

ANNEX A- Hydroponic System BoQTools & Materials for Plastic house

General Notes:

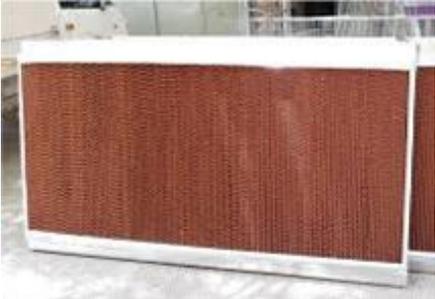
- 1. The cost for all the items listed below includes the provision of materials, equipment, transportation, installation, and any other necessary accessories and work. Any relocation or modification of existing items or services will be directed by DRC Team and the Research Department.*
 - 2. Samples of the items and materials to be used in this project must be provided to DRC team to be approved.*
 - 3. For the solar panels item "D", a data sheet must be provided for each panel, detailing the materials, applicable standards, and specifications of the panel.*
 - Maximum Power (Pmax)*
 - Maximum Power Voltage (Vmp)*
 - Maximum Power Current (Imp)*
 - Open-circuit voltage (Voc)*
 - Short-circuit Current (Isc)*
 - Nominal operating cell temperature*
 - Maximum System Voltage*
 - Operating temperature*
 - Maximum series fuse rating*
- * The required solar panel must be new and have not been used before and free from defects.*

#	ITEMS DESCRIPTION	UNIT	QTY	Offered unit Price	Offered Total Price (IQD)	SAMPLE (PICTURE)
A	<p>Structural design for the Plastic house (Greenhouse)</p> <p>The Ground: Levelling the ground and preparing a level base, using concrete.</p> <p>iron structure: Use Galvanized iron pipes to form the structure of the greenhouse. Dimensions are 40 metres in length and 9 metres in width and are of Jordanian origin.</p> <p>Covering with plastic: high-density polyethylene (HDPE) plastic with a thickness of 200 Micro.</p> <p>Doors: The door shall be in the centre of the greenhouse and to be heat-insulated and inside a second (within the main greenhouse) room, and this room shall have another external door of the same type.</p> <p>The insulation room: Consist of 3 rooms, the first is used to enter and exit the greenhouse, the second room is to protect the cooling pads and the third is to protect the discharge fans from direct sunlight to maintain temperatures and protect the greenhouse from rapid temperature rise.</p> <p>Connecting wires: Used for attaching plastic to the outside of the iron structure.</p>					
A.1	<p>Subbase and Leveling for the Ground : Area of 42x11.5 meters Provide equipment, tools and manpower to :</p> <ul style="list-style-type: none"> - Compacting the ground with proper machines (Griders and heavy duty Roller machine) to a level as instructed by DRC team - Spread one layer of subbase type "B"on the site in the form of flat layers with thickness = 15 cm to be layed and must be compacted properly with grider and heavy duty roller spraying with water , the second layer of subase = 15 cm to be comapcted with grider - One layer of nylon sheet must supplied with thickness 1 mm (Agricultural nylon) to be layed on the total area - The face of the last layer the level must be zero without any slopes. 	ACCY	1			

A.2	<p>Galvanized Iron structure (Arcs): Supply and install: -Galvanized iron structure with dimensions of 40 m in length, 9 m in width, and height is 3.25 m. - the iron structure contain of 19 arcs, the distance between the arcs is 2.5 m except the distance between the first and the second one is 2 m. - The specification for the arcs: Thickness = 1.5 mm, Diameter = 60 mm -All parts of the structure must be made of galvanized iron and connected to each other by crosses, All crosses are made of galvanized tubes with a diameter of 55 mm and a thickness of 2 mm. - The floor crosses that are used to install the house from the bottom should be with length of 25 to 30 cm.The steel frame includes all brackets and parts required to hold the structure together, including brackets, tubes, crossbars and all other required accessories. As supports for arches, doors, and house pillars. - Any parts or accessories that is needed during the installation or fixing the arcs on the ground must be provided to complete the work correctly.</p>	ACCY	1			
A.3	<p>Sandwich Panels for Roof: Supply and intall sandwich panels for roofs according to the below specifications: -Sandwich Panels for Roof size: 2*2 m - Materials: Galvanized, pre-fabricated, painted in white color - Insulations: Polyurethane foam - Thickness: 5cm -Slope :3% - Structure: using rectangular hollow iron tube 1.5" x 3"inch., plate thickness 2mm over the existing walls Two way Latitudinal (along short side dimension), paint the holow iron tube by one layer of anti-rust paint and two layer of oil paint, all works will be according to the supervisor</p>	M ²	4			

