

REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
COUNCIL FOR DEVELOPMENT AND RECONSTRUCTION

CONTRACT No 19841

**CONSTRUCTION OF DRILLING WATER WELLS, PUMPING
STATIONS AND LIFT LINES IN BEINO AND DEIR NBOUH AREAS**

VOLUME 5

BILL OF QUANTITIES

Part A - Preamble to Bill of Quantities

Part B – Bill of Quantities

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**BUREAU TECHNIQUE POUR
LE DEVELOPPEMENT (B.T.D.)**
P.O.Box : 70-492 Antélias
Tel : 04/712157-712158
Fax: 04/712159
Email: btd@btd-lb.com

**MINISTRY OF ENERGY AND
WATER**

**COUNCIL FOR DEVELOPMENT
AND RECONSTRUCTION**

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PART A

PREAMBLE TO BILL OF QUANTITIES

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1.010 GENERAL

The Bill of Quantities is not and does not purport to be either exhaustive or explanatory of all the obligations and duties of the Contractor who shall be deemed to have satisfied himself as to the correctness and sufficiency of the rates and prices entered by him in the Bill of Quantities all of which shall cover all his obligations under the Contract (including those in respect of the supply of goods, materials, plant or services etc.) and all matters and things necessary for the proper execution and completion of the Works and the remedying of any defects therein and which may reasonably be inferred to be necessary for the Works as described in the Contract whether expressly mentioned therein or not.

1.011 ITEMS DESCRIPTION

A detailed description of the items and of the conditions under which and the manner in which the work is to be done and measured is not set out in each item of the Bill of Quantities. Reference should be made to this Preamble and all other documents forming the Contract.

1.012 DEFINITIONS OF BILL OF QUANTITY CATEGORIES

The Bill of Quantities is divided into several categories, listed below, to group the prices under the following:

- A) Civil Works
- B) Electro-mechanical Works
- C) Transmission Pipelines
- D) Distribution Networks
- E) Boreholes
- F) Solar Energy

1.012.1 CIVIL WORKS

The Civil Works category shall include, but not be limited to, a complete topographic survey, soil investigations, excavation works, backfilling, road works, concrete works, blockworks, cladding, plastering, waterproofing, thermal insulation, aluminium works, glazing, painting, fencing, and all necessary works not mentioned above and needed for a good finishing and exploitation of the different structures. Also, this category shall include, but not be limited to, the prices to supply and install all necessary hydraulic accessories needed for equipment of the reservoirs and related valve chambers. In addition, to the steel structure, concrete works and supports for the solar energy.

1.012.2 ELECTRO-MECHANICAL WORKS

The Mechanical, Electrical, and Control of the BOQ shall include all the prices to supply and installation of the specified equipment including factory cost, factory tests, Engineer fees for factory tests and inspection, reports, packaging, shipping, handling, delivery on site and storage, trenching, backfilling, interconnections, connection to power supply, operation and maintenance manuals, testing and commissioning for a complete system in place according to specifications and design drawings.

1.012.3 TRANSMISSION AND DISTRIBUTION PIPELINES

The relevant activities shall comprise, but not be limited to, a complete topographic survey and a survey of the existing facilities using the GPR technique or others if approved by the Engineer.

Also included are trial tests and as-built drawings.

Besides, the pipe works shall mainly consist of the supply of the required pipes with all necessary fittings, trench excavation, preparation of suitable bedding and surrounds, pipe laying and trench backfilling. Special provision shall be made for stretches of pipes crossing highways, railways, and bridges.

Furthermore, the Works relating to transmission and distribution pipelines shall include the supply and installation of hydraulic accessories, such as gate valves, butterfly valves, air release valves, control valves, water meters and others...

Also comprised are valve chambers in addition to their frames and covers.

The concrete works form an important element of these activities, especially regarding pipe supports, anchor blocks, thrust blocks, and others.

Moreover, the testing and commissioning of the pipes, besides road reinstatement where necessary, are also required.

1.012.4 BOREHOLES

The Bill of Quantities is related to drilling, casing, screening and testing of a borehole.

The drilling works shall include, but not be limited to, the price of site preparation and mobilization, the price of drilling by rotary machine with bits of different diameters, the price for the supply, transportation and installation of casings and screens, the price of conducting the verticality and alignment tests, the price for grouting the annular space between the casing and the wall of the borehole, as well as the price of all necessary works and equipment needed for conducting development and pump testing the borehole.

Finally, the price of water analysis and reports.

1.012.5 SOLAR ENERGY

1.012.5.1 SOLAR SYSTEM EQUIPMENT

The Solar system equipment category of the BOQ shall include all the prices to supply the specified equipment including factory cost, factory tests, Engineer fees for factory tests and inspection, reports, packaging, shipping, handling, delivery on site and storage.

1.012.5.2 SOLAR SYSTEM INSTALLATION

The Solar system Installation category of the BOQ shall include all the prices for installation, trenching, backfilling, interconnections, proper installation of the conduits, cables, switchboards, earthing system and all other equipment, connection to power supply, operation and maintenance manuals, testing and commissioning for a complete solar system in place according to specifications and design drawings.

1.013 RATES AND PRICES

The Contractor shall be deemed to have inserted against each item in the Bills such rates and prices as he may deem necessary to cover the requirements of the Contract. Where neither price nor rate is entered against an item or if the term “included” or any such similar term is used it shall be deemed to have been included in the other priced items in the BOQ and measured accordingly. All rates and prices entered against any item in the BOQ shall be deemed to include all the detailed requirements of the General and Particular Specifications and the requirements of the volume 1 and 2.

Rates and prices shall be inserted in the unit rate column of the Bill of Quantities. Each part of the Bill of Quantities shall be totalled and the totals carried to the Summary and Grand Summary.

1.014 MEASUREMENT

The Bill of Quantities includes items as lump sum and others as measured quantities.

1.014.1 LUMP SUM

The lump sum items shall not be subject to re-measurement, and shall include the prices for all necessary equipment, construction, installation, testing and commissioning among others. The lump sum entered in the Bills shall include the price for a complete installation as described in the specifications.

The prices shall include all work necessary for completion of the Works and shall include the prices for all necessary building work such as forming box outs, supports plinths, cable trenches, and the like and all necessary safety and access works including guards, handrails, firefighting equipment and the like. Prices shall also include all necessary works and equipment to perform the verticality and alignment tests, the supervision of development test and the detailed daily reports.

1.014.2 MEASURED QUANTITIES

All measurements in the Bill of Quantities are taken strictly net. The principle of net measurements shall apply to all Works executed. All quantities measured for payment shall be measured by the

Engineer on the basis of actual net quantities of Work fixed in position. Item not used shall neither be measured nor included by the Contractor in his statements.

The quantities given in the Bill are the estimated quantities. In no sense shall such quantities be considered as limiting or extending the amount of the work to be done by the Contractor and of the materials to be supplied by him. The Contractor shall be responsible for checking quantities and for making any necessary surveys and investigations prior to placing any order for materials.

1.015 DEFINITIONS

The following definitions shall apply to items in the Bill of Quantities.

- **Extra - Over**
Any “Extra-Over” (EO) item shall be measured and paid for in addition to the measurement of the basic item to which it relates.
- **Included**
Where the term included is used in the Preamble or in the Bills, items stated to be included within other items shall not be subject to measurement and their costs shall be deemed to be included within the rates of the billed items.

1.016 DEALING WITH WATER

Unit rates of items in the Bills of Quantities especially excavation items or excavation works shall be deemed to include the prices for dealing with water flows (especially for water courses crossing, or excavation along a water course) and keeping the Works free of water, and shall include prices for dewatering and supporting of trenches and excavation limits for pipeline works and structure works (for reservoirs, pumping stations, etc...) the above-mentioned works shall not be measured and shall not be paid separately.

1.017 WATER AND POWER

Unless otherwise explicitly stated in the Contract, water and power for the purpose of constructing, cleaning, and testing the Works shall be provided by the Contractor at his own expense, and shall not be measured separately.

1.018 RECORDS AND “AS-BUILT” DRAWINGS

After the work has been completed, the Contractor shall submit “as-built” drawings prepared whilst surveying during construction, showing the Works as constructed together with all other information that may either be required or be useful for the operation and maintenance of the Works in the future, such as type of layers encountered during drilling, casing lengths, screens lengths, grouting lengths, type of soil, dimensions and location of structures, size of existing pipelines and cables encountered during excavation.

The cost of preparing the shop drawings, “as-built” Drawings and Records shall be deemed to be included by the Contractor in his unit rates for the various items in the Bill of Quantities and shall not be paid for separately. The As-built Drawings shall be submitted, if required by the Engineer, on computer CDs.

1.019 TRAFFIC REGULATION CONTROL AND SAFETY PROVISION

The provision of traffic control, safety equipment, signs, diversions, control systems including obtaining approvals and liaison with third parties for work in public roads and streets or in private sector will not be measured separately but shall be included in pipes rates, and shall include but not by way of limitation:

- Preparing all necessary plans, details and schedules and submission to the Employer/Engineer to obtain all necessary approvals.
- Liaison with third parties, to get all the needed permits from the concerned authorities.
- Erecting, maintaining, moving and removal of safety barriers, signs and traffic control equipment.
- Establishment and management of road diversions.
- Watching and lighting.
- Maintaining Roads and Streets clean and free from construction debris.

2.000 BILL A – CIVIL WORKS

2.010 GENERAL

2.010.1 CHECKING, COMPLETING, AND/OR PERFORMING TOPOGRAPHIC SURVEYS AND SITE DELIMITATION

The price per site of the topographical surveys shall include checking, completing, and/or performing land surveying based on approved benchmarks, the existing ground elevation, property lines, northing, and easting coordinates, topographical maps, layouts, delimitation of plots (official delimitation from the concerned Authorities), implantation of foundations and reservoirs, boreholes, pumping stations, access road, the measurement of earthworks, etc.... as well as all other additional tasks imposed by the site and/or the Supervisor. It also includes all necessary topographical works, official delimitation certificates, legal documents, approved plan, labour expenses, transport costs as well as all expenses resulting from calculations and data transfer on drawings and/or on technical sheets that will accelerate the progress of works.

The site survey shall be supplied as digital data suitable for automated plotting.

2.010.2 SITE CLEARANCE

The lump sum price shall include cleaning the entire surface of the site and clearing it from any obstacle (material or equipment) located within the area of works, it shall also include the demolition of existing unused structures (reservoirs, valve chamber, reinforced concrete structures, etc....), labours, necessary equipment, transport of soil or wastes to environmentally approved public dumps (After obtaining all permits from the competent authorities for all required works) and all tasks to deliver the site for excavation.

2.010.3 SITE REARRANGEMENT AFTER CONSTRUCTION

The lump sum price shall include the reinstatement of the site after completion of the works according to the drawings and the Supervisor's instructions. It also includes backfilling all around the structures and foundations with selected materials and/or backfill in order to deliver the site in good condition and prepare for the proposed improvements.

2.010.4 CONSTRUCTION OF ACCESS ROAD

This item shall be paid on a square meter and includes the provision of all necessary equipment or labour and the construction of an access road to the selected site for the construction of the pumping station. The price shall include all safety measures and equipment for the safety of labour, equipment, and materials.

This price also includes earthwork, excavation, backfilling, sub-base preparation (scraping, leveling, compaction,...), sub-base material layer (hard stones, gravel,...), base course material (hard crushed aggregate,...) width of 5 m, and length of 160m, bituminous tack coats, asphalt, and all material, the width of 4.5 m, and length of 160m, equipment, supply, transport labour, expenses, drainage system, testing, quality control, hauling, spreading and compaction, and all necessary tasks for laying, jointing and a perfect execution and shall include, but not be limited to:

- Base course supply, and transport of materials, earthwork, scraping, leveling, compaction, labour, final thickness after compaction 20 cm, testing quality control, and all necessary tasks for perfect execution.
- Asphalt: supply and transport of materials, bituminous, tack coat, asphalt and all necessary materials, labour, expenses, testing, quality control, hauling, spreading and compaction, and all necessary tasks for laying, jointing, and a perfect execution.

2.011 EARTHWORKS

2.011.1 SOIL INVESTIGATIONS

2.011.1.1 BORING, CORE SAMPLING, SPT TESTS, AND REPORT

The lump sum price of soil investigations according to BS 1377 (Methods of test for soil for civil engineering purposes) shall include various boreholes according to the nature of the soil, in situ and laboratory tests, a report determining the specifications and settlement description of the layers, the bearing capacity of the soil, the nature of foundations and the retaining structures if needed, level of the water table, installation of piezometer, labour, mobilization and demobilization of equipment, tests, reports, etc..., and this according to the detailed requirements of the general specifications.

2.011.2 EXCAVATION

2.011.2.1 EXCAVATION IN ALL TYPES OF SOILS AND ROCKS AND DEMOLITION OF EXISTING CONCRETE STRUCTURES AND TRANSPORT OF UNSUITABLE BACKFILLING MATERIAL TO DISPOSAL SITES

The price per cubic meter of excavation shall include but not be limited to:

Excavation in all kinds of soils and rocks for structures and for access roads, use of all adequate equipment, transport of soil to environmentally approved disposal sites accepted by the Supervisor, labour, dewatering, temporary and/or final retaining structures for trenches or open digs. The volume of excavations shall be measured from the geometric dimensions of structures and levels determined according to the site layout and drawings. No excess excavations or earthworks shall be paid for unless otherwise stated by the Supervisor.

2.011.3 PREPARATION OF FORMATION UNDER RESERVOIRS AND OTHER CONSTRUCTIONS

2.011.3.1 SUPPLY, PREPARATION, AND COMPACTION OF THE GRANULAR BEDS IN ADDITION TO LAYING THE POLYETHYLENE SHEET UNDER THE CONSTRUCTION'S FOUNDATIONS.

The price shall be measured in cubic meters for preparation of formation under the construction's foundation or slabs on grade and shall include compacted gravels, sand, polyethylene sheet (250µ), compaction equipment, labour, and all material and equipment necessary to achieve the subbase and base to receive the concrete. The volume shall be measured according to the geometric dimensions shown on the drawings.

2.011.4 BACKFILLING

2.011.4.1 BACKFILLING AND COMPACTION

The price of a cubic meter of backfilling shall include backfilling layers (25 cm thickness each before compaction) placed and compacted inside the fences, around the mechanical room if ordered by written instructions from the Supervisor or shown on the drawings. It shall also include geotextile sheets and drainage system if needed (minimum thickness 1.2mm, mass $\geq 300 \text{ g/m}^2$), bituminous coating, etc...

The volume of backfill materials shall be computed according to the dimensions shown on the drawings and the site layout and shall be composed of selected material for each case.

The price shall also include material, equipment, labour, etc... and all necessary tasks to achieve the work in perfect conditions.

