STATE COMMITTEE ON WATER SYSTEMS
THE REPUBLIC OF ARMENIA

THE STUDY
FOR
IMPROVEMENT OF RURAL WATER SUPPLY
AND
SEWAGE SYSTEMS
IN
THE REPUBLIC OF ARMENIA

FINAL REPORT

DATA BOOK (1/4)

MARCH 2009

JAPAN INTERNATIONAL COOPERATION AGENCY

NIPPON KOEI CO., LTD.

THE STUDY

FOR

IMPROVEMENT OF RURAL WATER SUPPLY AND SEWAGE SYSTEMS

IN

THE REPUBLIC OF ARMENIA

FINAL REPORT

DATA BOOK (1/4)

1. ARAGATSOTN MARZ

No.	Rural Community	No.	Rural Community
1	Akunq	31	Lernarot
2	Aghdzq	32	Lusagyugh
3	Antarut	33	Lusakn
4	Ashnak	34	Tsaghkahovit
5	Avan+Khnusik	35	Taghkashen
6	Avtona	36	Tsilqar
7	Avshen	37	Katnaghbyur
8	Aragats	38	Karmarashen
9	Aragats	39	Kaqavadzor
10	Arayi	40	Hartavan
11	Arteni	41	Dzoraglukh
12	Apnagyugh	42	Dzoragyugh
13	Baysz	43	Meliqgyugh
14	Byuravan	44	Miraq
15	Garnahovit	45	Mulqi
16	Geghadir	46	Nigavan
17	Gegharot	47	Norashen
18	Getap	48	Norashen
19	Davtashen	49	Shenavan
20	Derek	50	Shgharshik
21	Dian	51	Vosketas
22	Yeghipatrush	52	Chqnagh
23	Yeghnik	53	Jamshlu
24	Yernjatap	54	Saralanj

No.	Rural Community
25	Nor Yedesia
26	Zovasar
27	Ttujur
28	Tlik
29	Irind
30	Lernapar

No.	Rural Community
55	Sipan
56	Vardenis
57	Vardenut
58	Verin Sasunik
59	Tegher
60	Orgov
61	Ortachya

1 ARAGATSOTN MARZ

No.1 Akunq

Information on Existing Water Sources (Aragatsotn)

Study for Improvement of Rural Water Supply and Sewage Systems in RA

No.1 Community Akunq
District Talin
Marz Aragatsotn

No	Water source	Latitude			Longitude			Atidute	Yeild(L/sec)		
		deg	min	sec	deg	min	sec	(m)	Min	Max	At site
1	Aknagh spring	40	25	44.6	43	54	17.7	1,867	0.8	3.5	2.5
2											
3											
4											
5											
6											
7											
8											
9											
10											

Notes:

Latitude, Longitude, Atitude:	*Measured at site*
Yield (Min, Max):	*Interviewed to the Community*
Yield (at site):	*Measured / estimated at site in summer of 2007*

Users Acceptnce for water quality	Acceptable
Notes	The spring is located inside the Community, the flow is directly given to the internal network.
Alternative sources if any	No alternative water sources are available.

No.1 Community Akunq
District Talin
Marz Aragatsotn
Sampling date 08/Sep/2007

	Parameters analysed	Units	No1. Akhagh				Guidelines	
							WHO	Armenia
a	pH		7.7				6.5-8	6.0 - 9.0
b	Temperature	Deg.C	8.8					
c	TDS	Mg/L	66				1000	1000
1	Al:Aluminum	Mg/L	<0.008				0.10	0.50
2	B:Boron	Mg/L	n.d				0.70	0.50
3	Cl:Chloride	Mg/L	5				250	350
4	Cr:Chrome	Mg/L	<0.01				0.05	0.05
5	Cu:Copper	Mg/L	n.d				2	1
6	F:Fluoride	Mg/L	0.38				1.50	
7	Hardness	Mg/L	170				500	700
8	Fe:Iron	Mg/L	n.d				0.30	0.30
9	Mn:Manganese	Mg/L	n.d				0.40	0.10
10	Mo:Molibdenum	Mg/L	0.030				0.070	0.250
11	Ni:Nickel	Mg/L	<0.006				0.020	0.100
12	Nitrate(NO3+)	Mg/L	2.2				50.0	45.0
13	SO4:Sulfate	Mg/L	5.0				250.0	500.0
14	Zn:Zink	Mg/L	n.d				3.0	5.0
15	As:Arsenic	Mg/L	n.d				0.0	0.1
16	Ba:Barium	Mg/L	<0.01				0.70	0.10
17	Be:Berillium	Mg/L	n.d				NA	0.00020
18	Cd:Cadmium	Mg/L	n.d				0.0030	0.0010
19	Pb:Lead	Mg/L	0.001				0.010	0.030
20	Hg:Mercury	Mg/L	<0.0002				0.00100	0.00050
21	Se:Selenium	Mg/L	n.d				0.010	0.010
22	Sr:Strontium	Mg/L	0.1				NA	7.0
23	CN:Cyanide	Mg/L	n.d				0.070	0.035
24	Coli form bacteria	bacteria per 100 ml	n.d				-	0
25	Thermo-tolerant coli form bacteria	bacteria per 100 ml	n.d				0	0
26	Total bacteria	bacteria per 1 ml	n.d				-	50

Information on Existing Water Sources
Existing Bacteriological Test

No.1 Community Akunq
District Talin
Marz Aragatsotn

No.	Month	Date	Total amount of bacteria	Total amount of coliform bacteria	Coliform bacteria tolerant to heat
			nos/1mL	MPN/100mL	nos/100 mL
			Less than 50nos/1mL	Not Identified	Not Identified
1	2		139	9.0	Not Identified
2	3		137	9.0	Not Identified
3	4		99	7.5	Not Identified
4	5		121	7.5	Not Identified
5	6		114	7.5	Not Identified
6	7		111	7.5	Not Identified
7	8		132	9.0	Not Identified

1 **Marz** Aragatsotn **Community** Akunq

1. ACCESSIBILITY TO THE SITE

No.	Structures	Access by vehicle	Machine construction	Remarks
1	Intake	Fair	Possible	
2	Transmission pipeline			No transmission pipline
3	Reservoir	Difficult	Possible	

2. INTAKE STRUCTURE

No.	Water source	N	E	El. (m)	Year	Material	Volume (l/s)	Rehabilitation Necessity (Y/N)
1	Water main	40°25'44.6"	43°54'17.7"	1867	1947	Masonry	2.5	Yes

3. TRANSMISSION PIPELINE

No.	Pipeline length (m)	Pipe diameter	Material	Flow rate (l/s)	Year	Leakage	Rehabilitation Necessity (Y/N)
1	No						

4. RESERVOIR

No.	N	E	El. (m)	Material	Shape	Dimension (m)	Volume (m3)	Rehabilitation Necessity (Y/N)
1	40°25'51.2"	43°54'19.0"	1,990	reinforced concrete	Rectangular	2×(12×6×3)	2×400	Yes

5. CHLORINATION

No.	Existence (Y/N)	Location	Chlorine type	Chlorine duration
1	Yes	Intake	Tablet	3times per month

6. DISTRIBUTION PIPELINE

No.	Pipeline length (m)	Pipe diameter	Material	Year	Leakage	Rehabilitation Necessity (Y/N)
1	160	200	Steel	1950	Little	Yes
2	150	150	Steel		Little	Yes
3	180	125	Steel		Medium	Yes
4	1,550	100	Steel		Medium	Yes
5	3,400	50	Steel		Medium	Yes
6	640	150	AsbestosCement		Medium	Yes
7	150	150	wooden		Huge	Yes

7. PUMP STATION

Existence (Y/N)	Power source	Type	Capacity (l/s)	Pump head (m)	Tank cap. (m3)	House size (m)	Rehabilitation Necessity (Y/N)
No							

8. PUBLIC TAPS

No. of taps	Old one (year)	New one (year)	Valves (Y/N)	Valve rate (%)	Rehabilitation Necessity (Y/N)
3	1950		Yes	70	Yes

9. DRAINAGE SYSTEM

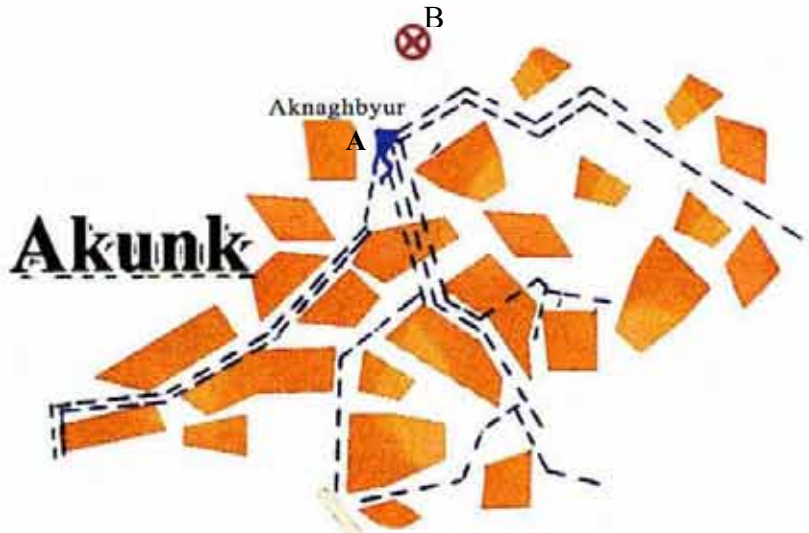
Existence (Y/N)	Rehabilitation Necessity (Y/N)	Remarks
No	Yes	

Questionnaire on Existing Water Supply Conditions by Socio-Economic Survey

Marz	**Aragatsotn**
Number and Name of Community	**No.1 Akunq**
District	**Talin**

