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Final Report

Annex 13: Cost Tables

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SHOURACONSULT Co.



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ANNEX 13

COST TABLES

Table of contents

COST ESTIMATES IRRIGATION DEVELOPMENT	3
IRRIGATION AND DRAINAGE SYSTEM	19

List of tables:

N°	Title	Page
Table 1.1A	Summary of Costs Phase 1: Wad Meskin 7,500 ha	3
Table 1.1B	Summary of Costs Phase 2: Wad Meskin+Rahad2, 107,500 ha	3
Table 1.1C	Summary of Additional Costs Phase 3: Wad Meskin+Rahad2, 107,500 ha	4
Table1.1D	Cumulative Costs for Irrigation Development	4
Table 1.2	Salsal Barrage Cost	5
Table 1.3	Salsal Barrage Head Works Cost	7
Table 1.4	Link Canal Works Cost	9
Table 1.5	Khor Atshan Works Cost	11
Table 1.6	U/S Head Works at Wad Meskin Barrage Cost	13
Table 1.7	Wad Meskin Barrage Cost	15
Table 1.8	D/S Head Works at Wad Meskin Barrage Cost	17
Table 2.1	Cost of Offices and Housing	19
Table 2.2	Cost of Irrigation Distribution System	19

COST ESTIMATES IRRIGATION DEVELOPMENT

Table 1.1A: SUMMARY OF COSTS PHASE I: WAD MESKIN 7,500 ha

Ref	Component	Cost in USD
1	Preliminaries (mobilisation, camps etc)	100,000
2	Salsal Barrage cost	0
3	Head Works at Salsal Barrage	0
4	Link Canal	0
5	Khor Atshan siphon	0
6	Head Works upstream of Wad Meskin Barrage	0
7	Wad Meskin Barrage	1,232,926
8	Intake Wad Meskin Barrage	762,764
9	I&D system for 7,500 ha	26,610,000
10	Main Canal from WM barrage to end of scheme, 37.5 km	800,000
12	On farm development, 174 USD/ha	1,300,000
13	Supporting investments	1,640,000
14	Sub total	32,445,690
15	Contingencies 15%	4,866,854
Total Cost Phase 1 with contingencies		37,312,544

Table 1.1B: SUMMARY OF COSTS PHASE 2: RAHAD 2, 100,000 HA

Ref	Component	Cost in USD
1	Preliminaries (mobilisation, camps etc)	1,000,000
2	Salsal Barrage	2,600,000
3	Head Works at Salsal Barrage	750,000
4	Link Canal and associated structures	24,690,000
5	Khor Atshan siphon	427,000
6	Head regulator at end of link canal	600,000
7	Wad Meskin Barrage	0
8	Intake Wad Meskin Barrage	0
9	I&D system for 100,000 ha	354,780,000
10	Increase capacity Main Canal from WM barrage over 37.5 km	18,765,000
11	Extension of main canal, 30 km	15,650,000
12	On farm development, 174 USD/ha	17,390,000
13	Supporting investments	22,200,000
14	Sub total	458,852,000
15	Contingencies 15%	68,828,000
Total Cost Phase 2 with contingencies		527,680,000

Table 1.1C: SUMMARY OF ADDITIONAL COSTS PHASE 3: WAD MESKIN+RAHAD 2, 107,500 HA,+DRY SEASON IRRIGATION

Ref	Component	Cost in USD
1	Preliminaries (mobilisation, camps etc)	0
2	Salsal Barrage	0
3	Head Works at Salsal Barrage	0
3A	Roseires Canal to Dinder Barrage	30,435,000
4	Link Canal and associated structures	0
5	Khor Atshan siphon	0
6	Head regulator at tail of link canal	0
7	Wad Meskin Barrage	0
8	Intake Wad Meskin Barrage	0
9	I&D system for 100,000 ha	0
10	Increase capacity Main Canal from WM barrage over 37.5 km	0
11	Extension of main canal, 30 km	0
12	On farm development	0
13	Supporting investments	4,350,000
13 A	On farm development for dry season irrigation on 107,500 ha	4,678,000
14	Sub total	39,463,000
15	Contingencies 15%	5,919,450
Total extra cost to achieve Phase 3 with contingencies		45,382,450