2.012 CONCRETE WORKS AND ACCESSORIES

2.012.1 CONCRETE WORKS

2.012.1.1 BLINDING AND MASS CONCRETE C20

The price of a cubic meter shall include all material, equipment, labour, transport, blinding, and/or mass concrete and shall be composed of at least 250 kg of cement per cubic meter of concrete and shall be measured according to the geometric shapes shown on the layout drawings and/or Standard Drawings. Any quantity executed more than the indicated dimensions shall not be paid for. Any quantity less than that required in the Contract drawings and according to the specification documents shall be deducted or completed according to the instructions given by the Supervisor.

2.012.1.2 REINFORCED CONCRETE CLASS C30, 400 KG OF CEMENT /CU.M, FOR RESERVOIR, INCLUDING FORMWORK

The price per cubic meter shall include all material, equipment, labour, transport, admixtures (retarders, plasticizers, waterproofing materials, ...) batching, mixing, placing, vibrating, curing, testing, finishing, scaffolding, reservations for equipment, formwork, wrought formwork (fair face), surface leveling with mechanical float, etc. The dosage of cement shall be 400 kg/cu.m. for reservoirs and retaining aqueous liquid structures. All joints or sealing systems shall be included in the price. Measurement shall be determined according to the geometric shapes indicated on the layout drawings and/or building drawings; any quantity executed in excess of the indicated dimensions shall not be paid for. Any quantity less than that required in the Contract drawings and according to the specification documents shall be deducted or completed according to the instructions given by the Engineer.

The price shall also include all materials, equipment, labour, transport, storage, placing, bending, scaffolding, etc. of reinforcing steel supplied, placed, bended, etc. with all needed materials, accessories, and tasks to achieve the works in perfect conditions. Detailed bar bending schedules and sheets should be submitted for approval before placing and installation.

The price shall also include all needed works, labour, material, transport, formwork, etc... to execute a fair-faced concrete for interior and exterior walls and ceilings.

2.012.1.3 REINFORCED CONCRETE CLASS C30, 350 KG OF CEMENT /CU.M, FOR OTHER STRUCTURES IN THE WATER TOWER AND OTHER STRUCTURES, INCLUDING FORMWORK

The price per cubic meter shall include all material, equipment, labour, transport, admixtures (retarders, plasticizers, waterproofing materials, ...) batching, mixing, placing, vibrating, curing, and testing to be carried out to verify the quality of the executed concrete, finishing, scaffolding, reservations for equipment, formwork, wrought formwork (fair face), surface leveling, etc. The dosage of cement shall be 350 kg/cu.m. for technical buildings, channels, retaining walls, foundations, wellhead manholes, etc... All joints or sealing systems shall be included in the price. Measurement shall be determined according to the geometric shapes indicated on the layout drawings and/or building drawings; any quantity executed more than the indicated dimensions shall not be paid for.

Any quantity less than that required in the Contract drawings and according to the specification documents shall be deducted or completed according to the instructions given by the Engineer.

The price shall also include all materials, equipment, labour, transport, storage, placing, bending, scaffolding, etc. of reinforcing steel supplied, placed, bended, etc. with all needed materials, accessories, and tasks to achieve the works in perfect conditions. Detailed bar bending schedules and sheets should be submitted for approval before placing and installation.

The price shall also include all needed works, labour, material, transport, formwork, etc., to execute a fair-faced concrete for interior and exterior walls and ceilings of technical rooms.

2.012.1.4 CONCRETE SURFACE LEVELING WITH MECHANICAL FLOAT

The price per square meter includes material, equipment, transport, labour..., and consists in leveling horizontal surfaces of large areas of slabs on grade (reservoirs and/or technical buildings) by a mechanical trowel.

2.012.1.5 CYCLOPEAN CONCRETE

The price per cubic meter of cyclopean concrete shall include material, equipment, transport, supply, placing, mixing, labour ... and shall be composed of 250 kg of cement per cubic meter of concrete and a maximum of 40% of hard rocks (ϕ 200mm). Formwork and scaffolding are included and cyclopean concrete shall be measured according to geometric shapes determined by written instructions of the engineer. All tasks necessary for the completion of the work are deemed to be included in the price.

2.012.1.6 STEEL REINFORCEMENT

The price per ton shall include all materials, equipment, labour, transport, storage, placing, bending, scaffolding, etc... of reinforcing steel supplied, placed, bended, etc... with all needed materials, accessories, and tasks to achieve the works in perfect conditions.

The price shall be paid per ton of reinforcement steel supplied, bended, and placed, and shall be measured according to the dimensions shown on the drawings. Detailed bar bending schedules and sheets should be submitted for approval before placing and installation. These bar bending schedules and sheets will be used for the calculation of reinforcing steel weight.

2.012.1.7 REINFORCED CONCRETE CLASS C25/30

The price per lump sum shall include all material, equipment, labour, transport, admixtures (retarders, plasticizers, waterproofing materials, ...) batching, mixing, placing, vibrating, curing, and testing to be carried out to verify the quality of the executed concrete, finishing, scaffolding, reservations for equipment, formwork, wrought formwork (fair face), surface leveling, etc. The dosage of cement shall be 350 kg/cu.m. for technical buildings, channels, retaining walls, foundations, wellhead manholes, for structural elements in contact with backfilling materials including but not limited to all concrete foundation of the panel's steel structure and the fence foundation concrete materials and accessories etc... All joints or sealing systems shall be included in the price. Measurement shall be determined according to the geometric shapes indicated on the layout drawings and/or building drawings; any quantity executed more than the indicated dimensions shall not be paid for.

2.012.2 WATER STOP AND BEARING PADS

2.012.2.1 WATER STOP UP TO 25 CM IN WIDTH

The price per linear meter of P.V.C. water-stop joints (expansion, contraction, ...) and/or Hypalon strip of 15 cm width shall include the supply, transport, and installation of the water stop strips (up to 25cm width) according to drawings (essentially between slab and walls of reservoirs). Any additional water stop strips to be used, according to particular methods of execution, shall not be taken into account for measurement. Written instructions from the engineer shall be obligatory. The price also includes the backing rod, sealant, and fiberboards, if needed.

2.012.2.2 NEOPRENE PADS BETWEEN WALLS AND ROOF SLAB

The price per linear meter of neoprene pads placed between reservoir roofs, slabs, and walls shall include preparation and application of neoprene pads which shall withstand all strains exerted by the roof cover. It shall also include the supply and application of polystyrene, polyethylene sheets, equipment, materials, scaffolding, accessories, and others that are necessary for good execution.

2.012.3 CONCRETE MASONRY UNITS

2.012.3.1 HOLLOW CONCRETE BLOCK WALLS

The price per square meter of built areas of hollow concrete blocks (10, 15, and 20 cm thick) shall include concrete blocks, sand, and cement for mortar, all materials, equipment, labour, expenses, scaffolding, placing, junctions, concrete lintels, openings, ... and shall be measured according to net areas built from one side.

2.013 RENDERING OR PLASTERING OF INTERIOR OR EXTERIOR SURFACES

2.013.1 RENDERING OR PLASTERING OF INTERIOR AND EXTERIOR SURFACES

The price of plastering per square meter shall include all materials: cement, sand, water, equipment, labour, scaffolding, expenses, ... supply, transport, and placing mortars and shall be measured according to geometric shapes of rendered areas, with no excess and no measurement shall be paid for re-entrant or salient angles of openings, chamfered angles or others. The rendering shall consist of three coats according to specifications.

2.013.2 EXTERIOR RENDERING WITH TYROLEAN COAT

The price of exterior rendering with colored Tyrolean coat per square meter shall include all material: cement, sand, water, equipment, labour, scaffolding, expenses, ... supply, transport, placing mortars and shall be measured according to geometric shapes of rendered areas, no excess and no measurement shall be paid for re-entrant or salient angles of openings, chamfered angles or others. The rendering shall be executed according to specifications.

2.013.3 BRICK TILING OF RESERVOIR WALLS

Brick tiling shall be measured in squared meters as the net tiled area in accordance with the Drawings, with no allowance for waste due to cut tiles at corners or finished edges.

The unit rates for wall tiling shall include all approved tiling materials including special tiles for edging, cement, sand, adhesion, and other necessary materials; soaking of the tiles in water, wetting of walls, preparation and application of cement mortar; application of tiles, filling of joints, etc.

2.014 WATERPROOFING, THERMAL INSULATION, AND WATER QUALITY CONTROL

2.014.1 INTERNAL LINING FOR RESERVOIR

The price per square meter of internal surface waterproofing coating for reservoirs shall include preparation of the surface (sandblasting, water blasting), treatment of singular points (contraction or expansion joints, pipe penetration, ...) material, transport, scaffolding, application in several layers, labour, expenses, ... in conformity with the technical sheet of approved material, quality tests, structures test, before and after application, warranty. Crystallization or mineralization products shall be applied on reservoir walls and slabs on the ground, and flexible protective and waterproofing slurry products on the bottom faces of roof slabs or domes.

All products used shall be non-toxic.

2.014.2 WATERPROOFING MEMBRANE OF RESERVOIR ROOF SLABS

The price per square meter of roof slab waterproofing shall include material, transport, equipment, labour, supply, installation, preparation of support (screed, ...), treatment of singular points (rain outlets, ventilations, openings, ...). Roof slab waterproofing shall be composed of a vapor barrier SBS or APP of thickness greater than or equal to 2.5 mm fixed by adherence or semi-adherence, a thermal insulation with a minimum thickness of 50 mm, and a thermal conductivity $\alpha = 0.037$ Kcal/h.m²/oC, and a waterproofing membrane (SBS/APP) 4mm thick minimum. Vertical upstands shall be aluminum self-protected. The price shall also include the supply and installation of concrete protection grade C20 or concrete paving slabs and a nonwoven polyester sheet of 200 g/m². Supply and installation works of necessary roof drains are deemed to be included in this item and shall not be paid for separately.

The membranes shall be measured only for horizontal surfaces and no measurements or excess shall be paid for vertical surfaces.

2.014.3 WATERPROOFING OF TECHNICAL ROOM

The price per square meter of waterproofing without thermal insulation shall include material, transport, equipment, labour, supply, installation, preparation of support, treatment of singular point, scaffolding and shall be composed of two layers of a liquid electrometric bitumen (aluminum color)

to assure a protective waterproofing of domes. Supply and installation works of necessary roof drains are deemed to be included in this item and shall not be paid for separately.

2.014.4 WATER TESTING AND DISINFECTION OF RESERVOIRS

The lump sum price of water testing of reservoirs per site shall include:

- Supply, transport, and filling of reservoir with water, and checking for leaks. This operation shall be repeated to the Engineer's satisfaction.
- Water sampling for analysis and transport in an adequate packing to the laboratory
- Bacteriological analysis type B2 (2 per reservoir)
- Cleaning and disinfection including all material, scaffolding, labour, expenses, and all tasks necessary to accomplish the work.

2.014.5 ROOF DRAINS

The price of the roof drain shall be paid by linear meter according to diameter. shall include material, transport, equipment, labour, supply, installation, preparation of support, and scaffolding, all as indicated in the drawings and to the satisfaction of the Engineer. All tasks necessary for the completion of the work are deemed to be included in the price.

2.015 METAL AND ALUMINIUM WORKS

2.015.1 METAL WORKS

2.015.1.1 EXTERIOR STEEL DOORS and windows INCLUDING GLAZING AND PAINTING

The price per square meter of exterior steel doors shall include all material, equipment, transport, labour, expenses, water-resistant hardware, glazing (8mm glass) ventilation, mechanical protections, epoxy paint, louvers, openings, locking system, supply, installation, anchoring, reinstatement of support, finishing and all tasks and accessories, necessary to a perfect execution. Metal sheets shall be 3mm thick minimum.

2.015.1.2 METAL WORKS: STEEL PROTECTION

The price per kilogram of metalwork (protection bars, louvers, ventilation, ladders type Saf-T-Climb or similar, grating, railings, trap doors, ...) shall include all material, equipment, transport, labour, expenses, hardware glazing (8mm glass), epoxy paint, supply, installation, anchoring, locking system, reinstatement of support, finishing and all tasks and accessories necessary to a perfect execution.

2.015.1.3 CIVIL AND STEEL WORKS

The lump sum price shall include all steel structures to support and installation for the solar panels, including all civil works, land preconditioning, excavation, backfilling, compaction, and all related works for the proper installation of the solar panels.

2.015.2 ALUMINUM WORKS

2.015.2.1 INTERIOR ALUMINIUM DOORS AND EXTERIOR ALUMINIUM WINDOWS INCLUDING GLAZING

The price per square meter of interior doors shall include all material, equipment, labour, expenses, manufacture, supply, transport, installation, glazing (8mm glass), anchoring, locking system, reinstatement of support, finishing, and all tasks and accessories necessary to a perfect execution.

2.016 FINISHING WORKS

2.016.1 PAINTING

2.016.1.1 INDUSTRIAL FLOORING

The price per square meter of industrial flooring shall include all material, equipment, transport, labour, expenses, application, preparation of support, scaffolding, curing, finishing, cleaning, singular points, and screed if necessary. It shall be composed of heavy-duty chemical and abrasion-resistant epoxy resin floor (5mm thick). For walls, 2mm thick of epoxy resin will be sufficient (the number of layers should comply with the manufacturer's recommendations and the Engineer's instructions).

The surfaces shall be measured according to the geometric shapes of the painted area (floor, wall, or ceiling), no measurement and no excess shall be paid for re-entrant or salient angles of openings.

2.016.1.2 WASHABLE PAINT FOR INTERNAL OR EXTERNAL USE COATING

The price per square meter of paint includes all materials, equipment, transport, labour, expenses, scaffolding, surface preparation, application, preparation of support, finishing cleaning, singular points, and shall be composed of external putty, primer, and a minimum of two coats of external paint.

The surfaces shall be measured according to the geometric shapes of the painted area, no measurement and no excess shall be paid for re-entrant or salient angles of openings.

2.017 FENCE

2.017.1 EXTERNAL FENCE

The price per linear meter of the fence shall include all excavation, reinforced concrete, metalwork, epoxy paint, finishing, material, labour, equipment, supply, transport, anchor bolts, reinstatement of the property line, and all tasks necessary for perfect execution. The price shall also include fixing the fence to the concrete support.

2.017.2 ACCESS GATE

The lump sum price of access gate per site shall include all excavation, reinforced concrete, steel access gate, locking system, epoxy paint, water-resistant hardware, anchors, finishing material,

labour, equipment, formwork, scaffolding, supply, transport, reinstatement of property line and all tasks necessary for perfect execution. For access gate width refer to site implantation.

