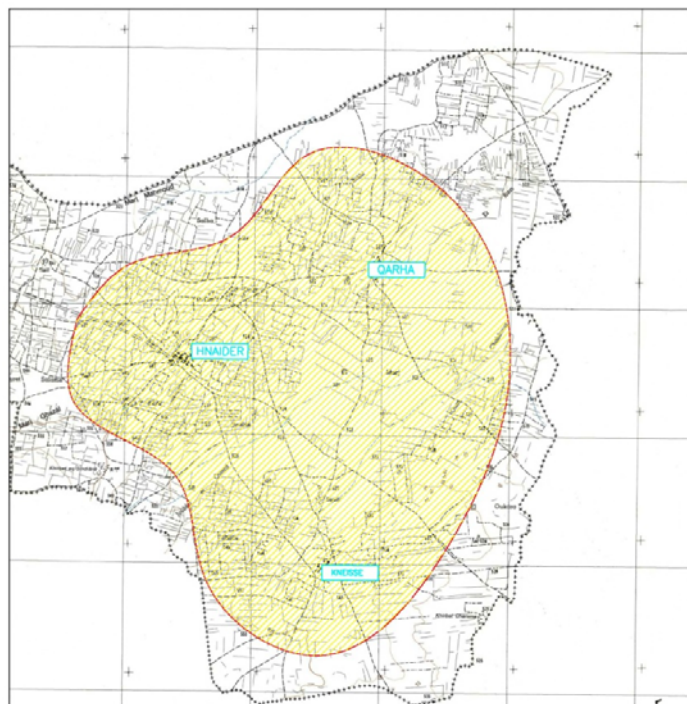


REPUBLIC OF LEBANON
MINISTRY OF ENERGY AND WATER
UNITED NATIONS DEVELOPMENT PROGRAMME

**FEASIBILITY ASSESSMENT AND DESIGN OF A
WASTEWATER MANAGEMENT SYSTEM IN
AL AMAYER-WADI KHALED**

(KNAISSE VILLAGE)



VOLUME 5
BILL OF QUANTITIES

- Part A – Preamble to Bill of Quantities
- Part B – Bill of Quantities

APRIL 2016

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PART A

PREAMBLE TO BILL OF QUANTITIES

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1. GENERAL

The clauses contained in this preamble relate to the bill of quantities for the wastewater collection and conveyance systems including gravity sewers and septic tank.

The Bill of Quantities (BOQ) 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) 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.

The Bill of Quantities is to be read in conjunction with other Contract Documents, which shall be taken as mutually explanatory.

The general directions and descriptions of work given in the specification and the drawings are not necessarily repeated in the bill of quantities. Reference must be made to the specification and the drawings for such information which shall be deemed to be included in the bill of quantities.

The unit price of any item in the Bill of Quantities shall include all costs for:

- Any temporary works necessary to maintain traffic.
- Mobilization, demobilization and reinstatement.
- Materials, wages, bonus and travel expenses.
- Transportation.
- Medical welfare, importation, repatriation, boarding and lodging payments for employees.
- Necessary tools, equipment and plant.
- Scaffolding and other temporary works for civil engineering works.
- Safety measures.
- General cleaning and complementary works.
- Insurance, bonds and similar expenses.
- Supplying of water, drainage, electricity and telephone.
- Testing and third party certificate.
- Contractor's general overheads and profit.
- Establishment of Contractor's and sub-Contractor's temporary site office complex, work yards, stores, project signboards, car-parks and hoarding.
- Repair of the works during the maintenance period.
- Civil works such as excavation, backfilling, supports, frames, making holes, openings ... etc.
- The prices of the pipes include all fittings.
- etc.

The above listing of the Tenderer's overheads is only indicative and it shall not be deemed to be complete. Unit prices shall include for all hidden and unforeseen contractual expenses.