Table 1.1D: CUMULATIVE COSTS FOR IRRIGATION DEVELOPMENT

Ref	Description	Cost in USD
1	Phase 1, Wad Meskin 7,500 ha	37,312,544
2	Phase 1+2, WM + Rahad2 107,500 ha supplementary irrigation	564,992,544
3	Phase 1+2+3, 107,500 ha, wet and dry season irrigation	610,374,994
1	Costs per hectare Phase 1, 7,500 ha	4,975
2	Cost per hectare Phase 1+2, 107,500 ha	5,256
3	Cost per hectares, Phase 1+2+3, 107,500 ha	5,678

Table 1.2 Salsal Barrage Cost
Wad Meskin Project
Salsal Barrage
BARRAGE AND SETTLING BASIN
BILL OF QUANTITIES AND COST

No	Description	Unit	Quantity	Unit Rate \$	Amount USD
	GENERAL		0.60	638.30	383
G1	Clearing for canals, roads and structures, light vegetation	ha	-		-
G2	Clearing for canals, roads and structures, medium vegetation	ha	-		-
G3	Clearing for canals, roads and structures, dense vegetation and gallery forest	ha	3,000.00	2.55	7,660
G4	Stripping of topsoil for canals, roads and structures 0.5 m thick	m3	1.00	4,300.00	4,300
G5	other(Mobilization to the site)	LS			
	EARTHWORKS		-		-
E1	Excavation, open cut in rock	m3	-		-
E2	Excavation in rock for cut-off trench	m3	-		-
E3	Excavation, common for canals and drains by equipment	m3	1,023.00	3.20	3,274
E4	Excavation, common for structures, by equipment	m3	-		-
E5	Excavation, common by hand labour	m3	3,000.00	16.00	48,000
E6	Compaction into canal embankment, no haul	m3	-		-
E8	Compacted backfill with excavation	m	-		-
E11	Others	LS			
	STRUCTURAL WORK		3,257.00	350.00	1,139,950
S1	Concrete in structures(mass)	m3	1,081.00	400.00	432,400
S1a	Class 30/20(C-30)	m3	810.00	260.00	210,600
S1b	Class 25/20(C-25)	m3	363.50	160.00	58,160
S1c	Class 20/20(C-20)	m3	-		-
S1d	Class 15/37(C-15)	m3	-		-
S1e	Class 10/37(C-10) in blinding layer	m3	-		-
S1f	Construction joints including all preparation	m2	216,200.00	1.30	281,060

Table 1.2 Salsal Barrage Cost (cont.)

No	Description	Unit	Quantity	Unit Rate \$	Amount USD
S4	Formwork		579.60	5.00	2,898
S4a	Rough formwork, flat	m2	-		-
S4b	Wrought formwork, flat	m2	662.40	7.00	4,637
S4c	Curved formwork	m2	882.00	52.00	45,864
S5	Stone pitching, 0.20m thick	m2	-		-
S7	Riprap	m3	-		-
S8	Quarry run rock fill	m3	176.40	4.00	706
S10	Filter gravel/sand	m3	-		-
S11	Masonry in structures, basaltic stone, 0.50m thick	m3	630.00	150.00	94,500
S12	Supply, place and fill double layer gabion	m3	-		-
S13	Supply, place and fill 0.40 thick gabion mattress on 0.1 gravel on approved geotextile filter	m3	-		-
S14	Supply, place and fill 0.30 thick gabion mattress	m3	-		-
S15	Supply, place and fill 0.30 thick stone apron	m3	-		-
S16	Pipe culvert, RC		-		-
S16a	diam 0.5 m	m	-		-
S16b	diam 0.8 m	m	-		-
S16c	diam 1.0 m	m	-		-
S16d	diam 1.5 m	m	-		-
S18	Steelwork for gates, gate frames, hand railings etc		24.00	10,000.00	240,000
S18 a	gates, h = 4.0 m, width =4.0 m, including gate frame and lifting device: 2 4units	Unit	-		-
S18b	gates for scouring sluice, h =m, width = ... m, including gate frame and lifting device: 2 units	Unit	-		-
S18c	flushing gate at end of settling basin, 1 unit	Unit	2.00	10,000.00	20,000
s18d	gates between settling basin and feeder canal, 2 units	Unit	-		-
s18e	hand railings and other steelwork	kg	-	-	-
S19	Other	LS	-	-	-
	Total Salsal Barrage cost (BARRAGE & SETTLING BASIN)				2,594,390.55