A.4	<p>Sandwich Panels for Walls: Supply and install sandwich panels for walls according to the below description</p> <ul style="list-style-type: none"> - Internace room size: 2*2*2.5 m - Materials: Galvanized, pre-fabricated, painted in white color. - Insulations: Polyurethane foam. - Thickness: 5cm. - Structure: Using right angle iron 3", plate thickness 4mm , as frame around the walls, painting the iron by one layer of anti-rust paint and two layer of oil paint.The work supplied must includes openings for the doors - All the openings or gaps must be closed. <p>all works will be according to the supervisor</p>	M ²	20			
A.5	<p>Covering Nylon fim (HDPE): used for covering the plastic house , high qulality with follows specifications: The nylon thickness is 200 microns. Roll 33 x 14 meter</p> <p>The dimensions are (m), Yellowish green colour (transparent), UV not less than 5%. The light transmittance should be 85%,light distribution 45% - Anti-cracking by UV at least 5-9%. Have at least 3 years guarantee and have ISO certification.</p> <p>All the openings or gaps must be closed.</p>	Roll	3			
A.6	<p>Doors: The greenhouse contains two doors that will be within the internace room</p> <ul style="list-style-type: none"> -Material : PVC -Dimensions of 2 m * 0.85 m. - Frame and stile : 6.5cm thickness -Hinges(Mullions): 8.5cm. - Accessories: three hinges, stop door, handles and locks. - All accessories and any other parts that it is needed must be provided for proper installation. - All the openings or gaps must be closed. <p>all works will be according to the supervisor</p>	No.	2			

A.7	<p>Supply and install Covering material for cooling pads room & vaccum room "Milky Span" The color preferred not to be white or clear for less heat absorption - Dimensions of one piece : 2 *1.2 m - All the openings must be closed - Simlilar to the photo. all works will be according to the supervisor</p>	PIECE	20			
A.8	<p>Supply and install Connecting wires: Polyester monofilament wire It is a fixing wires that is used to support the greenhouse fixation in addition to the nylon carry that is used to cover the greenhouse. a roll of the wire with the following specification: Polyester monofilament wire , UV content : 4%, bobbin ,thickness: 2.5 mm at minimum, natural white colour, N W : 10.5 KG, GW: 11.7 KG. Measurment :34.5*34*5*26 CM. can give us 38 lines at minimum to supoort the installing of the greenhouses and have at least 3 years guarantee. all works will be according to the supervisor</p>	Kg	150			

B	<p>Cooling system:</p> <p>Cooling pad Cooling pads: Place cooling pads along the width of the greenhouse at one end.</p> <p>Fans: Place vacuum fans on the opposite side of the cooling pads, appropriately sized to ensure hot air is drawn in.</p> <p>Accessories: Submersible pump, float, tank, external pump, connecting pipes, electrical cables</p>					
B.1	<p>Supply and install Cooling cells (Pads)</p> <p>Supply and install cooling cells with the below specification:</p> <ul style="list-style-type: none"> -Cell Dimensions: length 8 m, Height 1.5 m, Thickness 10 cm - To be installed on one of the ends of the plastic house - Provide any accessories like the plates around the pads and collecting bucket and any other parts that is needed to work correctly. - Similar to the photo. <p>all works will be according to the supervisor</p>	PIEC	1			
B.2	<p>Supply and install Vacuum fans:</p> <p>Supply and install vacuum fans with the below specification:</p> <ul style="list-style-type: none"> - 200 W with 4200 m³h discharge -Material: stainless steel -Size: 45 x 45 cm , 18 inch <p>-Shutters material: stainless steel</p> <p>-Steel blades</p> <p>- The work includes all the parts and frame, wiring, connections motor ,etc that is needed for functional installation.</p> <p>- Similar to Aswar brand.</p>	No.	4			

