STATE COMMITTEE OF WATER ECONOMY
MINISTRY OF ENERGY INFRASTRUCTURES AND NATURAL RESOURCES
THE REPUBLIC OF ARMENIA

PREPARATORY SURVEY FOR YEGHVARD IRRIGATION SYSTEM IMPROVEMENT PROJECT

FINAL REPORT
(FR)

APPENDIXES

NOVEMBER 2016

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SANYU CONSULTANTS INC. (SCI)
ORIENTAL CONSULTANTS GLOBAL CO., LTD. (OCG)

3R
CR
16-033

CONTENTS OF APPENDIXES

APPENDIX A

Current Conditions of Irrigation Facilities

Appendix-A: Current Conditions of Irrigation Facilities

(1)Arzni Branch Canal

1) Condition of irrigation

・ This canal is an open one of concrete of the extension L=14.55km that starts from the division work of Arzni-Shamiram Canal. Location of the irrigation facilities of this canal is shown in Figure A-10. Dimensions and design specifications of this canal are shown in the Table A-1.

Figure A-1 Intake of Arzni-Branch Canal (No.1)

Figure A-2 Arzni-Branch Canal (No.4)

・ Upstream portion of this canal is being managed by Yeghvart WUA and downstream portion of this canal is being managed by Ashutarak WUA. Water intake from the Arzni-Shamiram Canal is performed every WUA. Ashutarak WUA are not using running water from the upstream of this canal and have directly water intake by the pipeline from Arzni-Shamiram Canal and have water distribution by a pipeline network to the beneficiary areas of Arzni-Branch Canal.

Figure A-3 Border of Yeghvart WUA and Ashtarak WUA

Figure A-4 Intake of pipe fromArzni-Shamiram Canal to Arzni Branch Canal

Figure A-5 Inlet of pipe from Arzni-Shamiram Canal to Arzni Branch Canal

Figure A-6 Outlet of pipe from Arzni-Shamiram Canal to Arzni Branch Canal

- Downstream of the canal than No.33 point is not currently in use. Surplus water is used for irrigation of agricultural land around Sasunik town.

Figure A-7 End of using canal (No.33)

- The discharge of this canal is 7.0m^3/s at the beginning part and 2.0m/s at the end part. The canal cross section is B1.9m × H1.4m at the beginning part and B2.5m × H1.5m, at the end part. For more information, refer Table A-1 Arzni-Branch Canal's dimensions and specifications.
- Although the Connection Canal for water injection into Thakahan Canal near the end of this canal can be confirmed, it is not currently used.

Figure A-8 Connection Canal to Thakahan Canal (No.42)

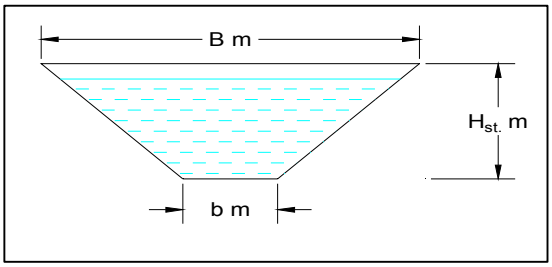
Figure A-9 Connection Canal to Thakahan Canal (No.42)

Figure A-10 Location of the Irrigation Facilities of Arzni-Branch Canal

Table A-1 Arzni-Branch Canal's Dimensions and Specifications

Arzni branch canal							
NN	D/M	Length	Conser Code	b, m	B, m	H_{st}, m	Discharge Q, m^3/s
1	0+00 0+90	90	C	1.0	2.5	1.5	7.0
2	0+90 2+00	110	C	1.0	2.5	1.5	7.0
3	2+00 2+35	35	C	0.7	2.2	1.5	7.0
4	2+35 4+95	260	C	0.6	2.1	1.5	7.0
5	4+95 6+00	105	C	0.7	2.5	1.8	7.0
6	6+00 10+20	420	C	0.8	2.8	2.0	7.0
7	0+25		B				7.0
8	3+50		B				7.0
9	8+80		B				7.0
10	9+10		B				7.0
11	10+00	–	G				–
12	10+20 11+20	100	C	0.8	2.6	1.8	7.0
13	11+20 11+50	30	C	2.5	2.5	2.5	7.0
14	11+50 29+00	1750	C	1.0 2.5	3.0 5.0	2.0 2.5	7.0
15	11+70	–	OUT				–
16	29+00 32+00	300	C	1.8	4.3	2.5	7.0
17	37+60	–	OUT				–
18	32+00 37+90	590	C	1.3	3.8	2.5	7.0
19	37+90 38+25	35	C	2.0	2.0	2.5	7.0
20	38+25 38+75	50	A	2.0	2.0	2.5	7.0
21	38+75 39+10	35	C	2.0	2.0	2.5	7.0
22	39+10 49+10	1000	C	1.5	4.0	2.5	7.0
23	46+00	–	OUT				–
24	49+10 52+00	290	C	8.0 1.5	3.1 4.5	2.5 3.0	7.0
25	52+00 56+00	400	C	1.2	3.8	2.6	6.0
26	56+00 56+50	50	C	1.3	3.9	2.6	6.0
27	56+50 61+00	450	C	1.3	3.9	2.6	6.0
29	59+00, 59+30; 59+40	3	OUT				–
30	61+00 64+50	350	C	1.2	3.6	2.4	6.0
31	64+50 69+00	450	C	1.2	3.7	2.5	6.0
32	69+00 72+80	380	C	1.3	3.3	2.0	4.3
33	72+80 88+00	1520	C	1.3	3.3	2.0	4.3
34	88+00 97+00	900	C	1.3	3.6	2.3	4.3
35	97+00 105+00	800	C	1.2	3.9	2.7	4.3
36	105+00 107+50	250	C	1.2	3.9	2.7	4.0
37	107+50	–	OUT				–
38	107+50 107+90	40	A	2.0	2.0	2.0	3.6
39	107+90 123+00	1510	C	1.5	4.1	2.6	3.6
40	123+00 130+00	700	C	0.8	2.0	1.2	2.8
41	130+00 136+00	600	C	1.0	2.7	1.7	2.8
42	136+00	–	OUT				–
43	136+00 137+50	150	C	0.8	2.3	1.5	2.8
44	137+50 143+00	550	C	0.8	2.3	1.5	2.8
45	143+00 143+80	80	C	1.5	1.5	1.5	2.8
48	143+80 144+50	70	C	0.4	1.6	1.2	2.8
49	144+50 145+00	50	A	1.5	1.5	1.2	2.8
50	145+00 145+50	50	C	0.8	2.3	1.5	2.8
51	145+50 148+50	300	C	0.5	2.0	1.5	2.0
52	148+50 152+50	400	C	0.5	1.9	1.4	2.0
53	152+00		S				2.0
54	152+50 170+50	1800	S		d = 700		2.0
55	145+50		B				2.8

Constraction Code
C - Canal
S - Syphon
A - Aqueduct
IN - Intake
OUT - Outlet
G - Gally
B - Bridge
O - Others



- The current beneficiary area under this canal is 1428ha in the estimation, the maximum water intake amount is estimated at Q = 1.084m^3 / s.

- Diversion from this canal to tertiary canals has been carried out by opening and closing the distribution gate. Although distribution gate has been confirmed 38 places, gate leafs of 7 places under the control of Ashutarak WUA (No.33,35,41,43,44) are missing and 12 places (No.34,35,36,38,40,41,42,43,44) of downstream of No.33 point are not currently used. Figure A-10 shows Gate positions. Although the size of gates is different in B = 0.30m ~ 0.95m × H = 0.5m ~ 1.9m, Diversion per one gate is estimated to be 0.02 ~ 0.04m^3/s approximately from the following.

  a) Estimated from the maximum water intake and distribution gate number
     Maximum water intake 1.084m^3/s÷distribution gates in use 26places =0.04m^3/s

  b) Estimated from the water depth measured by water measurement facility of downstream side of distribution gate (No.8 point)

     $Vc=\sqrt{(9.81\times0.05)}=0.70m/s$

     $Q=0.05\times0.60\times0.70=0.021m3/s$

Figure A-11 Distribution Gate (Slide Gate) (No.3)

Figure A-12 Distribution Gate (Bulb) (No.34)

2) Condition of facilities (Deterioration and damage)

- The upstream portion of this canal under the control of Yeghvart WUA is renovated in recent years, except for the most upstream section, The condition of canal is generally good (Figure A-13).

- It is found a damaged concrete portion at side wall at about 500m section of the non-renovation of downstream of crossing point of railway portion near the intake structure of this canal (Figure A-14).

- It is found water leakage from the joint of the side wall of the No.18 point aqueduct bridge (Figure A-15).

Figure A-13 Upstream of Canal under Control of Yeghvart WUA (No.4)

Figure A-14 Damaged Concrete at Side Wall of Canal (No.2)

Figure A-15 Leakage from Joint at side Wall of Aqueduct Bridge (No.18)

- It is found significant damaged concrete portions and cracks at side wall and bottom of channel within section that is currently being used up to No.33 point (Figure A-16 to A-18).
- No.33 point later canal is not currently being used, it is devastated (Figure A-19).

Figure A-16 Crack at Side Wall of Canal (No.26)

Figure A-17 Missing Portion at Bottom of Canal (No.27)

Figure A-18 Damaged Concrete at Side Wall of Canal (No.27)

Figure A-19 Disused Canal not Used (No.35)

3) Diversion from other water source

According to the results of the field survey, the inflow from other water sources has been confirmed in five locations in the middle of this canal.

Inflow location and water source are shown in the table below. Any of the inflow is also water conveyed from Arizni-Shamiram by pipelines. Refer route location map.

Location of inflow	Water source	Type of inflow
NO.25	Arzni-Shamiram Canal	Outlet of pipe(φ800mm)
NO.34	ditto	Outlet of pipe(φ500mm)
NO.37	ditto	Outlet of pipe(φ700mm)
NO.39	ditto	Outlet of pipe(φ700mm)×2places
NO.40	ditto	Outlet of pipe(φ500mm)

Figure A-20 Outlet of Pipe from Arizni -Shamiram Canal (φ800mm) (No.25)

Figure A-21 Outlet of Pipe from Arzni-Shamiram Canal (φ500mm) (No.34)

Figure A-22 Outlet (φ200mm) of Pipe from Arzni-Shamiram Canal (φ700mm) (No.37)

Figure A-23 Outlet (φ200mm×2) of Pipe from Arzni-Shamiram Canal(φ700mm) (No.39)

Figure A-24 Outlet of Pipe (φ500mm) (No.40)

(2) Tkahan Canal

1) Condition of irrigation

The water intake of this canal is done in Thakahan Intake located in Kasakh River. This canal is an open channel of concrete of the extension L = 13.0km that starts from outlet of pipe from the Intake near old Tkahan pump station.

This canal passes through one crossing point of Higway, two aqueduct bridge and one syphon (ϕ 1200m,L=250m) in the middle of the canal. Location of the irrigation facilities of this canal is shown in Figure A-30. Dimensions and design specifications of this canal are shown in Table A-2.

Figure A-25 Intake of Thakahan Canal (No.1)

Figure A-26 Outlet of Pipe (φ1500m) from the Intake (No.3)

Figure A-27 Thakahan Canal (No.6)

Figure A-28 Aqueduct Bridge (No.38)

Figure A-29 Siphon (φ1200mm) (No.30)

This canal is under control of Ashutarak WUA and the current beneficiary area under this canal is 537ha in the estimation, the maximum water intake amount is estimated at Q = 0.679m^3/s.

The discharge of this canal is 4.3m3 / s at the beginning part and 2.1m/s at the end part. The canal cross section is B2.5m × H1.5m at the beginning part and B2.8m × H1.2m, at the end part. For more information, refer table A-2 Dimensions and specifications.

Diversion from this canal to tertiary canals has been carried out by opening and closing the distribution gate. Although distribution gate has been confirmed 31 places, gate leafs of 2 places (No.34, 35point) are missing. Figure A-38 shows Gate positions. Although the size of gates is different in B = 0.30m ~ 0.75m × H = 0.4m ~ 1.0m, Diversion per one gate is estimated to be 0.02m^3/s approximately from the following.

a) Estimated from the maximum water intake and distribution gate number

   Maximum water intake 0.679m3/s÷distribution gates 31places =0.02m^3/s

b) Estimated from the water depth measured by water measurement facility of downstream side of distribution gate (No.5 point).

   $Vc=\sqrt{(9.81\times0.1)}=0.99m/s$

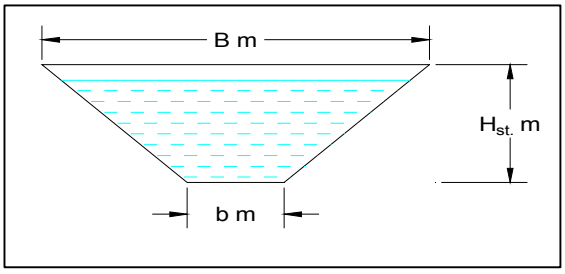
   $Q=0.1\times0.25\times0.99=0.025m3/s$

Figure A-30 Location of the Irrigation Facilities of Tkahan Canal

Table A-2 Tkahan Canal's Dimensions and Specifications

Tkahan Canal							
NN	D/M	Length m	Conser Code	b, m	B, m	H_{st}, m	Discharge Q, m^3/s
1	2	3	4	5	6	7	8
1	0+00 3+50	350	C	2.5	2.5	1.5	4.3
2	3+50 5+00	150	C	2	4.5	2	4.3
3	5+00	1	B				
4	5+00 9+50	450	C	2	4.7	1.8	4.3
5	9+50 20+00	1050	C	2	5	2.1	4.3
6	20+00 22+50	250	C	1.8	4.6	1.9	4.3
7	22+50 25+50	300	C	2.8	2.8	1.5	4.3
8	25+50 27+50	200	C	2.8	2.8	1.5	4.3
9	27+50 28+60	110	C	2.8	2.8	1.5	4.3
10	28+00	1	OUT				–
11	28+60 32+60	400	C	1.6 2.0	4.2 5.0	1.7 2.0	4.3
12	32+60 50+00	1740	C	1.0 1.4	3.2 3.6	1.5	4.3
13	50+00 61+00	1100	C	0.6 1.0	2.8 3.2	1.5	4.0
14	61+00 82+00	2100	C	1	4	2	4.0
15	68+80; 80+00	1	OUT				–
16	82+00 83+00	100	C	1	3.2	1.5	3.0
17	83+00 83+50	50	A	1.5	1.5	1.8	3.0
18	83+50 84+50	100	C	1	3.2	1.5	3.0
19	84+50 86+00	150	C	1	3.4	1.6	3.0
20	86+05	1	OUT				–
21	86+00 95+00	900	C	1	3.5	1.7	3.0
22	90+05; 91+00	1	OUT				
23	95+00 96+00	100	C	1	3.5	1.7	2.1
24	96+00 98+50	250	S	d=1200mm			2.1
25	98+50 120+00	2150	C	0.9	2.9	1.3	2.1
26	120+00 130+00	1000	C	0.8	2.6	1.2	2.1
27	20+00; 22+50; 31+50; 40+00; 41+00; 80+05; 86+00; 90+00		B	–	–	–	–
28	33+50; 50+00; 83+55		OUT	–	–	–	–

Constraction Code
C – Canal
S – Syphon
A – Aqueduct
IN – Intake
OUT – Outlet
G – Gally
B – Bridge
O – Others



2) Condition of facilities (deterioration and damage)

・The condition of canal is generally good except for an aqueduct bridge (Figure A-31 to A33).

・The top portion of the aqueduct bridge of No.35 point is rebar exposed by frost damage, etc. And deterioration of concrete is significant (Figure A-34 to A35).

Figure A-31 Upstream of Canal (No.9)

Figure A-29 Upstream of Canal (No.19)

Figure A-33 Midstream of Canal (No.35)

Figure A-34 Exposed Reba rat Top of Sidewall

Figure A-35 Leakage from Aqueduct Bridge (No.38)

3) Diversion from other water source

According to the results of the field survey, the inflow from other water sources has been confirmed in two locations in the middle of this canal. Inflow location and water source are shown in the table below.

The inflows from link canal of Tkahan Canal have been confirmed. It is considered that the water from outlet of pipeline from Arzni-Shamiram Canal is flowing into in the middle of the link canal.

Location of inflow	Water source	Type of inflow
No.14	-	Outlet of pipe(φ200mm)
No.22	Arzni-Branch Canal	Connection canal from Arzni-Branch Canal

Figure A-36 Outlet of Pipe(φ200mm)

Figure A-37 Diversion from Arzni- Branch Canal (No.22)

(3) Shah-Aru Canal

1) Condition of irrigation

・This canal is an open channel of concrete of the extension L = 8.4km that starts from the left bank Intake of Kasakh weir located in Kasakh River. Location of the irrigation facilities of this canal is shown in Figure A-43. Dimensions and design specifications of this canal are shown in the table A-3.

Figure A-38 Kasakh Weir (No.1)

Figure A-39 Kasakh Intake (No.1)

Figure A-40 Shah-Aru Canal (No.13)

Water of Kasakh River is rich in spring only. Therefore, since only the irrigation water from the Kasakh Intake (maximum water intake amount Q = 2.5m^3/s) has become a shortage of water for irrigation period, the water intake from the Lower Hrazdan Canal (maximum water intake amount Q = 2.5m^3/s) has become the main water intake of this canal currently. Intake point is from a distribution gate of the Lower Hrazdan Canal in underpass place to cross Lower Hrazdan Canal.

Figure A-41 Under pass to Cross Lower Hrazdan Canal (No.4)

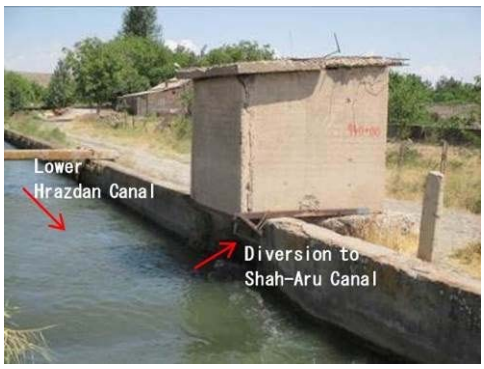


Figure A-42 Diversion from Lower Hrazdan Canal (No.4)

- This canal is under control of Vanherhapat WUA and the current beneficiary area under this canal is 701.6ha in the estimation, the maximum water intake amount is estimated at Q = 0.886m3 / s.
- The discharge of this canal is 2.0m^3/s at the beginning part, 3.0m^3/s at downstream of crossing point of Lower Hrazdan Canal and 0.7m/s3 at the end part.
- The canal cross section is B1.5m × H1.8m at the beginning part, B2.2m × H1.0m at downstream of crossing point of Lower Hrazdan Canal and B1.0m(Bottom),3.0m(Top) × H1.0m, at the end part. For more information, refer table A-3 Dimensions and specifications.

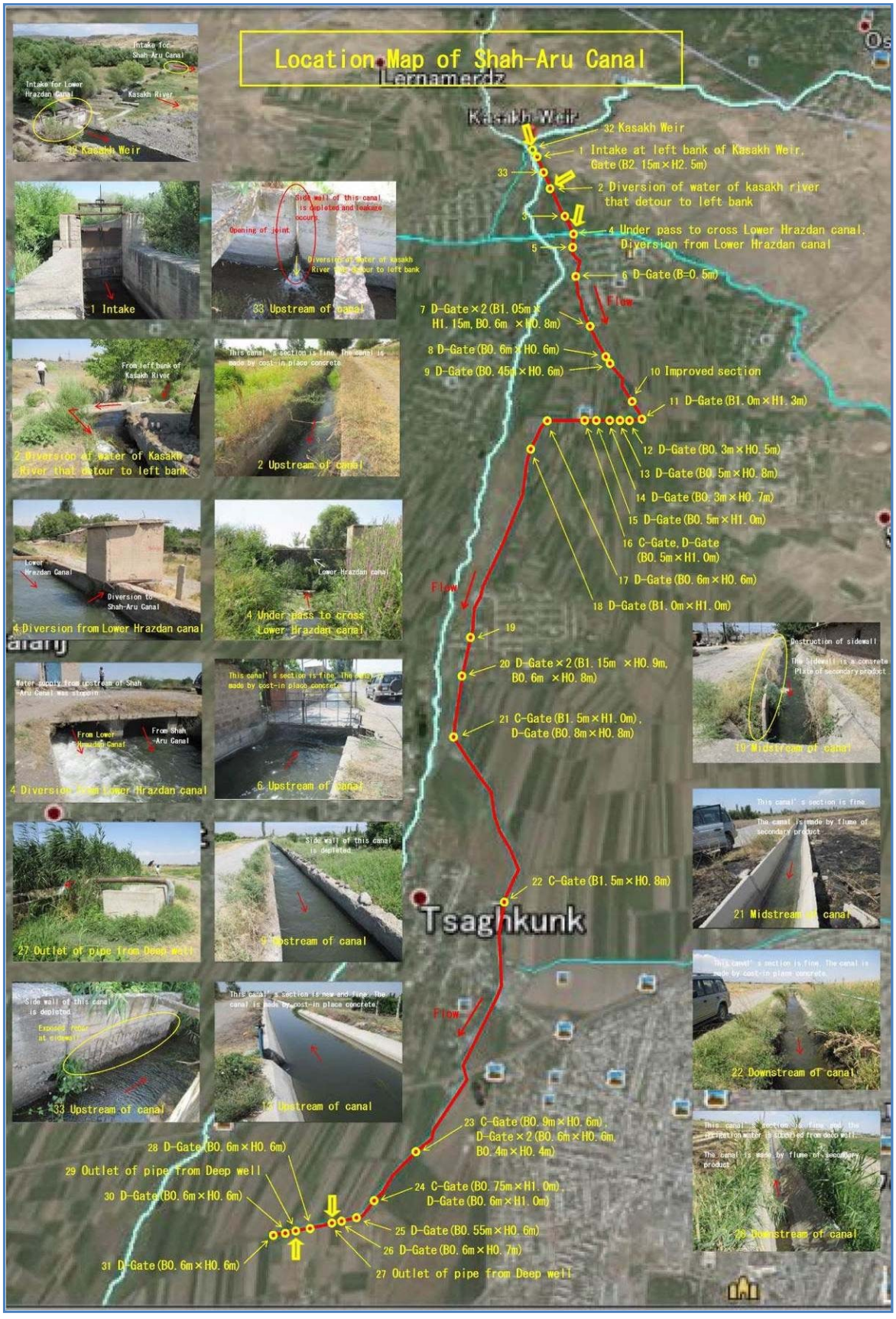
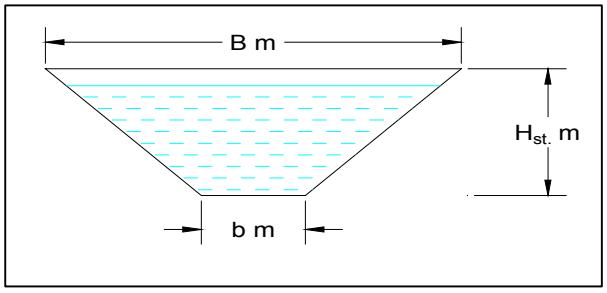


Figure A-43 Location of the Irrigation Facilities of Shah-Aru Canal

Table A-3 Shah-Aru Canal's Dimensions and Specifications

Shah-Aru Canal							
NN	D/M	Length	Conser Code	b, m	B, m	H_{st}, m	Discharge Q, m^3/s
1	0+00 2+00	200	C	1.5	1.5	1.8	2.0
2	2+00 3+40	140	C	1.5	1.5	1.0	2.0
3	3+40 4+00	60	C	1.5	1.5	0.8	2.0
4	4+00 9+50	550	C	1.5	1.5	1.0	2.0
5	9+50 11+00	150	C	1.5	1.5	1.0	2.0
6	11+00 28+00	1700	C	2.2	2.2	1.0	3
7	28+00 34+00	600	C	2	2	1.0	3
8	34+00 41+00	700	C	1.5	3.5	1.0	2.0
9	41+00 50+00	900	C	1.0	3.0	1.0	2.0
10	50+00 56+00	600	C	1.0	3.0	1.0	2.0
11	56+00 59+00	300	C	1.0	3.0	1.0	1.5
12	59+00 67+00	800	C	1.0	3.0	1.0	1.0
13	67+00 68+50	150	C	1.0	3.0	1.0	1.0
14	68+50 70+00	150	C	1.0	3.0	1.0	1.0
15	70+00 84+00	1400	C	1.0	3.0	1.0	1.0
16	84+00 93+00	900	C	1.0	3.0	1.0	0.7

Constraction Code
C - Canal
S - Syphon
A - Aqueduct
IN - Intake
OUT - Outlet
G - Gally
B - Bridge
O - Others



Distribution gate has been confirmed 24 places. Figure A-43 shows Gate positions. Although the size of gates is different in B = 0.30m ~ 1.15m × H = 0.4m ~ 1.3m, Diversion per one gate is estimated to be 0.04m3/s approximately from the following.

a) Estimated from the maximum water intake and distribution gate number

Maximum water intake $0.886m^3/s \div$ distribution gates 24places $=0.04m^3/s$

b) Estimated from the water depth measured by water measurement facility of downstream side of distribution gate (No.7 point)

$$Vc=\sqrt{(9.81\times0.09)}=0.94m/s$$
$$Q=0.09\times0.55\times0.94=0.046m^3/s$$

2) Condition of facilities (Deterioration and damage)

Water leakage due to the opening of the joint and exposed rebar can be seen on the side walls at canal section (No.33 point) of immediately downstream of Kassaku Intake. Since the water intake from Kasakh Intake becomes the main water intake after the completion of Yeghvart reservoir, it is necessary to repair the canal section (Figure A-44 to A45).

・The degradation of side wall portion of canal is significant at No.9 point (Figure A-46).

・The side walls of the canal are committed in urban areas around No.19 point. It is worried about water leakage (Figure A-47).

Figure A-44 Leakage from Opening of Joint at Sidewall (No.33)

Figure A-45 Exposed Rebar at Sidewall (No.33)

Figure A-46 Depleted Sidewall (No.9)

Figure A-47 Destruction of Sidewall (No.19)

3) Diversion from other water source

According to the results of the field survey, the inflow from other water sources has been confirmed in four locations in the middle of this canal.

Inflow location and water source are shown in the table below.

Location of inflow	Water source	Type of inflow
No.2	Another Intake of upstream of Kasakh Riverf	Open canal
No.4	Lower Hrazdan Canal	Distribution gate of Lower Hrazdan Canal
No.27	Deep well	Outlet of pipe(φ150mm)
No.29	Deep well	Outlet of pipe(φ150mm)

Figure A-48 Diversion of Water of Kasakh River that Detour to Left Bank (No.2)

Figure A-49 Diversion from Lower Hrazdan Canal (No.4)

Figure A-50 Outlet of Pipe from Deep (No.27)

Figure A-51 Outlet of Pipe from Deep (No.29)

(4) Upper Aknalich Canal

1) Condition of irrigation

This canal is an open channel of concrete of the extension L=approximately 10.km that starts from the outlet of pipe from Aknalich Pump Station. This canal passes through two crossing points of Highway, two aqueduct bridges in the middle of the canal. Location of the irrigation facilities of this canal is shown in Figure A-59.

Figure A-52 Aknalich PS (No.1)

Figure A-53 Upper Aknalich Canal (No.20)

Figure A-54 Aqueduct Bridge (No.23)

Figure A-55 Crossing Point of Road (No.13)

Akinalich Pumping Station was built in 1926 and the it has seven pumps in total, three pumps in outdoor (Capacity Q = 0.065m^3/s, 0.265m3/s and 0.75m^3/s), four pumps in indoor (One only operation, Capacity Q = 0.4m^3/s). The current maximum water discharge amount is 0.75m^3/s. Among them, it is possible to send irrigation water of the amount of 0.38m^3/s to this canal (Upper Aknalich Canal) and irrigation water of the amount of 0.27m^3/s to Inner Aknalich Canal. However, sufficient irrigation water is not supplied from Aknalich PS to this canal due to the drawdown of Lake Aknalich presently.

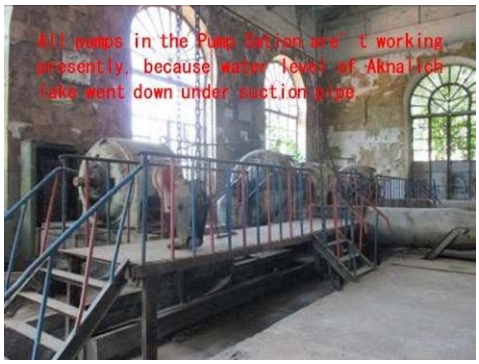


Figure A-56 Aknalich PS (No.1)

Figure A-57 Aknalich PS (No.1)

- The discharge of this canal is 3.0m3/s according to interviews
- Downstream canal from the road crossing of the No.32 point is not currently being used, it has been devastated.

Figure A-58 No used Downstream Canal (No.34)

Figure A-59 Location of the irrigation facilities of Upper Aknalich Canal

・The pipeline(φ730mm) for irrigation has been built in the direction from No.14 point to No.32 point by IFAD in 2004.

・This canal is under control of Khoy WUA and the current beneficiary area under this canal is 755.0ha in the estimation, the maximum water intake amount is estimated at Q = 0.954m^3/s.

・Distribution gate has been confirmed 26 places. Figure A-59 shows Gate positions. Although the size of gates is different in B = 0.30m ~ 0.8m × H = 0.3m ~ 1.7m, Diversion per one gate is estimated to be 0.04m^3/s approximately from the following.

a) Estimated from the maximum water intake and distribution gate number

Maximum water intake 0.954m^3/s ÷ distribution gates 26places =0.04m^3/s

・The flume canal was installed in parallel to this canal in the interval from No.35 point to end of canal. Water from deep wells is irrigated to the canal, it is irrigating surrounding farmland. In addition, this canal and the canal irrigated by deep well is not connected.

Figure A-60 Irrigated Canal by Deep Well (No.39)

Figure A-61 Irrigated Canal by Deep Well (No.39)

・There was an inlet of headrace (pipeline) to the Inner Aknalich Canal at No.2 point, but it is closed with concrete presently.

Figure A-62 Inlet of Pipe to Inner Aknalich Canal (No.2)

Figure A-63 Inlet of Pipe to Inner Aknalich Canal (No.2)

2) Condition of facilities (Deterioration and damage)

・The deterioration such as exposed rebar is significant at sidewall of the canal in about 200m section from No.8 to No.9 (Figure A-64).

・Large cracks, loss and destruction commitment etc. has occurred at canal's side wall in the section from the aqueduct bridge at No.21 point to the road crossing point at No.32 point and deterioration is significant (Figure A-65 to A-67).

・According to interviews from the WUA, they said that even if canal is repaired in the section from No.8 point to No.9 point and the section from No.21 point to No.32 point where deterioration is significant, enough water does not come from the pumping station. It is unnecessary to repair it.

・The deterioration of concrete and exposed rebar by frost damage are significant at side wall portion of the aqueduct bridges at No.21 point and No.23 point. (Figure A-68 to A-69)

Figure A-64 Exposed Rebar at Sidewall (No.9)

Figure A-65 Cracked Sidewall (No.22)

Figure A-66 Depleted Sidewall (No.29)

Figure A-67 Destruction of Sidewall (No.32)

Figure A-68 Exposed Rebar at Sidewall (No.21)

Figure A-69 Exposed Rebar at sidewall (No.23)

3) Diversion from other water source

According to the results of the field survey, the inflow from other water sources has been confirmed in five locations in the middle of this canal. Inflow location and water source are shown in the table below.

Inflow to No.25 point comes via earth canal (L=8km) from the confluence of the headrace from Kasakh Intake and Lower Hrazdan Canal.

Although discharge is 0.3m^3/s at diversion point, discharge that arrives in this canal is 0.15m^3/s. it is necessary to repair the earth canal for very large loss.

Location of inflow	Water source	Type of inflow
No.6	Lower Hrazdan Canal	Outlet of pipe(φ1000mm)
No.25	Lower Hrazdan Canal	Open canal→Outlet of pipe
No.36	Deep well	Outlet of pipe(φ150mm)
No.38	Deep well	Outlet of pipe(φ150mm)
No.40	Deep well	Outlet of pipe(φ150mm)

Figure A-70 Diversion from Lower Hrazdan Canal (No.6)

Figure A-71 Diversion from Lower Hrazdan Canal (No.25)

Figure A-72 Outlet of Pipe from Deep (No.36)

Figure A-73 Outlet of Pipe from Deep (No.39)

Figure A-74　Outlet of Pipe from Deep (No.40)

(5) Inner Aknalich Canal

1) Condition of irrigation

This canal is an open channel of concrete of the extension L=approx. 8 km that starts from the outlet of pipe from Aknalich Pump Station. This canal passes through two aqueduct bridges including crossing of Kasakh in the middle of the canal. Location of the irrigation facilities of this canal is shown in Figure A-78.

Figure A-75　Outlet of Pipe (φ1,000mm) from Aknalich PS (No.1)

Figure A-76　Inner Aknalich Canal (No.2)

Figure A-77　Aqueduct Bridge (No.20)

Figure A-78 Location of the Irrigation Facilities of Inner Aknalich Canal

The canal cross section is B2.0m × H1.7m (Oblong canal) at upstream (No.2), B2.0m (Bottom), B4.0m(Top) × H1.4m (Trapeziform canal) at upstream (No.7), B1.9m × H1.3m (Oblong canal) at midstream (No.10), B1.6m×H1.3m at downstream and B0.5m(Bottom),B1.0m(Top) × H0.7m at the end part.

Currently, irrigation water is not passed through only from the starting point to Highway near No.17 point. Previously water had been passed up to the end of canal. (Figure A-79 to A-80)

Figure A-79 No Used Canal (No.21)

Figure A-80 No Used Aqueduct Bridge (No.20)

・Water from deep wells is irrigated to this canaln section from No.24 point to end of canal, it is irrigating surrounding farmland.

Figure A-81 Irrigated Canal by Deep well (No.28)

・This canal is under control of Vanherhapat WUA and the current beneficiary area under this canal is 1,134ha in the estimation, the maximum water intake amount is estimated at Q = 1.432m^3/s.

・Distribution gate has been confirmed 23 places. Figure A-78 shows Gate positions. Although the size of gates is different in B = 0.30m ~ 0.9m , H = 0.4m ~ 1.15m, Diversion per one gate is estimated to be 0.04m^3/s～0.06m^3/s approximately from the following.

a) Estimated from the maximum water intake and distribution gate number

Maximum water intake 1.432m3/s÷distribution gates 23places =0.06$m^{3/}$s

b) Estimated from the water depth measured by water measurement facility of downstream side of distribution gate (No.6 point)

Vc=√(9.81×0.08)=0.89m/s,

$Q=0.08\times0.5\times0.89=0.04m^3/s$

・Near the No.2 point and No.19 point, Deep well is scheduled to be added next year.

2) Condition of facilities (Deterioration and damage)

The exposed rebar can be seen on the top of side walls in section (L=600m) from No.2 point to No.4 point and near No.12 point and No.14 point.

Figure A-82 Exposed Rebar at Sidewall (No.2)

Figure A-83 Exposed Rebar at Sidewall (No.14)

Grass is flourishing in the canal in section from upstream 520m point of No.22 point to No.24 point and the canal has been devastated. It is necessary to repair it in order to pass water until the end of canal again.

Figure A-84 No Used Canal (No.22)

Figure A-85 No Used Canal (No.23)

3) Diversion from other water source

According to the results of the field survey, the inflow from other water sources has been confirmed in six locations in the middle of this canal. Inflow location and water source are shown in the table below.

Inflow to No.8 point comes via earth canal (L=8km) from the confluence of the headrace from Kasakh Intake and Lower Hrazdan Canal.

Although discharge is $0.3m^3/s$ at diversion point, discharge that arrives in this canal is $0.15m^3/s$. it is necessary to repair the earth canal for very large loss.

Location of inflow	Water source	Type of inflow
No.5	Upper Aknalich Canal	Outlet of pipe(φ150mm)
No.8	Lower Hrazdan Canal	Open canal(Earth Canal) : Q=0.15m3/s
No.24	Deep well	Outlet of pipe(φ150mm)
No.28	Deep well	Outlet of pipe(φ150mm)
No.30	Deep well	Outlet of pipe(φ150mm)
No.34	Deep well	Outlet of pipe(φ150mm)

Figure A-86 Outlet of Pipe from Upper Aknalich Canal (No.5)

Figure A-87 Diversion from Lower Hrazdan Canal (No.8)

Figure A-88 Outlet of Pipe from Deep (No.24)

Figure A-89 Outlet of Pipe from Deep (No.28)

Figure A-90 Outlet of Pipe from Deep (No.30)

Figure A-91 Outlet of Pipe from Deep (No.34)

(6) Metsamor Canal

1) Condition of irrigation

This canal is divided into main line of the north side and branch line of the south side. The main line is a canal of trapezoidal concrete and branch line is a flume of the secondary product of the U-shaped. The water is supplied form outlet of pipe at No.1 point through pipeline (φ1,200mm) from mainly Metsamor PS. To the branch line, the water is supplied mainly from outlet of pipe at concrete box via the No.1 point by pipeline from the same PS in parallel with the pipeline to the main line. In addition, as the pump station stopped, main line and branch line are irrigated by open canal and pipeline from Lower Hrazdan Canal. Location of the irrigation facilities of this canal is shown in Figure A-96.

Figure A-92 Outlet of Pipe(φ 1200mm) from Metsamor PS (No.1)

Figure A-93 Metsamor Canal (Main Canal) (No.2)

Figure A-94 Outlet of Pipe (φ500mm) from Metsamor PS (No.25)

Figure A-95 Metsamor Canal (Branch Canal) (No.23)

Figure A-96 Location of the Irrigation Facilities of Metsamor Canal

The Metsamor Pump Station has total four pumps and pump are all running. Water supply capacity of the pump is P1=0.32m^3/s, P2=0.55m^3/s, P3=0.95m^3/s and P4= 0.35m^3/s. Normally, the only pump P2 is running once per two days, since the water to be pumped is insufficient in recent years. It is a situation in which sufficient irrigation water is not supplied to this canal from this pump station.

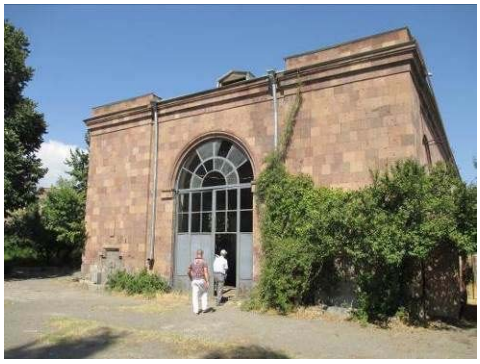


Figure A-97 Metsamor PS (No.27)

Figure A-98 Metsamor PS (No.27)

The canal cross section is B2.5m (Bottom), B3.5m(Top) × H1.8m (Trapeziform canal) at starting point of main line (No.1) and B0.54m×H0.45m (U-shaped) at the end part of branch line.

This canal is under control of Khoy WUA and the current beneficiary area under this canal is 132ha in the estimation, the maximum water intake amount is estimated at Q = 0.167m^3/s.

Distribution gate has been confirmed 22 places under the control of Khoy WUA, but gate leafs of 6 place are missing. Figure A-96 shows Gate positions. Although the size of gates is different in B=0.30m~0.6m, H=0.3m~0.8m, diversion per one gate is estimated to be 0.01m^3/s approximately from the following.

a) Estimated from the maximum water intake and distribution gate number

Maximum water intake 0.167m^3/s÷distribution gates 22places =0.01m^3/s

2) Condition of facilities (Deterioration and damage)

- This canal is renovated in recent years with the support of the World Bank. The condition of canal is good. (Figure A-99)
- Gate leafs of 6 places are missing. (Figure A-100)

Figure A-99 Canal of Metsamor (No.2)

Figure A-100 Missing Gate Leaf (No.18)

3) Diversion from other water source

According to the results of the field survey, the inflow from other water sources has been confirmed in four locations in the middle of this canal. Inflow location and water source are shown in the table below.

Inflow to No.2 point mainly comes through pipeline (ϕ 500mm) from Metsamor Pump Station. As the pump station stopped, it is possible to supply water from Lower Hrazdan Canal reversely through pipeline (ϕ 500mm) from confluence box of No.25 point to outlet of pipe at No.2 point.

Location of inflow	Water source	Type of inflow
No.2	Lower HrazdanCanal or Metsamor PS	Outlet of pipe(φ220mm)
No.6	Lower Hrazdan Canal	Open canal
No.21	Deep well	Outlet of pipe(φ150mm)
No.25	Lower Hrazdan Canal	Outlet of pipe(φ400mm)

Figure A-101 Outlet of Pipe (φ220mm) from Metsamor PS (No.2)

Figure A-102 Diversion from Lower Hrazdan Canal (No.6)

Figure A-103 Outlet of Pipe from Deep (No.20)

Figure A-104 Outlets of 3 Pipes from, Lower Hrazdan Canal, Deep Well Metsamo PS (No.25)

(7) Lower Hrazdan canal

1) Condition of irrigation

The water intake of this canal is done in Yerevan Intake located in Hrazdan River. This canal is an open channel of concrete that starts from the distribution gate at diversion point with Astashat Canal through headrace canal (L=1km). This canal is divided into Stage 1 (L = 28.3km) at the east side of Kasakh river and Stage 2 (L = 21.9km) at the west side and the total length is L=50.2km. This canal passes through six aqueduct bridges and one syphon (L=300m) in the middle of the canal. Location of the irrigation facilities of this canal is shown in Figure A-111. Dimensions and design specifications of this canal are shown in Table A-4 to A-5.

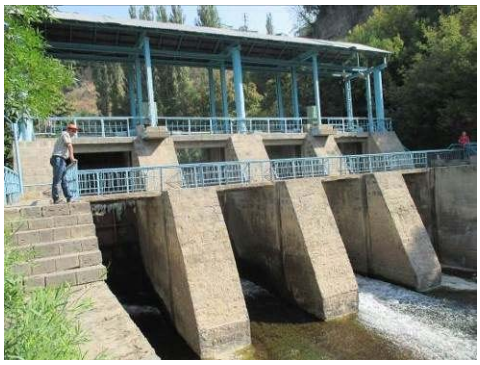


Figure A-105 Yerevan Weir (No.1)

Figure A-106 Intake for Lower Hrandzan Canal (No.2)

Figure A-107 Intake for Lower Hrandzan Canal (No.2)

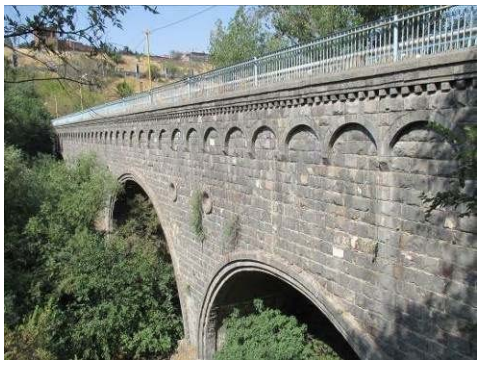


Figure A-108 Aqueduct Bridge (No.2)

Figure A-109 Lower Hrandzan Canal (No.17)

Figure A-110 Syhon Crossing Kasakh River (No.36)

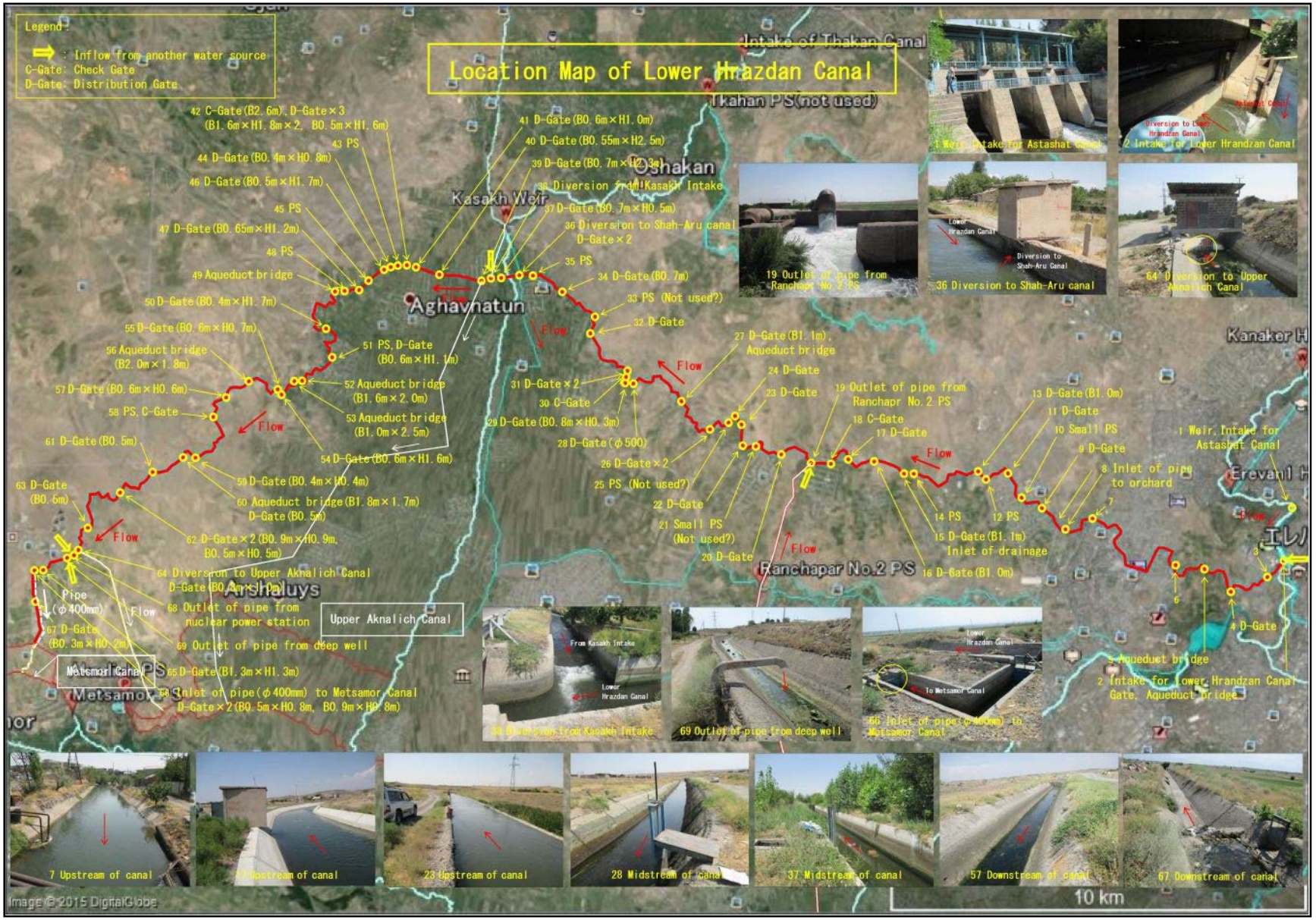


Figure A-111 Location of the Irrigation Facilities of Lower Hrazdan Canal

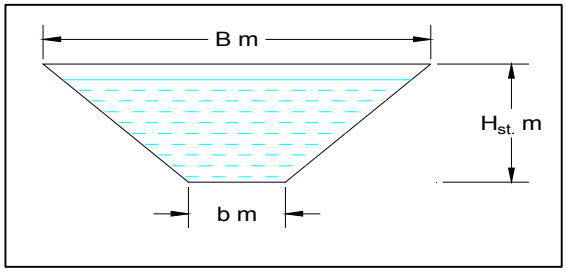
Table A-4 Lower Hrazdan Canal Specifications Table (1/2)

Lower Hrazdan Main canal I stage							
NN	D/M	Length	Conser Code	b, m	B, m	H_{st}, m	Discharge Q, m^3/s
1	0+00	0	IN	5	5	3	13
2	0+00 1+13	113	A	3	3	3.5	10
3	1+13 4+15	302	C	3	6.5	3.5	10
4	4+15 4+80	65	C	6.5	3	3.5	10
5	4+80 12+00	720	C	3	10	3.5	10
6	12+00 12+50	50	C	3	10	3.5	10
7	12+50 14+80	230	C	3	10	3.5	10
8	14+80 15+80	100	C	3	10	3.5	10
9	15+80 34+20	1840	C	3	10	3.5	10
10	34+20 38+20	400	C	3	10	3.5	10
11	38+20 57+20	1900	C	3	10	3.5	10
12	57+20 61+00	280	C	3	10	3.5	10
13	61+00 64+80	380	C	3	10	3.5	10
14	64+80 73+10	830	C	4	4	2.5	10
15	73+10 77+20	410	C	4	4	2.5	10
16	77+20 77+70	50	C	4	4	2.5	10
17	77+70 83+44	574	C	3	10	3.5	10
18	83+44 84+05	71	A	3.5	3.5	3.5	10
19	84+05 88+05	400	C	3	10	3.5	10
20	88+05 90+50	245	C	3	10	3.5	10
21	90+50 93+40	290	C	3	10	3.5	10
22	93+40 98+00	460	C	3	10	3.5	10
23	98+00 98+70	7	A	3.5	3.5	3.5	10
24	98+70 107+00	830	C	3.5	3.5	3.5	10
25	107+00 118+00	1100	C	3	10	3.5	10
26	118+00 132+00	1400	C	3	10	3.5	10
27	132+00 144+50	1250	C	3	9	3	10
28	144+50 146+50	200	C	3	9	3	10
29	146+50 188+40	5650	C	3	9	3	10
30	188+40 203+00	1460	C	2	7	2.5	9
31	203+00 227+00	2400	C	3	9	3	9
32	227+00 248+00	2100	C	3	9	3	8
33	248+00 254+00	600	C	3	9	3	8
34	254+00 271+50	1750	C	3	8	2.5	8
35	271+50 273+50	200	C	2	7	2.5	8
36	273+50 282+12	862	C	2	7	2.5	8
37	282+12 282+60	48	C	4	4	3	7
38		35	OUT				

Table A-5 Lower Hrazdan Canal specifications Table (2/2)

Lower Hrazdan Main canal II stage							
NN	D/M	Length	Conser Code	b, m	B, m	H_{st}, m	Discharge Q, m^3/s
1	0+00 3+00	300	S	3	3	1.5	7
2	3+00 6+50	350	C	2	6	2	7
3	6+50 21+50	1500	C	2	6	2	7
4	21+50 26+00	450	C	2	2	2.5	8
5	26+00 37+50	1150	C	2	6	2	8
6	37+50 40+00	250	C	2	6	2	5
7	40+00 46+70	670	C	2	6	2	5
8	46+70 47+70	100	A	3.5	3.5	2.5	3
9	47+70 80+35	3265	C	1.5	7.5	3	3
10	80+35 107+35	2700	C	1.5	7.5	3	3
11	107+35 159+35	5200	C	1.5	6.5	2.5	3
12	159+35 218+70	5935	C	1.5	5.5	2	3

Constraction Code
C - Canal
S - Syphon
A - Aqueduct
IN - Intake
OUT - Outlet
G - Gally
B - Bridge
O - Others



The discharge of this canal is 10.0m3 /s at the beginning part of I Stage, 7.0m3/s at the end part of I Stage, 7.0m3 /s at the beginning part of II Stage and 3.0m3/s at the end part of II Stage.

The canal cross section is B3.0m(Bottom),10.0m(Top)× H3.5m at the beginning part of I Stage, B2.0m(Bottom),7.0m(Top)× H2.5m at the end part of I Stage, B2.0m(Bottom),6.0m(Top)× H2.0m at the beginning part of II Stage, B1.5m (Bottom),5.5m (Top)× H2.0m at the end part of II Stage. For more information, refer table A-4 to A-5 Dimensions and specifications.

The situation of canal network from this canal to the secondary canals is as follows.

a) From this canal (Lower Hrazdan Canal) to Metsamor Canal

- It is possible to send water through the pipeline (φ400mm L=about 3.0km) from the inlet of pipe at No.66 point in this canal to the confluence box at No.25 point in Metsamor Canal.
- It is possible to send water from end of this canal to the confluence at No.6 point in Metsamor Canal.

b) From this canal to Upper Aknalich Canal

- It is possible to send water through the pipeline (φ600mm L=about 6.0km) from the inlet of pipe

at No.64 point in this canal to outlet of pipe at No.6 point in Upper Aknalich Canal.

・It is possible to send water (Q=0.15m^3/s) through the earth canal (L=5.0km) from around No.39 point in this canal to No.25 point in Upper Aknalich Canal.

c) From this canal to Inner Aknalich Canal

・It is possible to send water (Q=0.15m^3/s) through the earth canal (L=8.0km) from around No.39 point in this canal to No.8 point in Inner Aknalich Canal.

Figure A-112 Inlet of pipe(φ400mm) to Metsamor (No.66)

Figure A-113 Diversion from Lower Hrazdan Canal to Metsamor Canal

Figure A-114 Diversion to Upper Aknalich Canal (No.64)

Distribution gate has been confirmed 22 places in I Stage and 26 places in II Stage, a total of 48 places. Figure A-111 shows gate positions. Although the size of gates is different in B=0.30m~1.6m, H=0.2m~2.5m, diversion per one gate is estimated to be 0.21m^3/s approximately from the following.

a) Estimated from the maximum water intake and distribution gate number

Maximum water intake 10.0m3/s÷distribution gates 48places =0.21m3/s

2) Condition of facilities (Deterioration and damage)

・Since this canal has been built in 1954, all sections is aging.

・Since the freeboard of this canal is not enough, there are intervals where water likely overflow from canal.

・In particular at immediately downstream of the outlet of pipe from Ranchpar Pump Station No.2, it is remarkable (Figure A-116).

Figure A-115 Crack of Side Wall (No.27)

Figure A-116 Shortage of freeboard of Side Wall (No.23)

3) Diversion from other water source According to the results of the field survey, the inflow from other water sources has been confirmed in four locations in the middle of this canal. Inflow location and water source are shown in the table below.

Inflow to No.38 point is irrigation water which is gotten from Kasakh Intake at right bank. intake structure. The maximum water intake amount of Kasakh Intake at right bank is Q = 5.0m^3/s and the average water intake amount is Q = 16 million m^3/ s/ month.

In only an emergency, the water is drained from the pipe of the nuclear power plant at No.68 point.

Location of inflow	Water source	Type of inflow
No.19	Ranchpar No.2 PS	Outlet of pipe
No.38	Kasakh Intake	Open canal
No.68	Nuclear power station	Outlet of pipe
Mo.69	Deep well	Outlet of pipe(φ150mm)

Figure A-117 Outlet of Pipe from Ranchpar No.2 PS (No.19)

Figure A-118 Diversion from Kasakh Intake

Figure A-119 Outlet of Pipe from Nuclear Power Station (No.68)

Figure A-120 Outlet of Pipe from Deep Well (No.69)

APPENDIX B

Agriculture

Appendix B-1: Agricultural Production in Armenia in 2010-2014

1. Crop Planted Area (unit: ha)

Crops	Year				
	2010	2011	2012	2013	2014
Grains and leguminous plants	159.3	157.8	172.2	178.4	188.7
Industrial crops	2.4	3.2	3.5	3.5	3.2
Potatoes	28.4	28.7	31.2	30.7	31.6
Vegetables	23.5	25.0	25.2	25.4	26.4
Water-melons	4.5	5.8	5.1	5.4	5.8
Fruits and berries	37.7	37.1	39.3	40.2	40.1
Grape	17.4	16.3	17.4	17.5	17.2
Forage crops	65.5	66.2	67.0	74.7	77.1
Total	338.7	340.1	360.9	375.8	390.1

Source: Statistical Yearbook of Armenia, 2015

2. Crop Production (unit: 1,000 ton)

Crops	Year				
	2010	2011	2012	2013	2014
Wheat	183.5	224.1	243.1	311.6	338.2
Barley	118.5	178.2	170.1	188.8	200.6
Maize (grain)	12.8	19.1	19.1	20.9	20.2
Miscellaneous grains	11.6	19.3	23.8	27.5	31.6
Legumes	4.5	5.2	5.1	5.1	5.5
Potatoes	482.0	557.3	647.2	660.5	733.2
Vegetables	707.6	787.1	849.0	876.0	954.6
Water-melons	132.5	180.9	205.1	208.1	245.8
Fruits and berries	128.5	239.4	331.7	338.1	291.0
Grape	222.9	229.6	241.4	240.8	261.3
Forage crops	1,333.2	1,372.2	1,368.6	1,523.2	1,577.5
Tobacco	1.4	2.4	1.8	1.7	1.3

Source: Statistical Yearbook of Armenia, 2015

3. Number of Livestock (unit: 1,000 heads)

Livestock	Year				
	2010	2011	2012	2013	2014
Milk cows	272.6	283.3	303.3	309.6	313.9
Beef cattle	298.8	315.9	357.7	368.0	374.7
Sheep and goats	532.5	590.2	674.7	717.6	745.8
Pigs	114.8	108.1	145.0	139.8	142.4
Horses	10.1	9.9	10.8	11.7	11.4
Poultry	3,462.5	4,023.5	4,050.0	4,101.2	4,145.5

Source: Statistical Yearbook of Armenia, 2015

4. Production of Animal Products

Products	Unit	Year				
		2010	2011	2012	2013	2014
Beef and veal	1000 ton	48.0	48.2	47.6	53.6	59.0
Mutton and goat meat	1000 ton	8.2	8.4	8.5	9.0	9.1
Pork	1000 ton	7.9	9.4	9.5	12.6	16.2
Poultry meat	1000 ton	5.4	5.7	8.3	8.2	8.4
Milk	1000 ton	600.9	601.5	618.2	657.0	700.4
Eggs	Million pc	702.2	633.6	658.1	615.2	641.8
Wool	ton	1,188	1,230	1,280	1,426	1,477

Source: Statistical Yearbook of Armenia, 2015

Appendix B-2: Sufficiency of Phosphorus and Potassium of Farmlands of Armenia by Marzes

Marz		Phosphorus (P)			Potassium (K)		
		Weak	*Medium*	*Good*	*Weak*	*Medium*	*Good*
1	Aragatsotn	72%	19%	9%	5%	69%	26%
2	Ararat	69%	27%	4%	1%	74%	25%
3	Armavir	79%	18%	3%	9%	78%	13%
4	Gegarkhunik	58%	29%	13%	21%	75%	4%
5	Lori	65%	20%	15%	6%	74%	20%
6	Kotayk	72%	22%	6%	7%	87%	6%
7	Shirak	59%	32%	9%	16%	69%	15%
8	Syunik	49%	48%	3%	6%	80%	14%
9	Vayots Dzor	70%	27%	3%	5%	87%	8%
10	Tavush	81%	18%	1%	19%	77%	4%
Total		66.91%	25.18%	7.91%	12.17%	73.69%	14.29%

＜Note＞

Weak: Sampled soil contains scarcity level of fertilizer component. Maximum volume of dosage is needed.

Good: Sampled soil contains sufficient level of fertilizer component. Minimum volume of dosage is needed.