Table 1.3 Salsal Barrage Head Works Cost
Wad Meskin Project
Irrigation Infrastructures Cost
Head Works at Salsal Barrage
BILL OF QUANTITIES

No	Description	Unit	Quantity	Unit Rate \$	Amount USD
GENERAL					
G1	Clearing for canals, roads and structures, light vegetation	ha	-	638.30	-
G2	Clearing for canals, roads and structures, medium vegetation	ha	-		-
G3	Clearing for canals, roads and structures, dense vegetation and gallery forest	ha	-		-
G4	Stripping of topsoil for canals, roads and structures 0.5 m thick	m3	602.00	2.55	1,537.02
G5	other(Mobilization to the site)	LS	1.00	4,300.00	4,300.00
EARTHWORKS					
E1	Excavation, open cut in rock	m3	-		-
E2	Excavation in rock for cut-off trench	m3	-		-
E3	Excavation, common for canals and drains by equipment	m3	-		-
E4	Excavation, common for structures, by equipment	m3	247.00	3.20	790.40
E5	Excavation, common by hand labour	m3	-		-
E6	Compaction into canal embankment, no haul	m3	180.60	16.00	2,889.60
E8	Compacted backfill with excavation	m	-		-
E11	others	LS			-
STRUCTURAL WORK					
S1	Concrete in structures(mass)	m3	409.22	350.00	143,228.40
S1a	Class 30/20(C-30)	m3	704.00	400.00	281,600.00
S1b	Class 25/20(C-25)	m3		260.00	-
S1c	Class 20/20(C-20)	m3	68.40	160.00	10,944.00
S1d	Class 15/37(C-15)	m3	-		-
S1e	Class 10/37(C-10) in blinding layer	m3	-		-
S1f	Construction joints including all preparation	m2	-		-

Table 1.3 Salsal Barrage Head Works Cost (cont.)

No	Description	Unit	Quantity	Unit Rate \$	Amount USD
S3	Reinforcing steel (80-100kg/m ³ concrete)	kg	106,000.00	1.30	137,800.00
S4	Formwork				
S4a	Rough formwork, flat	m ²	612.00	5.00	3,060.00
S4b	Wrought formwork, flat	m ²	-		-
S4c	Curved formwork	m ²	172.80	7.00	1,209.60
S5	Stone pitching, 0.20m thick	m ²	-	52.00	-
S7	Riprap	m ³	-		-
S8	Quarry run rock fill	m ³	-		-
S10	Filter gravel/sand	m ³	-	4.00	-
S11	Masonry in structures, basaltic stone, 0.50m thick	m ³	-		-
S12	Supply, place and fill double layer gabion	m ³	675.00	150.00	101,250.00
S13	Supply, place and fill 0.40 thick gabion mattress on 0.1 gravel on approved geotextile filter	m ³	-		-
S14	Supply, place and fill 0.30 thick gabion mattress	m ³	-		-
S15	Supply, place and fill 0.30 thick stone apron	m ³	-		-
S16	Pipe culvert, RC		-		
S16a	diam 0.5 m	m	-		-
S16b	diam 0.8 m	m	-		-
S16c	diam 1.0 m	m	-		-
S16d	diam 1.5 m	m	-		-
S18	Steelwork for gates, gate frames, hand railings etc		-		
S18 a	intake gates, h = 4.0 m, width =4.0 m, including gate frame and lifting device: 2 4units	Unit	7.00	10,000.00	70,000.00
S18b	gates for scouring sluice, h =m, width = ... m, including gate frame and lifting device: 2 units	Unit	-		-
S18c	flushing gate at end of settling basin, 1 unit	Unit	-		-
s18d	gates between settling basin and feeder canal, 2 units	Unit	-	10,000.00	-
s18e	hand railings and other steelwork	kg	-		-
S19	Other	LS	-		-
	TOTAL Head Works at Salsal Barrage				758,609.02

Table 1.4 Link Canal Works Cost
Wad Meskin Project
Irrigation Infrastructures Cost
Link Canal