No.	Question	Answer
A: Baseline Data		
A1	Actual population in 2001	735
A2	Actual population in 2007	739
A3	Number of households	235
A4.1	Elderly people	35
A4.2	Population in labor force (age from 16 to 62)	322
A4.3	Children	122
A5.1	Pensioners	132
A5.2	Unemployed	3
A5.3	Receiving benefits	28
A6	Average monthly income of household (AMD)	25,000
A7	Number of medical ambulance staion/first and health post	absent
A8	Number of beds in each medical ambulance staion	0
A9	Number of school	1
A10	Number of pupils	97
B: Budget		
B1	Annual Budget of the community 2004, in thousand AMD	940
	Annual Budget of the community 2005, in thousand AMD	668
	Annual Budget of the community 2006, in thousand AMD	918
	Annual Budget of the community 2007, in thousand AMD	820
	Annual Budget of the community 2008, in thousand AMD	is not planned.
B2	Amount spent in drinking water sector 2004, in thousand AMD	350
	Amount spent in drinking water sector 2005, in thousand AMD	350
	Amount spent in drinking water sector 2006, in thousand AMD	350
	Amount spent in drinking water sector 2007, in thousand AMD	250
	Amount spent in drinking water sector 2008, in thousand AMD	is not planned.
C: Socio-Economic Survey		
C1	Major industries of the community:	dairy, eggs
C2	Is there any community activities carrying out by women? 1-Yes, 2-No	Aregak credit program
D: Water Usage and Water Demand Survey		
D1	Does the community hold water use permit? 1-Yes, 2-No	yes
D2	Water use permit number	1157
D3	Date of expiry of water use permit	31.07.06-31.07.09
D4	Planned date of obtaining water use permit	-
D5	Present condition of the water supply volume of Domestic use	insufficient
D6	Present condition of the water supply volume of Irrigation water	insufficient
D7	Number of house connection to drinking water system	60
D8	How many house connection household set the water meter	0
D9	Number of public taps	80 yard tap
D10.1	How is the regime of water supply in your community in the dry season?	12 hrs
D10.2	How is the regime of water supply in your community in the wet season?	24 hrs
D11	What time of day water is given?	12:00-24;00
D12	Are you pleased with duration of domestic water supply?	mainly pleased
D13	Are hours of water supply convenient?	mainly convenient
D14.1	How long the taps are open to provide the domestic water (cooking, washing, foodstuffs, dishes, Landry, bathing, etc) of each houshold a day?	-
D14.2	Estimate quantity of domestic water use of each household (litter per day)	500
D15.1	How long the taps are open to provide the each household for filling	-
D15.2	Estimate quantity of water for filling containers of each household (litter per	difficult to answer
D16	Drinking water monthly water fee per household	0
D17	How often do you usually pay water fees?	-
D18	Water fee structure 1Flate rate, 2 Having water tariff	-
D19	Where do you acquire the irrigation water?	from spring
D20	Are you satisfied with irrigation water supply volume?	is not sufficient
E: Present Operation and Maintenance Works		
E1	Name of responsible for water supply	Aghabekyan Hamlet
E2	Position	water distributor
E3	Telephone	with the help of administration head
E4	Quantity and present condition of the water supply facilities: spring/ intake	1 rehabilitated·
E5	Quantity and present condition of the water supply facilities:	rehabilitated
E6	Quantity and present condition of the water supply facilities: DRR(Daily Regulatory Reservoir)	1 rehabilitated·
E7	Quantity and present condition of the water supply facilities: net/distribution pipes	deteriorated
E8	Quantity and present condition of the water supply facilities: public tap	deteriorated
E9	Quantity and present condition of the water supply facilities: pump	absent
E10	Who is the owner of the water supply facilities?	community
E11	Who is engaged in the water supply facilities repairing works?	community and residents
E12	How do you repair the water supply facilities?	by ourselves
E13	Who is in charge of the repair work in the community?	absent
E14	How you prepare O&M costs?	payment from employed population
E15	Please indicate the O&M cost breakdown per year for water supply	
	Electricity (AMD)	0
	Labor cost (AMD)	300,000
	Repair cost(AMD)	100,000
	Others(AMD)	0
	Total (AMD)	400,000
E16	Do the residents participate in the O&M works?	manpower
E17	What kind of OM method is preferable to you?	resident participation
F: Initial Environmental Examination (IEE)		
F1	Are any of the following areas located inside or around the project site?	
F1.1	National park, protected area designated by the government (coast line, water lands, reserved are for ethnic or indigenous people, cultural heritage), and areas being considered for national parks or proposed areas.	absent
F1.2	Virgin forests, tropical forests	absent
F1.3	Ecological improvement habits areas (coral reef, mangrove wetland, tidal	absent
F1.4	Habit of valuable species protected by domestic laws or international treaties	absent
F1.5	Likely salts cumulus or soil erosion areas on a massive scale	absent
F1.6	Remarkable desertification trend areas	absent
F1.7	Archaeological historical or cultural valuable areas	absent
F1.8	Living areas of ethic, indigenous people or nomads who have a traditional lifestyle or special socially valuable areas	absent

	N	E	H (m)
A	$40^0$25’44.6”	$43^0$54’17.7”	1867
B	$40^0$25’51.2”	$43^0$54’19.0”	1990



Pipeline length (m)	Pipe diameter (mm)	Material
TRANSMISSION PIPELINE		
Absent		
DISTRIBUTION PIPELINE		
160	200	Steel
150	150	
180	1250	
1550	100	
3400	50	
640	150	Asbestos
150	150	Wood

LEGENDS

Spring intake

Distribution pipeline

Not operating DRR

0 100 200 300 400 500 m

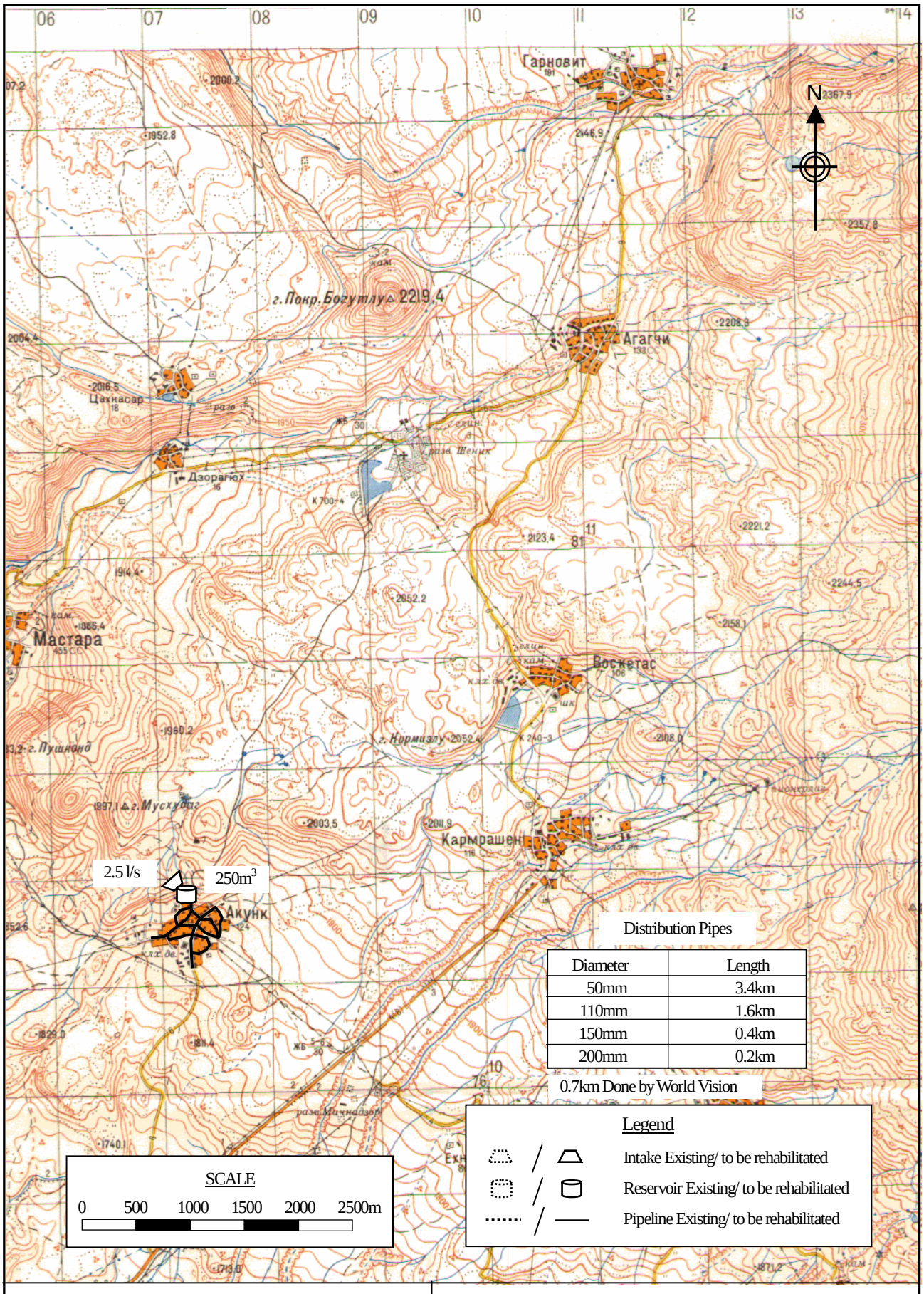
Aragatsotn Marz		The Study for Improvement of Rural Water Supply and Sewerage Systems in the Republic of Armenia
No.	Community	
01	Akunq	JICA STUDY TEAM 2007

