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 (4/4)

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

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4 TAVUSH MARZ

No.1 Aghavnavanq

Information on Existing Water Sources (Tavush)

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

No.1 Community Aghavnavanq
District Idjevan
Marz Tavush

No	Water source	Latitude			Longitude			Atidute	Yeild(L/sec)		
		deg	min	sec	deg	min	sec	(m)	Min	Max	At site
1	Existing pipeline	40	43	30.2	45	6	56.2	1,284			2.0
2	spring intake	40	43	24.6	45	6	24.1	1,214			0.5
3	spring intake	40	43	22.4	45	4	52.8	1,070	3.5	4.3	0.3
4	spring intake	40	43	28.8	45	4	13.2	1,054			0.2
5	spring intake	40	42	57.6	45	5	3.1	1,089			0.3
6	spring intake	40	43	13.7	45	5	40.3	1,104			1.0
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	No.1 Aghavnavanq's water mains were constructed in the 1950-60s.
Alternative sources if any	Water supply to the Community will be improved if water mains and the networks are renovated.

No.1 Community Aghavnavanq
District Idjevan
Marz Tavush
Sampling date 04/Sep/2007

	Parameters analysed	Units	No.1 Vanki aghbyur	No.2 Vardushenc taghamas	No.3 Municipality line		Guidelines WHO	Guidelines Armenia
a	pH		8.3	8.1	8.5		6.5-8	6.0 - 9.0
b	Temperature	Deg.C	12.1	14.3	10.4			
c	TDS	Mg/L	207	231	350		1000	1000
1	Al:Aluminum	Mg/L	0.01	n.d.	0.01		0.10	0.50
2	B:Boron	Mg/L	0.20	0.20	<0.2		0.70	0.50
3	Cl:Chloride	Mg/L	5	6	9		250	350
4	Cr:Chrome	Mg/L	<0.01	<0.01	n.d.		0.05	0.05
5	Cu:Copper	Mg/L	n.d.	n.d.	n.d.		2	1
6	F:Fluoride	Mg/L	0.10	0.07	0.12		1.50	
7	Hardness	Mg/L	420	470	530		500	700
8	Fe:Iron	Mg/L	n.d.	n.d.	n.d.		0.30	0.30
9	Mn:Manganese	Mg/L	n.d.	n.d.	n.d.		0.40	0.10
10	Mo:Molibdenum	Mg/L	<0.02	<0.02	<0.02		0.070	0.250
11	Ni:Nickel	Mg/L	n.d.	n.d.	n.d.		0.020	0.100
12	Nitrate(NO3+)	Mg/L	2.7	2.7	1.8		50.0	45.0
13	SO4:Sulfate	Mg/L	13.0	19.0	18.0		250.0	500.0
14	Zn:Zink	Mg/L	n.d.	n.d.	n.d.		3.0	5.0
15	As:Arsenic	Mg/L	n.d.	n.d.	n.d.		0.0	0.1
16	Ba:Barium	Mg/L	<0.01	<0.01	0.01		0.70	0.10
17	Be:Berillium	Mg/L	n.d.	n.d.	n.d.		NA	0.00020
18	Cd:Cadmium	Mg/L	n.d.	n.d.	n.d.		0.0030	0.0010
19	Pb:Lead	Mg/L	0.001	0.001	0.001		0.010	0.030
20	Hg:Mercury	Mg/L	<0.0002	<0.0002	<0.0002		0.00100	0.00050
21	Se:Selenium	Mg/L	<0.001	<0.001	<0.001		0.010	0.010
22	Sr:Strontium	Mg/L	<0.7	<0.7	<0.7		NA	7.0
23	CN:Cyanide	Mg/L	n.d.	n.d.	n.d.		0.070	0.035
24	Coli form bacteria	bacteria per 100 ml					-	0
25	Thermo-tolerant coli form bacteria	bacteria per 100 ml					0	0
26	Total bacteria	bacteria per 1 ml					-	50

Information on Existing Water Sources
Existing Bacteriological Test

No.1 Community Aghavnavanq
District Ijevan
Marz Tavush

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		10	0.0	Not Identified
2	5		5	0.0	Not Identified
3	6	12	29	2.3	Not Identified
4	6	12	21	0.9	Not Identified
5	6	19	15	0.0	Not Identified
6	6	19	16	0.0	Not Identified

No. **1** **Marz** Tavush **Community** Aghavnavanq

1. ACCESSIBILITY TO THE SITE

No.	Structures	Access by vehicle	Machine construction	Remarks
1	Intake	Fair	Possible	
	Intake	Possible	Possible	
	Intake	Fair	Possible	
	Intake	Possible	Possible	
	Intake	Fair	Possible	
2	Transmission pipeline	Fair	Possible	Pipeline is generally along or close to the road
3	Reservoir	Possible	Possible	

2. INTAKE STRUCTURE

No.	Water source	N	E	El. (m)	Year	Material	Volume (l/s)	Rehabilitation Necessity (Y/N)
1	Existing pipeline	40°43′30.2″	45°06′54.3″	1,284	1960	Concrete	2.0	Yes
2	Spring	40°43′24.6″	45°06′21.3″	1,214	1950	Concrete	0.5	Yes
3	Spring	40°43′22.4″	45°04′52.8″	1,070	2005	Masonry	0.3	No
4	Spring	40°43′28.8″	45°04′13.2″	1,054	2006	Concrete	0.2	No
5	Spring	40°43′13.7″	45°05′40.3″	1,104	1950	Masonry	1.0	Yes
6	Spring	40°42′57.6″	45°05′03.1″	1,089	-	-	0.3	No

3. TRANSMISSION PIPELINE

No.	Pipeline length (m)	Pipe diameter	Material	Flow rate (l/s)	Year	Leakage	Rehabilitation Necessity (Y/N)
1	1,500	100	Steel	2.0	1960	Huge	Yes
	1,000	50	Steel	0.5	1950	Huge	Yes
2	1,500	50	Steel	0.3	2005		No
3	1,000	75	Steel	0.2	2006		No
4	1,000	80	Steel	0.3	1950	Huge	Yes
5	1,000	100	Steel	1.0	1960	Huge	Yes

4. RESERVOIR

No.	N	E	El. (m)	Material	Shape	Dimension (m)	Volume (m3)	Rehabilitation Necessity (Y/N)
1	40°43′24.6″	45°06′24.1″	1,214	Concrete	Rectangular	6x12x4	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	6,000	100	Steel		Huge	Yes
2	3,000	50	Steel	1950	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	1970		No	0	Yes

9. DRAINAGE SYSTEM

Existence	Rehabilitation	Remarks
No	Yes	

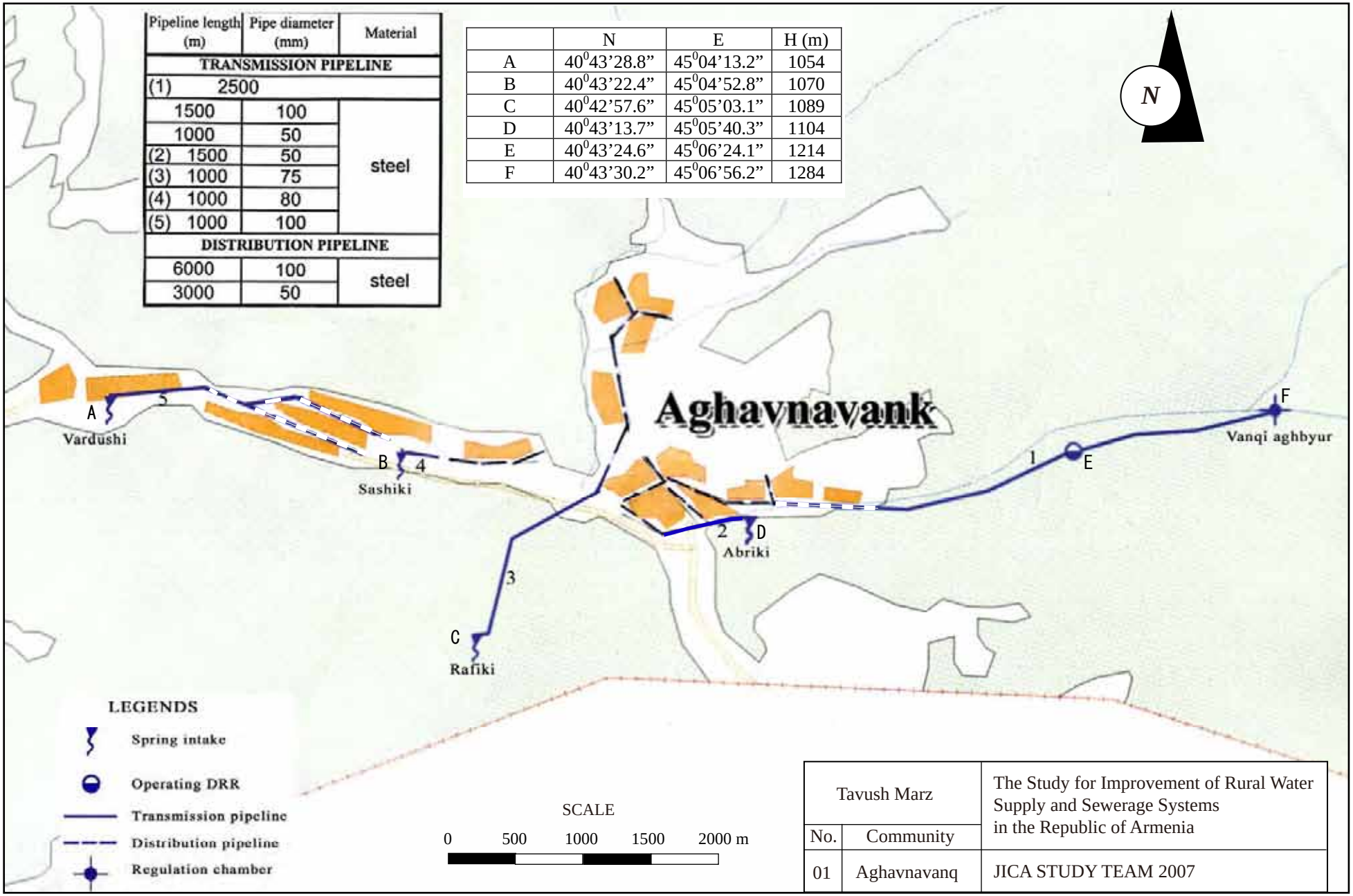
Questionnaire on Existing Water Supply Conditions by Socio-Economic Survey