BILL OF QUANTITIES

No	Description	Unit	Quantity	Unit rate USD	Amount USD
GENERAL					
G1	Clearing for canals, roads and structures, light vegetation	ha	-		-
G2	Clearing for canals, roads and structures, medium vegetation	ha	322.80	680.00	219,504
G3	Clearing for canals, roads and structures, dense vegetation and gallery forest	ha	-		-
G4	Stripping of topsoil for canals, roads and structures 0.1 m thick	m3	-		-
G5	other (mobilization)	LS	1.00	4,255.32	4,255
EARTHWORKS					
E1	Excavation, open cut in rock	m3	-		-
E2	Excavation in rock for cut-off trench	m3	-		-
E3	Excavation, common for canals and drains by equipment	m3	8,476,954.00	2.50	21,192,385
E4	Excavation, common for structures, by equipment	m3	-		-
E5	Excavation, common by hand labour	m3	-		-
E6	Compaction, into canal embankment, no haul	m3	-		-
E7	Compaction, into embankment, haul at 10km	m3	-		-
E8	Compacted backfill with excavation	m3	108,400.00	16.00	1,734,400
E9	Disposal of extra Item for haulage in excess of 1.5 km	m3 x km	-		-
E10	Road surfacing, 0.15 gravel	m2	-		-
E11	Others	LS	-		-
STRUCTURAL WORK					
S2	Concrete in canal lining, 80-120mm thickness		-		-
S2a	Class 26/20	m3	-		-
S2b	Class 21/20	m3	-		-
S2c	Plain Concrete Class 17/37	m3	-		-
S2d	Mass Concrete Class 17/37	m3	-		-

Table 1.4 Link Canal Works Cost (cont)

No	Description	Unit	Quantity	Unit rate USD	Amount USD
S3	Reinforcing steel (80-100kg/m3 concrete)	kg	-		-
S4	Formwork		-		-
S4a	Rough formwork, flat	m2	-		-
S4b	Wrought formwork, flat	m2	-		-
S4c	Curved formwork	m2	-		-
S5	Stone pitching, 0.20m thick	m2	-		-
S7	Riprap	m3	-		-
S8	Quarry run rock fill	m3	-		-
S10	Filter gravel/sand	m3	-		-
S11	Formwork	m2	-		-
S12	Supply, place and fill double layer gabion mattress 2.00 x 1.00 x 0.40 thick on 0.15 gravel on approved geotextile filter	m3	-		-
S13	Supply, place and fill 0.40 thick gabion mattress on 0.1 gravel on approved geotextile filter	m3	-		-
S14	Supply, place and fill 0.30 thick gabion mattress	m3	-		-
S15	Supply, place and fill 0.30 thick stone apron	m3	-		-
S16	Other	LS			1,000,000
	TOTAL Link Canal				24,150,544

Table 1.5 Khor Atshan Works Cost
Wad Meskin Project
Irrigation Infrastructures Cost
Atshan Khor CROSS DRAINAGE STRUCTURE TYPE I
BILL OF QUANTITIES

No	Description	Unit	Quantity	Unit rate USD	Amount USD
GENERAL					
G1	Clearing for canals, roads and structures, light vegetation	ha	0.09	640.00	59.52
G2	Clearing for canals, roads and structures, medium vegetation	ha	-		-
G3	Clearing for canals, roads and structures, dense vegetation and gallery forest	ha	-		-
G4	Stripping of topsoil for canals, roads and structures 0.1 m thick	m2	-		-
G5	other	LS	1.00	4,300.00	4,300.00
EARTHWORKS					
E4	Excavation, common for structures, by equipment	m3	1,526.00	3.20	4,883.20
E5	Excavation, common by hand labour	m3	-		-
E8	Compacted backfill with selected material	m3	165.00	10.00	1,650.00
E10	Compacted backfill with excavated material	m3	661.00	16.00	10,576.00
STRUCTURAL WORK					
S1	Concrete in structures		-		-
S1a	Class 30/20(C-30)	m3	688.00	350.00	240,800.00
S1b	Class 25/20(C-25)	m3	-		-
S1c	Class 20/20(C-20) PCC	m2	551.00	12.77	7,034.04
S1d	Class 15/37(C-15)	m3	-		-
S1e	Class 10/37(C-10) in blinding layer	m3	-		-
S1f	Construction joints including all preparation	m2	-		-
S3	Reinforcing steel (80-100kg/m3 concrete)	kg	103,200.00	1.30	134,160.00
S4	Formwork		-		-
S4a	Rough formwork, flat	m2	144.23	2.00	288.45
S4b	Wrought formwork, flat	m2	558.06	4.00	2,232.22