Marz : **Aragatsotn** No.1
Name : **Akunq**

No.	Item		Quantity	Unit	Water demand (m3/d)	
A.	**WATER DEMAND**					
	1 Population		739	persons	73.9	
	2 Factory		-	nos	0.0	
	3 School (pupils)		97	pupils	1.0	
	4 Medical Ambulance Station		-	nos	-	
	5 Policlinic		-	nos	-	
	7 Livestocks (87lit/household)		235	household	20.4	
	Sub-total				95.3	
	Unaccouted for water (20%)				19.1	
1	Average Daily Water Demand			70.1	114.4	m3/day
2	Maximum Daily Water Demand				137.2	m3/day
3	Maximum Hourly Water Demand				18.6	m3/hr
B	**WATER SUPPLY PLAN**					
	1 Water source type	Nr.	Total vol.			
	a Spring	1	2.5	lit/sec	216.0	m3/day
`	Total				216.0	m3/day
	2 Required reservoir volume				223	m3

C WATER SUPPLY FACILITIES REHABILITATION PLAN

No	Item	Quantity	Unit	
1	Intake			
	1m3	1	nos	
	2m3		nos	
	3m3		nos	
	4m3		nos	
2	Transmission pipe			
	50mm diameter		m	
	75mm diameter		m	
	90mm diameter		m	
	110mm diameter		m	
	150mm diameter		m	
	200mm diameter		m	
	250mm diameter		m	
3	Reservoir			
	250m3 capacity	1	nos	
4	Distribution pipe			Done by World Vision
	50mm diameter	3,400	m	
	75mm diameter		m	
	90mm diameter		m	
	110mm diameter	1,600	m	
	150mm diameter	400	m	700m rehabilitation
	200mm diameter	200	m	
	250mm diameter		m	
5	House connection	175	nos	
6	Water meter installation	235	nos	
7	Public tap	3	nos	
8	Chlorination	1	nos	
9	Pumps	-	nos	



Water Supply Facilities Rehabilitation Plan		The Study for Improvement of Rural Water Supply and Sewerage Systems in the Republic of Armenia
Marz	Aragatsotn	
No. 01	Akunq	JICA STUDY TEAM

Marz : **Aragatsotn**
No. : **1**
Name : **Akunq**

No	Item	Specification	Quantity	Unit	Unit Price	Total
1	Intake					
		1m3	1	nos	367,700	367,700
		2m3		nos	545,000	
		3m3		nos	669,100	
		4m3		nos	805,100	
	Sub-total					367,700
2	Transmission Pipe					
		50mm		m	5,520	
		75mm		m	7,160	
		90mm		m	8,040	
		110mm		m	9,680	
		150mm		m	13,140	
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					
3	Reservoir					
		50m3		nos	8,363,900	
		100m3		nos	12,968,300	
		150m3		nos	18,804,500	
		200m3		nos	22,524,600	
		250m3	1	nos	25,952,800	25,952,800
		300m3		nos	29,630,400	
		350m3		nos	33,528,700	
		400m3		nos	36,388,000	
		450m3		nos	39,392,500	
		500m3		nos	42,520,900	
	Sub-total					25,952,800
4	Distribution Pipe					
		50mm	3,400	m	5,520	18,768,000
		75mm		m	7,160	
		90mm		m	8,040	
		110mm	1,600	m	9,680	15,488,000
		150mm	400	m	13,140	5,256,000
		200mm	200	m	19,440	3,888,000
		250mm		m	27,040	
	Sub-total					43,400,000
5	House Connection		175	nos	74,000	12,950,000
6	Water Meter Installation		235	nos	80,000	18,800,000
7	Public Tap		3	nos	90,000	270,000
8	Chlorilation Equipment		1	nos	500,000	500,000
9	Pump Replacement			nos	10,000,000	
10	Drainage and Sewerage	concrete surfa	2,240	m	3,600	8,064,000
	Total				AMD	110,304,500
					Equivalent to USD	361,039
					Equivalent to JPY	38,089,568
					AMD	USD
	Investment Cost per household		235	HH	469,381	1,536
	Investment Cost per person		739	persons	149,262	489

ARAGATSOTN MARZ
Aparan District
No 1 Akunq

PROJECTED INCOME STATEMENT **Unit: million AMD**

Description	Unit	Total	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
A Water Sales Revenue																																										
Consumption water volume	1000m3/yr		34.8																																							
Unit rate	AMD/m3				40.00	40.00	40.00	41.32	70.00	72.31	74.70	77.16	115.65	119.47	123.41	127.48	131.69	136.03	140.52	145.16	149.95	154.90	160.01	165.29	170.75	176.38	182.20	188.21	194.42	200.84	207.47	214.31	221.39	228.69	236.24	244.04	252.09	260.41	269.00	277.88	287.05	296.52
Sub-total		194.15	0.00	0.00	0.51	1.03	1.25	1.29	2.19	2.26	2.34	2.42	3.62	3.74	3.86	3.99	4.12	4.26	4.40	4.54	4.69	4.85	5.01	5.17	5.35	5.52	5.70	5.89	6.09	6.29	6.50	6.71	6.93	7.16	7.40	7.64	7.89	8.15	8.42	8.70	8.99	9.28
B Operating Costs																																									
1. Staff salary																																									
Inspectors	person				1																																				
Pump operators	person				0																																				
Base Salary	AMD/m/p				20,000	20,660	21,342	22,046	22,774	23,525	24,301	25,103	25,932	26,788	27,672	28,585	29,528	30,502	31,509	32,549	33,623	34,732	35,879	37,063	38,286	39,549	40,854	42,202	43,595	45,034	46,520	48,055	49,641	51,279	52,971	54,719	56,525	58,390	60,317	62,308	64,364	66,488
Sub-total		17.70			0.24	0.25	0.26	0.26	0.27	0.28	0.29	0.30	0.31	0.32	0.33	0.34	0.35	0.37	0.38	0.39	0.40	0.42	0.43	0.44	0.46	0.47	0.49	0.51	0.52	0.54	0.56	0.58	0.60	0.62	0.64	0.66	0.68	0.70	0.72	0.75	0.77	0.80
2. Chlorine																																									
Pouring volume	kg/yr				209																																				
Unit rate	AMD/kg				600	620	640	661	683	706	729	753	778	804	830	858	886	915	945	976	1009	1042	1076	1112	1149	1186	1226	1266	1308	1351	1396	1442	1489	1538	1589	1642	1696	1752	1810	1869	1931	1995
Sub-total		9.13			0.05	0.11	0.13	0.14	0.14	0.15	0.15	0.16	0.16	0.17	0.17	0.18	0.19	0.19	0.20	0.20	0.21	0.22	0.22	0.23	0.24	0.25	0.26	0.26	0.27	0.28	0.29	0.30	0.31	0.32	0.33	0.34	0.35	0.37	0.38	0.39	0.40	0.42
3. Electricity (for pump)		0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4. Maintenance cost		16.05			0.09	0.19	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.29	0.30	0.31	0.32	0.34	0.35	0.36	0.37	0.38	0.39	0.41	0.42	0.44	0.45	0.46	0.48	0.50	0.51	0.53	0.55	0.56	0.58	0.60	0.62	0.64	0.66	0.69	0.71	0.73
Pump repair					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pipe repair					0.09	0.19	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.29	0.30	0.31	0.32	0.34	0.35	0.36	0.37	0.38	0.39	0.41	0.42	0.44	0.45	0.46	0.48	0.50	0.51	0.53	0.55	0.56	0.58	0.60	0.62	0.64	0.66	0.69	0.71	0.73
5. Pump replacement		0.00																0.00															0.00									
Sub-total		42.88	0.00	0.00	0.38	0.55	0.62	0.64	0.66	0.69	0.71	0.74	0.76	0.78	0.80	0.83	0.86	0.90	0.93	0.95	0.98	1.02	1.04	1.08	1.12	1.16	1.20	1.23	1.27	1.32	1.36	1.41	1.46	1.50	1.55	1.60	1.65	1.71	1.76	1.83	1.88	1.95
C Gross Income (A-B)		151.27	0.00	0.00	0.13	0.48	0.63	0.65	1.53	1.57	1.63	1.68	2.86	2.96	3.06	3.16	3.26	3.36	3.47	3.59	3.71	3.83	3.97	4.09	4.23	4.36	4.50	4.66	4.82	4.97	5.14	5.30	5.47	5.66	5.85	6.04	6.24	6.44	6.66	6.87	7.11	7.33
D Depreciation cost		104.65						2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99
E Interest paid		33.14	0.02	0.04	0.58	1.15	1.40	1.41	1.41	1.41	1.41	1.41	1.41	1.37	1.33	1.29	1.24	1.20	1.16	1.12	1.07	1.03	0.99	0.94	0.90	0.85	0.80	0.76	0.71	0.66	0.61	0.57	0.52	0.47	0.42	0.37	0.32	0.26	0.21	0.16	0.11	0.05
F Net Income		13.48	-0.02	-0.04	-0.45	-0.67	-0.77	-3.75	-2.87	-2.83	-2.77	-2.72	-1.54	-1.40	-1.26	-1.12	-0.97	-0.83	-0.68	-0.52	-0.35	-0.19	-0.01	0.16	0.34	0.52	0.71	0.91	1.12	1.32	1.54	1.74	1.96	2.20	2.44	2.68	2.93	3.19	3.46	3.72	4.01	4.29
G Tax and duties		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H Net Income after deduction of TAX		13.48	-0.02	-0.04	-0.45	-0.67	-0.77	-3.75	-2.87	-2.83	-2.77	-2.72	-1.54	-1.40	-1.26	-1.12	-0.97	-0.83	-0.68	-0.52	-0.35	-0.19	-0.01	0.16	0.34	0.52	0.71	0.91	1.12	1.32	1.54	1.74	1.96	2.20	2.44	2.68	2.93	3.19	3.46	3.72	4.01	4.29
OM Cost Recovery Ratio (A/B)		453%	0%	0%	133%	188%	202%	202%	332%	328%	330%	327%	476%	479%	483%	481%	479%	473%	473%	478%	479%	475%	482%	479%	478%	476%	475%	479%	480%	477%	478%	476%	475%	477%	477%	478%	478%	477%	478%	475%	478%	476%