Marz	**Tavush**
Number and Name of Community	**No.1 Aghavnavanq**
District	**Idejevan**

No.	Question	Answer
A: Baseline Data		
A1	Actual population in 2001	480
A2	Actual population in 2007	448
A3	Number of households	150
A4.1	Elderly people	94
A4.2	Population in labor force (age from 16 to 62)	273
A4.3	Children	81
A5.1	Pensioners	98
A5.2	Unemployed	5
A5.3	Receiving benefits	34
A6	Average monthly income of household (AMD)	45,000
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	63
B: Budget		
B1	Annual Budget of the community 2004, in thousand AMD	979
	Annual Budget of the community 2005, in thousand AMD	1,700
	Annual Budget of the community 2006, in thousand AMD	1,000
	Annual Budget of the community 2007, in thousand AMD	400
	Annual Budget of the community 2008, in thousand AMD	is not planned.
B2	Amount spent in drinking water sector 2004, in thousand AMD	920
	Amount spent in drinking water sector 2005, in thousand AMD	1,794
	Amount spent in drinking water sector 2006, in thousand AMD	0
	Amount spent in drinking water sector 2007, in thousand AMD	0
	Amount spent in drinking water sector 2008, in thousand AMD	is not planned.
C: Socio-Economic Survey		
C1	Major industries of the community:	egg, dairy, meat, apiculture
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	unknown
D5	Present condition of the water supply volume of Domestic use	sufficient
D6	Present condition of the water supply volume of Irrigation water	insufficient.
D7	Number of house connection to drinking water system	130
D8	How many house connection household set the water meter	0
D9	Number of public taps	3
D10.1	How is the regime of water supply in your community in the dry season?	regularly - 6hrs
D10.2	How is the regime of water supply in your community in the wet season?	regularly - 6hrs
D11	What time of day water is given?	by district 8^{00}-14^{00}, 14^{00}-20^{00}
D12	Are you pleased with duration of domestic water supply?	mainly displeased
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)	300
D15.1	How long the taps are open to provide the each household for filling	1 hour
D15.2	Estimate quantity of water for filling containers of each household (litter per	-
D16	Drinking water monthly water fee per household	0
D17	How often do you usually pay water fees?	-
D18	Water fee structure 1- Flate rate, 2- Having water tariff	-
D19	Where do you acquire the irrigation water?	from river
D20	Are you satisfied with irrigation water supply volume?	insufficient
E: Present Operation and Maintenance Works		
E1	Name of responsible for water supply	Melqumyan Artem
E2	Position	water distributor
E3	Telephone	with the help of administration head
E4	Quantity and present condition of the water supply facilities: spring/ intake	7-deteriorated
E5	Quantity and present condition of the water supply facilities:	1-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	deteriorated
E8	Quantity and present condition of the water supply facilities: public tap	partially repaired
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?	international and local organizations
E13	Who is in charge of the repair work in the community?	administration head
E14	How you prepare O&M costs?	international and local organizations
E15	Please indicate the O&M cost breakdown per year for water supply	
	Electricity (AMD)	0
	Labor cost (AMD)	140,000
	Repair cost(AMD)	1,650,000
	Others(AMD)	0
	Total (AMD)	1,790,000
E16	Do the residents participate in the O&M works?	manpower
E17	What kind of OM method is preferable to you?	resident participation, reduce 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.	present
F1.2	Virgin forests, tropical forests	present
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	present
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	present
F1.8	Living areas of ethic, indigenous people or nomads who have a traditional lifestyle or special socially valuable areas	absent

Pipeline length (m)	Pipe diameter (mm)	Material
TRANSMISSION PIPELINE		
(1) 2500		
1500	100	steel
1000	50	
(2) 1500	50	
(3) 1000	75	
(4) 1000	80	
(5) 1000	100	
DISTRIBUTION PIPELINE		
6000	100	steel
3000	50	

	N	E	H (m)
A	$40^0$43’28.8”	$45^0$04’13.2”	1054
B	$40^0$43’22.4”	$45^0$04’52.8”	1070
C	$40^0$42’57.6”	$45^0$05’03.1”	1089
D	$40^0$43’13.7”	$45^0$05’40.3”	1104
E	$40^0$43’24.6”	$45^0$06’24.1”	1214
F	$40^0$43’30.2”	$45^0$06’56.2”	1284



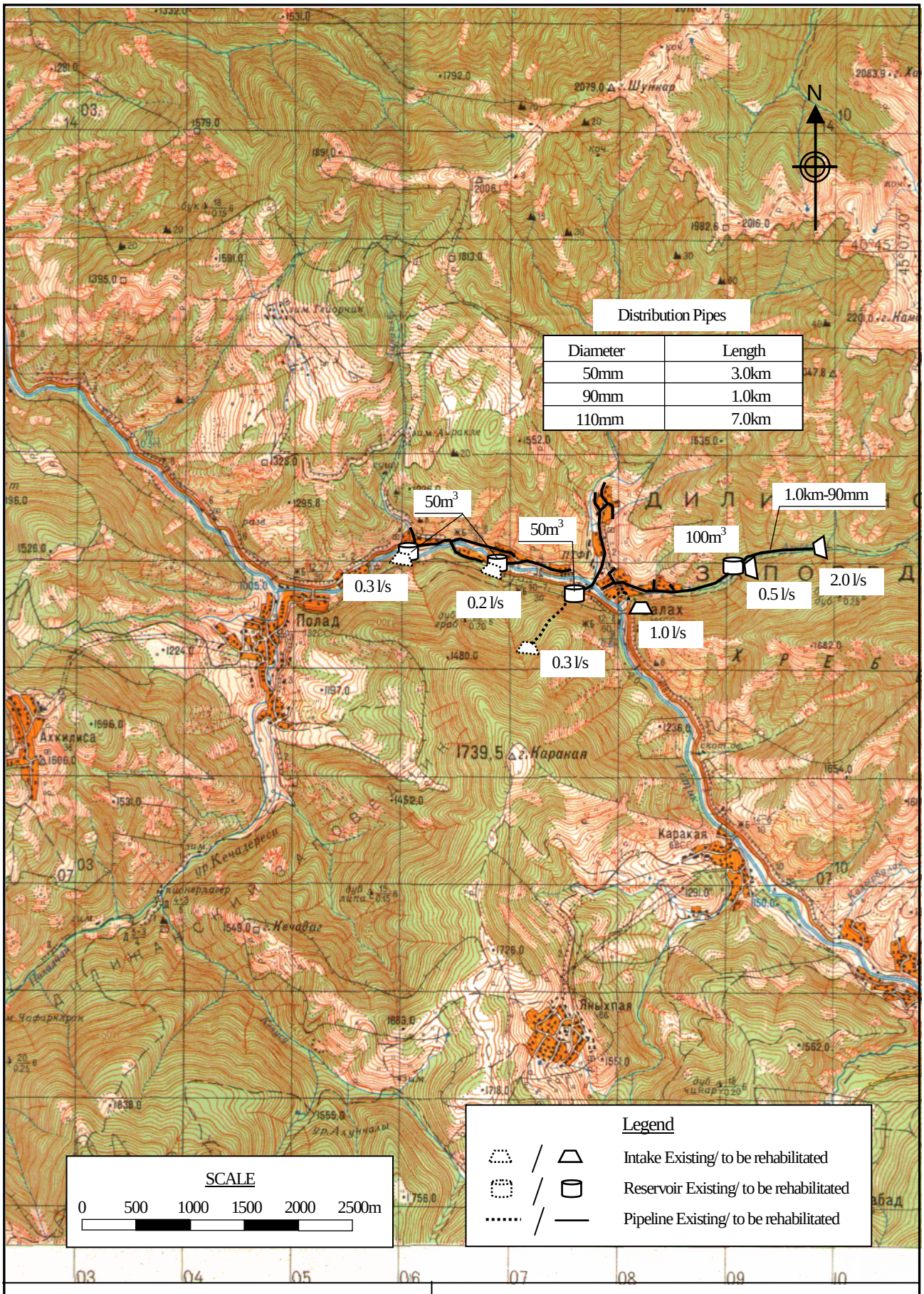
Tavush Marz		The Study for Improvement of Rural Water Supply and Sewerage Systems in the Republic of Armenia
No.	Community	
01	Aghavnavanq	JICA STUDY TEAM 2007

