CONTRACT DATA

A contract between

SENTECH, Sender Technology Park, Radiokop, Octave Road, Honeydew,

and

_____

_____

for the

Design, Supply and installation of a functional ground mounted Photovoltaic system at Cape Town Operations Centre and Paarl Transmitter Station

Bid Number: SENT/017/2021-22

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PART C1: AGREEMENTS AND CONTRACT DATA –

Form of Offer and Acceptance

Offer

Sentech, identified in the acceptance signature block, has solicited offers to enter into a contract for the Appointment of a service provider for the Design, Supply and installation of a functional ground mounted Photovoltaic system at Cape Town Operations Centre and Paarl Transmitter site.

The Bidder, identified in the offer signature block, has examined the documents listed in the Tender Data and addenda thereto as listed in the Bid schedules, and by submitting this offer has accepted the conditions of the Bid.

By the representative of the Bidder, deemed to be duly authorized, signing this part of this form of offer and acceptance, the Bidder offers to perform all of the obligations and liabilities of the Bidder under the Contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the conditions of contract identified in the Contract Data.

THE OFFERED TOTAL OF THE PRICES INCLUSIVE OF APPLICABLE TAXES; (in the Bids applicable currency).

_____ (amount in words);

_____(amount in figures)

NB: The Prices quoted above is the total Bid offer inclusive of all applicable taxes for the Contract duration. The price must be carried over from the price breakdown / schedule of rates provided in the Bid document.

This offer may be accepted by Sentech by signing the acceptance part of this form of offer and acceptance and returning one copy of this document to the Bidder before the end of the period of validity stated in the Tender Data, whereupon the Bidder becomes the party named as the Bidder in the conditions of contract identified in the Contract Data.

Bidder's Signature(s) _____

Signed by the Bidder at _____ on this the _____ day of _____ 20_____

Name(s) _____ _____

Capacity _____ _____

Address (*Domicillium*)

_____

_____

Acceptance

By signing this part of this form of offer and acceptance, Sentech accepts the Bidder's offer. In consideration thereof, Sentech shall pay the Bidder the amount due in accordance with the conditions of contract identified in the Contract Data. Acceptance of the Bidder's offer by the signature by Sentech shall form an agreement between Sentech and the Bidder upon the terms and conditions contained in this agreement and in the contract that is the subject of this agreement.

The terms of the contract, are contained in:

Part C1 Agreements and contract data, (which includes this agreement)

Part C2 Pricing data

Part C3 Scope of work.

and drawings and documents or parts thereof, which may be incorporated by reference into Parts C1 to C3 above.

Deviations from and amendments to the documents listed in the Tender Data and any addenda thereto as listed in the Bid schedules as well as any changes to the terms of the offer agreed by the Bidder and the employer during this process of offer and acceptance, are contained in the schedule of deviations attached to and forming part of this agreement. No amendments to or deviations from the said documents are valid unless contained in this schedule of deviations.

Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this agreement.

Notwithstanding anything contained herein, this agreement comes into effect on the date when the Bidder receives one fully completed original copy of this document, including the schedule of deviations (if any). Unless the Bidder within five working days of the date of such receipt notifies Sentech in writing of any reason why it cannot accept the contents of this agreement, this agreement shall constitute a binding contract between the parties.

Sentech's Signature(s) _____

Signed by Sentech at _____ **on this the** _____ **day of** _____ **20**_____

Name(s) _____

Designation_____ _____

SENTECH SOC LIMITED,
Sender Technology Park
Octave Road
Radiokop
Honeydew
Johannesburg
Date _____

Upon acceptance by Sentech of the Bidder's offer, a contract will come into existence.

SCHEDULE OF DEVIATIONS

Notes:

1 The extent of deviations from the Bid documents issued by the Sentech before the Bid closing date is limited to those permitted in terms of the conditions of Bid.

2 A Bidder's covering letter shall not be included in the final contract document. Should any matter in such letter, which constitutes a deviation as aforesaid, become the subject of agreements reached during the process of offer and acceptance, the outcome of such agreement shall be recorded here.

3 Any other matter arises from the process of offer and acceptance either as a confirmation, clarification or change to the Bid documents and which it is agreed by the Parties becomes an obligation of the contract shall also be recorded here.

4 Any change or addition to the Bid documents arising from the above agreements and recorded here shall also be incorporated into the Contract.

1. Subject _____

Details_____

2. Subject _____

Details_____

3. Subject _____

Details_____

4. Subject _____

Details_____

By the duly authorised representatives signing this schedule of deviations, Sentech and the Bidder agree to and accept the foregoing schedule of deviations as the only deviations from and amendments to the documents listed in the Tender Data and addenda thereto as listed in the Bid schedules, as well as any confirmation, clarification or changes to the terms of the offer agreed by the Bidder and Sentech during this process of offer and acceptance.

It is expressly agreed that no other matter whether in writing, oral communication or implied during the period between the issue of the Bid documents and the receipt by the Bidder of a completed signed copy of this Agreement shall have any meaning or effect in the contract between the parties arising from this agreement.

Contract Data

Part one - Data provided by Sentech given in all contracts

1. The *Purchaser* is
SENTECH SOC LIMITED,
Sender Technology Park
Octave Road
Radiokop
Honeydew
Johannesburg

2. General
The National Treasury General Conditions of Contract for goods and services (NT GCC, 2010) or General Conditions of Contract for Works (2015) as issued by National Treasury and the Construction Industry Development Board of the Republic of South Africa apply, respectively.