PROJECTED CASH FLOW STATEMENT **Unit: million AMD**

Description	Total	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
SOURCES OF FUNDS																																									
A Internal Cash Generation																																									
1. Net Income	13.48	-0.02	-0.04	-0.45	-0.67	-0.77	-3.75	-2.87	-2.83	-2.77	-2.72	-1.54	-1.40	-1.26	-1.12	-0.97	-0.83	-0.68	-0.52	-0.35	-0.19	-0.01	0.16	0.34	0.52	0.71	0.91	1.12	1.32	1.54	1.74	1.96	2.20	2.44	2.68	2.93	3.19	3.46	3.72	4.01	4.29
2. Depreciation cost	104.65	0.00	0.00	0.00	0.00	0.00	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99
3. Interest Paid	33.14	0.02	0.04	0.58	1.15	1.40	1.41	1.41	1.41	1.41	1.41	1.41	1.37	1.33	1.29	1.24	1.20	1.16	1.12	1.07	1.03	0.99	0.94	0.90	0.85	0.80	0.76	0.71	0.66	0.61	0.57	0.52	0.47	0.42	0.37	0.32	0.26	0.21	0.16	0.11	0.05
Sub-total	151.27	0.00	0.00	0.13	0.48	0.63	0.65	1.53	1.57	1.63	1.68	2.86	2.96	3.06	3.16	3.26	3.36	3.47	3.59	3.71	3.83	3.97	4.09	4.23	4.36	4.50	4.66	4.82	4.97	5.14	5.30	5.47	5.66	5.85	6.04	6.24	6.44	6.66	6.87	7.11	7.33
B Finances																																									
1. Project Loan	140.90	2.36	1.67	54.56	56.18	25.49	0.36	0.28																																	
2. Local fund	48.17	0.79	0.56	18.47	19.28	8.86	0.12	0.09																																	
Sub-total	189.07	3.15	2.23	73.03	75.46	34.35	0.48	0.37																																	
C Subsidy from Government																																									
1. Subsidy for O&M cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Subsidy for debt services	32.61	0.02	0.04	0.45	0.67	0.77	0.76	0.00	0.00	0.00	0.00	2.60	2.50	2.40	2.30	2.20	2.10	1.99	1.87	1.75	1.63	1.49	1.37	1.23	1.10	0.96	0.80	0.64	0.49	0.32	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total	32.61	0.02	0.04	0.45	0.67	0.77	0.76	0.00	0.00	0.00	0.00	2.60	2.50	2.40	2.30	2.20	2.10	1.99	1.87	1.75	1.63	1.49	1.37	1.23	1.10	0.96	0.80	0.64	0.49	0.32	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Cash Inflow	372.95	3.17	2.27	73.61	76.61	35.75	1.89	1.90	1.57	1.63	1.68	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.47	5.66	5.85	6.04	6.24	6.44	6.66	6.87	7.11	7.33
APPLICATION OF FUNDS																																								
D Project disbursement	189.07	3.15	2.23	73.03	75.46	34.35	0.48	0.37																																	
E Total debt services																																								
1. Loan repayment	140.89											4.05	4.09	4.13	4.17	4.22	4.26	4.30	4.34	4.39	4.43	4.47	4.52	4.56	4.61	4.66	4.70	4.75	4.80	4.85	4.89	4.94	4.99	5.04	5.09	5.14	5.19	5.25	5.30	5.35	5.41
2. Interest paid	33.14	0.02	0.04	0.58	1.15	1.40	1.41	1.41	1.41	1.41	1.41	1.41	1.37	1.33	1.29	1.24	1.20	1.16	1.12	1.07	1.03	0.99	0.94	0.90	0.85	0.80	0.76	0.71	0.66	0.61	0.57	0.52	0.47	0.42	0.37	0.32	0.26	0.21	0.16	0.11	0.05
Sub-total	174.03	0.02	0.04	0.58	1.15	1.40	1.41	1.41	1.41	1.41	1.41	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.45	5.46	5.46	5.46	5.46
Total Cash Outflow	363.10	3.17	2.27	73.61	76.61	35.75	1.89	1.78	1.41	1.41	1.41	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.45	5.46	5.46	5.46	5.46
F Net Surplus Cash (A+C2)-E	9.85	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.16	0.22	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.20	0.39	0.58	0.78	0.99	1.20	1.41	1.65	1.87
Project Cost Recovery Ratio (%)																																								
Cost recovery by water fee (A/E)	87%	0%	0%	22%	42%	45%	46%	109%	111%	116%	119%	52%	54%	56%	58%	60%	62%	64%	66%	68%	70%	73%	75%	77%	80%	82%	85%	88%	91%	94%	97%	100%	104%	107%	111%	114%	118%	122%	126%	130%	134%
Cost recovery by water fee + subsidy ((A+C2)/E)	106%	100%	100%	100%	100%	100%	100%	109%	111%	116%	119%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	104%	107%	111%	114%	118%	122%	126%	130%	134%

ARAGATSOTN MARZ
Aparan District
No 1 Akunq

FINANCIAL ANALYSIS

A COST RECOVERY ANALYSIS

Item	Millon AMD	Rate
1 Revenue		
Water fee revenue	194.15	85.6%
Subsidy	32.61	14.4%
Total	226.76	100.0%
2 Expenditure		
OM cost	42.88	18.9%
Loan repayment	140.89	62.1%
Interest paid	33.14	14.6%
Surplus cash	9.85	4.3%
Total	226.76	100.0%

B. FIRR CALCULATION **Unit: million AMD**

Description	Total	Year																																					
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
A COST																																								
1. Investment Cost	125.98	2.30	1.64	49.82	49.73	21.90	0.33	0.26																																
2. Operation and Maintenance Cost																																								
Salary	9.12			0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Chlorine	4.84			0.05	0.11	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Electricity	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mantenance cost	8.19			0.09	0.18	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Pump replacement																	0.00															0.00								
Sub-total	22.15			0.38	0.53	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
Total Outflow	148.13	2.30	1.64	50.20	50.26	22.49	0.92	0.85	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
B BENEFIT																																							
1. Water Tariff	121.89	0.00	0.00	0.51	1.03	1.25	1.29	2.19	2.26	2.34	2.42	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62
2. Subsidy	10.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.19	1.13	1.07	1.01	0.96	0.90	0.83	0.75	0.68	0.60	0.50	0.43	0.33	0.25	0.16	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Inflow	132.72	0.00	0.00	0.51	1.03	1.25	1.29	2.19	2.26	2.34	2.42	4.81	4.75	4.69	4.63	4.58	4.52	4.45	4.37	4.30	4.22	4.12	4.05	3.95	3.87	3.78	3.66	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62	3.62
NET BENEFIT	-15.41	-2.30	-1.64	-49.7	-49.2	-21.2	0.37	1.34	1.67	1.75	1.83	4.22	4.16	4.10	4.04	3.99	3.93	3.86	3.78	3.71	3.63	3.53	3.46	3.36	3.28	3.19	3.07	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03
FIRR =	**-0.66%**																																							

C. SENSITIVITY ANALYSIS

No.		Description	PV 1.75%	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	1	Capital cost 10% up	-54.96	-2.53	-1.80	-54.7	-54.2	-23.4	0.34	1.31	1.67	1.75	1.83	4.22	4.16	4.10	4.04	3.99	3.93	3.86	3.78	3.71	3.63	3.53	3.46	3.36	3.28	3.19	3.07	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03
	2	Capital cost 20% up	-66.77	-2.76	-1.97	-59.7	-59.2	-25.6	0.30	1.29	1.67	1.75	1.83	4.22	4.16	4.10	4.04	3.99	3.93	3.86	3.78	3.71	3.63	3.53	3.46	3.36	3.28	3.19	3.07	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03
2	1	OM cost 10% up	-44.69	-2.30	-1.64	-49.7	-49.3	-21.3	0.31	1.28	1.61	1.69	1.77	4.16	4.10	4.04	3.98	3.93	3.87	3.80	3.72	3.65	3.57	3.47	3.40	3.30	3.22	3.13	3.01	2.97	2.97	2.97	2.97	2.97	2.97	2.97	2.97	2.97	2.97	2.97	2.97	2.97
	2	OM cost 20% up	-46.24	-2.30	-1.64	-49.8	-49.3	-21.4	0.25	1.22	1.55	1.63	1.71	4.10	4.04	3.98	3.92	3.87	3.81	3.74	3.66	3.59	3.51	3.41	3.34	3.24	3.16	3.07	2.95	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91	2.91
3	1	Revenue 10% down	-52.19	-2.30	-1.64	-49.7	-49.3	-21.4	0.24	1.12	1.44	1.52	1.59	3.74	3.69	3.63	3.58	3.53	3.48	3.42	3.34	3.28	3.21	3.12	3.06	2.97	2.89	2.81	2.70	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67
	2	Revenue 20% down	-61.24	-2.30	-1.64	-49.8	-49.4	-21.5	0.11	0.90	1.22	1.28	1.35	3.26	3.21	3.16	3.11	3.07	3.03	2.97	2.91	2.85	2.79	2.71	2.65	2.57	2.51	2.43	2.34	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31	2.31

No.		Description	FIRR	Sensitivity indicator	Swiching value
1	1	Capital cost 10% up	-1.12%	-4.14	-24.13%
	2	Capital cost 20% up	-1.54%	-5.72	-17.47%
2	1	OM cost 10% up	-0.76%	-1.31	-76.54%
	2	OM cost 20% up	-0.86%	-2.32	-43.07%
3	1	Revenue 10% down	-1.28%	-4.85	-20.61%
	2	Revenue 20% down	-1.96%	-6.65	-15.04%

No.2 Aghdzq

Information on Existing Water Sources (Aragatsotn)

Study for Improvement of Rural Water Supply and Sewage Systems in RA

No.2 Community Aghdzq
District Ashtarak
Marz Aragatsotn

No	Water source	Latitude			Longitude			Atidute	Yeild(L/sec)		
		deg	min	sec	deg	min	sec	(m)	Min	Max	At site
1	a spring intake	40	19	46.1	44	15	20.8	1,309	5.0	9.0	8.0
2	7spring intakes	40	19	36.6	44	15	21.3	1,301	1.0	2.0	1.5
3											
4											
5											
6											
7											
8											
9											
10											

Notes:

Latitude, Longitude, Atitude:	*Measured at site*
Yield (Min, Max):	*Interviewed to the Community*
Yield (at site):	*Measured / estimated at site in summer of 2007*

Users Acceptnce for water quality	Acceptable
Notes	Spring water, 9.5lit/sec, is divided by the two communities. Spring intakes are in deteriorated condition
Alternative sources if any	There are big water storages in the area of these springs.