Marz : **Tavush** No.1
Name : **Aghavnavanq**

No.	Item	Quantity	Unit	Water demand (m3/d)	
A.	**WATER DEMAND**				
1	Population	448	persons	44.8	
2	Factory	-	nos	0.0	
3	School (pupils)	63	pupils	0.6	
4	Medical Ambulance Station	-	nos	-	
5	Policlinic	-	nos	-	
7	Livestocks (87lit/household)	150	household	13.1	
	Sub-total			58.5	
	Unaccouted for water (20%)			11.7	
1	Average Daily Water Demand			70.2	m3/day
2	Maximum Daily Water Demand			84.2	m3/day
3	Maximum Hourly Water Demand			16.0	m3/hr

B	**WATER SUPPLY PLAN**						
1	Water source type	Nr.	Total vol.				
a	Spring	6	4.3	lit/sec		371.5	m3/day
`	Total					371.5	m3/day
2	Required reservoir volume					192	m3

C	**WATER SUPPLY FACILITIES REHABILITATION PLAN**		
No	Item	Quantity	Unit
1	Intake		
	1m3	3	nos
	2m3		nos
	3m3		nos
	4m3		nos
2	Transmission pipe		
	50mm diameter		m
	75mm diameter		m
	90mm diameter	1,000	m
	110mm diameter		m
	150mm diameter		m
	200mm diameter		m
	250mm diameter		m
3	Reservoir		
	50m3 capacity	3	nos
	100m3 capacity	1	nos
4	Distribution pipe		
	50mm diameter	3,000	m
	75mm diameter		m
	90mm diameter	1,000	m
	110mm diameter	7,000	m
	150mm diameter		m
	200mm diameter		m
	250mm diameter		m
5	House connection	20	nos
6	Water meter installation	150	nos
7	Public tap	2	nos
8	Chlorination	3	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	Tavush	
No. 01	Aghavnavanq	JICA STUDY TEAM

Marz : **Tavush**
No. : **1**
Name : **Aghavnavanq**

No	Item	Specification	Quantity	Unit	Unit Price	Total
1	Intake					
		1m3	3	nos	367,700	1,103,100
		2m3		nos	545,000	
		3m3		nos	669,100	
		4m3		nos	805,100	
	Sub-total					1,103,100
2	Transmission Pipe					
		50mm		m	5,520	
		75mm		m	7,160	
		90mm	1,000	m	8,040	8,040,000
		110mm		m	9,680	
		150mm		m	13,140	
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					8,040,000
3	Reservoir					
		50m3	3	nos	8,363,900	25,091,700
		100m3	1	nos	12,968,300	12,968,300
		150m3		nos	18,804,500	
		200m3		nos	22,524,600	
		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					38,060,000
4	Distribution Pipe					
		50mm	3,000	m	5,520	16,560,000
		75mm		m	7,160	
		90mm	1,000	m	8,040	8,040,000
		110mm	7,000	m	9,680	67,760,000
		150mm		m	13,140	
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					92,360,000
5	House Connection		20	nos	74,000	1,480,000
6	Water Meter Installation		150	nos	80,000	12,000,000
7	Public Tap		2	nos	90,000	180,000
8	Chlorilation Equipment		3	nos	500,000	1,500,000
9	Pump Replacement			nos	10,000,000	
10	Drainage and Sewerage	concrete surfa	4,400	m	3,600	15,840,000
	Total				AMD	170,563,100
					Equivalent to USD	558,271
					Equivalent to JPY	58,897,640
					AMD	USD
	Investment Cost per household		150	HH	1,137,087	3,722
	Investment Cost per person		448	persons	380,721	1,246

TAVUSH MARZ
Ijevan District
No 1 Aghavnavanq

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		21.4																																							
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		118.78	0.00	0.00	0.00	0.54	0.77	0.79	1.35	1.39	1.44	1.48	2.22	2.30	2.37	2.45	2.53	2.61	2.70	2.79	2.88	2.98	3.07	3.18	3.28	3.39	3.50	3.62	3.74	3.86	3.99	4.12	4.25	4.39	4.54	4.69	4.84	5.00	5.17	5.34	5.52	5.70
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				129																																					
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		5.60			0.00	0.06	0.08	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.11	0.11	0.11	0.12	0.12	0.13	0.13	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	0.23	0.23	0.24	0.25	0.26
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		41.10			0.00	0.40	0.60	0.62	0.64	0.66	0.68	0.70	0.73	0.75	0.77	0.80	0.83	0.85	0.88	0.91	0.94	0.97	1.00	1.04	1.07	1.11	1.14	1.18	1.22	1.26	1.30	1.35	1.39	1.44	1.48	1.53	1.58	1.63	1.69	1.74	1.80	1.86
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	0.4	0.60	0.62	0.64	0.66	0.68	0.70	0.73	0.75	0.77	0.80	0.83	0.85	0.88	0.91	0.94	0.97	1.00	1.04	1.07	1.11	1.14	1.18	1.22	1.26	1.30	1.35	1.39	1.44	1.48	1.53	1.58	1.63	1.69	1.74	1.80	1.86
5. Pump replacement		0.00																0.00															0.00									
Sub-total		64.40	0.00	0.00	0.24	0.71	0.94	0.97	1.00	1.03	1.06	1.10	1.14	1.17	1.21	1.25	1.29	1.34	1.38	1.43	1.47	1.52	1.57	1.62	1.68	1.73	1.79	1.85	1.91	1.97	2.04	2.12	2.18	2.26	2.32	2.40	2.48	2.56	2.64	2.73	2.82	2.92
C Gross Income (A-B)		54.94	0.00	0.00	-0.24	-0.17	-0.17	-0.18	0.35	0.36	0.38	0.38	1.08	1.13	1.16	1.20	1.24	1.27	1.32	1.36	1.41	1.46	1.50	1.56	1.60	1.66	1.71	1.77	1.83	1.89	1.95	2.00	2.07	2.13	2.22	2.29	2.36	2.44	2.53	2.61	2.70	2.78
D Depreciation cost		162.05						4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63
E Interest paid		51.30	0.04	0.07	0.10	1.57	2.22	2.22	2.22	2.22	2.22	2.22	2.23	2.16	2.10	2.03	1.97	1.90	1.83	1.77	1.70	1.63	1.56	1.49	1.42	1.34	1.27	1.20	1.12	1.05	0.97	0.89	0.82	0.74	0.66	0.58	0.50	0.42	0.34	0.25	0.17	0.09
F Net Income		-158.41	-0.04	-0.07	-0.34	-1.74	-2.39	-7.03	-6.50	-6.49	-6.47	-6.47	-5.78	-5.66	-5.57	-5.46	-5.36	-5.26	-5.14	-5.04	-4.92	-4.80	-4.69	-4.56	-4.45	-4.31	-4.19	-4.06	-3.92	-3.79	-3.65	-3.52	-3.38	-3.24	-3.07	-2.92	-2.77	-2.61	-2.44	-2.27	-2.10	-1.94
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		-158.41	-0.04	-0.07	-0.34	-1.74	-2.39	-7.03	-6.50	-6.49	-6.47	-6.47	-5.78	-5.66	-5.57	-5.46	-5.36	-5.26	-5.14	-5.04	-4.92	-4.80	-4.69	-4.56	-4.45	-4.31	-4.19	-4.06	-3.92	-3.79	-3.65	-3.52	-3.38	-3.24	-3.07	-2.92	-2.77	-2.61	-2.44	-2.27	-2.10	-1.94
OM Cost Recovery Ratio (A/B)		184%	0%	0%	0%	76%	82%	81%	135%	135%	136%	135%	195%	197%	196%	196%	196%	195%	196%	195%	196%	196%	196%	196%	195%	196%	196%	196%	196%	196%	196%	194%	195%	194%	196%	195%	195%	195%	196%	196%	196%	195%