The quantities set out in the bill of quantities are estimated quantities of the work and not to be taken as the actual quantities of the works to be executed by the Contractor in fulfillment of his obligations under the contract.

The cost of any work, material...etc, that is required to ensure the satisfactory function of any item listed in the BOQ in accordance with the specifications shall be deemed to be included in the price of that item.

All information given for the guidance of the Tenderer whether on the drawings elsewhere in the Tender Documents or in this Bill of Quantities is to be considered as indicative only without guarantee of accuracy or compliance. Therefore, the inspection of the sites of the works is a must and the obtaining of all relevant information before tendering, specially regarding the positions, sizes, numbers and details of all obstacles where hidden or not, and also the nature of the terrain and ground conditions.

2. ITEM DESCRIPTIONS

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.

3. DEFINITIONS OF BILL OF QUANTITIES CATEGORIES

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

Wastewater Gravity Sewers including septic tank:

- General.
- Pipeworks.
- Manholes.
- Testing and Commissioning.
- Miscellaneous Items.
- Septic tank.

4. GENERAL

4.1 SITE 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 stakes shown on drawings, using steel pegs and high quality paint. Distance between two pegs shall not exceed 30m.

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 shall be 1/200 and horizontal scale 1/2000 for lift lines.

Vertical scale shall be 1/100 and horizontal scale 1/1000 for gravity lines.

Measurement of topographic survey shall be in horizontal kilometers.

4.2 TRIAL PIT

Trial pits shall be measured by number and shall include for excavation in any material 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.

4.3 TRIAL TRENCH

Trial trenches shall be measured by linear meters and shall include for all requirements as stipulated in item "Trial pit" above. Payment will only be made for trial trenches ordered in writing by the Engineer.

4.4 AS-BUILT DRAWINGS

As-built drawings shall be measured by horizontal kms 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 invert level and depth of pipe and distance between pipe axis and carriage edge or sidewalk, and between manhole cover center 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 utilities should be also submitted.

Payment shall only be made for as-built drawings approved by the Engineer and submitted on paper, and these records shall also be submitted on electronic media using Computer Aided Design (CAD) and Geographic Information System (GIS) Softwares, which is compatible with the systems used by the Employer and Engineer.

5. PIPEWORKS

The Pipework category of the Bill of Quantities shall include the prices for supply and transport to site of pipes and fittings for gravity and sewer lines, supply, transport and installation of supplementary equipment, trench excavation (of all kind of soil and rocks, etc) including dewatering, sand bedding and surrounds, reinforced concrete and concrete bedding and surrounds, laying of pipes, backfilling of trenches below paved roads, concrete roads and in open areas including supply and laying of indicator tapes.

5.1 SUPPLY OF PIPES INCLUDING ALL NECESSARY FITTINGS

Pipes shall be classified for payment according to diameter and shall be measured in linear meters measured along the crown of the pipeline and shall include but not be limited to:

- Supply of pipes.
- All fitting bends, tees, reducers dismantling joints, flanges, 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.

5.2 TRENCH EXCAVATION

Trench excavation shall include for excavation in all kind of soils (including rocks, etc...), dewatering of the trench using all necessary equipments, any extra excavation depth carried out as shown on the longitudinal profiles or under the direction of the Engineer, transporting of unsuitable materials to disposal sites approved by the Engineer, all kind of supporting of the trench, removing of existing sewers, removing remaining excavate materials and all debris from roads, and shall be measured by linear meter along the pipelines in function of trench type Ti-Hj.

5.3 SAND BEDDING AND SURROUNDS

Sand bedding and surrounds shall include for supply of sand, filling and compaction where the pipelines are above water table and shall be measured by linear meter along the pipelines in function of pipe diameter. The same price will be used to realize gravel bedding and surrounds for pipelines below water table.

5.4 REINFORCED CONCRETE BEDDING AND SURROUNDS

Reinforced concrete bedding and surrounds shall include concrete, reinforcement and formwork and shall be measured by linear meter according to pipe diameter and according to the dimensions shown in the standard drawings.