No.2 Community Aghdzq
District Ashtarak
Marz Aragatsotn
Sampling date 28/Aug/2007

	Parameters analysed	Units	No.1				Guidelines	
							WHO	Armenia
a	pH		7.5				6.5-8	6.0 - 9.0
b	Temperature	Deg.C	15					
c	TDS	Mg/L	111				1000	1000
1	Al:Aluminum	Mg/L	n.d				0.10	0.50
2	B:Boron	Mg/L	0.20				0.70	0.50
3	Cl:Chloride	Mg/L	11				250	350
4	Cr:Chrome	Mg/L	n.d				0.05	0.05
5	Cu:Copper	Mg/L	n.d				2	1
6	F:Fluoride	Mg/L	0.28				1.50	
7	Hardness	Mg/L	270				500	700
8	Fe:Iron	Mg/L	n.d				0.30	0.30
9	Mn:Manganese	Mg/L	n.d				0.40	0.10
10	Mo:Molibdenum	Mg/L	0.020				0.070	0.250
11	Ni:Nickel	Mg/L	n.d				0.020	0.100
12	Nitrate(NO3+)	Mg/L	1.3				50.0	45.0
13	SO4:Sulfate	Mg/L	8.0				250.0	500.0
14	Zn:Zink	Mg/L	n.d				3.0	5.0
15	As:Arsenic	Mg/L	n.d				0.0	0.1
16	Ba:Barium	Mg/L	<0.01				0.70	0.10
17	Be:Berillium	Mg/L	n.d				NA	0.00020
18	Cd:Cadmium	Mg/L	0.0001				0.0030	0.0010
19	Pb:Lead	Mg/L	0.001				0.010	0.030
20	Hg:Mercury	Mg/L	n.d				0.00100	0.00050
21	Se:Selenium	Mg/L	n.d				0.010	0.010
22	Sr:Strontium	Mg/L	<0.7				NA	7.0
23	CN:Cyanide	Mg/L	n.d				0.070	0.035
24	Coli form bacteria	bacteria per 100 ml	n.d				-	0
25	Thermo-tolerant coli form bacteria	bacteria per 100 ml	n.d				0	0
26	Total bacteria	bacteria per 1 ml	n.d				-	50

Information on Existing Water Sources
Existing Bacteriological Test

No.2 Community Aghdzq
District Ashtarak
Marz Aragatsotn

No.	Month	Date	Total amount of bacteria	Total amount of coliform bacteria	Coliform bacteria tolerant to heat
			nos/1mL	MPN/100mL	nos/100 mL
			Less than 50nos/1mL	Not Identified	Not Identified
	Data N/A				

No. 2 **Marz** Aragatsotn **Community** Aghdzq

1. ACCESSIBILITY TO THE SITE

No.	Structures	Access by vehicle	Machine construction	Remarks
1	Intake	Difficult	Unknown	
2	Transmission pipeline	Difficult	Unknown	Pipeline is mostly far from the road
3	Reservoir	Fair	Possible	

2. INTAKE STRUCTURE

No.	Water source	N	E	El. (m)	Year	Material	Volume (l/s)	Rehabilitation Necessity (Y/N)
1	Spring	40°19'46.1"	44°15'20.8"	1,309	1972	Masonry	8.0	Yes
2	7 Springs	40°19'36.6"	44°15'21.3"	1,301	1981	Concrete	1.5	Yes

3. TRANSMISSION PIPELINE

No.	Pipeline length (m)	Pipe diameter	Material	Flow rate (l/s)	Year	Leakage	Rehabilitation Necessity (Y/N)
1	1,700	150	Steel	4.4	1972	Medium	Yes
2	250	150	Steel	2.9		Little	Yes
3	700	150	Steel	1.5	1985	Little	Yes

4. RESERVOIR

No.	N	E	El. (m)	Material	Shape	Dimension (m)	Volume (m3)	Rehabilitation Necessity (Y/N)
1	40°19'02.5"	44°15'20.1"	1,297	reinforced concrete	Circle	h=6m.d=10m	500	Yes
2	40°18'44.4"	44°15'22.8"	1,261	reinforced concrete	Rectangular	12x6x4	250	Yes

5. CHLORINATION EQUIPMENT

No.	Existence (Y/N)	Location	Chlorine type	Chlorine duration
1	No			

6. DISTRIBUTION PIPELINE

No.	Pipeline length (m)	Pipe diameter	Material	Year	Leakage	Rehabilitation Necessity (Y/N)
1	4,130	100	Ductile Iron	1972	Medium	Yes
2	1,000	50	Steel		Medium	Yes
3	1,600	32	Steel		Medium	Yes
4	700	25	Steel		Medium	Yes

7. PUMP STATION

Existence (Y/N)	Power source	Type	Capacity (l/s)	Pump head (m)	Tank cap. (m3)	House size (m)	Rehabilitation Necessity (Y/N)
No							

8. PUBLIC TAPS

No. of taps	Old one (year)	New one (year)	Valves (Y/N)	Valve rate (%)	Rehabilitation Necessity (Y/N)
5	1984		Yes	100	Yes

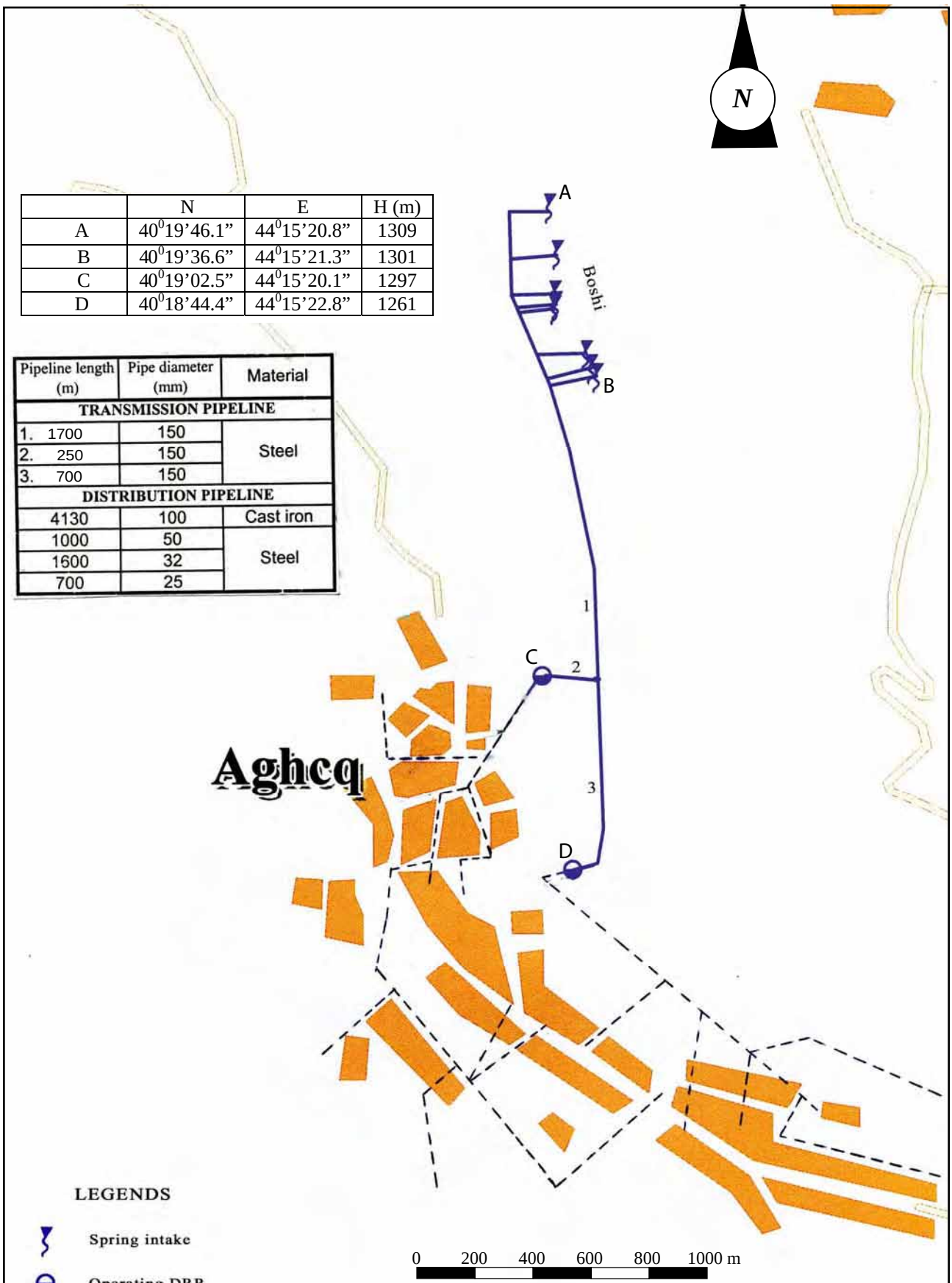
9. DRAINAGE SYSTEM

Existence (Y/N)	Rehabilitation Necessity (Y/N)	Remarks
Yes	Yes	DN150, L=3000m asbestos