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	-158.41	-0.04	-0.07	-0.34	-1.74	-2.39	-7.03	-6.50	-6.49	-6.47	-6.47	-5.78	-5.66	-5.57	-5.46	-5.36	-5.26	-5.14	-5.04	-4.92	-4.80	-4.69	-4.56	-4.45	-4.31	-4.19	-4.06	-3.92	-3.79	-3.65	-3.52	-3.38	-3.24	-3.07	-2.92	-2.77	-2.61	-2.44	-2.27	-2.10	-1.94
2. Depreciation cost	162.05	0.00	0.00	0.00	0.00	0.00	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63	4.63
3. Interest Paid	51.30	0.04	0.07	0.10	1.57	2.22	2.22	2.22	2.22	2.22	2.22	2.23	2.16	2.10	2.03	1.97	1.90	1.83	1.77	1.70	1.63	1.56	1.49	1.42	1.34	1.27	1.20	1.12	1.05	0.97	0.89	0.82	0.74	0.66	0.58	0.50	0.42	0.34	0.25	0.17	0.09
Sub-total	54.94	0.00	0.00	-0.24	-0.17	-0.17	-0.18	0.35	0.36	0.38	0.38	1.08	1.13	1.16	1.20	1.24	1.27	1.32	1.36	1.41	1.46	1.50	1.56	1.60	1.66	1.71	1.77	1.83	1.89	1.95	2.00	2.07	2.13	2.22	2.29	2.36	2.44	2.53	2.61	2.70	2.78
B Finances																																									
1. Project Loan	222.70	3.91	2.79	3.72	146.46	64.79	0.58	0.45																																	
2. Local fund	75.81	1.29	0.91	1.25	50.51	21.72	0.07	0.06																																	
Sub-total	298.51	5.20	3.70	4.97	196.97	86.51	0.65	0.51																																	
C Subsidy from Government																																									
1. Subsidy for O&M cost	0.76	0.00	0.00	0.24	0.17	0.17	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	218.29	0.04	0.07	0.10	1.57	2.22	2.22	1.87	1.86	1.84	1.84	7.55	7.50	7.47	7.43	7.39	7.36	7.31	7.27	7.22	7.17	7.13	7.07	7.03	6.97	6.92	6.86	6.80	6.74	6.68	6.62	6.56	6.50	6.41	6.34	6.27	6.19	6.10	6.02	5.93	5.85
Sub-total	219.05	0.04	0.07	0.34	1.74	2.39	2.40	1.87	1.86	1.84	1.84	7.55	7.50	7.47	7.43	7.39	7.36	7.31	7.27	7.22	7.17	7.13	7.07	7.03	6.97	6.92	6.86	6.80	6.74	6.68	6.62	6.56	6.50	6.41	6.34	6.27	6.19	6.10	6.02	5.93	5.85
Total Cash Inflow	572.50	5.24	3.77	5.07	198.54	88.73	2.87	2.73	2.22	2.22	2.22	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.62	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63
APPLICATION OF FUNDS																																								
D Project disbursement	298.51	5.20	3.70	4.97	196.97	86.51	0.65	0.51																																	
E Total debt services																																								
1. Loan repayment	222.69											6.40	6.47	6.53	6.60	6.66	6.73	6.80	6.86	6.93	7.00	7.07	7.14	7.21	7.29	7.36	7.43	7.51	7.58	7.66	7.73	7.81	7.89	7.97	8.05	8.13	8.21	8.29	8.38	8.46	8.54
2. Interest paid	51.30	0.04	0.07	0.10	1.57	2.22	2.22	2.22	2.22	2.22	2.22	2.23	2.16	2.10	2.03	1.97	1.90	1.83	1.77	1.70	1.63	1.56	1.49	1.42	1.34	1.27	1.20	1.12	1.05	0.97	0.89	0.82	0.74	0.66	0.58	0.50	0.42	0.34	0.25	0.17	0.09
Sub-total	273.99	0.04	0.07	0.10	1.57	2.22	2.22	2.22	2.22	2.22	2.22	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.62	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63
Total Cash Outflow	572.50	5.24	3.77	5.07	198.54	88.73	2.87	2.73	2.22	2.22	2.22	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.62	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63	8.63
F Net Surplus Cash (A+C2)-E	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Project Cost Recovery Ratio (%)																																								
Cost recovery by water fee (A/E)	20%	0%	0%	0%	0%	0%	0%	16%	16%	17%	17%	13%	13%	13%	14%	14%	15%	15%	16%	16%	17%	17%	18%	19%	19%	20%	21%	21%	22%	23%	23%	24%	25%	26%	27%	27%	28%	29%	30%	31%	32%
Cost recovery by water fee + subsidy ((A+C2)/E)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

TAVUSH MARZ
Ijevan District
No 1 Aghavnavanq

FINANCIAL ANALYSIS

A COST RECOVERY ANALYSIS

	Item	Millon AMD	Rate
1	**Revenue**		
	Water fee revenue	118.78	35.2%
	Subsidy	219.05	64.8%
	Total	337.83	100.0%
2	**Expenditure**		
	OM cost	63.84	18.9%
	Loan repayment	222.69	65.9%
	Interest paid	51.30	15.2%
	Surplus cash	0.00	0.0%
	Total	337.83	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	196.24	3.82	2.73	3.51	129.60	55.63	0.53	0.42																																
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	2.94			0.00	0.06	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
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
Mantenance cost	20.55			0.00	0.39	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56
Pump replacement																	0.00															0.00									
Sub-total	32.61			0.24	0.69	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Total Outflow	228.85	3.82	2.73	3.75	130.29	56.51	1.41	1.30	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
B BENEFIT																																								
1. Water Tariff	74.36	0.00	0.00	0.00	0.54	0.77	0.79	1.35	1.39	1.44	1.48	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22	2.22
2. Subsidy	169.22	0.00	0.00	0.24	0.17	0.17	0.18	0.00	0.00	0.00	0.00	5.32	5.34	5.37	5.40	5.42	5.46	5.48	5.50	5.52	5.54	5.57	5.58	5.61	5.63	5.65	5.66	5.68	5.69	5.71	5.73	5.74	5.76	5.75	5.76	5.77	5.77	5.76	5.77	5.76	5.76
Total Inflow	243.58	0.00	0.00	0.24	0.71	0.94	0.97	1.35	1.39	1.44	1.48	7.54	7.56	7.59	7.62	7.64	7.68	7.70	7.72	7.74	7.76	7.79	7.80	7.83	7.85	7.87	7.88	7.90	7.91	7.93	7.95	7.96	7.98	7.97	7.98	7.99	7.99	7.98	7.99	7.98	7.98
NET BENEFIT	14.72	-3.82	-2.73	-3.5	-129.6	-55.6	-0.44	0.05	0.51	0.56	0.60	6.66	6.68	6.71	6.74	6.76	6.80	6.82	6.84	6.86	6.88	6.91	6.92	6.95	6.97	6.99	7.00	7.02	7.03	7.05	7.07	7.08	7.10	7.09	7.10	7.11	7.11	7.10	7.11	7.10	7.10

