No.6 Bashqyugh

Information on Existing Water Sources (Shirak)

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

No.6 Community Bashgyugh
District Ashotsk
Marz Shirak

No	Water source	Latitude			Longitude			Atidute	Yeild(L/sec)		
		deg	min	sec	deg	min	sec	(m)	Min	Max	At site
1	Spring	40	59	0.3	43	57	58.4	2,144	1.0	5.0	4.0
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	
Alternative sources if any	

No.6 Community Bashgyugh
District Ashotsk
Marz Shirak
Sampling date 02/Aug/2007

	Parameters analysed	Units	No.1				Guidelines	
							WHO	Armenia
a	pH		8.4				6.5-8	6.0 - 9.0
b	Temperature	Deg.C	10.9					
c	TDS	Mg/L	110				1000	1000
1	Al:Aluminum	Mg/L	0.01				0.10	0.50
2	B:Boron	Mg/L	n.d				0.70	0.50
3	Cl:Chloride	Mg/L	6				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	0.20				1.50	
7	Hardness	Mg/L	280				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	n.d				0.070	0.250
11	Ni:Nickel	Mg/L	n.d				0.020	0.100
12	Nitrate(NO3+)	Mg/L	1.8				50.0	45.0
13	SO4:Sulfate	Mg/L	2.0				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	0.05				0.70	0.10
17	Be:Berillium	Mg/L	0.00005				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	n.d				NA	7.0
23	CN:Cyanide	Mg/L	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.6 Community Bashgyugh
District Ashotsk
Marz Shirak

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	05	18	-	Not Identified	Not Identified
2	06	16	-	Not Identified	Not Identified
3	07	16	-	Not Identified	Not Identified

No. 6 **Marz** Shirak **Community** Bashgyugh

1. ACCESSIBILITY TO THE SITE

No.	Structures	Access by vehicle	Machine construction	Remarks
1	Intake	Possible	Difficult	
2	Transmission pipeline	Possible	Possible	Pipeline is mostly far from 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	Spring	40°59′00,3″	43°57′58,4″	2,144	1988	Concrete	4.0	Yes

3. TRANSMISSION PIPELINE

No.	Pipeline length (m)	Pipe diameter	Material	Flow rate (l/s)	Year	Leakage	Rehabilitation Necessity (Y/N)
1	3,000	100	Polyethylene	3.0	1988	Little	Yes

4. RESERVOIR

No.	N	E	El. (m)	Material	Shape	Dimension (m)	Volume (m3)	Rehabilitation Necessity (Y/N)
1	40°56'47,4"	43°58'34,8"	2,031	Steel	Circle	3× d=1m,l=20	48	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	1,700	100	Polyethylene	1988	no	No

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)
7	1988		Yes	40	Yes

9. DRAINAGE SYSTEM

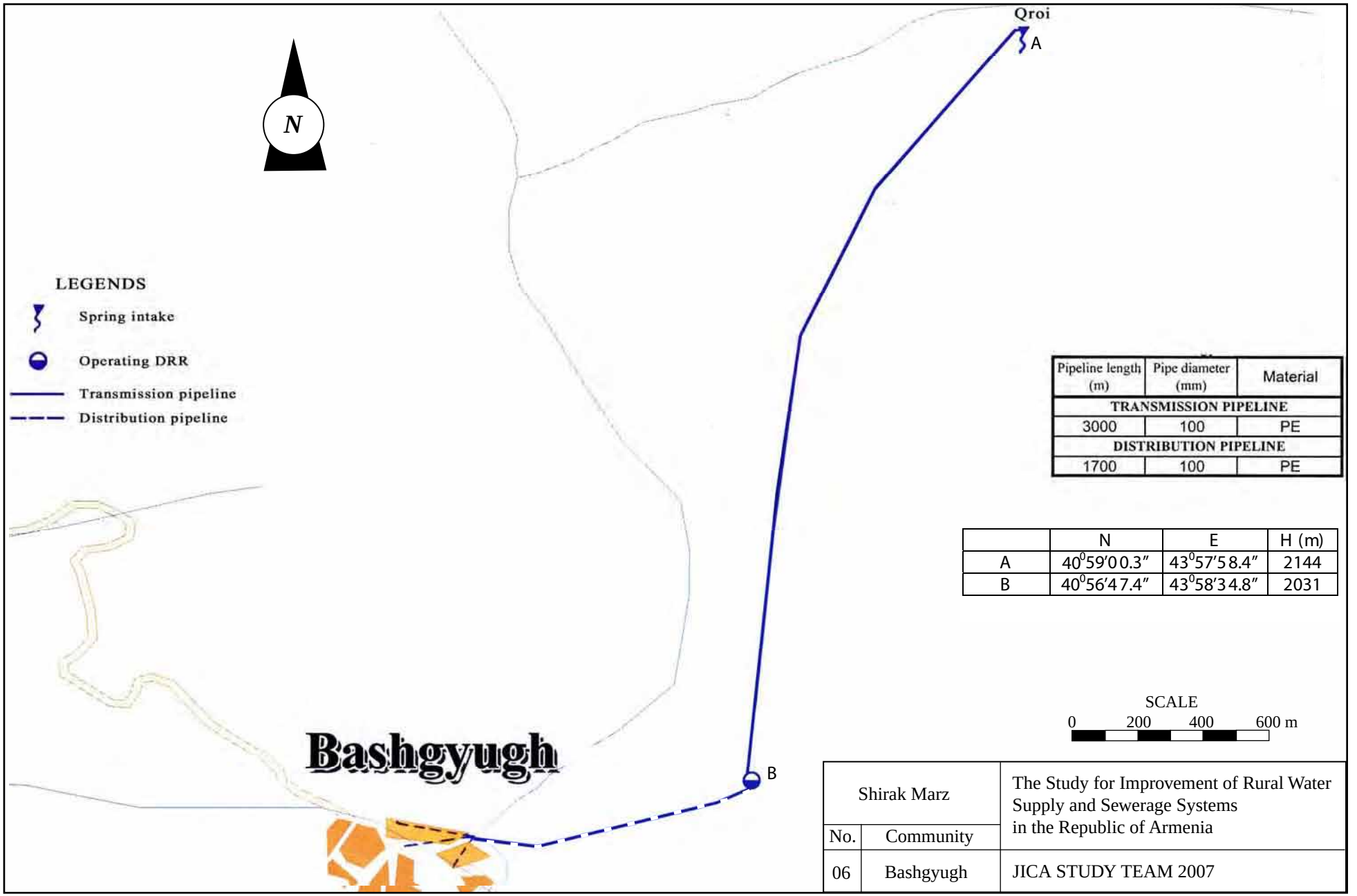
Existence (Y/N)	Rehabilitation Necessity (Y/N)	Remarks
No	Yes	