The goods are specified in the Scope of Work. The Special Conditions of Contract (SCC) are stipulated in the Tender Data.

3. Goods information:
The *Goods Information* is in the document called "Scope of Work" and in the documents and drawings referred to by it.

4. Terms of Delivery
The *Terms of Delivery* are contained in the General Conditions of Contract (GCC) and Special Conditions of Contract.

5. Language
The *language* of this contract is English.

6. Governing Laws and Jurisdiction
The Contract shall be governed by and interpreted according to the laws of the Republic of South Africa.

In the event of a conflict between or inconsistency in the laws applicable in the various provinces of the Republic of South Africa, the law as applied and interpreted in the Gauteng Province shall prevail.

The parties irrevocably submit to the exclusive jurisdiction of the South Gauteng High Court, Johannesburg in respect of any action or proceeding arising from this Bid.

This Bid and all contracts emanating there from will be subject to the General Conditions of Contract issued in accordance with Treasury Regulation 16A published in terms of the Public Finance Management Act, 1999 (Act 1 of 1999). The Special Conditions of Contract are supplementary to that of the General Conditions of Contract. Where, however, the SCC are in conflict with the GCC, the SCC shall prevail.

7. Sub-contracting post award
A Bidder awarded a Bid may only enter into a subcontracting arrangement with the approval of Sentech. The successful bidder may not subcontract more than 25% of the value of the contract to any other enterprise that does not have an equal or higher B-BBEE status level of contributor than the Bidder concerned, unless the contract is subcontracted to an EME that has the capability and ability to execute the subcontract.

8. Transformation Plan
A transformation plan is a record of activities an entity intends to undertake to improve its BBBEE Level through Ownership, Management and Control; Skills Development; Enterprise and Supplier Development and Socio-Economic Development.
Sentech reserves the right to request a BBBEE transformation plan with clearly defined timelines and milestones if the recommended bidder does not meet Sentech's transformation goals. These milestones must be achieved over the term of the contract. This transformation plan shall be submitted within 10 working days from the written request, failing which Sentech reserves the right to withdraw its appointment of the preferred recommended Bidder.

9. Warranty
The warranty period is 12 months after Delivery.

10. Payment

Sentech will **NOT** provide upfront payments to awarded suppliers.

The method and conditions of payment are contained in the Tender Data, GCC and SCC.

The interest on late payment is 0 % per complete week of delay.

11. Currency

South African registered businesses that purchase equipment overseas and quote in foreign currency will be required to provide Sentech a 6-month forward cover contract on appointment. The 6 months forward cover will be re-negotiated and renewed every 6 months should the contract term on this tender be longer than 6 months.

12. General - Prices

Unless approval has been obtained from Sentech, no adjustment in contract prices will be made.
Applications for price adjustment must be accompanied by documentary evidence in support of any adjustment.

13. Price Negotiations

Sentech reserves the right to negotiate market related prices. If market-related prices are not agreed to, Sentech reserves the right to cancel the Bid.

14. Liabilities indemnities and insurance

Insurance is required from the Bidder in respect of delivery and transportation where applicable.

15. Disputes

Should any dispute, disagreement or claim arise between the parties ("the dispute") concerning this Agreement, the parties shall try to resolve the dispute by negotiation. This entails one party inviting the other party to meet and attempt to resolve the dispute within fourteen (14) days from the date of the written invitation.

If the dispute has not been resolved by such negotiation as referred to in this clause above, the Parties shall submit the dispute to the Arbitration Foundation of Southern Africa ("AFSA") for administered mediation, upon the terms set out by the AFSA secretariat.

Failing such resolution, the dispute shall be resolved by arbitration in accordance with the rules and procedures of AFSA by an arbitrator appointed by AFSA. Where the arbitration route is followed, the dispute must be adjudicated within Johannesburg in the English language and finally resolved in accordance with the rules of AFSA, by an arbitrator or arbitrators appointed by that Foundation.

The provisions of this clause shall not preclude any party from obtaining relief from a Court of competent jurisdiction. To this extent, the Parties hereby consent to the jurisdiction of the South Gauteng High Court, Johannesburg, South Africa. The provisions of this clause shall continue to be binding on the Parties, notwithstanding any termination or cancellation of this Agreement.

16. Termination

Sentech shall have the right, at its sole and exclusive discretion, upon written notice to the Bidder, to terminate this Agreement, in whole or in part should the Bidder fail to perform any of its obligations or deliver any deliverable timeously or should Sentech not be satisfied with the quality of any service/s in terms of this Agreement, to the satisfaction of Sentech.

Sentech shall furthermore have the right, as a result of such termination, to appoint a third party to perform the obligations of the Bidder in terms of the Agreement and the Bidder indemnifies Sentech against all costs incurred by Sentech in appointing such third party to fulfil the obligations of the Bidder.

Sentech shall have the right, at its sole and exclusive discretion, to terminate this Agreement, at any time, upon 30 (thirty) days' written notice to the Bidder.

17. Contract Term

The supplier shall submit a timeline for the works to be successfully executed. Upon the date the works have been completed to a degree where the system is practically functional, a 15 month maintenance period will commence. During this period the system shall be monitored and maintained to such an extent that the simulated P50 or P90 energy yield as submitted in the tender can be met for a rolling 12 month period. The contract term shall therefore be for the construction period and the 15 month O&M duration thereafter as submitted by the supplier.

