

Table 9.4.5.28(1) Manjil Dam Operation (with Taleghan/Almout Diversion + Astur + Shah-rud Dams) (1/8)
(Unit: MCM)

Year	Month	Manjil Dam Inflow					Manjil Dam Operation				
		Catchment	fm Astur	fm Shah-rud	Storage	Outflow	Spillage	Shortage			
69-70	Mehr	34.29	0	0	213.39	47.5	0	0			
	Aban	75.57	0	0	243.16	45.8	0	0			
	Azar	50.04	0.41	0	249.2	44.4	0	0			
	Dey	63.18	265.67	0	533.15	44.9	0	0			
	Bah.	60.42	254.1	0	732.57	115.1	0	0			
	Esf.	81.94	344.61	8.05	942.57	224.6	0	0			
	Far.	126.15	530.49	46.35	1133	292.7	219.86	0			
	Ord.	54.13	227.61	330.26	1011	734	0	0			
	Kho.	19.66	82.68	0	309.84	803.5	0	0			
	Tir	6.57	386.6	4.89	0	707.9	0	0			
	Mor.	5.04	448.67	1.49	0	455.2	0	0			
	Sha.	6.46	80.76	41.28	0	128.5	0	0			
	totl	583.45	2621.59	432.32	5367.87	3644.1	219.86	0			
70-71	Mehr	11.68	35.82	0	0	47.5	0	0			
	Aban	17.77	28.03	0	0	45.8	0	0			
	Azar	28.95	15.45	0	0	44.4	0	0			
	Dey	30.29	7.77	6.84	0	44.9	0	0			
	Bah.	28.82	73.15	13.13	0	115.1	0	0			
	Esf.	58.26	118.63	47.72	0	224.6	0	0			
	Far.	99.59	94.76	98.36	0	292.7	0	0			
	Ord.	119.53	457.7	156.77	0	734	0	0			
	Kho.	36.29	706.98	60.23	0	803.5	0	0			
	Tir	5.66	298.72	224.95	0	529.33	0	178.57			
	Mor.	3.82	16.07	15.2	0	35.09	0	420.11			
	Sha.	1.69	7.12	9.78	0	18.59	0	109.91			
	totl	442.34	1860.2	632.97	0	2935.51	0	708.59			
71-72	Mehr	7.18	30.18	0.42	0	37.78	0	9.72			
	Aban	15.49	30.31	0	0	45.8	0	0			
	Azar	25.18	19.22	0	0	44.4	0	0			
	Dey	24.99	19.91	0	0	44.9	0	0			
	Bah.	25.47	89.63	0	0	115.1	0	0			
	Esf.	54.8	169.8	0	0	224.6	0	0			
	Far.	326.61	818.34	1.3	853.55	292.7	0	0			
	Ord.	372.97	1568.47	60	1133	734	987.99	0			
	Kho.	183.48	771.6	50.79	1133	803.5	202.37	0			
	Tir	33.48	140.8	30.6	629.98	707.9	0	0			
	Mor.	11.92	50.13	17.01	253.84	455.2	0	0			
	Sha.	10.11	42.49	13.78	191.72	128.5	0	0			
	totl	1091.68	3750.88	173.9	4195.09	3634.38	1190.36	9.72			
72-73	Mehr	13.85	58.25	11.15	227.47	47.5	0	0			
	Aban	36.74	154.52	0	372.93	45.8	0	0			
	Azar	38.71	162.77	22.14	552.15	44.4	0	0			
	Dey	32.03	134.72	17.16	691.17	44.9	0	0			
	Bah.	43.57	183.24	24.01	826.89	115.1	0	0			
	Esf.	129.57	544.87	68.45	1133	224.6	212.18	0			
	Far.	140.3	590	104.24	1133	292.7	541.84	0			
	Ord.	127.7	537	94.12	1133	734	24.82	0			
	Kho.	37.5	157.7	74.16	598.86	803.5	0	0			
	Tir	13.61	90.95	4.49	0	707.9	0	0			
	Mor.	10.54	444.66	0	0	455.2	0	0			
	Sha.	9.81	118.69	0	0	128.5	0	0			
	totl	633.93	3177.37	419.93	6668.47	3644.1	778.85	0			

Table 9.4.5.28(2) Manjil Dam Operation (with Taleghan/Almout Diversion + Astur + Shah-rud Dams) (2/8)
(Unit: MCM)

Year	Month	Manjil Dam Inflow					Manjil Dam Operation				
		Catchment	fm Astur	fm Shah-rud	Storage	Outflow	Spillage	Shortage			
73-74	Mehr	12.91	11.99	22.6	0	47.5	0	0			
	Aban	18.53	8.84	18.42	0	45.8	0	0			
	Azar	24.46	4.82	15.12	0	44.4	0	0			
	Dey	28.25	0	18.32	1.66	44.9	0	0			
	Bah.	28.03	64.63	20.78	0	115.1	0	0			
	Esf.	101.12	295.19	60.84	232.55	224.6	0	0			
	Far.	414.03	1741.15	168.38	1133	292.7	1130.41	0			
	Ord.	159.18	669.42	25.61	1133	734	120.21	0			
	Kho.	32.46	136.5	0	498.46	803.5	0	0			
	Tir	21.42	171.18	16.83	0	707.9	0	0			
	Mor.	12.22	416.96	26.02	0	455.2	0	0			
	Sha.	19.19	94.22	15.09	0	128.5	0	0			
	totl	871.8	3614.9	408.02	2998.67	3644.1	1250.62	0			
74-75	Mehr	15.97	22.02	9.5	0	47.5	0	0			
	Aban	19.38	14.98	11.43	0	45.8	0	0			
	Azar	28.2	0	25.64	9.44	44.4	0	0			
	Dey	27.53	0	26.81	18.88	44.9	0	0			
	Bah.	27.88	42.74	25.61	0	115.1	0	0			
	Esf.	55.33	192.98	44.6	68.31	224.6	0	0			
	Far.	129.04	542.65	61.3	508.6	292.7	0	0			
	Ord.	167.37	703.85	84.79	730.61	734	0	0			
	Kho.	40	168.22	20.28	155.61	803.5	0	0			
	Tir	5.04	535.51	11.74	0	707.9	0	0			
	Mor.	2.04	334.24	118.92	0	455.2	0	0			
	Sha.	2.82	11.85	97.34	0	112.01	0	16.49			
	totl	520.59	2569.05	537.97	1491.45	3627.61	0	16.49			
75-76	Mehr	11.84	35.66	0	0	47.5	0	0			
	Aban	13.36	32.44	0	0	45.8	0	0			
	Azar	15.38	29.02	0	0	44.4	0	0			
	Dey	28.89	16.01	0	0	44.9	0	0			
	Bah.	35.17	79.93	0	0	115.1	0	0			
	Esf.	35	189.6	0	0	224.6	0	0			
	Far.	230.3	333.07	0	270.67	292.7	0	0			
	Ord.	223.46	939.72	0	699.85	734	0	0			
	Kho.	81.5	342.73	34.86	355.44	803.5	0	0			
	Tir	9.86	322.61	20	0	707.9	0	0			
	Mor.	3.84	451.36	0	0	455.2	0	0			
	Sha.	9.31	119.19	0	0	128.5	0	0			
	totl	697.9	2891.34	54.85	1325.96	3644.1	0	0			
76-77	Mehr	10.71	29.37	7.41	0	47.5	0	0			
	Aban	23.62	15	7.18	0	45.8	0	0			
	Azar	24.9	11.79	7.71	0	44.4	0	0			
	Dey	26.1	9.32	9.48	0	44.9	0	0			
	Bah.	36.59	57.03	21.48	0	115.1	0	0			
	Esf.	76.76	116.17	31.67	0	224.6	0	0			
	Far.	115.04	284.23	33.2	139.78	292.7	0	0			
	Ord.	86.69	506.15	1.39	0	734	0	0			
	Kho.	112.82	660.62	30.06	0	803.5	0	0			
	Tir	6.26	538.6	163.04	0	707.9	0	0			
	Mor.	2.68	11.29	40.25	0	54.22	0	400.98			
	Sha.	2.68	11.29	1.84	0	15.81	0	112.69			
	totl	524.88	2250.86	354.7	139.78	3130.43	0	513.67			

Table 9.4.5.28(3) Manjil Dam Operation (with Taleghau/Almout Diversion + Astur + Shah-rud Dams) (3/8)
(Unit: MCM)

Year	Month	Manjil Dam Inflow				Manjil Dam Operation			
		Catchment	fm Astur	fm Shah-rud		Storage	Outflow	Spillage	Shortage
77-78	Mehr	7.02	29.54	10.94		0	47.5	0	0
	Aban	31.59	14.21	0		0	45.8	0	0
	Azar	35.3	9.1	0		0	44.4	0	0
	Dey	36.55	8.35	0		0	44.9	0	0
	Bah.	51.79	63.31	0		0	115.1	0	0
	Esf.	80.39	144.21	0		0	224.6	0	0
	Far.	117.32	405.01	9.74		239.37	292.7	0	0
	Ord.	85.93	408.7	0		0	734	0	0
	Kho.	33.65	740.83	29.02		0	803.5	0	0
	Tir	10.91	239.22	234.67		0	484.8	0	223.1
	Mor.	1.63	6.84	5.3		0	13.77	0	441.43
	Sha.	1.27	5.32	0		0	6.59	0	121.91
	totl	493.34	2074.65	289.67		239.37	2857.66	0	786.44
		3.73	15.7	6.16		0	25.59	0	21.91
78-79	Mehr	18.11	27.69	0		0	45.8	0	0
	Aban	48.64	0	0		4.24	44.4	0	0
	Azar	44.82	0	0		4.16	44.9	0	0
	Dey	69.71	41.22	0		0	115.1	0	0
	Bah.	70.25	154.35	0		0	224.6	0	0
	Esf.	174.95	730.24	191.72		804.21	292.7	0	0
	Far.	124.53	523.71	80.93		799.38	734	0	0
	Ord.	44.51	187.2	43.73		271.32	803.5	0	0
	Kho.	11.18	422.56	2.84		0	707.9	0	0
	Tir	4.63	449.93	0.65		0	455.2	0	0
	Mor.	3.7	49.51	75.29		0	128.5	0	0
	Sha.	618.76	2602.11	401.32		1883.31	3622.19	0	21.91
	totl	8.42	35.41	3.67		0	47.5	0	0
		17.38	28.42	0		0	45.8	0	0
79-80	Mehr	18.72	25.68	0		0	44.4	0	0
	Aban	22	22.9	0		0	44.9	0	0
	Azar	25.08	90.02	0		0	115.1	0	0
	Dey	36.89	172.87	14.84		0	224.6	0	0
	Bah.	308.1	620.71	206.47		842.58	292.7	0	0
	Esf.	117.47	494.01	50.84		770.9	734	0	0
	Far.	22.8	95.9	27.28		113.37	803.5	0	0
	Ord.	6.99	577.93	9.62		0	707.9	0	0
	Kho.	2.76	303.05	149.39		0	455.2	0	0
	Tir	2.93	12.34	56.75		0	72.02	0	56.48
	Mor.	589.54	2479.23	518.85		1726.85	3587.62	0	56.48
	Sha.	9.3	38.2	0		0	47.5	0	0
	totl	32.2	13.6	0		0	45.8	0	0
		29.11	15.29	0		0	44.4	0	0
80-81	Mehr	34.47	10.43	0		0	44.9	0	0
	Aban	44.56	70.54	0		0	115.1	0	0
	Azar	100.63	123.97	0		0	224.6	0	0
	Dey	224.86	886.09	85.71		903.96	292.7	0	0
	Bah.	213.07	896.01	146.6		1133	734	292.64	0
	Esf.	82.35	346.29	100.05		858.19	803.5	0	0
	Far.	31.71	133.34	29.14		344.48	707.9	0	0
	Ord.	8.45	86.64	15.62		0	455.2	0	0
	Kho.	5.91	118.15	4.43		0	128.5	0	0
	Tir	816.62	2738.56	381.56		3239.63	3644.1	292.64	0
	Mor.								
	Sha.								
	totl								