Table 1.5 Khor Atshan Works Cost (cont)

No	Description	Unit	Quantity	Unit rate USD	Amount USD
S4c	Curved formwork	m2	-		-
S5	Stone pitching, 0.20m thick	m2	-		-
S7	Riprap	m3	-		-
S8	Quarry run rock fill	m3	-		-
S10	Filter gravel/sand	m3	-		-
S11	Masonry in structures, basaltic stone, 0.50m thick	m3	-		-
S12	Supply, place and fill double layer gabion mattress 2.00 x 1.00 x 0.40 thick on 0.15 gravel on approved geotextile filter	m3	-		-
S13	Supply, place and fill 0.40 thick gabion mattress on 0.1 gravel on approved geotextile filter	m3	-		-
S14	Supply, place and fill 0.30 thick gabion mattress	m3	-		-
S15	Supply, place and fill 0.30 thick stone apron	m3	-		-
S16	Pipe culvert, RC		-		
S16a	diam 0.5 m	m	-		-
S16b	diam 0.8 m	m	-		-
S16c	diam 1.0 m	m	-		-
S16d	diam 1.5 m	m	-		-
S17	Siphon pipes GRP including collar		-		
S17a	diam 0.8 m	m	-		-
S17b	diam 1.0m	m	-		-
S17c	diam 1.5 m	m	-		-
S17d	diam 2.0 m	m	-		-
S18	Steelwork for gates, gate frames, hand railings etc	kg	-		-
S19	other	LS	-		20,000.00
	TOTAL Atshan Khor CROSS DRAINAGE STRUCTURE TYPE I				425,983.43

Table 1.6 U/S Head Works at Wad Meskin Barrage Cost
Wad Meskin Project
Irrigation Infrastructures Cost
Head Works at US Wad Meskin Barrage

BILL OF QUANTITIES BARRAGE AND SETTLING BASIN

No	Description	Unit	Quantity	Unit Rate \$	Amount USD
GENERAL					
G1	Clearing for canals, roads and structures, light vegetation	ha	-		-
G2	Clearing for canals, roads and structures, medium vegetation	ha	-		-
G3	Clearing for canals, roads and structures, dense vegetation and gallery forest	ha	-		-
G4	Stripping of topsoil for canals, roads and structures 0.5 m thick	m3	602.00	3.00	1,806.00
G5	other	LS	1.00	-	-
EARTHWORKS					
E1	Excavation, open cut in rock	m3	-		-
E2	Excavation in rock for cut-off trench	m3	-		-
E3	Excavation, common for canals and drains by equipment	m3	-		-
E4	Excavation, common for structures, by equipment	m3	247.00	3.50	864.50
E5	Excavation, common by hand labour	m3	-		-
E6	Compaction into canal embankment, no haul	m3	180.60	16.00	2,889.60
E8	Compacted backfill with excavation	m	-		-
E11	others	LS	1.00	-	-
STRUCTURAL WORK					
S1	Concrete in structures(mass)	m3	409.22	350.00	143,228.40
S1a	Class 30/20(C-30)	m3	704.00	382.98	269,617.02
S1b	Class 25/20(C-25)	m3			-
S1c	Class 20/20(C-20)	m3	68.40	148.94	10,187.23
S1d	Class 15/37(C-15)	m3	-		-
S1e	Class 10/37(C-10) in blinding layer	m3	-		-
S1f	Construction joints including all preparation	m2	-		-
S3	Reinforcing steel (80-100kg/m3 concrete)	kg	106,000.00	1.30	137,800.00

Table 1.6 U/S Head Works at Wad Meskin Barrage Cost (cont)

