

No.14 Kamo

Information on Existing Water Sources (Shirak)

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

No.14 Community Kamo
District Akhurian
Marz Shirak

No.14 Community Kamo
District Akhurian
Marz Shirak
Sampling date 26/Jul/2007

No	Water source	Latitude			Longitude			Atitude (m)	Yeild(L/sec)		
		deg	min	sec	deg	min	sec		Min	Max	At site
1	spring	40	49	3.2	43	59	3.5	1,848	3.0	6.5	1.0
2	spring	40	48	49.0	43	59	6.9	1,865			1.3
3	spring	40	48	48.2	43	58	57.5	1,855			2.0
4	spring	40	49	3.3	43	59	0.5	1,845			1.5
5	spring	40	49	19.8	43	58	35.9	1,834			1.0
6											
7											
8											
9											
10											
<i>Notes:</i>											
<i>Latitude, Longitude, Atitude:</i>		<i>Measured at site</i>									
<i>Yield (Min, Max):</i>		<i>Interviewed to the Community</i>									
<i>Yield (at site):</i>		<i>Measured / estimated at site in summer of 2007</i>									

Users Acceptnce for water quality	Acceptable
Notes	2 of the spring intakes were repaired in 2002, losses in water supply system are 10%
Alternative sources if any	

	Parameters analysed	Units	No.1	Guidelines	
				WHO	Armenia
<i>a</i>	pH		8	6.5-8	6.0 - 9.0
<i>b</i>	Temperature	Deg.C	12.8		
<i>c</i>	TDS	Mg/L	82	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	n.d	0.05	0.05
5	Cu:Copper	Mg/L	n.d	2	1
6	F:Fluoride	Mg/L	0.21	1.50	
7	Hardness	Mg/L	150	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	<0.02	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	4.0	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	0.00005	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	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

No. 14 Marz Shirak Community Kamo**1. ACCESSIBILITY TO THE SITE**

No.	Structures	Access by vehicle	Machine construction	Remarks
1	Intake	Difficult	Difficult	
	Intake	impossible	impossible	Impossible to find the intakes
	Intake	impossible	impossible	
	Intake	Difficult	Difficult	
	Intake	Difficult	Difficult	
2	Transmission pipeline	Difficult	Difficult	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°49'03,2"	43°59'03,5"	1,848	2002	Concrete	1	No
2	Spring	40°48'49,0"	43°59'06,9"	1,865	2002	Concrete	1.3	No
3	Spring	40°48'48,2"	43°58'57,5"	1,855	2003	Concrete	2	No
4	Spring	40°49'03,3"	43°59'00,5"	1,845	1965	Concrete	1.5	Yes
5	Spring	40°49'19,8"	43°58'35,9"	1,834	1967	Concrete	1	Yes

3. TRANSMISSION PIPELINE

No.	Pipeline length (m)	Pipe diameter	Material	Flow rate (l/s)	Year	Leakage	Rehabilitation Necessity (Y/N)
1	600	150	Steel		1964	no	No
2	4,000	100	Steel		2002	no	No

4. RESERVOIR

No.	N	E	El. (m)	Material	Shape	Dimension (m)	Volume (m3)	Rehabilitation Necessity (Y/N)
1	40°49'24,3"	43°57'29"	1,728	Concrete	Rectangular	22×6×3	220	Yes

5. CHLORINATION

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

6. DISTRIBUTION PIPELINE

No.	Pipeline length (m)	Pipe diameter	Material	Year	Leakage	Rehabilitation Necessity (Y/N)
1	3,000	100	Steel	1964	Medium	Yes
2	1,500	50	Steel		Little	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)
4	1964		No	0	Yes

