ANNEXURE C1 - COSTING TEMPLATE

# RFB013/21/22: SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

#### BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION COMMON ITEMS

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
1	METERING AND CONTROL					
1	METER MUNICIPAL CONNECTION					
1.1	Bi-directional 6.6kV Bulk Meter, 3 phase, Demand a	nd kWh				
	Schneider type EM3555 or similar, for monitoring import					
	and export to POS, including 6.6kV VT and 400/200:1 CTs and ethernet communications					
1.1.1	i) Supply, deliver and installation	No	2			
1.1.2	ii) Commissioning	No	2			
2	CONTROLLERS					
2 	CONTROLLERS					
	Power plant controller to manage active/ reactive					
2.1	power, one per bulk intake point, export monitoring and control.	ltem	2			
3	PERFORMANCE MONITORING SYSTEM					
3.1	Performance monitoring system for early detection of faults including communication to maintenance team.	ltem	1			

4	MISCELLANEOUS							
4,1	All other items not included above to complete the installation							
	i) Supply, deliver and installation	No	1					
5	TESTING AND COMMISSIONING							
5								
5.1	5.1 Testing and commissioning of installation and issue of Certificates							
	of Compliance	Sum	1					
6	WARRANTY AND MAINTENANCE							
6.1	Full warranty and maintenance of complete system for 5 years after Practical Completion including inspections, cleaning, on site replacement of faulty inverters, solar PV modules, etc. including cost of	Months	60					
0.1	materials, labour, monthly reporting and overheads.		00					
	SUB-TOTAL BoQ No. 1-4 COMMON ITEMS (Carried 1	forward	to Su	mmary)				

ITEM	DESCRIPTION	Unit	Qty	RATE		TOTAL
				Material	Labour	-
	PRELIMINARY AND GENERAL					
	Refer to Conditions and Special Conditions of Con in the Schedule below and the total amount shall Summary to Bill of Quantities for each Section.					
1.	PRELIMINARY AND GENERAL ITEMS					
1.1	Site Establishment : (Fixed-charge and Value					
	Related Items)					
1.1.1	Office	sum	1			
1.1.2	Office equipment	sum	1			
1.1.3	Store	sum	1			
1.1.4	Workshop	sum	1			
1.1.5	Other (Specify)	sum				
1.2	Administrative : (Time related items)					
1.2.1	Staff on Site	sum	1			
1.2.2	Supervisory Staff	sum	1			
1.2.3	Transport	sum	1			
1.2.4	Running cost eg. Telephone/ data, electricity, cleaning, services, printing & photocopy machines, stationery, etc.	sum	1			
1.2.5	Other (Specify)					
	Security (tenderer to allow for months as per his	mont	th			1
	program)					
	Registration of personnel at@ R150 /	sum	N/A			1
	person					

L.3	Items related to tender amount			1	
1.3.1	Insurance	sum	1		
1.3.2	Cost of Guarantee	sum	1		
1.3.3	Cost of Sureties	sum	1		
1.3.4	Financing of Retention	sum	1		
1.3.5	Financing of Contract Amount				
	i) Prior to Commencement of Construction	sum	1		
	ii) From Commencement of Construction	sum	1		
1.4	OHS Act Requirements				
	All conditions pertaining to the OHS Act,				
	including but not limited to the items listed below:				
1.4.1	Provision of a SAFETY plan	Item	1		
1.4.2	Provision of a medical aid kit on site	ltem	1		
1.4.3	Appointment of an ACCREDITED safety person on site	sum	1		
1.4.4	Supply and provision of safety clothing to all workers on	Sum	1		
	site				
1.4.5	"Adherence to and Compliance with" the OSH Act	Sum	1		
				1	

ITEM	DESCRIPTION		QTY	RATE		TOTAL
				Material	Labour	-
2	CABLE TRENCHES, CABLE SLEEVES & MARKERS					
2.1	CABLE TRENCH EXCAVATION AND RESURFACING					
	Excavate in machine removable materials (hand or machine excavation) for trenches to widths and depths as indicated below, backfill and compact in 200mm layers to 90% MOD AASTHO, including reinstating road surface, dispose of surplus material for sleeves/ cables.					
2.1.1	1000mm deep x 600mm wide	m	238			
2.1.2	600mm deep x 600 mm wide	m	10			
2.1.3	600mm deep x 450mm wide	m	10			
2.1.4	Extra over for items 2.1.1 to 2.1.3 for excavation (provisional) in hard rock material (as defined in SANS					
	1200).					
2.1.5	Hand excavation for cross cuts, to expose services,	m³	7			
	excavation on top of or next to existing services					
2.1.6	Bedding and covering sand for cables	m³	77			
2.1.7	Supply & Installation of Danger Tape	m	258			
2.2	CABLE SLEEVES					
	Cable sleeves with couplings and draw wire as specified					
2.2.1	160mm dia flexible BLACK sleeves, including draw wire couplings and bends (Kableflex, DN160)					
	i) Supply and delivery	m	12		1	
	ii) Installation	m	12			

2.2.2	110mm dia flexible BLACK sleeves, incl. draw wire				
	(Kableflex, DN110)				
	i) Supply and delivery	m	516		<u> </u>
	ii) Installation	m	516		
2.3	DRILLING FOR AND INSTALLATION OF CABLE				
	Drilling below road surface complete with sleeve installed, all excavations for pit holes included, site visit by contractor compulsory to determine and clarify extent				
	of work				
2.3.1	160mm dia, Nextube type (Kableflex, DN160)	m	10		
2.3.2	110mm dia, Nextube type (Kableflex, DN110)	m	10		
2.4	CABLE MARKERS				
2.4.1	Cable Markers	ea	5		
	TOTAL CABLE TRENCHES (carried to IT & HR Secti				<u> </u>