FIRR = **0.34%**

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	-63.58	-4.20	-3.00	-3.9	-142.5	-61.1	-0.49	0.01	0.51	0.56	0.60	6.66	6.68	6.71	6.74	6.76	6.80	6.82	6.84	6.86	6.88	6.91	6.92	6.95	6.97	6.99	7.00	7.02	7.03	7.05	7.07	7.08	7.10	7.09	7.10	7.11	7.11	7.10	7.11	7.10	7.10
	2	Capital cost 20% up	-81.83	-4.58	-3.28	-4.2	-155.5	-66.7	-0.55	-0.03	0.51	0.56	0.60	6.66	6.68	6.71	6.74	6.76	6.80	6.82	6.84	6.86	6.88	6.91	6.92	6.95	6.97	6.99	7.00	7.02	7.03	7.05	7.07	7.08	7.10	7.09	7.10	7.11	7.11	7.10	7.11	7.10	7.10
2	1	OM cost 10% up	-47.60	-3.82	-2.73	-3.5	-129.7	-55.7	-0.53	-0.04	0.42	0.47	0.51	6.57	6.59	6.62	6.65	6.67	6.71	6.73	6.75	6.77	6.79	6.82	6.83	6.86	6.88	6.90	6.91	6.93	6.94	6.96	6.98	6.99	7.01	7.00	7.01	7.02	7.02	7.01	7.02	7.01	7.01
	2	OM cost 20% up	-49.87	-3.82	-2.73	-3.6	-129.7	-55.7	-0.62	-0.13	0.33	0.38	0.42	6.48	6.50	6.53	6.56	6.58	6.62	6.64	6.66	6.68	6.70	6.73	6.74	6.77	6.79	6.81	6.82	6.84	6.85	6.87	6.89	6.90	6.92	6.91	6.92	6.93	6.93	6.92	6.93	6.92	6.92
3	1	Revenue 10% down	-61.31	-3.82	-2.73	-3.5	-129.7	-55.7	-0.54	-0.09	0.37	0.42	0.45	5.91	5.92	5.95	5.98	6.00	6.03	6.05	6.07	6.09	6.10	6.13	6.14	6.17	6.19	6.20	6.21	6.23	6.24	6.26	6.28	6.28	6.30	6.29	6.30	6.31	6.31	6.30	6.31	6.30	6.30
	2	Revenue 20% down	-77.30	-3.82	-2.73	-3.6	-129.7	-55.8	-0.63	-0.22	0.23	0.27	0.30	5.15	5.17	5.19	5.22	5.23	5.26	5.28	5.30	5.31	5.33	5.35	5.36	5.38	5.40	5.42	5.42	5.44	5.45	5.46	5.48	5.49	5.50	5.50	5.50	5.51	5.51	5.50	5.51	5.50	5.50

No.		Description	FIRR	Sensitivity indicator	Swiching value
1	1	Capital cost 10% up	-0.11%	-41.84	-2.39%
	2	Capital cost 20% up	-0.51%	-16.71	-5.98%
2	1	OM cost 10% up	0.27%	2.80	35.71%
	2	OM cost 20% up	0.19%	7.83	12.78%
3	1	Revenue 10% down	-0.23%	-24.61	-4.06%
	2	Revenue 20% down	-0.87%	-13.93	-7.18%

No.2 Gandzaqar

Information on Existing Water Sources (Tavush)

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

No.2 Community Gandzaqar
District Idjevan
Marz Tavush

No	Water source	Latitude			Longitude			Atidute	Yeild(L/sec)		
		deg	min	sec	deg	min	sec	(m)	Min	Max	At site
1	river intake	40	49	55.9	45	9	36.3	915	-	-	
2	river intake	40	51	2.3	45	10	1.0	940	-	-	60.0
3	river intake	40	49	7.8	45	8	54.3	1,015	-	-	
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	-
Notes	The community uses irrigation water for drinking purposes
Alternative sources if any	Babakhan springs are located at 7km distance from the community, with 8l/sec discharge.

No.2 Community Gandzaqar
District Idjevan
Marz Tavush
Sampling date 07/Sep/2007

	Parameters analysed	Unit	No.1 River water				Guidelines	
							WHO	Armenia
a	pH		8.8				6.5-8	6.0 - 9.0
b	Temperature	Deg.C	16.3					
c	TDS	Mg/L	187				1000	1000
1	Al:Aluminum	Mg/L	n.d.				0.10	0.50
2	B:Boron	Mg/L	n.d.				0.70	0.50
3	Cl:Chloride	Mg/L	4				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	0.26				1.50	
7	Hardness	Mg/L	355				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	0.040				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	37.0				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	<0.001				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	>1100				-	0
25	Thermo-tolerant coli form bacteria	bacteria per 100 ml	n.d				0	0
26	Total bacteria	bacteria per 1 ml	640				-	50

Information on Existing Water Sources
Existing Bacteriological Test

No.2 Community Gandzaqar
District Ijevan
Marz Tavush

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	06	35	0.0	Not Identified
2	2	22	35	2.3	Not Identified
3	2	22	32	0.9	Not Identified
4	3	05	38	9.0	Not Identified
5	3	19	45	9.0	Not Identified
6	3	29	35	9.0	Not Identified
7	4	05	40	9.0	Not Identified
8	4	05	38	0.9	Not Identified
9	5	17	25	0.9	Not Identified
10	5	17	17	0.9	Not Identified
11	6	11	28	2.3	Not Identified
12	6	11	31	2.3	Not Identified
13	6	19	42	2.3	Not Identified
14	7	03	>50	7.5	Not Identified
15	7	.1	>50	110.0	Not Identified
16	7	18	45	24.0	Not Identified
17	7	18	45	9.0	Not Identified
18	8	16	41	2.3	Not Identified
19	8	21	45	4.3	Not Identified

No. 2 **Marz** Tavush **Community** Gandzaqar

1. ACCESSIBILITY TO THE SITE

No.	Structures	Access by vehicle	Machine construction	Remarks
1	Intake	Fair	Possible	
2	Transmission pipeline	Possible	Possible	Pipeline is generally along or close to the road
3	Reservoir	Possible	Possible	

2. INTAKE STRUCTURE

No.	Water source	N	E	El. (m)	Year	Material	Volume (l/s)	Rehabilitation Necessity (Y/N)
1	River/stream	40°49′55.9″	45°09′36.3″	915	2002	Concrete	60.0	No
2	River/stream	40°51′02.3″	45°10′01.0″	940	2002	Concrete	-	No
3	River/stream	40°49′07.8″	45°08′54.3″	1,015	2002	Concrete	-	No

3. TRANSMISSION PIPELINE

No.	Pipeline length (m)	Pipe diameter	Material	Flow rate (l/s)	Year	Leakage	Rehabilitation Necessity (Y/N)
1	2,500	150	Steel	20.0	2001	Little	Yes
2	1,000	100	Steel	20.0	2001	Little	Yes
3	1,000	100	Steel	10.0	2002	Little	Yes
4	2,500	100	Steel	10.0	2003	Little	Yes

4. RESERVOIR

No.	N	E	El. (m)	Material	Shape	Dimension (m)	Volume (m3)	Rehabilitation Necessity (Y/N)
1	40°51′14.4″	45°10′01.9″	932	Concrete	Rectangular	6x15x4	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	1,600	150	Steel	1970	Little	Yes
2	2,000	100	Steel		Huge	Yes
3	1,500	75	Steel		Huge	Yes
4	1,000	50	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)
2			No	0	No