5.5 LAYING OF PIPES

Laying of pipes shall be classified for payment according to pipe diameter and shall be measured by linear meter along the center line of the pipe and 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.
- All necessary types of jointing.
- Checking pipe alignment and elevation using topographical instruments.

Only pipes actually laid, jointed and accepted by the Engineer shall be taken into account for payment.

5.6 BACKFILLING OF TRENCHES

Backfilling of trenches shall be measured by linear meter along the pipelines in function of trench type Ti-Hj and shall include among others (supply of suitable material, filling in layers and compaction, testing and compaction etc...) the supply and lay of indicator (warning) tapes for trenches below paved roads and in open areas.

6. MANHOLES

The Manholes category of the Bill of Quantities shall include construction of pre-cast or cast in situ concrete manholes, (works include excavation, dewatering, blinding, formwork, concrete, reinforcement, backfill, step iron or galvanized steel ladder inside manhole, benching, asphalt coating, pipes connection, all work described in general specifications, drawings and particular specifications and all other related works excluding cover and frame), extra over for external drop manholes, chambers for house connections if required, and manholes covers, and frames (supply, transport and installation).

6.1 CONSTRUCTION OF PRE-CAST OR CAST IN SITU CONCRETE MANHOLES

Manhole where not included in another item shall be measured by unit according to manhole type and shall include for excavation, dewatering, blinding formwork, concrete, reinforcement, rendering, external damp-proofing, painting, backfilling, step irons access ladders, compacted gravel, sub-base and base layers, asphalt, etc.. and all items necessary to make a complete manhole.

The manhole cover and frame shall be measured by unit separately.

6.2 EXTRA OVER FOR EXTERNAL DROP MANHOLES

The extra-over for the drop manhole will be measured by unit and paid separately according to the manhole type and the standard drawings.

6.3 MANHOLE COVER AND FRAME

Manhole cover and frame shall be measured by unit and shall include all necessary materials and equipment including supply, installation, labours, painting ...etc, in order to get an installed cover and frame according to the specifications.

7. TESTING AND COMMISSIONING

Testing and commissioning shall include all necessary equipment and water to carry hydrostatic test and infiltration test for the pipelines and manholes below water table and shall be measured by linear meter of tested pipelines and by units for manholes and chambers accepted by the Engineer.

8. MISCELLANEOUS ITEMS

The Miscellaneous Items category of the Bill of Quantities shall include the prices for concrete works, road reinstatement, above ground pipe supports and house connections.

8.1 LATERAL CONNECTIONS

The price shall include the supply of all materials and equipment required and the construction of a 1m x 1m manhole with an approximate depth of 1m for lateral connections including but not limited to the following:

- Construction of the 1m x 1m x 1m manhole including formwork, concrete, reinforcement and all related works.
- Manhole cover and frame.
- Manhole testing.
- All related works as specified and shown on drawings and with full coordination with relevant authorities.

Moreover, the price shall cover all required materials and equipment to supply and lay a 200mm connecting pipe to the lateral manhole including but not limited to the following:

- Breaking out and reinstatement of existing paved surfaces.
- All necessary excavation in any type of soil.
- Supply and laying of the 200mm pipe connecting the lateral manhole to the sewer manhole with all related works.
- Testing the connecting pipe.
- Reinforced concrete bedding and surrounds
- Backfilling with selected excavated or imported fill materials.
- And all other related works, all as specified, shown on drawings, and with full coordination with relevant authorities.

Mass concrete Class C20 used for blinding shall include for excavation and reinstatement in any material, trimming and formwork and shall be measured by m³.

Mass concrete Class C25 for thrust blocks, pipe supports, anchors, river crossings shall include for concrete reinforcement, excavation and reinstatement in any material, trimming and formwork and shall be measured by m³.

