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BoQ and Costing in Foreign Water Projects

CoP Kosten calculaties

21 November 2013

Arco van der Toorn

Overview projects

- ORIO The Gambia 2009 - 2012

Technical assistance

- PSSC Malawi 2009-2013

Peri-urban Water and Sanitation Project in Lilongwe & Blantyre, Malawi

Private Sector Service Contract

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ORIO THE GAMBIA

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ORIO THE GAMBIA

Beneficiary : National Water and Electricity Company (NAWEC)

Financier : EVD - NL Agentschap

Milestones:

- Submission of 9 reports
- All reports approved without major comments
- Budget DHV € 528,000
- Investment budget NAWEC € 7,300,000
- 210 km new PVC pipes
- 6 new elevated tanks 100 – 700 m^3
- 4 solar panels power supply

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Cost estimate of Client

NAWEC

TYPICAL WATER MAINS EXTENSION BILL OF QUANTITIES AND COSTING OF UPVC PIPES AND FITTINGS FOR AN AVERAGE DN80x80

DESCRIPTION	QUANTITY	UNIT PRICE	AMOUNT				
Di Flanged Tee DN80x80x80	3	3885,14	11655,42				
Flanged Adaptor For UPVC Pipe DN80	8	1315,74	10525,92				
Flat Rubber Joint DN80 For Flange PN10/16	12	93,8	1125,6				
Blanked Flange DN80	1	1000	1000				
Sluice Flange Valve DN80 With Cap PN16	1	5446	5446				
Surface Box For Sluice Valve	1	868,76	868,76				
Thrust Block	3	975	2925				
Denso Tape	3	805,09	2415,27				
Lubricant For UPVC Pipes	2	1227,6	2455,2				
DN80 Underground Fire Hydrant BS750	1	380000	380000				
Fire Hydrant Cover	1	1600	1600				
Large Orifice Air Valve DN80	1	25704,09	25704,09				
Air Vlave Chamber	1	7771,89	7771,89				
Bolts and Nuts M16x65	80	61,98	4958,4				
UPVC Pressure Pipe DN80 (OD.90)	2800	219	613200		5,48		
Tangit Glue	1	500	500				
TOTAL COST OF MATERIALS			**1.072.151,55**				
Excavation,laying,backfilling and testing	2800	200	560.000		5,00		
GRAND TOTAL			**1.632.151,55**		14,57		

		Material € /m	Esc/laying € /m	Total € /m
DN80x80	DE90	5,48	5,00	14,57
DN100x100	DE110	6,93	5,00	16,11
DN150x150	DE160	14,51	5,00	23,92
DN200x200	DE225	17,01	5,00	26,43

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No	Description	Unit	Number	Unit price €	Amount €	Depreciation (years)	Remarks
1	**Scope of Work**						
	Upgrading existing water supply facilities		YES				maintenance/ repair services
	Decommissioning of existing worne out and /or redundant installations		YES				*will extend lifetime of exisitng equipment*
	Supply and installtion of new facilities		YES				LT investments
2	**Rehabilitation of existing works**						
2,1	Testing and cleaning existing boreholes	u	13		100.100	<1	
2,2	Repair existing elevated tanks	u	3		39.200	<1	state unknown
2,3	Renovation switchboards and E-cables	u	19		49.400	<1	
2,4	Rehabilitation existing network	km	9,25		118.400	<1	repair valves
2,5	Take out of operation AC pipes	km	6,62		66.200	<1	disconnection only
3	**Decommissioning existing installations**						
3,1	removal old generator set + fuel tank xx kVA		8		9.600	<1	
3,2	removal broken down stand-by generator set vv kVA		5		6.000	<1	
4	**Installation of new facilities**						
4,1	supply and installation new water meters	u	6865		267.700	10	replacement 5 - 10 years
4,2	connection new house connection	u	6164		616.400	25	
4,3	drilling new boreholes	u	1		15.000	25	
4,4	supply and installation new submersible pumps incl cables, switchboards	u	2		20.000	5	
4,5	supply and installation new transmission mains	km	2,28		60.420	>40	
4,6	supply and installation new elevated tanks	u	4		869.000	>40	
4,7	supply and installation new distribution network	km	206,29		3.321.200	>40	
4,8	supply and installation new bulk water meters DN 150	u	29		43.500	15	
4,9	supply and installation new zoning valves DN100 - 150 - 200	u	68		36.700	25	
4.10	supply and installation new stand-by generator	u	6		115.400	5	
4,11	supply and installation new chlorination unit	u	12		48.000	10	
4.12	extension WTP (aeration, sedimentation basins, sandfilters, interconnectiong pipework)	LS	0		0	>40	M-E installations (value 15% - 15 years)
5	**Solar powered water supply**						Population
5,1	supply and installation new bulk solar panels incl inverter, cables, etc.		4		322.700	15	13423
5,2	drilling new boreholes	u	2		30.000	25	
5,3	supply and installation new submersible pumps incl cables, switchboards	u	9		154.200	5	see 2.3
5,4	supply and installation new transmission mains	km	6,9		182.900	40	
5,5	supply and installation new elevated tank V = m3, H = 10 m	u	2		512.800	40	
6	**Other investments**						
6,1	Water meter test bench repair/ calibration facility	u	2		25.000	15	
	TOTAL				7.029.820		