9. DRAINAGE SYSTEM

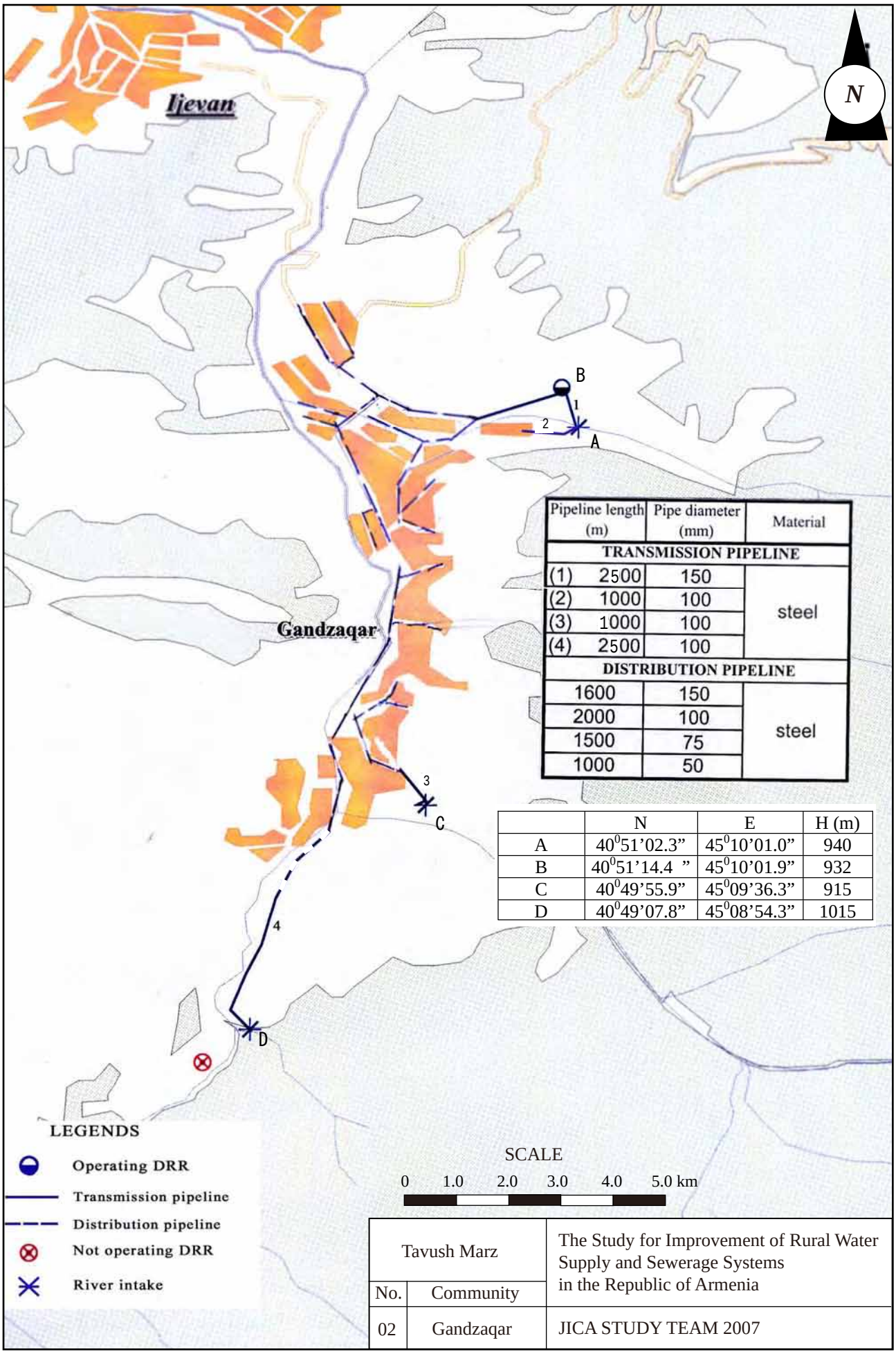
Existence	Rehabilitation	Remarks
No	Yes	

Questionnaire on Existing Water Supply Conditions by Socio-Economic Survey

Marz	**Tavush**
Number and Name of Community	**No.2 Gandzaqar**
District	**Idejevan**

No.	Question	Answer
A: Baseline Data		
A1	Actual population in 2001	3,766
A2	Actual population in 2007	3,840
A3	Number of households	1,250
A4.1	Elderly people	630
A4.2	Population in labor force (age from 16 to 62)	2,110
A4.3	Children	1,100
A5.1	Pensioners	735
A5.2	Unemployed	700
A5.3	Receiving benefits	1,430
A6	Average monthly income of household (AMD)	35,000
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	630
B: Budget		
B1	Annual Budget of the community 2004, in thousand AMD	7,000
	Annual Budget of the community 2005, in thousand AMD	7,200
	Annual Budget of the community 2006, in thousand AMD	8,500
	Annual Budget of the community 2007, in thousand AMD	8,000
	Annual Budget of the community 2008, in thousand AMD	is not planned.
B2	Amount spent in drinking water sector 2004, in thousand AMD	0
	Amount spent in drinking water sector 2005, in thousand AMD	0
	Amount spent in drinking water sector 2006, in thousand AMD	0
	Amount spent in drinking water sector 2007, in thousand AMD	0
	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
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	is not planned
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	500
D8	How many house connection household set the water meter	0
D9	Number of public taps	2
D10.1	How is the regime of water supply in your community in the dry season?	24 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?	-
D12	Are you pleased with duration of domestic water supply?	-
D13	Are hours of water supply 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)	200
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 1- Flate rate, 2- Having water tariff	-
D19	Where do you acquire the irrigation water?	pipeline , river
D20	Are you satisfied with irrigation water supply volume?	insufficient
E: Present Operation and Maintenance Works		
E1	Name of responsible for water supply	absent
E2	Position	-
E3	Telephone	-
E4	Quantity and present condition of the water supply facilities: spring/ intake	absent
E5	Quantity and present condition of the water supply facilities:	5-deteriorated
E6	Quantity and present condition of the water supply facilities: DRR(Daily Regulatory Reservoir)	1-rehabilitated, 1-non - operational
E7	Quantity and present condition of the water supply facilities: net/distribution	deteriorated
E8	Quantity and present condition of the water supply facilities: public tap	absent
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?	donation from residents
E15	Please indicate the O&M cost breakdown per year for water supply	
	Electricity (AMD)	0
	Labor cost (AMD)	0
	Repair cost(AMD)	100,000
	Others(AMD)	0
	Total (AMD)	100,000
E16	Do the residents participate in the O&M works?	manpower
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.	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

Tavush
No.2 Gandzaqar



Pipeline length (m)	Pipe diameter (mm)	Material
TRANSMISSION PIPELINE		
(1) 2500	150	steel
(2) 1000	100	
(3) 1000	100	
(4) 2500	100	
DISTRIBUTION PIPELINE		
1600	150	steel
2000	100	
1500	75	
1000	50	

	N	E	H (m)
A	$40^0$51’02.3”	$45^0$10’01.0”	940
B	$40^0$51’14.4 ”	$45^0$10’01.9”	932
C	$40^0$49’55.9”	$45^0$09’36.3”	915
D	$40^0$49’07.8”	$45^0$08’54.3”	1015

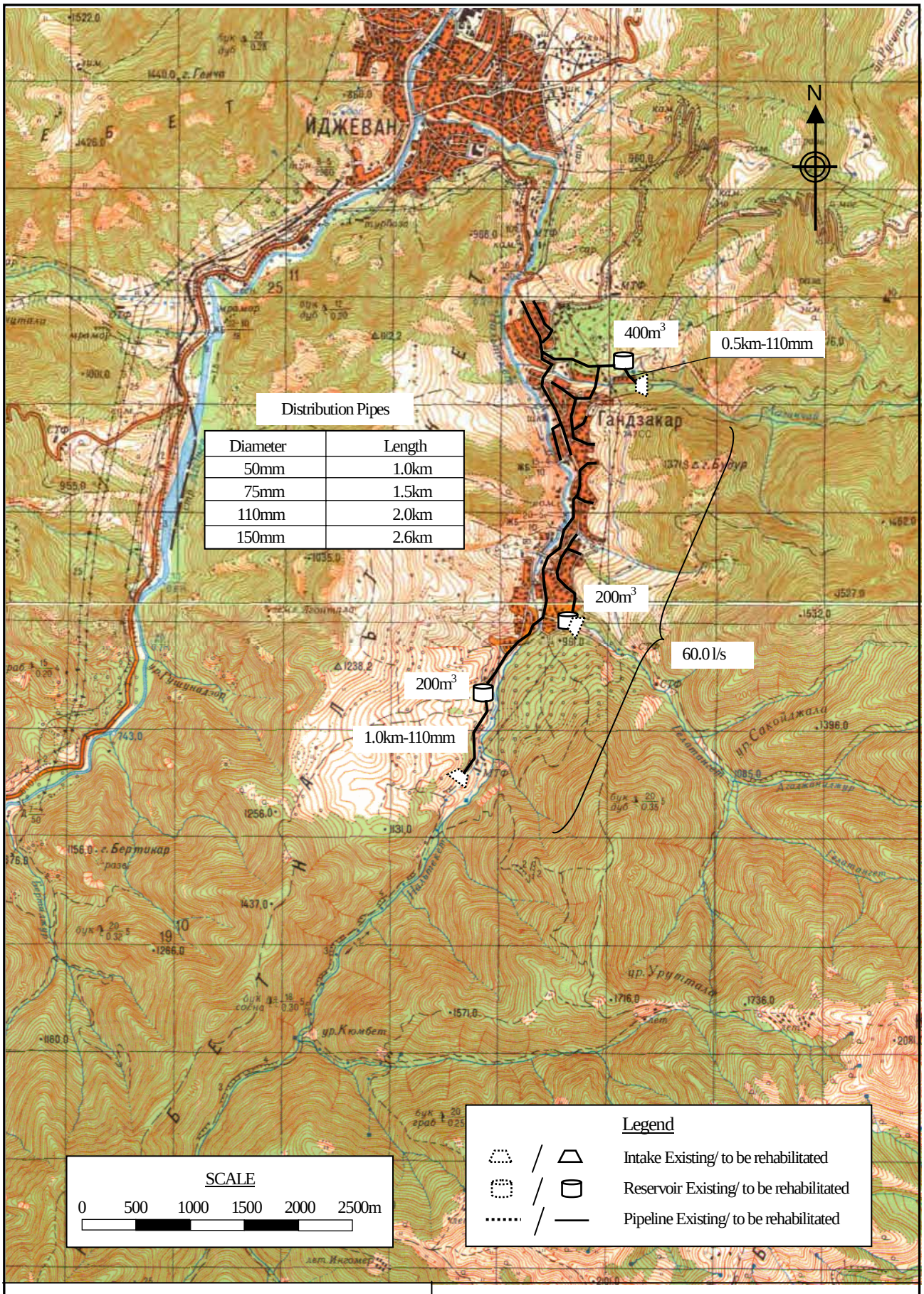
Tavush Marz		The Study for Improvement of Rural Water Supply and Sewerage Systems in the Republic of Armenia
No.	Community	
02	Gandzaqar	JICA STUDY TEAM 2007