9. DRAINAGE SYSTEM

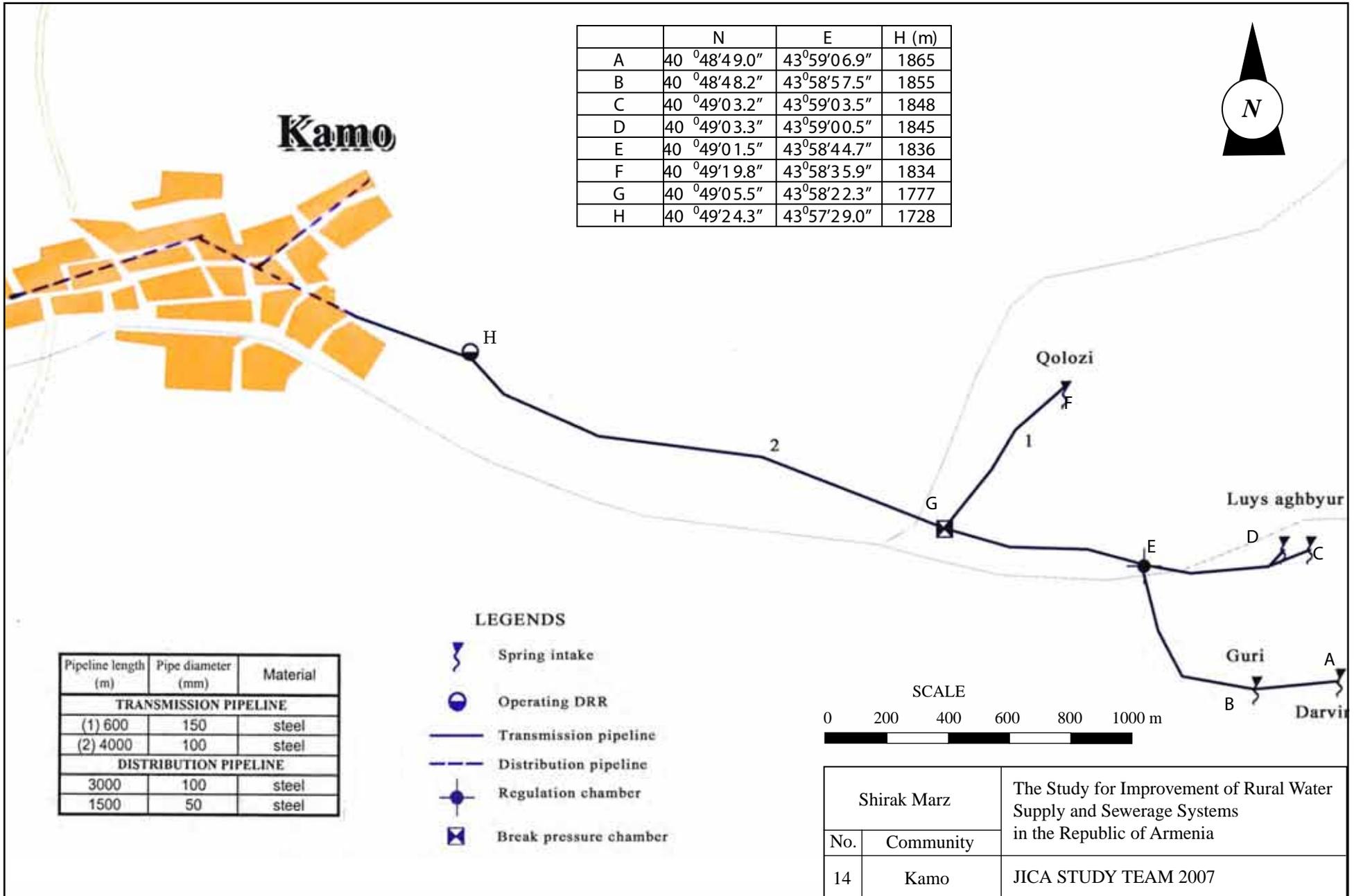
Existence (Y/N)	Rehabilitation Necessity (Y/N)	Remarks
Yes	Yes	No operating