Questionnaire on Existing Water Supply Conditions by Socio-Economic Survey

Marz	Shirak
Number and Name of Community	No.6 Bashgyugh
District	Ashotsk

No.	Question	Answer
A: Baseline Data		
A1	Actual population in 2001	71
A2	Actual population in 2007	66
A3	Number of households	24
A4.1	Elderly people	18
A4.2	Population in labor force (age from 16 to 62)	38
A4.3	Children	10
A5.1	Pensioners	17
A5.2	Unemployed	0
A5.3	Receiving benefits	0
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	0
A10	Number of pupils	0
B: Budget		
B1	Annual Budget of the community 2004, in thousand AMD	350
	Annual Budget of the community 2005, in thousand AMD	350
	Annual Budget of the community 2006, in thousand AMD	600
	Annual Budget of the community 2007, in thousand AMD	600
	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	yes
D2	Water use permit number	1325
D3	Date of expiry of water use permit	13.02.07-13.02.10
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	sufficient
D7	Number of house connection to drinking water system	19
D8	How many house connection household set the water meter	0
D9	Number of public taps	6
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?	fully pleased
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	200
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?	sufficient
E: Present Operation and Maintenance Works		
E1	Name of responsible for water supply	nobody
E2	Position	-
E3	Telephone	-
E4	Quantity and present condition of the water supply facilities: spring/ intake	1-partially repaired
E5	Quantity and present condition of the water supply facilities:	2-partially repaired
E6	Quantity and present condition of the water supply facilities: DRR(Daily Regulatory Reservoir)	3-rehabilitated
E7	Quantity and present condition of the water supply facilities: net/distribution	rehabilitated
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
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)	0
	Repair cost(AMD)	0
	Others(AMD)	0
	Total (AMD)	0
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	yes
F1.8	Living areas of ethic, indigenous people or nomads who have a traditional lifestyle or special socially valuable areas	absent

Shirak
No.6 Bashgyugh



Pipeline length (m)	Pipe diameter (mm)	Material
TRANSMISSION PIPELINE		
3000	100	PE
DISTRIBUTION PIPELINE		
1700	100	PE

	N	E	H (m)
A	$40^0$59′00.3″	$43^0$57′58.4″	2144
B	$40^0$56′47.4″	$43^0$58′34.8″	2031

SCALE
0 200 400 600 m

Shirak Marz		The Study for Improvement of Rural Water Supply and Sewerage Systems in the Republic of Armenia
No.	Community	
06	Bashgyugh	JICA STUDY TEAM 2007

Marz : **Shirak** No.6
Name : **Bashgyugh**

No.	Item	Quantity	Unit	Water demand (m3/d)	
A.	**WATER DEMAND**				
	1 Population	66	persons	6.6	
	2 Factory	-	nos	0.0	
	3 School (pupils)	-	pupils	0.0	
	4 Medical Ambulance Station	-	nos	-	
	5 Policlinic	-	nos	-	
	7 Livestocks (87lit/household)	24	household	2.1	
	Sub-total			8.7	
	Unaccouted for water (20%)			1.7	
1	Average Daily Water Demand			10.4	m3/day
2	Maximum Daily Water Demand			12.5	m3/day
3	Maximum Hourly Water Demand			3.1	m3/hr

B	**WATER SUPPLY PLAN**						
	1 Water source type	Nr.	Total vol.				
	a Distribution chamber	1	4.0	lit/sec		345.6	m3/day
`	Total					345.6	m3/day
	2 Required reservoir volume					37	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	4,700	m
	150mm diameter		m
	200mm diameter		m
	250mm diameter		m
3	Reservoir		
	50m3 capacity	1	nos
4	Distribution pipe		
	50mm diameter		m
	75mm diameter		m
	90mm diameter		m
	110mm diameter		m
	150mm diameter		m
	200mm diameter		m
	250mm diameter		m
5	House connection	5	nos
6	Water meter installation	24	nos
7	Public tap	1	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	Shirak	
No. 06	Bashgyugh	JICA STUDY TEAM

Marz : **Shirak**
No. : **6**
Name : **Bashgyugh**

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	4,700	m	9,680	45,496,000
		150mm		m	13,140	
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					45,496,000
3	Reservoir					
		50m3	1	nos	8,363,900	8,363,900
		100m3		nos	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					8,363,900
4	Distribution 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					
5	House Connection		5	nos	74,000	370,000
6	Water Meter Installation		24	nos	80,000	1,920,000
7	Public Tap		1	nos	90,000	90,000
8	Chlorilation Equipment		1	nos	500,000	500,000
9	Pump Replacement			nos	10,000,000	
10	Drainage and Sewerage	concrete surfa		m	3,600	
	Total				AMD	57,107,600
					Equivalent to USD	186,919
					Equivalent to JPY	19,719,991
					AMD	USD
	Investment Cost per household		24	HH	2,379,483	7,788
	Investment Cost per person		66	persons	865,267	2,832

SHIRAK MARZ
Gyumri District
No 6 Bashgyugh

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		3.2																																							
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		17.78	0.00	0.00	0.11	0.11	0.11	0.12	0.20	0.21	0.21	0.22	0.33	0.34	0.35	0.36	0.38	0.39	0.40	0.41	0.43	0.44	0.46	0.47	0.49	0.50	0.52	0.54	0.56	0.57	0.59	0.61	0.63	0.65	0.68	0.70	0.72	0.74	0.77	0.79	0.82	0.85
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				20																																				
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		0.89			0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04
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		12.59			0.17	0.18	0.18	0.19	0.19	0.20	0.21	0.21	0.22	0.23	0.24	0.24	0.25	0.26	0.27	0.28	0.29	0.30	0.30	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.40	0.41	0.42	0.44	0.45	0.47	0.48	0.50	0.51	0.53	0.55	0.57
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					0.17	0.18	0.18	0.19	0.19	0.20	0.21	0.21	0.22	0.23	0.24	0.24	0.25	0.26	0.27	0.28	0.29	0.30	0.30	0.32	0.33	0.34	0.35	0.36	0.37	0.38	0.40	0.41	0.42	0.44	0.45	0.47	0.48	0.50	0.51	0.53	0.55	0.57
5. Pump replacement		0.00																0.00															0.00									
Sub-total		31.18	0.00	0.00	0.42	0.44	0.45	0.46	0.47	0.49	0.51	0.53	0.55	0.57	0.59	0.60	0.62	0.65	0.67	0.69	0.71	0.74	0.75	0.78	0.81	0.83	0.86	0.90	0.92	0.95	0.99	1.02	1.05	1.09	1.12	1.16	1.19	1.24	1.27	1.32	1.36	1.41
C Gross Income (A-B)		-13.40	0.00	0.00	-0.31	-0.33	-0.34	-0.34	-0.27	-0.28	-0.30	-0.31	-0.22	-0.23	-0.24	-0.24	-0.24	-0.26	-0.27	-0.28	-0.28	-0.30	-0.29	-0.31	-0.32	-0.33	-0.34	-0.36	-0.36	-0.38	-0.40	-0.41	-0.42	-0.44	-0.44	-0.46	-0.47	-0.50	-0.50	-0.53	-0.54	-0.56
D Depreciation cost		54.25						1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55
E Interest paid		18.43	0.02	0.04	0.72	0.74	0.75	0.76	0.76	0.76	0.76	0.76	0.76	0.74	0.72	0.69	0.67	0.65	0.63	0.60	0.58	0.56	0.53	0.51	0.48	0.46	0.43	0.41	0.38	0.36	0.33	0.31	0.28	0.25	0.23	0.20	0.17	0.14	0.11	0.09	0.06	0.03
F Net Income		-86.08	-0.02	-0.04	-1.03	-1.07	-1.09	-2.65	-2.58	-2.59	-2.61	-2.62	-2.53	-2.52	-2.51	-2.48	-2.46	-2.46	-2.45	-2.43	-2.41	-2.41	-2.37	-2.37	-2.35	-2.34	-2.32	-2.32	-2.29	-2.29	-2.28	-2.27	-2.25	-2.24	-2.22	-2.21	-2.19	-2.19	-2.16	-2.17	-2.15	-2.14
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		-86.08	-0.02	-0.04	-1.03	-1.07	-1.09	-2.65	-2.58	-2.59	-2.61	-2.62	-2.53	-2.52	-2.51	-2.48	-2.46	-2.46	-2.45	-2.43	-2.41	-2.41	-2.37	-2.37	-2.35	-2.34	-2.32	-2.32	-2.29	-2.29	-2.28	-2.27	-2.25	-2.24	-2.22	-2.21	-2.19	-2.19	-2.16	-2.17	-2.15	-2.14
OM Cost Recovery Ratio (A/B)		57%	0%	0%	26%	25%	24%	26%	43%	43%	41%	42%	60%	60%	59%	60%	61%	60%	60%	59%	61%	59%	61%	60%	60%	60%	60%	60%	61%	60%	60%	60%	60%	60%	61%	60%	61%	60%	61%	60%	60%	60%