2.018 ASPHALTING

The price per square meter of asphaltting for structures and access roads layout shall include earthwork, sub-base preparation (scraping, levelling, compaction,...), sub-base material layer (hard stones, gravel,...), base course material (hard crushed aggregate,...) bituminous tack coats, asphalt and all material, equipment, supply, transport labour, expenses, drainage system, testing, quality control, hauling, spreading and compaction, and all necessary tasks for laying, jointing and a perfect execution and shall include, but not be limited to:

- Base course supply, and transport of materials, earthwork, scraping, leveling, compaction, labour, final thickness after compaction 20 cm, testing quality control, and all necessary tasks for perfect execution.
- Asphalt: supply and transport of materials, bituminous, tack coat, asphalt and all necessary materials, labour, expenses, testing, quality control, hauling, spreading and compaction, and all necessary tasks for laying, jointing, and a perfect execution.

2.019 RESERVOIRS HYDRAULIC ACCESSORIES

2.019.1 SUPPLY AND INSTALLATION OF PIPES

Pipes shall be classified for payment according to diameter and material and shall be measured in linear meters of pipeline in place measured along the crown of the pipeline.

The length measured for payment shall include the lengths of all fittings, valves, and specials installed in the line.

The price shall cover all fittings, bends, joints, reducers, flanges, holderbats, supports, puddle flanges, inserts, bolts, nuts, brackets, and bell mouths, as well as hauling, transport, unloading, staking and all necessary labour and accessories to provide a complete installation.

2.019.2 SUPPLY AND INSTALLATION OF GATE VALVES

Gate valves shall be classified for payment by nominal diameter and nominal pressure class and shall be measured by number.

Price shall include for all fittings necessary to joint the assembly to the pipeline (either new or existing), including thrust flanges, flexible joints, dismantling joints, supports and all items necessary to make a complete installation.

2.019.3 FLOOR DRAIN

Floor drains shall be measured by number, and shall include for floor drain pipe DN 80mm, excavation, backfilling, reinstatement of the concrete surface level, flap valve, bends and all components necessary to provide a complete installation.

2.019.4 SUPPLY AND INSTALLATION OF SUCTION STRAINERS

Suction strainers shall be measured by number according to nominal diameter. Material shall be stainless steel, coated cast iron or bronze.

Price shall include for all fittings necessary to install the suction strainer inside the reservoir on the outlet pipe including flanges, joints, bolts, nuts and all accessories to make a complete installation.

2.019.5 SUPPLY AND INSTALLATION OF LEVEL INDICATOR

Level indicators shall be measured by number, and the price shall include for all necessary fittings to install the level indicator, civil works, concrete drilling, grouting with suitable material, level indicator, testing, bolts, nuts, etc...

2.019.6 SUPPLY AND INSTALLATION OF DOUBLE AIR RELEASE VALVES

Air valves shall be measured by number for each air valve size and nominal pressure, and shall include for tees, ARV, gate valves, riser pipes, flanges, bolts, nuts, supports and all components necessary to provide a complete installation.

2.019.7 SUPPLY AND INSTALLATION OF ELECTROMAGNETIC FLOW METER

Flow meters shall be measured by number for each nominal diameter and nominal pressure class, and shall include for **filters/Y strainers, flow straighteners** (both having same DN and PN as water meters. Moreover, flow straighteners should be of the type which eliminate the need for any straight length of pipe before and after the water meter), flanges, dismantling joints, supports, bolts, nuts and all components necessary to provide a complete installation.

Price shall include for the supply and installation of all necessary fittings to joint the assembly to the pipeline, adapters, screen filter and all items necessary to make a complete installation according to standard drawings. Manhole frame, covers, reinforcement, concrete chambers and asphalt reinstatement shall be measured separately.

2.019.8 SUPPLY AND INSTALLATION OF INSERTS

Inserts shall be classified for payment by nominal diameters, and shall be measured by number, price shall include for material, inserts, installation, grouting, bolts, nuts, flanges, etc...

2.019.9 PIPE PAINTING

Pipes shall be painted with 2 layers of painting for DI DN 200 mm and coloured as recommended by NLWE. Price per linear meter shall include all necessary paint. Labour, etc... for the work accomplishment.

3.000 BILL B - ELECTRO-MECHANICAL EQUIPMENT AND WORKS

3.010 MECHANICAL, ELECTRICAL AND CONTROL EQUIPMENT AND WORKS

3.010.1 PUMPING SYSTEM

The price of the pumping system items shall include, but not limited to, factory witness test and report, supply of the complete pumpset, packaging, shipping and handling, customs fees, delivery on site, spare parts, storage. In addition to concrete base, installation on site of the complete pumpset, connection to hydraulic piping system, connection to electric power system, connection to control and monitoring systems, preparation O & M manuals, and supply and installation of any other items and accessories deemed necessary for the complete installation and trouble-free operation of the pumpset.

3.010.2 PIPING AND ACCESSORIES

The price of the piping and accessories items, shown on drawings, shall include, but not limited to, supply and installation of the complete piping system, all hydraulic equipment and accessories, packaging, shipping and handling, customs fees, delivery on site, spare parts, storage, connection to electrical, control and monitoring systems, preparation of O & M manuals and any other items and accessories deemed necessary for the complete installation and trouble free operation of the mechanical system.

3.010.3 LIQUID CHLORINATION EQUIPMENT

The price of the liquid chlorination equipment items shall include, but not limited to, supply of the complete liquid chlorination system, all equipment and accessories, packaging, shipping and handling customs fees, delivery on site, spare parts, storage, and any other items and accessories deemed necessary for the complete installation and trouble-free operation of the complete gas chlorination system. In addition, the price of the liquid chlorination shall include the installation on site of the liquid chlorination system, all controls and electric panels, connection to pipework, connection to electrical, control and monitoring systems, preparation of O & M manuals.

3.010.4 ELECTRICAL SYSTEM

The price of the electrical system items shall include, but not limited to, supply and installation of all electrical equipment, all electrical cables & wires, supply of all electrical control panels, supply of Software, spare parts, packaging, shipping and handling customs fees, delivery on site, storage, preparation of O & M manuals, connection to the electric power system of (E.D.L) connection to control and monitoring systems and any other items and accessories deemed necessary for the complete installation and trouble free operation of the electrical system.

3.010.4.1 EDL ELECTRICAL POWER TRANSFORMER AND SUBSCRIPTION

The price of the EDL electrical power transformer shall include, but not limited to:

- a) supply, transmission, storage, installation and testing of an oil-filled power transformer with ratings as specified, cooling by natural oil and air circulation (ONAN), connection type DYn11, including:

- Foundations and support chassis.
- MV disconnect switch.
- LV circuit breaker.
- MV & LV cable terminations.
- LV cable connecting transformer secondary to LV circuit breaker.
- Neutral earthing.
- Transformer protection relay.
- All necessary fixing and mounting accessories.

Note: Contractor is to submit shop drawings of pole and transformer to EDL for approval. Price shall also include all fees required by EDL including supervision fees.

- b) Supply, transmission, storage, installation and testing of all equipment and materials for the construction of a medium-voltage overhead power network, including: (NOT WITHIN THIS CONTRACT)

- Poles including foundations.
- Conductor insulators.
- Bare copper conductors.
- Connection to existing MV grid.
- Connection to transformer MV terminals.
- Mounting, fixing and connection accessories.

Note: Contractor is to submit shop drawings of overhead lines routing, poles and accessories to EDL for approval. Price shall also include all fees required by EDL including supervision fees.

Ensuring a LV subscription to EDL power including:

- Undertaking all administrative and legal procedures for subscribing to EDL power on the behalf of the Owner.
- All fees as required by EDL for the connection of the required power including the kWh meter, taxes, deposit...

This item shall be measured in unit of EDL electrical power transformer and power network, completely installed and tested and shall be classified for payment according to transformer's rated power.

3.010.4.2 STANDBY GENERATOR SET

The price of the standby generator shall include, but not limited to, supply, transportation, storage, installation and testing of a standby generator set as shown and specified including:

- Diesel engine, 1500 rpm.
- Alternator, 400/230 V, 50 Hz, 3 phase, 4 wire, with standby power as specified.
- Cooling system including radiator, belt-driven fan, piping, make-up tanks and accessories.
- Starting system including batteries and battery charger.
- Exhaust system including a residential type silencer, piping, insulation, etc.

- Soundproof and weatherproof enclosure suitable for exposed outdoor installation.
- Fuel system including fuel tank, daily fuel tank, piping, fittings and related accessories.
- Control and instrumentation panel/cubicle to include automatic start-up on normal power failure.
- Main circuit breaker.
- Termination of cables to generating sets and control panels including cable terminal boxes and accessories.
- All necessary mechanical and electrical work.

This item shall be measured in unit of standby generator set completely installed and tested and shall be classified for payment according to generator's rated standby power.

3.010.4.3 UNINTERRUPTIBLE POWER SUPPLY

The price of the uninterruptible power supply shall include, but not limited to, supply, transportation, storage, installation of UPS system, 1kva, power autonomy at least 8 hrs with communication port compatible with PLC communication protocols and testing of an uninterruptible power supply (UPS)

This item shall be measured by number of uninterruptible power supply completely installed and tested and shall be classified for payment according to UPS rated power.

3.010.5 INSTRUMENTATION AND CONTROL SYSTEM

The price of the instrumentation and control system items shall include, but not limited to, supply and installation on site of the complete instrumentation, control and monitoring systems, supply of all wires and cables, supply of all furniture, packaging, shipping and handling customs fees, delivery on site, spare parts, storage, preparation of O & M manuals, installation, configuration and commissioning of all Software, connection to electrical and hydraulic systems, and any other items and access deemed necessary for the complete instrumentation and trouble-free operation of the instrumentation, control and monitoring systems.

3.010.6 DOMESTIC PLUMBING, AND DRAINAGE SYSTEM

The lump sum price for the domestic plumbing and drainage system shall include, but not limited to supply and installation on site of pipes and fittings, valves, water meter, drain pipes, floor drain, plumbing accessories, necessary mechanical connections for the proper operation of the complete installation, testing and commissioning and any other items and accessories deemed necessary for the complete installation and trouble-free operation of the domestic plumbing and drainage system.

3.010.7 FIRE EXTINGUISHERS

The lump sum price for fire extinguishers shall include but not limited to, supply and installation on site of the fire extinguishers, packaging, shipping and handling customs fees, delivery on site, storage, preparation of O & M manuals and any other items and access deemed necessary for the complete trouble-free operation of the fire extinguishers, and as detailed in the particular specification.

3.010.8 DOMESTIC LIGHTING AND ELECTRICAL SYSTEM

The lump sum price for the domestic lighting and electrical installation shall include, but not limited to supply and installation on site of all electrical panel boards and their accessories, of all cables, conduits, junction boxes and their accessories, of all lighting fixtures, switches, sockets, plugs and their accessories, necessary electric connections for the proper operation of the complete installation, connection to electric power system, testing and commissioning and any other items and accessories

deemed necessary for the complete installation and trouble free operation of the domestic lighting and electrical system.

3.010.9 TRAINING, TESTING AND COMMISSIONING

The lump sum price for training, testing and commissioning shall include, but not limited to, on site tests for all, electrical, mechanical, control, and performance tests on equipment and systems, all measurements, equipment, apparatus, materials, power supply, and labour, tests reports, supply of necessary training sessions, training material and documentation, supply, transportation, accommodation and expenses of trainers and commissioners, and any other items and accessories deemed necessary for the comprehensive training of water authority and appointed personnel, and necessary for the on-site testing and commissioning of the plant.

3.010.10 TECHNICAL SCHEDULES

The following Technical Schedules, where appropriate shall be completed by Tenderers. Additional Technical Schedules shall be submitted for any alternative plant proposed by Tenderers.

PUMPSET		
1.1 PUMP		
Max. permissible sand content		g/m ³
Nominal flow		l/sec
Nominal head		m
NPSH at nominal flow		m
Manufacturer		
Required power		Kw
Efficiency at nominal flow		%
Speed		rpm
Impeller material		
Body material		
Manufacturing standards		

1.2 MOTOR		
Manufacturer		
Power at full load		kW
Efficiency at full load		%
Index of protection		
No. of starts per hour		

2. SURGE SUPPRESSION EQUIPMENT		
Surge tank material		
Working pressure		bar
Compressor manufacturer		
3. PIPES		
Manufacturer		
Material		
4. VALVES		
Manufacturer		
5. CABLES		
Manufacturer		

6. ELECTRICAL PANEL BOARD		
Enclosure IP rating		
Starter Rating		Kw
7. U.P.S.		
Manufacturer		
8. PLC		
Make		
9. LEVEL SENSOR		
Make		
Type		
10. FLOW SENSOR		
Make		
Type		
11. PRESSURE SENSOR		
Make		
Type		
12. TEMPERATURE SENSOR		
Make		
Type		
13. DIGITAL INDICATOR		
Make		
Type		
14. MODEM		
Make		
15. TELEMANAGEMENT CENTER EQUIPMENT (CPU, Memory, I/O, Colour VDUs, Peripherals Printers)		
Make		
Type		
16. SOFTWARE		
Make and application name		
17. SYSTEM OPERATION		
Configuration		

4.000 BILL C –TRANSMISSION PIPELINES/BILL D-DISTRIBUTION PIPELINES

4.010 GENERAL

The hydraulic design of transmission and distribution pipelines is based on topographic surveys done during the design period. However, some or all topographical points like stakes or benchmarks may have disappeared due to works executed on the road after this period.

For this reason, the Contractor shall be deemed to have covered himself for checking quantities and for making any necessary surveys and investigations prior to placing or ordering for materials.

4.010.1 TOPOGRAPHIC SURVEY

The price shall cover performing land surveying of the designed networks layout. The surveyor shall start from approved benchmarks and shall mark the stations shown on drawings, using steel pegs and high-quality paint. Distance between two stakes or pegs shall not exceed 30m.

Moreover, the Contractor is supposed to visit the site to check and be familiar with the present status of the survey.

EDM devices shall be used exclusively.

New longitudinal profiles shall be issued on transparent paper and AutoCAD files and shall be submitted to the Engineer's approval.

Vertical scale 1/200 and horizontal scale 1/2000

Measurement of topographic survey shall be in horizontal kilometres.

4.010.2 TRIAL PIT

Trial pits shall be measured by number and shall include for excavation in any material, any type of soil and rock, to a depth not exceeding 3m, hand excavation as necessary, backfilling, reinstatement of the surface to its original condition and reinstatement of road surfaces.

Payment will only be made for trial pits ordered in writing by the Engineer. Any measures taken by the Contractor to locate existing services or determine ground condition shall be included within the respective excavation item, whether separately itemised or not, and shall not be measured for payment.

4.010.3 TRIAL TRENCH

Trial trenches shall be measured by linear meters and shall include for all requirements as stipulated in item 'Trial pit' above.

4.010.4 AS-BUILT DRAWINGS

As-built drawings shall be measured by horizontal km and shall consist of new profiles, plans and details on scale similar to the design drawings scale.