Where additional concrete is ordered by the Engineer to replace unsuitable material, fill voids or otherwise increase the volume of concrete it shall be measured by volume and shall include excavation in any material, trimming, formwork and reinforcement.

8.2 ROAD REINSTATEMENT

Breaking out of bitumen or concrete surfaced roads shall be measured per linear meter along the pipelines and shall include:

- before excavation, cutting of the two sides of the trench.
- after excavation, and before reinstatement re-cutting of all damaged parts of the road during excavation.

Reinstatement of bitumen or concrete surfaced roads shall be measured per m² along the pipelines and shall include, but not by way of limitation for:

- Trench widening for chambers and other ancillary structures and fittings:
 - The removal and replacement of kerb stones, paving stones, street lamps, road signs, safety barriers and other street furniture and all other costs and charges in connection therewith;
 - Breaking out and of any form of foundation and subsequent restoration and reinstatement;
- Disposal of all surplus material.

It is to be noted that the width of the trench and the dimensions of the base, sub-base and wearing courses loggers will be taken as specified by the drawings and specifications to calculate the area of road reinstatement and any widening of the trench made by the Contractor without the approval of the Engineer will be reinstated by the Contractor at his own expenses.

9. SEPTIC TANK

The construction of the septic tank shall be paid on lump sum basis and shall include, but not limited to:

- Site topographic survey, site delimitation, leveling, clearing and soil investigation.
- Earthwork excavation, backfilling, compaction, cut and/or fill including supporting and dewatering.
- Foundation and concrete works (including joints, water stops, reinforcement...).
- Finishing and miscellaneous civil works including waterproofing, repairs...etc.
- Piping system and all related works.
- Supply and installation of access manholes covers and frames.

All necessary works not mentioned above and necessary works for a good finishing and exploitation of the septic tank should be included in the above-mentioned lump sum.

10. RATES AND PRICES

The Contractor shall be deemed to have inserted against each item in the Bill 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 it shall be deemed to be “nil” and measured accordingly. The term “included” or any such similar term shall be deemed to be nil.

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

11. MEASUREMENT

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

11.1 LUMP SUM

The lump sum items shall not be subject to remeasurement, and shall include all necessary equipment, construction, installation, testing and commissioning among others related to the pumping station. The lump sum entered in the Bill shall include for a complete installation as described in the specifications.

The prices shall include for all work necessary for the completion of the Works and shall include for all necessary building work such as forming box outs, support plinths, cable trenches, and the like and all necessary safety and access works including guards, handrails, fire fighting equipment and the like.

11.2 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 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.

12. VALUATIONS

Subject to the provisions of the Conditions of Contract, the Contractor shall value the Permanent Works executed at the rates in the Bill of Quantities.

13. COVERAGE

Where the Bill of Quantities does not include separate items for Contractor's Equipment, Temporary Works, labour and all associated costs, materials, goods and all associated goods, establishment charges, overheads and profit, all bonds and insurances, facilities for the Engineer and the like, the Contractor shall be deemed to have covered his obligations in these respects in the rates and prices for Permanent Works.

14. ABBREVIATIONS

The following abbreviations are used in the Bill of Quantities:

sq.	square	mm	millimeter
cu.	cubic	m	meter
#	number	km	kilometer
hr	hour	%	per cent
kg	kilogram	dia.	diameter
Prov. Sum	Provisional sum	ha	hectare
ND	Nominal diameter	lin.	linear
NP	Flange Pressure rating	EO	Extra Over
LS	Lump Sum	PI	Provisional Item

kW	kilowatt	BOQ	Bill of Quantities
m ³	Cubic meter	mo	Month
O&M	Operation & Maintenance	HVAC	Heating Ventilation & Air Conditioning

15. DEFINITION OF RANGE OF DIMENSIONS

A hyphen between two dimensions means a range of dimensions which includes all dimensions exceeding that preceding the hyphen but not exceeding that following the hyphen.