A maintenance term of 15 months is to be part of this contract. The maintenance term will commence on the date of final completion. The installation contractor shall be available to agree a new maintenance contract with client once the 15 month term expires, however the client reserves the right to negotiate a new maintenance agreement with a different service provider if he so wishes after the initial maintenance period.

The Purchaser's Representative is

Name: Mr Zunaid Adams

Address: **SENTECH SOC LIMITED,**
Sender Technology Park
Octave Road
Radiokop
Honeydew
Johannesburg

Tel No: 011 471 4400 Fax No:_____

E mailadamsz@sentech.co.za

The authority of the *Purchaser's* Representative is the Executive Head of Legal Services of Sentech.

18. Supplier Due Diligence

Sentech reserves the right to conduct supplier due diligence at any time pre, during and post the contract period. This may include announced or unannounced site visits.

Sentech's Representative is

Name: Mr Zunaid Adams

Address: **SENTECH SOC LIMITED,**
Sender Technology Park
Octave Road
Radiokop
Honeydew
Johannesburg

Tel No. 0114714400

Email: adamsz@sentech.co.za

Sentech's Representative is the Executive: Legal and Regulatory.

19. Delay damages

As stipulated in the Special Conditions of Contract.

Contract Data

Part two - Data provided by the Bidder

Statements given in all contracts

The Bidder is:

Name _____

Address _____

a company / close corporation / partnership duly incorporated in accordance with the laws of the Republic of South Africa.

PART C2: PRICING DATA
Price List

The purposes of evaluation; Sentech request bidders to use RoE of R15,00 - $1,00 for evauation purposes. Bidders must clearly indicate in their quote the line items that have an RoE impact.

Cape Town OC

Provisional and General

#	Description NOTE: All items to be designed, supplied, installed & commissioned as applicable. Items not covered by the schedule must be listed below. If quantities are zero, then provide rates only.	Unit	Qty	R/Unit	R Total
1	**CONTRACTORS FIXED CHARGES**				
1.1	Design, documentation & professional certification	Item	1		
1.2	Transport & logistics to site	Item	1		
1.3	Establishment of construction site facilities	Item	1		
1.4	Site inspection before contract commences	Item	1		
1.5	Compliance with OHSACT requirements	Item	1		
1.6	Compliance with Environmental requirements	Item	1		
1.7	Factory acceptance tests for Inverters only in South Africa	Item	1		
1.8	Site acceptance tests	Item	1		
1.9	Testing & commissioning	Item	1		
1.10	Preparation of 4 sets of O&M manuals plus electronic version	Item	1		
1.11	Operation and management training of Employer staff (1 day)	Item	1		
1.12	Operation and management contract (12 months from Final completion))	Item	1		
1.13	Cost of disposal at the end of the plant's 25 years lifespan (at today's prices)				
1.14	Cost of remediation of the site at end of life (at today's price)				
1.15	Risk assessment and report for lightning protection design	Item	1		
1.16	Performance guarantee	item	1		
1.17	Public Liability risk insurance	item	1		
1.18					
2	**CONTRACTORS TIME RELATED ITEMS**				
2.1	Contractual requirements	Item	1		

#	Description NOTE: All items to be designed, supplied, installed & commissioned as applicable. Items not covered by the schedule must be listed below. If quantities are zero, then provide rates only.	Unit	Qty	R/Unit	R Total
2.2	Operation/maintenance of facilities/site	Item	1		
2.3	Project Management & Works Supervision	Item	1		
2.4	HSE Supervision	Item	1		
2.5	Accommodation	Item	1		
2.6	Company and Head Office overhead costs	Item	1		
3	**All other items deemed necessary to complete the works. *(Specify):***				
3.1					
3.2					
Total excluding VAT carried forward					

PV Plant

#	Description NOTE: all items to be designed, supplied, installed & commissioned as applicable. Items not covered by the schedule must be listed below. If quantities are zero, then provide rates only. Rates must be supplied with site conditions in mind and as per the requirements in the scope of works	Unit	Qty	R/Unit	R Total
1	**PV PLANT**				
1.1	Site clearance	sum	1		
1.2	Plant related Civil Works	sum	1		
1.3.1	Supply: Photovoltaic modules	QTY			
1.3.2	Install: Photovoltaic modules	sum	1		
1.4.1	Supply: Array Structure	sum	1		
1.4.2	Install: Array Structure	sum	1		
1.5.1	Supply: Inverters	Qty			
1.5.2	Install: Inverters	sum	1		
1.6.1	Supply: DC works and cabling	sum	1		
1.6.2	Install DC works and cabling	sum	1		
1.7.1	Supply: AC reticulation	sum	1		
1.7.2	Install: AC reticulation	sum	1		