ITEM	DESCRIPTION		ΓΟΤΥ	RATE		TOTAL
				Material	Labour	
	PV PANELS, INVERTERS & CABLING					
3.1	PV PANELS					
3.1.1	Solar PV Panels					
	450W solar PV modules, minimum 12 year warranty					
	i) Supply, deliver and installation	No	372			
	ii) Commissioning	No	372			
3.2	INVERTER AND OPTIMISERS					
3.2.1	<u>OPTIMISERS</u>					
	950W Optimiser					
	i) Supply, deliver and installation	No	186			
	ii) Commissioning	No	186			
3.2.2	INVERTER/S					
	Three phase inverter (400V)					
	33,3kVAac Inverter or similar size, equipped with surge					
	arrestors					
	i) Supply, deliver and installation	No	4			
	ii) Commissioning	No	4			
3.3	COMBINER/S					

3.3.1	Combiner Boxes as Required				
	Including surge arrestors				
	i) Supply, deliver and installation	Sum	1		
	ii) Commissioning	Sum	1		
3.4	DC CABLING				
3.4.1	DC cabling as per the design layout				
	i) Supply, deliver and installation	Sum	1		
	ii) Terminate	Sum	1		
3.5	AC CABLING				
3.5.1	AC cabling as per the design layout				
	i) Supply, deliver and installation	Sum	1		
	ii) Terminate	Sum	1		
3.6	COMMUNICATIONS CABLES				
2.6.4					
3.6.1	Communications cabling and network equipment				
	i) Supply, deliver and installation	Sum	1		
	ii) Terminate	Sum	1		
		(			
	TOTAL PV PANELS, INVERTERS AND CABLES	(carried to	11.8	HR Section	

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	-
4	MOUNTING STRUCTURE FOR PV PANELS					
4.1	Carport mounting structure for mounting PV panels including foundations, rails, brackets, etc. and removal of existing structures. Structures to comply with SANS 10400-B and SANS 10160 for Johannesburg Wind Conditions 1:50 Year Design Wind Gust of 36m/s					
	i) Supply, deliver and installation	Sum	1			
	ii) Commissioning	Sum	1			
4.2	Lightning protection LPL 1 and earthing, including air- terminals, down-conductors and earth spikes, Dehn or	Sum	1			
	similar approved					
4.3	Structural Engineer's Involvement					
	a) Inception	ltem	1			
	b) Stage 1	ltem	1			
	c) Stage 2	ltem	1			
	d) Handing Over to Client / Contractor	ltem	1			
	TOTAL MOUNTING STRUCTURES (carried to IT & I	HR Se	ctior	Summary	)	

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
	AC PROTECTION AND METERING					
5.1	AC CIRCUIT BREAKERS					
	Circuit breakers installed in DBs or Minisubs. Fault current rating of breaker to suit transformer, 30kA at					
	1000kVA, 15kA at 500kVA.					
5.1.1	i) Supply, deliver and installation	Sum	1			
5.2	METERING EXISTING LOAD					
5.2.1	Honeywell Elster A1140	ltem	1			
5.2.2	CTs 800:1 set of 3, class 0,5	ltem	1			
5.2.3	Modem Kocos ME16.3 with GDSP sim card	ltem	1			
5.2.4	Ethernet Connection	ltem	1			
5.3	CONTROLLER					
	Controller to manage alternative power source,					
5.3.1	i.e. existing diesel generator, including cabling, connections, interfacing, programming, etc.	ltem	1			
5.4	MISCELLANEOUS					

	All other items not included above to complete the installation					
5.4.1	i) Supply, deliver and installation	No	1			
5.5	TESTING AND COMMISSIONING					
5.5.1	Testing and commissioning of installation and issue of	Sum	1			
	Certificates of Compliance					
TOTAL A	C PROTECTION AND METERING (carried to IT & HR S	Section	1	1	1	

PROJECT NAME : NHLS MODDERFONTEIN BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION IT & HR SECTION 1								
ITEM	DESCRIPTION	UNIT	ΟΤΥ	' RATE		TOTAL		
				Material	Labour	-		
6	UNINTERRUPTIBLE POWER SUPPLY		<u> </u>		1			
	UPS FOR HR AND IT SECTION	$\square$						
6.1	INVERTER	<del> </del>	<u> </u>	<u> </u>				
0.1		+	╞	+		+		
6.1	Inverter 500kVA, 400V three phase	+			<u> </u>	<u> </u>		
6.2	BATTERY FOR UPS	+	╞		+	+		
6.2.1	2 MWh Battery including container, battery management	ltem	1		+			
	and charging, IP connection							
6.3	LOAD MANAGEMENT	<del> </del>	<u> </u>	<u> </u>				
6.3.1	Load management, battery charging and discharge to	ltem	1		+	+		
	benefit from off-peak tariffs							
			Ē	Ţ				
6.4	CABLES AND CONNECTION	Item						
6.4.1	240mm <sup>2</sup> x 4 core cables run 3 in parallel 800A	m	1					
	 	+	┢			+		
6.4.2		+	┢	1	+			
		1	$\square$					
5.4	MISCELLANEOUS							
	All other items not included above to complete the							

	installation				
5.4.1	i) Supply, deliver and installation	No	1		
5.5	TESTING AND COMMISSIONING				
5.5.1	Testing and commissioning of installation and issue of	Sum	1		
	Certificates of Compliance				
TOTAL AC	 CPROTECTION AND METERING (carried to IT & HR So	ection			