Questionnaire on Existing Water Supply Conditions by Socio-Economic Survey

Marz	Shirak
Number and Name of Community	No.14 Kamo
District	Akhurian

No.	Question	Answer
A: Baseline Data		
A1	Actual population in 2001	1,460
A2	Actual population in 2007	1,563
A3	Number of households	400
A4.1	Elderly people	166
A4.2	Population in labor force (age from 16 to 62)	989
A4.3	Children	397
A5.1	Pensioners	190
A5.2	Unemployed	0
A5.3	Receiving benefits	59
A6	Average monthly income of household (AMD)	35,000-40,000
A7	Number of medical ambulance station/first and health post	absent
A8	Number of beds in each medical ambulance station	0
A9	Number of school	1
A10	Number of pupils	300
B: Budget		
B1	Annual Budget of the community 2004, in thousand AMD	0
	Annual Budget of the community 2005, in thousand AMD	2,800
	Annual Budget of the community 2006, in thousand AMD	3,000
	Annual Budget of the community 2007, in thousand AMD	2,700
	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	1,500
	Amount spent in drinking water sector 2008, in thousand AMD	is not planned
C: Socio-Economic Survey		
C1	Major industries of the community:	livestock, vegetables, cereals
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	1024
D3	Date of expiry of water use permit	till 13.02.09
D4	Planned date of obtaining water use permit	-
D5	Present condition of the water supply volume of Domestic use	insufficient
D6	Present condition of the water supply volume of Irrigation water	almost sufficient
D7	Number of house connection to drinking water system	150
D8	How many house connection household set the water meter	0
D9	Number of public taps	10
D10.1	How is the regime of water supply in your community in the dry season?	regularly-16hrs
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?	6.00-22.00
D12	Are you pleased with duration of domestic water supply?	mainly displeased
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 household a day?	-
D14.2	Estimate quantity of domestic water use of each household (litter per day)	800

No.	Question	Answer
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	800
D16	Drinking water monthly water fee per household	250AMD HH/ month
D17	How often do you usually pay water fees?	monthly
D18	Water fee structure 1Flat rate, 2 Having water tariff	flat rate
D19	Where do you acquire the irrigation water?	by spring
D20	Are you satisfied with irrigation water supply volume?	mainly sufficient
E: Present Operation and Maintenance Works		
E1	Name of responsible for water supply	Drmeyan Samvel
E2	Position	administration head
E3	Telephone	(094) 830211
E4	Quantity and present condition of the water supply facilities: spring/ intake	5-rehabilitated
E5	Quantity and present condition of the water supply facilities:	1-partially repaired
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	rehabilitated
E9	Quantity and present condition of the water supply facilities: pump	absent
E10	Who is the owner of the water supply facilities?	community
E11	Who is engaged in the water supply facilities repairing works?	central pipelines - community, own pipelines- the owners
E12	How do you repair the water supply facilities?	by ourselves
E13	Who is in charge of the repair work in the community?	hired specialist from
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)	480,000
	Repair cost(AMD)	1,000,000
	Others(AMD)	150,000
	Total (AMD)	1,630,000
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
	Virgin forests, tropical forests	absent
F1.2	Ecological improvement habitats areas (coral reef, mangrove wetland, tidal	absent
F1.3	Habit of valuable species protected by domestic laws or international treaties	absent
F1.4	Likely salts cumulus or soil erosion areas on a massive scale	absent
F1.5	Remarkable desertification trend areas	absent
F1.6	Archaeological historical or cultural valuable areas	absent
F1.7	Living areas of ethnic, indigenous people or nomads who have a traditional lifestyle or special socially valuable areas	absent
F1.8		