Table 9.4.5.28(4) Manjil Dam Operation (with Taleghau/Almout Diversion + Astur + Shah-rud Dams) (4/8)
(Unit: MCM)

Year	Month	Manjil Dam Inflow				Manjil Dam Operation			
		Catchment	fm Astur	fm Shah-rud		Storage	Outflow	Spillage	Shortage
81-82	Mehr	19.86	17.86	9.78		0	47.5	0	0
	Aban	27.74	37.91	10.94		30.79	45.8	0	0
	Azar	31.72	133.39	6.99		158.49	44.4	0	0
	Dey	31.34	131.77	13.34		290.04	44.9	0	0
	Bah.	41.73	175.5	18.98		411.15	115.1	0	0
	Esf.	43.76	184	38.71		453.02	224.6	0	0
	Far.	149.22	627.52	146.97		1084.03	292.7	0	0
	Ord.	136.87	575.58	100.17		1133	734	29.65	0
	Kho.	33.81	142.16	20.81		526.28	803.5	0	0
	Tir	6.54	162.11	12.97		0	707.9	0	0
	Mor.	2.12	447.73	5.35		0	455.2	0	0
	Sha.	3.04	123.35	2.12		0	128.5	0	0
	totl	527.73	2758.89	387.13		4086.79	3644.1	29.65	0
		38.94	0	17.93		9.37	47.5	0	0
82-83	Mehr	43.22	0	17.11		23.9	45.8	0	0
	Aban	56.27	0	49.08		84.85	44.4	0	0
	Azar	56.77	136.85	45.07		278.62	44.9	0	0
	Dey	53.28	224.06	25.71		466.58	115.1	0	0
	Bah.	82.79	348.17	25.43		698.36	224.6	0	0
	Esf.	227.43	956.42	92.4		1133	292.7	548.91	0
	Far.	237.21	997.53	128.3		1133	734	629.04	0
	Ord.	130.18	547.46	64.96		1072.1	803.5	0	0
	Kho.	20.36	85.61	0		470.17	707.9	0	0
	Tir	3.86	16.23	1.98		37.04	455.2	0	0
	Mor.	5.7	80.94	4.82		0	128.5	0	0
	Sha.	956.01	3393.27	472.78		5407	3644.1	1177.95	0
	totl	13.42	28.88	5.2		0	47.5	0	0
		21.61	61.43	14.26		51.5	45.8	0	0
83-84	Mehr	36.8	154.75	19.35		218	44.4	0	0
	Aban	31.42	132.14	16.87		353.52	44.9	0	0
	Azar	37.45	157.47	31.88		465.22	115.1	0	0
	Dey	45.44	191.09	40.96		518.12	224.6	0	0
	Bah.	73.94	310.95	136.85		747.16	292.7	0	0
	Esf.	146.96	617.99	165.8		943.9	734	0	0
	Far.	54.3	228.36	82.96		506.02	803.5	0	0
	Ord.	4.78	158.47	38.64		0	707.9	0	0
	Kho.	2.12	444.28	8.79		0	455.2	0	0
	Tir	2.47	117.1	8.94		0	128.5	0	0
	Mor.	470.7	2602.92	570.48		3803.43	3644.1	0	0
	Sha.	9.41	21.79	16.3		0	47.5	0	0
	totl	33.46	0	16.35		4.01	45.8	0	0
		58.61	0	73.43		91.66	44.4	0	0
84-85	Mehr	62.29	0	37.79		146.83	44.9	0	0
	Aban	88.76	359.7	73.72		553.91	115.1	0	0
	Azar	70.02	294.47	62.37		756.17	224.6	0	0
	Dey	345.95	1454.84	190.71		1133	292.7	1321.97	0
	Bah.	190.98	803.12	138.96		1133	734	399.06	0
	Esf.	53.93	226.77	70.76		680.96	803.5	0	0
	Far.	15.31	64.38	54.49		107.25	707.9	0	0
	Ord.	5.57	332.41	9.97		0	455.2	0	0
	Kho.	4.1	118.32	6.09		0	128.5	0	0
	Tir	938.37	3675.81	750.95		4606.79	3644.1	1721.03	0
	Mor.								
	Sha.								
	totl								

Table 9.4.5.28(5) Manjil Dam Operation (with Taleghan/Almout Diversion + Astur + Shah-rud Dams) (5/8)
(Unit: MCM)

Year	Month	Manjil Dam Inflow					Manjil Dam Operation			
		Catchment	fin Astur	fin Shah-rud	Storage	Outflow	Spillage	Shortage		
85-86	Mehr	12.95	22.72	11.83	0	47.5	0	0		
	Aban	25.49	3.07	17.25	0	45.8	0	0		
	Azar	37.04	0	23.53	16.18	44.4	0	0		
	Dey	37	37.15	22.29	67.71	44.9	0	0		
	Bah.	39.39	165.65	22.3	179.95	115.1	0	0		
	Esf.	50.98	214.39	27.02	247.74	224.6	0	0		
	Far.	147.08	618.5	93.33	813.95	734	0	0		
	Ord.	162.09	681.65	80.95	1004.64	734	0	0		
	Kho.	66.89	281.32	27.38	576.73	803.5	0	0		
	Tir	13.9	117.27	0	0	707.9	0	0		
	Mor.	2.69	450.27	2.24	0	455.2	0	0		
	Sha.	4.12	113	11.38	0	128.5	0	0		
	totl	599.62	2704.97	339.5	2906.9	3644.1	0	0		
86-87	Mehr	10.86	30.43	6.21	0	47.5	0	0		
	Aban	28.65	0	18.42	1.27	45.8	0	0		
	Azar	37.24	0	44.84	38.95	44.4	0	0		
	Dey	36.65	0	11.9	42.6	44.9	0	0		
	Bah.	39.35	18.46	21.48	6.79	115.1	0	0		
	Esf.	64.12	269.66	96.67	212.64	224.6	0	0		
	Far.	110.38	464.16	139.98	634.46	292.7	0	0		
	Ord.	109.24	459.38	129.22	598.3	734	0	0		
	Kho.	20.03	145.76	39.42	0	803.5	0	0		
	Tir	2.76	698.56	6.58	0	707.9	0	0		
	Mor.	2.59	102.41	206.6	0	311.6	0	143.6		
	Sha.	2.11	8.85	5.04	0	16	0	112.5		
	totl	463.97	2197.68	726.35	1535	3388	0	256.1		
87-88	Mehr	15.89	31.61	0	0	47.5	0	0		
	Aban	88.81	0	0	43.01	45.8	0	0		
	Azar	37.82	0	0	36.43	44.4	0	0		
	Dey	56.47	0	0	48	44.9	0	0		
	Bah.	59.72	216.35	11.23	220.2	115.1	0	0		
	Esf.	187.11	786.88	134.04	1103.63	224.6	0	0		
	Far.	306.72	1289.87	187.15	1133	292.7	1461.67	0		
	Ord.	297.4	1250.69	305.98	1133	734	1120.07	0		
	Kho.	70.78	297.65	151.03	848.96	803.5	0	0		
	Tir	30.11	126.63	38.67	336.47	707.9	0	0		
	Mor.	13.39	93.98	11.36	0	455.2	0	0		
	Sha.	10.86	106.13	11.5	0	128.5	0	0		
	totl	1175.1	4199.78	850.97	4902.69	3644.1	2581.75	0		
88-89	Mehr	19.08	11.64	16.77	0	47.5	0	0		
	Aban	33.06	109.55	15.29	112.1	45.8	0	0		
	Azar	36.05	151.58	10.62	265.95	44.4	0	0		
	Dey	32.86	138.21	11.99	404.11	44.9	0	0		
	Bah.	32.37	136.11	12.91	470.4	115.1	0	0		
	Esf.	103.97	437.24	66.5	853.52	224.6	0	0		
	Far.	170.32	716.23	109.95	1133	292.7	424.32	0		
	Ord.	60.79	255.66	50.8	766.25	734	0	0		
	Kho.	14.56	61.24	9.66	48.21	803.5	0	0		
	Tir	3.13	651.62	4.95	0	707.9	0	0		
	Mor.	1.92	209.58	200.36	0	411.85	0	43.35		
	Sha.	6.07	25.54	4.08	0	35.69	0	92.81		
	totl	514.18	2904.2	513.88	4051.54	3507.94	424.32	136.16		

Table 9.4.5.28(6) Manjil Dam Operation (with Taleghan/Almout Diversion + Astur + Shah-rud Dams) (6/8)
(Unit: MCM)

Year	Month	Manjil Dam Inflow			Manjil Dam Operation			
		Catchment	fin Astur	fin Shah-rud	Storage	Outflow	Spillage	Shortage
89-90	Mehr	7.57	31.83	4.18	0	43.58	0	3.92
	Aban	22.54	23.26	0	0	45.8	0	0
	Azar	27.24	17.16	0	0	44.4	0	0
	Dey	27.54	17.36	0	0	44.9	0	0
	Bah.	30.97	84.13	0	0	115.1	0	0
	Esf.	69.03	155.57	0	0	224.6	0	0
	Far.	137.49	186.37	37.36	68.52	292.7	0	0
	Ord.	101.88	763.63	21.24	0	734	0	0
	Kho.	18.63	88.82	212.25	0	803.5	0	0
	Tir	4.48	12.12	12.39	0	305.55	0	402.35
	Mor.	2.88	10.82	13.8	0	27.39	0	427.81
	Sha.	2.57	1904.22	351.67	68.52	27.19	0	101.31
	totl	452.81	1904.22	351.67	68.52	2708.7	0	935.4
90-91	Mehr	5.48	23.03	16.98	0	45.49	0	2.01
	Aban	16.28	29.52	0	0	45.8	0	0
	Azar	25.25	19.15	0	0	44.4	0	0
	Dey	26.79	18.11	0	0	44.9	0	0
	Bah.	34.21	80.89	0	0	115.1	0	0
	Esf.	56.94	167.66	0	0	224.6	0	0
	Far.	210.5	400.53	33.54	351.87	292.7	0	0
	Ord.	79.73	335.31	50.6	83.5	734	0	0
	Kho.	14.05	693.67	12.28	0	803.5	0	0
	Tir	5.3	227.7	204.83	0	437.82	0	270.08
	Mor.	1.65	6.92	10.21	0	18.78	0	436.42
	Sha.	1.8	7.57	14.92	0	24.29	0	104.21
	totl	477.98	2010.05	343.35	435.37	2831.38	0	812.72
91-92	Mehr	6.87	28.9	11.73	0	47.5	0	0
	Aban	17.53	28.27	0	0	45.8	0	0
	Azar	35.4	9	0	0	44.4	0	0
	Dey	27.14	17.76	0	0	44.9	0	0
	Bah.	33.56	81.54	0	0	115.1	0	0
	Esf.	48.05	176.55	0	0	224.6	0	0
	Far.	234.38	512.4	95.34	549.42	292.7	0	0
	Ord.	356.99	1501.28	307.46	1133	734	848.16	0
	Kho.	163.37	687.02	199.49	1133	803.5	246.38	0
	Tir	32.11	135.02	88.32	680.55	707.9	0	0
	Mor.	8.59	36.14	6.65	276.74	455.2	0	0
	Sha.	9.98	41.98	16	216.2	128.5	0	0
	totl	973.97	3255.86	725	3988.91	3644.1	1094.53	0
92-93	Mehr	16.93	71.2	19.4	276.22	47.5	0	0
	Aban	25.99	109.31	23.04	388.77	45.8	0	0
	Azar	38.64	162.5	24.35	569.86	44.4	0	0
	Dey	39.49	166.06	19.07	749.58	44.9	0	0
	Bah.	44.47	187	23.66	889.61	115.1	0	0
	Esf.	78.99	332.18	45.8	1121.98	224.6	0	0
	Far.	185.8	781.37	81.03	1133	292.7	744.48	0
	Ord.	189.92	798.68	71.81	1133	734	326.41	0
	Kho.	78.42	329.77	22.77	760.46	803.5	0	0
	Tir	13.53	56.91	11.9	134.9	707.9	0	0
	Mor.	6.02	312.51	1.77	0	455.2	0	0
	Sha.	9.16	113.19	6.15	0	128.5	0	0
	totl	727.37	3420.67	350.75	7157.38	3644.1	1070.89	0