Pipes, manholes, and accessories shall be shown clearly as well as effective cover depth of the crown of the pipe and distance between pipe axis and carriage edge or sidewalk, and between manhole

cover centre and electric pylons or buildings corners. Adequate number (minimum one for each road or 250 m which is less) of transversal sections showing all existing underground utilities/or facilities, should also be submitted.

Payment shall only be made for as-built drawings approved by the Engineer and submitted on paper and AutoCAD files.

4.011 PIPEWORKS

4.011.1 SUPPLY OF DUCTILE IRON PREFERRED C-CLASS PIPES INCLUDING ALL NECESSARY FITTINGS

Ductile iron preferred C-Class pipes shall be classified for payment according to diameter and shall be measured in linear meters of pipeline supplied and stored in good conditions.

The price shall cover all fittings, bends, tees, reducers, detachable joints, flanges, bolts, nuts, as well as fittings, joints and jointing material.

Only pipes, fittings, junctions, bends, etc... supplied and stored in good conditions and accepted by the Engineer shall be taken into account for payment.

4.011.2 SUPPLY OF HDPE PIPES INCLUDING ALL NECESSARY FITTINGS

Price shall include all the requirements as stipulated in item 4.011.1 above (for HDPE pipes).

4.011.3 TRENCH EXCAVATION

The price shall be calculated in terms of linear meters of dug trench only. The minimum width of trench is shown on the corresponding Contract drawings (refer to standard drawings).

This price shall include but shall not be limited to:

- Excavating in any type of soil, rock, structural fill, contaminated fill, clay or others.
- Excavating by hand or machine.
- Excavating in asphalted or non-asphalted roads, in fields, in valleys, in accessible or non-accessible areas, including the execution of temporary access roads if needed.
- De-watering operations necessary for keeping the excavation free from water whether rain water or any other sources.
- Extra excavation depth carried out as shown on the longitudinal profiles or under the direction of the Engineer.
- Extra excavation carried out in width for laying of the HDPE duct.
- Transport of unsuitable backfilling materials to environmentally approved disposal sites accepted by the Engineer.
- Levelling or grading and compacting the bottom of excavations.
- Supporting, protecting and maintaining existing services and utilities.
- Temporary or permanent supports to sides of excavation, roads or structures as required by the Engineer (soil supports, sheet piling, etc...) or other method proposed by the Contractor and approved by the Engineer (micro-tunnelling, concrete piles, etc...).
- Traffic regulation and safety provisions as described in Volume 1- Appendix 1 – CDR Safety, Health and Environmental Regulations.
- Repairing of all damaged utilities caused by the execution of the works.

Any excavated quantity will not be paid by the Employer under this item, if it is dumped or accidentally falls in the valley or in the field.

4.011.4 SAND BEDDING AND SAND SURROUNDS

The sand bedding and sand surrounds shall be classified for payment according to pipe diameter and shall comply with the corresponding contract drawings (refer to standard drawings), and shall be measured by linear meters of completed pipeline.

Price shall include supply of material, backfilling, testing and compaction.

4.011.5 LAYING OF PIPES

Laying of pipes shall be classified for payment according to pipe material and diameter and shall be measured in linear meters of completed pipeline in place measured along the crown of the pipeline and the price shall include but not be limited to:

- Removal of any abandoned pipework within the excavation.
- Distributing pipes along the trench.
- Checking and cleaning pipe from dirt, oil, grease, etc.
- Supply of temporary or final supports.
- Laying of pipes.
- All necessary types of jointing, welding, etc...
- Checking pipe alignment and evaluations using topographical instruments.
- Installation of all fittings, bends, tees, reducers, dismantling joints, flanges, couplings, bolts, nuts as well as hauling, transport, unloading, and staking of pipes, fittings, joints, and jointing material.

The length measured for payment shall include the lengths of all fittings, valves and accessories installed in the line.

Only pipes, fittings, junctions, bends, etc... actually laid, jointed and tested and accepted by the Engineer shall be taken into account for payment.

4.011.6 BACKFILLING OF TRENCHES

1-Backfilling of trenches (for main roads – refer to Ministry of Public Works decree No. 13495 dated 5/11/1998 – Volume 4 - Annex 1) shall be classified for payment according to pipe diameter and shall be measured by linear meters along the crown of the pipeline (refer to standard drawings).

Sand Backfilling shall include for:

- Supply of imported materials.
- Backfilling in layers and compaction.
- Testing and compaction
- Supply and installation of the warning tape (Marker Tape)

2-Backfilling of trenches on other roads shall be classified for payment according to pipe diameter and shall be measured by linear meters along the crown of the pipeline (refer to standard drawings).

Backfilling shall include for:

- Supply of materials.
- Backfilling in layers and compaction.
- Testing and compaction
- Supply and installation of the warning tape (Marker Tape)

4.012 ACCESSORIES

4.012.1 SUPPLY AND INSTALLATION OF AIR RELEASE VALVES

Air valves shall be measured by number for each air valve size, and nominal pressure, and shall include gate valves, riser pipe, flanges, bolts, nuts, supports and all necessary components to provide a complete installation.

Reinforced concrete chambers, covers and frames shall be measured separately by number. Cutting and reinstatement shall also be measured separately.

4.012.2 SUPPLY AND INSTALLATION OF GATE VALVES

Gate valves shall be classified for payment by nominal diameter and nominal pressure class and shall be measured by number of gate valves supplied and installed.

Price shall include for the supply and installation of all fittings necessary to joint the assembly to the pipeline (either new or existing), including thrust flanges, flexible joints, dismantling joints, supports and all necessary items to make a completed installation.

4.012.3 SUPPLY AND INSTALLATION OF WASHOUTS

Washouts shall be measured by number for each washout size and pressure class and shall include gate valves, duck foot bends, tees, flap valves, drain pipe HDPE or D.I. pipes for washout with the needed length (excavation, bedding, supply, laying and backfilling) and all necessary items to make a complete washout.

Reinforced concrete chambers, covers and frames, shall be measured separately by number. Cutting and reinstatement shall be also measured separately.

4.012.4 SUPPLY AND INSTALLATION OF WCHECK VALVES WITH BYPASS

Supply and installation of check valves with bypass shall be classified for payment by nominal diameter and shall be measured by number.

Price shall include for the supply and installation of all fittings necessary to join the assembly to the pipeline and all items necessary to make a complete installation.

4.012.5 SUPPLY AND INSTALLATION OF FIRE HYDRANT

Fire hydrants shall be paid by number. Price shall include but not be limited to:

- Fire hydrant
- Pipes, bends, short pieces, etc...
- Gate valve, dismantling joint, puddle flanges, etc...
- Concrete thrust blocks
- Valve chamber

- Cover and frame grade A
- Step irons
- Reinstatement works.

Flange sockets, puddle flanges, dismantling joints, bends, pipes and all necessary accessories to joint the assembly to the pipeline.

The price shall also include all accessories necessary to make a complete installation as shown on drawings.

The exact location on the network will be decided on site by the Engineer.

4.012.6 SUPPLY AND INSTALLATION OF CONNECTIONS TO EXISTING BOREHOLES

Connection to existing boreholes shall be measured by number and shall include pipes, bends, tees, concrete works, steel reinforcement, strainers, concrete supports, inserts, float valves (if any), filters, etc... (including excavation, bedding, compacting, supply, laying and backfilling, etc...) and all necessary items to make a complete connection system to existing borehole.

4.012.7 CONNECTION TO EXISTING PIPES

Connection to existing pipes shall be classified for payment according to diameter and material and shall be measured in number of completed connection unit installed in place and the price shall include but not be limited to:

- Extra excavation works to locate the existing pipe.
- Removal of any abandoned pipework within the excavation.
- Distributing pipes along the trench.
- Checking and cleaning pipe from dirt, oil, grease, etc...
- Supply of temporary or final supports.
- All necessary types of jointing, welding, etc...
- Checking pipe alignment and elevations using topographical instruments.
- Transport the material from the warehouse and/or storage area to site.
- Supply and installation of all fittings bends, tees, reducers dismantling joints, flanges, couplings, bolts, nuts, as well as, hauling, transport, unloading, and staking of pipes, fittings, joints and jointing material.

The Unit measured for payment shall include all fittings, accessories installed in the line.

Only pipes, fittings, junctions, bends, etc... actually installed, jointed and tested and accepted by the Engineer shall be taken into account for payment.

4.012.8 CONNECTIONS TO EXISTING STRUCTURES

Connection to existing reservoir shall be measured by number and shall include pipes, bends, tees, concrete works, steel reinforcement, strainers, concrete supports, inserts, float valves (if any), filters, etc... (including excavation, bedding, compacting, supply, laying and backfilling, etc...) and all necessary items to make a complete connection system to existing reservoir.

4.012.9 BRIDGE CROSSING

Bridge crossing, culvert crossing and all type of crossing shall be classified for payment by number of completed crossing unit installed in place and the price shall include but not limited to: extra excavation works, removal of any abandoned pipework with the excavation, HDPE pipe along the structure, checking and cleaning pipe from dirt, grease, etc. supply temporary and/or final supports including supply and installation of metal work needed to support the pipe, all necessary types of jointing, welding, etc.. checking pipe alignment and elevations using topographical instruments, any reinstatement works, all necessary materials or tasks needed to accomplish the works.

The contractor shall present calculation notes based on design assumptions and shall include calculation reports for connection detail and shop drawing.

4.013 VALVES CHAMBER AND SURFACE BOX UNITS

4.013.1 CONSTRUCTION OF PRE-CAST OR CAST IN SITU, REINFORCED CONCRETE VALVE CHAMBERS

Valve chambers where not included in another item, shall be measured by number according to chamber internal length and width and shall include for excavation, formwork, concrete, mass concrete, blinding etc..., reinforcement, rendering, external damp-proofing, painting, backfilling, floor drain, soak away, step irons access ladders, compacted gravel, sub-base and base layers, asphalt, etc... and all necessary items to make a complete chamber according to the contract drawings.

The valve chamber cover and frame shall be measured by number separately.

4.013.2 SUPPLY AND INSTALLATION OF VALVE CHAMBER COVER AND FRAME

Valve chamber cover and frame shall be measured by number and shall include all necessary materials and equipment including installation, labour, painting etc... in order to get an installed cover and frame according to the specifications.

4.013.3 SUPPLY AND INSTALLATION OF SURFACE BOX UNITS FOR WASHOUT AND SERVICE CONNECTIONS

Surface box units shall be measured by number and shall include for spindle guards, extension spindles, caps, couplings, covers, surface box units, and all necessary items to make a complete surface box unit.

4.014 CONCRETE WORKS

Cast in situ or precast concrete shall be measured by net volume shown on drawings.

Concrete, whether included in another item or separately measured, shall include for:

- All material, equipment, labour, transport, admixtures (retarders, plasticizers, waterproofing products, ...) batching, mixing, placing, vibrating, curing, testing.
- Formwork (Formwork shall be “sawn” finish to all buried external faces of concrete below a line 200mm below ground level and shall be “wrought” finish to all other faces).

- All needed excavation in all kinds of soils and rocks, use of all adequate equipment, transport of soil to disposal sites approved by the Engineer, labour, dewatering, temporary and/or final retaining structures for trenches or open digs, backfilling, compacting, cutting of asphalt.
- Forming of chamfers (25mm x 25mm) to all exposed external angles.
- Forming expansion, contraction, movement and construction joints and for all water stops, jointing materials, sealing compounds and formwork necessary for forming such joints;
- Building in of all pipes and fittings, bolts, frames, iron and steelwork and the like.
- Finishing of surfaces.
- Reinforcement.
- All necessary items to have the concrete works according to the specifications.

4.015 SERVICE CONNECTIONS

4.015.1 SUPPLY AND INSTALLATION OF HDPE PIPES FOR SERVICE CONNECTIONS

Supply and installation of HDPE pipes shall be classified for payment according to outer diameter, and shall be measured in linear meters of completed pipeline in place measured along the crown of the pipeline. The length measured for payment shall include the lengths of all fittings, valves, and specials installed in the line.

The price shall cover the supply and installation of all fittings, bends, tees, reducers, joints, adapters as well as hauling, transport, unloading, staking and laying of pipes.

Only pipes, fittings, junctions, bends, etc... actually laid, jointed and tested and accepted by the Engineer, shall be taken into account for payment.

Trench excavation, sand bedding, backfilling of trenches, cutting and reinstatement of surfaces shall be measured separately.

4.015.2 SUPPLY AND INSTALLATION OF TAPPING COLLARS

Supply and installation of tapping collars shall be classified for payment according to the distribution main diameter without taking into account the service connection diameter.

The price shall include for the supply and installation of bolts, nuts, rubber joints, wedge keys and all necessary accessories to make a good tapping collar.

4.015.3 SUPPLY AND INSTALLATION OF STOP VALVES

Supply and installation of stop valves shall be classified for payment by nominal diameter and shall be measured by number.

Price shall include for the supply and installation of all fittings necessary to joint the assembly to the pipeline and all necessary items to make a complete installation.

4.015.4 SUPPLY AND INSTALLATION OF BALL VALVES

Supply and installation of ball valves shall be classified for payment by nominal diameter and shall be measured by number.

Price shall include for the supply and installation of all necessary fittings to joint the assembly to the pipeline and all necessary items to make a complete installation.

4.015.5 SUPPLY AND INSTALLATION OF WATER METERS

Supply and installation of water meters shall be classified for payment by nominal diameter and shall be measured by number.

Price shall include for the supply and installation of all necessary fittings to joint the assembly to the pipeline, adapters, screen filter and all items necessary to make a complete installation.

4.015.6 SUPPLY AND INSTALLATION OF CHECK VALVES

Supply and installation of check valves shall be classified for payment by nominal diameter and shall be measured by number.

Price shall include for the supply and installation of all necessary fittings to joint the assembly to the pipeline and all necessary items to make a complete installation.

4.015.7 SUPPLY AND INSTALLATION OF WATER METER BOXES

Supply and installation of water meter boxes shall be classified for payment by number and classified in categories for 1, 2, 4, 6 or 8 water meters to be installed inside.

Price shall include for the supply and installation of the water meter box as shown on drawings in addition to all necessary fittings to joint the assembly such as distribution column, tees, bends, nuts, gaskets, air valve, lock, key, wall fixing screws, fixation rails, bolts, etc... and all necessary items to make a complete installation of the water meter box.

4.016 TESTING AND COMMISSIONING OF POTABLE WATER PIPES

For service connections only, testing and commissioning shall be measured by number. The price shall include all the material, equipment and labour (water, pumps, barrels, manometers, valves, labour, power supply, etc...) and no payment shall be made before getting the Engineer's approval.

For service connections only, testing and commissioning shall be measured by number.

4.017 ROAD REINSTATEMENT

4.017.1 CUTTING

Cutting of paved roads shall be measured by linear meters along the pipe crown. It shall include for asphalt cutting at both sides of the trench, and removal of excavated material to disposal sites.