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	-86.08	-0.02	-0.04	-1.03	-1.07	-1.09	-2.65	-2.58	-2.59	-2.61	-2.62	-2.53	-2.52	-2.51	-2.48	-2.46	-2.46	-2.45	-2.43	-2.41	-2.41	-2.37	-2.37	-2.35	-2.34	-2.32	-2.32	-2.29	-2.29	-2.28	-2.27	-2.25	-2.24	-2.22	-2.21	-2.19	-2.19	-2.16	-2.17	-2.15	-2.14
2. Depreciation cost	54.25	0.00	0.00	0.00	0.00	0.00	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55	1.55
3. Interest Paid	18.43	0.02	0.04	0.72	0.74	0.75	0.76	0.76	0.76	0.76	0.76	0.76	0.74	0.72	0.69	0.67	0.65	0.63	0.60	0.58	0.56	0.53	0.51	0.48	0.46	0.43	0.41	0.38	0.36	0.33	0.31	0.28	0.25	0.23	0.20	0.17	0.14	0.11	0.09	0.06	0.03
Sub-total	-13.40	0.00	0.00	-0.31	-0.33	-0.34	-0.34	-0.27	-0.28	-0.30	-0.31	-0.22	-0.23	-0.24	-0.24	-0.24	-0.26	-0.27	-0.28	-0.28	-0.30	-0.29	-0.31	-0.32	-0.33	-0.34	-0.36	-0.36	-0.38	-0.40	-0.41	-0.42	-0.44	-0.44	-0.46	-0.47	-0.50	-0.50	-0.53	-0.54	-0.56
B Finances																																								
1. Project Loan	76.05	2.36	1.67	68.32	2.09	0.97	0.36	0.28																																	
2. Local fund	25.42	0.79	0.56	23.13	0.70	0.17	0.04	0.03																																	
Sub-total	101.47	3.15	2.23	91.45	2.79	1.14	0.40	0.31																																	
C Subsidy from Government																																								
1. Subsidy for O&M cost	13.40	0.00	0.00	0.31	0.33	0.34	0.34	0.27	0.28	0.30	0.31	0.22	0.23	0.24	0.24	0.24	0.26	0.27	0.28	0.28	0.30	0.29	0.31	0.32	0.33	0.34	0.36	0.36	0.38	0.40	0.41	0.42	0.44	0.44	0.46	0.47	0.50	0.50	0.53	0.54	0.56
2. Subsidy for debt services	94.49	0.02	0.04	0.72	0.74	0.75	0.76	0.76	0.76	0.76	0.76	2.95	2.95	2.95	2.94	2.95	2.95	2.95	2.94	2.95	2.95	2.95	2.95	2.94	2.95	2.94	2.95	2.94	2.95	2.95	2.95	2.95	2.94	2.95	2.95	2.95	2.94	2.94	2.95	2.95	2.95
Sub-total	107.89	0.02	0.04	1.03	1.07	1.09	1.10	1.03	1.04	1.06	1.07	3.17	3.18	3.19	3.18	3.19	3.21	3.22	3.22	3.23	3.25	3.24	3.26	3.26	3.28	3.28	3.31	3.30	3.33	3.35	3.36	3.37	3.38	3.39	3.41	3.42	3.44	3.44	3.48	3.49	3.51
Total Cash Inflow	195.96	3.17	2.27	92.17	3.53	1.89	1.16	1.07	0.76	0.76	0.76	2.95	2.95	2.95	2.94	2.95	2.95	2.95	2.94	2.95	2.95	2.95	2.95	2.94	2.95	2.94	2.95	2.94	2.95	2.95	2.95	2.95	2.94	2.95	2.95	2.95	2.94	2.94	2.95	2.95	2.95
APPLICATION OF FUNDS																																								
D Project disbursement	101.47	3.15	2.23	91.45	2.79	1.14	0.40	0.31																																	
E Total debt services																																								
1. Loan repayment	76.06											2.19	2.21	2.23	2.25	2.28	2.30	2.32	2.34	2.37	2.39	2.42	2.44	2.46	2.49	2.51	2.54	2.56	2.59	2.62	2.64	2.67	2.69	2.72	2.75	2.78	2.80	2.83	2.86	2.89	2.92
2. Interest paid	18.43	0.02	0.04	0.72	0.74	0.75	0.76	0.76	0.76	0.76	0.76	0.76	0.74	0.72	0.69	0.67	0.65	0.63	0.60	0.58	0.56	0.53	0.51	0.48	0.46	0.43	0.41	0.38	0.36	0.33	0.31	0.28	0.25	0.23	0.20	0.17	0.14	0.11	0.09	0.06	0.03
Sub-total	94.49	0.02	0.04	0.72	0.74	0.75	0.76	0.76	0.76	0.76	0.76	2.95	2.95	2.95	2.94	2.95	2.95	2.95	2.94	2.95	2.95	2.95	2.95	2.94	2.95	2.94	2.95	2.94	2.95	2.95	2.95	2.95	2.94	2.95	2.95	2.95	2.94	2.94	2.95	2.95	2.95
Total Cash Outflow	195.96	3.17	2.27	92.17	3.53	1.89	1.16	1.07	0.76	0.76	0.76	2.95	2.95	2.95	2.94	2.95	2.95	2.95	2.94	2.95	2.95	2.95	2.95	2.94	2.95	2.94	2.95	2.94	2.95	2.95	2.95	2.95	2.94	2.95	2.95	2.95	2.94	2.94	2.95	2.95	2.95
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)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
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%

SHIRAK MARZ
Gyumri District
No 6 Bashgyugh

FINANCIAL ANALYSIS

A COST RECOVERY ANALYSIS

	Item	Millon AMD	Rate
1	**Revenue**		
	Water fee revenue	17.78	14.1%
	Subsidy	107.89	85.9%
	Total	125.67	100.0%
2	**Expenditure**		
	OM cost	31.18	24.8%
	Loan repayment	76.06	60.5%
	Interest paid	18.43	14.7%
	Surplus cash	0.00	0.0%
	Total	125.67	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	69.71	2.30	1.64	62.37	1.93	0.88	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	0.38			0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
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	6.46			0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Pump replacement																	0.00															0.00								
Sub-total	15.96			0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42
Total Outflow	85.67	2.30	1.64	62.79	2.35	1.30	0.75	0.68	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42
B BENEFIT																																							
1. Water Tariff	11.19	0.00	0.00	0.11	0.11	0.11	0.12	0.20	0.21	0.21	0.22	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
2. Subsidy	89.46	0.00	0.00	0.31	0.33	0.34	0.34	0.27	0.28	0.30	0.31	2.41	2.44	2.47	2.49	2.52	2.56	2.59	2.62	2.65	2.69	2.71	2.75	2.78	2.82	2.85	2.90	2.92	2.97	3.02	3.05	3.09	3.13	3.16	3.21	3.25	3.30	3.33	3.39	3.43	3.48
Total Inflow	100.65	0.00	0.00	0.42	0.44	0.45	0.46	0.47	0.49	0.51	0.53	2.74	2.77	2.80	2.82	2.85	2.89	2.92	2.95	2.98	3.02	3.04	3.08	3.11	3.15	3.18	3.23	3.25	3.30	3.35	3.38	3.42	3.46	3.49	3.54	3.58	3.63	3.66	3.72	3.76	3.81
NET BENEFIT	14.98	-2.30	-1.64	-62.4	-1.9	-0.9	-0.29	-0.21	0.07	0.09	0.11	2.32	2.35	2.38	2.40	2.43	2.47	2.50	2.53	2.56	2.60	2.62	2.66	2.69	2.73	2.76	2.81	2.83	2.88	2.93	2.96	3.00	3.04	3.07	3.12	3.16	3.21	3.24	3.30	3.34	3.39

