

No.41 Vaghashen

Information on Existing Water Sources (Gegharkunik)

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

No.41 Community Vaghashen
District Martuni
Marz Gegharkunik

No.41 Community Vaghashen
District Martuni
Marz Gegharkunik
Sampling date 08/Aug/2007

No	Water source	Latitude			Longitude			Atitude (m)	Yield(L/sec)		
		deg	min	sec	deg	min	sec		Min	Max	At site
1	Borehole	40	8	4.5	45	20	9.1	1,979	-	-	7.0
2	Borehole	40	7	35.7	45	19	45.7	1,985	-	-	7.0
3	Borehole	40	7	31.4	45	19	53.4	1,993	-	-	8.0
4											
5											
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	Leakage in the network -70%
Alternative sources if any	At 25km distance from the village, in mountains, there are springs. In case of this water yield will increase 100-150l/sec.

	Parameters analysed	Units	No.1 well	No.2	No.3 at cemetary	Guidelines	
						WHO	Armenia
<i>a</i>	pH		6.7	6.8	7.1	6.5-8	6.0 - 9.0
<i>b</i>	Temperature	Deg.C	12.1	13.1	10.1		
<i>c</i>	TDS	Mg/L	69	66	80	1000	1000
1	Al:Aluminum	Mg/L	n.d	nd	nd	0.10	0.50
2	B:Boron	Mg/L	n.d	nd	nd	0.70	0.50
3	Cl:Chloride	Mg/L	6	6	6	250	350
4	Cr:Chrome	Mg/L	<0.01	<0,01	<0,01	0.05	0.05
5	Cu:Copper	Mg/L	n.d	nd	nd	2	1
6	F:Fluoride	Mg/L	1.03	1.01	0.89	1.50	
7	Hardness	Mg/L	120	115	135	500	700
8	Fe:Iron	Mg/L	n.d	nd	nd	0.30	0.30
9	Mn:Manganese	Mg/L	n.d	nd	nd	0.40	0.10
10	Mo:Molibdenum	Mg/L	n.d	nd	nd	0.070	0.250
11	Ni:Nickel	Mg/L	n.d	nd	nd	0.020	0.100
12	Nitrate(NO3+)	Mg/L	1.3	2.7	2.2	50.0	45.0
13	SO4:Sulfate	Mg/L	3.0	8.0	2.0	250.0	500.0
14	Zn:Zink	Mg/L	n.d	nd	nd	3.0	5.0
15	As:Arsenic	Mg/L	n.d	nd	nd	0.0	0.1
16	Ba:Barium	Mg/L	0.01	0.01	0.01	0.70	0.10
17	Be:Berillium	Mg/L	0.00010	0.00009	0.00008	NA	0.00020
18	Cd:Cadmium	Mg/L	n.d	nd	nd	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	n.d	nd	nd	0.010	0.010
22	Sr:Strontium	Mg/L	n.d	nd	nd	NA	7.0
23	CN:Cyanide	Mg/L	n.d	nd	nd	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. 41 Marz Gegharkunik Community Vaghashen**1. ACCESSIBILITY TO THE SITE**

No.	Structures	Access by vehicle	Machine construction	Remarks
1	Intake			No intakes
2	Transmission pipeline			No transmission pipeline
3	Reservoir			No reservoir

2. INTAKE STRUCTURE

No.	Water source	N	E	El. (m)	Year	Material	Volume (l/s)	Rehabilitation Necessity (Y/N)
1	Groundwater	40°07'31.4"	45°19'53.4"	1,993	1970	Concrete	8.0	No
2	Groundwater	40°07'35.7"	45°19'45.7"	1,985	1970	Concrete	7.0	No
3	Groundwater	40°08'04.5"	45°20'09.1"	1,979	1970	Concrete	7.0	No

3. TRANSMISSION PIPELINE

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

4. RESERVOIR

No.	N	E	El. (m)	Material	Shape	Dimension (m)	Volume (m3)	Rehabilitation Necessity (Y/N)
1	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	5,000	100	Steel		Medium	Yes
2	2,000	50	Steel		Little	Yes
3	2,000	25-40	Steel		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)

8. PUBLIC TAPS

No. of taps	Old one (year)	New one (year)	Valves (Y/N)	Valve rate (%)	Rehabilitation Necessity (Y/N)
No				0	