Cutting and breaking of concrete pavements shall be measured by square meters, it shall include for cutting and breaking out of concrete pavement (the width of the cut trenches will be as shown on standard drawings) and removal of excavated material to disposal sites.

The price shall include cutting works and removal of material for widening of trench for chambers or other ancillary structures and fittings.

4.017.2 REINSTATEMENT

Reinstatement of asphalt pavement shall be classified for payment according to type of roads, as for main roads two layers of asphalt shall be applied, and one layer for the other roads, and shall be measured by square meters of completed asphalted and reinstated trenches, the quantity to be considered for payment will be the quantity actually executed but not to exceed the quantities shown on standard drawings, otherwise it will be on the Contractor own expenses and will not be considered for payment. For trench reinstatement, the price shall include for:

- Transport of material.
- Recutting works.
- Base and sub-base courses, material.
- Compaction.
- Laying and application of material,
- Tests.
- Repairing of all defects, asphalt or concrete collapse.
- Etc..

The width of asphalt layers shall be in accordance with the standard drawings.

Reinstatement of concrete and concrete stair cases shall be measured by square meters of completed reinstated trenches, the quantity to be considered for payment will be the quantity actually executed but not to exceed the quantities shown on standard drawings, otherwise it will be on the Contractor own expenses and will not be considered for payment. For trench reinstatement, the price shall include for:

- Transport of material.
- Recutting works.
- Base and sub-base courses, material.
- Compaction.
- Laying and application of material,
- Tests.
- Repairing of all defects, asphalt or concrete collapse, Etc...

Reinstatement shall also include for any re-cutting works of asphalt or concrete required by collapse of trench edges and for base and sub-base courses and compaction according to drawings and complying with the specifications.

5.000 BILL E BOREHOLE WORKS

5.010 SITE PREPARATION AND MOBILIZATION

The price shall be paid for on lump sum basis including all costs and labour expenses necessary to the delivery, installation and dismantling of the drilling and testing equipment as well as all tools and devices, other than the pumping equipment. The price also includes all expenses necessary to the preparation of the site (excavation, cleaning of land and preparing access roads as well as constructing a drainage pipe or culvert crossing the road in order to evacuate and drain the drilling cutting).

5.011 DRILLING

Execution of drilling works by rotary method for wells of different diameters.

The price shall be paid for every drilled linear meter and shall include all drilling costs, without exception (power, fuel, mud, water, air depression of parts and machinery, etc...) and the labour expenses required for drilling a well to the required diameter as well as taking sample cuttings from the ground and all measurements as stipulated in the Technical and Particular Specifications Vol. 3 and as per instructions from the Engineer.

5.012 WELL CONSTRUCTION

5.012.1 CASINGS

The price shall be paid on a linear basis and shall include the supply, transport, on-site storage and installation of casings including all the necessary accessories.

5.012.2 SCREENS

The price shall be paid for installed linear meter of screens including the supply, transport, on-site storage and installation of screens with all the necessary accessories.

5.013 VERTICALITY AND ALIGNMENT TEST

The price shall be paid for on lump sum basis including all costs and labour expenses necessary to conduct the tests, as well as all tools and devices (rotary machine, tripod, dummies, etc..), as stipulated in the Technical and Particular Specifications Vol. 3

5.014 WELL GROUTING

5.014.1 SUPPLY OF CEMENT

The price shall be paid for every ton of cement delivered on-site including supply, transport and on-site storage in its original packing.

5.014.2 INJECTION OF CEMENT IN THE ANNULAR SPACE

The price shall be paid for every meter of placed grout including the preparation of the slurry (supply of the required quantities of water and sand) by using supplied cement and additives (where necessary). Grout shall be placed as stipulated in the Technical and Particular Specifications Vol. 3, and the Contractor shall bear all costs.

5.015 WELL DEVELOPMENT

5.015.1 SUPPLY AND INSTALL OF PUMPING EQUIPMENT

The price shall be paid for every operation including all costs for supplying, transportation and installation of the pump at the specified discharge and head and later dismantle. This includes without restriction all costs and labour expenses necessary to the development of the well.

5.015.2 WELL DEVELOPMENT (PUMPING AT DIFFERENT RATES)

The price shall be paid for on the basis of every hour of effective pumping and shall include operating the pump at progressively increasing rates including all the necessary requirements of power supply, generators, fuel, etc.

5.016 WELL TESTING

5.016.1 STEP DRAWDOWN TEST

The price shall be paid for on the basis of every hour of effective pumping and shall be done with the same pumping system used in the development stage. The price shall include without restriction all the necessary labour, power supply, continuous level and flow measurements as stipulated in the Technical and Particular Specifications Vol. 3.

5.016.2 CONSTANT RATE TEST

The price shall be paid for on the basis of every hour of effective pumping, the pump shall be operated at a constant rate for 72 hours non-stop. The per hour price shall include all the requirements as stipulated in the step drawdown test above.

5.017 WATER ANALYSIS

5.017.1 COLLECTION AND DELIVERY OF WATER SAMPLES TO AN APPROVED LABORATORY

The price shall be paid for on the basis of every water sampling operation and shall include all costs, sterilized supplies, transport and labour expenses necessary for water sampling as stipulated in the Technical and Particular Specifications Vol. 3.

5.017.2 PHYSICO-CHEMICAL ANALYSIS

The price shall be paid for on the basis of every analysis carried out including the interpretation and submittal of results.

5.017.3 BACTERIOLOGICAL ANALYSIS

The price shall be paid for on the basis of every analysis carried out including the interpretation and submittal of results.

5.018 REPORTS

5.018.1 DAILY DRILLER'S LOG, AND REPORTS

The price shall be paid on a lump sum basis for the whole reports and shall include the daily driller's log as stipulated in the Technical and Particular Specifications Vol. 3, and according to the Engineer's instructions.

5.018.2 FINAL WELL REPORT

The price shall be paid for on a lump sum basis for the final report and shall include all requirements as stipulated in item "Daily driller's log" above.

6.000 BILL F SOLAR ENERGY WORKS

6.010 SOLAR ENERGY EQUIPMENT

6.010.1 SOLAR ENERGY SYSTEM EQUIPMENT

The Solar Energy System Equipment category of the BOQ shall include all the prices to supply specified equipment according to specifications, installation, testing and delivery in perfect running conditions of the electrical installations including labour, tools, shipping/transport, testing, delivery on site, all additional expenses. This category will be used to evaluate the specifications for the equipment provided under this contract.

6.010.1.1 LUMP SUM

The lump sum items shall not be subject to re-measurement, and shall include the prices for all necessary equipment. The lump sum entered in the Bills shall include all equipment necessary for a complete installation as described in the specifications.

6.010.2 SOLAR ENERGY SYSTEM WORKS

6.010.2.1 PV MODULES

The price of the PV Modules item, shall include, but not limited to, supply of the PV modules with all its required accessories for installation, packaging, shipping and handling, customs fees, delivery on site, spare parts, storage and any other items and accessories deemed necessary for the complete installation and trouble-free operation of the PV system.

6.010.2.2 INVERTERS

The price of the inverters item shall include, but not limited to, supply of the inverters as per specifications including all equipment and accessories required for installation and proper operation, packaging, shipping and handling customs fees, delivery on site, spare parts, storage, and any other items and accessories deemed necessary for the complete installation and trouble-free operation.

6.010.2.3 CONTROLLER

The price of the controller item shall include, but not limited to, supply of the controller as per specifications including all equipment and accessories required for installation and proper operation, packaging, shipping and handling customs fees, delivery on site, spare parts, storage, and any other items and accessories deemed necessary for the complete installation and trouble-free operation.

6.010.2.4 ELECTRICAL SYSTEM

The price of the electrical system items shall include, but not limited to, supply of all electrical equipment, main switch board, all electrical cables & wires, supply of all electrical control panels, spare parts, packaging, shipping and handling customs fees, delivery on site, storage, and any other items and accessories deemed necessary for the complete installation and trouble-free operation of the electrical system.

6.010.2.5 EARTHING PROTECTION

The price of the earthing protection items shall include, but not be limited to, the supply of all electrical equipment required for earthing protection as per specification required, packaging, shipping and handling customs fees, delivery on site, storage, and any other items and accessories deemed necessary for the complete installation and trouble-free operation of the protection.

6.010.2.6 TESTING AND COMMISSIONING

The lump sum price for testing and commissioning shall include, but not limited to, on site tests for all, electrical, mechanical, control, and performance tests on equipment and systems, all measurements, equipment, apparatus, materials, power supply, and labour, tests reports, and any other items and accessories deemed necessary for the on-site testing and commissioning of the plant.

6.010.2.7 COMPLETE MONITORING AND CONTROL SYSTEM

The price of the complete monitoring and control system items shall include, but not limited to, supply of the complete requirements for control and monitoring systems, supply of all wires and cables, packaging, shipping and handling customs fees, delivery on site, supply of Software, spare parts, storage, and any other items and access deemed necessary for the complete proper installation and trouble-free operation of the monitoring and control system.

6.011 TECHNICAL SCHEDULES

1. PV MODULES		
Make		
Type		
2. PUMP VFD CONTROLLERS		
Make		
Type		
3. HYBRID INVERTER		
Make		
Type		
4. BATTERY BANK		
Make		
Type		
5. MOUNTING RAILS		
Make		
Type		
6. MODULE CLAMPING SYSTEM		
Make		
Type		
7. DC CONNECTORS		
Make		
Type		
8. DC CABLING		
Make		
Type		

9. DC SURGE PROTECTION		
Make		
Type		
10. AC SURGE PROTECTION		
Make		
Type		
11. DC DISCONNECT		
Make		
Type		
12. AC DISCONNECT		
Make		
Type		
13. SENSORS		
Make		
Type		
14. RESIDUAL PROTECTION		
Make		
Type		
15. NETWORK FOR CONTROLLER		
Topology		
16. MONITORING SERVER		
Owner		
Location		

PART B

BILL OF QUANTITIES

BILL A

CIVIL WORKS

BEINO PUMPING STATION AND WATER TOWER (CAPACITY 300 m3)

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
1.0000	General				
1.0001	Checking, completing, and/or performing topographic survey and site delimitation	Site	1.00		
1.0002	Site clearance	L.S	1.00		
1.0003	Site rearrangement after construction	L.S	1.00		
	Sub-Total 1.0000				
1.1000	Earthworks				
1.1100	Soil investigations				
1.1101	Boring , core sampling, SPT tests and report	L.S	1.00		
	Sub-Total 1.1100				
1.1200	Excavation				
1.1201	Excavation in all types of soils and rocks and demolition of existing concrete structures and transport of unsuitable backfilling material to disposal sites	cu.m	550.00		
	Sub-Total 1.1200				
1.1300	Preparation of formation under reservoirs and other constructions				
1.1301	Supply, preparation and compaction of the granular beds in addition to laying the polyethylene sheet under the construction's foundations.	cu.m	23.00		
	Sub-Total 1.1300				
1.1400	Backfilling				
1.1401	Backfilling and compaction	cu.m	260.00		
	Sub-Total 1.1400				
	Sub-Total 1.1000				
1.2000	Concrete works and accessories				
1.2100	Concrete works				
1.2101	Blinding and mass concrete Class C20	cu.m	25.00		
1.2102	Reinforced Concrete Class C30, 400 kg of cement /cu.m, for reservoirs, including formwork	cu.m	150.00		
1.2103	Reinforced Concrete Class C30, 350 kg of cement /cu.m, for other structures in reservoir and other structures, including formwork	cu.m	240.00		
1.2104	Concrete surface leveling with mechanical float	sq.m	250.00		
1.2105	Cyclopean concrete	cu.m	60.00		
1.2106	Steel reinforcement	Ton	65.00		
	Sub-Total 1.2100				

BEINO PUMPING STATION AND WATER TOWER (CAPACITY 300 m3)

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
1.2200	Water stop and bearing pads				
1.2201	Water stop up to 25 cm in width	lin.m	46.00		
1.2202	Neoprene pads between walls and roof slab	lin.m	32.00		
	Sub-Total 1.2200				
1.2300	Concrete Masonry Units				
1.2302	Hollow concrete block wall 15 cm thick	sq.m	95.00		
	Sub-Total 1.2300				
	Sub-Total 1.2000				
1.3000	Rendering or plastering of interior or exterior surface				
1.3001	Plastering of interior and exterior surfaces	sq.m	400.00		
1.3002	Exterior rendering with tyrolean coat	sq.m	160.00		
1.3003	Brick tiling of reservoir walls	sq.m	160.00		
	Sub-Total 1.3000				
1.4000	Waterproofing, thermal insulation, and water quality control				
1.4001	Internal lining for reservoir	sq.m	310.00		
1.4002	Waterproofing membrane of reservoir roof slabs with thermal insulation	sq.m	90.00		
1.4003	Waterproofing of technical room	L.S	70.00		
1.4004	Water testing and disinfection for reservoir of capacity 300 m³	lin.m.	1.00		
	Sub-Total 1.4000				
1.5000	Metal and aluminium works				
1.5100	Metal works				
1.5101	Supply and installation of exterior steel doors and windows including glazing and painting (with blue color)	sq.m	7.00		
1.5102	Supply and installation of metal works : steel protection bars for exterior windows, metallic ladders with or without safety hoops, gratings for channels, railings, locks and all other metal works, including painting.	kg	3,000.00		
	Sub-Total 1.5100				
1.5200	Aluminium works				
1.5201	Supply and installation of interior aluminium doors and exterior aluminium windows, including glazing.	sq.m	2.00		
	Sub-Total 1.5200				
	Sub-Total 1.5000				

BEINO PUMPING STATION AND WATER TOWER (CAPACITY 300 m3)

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
1.6000	Finishing works				
1.6100	Painting				
1.6101	Supply and application of industrial flooring	sq.m	80.00		
1.6102	Supply and application of washable paint for internal or external use coating	sq.m	900.00		
	Sub-Total 1.6000				
1.7000	Fence				
1.7001	Supply and installation of site's external fence, including painting	L.S	225.00		
1.7002	Supply and installation of the access gate (L = 4m)	L.S	1.00		
	Sub-Total 1.7000				
1.8000	Asphalting				
1.8001	Subgrade compaction, sub-base and base preparation, and asphalting	sq.m	450.00		
	Sub-Total 1.8000				
1.9000	Reservoir Hydraulic Accessories				
1.9100	Supply and installation of preferred C-Class ductile iron pipes including all necessary fittings (bends, tees, reducers, flanges, dismantling joints, support, etc...)				
1.9104	DI pipes, DN 150	lin.m	42.00		
1.9104	DI pipes, DN 200	lin.m	120.00		
	Sub-Total 1.9100				
1.9200	Supply and installation of gate valves including dismantling joints and gaskets, bolts and nuts				
1.9204	Gate valve PN16, DN 150	nb	1.00		
1.9204	Gate valve PN16, DN 200	nb	2.00		
	Sub-Total 1.9200				
1.9300	Valve chamber floor drains				
1.9301	Supply and installation of floor drain inside the valve chamber including pipe DN 80, flap valve	nb	1.00		
	Sub-Total 1.9300				
1.9500	Supply and installation of suction strainers including dismantling joints and daskets, botls and nuts				
1.9504	Suction strainer, DN 150	nb	1.00		
1.9504	Suction strainer, DN 200	nb	1.00		
	Sub-Total 1.9500				