FIRR = **0.85%**

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	-18.61	-2.53	-1.80	-68.6	-2.1	-0.9	-0.32	-0.24	0.07	0.09	0.11	2.32	2.35	2.38	2.40	2.43	2.47	2.50	2.53	2.56	2.60	2.62	2.66	2.69	2.73	2.76	2.81	2.83	2.88	2.93	2.96	3.00	3.04	3.07	3.12	3.16	3.21	3.24	3.30	3.34	3.39
	2	Capital cost 20% up	-25.23	-2.76	-1.97	-74.8	-2.3	-1.0	-0.36	-0.26	0.07	0.09	0.11	2.32	2.35	2.38	2.40	2.43	2.47	2.50	2.53	2.56	2.60	2.62	2.66	2.69	2.73	2.76	2.81	2.83	2.88	2.93	2.96	3.00	3.04	3.07	3.12	3.16	3.21	3.24	3.30	3.34	3.39
2	1	OM cost 10% up	-13.11	-2.30	-1.64	-62.4	-2.0	-0.9	-0.33	-0.25	0.03	0.05	0.07	2.28	2.31	2.34	2.36	2.39	2.43	2.46	2.49	2.52	2.56	2.58	2.62	2.65	2.69	2.72	2.77	2.79	2.84	2.89	2.92	2.96	3.00	3.03	3.08	3.12	3.17	3.20	3.26	3.30	3.35
	2	OM cost 20% up	-14.23	-2.30	-1.64	-62.5	-2.0	-0.9	-0.37	-0.29	-0.01	0.01	0.03	2.24	2.27	2.30	2.32	2.35	2.39	2.42	2.45	2.48	2.52	2.54	2.58	2.61	2.65	2.68	2.73	2.75	2.80	2.85	2.88	2.92	2.96	2.99	3.04	3.08	3.13	3.16	3.22	3.26	3.31
3	1	Revenue 10% down	-18.53	-2.30	-1.64	-62.4	-2.0	-0.9	-0.34	-0.26	0.02	0.04	0.06	2.05	2.07	2.10	2.12	2.15	2.18	2.21	2.24	2.26	2.30	2.32	2.35	2.38	2.42	2.44	2.49	2.51	2.55	2.60	2.62	2.66	2.69	2.72	2.77	2.80	2.85	2.87	2.93	2.96	3.01
	2	Revenue 20% down	-25.07	-2.30	-1.64	-62.5	-2.0	-0.9	-0.38	-0.30	-0.03	-0.01	0.00	1.77	1.80	1.82	1.84	1.86	1.89	1.92	1.94	1.96	2.00	2.01	2.04	2.07	2.10	2.12	2.16	2.18	2.22	2.26	2.28	2.32	2.35	2.37	2.41	2.44	2.48	2.51	2.56	2.59	2.63

No.		Description	FIRR	Sensitivity indicator	Swiching value
1	1	Capital cost 10% up	0.43%	9.77	10.24%
	2	Capital cost 20% up	0.05%	150.52	0.66%
2	1	OM cost 10% up	0.76%	1.15	86.85%
	2	OM cost 20% up	0.67%	2.61	38.25%
3	1	Revenue 10% down	0.29%	19.04	5.25%
	2	Revenue 20% down	-0.32%	-36.26	-2.76%

No.7 Garnaritch + Yeghnajur

Information on Existing Water Sources (Shirak)

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

No.7 Community Garnarich+Yeghnajur
District Amasia
Marz Shirak

No	Water source	Latitude			Longitude			Atidute	Yeild(L/sec)		
		deg	min	sec	deg	min	sec	(m)	Min	Max	At site
1	Spring	41	4	47.4	43	33	1.7	2,224	18.0	40.0	22.0
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	
Alternative sources if any	

No.7 Community Garnarich+Yeghnajur
District Amasia
Marz Shirak
Sampling date 16,17/Aug/2007

	Parameters analysed	Units	No.1				Guidelines	
							WHO	Armenia
a	pH		7.3				6.5-8	6.0 - 9.0
b	Temperature	Deg.C	8.9					
c	TDS	Mg/L	36				1000	1000
1	Al:Aluminum	Mg/L	0.01				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	0.27				1.50	
7	Hardness	Mg/L	90				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	n.d				0.070	0.250
11	Ni:Nickel	Mg/L	n.d				0.020	0.100
12	Nitrate(NO3+)	Mg/L	1.8				50.0	45.0
13	SO4:Sulfate	Mg/L	3.0				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	0.00011				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					-	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.7 Community Garnarich+Yeghnajur
District Amasia
Marz Shirak

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	02	03	60-62,0,0,0	Not Identified	Not Identified
2	05	23	52-58,0,0,0	0,4,0,0,0	Not Identified
3	06	10	52-60 0,0,0	0,4,0,0,0	Not Identified
4	07	11	-	Not Identified	Not Identified
5	08	02	0,60,60,60	0;0,4;0,4;0,4	Not Identified

No. 7-1 **Marz** Shirak **Community** Garnaritch

1. ACCESSIBILITY TO THE SITE

No.	Structures	Access by vehicle	Machine construction	Remarks
1	Intake	Possible	Difficult	
2	Transmission pipeline	Possible	Possible	Pipeline is mostly far from 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	Spring	41°04′47,4″	43°33′01,7″	2,224	1989	Concrete	22.0	Yes

3. TRANSMISSION PIPELINE

No.	Pipeline length (m)	Pipe diameter	Material	Flow rate (l/s)	Year	Leakage	Rehabilitation Necessity (Y/N)
1	4,000	220	Ductile Iron	9.0	1989	Little	Yes

4. RESERVOIR

No.	N	E	El. (m)	Material	Shape	Dimension (m)	Volume (m3)	Rehabilitation Necessity (Y/N)
1	41°04′37,5″	43°35′00,3″	2,106	Steel	Circle	3×d=1m, l=20m	48	Yes

5. CHLORINATION EQUIPMENT

No.	Existence (Y/N)	Location	Chlorine type	Chlorine duration
1	Yes	Reservoir	Powder	once per year

6. DISTRIBUTION PIPELINE

No.	Pipeline length (m)	Pipe diameter	Material	Year	Leakage	Rehabilitation Necessity (Y/N)
1	7000	100	Polyethylene	1989	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)
0				0	

9. DRAINAGE SYSTEM

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

No. 7-2 **Marz** Shirak **Community** Yeghnajur

1. ACCESSIBILITY TO THE SITE

No.	Structures	Access by vehicle	Machine construction	Remarks
1	Intake	Possible	Possible	
2	Transmission pipeline	Possible	Possible	Pipeline is mostly far from 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	Spring	41°04′47,4″	43°33′01,7″	2,224	1989	Concrete	22.0	Yes