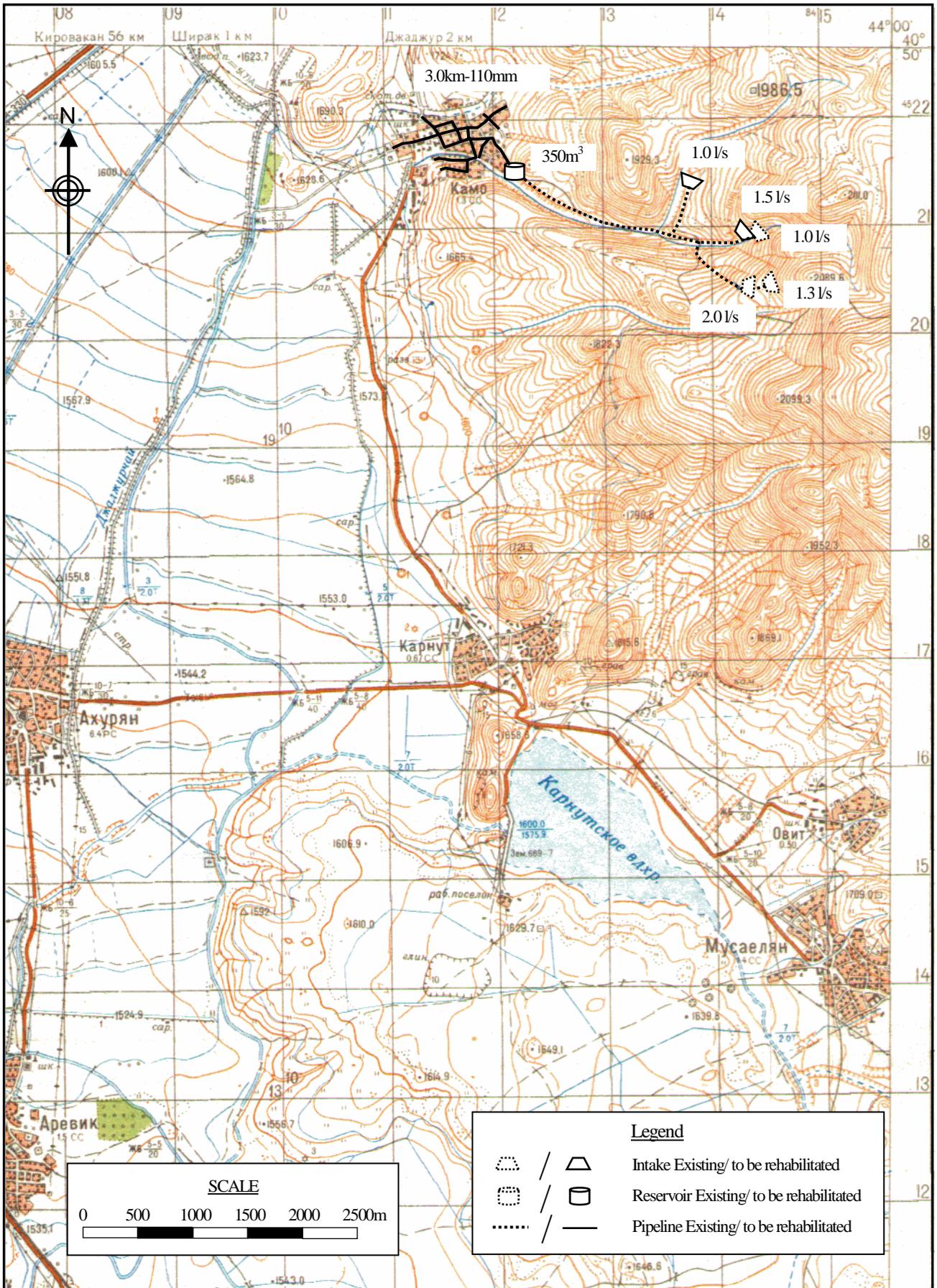


Marz : **Shirak**
Name : **Kamo**

No.14

No.	Item	Quantity	Unit	Water demand (m3/d)
A. WATER DEMAND				
	1 Population	1,563	persons	156.3
	2 Factory	-	nos	0.0
	3 School (pupils)	300	pupils	3.0
	4 Medical Ambulance Station	-	nos	-
	5 Polyclinic	-	nos	-
	6 Livestocks (87lit/household)	400	household	34.8
	Sub-total			194.1
	Unaccounted for water (20%)			38.8
1	Average Daily Water Demand			232.9 m3/day
2	Maximum Daily Water Demand			279.5 m3/day
3	Maximum Hourly Water Demand			27.3 m3/hr
B. WATER SUPPLY PLAN				
	1 Water source type	Nr.	Total vol.	
	a Spring	5	6.8 lit/sec	587.5 m3/day
	Total			587.5 m3/day
	2 Required reservoir volume			327 m3

C. WATER SUPPLY FACILITIES REHABILITATION PLAN				
No	Item	Quantity	Unit	
1	Intake			
	1m3	2	nos	
	2m3		nos	
	3m3		nos	
	4m3		nos	
2	Transmission pipe			
	50mm diameter		m	
	75mm diameter		m	
	90mm diameter		m	
	110mm diameter		m	
	150mm diameter		m	
	200mm diameter		m	
	250mm diameter		m	
3	Reservoir			
	350m3 capacity	1	nos	
4	Distribution pipe			
	50mm diameter		m	
	75mm diameter		m	
	90mm diameter		m	
	110mm diameter	3,000	m	
	150mm diameter		m	
	200mm diameter		m	
	250mm diameter		m	
5	House connection	250	nos	
6	Water meter installation	400	nos	
7	Public tap	4	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 JICA STUDY TEAM
Marz	Shirak	
No. 14	Kamo	