9. DRAINAGE SYSTEM

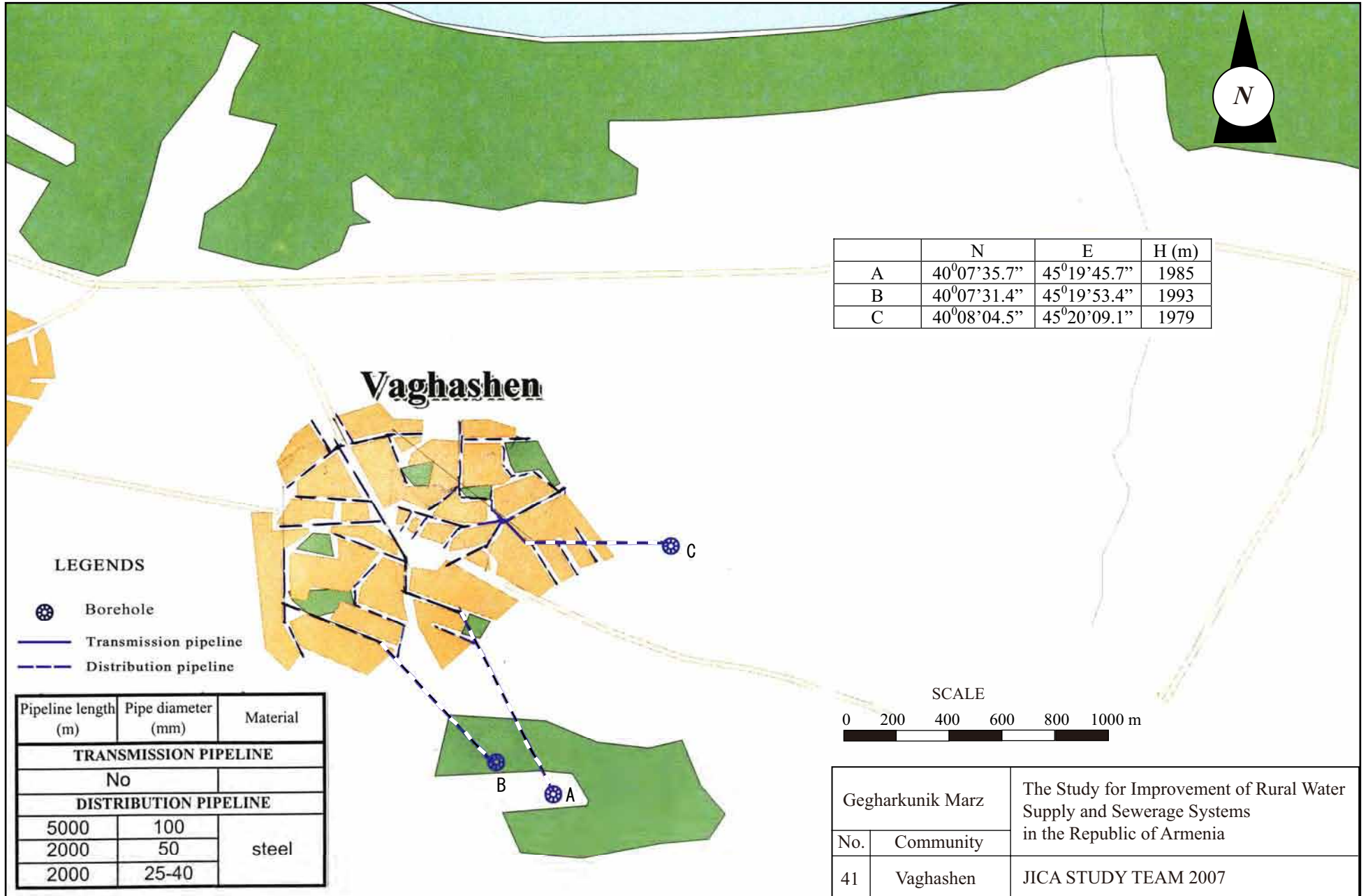
Existence	Rehabilitation	Remarks
No	Yes	

Questionnaire on Existing Water Supply Conditions by Socio-Economic Survey

Marz	Gegharkunik
Number and Name of Community	No.41 Vaghashen
District	Martini

No.	Question	Answer
A: Baseline Data		
A1	Actual population in 2001	4,000
A2	Actual population in 2007	4,220
A3	Number of households	1,503
A4.1	Elderly people	465
A4.2	Population in labor force (age from 16 to 62)	2,701
A4.3	Children	1,099
A5.1	Pensioners	440
A5.2	Unemployed	0
A5.3	Receiving benefits	245
A6	Average monthly income of household (AMD)	35,000
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	700
B: Budget		
B1	Annual Budget of the community 2004, in thousand AMD	6,500
	Annual Budget of the community 2005, in thousand AMD	7,200
	Annual Budget of the community 2006, in thousand AMD	8,400
	Annual Budget of the community 2007, in thousand AMD	2,500
	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	2
	Amount spent in drinking water sector 2008, in thousand AMD	is not planned
C: Socio-Economic Survey		
C1	Major industries of the community:	potatoes, cabbage, cereals, dairy, meat
C2	Is there any community activities carrying out by women? 1-Yes, 2-No	Aregak credit program
D: Water Usage and Water Demand Survey		
D1	Does the community hold water use permit? 1.Yes 2.No	no
D2	Water use permit number	-
D3	Date of expiry of water use permit	-
D4	Planned date of obtaining water use permit	2007
D5	Present condition of the water supply volume of Domestic use	insufficient
D6	Present condition of the water supply volume of Irrigation water	sufficient
D7	Number of house connection to drinking water system	360
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?	irregularly - 18hrs
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?	8 ⁰⁰ -24 ⁰⁰
D12	Are you pleased with duration of domestic water supply?	generally displeased
D13	Are hours of water supply convenient?	generally inconvenient
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)	400