GRID-TIED, CARPORT SOLAR PV INSTALLATION IT & HR SECTION 1

BoQ	DESCRIPTION	TOTAL
No.		
	SUMMARY OF BILLS OF QUANTITIES: NHLS MODDERFONTEIN	
	GRID-TIED, CARPORT SOLAR PV INSTALLATION	
	IT & HR SECTION 1	
1	PRELIMINARY AND GENERAL	
L		
2	CABLE TRENCHES, CABLE SLEEVES & MARKERS	
3	PV PANELS, INVERTERS & CABLING	
4	MOUNTING STRUCTURE FOR PV PANELS	
5	UNINTERRUPTIBLE POWER SUPPLY	
5		

IT & HR SECTION 1						
CONTINGENCY AMOUNT : 10 % OF ABOVE						
 SUB-TOTAL						
 ADD VAT : 15% ON SUB-TOTAL						
TOTAL CARRIED FORWARD TO BOQ SUMMARY PAGE						

ITEM	DESCRIPTION	Unit	Qty	RATE		TOTAL
				Material	Labour	-
	PRELIMINARY AND GENERAL					
	Refer to Conditions and Special Conditions of Con in the Schedule below and the total amount shall Summary to Bill of Quantities for each Section.					
1.	PRELIMINARY AND GENERAL ITEMS					
1.1	Site Establishment : (Fixed-charge and Value					
	Related Items)					
1.1.1	Office	sum	1			
1.1.2	Office equipment	sum	1			
1.1.3	Store	sum	1			
1.1.4	Workshop	sum	1			
1.1.5	Other (Specify)	sum				
1.2	Administrative : (Time related items)					
1.2.1	Staff on Site	sum	1			
1.2.2	Supervisory Staff	sum	1			
1.2.3	Transport	sum	1			
1.2.4	Running cost eg. Telephone/ data, electricity, cleaning, services, printing & photocopy machines, stationery, etc.	sum	1			
1.2.5	Other (Specify)					
	Security (tenderer to allow for months as per his	mon	th			
	program)					
	Registration of personnel at@ R150 /	sum	N/A			
	person					

1.3	Items related to tender amount				
1.3.1	Insurance	sum	1		
1.3.2	Cost of Guarantee	sum	1		
1.3.3	Cost of Sureties	sum	1		
1.3.4	Financing of Retention	sum	1		
1.3.5	Financing of Contract Amount				
	i) Prior to Commencement of Construction	sum	1		
	ii) From Commencement of Construction	sum	1		
1.4	OUS Act Dequirements				
L.4	OHS Act Requirements				
	All conditions pertaining to the OHS Act,				
	including but not limited to the items listed below:				
1.4.1	Provision of a SAFETY plan	ltem	1		
1.4.2	Provision of a medical aid kit on site	ltem	1		
1.4.3	Appointment of an ACCREDITED safety person on site	sum	1		
1.4.4	Supply and provision of safety clothing to all workers on	Sum	1		
	site				
L.4.5	"Adherence to and Compliance with" the OSH Act	Sum	1		

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
2	CABLE TRENCHES, CABLE SLEEVES & MARKERS					
2.1	CABLE TRENCH EXCAVATION AND RESURFACING					
	Excavate in machine removable materials (hand or machine excavation) for trenches to widths and depths as indicated below, backfill and compact in 200mm layers to 90% MOD AASTHO, including reinstating road surface, dispose of surplus material for sleeves/ cables.					
2.1.1	1000mm deep x 600mm wide	m	161			
2.1.2	600mm deep x 600 mm wide	m	10			
2.1.3	600mm deep x 450mm wide	m	10			
2.1.4	Extra over for items 2.1.1 to 2.1.3 for excavation (provisional) in hard rock material (as defined in SANS					
	1200).					
2.1.5	Hand excavation for cross cuts, to expose services,	m³	7			
	excavation on top of or next to existing services	3				
2.1.6	Bedding and covering sand for cables	m³	54			
2.1.7	Supply & Installation of Danger Tape	m	181			
2.2	CABLE SLEEVES					
	Cable sleeves with couplings and draw wire as specified					
2.2.1	160mm dia flexible BLACK sleeves, including draw wire couplings and bends (Kableflex, DN160)					
	i) Supply and delivery	m	12			
	ii) Installation	m	12		1	

2.2.2	110mm dia flexible BLACK sleeves, incl. draw wire				
	wire (Kableflex, DN110)				
	i) Supply and delivery	m	362		
	ii) Installation	m	362		
2.3	DRILLING FOR AND INSTALLATION OF CABLE				
	Drilling below road surface complete with sleeve installed, all excavations for pit holes included, site visit by contractor compulsory to determine and clarify extent of work				
2.3.1	160mm dia, Nextube type (Kableflex, DN160)	m	10		
2.3.2	110mm dia, Nextube type (Kableflex, DN110)	m	10		
2.4	CABLE MARKERS				
2.4.1	Cable Markers	ea	5		
	TOTAL CABLE TRENCHES (carried to SERUM Section	on Su	ımma	ry)	

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL	
				Material	Labour	-	
	PV PANELS, INVERTERS & CABLING						
3.1	PV PANELS						
3.1.1	Solar PV Panels						
	450W solar PV modules, minimum 12 year warranty						
	i) Supply, deliver and installation	No	676				
	ii) Commissioning	No	676				
3.2	INVERTER AND OPTIMISERS						
3.2.1	OPTIMISERS						
	950W Optimiser						
	i) Supply, deliver and installation	No	338				
	ii) Commissioning	No	338				
3.2.2	INVERTER/S						
	Three phase inverter (400V)						
	33,3kVAac Inverter or similar size, equipped with surge						
	arrestors						
		No	9				
	i) Supply, deliver and installation						
	ii) Commissioning	No	9				
3.3	COMBINER/S						