STUDY FOR IMPROVEMENT OF
RURAL WATER SUPPLY AND
SEWAGE SYSTEMS IN RA

Marz : **Shirak**
No. : **14**
Name : **Kamo**

No	Item	Specification	Quantity	Unit	Unit Price	Total
1	Intake	1m3	2	nos	367,700	735,400
		2m3		nos	545,000	
		3m3		nos	669,100	
		4m3		nos	805,100	
	Sub-total					735,400
2	Transmission Pipe	50mm		m	5,520	
		75mm		m	7,160	
		90mm		m	8,040	
		110mm		m	9,680	
		150mm		m	13,140	
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					
3	Reservoir	50m3		nos	8,363,900	
		100m3		nos	12,968,300	
		150m3		nos	18,804,500	
		200m3		nos	22,524,600	
		250m3		nos	25,952,800	
		300m3		nos	29,630,400	
		350m3	1	nos	33,528,700	33,528,700
		400m3		nos	36,388,000	
		450m3		nos	39,392,500	
		500m3		nos	42,520,900	
	Sub-total					33,528,700
4	Distribution Pipe	50mm		m	5,520	
		75mm		m	7,160	
		90mm		m	8,040	
		110mm	3,000	m	9,680	29,040,000
		150mm		m	13,140	
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					29,040,000
5	House Connection		250	nos	74,000	18,500,000
6	Water Meter Installation		400	nos	80,000	32,000,000
7	Public Tap		4	nos	90,000	360,000
8	Chlorilation Equipment		1	nos	500,000	500,000
9	Pump Replacement			nos	10,000,000	
10	Drainage and Sewerage	concrete surfa	1,200	m	3,600	4,320,000
Total					AMD	118,984,100
					Equivalent to USD	389,448
					Equivalent to JPY	41,086,746
					AMD	USD
Investment Cost per household			400	HH	297,460	974
Investment Cost per person			1,563	persons	76,125	249

No.15 Karmra qar

Information on Existing Water Sources (Shirak)

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

No.15 Community Karmra qar
District Akhurian
Marz Shirak

No.15 Community Karmra qar
District Akhurian
Marz Shirak
Sampling date 18/Jul/2007

No	Water source	Latitude			Longitude			Atitude (m)	Yeild(L/sec)		
		deg	min	sec	deg	min	sec		Min	Max	At site
1	Spring	40	50	14.0	43	52	58.7	1,807	0.1	1.0	0.2
2											
3											
4											
5											
6											
7											
8											
9											
10											

Notes:

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

Users Acceptnce for water quality	Not acceptable
Notes	Community feels poor water quality and only 2 taps are available. Water test results done by hygiene station shows water quality is not acceptable.
Alternative sources if any	

	Parameters analysed	Units				Guidelines	
						WHO	Armenia
a	pH		7.9			6.5-8	6.0 - 9.0
b	Temperature	Deg.C	13.8				
c	TDS	Mg/L	223			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	7			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	0.10			1.50	
7	Hardness	Mg/L	440			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	1.0			50.0	45.0
13	SO4:Sulfate	Mg/L	10.0			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	0.00005			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	0.3			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

No. 15 Marz Shirak Community Karmraqr**1. ACCESSIBILITY TO THE SITE**

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

2. INTAKE STRUCTURE

No.	Water source	N	E	El. (m)	Year	Material	Volume (l/s)	Rehabilitation Necessity (Y/N)
1	Spring	40°50'14,0"	43°52'58,7"	1,807	1961	Concrete	0.2	Yes

3. TRANSMISSION PIPELINE

No.	Pipeline length (m)	Pipe diameter	Material	Flow rate (l/s)	Year	Leakage	Rehabilitation Necessity (Y/N)
1	600	120	Steel	0.2	1961	0	No

4. RESERVOIR

No.	N	E	El. (m)	Material	Shape	Dimension (m)	Volume (m3)	Rehabilitation Necessity (Y/N)
1	No							

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	No distribution pipeline					

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	1961		No	0	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.15 Karmra qar
District	Akhurian

No.	Question	Answer
A: Baseline Data		
A1	Actual population in 2001	62
A2	Actual population in 2007	62
A3	Number of households	13
A4.1	Elderly people	5
A4.2	Population in labor force (age from 16 to 62)	32
A4.3	Children	25
A5.1	Pensioners	5
A5.2	Unemployed	1
A5.3	Receiving benefits	3
A6	Average monthly income of household (AMD)	3,000
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	20
B: Budget		
B1	Annual Budget of the community 2004, in thousand AMD	456
	Annual Budget of the community 2005, in thousand AMD	3,444
	Annual Budget of the community 2006, in thousand AMD	2,545
	Annual Budget of the community 2007, in thousand AMD	3,350
	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	0
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?	mainly 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