Questionnaire on Existing Water Supply Conditions by Socio-Economic Survey

Marz	**Aragatsotn**
Number and Name of Community	**No.2 Aghdzq**
District	**Ashtarak**

No.	Question	Answer
A: Baseline Data		
A1	Actual population in 2001	1,800
A2	Actual population in 2007	1,800
A3	Number of households	470
A4.1	Elderly people	200
A4.2	Population in labor force (age from 16 to 62)	618
A4.3	Children	458
A5.1	Pensioners	241
A5.2	Unemployed	3
A5.3	Receiving benefits	40
A6	Average monthly income of household (AMD)	20,000
A7	Number of medical ambulance staion/first and health post	absent
A8	Number of beds in each medical ambulance staion	0
A9	Number of school	1
A10	Number of pupils	340
B: Budget		
B1	Annual Budget of the community 2004, in thousand AMD	5,245
	Annual Budget of the community 2005, in thousand AMD	6,316
	Annual Budget of the community 2006, in thousand AMD	10,337
	Annual Budget of the community 2007, in thousand AMD	8,351
	Annual Budget of the community 2008, in thousand AMD	is not planned.
B2	Amount spent in drinking water sector 2004, in thousand AMD	300
	Amount spent in drinking water sector 2005, in thousand AMD	600
	Amount spent in drinking water sector 2006, in thousand AMD	700
	Amount spent in drinking water sector 2007, in thousand AMD	1,000
	Amount spent in drinking water sector 2008, in thousand AMD	is not planned.
C: Socio-Economic Survey		
C1	Major industries of the community:	dairy, meat, cereals, fruit, washing powder
C2	Is there any community activities carrying out by women? 1-Yes, 2-No	no
D: Water Usage and Water Demand Survey		
D1	Does the community hold water use permit? 1-Yes, 2-No	no
D2	Water use permit number	-
D3	Date of expiry of water use permit	-
D4	Planned date of obtaining water use permit	2007
D5	Present condition of the water supply volume of Domestic use	insufficient
D6	Present condition of the water supply volume of Irrigation water	sufficient
D7	Number of house connection to drinking water system	450
D8	How many house connection household set the water meter	0
D9	Number of public taps	4
D10.1	How is the regime of water supply in your community in the dry season?	regularly 12 hrs
D10.2	How is the regime of water supply in your community in the wet season?	regularly 7 hrs
D11	What time of day water is given?	8-20; 10-13; 16-20
D12	Are you pleased with duration of domestic water supply?	mainly pleased
D13	Are hours of water supply convenient?	mainly convenient
D14.1	How long the taps are open to provide the domestic water (cooking, washing, foodstuffs, dishes, Landry, bathing, etc) of each houshold a day?	-
D14.2	Estimate quantity of domestic water use of each household (litter per day)	1,000
D15.1	How long the taps are open to provide the each household for filling	-
D15.2	Estimate quantity of water for filling containers of each household (litter per	1,000
D16	Drinking water monthly water fee per household	400 drams
D17	How often do you usually pay water fees?	irregularly
D18	Water fee structure 1Flate rate, 2 Having water tariff	flat rate
D19	Where do you acquire the irrigation water?	canal
D20	Are you satisfied with irrigation water supply volume?	sufficient
E: Present Operation and Maintenance Works		
E1	Name of responsible for water supply	Parvanyan Mushegh
E2	Position	water distributor
E3	Telephone	with the help of administration head
E4	Quantity and present condition of the water supply facilities: spring/ intake	1 rehabilitated·
E5	Quantity and present condition of the water supply facilities:	2 rehabilitated
E6	Quantity and present condition of the water supply facilities: DRR(Daily Regulatory Reservoir)	2 rehabilitated·,
E7	Quantity and present condition of the water supply facilities: net/distribution pipes	partially repaired
E8	Quantity and present condition of the water supply facilities: public tap	rehabilitated
E9	Quantity and present condition of the water supply facilities: pump	absent
E10	Who is the owner of the water supply facilities?	community
E11	Who is engaged in the water supply facilities repairing works?	residents
E12	How do you repair the water supply facilities?	by ourselves
E13	Who is in charge of the repair work in the community?	administration head
E14	How you prepare O&M costs?	community budget
E15	Please indicate the O&M cost breakdown per year for water supply	
	Electricity (AMD)	0
	Labor cost (AMD)	200,000
	Repair cost(AMD)	800,000
	Others(AMD)	0
	Total (AMD)	1,000,000
E16	Do the residents participate in the O&M works?	earthwork, welding
E17	What kind of OM method is preferable to you?	water fee
F: Initial Environmental Examination (IEE)		
F1	Are any of the following areas located inside or around the project site?	
F1.1	National park, protected area designated by the government (coast line, water lands, reserved are for ethnic or indigenous people, cultural heritage), and areas being considered for national parks or proposed areas.	yes
F1.2	Virgin forests, tropical forests	yes
F1.3	Ecological improvement habits areas (coral reef, mangrove wetland, tidal	absent
F1.4	Habit of valuable species protected by domestic laws or international treaties	yes
F1.5	Likely salts cumulus or soil erosion areas on a massive scale	yes
F1.6	Remarkable desertification trend areas	absent
F1.7	Archaeological historical or cultural valuable areas	yes
F1.8	Living areas of ethic, indigenous people or nomads who have a traditional lifestyle or special socially valuable areas	absent



	N	E	H (m)
A	$40^0$19'46.1"	$44^0$15'20.8"	1309
B	$40^0$19'36.6"	$44^0$15'21.3"	1301
C	$40^0$19'02.5"	$44^0$15'20.1"	1297
D	$40^0$18'44.4"	$44^0$15'22.8"	1261

Pipeline length (m)	Pipe diameter (mm)	Material
TRANSMISSION PIPELINE		
1. 1700	150	Steel
2. 250	150	
3. 700	150	
DISTRIBUTION PIPELINE		
4130	100	Cast iron
1000	50	Steel
1600	32	
700	25	

LEGENDS

- Spring intake
- Operating DRR
- Transmission pipeline
- Distribution pipeline

Aragatsotn Marz		The Study for Improvement of Rural Water Supply and Sewerage Systems in the Republic of Armenia
No.	Community	
02	Aghdzq	JICA STUDY TEAM 2007

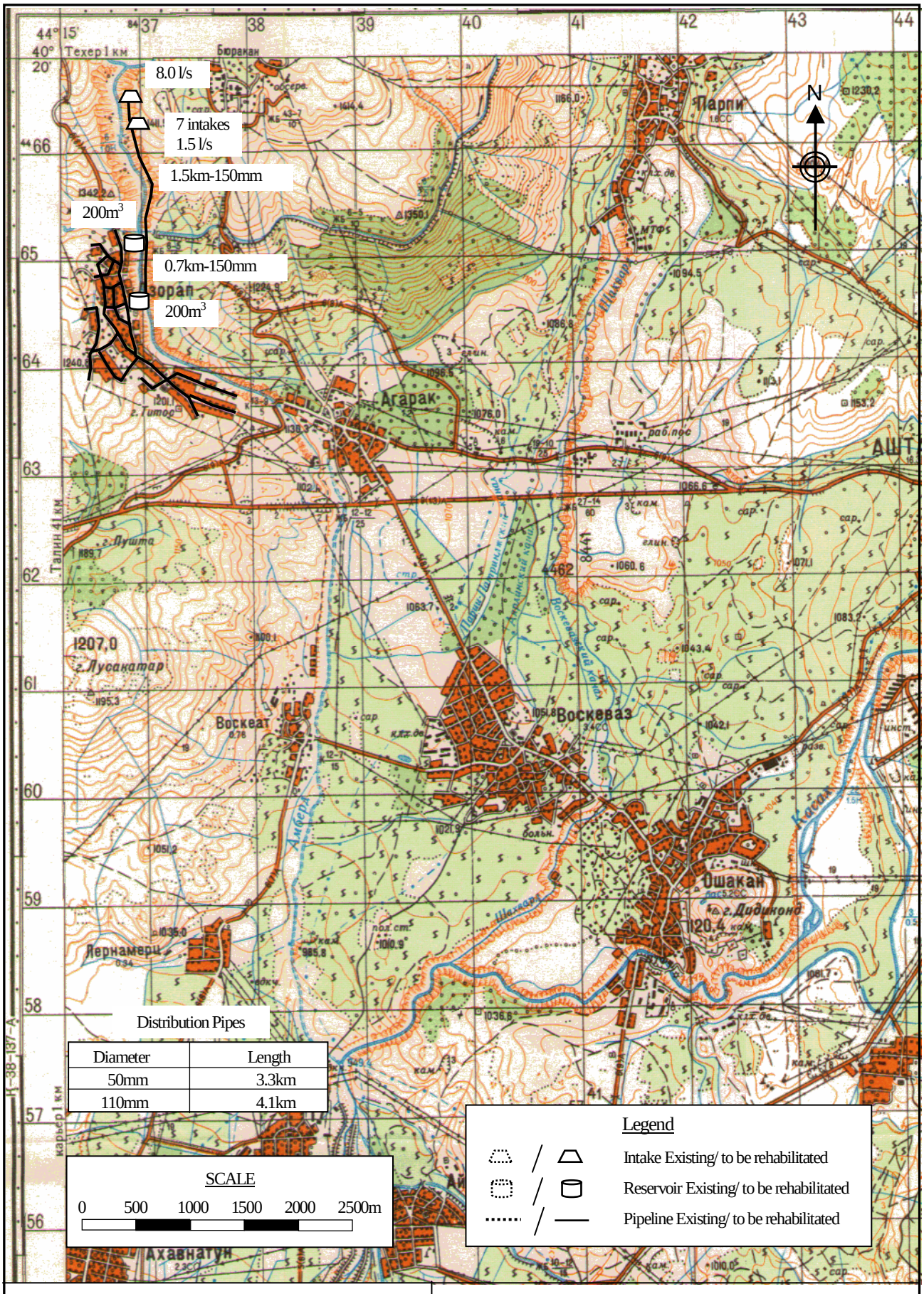
Marz : **Aragatsotn** No.2
Name : **Aghdzq**