3. TRANSMISSION PIPELINE

No.	Pipeline length (m)	Pipe diameter	Material	Flow rate (l/s)	Year	Leakage	Rehabilitation Necessity (Y/N)
1	3,000	100	Steel	11.0	1989	Little	Yes

4. RESERVOIR

No.	N	E	El. (m)	Material	Shape	Dimension (m)	Volume (m3)	Rehabilitation Necessity (Y/N)
1	41°05′37,5″	43°33′53,4″	2,187	Concrete	Rectangular	6×6×4	120	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	1,000	100	Polyethylene	1989	Little	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		1989	No	0	No

9. DRAINAGE SYSTEM

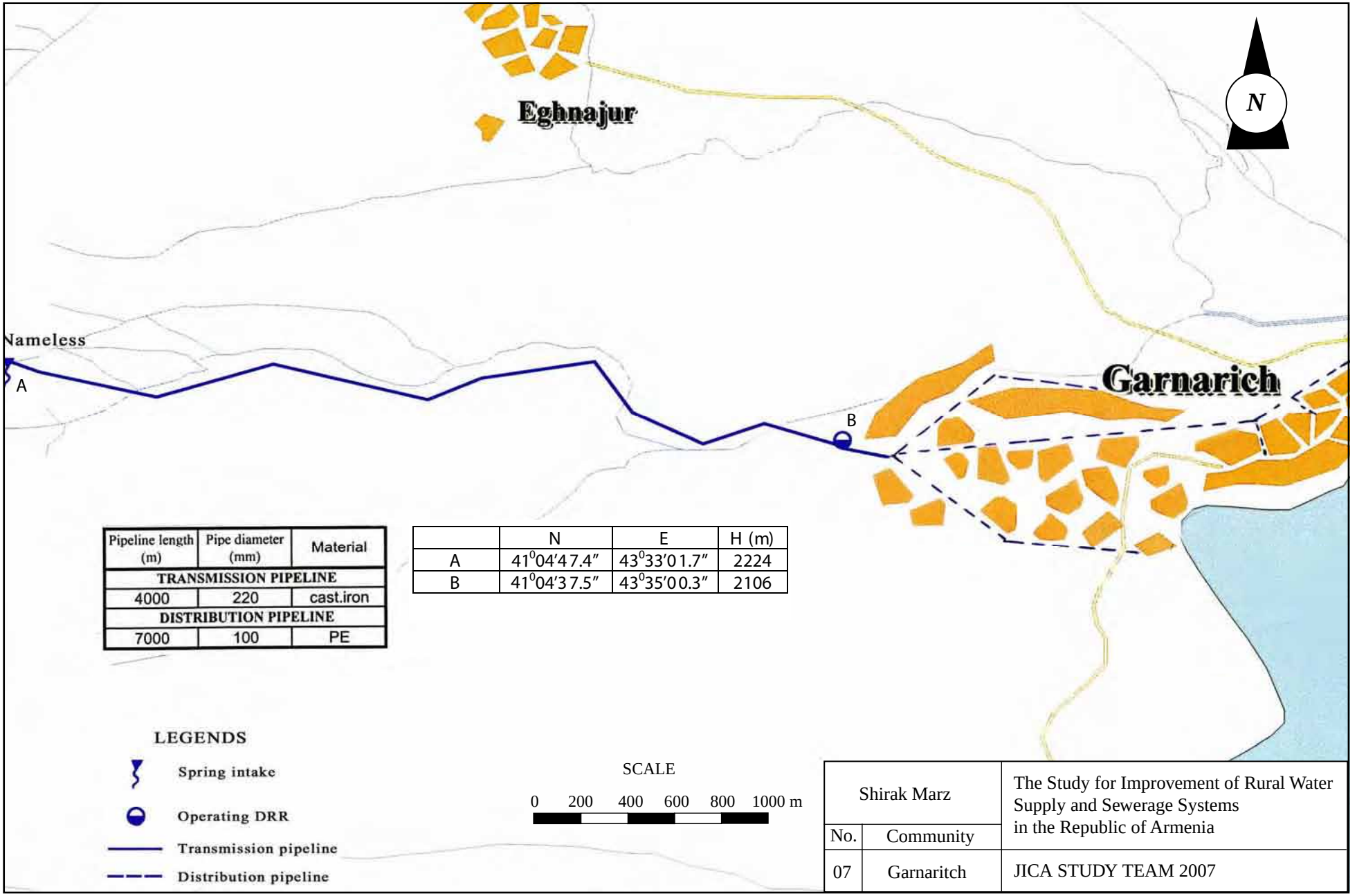
Existence (Y/N)	Rehabilitation Necessity (Y/N)	Remarks
No	Yes	

Questionnaire on Existing Water Supply Conditions by Socio-Economic Survey

Marz	**Shirak**
Number and Name of Community	**No.7 Garnarich+Yeghnajur**
District	**Amasia**

No.	Question	Answer
A: Baseline Data		
A1	Actual population in 2001	246
A2	Actual population in 2007	288
A3	Number of households	54
A4.1	Elderly people	28
A4.2	Population in labor force (age from 16 to 62)	141
A4.3	Children	110
A5.1	Pensioners	5
A5.2	Unemployed	4
A5.3	Receiving benefits	4
A6	Average monthly income of household (AMD)	200,000
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	66
B: Budget		
B1	Annual Budget of the community 2004, in thousand AMD	1,200
	Annual Budget of the community 2005, in thousand AMD	1,300
	Annual Budget of the community 2006, in thousand AMD	1,500
	Annual Budget of the community 2007, in thousand AMD	2,150
	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, potatoes
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	yes
D2	Water use permit number	1025
D3	Date of expiry of water use permit	13.02.06-13.02.09
D4	Planned date of obtaining water use permit	-
D5	Present condition of the water supply volume of Domestic use	sufficient
D6	Present condition of the water supply volume of Irrigation water	absent
D7	Number of house connection to drinking water system	40
D8	How many house connection household set the water meter	0
D9	Number of public taps	0
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?	fully pleased
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)	60
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	160
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?	absent
D20	Are you satisfied with irrigation water supply volume?	insufficient
E: Present Operation and Maintenance Works		
E1	Name of responsible for water supply	nobody
E2	Position	-
E3	Telephone	-
E4	Quantity and present condition of the water supply facilities: spring/ intake	4-deteriorated
E5	Quantity and present condition of the water supply facilities:	2-partially repaired
E6	Quantity and present condition of the water supply facilities: DRR(Daily Regulatory Reservoir)	2-deteriorated
E7	Quantity and present condition of the water supply facilities: net/distribution	partially repaired
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?	residents
E12	How do you repair the water supply facilities?	by ourselves
E13	Who is in charge of the repair work in the community?	volunteers from the
E14	How you prepare O&M costs?	no collection
E15	Please indicate the O&M cost breakdown per year for water supply	
	Electricity (AMD)	0
	Labor cost (AMD)	0
	Repair cost(AMD)	0
	Others(AMD)	0
	Total (AMD)	0
E16	Do the residents participate in the O&M works?	earthwork
E17	What kind of OM method is preferable to you?	residents 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.	yes
F1.2	Virgin forests, tropical forests	yes
F1.3	Ecological improvement habits areas (coral reef, mangrove wetland, tidal	yes
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	yes
F1.6	Remarkable desertification trend areas	absent
F1.7	Archaeological historical or cultural valuable areas	not identified
F1.8	Living areas of ethic, indigenous people or nomads who have a traditional lifestyle or special socially valuable areas	absent