#	Description NOTE: all items to be designed, supplied, installed & commissioned as applicable. Items not covered by the schedule must be listed below. If quantities are zero, then provide rates only. Rates must be supplied with site conditions in mind and as per the requirements in the scope of works	Unit	Qty	R/Unit	R Total
1.7.3	Supply AC DB as required at all relevant POC's (Incl SPD's)	sum	1		
1.7.4	Install AC DB as required at all relevant POC's	sum	1		
1.8.1	Supply: Earthing and bonding system	sum	1		
1.8.2	Install: Earthing and bonding system	sum	1		
1.9.1	Supply: Lightning protection system	sum	1		
1.9.2	Install: Lightning protection system	sum	1		
1.10.1	Supply: Control and management system	sum	1		
1.10.2	Install: Control and management system	sum	1		
1.11	Supply: Monitoring meter and CT's for the prevention of feeding onto the grid	sum	1		
1.12	Install: Monitoring meter and CT's for the prevention of feeding onto the grid	sum	1		
1.13	Supply: Control for diesel saving when generator is running	sum	1		
1.14	Install: Control for diesel saving when generator is running	sum	1		
1.15	Labelling and notices	sum	1		
1.16	Spare PV Modules	each	5		
1.17	Rigging of materials	each	1		
1.18	System monitoring licence for lifespan of PV system (25 years)	each	1		
1.19	Washing of entire system panels at least once off during 12-month maintenance period (P90 to be considered)	each	1		
1.20	Supply of materials for the provision of water points	each	1		
1.21	Installation of water points	each	1		
1.22	Supply: 19mm crushed stone for under entire PV structure	sum	1		
1.23	Install: 19mm crushed stone under entire PV structure	sum	1		
1.24	Supply: clearvu with spikes on top (or similar) fence around the PV installation (i.e. high security level)	sum	1		
1.25	Install: Clearvu (or similar) fence around the PV installation	sum	1		
1.26	Supply: electric fence with energizer (4 wire)	sum	1		

#	Description NOTE: all items to be designed, supplied, installed & commissioned as applicable. Items not covered by the schedule must be listed below. If quantities are zero, then provide rates only. Rates must be supplied with site conditions in mind and as per the requirements in the scope of works	Unit	Qty	R/Unit	R Total
1.27	Install: electric fence with energizer (4 wire)	sum	1		
1.28	Supply: Razor Wire Barbed Tape Concertina	sum	1		
1.29	Install: Razor Wire Barbed Tape Concertina	sum	1		
2	**All other items deemed necessary to complete the works. *(Specify):***				
2.1	All equipment and materials linked to ROE needs to be priced based on R15.00 to 1$ US. Please specify items linked to ROE and the corresponding value based on R15.00 to 1$ US				
2.2					
Total excluding VAT carried forward					

Total

Total	Description	Total
A	PROVISIONAL AND GENERAL	
B	PV PLANT	
1	**SUB TOTAL 1 (Items A + B)**	
2	**PROVISIONAL SUM ITEMS**	
2.1	SCADA integration	**R30 000**
2.2		
2.3		
2.4	ADD TOTAL OF PROVISIONAL SUM ITEMS (Items 2.1 to 2.2)	
2.5	ADD CONTRACTOR'S MARK-UP ON TOTAL OF PROVISIONAL SUM (Item 2.4)	
3	**SUB TOTAL 2 (Items 1 + 2.4 + 2.5)**	
4	**SUB TOTAL 3 (Items 3 + 4)**	
5	**CONTINGENCY AMOUNT 5%**	
6	**ADD 15 % VAT**	
7	**TENDER TOTAL INCLUDING VAT (Items 5 + 6)**	

Paarl Transmitter Station

Provisional and General

#	Description NOTE: All items to be designed, supplied, installed & commissioned as applicable. Items not covered by the schedule must be listed below. If quantities are zero, then provide rates only.	Unit	Qty	R/Unit	R Total
1	**CONTRACTORS FIXED CHARGES**				
1.1	Design, documentation & professional certification	Item	1		
1.2	Transport & logistics to site	Item	1		
1.3	Establishment of construction site facilities	Item	1		
1.4	Site inspection before contract commences	Item	1		
1.5	Compliance with OHSACT requirements	Item	1		
1.6	Compliance with Environmental requirements	Item	1		
1.7	Factory acceptance tests for Inverters only in South Africa	Item	1		
1.8	Site acceptance tests	Item	1		
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1.10	Preparation of 4 sets of O&M manuals plus electronic version	Item	1		
1.11	Operation and management training of Employer staff (1 day)	Item	1		
1.12	Operation and management contract (12 months from Final completion))	Item	1		
1.13	Cost of disposal at the end of the plant's 25 years lifespan (at today's prices)				
1.14	Cost of remediation of the site at end of life (at today's price)				
1.15	Risk assessment and report for lightning protection design	Item	1		
1.16	Performance guarantee	item	1		
1.17	Public Liability risk insurance	item	1		
1.18					
2	**CONTRACTORS TIME RELATED ITEMS**				
2.1	Contractual requirements	Item	1		
2.2	Operation/maintenance of facilities/site	Item	1		
2.3	Project Management & Works Supervision	Item	1		
2.4	HSE Supervision	Item	1		
2.5	Accommodation	Item	1		

#	Description NOTE: All items to be designed, supplied, installed & commissioned as applicable. Items not covered by the schedule must be listed below. If quantities are zero, then provide rates only.	Unit	Qty	R/Unit	R Total
2.6	Company and Head Office overhead costs	Item	1		
3	**All other items deemed necessary to complete the works. *(Specify):***				
3.1					
3.2					
Total excluding VAT carried forward					