16. DEFINITIONS

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

- **Extra-Over**
Any “Extra-Over” 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 any items stated to be included within another item shall not be subject to measurement and their costs shall be deemed to be included within the rates of the billed item.

17. DEALING WITH WATER

Items in the Bills of Quantities especially excavation items shall be deemed to include for dealing with flows and keeping the works free of water, i.e. works includes dewatering and supporting of trenches for pipelines and dewatering and supporting of excavations for pumping stations buildings. Dewatering shall not be paid separately.

18. WATER AND POWER

Unless otherwise explicitly stated in the Contract, water and power for the purpose of constructing, cleaning, testing and commissioning the Works shall be provided by the Contractor, and shall not be measured nor paid separately.

19. SITE PREPARATION AND CLEARANCE

Site clearance, shall include removing and disposal of vegetation, undergrowth, bushes, hedges, trees, debris, trash and the like and subsequent reinstatement shall not be measured. Site clearance and subsequent reinstatement of additional working areas or access routes required by the Contractor shall not be measured. Site clearance and reinstatement of pipeline and sewer routes and easements shall be deemed to be included within the rates for pipework and shall not be measured.

20. ITEM NUMBERS

For convenience each item in the Bill of Quantities has been assigned an item number consisting of a maximum of 5 digits. The first digit identifies the section of the work. The item numbers

shall not be deemed to form part of the item description and shall not be taken into account in the interpretation of the Contract.

21. REFERENCES TO PREAMBLE IN THE BILL OF QUANTITIES

Item headings in the Bill of Quantities have been referenced to the appropriate section in the preamble. These references are only to facilitate pricing and in no way limits the obligations of the Contractor. Items should be priced fully inclusive of all the requirements mentioned in the preamble, drawings, specifications and elsewhere in the Contract.

22. 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 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 Engineer, as necessary for the Employer to obtain all necessary approvals.
- Liaison with third parties.
- 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.

PART B

BILL OF QUANTITIES

WASTEWATER MANAGEMENT SYSTEM IN AL AMAYER-WADI KHALED
VOLUME 5 - PART B - BILL OF QUANTITIES

SUMMARY OF BILL

SUMMARY	TOTAL PRICE IN LETTERS USD	TOTAL PRICE USD
GENERAL	OnlyUSD	
PIPEWORKS	OnlyUSD	
MANHOLES	OnlyUSD	
TESTING AND COMMISSIONING	OnlyUSD	
MISCELLANEOUS ITEMS	OnlyUSD	
SEPTIC TANK	OnlyUSD	
TOTAL	OnlyUSD	
TOTAL VAT	OnlyUSD	
GRAND TOTAL	OnlyUSD	

Signature.....

Date.....

KNAISSE VILLAGE

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE in USD	TOTAL AMOUNT in USD
A.1.000	General				
A.1.001	Site Topographic Survey	km	8.700		
A.1.002	Trial pit not exceeding 3m depth	nb	18.0		
A.1.003	Trial Trench not exceeding 3m depth	Lin.m	26.1		
A.1.004	As Built Drawings	km	8.7		
	Sub-Total A.1.000				
A.2.000	Pipeworks				
A.2.100	Supply of Pipes and fittings for gravity main and lateral sewers Material: (tender to select material from the specified ones in volume 3)				
A.2.101	Supply of 200 mm dia Pipes	Lin.m	7,600		
A.2.102	Supply of 300 mm dia Pipes	Lin.m	1,100		
	Sub-Total A.2.100				
A.2.200	Trench excavation				
A.2.201	Excavation of Trench Type T1-H1	Lin.m	5,960		
A.2.202	Excavation of Trench Type T1-H2	Lin.m	1,800		
A.2.203	Excavation of Trench Type T1-H3	Lin.m	460		
A.2.204	Excavation of Trench Type T1-H4	Lin.m	480		
	Sub-Total A.2.200				
A.2.300	Sand or gravel bedding and surrounds				
A.2.301	for 200 mm pipes	Lin.m	7,375		
A.2.302	for 300 mm pipes	Lin.m	600		
	Sub-Total A.2.300				
A.2.400	Reinforced concrete bedding and surrounds				
A.2.401	for 200 mm pipes	Lin.m	225		
A.2.402	for 300 mm pipes	Lin.m	500		
	Sub-Total A.2.400				
A.2.500	Laying of pipes				
A.2.501	Laying of 200 mm Dia pipes	Lin.m	7,600		
A.2.502	Laying of 300 mm Dia pipes	Lin.m	1,100		
	Sub-Total A.2.500				
A.2.600	Backfilling of trenches				
A.2.601	Backfilling of Trench Type T1-H1	Lin.m	5,960		
A.2.602	Backfilling of Trench Type T1-H2	Lin.m	1,800		
A.2.603	Backfilling of Trench Type T1-H3	Lin.m	460		
A.2.604	Backfilling of Trench Type T1-H4	Lin.m	480		
	Sub-Total A.2.600				
	Sub-Total A.2.000				