Source: The Ministry of Agriculture, RA

Appendix B-3: Crop Production in Yaghvard WUA area

Planted Area (ha)

Crops	2010	2011	2012	2013	2014
Wheat	46.0	45.0	59.0	44.0	47.0
Barley	10.0	10.0	17.0	15.0	11.0
Maize	0.0	0.0	0.0	0.0	0.0
Alfalfa	133.0	134.0	165.0	170.0	171.6
Potato	8.0	8.0	8.0	8.0	8.0
Other miscellaneous food & forage crops	1.0	1.0	1.0	1.0	1.0
Tomato	24.0	22.0	14.0	27.0	20.0
Cucumber	14.0	14.0	14.0	6.0	8.0
Eggplant	0.0	0.0	0.0	0.0	0.0
Sweet pepper	0.0	0.0	0.0	0.0	0.0
Cabbage	7.0	7.0	7.0	4.0	4.0
Water melon	0.0	0.0	0.0	0.0	0.0
Other miscellaneous vegetables	25.0	24.0	36.0	20.0	29.0
Grape	52.3	50.3	50.3	46.6	47.3
Apricot	132.0	132.0	132.0	132.0	113.0
Peach	16.0	16.0	16.0	16.0	16.0
Apple	124.7	124.7	124.7	124.7	116.0
Pear	18.0	18.0	18.0	18.0	18.0
Other miscallaneous fruits & berries & nuts	18.0	18.0	18.0	20.3	20.3
Total	629.0	624.0	680.0	652.6	630.2

Production (ton)

Crops	2010	2011	2012	2013	2014
Wheat	90.5	120.0	90.6	74.0	84.0
Barley	29.0	26.0	30.0	38.1	36.0
Maize	0.0	0.0	0.0	0.0	0.0
Alfalfa	429.0	437.0	466.0	466.0	516.0
Potato	79.0	87.0	100.0	215.0	162.8
Other miscellaneous food & forage crops	1.6	1.5	1.8	1.8	1.8
Tomato	276.0	274.0	330.0	362.5	744.0
Cucumber	146.0	238.0	294.0	132.0	330.0
Eggplant	0.0	0.0	0.0	0.0	0.0
Sweet pepper	0.0	0.0	0.0	0.0	0.0
Cabbage	108.0	362.0	316.0	76.0	166.0
Water melon	0.0	0.0	0.0	0.0	0.0
Other miscellaneous vegetables	136.0	247.0	584.0	263.5	185.0
Grape	246.4	347.9	307.9	211.3	161.2
Apricot	29.3	13.2	322.7	199.3	0.6
Peach	150.5	133.0	177.5	178.0	37.0
Apple	227.0	535.0	857.0	878.3	2,164.8
Pear	45.4	54.4	73.4	87.4	56.6
Other miscallaneous fruits & berries & nuts	59.0	62.5	73.8	75.5	55.0

Yield (ton/ha)

Crops	2010	2011	2012	2013	2014
Wheat	2.0	2.7	1.5	1.7	1.8
Barley	2.9	2.6	1.8	2.5	3.3
Maize	NA	NA	NA	NA	NA
Alfalfa	3.2	3.3	2.8	2.7	3.0
Potato	9.9	10.9	12.5	26.9	20.4
Other miscellaneous food & forage crops	1.6	1.5	1.8	1.8	1.8
Tomato	11.5	12.5	23.6	13.4	37.2
Cucumber	10.4	17.0	21.0	22.0	41.3
Eggplant	NA	NA	NA	NA	NA
Sweet pepper	NA	NA	NA	NA	NA
Cabbage	15.4	51.7	45.1	19.0	41.5
Water melon	NA	NA	NA	NA	NA
Other miscellaneous vegetables	5.4	10.3	16.2	13.2	6.4
Grape	4.7	6.9	6.1	4.5	3.4
Apricot	0.2	0.1	2.4	1.5	0.0
Peach	9.4	8.3	11.1	11.1	2.3
Apple	1.8	4.3	6.9	7.0	18.7
Pear	2.5	3.0	4.1	4.9	3.1
Other miscallaneous fruits & berries & nuts	3.3	3.5	4.1	3.7	2.7

Source: 3 Community Offices concerned (Zovuni, Kasakh and Proshyan communities)

Appendix B-4: Crop Production in Ashtarak WUA area

Planted Area (ha)

Crops	2010	2011	2012	2013	2014
Wheat	46.1	41.0	45.0	44.0	57.5
Barley	19.4	21.4	23.2	18.7	26.2
Maize	0.0	0.0	0.0	1.5	0.0
Alfalfa	105.1	104.1	101.5	103.7	109.8
Potato	4.9	4.4	4.6	4.0	6.8
Other miscellaneous food & forage crops	50.0	50.0	60.0	55.0	50.0
Tomato	5.6	5.5	6.8	6.5	6.3
Cucumber	2.8	3.3	3.2	3.7	4.0
Eggplant	3.0	3.4	2.4	3.5	3.0
Sweet pepper	1.9	1.5	2.3	2.4	2.2
Cabbage	3.3	3.5	3.3	1.4	2.2
Water melon	0.0	0.0	0.0	0.0	0.0
Other miscellaneous vegetables	180.2	180.3	180.7	180.0	179.3
Grape	510.4	511.8	512.2	511.4	512.8
Apricot	100.6	99.6	98.5	102.1	99.3
Peach	23.4	23.7	23.8	24.0	24.0
Apple	27.1	27.2	27.2	27.3	27.3
Pear	17.0	17.0	17.1	17.1	17.1
Other miscallaneous fruits & berries & nuts	12.8	12.8	13.3	13.8	14.8
Total	1,113.6	1,110.5	1,125.1	1,120.1	1,142.6

Production (ton)

Crops	2010	2011	2012	2013	2014
Wheat	200.5	193.1	213.8	158.5	213.8
Barley	57.7	60.8	68.8	20.6	94.6
Maize	0.0	0.0	0.0	3.3	0.0
Alfalfa	907.6	887.1	818.1	996.6	821.5
Potato	164.0	166.2	163.9	128.0	201.7
Other miscellaneous food & forage crops	100.0	100.0	120.0	110.0	100.0
Tomato	158.0	143.0	134.5	159.9	139.9
Cucumber	36.4	48.0	45.5	40.6	58.0
Eggplant	49.4	59.4	44.0	67.5	65.1
Sweet pepper	26.5	18.7	25.1	25.8	30.4
Cabbage	49.8	57.1	51.5	32.5	36.5
Water melon	0.0	0.0	0.0	0.0	0.0
Other miscellaneous vegetables	3,635.4	3,672.0	3,675.6	3,669.2	3,644.1
Grape	3,314.0	3,526.8	3,811.2	4,837.0	5,362.5
Apricot	1,239.1	1,400.5	1,246.0	1,540.7	240.0
Peach	402.1	389.3	451.0	422.2	380.8
Apple	342.3	364.8	360.8	450.5	589.1
Pear	180.7	188.8	195.9	210.6	223.1
Other miscallaneous fruits & berries & nuts	62.6	71.1	82.6	80.1	92.6

Yield (ton/ha)

Crops	2010	2011	2012	2013	2014
Wheat	4.3	4.7	4.8	3.6	3.7
Barley	3.0	2.8	3.0	1.1	3.6
Maize	NA	NA	NA	2.2	NA
Alfalfa	8.6	8.5	8.1	9.6	7.5
Potato	33.5	37.8	35.6	32.0	29.7
Other miscellaneous food & forage crops	2.0	2.0	2.0	2.0	2.0
Tomato	28.2	26.0	19.8	24.6	22.2
Cucumber	13.0	14.5	14.2	11.0	14.5
Eggplant	16.5	17.5	18.3	19.3	21.7
Sweet pepper	13.9	12.5	10.9	10.8	13.8
Cabbage	15.1	16.3	15.6	23.2	16.6
Water melon	NA	NA	NA	NA	NA
Other miscellaneous vegetables	20.2	20.4	20.3	20.4	20.3
Grape	6.5	6.9	7.4	9.5	10.5
Apricot	12.3	14.1	12.6	15.1	2.4
Peach	17.2	16.4	18.9	17.6	15.9
Apple	12.6	13.4	13.3	16.5	21.6
Pear	10.6	11.1	11.5	12.3	13.0
Other miscallaneous fruits & berries & nuts	4.9	5.6	6.2	5.8	6.3

Source: 4 Community Offices concerned (Sasunik, Norakert, Baghramyan and Merdzavan communities)

Appendix B-5: Crop Production in Vagarshapat WUA area

Planted Area (ha)

Crops	2010	2011	2012	2013	2014
Wheat	776.5	690.5	774.0	742.0	709.6
Barley	27.0	22.0	26.3	7.0	12.5
Maize	4.0	3.0	26.2	25.0	15.0
Alfalfa	259.5	244.5	250.5	242.3	228.3
Potato	188.0	142.9	175.5	131.3	127.3
Other miscellaneous food & forage crops	145.5	158.0	137.7	152.0	135.0
Tomato	145.8	151.0	170.0	207.4	224.5
Cucumber	107.0	114.5	111.7	103.5	108.0
Eggplant	37.0	34.6	55.0	64.9	78.4
Sweet pepper	100.0	93.8	107.0	113.2	87.3
Cabbage	44.3	52.3	50.4	54.9	64.0
Water melon	185.5	237.0	218.4	224.7	340.0
Other miscellaneous vegetables	169.1	277.6	294.0	325.5	322.6
Grape	118.7	122.7	127.7	125.7	133.9
Apricot	9.4	8.4	8.4	8.4	8.4
Peach	4.4	4.4	4.2	5.9	5.9
Apple	13.2	12.3	11.3	12.3	12.3
Pear	2.8	2.3	1.3	1.3	1.3
Other miscallaneous fruits & berries & nuts	2.5	1.9	4.5	5.9	8.2
Total	2,340.2	2,373.7	2,554.1	2,553.2	2,622.5

Production (ton)

Crops	2010	2011	2012	2013	2014
Wheat	3,038.3	2,806.5	3,099.9	3,236.7	2,940.8
Barley	74.8	67.2	62.8	24.2	41.5
Maize	9.6	8.0	73.5	30.0	42.8
Alfalfa	3,984.2	4,052.8	4,406.4	3,676.6	3,510.4
Potato	6,968.0	4,824.0	5,877.0	4,339.0	4,156.0
Other miscellaneous food & forage crops	291.0	316.0	275.4	404.0	270.0
Tomato	7,769.5	7,616.0	10,786.0	9,755.0	11,056.4
Cucumber	3,956.0	4,946.0	4,345.8	4,552.0	3,944.2
Eggplant	1,654.0	1,461.0	2,190.0	2,463.0	2,864.0
Sweet pepper	4,387.2	4,249.6	4,732.0	5,022.4	3,545.0
Cabbage	2,015.5	2,373.5	1,900.0	2,319.5	2,226.4
Water melon	8,684.0	10,547.0	9,831.5	9,774.5	14,485.0
Other miscellaneous vegetables	1,320.0	1,634.3	1,326.7	1,130.1	868.2
Grape	2,259.3	2,238.7	2,315.8	2,260.2	2,572.5
Apricot	102.9	141.0	171.0	128.0	46.5
Peach	53.6	44.0	57.1	49.8	45.7
Apple	59.0	47.0	56.0	53.0	62.7
Pear	11.5	4.5	8.7	6.5	6.5
Other miscallaneous fruits & berries & nuts	29.0	21.5	29.5	29.0	28.9

Yield (ton/ha)

Crops	2010	2011	2012	2013	2014
Wheat	3.9	4.1	4.0	4.4	4.1
Barley	2.8	3.1	2.4	3.5	3.3
Maize	2.4	2.7	2.8	1.2	2.9
Alfalfa	15.4	16.6	17.6	15.2	15.4
Potato	37.1	33.8	33.5	33.0	32.6
Other miscellaneous food & forage crops	2.0	2.0	2.0	2.7	2.0
Tomato	53.3	50.4	63.4	47.0	49.2
Cucumber	37.0	43.2	38.9	44.0	36.5
Eggplant	44.7	42.2	39.8	38.0	36.5
Sweet pepper	43.9	45.3	44.2	44.4	40.6
Cabbage	45.5	45.4	37.7	42.2	34.8
Water melon	46.8	44.5	45.0	43.5	42.6
Other miscellaneous vegetables	7.8	5.9	4.5	3.5	2.7
Grape	19.0	18.2	18.1	18.0	19.2
Apricot	10.9	16.8	20.4	15.2	5.5
Peach	12.2	10.0	13.6	8.4	7.7
Apple	4.5	3.8	5.0	4.3	5.1
Pear	4.1	2.0	6.7	5.0	5.0
Other miscallaneous fruits & berries & nuts	11.6	11.3	6.6	4.9	3.5

Source: 7 Community Offices concerned (Mrgastan, Tsakhkunik, Artimet, Taroniq, Aratashen, Khoronk and Griboyedov communities)

Appendix B-6: Crop Production in Khoy WUA area

Planted Area (ha)

Crops	2010	2011	2012	2013	2014
Wheat	836.3	768.1	680.9	783.1	1,008.3
Barley	20.8	68.5	52.5	37.3	42.2
Maize	9.4	14.6	15.8	19.6	22.0
Alfalfa	271.2	276.0	308.1	322.2	458.7
Potato	525.6	621.5	668.8	562.0	586.0
Other miscellaneous food & forage crops	83.7	134.2	92.0	164.6	148.3
Tomato	226.8	287.5	230.3	228.7	257.1
Cucumber	126.1	123.0	127.4	89.4	105.1
Eggplant	42.2	36.0	43.3	26.9	37.8
Sweet pepper	24.5	20.6	28.0	15.8	19.7
Cabbage	162.8	180.3	196.2	154.5	148.9
Water melon	13.5	62.3	51.8	48.4	69.3
Other miscellaneous vegetables	990.6	806.3	896.5	947.1	813.0
Grape	632.1	606.8	631.2	619.3	606.2
Apricot	133.1	131.8	132.5	140.4	160.6
Peach	111.9	111.3	113.7	98.2	95.9
Apple	48.3	45.6	46.0	42.1	44.9
Pear	15.4	13.6	9.0	11.0	11.8
Other miscallaneous fruits & berries & nuts	73.3	87.4	80.1	92.4	107.5
Total	4,347.6	4,395.4	4,404.1	4,403.0	4,743.3

Production (ton)

Crops	2010	2011	2012	2013	2014
Wheat	2,015.5	2,503.3	2,039.6	2,589.3	3,611.5
Barley	68.9	195.2	91.6	88.5	143.0
Maize	23.2	37.8	29.1	28.7	40.7
Alfalfa	3,333.5	2,958.0	3,661.3	4,360.9	6,244.9
Potato	15,716.0	20,128.0	25,186.5	24,773.8	24,581.5
Other miscellaneous food & forage crops	176.4	253.1	219.4	221.1	274.8
Tomato	11,231.0	12,635.9	8,504.0	13,401.4	12,343.0
Cucumber	4,800.0	4,816.9	4,094.2	3,784.6	4,677.6
Eggplant	2,707.0	2,251.0	3,109.5	1,790.5	1,632.9
Sweet pepper	478.5	374.2	464.4	395.0	372.5
Cabbage	4,392.4	4,642.1	4,699.2	4,570.0	3,801.3
Water melon	330.0	1,765.2	1,639.0	2,360.0	2,067.0
Other miscellaneous vegetables	15,998.8	19,679.3	19,233.4	24,584.2	22,291.7
Grape	7,029.0	7,523.3	7,860.5	8,613.7	9,405.7
Apricot	631.5	881.6	919.2	1,012.4	3.0
Peach	768.5	806.2	857.5	903.8	932.9
Apple	316.5	324.8	408.5	449.4	583.2
Pear	95.8	102.3	89.7	127.6	154.2
Other miscallaneous fruits & berries & nuts	600.2	613.2	683.8	692.6	642.2

Yield (ton/ha)

Crops	2010	2011	2012	2013	2014
Wheat	2.4	3.3	3.0	3.3	3.6
Barley	3.3	2.8	1.7	2.4	3.4
Maize	2.5	2.6	1.8	1.5	1.9
Alfalfa	12.3	10.7	11.9	13.5	13.6
Potato	29.9	32.4	37.7	44.1	41.9
Other miscellaneous food & forage crops	2.1	1.9	2.4	1.3	1.9
Tomato	49.5	44.0	36.9	58.6	48.0
Cucumber	38.1	39.2	32.1	42.3	44.5
Eggplant	64.1	62.5	71.8	66.6	43.2
Sweet pepper	19.5	18.2	16.6	25.0	18.9
Cabbage	27.0	25.7	24.0	29.6	25.5
Water melon	24.4	28.3	31.6	48.8	29.8
Other miscellaneous vegetables	16.2	24.4	21.5	26.0	27.4
Grape	11.1	12.4	12.5	13.9	15.5
Apricot	4.7	6.7	6.9	7.2	0.0
Peach	6.9	7.2	7.5	9.2	9.7
Apple	6.6	7.1	8.9	10.7	13.0
Pear	6.2	7.5	10.0	11.6	13.1
Other miscallaneous fruits & berries & nuts	8.2	7.0	8.5	7.5	6.0

Source: 13 Community Offices concerned (Lernamerdz, Amberd, Aghavnatun, Dogh, Aragats, Tsaghkalanj, Hovtamej, Tsiatsan, Geghakert, Haytagh, Ferik, Arshaluys and Aknalich communities)

Appendix B-7: Number of Livestock in the Project Area

5. Yaghvard WUA area

Livestock		2010	2011	2012	2013	2014
Household growing livestock		733	763	672	612	627
1	Milk cows/Cattle total	4,585	5,760	5,444	5,741	4,930
1-1	Milk cows (milking)	2,231	2,602	2,691	2,740	2,459
1-2	Meat cattle (adult)	732	406	631	232	139
1-3	Infant/Infertile	1,622	2,752	2,122	2,769	2,332
2	Pigs	578	510	429	972	1,064
3	Sheep	5,633	4,805	5,158	7,389	5,547
4	Goats	61	130	77	222	67
5	Horses	23	5	25	39	36
6	Chicken total	8,492	7,166	6,119	7,162	7,769
6-1	Layer hen (egg)	7,780	6,576	5,741	6,321	6,958
6-2	Other chicken	712	590	378	841	811

Source: 3 Community Offices concerned (Zovuni, Kasakh and Proshyan communities)

6. Ashtarak WUA area

Livestock		2010	2011	2012	2013	2014
Household growing livestock		708	695	676	665	522
1	Milk cows/Cattle total	1,835	1,772	1,760	1,887	2,044
1-1	Milk cows (milking)	723	673	751	863	941
1-2	Meat cattle (adult)	37	38	57	45	94
1-3	Infant/Infertile	1,075	1,061	952	979	1,009
2	Pigs	1,097	1,019	787	1,128	1,406
3	Sheep	1,358	1,434	1,419	1,535	1,776
4	Goats	6	5	7	4	8
5	Horses	1	1	1	0	1
6	Chicken total	5,975	6,039	6,642	6,438	7,156
6-1	Layer hen (egg)	5,566	5,608	6,341	6,240	6,725
6-2	Other chicken	409	431	301	198	431

Source: 4 Community Offices concerned (Sasunik, Norakert, Baghramyan and Merdzavan communities)

7. Vagarshapat WUA area

Livestock		2010	2011	2012	2013	2014
Household growing livestock		1,294	1,295	1,287	1,242	1,189
1	Milk cows/Cattle total	1,884	1,958	2,022	2,095	2,076
1-1	Milk cows (milking)	826	818	843	852	884
1-2	Meat cattle (adult)	101	116	101	96	78
1-3	Infant/Infertile	957	1,024	1,078	1,147	1,114
2	Pigs	1,020	862	984	1,063	1,002
3	Sheep	1,475	1,012	657	1,161	1,141
4	Goats	4	6	5	3	35
5	Horses	0	0	0	0	0
6	Chicken total	19,512	14,950	12,656	13,013	13,569
6-1	Layer hen (egg)	15,944	11,620	10,248	10,855	11,218
6-2	Other chicken	3,568	3,330	2,408	2,158	2,351

Source: 7 Community Offices concerned (Mrgastan, Tsakhkunik, Artimet, Taroniq, Aratashen, Khoronk and Griboyedov communities)

8. Khoy WUA area

Livestock		2010	2011	2012	2013	2014
Household growing livestock		2,725	2,405	2,318	2,206	2,411
1	Milk cows/Cattle total	3,239	3,375	3,528	3,861	3,994
1-1	Milk cows (milking)	1,387	1,366	1,440	1,581	1,588
1-2	Meat cattle (adult)	169	244	269	231	146
1-3	Infant/Infertile	1,683	1,765	1,819	2,049	2,260
2	Pigs	786	706	622	779	857
3	Sheep	4,008	4,048	3,581	5,025	3,672
4	Goats	55	71	82	80	89
5	Horses	6	4	5	5	5
6	Chicken total	16,889	15,878	15,574	16,965	18,150
6-1	Layer hen (egg)	13,946	13,094	13,065	14,301	14,910
6-2	Other chicken	2,943	2,784	2,509	2,664	3,240

Source: 13 Community Offices concerned (Lernamerdz, Amberd, Aghavnatun, Dogh, Aragats, Tsaghkalanj, Hovtamej, Tsiatsan, Geghakert, Haytagh, Ferik, Arshaluys and Aknalich communities)

Appendix B-8: Agricultural Situation of Concerned Communities (information Collected from Respective Community Offices)

No	Community	Marz	WUA	Area (ha)		Soviet time crops & livestock			Present agriculture	
				Total Land	Cropped (Ave. 2010-14)	Type of Farm	Major	2nd Major	Crops & Livestock	Constraints/Problems
1	Zovuni	Kotayk	Yeghvard	1,532.0	296.6	Sovkhoz	Grape and Apricot	Forage crops+ milk cow	・Apricot and apple are major crops, and some plum ・Wheat and alfalfa are also popular crops ・Vegetables are usually grown in house-backyard mainly for home consumption ・Livestock is mainly dairy cattle and some chicken egg and sheep	・High irrigation fee ・Shortage of irrigation water ・Orchard area has gradually been decreased due to shortage of irrigation water since the independence ・Purchasing price of milks from processing factory is low ・Many experienced grape famers have already retired or passed away ・Abandon farming is progressing (many people are even selling their lands)
2	Kasakh			1,287.5	213.9	Sovkhoz	Apple and grape	Apricot	・Fruits are widely grown. Apricot, apple, grape and pear are popular ・Apricot is the most promising crop due to big market demand, easy management, less water requirement and short harvesting season (about 1 month) ・Alfalfa is also important crop, while wheat and barley are grown to some extent ・Vegetables are usually grown in house-backyard mainly for home consumption ・Dairy cattle is the most important livestock and there are some beef and sheep	・Cropped area has decreased by about 30% from Soviet time due to the shortage of irrigation water ・Many experienced grape famers have already retired or passed away
3	Proshyan			2,189.0	132.6	Sovkhoz	Grape	Fruits	・Fruits farming is the base of agriculture. Priority crops are apple, grape, apricot, peach and plum in order of importance ・Vegetables (mainly tomato, cucumber, sweet pepper and herbs) are usually grown in house-backyard mainly for home consumption ・Cereals and forage crops except for alfalfa are not much grown ・Approximately 30% of residents are breeding dairy cattle (almost for self-consumption) and some sheep is also bred	・90% of vineyard had been abandoned compare to the Soviet time ・Shortage of irrigation water ・On-farm canal networks are damaged and rehabilitation is needed ・There are difficulties of land expansion due to shortage of agricultural machinery ・Many people have already abandoned farming and got job in Yelevan (only 20% of the households mainly depend their life on farming)
4	Sasunik	Aragatsotn	Ashtarak	1,989.5	642.7	Sovkhoz	Grape	-	・Orchard farming is the base of agriculture. Priority crops are apple, grape, apricot, black plum and peach in order of importance ・Grape farming starts to recover after construction of new wine factory in the community area several years ago ・Vegetables (mainly tomato, eggplant and sweet pepper) are usually grown in house-backyard mainly for home consumption ・Wheat is widely grown, and barley is cultivated with the government support to seeds and fertilizers ・Following livestock are bred in the area: dairy cattle, sheep, pig and egg chicken.	・Vineyard area decreased much from Soviet time due to shortage of irrigation water and confused marketing system ・Purchasing price of milk from processing factory is low (many producers sell directly to individual consumers) ・Shortage of irrigation water
5	Norakert	Armavir		1,356.0	123.8	Sovkhoz	Grape	Apricot and other Fruits	・Grape suitable to this area's soil is major crop, and apricot is the second in this area ・Vegetables (mainly tomato, eggplant, sweet pepper, cucumber and beans) are usually grown in house-backyard mainly for home consumption ・Alfalfa is mainly grown with orchard trees ・Livestock farming is not active.	・Decreased cultivated area due to shortage of irrigation water and deteriorated canal system ・Increased irrigation fee ・Shortage of agricultural machinery ・Soil is not suitable for many annual crops including wheat ・Abandon farming and high unemployment rate (about 30%)
6	Baghramyan			1,071.0	198.1	Sovkhoz	Grape	Apricot and Alfalfa	・Grape, apricot, and alfalfa are major crops in this area ・Alfalfa is fed to dairy cattle, and the cow milk is sold directly to the consumer in urban area ・Vegetables (mainly herbs, tomato, sweet pepper, eggplant and cabbage) are usually grown in house-backyard mainly for home consumption	・Decreased cultivated area due to degradation and breakage of on-farm canal network, and shortage of irrigation water ・Agricultural machinery service fee is expensive for farmers, but not enough to cover proper maintenance and renewal costs ・Soil is not fertile (not suitable to grow annual crops) ・Abandon farming and high unemployment rate

No	Community	Marz	WUA	Area (ha)		Soviet time crops & livestock			Present agriculture	
				Total Land	Cropped (Ave. 2010-14)	Type of Farm	Major	2nd Major	Crops & Livestock	Constraints/Problems
7	Merdzavan	Amarvir	Ashtarak	879.0	157.7	Research Farms	Grape research farm, Soil research farm and Plant protection research farm		・Fruits farming is the base of agriculture. Priority crops are grape, apricot and some pear and apple in order of importance ・Vegetables (mainly potato, tomato and sweet pepper) are usually grown in house-backyard mainly for home consumption ・Livestock farming is not active because there is no grazing pasture ・A large scale vineyard has been newly developed by private investment	・Low fertile soil condition ・Very weak activity of the existing research farms ・There are many landowners who are not community people
8	Mrgastan		Vagarsha-pat	296.0	100.2	Kolkhoz	Vegetables and Potato	Grape, Wheat and Maize	・Vegetable farming (in open field) is the major income source of farmers ・Tomato, eggplant, haricot, onion and potato are popular vegetables ・Orchard (mostly apricot) grown mainly in house-backyard is the second major income source ・Wheat and alfalfa are grown mainly for self-consumption ・Flower farming in greenhouse is not popular	・There are plenty of water losses due to degradation and breakage of on-farm canal network ・Only 2 out of 5 deep wells are running (24h). More irrigation water is expected if all wells will be workable. ・Maize cropped area decreased in parallel with decline of livstock farming due to inaccessibility to grazing pasture after the independence
9	Tsakhkunk			405.0	136.1	Kolkhoz	Vegetables	Maize	・Potato is the most important cash crop. Wheat and maize also widely grown ・Cucumber and haricot are often grown after potato, wheat and maize ・Fruits are grown in house-backyard mainly for home consumption ・Livestock farming is not active ・Cabbage, tomato and eggplant are popular cash vegetables. Other vegetables are grown mainly for home consumption ・Tomato and eggplant are grown in open field, as well as in greenhouses ・Flower farming in greenhouse tends to increase in recent years	・Degradation and breakage of on-farm canal network ・Only 4 out of 7 deep wells are running ・Decreased volume of irrigation water (but, not serious) ・High water irrigation fee
10	Artimet			636.0	442.1	Kolkhoz	Alfalfa and Maize	Grape and Apricot	・Vegetables, water melon and potato are major cash crops ・Tomato, cucumber, sweet pepper and strawberry are commonly grown in greenhouses ・More than a half of farmers construct greenhouses in their house-backyard. ・Wheat is usually combined with vegetables in a rotation cropping ・Fruits and livestock farming are not active	・Livestock farming, including alfalfa and forage cultivation, is not profitable any more ・High irrigation fee
11	Taroniq			716.0	408.8	Sovkhoz	Vegetables (seed production)	Wheat and Grape	・Cropped area has been increased by 150 ha from Soviet time ・Vegetable farming is very active ・Chili, cucumber, onion, water melon, tomato and eggplant are popular crops. Chili is the speciality crop ・While vegetables are grown in open field and in greenhouses, greenhouse vegetables, i.e. tomato, cucumber and chili are more important for farmers' revenue ・Alfalfa and wheat are the second popular crops ・Alfalfa is fed to milk cows. 60-70% of households raise milk cows mainly for home consumption ・Fruits are only grown in house-backyard for home-consumption	・Degradation and breakage of on-farm canal network ・Decreased supply of irrigation water from canal (30-40% of farmland is irrigated by tube-wells)
12	Aratashen			976.0	740.5	Kolkhoz	Vegetables	Grape, Fruits and Wheat	・Wheat is the most popular crop in terms of cropped area, but not profitable ・Vegetable crops, e.g. tomato, sweet pepper, water melon, eggplant and onion, are major income source of farmers ・About 40% of farmers have constructed greenhouses and grow mainly tomato, cucumber and sweet pepper. Greenhouse vegetables are more profitable than open field vegetables ・Grapes are also widely grown, while other fruits farming is not so active	・Decreased cropped area from Soviet time due to decreased irrigation water ・Individual farmers think that they are burdened down with responsibility for farm management after the independence ・Wells are main irrigation source ・High agricultural machinery service fees ・Low price of farm products ・Wages of off-farm works in the city is favorable comparing to farming income

No	Community	Marz	WUA	Area (ha)		Soviet time crops & livestock			Present agriculture	
				Total Land	Cropped (Ave. 2010-14)	Type of Farm	Major	2nd Major	Crops & Livestock	Constraints/Problems
13	Khoronk	Amarvir	Vagarsha-pat	695.0	400.8	Kolkhoz	Vegetables	-	・Vegetable farming (mainly in open field) is the major crops ・Tomato, sweet pepper, chili, eggplant, cucumber, cabbage, onion, potato and water melon are popular vegetables ・Tomato, sweet pepper, chili, and cucumber are also grown in greenhouses. Greenhouse farming is profitable ・Wheat also widely grown ・Fruits farming and floriculture are not active	・Deep wells are almost only source of irrigation water ・Irrigation fee is rising year by year ・Small or no profitability of cereals and livestock
14	Griboyedov			711.0	259.7	Kolkhoz	Grape	Vegetables, Wheat and Maize	・Wheat, alfalfa and barley are popular crops in terms of cropped area ・Cropped area of cereals and alfalfa is shifting to vegetable area because of low profitability ・Vegetables, e.g. cucumber, tomato, cabbage, eggplant, potato, water melon and hericot are main crops in terms of farmers' revenue ・Many farmers grow tomato, cucumber and sweet pepper in greenhouses. Greenhouse vegetables are more profitable than open-field vegetables ・Fruits farming, except for grapes, is not active	・Decreased supply of irrigation water, comparing to Soviet time, caused a shift from grapes to cereals ・Weakened wine industry is another reason of the shift ・High irrigation fee (Water source for irrigation is depending on deep wells at present)
15	Lernamerdz		Khoy	164.0	61.0	Kolkhoz	Grape	Vegetables and Flowers	・Tarragon is the speciality crop, and major income source of farmers. Taraggon is mainly grown in greenhouses ・Wheat and alfalfa are also popular crops among farmers ・Vegetables, e.g. tomato, eggplant, sweet pepper and haricot are usually grown in house-backyard mainly for home consumption ・There are some fruits (peach, plum and apricot), but few grapes ・Milk cows are bred for getting milk for home consumption	・Shortage of irrigation water (about 1/2 volume from Soviet time) ・Shortage of agricultural machinery ・Livestock farming becomes to be unprofitable after losing a grazing right in mountainous region
16	Amberd			451.0	326.0	Kolkhoz	Grape	Vegetables and Potato	・Grape is very popular (recovering after a dcline caused by confusion after the Independence) ・Other fruits, i.e. apricot, peach, apple and cherry are also widely grown ・Vegetable farming, e.g. tomato, cucumber and haricot, mainly in open-filed is also important revenue source ・Taraggon cropped in open-field is becoming popular in recent years ・Wheat and alfalfa have a large cropped area	・Decreased crop productivity caused by less use of fertilizers (high price of fertilizers) ・Decreased cropped area due to abandon farming, high irrigation costs and shortage of farm machinery ・Distribution loss of irrigation water caused by land fragmentation ・Degradation of internal irrigation network ・Some farmland in the northern part is located at higher altitude area than the main irrigation canal (need pump irrigation)
17	Aghavnatun			1,139.0	409.3	Kolkhoz	Grape	Vegetables and Fodder crops	・Crop diversification is ongoing, while grape is the most impotant single crop ・Various kinds of vegetables are grown in open fields and in plastic tunnels ・Among vegetables, strawberry, cucumber and tomato are commonly grown in plastic tunnels ・Tarragon is also widely grown mainly in plastic tunnels ・Many farmers grow 2 crops in a year ・Flowers are also grown in 31 greenhouses constructed in Soviet time ・Milk cows are grown for getting milk mainly for home consumption ・Sheep farmers take their sheep to a mountainous grazing area during the summer season	・Land fragmentation (It makes difficult to utilize agricultural machinery efficiently.) ・Decrepit agricultural machinery ・Increase of abandon farming and aging of agricultural workforce ・Decreased cropped area ・High irrigation fee ・Less use of fertilizers due to their increased price
18	Doghs			384.0	262.2	Kolkhoz	Vegetables	Grape and Fruits	・Tarragon and potato are major income sources of farmers ・Haricot, herbs and grape are also important cash crops ・Wheat is widely grown mainly for home consumption ・Orchard trees (peach, apricot and apple) are grown to some extent ・Miscellaneous vegetables are grown in house-backyard mainly for home consumption ・Greenhouses or plantic tunnels are not well developed	・Serious shortage of agricultural machinery ・Abandon farming and transmigration is progressing ・Shortage of labor force (cropping pattern has shifted to labor extensive crops) ・Increased irrigation fee

No	Community	Marz	WUA	Area (ha)		Soviet time crops & livestock			Present agriculture	
				Total Land	Cropped (Ave. 2010-14)	Type of Farm	Major	2nd Major	Crops & Livestock	Constraints/Problems
19	Aragats	Amarvir	Khoy	875.0	512.2	Kolkhoz	Vegetables	Wheat and Alfalfa	・Taraggon is the speciality crop and major cash crop for farmers ・Cabbage, potato and strawberry usually grown in plastic tunnels and cucumber usually grown in open-fieldsare are also important cash crops ・Other miscellaneous vegetables are grown in house-backyard mainly for home consumption ・Fruits trees, grape, apricot and etc. are also widely grown ・Wheat, alfalfa and maize are grown to some extent	・Fertilizers and PE film (for tunnel and greenhouse) are expensive
20	Tsaghkalanj			795.0	304.7	Kolkhoz	Vegetables	Grape, Alfalfa and Maize	・Tarragon mainly grown in greenhouses is the most important cash crop ・Strawberry mainly grown in greenhouses and potato are also imortant cash crops ・Among vegetables, tomato and cucumber grown in plastic tunnels and cabbage grown in open fields are popular crops ・Wheat and grape are also widely grown ・Alfalfa growing area is steadly increasing (more profitable than wheat) ・Fruits farming and livestock farming are not active ・A few farmers grow flowers (Alstroemeria, Gladiolus and Carnation) in greenhouses	・Increased irrigation water demand because of increased farmland (pasture area has been transferred to vineyard by the investment of wine company in 2007) ・Irrigation water loss has increased due to the degradation of internal canal network ・Livestock farming becomes to be unprofitable after losing a grazing right in mountainous region
21	Hovtamej			268.0	172.3	Kolkhoz	Vegetables	Grape and Fodder crops	・Many farmers have double/multi-cropping system ・Vegetables, e.g. tomato, cucmber, onion, cauliflower, eggplant, strawberry and cabbage are major income source ・Many vegetables except for cabbage and herbs are grown in greenhouses ・Potato is also an important cash crop ・Only a few famers grow flowers ・Fruits and livestock farming are not active	・Volume of water supply from deep well has been decreased ・There are irrigation water supply shortage for 15days from around 20th May and for 20days in the beginning of August ・Irrigation fee is high ・Abandon farming is progressing though number of farm households has increased since the Independence ・Livestock farming becomes to be unprofitable after losing a grazing right in mountainous region
22	Tsiatsan			311.0	200.8	Kolkhoz	Grape and Fruits	Vegetables and Fodder crops	・Many farmers have double/multi-cropping system ・Vegetables, e.g. tomato, cucmber, haricot and cauliflower are major income source ・Tomato and cucumber are usually grown in greenhouses constructed in house-backyard, while many vegetables are combined with potato and wheat in crop rortation system ・Potato is also an important cash crop ・Fruits including grape are grown to some extent ・Livestock farming is not active	・Abandon farming is progressing though number of farm households has increased since the Independence ・Livestock farming becomes to be unprofitable after losing a grazing right in mountainous region ・Land fragmentation causes effective utilization of irrigation water ・Irrigation water is sometimes short in July - August ・Irrigation stops during the winter season (necessary for greenhouses)
23	Geghakert			659.0	427.3	Kolkhoz	Grape	Wheat, Potato and Tomato	・Many farmers have double/multi-cropping system ・Strawberry is the speciality crop and important income source ・Potato, usually combined with strawberry, wheat and vegetables in crop rotation, is the second important crop ・Among vegetables, tomato, haricot, cabbage and cucumbers are popular crops. They are usually grown in open fileds except for tomato ・Wheat is also widely grown ・Fruits and livestock farming are not active	・There are water shortage in July - August ・Abandon farming is progressing though number of farm households has increased since the Independence ・Livestock farming have declined after losing a grazing right in mountainous region

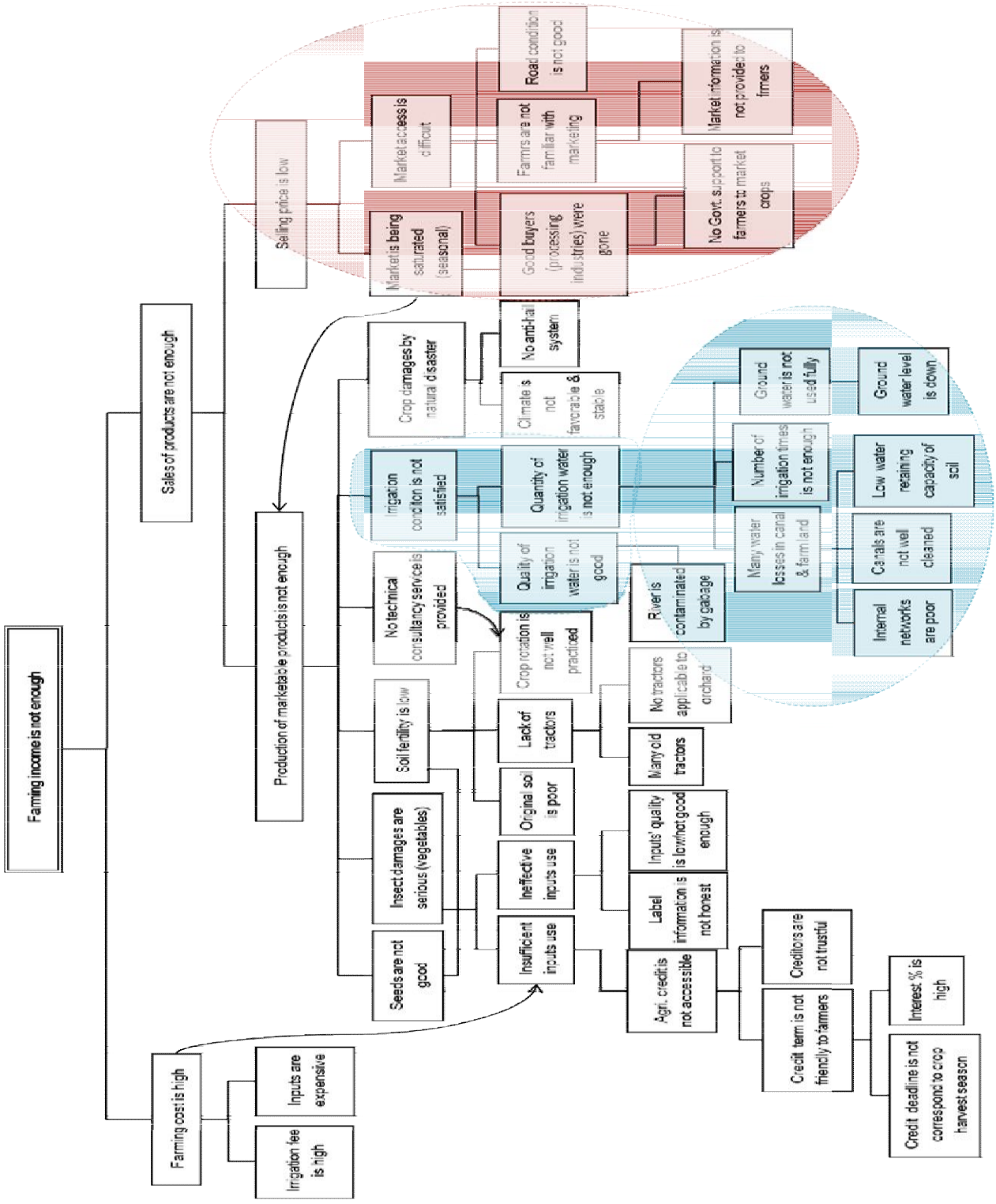
No	Community	Marz	WUA	Area (ha)		Soviet time crops & livestock			Present agriculture	
				Total Land	Cropped (Ave. 2010-14)	Type of Farm	Major	2nd Major	Crops & Livestock	Constraints/Problems
24	Haytagh	Amarvir	Khoy	1,261.0	382.6	Kolkhoz	Grape	Forage crops	・Many farmers have double/multi-cropping system ・Herbs are usually grown in open fields combining with vegetables in crop rotation. The short harvest-interval brings a frequent cash income ・Vegetables, e.g. cucumber, tomato, haricot and beans are also another importnat income source. Cucumber and tomato are usually grown in greenhouses ・Wheat and potato are widely grown. The both crops are often grown one after another in crop rotation ・Fruits and livestock farming are not active	・Cropped area has decreased to almost a half aftre the Independence mainly due to abandon farming ・Total population is also decreasing because of active transmigration ・Vineyard has decereased since the Idependence due to confused procurement system of wine companies (Private sector starts to invest for resuming vineyard) ・Cattle breeding have declined after losing a grazing right in mountainous region
25	Ferik			402.0	117.5	Kolkhoz	Vegetables	Fruits (Apricot) and Grape	・Livestock farming is the base of agriculture. Every farm household has 10 - 15 cattle/milk cows ・Potato is the most important crop ・Cucumber, often grown after potato in rotation system, is the second important crop ・Vegetables, e.g. cucumber, tomato and eggplant and herbs are mainly grown in open fields ・Wheat and alfalfa are also popular crops ・Fruits farming is not active	・Cultivated land area including orchard has decreased from 160 ha to 110 ha after the Independence due to shortage of irrigation water ・Total population has also decreased from 700 to 400 due to active transmigtation ・The community lost a grazing right in mountainous region after the Independence ・Farmland size per one household is small
26	Arshaluys			1,746.0	808.3	Kolkhoz	Potato and Tomato	Grape	・Potato is the most important crop ・Vegetables, e.g. tomato, eggplant, cabbage, sweet pepper and cucumber are also important crops ・Vegetables are mainly grown in open fields (Only 10% of farm households have greenhouses) ・Some farmers grow flowers, e.g. gladiolus, rose and gerbera in greenhouses (very high profitable crops) ・Grape and wheat are also popular crops (wheat is a low profitable crop) ・Fruit trees are usually grown in house-backyard ・Tobacco is newly introduced	Decreased crop productivity due to; ・Less use of fertilizers due to increased price ・Increased insect/desease damages ・Poor technical extension activity
27	Aknalich			1,743.0	474.6	Sovkhoz	Grape	Fruits (Apricot, Apple, Pear)	・Grape is the most important crop. Vineyard area is increasing in recent years ・Vegetables, e.g. tomato, eggplant, watermelon, sweet pepper and chili, are the next important crops ・Vegetables are mainly grown in open field ・Wheat and alfalfa are also popular crops ・Milk cows are bred with the produced alfalfa and other forage	・Decreased cropped area caused by the shortage of irrigation water ・Grand water level is low (difficult to utilize grand water for greenhouse irrigation) ・Degradation of internal irrigation network causes increased water losses

Appendix B-9: Farm-gate Price of Major Farm Products (Sep. 2014-Aug. 2015)

No.	Crop/Product	unit	Price (Armenia Dram)		
			Average/Common	Maximum	Minimum
1	Wheat	kg	120	160	100
				Month: Feb	Month: Jul-Aug
2	Barley	kg	115	120	110
				Month: Aug	Month: Jul-Aug
3	Maize	kg	250	400	150
				Month: Jul	Month: Jul
4	Alfalfa	kg	60	150	30
				Month: Dec-Feb	Month: Sep
5	Potato	kg	100-110	250	60
				Month: May	Month: Jun
6	Cabbage	kg	100-110	400	50
				Month: Apr	Month: Sep
7	Cucumber (Open field)	kg	100	200	30
				Month: Aug-Sep	Month: Jun-Jul
8	Cucumber (Greenhouse)	kg	220	700	30
				Month: May	Month: Jun
9	Tomato (Open field)	kg	120	700	40
				Month: Jul	Month: Aug-Sep
10	Tomato (Greenhouse)	kg	250	750	60
				Month: May	Month: Jun
11	Pepper (Open field)	kg	200	300	150
				Month: Jun-Jul	Month: Sep-Oct
12	Pepper (Greenhouse)	kg	350	1,000	130-150
				Month: Apr	Month: Aug-Sep
13	Egg plant	kg	90-100	1,200	50
				Month: Apr	Month: Jul-Aug
14	Water melon	kg	50-60	100	35
				Month: Jun	Month: Jul-Sep
15	Apple	kg	200	300	100
				Month: Dec-Mar	Month: Sep-Oct
16	Grape	kg	150	300	100
				Month: Jul	Month: Sep
17	Apricot	kg	200	400	50
				Month: Jun	Month: Jul
18	Milk	lit.	200	300	100
				-	-
19	Beef meat	kg	2,000-2,100	2,200	2,000
				Month: May, Aug, Dec	Month: Sep-Dec
20	Broiler Chicken/Meat	kg	1350-1400	1700	1250
				-	-
21	Egg (Chicken)	kg	70	100	60
				-	-

Source: The Study Team (farm household survey)

Appendix B-10: Problems of Farmers in the Project Area



Appendix B-11: Forecasted Crop Area % of Present Crop Area in 2023 (by WUAs)

<Yeghvard WUA>

1. Planted Area (%) during 2010-14

Crops	2010	2011	2012	2013	2014
Wheat	7.3	7.2	8.7	6.7	7.5
Alfalfa	21.1	21.5	24.3	26.0	27.2
Other food & forage	1.7	1.8	2.6	2.5	1.9
Potatoes	1.3	1.3	1.2	1.2	1.3
Vegetables/Melons	11.1	10.7	10.4	8.7	9.7
Fruits	49.1	49.5	45.4	47.7	45.0
Grapes	8.3	8.1	7.4	7.1	7.5
Total	100.0	100.0	100.0	100.0	100.0

2. Index of Planted Area (%) during 2010-14: (2010=100)

Crops	2010	2011	2012	2013	2014	Log Approximation Formula
Wheat	100	99	119	92	102	y=0.5824ln(x)+101.73
Alfalfa	100	102	115	123	129	y=18.804ln(x)+95.653
Other food & forage	100	101	151	140	109	y=18.0609ln(x)+102.43
Potatoes	100	101	93	96	100	y=-1.823ln(x)+99.644
Vegetables/Melons	100	96	94	78	87	y=-10.93ln(x)+101.62
Fruits	100	101	93	97	92	y=-4.947ln(x)+101.14
Grapes	100	97	89	86	90	y=-8.14ln(x)+100.21

3. Forecasted in 2023 (calculated by the Log Approximation Formula)

Crop	Wheat	Alfalfa	Other food & forage	Potatoes	Vegetables /Melons	Fruits	Grapes	Total
Index	103	145	152	95	73	88	79	100
%	8%	31%	3%	1%	8%	43%	6%	100%

<Ashtarak WUA>

1. Planted Area (%) during 2010-14

Crops	2010	2011	2012	2013	2014
Wheat	4.1	3.7	4.0	3.9	5.0
Alfalfa	9.4	9.4	9.0	9.3	9.6
Other food & forage	6.2	6.4	7.4	6.7	6.7
Potatoes	0.4	0.4	0.4	0.4	0.6
Vegetables/Melons	17.7	17.8	17.7	17.6	17.2
Fruits	16.2	16.2	16.0	16.5	16.0
Grapes	45.8	46.1	45.5	45.7	44.9
Total	100.0	100.0	100.0	100.0	100.0

2. Index of Planted Area (%) during 2010-14: (2010=100)

Crops	2010	2011	2012	2013	2014	Log Approximation Formula
Wheat	100	89	97	95	122	y=8.8199ln(x)+92.006
Alfalfa	100	99	96	98	102	y=-0.046ln(x)+99.01
Other food & forage	100	103	119	108	107	y=-5.9922ln(x)+101.58
Potatoes	100	90	93	81	135	y=10.236ln(x)+90.075
Vegetables/Melons	100	101	100	100	98	y=-1.154ln(x)+100.69
Fruits	100	100	98	101	98	y=-0.463ln(x)+100.04
Grapes	100	101	99	100	98	y=-1.091ln(x)+100.53

3. Forecasted Area in 2023 (calculated by the Log Approximation Formula)

Crop	Wheat	Alfalfa	Other food & forage	Potatoes	Vegetables /Melons	Fruits	Grapes	Total
Index	115	99	117	117	98	99	98	100
%	5%	9%	7%	1%	17%	16%	45%	100%

<Vagersgapat WUA>

1. Planted Area (%) during 2010-14

Crops	2010	2011	2012	2013	2014
Wheat	33.2	29.1	30.3	29.1	27.1
Alfalfa	11.1	10.3	9.8	9.5	8.7
Other food & forage	7.5	7.7	7.4	7.2	6.2
Potatoes	8.0	6.0	6.9	5.1	4.9
Vegetables/Melons	33.7	40.5	39.4	42.9	46.7
Fruits	1.4	1.2	1.2	1.3	1.4
Grapes	5.1	5.2	5.0	4.9	5.1
Total	100.0	100.0	100.0	100.0	100.0

2. Index of Planted Area (%) during 2010-14: (2010=100)

Crops	2010	2011	2012	2013	2014	Log Approximation Formula
Wheat	100	88	91	88	82	y=-9.482ln(x)+98.705
Alfalfa	100	93	88	86	79	y=-12.35ln(x)+100.91
Other food & forage	100	102	99	96	82	y=-8.855ln(x)+104.21
Potatoes	100	75	86	64	60	y=-22.69ln(x)+98.703
Vegetables/Melons	100	120	117	127	139	y=20.963ln(x)+100.48
Fruits	100	89	84	96	100	y=-0.8381ln(x)+94.669
Grapes	100	102	99	97	101	y=-0.95ln(x)+100.55

3. Forecasted Area in 2023 (calculated by the Log Approximation Formula)

Crop	Wheat	Alfalfa	Other food & forage	Potatoes	Vegetables /Melons	Fruits	Grapes	Total
Index	74	68	81	39	156	92	98	100
%	24%	8%	6%	3%	53%	1%	5%	100%

<Khoy WUA>

1. Planted Area (%) during 2010-14

Crops	2010	2011	2012	2013	2014
Wheat	19.2	17.5	15.5	17.8	21.3
Alfalfa	6.2	6.3	7.0	7.3	9.7
Other food & forage	2.6	4.9	3.6	5.0	4.5
Potatoes	12.1	14.1	15.2	12.8	12.4
Vegetables/Melons	36.5	34.5	35.7	34.3	30.6
Fruits	8.8	8.9	8.7	8.7	8.9
Grapes	14.5	13.8	14.3	14.1	12.8
Total	100.0	100.0	100.0	100.0	100.0

2. Index of Planted Area (%) during 2010-14: (2010=100)

Crops	2010	2011	2012	2013	2014	Log Approximation Formula
Wheat	100	91	80	92	111	y=2.0232ln(x)+92.901
Alfalfa	100	101	112	117	155	y=27.7541ln(x)+90.456
Other food & forage	100	189	139	192	171	y=41.964ln(x)+117.95
Potatoes	100	117	126	106	102	y=1.8273ln(x)+108.32
Vegetables/Melons	100	95	98	94	84	y=-7.398ln(x)+101.14
Fruits	100	101	99	99	101	y=-0.085ln(x)+100.02
Grapes	100	95	99	97	88	y=-5.045ln(x)+100.47

3. Forecasted Area in 2023 (calculated by the Log Approximation Formula)

Crop	Wheat	Alfalfa	Other food & forage	Potatoes	Vegetables /Melons	Fruits	Grapes	Total
Index	98	164	229	113	82	100	87	100
%	19%	10%	6%	14%	30%	9%	12%	100%

Appendix B-12: Cropping Plan of New Crop Area in 2023 (by Communities)

<in %>

No	Community	WUA	Crop Land Use (%)							
			Wheat	Alfalfa	Other Food & Forage	Potatoes	Vege. & Melons	Fruits	Grape	Total
1	Zovuni	Yeghvard	20	5	5	5	0	65	0	100
2	Kasakh		10	60	5	0	0	25	0	100
3	Proshyan		3	10	2	0	0	30	55	100
4	Sasunik	Ashtarak	5	10	5	0	10	20	50	100
5	Norakert		5	10	5	0	0	30	50	100
6	Baghramyan		10	15	5	0	0	20	50	100
7	Merdzavan		0	0	0	0	0	20	80	100
8	Mrgastan	Vagershapat	65	0	0	20	5	5	5	100
9	Tsakhkunk		40	5	5	10	10	30	0	100
10	Artimet		0	0	0	0	60	0	40	100
11	Taroniq		15	20	5	0	60	0	0	100
12	Aratashen		10	5	5	0	50	0	30	100
13	Khoronk		30	5	0	5	60	0	0	100
14	Griboyedov		15	15	0	0	70	0	0	100
15	Lernamerdz	Khoy	10	10	0	0	40	10	30	100
16	Amberd		10	5	0	5	50	0	30	100
17	Aghavnatun		5	20	15	0	10	50	0	100
18	Doghs		20	10	0	20	30	20	0	100
19	Aragats		10	10	0	10	35	25	10	100
20	Tsaghkalanj		10	10	5	15	25	5	30	100
21	Hovtamej		0	0	0	0	100	0	0	100
22	Tsiatsan		0	0	0	0	100	0	0	100
23	Geghakert		10	5	5	20	50	0	10	100
24	Haytagh		10	5	0	5	30	10	40	100
25	Ferik		5	30	10	10	5	40	0	100
26	Arshaluys		10	0	0	20	50	0	20	100
27	Aknalich		5	15	0	5	40	5	30	100

<in ha>

No	Community	WUA	Crop Land Use (ha)							
			Wheat	Alfalfa	Other Food & Forage	Potatoes	Vege. & Melons	Fruits	Grape	Total
1	Zovuni	Yeghvard	48	12	12	12	0	157	0	241
2	Kasakh		33	200	17	0	0	83	0	333
3	Proshyan		24	80	16	0	0	241	442	803
4	Sasunik	Ashtarak	15	29	15	0	29	58	145	291
5	Norakert		5	10	5	0	0	29	49	98
6	Baghramyan		17	26	9	0	0	34	86	172
7	Merdzavan		0	0	0	0	0	53	210	263
8	Mrgastan	Vagershapat	9	0	0	3	1	1	1	14
9	Tsakhkunk		7	1	1	2	2	6	0	18
10	Artimet		0	0	0	0	1	0	1	2
11	Taroniq		18	24	6	0	71	0	0	119
12	Aratashen		7	4	4	0	36	0	22	73
13	Khoronk		48	8	0	8	96	0	0	160
14	Griboyedov		38	38	0	0	175	0	0	250
15	Lernamerdz	Khoy	4	4	0	0	15	4	11	36
16	Amberd		2	1	0	1	12	0	7	24
17	Aghavnatun		3	11	8	0	5	26	0	53
18	Doghs		3	1	0	3	4	3	0	14
19	Aragats		13	13	0	13	47	34	13	133
20	Tsaghkalanj		17	17	8	25	41	8	50	166
21	Hovtamej		0	0	0	0	4	0	0	4
22	Tsiatsan		0	0	0	0	1	0	0	1
23	Geghakert		6	3	3	13	32	0	6	64
24	Haytagh		22	11	0	11	67	22	89	223
25	Ferik		2	15	5	5	2	20	0	49
26	Arshaluys		16	0	0	33	82	0	33	164
27	Aknalich		9	28	0	9	75	9	56	186

Appendix B-13: Minutes of the Meeting on 19.02.2016 in MOA

List of Participants

Department/Division	Name
1. Department of Agricultural Development Programs	
Agricultural Planning Division, Head of Division	Artur Petrosyan
Infrastructure Development and Food Security Division, Head of Division	Armenak Aghajanyan
2. Department of Plant Growing and Plant Protection	
Head of The Horticulture Development and Plant Protection Division	Karine Esayan
3. State Inspectorate of Agricultural Machinery	
Head of Inspectorate	Vardan Ghushchyan
4. Division of Agricultural Cooperative Support	
Head of Division	Marianna Khachatryan
5. Division of Research and Coordination of Agriculture Support Centers	
Chief specialist of the division	Hasmik Mkrtchyan
6. Department of Land Use and Melioration	
Head of Department	Artur Baghdasaryan

1. Extension research:

Main issues and constraints

- Shortage of Extension agents

There is a serious staff shortage of extension agents. The Ministry of Agriculture has 240 employees in total, 130 of them are consultants (extension agents). One consultant provides services in 7-9 communities. Even in some communities there are no available consultants at all. It has been developed a reform concept for increasing the number of consultants, but it hasn't been approved because of budget limitation of the MoA. In order to improve current situation, additional finance sources are needed.

Background

- The Agricultural Support Marz Center cooperates with marz centers to find out the needs and problems of the farmers. They conduct workshops on certain topics and provide consultancy services.
- ASMS and Agricultural Support Republican Center has carried out 1041 workshops, 841 field trainings, 156 newspapers, 32 types of informational sheets.
- Besides, the ASMSs have websites which have a lot of users. ASRS has a newspaper and TV program about new technologies and scientific researches.

Solution

- In this sphere there is a necessity for support to strengthen professional skills, to train the specialists and to provide with office equipment.

Ongoing project

- In 2015 the European Neighborhood Program for Agriculture and Rural Development has started, it will launch in 2016 and will try to find out the demand of farmers.

2. Agricultural machinery:

Main issues and constraints

- There are 340,000 agricultural households and their farmlands are small.
- All the farmers want to have their own tractors.
- The agricultural machinery, especially tractors and combine harvesters are very expensive.
- Shortage of spare parts, also for the tractors provided to Armenia due to grants from Japan, China, and India about 10 years ago.
- Import of secondhand agricultural machinery is not suitable because in short period of time the problem of spare parts will arise.

Solution

- Development of supplier network by producers, imports or distributing agents, for example from Russia or Japan.

Ongoing project

- In the framework of Community Agricultural Resource Management and Competitiveness Project by World Bank funding agricultural machinery is provided to cooperatives - Pasture Users Associations are responsible only for 20% of the machinery price and some part from community investment, though this part is covered also by HEIFER International Armenia.

3. Cooperatives:

Main issues and constraints

- As the law on agricultural cooperatives is just adopted, it is necessary to improve it, to study the international experience and to consider the characteristics of Armenian agriculture.
- The cooperatives which are established spontaneously do not operate effectively putting aside the business model of the cooperative and do not focus on its management and marketing issues.
- Cooperation between each farmer is too weak.

Background

- From 240 agricultural cooperatives 55-60% are livestock oriented.
- Some farmers have negative images about cooperative from the experience of Kolkhoz and Sovkhoz during Soviet era.

Solution

- Establishment of new models for cooperatives, trainings for farmers how to create a cooperative and about its management (including significance of cooperatives) – these cooperatives can be a good example for other farmers.
- Mr. Baghdasaryan: To have a pilot project to promote cooperatives in one of 27 target communities for Yeghvard Irrigation System Improvement Project to be more effective.

4. Agricultural crediting:

Main issues and constraints

- Not too available/affordable for the farmers.
- Loans are provided by trade banks and the banks present their own conditions, the Ministry of Agriculture does not carry any responsibility for this issue.

Background

- The subsidizing program started in 2011, the loan was provided with 14% of interest rate, 4% was subsidized by the government, 6% - for 225 communities.
- In 2015 about 915 communities were involved in the program, 6% was subsidized for all the communities. The loan duration is 2 years, maximum provided sum 3mln AMD, the repayment starts after six months of the loan received date.
- The ASMS ensure awareness about agricultural loans already for five years, all the farmers are informed about the system of agricultural loans.

Solution

- A Concept of Directions and Mechanisms of Agricultural Subsidies has been developed, which aims to create favorable competitive environment and develop priority directions in the agricultural sector.

5. Agricultural inputs:

Main issues and constraints

- The farmers recognize only 3 types of fertilizers (Nitrogen, Phosphorus, Potassium)
- Farmers complain about the quality of the fertilizers, but ineffectiveness of fertilizers is caused by their improper usage (exceeded nitrogen input and less P.K input).

Background

- The ASMSs provide information to the farmers about proper usage of fertilizers and agrochemicals which they do not follow.
- There is an NGO "Kanach Chanapar" which also raises awareness of agrochemicals among the farmers.
- Each community receives an assignment concerning the soil proper treatment in the certain area from "Agrochemical Service" SNCO.
- Year by year the number of fertilizers and agrochemicals increase. Before it used to require a license for importing fertilizers and agrochemicals, now it is not obligatory.
- The fertilizers are imported from Israel, Spain, Netherlands, etc. In 2014 were imported 800 tons of fertilizers, in 2015 – 1250tons, if there wasn't a market for it the demand shouldn't increase.

Solution

- The extension agents need to be trained, some workshops can be carried out for them, they have to be aware of new technologies, etc.

6. Marketing:

Main issues and constraints

- In order to export agricultural products, exporter has to meet customer requirement including enough volume, spec and quality standard based on the contract. Therefore farmers have to produce enough volume of products stably.

Background

- Self-sufficiency level of potato, fruits, eggs and meat (goat and mutton) are at the high level in recent years. The level of milk, milk products and beef are at the average, but cereals (wheat, maize), legume crops, pork and chicken are at the low level currently. The government is targeting

to increase self-sufficiency level from current 60% (on calorie basis) to 85% in the future.

Solution

- In case of proper survey of Armenian market, the solution can be the increase of greenhouses and long-term loans.
- There are new varieties of crops which are mainly cultivated in greenhouses like broccoli, celery root. There are possibilities to introduce more new varieties as well.
- Workshops on free market system, for example the presentation of Japanese experience of marketing.
- Farmers and producers cooperation, contractual relations.

7. Agricultural processing:

Main issues and constraints

- Limited varieties and selling channels of agricultural products
- Due to political situation and unstable ruble exchange rate problems of export to Russia

Background

- In 2015 the Council of Export has developed an agreement form according which the rights of farmers and processors can be protected.

Solution

- It is easier to keep the quality standards working with a cooperative than with individual farmers. The cooperatives are more competitive.