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Cost / price data from various sources

BUDGET prices ORIO The Gambia										
Material					DHV 2009, esc 2011 PN6	NAWEC 2011	DHV 2011	DHV 2011	NAWEC material	ORIO-DHV 2011
Distribution system - expansion					**Euro/m'** all-in	**Euro/m'** all-in	**Euro/m'** all-in	**Euro/m'** material	**Euro/m'** material	**Euro/m'** material
	DN		De mm							
	DN50mm - PVC		63	m	13,4		12,6	7,50	*4,00*	5,72
	DN80mm - PVC		90	m	14,2	14,6	13,3	8,00	5,48	6,16
	DN100mm - PVC		110	m	17,0	16,1	16,9	10,00	6,93	8,80
	DN150mm - PVC		160	m	26,5	23,9	24,3	18,00	14,51	14,40
	DN200mm - PVC		225	m	41,6	26,4	31,5	26,00	17,01	19,36
	DN250mm - PVC		280	m	63,3		*49,0*			
	DN300mm - PVC		315	m	79,8		*61,8*			

Distribution system - expansion						Surcharge		**Euro/m'**			**Euro/m'**	
					General costs		Transport CFR NL-Gambia	Average ORIO costs			all-in	
DHV calc	DN		De mm									
	DN50mm - PVC		63	m	15%		0%	10,96			12,60	
	DN80mm - PVC		90	m	15%		0%	11,58			13,32	
	DN100mm - PVC		110	m	15%		0%	14,68			16,89	
	DN150mm - PVC		160	m	15%		0%	21,09			24,26	
	DN200mm - PVC		225	m	15%		0%	27,39			31,49	

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Works

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SUPPORTING HEALTHY SOLUTIONS BY LOCAL COMMUNITIES

Malawi

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Malawi - National Water Development Programme

Donor coordination: 10 donors – total budget: US$182M

1. Sector Management and Urban Water Sector Reform (US$ 10M)
   - Strategic urban sanitation planning
   - Institutional and regulatory framework
   - Sector reform promotion & communication
2. Water Resources Management (US$ 16M)
3. Urban Water Supply and Sanitation (Blantyre/Lilongwe) (US$ 48M)
   - **PSSC project (EIB/EU/Wateraid - € 31M)**
   - Priority investments (WB - US$ 4M)
   - Reaching the unserved areas (WB – US$ 3M)
4. Town, Market Centre en Rural Piped WS&S (US$ 31M)
5. Rural Water Supply and Sanitation (US$ 74M)

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Investment Programme

	Lilongwe	Blantyre
Task 11 Improvement water production capacity and efficiency	€5.28 m	€6.83 m
Task 4 Reduction of non-revenue water	€1.10 m	€3.59 m
Task 7 Extension of water supply services into low-income areas	€2.13 m	€2.89 m
Total	€8.5 m	€13.3 m

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Bill of Quantities for Employer (before tender award)

Bill No. 5 - DAYWORKS

Item Number				Item Description	Unit	Quantity	Rate [EUR]	Amount [EUR]	Portion of item being supplies	Value of equipment to be imported
5				**Dayworks**						
5	**1**			**Daywork Labour**						
5	1	1		Ganger	hour	100	4,12	412,00		
5	1	2		Foreman	hour	100	4,12	412,00		
5	1	3		Labourer (unskilled)	hour	500	1,40	700,00		
5	1	4		Labourer (skilled)	hour	400	2,20	880,00		
5	1	5		Bricklayer	hour	400	3,80	1.520,00		
5	1	6		Carpenter	hour	100	3,80	380,00		
5	1	7		Roofer	hour	100	3,80	380,00		
5	1	8		Plumper	hour	100	3,40	340,00		
5	1	9		Steel worker	hour	100	3,40	340,00		
5	1	10		Welder	hour	100	3,20	320,00		
5	1	11		Tiler	hour	100	2,35	235,00		
5	1	12		Mechanical Engineer	hour	50	8,20	410,00		
5	1	13		Mechanic	hour	100	3,60	360,00		
5	1	14		Electrical Engineer	hour	50	8,20	410,00		
5	1	15		Electrician	hour	100	3,60	360,00		
5	1	16		Truck driver	hour	200	2,20	440,00		
5	1	17		Special site equipment driver	hour	50	2,90	145,00		
5	1	18		Universal driver	hour	100	2,20	220,00		
				Subtotal				*8.264,00*		