Table 9.4.5.28(7) Manjil Dam Operation (with Taleghan/Almout Diversion + Astur + Shah-rud Dams) (7/8)
(Unit: MCM)

Year	Month	Manjil Dam Inflow				Manjil Dam Operation			
		Catchment	fm Astur	fm Shah-rud	Storage	Outflow	Spillage	Shortage	
93-94	Mehr	12.28	26.97	8.25	0	47.5	0	0	0
	Aban	56.42	0	37.31	47.92	45.8	0	0	0
	Azar	90.93	282.45	83.28	460.19	44.4	0	0	0
	Dey	135.84	571.26	84.22	1133	44.9	73.61	0	0
	Bah.	99.64	419.02	62.72	1133	115.1	466.28	0	0
	Esf.	164.05	689.86	71.52	1133	224.6	700.83	0	0
	Far.	303.12	1274.73	126.26	1133	292.7	1411.41	0	0
	Ord.	217.45	914.44	88.63	1133	734	486.52	0	0
	Kho.	62.21	261.61	80.2	733.52	803.5	0	0	0
	Tir	21.87	91.96	18.03	157.48	707.9	0	0	0
	Mor.	7	290.72	0	0	455.2	0	0	0
	Sha.	12.81	115.69	0	0	128.5	0	0	0
	totl	1183.61	4938.72	660.42	7064.11	3644.1	3138.65	0	0
94-95	Mehr	26.34	14.01	7.15	0	47.5	0	0	0
	Aban	81.31	115.63	51.18	202.33	45.8	0	0	0
	Azar	124.34	522.88	105.95	911.09	44.4	0	0	0
	Dey	61.15	257.15	61.28	1133	44.9	112.78	0	0
	Bah.	74.69	314.11	48.65	1133	115.1	322.35	0	0
	Esf.	96.65	406.47	49.43	1133	224.6	327.95	0	0
	Far.	164.25	690.7	57.39	1133	292.7	619.64	0	0
	Ord.	220.28	926.34	172.16	1133	734	584.78	0	0
	Kho.	122.72	516.1	89.85	1058.17	803.5	0	0	0
	Tir	26.65	112.09	32.15	521.16	707.9	0	0	0
	Mor.	6.84	28.78	3.02	104.6	455.2	0	0	0
	Sha.	5.87	24.66	8.6	15.23	128.5	0	0	0
	totl	1011.1	3928.91	686.82	8477.58	3644.1	1967.49	0	0
95-96	Mehr	17.07	71.8	12.91	69.51	47.5	0	0	0
	Aban	27.19	114.33	26.05	191.29	45.8	0	0	0
	Azar	30.92	130.04	21.5	329.34	44.4	0	0	0
	Dey	34.31	144.28	20.78	483.81	44.9	0	0	0
	Bah.	44.92	188.88	23.78	626.29	115.1	0	0	0
	Esf.	60.2	253.15	28.82	743.86	224.6	0	0	0
	Far.	250.62	1053.95	162.95	1133	292.7	785.67	0	0
	Ord.	235.66	991.05	200.21	1133	734	692.92	0	0
	Kho.	65.76	276.56	106.14	777.96	803.5	0	0	0
	Tir	16.05	67.52	22.46	176.1	707.9	0	0	0
	Mor.	11.89	254.34	12.88	0	455.2	0	0	0
	Sha.	5.81	108.85	13.83	0	128.5	0	0	0
	totl	800.41	3654.74	652.31	5664.16	3644.1	1478.59	0	0
96-97	Mehr	16.17	16.18	15.15	0	47.5	0	0	0
	Aban	27.74	0	37.25	19.19	45.8	0	0	0
	Azar	31.77	13.32	39.98	59.85	44.4	0	0	0
	Dey	32.96	138.63	22.13	208.67	44.9	0	0	0
	Bah.	33.87	142.41	21.27	291.12	115.1	0	0	0
	Esf.	41.96	176.47	10.79	295.74	224.6	0	0	0
	Far.	86.45	363.53	13.95	466.97	292.7	0	0	0
	Ord.	92.09	387.28	0	212.34	734	0	0	0
	Kho.	35.24	555.92	0	0	803.5	0	0	0
	Tir	11.27	479.71	200.55	0	691.54	0	16.36	0
	Mor.	0.94	3.93	2.26	0	7.13	0	448.07	0
	Sha.	1.01	4.25	5.32	0	10.58	0	117.92	0
	totl	411.48	2281.63	368.64	1553.88	3061.75	0	582.35	0

Table 9.4.5.28(8) Manjil Dam Operation (with Taleghan/Almout Diversion + Astur + Shah-rud Dams) (8/8)
(Unit: MCM)

Year	Month	Manjil Dam Inflow				Manjil Dam Operation			
		Catchment	fm Astur	fm Shah-rud	Storage	Outflow	Spillage	Shortage	
97-98	Mehr	5.38	22.65	8.79	0	36.82	0	10.68	0
	Aban	25.14	20.66	0	0	45.8	0	0	0
	Azar	25.1	19.3	0	0	44.4	0	0	0
	Dey	24.96	19.94	0	0	44.9	0	0	0
	Bah.	38.74	76.36	0	0	115.1	0	0	0
	Esf.	93.38	131.22	0	0	224.6	0	0	0
	Far.	283.52	956.69	0	947.51	292.7	0	0	0
	Ord.	144.07	605.88	0	963.46	734	0	0	0
	Kho.	34.32	144.33	0	338.61	803.5	0	0	0
	Tir	6.43	362.86	0	0	707.9	0	0	0
	Mor.	5.57	449.63	0	0	455.2	0	0	0
	Sha.	2.64	89.07	36.79	0	128.5	0	0	0
	totl	689.26	2898.58	45.58	2249.58	3633.42	0	10.68	0

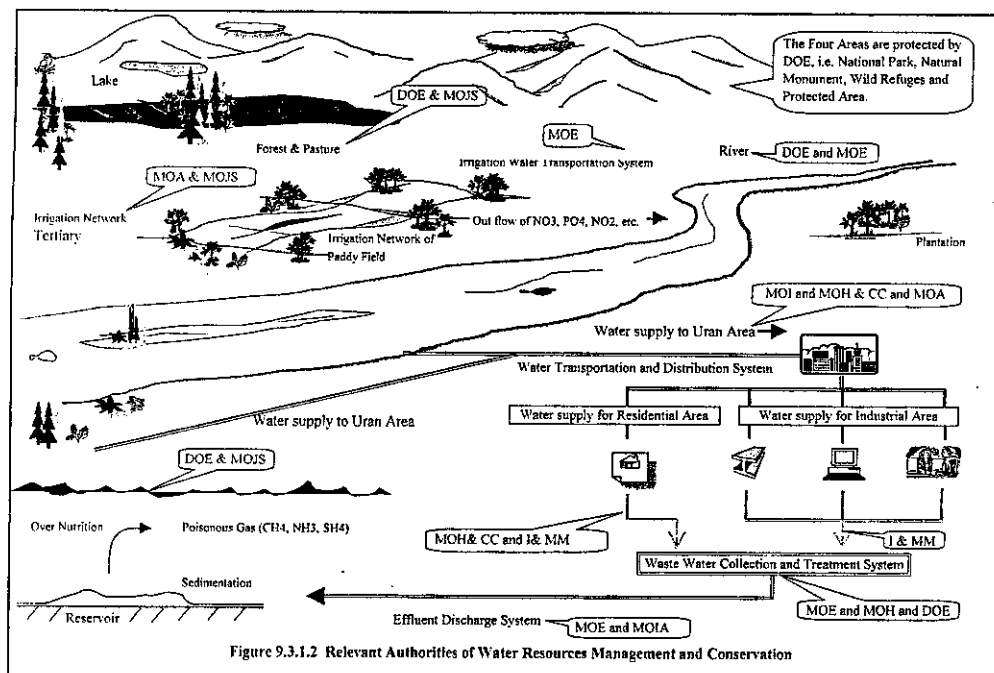


Figure 9.3.1.2 Relevant Authorities of Water Resources Management and Conservation

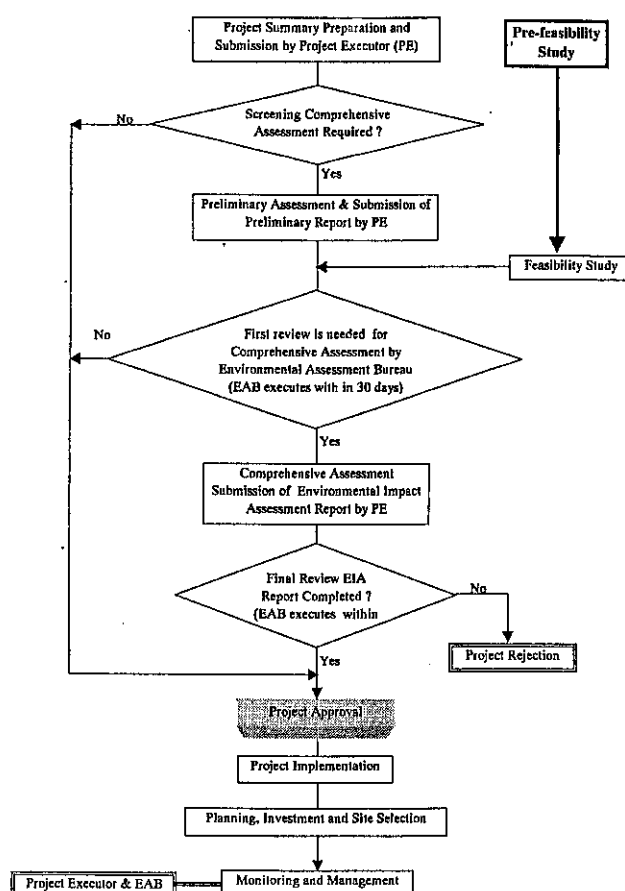


Figure 9.3.1.3 Flow Diagram of the IEE/EIA Procedure in Iran

Appendix

1. Environmental Related Institutions

(1) The Department of Environment (DOA)

The first environmental related institution in the country was established in 1956. Its main responsibility was to control the range and hunting areas. Under the title of the Game and Fish Organization, in 1967 it took full responsibility for oversight and protection of wild life and wide variety of ecosystem. The organization was restructured as the Department of Environment in 1974. Its mandate was upgraded to insure the enhancement and promotion of establishing equilibrium between the need of social development and environmental protection.