PV Plant

#	Description NOTE: all items to be designed, supplied, installed & commissioned as applicable. Items not covered by the schedule must be listed below. If quantities are zero, then provide rates only. Rates must be supplied with site conditions in mind and as per the requirements in the scope of works	Unit	Qty	R/Unit	R Total
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1.2	Plant related Civil Works	sum	1		
1.3.1	Supply: Photovoltaic modules	QTY			
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1.4.1	Supply: Array Structure	sum	1		
1.4.2	Install: Array Structure	sum	1		
1.5.1	Supply: Inverters	Qty			
1.5.2	Install: Inverters	sum	1		
1.6.1	Supply: DC works and cabling	sum	1		
1.6.2	Install DC works and cabling	sum	1		
1.7.1	Supply: AC reticulation	sum	1		
1.7.2	Install: AC reticulation	sum	1		
1.7.3	Supply AC DB as required at all relevant POC's (Incl SPD's)	sum	1		
1.7.4	Install AC DB as required at all relevant POC's	sum	1		
1.8.1	Supply: Earthing and bonding system	sum	1		
1.8.2	Install: Earthing and bonding system	sum	1		

#	Description NOTE: all items to be designed, supplied, installed & commissioned as applicable. Items not covered by the schedule must be listed below. If quantities are zero, then provide rates only. Rates must be supplied with site conditions in mind and as per the requirements in the scope of works	Unit	Qty	R/Unit	R Total
1.9.1	Supply: Lightning protection system	sum	1		
1.9.2	Install: Lightning protection system	sum	1		
1.10.1	Supply: Control and management system	sum	1		
1.10.2	Install: Control and management system	sum	1		
1.11	Supply: Monitoring meter and CT's for the prevention of feeding onto the grid	sum	1		
1.12	Install: Monitoring meter and CT's for the prevention of feeding onto the grid	sum	1		
1.13	Supply: Control for diesel saving when generator is running	sum	1		
1.14	Install: Control for diesel saving when generator is running	sum	1		
1.15	Labelling and notices	sum	1		
1.16	Spare PV Modules	each	5		
1.17	Rigging of materials	each	1		
1.18	System monitoring licence for lifespan of PV system (25 years)	each	1		
1.19	Washing of entire system panels at least once off during 12-month maintenance period (P90 to be considered)	each	1		
1.20	Supply of materials for the provision of water points	each	1		
1.21	Installation of water points	each	1		
1.22	Supply: 19mm crushed stone for under entire PV structure	sum	1		
1.23	Install: 19mm crushed stone under entire PV structure	sum	1		
1.24	Supply: clearvu with spikes on top (or similar) fence around the PV installation (i.e. high security level)	sum	1		
1.25	Install: Clearvu (or similar) fence around the PV installation	sum	1		
1.26	Supply: electric fence with energizer (4 wire)	sum	1		
1.27	Install: electric fence with energizer (4 wire)	sum	1		
1.28	Supply: Razor Wire Barbed Tape Concertina	sum	1		
1.29	Install: Razor Wire Barbed Tape Concertina	sum	1		
2	**All other items deemed necessary to complete the works. *(Specify):***				

#	Description NOTE: all items to be designed, supplied, installed & commissioned as applicable. Items not covered by the schedule must be listed below. If quantities are zero, then provide rates only. Rates must be supplied with site conditions in mind and as per the requirements in the scope of works	Unit	Qty	R/Unit	R Total
2.1	All equipment and materials linked to ROE needs to be priced based on R15.00 to 1$ US. Please specify items linked to ROE and the corresponding value based on R15.00 to 1$ US				
2.2					
Total excluding VAT carried forward					

Total

Total	Description	Total
A	PROVISIONAL AND GENERAL	
B	PV PLANT	
1	**SUB TOTAL 1 (Items A + B)**	
2	**PROVISIONAL SUM ITEMS**	
2.1	SCADA integration	**R30 000**
2.2		
2.3		
2.4	ADD TOTAL OF PROVISIONAL SUM ITEMS (Items 2.1 to 2.2)	
2.5	ADD CONTRACTOR'S MARK-UP ON TOTAL OF PROVISIONAL SUM (Item 2.4)	
3	**SUB TOTAL 2 (Items 1 + 2.4 + 2.5)**	
4	**SUB TOTAL 3 (Items 3 + 4)**	
5	**CONTINGENCY AMOUNT 5%**	
6	**ADD 15 % VAT**	
7	**TENDER TOTAL INCLUDING VAT (Items 5 + 6)**	

PART C3: SCOPE OF WORK
SENTECH'S GOODS INFORMATION

1. TECHNICAL REQUIREMENTS

1.1. Glossary of Terms

SYMBOLS AND ABBREVIATIONS

Throughout the documentation units of measurement are referred to by symbols: Abbreviations used:

Alternating Current	: AC
British Standard	: BS
Certificate of Compliance	: COC
Contract Price Adjustment	: CPA
Control and Management System	: CMS
Direct Current	: DC
Distribution Board	: DB
Environmental Impact Assessment	: EIA
International Electro-Technical Commission	: IEC
Ingress Protection	: IP
Kilo Volt-Ampere	: kVA
Low Voltage	: LV
Miniature Circuit Breaker	: MCB
Medium Voltage	: MV
New Registration System	: NRS
Point of Connection	: POC
PolyVinyl Chloride	: PVC
South African National Standards	: SANS
Steel Wire armoured	: SWA
OC	: Operations Centre
The Main Contractor on Site	: Main Contractor
The contractor responsible for the electrical installation on site	: Electrical contractor

2. SCOPE OF WORKS

The scope of this project is for the appointment of a service provider to design,supply, install and commission a functional ground mounted Photovoltaic system at Cape Town OC and Paarl Transmitter Station. The identified sites is to have a 25kWp solar power without losses per site.