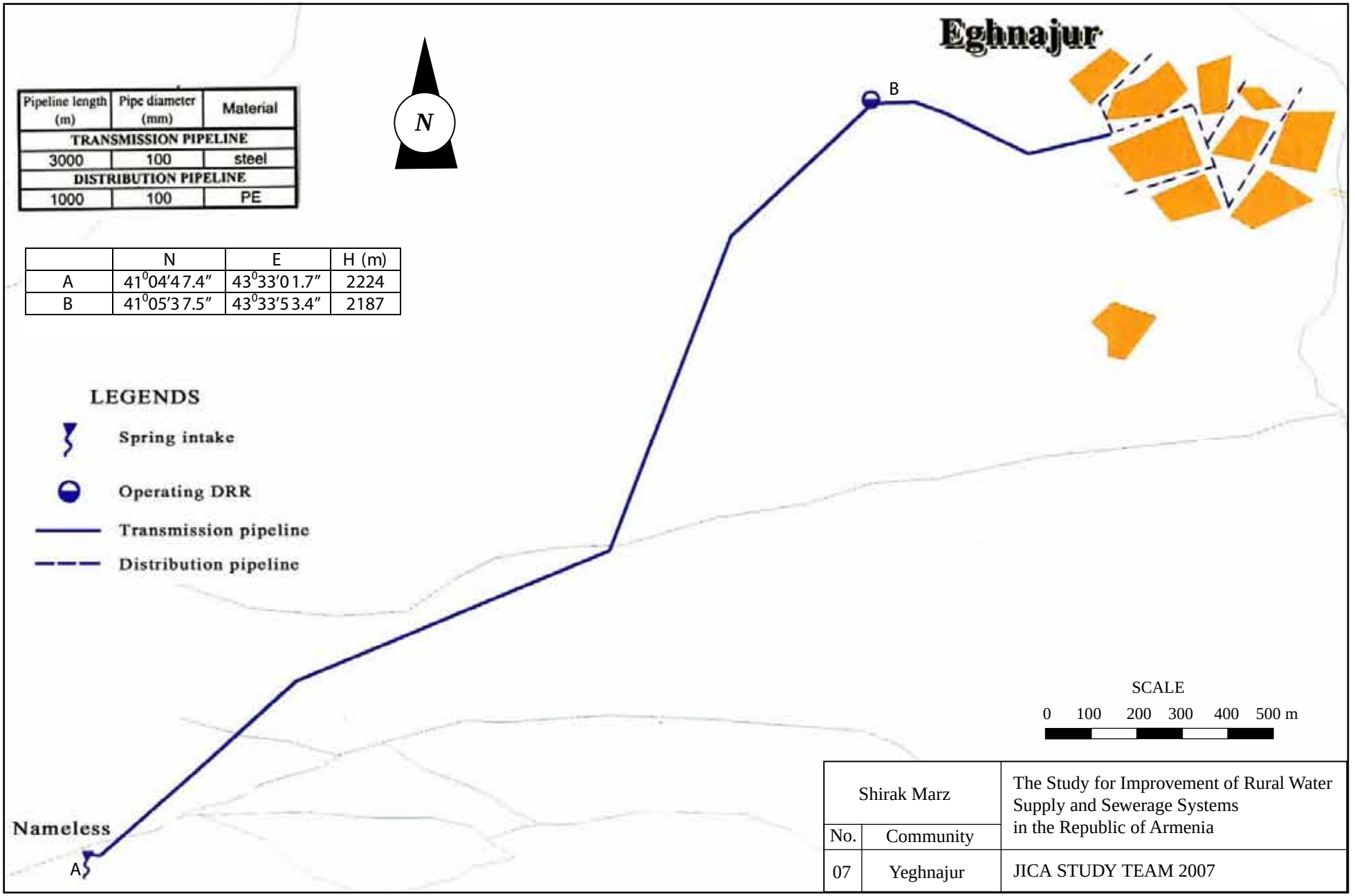
Shirak
No.7 Garnarich+Yeghnajur



Pipeline length (m)	Pipe diameter (mm)	Material
TRANSMISSION PIPELINE		
4000	220	cast.iron
DISTRIBUTION PIPELINE		
7000	100	PE

	N	E	H (m)
A	41°04'47.4"	43°33'01.7"	2224
B	41°04'37.5"	43°35'00.3"	2106

Shirak Marz		The Study for Improvement of Rural Water Supply and Sewerage Systems in the Republic of Armenia
No.	Community	
07	Garnaritch	JICA STUDY TEAM 2007


Eghnajur
B
A
Nameless
N
Pipeline length (m) | Pipe diameter (mm) | Material
TRANSMISSION PIPELINE
3000 | 100 | steel
DISTRIBUTION PIPELINE
1000 | 100 | PE
N | E | H (m)
A | 41°04'47.4" | 43°33'01.7" | 2224
B | 41°05'37.5" | 43°33'53.4" | 2187
LEGENDS
Spring intake
Operating DRR
Transmission pipeline
Distribution pipeline
SCALE
0 100 200 300 400 500 m
Shirak Marz
No. | Community
07 | Yeghnajur
The Study for Improvement of Rural Water Supply and Sewerage Systems in the Republic of Armenia
JICA STUDY TEAM 2007

Marz : **Shirak** No.7
Name : **Garnaritch+Yeghnajur**

No.	Item	Quantity	Unit	Water demand (m3/d)	
A.	**WATER DEMAND**				
	1 Population	288	persons	28.8	
	2 Factory	-	nos	0.0	
	3 School (pupils)	66	pupils	0.7	
	4 Medical Ambulance Station	-	nos	-	
	5 Policlinic	-	nos	-	
	7 Livestocks (87lit/household)	54	household	4.7	
	Sub-total			34.2	
	Unaccouted for water (20%)			6.8	
1	Average Daily Water Demand			41.0	m3/day
2	Maximum Daily Water Demand			49.2	m3/day
3	Maximum Hourly Water Demand			10.7	m3/hr

B	**WATER SUPPLY PLAN**						
	1 Water source type	Nr.	Total vol.				
	a Spring	1	22.0	lit/sec		1900.8	m3/day
`	Total					1900.8	m3/day
	2 Required reservoir volume					128	m3

C	**WATER SUPPLY FACILITIES REHABILITATION PLAN**		
	No Item	Quantity	Unit
	1 Intake		
	1m3		nos
	2m3	1	nos
	3m3		nos
	4m3		nos
	2 Transmission pipe		
	50mm diameter		m
	75mm diameter		m
	90mm diameter		m
	110mm diameter	5,500	m
	150mm diameter		m
	200mm diameter		m
	250mm diameter		m
	3 Reservoir		
	50m3 capacity	1	nos
	100m3 capacity	1	nos
	4 Distribution pipe		
	50mm diameter		m
	75mm diameter		m
	90mm diameter		m
	110mm diameter	8,000	m
	150mm diameter		m
	200mm diameter		m
	250mm diameter		m
	5 House connection	14	nos
	6 Water meter installation	54	nos
	7 Public tap	1	nos
	8 Chlorination	2	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	Shirak	
No. 07	Garnaritch+Yeghnajur	JICA STUDY TEAM