BEINO PUMPING STATION AND WATER TOWER (CAPACITY 300 m3)

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
1.9600	Supply and installation of level indicators				
1.9601	Level indicator	nb	2.00		
	Sub-Total 1.9600				
1.9700	Supply and installation of double air release valves including isolating gate valves				
1.9701	Double air release valve including gate valve PN16, DN60 mm	nb	1.00		
	Sub-Total 1.9700				
1.9800	Supply and installation of water meters including Y strainers, filters, flow straighteners including dismantling joints and gaskets, bolts and nuts				
1.9804	Water meter PN16, DN 150	nb	1.00		
1.9804	Water meter PN16, DN 200	nb	1.00		
	Sub-Total 1.9800				
1.9900	Supply and installation of inserts				
1.9902	Insert DN 150 mm	nb	2.00		
1.9903	Insert DN 200 mm	nb	4.00		
	Sub-Total 1.9900				
1.9910	Pipe Painting				
1.9911	2 Layers of painting for DI pipes, Color as recommended by NLWE	lin.m	162.00		
	Sub-Total 1.9910				
	Sub-Total 1.9000				
	Total BEINO PUMPING STATION AND WATER TOWER (CAPACITY 300 m3)				

DEIR NBOUH BOREHOLE AND PUMPING STATION

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
1.0000	General				
1.0001	Checking, completing, and/or performing topographic survey and site delimitation	Site	1.00		
1.0002	Site clearance	L.S	1.00		
1.0003	Site rearrangement after construction	L.S	1.00		
1.0004	Construction of access road	sq.m	700.00		
	Sub-Total 1.0000				
1.1000	Earthworks				
1.1200	Excavation				
	Excavation in all types of soils and rocks and demolition of existing concrete structures and transport of unsuitable backfilling material to disposal sites	cu.m	375.00		
	Sub-Total 1.1200				
1.1300	Preparation of formation under reservoir and other constructions				
	Supply, preparation and compaction of the granular beds in addition to laying the polyethylene sheet under the construction's foundations.	cu.m	18.00		
	Sub-Total 1.1300				
1.1400	Backfilling				
1.1401	Backfilling and compaction	cu.m	200.00		
	Sub-Total 1.1400				
	Sub-Total 1.1000				
1.2000	Concrete works and accessories				
1.2100	Concrete works				
1.2101	Blinding and mass concrete Class C20	cu.m	15.00		
	Reinforced Concrete Class C30, 350 kg of cement /cu.m, for other structures in reservoir and other structures, including				
1.2103	formwork	cu.m	140.00		
1.2104	Concrete surface leveling with mechanical float	sq.m	60.00		
1.2105	Cyclopean concrete	cu.m	20.00		
1.2106	Steel reinforcement for reservoirs and other buildings	Ton	13.00		
	Sub-Total 1.2100				
1.2300	Concrete Masonry Units				
1.2301	Hollow concrete block 10 cm thick	sq.m	30.00		
1.2303	Hollow concrete block 20 cm thick	sq.m	45.00		
	Sub-Total 1.2300				
	Sub-Total 1.2000				
1.3000	Rendering or plastering of interior or exterior surface				
1.3001	Rendering or plastering of interior and exterior surfaces	sq.m	325.00		
1.3002	Exterior rendering with tyrolean coat	sq.m	110.00		
	Sub-Total 1.3000				

DEIR NBOUH BOREHOLE AND PUMPING STATION

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
1.4000	Waterproofing, thermal insulation, and water quality control				
1.4002	Waterproofing of reservoir and other buildings roof slabs with thermal insulation	sq.m	70.00		
1.4005	uPVC drain 100 mm diameter	lin.m.	16.00		
	Sub-Total 1.4000				
1.5000	Metal and aluminium works				
1.5100	Metal works				
1.5101	Supply and installation of exterior steel doors and windows including glazing and painting (with blue color)	sq.m	15.00		
1.5102	Supply and installation of metal works : steel protection bars for exterior windows, metallic ladders with or without safety hoops, gratings for channels, railings, locks and all other metal works, including painting.	kg	500.00		
	Sub-Total 1.5100				
1.5200	Aluminium works				
1.5201	Supply and installation of interior aluminium doors and exterior aluminium windows, including glazing.	sq.m	6.00		
	Sub-Total 1.5200				
	Sub-Total 1.5000				
1.6000	Finishing works				
1.6100	Painting				
1.6101	Supply and application of industrial flooring	sq.m	95.00		
1.6102	Supply and application of washable paint for internal or external use coating	sq.m	450.00		
	Sub-Total 1.6100				
	Sub-Total 1.6000				
1.7000	Fence				
1.7001	Supply and installation of site's external fence, including painting	lin.m	105.00		
1.7002	Supply and installation of the access gate (L = 4m)	L.S.	1.00		
	Sub-Total 1.7000				
1.8	Asphalting				
1.8001	Subgrade compaction, sub-base and base preparation, and asphalting	sq.m	100.00		
	Sub-Total 1.8000				
	Total DEIR NBOUH BOREHOLE AND PUMPING STATION				

BILL A - BEINO CIVIL WORKS FOR SOLAR ENERGY

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
1.2000	Concrete works				
1.2101	Reinforced Concrete Strength Class C30, 350 kg of cement/cu.m, for structural below and above-ground concrete elements in contact with backfilling materials including but not limited to all concrete foundations of the panels' steel structure	L.S	1.00		
	Sub-Total 1.2000				
1.5000	Metal works				
1.5003	Civil & Steel Works Steel Structure to support the Solar panels, including all civil works, land preconditioning and all related works for the proper installation of the solar panels.	L.S	1.00		
	Sub-Total 1.5000				
	Total BILL A - BEINO CIVIL WORKS FOR SOLAR ENERGY				

SUMMARY BILL A

SUMMARY BILL A

BILL	DESCRIPTION	TOTAL AMOUNT USD
BILL A	BEINO PUMPING STATION AND WATER TOWER (CAPACITY 300 m3)	
BILL A	DEIR NBOUH BOREHOLE AND PUMPING STATION	
BILL A	BEINO CIVIL WORKS FOR SOLAR ENERGY	
GRAND TOTAL		

BILL B

ELECTROMECHANICAL WORKS

BILL B - BEINO ELECTROMECHANICAL EQUIPMENT AND WORK

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
2.1000	Mechanical, Electrical and Control Equipment and Works				
2.1100	Pumping system				
2.1101	Submersible motopumpset (in deep Well) Q= 16.5 L /s, Hmt= 150 m	nb	1.00		
2.1102	Hydraulic accessories (base frame, shock absorbers, supports, bolts, nuts, etc...)	L.S	1.00		
	Sub -Total 2.1100				
2.1200	Piping and accessories				
2.1201	Rising column pipe DN100	lin.m	175.00		
2.1202	Piezometric tube OD40	lin.m	350.00		
2.1203	Double Air release valve DN65, PN16 with isolating valve	nb	1.00		
2.1204	Sampling ball valve DN13, PN16	nb	1.00		
2.1205	Dismantling Joints DN125 PN16	nb	2.00		
2.1206	Dismantling Joints DN100 PN16	nb	1.00		
2.1207	Check Valve DN125 PN16	nb	1.00		
2.1208	Gate Valve DN100 PN16	nb	1.00		
2.1209	Globe Valve DN125 PN16	nb	1.00		
2.1210	Butterfly Valve DN125 PN16	nb	1.00		
2.1211	Hydraulic accessories (bends, tees, pipes, flanges, gaskets, joints, bolts, nuts, supports, insert well head piece...)	L.S	1.00		
	Sub -Total 2.1200				
2.1300	Liquid chlorination system				
2.1301	Chlorinator complete system with a capacity of 4.5 l/Hr. and a back pressure of 4 bars (including pump, ejector, preregulators, auto-transfer switch, controller, Cl2 flowmeter, horn, sensors, Gas masks...)	L.S	1.00		
2.1302	Supply of Calcium Hypochlorite granules	kg	100.00		
2.1303	Chlorine mixer complete including agitator and mixing tank 200 L	L.S	1.00		
2.1304	Chlorine leakage detection system	nb	2.00		
2.1305	Ventilator fans	nb	2.00		
2.1306	Supply and installation of outdoor shower system complete with 1000 liters water tank including all piping, valves and connections.	L.S	1.00		
2.1307	Accessories (pipes, bends, tees, joints, bolts, nuts, supports, flow switch, vacuum switch, Panic Hardware for both Chlorination Room and Electrical Room Doors, Secondary containment for Chlorination Room, Hazard Signage on doors...)	L.S	1.00		
	Sub -Total 2.1300				

BILL B - BEINO ELECTROMECHANICAL EQUIPMENT AND WORK

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
2.1400	Electrical system				
2.1401	EDL Transformer 100 KVA	nb	1.00		
2.1402	Subscription to EDL for 1 x 100 KVA EDL transformer	L.S	1.00		
2.1403	Emergency Generator 80 KVA including fuel tank 2000 L	nb	1.00		
2.1404	Main ATS panel 150 A	nb	1.00		
2.1405	Solar Variable Frequency Driver (VFD) with minimum power capacity of 50 kW with filter	nb	1.00		
2.1406	Low voltage cable 1x(3x50+25) mm ²	lin.m	205.00		
2.1407	Low voltage cable 1x(3x70+35) mm ²	lin.m	25.00		
2.1408	Low voltage cable 1x(3x95+50) mm ²	lin.m	25.00		
2.1409	Supply and installation and Configuration of power meter for each pump and electrical power source, (EDL , Generator) Power meter shall be equipped with Modbus communication	nb	3.00		
2.1410	Supply and Installation of UPS system, 1kva capacity, power autonomy at least 10 hrs with 70% depth of discharge of batteries with all necessary accessories	Set	1.00		
2.1411	Grounding system - Lightning & Surge Protections	L.S	1.00		
2.1412	Electric accessories (cables, Lugs, clamps, connectors, conduits, cable trays, insulation, junction boxes ...)	L.S	1.00		
	Sub -Total 2.1400				
2.1500	Instrumentation and Control				
2.1501	Piezoresistive level measurement in the well (175 m deep) with its cable	nb	1.00		
2.1502	Piezoresistive level measurement in the reservoir with its cable	nb	1.00		
2.1503	Water level protection system (length 175 m) with 3 electrodes and relay	Set	1.00		
2.1504	Piezoresistive pressure measurement	nb	1.00		
2.1505	Flow switch DN13 PN 16	nb	1.00		
2.1506	Temperature measurement (PT100) for submersible well pump	Set	1.00		
2.1507	Telemetry cable	lin.m	80.00		
2.1508	Electromagnetic Flow measurement DN125 PN16 (For Well)	nb	1.00		
2.1509	Glycerine filled manometer Ø 100 with 3 way valve caliber 16	nb	2.00		
2.1510	Supply and installation of PLC Self Standing Enclosure IP 54 made by steel sheet of thickness not less than 2 mm thick, modular in construction, properly reinforced, powder coated and having rigid frame structure; and internal mounting plate including the gland plate shall be 3 mm thick. The control panel shall have dimensions as per system requirement. However, the control panel height shall not exceed 2000 mm. Front door with lock.	L.S	1.00		
2.1511	Supply & installation of PLC Controller with Plug-in Memory Card 2GB max and built-in ethernet and communication ports (RS485, RS232) . The Control panel shall include necessary component to insure proper functioning, Modbus Module for Peripherals. The 24 VDC Power supply for connection 124 master or slave units. The PLC shall support DNP3 Protocol and data logging . Digital inputs shall be 24VDC input level, galvanic isolated, with led indication. Analogue inputs Module with minimum resolution 16-bit, external power supply 24VDC. the Input-output module shall secure 10% spare for future extensions. 44 DI 16 AI 14 DO 29 Point Modbus communication	L.S	1.00		

BILL B - BEINO ELECTROMECHANICAL EQUIPMENT AND WORK

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
2.1512	Supply and installation of industrial cellular gateway that support LTE 2G/3G/4G with Built In Ethernet Communication with the PLC .	L.S	1.00		
2.1513	Supply and installation of an industrial switch with 5 ethernet ports at least	L.S	1.00		
2.1514	HMI Panel of size 10", 24VDC, with Built-in ethernet port for communication with PLC	L.S	1.00		
2.1515	Broadband sim cards	L.S	1.00		
2.1516	Subscription Fees to 3G/4G/5G providers for 6 month	L.S	1.00		
	Sub -Total 2.1500				
2.1600	Domestic Plumbing, and drainage system	L.S	1.00		
	Sub -Total 2.1600				
2.1700	Fire extinguishers (As detailed in the particular specifications)	L.S	1.00		
	Sub -Total 2.1700				
2.1800	Electrical installation for buildings, including internal and external domestic lighting system, emergency lamps, control panels, cables and wires,...	L.S	1.00		
	Sub -Total 2.1800				
2.1900	Training, Testing and Commissioning	L.S	1.00		
	Sub -Total 2.1900				
2.2000	Preparation of O&M Manuals and Detailed As-Built Drawings	L.S	1.00		
	Sub -Total 2.2000				
	Total BILL B - BEINO ELECTROMECHANICAL EQUIPMENT AND WORK				