The project entails the following works:

- A recommendation as to the best location and orientation for the PV array, must be included in the submission. The reasoning behind these recommendations must be included.
- Pricing for a ground mounted tilted, [with two panel portrait per structure], must be provided for.
- Calculation of power saving annually.
- Calculation of annual payback based on current tariffs and proposed 12% increases for 2022, 2023, 2024, 2025 and 12% thereafter.
- Calculation of payback period based on the tariff sheet.
- SMA grid connected inverters or approved similar to be used.

Ground mounted installations

The array shall be installed on structures suitably sized for the array output required and the given area available. The structures must be designed and orientated as to achieve the maximum yield which will in turn provide the client with the quickest payback period. It is the contractor's responsibility to do a proper geological study to determine what the ground conditions are for securing the structure to the ground. Any additional civil costs required due to a lack of research on the ground conditions shall be for the contractors account. Ballasted solutions will be the very last option to be considered. The installation must be secure

A drawn design of the fixing detail of the structure to shall accompany this RFP.

Array

The system's photovoltaic array shall provide a peak (DC) power at Standard Test Conditions. The array by a combination of modular panels shall produce electrical power to supply the buildings during peak sun hours. Peak sun hours are the equivalent number of hours per day when solar irradiance averages 1 kW/m².

The array is to be optimally orientated and sized to achieve an average of five and a half (5.5) peak sun hours per day averaged over the year. Array efficiency is of paramount importance - inefficient array layouts that do not maximise solar exposure, [are subject to shading and less than 5.5 peak sun hours per day over the year], will not be considered.

Sufficient space must be allocated for the cleaning and servicing of the panels and thus adequate walkways and circulation space must be included in the submission. A description as to how the panels will be cleaned needs to be submitted if the highest panel is higher than 2m above the ground

The system needs to be sized to **25kWp power without losses.** The way to achieve this is left up to the discretion of the contractor preparing the solution. Panel performance depreciation over time also needs to be considered in the proposed solution. Drawings will be supplied to the contractor in order to prepare a panel layout. Co-ordinates are also provided in Schedule 3

Since the ground levels are not level, it is preferred that all the solar panels be installed on a structure where the panels can all be at the same level by means of adjusting the individual legs of the structure. Space needs to be allocated for pathways between the panels to ensure that access for cleaning is available.

The proposed panel needs to be able to withstand normal weather conditions such as UV radiation, temperature, humidity, hail, snow and wind pressure. Testing details of the panel under various weather conditions need to be provided in accordance with IEC 61646. The proposed panel needs to be able to withstand a minimum hail diameter of 25mm, (7.53 g), but preferably 45 mm, (43.9 g)

Irrespective the type of installation, roof or ground, the support structures shall be light-weight in materials and design; evidence of this must be supplied. The PV array shall be installed to allow proper run off and drainage and avoid dirt accumulation. The abovementioned support structure will have to be approved by the appointed Structural Engineer.

The system is to include electrical terminal and combiner boxes, quick-connect electrical connectors, DC wiring, DC disconnects, grid-connected inverters, AC disconnect and a corresponding Supervisory Control and Data Acquisition (SCADA) system. The inverters shall be wired to the electrical system through a suitable circuit breaker compliant to NRS 097-2-1 NS protection. The inverters shall be guaranteed for a minimum of five [5] years, but offers to extend it to 10 and 15 years must be provided. The Solar contractor shall endeavour throughout the project to ensure safety and appropriate compliances.

PV Modules

PV Modules shall be tier 1 and shall provide the maximum power production per meter squared (m²).
The Contractor shall supply and install the PV modules to achieve the specified levels of performance for the required design life of 25 years under the prevailing site environmental conditions, which shall be determined by the Contractor.
Modules to be used shall be reliable modules with a proven track record in performance, operation and obtaining long-term debt (project finance). The Contractor shall ensure that PV modules are sourced from a Tier 1 manufacturer. (Tier 1 in this context refers to the Tier 1 list of Bloomberg New Energy Finance (BNEF) in the version as of the date of publishing of the tender documents. Locally assembled modules shall be considered Tier 1 if there is a clear link to one of the manufacturers of the BNEF Tier1 list.)
All modules supplied shall be of the same type and from a single manufacturer.

The quality of equipment supplied shall be generally controlled to meet the guidelines for the design included in the standards and codes listed.
All transportation, storage, handling and installation of the modules shall be in accordance with the specifications from the manufacturer to ensure that the module manufacturer's warranty is honoured.
The module rated peak power shall be used to determine the peak power of the PV Plant. The peak power shall be the sum of the manufacturer's name plate data sheets for each individual module.

The Contractor shall be responsible to decide the module arrangements to minimise the losses due to mismatching. Where the manufacturer's module flasher data show an IMPP deviation of more than 3%, PV modules shall be sorted into three groups to meet a set tolerance. Only modules from the same set shall be used in in the same string. All records of the testing and grouping of Modules must be kept and presented to the Clients.

Inverters

Inverters shall be string inverters and have a NRS 097-2-1 (2017) inverter compliance certificate from a third-party test institute.