No.	Question	Answer
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 1)Flate rate, 2) Having water tariff	-
D19	Where do you acquire the irrigation water?	from spring
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	absent
E5	Quantity and present condition of the water supply facilities:	1-deteriorated
E6	Quantity and present condition of the water supply facilities: DRR(Daily Regulatory Reservoir)	absent
E7	Quantity and present condition of the water supply facilities: net/distribution	absent
E8	Quantity and present condition of the water supply facilities: public tap	deteriorated
E9	Quantity and present condition of the water supply facilities: pump	absent
E10	Who is the owner of the water supply facilities?	community
E11	Who is engaged in the water supply facilities repairing works?	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?	manpower
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.	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



Karmra qar

Karmir

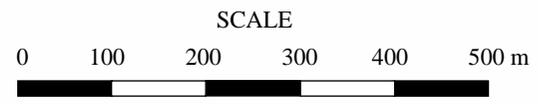
A

LEGENDS

-  Spring intake
-  Transmission pipeline

	N	E	H (m)
A	40°50'14.0"	43°52'58.7"	1807

Pipeline length (m)	Pipe diameter (mm)	Material
TRANSMISSION PIPELINE		
600	120	steel
DISTRIBUTION PIPELINE		
absent		



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

Marz : **Shirak**
Name : **Karmraqar**

No.15

No.	Item	Quantity	Unit	Water demand (m3/d)
A. WATER DEMAND				
	1 Population	62	persons	6.2
	2 Factory	-	nos	0.0
	3 School (pupils)	20	pupils	0.2
	4 Medical Ambulance Station	-	nos	-
	5 Polyclinic	-	nos	-
	6 Livestocks (87lit/household)	13	household	1.1
	Sub-total			7.5
	Unaccounted for water (20%)			1.5
1	Average Daily Water Demand		5.3	9.0 m3/day
2	Maximum Daily Water Demand			10.8 m3/day
3	Maximum Hourly Water Demand			2.6 m3/hr
B. WATER SUPPLY PLAN				
	1 Water source type	Nr.	Total vol.	
	a Spring	1	0.2 lit/sec	17.3 m3/day
	Total			17.3 m3/day
	2 Required reservoir volume			32 m3

C. WATER SUPPLY FACILITIES REHABILITATION PLAN				
No	Item	Quantity	Unit	
1	Intake			
	1m3	1	nos	
	2m3		nos	
	3m3		nos	
	4m3		nos	
2	Transmission pipe			
	50mm diameter		m	
	75mm diameter		m	
	90mm diameter		m	
	110mm diameter		m	
	150mm diameter		m	
	200mm diameter		m	
	250mm diameter		m	
3	Reservoir			
	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	13	nos	
6	Water meter installation	13	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. 15	Karmrahar	JICA STUDY TEAM

STUDY FOR IMPROVEMENT OF
RURAL WATER SUPPLY AND
SEWAGE SYSTEMS IN RA

Marz : **Shirak**
No. : **15**
Name : **Karmraqar**

No	Item	Specification	Quantity	Unit	Unit Price	Total
1	Intake	1m3	1	nos	367,700	367,700
		2m3		nos	545,000	
		3m3		nos	669,100	
		4m3		nos	805,100	
	Sub-total					367,700
2	Transmission Pipe	50mm		m	5,520	
		75mm		m	7,160	
		90mm		m	8,040	
		110mm		m	9,680	
		150mm		m	13,140	
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					
3	Reservoir	50m3	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		13	nos	74,000	962,000
6	Water Meter Installation		13	nos	80,000	1,040,000
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	11,323,600
					Equivalent to USD	37,063
					Equivalent to JPY	3,910,185
					AMD	USD
	Investment Cost per household		13	HH	871,046	2,851
	Investment Cost per person		62	persons	182,639	598

No.16 Kaqavasari

Information on Existing Water Sources (Shirak)

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

No.16 Community Kaqavasars
District Ashotsk
Marz Shirak

No.16 Community Kaqavasars
District Ashotsk
Marz Shirak
Sampling date 28/Jul/2007

No	Water source	Latitude			Longitude			Atitude (m)	Yeild(L/sec)		
		deg	min	sec	deg	min	sec		Min	Max	At site
1	Spring	40	55	13.9	44	2	10.4	1,994	1.0	1.0	0.5
2	Spring	40	55	18.7	44	1	7.2	1,960	1.0	1.0	0.5
3											
4											
5											
6											
7											
8											
9											
10											

Notes:

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

Users Acceptnce for water quality	Acceptable
Notes	One of the spring intakes is damaged.
Alternative sources if any	There is a spring with 6l/sec discharge.