KNAISSE VILLAGE

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE in USD	TOTAL AMOUNT in USD
A.3.000	Manholes				
A.3.100	Construction of pre-cast or cast in situ concrete manholes The works include excavation, formwork, concrete, reinforcement, backfill, step iron or ladder inside manhole and all other related works (excluding cover)				
A.3.101	Manhole Type M1-H1 or C1-H1	Unit	200		
A.3.102	Manhole Type M1-H2 or C1-H2	Unit	49		
A.3.103	Manhole Type M1-H3 or C1-H3	Unit	16		
A.3.104	Manhole Type M1-H4 or C1-H4	Unit	12		
	Sub-Total A.3.100				
A.3.200	Extra over for external drop manholes :				
A.3.201	Manhole Type M1-H3	Unit	3		
A.3.202	Manhole Type M1-H4	Unit	6		
	Sub-Total A.3.200				
A.3.300	Manhole Cover & Frame				
A.3.301	Manhole cover & frame Grade A (heavy duty)	Unit	277		
	Sub-Total A.3.300				
	Sub-Total A.3.000				
A.4.000	Testing and Commissioning				
A.4.100	Sewer Lines & Microtunnels				
A.4.101	Testing & commissioning of 200 mm dia sewer lines	Lin.m	7,600		
A.4.102	Testing & commissioning of 300 mm dia sewer lines	Lin.m	1,100		
	Sub-Total A.4.100				
A.4.200	Testing & Commissioning of Manholes and Chambers				
A.4.201	Testing & Commissioning of manholes and chambers all types	Unit	277		
	Sub-Total A.4.200				
	Sub-Total A.4.000				
A.5.000	Miscellaneous Items				
A.5.100	Lateral connections				
A.5.101	Lateral connections	nb	125		
	Sub-Total A.5.100				
A.5.200	Road Reinstatement				
A.5.201	Cutting of paved roads for sewers	Lin.m	4,825		
A.5.202	Reinstatement of paved roads including base, sub-base and wearing courses	M2	7,000		
	Sub-Total A.5.200				
	Sub-Total A.5.000				

KNAISSE VILLAGE

ITEM Nb	DESCRIPTION	UNIT	QUANTITY	UNIT RATE in USD	TOTAL AMOUNT in USD
A.6.000	Waste Water Septic Tank				
A.6.100	Septic Tank				
	Construction, testing and all necessary works for a good finishing and exploitation of the septic tank				
A.6.101	Setic Tank	Unit	2		
	Sub-Total A.6.100				
	Sub-Total A.6.000				
	Summary				
A.1.000	General				
A.2.000	Pipeworks				
A.3.000	Manholes				
A.4.000	Testing and Commissioning				
A.5.000	Miscellaneous Items				
A.6.000	Septic Tank				
	TOTAL OF BILL KNAISSE				