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Unit rates - available from previous project phase

Bill No. 5 - DAYWORKS

Item Number				Item Description	Unit	Quantity	Rate [EUR]	Amount [EUR]	Portion of item being supplies	Value of equipment to be imported
5	**2**			**Daywork Material**						
5	**2**	**1**		*Building materials*						
5	2	1	1	Sand	t	100	7,90	790,00		
5	2	1	2	Gravel	t	100	6,75	675,00		
5	2	1	3	Cement, ordinary Portland or equivalent	t	40	132,00	5.280,00		
5	2	1	4	Cement, rapid hardening,	t	20	181,00	3.620,00		
5	2	1	5	Steel reinforcement bar up to 25mm diameter	t	5	1.027,00	5.135,00		
5	2	1	6	Formworks (incl. False work if required)	m2	200	15,00	3.000,00		
5	2	1	7	Bitumen	kg	100	1,00	100,00		
5	2	1	8	Bituminised felt	m2	200	10,00	2.000,00		
5	2	1	9	Excavation loose material	m3	100	3,00	300,00		
5	2	1	10	Excavation solid material	m3	100	5,50	550,00		
5	2	1	11	Excavation rock material	m3	100	8,50	850,00		
5	2	1	12	Excavation by hand	m3	100	20,00	2.000,00		
5	2	1	13	Backfill material imported from distance under 10	m3	100	12,00	1.200,00		
5	2	1	14	Backfill material imported from distance over 10 km	m3	100	18,00	1.800,00		
5	2	1	15	Backfill with temporary stored excavatin material	m3	100	2,50	250,00		
5	2	1	16	Zinc paint	l	200	3,23	646,00		
5	2	1	17	Mortar	l	200	0,40	80,00		
5	2	1	18	Prepacked high strength trowelable repair mortar	l	200	0,60	120,00		
5	2	1	19	Epoxy resin for injection	l	50	2,30	115,00		
5	2	1	20	Bandage joint sealings	m	100	25,00	2.500,00		
5	2	1	21	Outside wall paint	l	100	0,45	45,00		
5	2	1	22	Inside wall paint	l	100	0,45	45,00		
5	2	1	23	Lime	kg	100	2,60	260,00		
5	2	1	24	Clay Bricks, wall thickness up to 40cm	m3	50	58,00	2.900,00		
5	2	1	25	Road pavement, asphalt	t	10	68,00	680,00		
5	2	1	26	Base course for road construction	t	50	3,85	192,50		
5	2	1	27	Wall joint sealing with 250mm wide reinforced felxible waterproof mortar	m	100	32,00	3.200,00		
5	2	1	28	Wall/floor joint sealant with bandage 250mm x 2mm	m	100	29,00	2.900,00		
5	2	1	29	Floor sealant with bandage 200mm x 2mm	m	100	27,00	2.700,00		
5	2	1	30	Fire extinguisher	no.	1	15,00	15,00		
5	2	1	31	Standard access door	no.	1	90,00	90,00		
5	2	1	32	Standard window	no.	1	245,00	245,00		
5	2	1	33	Standard access ladder incl. safety rings	m	1	62,00	62,00		
5	2	1	34	New site fence	m	50	9,80	490,00		

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Pipe material - most important, but provided in totals