	Parameters analysed	Units	No.1	No.2	Guidelines	
					WHO	Armenia
<i>a</i>	pH		8.2	8.6	6.5-8	6.0 - 9.0
<i>b</i>	Temperature	Deg.C	9.8	10.2		
<i>c</i>	TDS	Mg/L	64	72	1000	1000
1	Al:Aluminum	Mg/L	n.d	n.d	0.10	0.50
2	B:Boron	Mg/L	n.d	n.d	0.70	0.50
3	Cl:Chloride	Mg/L	4	4	250	350
4	Cr:Chrome	Mg/L	<0.01	n.d	0.05	0.05
5	Cu:Copper	Mg/L	n.d	n.d	2	1
6	F:Fluoride	Mg/L	0.14	0.12	1.50	
7	Hardness	Mg/L	170	150	500	700
8	Fe:Iron	Mg/L	n.d	n.d	0.30	0.30
9	Mn:Manganese	Mg/L	n.d	n.d	0.40	0.10
10	Mo:Molibdenum	Mg/L	<0.02	n.d	0.070	0.250
11	Ni:Nickel	Mg/L	n.d	n.d	0.020	0.100
12	Nitrate(NO3+)	Mg/L	3.5	4.0	50.0	45.0
13	SO4:Sulfate	Mg/L	3.0	4.0	250.0	500.0
14	Zn:Zink	Mg/L	n.d	n.d	3.0	5.0
15	As:Arsenic	Mg/L	n.d	n.d	0.0	0.1
16	Ba:Barium	Mg/L	0.01	0.01	0.70	0.10
17	Be:Berillium	Mg/L	0.00006	0.00005	NA	0.00020
18	Cd:Cadmium	Mg/L	n.d	n.d	0.0030	0.0010
19	Pb:Lead	Mg/L	0.001	0.001	0.010	0.030
20	Hg:Mercury	Mg/L	<0.0002	<0.0002	0.00100	0.00050
21	Se:Selenium	Mg/L	<0.001	<0.001	0.010	0.010
22	Sr:Strontium	Mg/L	n.d	n.d	NA	7.0
23	CN:Cyanide	Mg/L	n.d	n.d	0.070	0.035
24	Coli form bacteria	bacteria per 100 ml		<9	-	0
25	Thermo-tolerant coli form bacteria	bacteria per 100 ml		n.d	0	0
26	Total bacteria	bacteria per 1 ml		200	-	50

No. 16 Marz Shirak Community Kaqavasar**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	the reservoir is not operating

2. INTAKE STRUCTURE

No.	Water source	N	E	El. (m)	Year	Material	Volume (l/s)	Rehabilitation Necessity (Y/N)
1	Spring	40°55'13,9"	44°02'10,4"	1,994	1976	Masonry	0.5	Yes
2	Spring	40°55'18,7"	44°02'07,2"	1,960	1997	Concrete	0.5	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	0.45	1976	Little	Yes
2	100	50	Steel	0.45	1997	Little	Yes

4. RESERVOIR

No.	N	E	El. (m)	Material	Shape	Dimension (m)	Volume (m3)	Rehabilitation Necessity (Y/N)
1	40°55'23,0"	44°01'16,3"	1,500	Concrete	Rectangular	6×6×6	200	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	1990	no	No
2	2,000	150	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)
10		1990	No	0	Yes