Combiner Boxes as Required					
Including surge arrestors					
i) Supply, deliver and installation	Sum	1			
ii) Commissioning	Sum	1			
DC CABLING					
DC cabling as per the design layout					
i) Supply, deliver and installation	Sum	1			
ii) Terminate	Sum	1			
AC CABLING					
AC cabling as per the design layout					
i) Supply, deliver and installation	Sum	1			
ii) Terminate	Sum	1			
COMMUNICATIONS CABLES					
Communications cabling and network equipment					
i) Supply, deliver and installation	Sum	1			
ii) Terminate	Sum	1			
TOTAL PV PANELS, INVERTERS AND CABLES	(carried to	SER	UM Section		
	Including surge arrestors i) Supply, deliver and installation ii) Commissioning DC CABLING DC cabling as per the design layout i) Supply, deliver and installation ii) Terminate AC CABLING AC cabling as per the design layout i) Supply, deliver and installation ii) Terminate COMMUNICATIONS CABLES COMMUNICATIONS CABLES i) Supply, deliver and installation ii) Terminate	Including surge arrestors       Including surge arrestors         i) Supply, deliver and installation       Sum         ii) Commissioning       Sum         DC CABLING       Including as per the design layout         i) Supply, deliver and installation       Sum         ii) Terminate       Sum         AC CABLING       Including as per the design layout         ii) Terminate       Sum         iii) Terminate       Sum         iii) Terminate       Sum         ii) Supply, deliver and installation       Sum         ii) Supply, deliver and installation       Sum         iii) Terminate       Sum         ii) Supply, deliver and installation       Sum         ii) Supply, deliver and installation       Sum         ii) Terminate       Sum         iii) Terminate       Sum         iii) Terminate       Sum         ii) Supply, deliver and installation       Sum         ii) Supply, deliver and installation       Sum         ii) Supply, deliver and installation       Sum         ii) Terminate       Sum <td>Including surge arrestors       Including surge arrestors         i) Supply, deliver and installation       Sum         ii) Commissioning       Sum         DC CABLING       Including as per the design layout         DC cabling as per the design layout       Including         i) Supply, deliver and installation       Sum         ii) Terminate       Sum         AC CABLING       Including as per the design layout         ii) Terminate       Sum         AC cabling as per the design layout       Including as per the design layout         ii) Terminate       Sum         ii) Supply, deliver and installation       Sum         ii) Terminate       Sum         ii) Terminate       Sum         ii) Terminate       Sum         ii) Terminate       Sum         iii) Terminate       Sum         iii) Terminate       Sum         iii) Terminate       Sum         iii) Supply, deliver and installation       Sum         iii) Supply, deliver and installation       Sum         ii) Supply, deliver and installation       Sum         iii) Terminate       Sum         iii) Terminate       Sum</td> <td>Including surge arrestorsImage: Communication surge arrestorsImage: Communication scabling and network equipmenti) Supply, deliver and installationSum1ii) CommissioningSum1iii) CommissioningSum1DC CABLINGImage: Communication scabling and network equipmentImage: Communication scabling and network equipmentImage: Communication scabling and network equipment</td> <td>Including surge arrestors       Including surge arrestors         i) Supply, deliver and installation       Sum       1         ii) Commissioning       Sum       1         DC CABLING       Including as per the design layout       Including as per the design layout       Including as per the design layout         i) Supply, deliver and installation       Sum       1       Including as per the design layout         ii) Terminate       Sum       1       Including as per the design layout         AC CABLING       Including as per the design layout       Including as per the design layout       Including as per the design layout         ii) Terminate       Sum       1       Including as per the design layout       Including as per the design layout         ii) Supply, deliver and installation       Sum       1       Including as per the design layout         ii) Supply, deliver and installation       Sum       1       Including as per the design layout         ii) Terminate       Sum       1       Including as per the design layout       Including and network         communications cabling and network       Including and network       Including and Incl</td>	Including surge arrestors       Including surge arrestors         i) Supply, deliver and installation       Sum         ii) Commissioning       Sum         DC CABLING       Including as per the design layout         DC cabling as per the design layout       Including         i) Supply, deliver and installation       Sum         ii) Terminate       Sum         AC CABLING       Including as per the design layout         ii) Terminate       Sum         AC cabling as per the design layout       Including as per the design layout         ii) Terminate       Sum         ii) Supply, deliver and installation       Sum         ii) Terminate       Sum         ii) Terminate       Sum         ii) Terminate       Sum         ii) Terminate       Sum         iii) Terminate       Sum         iii) Terminate       Sum         iii) Terminate       Sum         iii) Supply, deliver and installation       Sum         iii) Supply, deliver and installation       Sum         ii) Supply, deliver and installation       Sum         iii) Terminate       Sum         iii) Terminate       Sum	Including surge arrestorsImage: Communication surge arrestorsImage: Communication scabling and network equipmenti) Supply, deliver and installationSum1ii) CommissioningSum1iii) CommissioningSum1DC CABLINGImage: Communication scabling and network equipmentImage: Communication scabling and network equipmentImage: Communication scabling and network equipment	Including surge arrestors       Including surge arrestors         i) Supply, deliver and installation       Sum       1         ii) Commissioning       Sum       1         DC CABLING       Including as per the design layout       Including as per the design layout       Including as per the design layout         i) Supply, deliver and installation       Sum       1       Including as per the design layout         ii) Terminate       Sum       1       Including as per the design layout         AC CABLING       Including as per the design layout       Including as per the design layout       Including as per the design layout         ii) Terminate       Sum       1       Including as per the design layout       Including as per the design layout         ii) Supply, deliver and installation       Sum       1       Including as per the design layout         ii) Supply, deliver and installation       Sum       1       Including as per the design layout         ii) Terminate       Sum       1       Including as per the design layout       Including and network         communications cabling and network       Including and network       Including and Incl