Marz : **Shirak**
No. : **7**
Name : **Garnaritch+Yeghnajur**

No	Item	Specification	Quantity	Unit	Unit Price	Total
1	Intake					
		1m3		nos	367,700	
		2m3	1	nos	545,000	545,000
		3m3		nos	669,100	
		4m3		nos	805,100	
	Sub-total					545,000
2	Transmission Pipe					
		50mm		m	5,520	
		75mm		m	7,160	
		90mm		m	8,040	
		110mm	5,500	m	9,680	53,240,000
		150mm		m	13,140	
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					53,240,000
3	Reservoir					
		50m3	1	nos	8,363,900	8,363,900
		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					21,332,200
4	Distribution Pipe					
		50mm		m	5,520	
		75mm		m	7,160	
		90mm		m	8,040	
		110mm	8,000	m	9,680	77,440,000
		150mm		m	13,140	
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					77,440,000
5	House Connection		14	nos	74,000	1,036,000
6	Water Meter Installation		54	nos	80,000	4,320,000
7	Public Tap		1	nos	90,000	90,000
8	Chlorilation Equipment		2	nos	500,000	1,000,000
9	Pump Replacement			nos	10,000,000	
10	Drainage and Sewerage	concrete surfa	3,200	m	3,600	11,520,000
	Total				AMD	170,523,200
					Equivalent to USD	558,141
					Equivalent to JPY	58,883,862
					AMD	USD
	Investment Cost per household		54	HH	3,157,837	10,336
	Investment Cost per person		288	persons	592,094	1,938

SHIRAK MARZ
Amasia District
No 7 Garnaritch + Yeghnajur

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		12.5																																							
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		69.57	0.00	0.00	0.00	0.45	0.45	0.46	0.79	0.81	0.84	0.87	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	2.05	2.11	2.18	2.26	2.33	2.41	2.49	2.57	2.65	2.74	2.83	2.93	3.02	3.12	3.22	3.33
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				75																																				
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		3.27			0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.11	0.11	0.12	0.12	0.12	0.13	0.13	0.14	0.14	0.14	0.15
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		38.55			0.00	0.55	0.57	0.58	0.60	0.62	0.64	0.67	0.69	0.71	0.73	0.76	0.78	0.81	0.83	0.86	0.89	0.92	0.95	0.98	1.01	1.05	1.08	1.12	1.16	1.19	1.23	1.27	1.32	1.36	1.40	1.45	1.50	1.55	1.60	1.65	1.71	1.76
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	0.55	0.57	0.58	0.60	0.62	0.64	0.67	0.69	0.71	0.73	0.76	0.78	0.81	0.83	0.86	0.89	0.92	0.95	0.98	1.01	1.05	1.08	1.12	1.16	1.19	1.23	1.27	1.32	1.36	1.40	1.45	1.50	1.55	1.60	1.65	1.71	1.76
5. Pump replacement		0.00																0.00															0.00										
Sub-total		59.52	0.00	0.00	0.24	0.85	0.88	0.89	0.92	0.95	0.98	1.03	1.06	1.09	1.12	1.16	1.20	1.25	1.28	1.32	1.37	1.42	1.46	1.50	1.56	1.61	1.66	1.72	1.78	1.83	1.89	1.96	2.03	2.10	2.16	2.23	2.31	2.38	2.46	2.54	2.62	2.71
C Gross Income (A-B)		10.05	0.00	0.00	-0.24	-0.40	-0.43	-0.43	-0.13	-0.14	-0.14	-0.16	0.24	0.25	0.27	0.27	0.28	0.28	0.30	0.31	0.31	0.32	0.34	0.36	0.36	0.37	0.39	0.39	0.40	0.43	0.44	0.45	0.46	0.47	0.49	0.51	0.52	0.55	0.56	0.58	0.60	0.62
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		49.86	0.02	0.04	0.06	2.12	2.13	2.14	2.14	2.14	2.14	2.14	2.14	2.08	2.02	1.96	1.89	1.83	1.76	1.70	1.63	1.57	1.50	1.43	1.36	1.29	1.22	1.15	1.08	1.01	0.93	0.86	0.79	0.71	0.64	0.56	0.48	0.40	0.32	0.24	0.16	0.08
F Net Income		-201.86	-0.02	-0.04	-0.30	-2.52	-2.56	-7.20	-6.90	-6.91	-6.91	-6.93	-6.53	-6.46	-6.38	-6.32	-6.24	-6.18	-6.09	-6.02	-5.95	-5.88	-5.79	-5.70	-5.63	-5.55	-5.46	-5.39	-5.31	-5.21	-5.12	-5.04	-4.96	-4.87	-4.78	-4.68	-4.59	-4.48	-4.39	-4.29	-4.19	-4.09
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		-201.86	-0.02	-0.04	-0.30	-2.52	-2.56	-7.20	-6.90	-6.91	-6.91	-6.93	-6.53	-6.46	-6.38	-6.32	-6.24	-6.18	-6.09	-6.02	-5.95	-5.88	-5.79	-5.70	-5.63	-5.55	-5.46	-5.39	-5.31	-5.21	-5.12	-5.04	-4.96	-4.87	-4.78	-4.68	-4.59	-4.48	-4.39	-4.29	-4.19	-4.09
OM Cost Recovery Ratio (A/B)		117%	0%	0%	0%	53%	51%	52%	86%	85%	86%	84%	123%	123%	124%	123%	123%	122%	123%	123%	123%	123%	123%	124%	123%	123%	123%	123%	122%	123%	123%	123%	123%	122%	123%	123%	123%	123%	123%	123%	123%	123%

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	-201.86	-0.02	-0.04	-0.30	-2.52	-2.56	-7.20	-6.90	-6.91	-6.91	-6.93	-6.53	-6.46	-6.38	-6.32	-6.24	-6.18	-6.09	-6.02	-5.95	-5.88	-5.79	-5.70	-5.63	-5.55	-5.46	-5.39	-5.31	-5.21	-5.12	-5.04	-4.96	-4.87	-4.78	-4.68	-4.59	-4.48	-4.39	-4.29	-4.19	-4.09
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	49.86	0.02	0.04	0.06	2.12	2.13	2.14	2.14	2.14	2.14	2.14	2.14	2.08	2.02	1.96	1.89	1.83	1.76	1.70	1.63	1.57	1.50	1.43	1.36	1.29	1.22	1.15	1.08	1.01	0.93	0.86	0.79	0.71	0.64	0.56	0.48	0.40	0.32	0.24	0.16	0.08
Sub-total	10.05	0.00	0.00	-0.24	-0.40	-0.43	-0.43	-0.13	-0.14	-0.14	-0.16	0.24	0.25	0.27	0.27	0.28	0.28	0.30	0.31	0.31	0.32	0.34	0.36	0.36	0.37	0.39	0.39	0.40	0.43	0.44	0.45	0.46	0.47	0.49	0.51	0.52	0.55	0.56	0.58	0.60	0.62
B Finances																																									
1. Project Loan	214.19	2.36	1.67	2.24	206.31	0.97	0.36	0.28																																	
2. Local fund	73.18	0.79	0.56	0.74	70.85	0.17	0.04	0.03																																	
Sub-total	287.37	3.15	2.23	2.98	277.16	1.14	0.40	0.31																																	
C Subsidy from Government																																									
1. Subsidy for O&M cost	2.07	0.00	0.00	0.24	0.40	0.43	0.43	0.13	0.14	0.14	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	251.95	0.02	0.04	0.06	2.12	2.13	2.14	2.14	2.14	2.14	2.14	8.06	8.05	8.03	8.03	8.03	8.02	8.02	8.00	7.99	7.99	7.98	7.96	7.94	7.94	7.93	7.91	7.91	7.90	7.87	7.86	7.85	7.84	7.83	7.81	7.79	7.78	7.75	7.74	7.72	7.70	7.68
Sub-total	254.02	0.02	0.04	0.30	2.52	2.56	2.57	2.27	2.28	2.28	2.30	8.06	8.05	8.03	8.03	8.02	8.02	8.02	8.00	7.99	7.99	7.98	7.96	7.94	7.94	7.93	7.91	7.91	7.90	7.87	7.86	7.85	7.84	7.83	7.81	7.79	7.78	7.75	7.74	7.72	7.70	7.68
Total Cash Inflow	551.44	3.17	2.27	3.04	279.28	3.27	2.54	2.45	2.14	2.14	2.14	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30
APPLICATION OF FUNDS																																								
D Project disbursement	287.37	3.15	2.23	2.98	277.16	1.14	0.40	0.31																																	
E Total debt services																																								
1. Loan repayment	214.21											6.16	6.22	6.28	6.34	6.41	6.47	6.54	6.60	6.67	6.73	6.80	6.87	6.94	7.01	7.08	7.15	7.22	7.29	7.37	7.44	7.51	7.59	7.66	7.74	7.82	7.90	7.98	8.06	8.14	8.22
2. Interest paid	49.86	0.02	0.04	0.06	2.12	2.13	2.14	2.14	2.14	2.14	2.14	2.14	2.08	2.02	1.96	1.89	1.83	1.76	1.70	1.63	1.57	1.50	1.43	1.36	1.29	1.22	1.15	1.08	1.01	0.93	0.86	0.79	0.71	0.64	0.56	0.48	0.40	0.32	0.24	0.16	0.08
Sub-total	264.07	0.02	0.04	0.06	2.12	2.13	2.14	2.14	2.14	2.14	2.14	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30
Total Cash Outflow	551.44	3.17	2.27	3.04	279.28	3.27	2.54	2.45	2.14	2.14	2.14	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30	8.30
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)	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	3%	3%	3%	3%	3%	4%	4%	4%	4%	4%	4%	4%	4%	5%	5%	5%	5%	5%	5%	6%	6%	6%	6%	6%	7%	7%	7%	7%	7%
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%

