1: Details of the existing damaged infrastructure



Window



Annexure 2: Details of the existing Battery/Inverter/MPPT stand



Battery/ Inverter/MPPT stand

Annexure 3: Bill of Quantities

Item No.	Description	Unit	Rate	Quantity	Amount
A	CAPITAL COST				
A.1	Equipment Costs (Supply and Delivery)				
A.1.1	Solar Panels and frame				
A.1.1.1					
A.1.2	Inverter/charger & charge controller				
A.1.2.1					
A.1.3	Batteries				
A 1.3.1					
A.1.4	Battery Monitor				
A1.4.1					
A.1.5	Cabling & system integrators				
A.1.5.1					
A.1.6	Electricity monitor				
A.1.6.1					
A.1.7	Building materials (Annexure 1)				
A.1.7.1					
A.2	Design and Installation Costs				
A.2.1	Solar system/electrical design and installation				

A.2.1.1					
A.2.2	Building materials installation (Annexure 1)				
A.2.2.1					
	Total for Section A				
Item No.	Description	Unit	Rate	Quantity	Amount
B	Maintenance Costs				
B.1	Maintenance				
B.1.1	Maintenance cost for first year			1 yr	
B.1.2	Maintenance cost for second year			1 yr	
B.1.3	Maintenance cost for third year			1 yr	
	Total for Section B				
	Summary of Cost				
	Total for Section A				
	Total for Section B				
	Subtotal				
	Add 14% VAT				
	Total				

Annexure 4: Declaration

_____ **(Name of Service Provider) hereby state:**

- 1) Is the service provider is a natural person (Yes/No)
 - a. If the service provider is a natural person, has the service provider been is in the service of the state, or has been in the service of the state in the previous twelve months; (Yes/No)
 - b. If Yes, please provide details

- 2) If the service provider is not a natural person, are any of its directors, managers, principal shareholders or stakeholder is in the service of the state, or has been in the service of the state in the previous twelve months; (Yes/No)
 - a. If Yes, please provide details

- 3) If the service provider is not a natural person, has a spouse, child or parent of the provider or of a director, manager, shareholder or stakeholder referred to in subparagraph (2) is in the service of the state, or has been in the service of the state in the previous twelve months. (Yes/No)
 - a. If Yes, please provide details

Service Provider

Date:

Name:

Designation:

Signature: