

APPENDIX F
COST ESTIMATION

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1. Water Supply

Table 1.1 Bill of Quantity

Item		Unit	Year		
Facility	Description		2005	2010	2015
Intake Facility	New borehole	sets	2	5	
	Existing borehole	sets	2		
	Observation borehole	sets	1		
	Dam	sets			1
	(Sub-total)	sets	5	5	1
Well Pump Facility	Submersible pump		BH-5, 0.096m ³ /min 81.0m, 1set	MEN-7, 0.180m ³ /min 90.0m, 1set	
			MEN-1, 0.120m ³ /min 87.7m, 1set	MEN-6, 0.180m ³ /min 65.6m, 1set	
			MEN-2, 0.120m ³ /min 68.4m, 1set	MEN-5, 0.180m ³ /min 45.2m, 1set	
			MEN-1, 0.120m ³ /min 18.2m, 1set	MEN-4, 0.180m ³ /min 30.7m, 1set	
			BH-4, 0.288m ³ /min 75.8m, 1set	MEN-3, 0.180m ³ /min 32.8m, 1set	
		(Sub-total)	sets	5	5
Transmission Pipeline	DCIP 200mm	m			
	ditto 150mm	m		2,900.0	43,000.0
	ditto 125mm	m	1,779.0	3,800.0	
	ditto 100mm	m	624.0	1,600.0	
	ditto 80mm	m	4,577.0	3,800.0	
	ditto 60mm	m	2,667.0		
	(Sub-total)	m	9,647.0	12,100.0	43,000.0
Booster Pump Facility	Centrifugal pump		BP.1, 0.240m ³ /min 99.8m, 1set	BP.3, 0.720m ³ /min 95.8m, 1set	BP.5, 1.026m ³ /min 110.9m, 5set
			BP.2, 0.240m ³ /min 101.1m, 1set	BP.4, 0.900m ³ /min 77.0m, 2set	
		(Sub-total)	sets	2	3
Pump Pit	Made of RC		15m ³ , 2set	25m ³ 30m ³ , 2set	35m ³ , 5set
	(Sub-total)	sets	2	3	5
Reservoir	Made of RC		340m ³	430m ³	240m ³ 180m ³ 50m ³ 40m ³
		Made of F R P			
		Existing			
		(Sub-total)	sets	1	1
Distribution Pipeline	P V C 300mm	m			
	ditto 250mm	m			
	ditto 200mm	m	980.0		
	ditto 150mm	m	832.0		883.0
	ditto 125mm	m	1,970.0	210.0	513.0
	ditto 100mm	m	454.0	1,484.0	1,877.0
	ditto 75mm	m	1,114.0	2,228.0	3,329.0
	ditto 50mm	m	22,716.0	31,887.0	31,140.0
	(Sub-total)	m	28,066.0	35,809.0	37,742.0
Control House	sets	7	8	5	
Communal Water Point	sets	13	13	19	
Individual Connection	sets	2,593	1,307	1,777	
Tempolaty Road	Width 3.0m	m	5,500	8,000	3,500

Table 1.2 (1) Project Cost (2005)

(Nakfa)

Description		Unit	Quantity	Unit Cost		Cost		Total
Item	Dimension			Local C.	Foreign C.	Local C.	Foreign C.	
1. Construction Cost								
Intake facility	New well	set	2	13,229.04	273,277.16	26,458	546,554	762,198
	Exsiting well	set	2	9,275.43	85,317.49	18,551	170,635	
	Observation well	set	1	0.00	0.00	0	0	
	Dam	set						
	(sub total)	set	5			45,009	717,189	
Submersible pump	BH-5, 0.096m3/min 81.0m	set	1	10,505.05	144,953.50	10,505	144,953	798,224
	MEN-1, 0.120m3/min 87.7m	set	1	10,583.20	151,426	10,583	151,426	
	nMEN-2, 0.120m3/min 68.4m	set	1	10,505.05	143,800	10,505	143,800	
	nMEN-1, 0.120m3/min 18.2m	set	1	10,505.05	111,757	10,505	111,757	
	BH-4, 0.288m3/min 75.8m	set	1	10,703.31	193,486	10,703	193,486	
	(sub total)			5			52,802	
Transmission pipeline	D C I P 200mm	m		245.85	842.83	0	0	6,860,376
	150mm	m		221.01	671.71	0	0	
	125mm	m	1,779	214.20	657.79	381,070	1,170,213	
	100mm	m	624	207.31	580.60	129,359	362,294	
	80mm	m	4,577	204.69	499.83	936,852	2,287,731	
	60mm	m	2,667	203.85	393.40	543,668	1,049,189	
	(sub total)	m	9,647			1,990,949	4,869,427	
Booster pump	BP.1, 0.240m3/min 99.8m	set	1	1,992.02	123,997.15	1,992	123,997	251,978
	BP.2, 0.240m3/min 101.1m	set	1	1,992.02	123,997.15	1,992	123,997	
	(sub total)		2			3,984	247,994	
Pump pit	RC 15m3	sets	2	62,765.43	38,970.28	125,531	77,941	203,471
	(sub total)		2			125,531	77,941	
Reservoir	RC 340m3	sets	1	588,430.18	242,765.04	588,430	242,765	831,195
	FRP	sets						
	(sub total)		1			588,430	242,765	
Distribution pipeline	P V C 300mm	m		289.52	1,221.56	0	0	6,486,631
	250mm	m		249.89	1,000.89	0	0	
	200mm	m	980	222.67	622.16	218,216	609,714	
	150mm	m	832	181.05	312.16	150,632	259,717	
	125mm	m	1,970	167.54	203.19	330,044	400,277	
	100mm	m	454	154.76	155.42	70,263	70,562	
	75mm	m	1,114	140.33	107.09	156,330	119,302	
	50mm	m	22,716	126.50	54.06	2,873,460	1,228,114	
(sub total)	m	28,066			3,798,946	2,687,686		
Control house	Type A	sets	3	137,822.18	9,992.65	413,467	29,978	1,269,469
	Type B	sets	2	195,386.85	10,232.97	390,774	20,466	
	Type C	sets	2	196,861.35	10,530.98	393,723	21,062	
	Type D	sets	0	254,523.76	10,963.56	0	0	
	(sub total)	sets	7			1,197,963	71,506	
Comunal water point		sets	13	18,019.46	6,866.40	234,253	89,263	323,516
Individual connection		set	2,593	0.00	0.00	0	0	0
Temporary Road	width3.0m	m	5,500	297.00	0.00	1,633,500	0	1,633,500
Sub-Total						9,671,366	9,749,193	19,420,560
2. Engineering Fee							1,942,056	1,942,056
3. Administration Cost						388,411		388,411
4. Physical Contingency						1,005,978	1,169,125	2,175,103
Total						11,065,755	12,860,374	23,926,129
5. Price Contingency						1,367,727	1,589,542	2,957,270
Grand Total						12,433,483	14,449,916	26,883,399

Table 1.2 (2) Project Cost (2010)

(Nakfa)

Item	Description Dimension	Unit	Quantity	Unit Cost		Cost		Total
				Local C.	Foreign C.	Local C.	Foreign C.	
1. Construction Cost								
Intake facility	New well	set	5	13,229.04	273,277.16	66,145	1,366,386	
	Exsiting well	set		9,275.43	85,317.49	0	0	
	Observation well	set		0.00	0.00	0	0	
	Dam	set						
	(sub total)	set	5			66,145	1,366,386	1,432,531
Submersible pump	nMEN-7, 0.180m ³ /min 90.0m	set	1	10,583.19	166,486.07	10,583	166,486	
	nMEN-6, 0.180m ³ /min 65.6m	set	1	10,505.05	142,838.64	10,505	142,839	
	nMEN-5, 0.180m ³ /min 45.2m	set	1	10,505.05	140,275.17	10,505	140,275	
	nMEN-4, 0.180m ³ /min 30.7m	set	1	10,505.05	131,623.47	10,505	131,623	
	nMEN-3, 0.180m ³ /min 32.8m	set	1	10,505.05	131,623.47	10,505	131,623	
	(sub total)		5			52,603	712,847	765,450
Transmission pipeline	D C I P 200mm	m		245.85	842.83	0	0	
	150mm	m	2,900	221.01	671.71	640,925	1,947,953	
	125mm	m	3,800	214.20	657.79	813,977	2,499,612	
	100mm	m	1,600	207.31	580.60	331,690	928,958	
	80mm	m	3,800	204.69	499.83	777,811	1,899,362	
	60mm	m		203.85	393.40	0	0	
	(sub total)	m	12,100			2,564,402	7,275,885	9,840,287
Booster pump	BP.3, 0.720m ³ /min 95.8m	set	1	2,355.16	179,241.90	2,355	179,242	
	BP.4, 0.900m ³ /min 77.0m	set	2	2,601.00	236,733.23	5,202	473,466	
	(sub total)		3			7,557	652,708	660,266
Pump pit	RC 25m ³	sets	1	83,878.04	58,069.92	83,878	58,070	
	30m ³		2	93,731.93	70,057.89	187,464	140,116	
	(sub total)		3			271,342	198,186	469,528
Reservoir	RC 430m ³	sets	1	668,410.26	259,744.46	668,410	259,744	
	FRP	sets						
	(sub total)		1			668,410	259,744	928,155
Distribution pipeline	P V C 300mm	m		289.52	1,221.56	0	0	
	250mm	m		249.89	1,000.89	0	0	
	200mm	m	0	222.67	622.16	0	0	
	150mm	m	0	181.05	312.16	0	0	
	125mm	m	210	167.54	203.19	35,182	42,669	
	100mm	m	1,484	154.76	155.42	229,670	230,646	
	75mm	m	2,228	140.33	107.09	312,661	238,604	
	50mm	m	31,887	126.50	54.06	4,033,546	1,723,934	
	(sub total)	m	35,809			4,611,059	2,235,853	6,846,912
Control house	Type A	sets	4	137,822.18	9,992.65	551,289	39,971	
	Type B	sets	1	195,386.85	10,232.97	195,387	10,233	
	Type C	sets	2	196,861.35	10,530.98	393,723	21,062	
	Type D	sets	1	254,523.76	10,963.56	254,524	10,964	
	(sub total)	sets	8			1,394,922	82,229	1,477,151
Comunal water point		sets	13	18,019.46	6,866.40	234,253	89,263	323,516
Individual connection		set	1,307	0.00	0.00	0	0	0
Temporary Road	width3.0m	m	8,000	297.00	0.00	2,376,000	0	2,376,000
Sub-Total						12,246,694	12,873,101	25,119,795
2. Engineering Fee							2,511,980	2,511,980
3. Administration Cost						502,396		502,396
4. Physical Contingency						1,274,909	1,538,508	2,813,417
Total						14,023,999	16,923,589	30,947,588
5. Price Contingency						5,869,312	7,082,845	12,952,157
Grand Total						19,893,310	24,006,434	43,899,745

Table 1.2 (3) Project Cost (2015)

(Nakfa)

Item	Description		Unit	Quantity	Unit Cost		Cost		Total
	Item	Dimension			Local C.	Foreign C.	Local C.	Foreign C.	
1. Construction Cost									
Intake facility		New well	set		13,229.04	273,277.16	0	0	
		Exsiting well	set		9,275.43	85,317.49	0	0	
		Observation well	set		0.00	0.00	0	0	
		Dam	set	1	1,558,372.33	321,701.24	1,558,372	321,701	
		(sub total)	set	1			1,558,372	321,701	1,880,074
Submersible pump			set						
		(sub total)		0			0	0	0
Transmission pipeline	D C I P	200mm	m		245.85	842.83	0	0	
		150mm	m	43,000	221.01	671.71	9,503,366	28,883,447	
		125mm	m		214.20	657.79	0	0	
		100mm	m		207.31	580.60	0	0	
		80mm	m		204.69	499.83	0	0	
		60mm	m		203.85	393.40	0	0	
		(sub total)	m	43,000			9,503,366	28,883,447	38,386,813
Booster pump		BP.5, 1.026m ³ /min 110.9m	set	5	2,730.01	551,014.34	13,650	2,755,072	
		(sub total)		5			13,650	2,755,072	2,768,722
Pump pit	RC	35m ³	sets	5	104,233.76	72,990.07	521,169	364,950	
		(sub total)		5			521,169	364,950	886,119
Reservoir	RC	240m ³	sets	1	476,113.57	218,432.93	476,114	218,433	
		180m ³		1	406,427.65	202,988.87	406,428	202,989	
		50m ³		1	195,893.96	153,789.73	195,894	153,790	
		40m ³		1	195,893.96	153,789.73	195,894	153,790	
		FRP		sets					
	(sub total)		4			1,274,329	729,001	2,003,330	
Distribution pipeline	PVC	300mm	m		289.52	1,221.56	0	0	
		250mm	m		249.89	1,000.89	0	0	
		200mm	m		222.67	622.16	0	0	
		150mm	m	883	181.05	312.16	159,866	275,637	
		125mm	m	513	167.54	203.19	85,945	104,234	
		100mm	m	1,877	154.76	155.42	290,492	291,727	
		75mm	m	3,329	140.33	107.09	467,167	356,514	
		50mm	m	31,140	126.50	54.06	3,939,054	1,683,548	
		(sub total)	m	37,742			4,942,525	2,711,661	7,654,185
Control house	Type A		sets	4	137,822.18	9,992.65	551,289	39,971	
	Type B		sets	1	195,386.85	10,232.97	195,387	10,233	
	Type C		sets		196,861.35	10,530.98	0	0	
	Type D		sets	0	254,523.76	10,963.56	0	0	
		(sub total)	sets	5			746,676	50,204	796,879
Comunal water point		sets	19	18,019.46	6,866.40	342,370	130,462	472,831	
Individual connection		set	1,777	0.00	0.00	0	0	0	
Temporary Road	width3.0m	m	3,500	297.00	0.00	1,039,500	0	1,039,500	
Sub-Total							19,941,956	35,946,498	55,888,453
2. Engineering Fee								5,588,845	5,588,845
3. Administration Cost								1,117,769	1,117,769
4. Physical Contingency								2,105,972	4,153,534
Total							23,165,697	45,688,877	68,854,575
5. Price Contingency								20,809,712	41,042,253
Grand Total							43,975,410	86,731,130	130,706,540

Table 1.3 O&M Cost (Nakfa)

Description	2005	2010	2015
1. Personnel cost	346,467	640,469	968,998
2. Electricity & fuel cost	295,072	1,018,403	2,379,707
3. Chemical coat	16,963	38,689	63,736
4. Repairing cost	112,589	258,589	581,204
5. Miscellaneous cost	77,109	195,615	399,364
Total	848,201	2,151,765	4,393,008

2. Sanitation

Table 2.1 Bill of Quantity for School and Public Latrine

SUMMARY

A. SUPERSTRUCTURE

1 EXCAVATION AND EARTHWORK	6905,00
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B. SUPERSTRUCTURE

1 BRICKWORKS	7060,00
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2 CARPENTARY AND JOINERY	6140,00
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3 METAL WORKS	5200,00
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4 PLASTERING	2038,00
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5 PAINTING	1660,00
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6 SANITARY INSTALLATION	14998,00
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7 SEPTIC TANK	30724,56
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TOTAL	74 725,56
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Table 2.1 (1) Bill of Quantity for School and Public Latrine

ITEM	DESCRIPTION	UNIT	QTY.	U.PRICE Nakfa	TOTAL P. Nakfa
A. SUBSTRUCTURE					
1. EXCAVATION & EARTHWORKS					
1.1	Clear off site to remove top soil to an average depth of 20cm.	m2	50	4	200
1.2	Excavate for trench foundation in ordinary soil to a depth not exceeding 75cm from the stripped ground level.	m3	39	25	975
1.3	Return fill around foundation with good, dry excavated material from site and well ram in layers every 25cm interval.	m3	26	22	572
1.4	Cartaway surplus excavated material to a distance not exceeding 5km from the compound.	m3	13	25	325
1.5	25cm thick basaltic or equivalent stone hardcore and blinded with crushed stone.	m2	179	27	4833
					-
					6905,00
	TOTAL CARRIED TO SUMMARY				=
B. SUPERSTRUCTURE					
2. BRICK WORKS					
2.1	20cm thick hollow concrete wall bedded on compo-mortar 1:2:9 mix both sides left for plastering.	m2	47	110	5170
2.2	Ditto, but 10cm thick brick wall	m2	27	70	1890
					-
					7060,00
	TOTAL CARRIED TO SUMMARY				=
3. CARPENTARY AND JOINERY					
3.1	Eucalyptus post for roofing, as shown on the section of section the drawing.	m	34	25	850
3.2	5x3cm zigba wood perlin, on which the C.I.S. is going to be fixed.	m	59	30	1770
3.3	Supply and fix 0.3mm thick C.I.S roofing, to be fixed to the perlin price including lap; roof ridges and washers	m2	44	80	3520
					-
					6140,00
	TOTAL CARRIED TO SUMMARY				=

Table 2.1 (2) Bill of Quantity for School and Public Latrine

ITEM	DESCRIPTION	UNIT	QTY.	U.PRICE Nakfa	TOTAL P. Nakfa
4. METAL WORKS					
4,1	Metal doors and windows constructed in accordance to detail drawing, including one coat of anti-rust and three coats of oil paint:-				
	Doors				
	a) Type D1 size: 60 x 170	No	10	400	4000
	b) Type D2 size: 100 x 200	No	2	600	1200
					5200,00
5. PLASTERING					
5,1	Apply three coats of plaster in compo-mortar (1:2:9) mix up to fine finish to all internal walls of the latrine units.	m2	61	28	1708
5,2	Ditto but to external wall of the front faces.	m2	11	30	330
					2038,00
6. PAINTING					
6,1	Apply in three coats of oil paint to internal plastered wall surfaces of the latrine units.	m2	61	20	1220
6,2	Ditto but plastic emulsion paint to external wall surfaces.	m2	11	40	440
					1660,00
	TOTAL CARRIED TO SUMMARY				=
7. SANITARY INSTALLATION					
7,1	Supply and install Galvanized steel water supply pipes for cold water distribution from supply line, elevated tanker to all sanitary fixtures according to where shown on the drawings. Complete with the necessary connecting pieces such as bends, unions, nipples, tee, elbow, etc. shall include all the necessary assistance to the installation works, such as chiselling of walls, slabs, floors, etc. and closing them with concrete to normal condition where required. The installation shall be tested at a pressure of 1bar at the expense of the contractor.				
	Dia. ND 15mm (1/2")	ml	13	25	325
	Dia. ND 20mm (3/4")	ml	21	28	588

Table 2.1 (3) Bill of Quantity for School and Public Latrine

ITEM	DESCRIPTION	UNIT	QTY.	U.PRICE Nakfa	TOTAL P. Nakfa
7,2	Supply and install, on water supply lines, gate valves, made of bronze or brass parts complete with rubber gaskets, hand weels unions and other accessories.				
	Dia. ND 15mm	pcs	18	25	450
	Dia. ND 20mm	pcs	2	30	
7,3	Supply and install soil waste and vent pipes in horizontal branches and vertical stacks made of UPVC pipes and fittings. Fittings should include bends, branches, tees, clearout reducers, etc. Unit price shall include all the necessary assistance work to the installation, such as chiselling of walls, slabs, floors, etc. and closing them with concrete. All pipes entering manhole shall be trapped.				
	Dia. ND 50mm	ml	17	55	935
	Dia. ND 100mm	ml	26	95	2470
7,4	Supply and fix on terminals of ventilation pipes, vent caps (cows), with weathering PP states, sealing gaps b/n the girth of the vent pipe and hole in the roof material.				
	Dia. ND 100mm	pcs	2	65	130
7,5	Supply and fix white vitreous Turkish type W.C. unit with trap and complete with fixing device.	pcs	10	700	7000
7,6	Construct sanitary manholes on domestic sewer lines in 200mm HCB wall plastered from the inside with cement mortar (1:3) on a base of mass concrete slab 100mm thick with proper slope for smooth flow, with reinforced concrete cover.				
	600 x 600mm	pcs	2	800	1600
7,8	Supply and install fiber-glass elevated tank of capacity 1 with vent pipe 25mm, drain pipe and gate valve of diam. 50mm and manhole 60x60cm. cover shall be provided.	pcs	1	1500	1500
					14998,00
	<u>8. SEPTIC TANK</u>				
	<u>Excavation & earthworks</u>				
8,1	Clear off site to remove top soil to an average depth of 20cm.	m2	16	4	64
8,2	Bulk excavation for under ground reservoir excavated in ordinary soil to a depth not exceeding 150cm from the stripped ground level.	m3	109	20	2180
8,3	Return fill around reservoir with good, dry excavated material from site and well ram in layers every 30cm interval.	m3	78	22	1716

Table 2.1 (4) Bill of Quantity for School and Public Latrine

ITEM	DESCRIPTION	UNIT	QTY.	U.PRICE Nakfa	TOTAL P. Nakfa
8,5	Cartaway surplus excavated material to a distance not exceeding 5km from the compound.	m3	31	25	775
8,6	25 cm thick basaltic or equivalent stone hardcore and blinded with crushed stone.	m2	36	27	972
	Concrete works				
	Reinforced concrete in c-25,360kg cement/m3 filled in to formworks and vibrated around rod reinforcem. steel reinforcement and formworks measured separately.				
8,7	In floor slab	m3	4	65	260
8,8	In roof slab	m3	5	100	500
	Steel works				
	Steel reinforcements according to drawing. Price includes cutting ,bending ,placing in position and tying wires.				
8,9	a) Dia.8mm deformed bar	Kg	71	7	511
8,10	b) Dia.12mm deformed bar	Kg	111	7	801
	Formworks				
	Provide cut and fix in position sawn zigba form works :				
8,11	a) Roof slab	m2	25	65	1625
	Walls				
8,12	50 cm thick in trachetic or equivalent stone wall bedded in cement mortar 1:3.	m3	55	290	15950
	Finishing				
8,13	Apply three coats of plastic in cement-mortar (1:3) mix up to	m2	110	37	4070
8,14	Provide and install steel manhole cover of 10mm thick and (60x60)cm size.	pcs	2	500	1000
8,15	Provide and install inlet and outlet pipes with all necessary fittings.	Ls	1	300	300
	TOTAL CARRIED TO SUMMARY				30724,56

Table 2.2 Bill of Quantity for Household Flush Latrine

SUMMARY

A. SUPERSTRUCTURE

1 EXCAVATION AND EARTHWORK 551,60

B. SUPERSTRUCTURE

1 BRICKWORKS 690,20

2 CARPENTARY AND JOINERY 440,00

3 METAL WORKS 400,00

4 PLASTERING 276,08

5 PAINTING 197,20

6 SANITARY INSTALLATION 1975,00

7 SEPTIC TANK 5764,28

TOTAL 10 294,36

Table 2.2 (1) Bill of Quantity for Household Flush Latrine

ITEM	DESCRIPTION	UNIT	QTY.	U.PRICE Nakfa	TOTAL P. Nakfa
A. SUBSTRUCTURE					
1. EXCAVATION & EARTHWORKS					
1.1	Clear off site to remove top soil to an average depth of 20cm.	m2	9,60	4	38
1.2	Excavate for trench foundation in ordinary soil to a depth not exceeding 75cm from the stripped ground level.	m3	9,60	25	240
1.3	Return fill around foundation with good, dry excavated material from site and well ram in layers every 25cm interval.	m3	6,40	22	141
1.4	Cartaway surplus excavated material to a distance not exceeding 5km from the compound.	m3	4,00	25	100
1.5	25cm thick basaltic or equivalent stone hardcore and blinded with crushed stone.	m2	1,20	27	32
TOTAL CARRIED TO SUMMARY					551,60
B. SUPERSTRUCTURE					
2. BRICK WORKS					
2.1	10cm thick hollow concrete wall bedded on compo-mortar 1:2:9 mix both sides left for plastering.	m2	9,86	70	690
TOTAL CARRIED TO SUMMARY					690,20
3. CARPENTARY AND JOINERY					
3.1	Eucalyptus post for roofing, as shown on the section of the drawing.	m	8,00	25	200
3.2	5x3cm zigba wood perlin, on which the C.I.S. is going to be fixed.	m	8,00	30	240
3.3	Supply and fix 0.3mm thick C.I.S roofing, to be fixed to the perlin price including laps, roof ridges and washers.	m2	1,80	80	144
TOTAL CARRIED TO SUMMARY					440,00

Table 2.2 (2) Bill of Quantity for Household Flush Latrine

ITEM	DESCRIPTION	UNIT	QTY.	U.PRICE Nakfa	TOTAL P. Nakfa
4. METAL WORKS					
4,1	Metal doors and windows constructed in accordance to detail drawing, including one coat of anti-rust and three coats of oil paint:-				
	Doors				
	a) Type D1 size: 60 x 170	No	1,00	400	400
					400,00
5. PLASTERING					
5,1	Apply three coats of plaster in compo-mortar (1:2:9) mix up to fine finish to all internal walls of the latrine units.	m2	9,86	28	276
					276,08
6. PAINTING					
6,1	Apply in three coats of oil paint to internal plastered wall surfaces of the latrine units.	m2	9,86	20	197
					197,20
	TOTAL CARRIED TO SUMMARY				400,00
7. SANITARY INSTALLATION					
7,1	Supply and install Galvanized steel water supply pipes for cold water distribution from supply line, elevated tanker to all sanitary fixtures according to where shown on the drawings. Complete with the necessary connecting pieces such as bends, unions, nipples, tee, elbow, etc. shall include all the necessary assistance to the installation works, such as chiselling of walls, slabs, floors, etc. and closing them with concrete to normal condition where required. The installation shall be tested at a pressure of 1bar at the expense of the contractor.				
	Dia. ND 15mm (1/2")	ml	4,00	25	100
7,2	Supply and install, on water supply lines, gate valves, made of bronze or brass parts complete with rubber gaskets, hand weels unions and other accessories.				
	Dia. ND 15mm	pcs	1,00	25	25

Table 2.2 (3) Bill of Quantity for Household Flush Latrine

ITEM	DESCRIPTION	UNIT	QTY.	U.PRICE Nakfa	TOTAL P. Nakfa
7,3	Supply and install soil waste and vent pipes in horizontal branches and vertical stacks made of UPVC pipes and fittings. Fittings should include bends, branches, tees, clearout reducers, etc. Unit price shall include all the necessary assistance work to the installation, such as chiselling of walls, slabs, floors, etc. and closing them with concrete. All pipes entering manhole shall be trapped.				
	Dia. ND 100mm	ml	3,00	95	285
7,4	Supply and fix on terminals of ventilation pipes, vent caps (cowls), with weathering PP states, sealing gaps b/n the girth of the vent pipe and hole in the roof material.				
	Dia. ND 100mm	pcs	1,00	65	65
7,5	Supply and fix white vitreous Turkish type W.C. unit with trap and complete with fixing device.	pcs	1,00	700	700
7,6	Construct sanitary manholes on domestic sewer lines in 200mm HCB wall plastered from the inside with cement mortar (1:3) on a base of mass concrete slab 100mm thick with proper slope for smooth flow, with reinforced concrete cover.				
	600 x 600mm	pcs	1,00	800	800
					1975,00
	8. SEPTIC TANK				
	Excavation & earthworks				
8,1	Clear off site to remove top soil to an average depth of 20cm.	m2	5,33	4	21
8,2	Bulk excavation for under ground reservoir excavated in ordinary soil to a depth not exceeding 150cm from the stripped ground level.	m3	36,33	20	727
8,3	Return fill around reservoir with good, dry excavated material from site and well ram in layers every 30cm interval.	m3	26,00	22	572
8,5	Cartaway surplus excavated material to a distance not exceeding 5km from the compound.	m3	10,30	25	258
8,6	25 cm thick basaltic or equivalent stone hardcore and blinded with crushed stone.	m2	12,00	27	324

Table 2.2 (4) Bill of Quantity for Household Flush Latrine

ITEM	DESCRIPTION	UNIT	QTY.	U.PRICE Nakfa	TOTAL P. Nakfa
	Concrete works				
	Reinforced concrete in c-25,360kg cement/m3 filled in to formworks and vibrated around rod reinforcem. steel reinforcement and formworks measured separately.				
8,7	In floor slab	m3	1,30	65	85
8,8	In roof slab	m3	1,70	100	170
	Steel works				
	Steel reinforcements according to drawing. Price includes cutting ,bending ,placing in position and tying wires.				
8,9	a) Dia.8mm deformed bar	Kg	23,70	7	171
8,10	b) Dia.12mm deformed bar	Kg	37,10	7	267
	Formworks				
	Provide cut and fix in position sawn zigba form works :				
8,11	a) Roof slab	m2	2,70	65	176
	Walls				
8,12	50 cm thick in trachetic or equivalent stone wall bedded in cement mortar 1:3.	m3	6,00	290	1740
	Finishing				
8,13	Apply three coats of plastic in cement-mortar (1:3) mix up to	m2	12,30	37	455
8,14	Provide and install steel manhole cover of 10mm thick and (60x60)cm size.	pcs	1,00	500	500
8,15	Provide and install inlet and outlet pipes with all necessary fittings.	Ls	1,00	300	300
	TOTAL CARRIED TO SUMMARY				5764,28

Table 2.3 Bill of Quantity for Double PIT VIP Latrine

Material expenses for double pit VIP

Item No.	Description	Unit	Quantity	Total amount	
				Unit rate Nfa	Nfa
1	Hollow block (20x20x10)	pcs	210	1,5	315
2	Stone	m3	7	20	140
3	Cement	quintel	4	70	280
4	Sand	m3	3,5	40	140
5	Reinforcement bar dia. 10mm	kg	31	6	186
6	Galvanized sheet metal vent pipe w	pcs	2	25	50
7	Door made with GSM complete with wire mesh and lock	pcs	1	110	110
8	Corrigated iron sheet roof	pcs	1	100	100
9	Wooden post for roof support	pcs	1	70	70
Total					1391

Labour expenses for double pit VIP

Item No.	Description	Total amount	
		Unit rate Nfa	Nfa
1	Pit cover slab	ls	60
2	Door	ls	40
3	Masonry work	ls	100
4	Digging pit-8m3	10/m3	80
Total labour expense			280

Total labour and material cost of Double pit VIP latrine = Nfa 1671/-

Table 2.4 Cost Estimation of Latrine

Item No.	Description	Qty	1998 price Nfa	Total price Nfa	Inflated price Nfa	Total price Nfa
1	School Latrine – PFL					
	- Year 2000 – 2005	5	74,725.56	373,628	83,961.64	419,808
	- Year 2005 – 2010	1	74,725.56	74,725.56	112,359.61	112,360
	- Year 2010 – 2015	1	74,725.56	74,725.56	150,362.51	150,363
2	Public latrine – CFL					
	- Year 2000 – 2005	5	74,725.56	373,627.80	83,961.64	419,808
	- Year 2005 – 2010	1	74,725.56	74,725.56	112,359.61	112,360
	- Year 2010 – 2015	1	74,725.56	74,725.56	150,362.51	150,363
3	Household latrine					
	- CFL – Year 2005	1,882	10,500.00	19,761,000	11,728.65	22,073,319
	- CFL – Year 2010	946	10,500.00	9,933,000	15,695.58	14,848,019
	- CFL – Year 2015	1,297	10,500.00	13,618,500	21,004.23	27,242,486
	- PFL – Year 2005	1,285	10,438.46	13,413,421	11,797.80	15,160,173
	- PFL – Year 2010	2,562	10,438.46	26,743,335	15,788.12	26,743,335
	- PFL – Year 2015	1,314	10,438.46	13,716,136	21,128.06	27,762,271
	- VIP – Year 2005	986	1,671.00	1,646,620	1,877.54	1,851,254
	- VIP – Year 2010	833	1,671.00	1,391,943	2,512.57	2,092,971
- VIP – Year 2015	457	1,671.00	763,647	3,362.38	1,536,608	

Table 2.5 Cost Estimation of Public Facility

Item No.	Description	Qty	1998 price Nfa	Total price Nfa	Inflated price Nfa	Total price Nfa
1	Refuse truck (compactor)					
	- Year 2000-2005	2	1,027,586	2,055,172	1,134,596	4,135,410
	- Year 2005-2010	1	1,027,586	1,027,586	1,545,109	1,545,109
	- Year 2010-2015	2	1,027,586	2,055,172	2,067,705	4,135,410
2	Vacuum truck (3,000 lit.)					
	- Year 2000-2005	1	924,828	924,828	1,039,137	1,039,137
	- Year 2005-2010	2	924,828	1,849,656	1,390,599	2,781,198
	- Year 2010-2015	1	924,828	924,828	1,860,936	1,860,936
3	Refuse collecting bins					
	- Year 2000-2005	150	500	75,000	562	84,300
	- Year 2005-2010	100	500	50,000	752	56,200
	- Year 2010-2015	100	500	50,000	1006	56,200
4	Refuse collecting container (8m ³)					
	- Year 2000-2005	20	59,086	1,181,720	66,392	1,327,840
	- Year 2005-2010	25	59,086	1,477,150	88,848	2,221,200
	- Year 2010-2015	10	59,086	590,860	118,899	1,118,899

APPENDIX G
FINANCIAL PLAN

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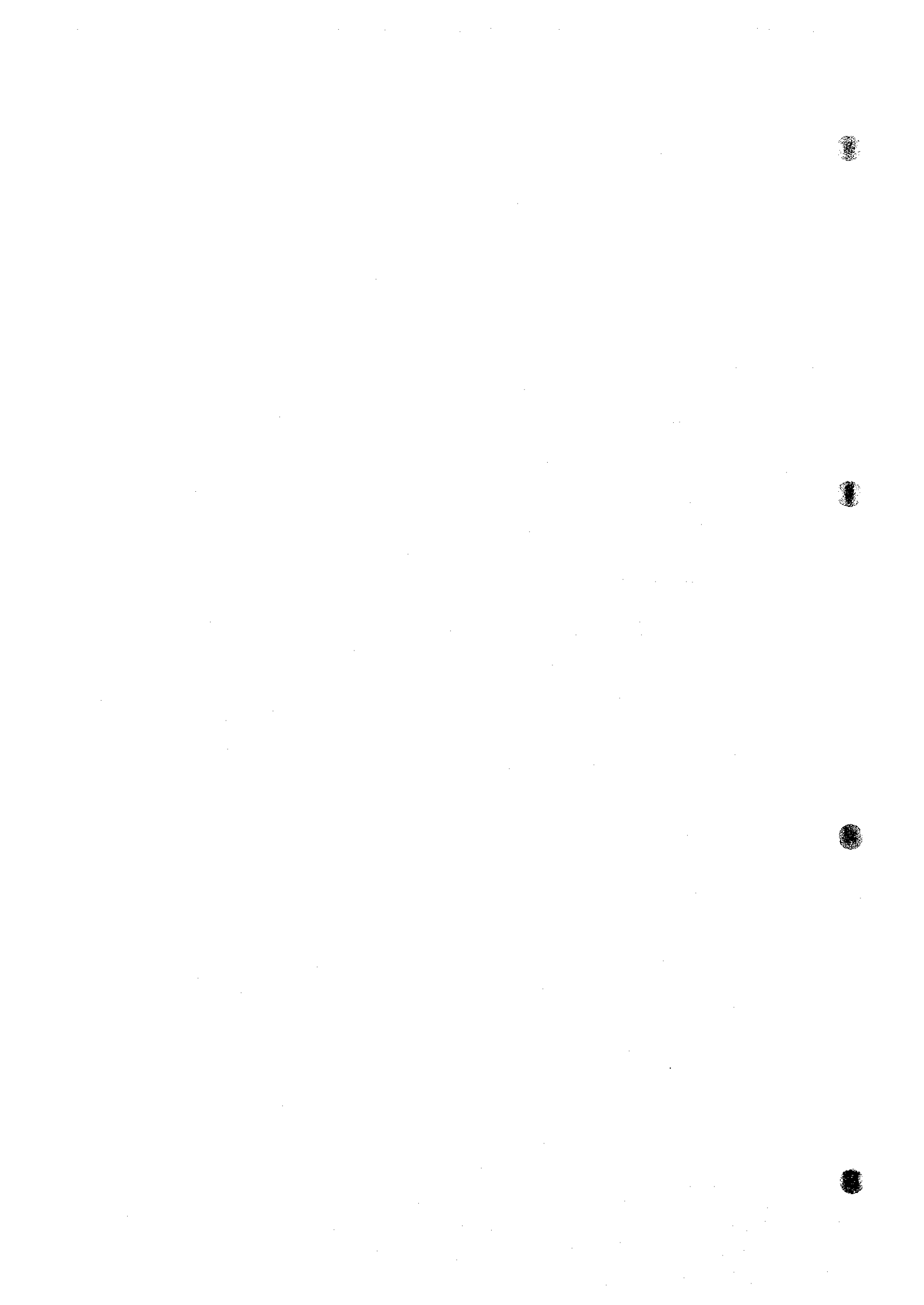


Table 1 Personnel Plan for WSA Mendefera

Item	1997	2005	2010	2015
1. Total No. of Personnel				
1) Total production of water (cu. m/day)	267	834	1,902	3,134
2) Water production per worker (cu. m/day/worker)	15.7	20	25	30
3) Coefficient	1	0.8	0.7	0.67
4) No. of personnel	17	33	53	69
5) Additional personnel for sanitation	0	4	6	8
6) Final No. of personnel	17	37	59	77
2. Breakdown of Personnel by Position/Function				
1) Manager	1	1	1	1
2) Customer services	0	1	1	1
3) Internal audit	0	0	1	1
4) Administrative service				
(1) Head	0	1	1	1
(2) General administration section				
Secretaries/typists/clerks	0	0	1	1
Guards	1	2	4	5
Sweepers/janitors	0	0	0	1
Drivers	1	1	2	3
Sub-total	2	3	7	10
(3) Personnel section				
Recruitment/training/remuneration	0	1	1	1
(4) Storage section				
Store keepers	0	1	2	3
Purchase of materials/supplies	0	1	1	1
Sub-total	0	2	3	4
(5) Legal section	0	1	1	1
Total	2	8	13	17
5) Financial service				
(1) Head	1	1	1	1
(2) Budgeting section	0	0	1	2
(3) Accounting section				
Accountants	0	1	2	3
Cashiers/treasurers	1	2	3	4
Sub-total	1	3	5	7
(4) Financial management section				
Financial analysts	0	1	2	3
(5) Operation section				
Meter readers	1	1	2	3
Bill distributors/collectors	0	1	2	2
Water sellers	3	4(+9*)	0	0
Sub-total	4	2	4	5
Total	6	7	13	18
6) Technical service				
(1) Head	0	1	1	1
(2) Technical records section	0	0	1	1
(3) Operation and maintenance section				
Mechanics	0	1	2	3
Electricians	0	0	1	1
Motor operators	4	6	10	12
Plumbers	4	4	6	8
Sub-total	8	11	19	24
(4) Inspection section				
Water meter technicians	0	0	1	1
Leakage detectors	0	0	1	1
Water quality analysts	0	0	0	0
Sub-total	0	0	2	2
(5) Workshop	0	0	1	1
(6) Works section				
Contracting	0	0	0	1
Designing/drafting	0	0	0	1
Sub-total	0	0	0	2
Total	8	12	24	31
7) Sanitary service				
(1) Head	0	1	1	1
(2) Loan service section	0	1	2	3
(3) Maintenance section				
Technicians	0	1	2	3
Drivers	0	1	1	1
Sub-total	0	2	3	4
Total	0	4	6	8
Grand total	17	33	59	77

Note: 1) Personnel in 1997 include those on temporary/contract basis. 2) *--temporary
 3) As need arises, section (3) in 6) technical service may take charge of functions of sections (4) and (5).

Table 2 (1) Financial Statements for Water Supply Facilities in Mendefera

(Unit: Nfa thousand)

No.	1	2	3	4	5	6	7	8	9	10
Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Income Statement										
Revenue	0	0	1386	1504	1637	1786	1954	3742	4131	4641
Operation and Maintenance	0	0	849	849	849	849	2152	2152	2152	2152
Depreciation	0	0	539	539	539	539	1240	1240	1240	1240
Payment of Interest	0	0	0	0	0	0	0	0	0	0
Expenditure	0	0	1387	1387	1387	1387	3392	3392	3392	3392
Profit before Tax	0	0	-1	117	250	399	-1438	350	739	1249
Tax	0	0	0	0	0	0	0	0	0	0
Profit after Tax	0	0	-1	117	250	399	-1438	350	739	1249
Funds Statement										
Profit after Tax	0	0	-1	117	250	399	-1438	350	739	1249
Loans	0	0	0	0	0	0	0	0	0	0
Government Budget	2136	21789	0	0	2763	28185	0	0	0	6148
Depreciation	0	0	539	539	539	539	1240	1240	1240	1240
Sources	2136	21789	538	656	3552	29122	-198	1590	1979	8637
Capital Works	2136	21789	0	0	2763	28185	0	0	0	6148
Payment of Principal	0	0	0	0	0	0	0	0	0	0
Working Capital	0	0	538	656	788	938	-198	1590	1979	2489
Applications	2136	21789	538	656	3552	29122	-198	1590	1979	8637
Balance Sheet										
Liabilities	0	0	0	0	0	0	0	0	0	0
Capital	2136	23925	23924	24041	27054	55637	54200	54550	55289	62685
Liabilities and Capital	2136	23925	23924	24041	27054	55637	54200	54550	55289	62685
Current Assets	0	0	538	1194	1982	2920	2722	4312	6291	8780
Fixed Assets	2136	23925	23387	22848	25072	52718	51478	50238	48998	53906
Assets	2136	23925	23924	24041	27054	55637	54200	54550	55289	62685

Source: JICA

Table 2 (2) Financial Statements for Water Supply Facilities in Mendefera

(Unit: Nfa thousand)

No.	11	12	13	14	15	16	17	18	19	20
Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Income Statement										
Revenue	5303	6163	6762	7435	8191	9041	9998	9859	9859	9859
Operation and Maintenance	2152	4393	4393	4393	4393	4393	4393	4393	4393	4393
Depreciation	1240	2776	2776	2776	2776	2776	2776	2776	2776	2776
Payment of Interest	0	0	0	0	0	0	0	0	0	0
Expenditure	3392	7170	7170	7170	7170	7170	7170	7170	7170	7170
Profit before Tax	1911	-1007	-408	265	1021	1871	2828	2690	2690	2690
Tax	0	0	0	0	0	0	0	0	0	0
Profit after Tax	1911	-1007	-408	265	1021	1871	2828	2690	2690	2690
Funds Statement										
Profit after Tax	1911	-1007	-408	265	1021	1871	2828	2690	2690	2690
Loans	0	0	0	0	0	0	0	0	0	0
Government Budget	62706	0	0	0	0	0	0	0	0	0
Depreciation	1240	2776	2776	2776	2776	2776	2776	2776	2776	2776
Sources	65857	1770	2368	3042	3797	4647	5604	5466	5466	5466
Capital Works	62706	0	0	0	0	0	1294	0	0	0
Payment of Principal	0	0	0	0	0	0	0	0	0	0
Working Capital	3151	1770	2368	3042	3797	4647	4311	5466	5466	5466
Applications	65857	1770	2368	3042	3797	4647	5604	5466	5466	5466
Balance Sheet										
Liabilities	0	0	0	0	0	0	0	0	0	0
Capital	127303	126296	125888	126154	127175	129046	131874	134564	137253	139943
Liabilities and Capital	127303	126296	125888	126154	127175	129046	131874	134564	137253	139943
Current Assets	11930	13700	16068	19110	22907	27554	31865	37331	42797	48262
Fixed Assets	115372	112596	109820	107044	104268	101492	100009	97233	94457	91681
Assets	127303	126296	125888	126154	127175	129046	131874	134564	137253	139943

Source: JICA

Table 2 (3) Financial Statements for Water Supply Facilities in Mendefera

(Unit: Nfa thousand)

No.	21	22	23	24	25	26	27	28	29	30
Year	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Income Statement										
Revenue	9859	9859	9859	9859	9859	9859	9859	9859	9859	9859
Operation and Maintenance	4393	4393	4393	4393	4393	4393	4393	4393	4393	4393
Depreciation	2776	2776	2776	2776	2776	2776	2776	2776	2776	2776
Payment of Interest	0	0	0	0	0	0	0	0	0	0
Expenditure	7170	7170	7170	7170	7170	7170	7170	7170	7170	7170
Profit before Tax	2690	2690	2690	2690	2690	2690	2690	2690	2690	2690
Tax	0	0	0	0	0	0	0	0	0	0
Profit after Tax	2690	2690	2690	2690	2690	2690	2690	2690	2690	2690
Funds Statement										
Profit after Tax	2690	2690	2690	2690	2690	2690	2690	2690	2690	2690
Loans	0	0	0	0	0	0	0	0	0	0
Government Budget	0	0	0	0	0	0	0	0	0	0
Depreciation	2776	2776	2776	2776	2776	2776	2776	2776	2776	2776
Sources	5466	5466	5466	5466	5466	5466	5466	5466	5466	5466
Capital Works	1758	0	0	0	0	3411	0	0	0	0
Payment of Principal	0	0	0	0	0	0	0	0	0	0
Working Capital	3708	5466	5466	5466	5466	2054	5466	5466	5466	5466
Applications	5466	5466	5466	5466	5466	5466	5466	5466	5466	5466
Balance Sheet										
Liabilities	0	0	0	0	0	0	0	0	0	0
Capital	142633	145322	148012	150701	153391	156080	158770	161460	164149	166839
Liabilities and Capital	142633	145322	148012	150701	153391	156080	158770	161460	164149	166839
Current Assets	51970	57436	62902	68367	73833	75887	81353	86819	92284	97750
Fixed Assets	90663	87886	85110	82334	79558	80193	77417	74641	71865	69089
Assets	142633	145322	148012	150701	153391	156080	158770	161460	164149	166839

Source: JICA

Table 3 Cost Benefit Streams, Mendefera (Economic Analysis)

CC=Capital Costs; OM=O/M Costs; CS=Costs; BF=Benefits
CF=Cash Flow (=BF - CS)

(Unit: Nfa thousand)

NO.	YEAR	CC	OM	CS	BF	CF
1	1999	2030	-279	1751	0	-1751
2	2000	20664	-279	20385	0	-20385
3	2001	0	570	570	1279	709
4	2002	0	570	570	1749	1180
5	2003	2628	570	3198	2302	-896
6	2004	26758	570	27328	2952	-24376
7	2005	0	1873	1873	3714	1841
8	2006	0	1873	1873	4306	2433
9	2007	0	1873	1873	4980	3107
10	2008	5928	1873	7801	5748	-2053
11	2009	60350	1873	62223	6622	-55602
12	2010	0	4114	4114	8761	4647
13	2011	0	4114	4114	9791	5676
14	2012	0	4114	4114	10933	6819
15	2013	0	4114	4114	12201	8087
16	2014	0	4114	4114	13608	9493
17	2015	1284	4114	5399	16675	11277
18	2016	0	4114	4114	16675	12561
19	2017	0	4114	4114	16675	12561
20	2018	0	4114	4114	16675	12561
21	2019	1747	4114	5862	16675	10814
22	2020	0	4114	4114	16675	12561
23	2021	0	4114	4114	16675	12561
24	2022	0	4114	4114	16675	12561
25	2023	0	4114	4114	16675	12561
26	2024	3404	4114	7518	16675	9157
27	2025	0	4114	4114	16675	12561
28	2026	0	4114	4114	16675	12561
29	2027	0	4114	4114	16675	12561
30	2028	0	4114	4114	16675	12561
31	2029	0	4114	4114	16675	12561
32	2030	1284	4114	5399	16675	11277

Table 4 (1) Financial Statements for Water Supply Facilities in Mendefera

(Unit: Nfa thousand)

No.	1	2	3	4	5	6	7	8	9	10
Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Income Statement										
Revenue	0	0	1386	1504	1637	1786	1954	1752	1752	1752
Operation and Maintenance	0	0	849	849	849	849	849	849	849	849
Depreciation	0	0	539	539	539	539	539	539	539	539
Payment of Interest	0	0	0	0	0	0	0	0	0	0
Expenditure	0	0	1387	1387	1387	1387	1387	1387	1387	1387
Profit before Tax	0	0	-1	117	250	399	567	365	365	365
Tax	0	0	0	0	0	0	0	0	0	0
Profit after Tax	0	0	-1	117	250	399	567	365	365	365
Funds Statement										
Profit after Tax	0	0	-1	117	250	399	567	365	365	365
Loans	0	0	0	0	0	0	0	0	0	0
Government Budget	2136	21789	0	0	0	0	0	0	0	0
Depreciation	0	0	539	539	539	539	539	539	539	539
Sources	2136	21789	538	656	788	938	1106	903	903	903
Capital Works	2136	21789	0	0	0	0	0	0	0	0
Payment of Principal	0	0	0	0	0	0	0	0	0	0
Working Capital	0	0	538	656	788	938	1106	903	903	903
Applications	2136	21789	538	656	788	938	1106	903	903	903
Balance Sheet										
Liabilities	0	0	0	0	0	0	0	0	0	0
Capital	2136	23925	23924	24041	24291	24690	25256	25621	25985	26350
Liabilities and Capital	2136	23925	23924	24041	24291	24690	25256	25621	25985	26350
Current Assets	0	0	538	1194	1982	2920	4025	4929	5832	6735
Fixed Assets	2136	23925	23387	22848	22309	21770	21231	20692	20153	19614
Assets	2136	23925	23924	24041	24291	24690	25256	25621	25985	26350

Source: JICA

Table 4 (2) Financial Statements for Water Supply Facilities in Mendefera

(Unit: Nfa thousand)

No.	11	12	13	14	15	16	17	18	19	20
Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Income Statement										
Revenue	1752	1752	1752	1752	1752	1752	1752	1752	1752	1752
Operation and Maintenance	849	849	849	849	849	849	849	849	849	849
Depreciation	539	539	539	539	539	539	539	539	539	539
Payment of Interest	0	0	0	0	0	0	0	0	0	0
Expenditure	1387	1387	1387	1387	1387	1387	1387	1387	1387	1387
Profit before Tax	365	365	365	365	365	365	365	365	365	365
Tax	0	0	0	0	0	0	0	0	0	0
Profit after Tax	365	365	365	365	365	365	365	365	365	365
Funds Statement										
Profit after Tax	365	365	365	365	365	365	365	365	365	365
Loans	0	0	0	0	0	0	0	0	0	0
Government Budget	0	0	0	0	0	0	0	0	0	0
Depreciation	539	539	539	539	539	539	539	539	539	539
Sources	903	903	903	903	903	903	903	903	903	903
Capital Works	0	0	0	0	0	0	1294	0	0	0
Payment of Principal	0	0	0	0	0	0	0	0	0	0
Working Capital	903	903	903	903	903	903	-390	903	903	903
Applications	903	903	903	903	903	903	903	903	903	903
Balance Sheet										
Liabilities	0	0	0	0	0	0	0	0	0	0
Capital	26714	27079	27443	27808	28172	28537	28901	29266	29631	29995
Liabilities and Capital	26714	27079	27443	27808	28172	28537	28901	29266	29631	29995
Current Assets	7639	8542	9446	10349	11252	12156	11766	12669	13572	14476
Fixed Assets	19076	18537	17998	17459	16920	16381	17136	16597	16058	15519
Assets	26714	27079	27443	27808	28172	28537	28901	29266	29631	29995

Source: JICA

Table 5 Cost Benefit Streams, Mendefera (Economic Analysis)

CC=Capital Costs; OM=O/M Costs; CS=Costs; BF=Benefits
CF=Cash Flow (=BF - CS)

(Unit: Nfa thousand)

NO.	YEAR	CC	OM	CS	BF	CF
1	1999	2030	-279	1751	0	-1751
2	2000	20664	-279	20385	0	-20385
3	2001	0	570	570	1279	709
4	2002	0	570	570	1749	1180
5	2003	0	570	570	2302	1733
6	2004	0	570	570	2952	2382
7	2005	0	570	570	3714	3145
8	2006	0	570	570	3714	3145
9	2007	0	570	570	3714	3145
10	2008	0	570	570	3714	3145
11	2009	0	570	570	3714	3145
12	2010	0	570	570	3714	3145
13	2011	0	570	570	3714	3145
14	2012	0	570	570	3714	3145
15	2013	0	570	570	3714	3145
16	2014	0	570	570	3714	3145
17	2015	1284	570	1854	3714	1861
18	2016	0	570	570	3714	3145
19	2017	0	570	570	3714	3145
20	2018	0	570	570	3714	3145
21	2019	0	570	570	3714	3145
22	2020	0	570	570	3714	3145

APPENDIX H
ENVIRONMENT



List of Tables

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Table H-2 Scooping Check List(Mendefera).....	H-2



Table H-1 Screening Check List (Mendefera)