No	Description	Unit	Quantity	Unit Rate \$	Amount USD
S4	Formwork				
S4a	Rough formwork, flat	m2	612.00	5.00	3,060.00
S4b	Wrought formwork, flat	m2	-		-
S4c	Curved formwork	m2	172.80	7.00	1,209.60
S5	Stone pitching, 0.20m thick	m2	-		-
S7	Riprap	m3	-		-
S8	Quarry run rock fill	m3	-		-
S10	Filter gravel/sand	m3	-		-
S11	Masonry in structures, basaltic stone, 0.50m thick	m3	-		-
S12	Supply, place and fill double layer gabion	m3	675.00	150.00	101,250.00
S13	Supply, place and fill 0.40 thick gabion mattress on 0.1 gravel on approved geotextile filter	m3	-		-
S14	Supply, place and fill 0.30 thick gabion mattress	m3	-		-
S15	Supply, place and fill 0.30 thick stone apron	m3	-		-
S16	Pipe culvert, RC		-		-
S16a	diam 0.5 m	m	-		-
S16b	diam 0.8 m	m	-		-
S16c	diam 1.0 m	m	-		-
S16d	diam 1.5 m	m	-		-
S18	Steelwork for gates, gate frames, hand railings etc		-		-
S18 a	intake gates, h = 4.0 m, width =4.0 m, including gate frame and lifting device: 2 4units	Unit	7.00	10,000.00	70,000.00
S18b	gates for scouring sluice, h =m, width = ... m, including gate frame and lifting device: 2 units	Unit	-		-
S18c	flushing gate at end of settling basin, 1 unit	Unit	-		-
s18d	gates between settling basin and feeder canal, 2 units	Unit	-		-
s18e	hand railings and other steelwork	kg	-		-
S19	Other	LS	1.00	40,000.00	40,000.00
	TOTAL Head Works at US Wad Meskin Barrage				781,912.36

Table 1.7 Wad Meskin Barrage Cost
Wad Meskin Project
Irrigation Infrastructures Cost
Wad Meskin Barrage AND SETTLING BASIN
BILL OF QUANTITIES

No	Description	Unit	Quantity	Unit Rate \$	Amount USD
GENERAL					
G1	Clearing for canals, roads and structures, light vegetation	ha	0.50	638.30	319.15
G2	Clearing for canals, roads and structures, medium vegetation	ha	-		-
G3	Clearing for canals, roads and structures, dense vegetation and gallery forest	ha	-		-
G4	Stripping of topsoil for canals, roads and structures 0.5 m thick	m3	2,300.00	2.55	5,872.34
G5	Other	LS	1.00	1,000.00	1,000.00
EARTHWORKS					
E1	Excavation, open cut in rock	m3	-	30.00	-
E2	Excavation in rock for cut-off trench	m3	-	32.00	-
E3	Excavation, common for canals and drains by equipment	m3	-	1.60	-
E4	Excavation, common for structures, by equipment	m3	200.00	3.40	680.85
E5		m3	-	-	-
E6	Compaction into canal embankment, no haul	m3	2,300.00	16.00	36,800.00
E8	Compacted backfill with excavation	m	-	-	-
E11	Others	LS	1.00	2,000.00	2,000.00
STRUCTURAL WORK					
S1	Concrete in structures(mass)	m3	975.00	350.00	341,250.00
S1a	Class 30/20(C-30)	m3	179.00	390.00	69,810.00
S1b	Class 25/20(C-25)	m3	540.00	255.00	137,700.00
S1c	Class 20/20(C-20)	m3	115.00	150.00	17,250.00
S1d	Class 15/37(C-15)	m3	-		-
S1e	Class 10/37(C-10) in blinding layer	m3	-		-
S1f	Construction joints including all preparation	m2	-		-
S3	Reinforcing steel (80-100kg/m3 concrete)	kg	254,100.00	1.30	330,330.00

Table 1.7 Wad Meskin Barrage Cost (cont)