The Contractor shall provide inverter arrangement for the PV Plant that is selected to give overall optimal energy yield from the PV Plant over the life of the Contract Period, taking into account the site conditions, the proposed module layouts, shading and orientations.
The inverters shall be installed in a manner that it is not exposed to direct sunlight.

Inverters shall meet the following general requirements:

Due to maintenance reasons and a conservative spare-part approach, inverters of the same type and size from the same manufacturer shall be deployed.
Inverters shall be equipped with communication capabilities as required by the Control and Monitoring System (CMS); all inverters shall be able to be controlled / supervised by the same software or CMS system.
Software must be paid for or free access for the Client for the lifetime of the plant.
Inverter specifications shall be selected with respect to the local climatic and environmental conditions. The inverters shall be suitable for inland installation and operation in conditions such as extreme heat and dust.
Inverters to be used shall be reliable inverters with a proven track record in performance, operation and obtaining long-term debt (project finance). The manufacturer shall be established in the market.
Inverters must comply with applicable norms and standards including but not limited to NRS-097-2-1:2017. The test result and certification must be attached to Returnable Technical Schedule,
Inverters shall comply with South Africa Grid Code requirements for renewables.
The Contractor shall submit calculations for ensuring electrical compatibility between the inverters and the modules selected including, selection of appropriate inverter dimensioning factor and ensuring system voltages lie within acceptable MPPT ranges across the range of operating conditions for the Site.
The quality of equipment supplied shall be generally controlled to meet the guidelines for the design included in the standards and codes listed.
All transportation, storage, handling and installation of the inverters shall be in accordance with the specifications from the manufacturer to ensure that the manufacturer's warranty is honoured.
The Contractor will be required to confirm the inverter manufacturer's warranties for the given environment and installation type. The Contractor shall also mention if the inverter warranties can be extended.
The Contractor is required to install a motorised circuit breaker.
The motorised circuit breaker shall have the following features:

- over and under voltage;
- over and under frequency;
- voltage vector shift; and
- rate of change of frequency (ROCOF).
  The protection relays used shall comply with the relevant sections of the international standard for protection relays IEC60255.

The inverters to be used shall be SMA grid-connected inverters or approved similar.

Earthing

The Contractor shall design, supply and install an earthing system for the PV Plant that eliminates the risk to personnel of electric shock under normal operating conditions as well as fault conditions. Furthermore, the earthing system shall ensure the functionality of electrical protection equipment during electrical faults.
The Contractor shall design the earthing system in accordance with Solar PV industry best practice and in compliance with SANS Codes.
The bidder shall provide an earthing proposal including but not limited to:

- A project specific earthing system diagram;

- Data sheets of main products used;
- Proposed test procedure.
- The Contractor shall conduct tests on the earthing system to fully verify and certify the safety of the site.

The AC Distribution Board shall be bonded to the earthing system with a bare Cu earth conductor.
Protective earthing or bonding conductors connected to the main earthing system shall be provided for the array frames.

Surge and lightning protection
The Contractor shall carry out a risk assessment for lightning and install adequate lightning protection systems.
The Contractor shall design the lightning protection system in accordance with the latest edition of the SANS/IEC standards.
The lightning protection system shall protect the plant, inverters, control and monitoring systems and any other electrical and mechanical equipment against damage caused by lightning strikes.
The proposals to the Client must provide for adequate design against lightning induced overvoltage risk.
Overvoltage protection shall be installed at DC side as well as AC side of the inverter and within the PV arrays.
In general, the design of the DC system must ensure that cables are kept in parallel and as short as possible, while cable loops are also avoided or restricted.
Protection against direct strikes (direct strike lightning protection) shall be installed and coupling because of strikes elsewhere in the grid (indirect strike lightning protection) shall be taken into consideration and designed out of the system.

The lightning and surge protection shall meet the following criteria:
Lightning protection level (LPL 1 or 2)
Type 1:
Type: Modular,1+2 Combined Lightning & Surge Arrester
Rating: Itotal = 100kA (10/350µs), Up ≤1.5kV
Fuse: (Internal/Integrated) or external
Configuration: 3-phase = 3+1 configuration, or 1-phase = 1+1 configuration
Indication: Remote Signalling & Flag indication between (L-N, N-PE)
Technology: Spark-gap or equivalent
Follow current extinguishing capability [L-N]/[N-PE] (Ifi): 50 kA rms/100 A rms
Compliance : SANS/IEC 61643-11
Proven energy coordination with downstream arresters and terminal equipment

Lightning protection level (LPL 3 or 4)
Type 1:
Type: 1+2 Combined Lightning & Surge Arrester
Rating: Itotal = 50kA (10/350µs), Up ≤1.5kV
Fuse: (Internal/Integrated) or external
Configuration: 3-phase = 3+1 configuration, or 1-phase = 1+1 configuration
Indication: Remote Signalling & Flag indication between (L-N, N-PE)
Technology: Spark-gap or equivalent
Follow current extinguishing capability [L-N]/[N-PE] (Ifi): 25 kA rms/100 A rms
Compliance : SANS/IEC 61643-11
Proven energy coordination with downstream arresters and terminal equipment