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	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 1Flat rate, 2 Having water tariff	-
D19	Where do you acquire the irrigation water?	deep well, pipeline
D20	Are you satisfied with irrigation water supply volume?	sufficient
E: Present Operation and Maintenance Works		
E1	Name of responsible for water supply	-
E2	Position	
E3	Telephone	
E4	Quantity and present condition of the water supply facilities: spring/ intake	5 deep wells 3-deteriorated, 2- non-operational
E5	Quantity and present condition of the water supply facilities: pipeline/transmission	1-deteriorated
E6	Quantity and present condition of the water supply facilities: DRR(Daily Regulatory Reservoir)	1-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	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?	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?	community
E14	How you prepare O&M costs?	community budget water fee
E15	Please indicate the O&M cost breakdown per year for water supply	
	Electricity (AMD)	0
	Labor cost (AMD)	0
	Repair cost(AMD)	1,000,000
	Others(AMD)	0
	Total (AMD)	1,000,000
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 ethnic, indigenous people or nomads who have a traditional lifestyle or special socially valuable areas	absent



Marz : **Gegharkunik**
Name : **Vaghashen**

No.41

No.	Item	Quantity	Unit	Water demand (m3/d)
A. WATER DEMAND				
1	Population	4,220	persons	422.0
2	Factory	-	nos	0.0
3	School (pupils)	700	pupils	7.0
4	Medical Ambulance Station	-	nos	-
5	Policlinic	-	nos	-
6	Livestocks (87lit/household)	1,503	household	130.8
	Sub-total			559.8
	Unaccounted for water (20%)			112.0
1	Average Daily Water Demand			671.8 m3/day
2	Maximum Daily Water Demand			806.1 m3/day
3	Maximum Hourly Water Demand			65.5 m3/hr
B. WATER SUPPLY PLAN				
	1 Water source type	Nr.	Total vol.	
	a Borehole	1	8.0 lit/sec	691.2 m3/day
	b Borehole	1	7.0 lit/sec	604.8 m3/day
	c Borehole	1	7.0 lit/sec	604.8 m3/day
	Total			1,900.8 m3/day
	2 Required reservoir volume			786 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		m	
	150mm diameter		m	
	200mm diameter		m	
	250mm diameter		m	
3	Reservoir			
	300m3 capacity	3	nos	For each borehole
4	Distribution pipe			
	50mm diameter	4,000	m	
	75mm diameter		m	
	90mm diameter		m	
	110mm diameter	5,000	m	
	150mm diameter		m	
	200mm diameter		m	
	250mm diameter		m	
5	House connection	1,143	nos	
6	Water meter installation	1,503	nos	
7	Public tap	16	nos	
8	Chlorination	3	nos	
9	Pumps	-	nos	

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

Marz : **Gegharkunik**

No. : **41**

Name : **Vaghashen**

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		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	3	nos	29,630,400	88,891,200
		350m3		nos	33,528,700	
		400m3		nos	36,388,000	
		450m3		nos	39,392,500	
		500m3		nos	42,520,900	
	Sub-total					88,891,200
4	Distribution Pipe	50mm	4,000	m	5,520	22,080,000
		75mm		m	7,160	
		90mm		m	8,040	
		110mm	5,000	m	9,680	48,400,000
		150mm		m	13,140	
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					70,480,000
5	House Connection		1,143	nos	74,000	84,582,000
6	Water Meter Installation		1,503	nos	80,000	120,240,000
7	Public Tap		16	nos	90,000	1,440,000
8	Chlorilation Equipment		3	nos	500,000	1,500,000
9	Pump Replacement			nos	10,000,000	
10	Drainage and Sewerage	concrete surfa	3,600	m	3,600	12,960,000
Total					AMD	380,093,200
					Equivalent to USD	1,244,086
					Equivalent to JPY	131,251,089
					AMD	USD
	Investment Cost per household		1,503	HH	252,890	828
	Investment Cost per person		4,220	persons	90,069	295