BILL B - DEIR NBOUH ELECTROMECHANICAL EQUIPMENT AND WORK

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
2.1000	Mechanical, Electrical and Control Equipment and Work				
2.1100	Pumping system				
2.1101	Submersible Motopumpset Q=6 l/s, Hmt=697 m	nb	1.00		
2.1102	Hydraulic accessories (base frame, shock absorbers, supports, bolts, nuts, etc...)	L.S	1.00		
	Sub -Total 2.1100				
2.1200	Piping and accessories				
2.1201	Rising column pipe DN80	lin.m	450.00		
2.1202	Piezometric tube OD40	lin.m	900.00		
2.1203	Double Air release valve DN65, PN40 with isolating valve	nb	1.00		
2.1204	Sampling ball valve DN13, PN16 With PRV 40-16	nb	1.00		
2.1205	Dismantling Joints DN80 PN40	nb	2.00		
2.1206	Check Valve DN80 PN40	nb	1.00		
2.1207	Globe Valve DN80 PN40	nb	1.00		
2.1208	Gate Valve DN80 PN40	nb	1.00		
2.1209	Butterfly Valve DN80 PN40	nb	1.00		
2.1210	Surge suppression equipment (Anti-water hammer system PN 40) fitted with reinforced bladder	LS	1.00		
2.1211	Hydraulic accessories (bends, tees, pipes, flanges, gaskets, joints, bolts, nuts, supports, insert well head piece...)	LS	1.00		
	Sub -Total 2.1200				
2.1300	Liquid chlorination system				
2.1301	Chlorinator complete system with a capacity of 2.5 l/Hr. and a back pressure of 31 bars (including pump, ejector, preregulators, auto-transfer switch, controller, Cl2 flowmeter, horn, sensors, Gas masks...) - pressure rating PN40	LS	1.00		
2.1302	Supply of Calcium Hypochlorite granules	kg	100.00		
2.1303	Chlorine mixer complete including agitator and mixing tank 200 L	LS	1.00		
2.1304	Chlorine leakage detection system	nb	2.00		
2.1305	Ventilator fans	nb	2.00		
2.1306	Outdoor shower system complete with 1000 liters water tank including all piping, valves and connections.	LS	1.00		
2.1307	Accessories (pipes, bends, tees, joints, bolts, nuts, supports, flow switch, vacuum switch, Panic Hardware for both Chlorination Room and Electrical Room Doors, Secondary containment for Chlorination Room, Hazard Signage on doors...)	LS	1.00		
	Sub -Total 2.1300				

BILL B - DEIR NBOUH ELECTROMECHANICAL EQUIPMENT AND WORK

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
2.1400	Electrical system				
2.1401	Main ATS panel 240 A	nb	1.00		
2.1402	Solar Variable Frequency Driver (VFD) with minimum power capacity of 85 kW with filter	nb	1.00		
2.1403	Low voltage cable 1x(3x95+50) mm²	lin.m	930.00		
2.1404	Low voltage cable 1x(3x185+90) mm²	lin.m	50.00		
2.1405	Power meter for each pump and electrical power source, (EDL, Generator) Power meter shall be equipped with Modbus communication	nb	3.00		
2.1406	UPS system, 1kva capacity, power autonomy at least 10 hrs with 70% depth of discharge of batteries with all necessary accessories	nb	1.00		
2.1407	Grounding system - Lightning & Surge Protections	LS	1.00		
2.1408	Electric accessories (cables, Lugs, clamps, connectors, conduits, cable trays, insulation, junction boxes ...)	LS	1.00		
	Sub -Total 2.1400				
2.1500	Instrumentation and Control				
2.1501	450 m deep well piezoresistive Level measurement	nb	1.00		
2.1502	Piezoresistive level measurement at reservoir	nb	2.00		
2.1503	Piezoresistive pressure measurement	nb	4.00		
2.1504	450 m water level protection system with 3 electrodes and relay	nb	1.00		
2.1505	Temperature measurement for well pump	nb	1.00		
2.1506	Telemetry cable	lin.m	2,762.00		
2.1507	Flow measurement DN 80 PN40	nb	1.00		
2.1508	Flow switch DN13 PN 40	nb	1.00		
2.1509	Glycerine filled manometer Ø 100 with 3 way valve caliber 40	nb	2.00		
2.1510	Mimic panel	nb	1.00		
2.1511	Control accessories (PLC, RTU, programming, transmission cables, etc...)	LS	1.00		
	Sub -Total 2.1500				
2.1600	Domestic Plumbing and drainage system	LS	1.00		
	Sub -Total 2.1600				
2.1700	Fire extinguishers	LS	1.00		
	Sub -Total 2.1700				
2.1800	Electrical installation for buildings	LS	1.00		
	Sub -Total 2.1800				
2.1900	Training, Testing and Commissioning	LS	1.00		
	Sub -Total 2.1900				
2.2000	Preparation of O&M Manuals and Detailed As-Built Drawings	LS	1.00		
	Sub -Total 2.2000				
	Total BILL B - DEIR NBOUH ELECTROMECHANICAL EQUIPMENT AND WORK				

SUMMARY BILL B

SUMMARY BILL B

BILL	DESCRIPTION	TOTAL AMOUNT USD
BILL B	BEINO ELECTROMECHANICAL EQUIPMENT AND WORK	
BILL B	DEIR NBOUH ELECTROMECHANICAL EQUIPMENT AND WORK	
GRAND TOTAL		

BILL C

TRANSMISSION PIPELINES

BILL C BEINO TRANSMISSION PIPELINE

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
3.0000	General				
3.0001	Site Topographic Survey	km	0.04		
3.0002	Trial pit not exceeding 3m depth	nb	1.00		
3.0003	Trial trench not exceeding 3m depth	lin.m	1.00		
3.0004	As-built drawings	km	0.04		
	Sub-Total 3.0000				
3.1000	Pipeworks				
3.1100	Supply of preferred C-Class ductile iron pipes including all necessary fittings (bends, tees, reducers, flanges, etc...)				
3.1102	Supply of 150 mm pipes	lin.m	42.00		
	Sub-Total 3.1100				
3.1200	Supply of HDPE pipes including all necessary fittings (bends, tees, reducers, flanges, etc...)				
3.121	Supply of PE100 - PN16 HDPE pipes				
3.1211	Supply of 63 mm pipes for telemetry ducts (tel.)	lin.m	42.00		
	Sub-Total 3.1200				
3.1300	Trench excavation				
3.1303	Trench excavation for 150 mm DI pipes	lin.m	42.00		
	Sub-Total 3.1300				
3.1400	Sand bedding and surrounds				
3.1403	Sand bedding for 150 mm DI pipes	lin.m	42.00		
	Sub-Total 3.1400				
3.1500	Laying of ductile iron pipes				
3.1503	Laying of 150 mm pipes	lin.m	42.00		
	Sub-Total 3.1500				

BILL C BEINO TRANSMISSION PIPELINE

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
3.1700	Backfilling of trenches on other roads including compaction and testing				
3.1703	Backfilling for 150 mm DI pipes	lin.m	42.00		
	Sub-Total 3.1700				
	Sub-Total 3.1000				
3.2000	Hydraulic Accessories				
3.2300	Supply and installation of washouts				
3.2303	Washout PN16, DN 80 mm	nb	1.00		
	Sub-Total 3.2300				
3.2600	Supply and installation of connections to existing Boreholes				
3.2601	Connection to existing borehole	nb	1.00		
	Sub-Total 3.2600				
	Sub-Total 3.2000				
3.3000	Valve chambers and Surface box units				
3.3100	Construction of pre-cast or cast in situ, concrete valve chamber (excluding cover and frame)				
3.3102	Valve chamber internal size 150 x 150 cm x cm	nb	1.00		
	Sub-Total 3.3100				
3.3200	Valve chamber cover				
3.3201	Valve chamber cover Grade A	nb	1.00		
	Sub-Total 3.3200				
3.3300	Surface box units for washouts and service connections				
3.3301	Supply and installation of surface box unit	nb	1.00		
	Sub-Total 3.3300				
	Sub-Total 3.3000				

BILL C BEINO TRANSMISSION PIPELINE

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
3.4000	Concrete works				
3.4001	Mass concrete - Class C20 for blinding	cu.m	1.00		
3.4002	Reinforced concrete - Class C25 for pipe supports, thrust blocks, anchors, pipe bedding and surround at river crossing.	cu.m	10.00		
	Sub-Total 3.4000				
3.6000	Testing and commissioning of potable water pipes				
3.6009	Testing and commissioning of 150 mm DI pipes	lin.m	42.00		
	Sub-Total 3.6000				
	Total BILL C BEINO TRANSMISSION PIPELINE				

BILL C - LIFT LINE WORKS -DEIR NBOUH WELL PUMPING STATION

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
3.0000	General				
3.0001	Site Topographic Survey	km	2.68		
3.0002	Trial pit not exceeding 3m depth	nb	25.00		
3.0003	Trial trench not exceeding 3m depth	lin.m	50.00		
3.0004	As-built drawings	km	2.68		
	Sub-Total 3.0000				
3.1000	Pipeworks				
3.1100	Supply of ductile iron K9 pipes including all necessary fittings (bends, tees, reducers, flanges, etc...)				
3.1101	Supply of 100 mm pipes	lin.m	2,676.00		
	Sub-Total 3.1100				
3.1200	Supply of HDPE pipes including all necessary fittings (bends, tees, reducers, flanges, etc...)				
3.1211	Supply of 63 mm pipes for telemetry ducts (tel.)	lin.m	2,676.00		
	Sub-Total 3.1200				
3.1300	Trench excavation				
3.1301	Trench excavation for 2 pipes: 100 mm DI and 63 mm HDPE (tel.) pipes	lin.m	2,676.00		
	Sub-Total 3.1300				
3.1400	Sand bedding and surrounds				
3.1401	Sand bedding for 2 pipes: 100 mm DI and 63 mm HDPE (tel.) pipes	lin.m	2,676.00		
	Sub-Total 3.1400				
3.1500	Laying of ductile iron pipes				
3.1501	Laying of 100mm pipes	lin.m	2,676.00		
	Sub-Total 3.1500				
3.1600	Laying of HDPE pipes				
3.1601	Laying of 63 mm PE80 - PN16 HDPE (tel.) pipes.	lin.m	2,676.00		
	Sub-Total 3.1600				
3.1700	Backfilling of trenches roads including compaction and testing				
3.1701	Backfilling of trenches for 2 pipes: 100 mm DI and 63 mm HDPE (tel.) pipes.	lin.m	2,676.00		
	Sub-Total 3.1700				
	Sub-Total 3.1000				

BILL C - LIFT LINE WORKS -DEIR NBOUH WELL PUMPING STATION

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
3.2000	Accessories				
3.2100	Supply and installation of air release valves				
3.2101	Anti-shock double (3F) air release valve including GV PN16, DN50*9 mm (anti-hammer orifice factory calibrated to a maximum of 9 mm)	nb	1.00		
3.2102	Anti-shock double (3F) air release valve including GV PN25, DN50*6 mm (anti-hammer orifice factory calibrated to a maximum of 6 mm)	nb	1.00		
3.2103	Anti-shock double air release valve including GV PN40, DN 60 mm	nb	2.00		
	Sub-Total 3.2100				
3.2300	Supply and installation of washouts				
3.2301	Washout PN25, DN 80 mm	nb	1.00		
	Sub-Total 3.2300				
3.2400	Supply and installation of check valve and bypass				
3.2401	Check valve DN100, PN25 with DN20 bypass	nb	1.00		
	Sub-Total 3.2400				
3.2800	Supply and installation of connections to existing structures				
3.2801	Connection to existing reservoir	nb	1.00		
	Sub-Total 3.2800				
	Sub-Total 3.2000				
3.3000	Valve chambers and Surface box units				
3.3100	Construction of pre-cast or cast in situ, concrete valve chamber (excluding cover and frame)				
3.3105	Draw-pit for telemetry ducts size 60 x 60 cm x cm	nb	32.00		
3.3101	Valve chamber internal size 125 x 100 cm x cm	nb	3.00		
3.3102	Valve chamber internal size 150 x 150 cm x cm	nb	1.00		
3.3104	Valve chamber internal size 225 x 150 cm x cm	nb	1.00		
	Sub-Total 3.3100				
3.3200	Valve chamber cover				
3.3201	Valve chamber cover Grade A	nb	37.00		
	Sub-Total 3.3200				
3.3300	Surface box units for washouts and service connections				
3.3301	Supply and installation of surface box unit	nb	1.00		
	Sub-Total 3.3300				
	Sub-Total 3.3000				

BILL C - LIFT LINE WORKS -DEIR NBOUH WELL PUMPING STATION

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
3.4000	Concrete works				
3.4001	Mass concrete - Class C20 for blinding	cu.m	10.00		
3.4002	Reinforced concrete - Class C25 for pipe supports, thrust blocks, anchors, pipe bedding and surround at river crossing.	cu.m	10.00		
3.4003	Reinforced concrete - Class C25 for pipe anchors, supports, protection slabs, thrust blocks, drainage and irrigation channels	cu.m	30.00		
	Sub-Total 3.4000				
3.6000	Testing and commissioning of potable water pipes				
3.6008	Testing and commissioning of 100 mm DI pipes	lin.m	2,676.00		
	Sub-Total 3.5000				
3.7000	Road Reinstatement				
3.7100	Cutting				
3.7101	Cutting of paved roads for water pipes	lin.m	2,475.00		
3.7102	Cutting, breaking-out and removal of concrete pavement or stairs for water pipes	sq.m	25.00		
	Sub-Total 3.7100				
3.7200	Reinstatement				
3.7201	Reinstatement of paved roads including recutting works	sq.m	2,570.00		
3.7201	Reinstatement of concrete pavement or stair cases for water pipes, including base, sub-base courses and concrete	sq.m	25.00		
	Sub-Total 3.7200				
	Sub-Total 3.7000				
	TOTAL OF DEIR NBOUH LIFT LINE WORKS				

SUMMARY BILL C

SUMMARY BILL C

BILL	DESCRIPTION	TOTAL AMOUNT USD
BILL C	BEINO PUMPING STATION AND WATER TOWER (CAPACITY 300 m3)	
BILL C	DEIR NBOUH BOREHOLE AND PUMPING STATION	
GRAND TOTAL		

BILL D

DISTRIBUTION NETWORKS

BILL D - BEINO DISTRIBUTION NETWORK

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
3.0000	General				
3.0001	Site Topographic Survey	km	3.44		
3.0002	Trial pit not exceeding 3m depth	nb	18.00		
3.0003	Trial trench not exceeding 3m depth	lin.m	52.00		
3.0004	As-built drawings	km	3.44		
	Sub-Total 3.0000				
3.1000	Pipeworks				
3.1100	Supply of preferred C-Class ductile iron pipes including all necessary fittings (bends, tees, reducers, flanges, etc...)				
3.1103	Supply of 200 mm pipes	lin.m	114.00		
	Sub-Total 3.1100				
3.1200	Supply of HDPE pipes including all necessary fittings (bends, tees, reducers, flanges, etc...)				
	Supply of PE100 - PN16 HDPE pipes				
3.1201	Supply of 63 mm pipes for distribution (dis.)	lin.m	3,323.00		
	Sub-Total 3.1200				
3.1300	Trench excavation				
3.1301	Trench excavation for service connections	lin.m	933.00		
3.1302	Trench excavation for pipes not exceeding 110 mm in diameter	lin.m	3,323.00		
3.1304	Trench excavation for 200 mm DI pipes	lin.m	114.00		
	Sub-Total 3.1300				
3.1400	Sand bedding and surrounds				
3.1401	Sand bedding for service connections	lin.m	933.00		
3.1402	Sand bedding for pipes not exceeding 110 mm in diameter	lin.m	3,323.00		
3.1404	Sand bedding for 200 mm DI pipes	lin.m	114.00		
	Sub-Total 3.1400				