No	Description	Unit	Quantity	Unit Rate \$	Amount USD
S4	Formwork				
S4a	Rough formwork, flat	m2	-	5.00	-
S4b	Wrought formwork, flat	m2	-		-
S4c	Curved formwork	m2	316.80	7.00	2,217.60
S5	Stone pitching, 0.20m thick	m2	670.00	52.00	34,840.00
S7	Riprap	m3	-		-
S8	Quarry run rock fill	m3	-		-
S10	Filter gravel/sand	m3	134.00	3.40	456.17
S11	Masonry in structures, basaltic stone, 0.50m thick	m3	-		-
S12	Supply, place and fill double layer gabion	m3	616.00	150.00	92,400.00
S13	Supply, place and fill 0.40 thick gabion mattress on 0.1 gravel on approved geotextile filter	m3	-		-
S14	Supply, place and fill 0.30 thick gabion mattress	m3	-		-
S15	Supply, place and fill 0.30 thick stone apron	m3	-		-
S16	Pipe culvert, RC		-		-
S16a	diam 0.5 m	m	-		-
S16b	diam 0.8 m	m	-		-
S16c	diam 1.0 m	m	-		-
S16d	diam 1.5 m	m	-		-
S18	Steelwork for gates, gate frames, hand railings etc		-		-
S18 a	intake gates, h = 4.0 m, width =4.0 m, including gate frame and lifting device: 2 4units	Unit	11.00	10,000.00	110,000.00
S18b	gates for scouring sluice, h =m, width = ... m, including gate frame and lifting device: 2 units	Unit	-		-
S18c	flushing gate at end of settling basin, 1 unit	Unit	-		-
s18d	gates between settling basin and feeder canal, 2 units	Unit	-		-
s18e	hand railings and other steelwork	kg	-		-
S19	Other	LS	1.00	50,000.00	50,000.00
	TOTAL Wad Meskin Barrage AND SETTLING BASIN				1,232,926.11

Table 1.8 D/S Head Works at Wad Meskin Barrage Cost
Wad Meskin Project
Irrigation Infrastructures Cost
Head Works at DS Wad Meskin Barrage

BILL OF QUANTITIES

No	Description	Unit	Quantity	Unit Rate \$	Amount USD
GENERAL					
G1	Clearing for canals, roads and structures, light vegetation	ha	-		-
G2	Clearing for canals, roads and structures, medium vegetation	ha	-		-
G3	Clearing for canals, roads and structures, dense vegetation and gallery forest	ha	-		-
G4	Stripping of topsoil for canals, roads and structures 0.5 m thick	m3	602.00	2.60	1,565.20
G5	Other	LS	1.00	-	-
EARTHWORKS					
E1	Excavation, open cut in rock	m3	-		-
E2	Excavation in rock for cut-off trench	m3	-		-
E3	Excavation, common for canals and drains by equipment	m3	-		-
E4	Excavation, common for structures, by equipment	m3	247.00	3.40	840.85
E5	Excavation, common by hand labour	m3	-		-
E6	Compaction into canal embankment, no haul	m3	180.60	17.00	3,070.20
E8	Compacted backfill with excavation	m	-		-
E11	Others	LS			-
STRUCTURAL WORK					
S1	Concrete in structures(mass)	m3	409.22	350.00	143,228.40
S1a	Class 30/20(C-30)	m3	704.00	370.00	260,480.00
S1b	Class 25/20(C-25)	m3			-
S1c	Class 20/20(C-20)	m3	68.40	150.00	10,260.00
S1d	Class 15/37(C-15)	m3	-		-
S1e	Class 10/37(C-10) in blinding layer	m3	-		-
S1f	Construction joints including all preparation	m2	-		-
S3	Reinforcing steel (80-100kg/m3 concrete)	kg	106,000.00	1.30	137,800.00

Table 1.8 D/S Head Works at Wad Meskin Barrage Cost (cont)

No	Description	Unit	Quantity	Unit Rate \$	Amount USD
S4	Formwork				
S4a	Rough formwork, flat	m2	612.00	5.00	3,060.00
S4b	Wrought formwork, flat	m2	-		-
S4c	Curved formwork	m2	172.80	7.00	1,209.60
S5	Stone pitching, 0.20m thick	m2	-		-
S7	Riprap	m3	-		-
S8	Quarry run rock fill	m3	-		-
S10	Filter gravel/sand	m3	-		-
S11	Masonry in structures, basaltic stone, 0.50m thick	m3	-		-
S12	Supply, place and fill double layer gabion	m3	675.00	150.00	101,250.00
S13	Supply, place and fill 0.40 thick gabion mattress on 0.1 gravel on approved geotextile filter	m3	-		-
S14	Supply, place and fill 0.30 thick gabion mattress	m3	-		-
S15	Supply, place and fill 0.30 thick stone apron	m3	-		-
S16	Pipe culvert, RC		-		
S16a	diam 0.5 m	m	-		-
S16b	diam 0.8 m	m	-		-
S16c	diam 1.0 m	m	-		-
S16d	diam 1.5 m	m	-		-
S18	Steelwork for gates, gate frames, hand railings etc		-		
S18 a	intake gates, h = 4.0 m, width =4.0 m, including gate frame and lifting device: 2 4units	Unit	7.00	10,000.00	70,000.00
S18b	gates for scouring sluice, h =m, width = ... m, including gate frame and lifting device: 2 units	Unit	-		-
S18c	flushing gate at end of settling basin, 1 unit	Unit	-		-
s18d	gates between settling basin and feeder canal, 2 units	Unit	-		-
s18e	hand railings and other steelwork	kg	-		-
S19	Other	LS	1.00	30,000.00	30,000.00
	TOTAL Head Works at DS Wad Meskin Barrage				762,764.25