No.42 Vardadzor

Information on Existing Water Sources (Gegharkunik)

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

No.42 Community Vardazor
District Martuni
Marz Gegharkunik

No.42 Community Vardazor
District Martuni
Marz Gegharkunik
Sampling date 20/Jul/2007

No	Water source	Latitude			Longitude			Atitude (m)	Yield(L/sec)		
		deg	min	sec	deg	min	sec		Min	Max	At site
1	Springs	40	11	29.3	45	8	13.0	2,304	50.0	50.0	32.0
2	Springs	40	11	37.6	45	8	17.7	2,311	-	-	
3											
4											
5											
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	
Alternative sources if any	

	Parameters analysed	Units	No.1	Guidelines	
				WHO	Armenia
a	pH		8.0	6.5-8	6.0 - 9.0
b	Temperature	Deg.C	5.8		
c	TDS	Mg/L	37	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	0.78	1.50	
7	Hardness	Mg/L	70	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	1.3	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	0.01	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	n.d	0.010	0.010
22	Sr: Strontium	Mg/L	<0.7	NA	7.0
23	CN: Cyanide	Mg/L	n.d	0.070	0.035
24	Coli form bacteria	bacteria per 100 ml		-	0
25	Thermo-tolerant coli form bacteria	bacteria per 100 ml		0	0
26	Total bacteria	bacteria per 1 ml		-	50

No. 42 Marz Gegharkunik Community Vardadzor**1. ACCESSIBILITY TO THE SITE**

No.	Structures	Access by vehicle	Machine construction	Remarks
1	Intake	Fair	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	40°11'37.6"	45°08'17.7"	2,311	1970	Concrete	32.0	Yes
2	Spring	40°11'29.3"	45°08'13.0"	2,304	1970	Concrete		Yes

3. TRANSMISSION PIPELINE

No.	Pipeline length (m)	Pipe diameter	Material	Flow rate (l/s)	Year	Leakage	Rehabilitation Necessity (Y/N)
1	5,000	200	Steel	30.0	1970	Medium	Yes

4. RESERVOIR

No.	N	E	El. (m)	Material	Shape	Dimension (m)	Volume (m3)	Rehabilitation Necessity (Y/N)
1	40°11'24.8"	45°11'19.5"	2,024	Concrete	Rectangular	12x12x4	400	No
2	40°11'25.6"	44°11'10.7"	2,055	Concrete	Circle	6x12x4	200	No

5. CHLORINATION EQUIPMENT

No.	Existence (Y/N)	Location	Chlorine type	Chlorine duration
1	Yes	Reservoir	bush-sieve	daily

6. DISTRIBUTION PIPELINE

No.	Pipeline length (m)	Pipe diameter	Material	Year	Leakage	Rehabilitation Necessity (Y/N)
1	300	150	Steel	1970	Huge	Yes
2	3,500	100	cast iron	1972	Medium	Yes
3	3,500	100	Steel	1972	Huge	Yes
4	800	50	uPVC	1972	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)
10	1972		No	0	Yes

9. DRAINAGE SYSTEM

Existence	Rehabilitation	Remarks
No	Yes	

Questionnaire on Existing Water Supply Conditions by Socio-Economic Survey

Marz	Gegharkunik
Number and Name of Community	No.42. Vardadzor
District	Martini

No.	Question	Answer
A: Baseline Data		
A1	Actual population in 2001	3,140
A2	Actual population in 2007	3,140
A3	Number of households	840
A4.1	Elderly people	400
A4.2	Population in labor force (age from 16 to 62)	1,100
A4.3	Children	1,400
A5.1	Pensioners	450
A5.2	Unemployed	0
A5.3	Receiving benefits	170
A6	Average monthly income of household (AMD)	10,000
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	560
B: Budget		
B1	Annual Budget of the community 2004, in thousand AMD	3,000
	Annual Budget of the community 2005, in thousand AMD	4,000
	Annual Budget of the community 2006, in thousand AMD	6,000
	Annual Budget of the community 2007, in thousand AMD	2,000
	Annual Budget of the community 2008, in thousand AMD	is not planned
B2	Amount spent in drinking water sector 2004, in thousand AMD	300
	Amount spent in drinking water sector 2005, in thousand AMD	3,200
	Amount spent in drinking water sector 2006, in thousand AMD	552
	Amount spent in drinking water sector 2007, in thousand AMD	552
	Amount spent in drinking water sector 2008, in thousand AMD	is not planned
C: Socio-Economic Survey		
C1	Major industries of the community:	potatoes, cabbage, cereals, 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	1362
D3	Date of expiry of water use permit	2006-2009
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	absent
D7	Number of house connection to drinking water system	750
D8	How many house connection household set the water meter	0
D9	Number of public taps	15
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?	regularly - 3hrs
D11	What time of day water is given?	18 ⁰⁰ -21 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, Laundry, bathing, etc) of each household a day?	-
D14.2	Estimate quantity of domestic water use of each household (litter per day)	according to the supplied water