Sub AC distribution board
Type 2:
Type: Modular Type 2, Surge Arrester
Rating: In = 20kA (8/20s), Up ≤1.5kV
Lightning impulse current (10/350 µs) [N-PE] (Iimp): 12 kA
Fuse: 125A gL/gG (External)
Configuration: 3-phase = 3+1 configuration, or 1-phase = 1+1 configuration
Indication: Remote Signalling & Flag (L-N, N-PE)
Technology: Spark-gap or equivalent
Short-circuit withstand capability for max. mains-side overcurrent protection (ISCCR): 50 kA rms
Compliance : SANS/IEC 61643-11
Energy coordination with upstream and downstream arresters and terminal equipment

DC SPD

Type:1	1+2 Combined Lightning & Surge Arrester
Total discharge current (10/350 µs) [DC+/DC- -> PE] (Itotal):	12.5 kA
Voltage protection level [(DC+/DC-) -> PE] (UP):	2.5 kV (1000V DC)
Voltage protection level [DC+ -> DC-] (UP):	4.75 kV (1000V DC)
Short-circuit current rating (ISCPV):	1000 A
Indication:	Remote Signalling & Flag indication
Compliance :	EN 50539-11
Technology:	Y - configuration combined disconnection
and short-circuiting device with safe electrical isolation	
Energy coordination with terminal equipment (≤ 10 m)	

Type:2	Modular, 2 Surge Arrester
Total discharge current (8/20 µs) [DC+/DC- -> PE] (Itotal):	40 kA
Voltage protection level (UP):	</= 4 kV (1000V DC)
Voltage protection level [DC+ -> DC-] (UP):	</= 3.5 kV (1000V DC)
Short-circuit current rating (ISCPV):	10 KA
Indication:	Remote Signalling & Flag indication
Compliance :	EN 50539-11
Technology:	Y - configuration combined disconnection
and short-circuiting device with safe electrical isolation	
Energy coordination with terminal equipment (≤ 10 m)……..	

Control and Monitoring System (CMS)

The following technical parameters are required to measure and monitor the plants:

- AC energy output at the point of supply (kWh);
- AC energy output from each inverter (kWh);
- Ambient air temperature (°C);
- Module temperature (°C);
- Global solar irradiation on plane of array (kWh/m2);
- Global solar irradiation on horizontal surface (kWh/m2).
- Wind speed (km/h)

A 24/7 metering and monitoring system are required, including the following:

- Web display with a content and functionality, similar or equally approved to SMA's "Webconnect";
- Weather station equipped with a pyranometer integrated with the web portal, similar or equally approved to SMA's "Meteo Station";

The display shall include the following minimum items:

- Current power in kW;
- Inverter comparison status;
- Energy for the current day and running total for the plant;
- Reimbursement;
- CO2 avoided;
- Plant information, i.e. plant accumulated kWh to date and commissioning date;
- Current weather report;
- Graph with day, month, year and total options depicting the time and power (kW)
- Theoretical Maximum kWh production vs Actual Maximum kWh production.

Generator integration

The site is fully backed up by a generator in the event of a power failure. When a power failure occurs the PV system shall run in parallel with the generator in order to save diesel. The generator shall not run at less than 50% to 60% of its full load capacity in order to prevent carbonization. The PV system will need to be throttled accordingly in order to accomplish this

General

The presence of voltage levels in the range of 300-600 V DC and beyond requires a very careful assessment of the protection and isolating devices.

The following forms of protection are to be taken into consideration during the design.

- Over current protection.
- Isolating devices on each string to allow this latter to be inspected or serviced without having to shut down other parts of the system.
- The exposed conductive parts of all the equipment must be earthed through the protection conductor with the aim to protect persons from indirect contacts.
- String protection against reverse currents.
- Earth fault protection.
- Grounding of the array.

Explanation as to how the above will be achieved will be by means of a protection philosophy schematic which must be included in the schematic.

A single-line electrical schematic is to be provided with the submission illustrating the system interconnections. This will illustrate the PV cell interconnections and how the PV array ties back into the domestic grid.

Detailed sizing calculations are to be included in the design submission. Design parameters and assumptions made are to be listed.

The Solar contractor will also train staff in the routine operation, maintenance and safety of the PV system, as well as the SCADA system.

The PV System is to be installed in a location that is not permanently manned. As a result theft is an issue at these remote sites. The contractor needs to allow for anti-theft means of fastening the panels to the structures as well as fastening the inverters to the structures

All cables (AC and DC) are to be buried and or enclosed as to prevent the cables from being stolen. ECC cables are to be used and they are to be accompanied by a separate insulated black earth cable.

Provision needs to be made to prevent veld fires from damaging the panels. Not only does the contractor need to clear and make provision under the panels, but the contractor also needs to clear/ make 5m provision around the installation. 19mm crushed stone needs to be allowed for under the installation.

A clearvu fence or a similar fence to the same quality needs to be installed around the PV system. An electric fence with remote alarm notification needs to be installed on top of the clearvu fence.

Nominal system characteristics:

Voltage : 400V ± 5%
Frequency : 50 Hz ± 0.1 Hz

Technical information submission requirements:

Please refer to Returnables document

2.1. Information to Bidders

DRAWINGS/DOCUMENTS TO BE PROVIDED TO THE SUPPLIER

- Cape Town OC and Paarl site Layout
- Cape Town OC and Paarl tariff sheet
- Co-ordinates of Site
- Cape Town OC and Paarl main breaker size at POC
- Cape Town OC and Paarl Cable size at POC

*Please note, drawings will be issued on the day of briefing(On site).