Environment Item	Contents	Evaluation	Remarks	
Social Environment				
1	Resettlement	Exchange of land onwership and/or residential rights due to occupation of land	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	Small structure
2	Economic activity	Loss of productive land, change in economic structure	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	Small structure
3	Transportation, Living environment	Traffic congestion, accident and subsequent effect on school, hospital etc.	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	Small structure
4	Regional segregation	Due to transportation hindrance	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	Small structure
5	Historical ruins, cultural heritage	Damage to cultural heritage and its loss	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	Does not exist near the town
6	Water right, right of common	Effect on right of fishery, irrigation, water right	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	Use of GW of shallow layer
7	Sanitation	Deteriorated sanitation due to garbage and harmful insect outbreak	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	Not relevant
8	Industrial and Solid waste	Construction waste, waste dumps, mud, solid waste	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	No big construction
9	Disaster (Risk)	Increased hazardous land subsidence, landslides, accidents	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	Small construction in flat area
Natural Environment				
10	Topography, geology	Change in topography, geological features by digging, soil piling	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	No big construction
11	Soil erosion	Top soil erosion by rain after creating new land reclamation, cutting down trees	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	Not be a causative factor
12	Groundwater	Depletion of GW level and pollution due to excessive pumping	<input checked="" type="radio"/> Yes <input type="radio"/> No Not available	There is a possibility of depletion
13	Lake, river regime	Change in flow amount and quality due to reclamation and drainage	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	Not in the vicinity
14	Beach, coast	Shoreline erosion due to reclamation or change in tidal current	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	Activities in the inland
15	Fauna and Flora	Disturbance in breeding, extinction due to change in living condition	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	No report of Red book species
16	Meteorology	Change in temperature, rainfall, wind due to large scale construction or building	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	Not relevant
17	Landscape	Destruction of harmony due to changed topography or buildings	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	No big construction
Pollution				
18	Air pollution	Exhaust, poisonous gas from automobile, factory	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	Not relevant
19	Water pollution	Flow of muddy water, oil from boring activities	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	Boring dia is small and low depth
20	Soil contamination	Pollution due to flow of poisonous material and drainage	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	Not relevant
21	Noise, vibration	Due to drilling and Water lifting	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	No house in vicinity
22	Landsubsidence	Lowering of WL due to over extraction of water	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	W.R.Z./Quarternary aquifer are thin
23	Offensive odor	Exhaust, Odor substance	Yes <input type="radio"/> No <input checked="" type="radio"/> Not available	Not relevant
Total Evaluation:		Is EIA necessary for this project ?	Necessary <input type="radio"/> <u>Unnecessary</u> <input checked="" type="radio"/>	Influential items are minimum

Note: W.R.Z. = Weathered Rock Zone

Table H-2 Scooping Check List (Mendefera)

Environment Item		Evaluation	Remarks
Social Environment			
1	Resettlement	D	Small structure
2	Economic activity	D	Small structure
3	Transportation, Living environment	D	Small structure
4	Regional segregation	D	Small structure
5	Historic ruins, Cultural heritage	D	Small structure
6	Water right, Right of common	D	GW development(no complaint so far)
7	Sanitation	D	The Project will improve the condition
8	Solid waste	D	No large scale construction
9	Disaster (Risk)	D	Small scale of construction in flat area
Natural Environment			
10	Topography, Geology	D	No large scale construction
11	Soil erosion	D	Not relevant
12	Groundwater	B	There is a possibility of depletion
13	Lake, River regime	D	Not relevant(GW development)
14	Beach, Coast	D	Not relevant(GW development in inland)
15	Fauna, Flora	D	No large scale construction activities
16	Meteorology	D	Not relevant
17	Landscape	D	No large scale construction activities
Pollution			
18	Air pollution	D	Not relevant
19	Water pollution	D	Not expected due to small drilling activities
20	Soil contamination	D	Not relevant
21	Noise, Vibration	D	Negligible(no houses close to the drilling site)
22	Land subsidence	D	Not expected
23	Offensive odor	D	Not relevant

Note: Evaluation Level

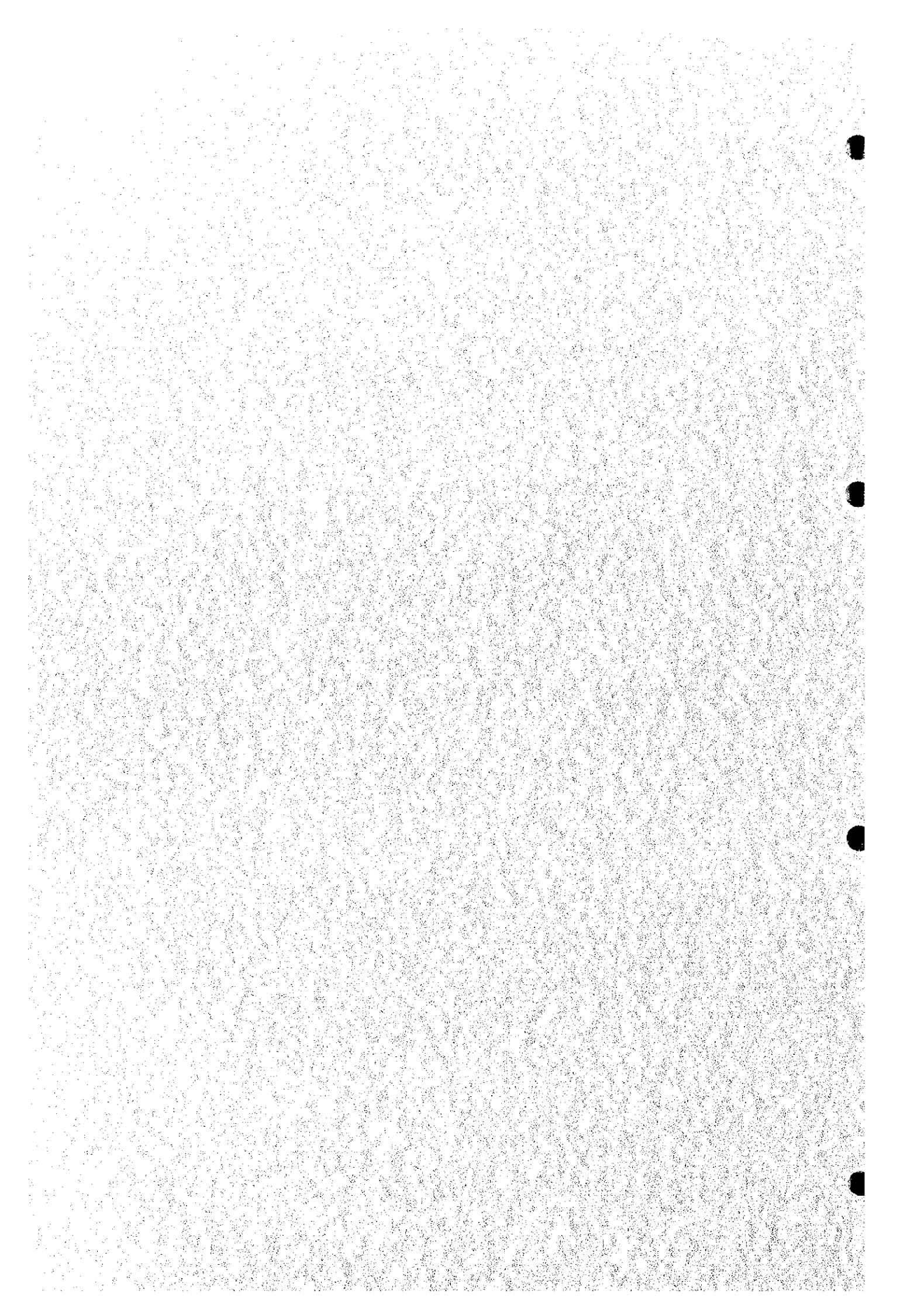
A: Much impact

B: Some impact

C: Not known (Further investigation is necessary)

D: No impact





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