The Vice President of the Islamic Republic of Iran heads the Department of Environment (DOE). This organization has four (4) deputies, three (3) independent general directors, and twenty (20) general directors (see Figure 9.3.1.1). The each province has a provincial directorate that is within the jurisdiction of the DOE. The directorate monitors all aspects of environmental protection, as well as implementation in the province.

Formulating national rules, regulation and standards for preserving and enhancing the quality of the environment is the major task of DOE. The DOE has its own College of the Environment, which was established in 1972. The College offers a variety of formal/informal courses and award diploma in environmental sciences. At national level the Department of Environment, and at provincial level Qazvin Province Directorate are directory concerned with this Water Development and Management Study. In the future of environmental considerations, the richness of Iran's natural and cultural heritage will be set by maintaining a judicious balance between the needs of development and environmental impacts.

(2) Institutions Concerned for Water Management Development

In Iran, due to special conditions of the water shortage in the recent year, the protection and proper utilization of water resources has a great priority in the overall country development projects. In this circumstances, many government agencies are concerned with this water management plans, such as the Department of Environment (DOE), Ministry of Energy (MOE), Ministry of Hygiene, Health and Medical Education (MOHH&ME), Ministry of Agriculture (MOA), Ministry of Interior Affairs (MOI), Ministry of Jihad Sazandegi (MOJS), Industrial and Mining Ministry (I&MM) and Ministry of Housing and Civil Construction (MOHC&C). Figure 9.3.1.2 shows the relevant authorities regarding water resources management and conservation.

The each of the other institutions has its own particular responsibility in cooperate with the DOE. The roles and the scope of responsibilities for each of these institutions are summarized as

follows;

(a) The Department of Environment (DOE)

- According to the Regulations for the Prevention of Water Pollution (enacted on 7th May, 1994), the article No.4 of the regulations makes the DOE responsible for the identification of the pollution sources.
- To determine of pollution type and the dimension of the pollution source in comparison to the verified living environmental standard of water pollution.
- To admonish the people responsible for the pollution, and finally sending them to the judiciary authorities.

(b) The Ministry of Energy (MOE)

- According to the article No.3, 4, and 5 of the above-mentioned regulations, the MOE collaborates with the DOE in determining the quality of the living water resources.
- With the article No.5 of the above regulations, the MOE collaborates with the DOE in identifying the pollution sources and setting the standard of water pollution.

(c) Ministry of Hygiene, Health and Medical Education (MOHH&ME)

- With the article No.3, the MOHH&ME collaborates with the DOE in determining the quality of the water resources.
- According to the comment No. 1 on the article No.3, the MOHHH & ME is responsible for controlling the pollution of the drinking water resources larger than small ponds.
- This ministry is member of commission for the article No.5 and collaborates with the DOE in identifying the pollution sources and setting standard for effluent water.

(d) Ministry of Agriculture (MOA)

- With the article No.3, 4, and 5 on the regulations, the MOA collaborates with the DOE in determining the quality of water resources, identifying the pollution sources and setting the standards of water pollution.
- With the article No.11, the MOA issue the licenses for construction and developing agriculture and is obliged to notify the applicant about standards and regulations established by the article No.5.

(e) Ministry of Interior Affairs (MOIA)

- The MOIA is responsible for the meeting sessions of the commission for the article No.5 for prevention of water pollution and also collaborates with the DOE in identifying the sources of water pollution. With the planning of cities and towns and the ministry is obliged to notify the designers and the executors of the standards and regulations established by the article No.5.

(f) Ministry of Jihad Sazandegi (MOJS)

- The MOJS collaborates with the DOE in executing the article No.3 and No.5, with issuing

the licenses for construction and development industrial unit, slaughterhouses is obliged to notify the applicant regulations established by the article No.5.

- One of the important duties of the MOJS is the preservation of the water resources of dam.
 - Another important of duty is the protection of forest and pasture resources, and conservation of watershed.
- (g) Ministry of Industrial and Mining Ministries (MOI&M)
- With issuing licenses for the construction of the Industrial units, the MOI&M is obliged to notify the applicants of the standards and regulations.
 - The Industrial complexes of residential sections are responsible for the purification of sewage generated by units of complex inside.
- (h) Ministry of Housing and Civil Construction (MOH&CC)
- With comprehensive Planning of cities, towns, and residential complexes, the MOH&CC is obliged to notify the planers and the executors about the standards and regulations established by the article No.5.

2. Relevant Laws and Regulations

All of the laws and regulations concerning the environmental related issues are based on the Article 50 that was approved by the Parliament in 1979. The principle laws and regulations enacted by the government authorities are closely related to the new development plan of the water diversion plan. The laws and regulations related to the water pollution and environmental impact assessment of dam/reservoir and natural resources management are summarized as follows.

(a) Legislation enforced by the Department of Environment (DOE)

The DOE is responsible for the protection and enhancement of the environment, the prevention and control of any form of pollution or degradation leading to the disturbance in the environmental balance.

- The Law of Hunting and Fishing, 1974 and amendment in 1996
- Aquatic Resources Conservation and Utilization Law (1995)
- The Law Concerning the Farms and Orchards Landuse (1995)
- The Regulation for the Prevention of Water Pollution (1994)
 - Environmental Impact Study Guidelines (1997), approved by Environmental Supreme Council
 - Waste Water Discharge Standards (1994)
 - Environmental Conservation and Rehabilitation Act (1974, amended in 1982)

(b) Legislation enforced by the Ministry of Energy (MOE)

The construction of dam and other water-related structures falls under the supervision of the

MOE.

- The Law of Just Distribution of Water
- The Law concerning the Boundary Zone of Dam Reservoirs (1965)
- The Law Concerning the Establishment of the Firms for Landuse Development of Dam (1968)
- The Law Concerning the Nationalization of Waters (1968)

Note

Article 50 of the constitution of the Islamic Republic of Iran: It shall be considered a public duty to protect the natural environment in which the present as well as future generation shall have a developing social life.

Therefore, economic activities or otherwise, which cause pollution or an irreversible damage to environment, are forbidden.

3. The Procedures for the Environmental Study

On the 13th April in 1994, based on the ratified determination No.138 of the High Commission for the Protection of Environment, the condition of environment impact assessment for the following projects become legally mandatory:

- (i) Petrochemical Plants
- (ii) Refineries
- (iii) Power Plants
- (iv) Steel Mills
- (v) Dam and other water structures
- (vi) Industrial Complex
- (vii) Airports

The Planning and management Organization and DOE are preparing the format for the environmental impact assessment so-called "the Criteria for the Environmental Assessments of the Seven Kinds of Projects"

Initial Environmental Examination (IEE) is defined on the article No.1 of the mentioned above regulations and Environmental Impact Assessment (EIA) is defined on the article No.3 in its. Flow diagram of the IEE/EIA procedure is shown in Figure 9.3.1.3. In the case of pre-feasibility study, the process of procedure shows bold line.

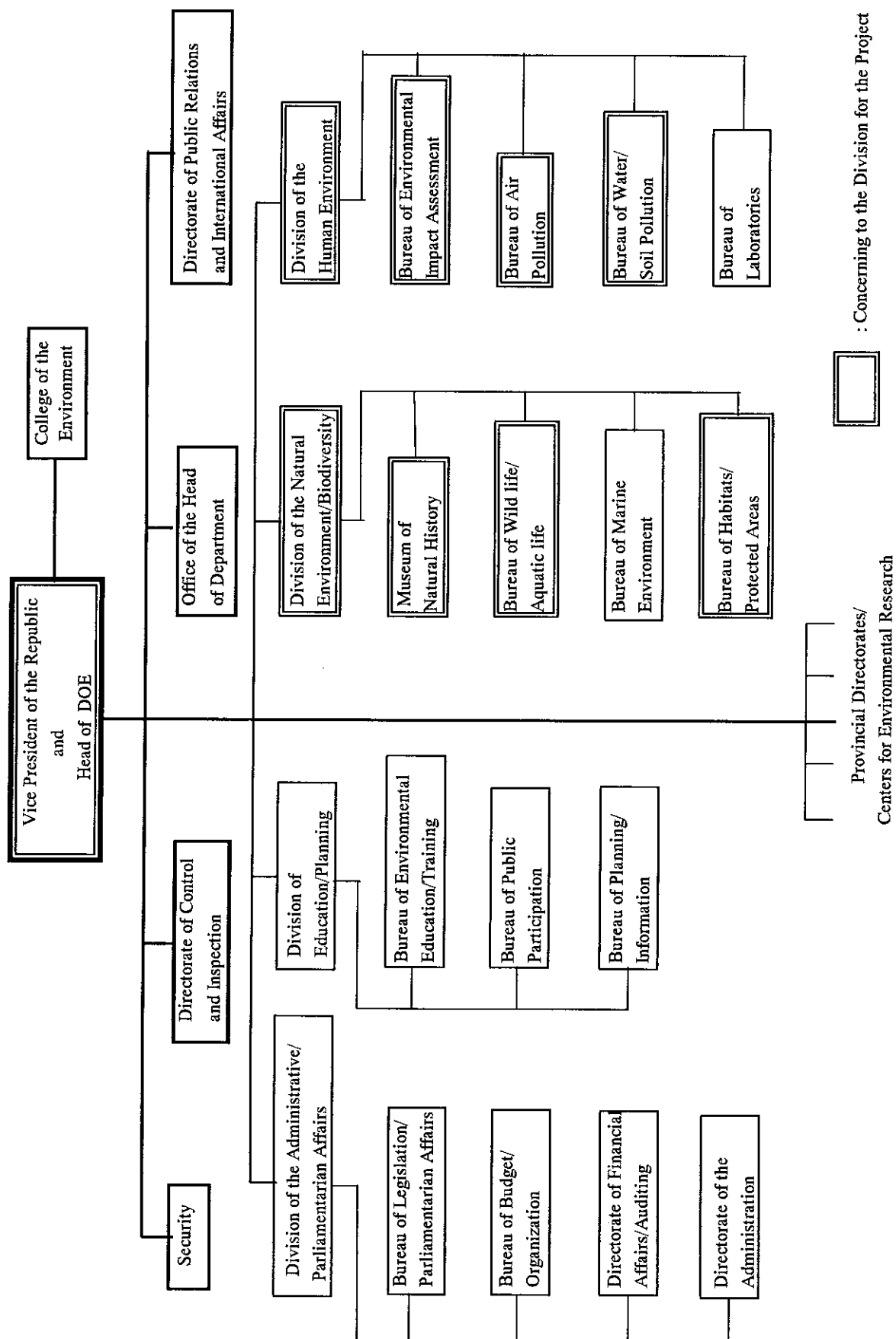


Figure 9.3.1.1 Organization Chart of the Department of the Environment (DOE) of the Islamic Republic of Iran

CHAPTER 10 QAZVIN IRRIGATION PROJECT

10.2	Conceptual Plan of Irrigation Development by Taleghan and Almort Water	10.1
10.2.5	Cost Estimation	10.18
10.3	Project Evaluation	10.21

10.2 Conceptual Plan of Irrigation Development by Taleghan and Almort Water

(1) Present agricultural condition in Qazvin plain

Cropped area

Qazvin plain is administratively located in the three sub-provinces of Qazvin, Takestan and Buin. According to the Qazvin Agricultural Organization, cultivated area of their sub-provinces is compiled as shown in Tables 10.1.2.1 to 10.1.2.3. Cropping area and production of fruit and tree crops is shown in Tables 10.1.2.4 to 10.1.2.6.