Appendix B-14: Recommended Projects Supporting the Yeghvard Irrigation Project

1. Pilot Agricultural Cooperatives Development

Background	In Armenia, agricultural cooperatives are not active. According to the Ministry of Agriculture, not a small number of farmers are still suspicious about the benefit of agricultural cooperatives due to negative mindset caused by their experiences during the Soviet era. From the result of the farm household survey, cooperatives are not a popular selling channel of farm products for most of the interviewed farmers and also not a common procurement source of agricultural products for buyers except for dairy product. There were many cooperatives established in short time by several projects even after the independence. However, many of them were not sustained. While a participatory process before the establishment and a careful monitoring for a certain long-period after the establishment are essential conditions to the development of self-sustained cooperatives, many projects fail to pay serious attention to them. Agricultural cooperatives are not yet became ingrained in farmers not only in the project area but also in all Armenia. Establishment of agricultural cooperative in the project area as a pilot project together with groups of selected farmers will be effective for addressing multiple fields' of issues. It is needed to maintain long term support for cooperative management from preparation period of the establishment to monitoring period by participatory decision-making.
Objectives	To enhance productivity and market access of small-scale farmers in the beneficially area of the Yeghvard irrigation project by organizing agricultural cooperatives
Project Goals	Pilot agricultural cooperatives are actively operated as a center of installation of new technologies, procurement of agricultural inputs, and selling channel of harvested products by self-reliant and participatory system
Expected Output	1. Model agricultural cooperatives are established and operated 2. Member farmers of pilot agricultural cooperatives are well perceived importance of cooperatives and procedure of operation 3. Members farmers of pilot agricultural cooperatives are well trained about a good practice in farming system and new technologies and facilities 4. Pilot agricultural cooperatives are actively operated based on short, middle and long term business plan 5. Pilot cooperatives have functions of inputs procurement and marketing of products
Main Activities	・ Establish 2 (two) cooperatives (one in fruits area and another in vegetables area) ・ Make a business plan of the cooperatives by participatory decision-making ・ Introduce new technologies and facilities (new varieties, green-houses, water-saving system, farm-machinery, storage & processing facilities, etc.) ・ Educate farmers a good practice in fertilizer application and pest-control, including recording the use of fertilizers and agrochemicals for ensuring traceability ・ Educate farmers a good practice in group marketing ・ Make a match between the cooperatives and business partners in marketing, processing and inputs procuring ・ Promote a branding strategy of the products

Expected Inputs	<Human Resources> ・ Leader/Agri. cooperative management specialist : 60 MM ・ Agri. business & financial management specialist : 40 MM ・ Vegetables production specialist: 30 MM ・ Fruits production specialist: 30 MM ・ Agri. marketing specialist: 60 MM ・ Project coordinator/ Agri. facility specialist: 1 month x 10 persons <Overseas Training> ・ Agri. cooperative management
Prioritized Area (candidate)	Beneficially area of the Yeghvard irrigation project (one in fruits area and another in vegetables area)
Implementing Agency/ related organization	The Ministry of Agriculture: Division of Agricultural Cooperative Support ASRC and ASMCs concerned and Community offices concerned
Relevant plan/ projects	“Techinical assistance to the Ministry of Agriculture of the Republic of Armenia for European Neighbourhood Partnership agriculture and rural development” (ENPARD) project implemented by FAO

2. Enhancement of Agricultural Credit System

Background	Since April 2011, the Armenian government has been implementing an agricultural finance supporting program which compensates the interest rate of agricultural credit. The subsidized agricultural credit is provided through three private banks, i.e. ACBA Credit Agricole Bank, Ardshininvest Bank and Converse Bank. The compensation rate for the interest rate by the government is 4% (ordinary interest rate is 14 %), and more favorable rates (6%) of government compensation are implemented in the poverty-stricken areas. While 915 communities were involved in the program in 2015, 6% interest compensation was applied for all the communities. The payback period of the credit is more than 1 year (depending on the loan condition), and the payments are to begin after 6 months of the borrowing. There are subsidized agricultural credit systems in Armenia but many farmers presumed that those credit systems are not applicable due to its inflexible repayment conditions. Farmers were insisted that the agricultural loan system should have more varieties with different payment conditions for different purposes such as loan for orchard reclamation, agricultural machinery and greenhouse construction.
Objectives	To promote advanced farming and agribusiness through improving accessibility to agricultural finance
Project Goals	To establish or reconstruct affordable agricultural credit system for farmers, as well as rural investors
Expected Output	1. An affordable and flexible agricultural credit scheme supported by the government is implemented 2. Farmers in the project area feel familiar to the agricultural credit scheme 3. Number of beneficiaries of agricultural credit increases
Main Activities	・ Raise a special fund for agricultural credit system ・ Implement a survey about demands of agricultural credit from farmers and situation of current credit scheme ・ Regulate a credit system, e.g. target beneficiaries, target goods (inputs, livestock, farm-machinery, greenhouses and other agricultural facilities), implementation bodies, appraisal system, money flow and procedures, partner banks, etc. ・ Set a credit terms, e.g. interest, payment term, grace period, etc. ・ Educate farmers how to use the agricultural loan including a scheduled repayment ・ Conduct capacity building of staff who will handle the credit system in the government sector
Expected Inputs	< Human Resources> ・ Leader/Agri. credit system specialist: 40 MM ・ Financial analysis specialist: 20 MM ・ Financial operation specialist: 20 MM ・ Project coordinator/Public relations expert: 40 MM <Fund Raising> 15 billion AMD
Prioritized Area (candidate)	Beneficially area of the Yeghvard irrigation project
Implementing Agency/ related organization	The Ministry of Agriculture The Ministry of Finance ASRC and ASMCs concerned and Community offices concerned
Relevant plan/ projects	N.A.

3. Establishment of Monitoring and Inspection System of Pesticide Residue

Background	All agricultural products beyond the norm are prohibited to distribute in Armenian markets. Logically, all agricultural products in Armenian markets don't exceed maximum pesticide residue limit if all farmers are producing their products in a good agricultural practice. However there is no practical monitoring and inspection system of pesticide residue for distributed products at present. Without proper monitoring and inspection system, it is difficult to ensure safety of the agricultural products in the country. And also, it is uncertain whether farmers are using pesticides properly or not without appropriate PDCA cycle of pesticide use. Meanwhile, a pesticide testing laboratory was established with FAO's assistance. FAO also extended its technical cooperation for the proper management of agrochemicals in collaboration with the European Union. However, there is no workable system to monitor the pesticide residue at the harvest points or in the markets in the country. Establishment and implementation of the workable system is a challenging issue of the government.
Objectives	To ensure food safety of distributed agricultural products in Armenia in order to protect the nation's health, as well as to promote the export of the products
Project Goals	To establish monitoring and inspection system of pesticide residue for agricultural products in every food supply chain stages
Expected Output	1. Development of regulations related to monitoring and inspection of pesticide residue of agricultural products 2. Launch of monitoring and inspection system of pesticide residue 3. Improved awareness of inspectors and farmers about the safety use of pesticide 4. Results of the monitoring and inspection are shared by related organizations, and the information is utilized for improvement of extension activities
Main Activities	・ Conduct capacity building of the existing staff ・ Recruit and train new staff for the monitoring and inspection ・ Regulate a procedure of the monitoring and inspection ・ Legalize responsibility and authority of inspectors ・ Develop information sharing system about result of monitoring and inspection
Expected Inputs	<Human Resources> ・ Leader/Pesticide residue inspection system specialist: 40 MM ・ Pesticide residue monitoring specialist: 30 MM ・ Pesticide residue analysis specialist: 20 MM ・ Project coordinator/ Public relations expert: 40 MM <Overseas Training> ・ Pesticide residue monitoring & inspection system: 1 month x 2 persons ・ Pesticide residue analysis (laboratory works): 3 months x 5 persons
Prioritized Area (candidate)	Beneficially area of the Yeghvard irrigation project
Implementing Agency/ related organization	The Ministry of Agriculture ASRC and ASMCs concerned
Relevant plan/ projects	N.A.

4. Enhancement of Agricultural Research to Promote a Market Oriented Agriculture

Background	Generally, Armenian farmers have a certain good level of farming technology considering relatively high level of crop productivity at present. However, they should need more advanced farming skills and knowledge not only to control pests and disease, but also to adapt them to internationally competitive agriculture which the government aims at. Improvement of farmers' technology through enhancement of agricultural R&D (research and development) by research institutions is a fundamental issue of Armenian agriculture, though many farmers don't recognize it well.
Objectives	To enhance and review agricultural research activities and system itself in order to correspond demands from markets including foreign countries to achieve market oriented agriculture
Project Goals	Enhance capacity of existing agricultural research institutes in order to accelerate intensive and market-oriented farming system
Expected Output	1. Empowerment of research institutions 2. Information about result of research related to new farming technologies, facilities and varieties is shared among farmers through extension agents 3. The results of agricultural research are utilized for promotion of market oriented agriculture
Main Activities	・ Strengthen research capacity of the existing staff and to recruit new staff for vegetables and fruits promotion ・ Concentrate every effort on the following priority subjects; – New promising varieties – Optimum use of fertilizers (balanced fertilizing) – Practical pest-control – Water saving technology ・ Share research outcomes with agricultural extension agents
Expected Inputs	<Human Resources> ・ Leader/Research planning & management: 60 MM ・ Vegetable breeding researcher: 40 MM ・ Fruits breeding researcher: 40 MM ・ IPM specialist (for vegetables & fruits): 20 MM ・ Water saving farming specialist: 60 MM ・ Project coordinator/Agri. extension: 10 persons x 24 months <Overseas Study & Training> ・ Scholarship study: 5 persons x 4 months ・ Vegetable breeding (training): 5 persons x 4 months ・ Fruits breeding (training): 2 persons x 3 months ・ Plant protection (training): 2 persons x 3 months ・ Water saving technology (training):
Prioritized Area (candidate)	Beneficially area of the Yeghvard irrigation project
Implementing Agency/ related organization	The Ministry of Agriculture The Scientific Centre of Vegetables, Melons and Industrial Crops
Relevant plan/ projects	N.A.

5. Vitalization of Agricultural Extension

Background	In Armenia, agricultural extension services are implemented by specialized agencies: the ASRC (Agricultural Support Republic Centre) and ASMCs (Agricultural Support Marz Centres). ASRC is placed at the central level and one ASMC is established in each Marz at the regional level (10 ASMCs in a country). The ASRC and ASMCs are autonomous body under the jurisdiction of the Ministry of Agriculture. There is no official hierarchical relation between them, but the ASRC plays a role of umbrella administration for agricultural extension programs in the country. ASMCs are responsible for agricultural extension services to individual farmers in respective Marzes, and 130 agricultural extension agents are allocated to ASMCs in total (The total number of ASMCs staff is 240, including the agricultural extension agents). It seems that the number of extension agents is too small to implement elaborate agricultural extension services, as there are 914 communities in Armenia. Farmers regard that the agricultural extension programs are not adequate for them even though ASRC and ASMCs provide a wide variety of services. Most of the farmers recognized that they've never had any opportunities of agricultural extension or supporting services. Farmers, who are even experienced in the extension services, are thinking that they are not provided their demanded services at the time of need. Many farmers also do not understand the contents of agricultural extension services properly.	
Objectives	To increase agricultural productivity and farmers' income.	
Project Goals	To strengthen and widespread agricultural extension activities based on demands from farmers	
Expected Output	1. Allocation of able extension agents 2. Empowerment of extension agents and farmers	
Main Activities	・ Strengthen capacity of the existing extension staff and to recruit new staff working at field level ・ Reinforce the existing extension system so that the extension agents will be closer to farmers ・ Promote mutual exchanges with agricultural researchers about new agricultural technology desired from farmers and applicable to farmers ・ Improve and enhance the ASMC/ASMCs websites and TV programs and newspaper articles about agricultural technologies	
Expected Inputs	<Human Resources> ・ Leader/Agri. extension system management: ・ Technical transfer/facilitation specialist: ・ Training material development specialist: ・ Project coordinator/Training coordinator: <Overseas Training> ・ Agri. extension system: ・ Technical transfer/facilitation:	 36 MM 9 MM 9 MM 36 MM 12 persons x 1 month 20 persons x 3 months
Prioritized Area (candidate)	Beneficially area of the Yeghvard irrigation project	
Implementing Agency/ related organization	The Ministry of Agriculture: Division of Research and Coordination of Agricultural Support Centers ASRC and ASMCs concerned	
Relevant plan/ projects	N.A.	

APPENDIX C

Results of Surveys Carried out and WUA Workshops

Appendix C-1: Agricultural Planning and Surveys Carried Out

Regarding an agricultural planning, following three main activities were carries out; (1) formulation cropping plan, (2) calculation of agricultural benefits, (3) recommendation for farm-support policies.

1) Formulation of cropping plan in the project area of Yeghvard reservoir

In order to formulate desirable direction of farming in the future, the team analyzed the results of the following surveys (see Table C-1.1).

Table C-1.1 Agricultural Surveys Carried Out

Item of survey	Survey level	Survey method
Agricultural development strategy, directives of the project area	Marz & Community	Data/information collection from the Ministry of Agriculture, Marz Agricultural Support Centers and Community offices
Number of farm household in the project area	Community	Data collection from Community offices
Actual cultivated crops in the project area (for recent 5 years)	Community	Data collection from Community offices
Current farming situations in the project area	Farm household	Farm household survey (27communities x 3 farm households = 81farm household samples)
Desirable direction on the farming of farm households in the project area	Farm household	Farm household survey and WUA workshops

Farmlands in the project area are locate in 27 communities in three (3) different administrative Marzes (districts) and their geographical characteristics are varies from plain areas to gentle slope areas at foot of mountains. Besides, farming types in the area are also different from an area to another. A farm household survey, including a simple market survey, was taken by an Armenian consultant company on a contracted basis in August – September in 2015. The workshops with target WUAs' members will be held in November 2015 in order to share the survey results and to identify whether the analyzed result accurately reflects the current situation of the farm households.

2) Calculation of agricultural benefits

Agricultural benefit in the project area is basically consists of agricultural revenue and expenditure of each farm household in the area. In order to calculate beneficiaries' impacts, following surveys about agricultural production, price of agricultural products, agricultural inputs and labor costs were conducted (see Table C-1.2). As to agricultural inputs, the government is subsidizing for fuel of farm machinery, seeds and fertilizers, so the Survey Team had collected information about its mechanism and price structure from the Ministry of Agriculture. Regarding the prices of agricultural products and inputs, information collection was made from farmers and traders through the farm household survey targeting past one year so that price performance and seasonal changes could be analyzed.

Table C-1.2 Surveys to Collect Base Information for Calculation of Agricultural Benefit

Item of information	Survey method
Productivity of agro-products (per unit area)	Farm household survey and data collection from Community offices
Farm-gate prices of agro-products	Farm household survey
Market prices of agro-products	Farm household survey and hearing from marketing/ processing agents (middlemen, wholesalers, retailers, exporters, processors; each 10 agents per sector = about 50 agents)
Quantities of inputs consumption	Information collection from Ministry of Agriculture and Greenhouse Association, RA
Prices paid by farm households to inputs	Farm household survey and hearing from inputs sellers/ dealers （those who handle seeds/ fertilizers/ chemicals, agricultural materials, agricultural services; 10 persons from each sector = about 30 agents）
Quantities of farm labor input and wages	Information collection from the Ministry of Agriculture, Greenhouse Association, RA and experienced farmers Farm household survey

Since farm products in the project area are diversified, the surveys and analysis were made by limiting to products with comparatively large cropping acreages and large production quantities. The crops and livestock listed in Table C-1.3 were targeted for the surveys and analysis.

Table C-1.3 Target Crops and Livestock for the Surveys

Classification	Crops/livestock as targets of the survey
Cereals and food-crops	Wheat, Potato
Vegetables	Tomato, Cucumber, Eggplant, Sweet pepper, Cabbage, Watermelon
Orchard fruits	Grape, Apricot, Apple
Forage crops	Alfalfa, Barley, Maize
Livestock	Poultry, Dairy cows, Beef cattle

3) Recommended agricultural development policies supporting the Yegvard reservoir project

The JICA's Data Collection Survey in 2014 said that marketing of farm products (low selling price, limited outlets for sale, road condition deterioration, etc.) and irrigation water were major constraints in farming or to farm households in the project area. Although Yeghvard reservoir will contribute to agricultural development in the project area by solving constraints on irrigation water, only irrigation cannot be a sufficient condition of agricultural development without addressing other issues such as marketing.

The Survey Team, therefore, has drawn a practical outline of agricultural support measures which focusing on marketing improvement, organizational/institutional reform, etc. as a comprehensive agricultural development strategy concerned to the project area.

Appendix C-2: List of Sample Farmers for the Farm Household Survey

No	Name	Age	Sex	Community	Marz	WUA
1	Armen Harutyunyan	45	Male	Zovuni	Kotayk	Yeghvard
2	Garnik Martirosyan	55	Male	Zovuni	Kotayk	Yeghvard
3	Hamlet Qoroxlyan	48	Male	Zovuni	Kotayk	Yeghvard
4	Armen Garigoryan	47	Male	Sasunik	Aragatsotn	Ashtarak
5	Raffi Grigoryan	50	Male	Aknalich	Armavir	Khoy
6	Anushavan Xachatryan	55	Male	Tsiatsan	Armavir	Khoy
7	Manuk Sargsyan	64	Male	Hovtamej	Armavir	Khoy
8	Garnik Movsisyan	53	Male	Arshaluys	Armavir	Khoy
9	Avetis Petrosyan	61	Male	Geghakert	Armavir	Khoy
10	Svetlana Simonyan	66	Female	Sasunik	Aragatsotn	Ashtarak
11	Svetlana Gevorgyan	60	Female	Sasunik	Aragatsotn	Ashtarak
12	Boris Tonoyan	65	Male	Proshyan	Kotayk	Yeghvard
13	Gritel Hovsepyan	65	Female	Kasagh	Kotayk	Yeghvard
14	Yurik Mkrtchyan	64	Male	Geghakert	Armavir	Khoy
15	Edik Knyazyan	55	Male	Arshaluys	Armavir	Khoy
16	Vardan Martirosyan	49	Male	Aknalich	Armavir	Khoy
17	Sevdin Sadoyan	48	Male	Ferik	Armavir	Khoy
18	Meliq Manukyan	67	Male	Tsiatsan	Armavir	Khoy
19	Ashot Xachatryan	57	Male	Hovtamej	Armavir	Khoy
20	Ishxan Gasso	38	Male	Ferik	Armavir	Khoy
21	Dorik Muradyan	76	Male	Tsiatsan	Armavir	Khoy
22	Rustam Jamshoyan	33	Male	Ferik	Armavir	Khoy
23	Ashot Mxitaryan	62	Male	Hovtamej	Armavir	Khoy
24	Yurik Hovsepyan	57	Male	Geghakert	Armavir	Khoy
25	Simon Muradyan	58	Male	Aknalich	Armavir	Khoy
26	Grigor Sahakyan	75	Male	Arshaluys	Armavir	Khoy
27	Mushex Grigoryan	58	Male	Proshyan	Kotayk	Yeghvard
28	Razmik Hakobyan	80	Male	Kasagh	Kotayk	Yeghvard
29	Norayr Gevorgyan	74	Male	Proshyan	Kotayk	Yeghvard
30	Ashxen Hovhannisyan	30	Female	Kasagh	Kotayk	Yeghvard
31	Manvel Avetisyan	60	Male	Baghramyan	Armavir	Ashtarak
32	Hakob Hovhannisyan	60	Male	Baghramyan	Armavir	Ashtarak
33	Rafik Dalmoyan	63	Male	Baghramyan	Armavir	Ashtarak
34	Armenak Esoyan	72	Male	Merdzavan	Armavir	Ashtarak
35	Hovakim Kostanyan	60	Male	Merdzavan	Armavir	Ashtarak
36	Arcrun Mxitaryan	82	Male	Merdzavan	Armavir	Ashtarak
37	Armenak Gasoyan	53	Male	Norakert	Armavir	Ashtarak
38	Karlen Adevosyan	34	Male	Norakert	Armavir	Ashtarak
39	Shoxik Hakobyan	58	Female	Norakert	Armavir	Ashtarak
40	Papik Maxaqyan	57	Male	Aghavnatun	Armavir	Khoy
41	Armen Karapetyan	42	Male	Haytagh	Armavir	Khoy
42	Surik Avagyan	56	Male	Aragats	Armavir	Khoy
43	Fedik Xachatryan	64	Male	Tsaghkalanj	Armavir	Khoy
44	Murad Manukyan	78	Male	Tsakghunk	Armavir	Vagharshapat
45	Varazdat Artemyan	44	Male	Tsakghunk	Armavir	Vagharshapat
46	Vardges Jahinyan	66	Male	Tsakghunk	Armavir	Vagharshapat
47	Egor Serobyan	50	Male	Doghs	Armavir	Khoy
48	Anush Virabyan	55	Female	Lernamerdz	Armavir	Khoy
49	Hovhannes Babayan	63	Male	Amberd	Armavir	Khoy
50	Gagik Hovhannisyan	46	Male	Haytagh	Armavir	Khoy
51	Arsen Mnacakanyan	62	Male	Aragats	Armavir	Khoy
52	Ashot Baxdasaryan	55	Male	Tsaghkalanj	Armavir	Khoy
53	Aramayis Aleqsanyan	69	Male	Aghavnatun	Armavir	Khoy
54	Virab Karapetyan	45	Male	Haytagh	Armavir	Khoy
55	Vasak Babayan	61	Male	Aghavnatun	Armavir	Khoy
56	Yurik Hovhannisyan	61	Male	Aragats	Armavir	Khoy
57	Karlen Araqelyan	61	Male	Tsaghkalanj	Armavir	Khoy
58	Hakob Papoyan	34	Male	Doghs	Armavir	Khoy
59	Levik Vardanyan	64	Male	Amberd	Armavir	Khoy

No	Name	Age	Sex	Community	Marz	WUA
60	Vardan Mirzoyan	55	Male	Lernamerdz	Armavir	Khoy
61	Sahak Xachatryan	79	Male	Doghs	Armavir	Khoy
62	Vahan Babayan	56	Male	Amberd	Armavir	Khoy
63	Sahak Mirzoyan	61	Male	Lernamerdz	Armavir	Khoy
64	Rafik Xachatryan	54	Male	Mrgastan	Armavir	Vagharshapat
65	Karapet Mirzaxanyan	49	Male	Taroniq	Armavir	Vagharshapat
66	Hovakim Nazaryan	59	Male	Aratashen	Armavir	Vagharshapat
67	Jora Yexiazaryan	32	Male	Aratashen	Armavir	Vagharshapat
68	Mxitar Avagyan	61	Male	Taroniq	Armavir	Vagharshapat
69	Ashot Harutyunyan	51	Male	Mrgastan	Armavir	Vagharshapat
70	Ashot Hovakimyan	41	Male	Mrgastan	Armavir	Vagharshapat
71	Harutyun Makaryan	39	Male	Aratashen	Armavir	Vagharshapat
72	Svetlana Avetisyan	63	Female	Taroniq	Armavir	Vagharshapat
73	Artashes Asatryan	56	Male	Artimet	Armavir	Vagharshapat
74	Heros Baxramyan	68	Male	Griboyedov	Armavir	Vagharshapat
75	Sargis Nahapetyan	51	Male	Khoronq	Armavir	Vagharshapat
76	Manvel Sahakyan	66	Male	Artimet	Armavir	Vagharshapat
77	Suren Grigoryan	31	Male	Griboyedov	Armavir	Vagharshapat
78	Sargis Xachatryan	47	Male	Khoronq	Armavir	Vagharshapat
79	Janes Nazaryan	57	Male	Artimet	Armavir	Vagharshapat
80	Grisha Asatryan	42	Male	Khoronq	Armavir	Vagharshapat
81	Edgar Sahakyan	30	Male	Griboyedov	Armavir	Vagharshapat

Appendix C-3: WUA Workshop Outputs (Solution for Farm Household Problems & Constrains)

Induction note

During two weeks 5 workshops were held in different WUA offices and in one community office, which were included in the project area. The main topics of the workshop were: **Marketing**, **Irrigation, Production** and **Machinery.** All problems are the result of summarizing information of previous workshops held in the beneficially area of Yeghvard Irrigation System Improvement Project and also the result of interview survey against WUA contracted farmers.

Table C-3.1 WUA offices, Communities and the Number of Participants

Date	WUA	Community		Gender
		Name	Participants	
9th Nov (Mon) (1st Workshop)	Yeghvard	Zovuni Kasakh Proshyan	4 9 5	Male: 16 Female: 2
11th Nov (Wed) (2nd Workshop)	Khoy 1	Lernamerdz Amberd Aghavnatun Doghs Aragats Tsaghkalanj Hovtamej	2 4 4 2 5 3 4	Male: 20 Female: 4
13th Nov (Fri) (3rd Workshop)	Sadunik	Sasunik Norakert Baghramyan Merdzavan	27 3 4 -	Male: 21 Female: 14
16th Nov (Mon) (4th Workshop)	Vagharshapat	Mragastan Tsakghkunk Artimet Taroniq Aratashen Khoronk Griboyedov	2 4 4 4 5 3 3	Male: 23 Female: 2
20th Nov (Fri) (5th Workshop)	Khoy 2	Tsiatsan Geghakert Haytagh Ferik Arshaluys Aknalich	4 6 5 4 4 5	Male: 20 Female: 8

1. The 1st workshop: Yeghvard WUA office (Date: November 09, 2015).

The first workshop was held in "Yeghvard" WUA with the farmers from Zovuni, Kasakh and Proshyan communities in Kotayq Marz. All communities are located at foothills of Mount Ara, and irrigated by Arzni branch canal.

There were 18 participants at the workshop from three communities: Proshyan, Kasakh, Zovuni and two members from WUA office.

The workshop began with participants' registration and self-introduction. Opening remarks were about introducing the workshop's issues concerning nowadays agricultural problems in Armenia. Participants were very active during the discussions and offered different solutions for represented problems and constraints.

The first theme to discuss concerned **Marketing** problems. The problems were about low sales price,

accessibility to the market (hard to find good buyers), lack of information/ knowledge about marketing, no governmental support for marketing. Participants agreed with all the above mentioned problems and after short discussion every participants gave their opinions about solutions problems' solution.

Farmers made complaints against low sales prices represented by middlemen, who resell the products in the city markets and always have a better profit. Generally, farmers harvest a big volume of products at once and they have to sell them in a short time period with low price to prevent its spoilage. Farmers also underlined the problems concerning transportation of products to the market. They offered to create small-scale market close to the communities where they can sell all products at once to wholesale buyers, middlemen or to processing companies with concrete stable price. Participants insisted that such kind of marketing activities should be organized by the government because farmers cannot solve such marketing problems themselves. The government should assist to create the environment that farmers can concentrate on the crop production to produce high quality products. Product sorting is considered as a problem too; middlemen buy only high quality products to sell them both for domestic market and for exporting purposed. So the marketing of low-quality products is a serious problem. Farmers often consume their low quality products by themselves. There were suggestions to create cooperatives within communities. Farmers wanted to rely on governmental support in most cases, mainly concerning financing and investments, creation of agricultural long-term credits and control of sales prices, which are usually controlled as they mentioned in the workshop.

Summarizing all the opinions concerning **Marketing** problems, the following solutions were suggested by the participants:

- Purchase of the total quantity of the products at once through the governmental support
- Creation of markets nearby the community
- Financial support from the government
- Long term agricultural credits with low interest rate by the government's support
- Control of sales price by the government

The second issue discussed was **Irrigation**. The following problems were offered to discuss: shortage of water, breakages of water canals, high irrigation water fee, absent of drip irrigation system, contamination of physical objects (garbage) in the irrigation water, low level of ground water for wells and unequal water distribution. After the discussion about suggested issues, participants shared their opinions. Many farmlands are not cultivated currently due to the irrigation problems. The result of water loss was caused not only by shortages of irrigation water distribution but also by breakages of irrigation networks. Despite no shortage of water distribution in canals, sometimes water shortages were happened. In some cases irrigation networks are needed to be rehabilitated. Farmers relied on governmental support in the matter of rehabilitation of canals and irrigation network too, because both farmers and the WUA do not have enough funds and resources for it. The government can utilize assists from donors for this purpose. They also expected governmental support for reduction of irrigation water fee.

Long-term credits with low interest rate provided by the government will help farmers to install drip irrigation system, which can save usage of irrigation water. As a result, reduce of water fee expenses also can be realized.

Concerning to the pollution of water, farmers said that they should take responsibility of its control, they offered to organize cleaning works of the canals once a week, every community must conduct such works in its territory, so they can refine and control water quality.

Summarizing all the opinions concerning **Irrigation**, the following **solutions** were suggested by the participants:

- Reconstruction of the irrigation network
- Water fee reduction
- Installation of drip irrigation system
- Clearing the channels from garbage, one employee from each community for cleaning works
- Providing long-term credits with low interest rate

Next part of the workshop was about **Production.** The following problems and constraints were offered to discuss: low soil fertility, marketable products are not enough, high farm input cost, quality of farm inputs, not enough governmental support, lack of appropriate credit scheme and damages from insects and diseases. To have a high quality and marketable product farmers must use high quality seeds, fertilizers, and agrochemicals. There is a lack of information / knowledge concerning these matters. They rely on their practice and experience gained during many years of cultivation. Farmers use low quality or expired (According to their opinion, as farmers have low quality production) farm inputs and as a result of the usage of those inputs, farmers sometimes have non-effective results than they expected. There is necessity of additional consultation and accurate information – when and how, what kind of chemicals and fertilizers to use. Farmers offered to open specialized shops in every community controlled by the government, with consultants, well-qualified agronomists, providing consultation services, for having accurate information about chemicals. Farmers offered to exercise control over companies providing fertilizers, and also control fertilizers' price and quality, subsidized fertilizers and all agricultural inputs being imported to the country. Farmers also have many loans from banks, there were proposals about providing long-term credits with another terms and conditions.

So, I'd like to underline the following solutions regarding Production problems.

- Sale of chemicals by the government
- Proper information about subsidized fertilizers, import and distribution of fertilizers by different companies
- Control over the quality of subsidized fertilizers,
- Necessity of agricultural specialist in every community
- High credit interest-rate, limited volume of provided money, short-term credit

Next issue for discussion was **Machinery** and here are the problems presented: shortage of farm machinery, tractors hiring service high costs, old machinery, not appropriate timing of machinery service, expensiveness of tractors and spare parts, fuel high price. Farmers found the problems relevant to their area.

Some farmers cultivate small parts of land and they do not want to buy big tractors (mainly used on big farmlands). Other farmers complained about fuel and renting high price. Farmers had various opinions regarding machinery problems. Farmers have small lands after Independence. So the tractors, which farmers use from Soviet Union era, were not suitable for small lands. Other farmers complained about fuel and renting high prices. Farmers do not have enough budgets to buy tractors and offered to create "machinery stations" providing renting services, where farmers can rent tractors and other machinery. Community office should properly organize renting services. Some farmers offered that government should create special bank programs for realizing machinery purchase for the community. Agricultural business is not so profitable for making big investments. Regrouping all the opinions we can identify the following three points for solution of machinery problems.

- Creation of stations where farmers can rent tractors and other machinery
- Establishment of proper organization of tractor renting services by community offices
- Tractor purchase for community by loans from bank or other investments

Then participants were shown the table of communities' lands in hectares, irrigated and not irrigated, and also the percentage of lands that should be irrigated after the reconstruction of Yeghvard reservoir. Now communities' lands are irrigated by Arzni branch canal. The communities get irrigation water far more than their registered farmland area in cadaster.

After Yeghvard reservoir reconstruction, irrigated area will be increased and respectively the cultivated land will be expected. Among most prosperous crops farmers from above mentioned communities mentioned Table C-3.2.

Table C-3.2 Prosperous Crops & Farmlands of Yeghvard WUA Communities

Community	Farmland	Irrigated land		Prosperous crops (priority order)				
	(ha)	(ha)	%	1	2	3	4	5
Zovuni	654	413	63.20%	*Apple*	*Apricot*	*Grape*	*Plum*	*Pear*
Kasakh	634	301	47.50%	*Apricot*	*Apple*	*Grape*	*Pear*	*Peach*
Proshyan	1,140	336	29.50%	*Apple*	*Grape*	*Peach*	*Walnuts*	*Alfalfa*

The cultivation of these prosperous crops can be realized using following methods: buying new machinery, installation of drip irrigation system, installation of anti-hail system, use of non-cultivated lands. Installation of drip irrigation system will save water.

In this area soil is stony and its quality is suitable for fruit cultivation. In case of rehabilitation of Irrigation network some farmers prefer to develop new orchards. Farmers used to cultivate fruits since Soviet Union period. Farmers have enough farm territory but do not cultivate it because of lack of irrigation water. Farmers also mentioned mixed cropping and intercropping for organizing cultivation process and having more production in future. In this area mainly elder generation is interested in farming.

2. The 2nd workshop: Khoy WUA office (Date: November 11 November, 2015).

The second workshop was held in "Khoy" WUA with 24 participants from Lernamerdz, Amberd, Aghavnatun, Doghs, Aragats, Tsaghkalanj and Hovtamej communities in Armavir Marz. All comunities are located in Ararat plain on the borders of foothills, and irrigated by the Lower Hrazdan canal.

All Marketing problems: low sales price, accessibility to the market, lack of information/ knowledge about marketing, no governmental support for marketing, were actual in this area.

Farmers added new problem about difficulties for exporting products. They have no permission from the government to realize it, is hard to export products even to Georgia, taxes and customs duty are the main reasons. During the Soviet period farmers often took the products (such as cabbage, apricot, herbs/greens, tomato and grape) to Georgia, or buyers from Georgia came to their communities. Now farmers were expecting to export their products to Georgia again.

Farmers were complaining about selling prices, especially potato price, they expected governmental support for this issue as well – mainly for controlling selling price. There was also a problem of commercial seed, in this case government should organize import~~ing~~ of high quality subsidized seeds.

Farmers expect the government to set initial crop cultivation plan by making agreements between farmers and processing companies with appropriate terms and conditions. They are thinking that this kind of governmental intervention will eliminate exceed production and be able to sell the products completely.

Then farmers talked about a problem of middlemen, it is difficult for farmers to take products to the market, city is far from the communities, fuel for transportation is expensive, so they have to sell their

products to middlemen with very low price. In addition, middleman tends to purchase only high quality products from farmers to sell it in city markets and other low quality non-standard products are not purchased or purchased at throwaway prices. So creation of markets in big cities where farmers can sell their products by themselves will be one way of solutions of the problem. In case of the establishment of such markets, farmers can sell the products directly to consumer without multilayer middlemen service. Another solution is creation of nearby markets (in the community) where farmers can sell the production entirely. Such market could be under government or community office control.

Another solution was crop planning organized by government to encourage stable agricultural exports. Government must negotiate with exporting companies and foreign buyers for planning supply and demand. Farmer should know what kind of products the producer will supply and he will be sure all his production will be sold with favorable price. Farmers often remember Soviet Union period when they could sell their production anytime and anywhere.

Another solution would be creation of cooperatives, it will help farmers to organize their activity, to plan seasonal works, planning of supply and demand. There is a need of additional proper information about organization of cooperative works and planning. But there were other opinions too. Farmers mainly hoped on government support. Other farmers offered cooperation with Russian exporting companies, for setting good sales prices and production planning, as big volume of Armenian fruits and vegetables is exported to Russia every year. So summarizing all opinions we can underline the following solutions:

- Government should set and control sales prices
- Creation of markets where farmers can sell their product
- Creation of processing companies
- Creation of cooperatives.
  Providing information about cooperatives (how to manage and cooperate)
- Planning by the government, control of supply and demand by the government, agreements in advance

Irrigation problems were offered to discuss: shortage of water, breakages of water canals, irrigation water high fee, absence of drip irrigation system, contamination of physical objects (garbage) in the irrigation water, ground water low level and unequal water distribution. All problems are relevant to this area, except shortage of water and unequal water distribution. Farmers thought that water pollution is community people's responsibility and offered to establish penalty charges, and organize cleaning works with WUA.

Since the installation of drip irrigation system is expensive for farmers, they offered that the government should support for the installation or making investments for this purpose.

Farmers are thinking that irrigation water fee is high for farmers. Because profits from agricultural production are limited and those are not enough to cover all the expenses. So they talked about necessity to reduce irrigation water fee. But in any case farmers are satisfied with the work of WUA office, in case of any problems farmers freely to apply to WUA office.

There was also a suggestion about precipitation water usage for irrigation purpose by installation of concrete or metal flumes.

Solutions of **Irrigation** issues were as follows:

- Installation of concrete or metal flumes
- Reduction of irrigation water fee
- Installation of drip irrigation system

- Establishment of penalty charges for water pollution by WUA

Production problems were as follows: low soil fertility, marketable products are not enough, high farm input cost, quality of farm inputs, not enough governmental support, lack of appropriate credit scheme and damages from insects and diseases. The main problem concerning Production in this area was about fertilizers, their high price and bad quality. Farmers insisted that if they used same fertilizer for many years on the same farmland, the productivity would be declined. Farmers wanted the government to organize import and control of high quality subsidized fertilizers, produced by different companies.

Farmers expected government to provide subsidized or even free and advanced tested seeds. There was a situation when farmers bought new sorts of wheat seeds, farmers could not get any harvest, or only very low amount and low quality of productions from the seeds. So they offered government to test the quality of imported seeds previously before the distribution.

Agrochemicals are expensive and they are mainly imported only by one company, so there is no option for farmers to choose appropriate product. Farmers claimed that the agrochemicals must be imported by several companies from different countries to stimulate appropriate competition, as the situation in the same with fertilizers.

Farmers agreed that they had some lack of information about agrochemicals, but they always can find new information (posters and booklets) in community offices. If farmers had proper knowledge of agricultural inputs and technologies through agricultural support and appropriate consultation, they could have a good production. There was other opinion that farm inputs quality is not a problem, the problem is their high price. Many farmers buy inputs using agricultural loans, therefore sometimes they have several loans with high interest rate. Subsidies from the government are not accessible for all farmers because their conditions are limited. Implementation of some changes in credit scheme will help farmers greatly. We can mark the following main solutions for Production issues:

- Import of high quality fertilizers by different companies
- Provision of subsidized agrochemicals and seeds by the government

Machinery problems were as follows: shortage of farm machinery, tractors hiring service high costs, old machinery, not appropriate timing of machinery service, high price of tractors and spare parts, fuel high price. All problems were considered relevant, especially lack of tractors.

Farmers discussed different ways of acquiring machinery. They offered to establish stations providing agricultural machinery services and for renting tractors by affordable service fees. Such stations can be organized by the government or individuals. Such organizations will be responsible for providing high quality machinery services with stable and affordable price for farmers. So the main solution was

- Establishment of governmental or private organizations providing agricultural services.

Then participants were introduced the table of communities' irrigated and non- irrigated lands. It was mentioned that cultivated lands will expand after Yeghvard reservoir construction.

The main water source in these communities is Lower Hrazdan canal and only in Hovtamej community farmers use 4 deep-wells for irrigation.

Among most prosperous crops in this area farmers mentioned:

Table C-3.3 Prosperous crops & farmlands of Khoy WUA communities (Group 1)

Community	Farmland	Irrigated land		Prosperous crops (priority order)				
	(ha)	(ha)	%	1	2	3	4	5
Lernamerdz	105	69	65.50%	*Potato*	*Cabbage*	*Onion*	*Strawberry*	*Cucumber*
Amberd	353	329	93.30%	*Beans*	*Grape*	*Tomato*	*Onion*	*Cabbage*
Doghs	476	423	89.00%	*Peach*	*Plum*	*Beans*	*Potato*	*Grape*
Tsaghkalanj	285	271	95.00%	*Tarragon*	*Cabbage*	*Cucumber*	*Potato*	*Grape*
Hovtamej	453	587	129.70%	*Tarragon*	*Strawberry*	*Potato*	*Cucumber*	*Alfalfa*

Following methods and ways of cultivation were offered by the farmers:

After reconstruction of Yeghvard reservoir farmers will expand cultivated area. Greenhouses will be built for having high quality production and respectively more profit. Provision of agricultural loans will also help farmers for making good profit. Ararat plain is well known with its high quality soil condition. It is suitable to cultivate fruits and vegetables in this area. Farmers can sell their production both to processing companies and for fresh consumption. Cultivation of strawberry has become popular in this area for 10-15 years, it is profitable too.

3. The 3rd workshop: Sasunik community office (Date: November 13 November, 2015).

From Ashtarak WUA, 4 communities are included in the Project Area. Members from Sasunik, Norakert, Baghramyan and Merdzavan communities participated at workshop.

Marketing problems are: low sales price, accessibility to the market, lack of information/ knowledge about marketing, no governmental support for marketing. In this area, participants faced all the above-mentioned problems in the field of Marketing except the difficulty to transport the products to the market, as these communities are not far from Yerevan city. But still some farmers had an opinion, fuel price is high to bring their products to the city, so they preferred to cooperate with middlemen, as they cannot sell fruits and vegetables without them. In this area, the cultivation of cereals is popular.

This year there has been a big problem concerning grape harvest. Production volume was too big in this year, therefore only the farmers who had made agreements with processing companies could sell their products with more or less stable price. Others had to sell it with low price.

Farmers discussed a problem concerning processing companies. Many farmers make agreements with processing companies for selling their production (mainly grape). Stable sales price is also mentioned in the agreement. So, farmers offered to construct new factories or processing companies, or to re-lunch the old ones by the government. During Soviet Union, there were more factories, but only several of them are operated now or they operate temporary.

Farmers underlined the low price set by the processing companies. Sales prices become lower after harvesting period. There was an offer to make cooperative, which will negotiate with factories according agreements' terms and conditions mainly about sales prices.

Thus, the following problems were added to the list:

- Sales price is not stable
- Farmers cannot bargain sales price set by the factory

Input cost was also discussed in this part of the workshop. In this area grape is known for its high

quality with high sugar degree, that's why it is mainly exported to Russia. Farmers in these areas have enough experience of grape cultivation since the Soviet era. Now they are cultivating new variety of grape, which can be stored for a long time and can resist low temperature. This new variety they can sell even in winter season. Now farmers start cultivating new varieties of grape for fresh consumption.

Farmers mainly cultivate wheat, apricot and plums in this area. But they make profit by selling apricot to middlemen or exporting to Georgia. Farmers offered that exporting should be reorganized. They need appropriate machinery with refrigerators as many products have short storing period. Farmers expected that there will be governmental support in organization of exporting process, especially during harvest period. The following solutions were offered:

- Input cost reduction
- Exporting, organization of exporting process
- Stability of sales price
- Governmental support
- Construction of new factories/processing companies

Next issue for discussion was **Irrigation** and the problems were: shortage of water, breakages of water canals, irrigation water high fee, absence of drip irrigation system, contamination of physical objects (garbage) in the irrigation water, ground water low level and unequal water distribution. All problems were relevant to that area except ground water level problem. As in other communities, internal network is in very bad condition here, and it is the main reason of water loss. The farmers think that repair works must be conducted mainly by the government, as both farmers and WUA office has not enough funds for it. Currently WUA is repairing internal networks but they cannot cover all facilities due to the budget limitation. WUA should repair irrigation network by the governmental support. Water fee must be reduced, but in this case WUA will not have enough funds for other works.

Farmers hoped that after the reservoir reconstruction they can expand cultivated lands and have more production, thus profit.

During the workshop the farmers also spoke about problems of water distribution and offered supervision on WUA office.

Concerning water pollution, farmers marked that it was their responsibility to take care of, so every spring in the beginning of cultivation season farmers both with WUA employees take part in cleaning works.

There was another problem concerning water distribution. Some farmlands are located very far from irrigation canals. Closer territories are irrigated firstly. Rehabilitation of irrigation networks will not solve the problem because of big distance.

Government should have supporting projects for installation of drip irrigation system, it will help farmers to use less water, and save money.

The **solutions** suggested were as follows:

- WUA must be supervised by the government in the process of water distribution
- WUA needs financial support for repair works of irrigation network from the government
- Financial support by the government for installation of drip irrigation system
- Farmers must control canals not to be polluted

All **Production** problems (low soil fertility, marketable products are not enough, high farm input cost, quality of farm inputs, not enough governmental support, lack of appropriate credit scheme and

damages from insects and diseases) were also actual in this area except extension and support from government.

Farmers need high quality fertilizers for having marketable production. Even when the government provides fertilizer, their price is still high for the ordinary farmers. In this area the problems of low quality seeds and chemicals were indicated by many farmers. They are suspicious about the qualities of farm inputs, therefore farmers wanted to have special equipment for testing (checking) fertilizers quality. If they possess this kind of device, they will be able to check the quality before buying it.

Farmers think that the government should establish special supporting scheme to provide subsidized fertilizers and seeds. They explain that due to low sales price and low quality of inputs they do not have appropriate profit. Reducing of input costs will cause to have more profit.

Some farmers suggested that if they could pay the charges for subsidized seeds and fertilizers after the harvest period, it will be helpful for the crop cultivation because it is easier for them to pay after the harvesting period. But in any case government should control fertilizers quality more before selling to farmers. Other solutions of production problems were mainly the same as offered during previous workshops.

Main solutions in this area were as follows:

- Fertilizers' quality control by the government
- Importing fertilizers by different organizations
- Fertilizers' testing equipment provided by the government
- Paying for subsidized fertilizers after harvesting period
- Providing loans in proper time (farmers prefer to take credits before cultivating period)
- Reduction of irrigation water price

In the matter of **Machinery**, farmers agreed with all problems. The problems are: shortage of farm machinery, tractors hiring service high costs, old machinery, not appropriate timing of machinery service, expensiveness of tractors and spare parts, fuel high price. Discussions were about lack of appropriate machinery, as it was described previously farmers think that big tractors are not suitable for small lands. Farmers suggested the government to establish machinery stations providing machinery services by employees with state salary. Government should revise and reorganize many aspects of agriculture sphere. Farmers rely on governmental support in buying new machinery by leasing terms, or change terms and conditions of loans, so it would be easy for farmers to repay the loan.

One problem was raised concerning fuel price and quality. As it was told previously machinery in communities are very old. Farmers use it from the Soviet Union times, they say that subsidized fuel do not correspond to the old machinery, fuel consumption is much, and farmers have to buy fuel with the market price and use more than it is needed, i.e. instead of 15 liters tractor consumes 20 liters. The main solutions for this problem were as follows:

- Creation of organizations providing agricultural services
- Leasing credits by the government
- Providing machinery by the government by loans with low interest rate
- Credit Terms & Conditions changes

The table of irrigated land and prosperous crops is given Table C-3.4.

Table C-3.4 Prosperous crops & Farmlands of Ashtarak WUA Communities

Community	Farmland	Irrigated land		Prosperous crops (priority order)				
	(ha)	(ha)	%	1	2	3	4	5
Sasunik	1,046	755	72.20%	*Grape*	*Wheat*	*Alfalfa*	*Maize*	*Tomato*
Norakert	130	32	24.60%	*Grape*	*Apricot*	*Alfalfa*	*Wheat*	*Barley*
Baghramyan	200	28	14.00%	*Grape*	*Apricot*	*Alfalfa*	*Wheat*	*Barley*
Merdzavan	363	100	27.50%	*Grape*	*Apricot*	*Alfalfa*	*Wheat*	*Barley*

These communities' farmlands are mainly irrigated by Arzni-Shamiram canal, Kasakh River and Tkahan Canal.

These prosperous crops can be cultivated due to sufficient water received after rehabilitation of irrigation network and Yeghvard reservoir construction. As farmers told water will help to overcome many other problems as well. Community lands in this area are very stony and have low fertility; if there is sufficient irrigation water farmers will cultivate also these lands, and can cultivate various products, especially new varieties of grape for fresh consumption. They indicated that soil fertility is low, which can be improved after Irrigation network rehabilitation.

The following methods were offered for realizing new plans.

- Land renting, cultivation of new lands
- Installing of drip irrigation system
- Inter-cultivation
- Installation of greenhouses

The last part of all workshops was about household total work load. Farmers were asked to determine family labor from total, also determination of work load in open farmlands and in greenhouses. Cultivation periods and work load depend on kind of the crop. Farmers need more employees mainly in harvesting period. Family work has great importance in farming. Usually, all members of family take part in crop cultivation. In greenhouses all cultivation works are conducted by family members. The table of average work load and days during a year is given below according to crops. Numbers are different during harvesting period (grape, apricot, alfalfa), when farmers need more employees (up to 10). Greenhouses average territory is 300-450 m^2.

Table C-3.5 Labor Force for Growing Crops

Crops	Total work load (man/day)	Family labor (man/day)
Wheat	2 men x 11 days	1 man x 11 days
Barley	2 men x 11 days	1 man x 11 days
Maize	6 men x 50 days	1 man x 10 days
Alfalfa	2 men x 27 days	1 man x 27 days
Potato	6 men x 38 days	2 men x 38 days
Tomato	9 men x 83 days	2 men x 83 days
Tomato (Greenhouse)	6 men x 135 days	2 men x 135 days
Cucumber	5 men x 30 days	2 men x 30 days
Cucumber (Greenhouse)	6 men x 120 days	3 men x 120 days
Eggplant	5 /men x 80 days	2 men x 80 days
Sweet pepper	6 men x 120 days	2 men x 120 days
Sweet pepper (Greenhouse)	3 men x 330 days	3 men x 330 days
Water melon	6 men x 60 days	1 man x 60 days
Grape	5 men x 220 days	2 men x 220 days
Apricot	2 men x 70 days	1 man x 70 days

Crops	Total work load (man/day)	Family labor (man/day)
Peach	4 men x 150 days	2 men x 150 days
Apple	4 men x 90 days	2 men x 90 days
Pear	4 men x 90 days	2 men x 90 days

Solutions for the constraints are mainly depend on financing and proper organization and planning of works. Farmers mainly rely on the Governmental support, they do not have enough funds to make big investments.

But the big role in farming has also family work, which will help to save money, as the farmers do not have to pay to employees. All these can be realized by good investments, made by the government or any company, or banks should have agricultural credits scheme to help farmers.

4. The 4th workshop: Vagharshapat WUA office (Date: November 16, 2015)

There were 25 farmers from "Vagharshapat" WUA communities: Mrgastan, Tsaghkunk, Artimet, Taronik, Aratashen, Khorunk and Griboyedov (See table 1). All communities are located in Ararat plain, where soil is well known for its fertility. Production in this area is comparably more in hectares than in other regions of Armenia.

Marketing problems were discussed firstly. Farmers offered development of stable market by community offices or by the government with fixed sales prices. Sales price (especially farm gate price which is negotiable) is not stable, it can be fluctuated even during the day, in the morning and in the evening.

As it was during previous workshops problems of agro-processing companies was also actual: necessity for funds, or sufficient number or operated processing companies. . **Sometimes production is more than consumption.** Farmers need to sell products even with low price to prevent spoilage as for own consumption this volume is really big. Creating of processing companies will be a good solution for the above-mentioned problem, it can be realized by the government or by the means of foreign investments.

The products are marketed with the help of middlemen, but in some cases the farmers prefer to take products to city markets by themselves to avoid low sales prices. In this process they face other problems: much consumption of fuel and its high cost, bad conditions of roads not only inside the community.

Exporting problems also exist in this area. Production volume is of vegetables is sometimes more than the domestic demands, so exporting will be a good solution to fulfill the gaps between production and demand by developing foreign markets. Exporting should be conducted by governmental support and control. Following problems regarding marketing were newly suggested by the participants.

- Sales price is not stable
- Production for export is far more than the demand
- Lack of agro-processing companies

Farmers offered to create Agricultural Unions (or cooperatives), supported by the government. Creation of some organizations uniting farmers will be easy in cultivation planning, organizing seasonal works, also selling process etc.

New solution was offered during this part of the workshop: the government should control the regulations to work properly. The meaning of this request is to keep under control every stage

concerning the agriculture (concerning agriculture, regarding cultivation, inputs, sales prices, agrochemicals, etc.).

Farmers want to cooperate with exporting companies, not only from Russia but also from other countries.

So they offered to create new cooperation on governmental level such as a deal between each Ministry of Agriculture or other ministries. It will be easy and profitable to plan cropping for export according to demand, with prices are set beforehand.

The following solutions in the field of Marketing were suggested:

- Creation of cooperatives (Agricultural unions) by farmers supported by the government
- Planning of farm household works and production by farmers
- Expanding of cultivating lands by governmental laws
- Armenian-Russian proper cooperation, periodical planning of supply and demand on governmental level.
- Governmental control in agricultural procedures by adopting new regulations strengthening them.

Next topic for discussion was **Irrigation.** Problems regarding shortage of water are not actual in every community of this area. Farmers agreed with all suggested problems by Project team except installation of drip irrigation system. (It is impossible to install the system on large scale farmlands and mountainous areas). New problem to discuss was soil quality. There are some parts of land where soil absorbs too much water and farmers have to use more water for irrigation than general farmlands. So, the field requirement of water for cultivation is more and respectively new expenses as for water fee arise, which is high for farmers.

Breakage of irrigation network is the main reason of water losses. Rehabilitation of internal network can be realized by the Governmental support. WUA conducts all seasonal preparatory works before cultivation in spring, but WUA cannot make big investments for repairing. Eurasian bank has implemented feasibility survey for rehabilitation of the irrigation network, repair works will begin next year. Farmers are expecting the monetary support for the rehabilitation of internal network from Eurasian bank in order to complement the role of WUA.

According to the farmers, water pollution problem cannot be controlled by them, because canals are already polluted in the cities' territory. Cleaning works are conducted by WUA and Water supply agencies every spring.

Farmers use many deep wells in this area. During last several years, there occurred a problem of ground water level decline. Farmers had to lengthen the pipes up to 5-7 meters deeper.

In this case we have two main solutions regarding irrigation issue:

- Yeghvard reservoir reconstruction
- Eurasian bank made investments for repairing canals and networks

Farmers agreed with all problems of **Production** issue what project team suggested.

During previous workshops in Vagharshapat WUA, farmers also complained of the high cost of farm inputs and those qualities, especially seeds, fertilizers, tractors, combine harvester, agrochemicals etc. Importers of fertilizers and agrochemicals in the country have been monopolized during many years, so farmers have to use the same kind of products during many years. Use of the same fertilizers in the same land for many years will cause low quality production and farmers have no assortment to choose another.

So farmers desire to have options to choose different kinds of imported fertilizers and agrochemicals.

There is also a problem of low quality seeds, both subsidized and bought from private shops. In this case, one of the offered solutions was seeds testing before selling it to farmers. Such kind of quality assurance activity must be realized through the community offices with governmental support or by the government. Only after all these measurements are taken for proving seeds quality, seeds can be sold to farmers. In this case they can be confident of having good production. According to farmers, government should set standards and regulations concerning management of farm inputs importing companies.

A new problem was offered regarding crop rotation. After the independence by land redistribution farmers have got small parts of lands, so crop rotation cannot be conducted in proper way due to small scale land area. But this problem can be partially solved after expanding farmlands, when water distribution will also be regulated. Farmlands can be expanded only by buying or renting (renting fee is also high). Farmers of this area were eager to get long-term credits with low interest rate by the government.

Farmers also discussed about the low quality of insecticides and agrochemicals. During the Soviet Union period, they had 4 types of agrochemicals and they all were quite effective. Now there is a large variety of agrochemicals and they are not effective in many cases. There is a lack of proper information and knowledge about usage of these inputs. Farmers need additional support in consultation about agricultural chemicals and insecticides use. Such kind of consultation services should be provided by corresponding specialists working in the agricultural shops.

In some cases, diseases are spread so widely that there is a need of special measurements organized by the government. Deceases must be prevented widely in all communities.

Some farmers requested to make soil analyses to find out what kind of fertilizer is necessary. Farmers need more agricultural support.

Other opinions were about seed breeding. Farmers mentioned the importance of having several seed breeding farms or establish seed breeding companies by the government control. This can be another solution for having appropriate seeds for the soil environment.

Summarizing all opinions, we can underline the following main solutions which were offered by the farmers.

- Providing consultation services by specialist concerning different agricultural issues in the community offices
- Import of agrochemicals preventing diseases by different companies
- Importing companies should be controlled by the government
- Seed testing before selling them to farmers to standardize the quality of them
- Creation of seed breeding farmers
- Provision of long-term loans with low interest rate
- The government should take special measurements to prevent some diseases, spread in many communities

Regarding **Machinery** issue all the problems that we suggested based on the result from the survey were actual too. Especially, shortage of tractors is the most significant issue for farmers. Tractors are very expensive, so farmers cannot afford it. Once they tried to organize collective purchase, but it did not work effectively. Farmers hoped on the governmental support to solve this problem or any foreign investments. The best solution, as it was offered during other workshops, was creating machinery stations where farmers can rent agricultural machinery or apply for machinery services. Such stations

can be managed either by the government or private sector.

There were also opinions about importing second-hand agricultural machinery from foreign countries. But if so, there will be another problem concerning spare parts of imported second-hand machinery. It will be difficult to get them in future. Or importing should be from nearby countries. The best solutions in this problem will be as follows:

- Machinery should be imported from close countries (as spare parts are expensive and it will take long to deliver them)
- Creation of organizations as machinery station providing agricultural services, such as renting tractors
- Import of second-hand machinery should be enhanced (including import of spare parts)

The main canals irrigating these communities are Lower Hrazdan Canal, Kasakh River, Akhnalich Canal and Sev Jur River. Farmers are also using deep wells, in some communities their numbers achieve up to 17.

Prosperous crops in the following table are based on the information of current cultivated vegetables and fruits. Based on current situation farmers told that cultivating vegetables is more profitable in this area. Among the cereals, alfalfa's selling price is more stable than others'.

Table C-3.6 Prosperous crops & farmlands of Vagharshapat WUA communities

Community	Farmland	Irrigated land		Prosperous crops (priority order)				
	(ha)	(ha)	%	1	2	3	4	5
Mrgastan	174	160	92.20%	Onion	Potato	wheat	Beans	Cucumber / Tomato
Tsakghkunk	138	120	86.70%	Potato	Cabbage	Maize	Beetroot	Alfalfa
Artimet	327	325	99.30%	Potato	Tomato	Water-melon	Wheat	Beans
Taroniq	405	286	70.60%	Alfalfa	Wheat	Hot Pepper	Tomato	Onion
Aratashen	724	651	89.90%	Pepper	Carrot	Tomato	Grape	Water-melon
Khoronk	482	322	66.80%	Water-melon	Eggplant	Tomato	Onion	Cucumber
Griboyedov	547	297	54.30%	Water-melon	Wheat	Grape	Alfalfa	Basil

For developing crop cultivation in these communities the following methods were discussed:

- Installation of green houses
- Installation of drip irrigation system
- Import of high quality agrochemicals
- Soil quality improvement

Construction of greenhouses will cause to production increase and respectively income increase. Importing of new high quality fertilizers and agrochemicals will cause to marketable production and their successful sales.

5. The 5th workshop: Khoy WUA office (Date: November 20 November, 2015).

The fifth and last workshop was held in «Khoy» WUA office. As usual the workshop began with participant's registration, self-introduction and opening remarks. There were farmers from 6 communities of Khoy WUA area: Tsiatsan, Geghakert, Haytagh, Ferik, Arshaluys and Aknalich in Armavir marz. All communities are located in the Ararat plain, where soil is well known for its

fertility.

The first theme to discuss was **Marketing** and concerning problems. Farmers' complains were similar to other workshops. Farmers hope to have governmental support same as the Soviet Union era in order to sell all of their production. They talked about production surplus which they cannot sell. They offered to create stations for selling their products entirely. Many farmers have no time to take their products to the city markets. In this case, farmers have transportation problems due to bad road conditions and high fuel price. Working in groups may make the transportation easier but currently they cannot work in cooperation because of time inconsequence. They also talked about the significant role of middlemen. Middleman helps farmers as a mains source of selling channel of their productions. But on the other hand, they also insisted about the difficulty to negotiate about the sales price of their products with the middleman. Farmers are not satisfied with their low buying prices. Other farmers preferred to sell their product without middlemen, so they want to have selling places in the city markets.

Farmers hoped support from the governmental concerning agricultural export. They want to cooperate with foreign companies, or have opportunity to take products to nearby countries. Processing companies also have a big role in marketing. Farmers cultivate grape, eggplant, bean, tomato and cucumber mainly for processing companies. Processing companies buy only the part of production according to agreements, with low price. Farmers want the government to encourage creation of new processing companies to increase the volume of purchasing because production of above crops always exceed more than the purchasing volume by processing companies. Farmers also insisted that the government should control the price of agricultural products to set higher sales prices than the current one. As there is still irrigation problem in the communities, farmers cultivate mainly grape which requires less water for cultivation than other fruits and vegetables in this area. So we can say that farmers' profit is not stable in any case. But in case of stable prices their profit will be stable but not high.

Armenian farmers have large capacity of production for exporting. Farmers look for opportunities to export their products to other countries such as Georgia, Russia, and Iran.

Accordingly we have the following solutions in Marketing:

- Creation of markets by the government, where farmers can sell all their product
- Stimulate agricultural export by the government
- Creation of new processing factories

Farmers agreed with all suggested problems regarding **Irrigation** issues except installation of drip irrigation system as in big-scale farmlands it is difficult to install drip irrigation system from perspective of its cost. The main reason of water loss (almost 20%) is breakage of internal network system. Water loss will decrease after irrigation network rehabilitation. There was a suggestion about precipitation water (rainfall, snow melt water) usage, farmers offered to install concrete flume in order to take the precipitation water to farmlands. Water distribution will be improved after the rehabilitation of irrigation network by reducing water losses, and also the soil will be more fertile to improve the condition by stable water provision. Improvement of water distribution will encourage the expansion of farmlands in the area.

Here was a new solution regarding water pollution: to establish garbage processing companies or to install trash collecting points managed by community, so that residents can take garbage to "trash collecting points". The main solutions for Irrigation issue were:

- Creation of garbage processing companies by community offices
- Installation of concrete gutter drains
- Rehabilitation of irrigation network (some farmlands of this area are included into Eurasian bank project)

All suggested **production** problems were actual in this area. Production quality mainly depends on water distribution (irrigation), and also soil fertility. It is widely spoken that Ararat plain is known for its soil fertility, but it is not necessary so in some communities (e.g. Aknalich community) according to farmers. Farmer tries to improve soil quality by fertilization and crop rotation. Sometimes crop rotation cannot be done in proper way because of small farmlands. As it was mentioned in other workshops, the participants of this workshop complained about fertilizers' quality as well. In some cases they have no result after using fertilizers and agricultural chemicals. Farmers suggested that the quality of imported fertilizers and import agents must be under control of the government. Farmers wish to use different kinds of fertilizers provided by different companies. Other farmers insisted that the importance of fertilization of all farmland territories before the cropping period. Proper fertilization will contribute to guarantee high quality production. Another opinion was that they want to do soil condition test of their farmland and consultation service in order to determine what fertilizer is needed for their farmland.

During Soviet Union era, there was a fertilizer factory in Vanadzor town, which provided fertilizers almost all communities in Armenia. So farmers wanted the government to reorganize the factory or create new fertilizer factories, in this case they will not have to purchase foreign products.

Regarding seeds and its quality, similar issue and solution were discussed. Farmers wanted governmental control on seeds quality, even subsidized seeds. According to farmers, imported seeds are often not suitable for the Armenian soil condition. Other farmers suggested establishing seed breeding companies or farms, so they will have high quality seeds which are suitable for their farmlands' soil.

Now farmers receive certain information from community offices through ASMC, but still they need more information about fertilizers and chemical use. Workshops are also usually organized in community offices for farmers by ASMC or other organizations. Farmers also get information from staff in agricultural shops.

Accordingly the following solutions are highlighted:

- Soil fertility improvement by farmers with governmental support (consultation service to know soil condition by test)
- Seed quality control and seeds testing by the government or community offices
- Reorganization of fertilizer factory (Vanadzor) or creating the new ones by the government
- Use of different kinds of fertilizers (options of different fertilizer use)
- Creation of seed breeding companies or farms by the government
- Fertilization of all farmlands before cropping period by community offices.

Suggested Machinery problems were also agreed in this area, mainly the shortage of agricultural machinery. During Sovkhozes period, farmers had machinery "machinery station" which was disappeared after the independence and all tractors were bought by individuals. Now creating of new machinery stations providing agricultural services with lower and stable prices will be a good solution for them. Such stations may be private or governmental. But in any case, farmers insisted on the importance of governmental support. So services should be provided in proper way and with appropriate timing. Problem of the timing of machinery service also exists in the area. Because there are limited numbers of tractors but demands of them are huge due to the heavy farm works. There is a problem of fuel price and quality too. In some cases farmers complained not only about high price but also about quality of fuel and incompatibility of fuel to old machinery. Even in case of subsidized fuel distribution, the quality is not sufficient. So farmers suggested to set the fuel quality standard and it should be controlled before importing into the country. So main solutions for machinery problem were as follows:

- Creation of private organizations providing agricultural services
- Governmental support

Main canals of these communities are Lower Hrazdan Canal, Aknalich pump station, Sev Jur pump station and several wells.