No.	Question	Answer
D15.1	How long the taps are open to provide the each household for filling	4 hrs
D15.2	Estimate quantity of water for filling containers of each household (litter per	1,000
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	Manukyan Nadirov
E2	Position	inspector
E3	Telephone	-
E4	Quantity and present condition of the water supply facilities: spring/ intake	15-partially rehabilitated
E5	Quantity and present condition of the water supply facilities: pipeline/transmission	1-partially rehabilitated
E6	Quantity and present condition of the water supply facilities: DRR(Daily Regulatory Reservoir)	2-partially 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 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?	community
E12	How do you repair the water supply facilities?	by ourselves
E13	Who is in charge of the repair work in the community?	specialist from community
E14	How you prepare O&M costs?	community budget, own capacities
E15	Please indicate the O&M cost breakdown per year for water supply	
	Electricity (AMD)	0
	Labor cost (AMD)	552,000
	Repair cost(AMD)	0
	Others(AMD)	0
	Total (AMD)	552,000
E16	Do the residents participate in the O&M works?	absent
E17	What kind of OM method is preferable to you?	residents participation, water fee reduction
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 ethnic, 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) 5000	200	steel
DISTRIBUTION PIPELINE		
300	150	steel
3500	100	cast iron
3500	100	steel
800	50	uPVC








Eranos

Vardadzor

Aghbyurakner
A
B
C

D
E

LEGENDS

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

	N	E	H (m)
A	40°11'37.6"	45°08'17.7"	2311
B	40°11'29.3"	45°08'13.0"	2304
C	40°11'30.8"	45°08'16.1"	2292
D	40°11'25.6"	44°11'10.7"	2055
E	40°11'24.8"	45°11'19.5"	2024

SCALE



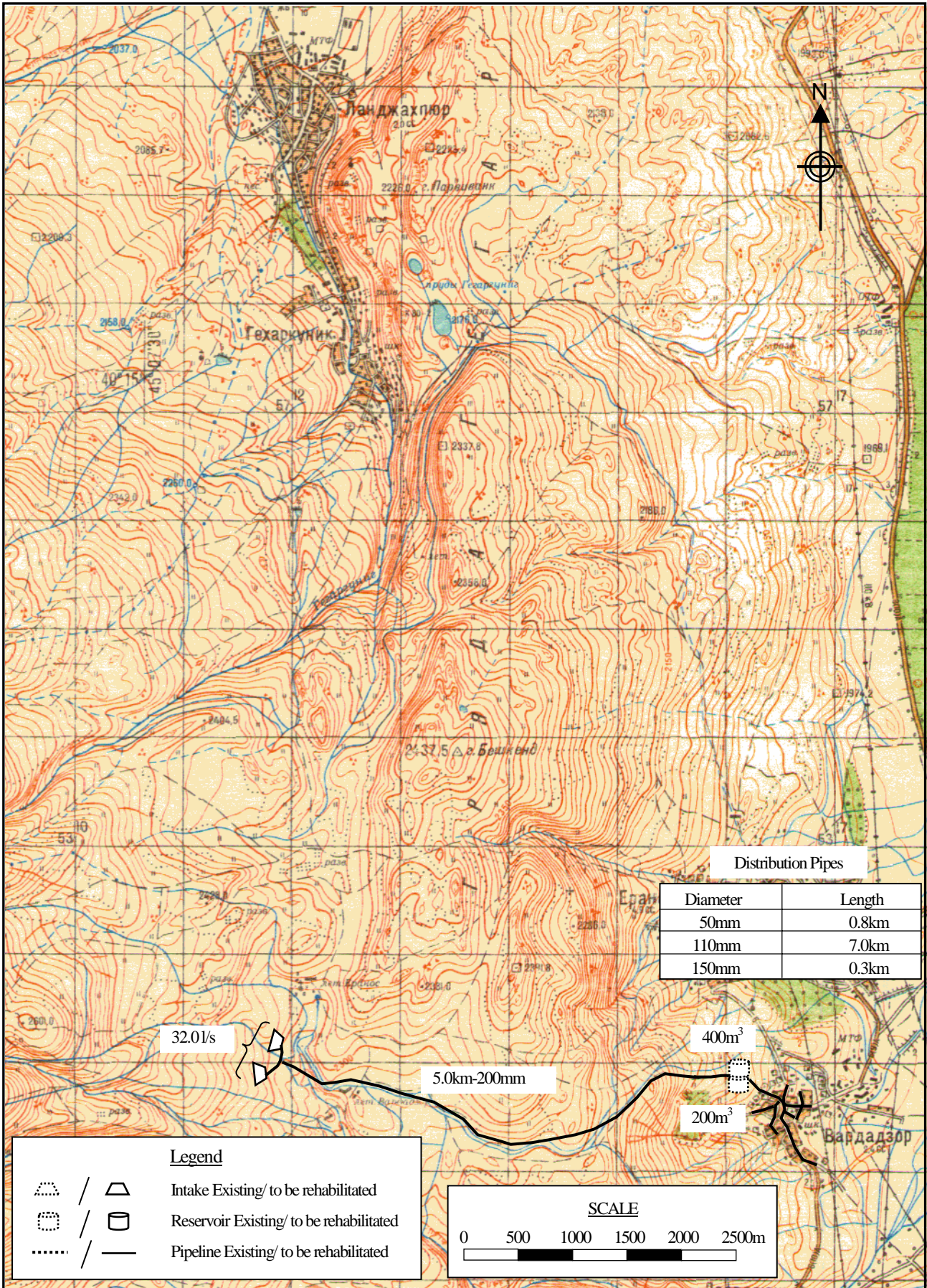
Gegharkunik Marz		The Study for Improvement of Rural Water Supply and Sewerage Systems in the Republic of Armenia
No.	Community	
42	Vardadzor	JICA STUDY TEAM 2007