ITEM	DESCRIPTION	UNIT		RATE		TOTAL
				Material	Labour	_
4	MOUNTING STRUCTURE FOR PV PANELS					
4.1	Carport mounting structure for mounting PV panels including foundations, rails, brackets, etc. and removal of existing structures. Structures to comply with SANS 10400-B and SANS 10160 for Johannesburg Wind Conditions 1:50 Year Design Wind Gust of 36m/s					
	i) Supply, deliver and installation	Sum	1			
	ii) Commissioning	Sum	1			
4.2	Lightning protection LPL 1 and earthing, including air- terminals, down-conductors and earth spikes, Dehn or similar approved	Sum	1			
4.3	Structural Engineer's Involvement					
	a) Inception	ltem	1			
	b) Stage 1	ltem	1			
	c) Stage 2	ltem	1			
	d) Handing Over to Client / Contractor	ltem	1			
	TOTAL MOUNTING STRUCTURES (carried to SERU	IM Se	ction	Summary	)	

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
	AC PROTECTION					
5.1	AC CIRCUIT BREAKERS					
	Circuit breakers installed in DBs or Minisubs. Fault					
	current rating of breaker to suit transformer, 30kA at					
	1000kVA, 15kA at 500kVA.					
5.1.1	i) Supply, deliver and installation	Sum	1			
			<u> </u>			
5.2	METERING EXISTING LOAD					
5.2.1	Honeywell Elster A1140	ltem	2			
5.2.2	CTs 1 500:1 set of 3, class 0,5	ltem	2			
5.2.3	Modem Kocos ME16.3 with GDSP sim card	ltem	1			
5.2.4	Ethernet Connection	ltem	1			
J. Z. T						
5.3	CONTROLLER					
	Controller to manage alternative power source,					
5.3.1	i.e.	ltem	1			
5.4	MISCELLANEOUS					

	All other items not included above to complete the				
5.4.1	installation i) Supply, deliver and installation	No	1		
5.5	TESTING AND COMMISSIONING				
5.5.1	Testing and commissioning of installation and issue of	Sum	1		
	Certificates of Compliance				
TOTAL A	C PROTECTION (carried to SERUM Section Summary	)			

#### GRID-TIED, CARPORT SOLAR PV INSTALLATION SERUM SECTION 2

BoQ	DESCRIPTION	TOTAL
No.		
	SUMMARY OF BILLS OF QUANTITIES: NHLS MODDERFONTEIN	
	GRID-TIED, CARPORT SOLAR PV INSTALLATION	
	SERUM SECTION 2	
1	PRELIMINARY AND GENERAL	
2	CABLE TRENCHES, CABLE SLEEVES & MARKERS	
3	PV PANELS, INVERTERS & CABLING	
4	MOUNTING STRUCTURE FOR PV PANELS	
5	AC PROTECTION	

SERUM SECTION 2	
CONTINGENCY AMOUNT : 10 % OF ABOVE	
 SUB-TOTAL	
 ADD VAT : 15% ON SUB-TOTAL	
TOTAL CARRIED FORWARD TO BOQ SUMMARY PAGE	

#### BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

ITEM	DESCRIPTION	Unit	Qty	RATE		TOTAL
				Material	Labour	-
	PRELIMINARY AND GENERAL					
	Refer to Conditions and Special Conditions of Contr the Schedule below and the total amount shall be o Bill of Quantities for each Section.					
1						
1.	PRELIMINARY AND GENERAL ITEMS					
1.1	Site Establishment : (Fixed-charge and Value					
	Related Items)					
1.1.1	Office	sum	1			
1.1.2	Office equipment	sum	1			
1.1.3	Store	sum	1			
1.1.4	Workshop	sum	1			
1.1.5	Other (Specify)	sum				
1.0						
1.2	Administrative : (Time related items)					
1.2.1	Staff on Site	sum	1			
1.2.2	Supervisory Staff	sum	1			
1.2.3	Transport	sum	1			
1.2.4	Running cost eg. Telephone/ data, electricity, cleaning, services, printing & photocopy machines, stationery, etc.	sum	1			
1.2.5	Other (Specify)					
	Security (tenderer to allow for months as per his	mont	h			
	program)					
	Registration of personnel at@ R150 /	sum	N/A			

1.3	Items related to tender amount				
1.3.1	Insurance	sum	1		
1.3.2	Cost of Guarantee	sum	1		
1.3.3	Cost of Sureties	sum	1		
1.3.4	Financing of Retention	sum	1		
1.3.5	Financing of Contract Amount				
	i) Prior to Commencement of Construction	sum	1		
	ii) From Commencement of Construction	sum	1		
1.4	OHS Act Requirements				
	All conditions pertaining to the OHS Act,				
	including but not limited to the items listed below:				
1.4.1	Provision of a SAFETY plan	ltem	1		
1.4.2	Provision of a medical aid kit on site	ltem	1		
1.4.3	Appointment of an ACCREDITED safety person on site	sum	1		
1.4.4	Supply and provision of safety clothing to all workers on	Sum	1		
	site				
1.4.5	"Adherence to and Compliance with" the OSH Act	Sum	1		

#### BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
					<b>b</b> . <b>b</b>	
				Material	Labour	
2	CABLE TRENCHES, CABLE SLEEVES & MARKERS					
2.1	CABLE TRENCH EXCAVATION AND RESURFACING					
	Excavate in machine removable materials (hand or machine excavation) for trenches to widths and depths as indicated below, backfill and compact in 200mm layers to 90% MOD AASTHO, including reinstating road surface, dispose of surplus material for sleeves/ cables.					
2.1.1	1000mm deep x 600mm wide	m	161			
2.1.2	600mm deep x 600 mm wide	m	10			
2.1.3	600mm deep x 450mm wide	m	10			
	Extra over for items 2.1.1 to 2.1.3 for excavation					
2.1.4	(provisional) in hard rock material (as defined in SANS 1200).					
2.1.5	Hand excavation for cross cuts, to expose services,	m³	7			
	excavation on top of or next to existing services					
2.1.6	Bedding and covering sand for cables	m³	54			
2.1.7	Supply & Installation of Danger Tape	m	181			
2.2	CABLE SLEEVES					
	Cable sleeves with couplings and draw wire as specified					
2.2.1	160mm dia flexible BLACK sleeves, including draw wire couplings and bends (Kableflex, DN160)					
	i) Supply and delivery	m	12			
	ii) Installation	m	12			

2.2.2	110mm dia flexible BLACK sleeves, incl. draw wire				
	(Kableflex, DN110)				
	i) Supply and delivery	m	362		
	ii) Installation	m	362		
2.3	DRILLING FOR AND INSTALLATION OF CABLE				
	SLEEVES				
	Drilling below road surface complete with sleeve installed, all excavations for pit holes included, site visit by contractor compulsory to determine and clarify extent				
	of work				
2.3.1	160mm dia, Nextube type (Kableflex, DN160)	m	10		
2.3.2	110mm dia, Nextube type (Kableflex, DN110)	m	10		
2.4	CABLE MARKERS				
2.4.1	Cable Markers	ea	5		
	TOTAL CABLE TRENCHES (carried to HIV Section Su	mma	ary)		

#### BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

ITEM	DESCRIPTION	UNIT	QTY	RATE	TOTAL	
				Material	Labour	_
	PV PANELS, INVERTERS & CABLING					
3.1	PV PANELS					
3.1.1	Solar PV Panels					
5.1.1						
	450W solar PV modules, minimum 12 year warranty					
	i) Supply, deliver and installation	No	1290			
	ii) Commissioning	No	1290			
3.2	INVERTER AND OPTIMISERS					
3.2.1	<u>OPTIMISERS</u>					
	950W Optimiser					
	i) Supply, deliver and installation	No	645			
	ii) Commissioning	No	645			
3.2.2	INVERTER/S					
	Three phase inverter (400V)					
	33,3kVAac Inverter or similar size, equipped with					
	surge					
	arrestors					
	i) Supply, deliver and installation	No	16			
	ii) Commissioning	No	16			
			1		1	

3.3	COMBINER/S				
3.3.1	Combiner Boxes as Required				
	Including surge arrestors				
	i) Supply, deliver and installation	Sum	1		
	ii) Commissioning	Sum	1		
3.4	DC CABLING				
3.4.1	DC cabling as per the design layout				
	i) Supply, deliver and installation	Sum	1		
	ii) Terminate	Sum	1		
3.5	AC CABLING				
3.5.1	AC cabling as per the design layout				
	i) Supply, deliver and installation	Sum	1		
	ii) Terminate	Sum	1		
3.6	COMMUNICATIONS CABLES				
3.6.1	Communications cabling and network equipment				
	i) Supply, deliver and installation	Sum	1		
	ii) Terminate	Sum	1		
	TOTAL PV PANELS, INVERTERS AND CABLES (carrie	dtot		oction	ļ

#### BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
4	MOUNTING STRUCTURE FOR PV PANELS					
4.1	Carport mounting structure for mounting PV panels including foundations, rails, brackets, etc. and removal of existing structures. Structures to comply with SANS 10400-B and SANS 10160 for Johannesburg Wind Conditions 1:50 Year Design Wind Gust of 36m/s					
	i) Supply, deliver and installation	Sum	1			
	ii) Commissioning	Sum	1			
4.2	Lightning protection LPL 1 and earthing, including air- terminals, down-conductors and earth spikes, Dehn or similar approved	Sum	1			
4.3	Structural Engineer's Involvement					
	a) Inception	ltem	1			
	b) Stage 1	ltem	1			
	c) Stage 2	ltem	1			
	d) Handing Over to Client / Contractor	ltem	1			
	TOTAL MOUNTING STRUCTURES (carried to HIV Se	ection	Sumi	mary)		

#### BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
	AC PROTECTION					
5.1	AC CIRCUIT BREAKERS					
	Circuit hurschaus installed in DDs au Minische Fault					
	Circuit breakers installed in DBs or Minisubs. Fault current rating of breaker to suit transformer, 30kA at					
	1000kVA, 15kA at 500kVA.					
5.1.1	i) Supply, deliver and installation	Sum	1			
5.2	METERING EXISTING LOAD					
5.2.1	Honeywell Elster A1140	ltem	2			
5.2.2	CTs 1 500:1 set of 3, class 0,5	ltem	2			
5.2.3	Modem Kocos ME16.3 with GDSP sim card	ltem	1			
5.2.4	Ethernet Connection	ltem	1			
5.3	CONTROLLER					
5.3.1	Controller to manage alternative power source, i.e. existing diesel generator, including cabling, connections,	ltem	1			
	interfacing, programming, etc.					