Table of prosperous crops represents current situation in this area. Famers will increase the poduction of following crops after the improvement of water distribution.

Table C-3.7 Prosperous crops & farmlands of Khoy WUA communities (Group-2)

Community	Farmland	Irrigated land		Prosperous crops (priority order)				
	(ha)	(ha)	%	1	2	3	4	5
Tsiatsan	205	204	99.50%	*Potato*	*Cucumber*	*Wheat*	*Beans*	*Wheat*
Geghakert	533	469	88.10%	*Strawberry*	*Wheat*	*Cucumber*	*Potato*	*Beans*
Haytagh	648	425	65.60%	*Wheat*	*Potato*	*Beans*	*Grape*	*Cucumber*
Ferik	159	110	69.20%	*Wheat*	*Alfalfa*	*Potato*	*Greens / tarragon seeds*	*Cucumber/ Cucumber seeds*
Arshaluys	1023	859	84.00%	*Grape*	*Eggplant*	*Potato*	*Alfalfa*	*Wheat*
Aknalich	471	659	139.90%	*Grape*	*Tomato*	*Alfalfa*	*Water-melon*	*Wheat*

Some farmers were talking about the possibility of tobacco cultivation. The following methods were discussed for getting the target.

- Importing of high quality seeds
- Installation of green houses
- Distribution of irrigation water
- Installation of drip irrigation system
- Expansion of cropped area by using non-cultivated lands, own or rented

In some communities, farmers have seed breeding farms (especially cucumber, greens and spinach), which is profitable and these cultivated seeds are suitable for the soil in this area. Strawberry cultivation began popular in this area during last 10-15 years, mainly for fresh consumption

APPENDIX D

Meteorology, Hydrology and Water Resource

Appendix D-1: Meteorological Data
(1)Hrazdan Meteorological Station

Monthly precipitation (mm)

Hrazdan

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1983	26.5	37.2	66.0	30.0	141.4	117.3	10.5	68.5	10.1	61.4	169.9	21.7	760.5
1984	6.5	44.4	85.6	120.5	59.3	37.6	82.2	16.1	13.6	59.7	36.6	17.4	579.5
1985	69.4	170.3	36.3	39.6	95.1	54.4	49.1	9.8	0.9	39.4	5.0	50.9	620.2
1986	90.6	81.2	25.7	54.9	170.6	65.3	26.7	17.6	35.4	75.8	87.9	39.9	771.6
1987	163.2	88.7	48.7	87.4	96.4	15.9	21.2	34.4	28.1	99.7	74.6	128.2	886.5
1988	76.5	73.3	89.4	83.0	134.0	97.5	71.2	34.6	22.1	71.8	51.2	83.4	888.0
1989	1.9	9.4	29.0	41.2	42.9	50.0	24.7	12.9	27.2	113.9	143.5	51.6	548.2
1990	27.7	23.6	4.1	161.7	95.7	20.1	23.7	21.4	13.9	84.4	67.3	31.5	575.1
1991	66.1	64.6	63.1	70.4	63.5	59.2	36.0	19.3	7.2	39.0	80.9	61.7	631.0
1992	53.1	128.7	16.0	48.6	59.0	127.5	40.3	19.0	65.3	15.6	82.8	56.1	712.0
1993	22.0	91.4	33.5	81.2	90.3	90.2	17.8	47.2	20.4	42.9	56.3	11.0	604.2
1994	26.4	56.0	50.2	88.7	109.0	82.0	34.3	27.6	18.3	31.7	115.6	53.6	693.4
*1995	-	-	-	-	-	-	-	-	-	-	-	-	-
*1996	-	-	-	-	-	-	-	-	-	-	-	-	-
*1997	-	-	-	-	-	-	-	-	-	-	-	-	-
*1998	-	-	-	-	109.6	57.2	62.8	25.8	6.9	4.8	59.6	35.7	-
*1999	0.0	-	-	-	79.2	109.5	42.3	31.8	57.5	65.2	45.3	23.8	-
*2000	91.0	-	-	-	-	12.4	8.2	26.9	17.0	72.6	7.0	74.2	-
2001	7.7	69.7	102.5	92.0	110.1	22.6	68.8	35.3	0.0	76.0	51.3	114.7	750.7
2002	49.3	46.7	58.9	162.7	78.1	93.0	73.1	58.7	23.2	65.3	14.1	73.5	796.6
2003	40.3	75.2	113.2	152.9	53.3	79.4	78.9	55.2	31.7	121.6	86.3	48.9	936.9
2004	38.9	101.3	77.2	115.1	140.0	46.9	48.5	20.5	34.3	39.9	88.8	4.0	755.4
2005	62.2	51.9	172.4	81.9	125.3	82.0	19.1	43.6	68.7	72.2	38.1	40.5	857.9
2006	86.3	70.3	62.5	162.7	85.1	44.0	91.5	22.9	28.3	103.0	20.2	30.0	806.8
2007	50.3	58.2	77.0	192.5	75.4	74.5	89.4	38.3	0.5	65.4	123.6	31.8	876.9
2008	27.7	29.3	46.6	44.4	107.6	86.3	26.7	31.7	54.0	26.1	22.0	55.6	558.0
2009	26.0	40.6	113.4	110.8	93.1	80.3	136.1	62.4	129.5	18.6	54.5	60.7	926.0
2010	152.2	65.5	60.5	200.0	102.2	57.9	71.6	14.4	16.3	148.7	0.0	6.6	895.9
2011	58.1	103.7	76.7	182.1	120.8	29.7	54.2	27.9	19.8	52.6	45.0	17.9	788.5
2012	36.9	96.0	56.2	41.0	113.5	30.6	78.3	2.6	20.5	41.7	19.0	120.4	656.7
2013	82.6	45.0	108.9	55.6	115.0	44.2	38.2	17.7	34.6	35.9	38.6	46.2	662.5
Average (1983-2013)	53.3	68.9	66.9	100.0	98.7	63.1	50.9	30.1	28.8	62.3	60.2	49.7	741.6

Evaporation(mm)

Hrazdan

	*Jan	*Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	*Dec	Total
1983	-	-	14.4	28.2	49.2	50.6	51.6	43.9	35.2	28.2	20.9	-	332.2
1984	-	-	19.0	27.5	42.1	51.9	55.1	42.0	40.6	28.4	18.9	-	374.3
1985	-	-	7.3	30.3	53.0	57.5	43.5	46.1	39.6	28.0	21.0	-	371.9
1986	-	-	14.4	30.8	42.7	49.2	52.3	48.3	44.9	30.1	16.6	-	381.9
1987	-	-	12.9	24.0	53.1	59.8	50.2	43.8	34.9	24.2	16.5	-	395.6
1988	-	-	16.2	27.6	44.2	50.8	47.1	39.9	34.7	30.2	16.2	-	352.5
1989	-	-	20.8	34.9	50.3	56.7	55.7	50.3	38.5	29.5	18.2	-	372.0
1990	-	-	17.3	25.7	47.0	55.5	52.2	43.2	40.8	30.1	20.4	-	369.1
1991	-	-	17.0	30.9	45.0	54.8	50.2	48.7	40.1	33.6	18.1	-	374.9
1992	-	-	10.2	25.0	42.3	49.2	46.4	41.0	34.5	31.0	16.8	-	309.0
1993	-	-	12.4	25.0	45.2	52.2	48.3	42.4	37.2	28.6	11.6	-	329.2
1994	-	-	16.6	31.3	47.3	51.2	45.5	43.7	39.4	32.8	18.8	-	368.2
*1995	-	-	-	-	-	-	-	-	-	-	-	-	-
*1996	-	-	-	-	-	-	-	-	-	-	-	-	-
1997	-	-	12.9	26.5	53.4	52.6	47.8	51.3	34.3	33.1	17.6	-	387.5
1998	-	-	15.8	30.3	53.4	64.9	52.0	49.5	38.8	33.3	22.9	-	404.8
1999	-	-	14.5	26.4	47.4	50.9	48.1	52.4	36.8	31.0	17.5	-	384.5
2000	-	-	14.5	26.6	47.4	52.1	48.2	48.8	39.9	29.0	17.3	-	369.1
2001	-	-	22.8	32.0	46.5	58.7	51.6	50.5	43.8	31.1	16.7	-	410.3
2002	-	-	19.3	25.0	43.3	53.3	50.1	46.2	43.5	34.0	20.4	-	370.6
2003	-	-	12.7	25.1	51.1	50.8	48.3	46.8	37.5	35.0	17.1	-	382.7
2004	-	-	19.5	24.7	45.8	53.3	44.8	48.7	37.5	30.8	17.6	-	368.6
2005	-	-	15.6	28.6	48.2	51.4	53.6	48.8	38.3	29.7	18.7	-	367.1
2006	-	-	18.5	30.0	51.5	69.8	48.2	58.1	39.5	33.3	17.1	-	401.9
2007	-	-	15.6	22.4	54.1	55.7	47.6	46.2	43.4	33.5	17.0	-	361.6
2008	-	-	23.2	35.0	44.4	51.0	49.9	49.4	39.8	31.2	18.6	-	344.9
2009	-	-	17.1	23.8	47.9	53.7	48.1	38.4	33.3	33.1	19.3	-	372.1
2010	-	-	22.0	27.4	47.6	63.9	56.9	49.6	45.9	33.1	19.8	-	450.8
2011	-	-	15.4	27.3	48.0	58.0	56.4	45.8	38.1	28.2	11.4	-	370.9
2012	-	-	10.1	31.7	52.7	60.2	50.0	52.1	41.5	34.0	21.0	-	393.8
Average (1983-2012)	-	-	16.0	28.0	48.0	55.0	50.0	47.0	39.0	31.0	18.0	-	374.0

Monthly average temperature (°C)

Hrazdan

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
1983	-11.3	-8.3	-2.0	5.9	10.8	13.5	18.1	16.8	12.4	6.6	3.3	-3.4	5.2
1984	-4.6	-6.3	1.2	5.5	8.4	13.8	19.0	16.2	14.4	6.7	2.0	-7.9	5.7
1985	-5.8	-6.7	-6.4	7.0	11.9	15.3	15.7	17.5	14.1	6.5	3.5	-5.6	5.6
1986	-6.5	-3.5	-2.0	7.3	8.6	13.0	18.3	18.2	15.9	7.6	0.3	-5.2	6.0
1987	-2.8	-2.4	-3.0	3.5	11.9	15.8	17.7	16.8	12.2	4.3	0.2	-3.4	5.9
1988	-7.4	-5.5	-0.7	5.6	9.2	13.5	16.8	15.4	12.2	7.6	0.0	-2.8	5.3
1989	-10.3	-8.4	2.4	9.2	11.1	15.1	19.2	18.7	13.7	7.2	1.4	-3.2	6.3
1990	-8.8	-5.8	0.0	4.5	10.1	14.8	18.2	16.6	14.5	7.6	3.0	-2.6	6.0
1991	-6.9	-7.8	-0.2	7.3	9.4	14.6	17.7	18.3	14.3	9.2	1.4	-5.7	6.0
1992	-10.5	-8.5	-4.7	4.1	8.5	13.0	16.6	15.8	12.1	8.0	0.4	-5.1	4.1
1993	-8.9	-7.7	-3.3	4.1	9.5	13.9	17.2	16.3	13.2	6.8	-3.3	-4.8	4.4
1994	-5.5	-6.8	-0.5	7.6	10.2	13.6	16.3	16.8	14.0	8.9	1.9	-8.4	5.7
*1995	-	-	-	-	-	-	-	-	-	-	-	-	-
*1996	-	-	-	-	-	-	-	-	-	-	-	-	-
*1997	-	-	-	-	-	-	-	-	-	-	-	-	-
*1998	-	-	-	-	11.3	17.0	18.2	18.6	13.5	9.3	4.8	-0.1	-
*1999	-4.4	-	-	-	-	14.5	17.1	19.2	13.0	7.9	0.8	-2.5	-
*2000	-6.9	-	-	-	-	16.0	23.8	19.0	14.2	7.1	0.9	-3.5	-
2001	-6.7	-3.0	3.8	7.9	9.9	15.6	18.1	18.8	15.5	8.1	0.3	-2.9	7.1
2002	-8.5	-3.0	1.4	4.1	8.9	14.2	17.7	17.5	15.4	9.4	3.0	-8.5	6.0
2003	-4.8	-5.1	-3.1	4.2	11.3	13.5	17.2	17.7	13.3	9.8	0.6	-4.2	5.9
2004	-6.0	-4.3	1.5	3.9	9.7	14.2	16.1	18.3	13.3	7.9	1.0	-8.8	5.6
2005	-8.4	-7.7	-1.1	6.1	10.5	13.7	18.6	18.3	13.6	7.4	1.8	-2.0	5.9
2006	-8.3	-4.8	0.9	6.9	11.5	18.0	17.1	20.8	14.0	9.1	0.7	-6.8	6.6
2007	-9.5	-6.1	-1.2	2.5	12.2	14.8	16.9	17.5	15.4	9.2	0.6	-5.5	5.6
2008	-11.8	-8.5	4.0	9.2	9.2	13.6	17.6	18.5	14.2	8.1	1.8	-5.2	5.9
2009	-7.7	-1.8	-0.2	3.4	10.4	14.3	17.1	14.9	11.5	9.0	2.2	-0.8	6.0
2010	-2.9	-0.9	3.2	5.5	10.3	16.8	19.5	18.5	16.2	9.0	2.6	-0.2	8.1
2011	-6.2	-6.3	-1.3	5.4	10.4	15.4	19.3	17.4	13.5	6.6	-3.5	-7.1	5.3
2012	-5.9	-8.7	-4.8	7.7	11.8	15.9	17.6	19.2	14.8	9.4	3.4	-4.4	6.3
2013	-6.2	-3.5	0.4	7.0	10.7	14.4	17.2	16.5	13.5	6.0	2.9	-10.1	5.7
Average (1983-2013)	-7.2	-5.7	-0.6	5.8	10.3	14.7	17.9	17.6	13.8	7.9	1.4	-4.7	5.8

(2)Yeghvard Meteorological Station

Monthly precipitation (mm)

Yeghvard

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1983	14.3	33.9	35.4	11.2	68.2	70.7	16.0	17.9	5.4	43.8	97.4	11.6	425.8
1984	6.6	45.2	79.5	79.6	31.0	10.2	15.7	7.0	0.8	51.0	10.9	13.3	350.8
1985	63.4	111.6	44.2	28.7	30.7	21.4	22.3	0.5	1.1	33.5	5.2	41.8	404.4
1986	21.2	26.5	16.6	34.7	108.6	43.8	25.9	1.4	7.7	46.2	67.9	12.8	413.3
1987	78.3	53.8	42.2	52.1	78.6	6.0	3.7	25.9	14.0	86.0	37.6	106.0	584.2
1988	62.9	28.4	39.9	42.1	109.5	75.5	18.5	37.7	13.1	47.1	22.2	46.8	543.7
1989	0.2	2.1	16.0	20.4	27.7	18.0	13.8	2.1	17.0	102.3	89.5	22.5	331.6
1990	24.0	7.0	2.8	123.0	62.6	20.8	16.6	11.1	8.3	47.6	32.7	22.5	379.0
1991	52.1	22.8	35.5	42.4	54.4	58.5	40.7	9.9	1.5	22.7	76.2	31.6	448.3
1992	37.9	77.8	32.1	26.5	61.7	81.1	15.1	17.8	30.9	5.3	56.7	41.9	484.8
1993	27.5	49.3	33.7	40.3	87.3	37.2	11.8	8.4	3.7	28.1	56.9	12.7	396.9
1994	28.0	64.8	43.1	140.2	63.8	50.7	13.6	10.3	16.8	32.8	70.6	36.4	571.1
1995	19.3	16.3	47.8	87.9	46.7	28.8	7.1	22.0	68.6	14.3	30.2	0.3	389.3
1996	37.3	31.6	40.9	92.6	46.3	18.6	58.8	1.1	15.3	32.1	0.0	62.4	437.0
1997	9.1	31.2	49.6	44.5	43.2	33.5	33.4	7.9	12.4	52.6	21.4	48.7	387.5
1998	28.3	42.8	29.1	47.4	92.5	44.5	60.9	1.8	2.9	4.4	35.8	19.2	409.6
1999	0.9	20.1	48.0	37.4	52.0	47.5	71.4	28.1	32.6	39.1	16.1	13.9	407.1
2000	51.6	24.9	14.7	42.7	75.4	15.3	16.7	6.7	7.9	43.7	4.0	42.2	345.8
2001	6.5	21.6	65.1	63.6	50.5	12.5	13.4	28.2	0.0	58.5	30.7	71.4	422.0
2002	23.0	20.0	29.0	122.0	66.0	59.0	23.0	27.0	8.0	36.0	14.0	51.0	478.0
2003	24.0	45.0	72.0	70.0	37.0	54.0	27.0	20.0	11.0	48.0	46.0	18.0	472.0
2004	25.6	21.9	33.5	42.4	66.3	32.9	34.5	11.1	15.7	32.3	26.5	3.3	346.0
*2005													
*2006													
*2007													
*2008	-	-	-	-	-	-	-	7.1	41.4	11.2	14.5	37.3	
2009	23.7	35.9	54.4	95.2	35.5	42.7	89.2	12.8	82.4	13.8	26.6	44.2	556.4
2010	74.8	48.0	41.4	139.8	98.4	16.2	48.3	1.9	3.9	92.5	0.0	3.8	569.0
2011	41.3	53.7	35.4	103.1	131.3	33.0	36.1	21.0	6.1	37.7	21.4	9.9	530.0
2012	25.0	69.5	20.3	35.2	35.8	48.6	43.8	1.1	17.6	23.7	14.2	69.0	403.8
2013	43.5	39.4	66.2	44.0	55.8	17.3	19.5	2.8	15.9	12.6	24.1	30.1	371.2
2014	54.3	7.5	64.3	28.9	59.3	30.6	19.2	12.4	22.4	45.0	47.4	28.6	419.9
Average (1983-2014)	32.3	37.6	40.5	62.1	63.4	36.7	29.1	12.5	16.7	39.4	34.4	32.9	438.5

Evaporation(mm)

Yeghvard

	*Jan	*Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	*Dec	Total
1983	-	-	20	39	55	50	52	45	36	34	23	-	364.4
1984	-	-	24	37	47	55	56	44	42	34	21	-	397.8
1985	-	-	12	42	64	61	44	49	41	33	25	-	399.3
1986	-	-	20	42	47	49	53	51	46	35	19	-	399.0
1987	-	-	19	33	62	62	51	45	36	27	19	-	403.3
1988	-	-	22	38	49	49	47	40	36	34	19	-	363.3
1989	-	-	27	49	60	61	57	52	39	34	21	-	420.5
1990	-	-	23	33	52	57	53	44	43	35	23	-	388.1
1991	-	-	22	42	50	57	52	50	42	41	21	-	405.2
1992	-	-	21	35	48	47	46	42	35	36	21	-	348.2
1993	-	-	18	34	50	52	50	46	41	34	15	-	358.7
1994	-	-	22	45	55	53	47	47	41	38	21	-	400.3
1995	-	-	26	38	62	57	50	52	39	33	21	-	418.1
1996	-	-	22	36	63	53	55	52	39	36	21	-	419.0
1997	-	-	20	36	60	61	49	53	34	40	21	-	413.6
1998	-	-	22	43	59	68	52	53	42	40	26	-	433.1
1999	-	-	26	38	56	58	51	57	38	38	20	-	430.2
2000	-	-	21	46	54	60	66	54	43	34	21	-	433.3
2001	-	-	30	42	52	63	53	53	44	35	19	-	431.6
*2002	-	-	-	-	-	-	-	-	-	-	-	-	-
*2003	-	-	-	-	-	-	-	-	-	-	-	-	-
*2004	-	-	-	-	-	-	-	-	-	-	-	-	-
*2005	-	-	-	-	-	-	-	-	-	-	-	-	-
*2006	-	-	-	-	-	-	-	-	-	-	-	-	-
*2007	-	-	-	-	-	-	-	-	-	-	-	-	-
*2008	-	-	-	-	-	-	-	-	-	-	-	-	-
2009	-	-	23	33	54	55	48	39	33	41	22	-	382.0
2010	-	-	28	36	52	66	57	52	48	38	24	-	452.4
2011	-	-	23	37	52	56	57	47	38	33	15	-	394.3
2012	-	-	16	43	61	62	48	55	42	42	25	-	429.4
Average (1983-2012)	-	-	22.0	39.0	55.0	57.0	52.0	48.9	40.0	35.9	21.0	-	403.7

Monthly average temperature (°C)

Yeghvard

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
1983	-9.9	-5.8	1.8	10.0	14.3	17.5	23.2	21.7	17.2	11.0	6.2	-0.2	8.9
1984	-1.7	-2.8	4.5	9.2	12.0	18.8	24.1	21.3	19.6	11.1	5.3	-5.0	9.7
1985	-4.3	-4.5	-3.6	11.0	16.3	20.3	20.8	23.0	19.1	10.5	7.4	-2.5	9.5
1986	-3.7	-0.8	1.9	11.1	11.9	17.4	23.4	23.6	20.8	11.5	3.5	-1.8	9.9
1987	0.1	0.8	1.1	7.4	16.0	20.6	22.9	21.8	17.3	7.9	3.7	-0.3	9.9
1988	-5.9	-2.6	3.2	9.8	12.5	17.4	21.5	20.2	17.3	11.3	3.2	0.2	9.0
1989	-7.7	-4.7	6.2	13.4	15.5	20.3	24.5	23.9	18.5	11.0	4.8	-0.1	10.5
1990	-7.3	-3.0	3.8	7.7	13.5	19.4	23.3	21.6	19.8	11.7	6.3	0.1	9.7
1991	-4.8	-4.3	3.5	11.0	12.8	19.3	23.0	23.4	19.4	13.8	5.1	-2.8	10.0
1992	-8.9	-3.0	2.3	8.2	12.2	16.7	21.4	20.8	16.8	12.2	4.7	-2.0	8.5
1993	-7.3	-6.1	0.5	8.2	12.9	18.2	22.5	22.1	19.0	11.3	0.0	-4.3	8.1
1994	-3.2	-4.5	3.1	12.1	14.1	18.4	21.7	22.3	19.1	12.9	5.1	-6.0	9.6
1995	-2.4	-0.9	5.5	9.8	15.8	19.4	22.5	23.8	18.5	10.7	5.3	-2.0	10.5
1996	-2.8	-0.4	3.4	8.6	16.1	18.3	24.0	23.9	18.5	12.1	5.2	3.8	10.9
1997	-1.0	-3.0	2.0	8.7	15.5	20.3	22.2	24.0	16.5	13.4	5.0	-1.4	10.2
1998	-5.6	-5.7	3.5	11.6	15.3	21.9	23.1	24.2	19.4	13.7	8.0	3.2	11.1
1999	-0.6	1.5	5.6	9.8	14.5	19.6	22.7	25.2	18.0	12.8	4.6	1.2	11.2
2000	-4.0	-3.4	2.8	12.3	14.1	20.3	26.6	24.2	19.7	11.4	5.0	-0.1	10.8
2001*	-3.7	0.9	7.7	11.2	13.5	20.9	23.5	24.2	20.2	11.6	3.5	0.5	11.2
2008	-	-	-	-	-	-	-	23.9	19.1	12.7	5.8	-1.7	12.0
2009	-5.9	1.6	3.8	7.3	14.1	18.9	21.9	19.7	16.0	13.9	5.9	2.5	10.0
2010	0.2	2.4	6.8	8.8	13.3	21.4	24.4	23.9	21.3	13.0	6.9	3.1	12.1
2011	-2.6	-2.5	3.8	9.1	13.5	19.3	24.4	22.5	17.9	10.7	0.1	-4.1	9.3
2012	-1.6	-6.0	-0.8	11.6	15.7	20.6	22.1	24.5	19.4	14.2	7.5	-0.1	10.6
2013	-3.1	0.6	5.2	11.3	14.7	19.3	22.4	21.9	18.5	10.9	7.0	-9.3	10.0
2014	-5.1	-0.6	6.5	11.2	16.3	19.9	23.7	25.5	19.8	11.3	4.0	1.7	11.2
Average (1983-2014)	-4.1	-2.3	3.4	10.0	14.3	19.4	23.0	23.0	18.7	11.9	5.0	-1.1	10.1

Appendix D-2: Hydrological Data

(1)Hrazdan River (Hrazdan Observation Station)

River Hrazdan - Hrazdan station **1983**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.180	1.890	2.050	13.700	17.9	16.5	5.5	3.6	3.3	2.8	3.73	3.320
2	2.060	1.980	3.040	19.000	21.4	16.6	3.3	2.3	2.6	2.38	5.48	2.820
3	1.890	2.060	9.460	13.40	16.5	8.4	3.8	3.9	2.6	3.07	5.080	3.320
average	2.040	1.970	5.000	15.40	18.6	13.8	4.2	3.2	2.8	2.76	4.76	2.800
max	2.240	2.060	19.900	26.4	36.8	27.0	8.2	5.0	4.3	7.1	7.82	3.630
Min	1.890	1.890	1.890	7.140	10.000	6.180	2.4	1.8	2.2	2.15	2.390	2.240

river Hrazdan - Hrazdan station **1984**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.860	2.020	2.770	16.900	15.70	19.4	5.1	2.8	2.8	2.2	2.59	2.020
2	2.400	2.050	4.130	28.600	38.50	11.7	3.3	2.5	2.6	2.5	2.25	2.000
3	2.080	2.020	6.040	22.000	29.20	8.1	4.9	2.3	2.3	2.66	2.130	2.000
average	2.440	2.030	4.370	22.500	27.80	13.1	4.5	2.5	2.6	2.46	2.33	2.000
max	3.080	2.080	9.800	81.000	67.5	25.4	13.9	3.8	3.4	2.9	2.8	2.080
Min	2.000	2.000	2.010	5.700	9.400	5.700	2.780	2.160	2.230	2.080	2.010	2.000

river Hrazdan - Hrazdan station **1985**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	1.830	2.330	1.800	17.500	21.2	7.69	3.81	1.99	2.38	2.29	2.28	2.220
2	2.000	2.040	2.460	25.700	19	5.2	2.33	1.98	2.4	2.54	2.19	2.240
3	2.300	1.930	4.680	25.400	11.2	2.76	2.58	2.26	2.4	2.4	2.22	2.070
average	2.050	2.110	3.030	22.900	16.9	5.23	2.9	2.08	2.39	2.41	2.23	2.170
max	2.400	2.500	11.200	50.900	35.3	9.72	11.2	2.4	2.6	2.7	2.4	2.300
Min	1.800	1.800	1.800	9.000	7.720	2.22	1.98	1.75	2.220	2.060	2.060	1.980

river Hrazdan - Hrazdan station **1986**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.080	1.930	2.650	11.000	13.10	19.800	4.4	2.7	2.5	2.91	3.70	3.000
2	2.140	1.940	2.640	18.300	21.50	10.8	3.0	2.8	2.5	2.49	2.910	4.500
3	1.950	2.500	4.730	16.30	23.600	10.4	2.8	2.9	2.7	2.82	2.570	5.580
average	2.050	2.100	3.390	15.20	19.50	13.60	3.4	2.8	2.6	2.74	3.06	4.400
max	2.360	3.060	9.500	28.6	32.0	26.8	7.4	3.7	7.1	6.0	6.0	8.600
Min	1.940	1.800	1.940	7.100	9.200	7.100	2.220	2.1	1.94	2.220	2.500	2.360

river Hrazdan - Hrazdan station **1987**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	7.000	7.660	3.560	6.600	54.300	18.600	3.4	2.8	2.5	2.950	3.07	3.180
2	8.300	4.230	2.820	23.800	50.600	10.90	2.9	2.7	2.8	2.70	2.94	3.630
3	6.410	5.050	3.170	18.300	33.700	5.12	3.1	2.7	2.6	2.89	4.00	2.760
average	7.210	5.690	3.180	16.200	45.800	11.50	3.1	2.7	2.7	2.85	3.33	3.180
max	11.400	11.000	5.700	47.800	92.000	25.00	3.9	3.2	3.7	3.7	5.70	6.000
Min	3.700	3.700	2.430	3.700	22.000	3.460	2.43	2.18	2.260	2.350	2.600	2.180

river Hrazdan - Hrazdan station **1988**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.540	2.550	3.640	12.800	45.5	45.1	16	6	3.71	3.71	4.030	3.730
2	2.680	2.620	4.220	45.600	55.3	24.9	9	5.42	3.69	3.81	4.160	4.860
3	2.590	2.720	8.940	56.4	54.2	19.6	6.53	4.26	3.52	4.170	3.430	4.240
average	2.600	2.630	5.710	38.3	51.8	29.8	10.4	5.19	3.64	3.9	3.870	4.270
max	3.050	3.050	13.100	84	77.8	52.5	19.5	9.9	4.52	6.5	4.300	6.060
Min	2.200	2.310	2.420	8.300	31.5	15.5	3.98	3.35	2.900	3.050	2.900	3.350

river Hrazdan - Hrazdan station **1989**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	4.010	3.100	6.430	10.100	7.23	3.9	3.6	3.0	3.0	6.57	3.210	11.200
2	3.110	3.170	4.810	16.500	5.4	4.1	3.6	3.1	3.5	4.800	3.690	7.300
3	3.210	3.260	6.310	10.70	4.5	3.4	3.0	3.5	3.46	3.660	8.230	4.680
average	3.440	3.170	5.860	12.500	5.7	3.8	3.4	3.2	3.3	4.97	5.040	7.630
max	4.300	3.390	10.000	21.50	9.7	5.4	5.0	4.0	5.2	10.90	16.400	28.200
Min	2.750	2.920	3.650	3.650	4.04	3.0	3.0	3.0	2.960	3.010	2.940	4.170

river Hrazdan - Hrazdan station **1990**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.140	2.680	4.120	12.900	34.900	20.500	7.0	4.4	4.8	5.53	7.010	5.120
2	3.250	2.920	6.500	19.600	35.800	11.50	5.9	4.3	4.9	4.48	6.53	5.150
3	2.940	2.780	18.200	52.900	34.800	8.8	3.5	5.7	5.0	5.57	5.17	4.30
average	3.650	2.790	9.880	28.500	35.100	13.6	5.4	4.8	4.9	5.21	6.24	4.84
max	7.900	4.540	24.200	144.000	64.500	31.6	9.40	9.1	6.5	10.0	14.9	10.4
Min	2.500	2.440	2.660	9.700	24.700	7.000	3.1	3.1	4.02	3.78	4.500	3.300

river Hrazdan - Hrazdan station **1991**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.840	2.920	3.230	22.900	34.500	8.78	4.1	2.81	3.4	3.43	4.45	4.21
2	2.900	2.93	3.530	17.600	18.400	9.06	3.5	3.04	3.9	3.68	3.81	4.1
3	2.830	3.040	19.600	15.700	43.300	6.6	3.57	3.2	3.7	3.47	3.61	3.73
average	2.860	2.96	9.140	18.700	32.400	8.15	3.72	3.03	3.64	3.52	3.96	4.01
max	3.000	3.4	45.400	43.000	71.000	13.6	7.2	6.3	4.2	4.7	6.5	4.5
Min	2.740	2.790	3.000	9.300	11.400	4.520	2.8	2.7	2.87	2.96	3.26	3.4

river Hrazdan - Hrazdan station **1992**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.9	3.8	4.2	15.2	25.2	23.5	10.2	4.0	4.01	4.6	5.2	5.6
2	3.9	3.8	4.4	27.1	40.1	25.9	9.0	3.9	6.0	4.9	5.3	5.7
3	3.8	4.0	7.0	23.3	35.8	20.3	5.5	5.6	6.2	4.3	5.3	5.7
average	3.9	3.9	5.2	21.9	33.8	23.2	8.2	4.5	5.4	4.6	5.3	5.7
max	4.0	4.2	9.4	35.7	48.6	32.8	22.0	6.9	18.0	6.7	5.9	6.2
Min	3.7	3.7	3.9	10.5	12.6	12.1	3.4	3.6	3.6	3.0	3.6	5.2

river Hrazdan - Hrazdan station **1993**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	5.7	6.2	6.5	28.3	37.7	33.0	7.2	4.2	4.3	5.0	4.5	4.4
2	5.9	6.3	6.7	31.9	58.2	20.4	4.9	6.1	4.8	5.2	4.6	4.5
3	6.0	6.4	9.5	21.1	43.2	11.6	3.9	5.9	5.3	4.9	4.6	8.3
average	5.9	6.3	7.6	27.1	46.2	21.6	5.3	5.5	4.8	5.0	4.4	4.5
max	6.1	6.5	24.2	75.0	70.0	41.8	9.1	20.5	6.2	6.4	5.0	4.9
Min	5.7	6.1	6.5	13.2	15.5	8.2	3.5	3.5	3.5	4.4	4.1	4.0

river Hrazdan - Hrazdan station **1994**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	4.5	5.3	9.6	20.4	39.4	13.2	7.1	3.8	4.3	3.8	4.1	4.2
2	4.3	5.0	11.1	33.00	31.6	7.2	3.9	3.9	4.2	3.7	4.0	3.9
3	5.5	4.7	14.5	40.900	43.6	7.8	4.3	3.8	3.8	4.0	4.3	4.3
average	4.8	5.0	11.8	31.40	38.3	9.5	5.1	3.9	4.1	3.8	4.1	4.1
max	5.9	5.9	25.5	61.4	63.0	20.1	10.0	5.9	6.9	5.1	4.9	4.7
Min	3.82	4.5	7.600	12.900	18.300	4.450	3.000	3.000	3.400	3.000	3.610	3.400

river Hrazdan - Hrazdan station **1995**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	4.52	4.04	6.28	22.20	33.300	14.8	6.89	3.26	3.6	2.160	3.07	3.21
2	4.33	3.72	8.95	34.6	28.400	12.7	3.91	2.88	3.1	1.990	3.46	2.88
3	4.29	5.24	11.7	27.200	24.6	8.81	2.91	3.11	3.3	2.66	3.69	2.85
average	4.38	4.26	9.06	28.00	28.6	12.1	4.52	3.08	3.3	2.28	3.41	2.97
max	4.94	5.74	16.5	56	47.8	18.5	17.5	3.88	6.9	3.23	4.94	3.35
Min	3.350	3.230	4.410	11.100	16.500	5.740	2.27	2.630	2.390	1.700	2.750	2.630

river Hrazdan - Hrazdan station **1996**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.98	2.40	2.92	10.10	56.100	8.82	2.6	7.2	1.7	2.17	3.10	3.47
2	2.66	2.7	3.82	10.400	32.300	3.9	2.4	3.9	2.2	2.05	2.62	3.19
3	2.81	3.2	3.16	19.600	12.40	3.9	3.4	1.9	2.3	2.58	3.08	2.99
average	2.82	2.7	3.30	13.40	32.90	5.5	2.8	4.3	2.1	2.28	2.94	3.21
max	3.3	4.0	5.1	61.3	95.0	15.2	14.2	11.3	2.95	3.8	3.6	4.5
Min	2.500	2.050	2.500	6.400	10.200	2.800	1.270	0.950	1.270	1.810	2.350	2.650

river Hrazdan - Hrazdan station **1997**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.54	2.35	2.8	9.71	32.1	14.6	7.06	3.02	3.18	3.13	5.36	3.21
2	2.53	2.65	2.52	9.1	34.7	9.94	4.18	2.56	2.84	3.19	3.01	2.38
3	2.4	2.8	2.88	44.9	27.2	6.91	2.62	2.58	2.95	3.1	2.84	2.7
average	2.5	2.59	2.77	21.3	31.2	10.5	4.55	2.72	2.99	3.17	3.74	2.76
max	2.95	3.1	3.82	91.6	43.5	22	9.2	5.29	3.82	5.08	7	3.82
Min	1.9	2.05	2.2	4.24	22.6	5.5	2.05	2.2	2.35	2.2	2.65	2.05

river Hrazdan - Hrazdan station **1998**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1												
2												
3												
average												
max												
Min												

river Hrazdan - Hrazdan station **1999**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	1.94	1.89	2.15	7.42	13.2	6.72	7.82	2.64	2.27	2.03	2.01	1.84
2	1.9	1.93	2.22	6.75	13.4	6.68	4.07	2.76	2.51	2.06	2.02	1.88
3	1.89	1.91	2.26	10.4	9.59	9.18	3.81	2.45	2.58	2.03	2.03	1.87
average	1.91	1.91	2.21	8.2	12	7.53	5.19	2.61	2.45	2.04	2.02	1.86
max	2.1	2.04	2.99	16.5	15.9	14.7	11.9	4.64	4.64	2.4	2.25	1.98
Min	1.83	1.83	1.86	3.51	7.23	4.64	2.35	2.15	2.1	1.92	1.89	1.8

river Hrazdan - Hrazdan station **2000**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.060	1.880	2.100	17.700	15.500	9.22	2.41	2.07	2.13	2.29	2.540	2.340
2	1.860	2.050	1.950	16.700	11.500	5.16	2.18	1.90	2.22	2.30	2.39	2.460
3	1.880	2.020	3.520	14.600	13.100	2.94	2.00	1.86	2.16	2.82	2.380	2.280
average	1.930	1.980	2.550	16.400	13.400	5.77	2.19	1.94	2.17	2.48	2.43	2.360
max	2.340	2.240	7.720	33.800	23.200	12.3	3.47	2.72	2.72	3.77	2.72	2.620
Min	1.700	1.760	1.760	8.190	9.030	2.140	1.700	1.500	1.57	1.760	2.240	1.950

river Hrazdan - Hrazdan station **2001**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	1.930	2.020	4.520	21.800	16.300	8.82	2.78	2.13	2.04	2.040	2.020	2.050
2	2.050	2.040	4.660	10.500	16.300	5.93	2.48	2.14	2.06	2.160	1.950	2.110
3	1.920	2.190	7.570	9.510	13.300	3.46	2.11	2.16	2.010	2.130	1.900	2.240
average	1.970	2.080	5.650	13.900	15.200	6.07	2.44	2.14	2.04	2.110	1.960	2.140
max	2.240	2.490	14.200	47.200	21.900	10.5	3.97	2.99	2.24	2.780	2.160	3.240
Min	1.800	1.870	2.320	7.620	8.340	2.590	1.500	1.800	1.870	1.870	1.670	1.800

river Hrazdan - Hrazdan station **2002**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.34	1.96	3.01	7.67	14.5	24	7.89	2.84	4.69	3.93	2.67	2.24
2	1.94	2.08	4.06	19	28.4	15.4	4.92	2.69	3.02	2.93	2.69	2.06
3	1.93	2.45	4.55	14.6	45.6	12	3.72	6.17	2.67	2.9	2.36	2.03
average	2.07	2.14	3.9	13.7	30	17.1	5.45	3.95	3.46	3.24	2.57	2.11
max	2.71	3.03	9.08	52	56.1	44.5	10.5	17.8	8.25	9.08	3.42	2.61
Min	1.8	1.73	2.12	3.99	11.9	9.42	2.61	2.22	2.22	2.31	1.88	1.57

river Hrazdan - Hrazdan station **2003**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.58	2.6	2.48	28.9	41	15.8	4.68	4.1	2.93	3.64	5.3	4.05
2	2.42	2.34	2.95	38.1	38.6	8.34	3.2	2.74	2.93	3.21	10.5	3.41
3	2.48	2.13	2.57	42	22.4	6.71	4.84	3.52	2.86	4.98	4.86	2.71
average												
max	2.9	2.78	3.55	87	58.8	21.4	12.7	7	4.9	13.8	19.5	4.5
Min	2	1.81	1.81	2.2	14.2	4.5	2.4	2.2	2	2.53	4.13	2.3

river Hrazdan - Hrazdan station **2004**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.98	2.35	22.2	8.65	39.8	17.9	5.59	3.6	5.85	4.08	4.49	3.52
2	2.51	2.44	6.61	20.9	26.4	10.1	3.89	3.25	4.58	4.15	4.24	3.49
3	2.42	2.62	13.5	21.4	20.4	7.37	4.63	3.52	3.8	4.1	3.78	3.57
average												
max	3.36	3.36	138	54.3	54.3	24	10.9	5.58	24	5.58	5.75	3.95
Min	1.64	1.78	2.89	5.58	16.3	5.23	2.63	2.51	3.05	3.52	3.52	3.05

river Hrazdan - Hrazdan station **2005**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.79	2.73	4.44	7.75	30.4	11	5.2	3.53	5.09	6.03	7.35	4.49
2	2.76	2.72	3.54	36.2	28.4	7.72	3.83	3.95	4.11	5.66	5.12	3.79
3	2.78	2.94	3.92	58.1	15.6	4.89	3.76	4.12	4.49	5.76	4.62	3.63
average												
max	2.9	3.54	10.5	90.1	38.7	17.1	8.34	6.41	6.89	10.8	8.92	4.85
Min	2.63	2.52	2.8	4.5	9.82	3	3.1	2.9	3.78	4.2	4.05	3.2

river Hrazdan - Hrazdan station **2006**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.79	3.55	3.87	23.5	48.9	9.91	10.1	3.89	3.05	3.02	2.99	2.61
2	3.57	3.49	6.76	45.6	30.6	5.43	4.57	3.51	2.98	3.48	2.98	2.59
3	3.41	3.37	12	52.6	15.9	4.89	3.84	3.53	2.91	3.17	2.7	2.56
average												
max	4.15	3.72	19.1	97.2	59.9	15.2	21.8	5.76	5.52	5.76	5.27	2.68
Min	3.26	3.17	3.47	17.1	12.4	3.72	3.47	2.88	2.58	2.58	2.58	2.5

river Hrazdan - Hrazdan station **2007**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.69	2.62	2.93	5.68	72.5	14.6	5.07	3.81	3.36	2.88	4.63	3.35
2	2.6	2.6	3.17	11.9	79.3	10.5	5.57	3.63	2.99	3.39	4.92	3.32
3	2.63	2.57	5.37	25.7	28.3	9.73	3.73	3.68	2.93	3.5	3.65	2.91
average												
max	2.81	2.68	9.22	89	128	20.3	11.6	12.4	4.44	4.09	8.16	3.63
Min	2.29	2.29	2.42	2.81	18.9	5.6	2.62	2.74	2.74	2.62	3.08	2.62

river Hrazdan - Hrazdan station **2008**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.92	2.59	3.85	12	10.2	7.54	5.48	3.4	3.32	3.14	3.18	3.17
2	2.88	2.75	7.08	15.8	14.3	8.01	3.44	3.46	3.94	3	3.15	2.9
3	2.96	2.69	14.9	14.5	13.6	9.38	2.97	3.51	3.59	3.61	3.32	2.89
average												
max	3.02	3.02	19.2	25.3	20.1	13.3	8.09	4.89	5.35	4.02	3.84	3.66
Min	2.75	2.4	2.61	8.96	8.09	5.83	2.61	2.75	2.89	2.75	2.61	2.61

river Hrazdan - Hrazdan station **2009**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.8	2.69	3.65	10.6	33.4	14.6	8	6.74	3.81	6.11	8.17	3.79
2	2.78	2.93	5.29	8.91	29.2	11.5	7.77	5.27	4.98	4.71	4.15	3.53
3	2.71	2.67	4.55	13.6	29.5	10.3	6.39	4.49	8.08	4.21	3.53	3.96
average												
max	3.1	3.43	11.9	32.8	50.3	19.3	17.1	6.94	10.7	7.15	9.92	5.1
Min	2.39	2.28	2.16	5.8	18.6	6.25	3.6	3.38	3.38	3.56	2.84	3

river Hrazdan - Hrazdan station **2010**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	4.51	3.45	7.78	13.1	31.6	19.1	5.42	3.46	3.33	5.58	4.79	4.09
2	3.87	5.29	38.4	22.1	39.3	9.74	4.67	3.69	3.52	4.85	4.37	3.98
3	3.98	6.79	12.8	37.2	25.5	7.27	4.93	3.56	3.61	5.09	4.07	3.5
average												
max	6.08	8.87	60.5	60.5	46.7	22.4	11.1	4.9	4.28	9.13	5.82	4.28
Min	3.06	2.9	4.02	8.87	22.8	6.07	3	3.11	3	3.42	3.75	3.27

river Hrazdan - Hrazdan station **2011**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.46	3.18	3.74	19.9	70.7	29.3	7.31	3.45	3.98	4.5	5.27	3.69
2	3.56	3.44	6.65	24.5	36.8	18.2	6.02	3.95	4.07	4.94	4.86	3.71
3	3.56	3.52	11.7	41.2	33.2	12.1	4.59	4.5	4.3	5.02	4.25	3.61
average												
max	3.83	3.62	17	61.9	99	44.9	9.49	6.77	5.62	6.19	5.91	3.91
Min	3.23	2.97	3.23	16.6	23.6	9.97	3.17	2.76	3.54	3.17	3.73	3.36

river Hrazdan - Hrazdan station **2012**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.9	3.33	2.84	10.9	15.5	8.58	7.43	5.71	3.85	3.49	3.18	3.19
2	4.03	3.05	2.75	25.4	14	7.2	7.2	4.31	3.84	3.46	3.13	3.11
3	3.9	3.24	5.05	16	10.4	7.12	5.8	3.86	3.81	3.34	3.28	2.98
average												
max	4.25	3.74	7.28	31.6	16.2	9.68	7.83	6.66	3.85	3.84	3.41	3.33
Min	3.49	2.68	2.3	3.49	9.56	7.09	5.2	3.85	3.63	3.24	2.93	2.87

river Hrazdan - Hrazdan station **2013**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.89	2.80	4.15	24.33	23.73	13.44	6.51	6.30	4.19	4.13	4.04	2.83
2	2.90	3.04	9.37	19.45	22.34	8.61	5.39	6.19	4.58	4.40	3.64	2.70
3	3.45	3.39	9.13	15.03	15.88	7.73	5.81	4.66	4.17	4.34	3.12	2.61
average	3.09	3.06	7.60	19.60	20.50	9.93	5.90	5.68	4.31	4.29	3.60	2.71
max	3.67	3.8	16.5	37.1	30.5	17.3	7.16	6.53	4.71	4.45	4.21	2.91
Min	2.51	2.51	3.54	12.2	11.5	7.27	5.19	3.88	3.94	3.97	2.93	2.56

(2)Hrazdan River (Lusakert Observation Station)

River Hrazdan - Lusakert station **1983**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.62	2.87	3.26	3.70	4.88	6.62	3.57	2.29	2.32	6.85	3.85	2.94
2	2.62	3.11	2.70	3.17	4.00	4.69	2.22	2.33	2.22	12.00	2.95	2.30
3	2.67	3.70	3.60	2.96	4.12	5.16	2.25	2.37	2.97	11.70	2.95	2.34
average	2.64	3.19	3.20	3.28	4.33	5.49	2.67	2.33	2.51	10.20	3.25	2.52
max	2.76	3.90	3.69	4.37	5.78	17.60	4.65	2.39	4.01	15.40	6.51	2.95
min	2.61	2.78	2.24	2.36	3.93	4.15	2.20	2.27	1.91	4.52	2.95	2.04

River Hrazdan - Lusakert station **1984**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.69	3.03	5.49	11.70	6.85	5.28	2.73	2.91	3.11	3.50	3.49	3.35
2	3.00	3.38	6.81	12.00	7.15	4.04	2.90	2.94	2.88	3.65	3.45	3.20
3	3.03	4.35	8.60	8.16	6.10	2.62	3.16	2.81	2.97	3.58	3.53	3.10
average	2.91	3.55	7.02	10.60	6.68	3.98	2.94	2.85	2.99	3.58	3.49	3.21
max	3.07	4.83	9.62	21.30	7.56	5.69	4.10	3.24	3.38	4.25	3.95	3.66
min	2.54	2.99	4.95	7.19	5.78	2.40	2.30	2.70	2.70	2.90	3.10	3.00

River Hrazdan - Lusakert station **1985**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.09	3.20	3.10	6.52	4.40	3.63	3.45	4.16	2.86	3.30	3.12	2.86
2	3.28	3.38	3.25	6.35	4.39	3.63	3.23	2.90	2.84	3.38	3.78	2.80
3	3.29	3.33	4.14	5.04	3.91	3.25	3.40	2.87	2.97	3.20	2.92	2.74
average	3.23	3.30	3.52	5.97	4.22	3.50	3.36	3.30	2.89	3.29	3.28	2.80
max	3.45	3.65	4.50	10.60	5.38	3.75	5.85	6.15	3.40	3.70	4.75	3.30
min	3.00	3.00	3.08	4.17	3.45	3.08	3.08	2.77	2.60	3.02	2.77	2.60

River Hrazdan - Lusakert station **1986**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.61	3.38	2.79	4.06	5.03	6.98	2.50	2.72	2.75	3.39	3.82	2.89
2	2.79	3.01	3.01	6.25	7.19	6.62	2.32	2.67	2.86	3.11	3.70	2.83
3	2.82	2.78	3.25	4.56	9.03	3.12	2.56	2.56	2.98	3.10	3.16	2.72
average	2.74	3.08	3.03	4.96	7.24	5.57	2.46	2.65	2.86	3.20	3.56	2.81
max	3.00	4.00	3.80	12.00	24.80	12.00	3.20	2.90	4.80	4.40	4.60	3.00
min	2.50	2.42	2.60	3.80	4.00	2.80	2.26	2.50	2.50	2.80	2.80	2.60

River Hrazdan - Lusakert station **1987**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.75	2.85	3.97	5.88	17.50	3.21	2.95	2.45	2.74	3.36	5.55	3.32
2	2.95	2.95	3.55	14.30	13.60	2.93	2.53	2.70	2.78	3.28	3.69	3.59
3	2.79	3.39	3.72	9.45	5.34	3.03	2.39	2.73	2.70	4.17	3.42	3.47
average	2.83	3.04	3.55	9.87	11.90	3.06	2.62	2.63	2.74	3.62	4.22	3.46
max	3.03	3.58	3.96	18.20	29.20	3.56	3.04	2.94	3.08	5.50	7.80	4.10
min	2.63	2.81	3.20	3.80	3.44	2.70	2.28	2.30	2.39	2.66	3.08	3.08

River Hrazdan - Lusakert station **1988**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.39	3.08	4.94	9.30	17.90	8.16	4.67	3.46	4.05	5.54	4.17	3.81
2	3.48	3.03	4.60	20.90	15.00	6.23	3.90	3.05	4.15	6.50	3.83	4.21
3	3.53	3.54	7.45	26.60	13.80	6.42	3.64	3.26	4.42	9.73	3.90	3.97
average	3.47	3.21	5.72	18.90	15.50	6.94	4.06	3.26	4.21	7.34	3.97	4.00
max	3.62	4.28	10.00	59.70	54.00	10.60	6.68	5.00	5.00	13.30	4.64	4.64
min	3.36	2.79	3.92	6.40	10.60	4.64	3.20	2.70	3.20	3.60	3.56	3.74

River Hrazdan - Lusakert station **1989**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.18	3.15	4.19	3.34	3.41	3.57	3.50	3.27	3.73	4.01	2.96	6.79
2	3.15	3.15	3.37	3.98	3.32	3.68	3.98	4.07	3.61	3.95	4.69	5.15
3	3.16	3.10	3.38	3.67	3.47	3.38	4.07	3.90	3.43	3.38	13.00	3.19
average	3.20	3.14	3.64	3.66	3.40	3.54	3.68	3.75	3.59	3.76	6.87	4.98
max	3.23	3.15	10.10	5.64	3.80	5.00	4.70	4.40	3.85	4.90	49.60	10.10
min	3.15	3.00	3.08	3.23	3.08	3.23	3.23	2.93	3.22	2.76	1.95	3.15

River Hrazdan - Lusakert station **1999**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	4.26	4.32	4.26	5.99	4.68	4.42	4.89	5.02	4.39	4.49	4.70	4.78
2	4.26	4.31	4.26	4.75	4.61	5.38	4.56	4.85	4.69	4.61	5.06	4.54
3	4.26	4.28	4.25	5.53	4.48	5.22	4.83	4.40	4.58	4.86	4.94	4.54
average	4.26	4.31	4.26	5.43	4.59	5.01	4.76	4.75	4.55	4.66	4.90	4.62
max	4.32	4.50	4.32	13.50	5.70	6.90	6.50	10.00	5.30	5.70	5.70	5.30
min	4.20	4.26	4.20	4.38	4.38	4.38	4.38	4.38	4.38	4.44	4.50	4.50

river Hrazdan - Lusakert station **2000**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.89	3.68	4.08	7.97	5.52	3.51	2.79	2.40	3.36	3.22	3.08	2.79
2	3.70	3.73	4.16	5.87	4.48	2.88	2.55	2.74	3.24	2.98	3.03	2.76
3	3.70	3.86	4.58	4.97	4.49	2.64	2.26	2.96	3.05	3.33	2.88	2.59
average	3.76	3.75	4.28	6.27	4.82	3.01	2.52	2.71	3.22	3.18	3.00	2.71
max	4.24	3.97	5.05	13.10	8.32	3.97	3.46	3.22	3.46	4.24	3.22	3.46
min	3.70	3.46	3.70	4.24	3.70	2.50	2.26	2.26	2.98	2.98	2.74	2.50

river Hrazdan - Lusakert station **2001**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.50	2.50	3.07	5.93	3.61	2.65	3.08	2.68	2.76	2.92	3.22	3.04
2	2.50	2.49	2.96	3.75	3.48	2.56	3.17	2.90	2.68	3.02	3.24	2.92
3	2.49	2.56	3.34	3.32	3.10	2.63	2.95	2.94	2.77	3.26	3.14	3.26
average	2.50	2.51	3.13	4.33	3.39	2.61	3.06	2.84	2.73	3.07	3.20	3.08
max	2.50	2.66	4.55	16.50	4.55	2.98	3.50	3.50	3.14	3.71	3.71	5.45
min	2.37	2.37	2.66	2.98	2.98	2.37	2.50	2.37	2.37	2.50	2.82	2.66

river Hrazdan - Lusakert station **2002**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.59	2.57	2.76	6.64	6.99	6.28	3.57	3.22	3.52	3.20	4.47	2.68
2	2.53	2.54	3.97	8.65	9.54	4.91	2.96	3.48	3.45	3.11	3.10	2.63
3	2.55	2.62	3.63	8.30	10.40	4.12	3.18	3.79	3.21	3.02	2.76	2.62
average	2.55	2.57	3.46	7.86	9.01	5.11	3.23	3.50	3.39	3.10	3.44	2.64
max	2.64	3.04	8.32	21.80	20.60	8.32	4.98	5.42	4.76	3.51	7.21	2.77
min	2.47	2.47	2.53	3.18	6.17	3.31	2.58	2.77	3.04	2.91	2.64	2.58

River Hrazdan - Lusakert station **2003**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.43	2.71	3.02	12.00	13.40	6.55	5.27	3.31	3.08	3.07	3.29	2.75
2	2.61	2.64	3.39	15.60	9.16	5.79	4.26	3.04	2.89	2.86	4.49	2.79
3	2.59	2.84	3.79	16.50	6.19	5.88	4.02	3.23	2.82	3.13	2.97	2.68
average												
max	2.82	2.96	4.44	43.70	17.10	6.92	7.24	6.60	3.28	4.88	19.10	2.96
min	2.40	2.54	2.82	3.64	5.40	5.40	3.64	2.68	2.82	2.68	2.82	2.54

River Hrazdan - Lusakert station **2004**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.52	2.74	16.10	6.08	9.36	6.22	5.20	4.42	4.43	4.34	8.64	3.82
2	2.60	2.79	5.85	7.70	7.72	5.25	5.00	4.36	4.43	4.30	5.62	3.71
3	2.70	2.78	7.36	8.68	6.95	4.75	4.75	4.30	4.35	4.31	3.98	3.75
average												
max	4.00	3.50	155.00	15.00	12.50	6.75	8.25	4.50	4.50	4.40	11.00	3.90
min	2.50	2.62	2.88	5.50	4.50	4.50	4.40	4.20	4.20	4.20	3.90	3.70

River Hrazdan - Lusakert station **2005**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.44	3.47	4.29	5.98	9.21	4.96	4.10	3.71	4.18	4.20	11.50	3.85
2	3.46	3.46	3.85	13.20	7.10	4.44	3.82	3.96	4.04	4.23	4.02	3.85
3	3.37	3.75	4.18	19.60	5.70	4.39	3.81	3.94	4.06	6.76	3.85	3.97
average												
max	3.52	4.01	8.00	40.50	14.50	5.90	4.34	4.18	4.34	9.33	16.40	4.01
min	3.20	3.36	3.52	4.90	5.10	4.34	3.69	3.69	4.01	4.18	3.85	3.85

River Hrazdan - Lusakert station **2006**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.03	2.91	3.44	11.14	13.40	4.43	4.48	3.36	3.21	3.31	3.48	3.26
2	2.99	3.09	4.33	12.54	8.38	3.93	3.68	3.38	3.42	3.36	3.39	3.37
3	2.91	3.06	6.14	16.59	5.69	4.18	3.42	3.31	3.44	3.39	3.26	3.38
average												
max	3.03	3.15	14.10	35.10	19.70	5.25	5.25	3.50	4.00	4.00	3.75	3.50
min	2.91	2.91	3.15	6.60	5.25	3.75	3.26	3.26	2.91	3.15	3.26	3.15

River Hrazdan - Lusakert station **2007**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.53	2.56	3.14	3.66	33.30	3.76	3.20	3.13	3.22	3.23	3.33	3.11
2	2.52	2.61	3.15	5.43	25.90	3.38	3.31	3.14	3.10	3.37	3.30	3.15
3	2.57	2.70	3.83	8.67	4.83	3.19	3.25	3.13	3.11	3.33	3.14	3.21
average												
max	2.60	2.84	9.00	33.00	74.00	4.14	3.82	3.45	3.33	3.45	3.58	3.21
min	2.52	2.48	2.72	3.21	4.14	2.97	3.09	3.09	3.09	3.21	3.09	3.09

River Hrazdan - Lusakert station **2008**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.12	3.15	3.56	4.21	3.41	2.65	2.69	2.90	3.09	2.96	3.12	2.76
2	2.96	3.17	4.73	3.94	3.14	2.64	2.75	2.98	3.03	3.02	3.13	2.57
3	3.02	3.21	4.27	3.68	2.87	2.67	2.83	3.05	2.97	3.06	2.96	2.37
average												
max	3.25	3.25	10.70	4.34	3.53	2.72	2.86	3.09	3.11	3.09	3.16	2.85
min	2.92	3.14	3.25	3.56	2.74	2.62	2.68	2.87	2.94	2.94	2.87	2.29

River Hrazdan - Lusakert station **2009**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.30	2.32	2.51	3.72	6.86	4.20	2.91	2.45	3.02	3.25	3.61	3.20
2	2.30	2.30	3.13	4.12	5.27	3.70	2.54	2.92	3.08	3.28	3.48	3.08
3	2.31	2.30	2.88	4.93	4.70	3.46	2.39	3.00	3.17	3.31	3.34	3.03
average												
max	2.42	2.42	6.52	6.52	9.10	4.41	3.22	3.01	3.21	3.21	3.60	3.26
min	2.30	2.30	2.30	2.99	4.20	3.22	2.26	2.15	3.01	3.54	3.28	3.03

River Hrazdan - Lusakert station **2010**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.05	3.00	5.37	7.04	10.80	5.20	3.80	3.57	2.62	3.44	2.79	2.61
2	3.35	3.67	12.20	9.44	9.57	4.89	3.76	2.79	2.73	2.98	2.69	2.67
3	3.16	4.89	6.53	11.36	6.53	4.33	4.03	2.71	2.83	2.90	2.69	2.57
average												
max	3.88	6.85	17.30	20.30	13.30	5.72	4.82	3.92	2.90	4.26	2.80	2.69
min	3.00	3.00	3.71	5.72	5.72	4.06	3.53	2.44	2.58	2.80	2.69	2.48

River Hrazdan - Lusakert station **2011**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.47	2.54	2.91	10.50	17.20	4.58	3.05	2.42	2.51	2.78	3.05	2.80
2	2.40	2.60	3.50	8.50	7.75	3.96	2.98	2.26	2.56	2.85	3.02	2.89
3	2.40	2.83	5.60	10.50	6.15	3.31	2.94	2.60	2.80	2.99	2.92	2.76
average												
max	2.58	2.94	7.78	20.20	25.40	5.07	3.31	2.76	3.68	3.13	3.13	2.94
min	2.40	2.40	2.76	5.07	5.07	3.13	2.76	2.04	2.40	2.76	2.76	2.76

River Hrazdan - Lusakert station **2012**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.67	2.68	2.81	5.10	5.40	3.65	3.31	3.20	2.92	3.30	3.01	3.12
2	2.59	2.80	2.96	7.10	4.65	3.41	3.30	3.08	3.05	3.25	3.10	3.14
3	2.67	2.78	3.23	5.13	4.02	3.32	3.24	2.79	3.24	3.12	3.06	3.17
average												
max	2.76	2.80	3.60	11.30	6.30	3.70	3.32	3.28	3.28	3.37	3.20	3.20
min	2.58	2.67	2.70	3.40	3.86	3.30	3.20	2.75	2.80	3.04	2.96	3.04

river Hrazdan - Lusakert station **2013**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.38	3.80	4.67	11.24	9.34	5.42	3.70	3.81	3.19	3.38	3.58	3.71
2	3.67	3.91	8.17	9.14	9.25	5.16	3.41	3.58	3.05	3.42	3.64	3.61
3	3.63	4.23	7.11	7.86	7.93	4.55	3.58	3.38	3.27	3.63	3.62	3.45
average	3.56	3.96	6.66	9.41	8.81	5.04	3.68	3.58	3.17	3.48	3.61	3.58
max	3.71	4.42	17.90	12.80	10.70	6.19	3.98	3.85	3.42	3.71	3.85	3.71
min	3.10	3.71	4.42	7.16	6.49	3.55	3.33	3.14	2.85	3.28	3.28	3.42

(3)Kasakh River (Ashtarak Observation Station)

River Kasakh - Ashtarak station **1983**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.50	2.34	2.66	10.3	2.93	4.17	2.75	2.74	2.96	1.81	2.34	2.18
2	2.50	2.39	2.90	2.96	2.93	2.02	2.53	2.50	2.56	2.00	2.56	2.07
3	2.46	2.62	4.23	2.47	2.46	2.44	2.83	2.66	1.88	1.93	2.44	1.86
average	2.48	2.44	3.29	5.24	2.76	2.88	2.71	2.63	2.47	1.92	2.45	2.03
max	2.66	2.66	6.50	28.4	3.52	37.0	3.74	3.14	3.14	2.34	3.74	2.18
min	2.34	2.34	2.50	2.18	2.18	2.02	2.34	2.50	1.70	1.70	2.18	1.86