IRRIGATION AND DRAINAGE SYSTEM

Table 2.1 Cost of offices and Housing
Wad Meskin Project
Irrigation Infrastructures Cost
Cost of offices and housing

Item	Building type	Unit	Quantity	Rate in SDG	Rate in USD	Total in USD
1	Senior houses	Ea	6	100,000	40,000	240,000
2	Junior houses	Ea	9	60,000	24,000	216,000
3	Worker's houses	Ea	15	20,000	8,000	120,000
4	Offices	m ²	500	2,400	960	480,000
5	Stores	Ea	1	30,000	12,000	12,000
Total for offices and housing						1,068,000

Table 2.2 Cost of Irrigation Distribution System
Wad Meskin Project
Irrigation Infrastructures Cost
Irrigation Distribution System

No	Description	Quantity	Unit	Rate SDG	Amount SDG	Rate USD	Amount USD
GENERAL							
1	Land clearing, medium vegetation.	7,743	ha	1,600	12,388,800	680.85	5,271,830
2	Land clearing, dense forest.(estimation)	2,000	ha	4,000	8,000,000	1,702.13	3,404,255
EARTHWORKS							
3	Excavation main canal	299,142	m ³	6	1,873,038	2.55	358,970
4	Excavation major canals	137,412	m ³	6	824,472	2.55	350,839
5	Excavation minors canals	543,541	m ³	6	3,261,246	2.55	1,387,764
DRAINS							
6	Protective drain	498,750	m ³	6	2,992,500	2.55	1,273,404
7	Minor drains	150,000	m ³	6	900,000	2.55	382,979
8	Collective drains	157,500	m ⁴	6	945,000	2.55	402,128
ROADS							
9	Access road 3.5 m wide gravel 0.2.0m thick	65	km	67,500	4,387,500	28,723.40	1,867,021
10	Service road 3.00m wide 0.2 thick gravel layer	315	km	66,000	20,790,000	28,085.11	8,846,809
11	Regional road 6.00 m wide parallel to main canal	46	km	96,600	4,443,600	41,106.38	1,890,894

Table 2.2 Cost of Irrigation Distribution System (cont)

No	Description	Quantity	Unit	Rate SDG	Amount SDG	Rate USD	Amount USD
12	Install of pipe for roads 1.00 m deep diameter 0.35 m (excluding pipe)	1,050	m	200	210,000	85.11	89,362
	STRUCTURES					-	
13	Pipe regulators	17	No.	3,700	62,900	1,574.47	26,766
14	Moveable weirs	2	No.	98,555	197,110	41,938.30	83,877
15	Field outlet pipes(F.O.P)	210	No.	350	73,500	148.94	31,277
16	Falls	21	No.			-	
17	Stone pitching 0.2 m thick.	100	m2	120	12,000	51.06	5,106
18	Masonry in walls of falls 0.5 m thick basaltic stone	105	m3	320	33,600	136.17	14,298
19	Concrete pipe culvert 1.00m (25*20) for cross drainage structures (main canal & drains)	500	m	570	285,000	242.55	121,277
	OFFICES AND HOUSING					-	
20	Senior houses	6	Ea	100,000	600,000	42,553.19	255,319
21	Junior houses	9	Ea	60,000	540,000	25,531.91	229,787
22	Worker's houses	15	Ea	20,000	300,000	8,510.64	127,660
23	Offices	500	m ²	2,400	1,200,000	1,021.28	510,638
24	Stores	1	Ea	30,000	30,000	12,765.96	2,766
	TOTAL				64,350,266		27,349,821
	Contingencies					15%	4,102,473
	TOTAL with contingencies						31,452,294