5.4	MISCELLANEOUS					
	All other items not included above to complete the					
	installation					
5.4.1	i) Supply, deliver and installation	No	1			
5.5	TESTING AND COMMISSIONING					
5.5.1	Testing and commissioning of installation and issue of	Sum	1			
	Certificates of Compliance					
TOTAL AC	C PROTECTION (carried to HIV Section Summary)	-	-	-	-	

GRID-TIED, CARPORT SOLAR PV INSTALLATION HIV SECTION 3

BoQ	DESCRIPTION	TOTAL
о.		
	SUMMARY OF BILLS OF QUANTITIES: NHLS MODDERFONTEIN	
	GRID-TIED, CARPORT SOLAR PV INSTALLATION	
	HIV SECTION 3	
	PRELIMINARY AND GENERAL	
_	CABLE TRENCHES, CABLE SLEEVES & MARKERS	
}	PV PANELS, INVERTERS & CABLING	
1	MOUNTING STRUCTURE FOR PV PANELS	
r		
5	AC PROTECTION	

r		
<b>├</b> ──		
	HIV SECTION 3	
	CONTINGENCY AMOUNT : 10 % OF ABOVE	
	SUB-TOTAL	
	ADD VAT : 15% ON SUB-TOTAL	
<b> </b>		
	TOTAL CARRIED FORWARD TO BOQ SUMMARY PAGE	

# PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

### BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

		1		1		
ITEM	DESCRIPTION	Unit	Qty	RATE		TOTAL
				Material	Labour	
	PRELIMINARY AND GENERAL					
	Refer to Conditions and Special Conditions of Contr the Schedule below and the total amount shall be o Bill of Quantities for each Section.					
1.	PRELIMINARY AND GENERAL ITEMS					
1.1	Site Establishment : (Fixed-charge and Value					
	Related Items)					
1.1.1	Office	sum	1			
1.1.2	Office equipment	sum	1			
1.1.3	Store	sum	1			
1.1.4	Workshop	sum	1			
1.1.5	Other (Specify)	sum				
1.2	Administrative : (Time related items)					
1.2.1	Staff on Site	sum	1			
1.2.2	Supervisory Staff	sum	1			
1.2.3	Transport	sum	1			
1.2.4	Running cost eg. Telephone/ data, electricity, cleaning, services, printing & photocopy machines, stationery, etc.	sum	1			
1.2.5	Other (Specify)					
	Security (tenderer to allow for months as per his	mont	:h			
	program)					
	Registration of personnel at@ R150 /	sum	N/A			

	person				
1.3	Items related to tender amount				
1.3.1	Insurance	sum	1		
1.3.2	Cost of Guarantee	sum	1		
1.3.3	Cost of Sureties	sum	1		
1.3.4	Financing of Retention	sum	1		
1.3.5	Financing of Contract Amount				
	i) Prior to Commencement of Construction	sum	1		
	ii) From Commencement of Construction	sum	1		
1.4	OHS Act Requirements				
	All conditions pertaining to the OHS Act,				
	including but not limited to the items listed below:				
1.4.1	Provision of a SAFETY plan	ltem	1		
1.4.2	Provision of a medical aid kit on site	ltem	1		
1.4.3	Appointment of an ACCREDITED safety person on site	sum	1		
1.4.4	Supply and provision of safety clothing to all workers on	Sum	1		
	site				
1.4.5	"Adherence to and Compliance with" the OSH Act	Sum	1		

# PROJECT NAME: SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN NHLS MODDERFONTEIN

### BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	_
2	CABLE TRENCHES, CABLE SLEEVES & MARKERS					
2.1	CABLE TRENCH EXCAVATION AND RESURFACING					
	Excavate in machine removable materials (hand or machine excavation) for trenches to widths and depths as indicated below, backfill and compact in 200mm layers to 90% MOD AASTHO, including reinstating road surface, dispose of surplus material for sleeves/ cables.					
2.1.1	1000mm deep x 600mm wide	m	161			
2.1.2	600mm deep x 600 mm wide	m	10			
2.1.3	600mm deep x 450mm wide	m	10			
	Extra over for items 2.1.1 to 2.1.3 for excavation					
2.1.4	(provisional) in hard rock material (as defined in SANS 1200).					
2.1.5	Hand excavation for cross cuts, to expose services,	m³	7			
	excavation on top of or next to existing services					
2.1.6	Bedding and covering sand for cables	m³	54			
2.1.7	Supply & Installation of Danger Tape	m	181			
2.2	CABLE SLEEVES					
	Cable sleeves with couplings and draw wire as specified					
	160mm dia flexible BLACK sleeves, including draw					
2.2.1	wire couplings and bends (Kableflex, DN160)					
	i) Supply and delivery	m	12			
	ii) Installation	m	12			

2.2.2	110mm dia flexible BLACK sleeves, incl. draw wire				
	(Kableflex, DN110)				
	i) Supply and delivery	m	362		
	ii) Installation	m	362		
2.3	DRILLING FOR AND INSTALLATION OF CABLE				
	SLEEVES				
	Drilling below road surface complete with sleeve installed, all excavations for pit holes included, site visit by contractor compulsory to determine and clarify extent				
	of work				
2.3.1	160mm dia, Nextube type (Kableflex, DN160)	m	10		
2.3.2	110mm dia, Nextube type (Kableflex, DN110)	m	10		
2.4	CABLE MARKERS				
2.4.1	Cable Markers	ea	5		
2.7.1		cu			
	TOTAL CABLE TRENCHES (carried to NICD Section S	umn	nary)	1	