River Kasakh - Ashtarak station **1984**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	1.92	2.16	5.78	7.47	1.93	2.68	2.45	3	4.14	2.08	2.14	2.81
2	1.98	2.09	7.15	4.11	2.5	2.62	2.94	3.59	2.4	1.84	2.26	2.71
3	1.92	2.11	16.1	2.82	2.84	2.46	2.91	3.49	2.22	2.26	2.7	2.68
average	1.94	2.12	9.9	4.8	2.44	2.59	2.77	3.36	2.92	2.07	2.37	2.73
max	2.06	2.37	73.20	26.6	2.84	2.8	3.3	4.46	4.75	2.37	2.84	2.84
min	1.75	1.75	2.22	2.22	1.5	2.37	2.37	2.84	2.06	1.75	2.06	2.68

River Kasakh - Ashtarak station **1985**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.83	2.81	2.65	26.2	1.95	2.83	2.35	3.27	2.83	2.61	2.61	3.05
2	3.03	2.92	2.65	8.6	2.41	2.54	3.07	3.23	2.79	2.70	2.61	3.29
3	2.95	2.91	4.04	2.61	2.83	1.95	3.17	2.83	2.61	2.61	2.81	3.45
average	2.94	2.88	3.15	12.5	2.41	2.44	2.87	3.1	2.74	2.64	2.68	3.27
max	3.05	3.05	7.34	110	2.83	2.8	3.27	3.27	2.83	2.83	3.05	3.49
min	2.83	2.61	2.61	1.95	1.95	1.95	1.95	2.83	2.61	2.61	2.61	3.05

River Kasakh - Ashtarak station **1986**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.29	3.35	3.35	3.8	3.46	3.09	2.38	2.48	2.39	2.9	2.79	3.18
2	3.30	3.35	3.35	3.54	3.44	2.72	2.39	2.36	2.35	2.90	3.22	3.35
3	3.35	3.35	4.49	3.35	3.39	2.76	2.48	2.46	2.5	2.79	3.05	3.43
average	3.32	3.35	3.76	3.57	3.43	2.86	2.42	2.43	2.41	2.86	3.02	3.33
max	3.35	3.35	21.70	6.2	5.1	3.8	2.48	2.62	2.9	3.05	4.35	3.5
min	3.05	3.35	3.35	3.35	3.05	2.48	2.35	2.35	2.35	2.35	2.35	3.05

River Kasakh - Ashtarak station **1987**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.61	3.38	2.6	3.51	2.61	2.5	2.32	2.32	2.3	2.3	3.22	3.05
2	3.52	3.25	2.60	13.4	2.69	2.69	2.3	2.30	2.3	2.32	3.27	3.33
3	3.65	2.77	2.6	2.84	2.62	2.4	2.49	2.3	2.3	3.02	3.07	3.37
average	3.59	3.16	2.6	6.6	2.64	2.53	2.37	2.31	2.3	2.56	3.18	3.25
max	4.22	3.5	2.75	70	3.95	3.2	2.64	2.64	2.64	3.35	3.35	3.55
min	3.5	2.75	2.60	2.3	2.3	2.3	2.3	2.30	2.30	2.30	2.98	2.98

River Kasakh - Ashtarak station **1988**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.19	3.08	3.23	6.4	4.9	3.14	2.24	2.21	2.71	2.41	3.15	3.14
2	2.98	2.93	3.29	33.7	4.89	2.58	2.2	2.20	2.66	2.62	3.47	2.95
3	2.96	3.1	4.05	13.2	3.43	2.31	2.21	2.25	2.25	2.84	3.4	3.34
average	3.04	3.03	3.54	17.8	4.38	2.67	2.22	2.22	2.54	2.63	3.34	3.15
max	3.32	3.5	7.60	62	8.8	3.4	2.4	2.73	2.73	2.97	3.59	3.49
min	2.95	2.62	2.95	3.5	3.28	2.28	2.2	2.20	2.15	2.32	3	2.86

River Kasakh - Ashtarak station **1989**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.25	2.46	3.21	1.87	1.37	1.42	1.46	1.44	1.36	1.57	1.86	3.02
2	2.87	2.35	2.72	1.83	1.3	1.29	1.42	1.45	1.45	1.61	2.07	2.12
3	2.55	2.35	2.95	1.41	1.23	1.42	1.44	1.34	1.5	1.86	3.37	2.15
average	2.88	2.39	2.96	1.7	1.3	1.38	1.44	1.41	1.44	1.69	2.44	2.42
max	3.38	2.55	4.70	2.55	1.51	1.5	1.51	1.58	1.58	1.95	13.7	7.38
min	2.55	2.35	2.35	1.35	1.1	1.1	1.37	1.30	1.30	1.51	1.85	2.05

River Kasakh - Ashtarak station **1990**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.07	2.07	2.18	2.3	2.43	1.04	1.06	1.14	1.25	2.45	2.46	2.5
2	2.00	2.15	2.48	3.04	1.61	1.1	1.16	1.19	1.44	2.40	2.51	2.5
3	2	2.08	4.85	3.79	0.9	1.07	1.08	1.14	1.58	2.47	2.5	2.36
average	2.02	2.1	3.22	3.04	1.62	1.07	1.1	1.16	1.42	2.44	2.49	2.45
max	2.2	2.2	16.70	25.3	3.2	1.2	1.18	1.24	2.3	2.64	2.64	2.5
min	1.92	1.92	2.00	2.2	0.88	0.98	1	1.12	1.18	2.30	2.4	2.2

River Kasakh - Ashtarak station **1991**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	1.93	1.89	1.9	16.5		1.57	1.44	1.53	1.45	1.83	4.06	2.05
2	1.93	1.84	1.93	2.99		1.5	1.47	1.48	1.6	2.05	2.36	2.03
3	1.93	1.84	18.1	4.84		1.37	1.66	1.32	1.7	2.05	2.24	2.08
average	1.93	1.86	7.65	8.11		1.48	1.53	1.44	1.59	1.98	2.89	2.05
max	1.93	1.93	68.00	59		1.9	1.84	1.93	1.93	2.11	12.5	2.2
min	1.93	1.84	1.84	2.36		1.3	1.3	1.20	1.38	1.65	2.11	1.93

River Kasakh - Ashtarak station **1992**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.38	2.2	2.19	5.89	2.25	2.13	1.98	2.1	1.98	2.14	2.18	2.27
2	2.36	2.2	2.05	20.2	2.32	2.15	2.04	2.10	2.22	2.18	2.21	2.3
3	2.33	2.2	2.11	4.56	2.25	2.12	2.01	1.97	2.31	2.2	2.29	2.24
average	2.35	2.2	2.12	10.2	2.27	2.13	2.01	2.05	2.17	2.17	2.23	2.27
max	2.5	2.2	2.30	62.8	2.8	2.3	2.2	2.3	2.5	2.4	2.4	2.3
min	2.3	2.2	2.00	2	2	2	1.87	1.80	1.87	2.00	2.1	2.1

River Kasakh - Ashtarak station **1993**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.10	2.25	2.3	14	4.15	3.16	2.07	2.6	2.2	2.47	4.74	2.59
2	2.20	2.3	2.23	8.94	3.42	2.38	2.31	2.30	2.2	3.18	3.82	2.69
3	2.2	2.3	2.23	2.58	2.7	2.22	2.32	2.2	2.3	4.45	2.78	2.62
average	2.17	2.28	2.25	8.49	3.4	2.59	2.24	2.36	2.23	3.4	3.78	2.63
max	2.2	2.3	2.50	45.6	17.8	19.7	2.4	14	2.5	7.4	5.8	2.8
min	2.1	2.2	2.50	2.2	2.4	2.1	2	2.20	2.20	2.30	2.5	2.5

River Kasakh - Ashtarak station **1994**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.75	2.56	2.48	12.6	2.9	2.56	2.43	2.24	2.27	2.56	2.56	2.65
2	2.65	2.52	2.47	4.11	2.87	2.69	2.26	2.38	2.53	2.56	2.62	2.65
3	2.63	2.5	2.95	2.87	2.69	4.3	2.32	2.3	2.56	2.54	2.65	2.65
average	2.68	2.53	2.64	6.53	2.81	3.18	2.34	2.3	2.46	2.55	2.61	2.65
max	2.78	2.56	7.32	25.2	3.04	10.5	2.56	2.38	2.56	2.65	2.65	2.65
min	2.56	2.47	2.47	2.78	2.56	2.56	2.2	2.20	2.20	2.47	2.56	2.65

River Kasakh - Ashtarak station **1995**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.53	2.51	2.79	11.9	4.7	2.47	2.2	2.45	2.75	2.7	2.43	2.22
2	2.51	2.51	3.06	4.92	2.6	2.35	2.36	2.49	2.88	2.51	2.45	2.26
3	2.51	2.42	4.7	3.26	2.35	2.27	2.34	2.51	2.94	2.44	2.33	2.19
average	2.52	2.48	3.55	6.69	3.19	2.36	2.3	2.48	2.86	2.55	2.4	2.22
max	2.6	2.51	20.20	33	13.6	2.5	2.79	2.6	3.17	2.98	2.51	2.33
min	2.51	2.42	2.42	2.51	2.33	2.15	2.15	2.33	2.51	2.42	2.33	2.15

River Kasakh - Ashtarak station **1996**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.30	2.22	2.67	13	8.21	2.17	2.35	2.38	2.73	2.47	2.4	2.46
2	2.13	2.26	3.74	9.59	3.89	2.3	2.6	2.50	2.59	2.42	2.4	2.3
3	2.2	2.27	3.75	10.1	2.56	2.35	2.31	2.74	2.51	2.36	2.35	2.31
average	2.21	2.25	3.4	10.9	4.81	2.27	2.42	2.55	2.61	2.42	2.38	2.35
max	2.3	2.4	8.70	34	14.5	2.5	2.92	2.92	2.76	2.6	2.5	2.5
min	2.1	2.1	2.30	5.24	2.1	2.1	2.2	2.30	2.50	2.30	2.3	2.3

River Kasakh - Ashtarak station **1997**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.08	2.84	2.89	3.72	4.04	2.68	2.91	2.55	2.68	2.79	3.13	2.98
2	3.06	2.84	3.01	14.4	2.8	2.47	2.78	2.45	2.58	2.74	3.31	2.84
3	2.99	2.84	3.08	6.97	2.35	2.5	2.76	2.5	2.55	2.89	3.21	2.84
average	3.04	2.84	2.98	8.36	3.04	2.55	2.78	2.5	2.6	2.81	3.22	2.89
max	3.18	2.84	3.34	67.6	5.44	3.2	3.34	3.18	2.84	3.01	3.34	3.01
min	2.84	2.84	2.84	3.01	2.35	2.35	2.52	2.35	2.52	2.52	3.01	2.84

River Kasakh - Ashtarak station **1998**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.60	2.5	2.6	4.39	3	2.5	2.3	2.6	2.37	2.4	2.41	2.6
2	2.53	2.42	2.63	4.03	3.19	2.4	2.45	2.43	2.35	2.47	2.47	2.58
3	2.5	2.48	4.39	2.77	2.65	2.31	2.68	2.38	2.4	2.34	2.59	2.43
average	2.54	2.46	3.25	3.73	2.93	2.4	2.48	2.47	2.37	2.4	2.49	2.53
max	2.6	2.6	60.00	29.3	13.7	2.7	2.7	2.7	2.5	2.5	2.7	2.6
min	2.5	2.4	2.60	2.5	2.3	2.3	2.3	2.30	2.30	2.30	2.4	2.4

River Kasakh - Ashtarak station **1999**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.52	2.6	2.76	5.09	1.97	2.57	2.52	2.96	2.17	2.09	2.19	2.89
2	2.58	2.67	2.72	2.06	2.31	2.38	2.04	2.68	2.37	2.24	2.6	2.75
3	2.59	2.7	2.69	1.87	2.47	2.68	2.3	2.66	2.13	2.14	2.96	2.72
average	2.56	2.65	2.72	3	2.26	2.54	2.28	2.76	2.22	2.16	2.58	2.78
max	2.7	2.7	2.85	60	3.41	3.3	2.72	3.55	2.58	2.58	3.74	3.14
min	2.4	2.55	2.55	1.2	1.8	1.98	1.78	2.31	1.59	1.88	2.07	2.58

River Kasakh - Ashtarak station **2000**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.54	2.54	2.54	10.2	2.35	1.66	2.29	2.5	2.63	2.46	2.45	2.7
2	2.54	2.6	2.63	3.87	1.65	2.28	2.71	2.92	2.45	2.54	2.42	2.8
3	2.58	2.54	2.72	2.01	1.76	2.42	2.48	2.76	2.7	2.66	2.57	2.86
average	2.55	2.6	2.63	5.38	1.92	2.12	2.49	2.73	2.59	2.56	2.48	2.79
max	2.67	2.67	2.80	47	8.82	3.2	4.31	4.06	2.8	2.8	2.93	2.93
min	2.54	2.54	2.54	1.44	1.44	1.44	1.92	2.15	2.28	2.41	2.28	2.54

River Kasakh - Ashtarak station **2001**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.75	2.77	2.84	4.69	1.91	1.44	1.86	2.16	1.58	1.63	1.76	2.14
2	2.65	2.73	3.67	2.84	1.73	1.81	1.96	2.18	1.44	1.84	1.98	2.39
3	2.61	2.81	3.94	1.84	1.49	1.65	2.08	2.25	1.34	1.86	2.32	2.38
average	2.67	2.77	3.5	3.12	1.7	1.63	1.97	2.2	1.45	1.78	2.02	2.31
max	3.17	2.91	11.60	36	5.18	2.0	2.52	2.52	1.9	2.13	2.52	2.52
min	2.52	2.65	2.78	1.6	1.3	1.3	1.7	1.90	1.00	1.60	1.6	2

River Kasakh - Ashtarak station **2002**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	1.70	1.76	1.98	14.3	2.17	1.98	1.92	2.07	2.43	2.17	2	2.51
2	1.74	1.88	4.60	11	1.93	2	1.94	2.34	1.85	1.97	1.93	2.45
3	1.7	1.92	4.13	6.28	1.75	2.12	2.37	2.07	1.64	2.07	1.7	2.63
average	1.71	1.85	3.59	10.5	1.94	2.03	2.09	2.16	1.97	2.07	1.88	2.53
max	1.88	1.98	18.50	10.9	9.68	3.3	3.6	2.66	3.3	2.33	2.07	2.83
min	1.7	1.7	1.98	1.98	1.25	1.25	1.42	1.59	1.59	1.70	1.59	2.16

River Kasakh - Ashtarak station **2003**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.96	2.92	2.78	13.30	3.50	2.38	2.65	1.94	1.87	1.94	4.03	2.30
2	2.92	2.90	2.85	13.70	3.60	2.61	2.36	1.86	1.98	2.18	10.40	2.15
3	2.92	2.79	2.82	12.00	3.88	2.82	1.91	1.91	1.84	2.13	2.27	2.27
average												
max	3.21	3.00	3.07	83.8	8.48	3.21	2.79	2.30	2.10	2.37	30.50	2.44
min	2.79	2.65	2.51	2.93	2.86	2.10	1.80	1.80	1.80	1.80	2.00	2.10

River Kasakh - Ashtarak station **2004**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.20	2.24	12.40	3.18	6.05	3.35	3.36	3.55	2.69	2.97	2.96	2.65
2	2.02	2.28	4.81	4.32	4.90	3.80	3.31	3.51	2.54	3.21	3.21	2.55
3	2.21	2.22	5.03	6.29	5.63	3.27	3.58	2.44	2.50	3.28	3.33	2.18
average												
max	2.54	2.38	130.00	20.5	11.00	4.62	3.93	3.93	3.36	3.93	3.93	3.36
min	1.95	2.12	2.38	1.95	2.80	2.80	2.80	2.29	2.29	2.80	2.80	1.95

River Kasakh - Ashtarak station **2005**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.62	2.70	3.81	5.39	3.95	3.07	2.68	2.41	2.67	2.50	2.84	2.90
2	2.43	2.80	3.74	12.00	2.50	2.82	2.69	2.45	2.57	2.56	2.85	2.87
3	2.57	3.59	3.04	5.24	2.74	2.63	2.45	2.36	2.53	2.67	3.03	2.92
average												
max	3.31	3.82	7.80	26.3	8.61	3.82	2.90	2.64	2.80	3.21	3.21	3.11
min	2.40	2.40	2.48	3.31	2.24	2.48	2.32	2.08	2.32	2.32	2.64	2.72

River Kasakh - Ashtarak station **2006**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.14	3.23	3.50	11.40	5.81	6.46	3.16	2.63	2.94	2.90	3.40	3.32
2	3.13	3.07	3.52	4.53	3.85	5.47	2.20	2.61	1.96	3.41	3.41	3.09
3	3.16	3.34	6.47	6.20	2.93	3.65	2.05	2.75	2.02	3.46	3.36	2.87
average												
max	3.36	3.54	29.10	32.5	12.80	7.86	7.23	3.00	3.00	3.72	3.54	3.54
min	3.00	3.00	3.36	3.72	1.70	3.00	1.70	2.19	1.70	2.68	3.18	2.68

River Kasakh - Ashtarak station **2007**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.74	3.04	2.80	4.13	8.14	3.00	2.92	2.54	2.80	2.48	3.00	3.00
2	2.80	3.29	2.82	6.45	4.59	4.28	2.96	2.47	2.77	2.64	2.97	3.14
3	2.91	2.73	4.18	5.76	2.87	4.60	2.68	2.72	2.32	2.75	2.97	3.14
average												
max	2.97	3.48	17.10	20.2	16.30	5.82	3.31	2.97	3.14	2.97	3.14	3.14
min	2.50	2.65	2.65	2.80	2.35	2.80	2.35	2.20	2.20	2.35	2.80	2.97

River Kasakh - Ashtarak station **2008**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	3.01	2.70	3.19	3.07	2.84	2.43	2.69	2.46	2.52	2.56	2.66	2.82
2	2.70	2.70	3.62	3.07	3.01	2.34	2.69	2.44	2.51	2.70	2.84	2.84
3	2.70	2.70	4.19	2.72	2.53	2.39	2.47	2.32	2.41	2.70	2.90	2.90
average												
max	3.09	2.90	16.00	3.3	3.09	2.56	2.70	2.70	2.70	2.70	2.90	3.09
min	2.70	2.70	2.70	2.70	2.42	2.29	2.42	2.15	2.15	2.42	2.42	2.70

River Kasakh - Ashtarak station **2009**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.88	2.80	2.83	4.66	4.09	2.66	2.83	2.87	2.74	2.90	3.07	2.88
2	2.81	2.80	2.88	4.65	3.11	2.71	2.58	2.86	2.63	2.72	3.01	2.90
3	2.85	2.84	4.01	4.65	2.73	2.70	2.70	2.74	2.80	2.97	3.28	3.00
average												
max	3.08	2.94	11.40	20.0	6.30	2.94	3.22	3.08	3.22	3.22	4.20	3.36
min	2.80	2.70	2.80	3.08	2.60	2.60	2.50	2.60	2.40	2.60	2.80	2.80

River Kasakh - Ashtarak station **2010**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.91	2.81	4.81	5.58	6.38	2.80	2.58	2.64	2.46	3.10	2.93	2.71
2	3.00	3.10	12.40	5.62	4.58	2.55	2.52	2.66	2.57	3.12	3.08	2.59
3	2.91	3.73	3.06	7.70	2.94	2.55	2.56	2.91	3.04	3.11	3.10	2.53
average												
max	3.27	5.14	58.40	23.7	16.70	3.08	2.70	3.27	3.46	3.46	3.27	3.08
min	2.70	2.70	2.70	2.70	2.70	2.47	2.36	2.47	2.24	2.89	2.89	2.47

River Kasakh - Ashtarak station **2011**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.36	2.50	2.76	11.38	5.71	2.76	3.06	2.36	3.98	3.20	3.22	3.10
2	2.38	2.55	2.76	6.38	2.98	2.58	2.58	2.61	3.86	3.26	3.08	2.78
3	2.44	2.72	4.65	3.68	2.57	3.64	2.33	3.63	3.50	3.37	2.90	2.70
average												
max	2.90	2.90	20.70	44.6	17.70	4.70	3.10	4.70	4.50	3.90	3.30	3.10
min	2.19	2.36	2.70	2.90	2.02	1.85	2.19	1.85	3.30	3.10	2.90	2.70

River Kasakh - Ashtarak station **2012**

Decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.60	2.40	2.49	5.60	3.32	2.65	2.66	2.43	2.51	2.80	2.98	2.78
2	2.52	2.38	2.76	9.61	2.73	2.56	2.46	2.37	2.86	3.12	3.08	2.60
3	2.46	2.54	3.05	4.32	2.79	2.49	2.44	2.47	2.94	3.05	3.00	2.59
average												
max	2.60	2.60	3.60	42.2	7.57	2.80	2.80	2.60	3.00	3.40	3.20	2.80
min	2.40	2.30	2.40	3.20	2.40	2.40	2.30	2.30	2.30	2.80	2.80	2.50

River Kasakh - Ashtarak station **2013**

decade	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	2.55	2.66	2.66	9.98	3.46	2.73	2.35	2.36	2.43	2.59	2.92	2.84
2	2.55	2.66	7.51	4.65	3.70	2.57	2.38	2.32	2.55	4.44	2.97	2.66
3	2.60	2.66	11.18	4.01	2.92	2.49	2.40	2.30	2.53	2.86	2.94	2.66
average	2.57	2.66	7.25	6.21	3.34	2.60	2.38	2.33	2.50	3.28	2.94	2.72
max	2.66	2.66	26.50	20.5	4.09	2.9	2.43	2.43	2.6	5.56	3.07	2.86
min	2.55	2.66	2.66	3.48	2.66	2.43	2.32	2.20	2.32	2.55	2.86	2.66

(4)Hrazdan River (Hrazdan Observation Station (Million Cubic Meter: MCM))

		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	*1998
Jan	1	1.884	2.471	1.581	1.797	6.048	2.195	3.465	2.713	2.454	3.352	4.951	3.862	3.905	2.575	2.195	
	2	1.780	2.074	1.728	1.849	7.171	2.316	2.687	2.808	2.506	3.378	5.072	3.732	3.741	2.298	2.186	
	3	1.796	1.977	2.186	1.853	6.092	2.462	3.051	2.794	2.690	3.621	5.712	5.265	4.077	2.671	2.281	
Feb	1	1.633	1.745	2.013	1.668	6.618	2.203	2.678	2.316	2.523	3.275	5.314	4.562	3.491	2.074	2.030	
	2	1.711	1.771	1.763	1.676	3.655	2.264	2.739	2.523	2.532	3.300	5.435	4.320	3.214	2.333	2.290	
	3	1.424	1.571	1.334	1.728	3.491	2.115	2.253	1.922	2.101	3.134	4.438	3.221	3.622	2.449	1.935	
Mar	1	1.771	2.393	1.555	2.290	3.076	3.145	5.556	3.560	2.791	3.586	5.651	8.268	5.426	2.523	2.419	
	2	2.627	3.568	2.125	2.281	2.436	3.646	4.156	5.616	3.050	3.767	5.772	9.590	7.733	3.300	2.177	
	3	8.991	5.740	4.448	4.495	3.013	8.497	5.997	17.297	18.628	6.681	9.019	13.781	11.120	3.003	2.737	
Apr	1	11.837	14.602	15.120	9.504	5.702	11.059	8.726	11.146	19.786	13.133	24.451	17.626	19.181	8.726	8.389	
	2	16.416	24.710	22.205	15.811	20.563	39.398	14.256	16.934	15.206	23.414	27.562	28.512	29.894	8.986	7.862	
	3	11.578	19.008	21.946	14.083	15.811	48.730	9.245	45.706	13.565	20.131	18.230	35.338	23.501	16.934	38.794	
May	1	15.466	13.565	18.317	11.318	46.915	39.312	6.247	30.154	29.808	21.773	32.573	34.042	28.771	48.470	27.734	
	2	18.490	33.264	16.416	18.576	43.718	47.779	4.631	30.931	15.898	34.646	50.285	27.302	24.538	27.907	29.981	
	3	15.682	27.752	10.644	22.429	32.028	51.512	4.277	33.074	41.152	34.024	41.057	41.437	23.380	11.785	25.851	
Jun	1	14.256	16.762	6.644	17.107	16.070	38.966	3.396	17.712	7.586	20.304	28.512	11.405	12.787	7.620	12.614	
	2	14.342	10.109	4.519	9.331	9.418	21.514	3.508	9.936	7.828	22.378	17.626	6.255	10.973	3.387	8.588	
	3	7.258	6.972	2.385	8.986	4.424	16.934	2.894	7.603	5.720	17.539	10.022	6.739	7.612	3.335	5.970	
Jul	1	4.769	4.398	3.292	3.802	2.946	13.824	3.128	6.022	3.542	8.813	6.178	6.134	5.953	2.272	6.100	
	2	2.808	2.877	2.013	2.618	2.488	7.776	3.067	5.080	3.024	7.741	4.225	3.352	3.378	2.030	3.612	
	3	3.564	4.676	2.452	2.680	2.899	6.206	2.880	3.355	3.393	5.256	3.726	4.087	2.766	3.269	2.490	
Aug	1	3.136	2.393	1.719	2.316	2.376	5.184	2.583	3.758	2.428	3.482	3.655	3.283	2.817	6.238	2.609	
	2	1.953	2.177	1.711	2.376	2.307	4.683	2.713	3.672	2.627	3.344	5.305	3.370	2.488	3.378	2.212	
	3	3.745	2.214	2.148	2.737	2.519	4.049	3.336	5.427	3.070	5.332	5.626	3.650	2.956	1.787	2.452	
Sep	1	2.851	2.376	2.056	2.134	2.169	3.205	2.575	4.139	2.946	3.465	3.707	3.681	3.110	1.426	2.748	
	2	2.264	2.246	2.074	2.160	2.454	3.188	3.059	4.216	3.326	5.219	4.164	3.612	2.644	1.884	2.454	
	3	2.246	2.022	2.074	2.341	2.255	3.041	2.989	4.303	3.154	5.391	4.562	3.318	2.851	2.004	2.549	
Oct	1	2.428	1.909	1.979	2.514	2.549	3.205	5.676	4.778	2.964	3.983	4.320	3.266	1.866	1.875	2.704	
	2	2.056	2.143	2.195	2.151	2.333	3.292	4.147	3.871	3.180	4.242	4.458	3.188	1.719	1.771	2.756	
	3	2.918	2.528	2.281	2.680	2.747	3.963	3.478	5.294	3.298	4.125	4.628	3.754	2.528	2.452	2.946	
Nov	1	3.223	2.238	1.970	3.197	2.652	3.482	2.773	6.057	3.845	4.493	3.888	3.499	2.652	2.678	4.631	
	2	4.735	1.944	1.892	2.514	2.540	3.594	3.188	5.642	3.292	4.536	3.957	3.413	2.989	2.264	2.601	
	3	4.389	1.840	1.918	2.220	3.456	2.964	7.111	4.467	3.119	4.605	3.974	3.698	3.188	2.661	2.454	
Dec	1	2.868	1.745	1.918	2.592	2.748	3.223	9.677	4.424	3.637	4.838	3.784	3.594	2.773	2.998	2.773	
	2	2.436	1.728	1.935	3.888	3.136	4.199	6.307	4.450	3.551	4.951	3.871	3.370	2.488	2.756	2.056	
	3	3.155	1.901	1.967	5.303	2.623	4.030	4.448	4.087	3.545	5.389	7.917	4.049	2.709	2.842	2.566	
Jan-Dec		204.0	233.0	175.0	197.0	283.0	427.0	163.0	328.0	254.0	331.0	384.0	332.0	279.0	207.0	239.0	
Mar-May		103.0	145.0	113.0	101.0	173.0	253.0	63.0	194.0	160.0	161.0	215.0	216.0	174.0	132.0	146.0	
Mar-Oct		173.0	210.0	152.0	167.0	233.0	392.0	113.0	284.0	218.0	282.0	325.0	285.0	240.0	176.0	209.0	

		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average
Jan	1	1.676	1.780	1.668	2.022	2.229	2.575	2.411	3.275	2.324	2.523	2.419	3.897	2.989	3.370	2.500	2.713
	2	1.642	1.607	1.771	1.676	2.091	2.169	2.385	3.084	2.246	2.488	2.402	3.344	3.076	3.482	2.504	2.687
	3	1.796	1.787	1.825	1.834	2.357	2.300	2.642	3.241	2.500	2.813	2.576	3.783	3.383	3.707	3.281	2.947
Feb	1	1.633	1.624	1.745	1.693	2.246	2.030	2.359	3.067	2.264	2.238	2.324	2.981	2.748	2.877	2.418	2.561
	2	1.668	1.771	1.763	1.797	2.022	2.108	2.350	3.015	2.246	2.376	2.532	4.571	2.972	2.635	2.629	2.580
	3	1.320	1.571	1.514	1.693	1.472	2.037	2.032	2.329	1.776	2.092	1.846	4.693	2.433	2.519	2.346	2.304
Mar	1	1.858	1.814	3.905	2.601	2.143	19.181	3.836	3.344	2.532	3.326	3.154	6.722	3.231	2.454	3.581	3.829
	2	1.918	1.685	4.026	3.508	2.549	5.711	3.059	5.841	2.739	6.117	4.571	33.178	5.746	2.376	8.096	4.999
	3	2.148	3.345	7.195	4.324	2.443	12.830	3.726	11.405	5.104	14.161	4.324	12.165	11.120	4.800	8.680	7.555
Apr	1	6.411	15.293	18.835	6.627	24.970	7.474	6.696	20.304	4.908	10.368	9.158	11.318	17.194	9.418	21.021	12.580
	2	5.832	14.429	9.072	16.416	32.918	18.058	31.277	39.398	10.282	13.651	7.698	19.094	21.168	21.946	16.805	19.089
	3	8.986	12.614	8.217	12.614	36.288	18.490	50.198	45.446	22.205	12.528	11.750	32.141	35.597	13.824	12.986	22.241
May	1	11.405	13.392	14.083	12.528	35.424	34.387	26.266	42.250	62.640	8.813	28.858	27.302	61.085	13.392	20.503	26.380
	2	11.578	9.936	14.083	24.538	33.350	22.810	24.538	26.438	68.515	12.355	25.229	33.955	31.795	12.096	19.302	25.706
	3	9.114	12.450	12.640	43.338	21.289	19.388	14.826	15.111	26.896	12.925	28.037	24.235	31.553	9.884	15.094	23.092
Jun	1	5.806	7.966	7.620	20.736	13.651	15.466	9.504	8.562	12.614	6.515	12.614	16.502	25.315	7.413	11.612	13.375
	2	5.772	4.458	5.124	13.306	7.206	8.726	6.670	4.692	9.072	6.921	9.936	8.415	15.725	6.221	7.436	9.077
	3	7.932	2.540	2.989	10.368	5.797	6.368	4.225	4.225	8.407	8.104	8.899	6.281	10.454	6.152	6.677	6.994
Jul	1	6.756	2.082	2.402	6.817	4.044	4.830	4.493	8.726	4.380	4.735	6.912	4.683	6.316	6.420	5.623	5.206
	2	3.516	1.884	2.143	4.251	2.765	3.361	3.309	3.948	4.812	2.972	6.713	4.035	5.201	6.221	4.659	3.803
	3	3.621	1.901	2.005	3.535	4.600	4.400	3.574	3.650	3.545	2.823	6.073	4.685	4.362	5.512	5.518	3.758
Aug	1	2.281	1.788	1.840	2.454	3.542	3.110	3.050	3.361	3.292	2.938	5.823	2.989	2.981	4.933	5.439	3.187
	2	2.385	1.642	1.849	2.324	2.367	2.808	3.413	3.033	3.136	2.989	4.553	3.188	3.413	3.724	5.345	2.983
	3	2.328	1.768	2.053	5.864	3.345	3.345	3.916	3.355	3.497	3.336	4.267	3.383	4.277	3.669	4.429	3.448
Sep	1	1.961	1.840	1.763	4.052	2.532	5.054	4.398	2.635	2.903	2.868	3.292	2.877	3.439	3.326	3.616	2.908
	2	2.169	1.918	1.780	2.609	2.532	3.957	3.551	2.575	2.583	3.404	4.303	3.041	3.516	3.318	3.955	2.973
	3	2.229	1.866	1.737	2.307	2.471	3.283	3.879	2.514	2.532	3.102	6.981	3.119	3.715	3.292	3.604	3.056
Oct	1	1.754	1.979	1.763	3.396	3.145	3.525	5.210	2.609	2.488	2.713	5.279	4.821	3.888	3.015	3.566	3.102
	2	1.780	1.987	1.866	2.532	2.773	3.586	4.890	3.007	2.929	2.592	4.069	4.190	4.268	2.989	3.802	2.992
	3	1.929	2.680	2.024	2.756	4.733	3.897	5.474	3.013	3.326	3.431	4.001	4.838	4.771	3.174	4.125	3.445
Nov	1	1.737	2.195	1.745	2.307	4.579	3.879	6.350	2.583	4.000	2.748	7.059	4.139	4.553	2.748	3.489	3.432
	2	1.745	2.065	1.685	2.324	9.072	3.663	4.424	2.575	4.251	2.722	3.586	3.776	4.199	2.704	3.142	3.324
	3	1.754	2.056	1.642	2.039	4.199	3.266	3.992	2.333	3.154	2.868	3.050	3.516	3.672	2.834	2.692	3.166
Dec	1	1.590	2.022	1.771	1.935	3.499	3.041	3.879	2.255	2.894	2.739	3.275	3.534	3.188	2.756	2.447	3.078
	2	1.624	2.125	1.823	1.780	2.946	3.015	3.275	2.238	2.868	2.506	3.050	3.439	3.205	2.687	2.333	2.969
	3	1.777	2.167	2.129	1.929	2.576	3.393	3.450	2.433	2.766	2.747	3.764	3.326	3.431	2.832	2.476	3.249
Jan-Dec		131.0	146.0	152.0	237.0	296.0	268.0	274.0	302.0	309.0	185.0	254.0	322.0	360.0	195.0	238.0	256.8
Mar-May		59.0	85.0	92.0	126.0	191.0	158.0	164.0	210.0	206.0	94.0	123.0	200.0	218.0	90.0	126.0	149.7
Mar-Oct		111.0	123.0	131.0	214.0	257.0	234.0	234.0	269.0	275.0	154.0	216.0	277.0	320.0	160.0	205.0	221.3

(5)Outflow from Sevan to HPP (Geghamavan Observation Station (MCM))

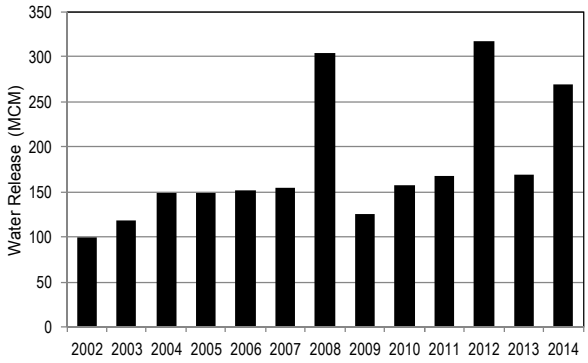
		1983	1984	1985	1986	1987	1988	1989	1990	1991	*1992	1993	1994	1995	1996	1997	1998
Jan	1	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060		56.419	60.394	19.786	2.609	2.393	2.652
	2	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060		59.184	60.739	18.230	3.914	3.102	3.516
	3	0.067	0.067	0.067	0.067	0.067	0.067	0.067	0.067	0.067		61.681	64.342	20.624	3.117	5.930	3.878
Feb	1	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060		55.382	59.443	6.540	2.955	5.607	4.000
	2	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	4.916		56.851	59.616	23.587	11.578	3.223	4.657
	3	0.048	0.054	0.048	0.048	0.048	0.054	0.048	0.048	0.048		45.481	47.071	12.096	12.986	2.516	2.267
Mar	1	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060		56.419	55.814	24.019	10.800	2.678	0.043
	2	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060		53.309	56.160	14.861	8.061	2.091	0.035
	3	0.067	0.067	0.067	0.067	0.067	0.067	0.067	0.067	0.067		57.974	28.322	13.686	4.914	2.680	0.038
Apr	1	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060		37.411	20.909	7.776	0.674	0.069	0.035
	2	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060		21.082	4.614	16.502	0.060	0.060	0.035
	3	7.828	0.060	0.060	0.328	0.060	0.060	1.080	0.060	0.060		31.968	0.060	0.060	0.060	0.060	0.035
May	1	13.738	1.521	5.659	7.828	0.060	0.060	6.774	0.060	0.060		13.565	6.877	0.060	0.060	0.060	0.035
	2	9.504	0.320	24.624	0.415	0.060	0.060	11.923	0.060	0.060		10.973	18.230	0.060	0.060	0.060	0.035
	3	14.921	5.294	34.595	0.076	0.067	0.067	20.244	0.067	0.067		18.248	19.198	6.805	0.836	0.067	0.038
Jun	1	9.504	13.651	34.906	0.069	0.060	0.060	21.341	0.060	3.162		32.486	32.659	10.195	8.199	1.244	0.035
	2	12.874	26.784	35.424	9.677	6.774	0.060	19.440	7.301	5.003		40.954	39.398	16.070	11.750	7.828	11.318
	3	29.894	32.314	40.003	11.491	13.306	0.060	25.229	13.392	11.405		43.891	45.187	20.995	20.390	13.133	19.958
Jul	1	33.178	37.152	38.794	29.894	23.674	0.600	27.130	18.749	20.390		43.978	50.458	20.822	25.315	14.083	20.218
	2	40.867	41.386	42.250	38.016	25.747	9.600	27.389	19.872	22.118		44.323	47.434	27.216	22.118	19.872	24.624
	3	49.136	46.665	46.665	44.479	28.797	15.840	30.793	25.281	29.938		46.665	52.652	40.772	30.603	27.276	28.797
Aug	1	44.237	46.138	43.373	41.126	26.611	13.900	28.598	23.760	24.797		41.645	47.347	33.869	31.363	28.598	22.550
	2	40.349	47.520	46.310	41.558	26.438	14.400	28.598	23.155	26.438		41.040	39.744	33.955	28.858	27.216	24.106
	3	43.718	47.805	56.929	44.764	28.132	20.130	27.181	26.136	23.475		46.665	39.252	35.450	29.938	25.851	23.475
Sep	1	29.635	38.362	39.226	37.066	21.082	14.700	22.118	19.526	22.896		51.322	34.042	26.352	22.291	17.626	19.094
	2	25.488	32.054	33.782	23.674	17.712	11.600	12.701	12.960	11.232		55.296	31.622	18.144	14.170	7.327	12.010
	3	18.749	19.094	20.909	16.502	13.392	10.800	7.076	11.059	14.256		55.037	28.080	2.143	15.725	4.467	3.015
Oct	1	9.331	13.306	13.824	4.277	5.244	2.900	1.279	2.583	12.182		55.555	22.205	0.060	3.041	1.175	0.043
	2	6.998	9.245	9.158	5.849	2.523	1.300	0.076	0.855	4.147		55.642	24.278	0.060	5.651	3.110	7.076
	3	8.021	3.051	7.955	3.336	2.338	0.110	0.067	0.162	2.614		61.586	26.421	6.121	7.318	5.550	7.879
Nov	1	3.905	1.572	2.186	1.408	0.060	0.060	0.060	0.077	2.549		56.765	24.624	5.495	2.912	7.949	4.208
	2	0.415	1.624	0.060	0.060	0.060	0.060	0.060	0.881	24.970		57.456	30.845	5.936	2.540	0.060	0.389
	3	0.066	0.060	0.060	0.060	0.821	0.060	0.060	1.045	25.488		56.333	27.043	4.761	2.748	0.060	0.060
Dec	1	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	24.883		56.592	27.389	5.236	3.119	0.060	0.035
	2	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	27.734		56.333	22.118	4.579	3.180	3.862	0.035
	3	0.067	0.067	0.067	0.067	0.067	0.067	0.067	2.585	40.392		63.962	28.702	9.257	5.522	5.740	0.580
Jan-Dec		453.0	466.0	578.0	363.0	244.0	117.0	320.0	210.0	386.0		1699.0	1283.0	512.0	359.0	253.0	251.0

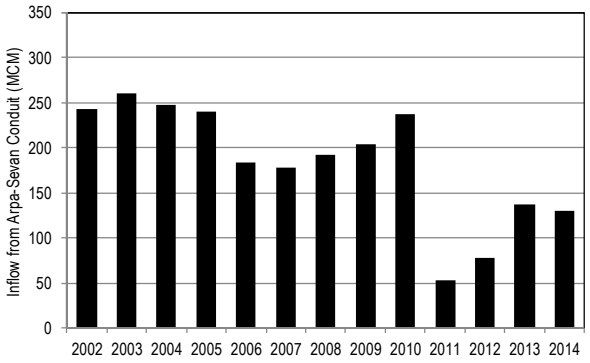
		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Jan	1	2.652	1.443	0.060	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.050	0.050	0.052
	2	3.516	0.510	0.060	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.050	0.050	0.052
	3	3.878	0.504	0.067	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.055	0.055	0.057
Feb	1	4.000	0.657	0.060	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.050	0.050	0.052
	2	4.657	0.484	0.060	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.050	0.050	0.052
	3	2.267	0.588	0.054	0.041	0.041	0.041	0.047	0.041	0.041	0.041	0.047	0.041	0.041	0.040	0.045	0.041
Mar	1	0.043	0.035	0.060	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.050	0.050	0.052
	2	0.035	0.035	0.060	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.050	0.050	0.052
	3	0.038	0.038	0.067	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.055	0.055	0.057
Apr	1	0.035	0.035	0.060	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.050	0.050	0.052
	2	0.035	0.035	0.060	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.050	0.050	0.052
	3	0.035	0.035	0.060	0.052	0.052	0.052	0.052	0.052	0.052	0.052	9.763	0.052	0.052	0.050	0.050	0.052
May	1	0.035	0.035	0.060	0.052	0.052	0.052	0.052	0.052	0.052	0.052	18.058	0.052	0.052	0.050	10.022	0.052
	2	0.035	0.035	0.060	0.052	0.052	0.052	0.052	0.052	0.052	0.052	11.146	0.052	0.052	0.050	13.219	0.052
	3	0.038	0.068	0.067	0.057	0.057	0.057	0.057	0.057	0.057	0.057	13.306	0.057	0.057	0.055	19.578	0.057
Jun	1	0.035	15.638	0.060	7.586	0.052	0.052	0.052	0.052	6.696	0.052	23.933	0.052	0.052	0.050	27.994	0.052
	2	11.318	17.194	12.960	17.539	1.434	6.273	6.454	7.214	15.898	10.195	23.242	9.504	9.158	0.050	28.339	14.688
	3	19.958	15.293	14.774	19.786	5.141	7.404	10.454	13.219	17.798	8.381	11.923	3.862	9.936	11.837	27.130	14.256
Jul	1	20.218	14.515	25.142	22.032	3.681	8.986	12.528	10.714	5.737	13.997	18.662	8.338	13.133	22.723	19.958	23.760
	2	24.624	15.984	19.699	15.034	6.705	11.146	11.837	15.034	9.936	12.182	20.650	12.874	16.589	24.538	19.786	22.291
	3	28.797	20.339	20.053	18.533	9.979	13.020	13.591	18.058	15.301	23.190	27.467	21.004	13.686	23.950	29.557	31.078
Aug	1	22.550	21.168	24.883	18.317	11.837	12.442	12.960	19.181	14.429	24.797	26.006	16.157	16.502	24.538	27.475	23.846
	2	24.106	21.254	19.699	18.317	17.712	13.392	13.046	14.774	16.330	15.034	21.514	12.701	17.539	19.354	27.648	18.662
	3	23.475	21.004	21.194	15.872	15.396	16.252	24.045	17.772	23.000	8.459	26.516	16.537	21.004	15.016	28.987	10.644
Sep	1	19.094	7.629	7.595	1.771	9.072	7.949	14.861	11.491	16.848	10.627	22.378	16.070	20.995	13.738	19.181	10.886
	2	12.010	10.368	0.060	2.998	10.714	6.929	5.409	4.899	8.433	15.379	14.602	7.482	13.997	11.578	13.738	0.190
	3	3.015	0.060	2.523	0.052	0.726	0.052	10.368	6.592	0.873	5.262	2.497	0.052	3.888	1.244	5.659	0.052
Oct	1	0.043	0.060	1.771	0.052	2.022	0.752	3.810	1.322	0.052	1.417	0.052	0.052	0.052	0.050	0.050	0.052
	2	7.076	0.065	5.158	0.052	2.557	4.018	3.361	1.417	0.052	0.052	0.052	0.052	0.052	0.050	0.050	0.052
	3	7.879	0.067	3.127	0.057	1.597	3.944	3.583	2.604	0.057	4.049	2.614	0.665	0.057	0.055	0.055	0.057
Nov	1	4.208	2.903	0.060	0.052	0.052	4.726	2.566	1.901	0.052	0.052	6.964	0.052	0.052	0.050	0.050	0.052
	2	0.389	4.294	4.156	0.052	0.052	0.053	0.052	2.480	0.052	0.052	0.968	0.052	0.052	0.050	0.050	0.052
	3	0.060	3.560	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.050	0.050	0.052
Dec	1	0.035	0.060	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.050	0.050	0.052
	2	0.035	0.060	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.050	0.050	0.052
	3	0.580	0.067	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.055	0.055	0.057
Jan-Dec		251.0	196.0	184.0	159.0	100.0	118.0	150.0	150.0	153.0	154.0	303.0	127.0	158.0	170.0	319.0	172.0

Appendix D-3: Discharge Volume of Lake Sevan

Year	Start Date	Duration (days)	Daily Discharge (MCM)	Total Discharge (MCM)	Inflow From Arpa-Sevan Conduit (MCM)
2002	18.06	117	0.85	99.46	243.50
2003	13.06	129	0.92	118.31	260.64
2004	14.06	149	1.00	149.00	247.90
2005	14.06	141	1.06	149.55	240.62
2006	7.06	110	1.38	152.00	183.76
2007	11.06	122	1.27	155.00	178.00
2008	23.04	174	1.75	303.69	192.44
2009	11.06	99	1.28	126.49	203.78
2010	11.06	110	1.43	157.74	237.00
2011	21.06	96	1.75	168.33	53.14
2012	2.05	147	2.16	317.62	77.62
2013	11.06	90	1.89	169.95	137.05
2014	23.04	130	2.07	269.63	130.23

Source: Ministry of Emergency Situations of RA (2015)





Appendix D-4: Calculation of Return Period and Probability

Rainfall, Hrazdan, Hrazdan station(Jan-Dec)

Year	mm	m	P(%)	R.P.	P-1(%)
1989	548.2	1	2.0	50.0	98.0
2008	558.0	2	6.4	15.6	93.6
1990	575.1	3	10.4	9.6	89.6
1984	579.5	4	14.4	6.9	85.6
1993	604.2	5	18.3	5.5	81.7
1985	620.2	6	22.3	4.5	77.7
1991	631.0	7	26.2	3.8	73.8
2012	656.7	8	30.2	3.3	69.8
2013	662.5	9	34.2	2.9	65.8
1994	693.4	10	38.1	2.6	61.9
1992	712.0	11	42.1	2.4	57.9
2001	750.7	12	46.0	2.2	54.0
2004	755.4	13	50.0	2.0	50.0
1983	760.5	14	54.0	1.9	46.0
1986	771.6	15	57.9	1.7	42.1
2011	788.5	16	61.9	1.6	38.1
2002	796.6	17	65.8	1.5	34.2
2006	806.8	18	69.8	1.4	30.2
2005	857.9	19	73.8	1.4	26.2
2007	876.9	20	77.7	1.3	22.3
1987	886.5	21	81.7	1.2	18.3
1988	888.0	22	85.6	1.2	14.4
2010	895.9	23	89.6	1.1	10.4
2009	926.0	24	93.6	1.1	6.4
2003	936.9	25	97.5	1.0	2.5

N= 25

Rainfall, Hrazdan, Hrazdan station(Mar-Oct)

Year	mm	m	P(%)	R.P.	P-1(%)
1985	324.6	1	2.5	40.0	97.5
1989	341.8	2	6.4	15.6	93.6
1991	357.7	3	10.4	9.6	89.6
2012	384.4	4	14.4	6.9	85.6
1992	391.3	5	18.3	5.5	81.7
2008	423.4	6	22.3	4.5	77.7
1993	423.5	7	26.2	3.8	73.8
1990	425.0	8	30.2	3.3	69.8
1987	431.8	9	34.2	2.9	65.8
1994	441.8	10	38.1	2.6	61.9
2013	450.1	11	42.1	2.4	57.9
1986	472.0	12	46.0	2.2	54.0
1984	474.6	13	50.0	2.0	50.0
1983	505.2	14	54.0	1.9	46.0
2001	507.3	15	57.9	1.7	42.1
2004	522.4	16	61.9	1.6	38.1
2011	563.8	17	65.8	1.5	34.2
2006	600.0	18	69.8	1.4	30.2
1988	603.6	19	73.8	1.4	26.2
2007	613.0	20	77.7	1.3	22.3
2002	613.0	21	81.7	1.2	18.3
2005	665.2	22	85.6	1.2	14.4
2010	671.6	23	89.6	1.1	10.4
2003	686.2	24	93.6	1.1	6.4
2009	744.2	25	97.5	1.0	2.5

N= 25

Rainfall, Hrazdan, Hrazdan station(Mar-Oct)

Year	mm	m	P(%)	R.P.	P-1(%)
2012	384.4	1	6.1	16.4	93.9
2008	423.4	2	15.9	6.3	84.1
2013	450.1	3	25.6	3.9	74.4
2004	522.4	4	35.4	2.8	64.6
2011	563.8	5	45.1	2.2	54.9
2006	600.0	6	54.9	1.8	45.1
2007	613.0	7	64.6	1.5	35.4
2005	665.2	8	74.4	1.3	25.6
2010	671.6	9	84.1	1.2	15.9
2009	744.2	10	93.9	1.1	6.1

N= 10

The probability of occurrence P(%).
P(%)= [(m-0.375)/(N+0.25)]x100
where:
P=probability in % of the observation of the rank m
m=the rank of the observation
N=total number of observations used (10to 100 is recommended)
(Blom's method)

R.P. (T)=100/P
where:
R.P. = the return period T (in years)

Discharge, Hrazdan River, Hrazdan O.S.(Jan-Dec)

	MCM	m	P(%)	R.P.	P-1(%)
1999	131.0	1	2.1	47.6	97.9
2000	146.0	2	5.4	18.5	94.6
2001	152.0	3	8.7	11.5	91.3
1989	163.0	4	12.0	8.3	88.0
1985	175.0	5	15.3	6.5	84.7
2008	185.0	6	18.6	5.4	81.4
2012	195.0	7	21.9	4.6	78.1
1986	197.0	8	25.2	4.0	74.8
1983	204.0	9	28.5	3.5	71.5
1996	207.0	10	31.8	3.1	68.2
1984	233.0	11	35.1	2.8	64.9
2002	237.0	12	38.4	2.6	61.6
2013	238.0	13	41.7	2.4	58.3
1997	239.0	14	45.0	2.2	55.0
1991	254.0	15	48.3	2.1	51.7
2009	254.0	16	51.7	1.9	48.3
2004	268.0	17	55.0	1.8	45.0
2005	274.0	18	58.3	1.7	41.7
1995	279.0	19	61.6	1.6	38.4
1987	283.0	20	64.9	1.5	35.1
2003	296.0	21	68.2	1.5	31.8
2006	302.0	22	71.5	1.4	28.5
2007	309.0	23	74.8	1.3	25.2
2010	322.0	24	78.1	1.3	21.9
1990	328.0	25	81.4	1.2	18.6
1992	331.0	26	84.7	1.2	15.3
1994	332.0	27	88.0	1.1	12.0
2011	360.0	28	91.3	1.1	8.7
1993	384.0	29	94.6	1.1	5.4
1988	427.0	30	97.9	1.0	2.1

N= 30

Discharge, Hrazdan River, Hrazdan O.S.(Mar-Oct)

	MCM	m	P(%)	R.P.	P-1(%)
1999	111.0	1	2.1	47.6	97.9
1989	113.0	2	5.4	18.5	94.6
2000	123.0	3	8.7	11.5	91.3
2001	131.0	4	12.0	8.3	88.0
1985	152.0	5	15.3	6.5	84.7
2008	154.0	6	18.6	5.4	81.4
2012	160.0	7	21.9	4.6	78.1
1986	167.0	8	25.2	4.0	74.8
1983	173.0	9	28.5	3.5	71.5
1996	176.0	10	31.8	3.1	68.2
2013	205.0	11	35.1	2.8	64.9
1997	209.0	12	38.4	2.6	61.6
1984	210.0	13	41.7	2.4	58.3
2002	214.0	14	45.0	2.2	55.0
2009	216.0	15	48.3	2.1	51.7
1991	218.0	16	51.7	1.9	48.3
1987	233.0	17	55.0	1.8	45.0
2004	234.0	18	58.3	1.7	41.7
2005	234.0	19	61.6	1.6	38.4
1995	240.0	20	64.9	1.5	35.1
2003	257.0	21	68.2	1.5	31.8
2006	269.0	22	71.5	1.4	28.5
2007	275.0	23	74.8	1.3	25.2
2010	277.0	24	78.1	1.3	21.9
1992	282.0	25	81.4	1.2	18.6
1990	284.0	26	84.7	1.2	15.3
1994	285.0	27	88.0	1.1	12.0
2011	320.0	28	91.3	1.1	8.7
1993	325.0	29	94.6	1.1	5.4
1988	392.0	30	97.9	1.0	2.1

N= 30

Discharge, Hrazdan River, Hrazdan O.S.(Mar-Oct)

	MCM	m	P(%)	R.P.	P-1(%)
2008	154.0	1	6.1	16.4	93.9
2012	160.0	2	15.9	6.3	84.1
2013	205.0	3	25.6	3.9	74.4
2009	216.0	4	35.4	2.8	64.6
2004	234.0	5	45.1	2.2	54.9
2005	234.0	6	54.9	1.8	45.1
2006	269.0	7	64.6	1.5	35.4
2007	275.0	8	74.4	1.3	25.6
2010	277.0	9	84.1	1.2	15.9
2011	320.0	10	93.9	1.1	6.1

N= 10

The probability of occurrence P(%).
P(%)= [(m-0.375)/(N+0.25)]x100
where:
P=probability in % of the observation of the rank m
m=the rank of the observation
N=total number of observations used (10to 100 is recommended)
(Blom's method)

R.P. (T)=100/P
where:
R.P. = the return period T (in years)

Appendix D-5: Water Utilization

(1) Water Intake at the Head Part of Arzni-Shamiram Canal

REFERENCE

Water intake at the head part of Arzni-Shamiram canal
in 2012-2015 by ten-days period

(mln m3)

Month	Decade (ten days)	2012	2013	2014	2015
Jan	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
Feb	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
Mar	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
Apr	I	0.00	0.00	0.00	0.00
	II	0.00	3.20	0.00	5.30
	III	1.18	6.90	6.20	6.90
May	I	10.66	12.60	13.50	9.60
	II	13.27	5.10	9.50	11.50
	III	13.64	6.40	8.50	9.50
Jun	I	12.58	3.40	10.00	9.60
	II	12.80	4.40	11.00	10.50
	III	13.00	3.84	7.00	9.20
Jul	I	9.75	10.78	12.70	9.10
	II	12.23	10.38	12.70	8.60
	III	12.80	13.14	8.80	8.30
Aug	I	12.73	12.60	13.40	8.70
	II	10.58	11.30	13.20	9.50
	III	13.18	9.75	7.80	11.40
Sep	I	6.58	6.80	3.50	3.40
	II	4.92	2.40	1.90	3.25
	III	3.23	0.90	2.50	3.30
Oct	I	2.05	0.50	0.00	3.00
	II	0.00	0.70	0.70	4.06
	III	0.00	4.20	2.80	5.80
Nov	I	0.00	0.00	0.00	4.30
	II	0.00	0.00	0.00	4.60
	III	0.00	0.00	0.00	5.20
Dec	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
Total		165.18	129.29	145.70	164.61

REFERENCE

Water intake at the head part of Arzni-Shamiram canal
in 2012-2015 by ten-days period

(m3/s)

Month	Decade (ten days)	2012	2013	2014	2015
Jan	1	0.000	0.000	0.000	0.000
	2	0.000	0.000	0.000	0.000
	3	0.000	0.000	0.000	0.000
Feb	1	0.000	0.000	0.000	0.000
	2	0.000	0.000	0.000	0.000
	3	0.000	0.000	0.000	0.000
Mar	1	0.000	0.000	0.000	0.000
	2	0.000	0.000	0.000	0.000
	3	0.000	0.000	0.000	0.000
Apr	1	0.000	0.000	0.000	0.000
	2	0.000	3.704	0.000	6.134
	3	1.366	7.986	7.176	7.986
May	1	12.338	14.583	15.625	11.111
	2	15.359	5.903	10.995	13.310
	3	14.352	6.734	8.944	9.996
Jun	1	14.560	3.935	11.574	11.111
	2	14.815	5.093	12.731	12.153
	3	15.046	4.444	8.102	10.648
Jul	1	11.285	12.477	14.699	10.532
	2	14.155	12.014	14.699	9.954
	3	13.468	13.826	9.259	8.733
Aug	1	14.734	14.583	15.509	10.069
	2	12.245	13.079	15.278	10.995
	3	13.868	10.259	8.207	11.995
Sep	1	7.616	7.870	4.051	3.935
	2	5.694	2.778	2.199	3.762
	3	3.738	1.042	2.894	3.819
Oct	1	2.373	0.579	0.000	3.472
	2	0.000	0.810	0.810	4.699
	3	0.000	4.419	2.946	6.103
Nov	1	0.000	0.000	0.000	4.977
	2	0.000	0.000	0.000	5.324
	3	0.000	0.000	0.000	6.019
Dec	1	0.000	0.000	0.000	0.000
	2	0.000	0.000	0.000	0.000
	3	0.000	0.000	0.000	0.000
Max		15.359	14.583	15.625	13.310

REFERENCE

Water intake in the top part of Lower Hrazdan canal
in 2012-2015 by ten-days period (mln m3)

(mln m3)

Month	Decade (ten days)	2012	2013	2014	2015
January	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
February	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
March	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
April	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	3.50
	III	8.40	2.80	4.90	7.60
May	I	8.60	6.90	7.90	8.20
	II	1.30	6.00	7.90	8.90
	III	9.20	5.00	9.00	9.30
June	I	8.65	5.50	6.10	7.20
	II	9.00	7.10	7.80	9.40
	III	6.85	6.90	4.50	5.00
July	I	6.50	8.20	7.30	4.50
	II	6.50	4.10	5.40	5.10
	III	8.00	5.70	7.50	4.50
August	I	8.00	4.30	6.40	3.30
	II	5.40	5.20	6.90	4.70
	III	6.30	3.80	6.30	4.20
September	I	3.30	3.30	1.50	2.00
	II	9.00	1.70	1.50	1.80
	III	2.00	2.30	0.90	1.10
October	I	0.90	2.00	1.80	0.40
	II	0.00	2.70	2.40	0.00
	III	0.00	0.00	2.10	0.38
November	I	0.00	0.30	0.40	0.00
	II	0.00	0.00	2.40	0.00
	III	0.00	0.00	2.10	0.00
December	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
Total		107.90	83.80	103.00	91.08

REFERENCE

Water intake in the top part of Lower Hrazdan canal
in 2012-2015 by ten-days period (m3/s)

(m3/s)

Month	Decade (ten days)	2012	2013	2014	2015
January	I	0.000	0.000	0.000	0.000
	II	0.000	0.000	0.000	0.000
	III	0.000	0.000	0.000	0.000
February	I	0.000	0.000	0.000	0.000
	II	0.000	0.000	0.000	0.000
	III	0.000	0.000	0.000	0.000
March	I	0.000	0.000	0.000	0.000
	II	0.000	0.000	0.000	0.000
	III	0.000	0.000	0.000	0.000
April	I	0.000	0.000	0.000	0.000
	II	0.000	0.000	0.000	4.051
	III	9.722	3.241	5.671	8.796
May	I	9.954	7.986	9.144	9.491
	II	1.505	6.944	9.144	10.301
	III	9.680	5.261	9.470	9.785
June	I	10.012	6.366	7.060	8.333
	II	10.417	8.218	9.028	10.880
	III	7.928	7.986	5.208	5.787
July	I	7.523	9.491	8.449	5.208
	II	7.523	4.745	6.250	5.903
	III	8.418	5.997	7.891	4.735
August	I	9.259	4.977	7.407	3.819
	II	6.250	6.019	7.986	5.440
	III	6.629	3.998	6.629	4.419
September	I	3.819	3.819	1.736	2.315
	II	10.417	1.968	1.736	2.083
	III	2.315	2.662	1.042	1.273
October	I	1.042	2.315	2.083	0.463
	II	0.000	3.125	2.778	0.000
	III	0.000	0.000	2.210	0.400
November	I	0.000	0.347	0.463	0.000
	II	0.000	0.000	2.778	0.000
	III	0.000	0.000	2.431	0.000
December	I	0.000	0.000	0.000	0.000
	II	0.000	0.000	0.000	0.000
	III	0.000	0.000	0.000	0.000
Max		10.417	9.491	9.470	10.880

(2) Water Intake from Kasakh River to Lower Hrazdan Canal

REFERENCE

Water intake from Kasakh river to Lower Hrazdan canal
in 2012-2015 by ten-days period (mln m3)

(mln m3)

month	Decade (ten days)	2012	2013	2014	2015
January	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
February	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
March	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
April	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	2.20	1.53	0.96	0.56
May	I	2.20	1.50	1.00	0.00
	II	1.90	1.50	1.00	0.00
	III	1.10	1.86	1.34	0.34
June	I	0.80	2.50	0.82	2.88
	II	0.90	2.50	0.51	2.56
	III	0.60	2.56	0.30	1.69
July	I	0.00	0.80	0.52	1.70
	II	0.45	0.80	0.52	2.02
	III	0.30	0.87	0.46	2.60
August	I	0.10	0.23	0.80	0.80
	II	0.70	0.00	0.85	1.23
	III	0.30	0.00	0.90	1.78
September	I	0.15	0.00	0.00	2.79
	II	0.00	0.00	0.00	1.26
	III	0.00	0.00	0.00	1.75
October	I	0.00	0.65	0.00	0.72
	II	0.00	0.00	0.00	1.35
	III	0.00	0.00	0.00	0.00
November	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
December	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
Total		11.70	17.30	9.98	26.03