On the other hand, according to the other study report (1996), cultivation area including fruit tree area is reported about 247,000 ha, out of which, irrigation farming area is 165,000 ha. Remaining 82,000 ha is considered as dry farming area. Cultivation area mentioned in the report is shown in Table 10.1.2.7.

Surface soil

By compiling land classification map, land area is classified into six classes. Cultivable land of land class 1,2 and 3 including complex class is about 370,000 ha.

Zoning of Qazvin Plain

For irrigation development planning purpose of the Study, total six (6) zones are delineated on the map. Divided zones are outlined as follows.

Zone	Approximate area (ha)	Remark
North-western small river basin area	41,000	
North small river basin area	30,000	
North canal network area	95,000	Covered with Taleghan diversion water
Central canal area	122,000	Covered with Almort diversion water
Takestan area	21,000	Groundwater irrigation
South river basin area	178,000	Haji Arab, Khar Rud, Abhar rud
Total	487,000	

Note: Each zone is defined by JICA Study Team on the available map. South river basin area is larger than the 178,000 ha, since a part of area is located out of the study area.

Table 10.1.2.1

Cultivated Area and Production in Qazvin (1998/99)

Crop		Cultivated Area(ha)				Production (ton)			
		Irrigated	Non-irrigated	Total		Irrigated	Non-irrigated	Total	
Cereals	Wheat	Native	7,588	2,484	10,072	12,104	1,134	13,238	
		Omid	2,740	1,171	3,911	5,182	336	5,518	
		Roshan			0			0	
		Sardian		6,399	6,399		523	523	
		Azadi	103		103	121		121	
	Wheat	Gods			0			0	
		Others	12,076	25	12,101	52,826	12	52,838	
	Barley	Sub-total	22,507	10,079	32,586	70,233	2,005	72,238	
			7,075	643	7,718	10,700	236	10,936	
	Grains	Corn	3,977		3,977	26,962		26,962	
Total		33,559	10,722	44,281	107,895	2,241	110,136		
Pea		422	285	707	286	18	304		
Bean		1,663		1,663	1,704		1,704		
Lentil		1,358	8,178	9,536	979	464	1,443		
Others		68		68	28		28		
Total		3,511	8,463	11,974	2,997	482	3,479		
Cotton				0			0		
Oil-seeds		100		100	131		131		
Total		100	0	100	131	0	131		
Vegetables(1)	Potato	1,499		1,499	25,249		25,249		
	Onion	99		99	203		203		
	Tomato	1,665		1,665	39,976		39,976		
	Others	234		234	1,584		1,584		
	Total	3,497	0	3,497	67,012	0	67,012		
Vegetables(2)	Melon			0			0		
	Watermelon	332	177	509	7,338	872	8,210		
	Cucumber	18		18	317		317		
Feed Crops	Total	350	177	527	7,655	872	8,527		
	Alfalfa	6,311	1,813	8,124	30,227	115	30,342		
	Others	4,967		4,967	228,646		228,646		
	Total	11,278	1,813	13,091	258,873	115	258,988		
	Total	52,295	21,175	73,470	444,563	3,710	448,273		

Source : Qazvin Agricultural Organization

Table 10.1.2.4 Cropping Area and Production of Fruit and Tree Crops in Qazvin (1998/99)

Crop	Young tree (ha)	Produced tree (ha)	Production(ton)	Yield (kg/ha)
Apple	183.5	3,065.5	47,821.8	15,600.0
Pear	36.5	781.5	7,852.8	10,048.4
Water ground grapes	680.0	4,880.0	40,016.0	8,200.0
Dry ground grapes	0.5	500.0	350.0	700.0
Water ground pistachid	324.0	409.0	286.3	700.0
Olive	1,338.0	2,815.5	11,262.0	4,000.0
Mulberry		20.0	90.0	4,500.0
Persimmon	4.0	26.0	254.8	9,800.0
Wild plum		48.0	38.4	800.0
Black cherry	120.0	326.0	3,031.8	9,300.0
Cherry	834.0	3,160.0	52,772.0	16,700.0
Tomato	31.0	97.0	766.3	7,900.0
Plum	7.0	79.0	592.5	7,500.0
Peach	85.0	910.0	15,470.0	17,000.0
Apricot	105.0	461.0	2,397.2	5,200.0
Nectarine	139.0	1,090.0	18,530.0	17,000.0
Golden plum		28.0	378.0	13,500.0
Quince	14.0	37.0	129.5	3,500.0
Water ground fig	1.0	185.5	1,521.1	8,200.0
Walnut	496.0	2,705.0	5,680.5	2,100.0
Hazel-nut	118.0	1,487.0	1,635.7	1,100.0
Water ground almond	214.0	1,635.0	1,308.0	800.0
Dry ground almond	15.0	8.0	2.4	300.0
Senjed		56.0	61.6	1,100.0
Pomegranate	105.0	377.5	2,718.0	7,200.0
Dog berry	340.0	473.0	4,635.4	9,800.0
Saffron		0.0	0.0	
Non-fertilized trees	252.0	1,690.0		0.0
Total	5,442.5	27,350.5	219,602.1	8,029.2
Total of cropping area	32,793.0			

Source: Qazvin Agricultural Organization

Table 10.1.2.2

Cultivated Area and Production in Tazekstan (1998/99)

Crop	Cultivated Area(ha)			Production (ton)		
	Irrigated	Non-irrigated	Total	Irrigated	Non-irrigated	Total
Cereals	Native	761	3,180	3,941	1,144	1,119
	Omid	2,001	3,055	5,056	3,401	1,571
	Roshan	420		420	1,626	1,626
	Sardan	2,453	1,067	3,520	5,854	263
	Azadi			0		0
	Gods	36		36	61	61
	Others	415		415	831	831
	Sub-total	6,086	7,302	13,388	12,917	2,953
	Barley	1,260	1,178	2,438	2,722	179
	Corn	59		59	341	341
Grains	Total	7,405	8,480	15,885	15,980	3,132
	Pea		345	345	47	47
	Bean	116		116	129	129
	Lentil			0		0
	Total	116	345	461	129	47
	Cotton			0		0
	Oil-seeds	8,088		8,088	14,158	14,158
	Total	8,088	0	8,088	14,158	0
	Potato	275		275	3,990	3,990
	Onion	27		27	299	299
Vegetables(1)	Tomato	2,594		2,594	91,509	91,509
	Others	17		17	154	154
	Total	2,913	0	2,913	95,952	0
	Melon			0		0
	Watermelon			0		0
	Cucumber	1,140		1,140	16,925	16,925
	Total	1,140	0	1,140	16,925	0
	Alfalfa	5,020		5,020	27,766	27,766
	Others	170		170	4,579	4,579
	Total	5,190	0	5,190	32,345	0
Feed Crops	Total	24,852	8,825	33,677	175,489	3,179
	Total	24,852	8,825	33,677	175,489	3,179
	Total	24,852	8,825	33,677	175,489	3,179
	Total	24,852	8,825	33,677	175,489	3,179
	Total	24,852	8,825	33,677	175,489	3,179
	Total	24,852	8,825	33,677	175,489	3,179
	Total	24,852	8,825	33,677	175,489	3,179
	Total	24,852	8,825	33,677	175,489	3,179
	Total	24,852	8,825	33,677	175,489	3,179
	Total	24,852	8,825	33,677	175,489	3,179

Source : Qazvin Agricultural Organization

Table 10.1.2.5 Cropping Area and Production of Fruit and Tree Crops in Takistan (1998/9)

Crop	Young tree (ha)	Produced tree (ha)	Production(ton)	Yield (kg/ha)
Apple	50.0	671.0	10,562.2	15,741.0
Pear	20.0	224.0	2,542.4	11,350.0
Water ground grapes	2,268.0	22,231.0	222,310.0	10,000.0
Dry ground grapes	27.0	349.0	108.2	310.0
Water ground pistachio	10.0	75.0	51.0	680.0
Olive	0.0	0.0	0.0	0.0
Mulberry	0.0	0.0	0.0	0.0
Persimmon	0.0	0.0	0.0	0.0
Wild plum	0.0	0.0	0.0	0.0
Black cherry	3.0	34.0	126.0	3,705.0
Cherry	10.0	74.0	296.4	4,005.0
Tomato	43.0	80.0	486.2	6,078.0
Plum	12.0	42.0	210.0	5,000.0
Peach	152.0	442.5	5,221.5	11,800.0
Apricot	27.5	265.0	1,603.3	6,050.0
Nectarine	83.0	424.0	5,724.0	13,500.0
Golden plum	27.5	126.5	1,100.6	8,700.0
Quince	0.0	3.0	2.4	800.0
Water ground fig	0.0	0.0	0.0	0.0
Walnut	123.0	466.0	1,957.2	4,200.0
Hazel-nut	0.0	0.0	0.0	0.0
Water ground almond	61.0	315.0	441.0	1,400.0
Dry ground almond	8.0	126.0	72.8	578.0
Senjed	8.0	63.5	108.2	1,703.9
Pomegranate	0.0	0.0	0.0	0.0
Dog berry	0.0	0.0	0.0	0.0
Saffron	0.0	0.0	0.0	0.0
Non-fertilized trees	28.0	685.0	0.0	0.0
Total	2,961.0	26,696.5	252,923.3	9,474.0
Total of cropping area	29,657.5			

Source : Qazvin Agricultural Organization

Table 10.1.2.3

Cultivated Area and Production in Buin (1998/99)

Crop	Cultivated Area(ha)		Production (ton)	
	Irrigated	Non-irrigated	Irrigated	Non-irrigated
Cereals	Native	1,084	19,170	20,254
	Omid	8,007	702	8,709
	Roshan	15,558	81	15,639
	Sardari	278	489	767
	Azadi			0
	Gods			0
	Others	3,255		8,822
	Sub-total	28,182	20,442	48,624
	Barley	7,420	6,078	13,498
	Corn	65	167	232
Grains	Total	35,667	26,520	62,187
	Pea		12	12
	Bean	52		52
	Lentil			0
	Others			0
Industrial Crops	Total	52	12	64
	Cotton	2,017		2,017
	Oil-seeds	541		541
Vegetables(1)	Total	2,558	0	2,558
	Potato	1,076		1,076
	Onion	329		329
	Tomato	1,267		1,267
Vegetables(2)	Total	2,842	0	2,842
	Melon	844		844
	Watermelon	278		278
	Cucumber	1,520		1,520
Feed Crops	Total	2,642	0	2,642
	Alfalfa	7,428		7,428
	Others	228		228
	Total	7,656	0	7,656
Total	51,417	26,532	77,949	11,125

Source : Qazvin Agricultural Organization

Table 10.1.2.6 Cropping Area and Production of Fruit and Tree Crops in Buin (1998/99)