No.	Item	Quantity	Unit	Water demand (m3/d)	
A.	**WATER DEMAND**				
	1 Population	1,800	persons	180.0	
	2 Factory	-	nos	0.0	
	3 School (pupils)	340	pupils	3.4	
	4 Medical Ambulance Station	-	nos	-	
	5 Policlinic	-	nos	-	
	7 Livestocks (87lit/household)	470	household	40.9	
	Sub-total			224.3	
	Unaccouted for water (20%)			44.9	
1	Average Daily Water Demand			269.2	m3/day
2	Maximum Daily Water Demand			323.0	m3/day
3	Maximum Hourly Water Demand			31.5	m3/hr

B	**WATER SUPPLY PLAN**						
	1 Water source type	Nr.	Total vol.				
	a Spring	8	9.5	lit/sec		820.8	m3/day
`	Total					820.8	m3/day
	2 Required reservoir volume					378	m3

C WATER SUPPLY FACILITIES REHABILITATION PLAN

No	Item	Quantity	Unit
1	Intake		
	1m3	2	nos
	2m3		nos
	3m3		nos
	4m3		nos
2	Transmission pipe		
	50mm diameter		m
	75mm diameter		m
	90mm diameter		m
	110mm diameter		m
	150mm diameter	2,200	m
	200mm diameter		m
	250mm diameter		m
3	Reservoir		
	200m3 capacity	2	nos
4	Distribution pipe		
	50mm diameter	3,300	m
	75mm diameter		m
	90mm diameter		m
	110mm diameter	4,100	m
	150mm diameter		m
	200mm diameter		m
	250mm diameter		m
5	House connection	20	nos
6	Water meter installation	470	nos
7	Public tap	5	nos
8	Chlorination	1	nos
9	Pumps	-	nos



Water Supply Facilities Rehabilitation Plan		The Study for Improvement of Rural Water Supply and Sewerage Systems in the Republic of Armenia
Marz	Aragatsotn	
No. 02	Aghdzq	JICA STUDY TEAM

Marz : **Aragatsotn**
No. : **2**
Name : **Aghdzq**

No	Item	Specification	Quantity	Unit	Unit Price	Total
1	Intake					
		1m3	2	nos	367,700	735,400
		2m3		nos	545,000	
		3m3		nos	669,100	
		4m3		nos	805,100	
	Sub-total					735,400
2	Transmission Pipe					
		50mm		m	5,520	
		75mm		m	7,160	
		90mm		m	8,040	
		110mm		m	9,680	
		150mm	2,200	m	13,140	28,908,000
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					28,908,000
3	Reservoir					
		50m3		nos	8,363,900	
		100m3		nos	12,968,300	
		150m3		nos	18,804,500	
		200m3	2	nos	22,524,600	45,049,200
		250m3		nos	25,952,800	
		300m3		nos	29,630,400	
		350m3		nos	33,528,700	
		400m3		nos	36,388,000	
		450m3		nos	39,392,500	
		500m3		nos	42,520,900	
	Sub-total					45,049,200
4	Distribution Pipe					
		50mm	3,300	m	5,520	18,216,000
		75mm		m	7,160	
		90mm		m	8,040	
		110mm	4,100	m	9,680	39,688,000
		150mm		m	13,140	
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					57,904,000
5	House Connection		20	nos	74,000	1,480,000
6	Water Meter Installation		470	nos	80,000	37,600,000
7	Public Tap		5	nos	90,000	450,000
8	Chlorilation Equipment		1	nos	500,000	500,000
9	Pump Replacement			nos	10,000,000	
10	Drainage and Sewerage	concrete surfa	2,960	m	3,600	10,656,000
	Total				AMD	183,282,600
					Equivalent to USD	599,904
					Equivalent to JPY	63,289,848
					AMD	USD
	Investment Cost per household		470	HH	389,963	1,276
	Investment Cost per person		1,800	persons	101,824	333

ARAGATSOTN MARZ
Talin District
No 2 Aghdzq

PROJECTED INCOME STATEMENT **Unit: million AMD**

Description	Unit	Total	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
A Water Sales Revenue																																										
Consumption water volume	1000m3/yr		81.9																																							
Unit rate	AMD/m3				40.00	40.00	40.00	41.32	70.00	72.31	74.70	77.16	115.65	119.47	123.41	127.48	131.69	136.03	140.52	145.16	149.95	154.90	160.01	165.29	170.75	176.38	182.20	188.21	194.42	200.84	207.47	214.31	221.39	228.69	236.24	244.04	252.09	260.41	269.00	277.88	287.05	296.52
Sub-total		457.24	0.00	0.00	1.30	2.59	2.95	3.04	5.16	5.33	5.50	5.69	8.52	8.80	9.09	9.39	9.70	10.02	10.35	10.70	11.05	11.41	11.79	12.18	12.58	13.00	13.42	13.87	14.33	14.80	15.29	15.79	16.31	16.85	17.41	17.98	18.57	19.19	19.82	20.47	21.15	21.85
B Operating Costs																																									
1. Staff salary																																									
Inspectors	person				1																																				
Pump operators	person				0																																				
Base Salary	AMD/m/p				20,000	20,660	21,342	22,046	22,774	23,525	24,301	25,103	25,932	26,788	27,672	28,585	29,528	30,502	31,509	32,549	33,623	34,732	35,879	37,063	38,286	39,549	40,854	42,202	43,595	45,034	46,520	48,055	49,641	51,279	52,971	54,719	56,525	58,390	60,317	62,308	64,364	66,488
Sub-total		17.70			0.24	0.25	0.26	0.26	0.27	0.28	0.29	0.30	0.31	0.32	0.33	0.34	0.35	0.37	0.38	0.39	0.40	0.42	0.43	0.44	0.46	0.47	0.49	0.51	0.52	0.54	0.56	0.58	0.60	0.62	0.64	0.66	0.68	0.70	0.72	0.75	0.77	0.80
2. Chlorine																																									
Pouring volume	kg/yr				492																																				
Unit rate	AMD/kg				600	620	640	661	683	706	729	753	778	804	830	858	886	915	945	976	1009	1042	1076	1112	1149	1186	1226	1266	1308	1351	1396	1442	1489	1538	1589	1642	1696	1752	1810	1869	1931	1995
Sub-total		21.57			0.13	0.27	0.31	0.33	0.34	0.35	0.36	0.37	0.38	0.40	0.41	0.42	0.44	0.45	0.46	0.48	0.50	0.51	0.53	0.55	0.57	0.58	0.60	0.62	0.64	0.66	0.69	0.71	0.73	0.76	0.78	0.81	0.83	0.86	0.89	0.92	0.95	0.98
3. Electricity (for pump)		0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4. Maintenance cost		25.59			0.16	0.32	0.37	0.39	0.40	0.41	0.43	0.44	0.45	0.47	0.48	0.50	0.52	0.53	0.55	0.57	0.59	0.61	0.63	0.65	0.67	0.69	0.71	0.74	0.76	0.79	0.81	0.84	0.87	0.90	0.93	0.96	0.99	1.02	1.06	1.09	1.13	1.16
Pump repair					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pipe repair					0.16	0.32	0.37	0.39	0.40	0.41	0.43	0.44	0.45	0.47	0.48	0.50	0.52	0.53	0.55	0.57	0.59	0.61	0.63	0.65	0.67	0.69	0.71	0.74	0.76	0.79	0.81	0.84	0.87	0.90	0.93	0.96	0.99	1.02	1.06	1.09	1.13	1.16
5. Pump replacement		0.00																0.00															0.00									
Sub-total		64.86	0.00	0.00	0.53	0.84	0.94	0.98	1.01	1.04	1.08	1.11	1.14	1.19	1.22	1.26	1.31	1.35	1.39	1.44	1.49	1.54	1.59	1.64	1.70	1.74	1.80	1.87	1.92	1.99	2.06	2.13	2.20	2.28	2.35	2.43	2.50	2.58	2.67	2.76	2.85	2.94
C Gross Income (A-B)		392.38	0.00	0.00	0.77	1.75	2.01	2.06	4.15	4.29	4.42	4.58	7.38	7.61	7.87	8.13	8.39	8.67	8.96	9.26	9.56	9.87	10.20	10.54	10.88	11.26	11.62	12.00	12.41	12.81	13.23	13.66	14.11	14.57	15.06	15.55	16.07	16.61	17.15	17.71	18.30	18.91
D Depreciation cost		173.95						4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97
E Interest paid		53.49	0.02	0.04	0.99	1.98	2.26	2.27	2.27	2.27	2.27	2.27	2.27	2.20	2.14	2.07	2.00	1.94	1.87	1.80	1.73	1.66	1.59	1.51	1.44	1.37	1.29	1.22	1.14	1.07	0.99	0.91	0.83	0.75	0.67	0.59	0.51	0.43	0.34	0.26	0.17	0.09
F Net Income		164.94	-0.02	-0.04	-0.22	-0.23	-0.25	-5.18	-3.09	-2.95	-2.82	-2.66	0.14	0.44	0.76	1.09	1.42	1.76	2.12	2.49	2.86	3.24	3.64	4.06	4.47	4.92	5.36	5.81	6.30	6.77	7.27	7.78	8.31	8.85	9.42	9.99	10.59	11.21	11.84	12.48	13.16	13.85
G Tax and duties		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
H Net Income after deduction of TAX		164.94	-0.02	-0.04	-0.22	-0.23	-0.25	-5.18	-3.09	-2.95	-2.82	-2.66	0.14	0.44	0.76	1.09	1.42	1.76	2.12	2.49	2.86	3.24	3.64	4.06	4.47	4.92	5.36	5.81	6.30	6.77	7.27	7.78	8.31	8.85	9.42	9.99	10.59	11.21	11.84	12.48	13.16	13.85
OM Cost Recovery Ratio (A/B)		705%	0%	0%	244%	307%	314%	310%	511%	513%	509%	513%	747%	739%	745%	745%	740%	742%	745%	743%	742%	741%	742%	743%	740%	747%	746%	742%	746%	744%	742%	741%	741%	739%	741%	740%	743%	744%	742%	742%	742%	743%