Marz : **Tavush** No.2
Name : **Gandzaqar**

No.	Item	Quantity	Unit	Water demand (m3/d)	
A.	**WATER DEMAND**				
	1 Population	3,840	persons	384.0	
	2 Factory	-	nos	0.0	
	3 School (pupils)	630	pupils	6.3	
	4 Medical Ambulance Station	-	nos	-	
	5 Policlinic	-	nos	-	
	7 Livestocks (87lit/household)	1,250	household	108.8	
	Sub-total			499.1	
	Unaccouted for water (20%)			99.8	
1	Average Daily Water Demand			598.9	m3/day
2	Maximum Daily Water Demand			718.7	m3/day
3	Maximum Hourly Water Demand			62.3	m3/hr

B	**WATER SUPPLY PLAN**					
	1 Water source type	Nr.	Total vol.			
	a River	3	60	lit/sec	5184.0	m3/day
`	Total				5184.0	m3/day
	2 Required reservoir volume				747	m3

C	**WATER SUPPLY FACILITIES REHABILITATION PLAN**		
No	Item	Quantity	Unit
1	Intake		
	1m3		nos
	2m3		nos
	3m3		nos
	4m3		nos
2	Transmission pipe		
	50mm diameter		m
	75mm diameter		m
	90mm diameter		m
	110mm diameter	1,500	m
	150mm diameter		m
	200mm diameter		m
	250mm diameter		m
3	Reservoir		
	200m3 capacity	2	nos
	400m3 capacity	1	nos
4	Distribution pipe		
	50mm diameter	1,000	m
	75mm diameter	1,500	m
	90mm diameter		m
	110mm diameter	2,000	m
	150mm diameter	2,600	m
	200mm diameter		m
	250mm diameter		m
5	House connection	750	nos
6	Water meter installation	1,250	nos
7	Public tap	13	nos
8	Chlorination	3	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	Tavush	
No. 02	Gandzaqar	JICA STUDY TEAM

Marz : **Tavush**
No. : **2**
Name : **Gandzaqar**

No	Item	Specification	Quantity	Unit	Unit Price	Total
1	Intake					
		1m3		nos	367,700	
		2m3		nos	545,000	
		3m3		nos	669,100	
		4m3		nos	805,100	
	Sub-total					
2	Transmission Pipe					
		50mm		m	5,520	
		75mm		m	7,160	
		90mm		m	8,040	
		110mm	1,500	m	9,680	14,520,000
		150mm		m	13,140	
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					14,520,000
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	1	nos	36,388,000	36,388,000
		450m3		nos	39,392,500	
		500m3		nos	42,520,900	
	Sub-total					81,437,200
4	Distribution Pipe					
		50mm	1,000	m	5,520	5,520,000
		75mm	1,500	m	7,160	10,740,000
		90mm		m	8,040	
		110mm	2,000	m	9,680	19,360,000
		150mm	2,600	m	13,140	34,164,000
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					69,784,000
5	House Connection		750	nos	74,000	55,500,000
6	Water Meter Installation		1,250	nos	80,000	100,000,000
7	Public Tap		13	nos	90,000	1,170,000
8	Chlorilation Equipment		3	nos	500,000	1,500,000
9	Pump Replacement			nos	10,000,000	
10	Drainage and Sewerage	concrete surfa	2,840	m	3,600	10,224,000
	Total				AMD	334,135,200
					Equivalent to USD	1,093,661
					Equivalent to JPY	115,381,198
					AMD	USD
	Investment Cost per household		1,250	HH	267,308	875
	Investment Cost per person		3,840	persons	87,014	285

TAVUSH MARZ
Ijevan District
No 2 Gandzaqar

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		182.2																																							
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		1013.40	0.00	0.00	0.00	4.59	6.56	6.77	11.48	11.86	12.25	12.65	18.96	19.59	20.23	20.90	21.59	22.30	23.04	23.80	24.58	25.40	26.23	27.10	28.00	28.92	29.87	30.86	31.88	32.93	34.02	35.14	36.30	37.49	38.73	40.01	41.33	42.70	44.10	45.56	47.06	48.62
B Operating Costs																																									
1. Staff salary																																									
Inspectors	person				3																																				
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		53.07			0.72	0.74	0.77	0.79	0.82	0.85	0.87	0.90	0.93	0.96	1.00	1.03	1.06	1.10	1.13	1.17	1.21	1.25	1.29	1.33	1.38	1.42	1.47	1.52	1.57	1.62	1.67	1.73	1.79	1.85	1.91	1.97	2.03	2.10	2.17	2.24	2.32	2.39
2. Chlorine																																									
Pouring volume	kg/yr				1,094																																				
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		47.58			0.00	0.48	0.70	0.72	0.75	0.77	0.80	0.82	0.85	0.88	0.91	0.94	0.97	1.00	1.03	1.07	1.10	1.14	1.18	1.22	1.26	1.30	1.34	1.39	1.43	1.48	1.53	1.58	1.63	1.68	1.74	1.80	1.86	1.92	1.98	2.04	2.11	2.18
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		33.80			0.00	0.33	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	0.83	0.85	0.88	0.91	0.94	0.97	1.00	1.04	1.07	1.11	1.14	1.18	1.22	1.26	1.30	1.34	1.39	1.43	1.48	1.53
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	0.33	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	0.83	0.85	0.88	0.91	0.94	0.97	1.00	1.04	1.07	1.11	1.14	1.18	1.22	1.26	1.30	1.34	1.39	1.43	1.48	1.53
5. Pump replacement		0.00																0.00															0.00										
Sub-total		134.45	0.00	0.00	0.72	1.55	1.96	2.02	2.09	2.16	2.23	2.30	2.38	2.46	2.55	2.63	2.71	2.80	2.88	2.99	3.08	3.19	3.30	3.40	3.52	3.63	3.75	3.88	4.00	4.14	4.27	4.42	4.56	4.71	4.87	5.03	5.19	5.36	5.54	5.71	5.91	6.10
C Gross Income (A-B)		879.41	0.00	0.00	-0.72	3.04	4.60	4.75	9.39	9.70	10.02	10.35	16.58	17.13	17.68	18.27	18.88	19.50	20.16	20.81	21.50	22.21	22.93	23.70	24.48	25.29	26.12	26.98	27.88	28.79	29.75	30.72	31.74	32.78	33.86	34.98	36.14	37.34	38.56	39.85	41.15	42.52
D Depreciation cost		317.45						9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07
E Interest paid		96.48	0.04	0.07	0.10	2.93	4.19	4.19	4.19	4.19	4.19	4.19	4.20	4.08	3.96	3.83	3.71	3.58	3.46	3.33	3.20	3.07	2.94	2.80	2.67	2.53	2.39	2.26	2.12	1.97	1.83	1.69	1.54	1.39	1.24	1.09	0.94	0.79	0.63	0.48	0.32	0.16
F Net Income		465.48	-0.04	-0.07	-0.82	0.11	0.41	-8.51	-3.87	-3.56	-3.24	-2.91	3.31	3.98	4.65	5.37	6.10	6.85	7.63	8.41	9.23	10.07	10.92	11.83	12.74	13.69	14.66	15.65	16.69	17.75	18.85	19.96	21.13	22.32	23.55	24.82	26.13	27.48	28.86	30.30	31.76	33.29
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		465.48	-0.04	-0.07	-0.82	0.11	0.41	-8.51	-3.87	-3.56	-3.24	-2.91	3.31	3.98	4.65	5.37	6.10	6.85	7.63	8.41	9.23	10.07	10.92	11.83	12.74	13.69	14.66	15.65	16.69	17.75	18.85	19.96	21.13	22.32	23.55	24.82	26.13	27.48	28.86	30.30	31.76	33.29
OM Cost Recovery Ratio (A/B)		754%	0%	0%	0%	297%	335%	335%	549%	549%	549%	550%	797%	796%	793%	795%	797%	796%	800%	796%	798%	796%	795%	797%	795%	797%	797%	795%	797%	795%	797%	795%	796%	796%	795%	795%	796%	797%	796%	798%	796%	797%