Crop	Young tree (ha)	Produced tree (ha)	Production(ton)	Yield (kg/ha)
Apple	50.0	551.0	7,267.4	13,189.5
Pear	27.5	93.0	976.5	10,500.1
Water ground grapes	320.5	3,696.0	29,198.4	7,900.0
Dry ground grapes	5.0	178.0	35.6	200.0
Water ground pistachik	1,212.5	1,413.5	1,342.8	950.0
Olive	0.0	0.0	0.0	0.0
Mulberry	0.0	0.5	0.5	1,000.0
Persimmon	0.0	0.0	0.0	0.0
Wild plum	0.0	0.0	0.0	0.0
Black cherry	1.5	10.0	65.0	6,500.0
Cherry	4.5	33.0	264.0	8,000.0
Tomato	18.0	66.0	330.0	5,000.0
Plum	5.0	7.5	45.0	6,000.0
Peach	73.6	401.4	3,291.5	8,200.0
Apricot	29.0	178.5	571.2	3,200.0
Nectarine	49.0	85.0	1,147.5	13,500.0
Golden plum	1.0	23.0	257.6	11,200.0
Quince	0.0	2.0	14.0	7,000.0
Water ground fig	0.0	0.0	0.0	0.0
Walnut	187.0	495.0	841.5	1,700.0
Hazel-nut	0.0	0.0	0.0	0.0
Water ground almond	103.1	277.9	155.6	559.9
Dry ground almond	2.0	58.0	4.4	75.0
Senjed	1.4	28.4	42.6	1,500.0
Pomegranate	0.0	0.0	0.0	0.0
Dog berry	0.0	0.0	0.0	0.0
Saffron	0.0	2.5	1.3	520.0
Non-fertilized trees	177.0	400.0	0.0	0.0
Total	2,267.6	8,000.2	45,852.3	5,731.4
Total of cropping area	10,267.8			

Source : Qazvin Agricultural Organization

Table 10.1.2.7 Cultivation Area in Qazvin Plain

Irrigation Farming Land

Crop	Area (ha)	%
Wheat	38,435	36.9
Pea	250	0.2
Bean	540	0.5
Lentil	1,065	1.0
Barley	22,060	21.2
Alfalfa	8,780	8.4
Corn, grass corn	1,750	1.7
Corn, grass corn	520	0.5
Grass	55	0.1
Water melon	1,345	1.3
Potato	535	0.5
Onion	80	0.1
Cucumber	200	0.2
Tomato	650	0.6
Eggplant	30	0.0
Carrot, Beet root crop	90	0.1
Melon	80	0.1
Vegetable	115	0.1
Sugar beet root	3,705	3.6
Sunflower	1,575	1.5
Soya	15	0.0
Cotton	155	0.1
Grape	9,855	9.5
Fruit garden	11,905	11.4
Fruitless garden	230	0.2
Sub-total	104,020	100.0
Fallow land	60,875	
Total	164,895	

Dry Farming Land

Crop	Area (ha)	%
Wheat	28,930	64.9
Pea	856	1.9
Lentil	7,705	17.3
Barley	5,515	12.4
Alfalfa, Clover	100	0.2
Grass	15	0.0
Water melon	580	1.3
Cotton	15	0.0
Garden crop	850	1.9
Sub-total	44,566	100.0
Fallow land	37,290	
Total	81,856	

Total land = 246,751 ha

Source : Master Plan Study for Restructure and Development in Agriculture and Natural Resources. Annex-3 Irrigation and Irrigation Development Study

(2) **Existing Irrigated Agriculture**

Present groundwater discharge

Based on the Inventory Survey, pumping groundwater discharge for agricultural use, accounted in the 5 km interval mesh basis, is shown in Figure 10.2.1.1. Summary is compiled as follows.

Present withdrawal from agricultural production wells

Area	Number of wells		Annual pumping discharge of irrigation wells (MCM)
	Total	Irrigation	
North canal network area	1,224	808	419
Central canal area	1,639	1,365	344
Takestan area	353	239	91
South river basin area	1,039	844	230
Sub-total	4,255	3,256	1,084
Other areas	593	359	59
Total	4,848	3,615	1,143

Source: Inventory Survey by JICA Study Team

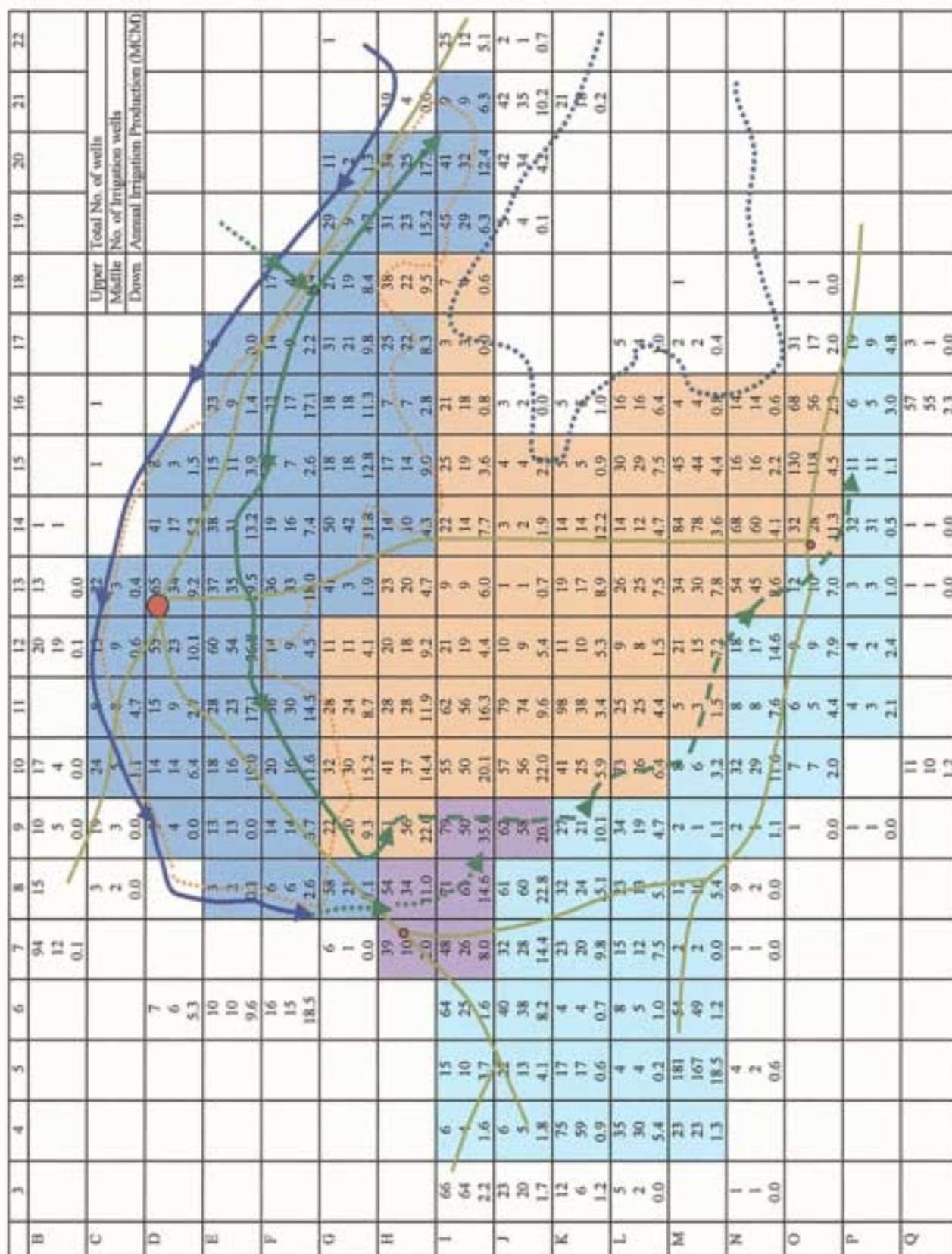


Figure 10.2.1.1 Present Groundwater Pumping Discharge

(3) Rehabilitation of Irrigation Canal System

Canal facilities

According to the inventory survey, deteriorated structures in the north canal system are summarized as follows;

Quantity of rehabilitation facilities

Rehabilitation facilities	Quantity	Rehabilitation items
Rehabilitation of concrete structures	588 places	Reinforcement with concrete
Repair of gate		
- Repair/replacement of gate body	133 places	Repair, replacement
- Replacement of arch gate	250	Type from 50 lit to 1,000 lit
- Replacement of other gates	200	
- Replacement of gate frame	200	

Source: Inventory survey (2000)

Survey result is also shown in Table 10.2.3.1.

Combined well

Out of total 63 wells, 11 wells are active. Remaining 52 wells have operation difficulties. Out of them, 32 wells are not active due to deteriorated pumping facilities and 20 wells are not functioning due to not providing pumping facilities. The result of inventory survey is shown in Table 10.2.3.2.

Rehabilitation program

Rehabilitation facilities	Quantity	Specification
Replacement of pump facilities	32	300 – 400 m ³ /h, 100 – 200 kw
Installation of pump facilities	20	Including pump house

Source: Inventory survey (2000)

Table 10.2.3.1 Quantity of Canal Facilities for Rehabilitation Program

Canal	Number of broken canal	Concrete volume (m3)	Remark	Gate	Type	Number of repair or replacement	Remark
Main	17	6,197		Corrosion of gate body		133	Sand blast, painting, partly repair
L1	41	2,305		Arch gate for main canal	100 lit	25	Replacement
L2	54	3,781			200 lit	20	
L3	118	9,586			400 lit	15	
L4, L4A	53	3,437			600 lit	15	
L5	14	961			1,000 lit	15	
L6	53	4,296		Arch gate for secondary canal	50 lit	100	
L7	125	11,009			100 lit	70	
L8	81	7,213			200 lit	50	
L9	12	751			400 lit	30	
L10	10	927		Other gate		200	
L20	10	967		Frame of gates		200	
Total	588	51,430					

Source: Inventory survey (2000)