REFERENCE

Water intake from Kasakh river to Lower Hrazdan canal
in 2012-2015 by ten-days period (m3/s)

(m3/s)

Month	Decade (ten days)	2012	2013	2014	2015
January	I	0.000	0.000	0.000	0.000
	II	0.000	0.000	0.000	0.000
	III	0.000	0.000	0.000	0.000
February	I	0.000	0.000	0.000	0.000
	II	0.000	0.000	0.000	0.000
	III	0.000	0.000	0.000	0.000
March	I	0.000	0.000	0.000	0.000
	II	0.000	0.000	0.000	0.000
	III	0.000	0.000	0.000	0.000
April	I	0.000	0.000	0.000	0.000
	II	0.000	0.000	0.000	0.000
	III	2.546	1.771	1.111	0.648
May	I	2.546	1.736	1.157	0.000
	II	2.199	1.736	1.157	0.000
	III	1.157	1.957	1.410	0.355
June	I	0.926	2.894	0.949	3.333
	II	1.042	2.894	0.590	2.963
	III	0.694	2.963	0.347	1.956
July	I	0.000	0.926	0.602	1.968
	II	0.521	0.926	0.602	2.338
	III	0.316	0.910	0.484	2.736
August	I	0.116	0.266	0.926	0.926
	II	0.810	0.000	0.984	1.424
	III	0.316	0.000	0.947	1.873
September	I	0.174	0.000	0.000	3.229
	II	0.000	0.000	0.000	1.458
	III	0.000	0.000	0.000	2.025
October	I	0.000	0.752	0.000	0.833
	II	0.000	0.000	0.000	1.563
	III	0.000	0.000	0.000	0.000
November	I	0.000	0.000	0.000	0.000
	II	0.000	0.000	0.000	0.000
	III	0.000	0.000	0.000	0.000
December	I	0.000	0.000	0.000	0.000
	II	0.000	0.000	0.000	0.000
	III	0.000	0.000	0.000	0.000
Max		2.546	2.963	1.410	3.333

REFERENCE

Water discharge to Lower Hrazdan canal from Ranchpar PS
in 2012-2015 by ten-days period (mln m3)

(mln m3)

month	decade (ten days)	2012	2013	2014	2015
January	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
February	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
March	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
April	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.11	0.00
May	I	0.00	0.00	0.00	0.51
	II	0.00	0.00	0.00	0.17
	III	0.00	0.00	0.00	0.00
June	I	0.06	0.00	1.96	0.00
	II	0.00	0.00	1.40	0.00
	III	0.00	0.00	1.24	1.86
July	I	0.00	0.00	1.72	2.08
	II	0.00	1.33	1.88	2.19
	III	0.00	2.00	2.28	2.34
August	I	0.00	2.15	2.22	1.50
	II	0.00	2.30	2.02	2.21
	III	0.00	2.86	2.50	1.85
September	I	0.00	2.69	2.08	1.02
	II	0.00	2.10	2.26	2.25
	III	1.10	0.28	1.46	1.57
October	I	0.00	0.00	0.00	0.08
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
November	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
December	I	0.00	0.00	0.00	0.00
	II	0.00	0.00	0.00	0.00
	III	0.00	0.00	0.00	0.00
Total		1.16	15.71	23.13	19.63

REFERENCE

Water discharge to Lower Hrazdan canal from Ranchpar PS
in 2012-2015 by ten-days period (m3/s)

(m3/s)

Month	Decade (ten days)	2012	2013	2014	2015
January	I	0.000	0.000	0.000	0.000
	II	0.000	0.000	0.000	0.000
	III	0.000	0.000	0.000	0.000
February	I	0.000	0.000	0.000	0.000
	II	0.000	0.000	0.000	0.000
	III	0.000	0.000	0.000	0.000
March	I	0.000	0.000	0.000	0.000
	II	0.000	0.000	0.000	0.000
	III	0.000	0.000	0.000	0.000
April	I	0.000	0.000	0.000	0.000
	II	0.000	0.000	0.000	0.000
	III	0.000	0.000	0.123	0.000
May	I	0.000	0.000	0.000	0.590
	II	0.000	0.000	0.000	0.197
	III	0.000	0.000	0.000	0.000
June	I	0.069	0.000	2.269	0.000
	II	0.000	0.000	1.620	0.000
	III	0.000	0.000	1.435	2.153
July	I	0.000	0.000	1.991	2.407
	II	0.000	1.539	2.176	2.535
	III	0.000	2.104	2.399	2.462
August	I	0.000	2.488	2.569	1.736
	II	0.000	2.662	2.338	2.558
	III	0.000	3.009	2.630	1.947
September	I	0.000	3.113	2.407	1.181
	II	0.000	2.431	2.616	2.604
	III	1.273	0.324	1.690	1.817
October	I	0.000	0.000	0.000	0.093
	II	0.000	0.000	0.000	0.000
	III	0.000	0.000	0.000	0.000
November	I	0.000	0.000	0.000	0.000
	II	0.000	0.000	0.000	0.000
	III	0.000	0.000	0.000	0.000
December	I	0.000	0.000	0.000	0.000
	II	0.000	0.000	0.000	0.000
	III	0.000	0.000	0.000	0.000
Max		1.273	3.113	2.630	2.604

(3) Aknalich Pump Station

Aknalich Pump Station

(m3/s)

		2009	2010	2011	2012	2013	2014	2015	Average
Jan	1								
	2								
	3								
Feb	1								
	2								
	3								
Mar	1							0.010	0.010
	2							0.420	0.420
	3						0.040	0.020	0.030
Apr	1		0.010	0.000	0.660	0.250	0.000	0.000	0.153
	2		0.050	0.030	0.880	0.470	0.350	0.160	0.323
	3	1.020	0.490	0.040	1.210	0.310	0.590	0.280	0.563
May	1	1.640	0.010	0.400	1.150	0.480	0.920	0.620	0.746
	2	1.820	0.640	0.920	1.050	0.080	0.840	0.070	0.774
	3	1.860	1.010	0.780	1.210	0.640	0.560	0.570	0.947
Jun	1	1.120	1.730	0.700	1.300	0.850	0.660	0.620	0.997
	2	1.660	1.620	1.230	1.270	0.860	0.910	0.510	1.151
	3	1.250	1.330	1.700	0.940	0.400	0.900	0.540	1.009
Jul	1	0.900	1.470	1.430	0.630	0.870	0.790	0.400	0.927
	2	0.970	1.160	1.330	0.930	0.870	0.910	0.610	0.969
	3	1.340	1.350	1.520	0.890	0.750	1.110	0.620	1.083
Aug	1	1.090	1.590	1.450	0.990	0.810	1.000	0.560	1.070
	2	1.450	1.360	1.230	1.170	0.680	0.910	0.680	1.069
	3	1.010	1.540	1.200	0.830	0.900	0.750	0.470	0.957
Sep	1	1.490	1.470	1.100	0.820	0.810	0.930	0.530	1.021
	2	0.560	0.920	1.190	0.690	0.320	0.890	0.540	0.730
	3	0.580	0.690	0.600	0.450	0.520	0.270	0.520	0.519
Oct	1	0.530	0.000	0.090	0.640	0.050	0.250	0.130	0.241
	2	0.760	0.030	0.180	0.270	0.530	0.150	0.000	0.274
	3	1.020	0.600	0.000	0.070	0.170	0.350	0.000	0.316
Nov	1	0.040	0.180	0.000	0.150	0.140	0.370	0.000	0.126
	2	0.360	0.450	0.040	0.000	0.000	0.000	0.000	0.121
	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dec	1								
	2								
	3								

(4) Aparan Reservoir

Aparan Reservoir

(m3/s)

		2009	2010	2011	2012	2013	2014	2015	Average
Jan	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Feb	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mar	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Apr	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.071
	3	0.000	0.000	0.000	5.700	1.600	0.000	0.000	1.043
May	1	0.000	0.000	0.000	1.800	4.500	0.000	0.000	0.900
	2	0.100	0.000	0.000	2.300	1.300	1.700	0.000	0.771
	3	2.200	0.000	0.400	3.200	3.100	1.000	1.900	1.686
Jun	1	6.000	0.000	6.800	3.000	10.000	0.900	4.300	4.429
	2	4.000	9.700	4.900	4.400	11.000	2.400	4.900	5.900
	3	8.200	9.400	12.500	1.900	11.000	1.000	2.800	6.686
Jul	1	11.200	8.900	11.600	1.300	1.900	2.500	4.800	6.029
	2	5.100	11.600	9.900	1.900	3.100	1.200	4.700	5.357
	3	2.100	10.400	10.900	2.000	3.000	2.600	6.600	5.371
Aug	1	2.200	13.200	11.500	3.000	1.700	1.500	2.400	5.071
	2	5.400	10.300	11.000	1.800	2.000	1.200	2.900	4.943
	3	3.600	5.800	7.800	2.100	1.300	1.300	2.100	3.429
Sep	1	1.500	2.100	4.400	1.700	1.500	1.200	2.000	2.057
	2	1.100	1.100	1.500	1.000	0.300	1.200	1.900	1.157
	3	0.000	0.000	0.000	0.100	0.700	0.400	0.000	0.171
Oct	1	0.000	0.200	0.000	0.000	0.700	0.000	0.300	0.171
	2	0.800	0.000	0.700	0.000	1.000	0.000	0.300	0.400
	3	1.000	1.000	2.800	0.000	1.400	0.000	0.200	0.914
Nov	1	0.400	0.400	0.000	0.000	1.100	0.000	0.000	0.271
	2	0.000	0.400	0.000	0.000	0.000	0.000	0.000	0.057
	3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dec	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	3	0.000	0.000	0.000	0.000	0.000	0.000		0.000

(5) Water Source for Khoy WUA

2012 (Thousand m3)

Water Source	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Ratio (%)
Lower Hrazdan	-	-	-	0	9,331	10,621	8,147	8,319	5,776	419	0	-	42,613	58
Aknalich P/S(upper canal)	-	-	-	1,720	1,707	1,729	1,465	1,795	1,366	570	0	-	10,352	14
Metsamor P/S	-	-	-	404	1,370	1,531	1,340	1,472	1,125	275	0	-	7,517	10
Mechanical(Pump station)	-	-	-	301	402	228	245	285	696	85	0	-	2,242	3
Local sources(Deep Wells)	-	-	-	657	1,381	1,878	1,793	2,366	1,606	878	143	-	10,702	15
Total				3,082	14,191	15,987	12,990	14,237	10,569	2,227	143		73,426	100

Source : Khoy WUA

2013 (Thousand m3)

Water Source	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Ratio (%)
Lower Hrazdan	-	-	-	1,661	6,032	11,157	7,566	3,962	2,306	1,560	201	-	34,445	50
Aknalich P/S(upper canal)	-	-	-	402	598	1,310	1,706	1,761	1,244	344	134	-	7,499	11
Metsamor P/S	-	-	-	648	922	1,149	1,229	1,111	856	50	0	-	5,965	9
Mechanical(Pump station)	-	-	-	107	133	83	2,257	4,567	3,004	206	10	-	10,367	15
Local sources(Deep Wells)	-	-	-	418	940	1,926	2,157	2,414	2,385	577	225	-	11,042	16
Total				3,236	8,625	15,625	14,915	13,815	9,795	2,737	570		69,318	101

Source : Khoy WUA

2014 (Thousand m3)

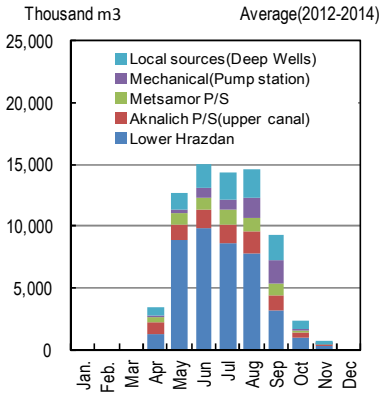
Water Source	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Ratio (%)
Lower Hrazdan	-	-	-	2,127	11,271	7,601	9,977	11,111	1,249	995	648	-	44,979	60
Aknalich P/S(upper canal)	-	-	-	541	1,559	1,412	1,650	1,572	1,367	475	323	-	8,899	12
Metsamor P/S	-	-	-	186	437	499	737	681	594	23	69	-	3,226	4
Mechanical(Pump station)	-	-	-	118	94	2,013	261	184	2,330	46	46	-	5,092	7
Local sources(Deep Wells)	-	-	-	981	1,863	2,001	2,607	2,390	2,017	571	250	-	12,680	17
Total				3,953	15,224	13,526	15,232	15,938	7,557	2,110	1,336		74,876	100

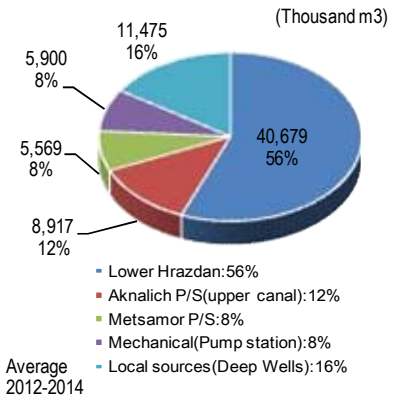
Source : Khoy WUA

Khoy WUA : Average(2012-2014) (Thousand m3)

Water Source	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Ratio (%)
Lower Hrazdan	0	0	0	1,263	8,878	9,793	8,563	7,797	3,110	991	283	0	40,679	56
Aknalich P/S(upper canal)	0	0	0	888	1,288	1,484	1,607	1,709	1,326	463	152	0	8,917	12
Metsamor P/S	0	0	0	413	910	1,060	1,102	1,088	858	116	23	0	5,569	8
Mechanical(Pump station)	0	0	0	175	210	775	921	1,679	2,010	112	19	0	5,900	8
Local sources(Deep Wells)	0	0	0	685	1,395	1,935	2,186	2,390	2,003	675	206	0	11,475	16
Total				3,424	12,681	15,047	14,379	14,663	9,307	2,357	683		72,540	100

Source : Khoy WUA





(6) Water Source for Vagharshapat WUA

2012

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Conractual Area
from Lower Hrazdan	0	0	0	0	3365.9	3325.3	2102.8	1605.5	1549.2	24.82	0	0	11,974	1076.1
Inner Aknalich	0	0	0	207.44	1382	1599.1	909.09	937.17	590.36	426.88	154.39	0	6,206	136.2
Deep Well	0	0	29.134	931.66	1879.3	2122	1889	1826	981	973.08	306.58	0	10,938	1354.6
Aratashen PS	0	0	0	0	271.83	436.56	326.45	416.34	18.065	0	0	0	1,469	120
Total	0	0	29	1,139	6,899	7,483	5,227	4,785	3,139	1,425	461	0	30,587	2686.9

Source : Vagarshapat WUA

2013

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Conractual Area
from Lower Hrazdan	0	0	0	467.27	1387	2803.8	2338.3	2146.5	1369.1	426.74	0	0	10,939	1076.1
Inner Aknalich	0	0	0	523.22	463.96	715.37	646.26	553.39	279.23	194.65	0	0	3,376	136.2
Deep Well	0	0	14.824	1056.8	1692.8	2307.1	1804.7	1779.3	1069.2	853.5	384.85	0	10,963	1354.6
Aratashen PS	0	0	0	165.59	145.81	369.89	334.62	406.02	167.74	1.72	0	0	1,591	120
Total	0	0	15	2,213	3,689	6,196	5,124	4,885	2,885	1,477	385	0	26,869	2686.9

Source : Vagarshapat WUA

2014

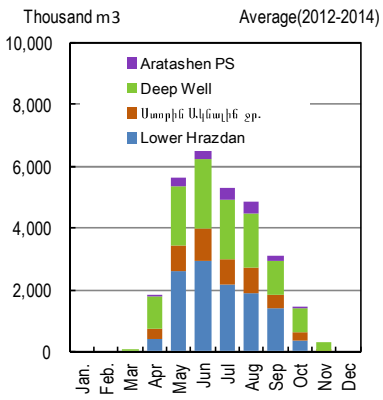
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Conractual Area
from Lower Hrazdan	0	0	0	704.76	3050.8	2725.9	2063.6	1953.1	1297	574.01	0	0	12,369	1108.5
Inner Aknalich	0	0	0	314.74	664.4	811.79	947.28	903.47	459.81	235.26	0	0	4,337	205
Deep Well	0	0	74.373	1096.7	2177.4	2303.8	2123	1788.2	1211.3	561.68	140.9	0	11,477	1397.9
Aratashen PS	0	0	0	67.097	396.13	384.52	371.18	344.95	301.51	0	0	0	1,865	128
Total	0	0	74	2,183	6,289	6,226	5,505	4,990	3,270	1,371	141	0	30,048	2839.4

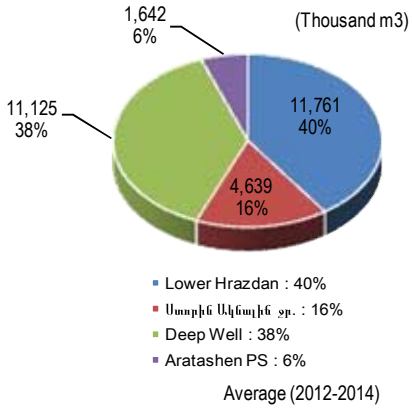
Source : Vagarshapat WUA

Vagarshapt WUA : Average(2012-2014) (Thousand m3)

Water Source	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Ratio (%)
Lower Hrazdan	0	0	0	391	2,601	2,952	2,168	1,902	1,405	342	0	0	11,761	40
Ստորին Ակնալիճ ջ	0	0	0	348	837	1,042	834	798	443	286	51	0	4,639	16
Deep Well	0	0	39	1,028	1,917	2,244	1,939	1,798	1,087	796	277	0	11,125	38
Aratashen PS	0	0	0	78	271	397	344	389	162	1	0	0	1,642	6
Total	0	0	39	1,845	5,626	6,635	5,285	4,887	3,097	1,425	328	0	29,167	100

Source : Vagarshapat WUA





(7) Water Source for Yeghvard WUA

From the head point of Arzni Branch canal

2012 thousand m³

Name	Contractual area (ha)	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Remarks
Arzni Branch	**912.9**	**249.70**	**1,805.49**	**2,007.15**	**1,641.86**	**1,817.02**	**909.72**	**151.68**	**8,582.62**	
(1) Zovuni	371.6	88.59	571.06	745.60	711.77	681.80	385.20	109.20	3,293.22	
(2) Kasakh	193.9	55.38	176.82	146.87	121.38	121.72	39.97	3.79	665.93	
(3) Proshyan	347.4	105.73	1,057.61	1,114.68	808.71	1,013.50	484.55	38.69	4,623.47	

2013 thousand m³

Name	Contractual area (ha)	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Remarks
Arzni Branch	**912.9**	**66.51**	**1,176.59**	**1,934.02**	**1,596.13**	**1,842.90**	**679.49**	**-**	**7,295.64**	
(1) Zovuni	371.6	66.51	454.19	713.91	523.14	677.88	235.83	-	2,671.46	
(2) Kasakh	193.9	-	78.72	246.22	129.95	93.10	55.19	-	603.18	
(3) Proshyan	347.4	-	643.68	973.89	943.04	1,071.92	388.47	-	4,021.00	

2014 thousand m³

Name	Contractual area (ha)	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Remarks
Arzni Branch	**912.9**	**163.06**	**1,430.33**	**1,516.58**	**2,089.95**	**1,881.71**	**595.12**	**59.32**	**7,736.07**	
(1) Zovuni	371.6	70.68	586.57	716.91	927.71	887.20	228.19	59.32	3,476.58	
(2) Kasakh	193.9	24.92	243.52	217.74	254.87	208.42	139.39	-	1,088.86	
(3) Proshyan	347.4	67.46	600.24	581.93	907.37	786.09	227.54	-	3,170.63	

Yeghvard WUA : Average (2012-2014) thousand m³

Name	Contractual area (ha)	Apr	May	Jun	Jul	Aug	Sep	Oct	Total	Remarks
Arzni Branch	**913**	**160**	**1,470**	**1,819**	**1,776**	**1,847**	**728**	**70**	**7,871**	
(1) Zovuni	372	75	537	725	721	749	283	56	3,147	
(2) Kasakh	194	27	166	204	169	141	78	1	786	
(3) Proshyan	347	58	767	890	886	957	367	13	3,938	

(8) Water Source for Ashtarak WUA

Water received from Tkahan and Arzni branch canals in 2012-2014

thousand cubic meter

	Tkahan canal	2012-2014										
		April	May	June	July	August	September	October	November	Total	Contract (2014)	Irrigated (2014)
	Tkahan canal from which	**142**	**1,177**	**1,306**	**1,108**	**1,257**	**478**	**96**	**0**			
1	Sasunik	46	389	465	301	328	85	84	0	1,698	289	355
2	Norakert	7	44	30	19	28	7	0	0	135	18	220
3	Baghramyan	5	16	29	30	22	8	0	0	110	30	200
4	Merdzavan	29	174	157	159	158	50	29	0	756	120	120
Sub-Total*)		87	623	681	509	536	150	113	0	2,699	457	895
Arzni branch canal												
Arzni branch canal **)		**50**	**681**	**658**	**686**	**723**	**201**	**115**	**0**			
1	Sasunik (A.S. Ca	29	361	374	361	387	147	78	0	1,737	275	327
Total		116	984	1,055	870	923	297	191	0	4,436	732	1,222

*)Remain distributed area is Oshakan Community (Contructed Area:220ha, Irrigated:225ha).

(9) List of Pump Station in Khoy WUA (As of July, 2015)

Sr. No.	Kind of Facility	Community	Intake from	Discharge to	Description	Longitude	Latutude
K-01	DW	Hovtameji	Aquifer	–	Pump depth 56m	44.25525	40.18551
K-02	DW	Hovtameji	Aquifer	–	Pump depth 86m	44.25992	40.18633
K-03	DW	Hovtameji	Aquifer	–	Pump depth 62m	44.26198	40.18552
K-04	DW	Hovtameji	Aquifer	–	Pump depth 56m	44.26127	40.18992
K-05	DW	Tsiatsan	Aquifer	Secondary Canal	Pump removed for renewal	44.26189	40.20327
K-06	PS	Amberd	Kasak River just U/S at the Kasakh intake	Higher area than LHC	ϕ300x2 suction pipes. Can be used in supply from Aparan Reservoir. Two other temporarily-used PSs present, but not used for two years and may not be used ever in future.	44.27770	40.24878
K-07	PS	Aghavnatun	LHC	Higher area than LHC	ϕ300x2 suction pipes	44.25563	40.23965
K-08	PS	Aghavnatun	LHC	Higher area than LHC	ϕ150x1 suction pipe	44.24808	40.24063
K-09	PS	Aghavnatun	LHC	Higher area than LHC	ϕ200x1 suction pipe	44.24182	40.23867
K-10	PS	Aghavnatun	Induction earthy canal from LHC	Higher area than LHC	ϕ100x1 suction pipe; Induction canal gets dry in no pumping, because of infiltration.	44.22837	40.23729
K-11	DW	Aghavnatun	Aquifer	–	Not used; only for emergency	44.25395	40.23545
K-12	DW	Tsiatsan	Aquifer	–		44.26263	40.18544
K-13	DW	Tsiatsan	Aquifer	–		44.26639	40.19163
K-14	PS	Tsiatsan	Kasak River	–	Can be used in supply from Aparan Reservoir. ϕ120x1 suction pipe .	44.26855	40.18421
K-15	DW	Geghakert	Aquifer	–		44.25201	40.18470
K-16	DW	Geghakert	Aquifer	–	Just renewed.	44.24753	40.18111
K-17	DW	Geghakert	Aquifer	–		44.24433	40.17483
K-18	DW	Geghakert	Aquifer	–		44.24180	40.16906
K-19	DW	Geghakert	Aquifer	–		44.23835	40.17094
K-20	DW	Geghakert	Aquifer	–	Not used after the last summer.	44.24506	40.17863
K-21	DW	Geghakert	Aquifer	–		44.24037	40.17946
K-22	DW	Geghakert	Aquifer	–	Not used. Under renewal	44.24152	40.18143
K-23	DW	Geghakert	Aquifer	–	Not used. To be renewed.	44.24568	40.18292
K-24	DW	Geghakert	Aquifer	–	Not used. To be renewed.	44.25366	40.19024
K-25	DW	Hovtomeji	Aquifer	–		44.25862	40.17843
K-26	DW	Hovtomeji	Aquifer	–		44.25723	40.17935
K-27	DW	Arshaluys	Aquifer	3rd canal (earth)		44.22094	40.16119
K-28	DW	Arshaluys	Aquifer	–	Located in restaurant	44.18480	40.15661
K-29	DW	Arshaluys	Aquifer	–	22 ha irrigated	44.17825	40.15418
K-30	DW	Aknalich	Aquifer	2nd main cabal from Metsamor PS	Outlet of pipes from Metsamor PS (ϕ500), LHC (ϕ500) and the well (ϕ100) join in a pit.	44.14167	40.15195
K-31	DW	Aknalich	Aquifer	3rd canal (flume)		44.13394	40.15069
K-32	DW	Aknalich	Aquifer	3rd canal (flume)		44.12702	40.15554
K-33	DW	Aknalich	Aquifer	–		44.12479	40.15537
K-34	DW	Aknalich	Aquifer	–	not used	44.12083	40.15949
K-35	DW	Aknalich	Aquifer	3rd canal (flume) & field		44.13119	40.17106
K-36	DW	Aknalich	Aquifer	3rd canal (flume)		44.12922	40.17119
K-37	DW	Aknalich	Aquifer	3rd canal (flume)		44.12440	40.17085
K-38	DW	Aknalich	Aquifer	–		44.14579	40.17339
K-39	DW	Aknalich	Aquifer	3rd canal (flume)		44.14946	40.17499
K-40	DW	Aknalich	Aquifer	LHC	Under repair	44.15723	40.17765
K-41	DW	Arshaluys	Aquifer	3rd canal (flume)	Under repair	44.17268	40.17473
K-42	DW	Arshaluys	Aquifer	–	Under repair	44.17306	40.15394
K-43	DW	Arshaluys	Aquifer	–		44.17587	40.15473
K-44	DW	Aknalich	Aquifer	3rd canal (flume)		44.15253	40.16494
K-45	DW	Aknalich	Aquifer	3rd canal (flume)	Flume damaged	44.16071	40.15732
K-46	PS	Aknalich	Branch canal (?) supplied from Metsamor PS	3rd canal (flume)	Other two temporarily-used PSs present.	44.15622	40.15892
K-47	PS	Aknalich	Induction canal from Metsamor River	Metsamor Canal and a secondary canal	ϕ1000, ϕ500 discharging pipes; five large pumps equipped.	44.15549	40.14266
K-48	DW	Arshaluys	Aquifer	–		44.17498	40.14960
K-49	DW	Arshaluys	Aquifer	–		44.18110	40.14913
K-50	DW	Arshaluys	Aquifer	3rd canal (flume)		44.18726	40.17188
K-51	DW	Arshaluys	Aquifer	3rd canal		44.19486	40.17385
K-52	DW	Arshaluys	Aquifer	–	In front of a private house	44.21173	40.17081
K-53	DW	Arshaluys	Aquifer	3rd canal (erath)		44.20804	40.17421
K-54	DW	Arshaluys	Aquifer	Field		44.21255	40.17563
K-55	DW	Arshaluys	Aquifer	Field	Not used at present	44.22088	40.17768
K-56	DW	Arshaluys	Aquifer	–	Located in an obsolete factory compound	44.22040	40.17206
K-57	DW	Arshaluys	Aquifer	3rd canal (flume & earth)		44.22125	40.16675
K-58	DW	Haytagh	Aquifer	–		44.23410	40.17589
K-59	DW	Haytagh	Aquifer	–		44.23065	40.17929
K-60	DW	Haytagh	Aquifer	3rd canal (erath)		44.23488	40.18321
K-61	DW	Haytagh	Aquifer	3rd canal (erath)		44.23148	40.18451
K-62	DW	Haytagh	Aquifer	–		44.22621	40.18533
K-63	DW	Ferik	Aquifer	3rd canal (flume)		44.22493	40.18762
K-64	DW	Ferik	Aquifer	–		44.22578	40.19079
K-65	DW	Haytagh	Aquifer	3rd canal (flume)		44.22207	40.18404
K-66	DW	Haytagh	Aquifer	3rd canal (flume)		44.20875	40.18105
K-67	DW	Ferik	Aquifer	–		44.20850	40.19002
K-68	DW	Haytagh	Aquifer	3rd canal (flume)		44.23372	40.19750
K-69	DW	Tsaghkalanj	Aquifer	–	Not used at present	44.22391	40.20200
K-70	PS	Tsaghkalanj	LHC	Higher area than LHC		44.19587	40.20796
K-71	PS	Aagats	LHC	Higher area than LHC		44.22170	40.21700

Note: Longitude and latitude in degree on WGS84. Abbreviations – PS: Pump Station DW: Deep Well LHC: Lower Hrazdan Canal

(10) List of Pump Station in Vagharshapat WUA (As of July, 2015)

Sr. No.	Kind of Facility	Community	Intake from	Discharge to	Description	Longitude	Latitude
V-01	PS	Norakert	LHC	Mainly to the southern area; to the northern 2 ha cropland	Norakert PS; one ϕ200 suction pipe; sending water to south with ϕ125 pipe and to north with ϕ200 pipe.	44.35042	40.20230
V-02	PS	Baghramyan	LHC	Northern cropland	Baghramyan PS; ϕ400, ϕ300 and ϕ120 suction pipes.	44.36723	40.19789
V-03	PS	Aygek	LHC	Southern cropland	Aygek PS; 3Xϕ200 suction pipes	44.39548	40.19531
V-04	DW	Vagharshapat	Aquifer	3rd canal (flume) and field		44.32241	40.17498
V-05	DW	Vagharshapat	Aquifer	3rd canal (flume)		44.32493	40.18108
V-06	DW	Vagharshapat	Aquifer	3rd canal (flume)		44.31052	40.18638
V-07	DW	Vagharshapat	Aquifer	3rd canal (flume)	A secondary canal from LHC by the well damaged and replaced by a pipe line.	44.30955	40.19010
V-08	DW	Mrgastan	Aquifer	3rd canal (flume)	Highest point among DW locations; well dep. 100m, pupm dep. 70m, 65kwh	44.28151	40.20205
V-09	DW	Mrgastan	Aquifer	3rd canal (flume & earth)		44.27656	40.20338
V-10	DW	Tsaghkunk	Aquifer	3rd canal (earth)		44.27352	40.18246
V-11	DW	Tsaghkunk	Aquifer	3rd canal (flume)		44.26980	40.18352
V-12	DW	Tsaghkunk	Aquifer	3rd canal (earth)		44.26724	40.17753
V-13	DW	Tsaghkunk	Aquifer	3rd canal (flume)	A board stands notifing comletion of "Tsghkunk community tertiary canal rehabilitation by Millenium Challenge Account – Armenia SCO" on 12/31/2010.	44.26985	40.17494
V-14	DW	Vagharshapat	Aquifer	3rd canal (flume)		44.27556	40.16635
V-15	DW	Vagharshapat	Aquifer	3rd canal (flume)		44.27518	40.15799
V-16	DW	Vagharshapat	Aquifer	3rd canal (earth)		44.27393	40.14977
V-17	DW	Vagharshapat	Aquifer	3rd canal (flume & earth)		44.27637	40.15151
V-18	DW	Vagharshapat	Aquifer	3rd canal (flume & earth)		44.27825	40.14476
V-19	DW	Vagharshapat	Aquifer	3rd canal (earth)	Soil quality very good to the sourth; 110 ha around irrigated only with groundwater..	44.27644	40.14343
V-20	DW	Vagharshapat	Aquifer	3rd canal (flume)		44.27931	40.13766
V-21	DW	Vagharshapat	Aquifer	3rd canal (flume)		44.28654	40.14254
V-22	DW	Vagharshapat	Aquifer	3rd canal (earth)		44.28556	40.13697
V-23	DW	Vagharshapat	Aquifer	3rd canal (earth)		44.28698	40.13786
V-24	DW	Vagharshapat	Aquifer	3rd canal (flume)		44.28408	40.14798
V-25	DW	Vagharshapat	Aquifer	3rd canal (flume)		44.28178	40.15213
V-26	DW	Griboedov	Aquifer	Lower Aknalich Canal	Well dep. 80m, pump dep. 32m, Q = 52 l/s	44.27073	40.12830
V-27	DW	Griboedov	Aquifer	3rd canal (flume) & Lower Aknalich Canal	Q = 27 l/s	44.26205	40.12876
V-28	DW	Griboedov	Aquifer	Lower Aknalich Canal		44.25754	40.12980
V-29	DW	Griboedov	Aquifer	3rd canal (flume)		44.25792	40.12576
V-30	DW	Griboedov	Aquifer	3rd canal (flume) & Lower Aknalich Canal		44.25104	40.12993
V-31	DW	Khoronk	Aquifer	3rd canal (flume)		44.25265	40.12479
V-32	DW	Khoronk	Aquifer	3rd canal (flume)	Soil quality low in the area	44.25193	40.11885
V-33	DW	Khoronk	Aquifer	3rd canal (flume)		44.24771	40.13240
V-34	DW	Khoronk	Aquifer	3rd canal (earth)	Q = 56 l/s	44.24317	40.12970
V-35	DW	Khoronk	Aquifer	3rd canal (flume) & field		44.24180	40.12996
V-36	DW	Khoronk	Aquifer	Maybe 3rd canals	Many pipes connected	44.24197	40.13739
V-37	DW	Khoronk	Aquifer	3rd canal (earth)	Located near Qasakh river where water stagnant.	44.24631	40.14672
V-38	DW	Khoronk	Aquifer	3rd canal (earth)	Located near Qasakh river	44.25291	40.15789
V-39	DW	Khoronk	Aquifer	3rd canal (earth) & field		44.25054	40.15172
V-40	DW	Khoronk	Aquifer	3rd canal (earth)	Well dep. 80m, pump dep. 30m, SWL 18m, in artesian condition 10 to 20 years ago	44.23728	40.12656
V-41	DW	Aratashen	Aquifer	3rd canal (flume) & field	The canal originally supplied with water by Upper Aknolich Canal.	44.23705	40.15293
V-42	DW	Aratashen	Aquifer	3rd canal (flume) running near along the Upper Aknolich Canal		44.24168	40.15243
V-43	DW	Aratashen	Aquifer	3rd canal (flume)		44.23293	40.15539
V-44	DW	Aratashen	Aquifer	3rd canal (flume) running near along the Upper Aknolich Canal		44.23056	40.15616
V-45	DW	Aratashen	Aquifer	3rd canal (flume) running near along the Upper Aknolich Canal		44.22832	40.15680
V-46	DW	Aratashen	Aquifer	3rd canal (flume)	50 ha irrigated by a well on average.	44.22252	40.15357
V-47	DW	Aratashen	Aquifer	3rd canal (flume & earth)		44.22912	40.14835
V-48	DW	Aratashen	Aquifer	3rd canal (flume) & field		44.23324	40.14605
V-49	DW	Aratashen	Aquifer	3rd canal (flume)		44.21821	40.14911
V-50	DW	Taronik	Aquifer	3rd canal (flume)		44.21183	40.13073
V-51	DW	Taronik	Aquifer	3rd canal (flume)		44.20482	40.12996
V-52	DW	Taronik	Aquifer	3rd canal (flume)		44.19813	40.13100
V-53	DW	Aratashen	Aquifer	Pipe outlet uknown		44.22331	40.12497
V-54	DW	Aratashen	Aquifer	3rd canal (flume)		44.23023	40.12432
V-55	DW	Aratashen	Aquifer	3rd canal (flume)		44.23329	40.11916
V-56	PS	Aratashen	Drainage canal	Secondary canal to D/S area	Located at the southernmost end of the area	44.23176	40.11257
V-57	DW	Artimet	Aquifer	3rd canal (flume)		44.25984	40.14418
V-58	DW	Artimet	Aquifer	3rd canal (flume) & field		44.25774	40.14170
V-59	DW	Artimet	Aquifer	3rd canal (earth)		44.26507	40.14749
V-60	DW	Artimet	Aquifer	3rd canal (flume)		44.26676	40.14558
V-61	DW	Artimet	Aquifer	3rd canal (flume) & field		44.26692	40.14416
V-62	DW	Artimet	Aquifer	pool for irrigation	Water being sent through 600m-long pipe along the old river to a pool.	44.26773	40.15053
V-63	DW	Artimet	Aquifer	Field	Private well	44.27066	40.14981
V-64	DW	Artimet	Aquifer	3rd canal (earth) & field		44.27134	40.15637
V-65	DW	Artimet	Aquifer	3rd canal (earth)		44.26543	40.15480
V-66	DW	Artimet	Aquifer	3rd canal (flume)		44.26630	40.16117
V-67	DW	Artimet	Aquifer	Shah-Aru Canal ending portion		44.26292	40.16063
V-68	DW	Artimet	Aquifer	3rd canal (flume)	The canal starts at the end of Shah-Aru Canal	44.26132	40.16033
V-69	DW	Artimet	Aquifer	3rd canal (flume)		44.26117	40.15732
V-70	DW	Artimet	Aquifer	3rd canal (flume & earth)		44.26070	40.15449
V-71	DW	Artimet	Aquifer	3rd canal (earth)		44.25354	40.14904
V-72	DW	Artimet	Aquifer	3rd canal (flume) & field		44.26106	40.15038
V-73	DW	Artimet	Aquifer	3rd canal (flume)	Private; used also for domestic	44.26075	40.14843
V-74	DW	Vagharshapat	Aquifer	3rd canal (flume) & field		44.31327	40.17516
V-75	DW	Vagharshapat	Aquifer	3rd canal (flume) & field		44.29378	40.18324

Note: Longitude and latitude in degree on WGS84.

Abbreviations – PS: Pump Station DW: Deep Well LHC: Lower Hrazdan Canal

(11) Comparison Table of Pump Station in Khyo WUA (As of July, 2015)

Community	Present Survey		Listed in JICA Report, 2014	
	Deep Well	Pump Station	Deep Well	Pump Station
Aragats	0	1	3	2
Aghavnatun	1	4	1	4
Aknalich	13	2	11	3
Amberd	0	1	0	3
Arshaluys	16	0	18	1
Doghs	0	0	0	0
Ferik	3	0	3	0
Geghakert	10	0	12	0
Haytagh	8	0	10	1
Hovtameji	6	0	6	0
Lernamerdz	0	0	1	0
Tsaghkalanj	1	1	1	1
Tsiatsan	3	1	3	1
Total	61	10	69	16

(12) Comparison Table of Pump Station in Vagharshapt WUA (As of July, 2015)

Community	Present Survey		Listed in JICA Report, 2014	
	Deep Well	Pump Station	Deep Well	Pump Station
Aratashen	12	1	15	1
Artimet	17	0	17	0
Aygek	0	1	Not listed	
Baghramyan	0	1	0	1
Griboedov	5	0	5	0
Khoronk	11	0	10	0
Mertdzavan	0	0	0	3
Mrgastan	2	0	1	0
Norakert	0	1	0	2
Taronik	3	0	3	0
Tsaghkunk	4	0	4	0
Vargharshapat	18	0	Not listed	
Total	72	4	55	7

Appendix D-6: Irrigation Standards in Armenia

(1)Irrigation Standards for Ararat Plain, Armavir Marz (heavy sand)

Wheat		0.468		1,693	ha																			
		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec
	N		N		N		N		N		N		N		N		N		N		N		N	
1		0.000		0.000		0.000		0.000	2	0.355	3	0.500		0.000		0.000		0.000	1	0.478		0.000		0.000
2		0.000		0.000		0.000		0.000	2	0.355	3	0.500		0.000		0.000		0.000	1	0.478		0.000		0.000
3		0.000		0.000		0.000		0.000	2	0.355	3	0.500		0.000		0.000		0.000	1	0.478		0.000		0.000
4		0.000		0.000		0.000		0.000	2	0.355	3	0.500		0.000		0.000		0.000	1	0.478		0.000		0.000
5		0.000		0.000		0.000		0.000	2	0.355	3	0.500		0.000		0.000		0.000	1	0.478		0.000		0.000
6		0.000		0.000		0.000		0.000	2	0.355	3	0.500		0.000		0.000		0.000	1	0.478		0.000		0.000
7		0.000		0.000		0.000		0.000	2	0.355	3	0.500		0.000		0.000		0.000	1	0.478		0.000		0.000
8		0.000		0.000		0.000		0.000	2	0.355	3	0.500		0.000		0.000		0.000	1	0.478		0.000		0.000
9		0.000		0.000		0.000		0.000	2	0.355	3	0.500		0.000		0.000		0.000	1	0.478		0.000		0.000
10		0.000		0.000		0.000		0.000	2	0.355	3	0.500		0.000		0.000		0.000	1	0.478		0.000		0.000
11		0.000		0.000		0.000		0.000	2	0.355	3	0.500		0.000		0.000		0.000	1	0.478		0.000		0.000
12		0.000		0.000		0.000		0.000	2	0.355	4	0.647		0.000		0.000		0.000	1	0.478		0.000		0.000
13		0.000		0.000		0.000		0.000	2	0.355	4	0.647		0.000		0.000		0.000	1	0.478		0.000		0.000
14		0.000		0.000		0.000		0.000	2	0.355	4	0.647		0.000		0.000		0.000	1	0.478		0.000		0.000
15		0.000		0.000		0.000		0.000	2	0.355	4	0.647		0.000		0.000		0.000	1	0.478		0.000		0.000
16		0.000		0.000		0.000		0.000	2	0.355	4	0.647		0.000		0.000		0.000	1	0.478		0.000		0.000
17		0.000		0.000		0.000		0.000	2	0.355	4	0.647		0.000		0.000		0.000	1	0.478		0.000		0.000
18		0.000		0.000		0.000		0.000	2	0.355	4	0.647		0.000		0.000		0.000	1	0.478		0.000		0.000
19		0.000		0.000		0.000		0.000	2	0.355	4	0.647		0.000		0.000		0.000	1	0.478		0.000		0.000
20		0.000		0.000		0.000	2	0.355	2	0.355	4	0.647		0.000		0.000		0.000	1	0.478		0.000		0.000
21		0.000		0.000		0.000	2	0.355	3	0.500	4	0.647		0.000		0.000		0.000		0.000		0.000		0.000
22		0.000		0.000		0.000	2	0.355	3	0.500	4	0.647		0.000		0.000		0.000		0.000		0.000		0.000
23		0.000		0.000		0.000	2	0.355	3	0.500	4	0.647		0.000		0.000		0.000		0.000		0.000		0.000
24		0.000		0.000		0.000	2	0.355	3	0.500	4	0.647		0.000		0.000		0.000		0.000		0.000		0.000
25		0.000		0.000		0.000	2	0.355	3	0.500	4	0.647		0.000		0.000		0.000		0.000		0.000		0.000
26		0.000		0.000		0.000	2	0.355	3	0.500	4	0.647		0.000		0.000		0.000		0.000		0.000		0.000
27		0.000		0.000		0.000	2	0.355	3	0.500	4	0.647		0.000		0.000		0.000		0.000		0.000		0.000
28		0.000		0.000		0.000	2	0.355	3	0.500	4	0.647		0.000		0.000	1	0.478		0.000		0.000		0.000
29		0.000				0.000	2	0.355	3	0.500		0.000		0.000		0.000	1	0.478		0.000		0.000		0.000
30		0.000				0.000	2	0.355	3	0.500		0.000		0.000		0.000	1	0.478		0.000		0.000		0.000
31		0.000				0.000			3	0.500				0.000		0.000				0.000				0.000
																								(l/s/ha)
1		0.000		0.000		0.000		0.000		0.355		0.500		0.000		0.000		0.000		0.478		0.000		0.000
2		0.000		0.000		0.000		0.036		0.355		0.632		0.000		0.000		0.000		0.478		0.000		0.000
3		0.000		0.000		0.000		0.355		0.500		0.518		0.000		0.000		0.143		0.000		0.000		0.000
																								(l/s)
		0		0		0		0		1,284		1,809		0		0		0		1,729		0		0
		0		0		0		128		1,284		2,287		0		0		0		1,729		0		0
		0		0		0		1,284		1,809		1,872		0		0		519		0		0		0
																								(thoudand m3)
		0		0		0		0		1,109		1,563		0		0		0		1,494		0		0
		0		0		0		111		1,109		1,976		0		0		0		1,494		0		0
		0		0		0		1,109		1,719		1,617		0		0		448		0		0		0
		0		0		0		1,220		3,937		5,156		0		0		448		2,988		0		0

Vegetable		0.468		3,401	ha																			
		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec
	N		N		N		N		N		N		N		N		N		N		N		N	
1		0.000		0.000		0.000		0.000		0.000	4	0.537	6	0.579	9	0.537	11	0.502	13	0.579		0.000		0.000
2		0.000		0.000		0.000		0.000		0.000	4	0.537	6	0.579	9	0.537	11	0.502	13	0.579		0.000		0.000
3		0.000		0.000		0.000		0.000		0.000	4	0.537	6	0.579	9	0.537	11	0.502	13	0.579		0.000		0.000
4		0.000		0.000		0.000		0.000		0.000	4	0.537	7	0.579	9	0.537	11	0.502	13	0.579		0.000		0.000
5		0.000		0.000		0.000		0.000		0.000	4	0.537	7	0.579	9	0.537	11	0.502	13	0.579		0.000		0.000
6		0.000		0.000		0.000		0.000		0.000	4	0.537	7	0.579	9	0.537	11	0.502	13	0.579		0.000		0.000
7		0.000		0.000		0.000		0.000	3	0.443	5	0.537	7	0.579	9	0.537	11	0.502	13	0.579		0.000		0.000
8		0.000		0.000		0.000		0.000	3	0.443	5	0.537	7	0.579	9	0.537	11	0.502		0.000		0.000		0.000
9		0.000		0.000		0.000		0.000	3	0.443	5	0.537	7	0.579	9	0.537	11	0.502		0.000		0.000		0.000
10		0.000		0.000		0.000	1	0.358	3	0.443	5	0.537	7	0.579	9	0.537	12	0.502		0.000		0.000		0.000
11		0.000		0.000		0.000	1	0.358	3	0.443	5	0.537	7	0.579	9	0.537	12	0.502		0.000		0.000		0.000
12		0.000		0.000		0.000	1	0.358	3	0.443	5	0.537	7	0.579	10	0.537	12	0.502		0.000		0.000		0.000
13		0.000		0.000		0.000	1	0.358	3	0.443	5	0.537	7	0.579	10	0.537	12	0.502		0.000		0.000		0.000
14		0.000		0.000		0.000	1	0.358	3	0.443	5	0.537	7	0.579	10	0.537	12	0.502		0.000		0.000		0.000
15		0.000		0.000		0.000	1	0.358	3	0.443	5	0.537	7	0.579	10	0.537	12	0.502		0.000		0.000		0.000
16		0.000		0.000		0.000	1	0.358	3	0.443	5	0.537	7	0.579	10	0.537	12	0.502		0.000		0.000		0.000
17		0.000		0.000		0.000	1	0.358	3	0.443	5	0.537	8	0.627	10	0.537	12	0.502		0.000		0.000		0.000
18		0.000		0.000		0.000	1	0.358	3	0.443	5	0.537	8	0.627	10	0.537	12	0.502		0.000		0.000		0.000
19		0.000		0.000		0.000	1	0.358	3	0.443	5	0.537	8	0.627	10	0.537	12	0.502		0.000		0.000		0.000
20		0.000		0.000		0.000	1	0.358	3	0.443	5	0.537	8	0.627	10	0.537	12	0.502		0.000		0.000		0.000
21		0.000		0.000		0.000	1	0.358	3	0.443	6	0.579	8	0.627	10	0.537	12	0.502		0.000		0.000		0.000
22		0.000		0.000		0.000	1	0.358	3	0.443	6	0.579	8	0.627	10	0.537	12	0.502		0.000		0.000		0.000
23		0.000		0.000		0.000	1	0.358	3	0.443	6	0.579	8	0.627	10	0.537	12	0.502		0.000		0.000		0.000
24		0.000		0.000		0.000	1	0.358	4	0.537	6	0.579	8	0.627	10	0.537	12	0.502		0.000		0.000		0.000
25		0.000		0.000		0.000	1	0.358	4	0.537	6	0.579	8	0.627	10	0.537	13	0.579		0.000		0.000		0.000
26		0.000		0.000		0.000	1	0.358	4	0.537	6	0.579	8	0.627	11	0.502	13	0.579		0.000		0.000		0.000
27		0.000		0.000		0.000	1	0.358	4	0.537	6	0.579	8	0.627	11	0.502	13	0.579		0.000		0.000		0.000
28		0.000		0.000		0.000	1	0.358	4	0.537	6	0.579	9	0.537	11	0.502	13	0.579		0.000		0.000		0.000
29		0.000				0.000	1	0.358	4	0.537	6	0.579	9	0.537	11	0.502	13	0.579		0.000		0.000		0.000
30		0.000				0.000	1	0.358	4	0.537	6	0.579	9	0.537	11	0.502	13	0.579		0.000		0.000		0.000
31		0.000				0.000			4	0.537			9	0.537	11	0.502				0.000				0.000
																								(l/s/ha)
1		0.000		0.000		0.000		0.036		0.177		0.537		0.579		0.537		0.502		0.405		0.000		0.000
2		0.000		0.000		0.000		0.358		0.443		0.537		0.598		0.537		0.502		0.000		0.000		0.000
3		0.000		0.000		0.000		0.358		0.511		0.579		0.594		0.518		0.548		0.000		0.000		0.000
																								(l/s)
		0		0		0		260		1,288		3,902		4,208		3,902		3,648		2,945		0		0
		0		0		0		2,602		3,219		3,902		4,347		3,902		3,648		0		0		0
		0		0		0		2,602		3,716		4,208		4,319		3,764		3,984		0		0		0
																								(thoudand m3)
		0		0		0		225		1,113		3,371		3,636		3,371		3,152		2,544		0		0
		0		0		0		2,248		2,781		3,371		3,756		3,371		3,152		0		0		0
		0		0		0		2,248		3,532		3,636		4,105		3,577		3,442		0		0		0
		0		0		0		4,721		7,426		10,378		11,497		10,319		9,746		2,544		0		0

Grape		0.468		993	ha																			
		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec
	N		N		N		N		N		N		N		N		N		N		N		N	
1		0.000		0.000		0.000		0.000	1	0.401	2	0.386	4	0.694	6	0.744		0.000		0.000		0.000		0.000
2		0.000		0.000		0.000		0.000	1	0.401	2	0.386	4	0.694	6	0.744		0.000		0.000		0.000		0.000
3		0.000		0.000		0.000		0.000	1	0.401	2	0.386	4	0.694	6	0.744		0.000		0.000		0.000		0.000
4		0.000		0.000		0.000		0.000	1	0.401	2	0.386	4	0.694	6	0.744		0.000		0.000		0.000		0.000
5		0.000		0.000		0.000		0.000	1	0.401	2	0.386	4	0.694	6	0.744		0.000		0.000		0.000		0.000
6		0.000		0.000		0.000		0.000	1	0.401	2	0.386	4	0.694	6	0.744		0.000		0.000		0.000		0.000
7		0.000		0.000		0.000		0.000	1	0.401	2	0.386	4	0.694	6	0.744		0.000		0.000		0.000		0.000
8		0.000		0.000		0.000		0.000	1	0.401	2	0.386	4	0.694	6	0.744		0.000		0.000		0.000		0.000
9		0.000		0.000		0.000		0.000	1	0.401	2	0.386	4	0.694	6	0.744		0.000		0.000		0.000		0.000
10		0.000		0.000		0.000		0.000	1	0.401	2	0.386	4	0.694	6	0.744		0.000	8	0.496		0.000		0.000
11		0.000		0.000		0.000		0.000		0.000	2	0.386	4	0.694	6	0.744		0.000	8	0.496		0.000		0.000
12		0.000		0.000		0.000		0.000		0.000	2	0.386	4	0.694	6	0.744		0.000	8	0.496		0.000		0.000
13		0.000		0.000		0.000		0.000		0.000	2	0.386	4	0.694	6	0.744		0.000	8	0.496		0.000		0.000
14		0.000		0.000		0.000		0.000		0.000	2	0.386	4	0.694	7	0.579		0.000	8	0.496		0.000		0.000
15		0.000		0.000		0.000	1	0.401		0.000	2	0.386	4	0.694	7	0.579		0.000	8	0.496		0.000		0.000
16		0.000		0.000		0.000	1	0.401		0.000	3	0.694	5	0.694	7	0.579		0.000	8	0.496		0.000		0.000
17		0.000		0.000		0.000	1	0.401		0.000	3	0.694	5	0.694	7	0.579		0.000	8	0.496		0.000		0.000
18		0.000		0.000		0.000	1	0.401		0.000	3	0.694	5	0.694	7	0.579		0.000	8	0.496		0.000		0.000
19		0.000		0.000		0.000	1	0.401		0.000	3	0.694	5	0.694	7	0.579		0.000	8	0.496		0.000		0.000
20		0.000		0.000		0.000	1	0.401	2	0.386	3	0.694	5	0.694	7	0.579		0.000	8	0.496		0.000		0.000
21		0.000		0.000		0.000	1	0.401	2	0.386	3	0.694	5	0.694	7	0.579		0.000	8	0.496		0.000		0.000
22		0.000		0.000		0.000	1	0.401	2	0.386	3	0.694	5	0.694	7	0.579		0.000	8	0.496		0.000		0.000
23		0.000		0.000		0.000	1	0.401	2	0.386	3	0.694	5	0.694	7	0.579		0.000	8	0.496		0.000		0.000
24		0.000		0.000		0.000	1	0.401	2	0.386	3	0.694	5	0.694	7	0.579		0.000	8	0.496		0.000		0.000
25		0.000		0.000		0.000	1	0.401	2	0.386	3	0.694	5	0.694	7	0.579		0.000	8	0.496		0.000		0.000
26		0.000		0.000		0.000	1	0.401	2	0.386	3	0.694	5	0.694	7	0.579		0.000	8	0.496		0.000		0.000
27		0.000		0.000		0.000	1	0.401	2	0.386	3	0.694	5	0.694	7	0.579		0.000	8	0.496		0.000		0.000
28		0.000		0.000		0.000	1	0.401	2	0.386	3	0.694	5	0.694	7	0.579		0.000	8	0.496		0.000		0.000
29		0.000				0.000	1	0.401	2	0.386	3	0.694	5	0.694	7	0.579		0.000	8	0.496		0.000		0.000
30		0.000				0.000	1	0.401	2	0.386	3	0.694	5	0.694	7	0.579		0.000		0.000		0.000		0.000
31		0.000				0.000			2	0.386			6	0.744	7	0.579				0.000				0.000
																								(l/s/ha)
1		0.000		0.000		0.000		0.000		0.401		0.386		0.694		0.744		0.000		0.050		0.000		0.000
2		0.000		0.000		0.000		0.241		0.039		0.540		0.694		0.629		0.000		0.496		0.000		0.000
3		0.000		0.000		0.000		0.401		0.386		0.694		0.699		0.579		0.000		0.406		0.000		0.000
																								(l/s)
		0		0		0		0		851		819		1,473		1,579		0		105		0		0
		0		0		0		511		82		1,146		1,473		1,334		0		1,052		0		0
		0		0		0		851		819		1,473		1,482		1,229		0		861		0		0
																								(thoudand m3)
		0		0		0		0		735		708		1,273		1,364		0		91		0		0
		0		0		0		442		71		990		1,273		1,153		0		909		0		0
		0		0		0		735		778		1,273		1,408		1,168		0		818		0		0
		0		0		0		1,177		1,584		2,971		3,954		3,685		0		1,818		0		0

Alfalfa		0.468		824	ha																			
		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec
	N		N		N		N		N		N		N		N		N		N		N		N	
1		0.000		0.000		0.000		0.000	1	0.316	3	0.473	4	0.613	6	0.651	8	0.473	9	0.548		0.000		0.000
2		0.000		0.000		0.000		0.000	1	0.316	3	0.473	4	0.613	6	0.651	8	0.473	9	0.548		0.000		0.000
3		0.000		0.000		0.000		0.000	1	0.316	3	0.473	4	0.613	6	0.651	8	0.473	9	0.548		0.000		0.000
4		0.000		0.000		0.000		0.000	1	0.316	3	0.473	4	0.613	6	0.651	8	0.473	9	0.548		0.000		0.000
5		0.000		0.000		0.000		0.000	1	0.316	3	0.473	4	0.613	6	0.651	8	0.473	9	0.548		0.000		0.000
6		0.000		0.000		0.000	1	0.316	1	0.316	3	0.473	4	0.613	6	0.651	8	0.473	9	0.548		0.000		0.000
7		0.000		0.000		0.000	1	0.316	1	0.316	3	0.473	4	0.613	6	0.651	8	0.473		0.000		0.000		0.000
8		0.000		0.000		0.000	1	0.316	1	0.316	3	0.473	4	0.613	6	0.651	8	0.473		0.000		0.000		0.000
9		0.000		0.000		0.000	1	0.316		0.000	3	0.473	4	0.613	6	0.651	8	0.473		0.000		0.000		0.000
10		0.000		0.000		0.000	1	0.316		0.000	3	0.473	5	0.651	6	0.651	8	0.473		0.000		0.000		0.000
11		0.000		0.000		0.000	1	0.316		0.000	3	0.473	5	0.651	7	0.651	8	0.473		0.000		0.000		0.000
12		0.000		0.000		0.000	1	0.316	2	0.521	3	0.473	5	0.651	7	0.651	8	0.473		0.000		0.000		0.000
13		0.000		0.000		0.000	1	0.316	2	0.521	3	0.473	5	0.651	7	0.651	8	0.473		0.000		0.000		0.000
14		0.000		0.000		0.000	1	0.316	2	0.521	3	0.473	5	0.651	7	0.651	8	0.473		0.000		0.000		0.000
15		0.000		0.000		0.000	1	0.316	2	0.521	3	0.473	5	0.651	7	0.651	8	0.473		0.000		0.000		0.000
16		0.000		0.000		0.000	1	0.316	2	0.521	3	0.473	5	0.651	7	0.651	8	0.473		0.000		0.000		0.000
17		0.000		0.000		0.000	1	0.316	2	0.521	3	0.473	5	0.651	7	0.651	8	0.473		0.000		0.000		0.000
18		0.000		0.000		0.000	1	0.316	2	0.521	3	0.473	5	0.651	7	0.651	9	0.548		0.000		0.000		0.000
19		0.000		0.000		0.000	1	0.316	2	0.521	3	0.473	5	0.651	7	0.651	9	0.548		0.000		0.000		0.000
20		0.000		0.000		0.000	1	0.316	2	0.521	3	0.473	5	0.651	7	0.651	9	0.548		0.000		0.000		0.000
21		0.000		0.000		0.000	1	0.316	2	0.521	3	0.473	5	0.651	7	0.651	9	0.548		0.000		0.000		0.000
22		0.000		0.000		0.000	1	0.316	2	0.521	3	0.473	5	0.651	7	0.651	9	0.548		0.000		0.000		0.000
23		0.000		0.000		0.000	1	0.316	2	0.521	4	0.613	5	0.651	7	0.651	9	0.548		0.000		0.000		0.000
24		0.000		0.000		0.000	1	0.316	2	0.521	4	0.613	5	0.651	7	0.651	9	0.548		0.000		0.000		0.000
25		0.000		0.000		0.000	1	0.316	2	0.521	4	0.613	5	0.651	7	0.651	9	0.548		0.000		0.000		0.000
26		0.000		0.000		0.000	1	0.316	2	0.521	4	0.613	6	0.651	7	0.651	9	0.548		0.000		0.000		0.000
27		0.000		0.000		0.000	1	0.316	2	0.521	4	0.613	6	0.651	8	0.473	9	0.548		0.000		0.000		0.000
28		0.000		0.000		0.000	1	0.316	2	0.521	4	0.613	6	0.651	8	0.473	9	0.548		0.000		0.000		0.000
29		0.000				0.000	1	0.316	2	0.521	4	0.613	6	0.651	8	0.473	9	0.548		0.000		0.000		0.000
30		0.000				0.000	1	0.316	2	0.521	4	0.613	6	0.651	8	0.473	9	0.548		0.000		0.000		0.000
31		0.000				0.000			2	0.521			6	0.651	8	0.473				0.000				0.000
																								(l/s/ha)
1		0.000		0.000		0.000		0.158		0.253		0.473		0.617		0.651		0.473		0.329		0.000		0.000
2		0.000		0.000		0.000		0.316		0.469		0.473		0.651		0.651		0.496		0.000		0.000		0.000
3		0.000		0.000		0.000		0.316		0.521		0.585		0.651		0.570		0.548		0.000		0.000		0.000
																								(l/s)
		0		0		0		278		445		833		1,086		1,146		833		579		0		0
		0		0		0		556		826		833		1,146		1,146		872		0		0		0
		0		0		0		556		917		1,030		1,146		1,004		965		0		0		0
																								(thoudand m3)
		0		0		0		240		384		720		938		990		720		500		0		0
		0		0		0		480		714		720		990		990		753		0		0		0
		0		0		0		480		872		890		1,089		954		834		0		0		0
		0		0		0		1,200		1,970		2,330		3,017		2,934		2,307		500		0		0