PROJECTED CASH FLOW STATEMENT **Unit: million AMD**

Description	Total	Year 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
SOURCES OF FUNDS																																									
A Internal Cash Generation																																									
1. Net Income	164.94	-0.02	-0.04	-0.22	-0.23	-0.25	-5.18	-3.09	-2.95	-2.82	-2.66	0.14	0.44	0.76	1.09	1.42	1.76	2.12	2.49	2.86	3.24	3.64	4.06	4.47	4.92	5.36	5.81	6.30	6.77	7.27	7.78	8.31	8.85	9.42	9.99	10.59	11.21	11.84	12.48	13.16	13.85
2. Depreciation cost	173.95	0.00	0.00	0.00	0.00	0.00	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97	4.97
3. Interest Paid	53.49	0.02	0.04	0.99	1.98	2.26	2.27	2.27	2.27	2.27	2.27	2.27	2.20	2.14	2.07	2.00	1.94	1.87	1.80	1.73	1.66	1.59	1.51	1.44	1.37	1.29	1.22	1.14	1.07	0.99	0.91	0.83	0.75	0.67	0.59	0.51	0.43	0.34	0.26	0.17	0.09
Sub-total	392.38	0.00	0.00	0.77	1.75	2.01	2.06	4.15	4.29	4.42	4.58	7.38	7.61	7.87	8.13	8.39	8.67	8.96	9.26	9.56	9.87	10.20	10.54	10.88	11.26	11.62	12.00	12.41	12.81	13.23	13.66	14.11	14.57	15.06	15.55	16.07	16.61	17.15	17.71	18.30	18.91
B Finances																																									
1. Project Loan	226.86	2.36	1.67	95.54	98.53	28.12	0.36	0.28																																	
2. Local fund	77.52	0.79	0.56	32.36	33.83	9.77	0.12	0.09																																	
Sub-total	304.38	3.15	2.23	127.90	132.36	37.89	0.48	0.37																																	
C Subsidy from Government																																									
1. Subsidy for O&M cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Subsidy for debt services	5.66	0.02	0.04	0.22	0.23	0.25	0.21	0.00	0.00	0.00	0.00	1.41	1.18	0.92	0.66	0.40	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-total	5.66	0.02	0.04	0.22	0.23	0.25	0.21	0.00	0.00	0.00	0.00	1.41	1.18	0.92	0.66	0.40	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Cash Inflow	702.42	3.17	2.27	128.89	134.34	40.15	2.75	4.52	4.29	4.42	4.58	8.79	8.79	8.79	8.79	8.79	8.79	8.96	9.26	9.56	9.87	10.20	10.54	10.88	11.26	11.62	12.00	12.41	12.81	13.23	13.66	14.11	14.57	15.06	15.55	16.07	16.61	17.15	17.71	18.30	18.91
APPLICATION OF FUNDS																																								
D Project disbursement	304.38	3.15	2.23	127.90	132.36	37.89	0.48	0.37																																	
E Total debt services																																								
1. Loan repayment	226.85											6.52	6.59	6.65	6.72	6.79	6.85	6.92	6.99	7.06	7.13	7.20	7.28	7.35	7.42	7.50	7.57	7.65	7.72	7.80	7.88	7.96	8.04	8.12	8.20	8.28	8.36	8.45	8.53	8.62	8.70
2. Interest paid	53.49	0.02	0.04	0.99	1.98	2.26	2.27	2.27	2.27	2.27	2.27	2.27	2.20	2.14	2.07	2.00	1.94	1.87	1.80	1.73	1.66	1.59	1.51	1.44	1.37	1.29	1.22	1.14	1.07	0.99	0.91	0.83	0.75	0.67	0.59	0.51	0.43	0.34	0.26	0.17	0.09
Sub-total	280.34	0.02	0.04	0.99	1.98	2.26	2.27	2.27	2.27	2.27	2.27	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79
Total Cash Outflow	584.72	3.17	2.27	128.89	134.34	40.15	2.75	2.64	2.27	2.27	2.27	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79	8.79
F Net Surplus Cash (A+C2)-E	117.70	0.00	0.00	0.00	0.00	0.00	0.00	1.88	2.02	2.15	2.31	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.47	0.77	1.08	1.41	1.75	2.09	2.47	2.83	3.21	3.62	4.02	4.44	4.87	5.32	5.78	6.27	6.76	7.28	7.82	8.36	8.92	9.51	10.12
Project Cost Recovery Ratio (%)																																								
Cost recovery by water fee (A/E)	140%	0%	0%	78%	88%	89%	91%	183%	189%	195%	202%	84%	87%	90%	92%	95%	99%	102%	105%	109%	112%	116%	120%	124%	128%	132%	137%	141%	146%	151%	155%	161%	166%	171%	177%	183%	189%	195%	201%	208%	215%
Cost recovery by water fee + subsidy ((A+C2)/E)	142%	100%	100%	100%	100%	100%	100%	183%	189%	195%	202%	100%	100%	100%	100%	100%	100%	102%	105%	109%	112%	116%	120%	124%	128%	132%	137%	141%	146%	151%	155%	161%	166%	171%	177%	183%	189%	195%	201%	208%	215%

ARAGATSOTN MARZ
Talin District
No 2 Aghdzq

FINANCIAL ANALYSIS

A COST RECOVERY ANALYSIS

Item	Millon AMD	Rate
1 Revenue		
Water fee revenue	457.24	98.8%
Subsidy	5.66	1.2%
Total	462.90	100.0%
2 Expenditure		
OM cost	64.86	14.0%
Loan repayment	226.85	49.0%
Interest paid	53.49	11.6%
Surplus cash	117.70	25.4%
Total	462.90	100.0%

B. FIRR CALCULATION **Unit: million AMD**

Description	Total	Year																																						
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
A COST																																								
1. Investment Cost	203.04	2.30	1.64	87.19	87.16	24.16	0.33	0.26																																
2. Operation and Maintenance Cost																																								
Salary	9.12			0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Chlorine	11.56			0.13	0.27	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Electricity	0.00			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mantenance cost	13.07			0.16	0.31	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Pump replacement																	0.00															0.00										
Sub-total	33.75			0.53	0.82	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Total Outflow	236.79	2.30	1.64	87.72	87.98	25.06	1.23	1.16	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
B BENEFIT																																								
1. Water Tariff	287.16	0.00	0.00	1.30	2.59	2.95	3.04	5.16	5.33	5.50	5.69	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52
2. Subsidy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Inflow	287.16	0.00	0.00	1.30	2.59	2.95	3.04	5.16	5.33	5.50	5.69	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52	8.52
NET BENEFIT	50.37	-2.30	-1.64	-86.4	-85.4	-22.1	1.81	4.00	4.43	4.60	4.79	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62
FIRR =	**1.14%**																																							

C. SENSITIVITY ANALYSIS

No.	Description	PV 1.75%	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	1 Capital cost 10% up	-39.35	-2.53	-1.80	-95.1	-94.1	-24.5	1.78	3.97	4.43	4.60	4.79	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62
	2 Capital cost 20% up	-58.41	-2.76	-1.97	-103.9	-102.8	-26.9	1.74	3.95	4.43	4.60	4.79	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62	7.62
2	1 OM cost 10% up	-22.65	-2.30	-1.64	-86.5	-85.5	-22.2	1.72	3.91	4.34	4.51	4.70	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53	7.53
	2 OM cost 20% up	-25.00	-2.30	-1.64	-86.5	-85.6	-22.3	1.63	3.82	4.25	4.42	4.61	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44	7.44
3	1 Revenue 10% down	-39.68	-2.30	-1.64	-86.6	-85.6	-22.4	1.51	3.48	3.90	4.05	4.22	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77	6.77
	2 Revenue 20% down	-59.07	-2.30	-1.64	-86.7	-85.9	-22.7	1.20	2.97	3.36	3.50	3.65	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92	5.92

No.	Description	FIRR	Sensitivity indicator	Swiching value
1	1 Capital cost 10% up	0.64%	7.80	12.81%
	2 Capital cost 20% up	0.20%	47.98	2.08%
2	1 OM cost 10% up	1.07%	0.68	146.55%
	2 OM cost 20% up	0.99%	1.47	68.03%
3	1 Revenue 10% down	0.51%	12.31	8.12%
	2 Revenue 20% down	-0.17%	-75.25	-1.33%