Table 10.2.3.2 Inventory of Combined Wells

Well Specifications																					
No.	Index on the Map	UTM Coordinate		Discharge cms	Village	Network No.	Present Condition	Major Water Use	Property (owner)	Connected Canal Name	Well Structure				Water			Pump			
		X	Y								Constructed Year	Depth (m)	Casing Diameter (mm)	Diam. of Pipe	Ann. Discharge	Natural Water Level (m)	Dynamic Water Level (m)	Kind of Motor	Manufacture Type	Setting Depth m	Motor Output (KW)
1	4996	414750	4004500		Dizaj	13E	UnSupply.	Agriculture	Government	L6		115		10		47.2					
2	1312	442050	3998050	320	zagheh	19G	Active	Agriculture	Government	L2	1364	150		10		45990	50.4		Electrical		200
3	190	413050	4010600		Jahanabad	13D	UnSupply.	Agriculture	Government	L6	1364	150		8		0	49.45				
4	1247	438250	3996250	320	hajitapeh	18G	Active	Agriculture	Government	L2	1362	142	12	10		251100	47.3		Electrical		150
5	1051	448050	3990700	252	gheshlagh-kosar	20H	Active	Agriculture	Government	L1	1362	150	10	10		414720	47	30	Electrical	12MB	150
6	1058	448750	3989400	277	gheshlagh	20I	Active	Agriculture	Government	L1	1363	140	10	10		0	39.3	40	Electrical	12HSP	125
7	1242	441000	3994500		zagheh	19H	UnSupply.	Agriculture	Government	L2	1362	150	10	10		0	35.3	38	Electrical	12HSP	66
8	1243	441550	3993500		zagheh	19H	Unactive	Agriculture	Government	L2	1362	150	10	10		0	27.2		Electrical	12HXB	
9	256	415450	4007500	300	bidestan	15E	Active	Agriculture	Government	L4A	1363	140	10	10		338256	57	58	Electrical	12HSP	200
10	894	419100	4009200		bidestan	14E	Combined	Agriculture	Government	L4A	1360	150	12	10		0	49.6				
11	257	421300	4008000	333	bidestan	15E	Active	Agriculture	Government	L4A	1363	150	10	10		291600	53.7	58	Electrical	12MB	200
12	280	420450	4007500		bidestan	15E	Unactive	Agriculture	Government	L4A	1363	145		10		0	50				
13	232	418650	4009900		Dizaj	14E	UnSupply.	Agriculture	Government	L5	1363	140		10		0	52.9				
14	243	418450	4008650		Dizaj	14E	Unactive	Agriculture	Government	L5	1361	150		10		0	47.2				
15	4997	411400	4008000	354	Mashaladar	13E	Active	Agriculture	Government	L6	1362	140	10	10			40.4	30	Electrical	12HSP	125
16	892	411550	4006600		Mashaladar	13E	Active	Agriculture	Government	L6	1361	138	12	10		0	40.1		Electrical		
17	12	410600	4009250	324	Mashaladar	13E	Active	Agriculture	Government	L6	1363	140	8	10		559786	31.7	33	Electrical	12HSP	100
18	186	414000	4008250		Jahanabad	13E	Active	Agriculture	Government	L6	1363	140		10		0	40.5				
19	187	414900	4007000	324	Jahanabad	13E	UnSupply.	Agriculture	Government	L6	1363	140	10	10		0	37.6	38	Electrical	12HXB	125
20	312	418650	4000450	240	Kamalabad	14F	Unactive	Agriculture	Government	L3	1364	150		10		0	23.4				100
21	397	418200	3999400		Kamalabad	14G	Active	Agriculture	Government	L3		150	12	10		1330182	19.25		Dizel		
22	406	418000	3996400	162	Kamalabad	14G	Combined	Agriculture	Government	L3	1364	150	8	10		0	14.2	18	Electrical	12MB	75
23	494	408100	4009400		Kamalabad	12E	Unactive	Agriculture	Government	L6	1360	150		10		0	38.6				
24	843	399650	4014500	144	Nezamabad	10D	Unactive	Agriculture	Government	M89A	1364	150		10		0	41.5				
25	317	421950	4001650		Nosratabad	15F	UnSupply.	Agriculture	Government	L3	1362	150		10		0	32				
26	844	395150	4010850		Hadiabad	10D	Unactive	Agriculture	Government	L8	1364	146		8		0	42.35				
27	1604	394650	4008900		Hadiabad	9E	Unactive	Agriculture	Government	L8	1362	150		8		0					
28	1378	430175	3996950	340	Hezarjofa	17G	UnSupply.	Agriculture	Government	L3	1362	150	10	10		0	23.3	24	Electrical	12HXB	125
29	1180	434500	3996325		hajitapeh	17G	UnSupply.	Agriculture	Private	L3	1344	140		10		0	29.9				
30	1364	434550	4000750	323	Hezarjofa	17F	UnSupply.	Agriculture	Government	L3	1362	150	10	10		0	53.9	54	Electrical	12HXB	200

Table 10.2.3-2 Inventory of Combined Wells (Continued)

Well Specifications																						
No.	Index on the Map	UTM Coordinate		Discharge cms	Village	Network No.	Present Condition	Major Water Use	Property (owner)	Connected Canal Name	Well Structure				Water			Pump				
		X	Y								Constructed Year	Depth (m)	Casing Diameter (mm)	Diam. of Pipe	Ann. Discharge	Natural Water Level (m)	Dynamic Water Level (m)	Kind of Motor	Manufacture Type	Setting Depth m	Motor Output (KW)	
31	1387	427350	3998900	358	Khakali	16G	UnSuply.	Agriculture	Government	L3	1364	150	10	10	10	0	36.5	37		12HSP	75	150
32	1380	429150	3999400		Khakali	16G	UnSuply.	Agriculture	Private	L3	1362	150			10	0	38.7		Electrical		75	
33	1394	428400	3997650	338	Abdolali	16G	UnSuply.	Agriculture	Private	L3	1365	150	10	10	10	0	24	24	Electrical	12HXB	75	100
34	1381	430125	4000200		Abdolali	17F	UnSuply.	Agriculture	Private	L3	1363	150	10	10	10	0	46.4	46	Electrical	12HSP	90	
35	425	419700	4000800		Nosratabad	14F	UnSuply.	Agriculture	Private	L3	1362	142	14	10	10	0	23.5					
36	561	409750	4013550	330	Chobindar	12D	Unactive	Agriculture	Private	L7	1360	150	10	10	10	0	40.3	38	Electrical	12HSP	98	200
37	74	406350	4009250		Chobindar	12E	Unactive	Agriculture	Private	L7	1360	150			10	0	31.8					
38	127	404650	4011100	288	Chobindar	11D	Unactive	Agriculture	Private	L7	1360	150	8	10	10	0	36	38	Electrical	12HSP	78	200
39	141	402250	4008500	275	Chobindar	11E	Active	Agriculture	Private	L7	1360	150			10	0	28.4					125
40	130	402350	4005400	300	Janatabad	11E	Active	Agriculture	Private	L8	1360	144	10	10	10	1222690	22.5	24	Electrical	12HSP	60	100
41	154	401500	4000250	272	Janatabad	11F	Active	Agriculture	Private	L8	1364	150	10	10	10	559788	22.1	40	Electrical	12HSP	150	100
42	155	402000	4001800	270	Janatabad	11F	Active	Agriculture	Private	L8	1360	124	10	10	10	1306166	18.2	20	Electrical	12HXP	52	100
43	4998	403300	4008400	315	Janatabad	11E	Active	Agriculture	Private	L8	1361	150	10	10	10		24.3	24	Electrical	12HSP	60	125
44	879	398750	4005850	320	Mehdiabad	10E	Active	Agriculture	Private	L8	1360	142	10	10	10	0	28.2	20	Electrical	12HSP	60	125
45	3441	397050	4002400	335	Mehdiabad	10F	Unactive	Agriculture	Government	L8	1363	150	12	10	10	0	23.2	25	Electrical	12HSP	56	125
46	4859	393650	4006000	314	Dolatabad	9E	Active	Agriculture	Government	L8	1361	145			10	0	53	35	Electrical	12HSP	69	120
47	3516	395150	4002500	314	Mehdiabad	10F	Unactive	Agriculture	Government	L8	1361	140			10	0	24.4	25	Electrical	12HSP	57	100
48	3442	395700	4002250	313	Mehdiabad	10F	Unactive	Agriculture	Government	L8	1362	140	8	10	10	0	21.75	25	Electrical	12HSP	54	100
49	4866	394400	4004050		Dolatabad	9F	Combined	Agriculture	Government	L8	1362	140			10	0	55.75					
50	4868	394650	4002850		Dolatabad	9F	UnSuply.	Agriculture	Government	L8	1361	140			10	0	28.25					
51	2569	394250	4000650	315	Rahmatabad	9F	UnSuply.	Agriculture	Government	L20	1360	130	14	10	10	0	21					100
52	3504	394400	4001850		Rahmatabad	9F	Unactive	Agriculture	Government	L20	1362	150	8	10	10	0	23.1	23	Electrical	12HXP	57	100
53	878	397300	4006500	306	Shir esfahan	10E	Unactive	Agriculture	Government	L8	1365	148	8	10	10	0	30.8	33	Electrical	12HSP	72	125
54	4858	394450	4007500		Dolatabad	9E	Active	Agriculture	Government	L8	1361	145	8	10	10	0		42	Electrical	12HXB		150
55	877	397900	4010450	320	Shir Esfahan	10D	Active	Agriculture	Government	L8	1360	140	8	10	10	0	40.3	42	Electrical	12HSP	90	150
56	1057	449300	3990550	247	Khakali	20H	Active	Agriculture	Government	L1	1365	160			10	0	51.4	22	Electrical	12HSP	54	150
57	1059	448550	3988700	222	Gheshtlakh	20I	Active	Agriculture	Government	L1	1365	150	10	8	8	0	28	30	Electrical	12MB	86	125

Table 10.2.3-2 Inventory of Combined Wells (Continued)

No.	Well Specifications													Well Structure			Water			Pump		
	Index on the Map	UTM Coordinate		Discharge cms	Village	Network No.	Present Condition	Major Water Use	Property (owner)	Connected Canal Name	Constructed Year	Depth (m)	Casing Diameter (mm)	Diam. of Pipe	Ann. Discharge	Natural Water Level (m)	Dynamic Water Level (m)	Kind of Motor	Manufacture Type	Setting Depth m	Motor Output (KW)	
		X	Y																			
58	4999	447050	3985650	263	Gheshlagh	20I	Active	Agriculture	Government	L1	1362	150	10	8		25	30	Electrical	12MB	66	100	
59	1062	448000	3987000	231	Gheshlagh	20I	Active	Agriculture	Government	L1	1364	130	8	10	0	21.5	30	Electrical	10HH	54	100	
60	1052	447750	3990100	230	Gheshlagh	20H	Active	Agriculture	Government	L1	1362	150	8	8	210600	37.5	40	Electrical	10HH	63	100	
61	1053	447350	3989600	230	Gheshlagh	20I	UnSupply.	Agriculture	Government	L1	1363	150	8	8	0	38.2	40	Electrical	10HH	66	100	
62	1054	447050	3988800		Gheshlagh	20I	UnSupply.	Agriculture	Government	L1	1363	152		8	0	27.5		Electrical				
63	1137	445350	3989700	230	Zargar shargh	20I	Active	Agriculture	Government	L1	1361	150	8	8	0	16.7	38	Electrical	10HH		75	

(4) Proposed Central Qazvin Irrigation Project

(a) Proposed Service Area by Almount Water Diversion

Proposed service area is divided into irrigation service area unit by north and central canals, based on the present service units of north canal and planning route of central canal. A part of the service areas of north canal will be covered with the proposed central canal. As the delineation on the map, irrigation service area is zoned into 12 units at the high land of the north canal area, 15 units at the low land of the north canal area and 11 units of central canal area.

Cultivable area of each service unit is estimated based on the present and future irrigation areas of north canal and available land classification map as shown in Table 10.3.1.1.

(b) Proposed Irrigated Agriculture Plan

Rate of cropping area in Qazvin plain is discussed with Qazvin Agricultural Organization based on the related study report. As the result, share of cropping area is planned as shown in Table 10.3.2.1.

(c) Irrigation Water Demand

In the related study report, net crop water requirement in Qazvin plain is theoretically calculated as shown in Table 10.3.3-1. After calculation of monthly net water demand, total monthly water demand is calculated by assuming 43% of irrigation efficiency. In the report, necessary irrigation period and irrigation times for major crops are planned, as shown in Figure 10.3.3.1.

Irrigable area can be assumed in the water balance of available diversion water and present groundwater. In the calculation, withdrawal discharge from groundwater is assumed to be the same as the present. As the result, irrigable area of each irrigation service unit is estimated based on the water balance calculation by expected water demand per ha, as shown in Table 10.3.3.2.

If unit water demand is assumed at 11,000 m³/ha, irrigable area comes to about 109,600 ha. Water supply for artificial recharge is incorporated in the calculation. If groundwater wells are newly developed, irrigable area will be more extended.

Monthly water supply and demand patterns are calculated. To meet whole crop water demand, available supply volume of groundwater and diversion water should be considered. In the water balance calculation, diversion water is firstly allocated for water demand and shortage is supplemented with groundwater. Diversion water in winter season when irrigation is not needed can be used for artificial recharge.