Marz : **Gegharkunik**
Name : **Vardadzor**

No.42

No.	Item	Quantity	Unit	Water demand (m3/d)
A. WATER DEMAND				
1	Population	3,140	persons	314.0
2	Factory	-	nos	0.0
3	School (pupils)	560	pupils	5.6
4	Medical Ambulance Station	-	nos	-
5	Policlinic	-	nos	-
6	Livestocks (87lit/household)	840	household	73.1
	Sub-total			392.7
	Unaccounted for water (20%)			78.5
1	Average Daily Water Demand			471.2 m3/day
2	Maximum Daily Water Demand			565.5 m3/day
3	Maximum Hourly Water Demand			49.0 m3/hr
B. WATER SUPPLY PLAN				
1	Water source type	Nr.	Total vol.	
	a Spring	2	32.0	lit/sec
				2,764.8 m3/day
	Total			2,764.8 m3/day
	2 Required reservoir volume			588 m3

C. WATER SUPPLY FACILITIES REHABILITATION PLAN				
No	Item	Quantity	Unit	
1	Intake			
	1m3		nos	
	2m3	2	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	5,000	m	
	250mm diameter		m	
3	Reservoir			
4	Distribution pipe			
	50mm diameter	800	m	
	75mm diameter		m	
	90mm diameter		m	
	110mm diameter	7,000	m	
	150mm diameter	300	m	
	200mm diameter		m	
	250mm diameter		m	
5	House connection	90	nos	
6	Water meter installation	840	nos	
7	Public tap	9	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	Gegharkunik	
No. 42	Vardadzor	JICA STUDY TEAM

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

Marz : **Gegharkunik**

No. : **42**

Name : **Vardadzor**

No	Item	Specification	Quantity	Unit	Unit Price	Total
1	Intake	1m3		nos	367,700	
		2m3	2	nos	545,000	1,090,000
		3m3		nos	669,100	
		4m3		nos	805,100	
	Sub-total					1,090,000
2	Transmission Pipe	50mm		m	5,520	
		75mm		m	7,160	
		90mm		m	8,040	
		110mm		m	9,680	
		150mm		m	13,140	
		200mm	5,000	m	19,440	97,200,000
		250mm		m	27,040	
	Sub-total					97,200,000
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		nos	33,528,700	
		400m3		nos	36,388,000	
		450m3		nos	39,392,500	
		500m3		nos	42,520,900	
	Sub-total					
4	Distribution Pipe	50mm	800	m	5,520	4,416,000
		75mm		m	7,160	
		90mm		m	8,040	
		110mm	7,000	m	9,680	67,760,000
		150mm	300	m	13,140	3,942,000
		200mm		m	19,440	
		250mm		m	27,040	
	Sub-total					76,118,000
5	House Connection		90	nos	74,000	6,660,000
6	Water Meter Installation		840	nos	80,000	67,200,000
7	Public Tap		9	nos	90,000	810,000
8	Chlorilation Equipment		1	nos	500,000	500,000
9	Pump Replacement			nos	10,000,000	
10	Drainage and Sewerage	concrete surfa	3,240	m	3,600	11,664,000
Total					AMD	261,242,000
					Equivalent to USD	855,073
					Equivalent to JPY	90,210,235
					AMD	USD
Investment Cost per household			840	HH	311,002	1,018
Investment Cost per person			3,140	persons	83,198	272