Fruit		0.468		559	ha																			
		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec
	N		N		N		N		N		N		N		N		N		N		N		N	
1		0.000		0.000		0.000		0.000	1	0.187	2	0.223	3	0.322	5	0.386	7	0.305	8	0.231		0.000		0.000
2		0.000		0.000		0.000		0.000	1	0.187	2	0.223	3	0.322	5	0.386	7	0.305	8	0.231		0.000		0.000
3		0.000		0.000		0.000		0.000	1	0.187	2	0.223	3	0.322	5	0.386	7	0.305	8	0.231		0.000		0.000
4		0.000		0.000		0.000		0.000	1	0.187	2	0.223	3	0.322	5	0.386	7	0.305	8	0.231		0.000		0.000
5		0.000		0.000		0.000		0.000	1	0.187	2	0.223	3	0.322	5	0.386	7	0.305	8	0.231		0.000		0.000
6		0.000		0.000		0.000		0.000	1	0.187	2	0.223	4	0.362	6	0.340	7	0.305		0.000		0.000		0.000
7		0.000		0.000		0.000		0.000	1	0.187	2	0.223	4	0.362	6	0.340	7	0.305		0.000		0.000		0.000
8		0.000		0.000		0.000		0.000	1	0.187	2	0.223	4	0.362	6	0.340	7	0.305		0.000		0.000		0.000
9		0.000		0.000		0.000		0.000	1	0.187	2	0.223	4	0.362	6	0.340	7	0.305		0.000		0.000		0.000
10		0.000		0.000		0.000		0.000	1	0.187	2	0.223	4	0.362	6	0.340	7	0.305		0.000		0.000		0.000
11		0.000		0.000		0.000		0.000	1	0.187	2	0.223	4	0.362	6	0.340	8	0.231		0.000		0.000		0.000
12		0.000		0.000		0.000		0.000	1	0.187	2	0.223	4	0.362	6	0.340	8	0.231		0.000		0.000		0.000
13		0.000		0.000		0.000		0.000	1	0.187	2	0.223	4	0.362	6	0.340	8	0.231		0.000		0.000		0.000
14		0.000		0.000		0.000		0.000	1	0.187	2	0.223	4	0.362	6	0.340	8	0.231		0.000		0.000		0.000
15		0.000		0.000		0.000		0.000	1	0.187	2	0.223	4	0.362	6	0.340	8	0.231		0.000		0.000		0.000
16		0.000		0.000		0.000		0.000	1	0.187	2	0.223	4	0.362	6	0.340	8	0.231		0.000		0.000		0.000
17		0.000		0.000		0.000		0.000	1	0.187	2	0.223	4	0.362	6	0.340	8	0.231		0.000		0.000		0.000
18		0.000		0.000		0.000		0.000	1	0.187	3	0.322	4	0.362	6	0.340	8	0.231		0.000		0.000		0.000
19		0.000		0.000		0.000		0.000	1	0.187	3	0.322	4	0.362	6	0.340	8	0.231		0.000		0.000		0.000
20		0.000		0.000		0.000	1	0.187	1	0.187	3	0.322	4	0.362	6	0.340	8	0.231		0.000		0.000		0.000
21		0.000		0.000		0.000	1	0.187		0.000	3	0.322	4	0.362	6	0.340	8	0.231		0.000		0.000		0.000
22		0.000		0.000		0.000	1	0.187		0.000	3	0.322	5	0.386	6	0.340	8	0.231		0.000		0.000		0.000
23		0.000		0.000		0.000	1	0.187	2	0.223	3	0.322	5	0.386	7	0.305	8	0.231		0.000		0.000		0.000
24		0.000		0.000		0.000	1	0.187	2	0.223	3	0.322	5	0.386	7	0.305	8	0.231		0.000		0.000		0.000
25		0.000		0.000		0.000	1	0.187	2	0.223	3	0.322	5	0.386	7	0.305	8	0.231		0.000		0.000		0.000
26		0.000		0.000		0.000	1	0.187	2	0.223	3	0.322	5	0.386	7	0.305	8	0.231		0.000		0.000		0.000
27		0.000		0.000		0.000	1	0.187	2	0.223	3	0.322	5	0.386	7	0.305	8	0.231		0.000		0.000		0.000
28		0.000		0.000		0.000	1	0.187	2	0.223	3	0.322	5	0.386	7	0.305	8	0.231		0.000		0.000		0.000
29		0.000				0.000	1	0.187	2	0.223	3	0.322	5	0.386	7	0.305	8	0.231		0.000		0.000		0.000
30		0.000				0.000	1	0.187	2	0.223	3	0.322	5	0.386	7	0.305	8	0.231		0.000		0.000		0.000
31		0.000				0.000	1		2	0.223				0.000	7	0.305				0.000				0.000
																								(l/s/ha)
1		0.000		0.000		0.000		0.000		0.187		0.223		0.342		0.363		0.305		0.116		0.000		0.000
2		0.000		0.000		0.000		0.019		0.187		0.253		0.362		0.340		0.231		0.000		0.000		0.000
3		0.000		0.000		0.000		0.187		0.182		0.322		0.349		0.311		0.231		0.000		0.000		0.000
																								(l/s)
		0		0		0		0		223		266		409		434		364		138		0		0
		0		0		0		22		223		302		432		406		276		0		0		0
		0		0		0		223		218		385		417		372		276		0		0		0
																								(thoudand m3)
		0		0		0		0		193		230		353		375		314		119		0		0
		0		0		0		19		193		261		373		351		238		0		0		0
		0		0		0		193		207		333		396		354		238		0		0		0
		0		0		0		212		593		824		1,122		1,080		790		119		0		0

Maize		0.468		452	ha																			
		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec
	N		N		N		N		N		N		N		N		N		N		N		N	
1		0.000		0.000		0.000		0.000	1	0.343	2	0.289	4	0.545		0.000		0.000		0.000		0.000		0.000
2		0.000		0.000		0.000		0.000	1	0.343	2	0.289	4	0.545		0.000		0.000		0.000		0.000		0.000
3		0.000		0.000		0.000		0.000	1	0.343	2	0.289	4	0.545		0.000		0.000		0.000		0.000		0.000
4		0.000		0.000		0.000		0.000	1	0.343	2	0.289	4	0.545		0.000		0.000		0.000		0.000		0.000
5		0.000		0.000		0.000		0.000	1	0.343	2	0.289	4	0.545		0.000		0.000		0.000		0.000		0.000
6		0.000		0.000		0.000		0.000	1	0.343	2	0.289	4	0.545		0.000		0.000		0.000		0.000		0.000
7		0.000		0.000		0.000		0.000	1	0.343	2	0.289	4	0.545		0.000		0.000		0.000		0.000		0.000
8		0.000		0.000		0.000		0.000	1	0.343	2	0.289	4	0.545		0.000		0.000		0.000		0.000		0.000
9		0.000		0.000		0.000		0.000	1	0.343	2	0.289	4	0.545		0.000		0.000		0.000		0.000		0.000
10		0.000		0.000		0.000		0.000	1	0.343	2	0.289	4	0.545		0.000		0.000		0.000		0.000		0.000
11		0.000		0.000		0.000		0.000	1	0.343	2	0.289	4	0.545		0.000		0.000		0.000		0.000		0.000
12		0.000		0.000		0.000		0.000	1	0.343	2	0.289	4	0.545		0.000		0.000		0.000		0.000		0.000
13		0.000		0.000		0.000		0.000	1	0.343	2	0.289	4	0.545		0.000		0.000		0.000		0.000		0.000
14		0.000		0.000		0.000		0.000	1	0.343	2	0.289	4	0.545		0.000		0.000		0.000		0.000		0.000
15		0.000		0.000		0.000		0.000	1	0.343	2	0.289	5	0.617		0.000		0.000		0.000		0.000		0.000
16		0.000		0.000		0.000		0.000	1	0.343	2	0.289	5	0.617		0.000		0.000		0.000		0.000		0.000
17		0.000		0.000		0.000		0.000	2	0.289	3	0.842	5	0.617		0.000		0.000		0.000		0.000		0.000
18		0.000		0.000		0.000		0.000	2	0.289	3	0.842	5	0.617		0.000		0.000		0.000		0.000		0.000
19		0.000		0.000		0.000		0.000	2	0.289	3	0.842	5	0.617		0.000		0.000		0.000		0.000		0.000
20		0.000		0.000		0.000	1	0.343	2	0.289	3	0.842	5	0.617		0.000		0.000		0.000		0.000		0.000
21		0.000		0.000		0.000	1	0.343	2	0.289	3	0.842	5	0.617		0.000		0.000		0.000		0.000		0.000
22		0.000		0.000		0.000	1	0.343	2	0.289	3	0.842	5	0.617		0.000		0.000		0.000		0.000		0.000
23		0.000		0.000		0.000	1	0.343	2	0.289	3	0.842	5	0.617		0.000		0.000		0.000		0.000		0.000
24		0.000		0.000		0.000	1	0.343	2	0.289	3	0.842	5	0.617		0.000		0.000		0.000		0.000		0.000
25		0.000		0.000		0.000	1	0.343	2	0.289	3	0.842	5	0.617		0.000		0.000		0.000		0.000		0.000
26		0.000		0.000		0.000	1	0.343	2	0.289	3	0.842	5	0.617		0.000		0.000		0.000		0.000		0.000
27		0.000		0.000		0.000	1	0.343	2	0.289	3	0.842	5	0.617		0.000		0.000		0.000		0.000		0.000
28		0.000		0.000		0.000	1	0.343	2	0.289	4	0.545	5	0.617		0.000		0.000		0.000		0.000		0.000
29		0.000				0.000	1	0.343	2	0.289	4	0.545	5	0.617		0.000		0.000		0.000		0.000		0.000
30		0.000				0.000	1	0.343	2	0.289	4	0.545		0.000		0.000		0.000		0.000		0.000		0.000
31		0.000				0.000			2	0.289				0.000		0.000				0.000				0.000
																								(l/s/ha)
1		0.000		0.000		0.000		0.000		0.343		0.289		0.545		0.000		0.000		0.000		0.000		0.000
2		0.000		0.000		0.000		0.034		0.321		0.510		0.588		0.000		0.000		0.000		0.000		0.000
3		0.000		0.000		0.000		0.343		0.289		0.753		0.505		0.000		0.000		0.000		0.000		0.000
																								(l/s)
		0		0		0		0		331		279		526		0		0		0		0		0
		0		0		0		33		310		493		568		0		0		0		0		0
		0		0		0		331		279		727		488		0		0		0		0		0
																								(thoudand m3)
		0		0		0		0		286		241		454		0		0		0		0		0
		0		0		0		29		268		426		491		0		0		0		0		0
		0		0		0		286		265		628		464		0		0		0		0		0
		0		0		0		315		819		1,295		1,409		0		0		0		0		0

Early variety potato				0.468		781	ha																	
		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec
	N		N		N		N		N		N		N		N		N		N		N		N	
1		0.000		0.000		0.000	1	0.418	2	0.470	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
2		0.000		0.000		0.000	1	0.418	2	0.470	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
3		0.000		0.000		0.000	1	0.418	2	0.470	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
4		0.000		0.000		0.000	1	0.418	2	0.470	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
5		0.000		0.000		0.000	1	0.418	2	0.470	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
6		0.000		0.000		0.000	1	0.418	2	0.470	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
7		0.000		0.000		0.000	1	0.418	2	0.470	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
8		0.000		0.000		0.000	1	0.418	2	0.470	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
9		0.000		0.000		0.000	1	0.418	2	0.470	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
10		0.000		0.000		0.000	1	0.418	2	0.470	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
11		0.000		0.000		0.000	1	0.418	2	0.470	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
12		0.000		0.000		0.000		0.000	2	0.470	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
13		0.000		0.000		0.000		0.000	2	0.470	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
14		0.000		0.000		0.000		0.000	2	0.470	5	0.579		0.000		0.000		0.000		0.000		0.000		0.000
15		0.000		0.000		0.000		0.000	2	0.470	5	0.579		0.000		0.000		0.000		0.000		0.000		0.000
16		0.000		0.000		0.000		0.000	2	0.470	5	0.579		0.000		0.000		0.000		0.000		0.000		0.000
17		0.000		0.000		0.000		0.000	3	0.502	5	0.579		0.000		0.000		0.000		0.000		0.000		0.000
18		0.000		0.000		0.000		0.000	3	0.502	5	0.579		0.000		0.000		0.000		0.000		0.000		0.000
19		0.000		0.000		0.000		0.000	3	0.502	5	0.579		0.000		0.000		0.000		0.000		0.000		0.000
20		0.000		0.000		0.000		0.000	3	0.502	5	0.579		0.000		0.000		0.000		0.000		0.000		0.000
21		0.000		0.000		0.000		0.000	3	0.502	5	0.579		0.000		0.000		0.000		0.000		0.000		0.000
22		0.000		0.000		0.000		0.000	3	0.502	5	0.579		0.000		0.000		0.000		0.000		0.000		0.000
23		0.000		0.000		0.000		0.000	3	0.502	5	0.579		0.000		0.000		0.000		0.000		0.000		0.000
24		0.000		0.000		0.000		0.000	3	0.502	5	0.579		0.000		0.000		0.000		0.000		0.000		0.000
25		0.000		0.000	1	0.418		0.000	3	0.502	5	0.579		0.000		0.000		0.000		0.000		0.000		0.000
26		0.000		0.000	1	0.418		0.000	3	0.502	5	0.579		0.000		0.000		0.000		0.000		0.000		0.000
27		0.000		0.000	1	0.418		0.000	3	0.502		0.000		0.000		0.000		0.000		0.000		0.000		0.000
28		0.000		0.000	1	0.418		0.000	3	0.502		0.000		0.000		0.000		0.000		0.000		0.000		0.000
29		0.000			1	0.418		0.000	3	0.502		0.000		0.000		0.000		0.000		0.000		0.000		0.000
30		0.000			1	0.418		0.000	3	0.502		0.000		0.000		0.000		0.000		0.000		0.000		0.000
31		0.000			1	0.418			3	0.502				0.000		0.000				0.000				0.000
																								(l/s/ha)
1		0.000		0.000		0.000		0.418		0.470		0.579		0.000		0.000		0.000		0.000		0.000		0.000
2		0.000		0.000		0.000		0.042		0.483		0.579		0.000		0.000		0.000		0.000		0.000		0.000
3		0.000		0.000		0.266		0.000		0.502		0.347		0.000		0.000		0.000		0.000		0.000		0.000
																								(l/s)
		0		0		0		698		784		966		0		0		0		0		0		0
		0		0		0		70		806		966		0		0		0		0		0		0
		0		0		444		0		838		580		0		0		0		0		0		0
																								(thoudand m3)
		0		0		0		603		677		835		0		0		0		0		0		0
		0		0		0		60		696		835		0		0		0		0		0		0
		0		0		422		0		796		501		0		0		0		0		0		0
		0		0		422		663		2,169		2,171		0		0		0		0		0		0

(2)Irrigation Standards for Ararat, Aragatsotn, Kotayk Regions (1000 - 1300 m) (Gray and brown, solid , with middle capacity heavy loamy sands

Wheat		0.468		233	ha																			
		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec
	N		N		N		N		N		N		N		N		N		N		N		N	
1		0.000		0.000		0.000		0.000		0.000	2	0.306	4	0.694		0.000		0.000	1	0.496		0.000		0.000
2		0.000		0.000		0.000		0.000		0.000	2	0.306	4	0.694		0.000		0.000	1	0.496		0.000		0.000
3		0.000		0.000		0.000		0.000		0.000	2	0.306	4	0.694		0.000		0.000	1	0.496		0.000		0.000
4		0.000		0.000		0.000		0.000		0.000	2	0.306	4	0.694		0.000		0.000	1	0.496		0.000		0.000
5		0.000		0.000		0.000		0.000		0.000	2	0.306	4	0.694		0.000		0.000	1	0.496		0.000		0.000
6		0.000		0.000		0.000		0.000	2	0.306	2	0.306	4	0.694		0.000		0.000	1	0.496		0.000		0.000
7		0.000		0.000		0.000		0.000	2	0.306	2	0.306		0.000		0.000		0.000	1	0.496		0.000		0.000
8		0.000		0.000		0.000		0.000	2	0.306	2	0.306		0.000		0.000		0.000	1	0.496		0.000		0.000
9		0.000		0.000		0.000		0.000	2	0.306	3	0.801		0.000		0.000		0.000	1	0.496		0.000		0.000
10		0.000		0.000		0.000		0.000	2	0.306	3	0.801		0.000		0.000		0.000	1	0.496		0.000		0.000
11		0.000		0.000		0.000		0.000	2	0.306	3	0.801		0.000		0.000		0.000		0.000		0.000		0.000
12		0.000		0.000		0.000		0.000	2	0.306	3	0.801		0.000		0.000		0.000		0.000		0.000		0.000
13		0.000		0.000		0.000		0.000	2	0.306	3	0.801		0.000		0.000		0.000		0.000		0.000		0.000
14		0.000		0.000		0.000		0.000	2	0.306	3	0.801		0.000		0.000		0.000		0.000		0.000		0.000
15		0.000		0.000		0.000		0.000	2	0.306	3	0.801		0.000		0.000		0.000		0.000		0.000		0.000
16		0.000		0.000		0.000		0.000	2	0.306	3	0.801		0.000		0.000		0.000		0.000		0.000		0.000
17		0.000		0.000		0.000		0.000	2	0.306	3	0.801		0.000		0.000		0.000		0.000		0.000		0.000
18		0.000		0.000		0.000		0.000	2	0.306	3	0.801		0.000		0.000		0.000		0.000		0.000		0.000
19		0.000		0.000		0.000		0.000	2	0.306	3	0.801		0.000		0.000		0.000		0.000		0.000		0.000
20		0.000		0.000		0.000		0.000	2	0.306	3	0.801		0.000		0.000	1	0.496		0.000		0.000		0.000
21		0.000		0.000		0.000		0.000	2	0.306	3	0.801		0.000		0.000	1	0.496		0.000		0.000		0.000
22		0.000		0.000		0.000		0.000	2	0.306	4	0.694		0.000		0.000	1	0.496		0.000		0.000		0.000
23		0.000		0.000		0.000		0.000	2	0.306	4	0.694		0.000		0.000	1	0.496		0.000		0.000		0.000
24		0.000		0.000		0.000		0.000	2	0.306	4	0.694		0.000		0.000	1	0.496		0.000		0.000		0.000
25		0.000		0.000		0.000		0.000	2	0.306	4	0.694		0.000		0.000	1	0.496		0.000		0.000		0.000
26		0.000		0.000		0.000		0.000	2	0.306	4	0.694		0.000		0.000	1	0.496		0.000		0.000		0.000
27		0.000		0.000		0.000		0.000	2	0.306	4	0.694		0.000		0.000	1	0.496		0.000		0.000		0.000
28		0.000		0.000		0.000		0.000	2	0.306	4	0.694		0.000		0.000	1	0.496		0.000		0.000		0.000
29		0.000				0.000		0.000	2	0.306	4	0.694		0.000		0.000	1	0.496		0.000		0.000		0.000
30		0.000				0.000		0.000	2	0.306	4	0.694		0.000		0.000	1	0.496		0.000		0.000		0.000
31		0.000				0.000			2	0.306				0.000		0.000				0.000				0.000
																								(l/s/ha)
1		0.000		0.000		0.000		0.000		0.153		0.405		0.416		0.000		0.000		0.496		0.000		0.000
2		0.000		0.000		0.000		0.000		0.306		0.801		0.000		0.000		0.050		0.000		0.000		0.000
3		0.000		0.000		0.000		0.000		0.306		0.705		0.000		0.000		0.496		0.000		0.000		0.000
																								(l/s)
		0		0		0		0		76		202		207		0		0		247		0		0
		0		0		0		0		152		399		0		0		25		0		0		0
		0		0		0		0		152		351		0		0		247		0		0		0
																								(thoudand m3)
		0		0		0		0		66		175		179		0		0		213		0		0
		0		0		0		0		131		345		0		0		22		0		0		0
		0		0		0		0		144		303		0		0		213		0		0		0
		0		0		0		0		341		823		179		0		235		213		0		0

Vegetable		0.468		216	ha																			
		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec
	N		N		N		N		N		N		N		N		N		N		N		N	
1		0.000		0.000		0.000		0.000	2	0.434	3	0.347	5	0.496	7	0.631	10	0.434		0.000		0.000		0.000
2		0.000		0.000		0.000		0.000	2	0.434	3	0.347	5	0.496	8	0.579	10	0.434		0.000		0.000		0.000
3		0.000		0.000		0.000		0.000	2	0.434	3	0.347	5	0.496	8	0.579	10	0.434		0.000		0.000		0.000
4		0.000		0.000		0.000		0.000	2	0.434	3	0.347	5	0.496	8	0.579	10	0.434		0.000		0.000		0.000
5		0.000		0.000		0.000		0.000	2	0.434	3	0.347	5	0.496	8	0.579	10	0.434		0.000		0.000		0.000
6		0.000		0.000		0.000		0.000	2	0.434	3	0.347	5	0.496	8	0.579	10	0.434		0.000		0.000		0.000
7		0.000		0.000		0.000		0.000	2	0.434	3	0.347	5	0.496	8	0.579	10	0.434		0.000		0.000		0.000
8		0.000		0.000		0.000		0.000	2	0.434	3	0.347	5	0.496	8	0.579	10	0.434		0.000		0.000		0.000
9		0.000		0.000		0.000		0.000	2	0.434	3	0.347	5	0.496	8	0.579	10	0.434		0.000		0.000		0.000
10		0.000		0.000		0.000		0.000	2	0.434	3	0.347	6	0.579	8	0.579	10	0.434		0.000		0.000		0.000
11		0.000		0.000		0.000		0.000	2	0.434	3	0.347	6	0.579	8	0.579	10	0.434		0.000		0.000		0.000
12		0.000		0.000		0.000		0.000	2	0.434	4	0.496	6	0.579	8	0.579	11	0.408		0.000		0.000		0.000
13		0.000		0.000		0.000		0.000		0.000	4	0.496	6	0.579	8	0.579	11	0.408		0.000		0.000		0.000
14		0.000		0.000		0.000		0.000		0.000	4	0.496	6	0.579	9	0.534	11	0.408		0.000		0.000		0.000
15		0.000		0.000		0.000		0.000		0.000	4	0.496	6	0.579	9	0.534	11	0.408		0.000		0.000		0.000
16		0.000		0.000		0.000		0.000		0.000	4	0.496	6	0.579	9	0.534	11	0.408		0.000		0.000		0.000
17		0.000		0.000		0.000		0.000		0.000	4	0.496	6	0.579	9	0.534	11	0.408		0.000		0.000		0.000
18		0.000		0.000		0.000		0.000		0.000	4	0.496	6	0.579	9	0.534	11	0.408		0.000		0.000		0.000
19		0.000		0.000		0.000		0.000		0.000	4	0.496	6	0.579	9	0.534	11	0.408		0.000		0.000		0.000
20		0.000		0.000		0.000		0.000		0.000	4	0.496	6	0.579	9	0.534	11	0.408		0.000		0.000		0.000
21		0.000		0.000		0.000		0.000		0.000	4	0.496	6	0.579	9	0.534	11	0.408		0.000		0.000		0.000
22		0.000		0.000		0.000		0.000		0.000	4	0.496	7	0.631	9	0.534	11	0.408		0.000		0.000		0.000
23		0.000		0.000		0.000		0.000	3	0.347	4	0.496	7	0.631	9	0.534	11	0.408		0.000		0.000		0.000
24		0.000		0.000		0.000		0.000	3	0.347	4	0.496	7	0.631	9	0.534	11	0.408		0.000		0.000		0.000
25		0.000		0.000		0.000		0.000	3	0.347	4	0.496	7	0.631	9	0.534	11	0.408		0.000		0.000		0.000
26		0.000		0.000		0.000		0.000	3	0.347	5	0.496	7	0.631	9	0.534	11	0.408		0.000		0.000		0.000
27		0.000		0.000		0.000	2	0.434	3	0.347	5	0.496	7	0.631	10	0.434	11	0.408		0.000		0.000		0.000
28		0.000		0.000		0.000	2	0.434	3	0.347	5	0.496	7	0.631	10	0.434	11	0.408		0.000		0.000		0.000
29		0.000				0.000	2	0.434	3	0.347	5	0.496	7	0.631	10	0.434		0.000		0.000		0.000		0.000
30		0.000				0.000	2	0.434	3	0.347	5	0.496	7	0.631	10	0.434		0.000		0.000		0.000		0.000
31		0.000				0.000			3	0.347			7	0.631	10	0.434				0.000				0.000
1		0.000		0.000		0.000		0.000		0.434		0.347		0.504		0.584		0.434		0.000		0.000		0.000
2		0.000		0.000		0.000		0.000		0.087		0.481		0.579		0.548		0.411		0.000		0.000		0.000
3		0.000		0.000		0.000		0.174		0.284		0.496		0.626		0.489		0.326		0.000		0.000		0.000
		0		0		0		0		200		160		233		270		200		0		0		0
		0		0		0		0		40		222		267		253		190		0		0		0
		0		0		0		80		131		229		289		225		151		0		0		0
		0		0		0		0		173		138		201		233		173		0		0		0
		0		0		0		0		35		192		231		219		164		0		0		0
		0		0		0		69		125		198		275		214		130		0		0		0
		0		0		0		69		333		528		707		666		467		0		0		0

Grape		0.468		1,338	ha																			
		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec
	N		N		N		N		N		N		N		N		N		N		N		N	
1		0.000		0.000		0.000		0.000	1	0.401		0.000	2	0.496	4	0.613	6	0.613		0.000		0.000		0.000
2		0.000		0.000		0.000		0.000	1	0.401		0.000	2	0.496	4	0.613	6	0.613		0.000		0.000		0.000
3		0.000		0.000		0.000		0.000	1	0.401		0.000	2	0.496	4	0.613	6	0.613		0.000		0.000		0.000
4		0.000		0.000		0.000		0.000	1	0.401		0.000	2	0.496	4	0.613	6	0.613		0.000		0.000		0.000
5		0.000		0.000		0.000		0.000	1	0.401		0.000	2	0.496	4	0.613	6	0.613		0.000		0.000		0.000
6		0.000		0.000		0.000		0.000	1	0.401		0.000	3	0.651	4	0.613	6	0.613		0.000		0.000		0.000
7		0.000		0.000		0.000		0.000	1	0.401		0.000	3	0.651	4	0.613	6	0.613		0.000		0.000		0.000
8		0.000		0.000		0.000		0.000	1	0.401		0.000	3	0.651	5	0.613	6	0.613		0.000		0.000		0.000
9		0.000		0.000		0.000		0.000	1	0.401		0.000	3	0.651	5	0.613	6	0.613		0.000		0.000		0.000
10		0.000		0.000		0.000		0.000	1	0.401		0.000	3	0.651	5	0.613	6	0.613	7	0.651		0.000		0.000
11		0.000		0.000		0.000		0.000	1	0.401		0.000	3	0.651	5	0.613		0.000	7	0.651		0.000		0.000
12		0.000		0.000		0.000		0.000	1	0.401		0.000	3	0.651	5	0.613		0.000	7	0.651		0.000		0.000
13		0.000		0.000		0.000		0.000	1	0.401		0.000	3	0.651	5	0.613		0.000	7	0.651		0.000		0.000
14		0.000		0.000		0.000		0.000	1	0.401		0.000	3	0.651	5	0.613		0.000	7	0.651		0.000		0.000
15		0.000		0.000		0.000		0.000	1	0.401	2	0.496	3	0.651	5	0.613		0.000	7	0.651		0.000		0.000
16		0.000		0.000		0.000		0.000	1	0.401	2	0.496	3	0.651	5	0.613		0.000	7	0.651		0.000		0.000
17		0.000		0.000		0.000		0.000	1	0.401	2	0.496	3	0.651	5	0.613		0.000	7	0.651		0.000		0.000
18		0.000		0.000		0.000		0.000	1	0.401	2	0.496	3	0.651	5	0.613		0.000	7	0.651		0.000		0.000
19		0.000		0.000		0.000		0.000	1	0.401	2	0.496	3	0.651	5	0.613		0.000	7	0.651		0.000		0.000
20		0.000		0.000		0.000		0.000	1	0.401	2	0.496	3	0.651	5	0.613		0.000	7	0.651		0.000		0.000
21		0.000		0.000		0.000		0.000		0.000	2	0.496	3	0.651	5	0.613		0.000	7	0.651		0.000		0.000
22		0.000		0.000		0.000		0.000		0.000	2	0.496	4	0.613	5	0.613		0.000	7	0.651		0.000		0.000
23		0.000		0.000		0.000		0.000		0.000	2	0.496	4	0.613	5	0.613		0.000	7	0.651		0.000		0.000
24		0.000		0.000		0.000		0.000		0.000	2	0.496	4	0.613	5	0.613		0.000	7	0.651		0.000		0.000
25		0.000		0.000		0.000	1	0.401		0.000	2	0.496	4	0.613	6	0.613		0.000	7	0.651		0.000		0.000
26		0.000		0.000		0.000	1	0.401		0.000	2	0.496	4	0.613	6	0.613		0.000		0.000		0.000		0.000
27		0.000		0.000		0.000	1	0.401		0.000	2	0.496	4	0.613	6	0.613		0.000		0.000		0.000		0.000
28		0.000		0.000		0.000	1	0.401		0.000	2	0.496	4	0.613	6	0.613		0.000		0.000		0.000		0.000
29		0.000				0.000	1	0.401		0.000	2	0.496	4	0.613	6	0.613		0.000		0.000		0.000		0.000
30		0.000				0.000	1	0.401		0.000	2	0.496	4	0.613	6	0.613		0.000		0.000		0.000		0.000
31		0.000				0.000				0.000			4	0.613	6	0.613				0.000				0.000
1		0.000		0.000		0.000		0.000		0.401		0.000		0.574		0.613		0.613		0.065		0.000		0.000
2		0.000		0.000		0.000		0.000		0.401		0.298		0.651		0.613		0.000		0.651		0.000		0.000
3		0.000		0.000		0.000		0.241		0.000		0.496		0.616		0.613		0.000		0.296		0.000		0.000
		0		0		0		0		1,146		0		1,640		1,753		1,753		186		0		0
		0		0		0		0		1,146		851		1,861		1,753		0		1,861		0		0
		0		0		0		688		0		1,418		1,762		1,753		0		846		0		0
		0		0		0		0		990		0		1,417		1,515		1,515		161		0		0
		0		0		0		0		990		735		1,608		1,515		0		1,608		0		0
		0		0		0		594		0		1,225		1,675		1,666		0		804		0		0
		0		0		0		594		1,980		1,960		4,700		4,696		1,515		2,573		0		0

Alfalfa		0.468		622	ha																			
		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec
	N		N		N		N		N		N		N		N		N		N		N		N	
1		0.000		0.000		0.000		0.000	1	0.514	2	0.250	4	0.712	6	0.661	8	0.441		0.000		0.000		0.000
2		0.000		0.000		0.000		0.000	1	0.514	2	0.250	4	0.712	6	0.661	8	0.441		0.000		0.000		0.000
3		0.000		0.000		0.000		0.000	1	0.514	2	0.250	4	0.712	6	0.661	8	0.441		0.000		0.000		0.000
4		0.000		0.000		0.000		0.000	1	0.514	2	0.250	4	0.712	6	0.661	8	0.441		0.000		0.000		0.000
5		0.000		0.000		0.000		0.000	1	0.514	2	0.250	4	0.712	6	0.661	8	0.441		0.000		0.000		0.000
6		0.000		0.000		0.000		0.000	1	0.514	2	0.250	4	0.712	6	0.661	8	0.441		0.000		0.000		0.000
7		0.000		0.000		0.000		0.000	1	0.514	2	0.250	4	0.712	6	0.661	8	0.441		0.000		0.000		0.000
8		0.000		0.000		0.000		0.000	2	0.250	2	0.250	4	0.712	6	0.661	8	0.441		0.000		0.000		0.000
9		0.000		0.000		0.000		0.000	2	0.250	2	0.250	4	0.712	6	0.661	8	0.441		0.000		0.000		0.000
10		0.000		0.000		0.000		0.000	2	0.250	2	0.250	4	0.712	6	0.661	8	0.441		0.000		0.000		0.000
11		0.000		0.000		0.000		0.000	2	0.250	2	0.250	4	0.712	7	0.617	8	0.441		0.000		0.000		0.000
12		0.000		0.000		0.000		0.000	2	0.250	2	0.250	4	0.712	7	0.617	8	0.441		0.000		0.000		0.000
13		0.000		0.000		0.000		0.000	2	0.250	2	0.250	4	0.712	7	0.617	8	0.441		0.000		0.000		0.000
14		0.000		0.000		0.000		0.000	2	0.250	3	0.545	5	0.661	7	0.617	8	0.441		0.000		0.000		0.000
15		0.000		0.000		0.000		0.000	2	0.250	3	0.545	5	0.661	7	0.617	8	0.441		0.000		0.000		0.000
16		0.000		0.000		0.000		0.000	2	0.250	3	0.545	5	0.661	7	0.617		0.000		0.000		0.000		0.000
17		0.000		0.000		0.000		0.000	2	0.250	3	0.545	5	0.661	7	0.617		0.000		0.000		0.000		0.000
18		0.000		0.000		0.000		0.000	2	0.250	3	0.545	5	0.661	7	0.617		0.000		0.000		0.000		0.000
19		0.000		0.000		0.000		0.000	2	0.250	3	0.545	5	0.661	7	0.617		0.000		0.000		0.000		0.000
20		0.000		0.000		0.000	1	0.514	2	0.250	3	0.545	5	0.661	7	0.617		0.000		0.000		0.000		0.000
21		0.000		0.000		0.000	1	0.514	2	0.250	3	0.545	5	0.661	7	0.617		0.000		0.000		0.000		0.000
22		0.000		0.000		0.000	1	0.514	2	0.250	3	0.545	5	0.661	7	0.617		0.000		0.000		0.000		0.000
23		0.000		0.000		0.000	1	0.514	2	0.250	3	0.545	5	0.661	7	0.617		0.000		0.000		0.000		0.000
24		0.000		0.000		0.000	1	0.514	2	0.250	3	0.545	5	0.661	7	0.617		0.000		0.000		0.000		0.000
25		0.000		0.000		0.000	1	0.514	2	0.250	3	0.545	5	0.661	7	0.617		0.000		0.000		0.000		0.000
26		0.000		0.000		0.000	1	0.514	2	0.250	3	0.545	5	0.661	8	0.441		0.000		0.000		0.000		0.000
27		0.000		0.000		0.000	1	0.514	2	0.250	3	0.545	5	0.661	8	0.441		0.000		0.000		0.000		0.000
28		0.000		0.000		0.000	1	0.514	2	0.250	3	0.545	6	0.661	8	0.441		0.000		0.000		0.000		0.000
29		0.000				0.000	1	0.514	2	0.250	3	0.545	6	0.661	8	0.441		0.000		0.000		0.000		0.000
30		0.000				0.000	1	0.514	2	0.250	3	0.545	6	0.661	8	0.441		0.000		0.000		0.000		0.000
31		0.000				0.000			2	0.250			6	0.661	8	0.441				0.000				0.000
1		0.000		0.000		0.000		0.000		0.435		0.250		0.712		0.661		0.441		0.000		0.000		0.000
2		0.000		0.000		0.000		0.051		0.250		0.457		0.676		0.617		0.221		0.000		0.000		0.000
3		0.000		0.000		0.000		0.514		0.250		0.545		0.661		0.521		0.000		0.000		0.000		0.000
		0		0		0		0		578		332		946		879		586		0		0		0
		0		0		0		68		332		607		899		820		293		0		0		0
		0		0		0		683		332		724		879		692		0		0		0		0
		0		0		0		0		499		287		817		759		506		0		0		0
		0		0		0		59		287		524		777		708		253		0		0		0
		0		0		0		590		316		626		835		658		0		0		0		0
		0		0		0		649		1,102		1,437		2,429		2,125		759		0		0		0

Fruit		0.468		1,060	ha																			
		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec
	N		N		N		N		N		N		N		N		N		N		N		N	
1		0.000		0.000		0.000		0.000	1	0.276		0.000	3	0.413	5	0.445	7	0.263		0.000		0.000		0.000
2		0.000		0.000		0.000		0.000	1	0.276		0.000	3	0.413	5	0.445	7	0.263		0.000		0.000		0.000
3		0.000		0.000		0.000		0.000	1	0.276		0.000	3	0.413	5	0.445	7	0.263		0.000		0.000		0.000
4		0.000		0.000		0.000		0.000	1	0.276		0.000	3	0.413	5	0.445	7	0.263		0.000		0.000		0.000
5		0.000		0.000		0.000		0.000	1	0.276		0.000	3	0.413	5	0.445	7	0.263		0.000		0.000		0.000
6		0.000		0.000		0.000		0.000		0.000		0.000	3	0.413	5	0.445	7	0.263		0.000		0.000		0.000
7		0.000		0.000		0.000		0.000		0.000		0.000	3	0.413	5	0.445	7	0.263		0.000		0.000		0.000
8		0.000		0.000		0.000		0.000		0.000		0.000	3	0.413	6	0.413	7	0.263		0.000		0.000		0.000
9		0.000		0.000		0.000		0.000		0.000		0.000	3	0.413	6	0.413	7	0.263		0.000		0.000		0.000
10		0.000		0.000		0.000		0.000		0.000	2	0.362	4	0.362	6	0.413	7	0.263		0.000		0.000		0.000
11		0.000		0.000		0.000		0.000		0.000	2	0.362	4	0.362	6	0.413	7	0.263		0.000		0.000		0.000
12		0.000		0.000		0.000		0.000		0.000	2	0.362	4	0.362	6	0.413	7	0.263		0.000		0.000		0.000
13		0.000		0.000		0.000		0.000		0.000	2	0.362	4	0.362	6	0.413		0.000		0.000		0.000		0.000
14		0.000		0.000		0.000		0.000		0.000	2	0.362	4	0.362	6	0.413		0.000		0.000		0.000		0.000
15		0.000		0.000		0.000	1	0.276		0.000	2	0.362	4	0.362	6	0.413		0.000		0.000		0.000		0.000
16		0.000		0.000		0.000	1	0.276		0.000	2	0.362	4	0.362	6	0.413		0.000		0.000		0.000		0.000
17		0.000		0.000		0.000	1	0.276		0.000	2	0.362	4	0.362	6	0.413		0.000		0.000		0.000		0.000
18		0.000		0.000		0.000	1	0.276		0.000	2	0.362	4	0.362	6	0.413		0.000		0.000		0.000		0.000
19		0.000		0.000		0.000	1	0.276		0.000	2	0.362	4	0.362	6	0.413		0.000		0.000		0.000		0.000
20		0.000		0.000		0.000	1	0.276		0.000	2	0.362	4	0.362	6	0.413		0.000		0.000		0.000		0.000
21		0.000		0.000		0.000	1	0.276		0.000	2	0.362	4	0.362	6	0.413		0.000		0.000		0.000		0.000
22		0.000		0.000		0.000	1	0.276		0.000	2	0.362	4	0.362	7	0.263		0.000		0.000		0.000		0.000
23		0.000		0.000		0.000	1	0.276		0.000	2	0.362	4	0.362	7	0.263		0.000		0.000		0.000		0.000
24		0.000		0.000		0.000	1	0.276		0.000	2	0.362	4	0.362	7	0.263		0.000		0.000		0.000		0.000
25		0.000		0.000		0.000	1	0.276		0.000	2	0.362	4	0.362	7	0.263		0.000		0.000		0.000		0.000
26		0.000		0.000		0.000	1	0.276		0.000	3	0.413	5	0.445	7	0.263		0.000		0.000		0.000		0.000
27		0.000		0.000		0.000	1	0.276		0.000	3	0.413	5	0.445	7	0.263		0.000		0.000		0.000		0.000
28		0.000		0.000		0.000	1	0.276		0.000	3	0.413	5	0.445	7	0.263		0.000		0.000		0.000		0.000
29		0.000				0.000	1	0.276		0.000	3	0.413	5	0.445	7	0.263		0.000		0.000		0.000		0.000
30		0.000				0.000	1	0.276		0.000	3	0.413	5	0.445	7	0.263		0.000		0.000		0.000		0.000
31		0.000				0.000	1			0.000			5	0.445	7	0.263				0.000				0.000
1		0.000		0.000		0.000		0.000		0.138		0.036		0.408		0.435		0.263		0.000		0.000		0.000
2		0.000		0.000		0.000		0.166		0.000		0.362		0.362		0.413		0.053		0.000		0.000		0.000
3		0.000		0.000		0.000		0.276		0.000		0.388		0.407		0.277		0.000		0.000		0.000		0.000
		0		0		0		0		313		82		924		986		596		0		0		0
		0		0		0		375		0		820		820		935		119		0		0		0
		0		0		0		625		0		878		922		627		0		0		0		0
		0		0		0		0		270		71		798		852		515		0		0		0
		0		0		0		324		0		708		708		808		103		0		0		0
		0		0		0		540		0		759		876		596		0		0		0		0
		0		0		0		864		270		1,538		2,382		2,256		618		0		0		0

Maize		0.468		149	ha																			
		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec
	N		N		N		N		N		N		N		N		N		N		N		N	
1		0.000		0.000		0.000		0.000	1	0.280	2	0.334	3	0.511	5	0.511		0.000		0.000		0.000		0.000
2		0.000		0.000		0.000		0.000	1	0.280	2	0.334	3	0.511	5	0.511		0.000		0.000		0.000		0.000
3		0.000		0.000		0.000		0.000	1	0.280	2	0.334	3	0.511	5	0.511		0.000		0.000		0.000		0.000
4		0.000		0.000		0.000		0.000	1	0.280	2	0.334	3	0.511	5	0.511		0.000		0.000		0.000		0.000
5		0.000		0.000		0.000		0.000	1	0.280	2	0.334	3	0.511	5	0.511		0.000		0.000		0.000		0.000
6		0.000		0.000		0.000		0.000	1	0.280	2	0.334	3	0.511	5	0.511		0.000		0.000		0.000		0.000
7		0.000		0.000		0.000		0.000	1	0.280	2	0.334	3	0.511		0.000		0.000		0.000		0.000		0.000
8		0.000		0.000		0.000		0.000	1	0.280	2	0.334	4	0.668		0.000		0.000		0.000		0.000		0.000
9		0.000		0.000		0.000		0.000	1	0.280	2	0.334	4	0.668		0.000		0.000		0.000		0.000		0.000
10		0.000		0.000		0.000		0.000	1	0.280	2	0.334	4	0.668		0.000		0.000		0.000		0.000		0.000
11		0.000		0.000		0.000		0.000	1	0.280	2	0.334	4	0.668		0.000		0.000		0.000		0.000		0.000
12		0.000		0.000		0.000		0.000	1	0.280	2	0.334	4	0.668		0.000		0.000		0.000		0.000		0.000
13		0.000		0.000		0.000		0.000	1	0.280	2	0.334	4	0.668		0.000		0.000		0.000		0.000		0.000
14		0.000		0.000		0.000		0.000	1	0.280	2	0.334	4	0.668		0.000		0.000		0.000		0.000		0.000
15		0.000		0.000		0.000		0.000	1	0.280	2	0.334	4	0.668		0.000		0.000		0.000		0.000		0.000
16		0.000		0.000		0.000		0.000	1	0.280	2	0.334	4	0.668		0.000		0.000		0.000		0.000		0.000
17		0.000		0.000		0.000		0.000	1	0.280	2	0.334	4	0.668		0.000		0.000		0.000		0.000		0.000
18		0.000		0.000		0.000		0.000	1	0.280	2	0.334	4	0.668		0.000		0.000		0.000		0.000		0.000
19		0.000		0.000		0.000		0.000	1	0.280	2	0.334	4	0.668		0.000		0.000		0.000		0.000		0.000
20		0.000		0.000		0.000		0.000	1	0.280	2	0.334	4	0.668		0.000		0.000		0.000		0.000		0.000
21		0.000		0.000		0.000		0.000	1	0.280	3	0.511	5	0.511		0.000		0.000		0.000		0.000		0.000
22		0.000		0.000		0.000		0.000	1	0.280	3	0.511	5	0.511		0.000		0.000		0.000		0.000		0.000
23		0.000		0.000		0.000		0.000	1	0.280	3	0.511	5	0.511		0.000		0.000		0.000		0.000		0.000
24		0.000		0.000		0.000		0.000	1	0.280	3	0.511	5	0.511		0.000		0.000		0.000		0.000		0.000
25		0.000		0.000		0.000	1	0.280	1	0.280	3	0.511	5	0.511		0.000		0.000		0.000		0.000		0.000
26		0.000		0.000		0.000	1	0.280	2	0.334	3	0.511	5	0.511		0.000		0.000		0.000		0.000		0.000
27		0.000		0.000		0.000	1	0.280	2	0.334	3	0.511	5	0.511		0.000		0.000		0.000		0.000		0.000
28		0.000		0.000		0.000	1	0.280	2	0.334	3	0.511	5	0.511		0.000		0.000		0.000		0.000		0.000
29		0.000				0.000	1	0.280	2	0.334	3	0.511	5	0.511		0.000		0.000		0.000		0.000		0.000
30		0.000				0.000	1	0.280	2	0.334	3	0.511	5	0.511		0.000		0.000		0.000		0.000		0.000
31		0.000				0.000			2	0.334			5	0.511		0.000				0.000				0.000
1		0.000		0.000		0.000		0.000		0.280		0.334		0.558		0.307		0.000		0.000		0.000		0.000
2		0.000		0.000		0.000		0.000		0.280		0.334		0.668		0.000		0.000		0.000		0.000		0.000
3		0.000		0.000		0.000		0.168		0.309		0.511		0.511		0.000		0.000		0.000		0.000		0.000
		0		0		0		0		89		106		178		98		0		0		0		0
		0		0		0		0		89		106		213		0		0		0		0		0
		0		0		0		53		99		163		163		0		0		0		0		0
		0		0		0		0		77		92		154		85		0		0		0		0
		0		0		0		0		77		92		184		0		0		0		0		0
		0		0		0		46		94		141		155		0		0		0		0		0
		0		0		0		46		248		325		493		85		0		0		0		0

Early variety potato				0.468		26	ha																	
		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec
	N		N		N		N		N		N		N		N		N		N		N		N	
1		0.000		0.000		0.000	1	0.318		0.000	2	0.289	4	0.579		0.000		0.000		0.000		0.000		0.000
2		0.000		0.000		0.000	1	0.318		0.000	2	0.289	4	0.579		0.000		0.000		0.000		0.000		0.000
3		0.000		0.000		0.000	1	0.318		0.000	2	0.289	5	0.455		0.000		0.000		0.000		0.000		0.000
4		0.000		0.000		0.000	1	0.318		0.000	2	0.289	5	0.455		0.000		0.000		0.000		0.000		0.000
5		0.000		0.000		0.000	1	0.318		0.000	2	0.289	5	0.455		0.000		0.000		0.000		0.000		0.000
6		0.000		0.000		0.000	1	0.318		0.000	2	0.289	5	0.455		0.000		0.000		0.000		0.000		0.000
7		0.000		0.000		0.000	1	0.318		0.000	2	0.289	5	0.455		0.000		0.000		0.000		0.000		0.000
8		0.000		0.000		0.000	1	0.318		0.000	2	0.289	5	0.455		0.000		0.000		0.000		0.000		0.000
9		0.000		0.000		0.000	1	0.318		0.000	2	0.289	5	0.455		0.000		0.000		0.000		0.000		0.000
10		0.000		0.000		0.000	1	0.318		0.000	2	0.289	5	0.455		0.000		0.000		0.000		0.000		0.000
11		0.000		0.000		0.000	1	0.318		0.000	3	0.579	5	0.455		0.000		0.000		0.000		0.000		0.000
12		0.000		0.000		0.000	1	0.318		0.000	3	0.579	5	0.455		0.000		0.000		0.000		0.000		0.000
13		0.000		0.000		0.000	1	0.318		0.000	3	0.579	5	0.455		0.000		0.000		0.000		0.000		0.000
14		0.000		0.000		0.000	1	0.318		0.000	3	0.579	5	0.455		0.000		0.000		0.000		0.000		0.000
15		0.000		0.000		0.000	1	0.318		0.000	3	0.579	5	0.455		0.000		0.000		0.000		0.000		0.000
16		0.000		0.000		0.000	1	0.318		0.000	3	0.579	5	0.455		0.000		0.000		0.000		0.000		0.000
17		0.000		0.000		0.000	1	0.318		0.000	3	0.579		0.000		0.000		0.000		0.000		0.000		0.000
18		0.000		0.000		0.000	1	0.318		0.000	3	0.579		0.000		0.000		0.000		0.000		0.000		0.000
19		0.000		0.000		0.000	1	0.318		0.000	3	0.579		0.000		0.000		0.000		0.000		0.000		0.000
20		0.000		0.000		0.000	1	0.318	2	0.289	3	0.579		0.000		0.000		0.000		0.000		0.000		0.000
21		0.000		0.000		0.000		0.000	2	0.289	3	0.579		0.000		0.000		0.000		0.000		0.000		0.000
22		0.000		0.000		0.000		0.000	2	0.289	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
23		0.000		0.000		0.000		0.000	2	0.289	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
24		0.000		0.000		0.000		0.000	2	0.289	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
25		0.000		0.000		0.000		0.000	2	0.289	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
26		0.000		0.000		0.000		0.000	2	0.289	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
27		0.000		0.000		0.000		0.000	2	0.289	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
28		0.000		0.000		0.000		0.000	2	0.289	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
29		0.000				0.000		0.000	2	0.289	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
30		0.000				0.000		0.000	2	0.289	4	0.579		0.000		0.000		0.000		0.000		0.000		0.000
31		0.000				0.000			2	0.289				0.000		0.000				0.000				0.000
1		0.000		0.000		0.000		0.318		0.000		0.289		0.480		0.000		0.000		0.000		0.000		0.000
2		0.000		0.000		0.000		0.318		0.029		0.579		0.273		0.000		0.000		0.000		0.000		0.000
3		0.000		0.000		0.000		0.000		0.289		0.579		0.000		0.000		0.000		0.000		0.000		0.000
		0		0		0		18		0		16		27		0		0		0		0		0
		0		0		0		18		2		32		15		0		0		0		0		0
		0		0		0		0		16		32		0		0		0		0		0		0

Appendix D-7: Demand for 8,703ha, 3,644ha and 12,347ha

C.R. 0.468

		1			2			3			4			5			6			7			8			9			10			11			12			
Crop	(ha)	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	(1000 m3)
Wheat	1,693	0	0	0	0	0	0	0	0	0	0	111	1,109	1,109	1,109	1,719	1,563	1,976	1,617	0	0	0	0	0	0	0	0	448	1,494	1,494	0	0	0	0	0	0	0	13,749
Vegetable	3,401	0	0	0	0	0	0	0	0	0	225	2,248	2,248	1,113	2,781	3,532	3,371	3,371	3,636	3,636	3,756	4,105	3,371	3,371	3,577	3,152	3,152	3,442	2,544	0	0	0	0	0	0	0	0	56,631
Grape	993	0	0	0	0	0	0	0	0	0	0	442	735	735	71	778	708	990	1,273	1,273	1,273	1,408	1,364	1,153	1,168	0	0	0	91	909	818	0	0	0	0	0	0	15,189
Alfalfa	824	0	0	0	0	0	0	0	0	0	240	480	480	384	714	872	720	720	890	938	990	1,089	990	990	954	720	753	834	500	0	0	0	0	0	0	0	0	14,258
Fruit	559	0	0	0	0	0	0	0	0	0	0	19	193	193	193	207	230	261	333	353	373	396	375	351	354	314	238	238	119	0	0	0	0	0	0	0	0	4,740
Potato	781	0	0	0	0	0	0	0	0	422	603	60	0	677	696	796	835	835	501	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,425
Other	452	0	0	0	0	0	0	0	0	0	0	29	286	286	268	265	241	426	628	454	491	464	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,838
Total	8,703	0	0	0	0	0	0	0	0	422	1,068	3,389	5,051	4,497	5,832	8,169	7,668	8,579	8,878	6,654	6,883	7,462	6,100	5,865	6,053	4,186	4,143	4,962	4,748	2,403	818	0	0	0	0	0	0	113,830
Demand (m3/s)										0.444	1.236	3.922	5.846	5.205	6.750	8.595	8.875	9.929	10.275	7.701	7.966	7.851	7.060	6.788	6.369	4.845	4.795	5.743	5.495	2.781	0.861							

C.R. Conveyanace Ratio

C.R. 0.468

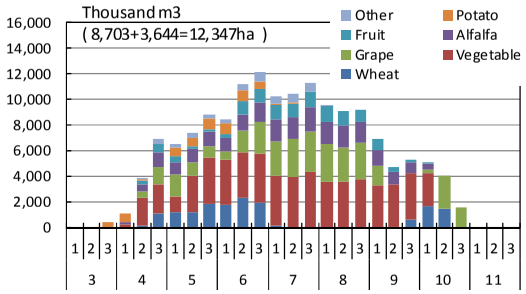
		1			2			3			4			5			6			7			8			9			10			11			12			
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	(1000 m3)
Wheat	233	0	0	0	0	0	0	0	0	0	0	0	0	66	131	144	175	345	303	179	0	0	0	0	0	0	22	213	213	0	0	0	0	0	0	0	0	1,791
Vegetable	216	0	0	0	0	0	0	0	0	0	0	0	69	173	35	125	138	192	198	201	231	275	233	219	214	173	164	130	0	0	0	0	0	0	0	0	0	2,770
Grape	1,338	0	0	0	0	0	0	0	0	0	0	0	594	990	990	0	0	735	1,225	1,417	1,608	1,675	1,515	1,515	1,666	1,515	0	0	161	1,608	804	0	0	0	0	0	0	18,018
Alfalfa	622	0	0	0	0	0	0	0	0	0	0	59	590	499	287	316	287	524	626	817	777	835	759	708	658	506	253	0	0	0	0	0	0	0	0	0	0	8,501
Fruit	1,060	0	0	0	0	0	0	0	0	0	0	324	540	270	0	0	71	708	759	798	708	876	852	808	596	515	103	0	0	0	0	0	0	0	0	0	0	7,928
Potato	26	0	0	0	0	0	0	0	0	0	16	16	0	0	2	15	14	28	28	23	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	155
Other	149	0	0	0	0	0	0	0	0	0	0	0	46	77	77	94	92	92	141	154	184	155	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,197
Total	3,644	0	0	0	0	0	0	0	0	0	16	399	1,839	2,075	1,522	694	777	2,624	3,280	3,589	3,521	3,816	3,444	3,250	3,134	2,709	542	343	374	1,608	804	0	0	0	0	0	0	40,360
Demand (m3/s)											0.019	0.462	2.128	2.402	1.762	0.730	0.899	3.037	3.796	4.154	4.075	4.015	3.986	3.762	3.298	3.135	0.627	0.397	0.433	1.861	0.846							

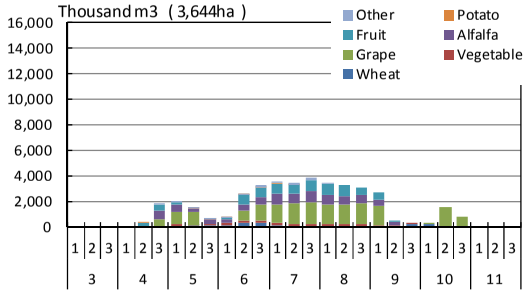
C.R. Conveyanace Ratio

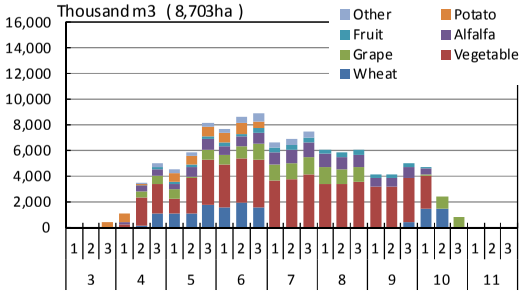
C.R. 0.468

		1			2			3			4			5			6			7			8			9			10			11			12			
Crop	(ha)	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	(1000 m3)
Wheat	1,926	0	0	0	0	0	0	0	0	0	0	111	1,109	1,175	1,240	1,863	1,738	2,321	1,920	179	0	0	0	0	0	0	22	661	1,707	1,494	0	0	0	0	0	0	0	15,540
Vegetable	3,617	0	0	0	0	0	0	0	0	0	225	2,248	2,317	1,286	2,816	3,657	3,509	3,563	3,834	3,837	3,987	4,380	3,604	3,590	3,791	3,325	3,316	3,572	2,544	0	0	0	0	0	0	0	0	59,401
Grape	2,331	0	0	0	0	0	0	0	0	0	0	442	1,329	1,725	1,061	778	708	1,725	2,498	2,690	2,881	3,083	2,879	2,668	2,834	1,515	0	0	252	2,517	1,622	0	0	0	0	0	0	33,207
Alfalfa	1,446	0	0	0	0	0	0	0	0	0	240	539	1,070	883	1,001	1,188	1,007	1,244	1,516	1,755	1,767	1,924	1,749	1,698	1,612	1,226	1,006	834	500	0	0	0	0	0	0	0	0	22,759
Fruit	1,619	0	0	0	0	0	0	0	0	0	0	343	733	463	193	207	301	969	1,092	1,151	1,081	1,272	1,227	1,159	950	829	341	238	119	0	0	0	0	0	0	0	0	12,668
Potato	807	0	0	0	0	0	0	0	0	422	619	76	0	677	698	811	849	863	529	23	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,580
Other	601	0	0	0	0	0	0	0	0	0	0	29	332	363	345	359	333	518	769	608	675	619	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5,035
Total	12,347	0	0	0	0	0	0	0	0	422	1,084	3,788	6,890	6,572	7,354	8,863	8,445	11,203	12,158	10,243	10,404	11,278	9,544	9,115	9,187	6,895	4,685	5,305	5,122	4,011	1,622	0	0	0	0	0	0	154,190
Demand (m3/s)										0.444	1.255	4.384	7.974	7.607	8.512	9.325	9.774	12.966	14.071	11.855	12.041	11.866	11.046	10.550	9.667	7.980	5.422	6.140	5.928	4.642	1.707							

C.R. Conveyanace Ratio







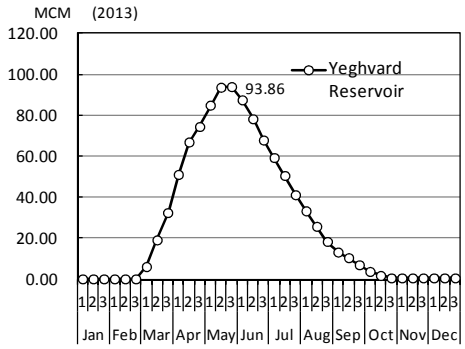
Appendix D-8: Water Balance Calculation for 12,347ha (2013)

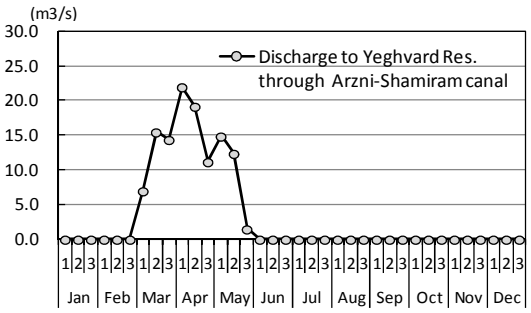
2013(12,347ha)			Demand			Hrazdan River			Water Balance of Lower Hrazdan (1st part)					Water Balance of Artashat Canal				
			<Demand> Lower Hrazdan (1st part)	<Demand> Artashat	<Demand> Arzni-Shamiram (2nd part)	<Demand> Other Canals	Hrazdan River (2013)	Ecological flow	Available water of Hrazdan	<Demand> Lower Hrazdan (1st part)	Available water of Hrazdan River (20%)	Supply from Hrazdan River(1st part)	Remaining water of Hrazdan River	Water deficit(Supplied from Sevan)(1st Part)	<Demand> Artashat	Available water of Hrazdan River (20%)	Supply from Hrazdan River	Remaining water of Hrazdan River	Water deficit (Supplied from Sevan)
			(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Jan	01-10	1	0.000	0.000	0.000	0.000	6.3	1.9	4.4	0.0	0.9	0.0	0.9	0.0	0.0	0.9	0.0	0.9	0.0
	11-20	2	0.000	0.000	0.000	0.000	6.6	1.9	4.7	0.0	0.9	0.0	0.9	0.0	0.0	0.9	0.0	0.9	0.0
	21-31	3	0.000	0.000	0.000	0.000	7.1	1.9	5.2	0.0	1.0	0.0	1.0	0.0	0.0	1.0	0.0	1.0	0.0
Feb	01-10	1	0.000	0.000	0.000	0.000	6.6	1.9	4.7	0.0	0.9	0.0	0.9	0.0	0.0	0.9	0.0	0.9	0.0
	11-20	2	0.000	0.000	0.000	0.000	7.0	1.9	5.1	0.0	1.0	0.0	1.0	0.0	0.0	1.0	0.0	1.0	0.0
	21-28	3	0.000	0.000	0.000	0.000	7.6	1.9	5.7	0.0	1.1	0.0	1.1	0.0	0.0	1.1	0.0	1.1	0.0
Mar	01-10	1	0.000	0.000	0.000	0.000	8.8	1.9	6.9	0.0	1.4	0.0	1.4	0.0	0.0	1.4	0.0	1.4	0.0
	11-20	2	0.000	0.000	0.000	0.000	17.5	1.9	15.6	0.0	3.1	0.0	3.1	0.0	0.0	3.1	0.0	3.1	0.0
	21-31	3	0.000	0.000	0.000	0.000	16.2	1.9	14.3	0.0	2.9	0.0	2.9	0.0	0.0	2.9	0.0	2.9	0.0
Apr	01-10	1	0.000	0.000	0.000	0.000	35.6	1.9	33.7	0.0	6.7	0.0	6.7	0.0	0.0	6.7	0.0	6.7	0.0
	11-20	2	3.000	3.500	0.000	0.000	28.6	1.9	26.7	3.0	5.3	3.0	2.3	0.0	3.5	5.3	3.5	1.8	0.0
	21-30	3	3.500	3.500	0.000	0.000	22.9	1.9	21.0	3.5	4.2	3.5	0.7	0.0	3.5	4.2	3.5	0.7	0.0
May	01-10	1	4.000	4.000	7.000	2.386	33.1	1.9	31.2	4.0	6.2	4.0	2.2	0.0	4.0	6.2	4.0	2.2	0.0
	11-20	2	4.000	4.000	7.000	2.388	31.6	1.9	29.7	4.0	5.9	4.0	1.9	0.0	4.0	5.9	4.0	1.9	0.0
	21-31	3	4.000	4.000	10.000	2.842	23.8	1.9	21.9	4.0	4.4	4.0	0.4	0.0	4.0	4.4	4.0	0.4	0.0
Jun	01-10	1	5.000	5.000	13.000	3.865	18.9	1.9	17.0	5.0	3.4	3.4	0.0	1.6	5.0	3.4	3.4	0.0	1.6
	11-20	2	5.000	5.000	13.000	4.621	13.8	1.9	11.9	5.0	2.4	2.4	0.0	2.6	5.0	2.4	2.4	0.0	2.6
	21-30	3	5.000	5.000	13.000	5.183	12.3	1.9	10.4	5.0	2.1	2.1	0.0	2.9	5.0	2.1	2.1	0.0	2.9
Jul	01-10	1	5.000	5.000	13.000	5.262	10.2	1.9	8.3	5.0	1.7	1.7	0.0	3.3	5.0	1.7	1.7	0.0	3.3
	11-20	2	5.000	5.000	13.000	5.521	8.8	1.9	6.9	5.0	1.4	1.4	0.0	3.6	5.0	1.4	1.4	0.0	3.6
	21-31	3	5.000	5.000	13.000	5.635	9.4	1.9	7.5	5.0	1.5	1.5	0.0	3.5	5.0	1.5	1.5	0.0	3.5
Aug	01-10	1	5.000	5.000	13.000	4.982	10.1	1.9	8.2	5.0	1.6	1.6	0.0	3.4	5.0	1.6	1.6	0.0	3.4
	11-20	2	5.000	5.000	13.000	4.881	9.8	1.9	7.9	5.0	1.6	1.6	0.0	3.4	5.0	1.6	1.6	0.0	3.4
	21-31	3	5.000	5.000	13.000	4.356	8.0	1.9	6.1	5.0	1.2	1.2	0.0	3.8	5.0	1.2	1.2	0.0	3.8
Sep	01-10	1	4.000	4.000	8.000	2.759	7.4	1.9	5.5	4.0	1.1	1.1	0.0	2.9	4.0	1.1	1.1	0.0	2.9
	11-20	2	4.000	4.000	8.000	2.303	7.6	1.9	5.7	4.0	1.1	1.1	0.0	2.9	4.0	1.1	1.1	0.0	2.9
	21-30	3	4.000	4.000	8.000	1.534	7.4	1.9	5.5	4.0	1.1	1.1	0.0	2.9	4.0	1.1	1.1	0.0	2.9
Oct	01-10	1	4.000	4.000	5.000	1.136	7.5	1.9	5.6	4.0	1.1	1.1	0.0	2.9	4.0	1.1	1.1	0.0	2.9
	11-20	2	4.000	4.000	5.000	0.000	7.8	1.9	5.9	4.0	1.2	1.2	0.0	2.8	4.0	1.2	1.2	0.0	2.8
	21-31	3	3.000	4.000	5.000	0.000	8.0	1.9	6.1	3.0	1.2	1.2	0.0	1.8	4.0	1.2	1.2	0.0	2.8
Nov	01-10	1	0.000	0.000	0.000	0.000	7.6	1.9	5.7	0.0	1.1	0.0	1.1	0.0	0.0	1.1	0.0	1.1	0.0
	11-20	2	0.000	0.000	0.000	0.000	7.3	1.9	5.4	0.0	1.1	0.0	1.1	0.0	0.0	1.1	0.0	1.1	0.0
	21-30	3	0.000	0.000	0.000	0.000	6.7	1.9	4.8	0.0	1.0	0.0	1.0	0.0	0.0	1.0	0.0	1.0	0.0
Dec	01-10	1	0.000	0.000	0.000	0.000	6.5	1.9	4.6	0.0	0.9	0.0	0.9	0.0	0.0	0.9	0.0	0.9	0.0
	11-20	2	0.000	0.000	0.000	0.000	6.3	1.9	4.4	0.0	0.9	0.0	0.9	0.0	0.0	0.9	0.0	0.9	0.0
	21-31	3	0.000	0.000	0.000	0.000	6.1	1.9	4.2	0.0	0.8	0.0	0.8	0.0	0.0	0.8	0.0	0.8	0.0
Total (MCM)			**76.2**	**77.6**	**159.1**	**52.6**	**391.5**	**59.9**	**331.6**	**76.2**	**66.1**	**37.1**	**28.9**	**39.1**	**77.6**	**66.1**	**37.6**	**28.5**	**40.0**