Table 10.3.1.1 Land Classification in the Central Canal Area

Class	Area (ha)	Sub-class	Area (ha)	%
I	2,840		2,840	2.4
II	16,770	II A	7,500	6.4
		II AS	7,040	6.0
		II S	880	0.8
		II ST	1,350	1.2
		Sub-total	16,770	14.4
III	36,540	III A	34,260	29.3
		III W	2,280	2.0
		Sub-total	36,540	31.3
V	13,550	V A	13,550	11.6
VI	46,790	VIA	43,220	37.0
		VIE	280	0.2
		Sub-total	43,500	37.2
Others			3,600	3.1
Total			116,800	100.0

Note ; Except for the area in the North Canal Network.

Land classification

Land class	Other land class
I : Most suitable for cultivation	R: Coverage with stone
II : More suitable for cultivation	RW: Flood/or dry river and stone river bank
III : Suitable for cultivation	D: Sandy or gravel hill
IV : Limited suitable for cultivation	E: Erosion land and high ground hill
V : Not suitable for cultivation	GY:
VI: Unable for cultivation	L: Lake
Land sub-class	M: Swamp
A : Limited related to salty and alkalined soil	U: Residential area
S: Limited related to soil property	
T: limited related to erosion	
W: limited related to drainage and groundwater	

Cultivable Area based on the Land Class in the Central Canal Area

Block	Gross Area (ha)	Soil I , II , III (ha)
S-1	4,100	not available
S-2	10,700	7,920
S-3	14,500	6,650
S-4	5,400	3,370
S-5	8,900	4,250
S-6	13,100	9,810
S-7	13,200	4,190
S-8	11,200	870
S-9	12,800	2,900
S-10	14,700	9,060
S-11	8,200	7,130
Total	116,800	56,150

Note : Area is measured by JICA Study Team on the Available Map.

Table 10.3.3.2 Irrigation Water Allocation of Taleghan, Almout and Groundwater in Canal (2021)

Canal No.	Irrigable Area (ha)	Net Irrigation Area (ha)	Irrigation Demand (MCM)	Surface Water Allocation (MCM)	Groundwater Allocation (MCM)
1. Irrigation by North Canal (Taleghan Water)					
1.1 North Higher Area (Higher than EL 1,250m)					
L1	700	500	5.5	2.2	3.3
L2	700	500	5.5	2.2	3.3
L3	1,200	900	10.0	4.1	5.9
L4	2,700	2,000	22.2	9.0	13.2
L4-A	2,700	2,000	22.2	9.0	13.2
L5	2,400	1,800	19.9	8.1	11.8
L6	4,000	3,000	33.2	13.5	19.7
L7	9,800	7,400	81.9	33.3	48.6
L8	6,800	5,100	56.5	23.0	33.5
L9	3,300	2,500	27.7	11.2	16.5
L10&20	4,300	3,200	35.4	14.4	21.0
Sub-total	38,600	28,900	320.0	130.0	190.0
1.2 Takestan New Area					
L20-1	9,000	6,700	80.0	10.0	70.0
Sub-total	9,000	6,700	80.0	10.0	70.0
Total	47,600	35,600	400.0	140.0	260.0
2. Irrigation by Central Canal (Almout Water)					
2.1 North Lower Area (Lower than EL 1,250m)					
L1-1	2,300	1,700	19.1	5.4	13.7
L1-2	1,500	1,100	12.4	3.5	8.9
L2-1	5,100	3,800	42.7	12.0	30.7
L2-2	200	200	2.2	0.6	1.6
L2-3	700	500	5.6	1.6	4.0
L3-1	1,300	1,000	11.2	3.2	8.0
L3-2	16,000	12,000	134.7	37.9	96.8
L4-1	200	200	2.2	0.6	1.6
L4A-1	700	500	5.6	1.6	4.0
L6-1	1,000	700	7.9	2.2	5.7
L6-2	4,400	3,300	37.1	10.4	26.7
L7-1	100	100	1.1	0.3	0.8
L8-1	1,100	800	9.0	2.5	6.5
L8-2	2,500	1,900	21.3	6.0	15.3
L20-1	1,000	700	7.9	2.2	5.7
Sub-total	38,100	28,500	320.0	90.0	230.0
2.2 Central Area					
C-1	3,100	2,300	25.3	6.1	19.2
C-2	7,900	5,900	64.8	15.6	49.2
C-3	6,600	4,900	53.8	12.9	40.9
C-4	3,300	2,500	27.5	6.6	20.9
C-5	4,200	3,200	35.2	8.4	26.8
C-6	9,800	7,300	80.2	19.2	61.0
C-7	4,100	3,100	34.1	8.2	25.9
C-8	3,000	2,200	24.2	5.8	18.4
C-9	2,800	2,100	23.1	5.5	17.6
C-10	9,000	6,700	73.6	17.7	55.9
C-11	7,100	5,300	58.2	14.0	44.2
Sub-total	60,900	45,500	500.0	120.0	380.0
Total	99,000	74,000	820.0	210.0	610.0
Grand Total	146,600	109,600	1,220.0	350.0	870.0

Note (1) The Taleghan water of 140MCM is controlled by Taleghan dam and can be used fully for irrigation.

(2) The Almout water of 250MCM includes the water of 40MCM in winter season, which is not used directly for irrigation but for groundwater recharge. Accordingly the Almout water of 210MCM can be used for irrigation in central canal.

Table 10.3.2.1 Calculation of Unit Water Requirement

Crop	Cropping area (%)	Based on standard by Irrigation Company		Based on theoretical calculation	
		Unit water requirement (m3/ha)	Water Requirement (m3/ha)	Unit water requirement (m3/ha) (*2)	Net Water Requirement (m3/ha)
Wheat	36.9	8,000	2,956	5,230	1,932
Pea	0.2	5,500	13	5,880	14
Bean	0.5	5,500	29	6,460	34
Lentil	1.0	5,500	56	5,880	60
Barley	21.2	6,000	1,272	3,860	819
Alfalfa, Clover	8.4	16,500	1,393	10,350	874
Corn, Grass corn	1.7	11,000	185	4,740	80
Corn	0.5	11,000	55	6,820	34
Grass	0.1	16,500	9	5,820	3
Water melon	1.3	7,000	91	6,080	79
Potato	0.5	12,500	64	8,140	42
Onion	0.1	15,000	12	8,140	6
Cucumber	0.2	7,000	13	6,050	12
Tomato	0.6	16,000	100	7,240	45
Eggplant	0.0	16,000	5	7,240	2
Carrot, Beet root	0.1	15,000	13	7,240	6
Melon	0.1	7,000	5	6,080	5
Vegetable	0.1	15,000	17	7,240	8
Sugarbeet	3.6	16,500	588	7,870	280
Sunflower	1.5	7,000	106	6,760	102
Soya	0.0	9,000	1	5,130	1
Cotton	0.1	10,000	15	10,050	15
Grape	9.5	16,500	1,563	7,090	672
Fruit garden	11.4	18,500	2,117	9,310	1,066
Fruitless garden	0.2	16,500	36	6,510	14
Total	100.0		10,714		6,204

Note : *1: Qazvin Irrigation Company, *2: Master Plan Study of Restructure and Natural Resources, Agricultural Organization

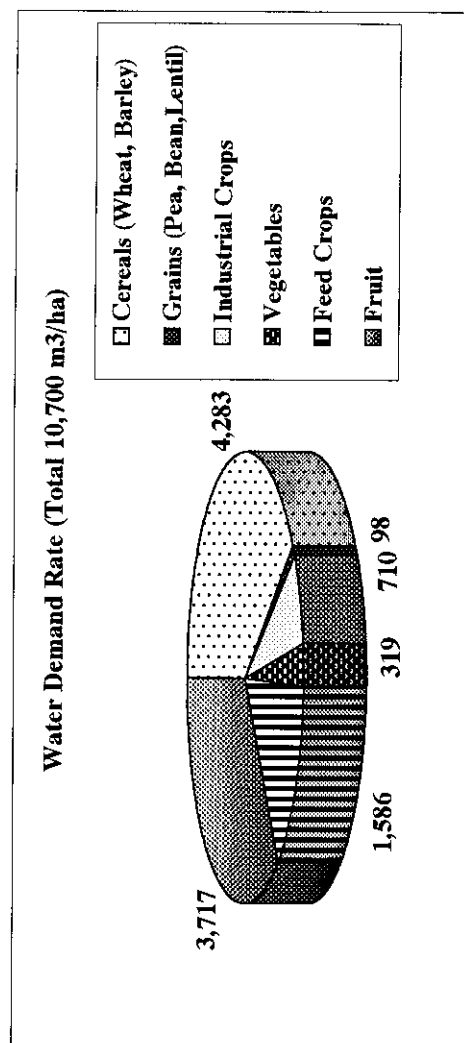
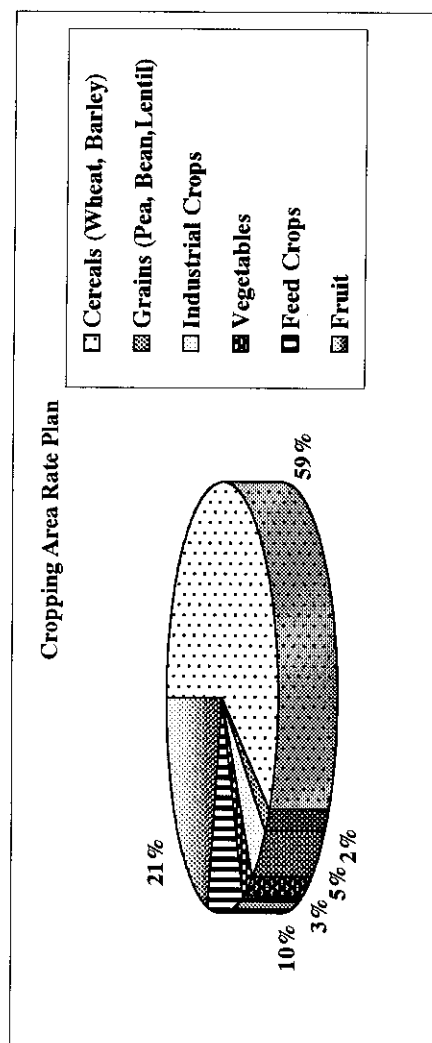


Figure 10.3.3.1 Standard of Irrigation Schedule in Qazvin Plain

Crop	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Irrigation times	Interval (days)	Approximate Requirement (m ³ /ha)
Wheat	→	→					→	→	→				9	15	10,000
Barley	→	→				→	→	→	→				9	15	9,000
Pea							→	→	→	→			5	20	11,000
Bean							→	→	→	→			7	15	13,000
Lentil							→	→	→	→			5	20	11,000
Alfalfa	→							→	→	→	→	→	22	10	21,000
Corn								→	→	→	→	→	13	10	13,000
Grass corn								→	→	→	→	→	14	10	10,000
Water melon							→	→	→	→	→	→	17	10	12,000
Potato								→	→	→	→	→	15	10	16,500
Cucumber							→	→	→	→	→		22-25	5	12,000
Tomato							→	→	→	→	→	→	35	5	15,000
Suger beet root							→	→	→	→	→	→	14-17	10	16,500

Source : Master Plan Study for Restructure and Development in Agriculture and Natural Resources, Annex-3 Irrigation and Irrigation Development Study