GEGHARKUNIK MARZ
Marutuni District
No 42 Vardadzor

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	143.3																																								
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		800.09	0.00	0.00	2.12	4.23	5.16	5.33	9.03	9.33	9.64	9.95	14.92	15.41	15.92	16.45	16.99	17.55	18.13	18.73	19.34	19.98	20.64	21.32	22.03	22.75	23.50	24.28	25.08	25.91	26.76	27.65	28.56	29.50	30.48	31.48	32.52	33.59	34.70	35.85	37.03	38.25
B Operating Costs																																										
1. Staff salary	person																																									
Inspectors	person																																									
Pump operators	person																																									
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		35.40	0.48	0.50	0.51	0.53	0.55	0.56	0.58	0.60	0.62	0.64	0.66	0.69	0.71	0.73	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	1.15	1.19	1.23	1.27	1.31	1.36	1.40	1.45	1.50	1.54	1.60		
2. Chlorine	kg/yr																																									
Pouring volume	kg/yr	861																																								
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		37.71	0.21	0.43	0.55	0.57	0.59	0.61	0.63	0.65	0.67	0.69	0.71	0.74	0.76	0.79	0.81	0.84	0.87	0.90	0.93	0.96	0.99	1.02	1.06	1.09	1.13	1.16	1.20	1.24	1.28	1.32	1.37	1.41	1.46	1.51	1.56	1.61	1.66	1.72		
3. Electricity (for pump)		0.00																																								
4. Maintenance cost		33.59																																								
Pump repair		0.00																																								
Pipe repair		0.19																																								
5. Pump replacement		0.00																																								
Sub-total		106.70	0.00	0.00	0.88	1.32	1.55	1.61	1.66	1.71	1.77	1.83	1.89	1.95	2.01	2.09	2.15	2.22	2.29	2.37	2.45	2.53	2.62	2.70	2.79	2.88	2.98	3.07	3.18	3.28	3.39	3.50	3.61	3.73	3.86	3.98	4.12	4.25	4.40	4.54	4.68	4.85
C Gross Income (A-B)		693.39	0.00	0.00	1.24	2.91	3.61	3.72	7.37	7.62	7.87	8.12	13.03	13.46	13.91	14.36	14.84	15.33	15.84	16.36	16.89	17.45	18.02	18.62	19.24	19.87	20.52	21.21	21.90	22.63	23.37	24.15	24.95	25.77	26.62	27.50	28.40	29.34	30.30	31.31	32.35	33.40
D Depreciation cost		248.15																																								
E Interest paid		76.75	0.04	0.07	1.34	2.66	3.26	3.26	3.26	3.26	3.26	3.27	3.17	3.08	2.98	2.89	2.79	2.69	2.59	2.49	2.39	2.28	2.18	2.08	1.97	1.86	1.76	1.65	1.54	1.43	1.31	1.20	1.08	0.97	0.85	0.73	0.61	0.49	0.37	0.25	0.13	
F Net Income		368.49	-0.04	-0.07	-0.10	0.25	0.35	-6.63	-2.98	-2.73	-2.48	-2.23	2.67	3.20	3.74	4.29	4.86	5.45	6.06	6.68	7.31	7.97	8.65	9.35	10.07	10.81	11.57	12.36	13.16	14.00	14.85	15.75	16.66	17.60	18.56	19.56	20.58	21.64	22.72	23.85	25.01	26.18
G Tax and duties		0.00																																								
H Net Income after deduction of TAX		368.49	-0.04	-0.07	-0.10	0.25	0.35	-6.63	-2.98	-2.73	-2.48	-2.23	2.67	3.20	3.74	4.29	4.86	5.45	6.06	6.68	7.31	7.97	8.65	9.35	10.07	10.81	11.57	12.36	13.16	14.00	14.85	15.75	16.66	17.60	18.56	19.56	20.58	21.64	22.72	23.85	25.01	26.18
OM Cost Recovery Ratio (A/B)		750%	0%	0%	240%	319%	333%	331%	544%	546%	545%	544%	789%	790%	792%	787%	790%	791%	792%	790%	789%	790%	788%	790%	790%	789%	791%	789%	790%	789%	790%	791%	791%	790%	791%	790%	789%	790%	789%	790%	791%	789%