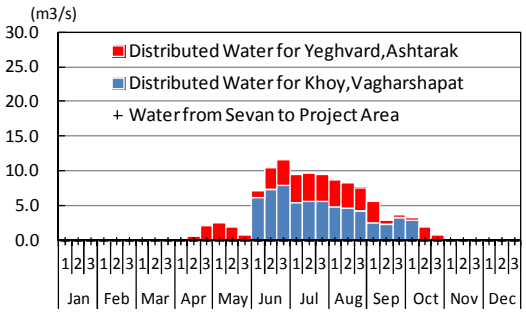
2013(12,347ha)			Water Balance of Arzni-Shamiram (2nd part)											Water Balance of Other Canals					Total	
			<Demand> Arzni-Shamiram (2nd part)	Available water of Amberd River	Supply from Armbed River	Water deficit after using of Armbed River	Available water of Aparan Reservoir	Supply from Aparan Reservoir	Water deficit after using of Aparan Reservoir	Available water of Hrazdan River (40%)	Supply from Hrazdan River through Arzni-Shamiram	Remaining water of Hrazdan River	Water deficit (Supplied from Sevan)	<Demand> Other Canals	Available water of Hrazdan River (20%)	Supply from Hrazdan River	Remaining water of Hrazdan River	Water deficit (Supplied from Sevan)	Remaining water of Hrazdan River	Water deficit for other areas (Supplied from Sevan)
			(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)
			(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)
Jan	01-10	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	1.8	0.0	0.0	0.9	0.0	0.9	0.0	4.5	0.0
	11-20	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	1.9	0.0	0.0	0.9	0.0	0.9	0.0	4.6	0.0
	21-31	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.0	2.1	0.0	0.0	1.0	0.0	1.0	0.0	5.1	0.0
Feb	01-10	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	1.9	0.0	0.0	0.9	0.0	0.9	0.0	4.6	0.0
	11-20	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	2.0	0.0	0.0	1.0	0.0	1.0	0.0	5.0	0.0
	21-28	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	2.3	0.0	0.0	1.1	0.0	1.1	0.0	5.6	0.0
Mar	01-10	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	0.0	2.8	0.0	0.0	1.4	0.0	1.4	0.0	7.0	0.0
	11-20	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.2	0.0	6.2	0.0	0.0	3.1	0.0	3.1	0.0	15.5	0.0
	21-31	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	0.0	5.7	0.0	0.0	2.9	0.0	2.9	0.0	14.4	0.0
Apr	01-10	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.5	0.0	13.5	0.0	0.0	6.7	0.0	6.7	0.0	33.6	0.0
	11-20	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.7	0.0	10.7	0.0	0.0	5.3	0.0	5.3	0.0	20.1	0.0
	21-30	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.4	0.0	8.4	0.0	0.0	4.2	0.0	4.2	0.0	14.0	0.0
May	01-10	1	7.0	0.0	0.0	7.0	3.4	3.4	3.6	12.5	3.6	8.9	0.0	2.4	6.2	2.4	3.8	0.0	17.1	0.0
	11-20	2	7.0	0.0	0.0	7.0	4.0	4.0	3.0	11.9	3.0	8.9	0.0	2.4	5.9	2.4	3.5	0.0	16.2	0.0
	21-31	3	10.0	0.0	0.0	10.0	6.0	6.0	4.0	8.8	4.0	4.8	0.0	2.8	4.4	2.8	1.6	0.0	7.2	0.0
Jun	01-10	1	13.0	0.0	0.0	13.0	6.0	6.0	7.0	6.8	6.8	0.0	0.2	3.9	3.4	3.4	0.0	0.5	0.0	3.9
	11-20	2	13.0	0.0	0.0	13.0	8.0	8.0	5.0	4.8	4.8	0.0	0.2	4.6	2.4	2.4	0.0	2.2	0.0	7.6
	21-30	3	13.0	0.0	0.0	13.0	7.0	7.0	6.0	4.2	4.2	0.0	1.8	5.2	2.1	2.1	0.0	3.1	0.0	10.7
Jul	01-10	1	13.0	0.0	0.0	13.0	7.0	7.0	6.0	3.3	3.3	0.0	2.7	5.3	1.7	1.7	0.0	3.6	0.0	12.9
	11-20	2	13.0	0.0	0.0	13.0	6.0	6.0	7.0	2.8	2.8	0.0	4.2	5.5	1.4	1.4	0.0	4.1	0.0	15.5
	21-31	3	13.0	0.0	0.0	13.0	0.0	0.0	13.0	3.0	3.0	0.0	10.0	5.6	1.5	1.5	0.0	4.1	0.0	21.1
Aug	01-10	1	13.0	0.0	0.0	13.0	0.0	0.0	13.0	3.3	3.3	0.0	9.7	5.0	1.6	1.6	0.0	3.4	0.0	19.9
	11-20	2	13.0	0.0	0.0	13.0	0.0	0.0	13.0	3.2	3.2	0.0	9.8	4.9	1.6	1.6	0.0	3.3	0.0	19.9
	21-31	3	13.0	0.0	0.0	13.0	0.0	0.0	13.0	2.4	2.4	0.0	10.6	4.4	1.2	1.2	0.0	3.2	0.0	21.4
Sep	01-10	1	8.0	0.0	0.0	8.0	0.0	0.0	8.0	2.2	2.2	0.0	5.8	2.8	1.1	1.1	0.0	1.7	0.0	13.3
	11-20	2	8.0	0.0	0.0	8.0	0.0	0.0	8.0	2.3	2.3	0.0	5.7	2.3	1.1	1.1	0.0	1.2	0.0	12.7
	21-30	3	8.0	0.0	0.0	8.0	0.0	0.0	8.0	2.2	2.2	0.0	5.8	1.5	1.1	1.1	0.0	0.4	0.0	12.0
Oct	01-10	1	5.0	0.0	0.0	5.0	0.0	0.0	5.0	2.2	2.2	0.0	2.8	1.1	1.1	1.1	0.0	0.0	0.0	8.6
	11-20	2	5.0	0.0	0.0	5.0	0.0	0.0	5.0	2.4	2.4	0.0	2.6	0.0	1.2	0.0	1.2	0.0	1.2	8.2
	21-31	3	5.0	0.0	0.0	5.0	0.0	0.0	5.0	2.4	2.4	0.0	2.6	0.0	1.2	0.0	1.2	0.0	1.2	7.2
Nov	01-10	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	2.3	0.0	0.0	1.1	0.0	1.1	0.0	5.6	0.0
	11-20	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0	2.2	0.0	0.0	1.1	0.0	1.1	0.0	5.5	0.0
	21-30	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	1.9	0.0	0.0	1.0	0.0	1.0	0.0	4.9	0.0
Dec	01-10	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	1.8	0.0	0.0	0.9	0.0	0.9	0.0	4.5	0.0
	11-20	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	1.8	0.0	0.0	0.9	0.0	0.9	0.0	4.5	0.0
	21-31	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	1.7	0.0	0.0	0.8	0.0	0.8	0.0	4.1	0.0
Total (MCM)			**159.1**	**0.0**	**0.0**	**159.1**	**41.5**	**41.5**	**117.6**	**132.9**	**51.2**	**81.7**	**66.4**	**52.7**	**66.1**	**25.4**	**40.6**	**27.2**	**179.8**	**172.7**

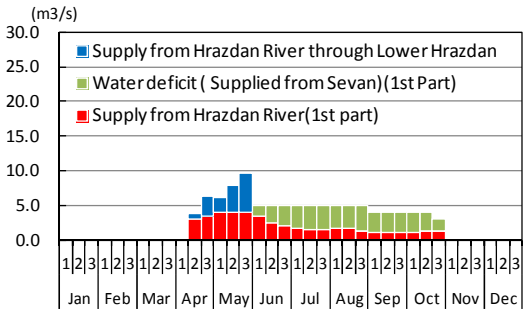
2013(12,347ha)			Demand of Yeghvard Project Area			Kasakh River					Water Balance of Vagharshapat and Khoy WUA									Water Balance of Yeghvard WUA and Ashtarak WUA				
			Yeghvard WUA and Ashtarak WUA	Vagharshapat and Khoy WUA	12347ha	Kasakh River (2013)	Water Flow from Intermediate C.A. between Ashtarak O.S. and Kasakh Intake	Kasakh Intake	Ecological flow	Available water of Kasakh River	Vagharshapat and Khoy WUA	Available water of Kasakh River	Supply from Kasakh River	Remaining water of Kasakh River	Water deficit after using of Kasakh River	Remaining water of Hrazdan River	Supply from Hrazdan River through Lower Hrazdan	Remaining water of Hrazdan River	Water deficit (Supplied from Yeghvard Res.)	Yeghvard WUA and Ashtarak WUA	Remaining water of Hrazdan River	Supply from Hrazdan River through Arzni-Shamiram	Remaining water of Hrazdan River	Water deficit (Supplied from Yeghvard Res.)
			(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)
			(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)	(46)	(47)	(48)	(49)	(50)	(51)	(52)	(53)	(54)	(55)	(56)	(57)
Jan	01-10	1	0.000	0.000	0.000	2.6	0.7	3.3	0.7	2.6	0.0	2.6	0.0	3.3	0.0	4.5	0.0	4.5	0.0	0.0	4.5	0.0	4.5	0.0
	11-20	2	0.000	0.000	0.000	2.6	0.7	3.3	0.7	2.6	0.0	2.6	0.0	3.3	0.0	4.6	0.0	4.6	0.0	0.0	4.6	0.0	4.6	0.0
	21-31	3	0.000	0.000	0.000	2.6	0.7	3.3	0.7	2.6	0.0	2.6	0.0	3.3	0.0	5.1	0.0	5.1	0.0	0.0	5.1	0.0	5.1	0.0
Feb	01-10	1	0.000	0.000	0.000	2.7	0.7	3.4	0.7	2.7	0.0	2.7	0.0	3.4	0.0	4.6	0.0	4.6	0.0	0.0	4.6	0.0	4.6	0.0
	11-20	2	0.000	0.000	0.000	2.7	0.7	3.4	0.7	2.7	0.0	2.7	0.0	3.4	0.0	5.0	0.0	5.0	0.0	0.0	5.0	0.0	5.0	0.0
	21-28	3	0.000	0.000	0.000	2.7	0.7	3.4	0.7	2.7	0.0	2.7	0.0	3.4	0.0	5.6	0.0	5.6	0.0	0.0	5.6	0.0	5.6	0.0
Mar	01-10	1	0.000	0.000	0.000	2.7	0.7	3.4	0.7	2.7	0.0	2.7	0.0	3.4	0.0	7.0	0.0	7.0	0.0	0.0	7.0	0.0	7.0	0.0
	11-20	2	0.000	0.000	0.000	7.5	0.7	8.2	0.7	3.0	0.0	3.0	0.0	8.2	0.0	15.5	0.0	15.5	0.0	0.0	15.5	0.0	15.5	0.0
	21-31	3	0.000	0.444	0.444	11.2	0.7	11.9	0.7	3.0	0.4	3.0	0.4	11.5	0.0	14.4	0.0	14.4	0.0	0.0	14.4	0.0	14.4	0.0
Apr	01-10	1	0.019	1.236	1.255	10.0	0.7	10.7	0.7	3.0	1.2	3.0	1.2	9.5	0.0	33.6	0.0	33.6	0.0	0.0	33.6	0.0	33.6	0.0
	11-20	2	0.462	3.922	4.384	4.7	0.7	5.4	0.7	3.0	3.9	3.0	3.0	2.4	0.9	20.1	0.9	19.2	0.0	0.5	19.2	0.0	19.2	0.5
	21-30	3	2.128	5.846	7.974	4.0	0.7	4.7	0.7	3.0	5.8	3.0	3.0	1.7	2.8	14.0	2.8	11.2	0.0	2.1	11.2	0.0	11.2	2.1
May	01-10	1	2.402	5.205	7.607	3.5	0.7	4.2	0.7	3.0	5.2	3.0	3.0	1.2	2.2	17.1	2.2	14.9	0.0	2.4	14.9	0.0	14.9	2.4
	11-20	2	1.762	6.750	8.512	3.7	0.7	4.4	0.7	3.0	6.8	3.0	3.0	1.4	3.8	16.2	3.8	12.4	0.0	1.8	12.4	0.0	12.4	1.8
	21-31	3	0.730	8.595	9.325	2.9	0.7	3.6	0.7	2.9	8.6	2.9	2.9	0.7	5.7	7.2	5.7	1.5	0.0	0.7	1.5	0.0	1.5	0.7
Jun	01-10	1	0.899	8.875	9.774	2.7	0.7	3.4	0.7	2.7	8.9	2.7	2.7	0.7	6.2	0.0	0.0	0.0	6.2	0.9	0.0	0.0	0.0	0.9
	11-20	2	3.037	9.929	12.966	2.6	0.7	3.3	0.7	2.6	9.9	2.6	2.6	0.7	7.3	0.0	0.0	0.0	7.3	3.0	0.0	0.0	0.0	3.0
	21-30	3	3.796	10.275	14.071	2.5	0.7	3.2	0.7	2.5	10.3	2.5	2.5	0.7	7.8	0.0	0.0	0.0	7.8	3.8	0.0	0.0	0.0	3.8
Jul	01-10	1	4.154	7.701	11.855	2.4	0.7	3.1	0.7	2.4	7.7	2.4	2.4	0.7	5.3	0.0	0.0	0.0	5.3	4.2	0.0	0.0	0.0	4.2
	11-20	2	4.075	7.966	12.041	2.4	0.7	3.1	0.7	2.4	8.0	2.4	2.4	0.7	5.6	0.0	0.0	0.0	5.6	4.1	0.0	0.0	0.0	4.1
	21-31	3	4.015	7.851	11.866	2.4	0.7	3.1	0.7	2.4	7.9	2.4	2.4	0.7	5.5	0.0	0.0	0.0	5.5	4.0	0.0	0.0	0.0	4.0
Aug	01-10	1	3.986	7.060	11.046	2.4	0.7	3.1	0.7	2.4	7.1	2.4	2.4	0.7	4.7	0.0	0.0	0.0	4.7	4.0	0.0	0.0	0.0	4.0
	11-20	2	3.762	6.788	10.550	2.3	0.7	3.0	0.7	2.3	6.8	2.3	2.3	0.7	4.5	0.0	0.0	0.0	4.5	3.8	0.0	0.0	0.0	3.8
	21-31	3	3.298	6.369	9.667	2.3	0.7	3.0	0.7	2.3	6.4	2.3	2.3	0.7	4.1	0.0	0.0	0.0	4.1	3.3	0.0	0.0	0.0	3.3
Sep	01-10	1	3.135	4.845	7.980	2.4	0.7	3.1	0.7	2.4	4.8	2.4	2.4	0.7	2.4	0.0	0.0	0.0	2.4	3.1	0.0	0.0	0.0	3.1
	11-20	2	0.627	4.795	5.422	2.6	0.7	3.3	0.7	2.6	4.8	2.6	2.6	0.7	2.2	0.0	0.0	0.0	2.2	0.6	0.0	0.0	0.0	0.6
	21-30	3	0.397	5.743	6.140	2.5	0.7	3.2	0.7	2.5	5.7	2.5	2.5	0.7	3.2	0.0	0.0	0.0	3.2	0.4	0.0	0.0	0.0	0.4
Oct	01-10	1	0.433	5.495	5.928	2.6	0.7	3.3	0.7	2.6	5.5	2.6	2.6	0.7	2.9	0.0	0.0	0.0	2.9	0.4	0.0	0.0	0.0	0.4
	11-20	2	1.861	2.781	4.642	4.4	0.7	5.1	0.7	3.0	2.8	3.0	2.8	2.3	0.0	1.2	0.0	1.2	0.0	1.9	1.2	0.0	1.2	1.9
	21-31	3	0.846	0.861	1.707	2.9	0.7	3.6	0.7	2.9	0.9	2.9	0.9	2.7	0.0	1.2	0.0	1.2	0.0	0.8	1.2	0.0	1.2	0.8
Nov	01-10	1	0.000	0.000	0.000	2.9	0.7	3.6	0.7	2.9	0.0	2.9	0.0	3.6	0.0	5.6	0.0	5.6	0.0	0.0	5.6	0.0	5.6	0.0
	11-20	2	0.000	0.000	0.000	3.0	0.7	3.7	0.7	3.0	0.0	3.0	0.0	3.7	0.0	5.5	0.0	5.5	0.0	0.0	5.5	0.0	5.5	0.0
	21-30	3	0.000	0.000	0.000	2.9	0.7	3.6	0.7	2.9	0.0	2.9	0.0	3.6	0.0	4.9	0.0	4.9	0.0	0.0	4.9	0.0	4.9	0.0
Dec	01-10	1	0.000	0.000	0.000	2.8	0.7	3.5	0.7	2.8	0.0	2.8	0.0	3.5	0.0	4.5	0.0	4.5	0.0	0.0	4.5	0.0	4.5	0.0
	11-20	2	0.000	0.000	0.000	2.7	0.7	3.4	0.7	2.7	0.0	2.7	0.0	3.4	0.0	4.5	0.0	4.5	0.0	0.0	4.5	0.0	4.5	0.0
	21-31	3	0.000	0.000	0.000	2.7	0.7	3.4	0.7	2.7	0.0	2.7	0.0	3.4	0.0	4.1	0.0	4.1	0.0	0.0	4.1	0.0	4.1	0.0
Total (MCM)			**40.4**	**113.8**	**154.2**	**107.7**	**22.1**	**129.8**	**22.1**	**85.4**	**113.9**	**85.4**	**46.0**	**83.8**	**67.9**	**179.8**	**13.8**	**166.0**	**54.1**	**40.3**	**166.0**	**0.0**	**166.0**	**40.3**

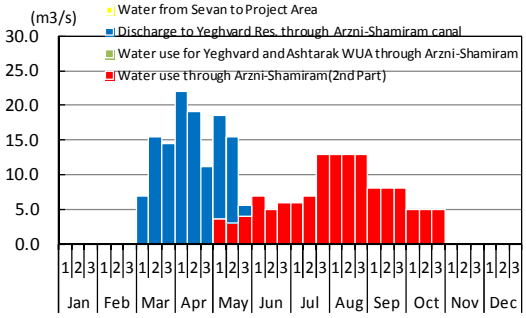
2013(12,347ha)					Water Balance Calculation of Yeghvard Reservoir										Supplied from Sevan			Usage of River flow			
			Water use through Arzni-Shamiram(2nd Part)	Water use for Yeghvard and Ashtarak WUA through Arzni-Shamiram	flag (1:Usage period of Yeghvard)	Discharge to Yeghvard Res. through Arzni-Shamiram canal	Discharge of Arzni-Shamiram canal to Yeghvard Res.(Volume-based)	Distributed Water for Khoy,Vagharshapat	Distributed Water for Yeghvard,Ashtarak	Total	Evaporation from Reservoir(0.17m3/s)	Reservoir Loss(0.24m3/s)	Reservoir Volume	Water deficit of Yeghvard Reservoir	Another all canals supplied by Sevan	Water from Sevan to Project Area	Total discharge of deficit water supplied by Sevan	Hrazdan	Amberd	Aparan	Kasakh
			(m3/s)	(m3/s)		(m3/s)	(MCM)	(m3/s)	(m3/s)	(MCM)	(MCM)	(MCM)	(MCM)	(MCM)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)	(m3/s)
			(58)	(59)	(60)	(61)	(62)	(63)	(64)	(65)	(66)	(67)	(68)	(69)	(70)	(71)	(72)	(73)	(74)	(75)	(76)
Jan	01-10	1	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	11-20	2	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	21-31	3	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feb	01-10	1	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	11-20	2	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	21-28	3	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mar	01-10	1	0.0	0.0	1	7.0	6.0	0.0	0.0	0.0	0.00	0.00	6.00	0.0	0.0	0.0	0.0	7.0	0.0	0.0	0.0
	11-20	2	0.0	0.0	1	15.5	13.4	0.0	0.0	0.0	0.15	0.21	19.04	0.0	0.0	0.0	0.0	15.5	0.0	0.0	0.0
	21-31	3	0.0	0.0	1	14.4	13.7	0.0	0.0	0.0	0.16	0.23	32.35	0.0	0.0	0.0	0.0	14.4	0.0	0.0	0.4
Apr	01-10	1	0.0	0.0	1	22.0	19.0	0.0	0.0	0.0	0.15	0.21	50.99	0.0	0.0	0.0	0.0	22.0	0.0	0.0	1.2
	11-20	2	0.0	0.0	1	19.2	16.6	0.0	0.5	0.4	0.15	0.21	66.83	0.0	0.0	0.0	0.0	26.6	0.0	0.0	3.0
	21-30	3	0.0	0.0	1	11.2	9.7	0.0	2.1	1.8	0.15	0.21	74.37	0.0	0.0	0.0	0.0	21.0	0.0	0.0	3.0
May	01-10	1	3.6	0.0	1	14.9	12.9	0.0	2.4	2.1	0.15	0.21	84.81	0.0	0.0	0.0	0.0	31.1	0.0	3.4	3.0
	11-20	2	3.0	0.0	1	12.4	10.7	0.0	1.8	1.6	0.15	0.21	93.55	0.0	0.0	0.0	0.0	29.6	0.0	4.0	3.0
	21-31	3	4.0	0.0	1	1.5	1.4	0.0	0.7	0.7	0.16	0.23	93.86	0.0	0.0	0.0	0.0	22.0	0.0	6.0	2.9
Jun	01-10	1	7.0	0.0	1	0.0	0.0	6.2	0.9	6.1	0.15	0.21	87.40	0.0	3.9	0.0	3.9	17.0	0.0	6.0	2.7
	11-20	2	5.0	0.0	1	0.0	0.0	7.3	3.0	8.9	0.15	0.21	78.14	0.0	7.6	0.0	7.6	12.0	0.0	8.0	2.6
	21-30	3	6.0	0.0	1	0.0	0.0	7.8	3.8	10.0	0.15	0.21	67.78	0.0	10.7	0.0	10.7	10.5	0.0	7.0	2.5
Jul	01-10	1	6.0	0.0	1	0.0	0.0	5.3	4.2	8.2	0.15	0.21	59.22	0.0	12.9	0.0	12.9	8.4	0.0	7.0	2.4
	11-20	2	7.0	0.0	1	0.0	0.0	5.6	4.1	8.4	0.15	0.21	50.46	0.0	15.5	0.0	15.5	7.0	0.0	6.0	2.4
	21-31	3	13.0	0.0	1	0.0	0.0	5.5	4.0	9.0	0.16	0.23	41.07	0.0	21.1	0.0	21.1	7.5	0.0	0.0	2.4
Aug	01-10	1	13.0	0.0	1	0.0	0.0	4.7	4.0	7.5	0.15	0.21	33.21	0.0	19.9	0.0	19.9	8.1	0.0	0.0	2.4
	11-20	2	13.0	0.0	1	0.0	0.0	4.5	3.8	7.2	0.15	0.21	25.65	0.0	19.9	0.0	19.9	8.0	0.0	0.0	2.3
	21-31	3	13.0	0.0	1	0.0	0.0	4.1	3.3	7.0	0.16	0.23	18.26	0.0	21.4	0.0	21.4	6.0	0.0	0.0	2.3
Sep	01-10	1	8.0	0.0	1	0.0	0.0	2.4	3.1	4.8	0.15	0.21	13.10	0.0	13.3	0.0	13.3	5.5	0.0	0.0	2.4
	11-20	2	8.0	0.0	1	0.0	0.0	2.2	0.6	2.4	0.15	0.21	10.34	0.0	12.7	0.0	12.7	5.6	0.0	0.0	2.6
	21-30	3	8.0	0.0	1	0.0	0.0	3.2	0.4	3.1	0.15	0.21	6.88	0.0	12.0	0.0	12.0	5.5	0.0	0.0	2.5
Oct	01-10	1	5.0	0.0	1	0.0	0.0	2.9	0.4	2.9	0.15	0.21	3.62	0.0	8.6	0.0	8.6	5.5	0.0	0.0	2.6
	11-20	2	5.0	0.0		0.0	0.0	0.0	1.9	1.6	0.15	0.21	1.66	0.0	8.2	0.0	8.2	4.8	0.0	0.0	2.8
	21-31	3	5.0	0.0		0.0	0.0	0.0	0.8	0.8	0.16	0.23	0.47	0.0	7.2	0.0	7.2	4.8	0.0	0.0	0.9
Nov	01-10	1	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.47	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	11-20	2	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.47	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	21-30	3	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.47	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dec	01-10	1	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.47	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	11-20	2	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.47	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	21-31	3	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.47	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total (MCM)			**117.6**	**0.0**		**103.4**	**103.4**	**54.1**	**40.3**	**94.5**	**3.5**	**4.9**	**0.0**	**0.0**	**172.7**	**0.0**	**172.7**	**268.6**	**0.0**	**41.5**	**46.0**

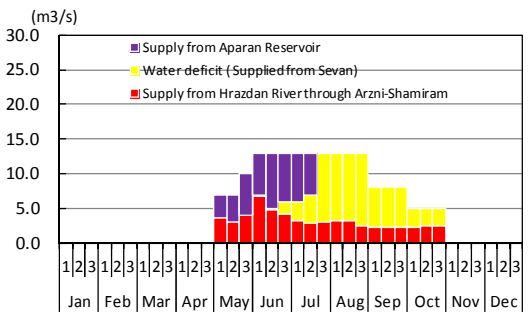

MCM (2013)
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Yeghvard Reservoir
93.86
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

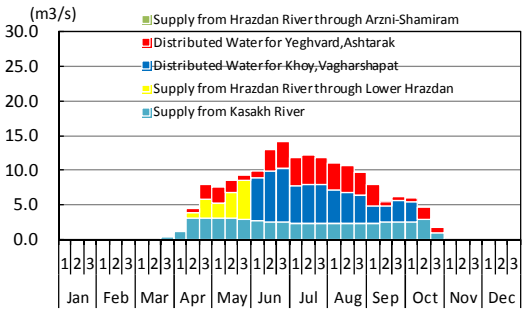

(m3/s)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Discharge to Yeghvard Res. through Arzni-Shamiram canal
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

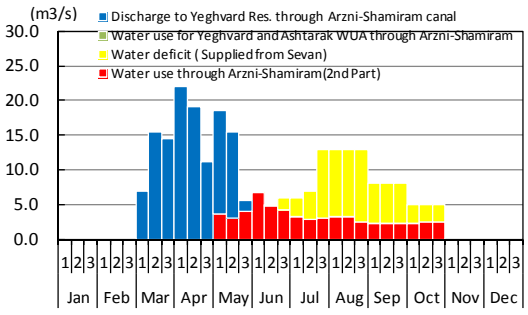

(m3/s)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Distributed Water for Yeghvard,Ashtarak
Distributed Water for Khoy,Vagharshapat
+ Water from Sevan to Project Area
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


(m3/s)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Supply from Hrazdan River through Lower Hrazdan
Water deficit (Supplied from Sevan) (1st Part)
Supply from Hrazdan River(1st part)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


(m3/s)
Water from Sevan to Project Area
Discharge to Yeghvard Res. through Arzni-Shamiram canal
Water use for Yeghvard and Ashtarak WUA through Arzni-Shamiram
Water use through Arzni-Shamiram(2nd Part)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


(m3/s)
Supply from Aparan Reservoir
Water deficit (Supplied from Sevan)
Supply from Hrazdan River through Arzni-Shamiram
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


(m3/s)
Supply from Hrazdan River through Arzni-Shamiram
Distributed Water for Yeghvard,Ashtarak
Distributed Water for Khoy,Vagharshapat
Supply from Hrazdan River through Lower Hrazdan
Supply from Kasakh River
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec


(m3/s)
Discharge to Yeghvard Res. through Arzni-Shamiram canal
Water use for Yeghvard and Ashtarak WUA through Arzni-Shamiram
Water deficit (Supplied from Sevan)
Water use through Arzni-Shamiram(2nd Part)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

	No	Title	Contents	Calculation	Example (1st decade of May)	unit
Demand	(1)	Lower Hrazdan(1st part)	Pre-Conditioned data	Inputted data	4.000	(m3/s)
	(2)	Artashat	Pre-Conditioned data	Inputted data	4.000	(m3/s)
	(3)	Arzni-Shamiram(2nd part)	Pre-Conditioned data	Inputted data	7.000	(m3/s)
	(4)	Other Canals	Pre-Conditioned data	Inputted data	2.386	(m3/s)
Hrazdan River	(5)	River Flow	Hrazdan o.s. +Lusakert o.s.	Inputted data	33.1	(m3/s)
	(6)	Ecological Flow	Minimum flow during non-irrigation period	Inputted data	1.9	(m3/s)
	(7)	Available Water	Available water for irrigation	=(5)-(7)	31.2	(m3/s)
Water Balance of 1st part of Lower Hrazdan	(8)	<Demand> Lower Hrazdan(1st part)	Demand for 1st part of Lower Hrazdan	=(1)	4.0	(m3/s)
	(9)	Available Water of Hrazdan River	20% of Total Available Water	=(7)x20%	6.2	(m3/s)
	(10)	Supply from Hrazdan River	Irrigation water from Hrazdan River	=MIN((8), (9))	4.0	(m3/s)
	(11)	Remaining Water of Hrazdan River	Remaining water after supply for 1st part of Lower Hrazdan	=MAX((9)-(10), 0.0)	2.2	(m3/s)
	(12)	Water Deficit (Supplied from Sevan)	Deficit water is supplied from Sevan	=(8)-(10)	0.0	(m3/s)
Water Balance of Artashat Canal	(13)	<Demand> Artashat	Demand for Artashat Canal	=(2)	4.0	(m3/s)
	(14)	Available Water of Hrazdan River	20% of Total Available Water	=(7)x20%	6.2	(m3/s)
	(15)	Supply from Hrazdan River	Irrigation water from Hrazdan River	=MIN((13), (14))	4.0	(m3/s)
	(16)	Remaining Water of Hrazdan River	Remaining water after supply for Artashat Canal	=MAX((14)-(15), 0.0)	2.2	(m3/s)
	(17)	Water Deficit (Supplied from Sevan)	Deficit water is supplied from Sevan	=(13)-(15)	0.0	(m3/s)
Water Balance of 2nd part of Lower Hrazdan Canal	(18)	<Demand> Arzni-Shamiram (2nd Part)	Demand for 2nd part of Arzni-Shamiram	=(3)	7.0	(m3/s)
	(19)	Available Water of Amberd River	Pre-Conditioned data	Inputted data	0.0	(m3/s)
	(20)	Supply from Amberd River	Irrigation water from Amberd River	=MIN((18), (19))	0.0	(m3/s)
	(21)	Water deficit after using of Amberd River	Deficit water	=(18)-(20)	7.0	(m3/s)
	(22)	Available water of Aparan Reservoir	Pre-Conditioned data	Inputted data	3.4	(m3/s)
	(23)	Supply from Aparan Reservoir	Irrigation water from Aparan Reservoir	=MIN((21), (22))	3.4	(m3/s)
	(24)	Water deficit after using of Aparan	Deficit water	=(21)-(23)	3.6	(m3/s)
	(25)	Available water of Hrazdan River (40%)	40% of Total Available Water	=(7)x40%	12.5	(m3/s)
	(26)	Supply from Hrazdan River through Arzni-Shamiram	Irrigation water from Hrazdan River	=MIN((24), (25))	3.6	(m3/s)
	(27)	Remaining water of Hrazdan River	Remaining water after supply for 2nd part of Arzni-Shamiram Canal	=MAX((25)-(26), 0.0)	8.9	(m3/s)
	(28)	Water deficit (Supplied from Sevan)	Deficit water is supplied from Sevan	=(24)-(26)	0.0	(m3/s)
Water Balance of Other Canals	(29)	<Demand> Other Canals	Demand for Other Canals	=round((4),1)	2.4	(m3/s)
	(30)	Available water of Hrazdan River (20%)	20% of Total Available Water	=(7)x20%	6.2	(m3/s)
	(31)	Supply from Hrazdan River	Irrigation water from Hrazdan River	=MIN((29),(30))	2.4	(m3/s)
	(32)	Remaining water of Hrazdan River	Remaining water after supply for Other c	=MAX((30)-(31), 0.0)	3.8	(m3/s)
	(33)	Water deficit (Supplied from Sevan)	Deficit water is supplied from Sevan	=(29)-(31)	0.0	(m3/s)
Total	(34)	Remaining water of Hrazdan River	Remaining water of Hrazdan River after supplying of Irrigation water for Four Canals)	=(11)+(16)+(27)+(32)	17.1	(m3/s)
	(35)	Water deficit for other areas(Supplied from Sevan)	Total deficit water supplied from Sevan (1st part of Lower Hrazdan, Artashat, 2nd part of Arzni-Shamiram and other canals	=(12)+(17)+(28)+(33)	0.0	(m3/s)

	No	Title	Contents	Calculation	Example (1st decade of May)	unit
Demand of yeghvard Project Area	(36)	Yeghvard WUA and Ashtarak WUA	Demand for Yeghvard WUA and Ashtarak WUA (3,644ha)	Inputted data	2.402	(m3/s)
	(37)	Vagharshapat and Khoy WUA	Demand for Vagharshapat and Khoy WUA (8,703ha)	Inputted data	5.205	(m3/s)
	(38)	Demand	Demand for 12,347ha	=(36)+(37)	7.607	(m3/s)
Kasakh River	(39)	River Flow	Ashtarak o.s.	Inputted data	3.5	(m3/s)
	(40)	Water Flow from Intermediate C.A. between Ashtarak O.S. and Kasakh Intake	Watershed flow from intermediate Catchment Area (300km2)	Inputted data	0.7	(m3/s)
	(41)	River flow at Kasakh Intake	River flow at Kasakh Intake (1,318km2)	=(39)+(40)	4.2	(m3/s)
	(42)	Ecological Flow	Assumed ecological flow as watershed flow from intermediate Catchment Area	Inputted data	0.7	(m3/s)
	(43)	Available Water	Available water for irrigation under current dotation's cross section(3.0m3/s)	=MIN(3.0m^3/s,MAX((41)-(42),0))	3.0	(m3/s)
Vagharshapat and Khoy WUA	(44)	Vagharshapat and Khoy WUA	Demand for Vagharshapat and Khoy WUA	=(37)	5.2	(m3/s)
	(45)	Available water of Kasakh River	Available water for irrigation	=(43)	3.0	(m3/s)
	(46)	Supply from Kasakh River	Supply from Kasakh River for irrigation use	=MIN((44),(45))	3.0	(m3/s)
	(47)	Remaining water of Kasakh River	Remaining water	=MAX((41)-(46),0)	1.2	(m3/s)
	(48)	Water deficit after using of Kasakh River	Water deficit after using of Kasakh River	=(44)-(46)	2.2	(m3/s)
	(49)	Remaining water of Hrazdan River	Remaining water of Hrazdan River	=(34)	17.1	(m3/s)
	(50)	Supply from Hrazdan River through Lower Hrazdan	Supply from Hrazdan River through Lower Hrazdan	=MIN((46),(47))	2.2	(m3/s)
	(51)	Remaining water of Hrazdan River	Remaining water of Hrazdan River	=MAX((49)-(48),0)	14.9	(m3/s)
	(52)	Water deficit (Supplied from Yeghvard Res.)	Deficit water is supplied from Yeghvard Reservoir	=(48)-(50)	0.0	(m3/s)
Yeghvard and Ashtarak WUA	(53)	Yeghvard WUA and Ashtarak WUA	Demand for Yeghvard WUA and Ashtarak WUA	=(36)	2.4	(m3/s)
	(54)	Remaining water of Hrazdan River	Remaining water of Hrazdan River	=(51)	14.9	(m3/s)
	(55)	Supply from Hrazdan River through Arzni-Shamiram	Supply from Hrazdan River through Arzni-Shamiram	=MIN((53),(54),0)	0.0	(m3/s)
	(56)	Remaining water of Hrazdan River	Remaining water of Hrazdan River	=MAX((54)-(55),0)	14.9	(m3/s)
	(57)	Water deficit (Supplied from Yeghvard Res.)	Water deficit (Supplied from Yeghvard Res.)	=(53)-(55)	2.4	(m3/s)
	(58)	Water use through Arzni-Shamiram(2nd Part)	Water use through Arzni-Shamiram(2nd Part)	=(26)+(28)	3.6	(m3/s)
	(59)	Water use for Yeghvard and Ashtarak WUA through Arzni-Shamiram	Water use for Yeghvard and Ashtarak WUA through Arzni-Shamiram	=(55)	0.0	(m3/s)

	No	Title	Contents	Calculation	Example (1st decade of May)	unit
Water balance caluculation for Yeghvard Reservoir	(60)	flag (1:Usage period of Yeghvard)	When the flag equal to "1", distribution discharge from Arzni-Shamiram canal to Yeghvard Res. is calculated	-	1	-
	(61)	Discharge of Arzni-Shamiram canal to Yeghvard Res.	Distribution discharge is "maximum cross section of Arzni-Shamiram Canal" minus "water use for Arzni-Shamiram 2nd part and Ashtarak WUA". However, This discharge is less than remaining water of Hrazdan River.	=MAX(0,IF(BV20=1,MIN(22.0m^3/s-((58)+(59)),(56)),0))	14.9	(m3/s)
	(62)	Discharge of Arzni-Shamiram canal to Yeghvard Res.(Volume-based)	Change the unit from m3/s to MCM(million cubic meter)	=(61)x10daysx86,400/1,000,000	12.9	(MCM)
	(63)	Vagharshapat,Khoy	Water deficit for Vagharshapat and Khoy WUA(Supplied from Yeghvard Res.)	=(52)	0.0	(m3/s)
	(64)	Yeg,Ash	Water deficit for Yeghvard, Ashtarak(Supplied from Yeghvard Res.)	=(57)	2.4	(m3/s)
	(65)	Total	Total of dependence volume to Yeghvard Res.	=((63)+(64))x10daysx86,400/1,000,000	2.1	(MCM)
	(66)	Evaporation from Reservoir(0.17m3/s)	If previous day of Reservoir volume(68) =0, Evaporation from reservoir become 0. However, when the flag(60) equal to "1", evaporation from Yeghvard Res. is calculated. 0.17m3/s=(50mm/month)x3kmx3km/30 days/86,400	=IF(previous(68)<0.1,0,IF(OR((60)=1,(65)>0), 0.17m3/sx10days*86,400/1,000,000, 0))	0.15	(MCM)
	(67)	Reservoir Loss(0.24m3/s)	If previous day of Reservoir volume(68) =0, reservoir loss become 0. However, when the flag(60) equal to "1", reservoir loss from Yeghvard Res. is calculated. 0.24m3/s=(90MCMx1,000,000x5%)/(214daysx86,400)	=IF(previous(68)<0.1,0,IF(OR((60)=1,(65)>0), 0.24m3/sx10days*86,400/1,000,000, 0))	0.21	(MCM)
	(68)	Reservoir Volume	Previous decade volume (74.37MCM) add distributed discharge from Arzni-Shamiram minus WUA's deficit and Evaporation and loss from Res.	=(74.37(previous decade of (68))+(62)-(65)-(66)-(67)	84.8	(MCM)
	(69)	Water deficit of Yeghvard Reservoir	Water deficit of Yeghvard Reservoir	=MIN(0,previous(68)+(62)-(65)-(66)-(67))	0.0	(MCM)
Supplied from Sevan	(70)	Another all canals supplied by Sevan	Sub-total deficit water supplied from Sevan (1st part of Lower Hrazdan, Artashat, 2nd part of Arzni-Shamiram and other canals	=(35)	0.0	(m3/s)
	(71)	Water from Sevan to Project Area	Deficit water supplied from Sevan (12,347ha : project area)	-(69))x1,000,000/(86,400x10days)	0.0	(m3/s)
	(72)	Total discharge of deficit water supplied by Sevan	Total deficit water supplied from Sevan	=(70)+(71)	0.0	(m3/s)
Usage of River Flow	(73)	Hrazdan River	Total usage of Hrazdan River	=(10)+(15)+(26)+(31)+(50)+(55)+(61)	31.1	(m3/s)
	(74)	Amberd River	Total usage of Amberd River	=(20)	0.0	(m3/s)
	(75)	Aparan Reservoir	Total usage of Aparan Reservoir	=(23)	3.4	(m3/s)
	(76)	Kasakh River	Total usage of Kasakh River	=(46)	3.0	(m3/s)
		o.s. : Observation Station				

Appendix D-9: Precondition data for Water Balance Calculation

(1) Demand for Other Canals

Demand of 1st part of Lower Hrazdan Canal

2013 (m3/s)

Decade	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.000	0.000	0.000	0.000	4.000	5.000	5.000	5.000	4.000	4.000	0.000	0.000
2	0.000	0.000	0.000	3.000	4.000	5.000	5.000	5.000	4.000	4.000	0.000	0.000
3	0.000	0.000	0.000	3.500	4.000	5.000	5.000	5.000	4.000	3.000	0.000	0.000
Q(MCM)	0.0	0.0	0.0	5.6	10.7	13.0	13.4	13.4	10.4	9.8	0.0	0.0

Source:PIU Total (MCM) 76.3

Demand of Artashat Canal

2013 (m3/s)

Decade	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.000	0.000	0.000	0.000	4.000	5.000	5.000	5.000	4.000	4.000	0.000	0.000
2	0.000	0.000	0.000	3.500	4.000	5.000	5.000	5.000	4.000	4.000	0.000	0.000
3	0.000	0.000	0.000	3.500	4.000	5.000	5.000	5.000	4.000	4.000	0.000	0.000
Q(MCM)	0.0	0.0	0.0	6.0	10.7	13.0	13.4	13.4	10.4	10.7	0.0	0.0

Source:PIU Total (MCM) 77.6

Demand of 2nd part of Arzni-Shamiram Canal

2013 (m3/s)

Decade	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.000	0.000	0.000	0.000	7.000	13.000	13.000	13.000	8.000	5.000	0.000	0.000
2	0.000	0.000	0.000	0.000	7.000	13.000	13.000	13.000	8.000	5.000	0.000	0.000
3	0.000	0.000	0.000	0.000	10.000	13.000	13.000	13.000	8.000	5.000	0.000	0.000
Q(MCM)	0.0	0.0	0.0	0.0	21.6	33.7	34.8	34.8	20.7	13.4	0.0	0.0

Source:PIU Total (MCM) 159.0

Demand of Other Canals

2013 (m3/s)

Decade	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.000	0.000	0.000	0.000	2.386	3.865	5.262	4.982	2.759	1.136	0.000	0.000
2	0.000	0.000	0.000	0.000	2.388	4.621	5.521	4.881	2.303	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	2.842	5.183	5.635	4.356	1.534	0.000	0.000	0.000
Q(MCM)	0.0	0.0	0.0	0.0	6.8	11.8	14.7	12.7	5.7	1.0	0.0	0.0

Source:PIU Total (MCM) 52.7

Demand of Yeghvard and Ashtarak WUA

3,644ha 2013 (m3/s)

Decade	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.000	0.000	0.000	0.019	2.402	0.899	4.154	3.986	3.135	0.433	0.000	0.000
2	0.000	0.000	0.000	0.462	1.762	3.037	4.075	3.762	0.627	1.861	0.000	0.000
3	0.000	0.000	0.000	2.128	0.730	3.796	4.015	3.298	0.397	0.846	0.000	0.000
Q(MCM)	0.0	0.0	0.0	2.3	4.3	6.7	10.9	9.8	3.6	2.8	0.0	0.0

Source:JICA Survey Team Total (MCM) 40.4

Demand of Vagharshapat and Khoy WUA

8,703ha 2013 (m3/s)

Decade	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.000	0.000	0.000	1.236	5.205	8.875	7.701	7.060	4.845	5.495	0.000	0.000
2	0.000	0.000	0.000	3.922	6.750	9.929	7.966	6.788	4.795	2.781	0.000	0.000
3	0.000	0.000	0.444	5.846	8.595	10.275	7.851	6.369	5.743	0.861	0.000	0.000
Q(MCM)	0.0	0.0	0.4	9.5	18.5	25.1	21.0	18.0	13.3	8.0	0.0	0.0

Source:JICA Survey Team Total (MCM) 113.8

Demand of Yeghvard Project Area

12,347ha 2013 (m3/s)

Decade	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.000	0.000	0.000	1.255	7.607	9.774	11.855	11.046	7.980	5.928	0.000	0.000
2	0.000	0.000	0.000	4.384	8.512	12.966	12.041	10.550	5.422	4.642	0.000	0.000
3	0.000	0.000	0.444	7.974	9.325	14.071	11.866	9.667	6.140	1.707	0.000	0.000
Q(MCM)	0.0	0.0	0.4	11.8	22.8	31.8	31.9	27.8	16.9	10.8	0.0	0.0

Source:JICA Survey Team Total (MCM) 154.2

(2) Supply from Water Resources

Supply from Aparan Reservoir

(m3/s)

Decade	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.000	0.000	0.000	0.000	3.400	6.000	7.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000	4.000	8.000	6.000	0.000	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	6.000	7.000	0.000	0.000	0.000	0.000	0.000	0.000
Q(MCM)	0.0	0.0	0.0	0.0	12.1	18.1	11.2	0.0	0.0	0.0	0.0	0.0

Source:PIU Total (MCM) 41.4

River Flow at Hrazdan+Lusakert (2013)

(m3/s)

Decade	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	6.300	6.600	8.800	35.600	33.100	18.900	10.200	10.100	7.400	7.500	7.600	6.500
2	6.600	7.000	17.500	28.600	31.600	13.800	8.800	9.800	7.600	7.800	7.300	6.300
3	7.100	7.600	16.200	22.900	23.800	12.300	9.400	8.000	7.400	8.000	6.700	6.100
Q(MCM)	17.9	17.0	38.1	75.3	78.5	38.9	25.3	24.8	19.4	20.8	18.7	16.9

Source:PIU Total (MCM) 391.6

River Flow at Kasakh(2013)

(m3/s)

Decade	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2.600	2.700	2.700	10.000	3.500	2.700	2.400	2.400	2.400	2.600	2.900	2.800
2	2.600	2.700	7.500	4.700	3.700	2.600	2.400	2.300	2.600	4.400	3.000	2.700
3	2.600	2.700	11.200	4.000	2.900	2.500	2.400	2.300	2.500	2.900	2.900	2.700
Q(MCM)	7.0	6.5	19.5	16.2	9.0	6.7	6.4	6.2	6.5	8.8	7.6	7.3

Total (MCM) 107.7

Appendix D-10: Plan of Canal's Discharge

unit:m3/s

a) Water Source		Arzni-Shamiram Canal			Feeder Canal		Yeghvard Dam				Kakakh R.	Tkahan Intake		Kasakh Intake							
b) Canal / River		Canal Part I	Canal Part II	Total	Canal 1 (PK.130)	Canal 2 (PK.260)	Inflow	Release	Yeg.Res	Arzni-Br.	Pipeline		Kasakh R.	Tkahan C. Yeg. Res.	L Hrazdan Part II				Shah-Aru Canal		
c) WUA	Yeghvard								-	Yeghvard	-	-	-	-					-	-	
	Ashtarak (1) to (2)								Ashtarak(2)	-	Ashtarak(1)	-	-	Ashtarak(2)					-	-	
	Khoy (1) to (5)								Khoy(1)-(5)	-	-	Khoy(1)-(5)	Khoy(1)-(5)	-	Khoy(1)-(5)	Khoy(1)-(5)	Khoy(1)-(5)		-	-	
	Vag.(1) to (4)								Vag.(1)-(4)	-	-	Vag.(1)-(4)	Vag.(1)-(4)	-	Vag.(2)-(4)	Vag.(2)-(4)	Vag.(2)-(4)		Vag.(1)	Vag.(1)	
Month	Day	(1)	(2)	(3)=(1)+(2)	(4)	(5)	(6)=(4)+(5)	(7)=(8)+(9)+(10)	(8) =(13)+(16)+(20)	(9)	(10)	(11) =(15)+(19)	(12) =(15)+(16)+(19)+(20)	(13)	(14) =(15)+(16)+(17)	(15)	(16)	(17)	(18) =(19)+(20)	(19)	(20)
Jan	1st 01-10	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2nd 11-20	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3rd 21-31	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feb	1st 01-10	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2nd 11-20	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3rd 21-28	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mar	1st 01-10	7.00	0.00	7.00	7.00	0.00	7.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2nd 11-20	15.50	0.00	15.50	9.00	6.50	15.50	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3rd 21-31	14.40	0.00	14.40	9.00	5.40	14.40	0.0	0.00	0.00	0.00	0.40	0.40	0.00	0.36	0.36	0.00	0.00	0.04	0.04	0.00
Apr	1st 01-10	22.00	0.00	22.00	9.00	13.00	22.00	0.0	0.00	0.00	0.00	1.20	1.20	0.00	1.08	1.08	0.00	0.00	0.12	0.12	0.00
	2nd 11-20	19.20	0.00	19.20	9.00	10.20	19.20	0.5	0.16	0.28	0.07	3.00	3.00	0.16	3.60	2.70	0.00	0.90	0.30	0.30	0.00
	3rd 21-30	11.20	0.00	11.20	9.00	2.20	11.20	2.1	0.66	1.16	0.28	3.00	3.00	0.66	5.50	2.70	0.00	2.80	0.30	0.30	0.00
May	1st 01-10	14.90	3.60	18.50	9.00	5.90	14.90	2.4	0.75	1.33	0.32	3.00	3.00	0.75	4.90	2.70	0.00	2.20	0.30	0.30	0.00
	2nd 11-20	12.40	3.00	15.40	9.00	3.40	12.40	1.8	0.56	1.00	0.24	3.00	3.00	0.56	6.50	2.70	0.00	3.80	0.30	0.30	0.00
	3rd 21-31	1.50	4.00	5.50	1.50	0.00	1.50	0.7	0.22	0.39	0.09	2.90	2.90	0.22	8.31	2.61	0.00	5.70	0.29	0.29	0.00
Jun	1st 01-10	0.00	7.00	7.00	0.00	0.00	0.00	7.1	6.48	0.50	0.12	2.70	8.90	0.28	8.00	2.43	5.57	0.00	0.90	0.27	0.63
	2nd 11-20	0.00	5.00	5.00	0.00	0.00	0.00	10.3	8.24	1.66	0.40	2.60	9.90	0.94	8.90	2.34	6.56	0.00	1.00	0.26	0.74
	3rd 21-30	0.00	6.00	6.00	0.00	0.00	0.00	11.6	8.99	2.11	0.51	2.50	10.30	1.19	9.26	2.25	7.01	0.00	1.04	0.25	0.79
Jul	1st 01-10	0.00	6.00	6.00	0.00	0.00	0.00	9.5	6.61	2.33	0.56	2.40	7.70	1.31	6.92	2.16	4.76	0.00	0.78	0.24	0.54
	2nd 11-20	0.00	7.00	7.00	0.00	0.00	0.00	9.7	6.88	2.27	0.55	2.40	8.00	1.28	7.19	2.16	5.03	0.00	0.81	0.24	0.57
	3rd 21-31	0.00	13.00	13.00	0.00	0.00	0.00	9.5	6.75	2.22	0.54	2.40	7.90	1.25	7.10	2.16	4.94	0.00	0.80	0.24	0.56
Aug	1st 01-10	0.00	13.00	13.00	0.00	0.00	0.00	8.7	5.95	2.22	0.54	2.40	7.10	1.25	6.39	2.16	4.23	0.00	0.71	0.24	0.47
	2nd 11-20	0.00	13.00	13.00	0.00	0.00	0.00	8.3	5.69	2.11	0.51	2.30	6.80	1.19	6.12	2.07	4.05	0.00	0.68	0.23	0.45
	3rd 21-31	0.00	13.00	13.00	0.00	0.00	0.00	7.4	5.13	1.83	0.44	2.30	6.40	1.03	5.76	2.07	3.69	0.00	0.64	0.23	0.41
Sep	1st 01-10	0.00	8.00	8.00	0.00	0.00	0.00	5.5	3.37	1.72	0.42	2.40	4.80	0.97	4.32	2.16	2.16	0.00	0.48	0.24	0.24
	2nd 11-20	0.00	8.00	8.00	0.00	0.00	0.00	2.8	2.39	0.33	0.08	2.60	4.80	0.19	4.32	2.34	1.98	0.00	0.48	0.26	0.22
	3rd 21-30	0.00	8.00	8.00	0.00	0.00	0.00	3.6	3.32	0.22	0.05	2.50	5.70	0.12	5.13	2.25	2.88	0.00	0.57	0.25	0.32
Oct	1st 01-10	0.00	5.00	5.00	0.00	0.00	0.00	3.3	3.02	0.22	0.05	2.60	5.50	0.12	4.95	2.34	2.61	0.00	0.55	0.26	0.29
	2nd 11-20	0.00	5.00	5.00	0.00	0.00	0.00	1.9	0.59	1.05	0.25	2.80	2.80	0.59	2.52	2.52	0.00	0.00	0.28	0.28	0.00
	3rd 21-31	0.00	5.00	5.00	0.00	0.00	0.00	0.8	0.25	0.44	0.11	0.90	0.90	0.25	0.81	0.81	0.00	0.00	0.09	0.09	0.00
Nov	1st 01-10	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2nd 11-20	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3rd 21-30	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dec	1st 01-10	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2nd 11-20	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3rd 21-31	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	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 (MCM)		103.4	117.6	221.0	40.6	62.8	103.4	94.5	66.7	22.4	5.4	46.0	100.1	12.6	103.8	41.4	48.7	13.8	10.1	4.6	5.5

unit:MCM

a) Water Source				Yeghvard Dam												
b) Canal / River				Inflow			Release	Loss (Evp.+Res.)	Balance	Demand						
				Canal 1 (PK.130)	Canal 2 (PK.260)	Total					Arzni-Br.	Pipeline	Tkahan	L. Hrazdan	Shah-Aru
c)WUA	Yeghvard										Yeghvard				
	Ashtarak (1) to (2)											Ashtarak(1)	Ashtarak(2)		
	Khoy (1) to (5)													Khoy(1)-(5)	
	Vag.(1) to (4)													Vag.(2)-(4)	Vag.(1)
Month	Day			(1)	(2)	(3)=(1)+(2)	(4)	(5)	(6) =prev.(6)+(3)-(4)-(5)	(7) =(8)+(9)+(10)+(11)+(12)	(8)	(9)	(10)	(11)	(12)
Jan	1st	01-10	10	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00
	2nd	11-20	10	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00
	3rd	21-31	11	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00
Feb	1st	01-10	10	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00
	2nd	11-20	10	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00
	3rd	21-28	8	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.00
Mar	1st	01-10	10	6.00	0.00	6.00	0.00	0.00	6.00	0.0	0.00	0.00	0.00	0.00	0.00
	2nd	11-20	10	7.80	5.60	13.40	0.00	0.36	19.04	0.0	0.00	0.00	0.00	0.00	0.00
	3rd	21-31	11	8.60	5.10	13.70	0.00	0.39	32.35	0.0	0.00	0.00	0.00	0.00	0.00
Apr	1st	01-10	10	7.80	11.20	19.00	0.00	0.36	50.99	0.0	0.00	0.00	0.00	0.00	0.00
	2nd	11-20	10	7.80	8.80	16.60	0.40	0.36	66.83	0.4	0.24	0.06	0.14	0.00	0.00
	3rd	21-30	10	7.80	1.90	9.70	1.80	0.36	74.37	1.8	1.00	0.24	0.57	0.00	0.00
May	1st	01-10	10	7.80	5.10	12.90	2.10	0.36	84.81	2.1	1.15	0.28	0.65	0.00	0.00
	2nd	11-20	10	7.80	2.90	10.70	1.60	0.36	93.55	1.6	0.86	0.21	0.48	0.00	0.00
	3rd	21-31	11	1.40	0.00	1.40	0.70	0.39	93.86	0.7	0.37	0.09	0.21	0.00	0.00
Jun	1st	01-10	10	0.00	0.00	0.00	6.10	0.36	87.40	6.1	0.43	0.10	0.24	4.81	0.54
	2nd	11-20	10	0.00	0.00	0.00	8.90	0.36	78.14	8.9	1.43	0.35	0.81	5.67	0.64
	3rd	21-30	10	0.00	0.00	0.00	10.00	0.36	67.78	10.0	1.82	0.44	1.03	6.06	0.68
Jul	1st	01-10	10	0.00	0.00	0.00	8.20	0.36	59.22	8.2	2.01	0.48	1.13	4.11	0.47
	2nd	11-20	10	0.00	0.00	0.00	8.40	0.36	50.46	8.4	1.96	0.48	1.11	4.35	0.49
	3rd	21-31	11	0.00	0.00	0.00	9.00	0.39	41.07	9.0	2.11	0.51	1.19	4.69	0.53
Aug	1st	01-10	10	0.00	0.00	0.00	7.50	0.36	33.21	7.5	1.92	0.47	1.08	3.65	0.41
	2nd	11-20	10	0.00	0.00	0.00	7.20	0.36	25.65	7.2	1.82	0.44	1.03	3.50	0.39
	3rd	21-31	11	0.00	0.00	0.00	7.00	0.39	18.26	7.0	1.74	0.42	0.98	3.51	0.39
Sep	1st	01-10	10	0.00	0.00	0.00	4.80	0.36	13.10	4.8	1.49	0.36	0.84	1.87	0.21
	2nd	11-20	10	0.00	0.00	0.00	2.40	0.36	10.34	2.4	0.29	0.07	0.16	1.71	0.19
	3rd	21-30	10	0.00	0.00	0.00	3.10	0.36	6.88	3.1	0.19	0.04	0.10	2.49	0.28
Oct	1st	01-10	10	0.00	0.00	0.00	2.90	0.36	3.62	2.8	0.19	0.04	0.10	2.26	0.25
	2nd	11-20	10	0.00	0.00	0.00	1.60	0.36	1.66	1.6	0.91	0.22	0.51	0.00	0.00
	3rd	21-31	11	0.00	0.00	0.00	0.80	0.39	0.47	0.8	0.42	0.10	0.24	0.00	0.00
Nov	1st	01-10	10	0.00	0.00	0.00	0.00	0.00	0.47	0.0	0.00	0.00	0.00	0.00	0.00
	2nd	11-20	10	0.00	0.00	0.00	0.00	0.00	0.47	0.0	0.00	0.00	0.00	0.00	0.00
	3rd	21-30	10	0.00	0.00	0.00	0.00	0.00	0.47	0.0	0.00	0.00	0.00	0.00	0.00
Dec	1st	01-10	10	0.00	0.00	0.00	0.00	0.00	0.47	0.0	0.00	0.00	0.00	0.00	0.00
	2nd	11-20	10	0.00	0.00	0.00	0.00	0.00	0.47	0.0	0.00	0.00	0.00	0.00	0.00
	3rd	21-31	11	0.00	0.00	0.00	0.00	0.00	0.47	0.0	0.00	0.00	0.00	0.00	0.00
Total (MCM)				62.80	40.60	103.40	94.50	8.43	-	94.40	22.35	5.40	12.60	48.68	5.47