9. DRAINAGE SYSTEM

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

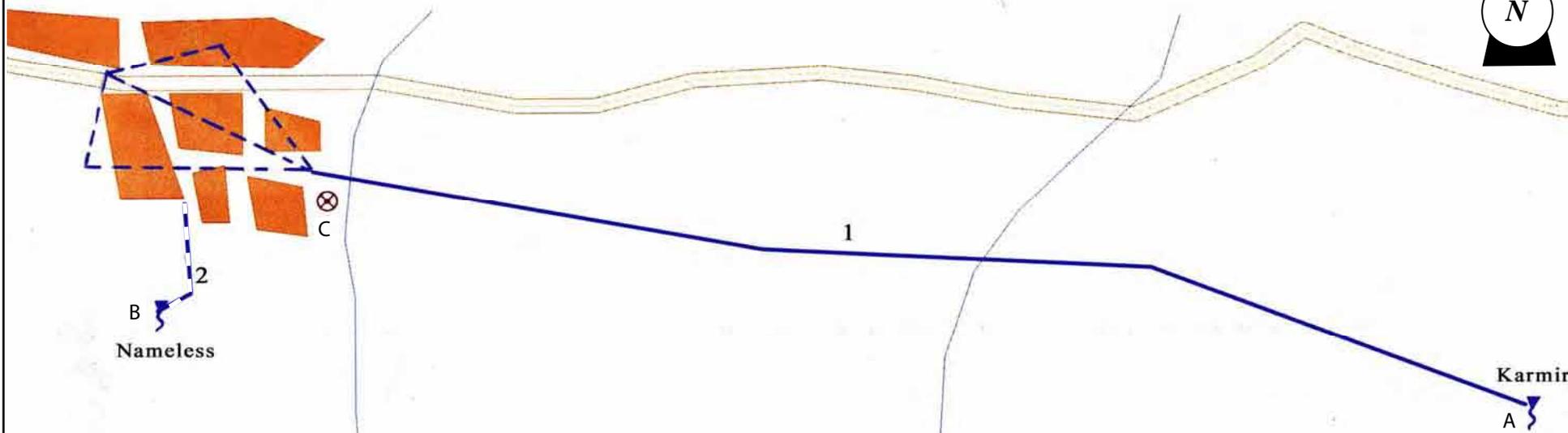
Questionnaire on Existing Water Supply Conditions by Socio-Economic Survey

Marz	Shirak
Number and Name of Community	No.16 Kaqavasar
District	Ashotsk

No.	Question	Answer
A: Baseline Data		
A1	Actual population in 2001	156
A2	Actual population in 2007	163
A3	Number of households	44
A4.1	Elderly people	29
A4.2	Population in labor force (age from 16 to 62)	80
A4.3	Children	48
A5.1	Pensioners	20
A5.2	Unemployed	0
A5.3	Receiving benefits	4
A6	Average monthly income of household (AMD)	30,000
A7	Number of medical ambulance station/first and health post	absent
A8	Number of beds in each medical ambulance station	0
A9	Number of school	1
A10	Number of pupils	10
B: Budget		
B1	Annual Budget of the community 2004, in thousand AMD	600
	Annual Budget of the community 2005, in thousand AMD	600
	Annual Budget of the community 2006, in thousand AMD	1,200
	Annual Budget of the community 2007, in thousand AMD	200
	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	1321
D3	Date of expiry of water use permit	03.02.07-03.02.10
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	30
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?	mainly 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 household a day?	-
D14.2	Estimate quantity of domestic water use of each household (litter per day)	300

No.	Question	Answer
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	300
D16	Drinking water monthly water fee per household	0
D17	How often do you usually pay water fees?	-
D18	Water fee structure 1 Flat 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	6-deteriorated
E5	Quantity and present condition of the water supply facilities:	2-deteriorated
E6	Quantity and present condition of the water supply facilities: DRR(Daily Regulatory Reservoir)	3-deteriorated
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
E12	How do you repair the water supply facilities?	by ourselves
E13	Who is in charge of the repair work in the community?	community
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?	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 ethnic, indigenous people or nomads who have a traditional lifestyle or special socially valuable areas	absent

Kaqavasasar

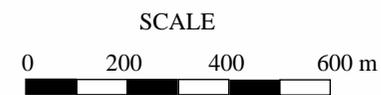


	N	E	H (m)
A	40°55'13.9"	44°02'10.4"	1994
B	40°55'18.7"	44°02'07.2"	1960
C	40°55'23.0"	44°01'16.3"	1500

LEGENDS

-  Spring intake
-  Not operating DRR
-  Spring intake
-  Transmission pipeline
-  Distribution pipeline

Pipeline length (m)	Pipe diameter	Material
TRANSMISSION PIPELINE		
(1) 3000	100	steel
(2) 100	50	steel
DISTRIBUTION PIPELINE		
1000	100	PE
2000	150	steel



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