BILL D - BEINO DISTRIBUTION NETWORK

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
3.1500	Laying of ductile iron pipes				
3.1504	Laying of 200 mm pipes	lin.m	114.00		
	Sub-Total 3.1500				
3.1600	Laying of HDPE pipes				
	Laying of PE10 - PN16 HDPE pipes				
3.1601	Laying of 63 mm pipes	lin.m	3,323.00		
	Sub-Total 3.1600				
3.1700	Backfilling of trenches on other roads including compaction and testing				
3.1701	Backfilling of trenches for service connections	lin.m	933.00		
3.1702	Backfilling of trenches on main roads for pipes not exceeding 110 mm in dia.	lin.m	3,323		
3.1704	Backfilling for 200 mm DI pipes	lin.m	114.00		
	Sub-Total 3.1700				
	Sub-Total 3.1000				
3.2000	Hydraulic Accessories				
3.2100	Supply and installation of air release valves				
3.2101	Single air release valve including isolating GV PN16, DN 40 mm	nb	5.00		
	Sub-Total 3.2100				
3.2200	Supply and installation of isolating/ gate valves (including bolts, nuts, dismantling joints, etc..).				
3.2201	Gate valve PN16, DN 50 mm	nb	7.00		
3.2202	Gate valve PN16, DN 80 mm	nb	2.00		
	Sub-Total 3.2200				
3.2300	Supply and installation of washouts				
3.2301	Washout PN16, DN 40 mm	nb	5.00		
3.2302	Washout PN16, DN 60 mm	nb	1.00		
3.2304	Washout PN16, DN 100 mm	nb	1.00		
	Sub-Total 3.2300				

BILL D - BEINO DISTRIBUTION NETWORK

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
3.2500	Supply and Installation of fire hydrants				
3.2501	Fire Hydrant PN 16	nb	1.00		
	Sub-Total 3.2500				
3.2700	Supply and installation of connections to existing Pipelines				
3.2701	Connection to existing pipelines	nb	2.00		
	Sub-Total 3.2700				
3.2900	Bridge Crossing				
3.2901	Bridge Crossing including clamps,etc...	nb	1.00		
	Sub-Total 3.2900				
	Sub-Total 3.2000				
3.3000	Valve chambers and Surface box units				
3.3100	Construction of pre-cast or cast in situ, concrete valve chamber (excluding cover and frame)				
3.3101	Valve chamber internal size 125 x 100 cm x cm	nb	5.00		
3.3102	Valve chamber internal size 150 x 150 cm x cm	nb	6.00		
3.3103	Valve chamber internal size 175 x 150 cm x cm	nb	2.00		
3.3104	Valve chamber internal size 200 x 150 cm x cm	nb	3.00		
	Sub-Total 3.3100				
3.3200	Valve chamber cover				
3.3201	Valve chamber cover Grade A	nb	16.00		
	Sub-Total 3.3200				
3.3300	Surface box units for washouts and service connections				
3.3301	Supply and installation of surface box unit	nb	61.00		
	Sub-Total 3.3300				
	Sub-Total 3.3000				

BILL D - BEINO DISTRIBUTION NETWORK

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
3.4000	Concrete works				
3.4001	Mass concrete - Class C20 for blinding	cu.m	6.00		
3.4002	Reinforced concrete - Class C25 for pipe supports, thrust blocks, anchors, pipe bedding and surround at river crossing.	cu.m	31.00		
	Sub-Total 3.4000				
3.5000	Service connections				
3.5100	Supply and Installation of HDPE Pipes				
3.5101	HDPE pipe PN16, nominal OD 20 mm	lin.m	914.00		
3.5102	HDPE pipe PN16, nominal OD 25 mm	lin.m	19.00		
	Sub-Total 3.5100				
3.5200	Supply and Installation of tapping collars				
3.5201	Tapping Collar, OD63mm	nb	52.00		
3.5201	Tapping Collar, OD90mm	nb	2.00		
	Sub-Total 3.5200				
3.5300	Supply and Installation of stop valves				
3.5301	Stop valve PN16, DN 20 mm	nb	53.00		
3.5302	Stop valve PN16, DN 25 mm	nb	1.00		
	Sub-Total 3.5300				
3.5400	Supply and Installation of ball valves				
3.5401	Ball valve PN16, DN 20 mm	nb	106.00		
3.5402	Ball valve PN16, DN 25 mm	nb	2.00		
	Sub-Total 3.5400				
3.5500	Supply and Installation of water meters				
3.5501	Water meter PN16, DN 20 mm	nb	53.00		
3.5502	Water meter PN16, DN 25 mm	nb	1.00		
	Sub-Total 3.5500				

BILL D - BEINO DISTRIBUTION NETWORK

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
3.5600	Supply and Installation of check valves				
3.5601	Check valve PN16, DN 20 mm	nb	53.00		
3.5602	Check valve PN16, DN 25 mm	nb	1.00		
	Sub-Total 3.5600				
3.5700	Supply and Installation of water meters boxes				
3.5701	Boxes for 1 watermeter	nb	35.00		
3.5702	Boxes for 2 watermeters	nb	15.00		
3.5703	Boxes for 4 watermeters	nb	3.00		
3.5704	Boxes for 6 watermeters	nb	1.00		
	Sub-Total 3.5700				
	Sub-Total 3.5000				
3.6000	Testing and commissioning of potable water pipes				
3.6001	Testing and commissioning of service connections	nb	54.00		
3.6002	Testing and commissioning of 63 mm HDPE pipes	lin.m	3,323.00		
3.6010	Testing and commissioning of 200 mm DI pipes	lin.m	114.00		
	Sub-Total 3.6000				
3.7000	Road Reinstatement				
3.7100	Cutting				
3.7101	Cutting of paved roads for water pipes	lin.m	4,256.00		
3.7102	Cutting, breaking-out and removal of concrete pavement or stairs for water pipes	sq.m	69.00		
	Sub-Total 3.7100				
3.7200	Reinstatement				
3.7201	Reinstatement in one layer of other paved roads including recutting works	sq.m	3,480.15		
3.7201	Reinstatement of concrete pavement or stair cases for water pipes, including base, sub-base courses and concrete	sq.m	103.50		
	Sub-Total 3.7200				
	Sub-Total 3.7000				
	Total BILL D - BEINO DISTRIBUTION NETWORK				

SUMMARY BILL D

SUMMARY BILL D

BILL	DESCRIPTION	TOTAL AMOUNT USD
BILL D	BEINO DISTRIBUTION NETWORK	
GRAND TOTAL		

BILL E

BOREHOLES

BILL E- BEINO BOREHOLE WORKS

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
4.0000	General				
4.0100	Site preparation and set up borehole drilling unit and later dismantle	L.S	1.00		
	Sub-Total 4.0000				
4.1000	Drilling by rotary				
4.1600	Drilling at nominal diameter 9.88"	lin.m	100.00		
	Sub-Total 4.1100				
4.2000	Well construction				
4.2700	Supply, transport and install 8" black steel Liner slotted screens 6mm thick including conical adaptor	lin.m	100.00		
	Sub-Total 4.2000				
4.3000	Verticality and alignment tests				
4.3100	Carry out verticality and alignment tests	L.S	1.00		
	Sub-Total 4.3000				
4.5000	Well Development				
4.5100	Supply, install and remove test pumping unit (15 l/s, depth 180m) and all associated equipment including discharge pipeline	nb	1.00		
4.5200	Pumping and surging at different rates	hr	16.00		
4.5300	Supervise development test	L.S	1.00		
	Sub-Total 4.5000				

BILL E- BEINO BOREHOLE WORKS

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
4.6000	Well Testing				
4.6100	Step drawdown test	hr.	16.00		
4.6200	Water level recovery measurements	hr.	16.00		
4.6300	Constant rate test	hr.	72.00		
4.6400	Water level recovery measurements	hr.	24.00		
	Sub-Total 4.6000				
4.7000	Water Analysis				
4.7100	Collection and delivery of water samples to an approved laboratory	nb	6.00		
4.7200	Physico-chemical analysis	nb	3.00		
4.7300	Bacteriological analysis	nb	3.00		
	Sub-Total 4.7000				
4.8000	Reports				
4.8100	Detailed daily reports	L.S	1.00		
4.8200	Final well report	nb	1.00		
	Sub-Total 4.8000				
	Total BILL E- BEINO BOREHOLE WORKS				

BILL E- DEIR NBOUH BOREHOLE WORKS

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
4.0000	Site Preparation				
4.0100	Site preparation and set up borehole drilling unit and later dismantle	L.S	1.00		
	Sub-Total 4.0000				
4.1000	Drilling by rotary				
4.1100	Drilling at nominal diameter 22"	lin.m	20.00		
4.1200	Drilling at nominal diameter 17 1/2"	lin.m	130.00		
4.1300	Drilling at nominal diameter 14 3/4"	lin.m	200.00		
4.1400	Drilling at nominal diameter 12 1/4"	lin.m	150.00		
	Sub-Total 4.1000				
4.2000	Well construction				
4.2100	Supply, transport and install 18" black steel casing 5mm thick	lin.m	20.00		
1.2200	Supply, transport and install 15.5" black steel casing 5mm thick	lin.m	150.00		
1.2300	Supply, transport and install 12.5" carbon steel casing 6mm thick	lin.m	350.00		
1.2500	Supply, transport and install 10" carbon steel casing 6mm thick	lin.m	400.00		
1.2600	Supply, transport and install 10" carbon steel bridge slotted screens 6mm thick	lin.m	100.00		
	Sub-Total 4.2000				
4.3000	Verticality and alignment tests				
4.3100	Carry out verticality and alignment tests	LS	1.00		
	Sub-Total 4.3000				
4.4000	Grouting				
4.4100	Supply and transport cement	kg	2200.00		
4.4200	Pump cement in annular space	lin.m	20.00		
	Sub-Total 4.4000				
4.5000	Well Development				
4.5100	Supply, install and remove test pumping unit (8 l/s, depth 480m) and all associated equipment including discharge pipeline	nb	1.00		
4.5200	Pumping and surging at different rates	hr.	16.00		
4.5300	Supervise development test	LS	1.00		
	Sub-Total 4.5000				
4.6000	Well Testing				
4.6100	Step drawdown test	hr.	16.00		
4.6200	Water level recovery measurements	hr.	16.00		
4.6300	Constant rate test	hr.	72.00		
4.6400	Water level recovery measurements	hr.	24.00		
	Sub-Total 4.6000				

BILL E- DEIR NBOUH BOREHOLE WORKS

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
4.7000	Water Analysis				
4.7100	Collection and delivery of water samples to an approved laboratory	nb	6.00		
4.7200	Physico-chemical analysis	nb	3.00		
4.7300	Bacteriological analysis	nb	3.00		
	Sub-Total 4.7000				
4.8000	Reports				
4.8100	Detailed daily reports	L.S	1.00		
4.8200	Final well report	nb	1.00		
	Sub-Total 4.8000				
	Total BILL E- DEIR NBOUH BOREHOLE WORKS				

SUMMARY BILL E

SUMMARY BILL E

BILL	DESCRIPTION	TOTAL AMOUNT USD
BILL E	BEINO BOREHOLE WORKS	
BILL E	DEIR NBOUH BOREHOLE WORKS	
GRAND TOTAL		

BILL F

SOLAR ENERGY

BILL F - BEINO SOLAR ENERGY EQUIPMENT AND WORKS (OPTIONAL)

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE USD	TOTAL AMOUNT USD
5.0000	Solar Energy Equipment and Works				
5.0001	PV Generator 83.4 kWp PV Generator (139 PV panel.S of 600W each), comprising of Tier 1 monocrystalline N panel.S, Along with UV resistant DC Cables for string connectivity to combiner box and between structures, connectors, sockets and plugs	L.S	1.00		
5.0002	PV Alluminum Profile Rails and connectors for mounting PV modules on structure	L.S	1.00		
5.0003	Module equipotential Bonding with main structure	L.S	1.00		
5.0005	Chlorination Pump Controller, 2kW, Single Phase MPPT DC input	nb	1.00		
5.0006	Communication module for remote monitoring and management To enable remote monitoring and control of the stored data in the Solar Pump Controllers	nb	2.00		
5.0007	Automatic Remote Diesel Generator Switching Device. This device shall automatically and remotely start and stop the diesel generator, and shall connect to the pump controller and to the remote switch input of the diesel generator	nb	1.00		
5.0008	Irradiation Controlled Switch. To be used for controlling switching depending on the solar intensity.	nb	1.00		
5.0009	Pressure Switch. Used to detect storage water levels	nb	1.00		
5.0010	Surge Protection Device (SPD) Type II for DC side	nb	2.00		
5.0011	Surge Protection Devices (SPDs). SPDs Type I + II to protect AC Side, Din Rail Mount	nb	2.00		
5.0012	AC Circuit Breaker 10A, 4 Pole, 240/ 415 Vac	nb	4.00		
5.0013	AC Circuit Breaker 100A, 3 Pole, 240/ 415 Vac	nb	2.00		
5.0014	AC Cable, Cu, 2x6mm2, PVC insulation	m	25.00		
5.0015	AC Cable, Cu, 4x10mm2, PVC insulation	m	25.00		
5.0016	AC Cable, Cu, 4x50mm2, PVC insulation	m	25.00		
5.0017	DC Combiner Box 8 inputs, 1000V with integrated 20A DC fuses and DC disconnect	nb	1.00		
5.0018	Site Earthing system works and equipotential bonding for modules and structures	L.S	1.00		
5.0019	Electric accessories for termination and control, cable lugs, connectors, cabinets, ducting works, DC and AC accessories required for adequate integration.	L.S	1.00		
5.0020	Off-Grid inverter 2000W Nominal output, 5000W DC nominal input. Allows connection of LI battery bank with convenient communication with BMS.	nb	1.00		
5.0021	Battery bank storage for offgrid application: 10kWp, Lithium ion battery with integrated BMS; @ 90% DoD; with connectors, fuses and protection requirements	nb	1.00		
5.0022	System testing prior to commissioning.	L.S	1.00		
5.0023	Project Management & Execution Installation, Commissioning, validation & verification, training & Handover	L.S	1.00		
	Total BILL F - BEINO SOLAR ENERGY EQUIPMENT AND WORKS (OPTIONAL)				

SUMMARY BILL F

SUMMARY BILL F

BILL	DESCRIPTION	TOTAL AMOUNT USD
BILL F	BEINO SOLAR ENERGY EQUIPMENT AND WORKS	
GRAND TOTAL		

SUMMARY

SUMMARY

BILL	DESCRIPTION	TOTAL AMOUNT USD
BILL A	CIVIL WORKS	
BILL B	ELECTROMECHANICAL WORKS	
BILL C	TRANSMISSION PIPELINE	
BILL D	DISTRIBUTION NETWORK	
BILL E	BOREHOLES	
BILL F	SOLAR ENERGY	
GRAND TOTAL		