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	465.48	-0.04	-0.07	-0.82	0.11	0.41	-8.51	-3.87	-3.56	-3.24	-2.91	3.31	3.98	4.65	5.37	6.10	6.85	7.63	8.41	9.23	10.07	10.92	11.83	12.74	13.69	14.66	15.65	16.69	17.75	18.85	19.96	21.13	22.32	23.55	24.82	26.13	27.48	28.86	30.30	31.76	33.29
2. Depreciation cost	317.45	0.00	0.00	0.00	0.00	0.00	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07
3. Interest Paid	96.48	0.04	0.07	0.10	2.93	4.19	4.19	4.19	4.19	4.19	4.19	4.20	4.08	3.96	3.83	3.71	3.58	3.46	3.33	3.20	3.07	2.94	2.80	2.67	2.53	2.39	2.26	2.12	1.97	1.83	1.69	1.54	1.39	1.24	1.09	0.94	0.79	0.63	0.48	0.32	0.16
Sub-total	879.41	0.00	0.00	-0.72	3.04	4.60	4.75	9.39	9.70	10.02	10.35	16.58	17.13	17.68	18.27	18.88	19.50	20.16	20.81	21.50	22.21	22.93	23.70	24.48	25.29	26.12	26.98	27.88	28.79	29.75	30.72	31.74	32.78	33.86	34.98	36.14	37.34	38.56	39.85	41.15	42.52
B Finances																																									
1. Project Loan	419.84	3.91	2.79	3.72	282.89	125.50	0.58	0.45																																	
2. Local fund	145.09	1.29	0.91	1.25	97.64	43.87	0.07	0.06																																	
Sub-total	564.93	5.20	3.70	4.97	380.53	169.37	0.65	0.51																																	
C Subsidy from Government																																									
1. Subsidy for O&M cost	0.72	0.00	0.00	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.21	0.04	0.07	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.93	0.04	0.07	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	1445.27	5.24	3.77	5.07	383.57	173.97	5.40	9.90	9.70	10.02	10.35	16.58	17.13	17.68	18.27	18.88	19.50	20.16	20.81	21.50	22.21	22.93	23.70	24.48	25.29	26.12	26.98	27.88	28.79	29.75	30.72	31.74	32.78	33.86	34.98	36.14	37.34	38.56	39.85	41.15	42.52
APPLICATION OF FUNDS																																									
D Project disbursement	564.93	5.20	3.70	4.97	380.53	169.37	0.65	0.51																																	
E Total debt services																																									
1. Loan repayment	419.84											12.07	12.19	12.31	12.44	12.56	12.69	12.81	12.94	13.07	13.20	13.33	13.47	13.60	13.74	13.87	14.01	14.15	14.29	14.44	14.58	14.73	14.87	15.02	15.17	15.33	15.48	15.63	15.79	15.95	16.11
2. Interest paid	96.48	0.04	0.07	0.10	2.93	4.19	4.19	4.19	4.19	4.19	4.19	4.20	4.08	3.96	3.83	3.71	3.58	3.46	3.33	3.20	3.07	2.94	2.80	2.67	2.53	2.39	2.26	2.12	1.97	1.83	1.69	1.54	1.39	1.24	1.09	0.94	0.79	0.63	0.48	0.32	0.16
Sub-total	516.32	0.04	0.07	0.10	2.93	4.19	4.19	4.19	4.19	4.19	4.19	16.27	16.27	16.27	16.27	16.27	16.27	16.27	16.27	16.27	16.27	16.27	16.27	16.27	16.27	16.26	16.27	16.27	16.26	16.27	16.27	16.27	16.26	16.26	16.26	16.27	16.27	16.26	16.27	16.27	16.27
Total Cash Outflow	1081.25	5.24	3.77	5.07	383.46	173.56	4.84	4.70	4.19	4.19	4.19	16.27	16.27	16.27	16.27	16.27	16.27	16.27	16.27	16.27	16.27	16.27	16.27	16.27	16.27	16.26	16.27	16.27	16.26	16.27	16.27	16.27	16.26	16.26	16.26	16.27	16.27	16.26	16.27	16.27	16.27
F Net Surplus Cash (A+C2)-E	364.02	0.00	0.00	0.00	0.11	0.41	0.56	5.20	5.51	5.83	6.16	0.31	0.86	1.41	2.00	2.61	3.23	3.89	4.54	5.23	5.94	6.66	7.43	8.21	9.02	9.86	10.71	11.61	12.53	13.48	14.45	15.47	16.52	17.60	18.72	19.87	21.07	22.30	23.58	24.88	26.25
Project Cost Recovery Ratio (%)																																									
Cost recovery by water fee (A/E)	170%	0%	0%	0%	104%	110%	113%	224%	232%	239%	247%	102%	105%	109%	112%	116%	120%	124%	128%	132%	137%	141%	146%	150%	155%	161%	166%	171%	177%	183%	189%	195%	202%	208%	215%	222%	230%	237%	245%	253%	261%
Cost recovery by water fee + subsidy ((A+C2)/E)	171%	100%	100%	100%	104%	110%	113%	224%	232%	239%	247%	102%	105%	109%	112%	116%	120%	124%	128%	132%	137%	141%	146%	150%	155%	161%	166%	171%	177%	183%	189%	195%	202%	208%	215%	222%	230%	237%	245%	253%	261%

TAVUSH MARZ
Ijevan District
No 2 Gandzaqar

FINANCIAL ANALYSIS

A COST RECOVERY ANALYSIS

	Item	Millon AMD	Rate
1	**Revenue**		
	Water fee revenue	1,013.40	99.9%
	Subsidy	0.93	0.1%
	Total	1,014.33	100.0%
2	**Expenditure**		
	OM cost	133.99	13.2%
	Loan repayment	419.84	41.4%
	Interest paid	96.48	9.5%
	Surplus cash	364.02	35.9%
	Total	1,014.33	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	368.82	3.82	2.73	3.51	250.11	107.70	0.53	0.42																																	
2. Operation and Maintenance Cost																																									
Salary	27.36			0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Chlorine	24.95			0.00	0.47	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
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
Mantenance cost	16.88			0.00	0.32	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
Pump replacement																	0.00															0.00									
Sub-total	69.19			0.72	1.51	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86
Total Outflow	438.01	3.82	2.73	4.23	251.62	109.56	2.39	2.28	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86	1.86
B BENEFIT																																								
1. Water Tariff	634.96	0.00	0.00	0.00	4.59	6.56	6.77	11.48	11.86	12.25	12.65	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96
2. Subsidy	0.72	0.00	0.00	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	635.68	0.00	0.00	0.72	4.59	6.56	6.77	11.48	11.86	12.25	12.65	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96	18.96
NET BENEFIT	197.67	-3.82	-2.73	-3.5	-247.0	-103.0	4.38	9.20	10.00	10.39	10.79	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10

FIRR = 2.35%

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	3.19	-4.20	-3.00	-3.9	-272.0	-113.8	4.33	9.16	10.00	10.39	10.79	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10
	2	Capital cost 20% up	-31.08	-4.58	-3.28	-4.2	-297.1	-124.5	4.27	9.12	10.00	10.39	10.79	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10
2	1	OM cost 10% up	32.64	-3.82	-2.73	-3.6	-247.2	-103.2	4.19	9.01	9.81	10.20	10.60	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91	16.91
	2	OM cost 20% up	27.82	-3.82	-2.73	-3.7	-247.3	-103.4	4.01	8.83	9.63	10.02	10.42	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73	16.73
3	1	Revenue 10% down	-5.37	-3.82	-2.73	-3.6	-247.5	-103.7	3.70	8.05	8.81	9.17	9.53	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20	15.20
	2	Revenue 20% down	-48.20	-3.82	-2.73	-3.7	-248.0	-104.3	3.03	6.90	7.63	7.94	8.26	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31

No.		Description	FIRR		Sensitivity indicator	Swiching value
1	1	Capital cost 10% up	1.80%		3.07	32.59%
	2	Capital cost 20% up	1.31%		7.93	12.61%
2	1	OM cost 10% up	2.27%		0.33	300.02%
	2	OM cost 20% up	2.20%		0.69	144.64%
3	1	Revenue 10% down	1.66%		4.15	24.12%
	2	Revenue 20% down	0.91%		15.68	6.38%