SHIRAK MARZ
Amasia District
No 7 Garnaritch + Yeghnajur

FINANCIAL ANALYSIS

A COST RECOVERY ANALYSIS

	Item	Millon AMD	Rate
1	**Revenue**		
	Water fee revenue	69.57	21.5%
	Subsidy	254.02	78.5%
	Total	323.59	100.0%
2	**Expenditure**		
	OM cost	59.52	18.4%
	Loan repayment	214.21	66.2%
	Interest paid	49.86	15.4%
	Surplus cash	0.00	0.0%
	Total	323.59	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	189.97	2.30	1.64	2.11	182.45	0.88	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	1.85			0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
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	19.61			0.00	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
Pump replacement																	0.00															0.00								
Sub-total	30.58			0.24	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Total Outflow	220.55	2.30	1.64	2.35	183.27	1.70	1.15	1.08	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
B BENEFIT																																							
1. Water Tariff	43.67	0.00	0.00	0.00	0.45	0.45	0.46	0.79	0.81	0.84	0.87	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
2. Subsidy	204.16	0.00	0.00	0.24	0.40	0.43	0.43	0.13	0.14	0.14	0.16	5.92	5.97	6.01	6.07	6.13	6.19	6.24	6.29	6.36	6.41	6.46	6.51	6.58	6.64	6.69	6.76	6.82	6.86	6.93	6.99	7.05	7.12	7.17	7.23	7.30	7.35	7.42	7.48	7.54	7.60
Total Inflow	247.83	0.00	0.00	0.24	0.85	0.88	0.89	0.92	0.95	0.98	1.03	7.22	7.27	7.31	7.37	7.43	7.49	7.54	7.59	7.66	7.71	7.76	7.81	7.88	7.94	7.99	8.06	8.12	8.16	8.23	8.29	8.35	8.42	8.47	8.53	8.60	8.65	8.72	8.78	8.84	8.90
NET BENEFIT	27.28	-2.30	-1.64	-2.1	-182.4	-0.8	-0.26	-0.16	0.13	0.16	0.21	6.40	6.45	6.49	6.55	6.61	6.67	6.72	6.77	6.84	6.89	6.94	6.99	7.06	7.12	7.17	7.24	7.30	7.34	7.41	7.47	7.53	7.60	7.65	7.71	7.78	7.83	7.90	7.96	8.02	8.08
FIRR =	**0.62%**																																								

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	-55.28	-2.53	-1.80	-2.3	-200.7	-0.9	-0.29	-0.19	0.13	0.16	0.21	6.40	6.45	6.49	6.55	6.61	6.67	6.72	6.77	6.84	6.89	6.94	6.99	7.06	7.12	7.17	7.24	7.30	7.34	7.41	7.47	7.53	7.60	7.65	7.71	7.78	7.83	7.90	7.96	8.02	8.08
	2	Capital cost 20% up	-73.02	-2.76	-1.97	-2.5	-218.9	-1.0	-0.33	-0.21	0.13	0.16	0.21	6.40	6.45	6.49	6.55	6.61	6.67	6.72	6.77	6.84	6.89	6.94	6.99	7.06	7.12	7.17	7.24	7.30	7.34	7.41	7.47	7.53	7.60	7.65	7.71	7.78	7.83	7.90	7.96	8.02	8.08
2	1	OM cost 10% up	-39.67	-2.30	-1.64	-2.1	-182.5	-0.9	-0.34	-0.24	0.05	0.08	0.13	6.32	6.37	6.41	6.47	6.53	6.59	6.64	6.69	6.76	6.81	6.86	6.91	6.98	7.04	7.09	7.16	7.22	7.26	7.33	7.39	7.45	7.52	7.57	7.63	7.70	7.75	7.82	7.88	7.94	8.00
	2	OM cost 20% up	-41.80	-2.30	-1.64	-2.2	-182.6	-1.0	-0.42	-0.32	-0.03	0.00	0.05	6.24	6.29	6.33	6.39	6.45	6.51	6.56	6.61	6.68	6.73	6.78	6.83	6.90	6.96	7.01	7.08	7.14	7.18	7.25	7.31	7.37	7.44	7.49	7.55	7.62	7.67	7.74	7.80	7.86	7.92
3	1	Revenue 10% down	-53.66	-2.30	-1.64	-2.1	-182.5	-0.9	-0.35	-0.25	0.03	0.06	0.11	5.68	5.72	5.76	5.81	5.87	5.92	5.97	6.01	6.07	6.12	6.16	6.21	6.27	6.33	6.37	6.43	6.49	6.52	6.59	6.64	6.70	6.76	6.80	6.86	6.92	6.97	7.03	7.08	7.14	7.19
	2	Revenue 20% down	-69.77	-2.30	-1.64	-2.2	-182.6	-1.0	-0.44	-0.34	-0.06	-0.04	0.00	4.96	5.00	5.03	5.08	5.12	5.17	5.21	5.25	5.31	5.35	5.39	5.43	5.48	5.53	5.57	5.63	5.68	5.71	5.76	5.81	5.86	5.92	5.96	6.00	6.06	6.10	6.16	6.20	6.25	6.30

No.		Description	FIRR	Sensitivity indicator	Swiching value
1	1	Capital cost 10% up	0.18%	24.86	4.02%
	2	Capital cost 20% up	-0.22%	-38.39	-2.60%
2	1	OM cost 10% up	0.55%	1.23	81.32%
	2	OM cost 20% up	0.48%	2.81	35.53%
3	1	Revenue 10% down	0.06%	94.34	1.06%
	2	Revenue 20% down	-0.55%	-21.11	-4.74%