B.3	<p>Internal Circulation Fans</p> <p>Supply and install vacuum fans with the below specification:</p> <ul style="list-style-type: none"> - 70 W with 1350 m³/h discharge -Material: stainless steel -Size: 35 x 35 cm , 14 inch -Shutters material: stainless steel -Steel blades - For the structure (as shown in the photo), right angle steel frame with height of 2.36 m to be used in the installation and with an iron rod to be placed on a distance of 1 meter from the ground level and attached with the frame. - The work includes all the parts and wiring, connections motor ,etc that is needed for functional installation. - Design of the frame is similar to the photo 	No.	4			
B.4	<p>External pump:</p> <p>500W (Similar to Shimgo Co.)</p> <p>-Supply and install pump with the below descriptions:</p> <p>Material: Cast iron</p> <p>Power: 0.75 HP</p> <p>Pipe diameter: 1"x1"</p> <p>Qmax:45 L/min</p> <p>the work must include all needed connections and accessories.</p>	No.	1			
B.5	<p>Submersible pump:</p> <p>Provide and install a high efficiency, sealed motor is thermally protected to prevent overheating, and uses less energy</p> <ul style="list-style-type: none"> -Material: stainless steel -Rated power: 0.5KW/0.7HP - Pump; Max. flow rate: 1.6m³/h - The cost includes Provision and installation of any accessories or parts that it is needed to complete the work correctly. 	No.	1			

B.6	<p>Mechanical float valve :</p> <p>Provide & Install float valve according to the following specification:</p> <ul style="list-style-type: none"> - Size: 1/2 inch. - Material: Brass, and ABS - Wall mounted. - Accessories: hole cover, reducer. - Flow rate: High Flow Rate - The cost includes Provision and installation of any accessories or parts that it is needed to complete the work correctly. 	No.	1			
B.7	<p>Storage Tank 2000 L</p> <p>Supply PVC water tank according to the bellow descriptions:</p> <ul style="list-style-type: none"> - Size: 2000 L - Type: vertical - Structure: PVC water tank, (3 layers of polyethylene) - includes supplying PPR pipe 3/4" with necessary fittings (elbow, tee, valves, female elbow, floating valves, etc.). - location : to be buried in the soil 	No.	1			
B.8	<p>Connection pipes:</p> <p>Supply and install PVC connection pipe to connect between the cooling cells and the returned to the tank and the coming from the fill pump</p> <ul style="list-style-type: none"> -Size: 3/4". - Materials: PVC raw materials. - DIN: 4102. - Fittings: elbow, tee, Y, p-Trap, etc. 	M.L	150			
B.9	<p>Water Tap:</p> <p>Provide machinery, material and manpower to supply and install water taps, the supplied tap should adhere to the below specification:</p> <ul style="list-style-type: none"> - Size: 3/4 inch. - Material: Brass, Chrome finished. - Wall mounted. - Accessories: hole cover, reducer. 	No.	3			