# PROJECT NAME :SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

### BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
	PV PANELS, INVERTERS & CABLING					
3.1	PV PANELS					
3.1.1	Solar PV Panels					
	450W solar PV modules, minimum 12 year warranty					
	i) Supply, deliver and installation	No	795			
	ii) Commissioning	No	795			
3.2	INVERTER AND OPTIMISERS					
J.L						
3.2.1	OPTIMISERS					
	950W Optimiser					
	i) Supply, deliver and installation	No	398			
	ii) Commissioning	No	398			
3.2.2	INVERTER/S					
	Three phase inverter (400V)					
	33,3kVAac Inverter or similar size, equipped with surge					
	arrestors					
	i) Supply, deliver and installation	No	9			
	ii) Commissioning	No	9			
		1				

3.3	COMBINER/S				
3.3.1	Combiner Boxes as Required				
	Including surge arrestors				
	i) Supply, deliver and installation	Sum	1		
	ii) Commissioning	Sum	1		
3.4	DC CABLING				
3.4.1	DC cabling as per the design layout				
	i) Supply, deliver and installation	Sum	1		
	ii) Terminate	Sum	1		
3.5	AC CABLING				
3.5.1	AC cabling as per the design layout				
	i) Supply, deliver and installation	Sum	1		
	ii) Terminate	Sum	1		
3.6	COMMUNICATIONS CABLES				
3.6.1	Communications cabling and network equipment				
	i) Supply, deliver and installation	Sum	1		
	ii) Terminate	Sum	1		
	TOTAL PV PANELS, INVERTERS AND CABLES (carrie	d to N		Section	

## PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

### BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

TEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
4	MOUNTING STRUCTURE FOR PV PANELS					
4.1	Carport mounting structure for mounting PV panels including foundations, rails, brackets, etc. and removal of existing structures. Structures to comply with SANS 10400-B and SANS 10160 for Johannesburg Wind Conditions 1:50 Year Design Wind Gust of 36m/s					
	i) Supply, deliver and installation	Sum	1			
	ii) Commissioning	Sum	1			
4.2	Lightning protection LPL 1 and earthing, including air- terminals, down-conductors and earth spikes, Dehn or similar approved	Sum	1			
4.3	Structural Engineer's Involvement					
	a) Inception	ltem	1			
	b) Stage 1	ltem	1			
	c) Stage 2	ltem	1			
	d) Handing Over to Client / Contractor	ltem	1			
	TOTAL MOUNTING STRUCTURES (carried to NICD	Sectio	n Sur	nmarv)		

## PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

### BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
	AC PROTECTION					
5.1	AC CIRCUIT BREAKERS					
	Circuit breakers installed in DBs or Minisubs. Fault					
	current rating of breaker to suit transformer, 30kA at					
	1000kVA, 15kA at 500kVA.					
5.1.1	i) Supply, deliver and installation	Sum	1			
5.2	METERING EXISTING LOAD					
5.2.1	Honeywell Elster A1140	ltem	2			
5.2.2	CTs 1 500:1 set of 3, class 0,5	ltem	2			
5.2.3	Modem Kocos ME16.3 with GDSP sim card	ltem	1			
5.2.4	Ethernet Connection	ltem	1			
5.3	CONTROLLER					
5.3.1	Controller to manage alternative power source, i.e. existing diesel generator, including cabling, connections,	ltem	1			
	interfacing, programming, etc.					
			1			

5.4	MISCELLANEOUS				
	All other items not included above to complete the				
	installation				
5.4.1	i) Supply, deliver and installation	No	1		
5.5	TESTING AND COMMISSIONING				
5.5.1	Testing and commissioning of installation and issue of	Sum	1		
	Certificates of Compliance				
TOTAL A	C PROTECTION (carried to NICD Section Summary)				

# PROJECT NAME: SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

### GRID-TIED, CARPORT SOLAR PV INSTALLATION NICD SECTOIN 4

BoQ	DESCRIPTION	TOTAL
lo.		
	SUMMARY OF BILLS OF QUANTITIES: NHLS MODDERFONTEIN	
	GRID-TIED, CARPORT SOLAR PV INSTALLATION	
	NICD SECTOIN 4	
	PRELIMINARY AND GENERAL	
<u>.</u>	CABLE TRENCHES, CABLE SLEEVES & MARKERS	
1	PV PANELS, INVERTERS & CABLING	
ļ	MOUNTING STRUCTURE FOR PV PANELS	
	AC PROTECTION	

	NICD SECTOIN 4	
	CONTINGENCY AMOUNT : 10 % OF ABOVE	
	SUB-TOTAL	
	ADD VAT : 15% ON SUB-TOTAL	
	TOTAL CARRIED FORWARD TO BOQ SUMMARY PAGE	

# PROJECT NAM: SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION SUMMARY

BoQ No.	DESCRIPTION	TOTAL
	SUMMARY OF BILLS OF QUANTITIES: NHLS MODDERFONTEIN	
	GRID-TIED, CARPORT SOLAR PV INSTALLATION	
1	TOTAL COMMON ITEM	
2	TOTAL IT & HR SECTION	
3	TOTAL SERUM SECTION	
4	TOTAL HIV SECTION	
5	TOTAL NICD SECTION	
6	SUB-TOTAL	
7	DISCOUNT IF ALL FOUR SECTIONS PROCEED TOGETHER	

SUB-TOTAL A		
CONTINGENCY AMOUNT : 10 % OF SUB-TOTAL A		
SUB-TOTAL B		
ADD VAT : 15% ON SUB-TOTAL B		
TOTAL CARRIED FORWARD TO SUMMARY PAGE - MAIN		
 TENDER DOCUMENT		