PROJECTED CASH FLOW 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				
SOURCES OF FUNDS																																														
A Internal Cash Generation																																														
1. Net Income		368.49	-0.04	-0.07	-0.10	0.25	0.35	-6.63	-2.98	-2.73	-2.48	-2.23	2.67	3.20	3.74	4.29	4.86	5.45	6.06	6.68	7.31	7.97	8.65	9.35	10.07	10.81	11.57	12.36	13.16	14.00	14.85	15.75	16.66	17.60	18.56	19.56	20.58	21.64	22.72	23.85	25.01	26.18				
2. Depreciation cost		248.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
3. Interest Paid		76.75	0.04	0.07	1.34	2.66	3.26	3.26	3.26	3.26	3.26	3.27	3.17	3.08	2.98	2.89	2.79	2.69	2.59	2.49	2.39	2.28	2.18	2.08	1.97	1.86	1.76	1.65	1.54	1.43	1.31	1.20	1.08	0.97	0.85	0.73	0.61	0.49	0.37	0.25	0.13					
Sub-total		693.39	0.00	0.00	1.24	2.91	3.61	3.72	7.37	7.62	7.87	8.12	13.03	13.46	13.91	14.36	14.84	15.33	15.84	16.36	16.89	17.45	18.02	18.62	19.24	19.87	20.52	21.21	21.90	22.63	23.37	24.15	24.95	25.77	26.62	27.50	28.40	29.34	30.30	31.31	32.35	33.40				
B Finances																																														
1. Project Loan		326.77	3.91	2.79	127.65	131.48	59.91	0.58	0.45																																					
2. Local fund		111.20	1.29	0.91	43.25	45.46	20.16	0.07	0.06																																					
Sub-total		437.97	5.20	3.70	170.90	176.94	80.07	0.65	0.51																																					
C Subsidy from Government																																														
1. Subsidy for O&M cost		0.00																																												
2. Subsidy for debt services		0.21																																												
Sub-total		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					
Total Cash Inflow		1131.58	5.24	3.77	172.24	179.85	83.68	4.37	7.88	7.62	7.87	8.12	13.03	13.46	13.91	14.36	14.84	15.33	15.84	16.36	16.89	17.45	18.02	18.62	19.24	19.87	20.52	21.21	21.90	22.63	23.37	24.15	24.95	25.77	26.62	27.50	28.40	29.34	30.30	31.31	32.35	33.40				
APPLICATION OF FUNDS																																														
D Project disbursement		437.97	5.20	3.70	170.90	176.94	80.07	0.65	0.51																																					
E Total debt services																																														
1. Loan repayment		326.79																																												
2. Interest paid		76.75	0.04	0.07	1.34	2.66	3.26	3.26	3.26	3.26	3.26	3.27	3.17	3.08	2.98	2.89	2.79	2.69	2.59	2.49	2.39	2.28	2.18	2.08	1.97	1.86	1.76	1.65	1.54	1.43	1.31	1.20	1.08	0.97	0.85	0.73	0.61	0.49	0.37	0.25	0.13					
Sub-total		403.54	0.04	0.07	1.34	2.66	3.26	3.26	3.26	3.26	3.26	3.26	3.27	3.17	3.08	2.98	2.89	2.79	2.69	2.59	2.49	2.39	2.28	2.18	2.08	1.97	1.86	1.76	1.65	1.54	1.43	1.31	1.20	1.08	0.97	0.85	0.73	0.61	0.49	0.37	0.25	0.13				
Total Cash Outflow		841.51	5.24	3.77	172.24	179.60	83.33	3.91	7.77	7.62	7.87	8.12	13.03	13.46	13.91	14.36	14.84	15.33	15.84	16.36	16.89	17.45	18.02	18.62	19.24	19.87	20.52	21.21	21.90	22.63	23.37	24.15	24.95	25.77	26.62	27.50	28.40	29.34	30.30	31.31	32.35	33.40				
F Net Surplus Cash (A+C2)-E		290.07	0.00	0.00	0.00	0.25	0.35	0.46	4.11	4.36	4.61	4.86	0.37	0.80	1.25	1.70	2.17	2.67	3.18	3.70	4.23	4.79	5.36	5.96	6.57	7.21	7.86	8.54	9.23	9.96	10.70	11.49	12.29	13.11	13.96	14.84	15.74	16.68	17.64	18.65	19.69	20.73				
Investment Cost Recovery Ratio (%)																																														
Cost recovery by water fee (A/E)		172%	0%	0%	92%	109%	111%	114%	226%	234%	241%	249%	103%	106%	110%	113%	117%	121%	125%	129%	133%	138%	142%	147%	152%	157%	162%	167%	173%	179%	184%	191%	197%	204%	210%	217%	224%	232%	239%	247%	256%	264%				
Cost recovery by water fee + subsidy ((A+C2)/E)		172%	100%	100%	100%	109%	111%	114%	226%	234%	241%	249%	103%	106%	110%	113%	117%	121%	125%	129%	133%	138%	142%	147%	152%	157%	162%	167%	173%	179%	184%	191%	197%	204%	210%	217%	224%	232%	239%	247%	256%	264%				