B.10	<p>Steel Electrical Distribution Box: Supply and install power electrical distribution board panel according to the following specifications:</p> <ul style="list-style-type: none"> - Dimensions: 50x40x20cm. - Plate thickness: 1.2mm. - Surface treatment: Powder coating spray. - Protection degree: IP55. - Lock: Zinc alloy. 	No.	2			
B.11	<p>Circuit Breaker 250A: Supply and install a miniature circuit breaker MCB, the product should be CE marked according to the following specifications:</p> <ul style="list-style-type: none"> - Rated Current: 250 A , 3 phase - Box Clamp Barrier. <p>The cost includes all installation accessories (i.e. wire terminals, screws, etc.)</p> <ul style="list-style-type: none"> - Similar to Schneider 	No.	2			
B.12	<p>Changeover switch: Supply and install a changeover similar to Havells</p> <ul style="list-style-type: none"> -Rated current: 250 A , 3 phase -The cost includes all installation accessories. - Similar to the photo 	No.	1			
B.13	<p>Electrical contactor: Supply and install 2-Pole Heavy Duty AC Contactor relay with automatic switching between two sources with rated current equal to 40 amp/ Automatic switching between two input sources to one load.</p>	No.	1			

B.14	<p>Small laights for the distribution box: Supply and install the lights and any needed accessories for correct installions.</p>	No.	3			
B.15	<p>Electrical cable Supply and install electrical power single cable according to the following specifications: - Size: 2x16mm - Type: PVC cable. - Conductor type: Solid. - Conductor Material: Copper.</p>	M.L	2			
B.16	<p>Electrical cable Supply and install electrical power single cable according to the following specifications: - Size: 2x25 mm - Type: PVC cable. - Conductor type: Solid. - Conductor Material: Copper.</p>	M.L	2			
B.17	<p>Wire terminals connection: Supply and install wire terminals 16 and any needed accessories for correct installions.</p>	No.	20			
B.18	<p>Wire terminals connection: Supply and install wire terminals 25 and any needed accessories for correct installions.</p>	No.	8			

B.19	<p>Tomatoes Seeds :</p> <p>Provide tomatoes seeds envelope specific for the plastic house</p> <p>- Type: Newton</p>	No.	3			
B.20	<p>Electric cables:</p> <p>Supply and install electrical power cable "Jordinian origin" according to the below specifications:</p> <ul style="list-style-type: none"> - Size: 2x4mm - Roll : 96-100 meter. - Type: PVC insulated- twin flat cable. - Conductor type: Solid. - Conductor Material: Copper. - Permissible operating tem.: -5 C - 70 C - Test voltage (AC): 2KV. <p>The cost includes Provision and installation of PVC cable tray if needed or requested.</p>	Roll	1			
B.21	<p>Electric cables:</p> <p>Supply and install an electrical cables to connect from the control board in the centre of the greenhouse to the submersible and external pumps according to the below specifications:</p> <ul style="list-style-type: none"> - Size: 2x2.5mm - Roll: 100 meter - Type: PVC insulated- twin flat cable. - Conductor type: Solid. - Conductor Material: Copper. - Permissible operating tem.: -5 C - 70 C - Test voltage (AC): 2KV. <p>The cost includes Provision and installation of PVC cable tray if needed or requested.</p>	Roll	1			
B.22	<p>Water hose: supply felxible , durable and lightwight water hose with the below specifications:</p> <p>material: Plastic</p> <p>size: 3/4"</p>	M.L	30			

Dutch Bucket system:

Designing Dutch Bucket Lines: Distribute 344 buckets complete with accessories to 4 lines within the reserve, with each line having 86 buckets.

Spacing between lines: The distance between each line should be about 1.2 to 1.5 metres to leave enough space for walkways and maintenance.

Agricultural medium: Use an inorganic porous material, preferably volcanic stone or perlite.

Metrics:

C

A.The pH:

B.TDS:

C.Humidity and temperature: microelectronic device to measure both temperature and humidity.

D.Nutrients (fertilisers): need to ensure the availability of essential elements such as nitrogen (N), phosphorus (P), potassium (K), as well as minerals such as iron, magnesium, and zinc etc.

Accessories: Return hose, non-perforated drip pipe, drippers, reservoir, salt resistant submersible pump 500W.