Bill No. 5 - DAYWORKS

Item Number				Item Description	Unit	Quantity	Rate [EUR]	Amount [EUR]	Portion of item being supplies	Value of equipment to be imported
5	**2**	**2**		*PE-HD pipes (PN16)*						
5	2	1	1	OD600	m	10	250,00	2.500,00		
5	2	1	2	OD500	m	10	200,00	2.000,00		
5	2	1	3	OD400	m	10	184,90	1.849,00		
5	2	1	4	OD355	m	10	145,70	1.457,00		
5	2	1	5	OD315	m	10	114,85	1.148,50		
5	2	1	6	OD280	m	10	90,80	908,00		
5	2	1	7	OD250	m	10	72,45	724,50		
5	2	1	8	OD225	m	10	58,65	586,50		
5	2	1	9	OD200	m	10	46,50	465,00		
5	2	1	10	OD180	m	10	37,65	376,50		
5	2	1	11	OD160	m	10	29,90	299,00		
5	2	1	12	OD140	m	10	22,85	228,50		
5	2	1	13	OD125	m	10	18,25	182,50		
5	**2**	**2**		*PVC Pipes (PN10)*						
5	2	2	1	DN500	m	10	228,50	2.284,97		
5	2	2	2	DN450	m	10	201,57	2.015,67		
5	2	2	3	DN400	m	10	165,89	1.658,87		
5	2	2	4	DN300	m	10	103,04	1.030,40		
5	2	2	5	DN250	m	10	65,00	650,00		
5	2	2	6	DN200	m	10	39,90	399,00		
5	2	2	7	DN150	m	10	21,10	211,00		
5	**2**	**3**		*Ductile Iron Pipes (PN16)*						
5	2	3	1	DN800	m	10	490,37	4.903,70		
5	2	3	2	DN700	m	10	373,85	3.738,50		
5	2	3	3	DN600	m	10	305,02	3.050,20		
5	2	3	4	DN500	m	10	231,27	2.312,70		
5	2	3	5	DN450	m	10	199,15	1.991,50		
5	2	3	6	DN400	m	10	167,90	1.679,00		
5	2	3	7	DN350	m	10	141,94	1.419,40		
5	2	3	8	DN300	m	10	116,65	1.166,50		
5	2	4	7	Diverse pipes or other equipment made of ductile cast iron (DCI)	kg	1000	0,90	900,00		
5	**2**	**4**		*Steel Pipes (PN16)*						
5	2	4	1	DN900	m	10	702,00	7.020,00		
5	2	4	2	DN800	m	10	624,00	6.240,00		
5	2	4	3	DN700	m	10	546,00	5.460,00		
5	2	4	4	DN600	m	10	468,00	4.680,00		
5	2	4	5	DN500	m	10	390,00	3.900,00		
5	2	4	6	DN400	m	10	312,00	3.120,00		
5	2	4	7	Diverse pipes or other equipment made of stainless steel	kg	2000	1,70	3.400,00		
5	2	4	8	Diverse pipes or other equipment made of galvanised steel	kg	4000	1,30	5.200,00		

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BILL OF QUANTITIES - SUMMARY

Bill Number		Item Description	Page	Amount [EUR]		Value of equipment to be imported	
1	TOTAL of	Bill No. 1 - General Items		**583.500,00**		0	0%
2	TOTAL of	Bill No. 2 - Walker's Ferry - Raw water intake and Pumping Station		**965.357,00**		726.830	75%
4	TOTAL of	Bill No. 3 - Walker's Ferry - High Lift Pumping Station and Clear Water Reservoir		**4.676.696,00**		4.067.931	87%
5	TOTAL of	Bill No. 4 - Twin-Pipeline to Chileka		**695.900,00**			
6	TOTAL of	Bill No. 5 - DAYWORKS		**99.000,00**		57.000	58%
		TOTAL OF BILLS NET	(A)	**7.020.453,00**		**4.851.761**	69%
		SPECIFIED PROVISIONAL SUMS INCLUDED IN TOTAL OF BILLS NET	(B)	33.290,00	Provision of additional surge protection		
		PERCENT OF SPECIFIED PROVISIONAL SUMS FOR CONTRACTOR'S OVERHEAD & PROFIT, IF ANY [REFER TO PARA 13.5.(b)(ii)] (of B)	(C)	1.664,50	5% of B		
		TOTAL OF BILLS LESS SPECIFIED PROVISIONAL SUMS (A - B)	(D)	6.987.163,00			
		ADD PROVISIONAL SUM FOR CONTINGENCY ALLOWANCE	(E)	500.000,00			
		GRAND TOTAL NET (A + C + E) (carried forward to Form of Bid)	(F)	**7.522.117,50**			

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Blantyre - High-lift pumping station

Resumé

- Position NL consultant : from cost engineer to adviser
- Cooperation with National consultants
- Review / second opinion : Basis of original cost estimates incomplete

Required:

- Database of cost items (pipes, accessories, elevated tanks);
- Country data for labour, escavation and transport costs
- Material costs (low quality PVC, sub standard concrete, etc.)

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