C.1	<p>Dutch Bucket: Supply and install 344 buckets complete with accessories to 4 lines within the reserve, with each line having 86 buckets.All needed accessories must be provided for proper useage. - Material : plastic - Volume :20 litter with all the accessories that it is needed for the work</p>	No.	344			
C.2	<p>Agricultural medium: Provide an inorganic porous material, preferably volcanic stone or perlite - Preferred to be Turkish origin</p>	L	7000			
C.3	<p>pH sensor: provide dogital pH sensor water resistant with Measurement range of 0-14 pH measure material is and an accuracy of ±0.25pH - Must be European origin</p>	No.	1			
C.4	<p>TDS sensor: provide dogital TDS sensor with Measurement range of 0 - 1000ppm and an accuracy of ±2 %</p>	No.	1			
C.5	<p>Humidity and temperature sensor: -Digital sensor type HTC-2 -Temperature range: -50 ~ 70 degrees -LCD display, easy to read. -Temperature measurement accuracy ±1°C -Humidity range 10% ~ 99% RH -Humidity accuracy -/+10% RH</p>	No.	3			

C.6	Npk 20.20.20 - Water solubale and similar to Head Land - Physical sample required - Bag: 25 Kg in weight - Preferred to be from European origin	Bag	5			
C.7	Npk 15.30.15 - Water solubale and similar to Head Land - Physical sample required - Bag: 25 Kg in weight - Preferred to be from European origin	Bag	2			
C.8	Npk 10.10.40 -Water solubale and similar to Head Land - Physical sample required -Bag : 25 Kg - Preferred to be from European origin	Bag	2			
C.9	Calcium nitrate Bag= 25 Kg - White grains - Physical sample required - Preferred to be from European origin	Bag	2			
C.10	Magnesium sulfate , Bag= 25 Kg - Physical sample required - Preferred to be from European origin	Bag	2			
C.11	Potassium nitrate (Powder) bag=25 Kg - Physical sample required - Preferred to be from European origin	Bag	2			
C.12	Minerals: provide other minerals that is used for plant growth that contain 9 minerals (iron, zinc, Manganese, Calcium, Sulfur, Potassium etc..)(Equal mixing ratio) - Physical sample required - Preferred to be from European origin	Kg	10			

C.13	<p>Return hose (pipe): Provide and install a good quality pipe for the dutch buckets with the below specification:</p> <ul style="list-style-type: none"> - 1.5" in size - Roll: 100 meter - All needed parts of fitting and other accessories must be provided to complete the work correctly. - Must be Turkish origin 	Roll	2			
C.14	<p>Water pipe fittings: Supply & Install water pipe fittings plug end cap</p> <ul style="list-style-type: none"> - size: 1.5" <p>all works will be according to the supervisor</p>	No.	8			
C.15	<p>Water pipe fittings: Supply & Install water pipe fittings 4 ways tee cross</p> <ul style="list-style-type: none"> - size: 1.5" <p>all works will be according to the supervisor</p>	No.	4			
C.16	<p>Non-perforated drip pipe: Supply and install drip pipe non perforated 20 mm</p> <ul style="list-style-type: none"> - Roll: 400 meter "pipe" - The work includes all the accessories and parts that is needed for the system to work correctly. 	Roll	2			
C.17	<p>Plastic drippers: Supply and install drippers for the sprinkle system</p> <p>Material : plastic</p> <ul style="list-style-type: none"> - The work includes all the accessories and parts that is needed. 	No.	400			
C.18	<p>Socket with Switch 13A: Supply and install a wall socket with switch, the product should be CE marked according to the following specification:</p> <ul style="list-style-type: none"> - Rated Current 13Amp - Standard Grounding. - Accessories: galvanized electrical junction box. - Similar to Ozone 	No.	3			

C.19	<p>Switch 16A: Supply and install a switch, the product should be CE marked according to the following specification:</p> <ul style="list-style-type: none"> - Rated Current 16Amp - Standard Grounding. - Accessories: galvanized electrical junction box. - Similar to Ozone 	No.	4			
C.20	<p>Peat moss soil: -Provide peat moss soil for planting preferred to be from European source, the content has small mineral mixed. - Size for one bag : 280 liter</p>	Bag	2			
C.21	<p>Plastic white plates : Supply plastic plates "Cork" for seedling planting -Opening: 209 - Similar to the photo</p>	No.	10			
C.22	<p>Storage Tank 1000 L Supply PVC water tank according to the bellow descriptions: - Size: 1000 L - Type: vertical - Structure: PVC water tank, (3 layers of polyethylene) - includes supplying PPR pipe 3/4" with necessary fittings (elbow, tee, valves, female elbow, floating valves, etc.). all works must be installed and connected to their proper location</p>	No.	2			

C.23	<p>Submersible pump: Provide and install a high efficiency, sealed motor is thermally protected to prevent overheating, and uses less energy</p> <ul style="list-style-type: none"> -Material: stainless steel -Rated power: 0.5KW/0.75 HP - Pump; Max. flow rate: 1.6m³/h - The cost includes Provision and installation of any accessories or parts that it is needed to complete the work correctly. 	No.	1			
C.24	<p>Control unit : Provide and install controller with Wifi Kit that offers fast scheduling and advanced water-saving features for the plastic house</p> <ul style="list-style-type: none"> -Transformer input: 230 VAC -Transformer Output (24 VAC): 1 amp -Station Output (24 VAC): 0.56 amps -Pump/main trap output (24 VAC): 0.28 amps - Number stations: 8 -Approvals (console): IP44 for plastic, UL, cUL, FCC, CE, RCM -Approvals (module): Wi-Fi 2.4 GHz b/g/n, Bluetooth 5.0, UI, cUL, FCC, FCC, CE, RCM -Warranty period: Two years (console and module) - Similar to Hunter (attached photo) and physical sample required. - The cost includes Provision and installation of any accessories or parts that it is needed to complete the work correctly. 	No.	1			

D Solar Panel system						
D.1	<p>Solar Panels: Supply and install high-quality solar of 710W, 10 A</p> <p>The minimum technical specifications for the solar panels are:</p> <ul style="list-style-type: none"> - The brand has an excellent reputation. - Type: two face - No less than 26BB connections - Panel power 710W -Life expectancy 30 years -Product warranty is 10 years. -Operate at temperatures above 80 degrees Celsius and the coefficient of thermal change should be 0.35% or less for each temperature above 25 degrees. - The Price includes materials, installation, transportation, and all needed to complete the work correctly. - Similar to Maxima solar 	PIECE	6			
D.2	<p>Battery: Supply and install tubular Type</p> <ul style="list-style-type: none"> -200 A C10 - Lifespan five years -6000 charging and discharging cycles at 80% -Batteries are warranted for two years. - The Price includes materials, installation, transportation, and all needed to complete the work correctly. -Similar to Maxima solar 	No.	4			

D.3	<p>Inverter: Inverter 5.7 kW or more - Internal regulator type mppt. -Inverter efficiency higher than 94%. - LCD display of parameters. - The Price includes materials, installation, transportation, and all needed to complete the work correctly. -Similar to Maxima solar</p>	PIECE	1			
D.4	<p>Installation Solar system: Supply and install all needed parts for the solar system from the iron Galvanized base and electrical works -The panels should be fixed on the Galvanized Frame using screws with nuts. -The base must be coated with paint, one coat of base paint and two coats of oil paint the frame should be fixed properly on the ground using Concrete or Any other Materials -Provide and extend DC electrical wiring 6 mm from the panels to the inverters and from the inverters to the batteries. The Price includes materials, installation, transportation, and all needed to complete the work correctly.</p>	ACCY	1			
TOTAL Price (IQD)						