

Tableau 3.17 Calcul des Débits de Base à Tunis (1/6)

Oued Mayzette Basin			(Runoff Calculation by Rational Formula)							
Calc. Point	Sub-basin Combination	Total Area (sq.km)	Present Land Use Condition				Future Land Use Condition			
			Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)	Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)
1	1	0.50	0.40	40	4.4	2.1	0.80	36	9.6	4.7
2	1,2	0.81	0.37	46	5.8	2.9	0.80	46	12.6	6.2
3	3	0.47	0.32	46	2.9	1.4	0.80	46	7.3	3.6
4	1,2,3	1.28	0.35	46	8.7	4.3	0.80	46	20.0	9.8
5	1,2,3,4	1.88	0.34	70	8.7	4.3	0.71	63	19.8	9.7
6	5	0.79	0.24	35	4.6	2.3	0.26	35	5.0	2.5
7	1,2,3,4,5	2.65	0.31	70	11.3	5.5	0.57	63	22.7	11.1
8	1,2,3,4,5,6	3.97	0.29	87	13.2	6.5	0.47	79	23.2	11.4
9	1,2,3,4,5,6,7	5.08	0.28	104	14.1	6.9	0.42	96	22.6	11.1
10	9	1.24	0.52	74	8.5	4.1	0.80	74	13.0	6.4
11	1,2,3,4,5,6,7,9	6.32	0.32	104	20.0	9.8	0.50	96	33.4	16.4
12	1,2,3,4,5,6,7,8,9	6.98	0.34	114	21.8	10.7	0.50	107	33.7	16.5

Tableau 3.17 Calcul des Débits de Base à Tunis (2/6)

Oued Enkhilet Basin (Runoff Calculation by Rational Formula)										
Calc. Point	Sub-basin Combination	Total Area (sq.km)	Present Land Use Condition				Future Land Use Condition			
			Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)	Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)
1	1	0.32	0.28	20	3.5	1.7	0.39	20	4.9	2.4
2	2	0.35	0.33	11	7.4	3.6	0.44	11	9.8	4.8
3	1-2	0.67	0.31	20	8.1	4.0	0.42	20	10.9	5.4
4	1-3	0.89	0.35	28	9.2	4.5	0.50	28	13.1	6.4
5	6	1.56	0.24	30	10.4	5.1	0.26	30	11.3	5.5
6	4	0.60	0.32	13	10.7	5.2	0.50	13	16.7	8.2
7	4-5	1.22	0.32	34	9.8	4.8	0.53	34	16.2	7.9
8	1-6	3.67	0.29	34	26.7	13.0	0.41	34	37.7	18.4
9	1-7	4.72	0.31	67	20.9	10.2	0.50	67	33.7	16.5
10	9	1.14	0.20	10	15.8	7.7	0.20	10	15.8	7.7
11	Dam No. 1	1.14	0.20	10	15.8	7.7	0.20	10	15.8	7.7
12	9-10	1.87	0.25	18	19.8	9.7	0.27	18	21.4	10.5
13	9-11	2.16	0.26	23	19.5	9.5	0.34	23	25.4	12.5
14	8	0.25	0.20	8	4.2	2.0	0.27	8	5.6	2.8
15	8-18	0.29	0.20	11	3.7	1.8	0.34	11	6.3	3.1
16	8-11,18	2.45	0.26	23	22.1	10.8	0.34	23	28.9	14.1
17	8-12,18	2.74	0.28	41	16.4	8.1	0.39	41	22.9	11.2
18	1-12,18	7.46	0.30	67	31.9	15.6	0.46	67	48.9	24.0
19	1-13,18	7.62	0.30	73	30.4	14.9	0.46	73	46.6	22.8
20	14	0.96	0.24	12	13.7	6.7	0.26	12	14.8	7.3
21	Dam No. 2	0.96	0.24	12	13.7	6.7	0.26	12	14.8	7.3
22	14-15	1.70	0.29	27	14.9	7.3	0.36	27	18.6	9.1
23	14-16	2.36	0.36	47	16.3	8.0	0.47	47	21.2	10.4
24	1-16,18	9.98	0.31	73	41.1	20.1	0.47	73	62.3	30.5
25	1-16,17,18	12.13	0.30	83	43.4	21.3	0.47	83	68.1	33.3
26	20	1.41	0.28	25	12.8	6.2	0.32	25	14.6	7.1
27	19-20	2.39	0.28	38	15.3	7.5	0.39	38	21.3	10.4
28	1-20	14.32	0.30	83	52.0	25.5	0.46	83	79.7	39.0
29	1-20,23	15.12	0.30	101	46.0	22.5	0.47	101	72.1	35.3
30	21	0.51	0.28	69	2.0	1.0	0.80	69	5.7	2.8
31	22	0.57	0.24	69	1.9	0.9	0.80	69	6.3	3.1
32	21-22	1.08	0.26	69	3.9	1.9	0.80	69	12.0	5.9
33	21-22,25	1.46	0.26	83	4.5	2.2	0.80	83	13.9	6.8
34	1-23,25	16.58	0.30	101	50.5	24.7	0.50	101	84.1	41.2
35	1-25	17.12	0.29	118	44.3	21.7	0.51	118	77.8	38.1
36	26	73.58	0.32	118	209.9	102.8	0.50	118	328.0	160.6
37	27	33.73	1.00	118	300.7	147.2	1.00	118	300.7	147.2
38	1-27	124.43	0.50	118	554.6	271.6	0.64	118	709.9	347.6

Tableau 3.17 Calcul des Débits de Base à Tunis (3/6)

Oued Greb Basin		(Runoff Calculation by Rational Formula)								
Calc. Point	Sub-basin Combination	Total Area (sq.km)	Present Land Use Condition				Future Land Use Condition			
			Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)	Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)
1	1	1.10	0.20	15	10.9	5.3	0.20	15	10.9	5.3
2	Dam 1 (B.greb)	1.10	0.20	15	10.9	5.3	0.20	15	10.9	5.3
3	1,2	1.99	0.25	22	17.9	8.8	0.39	22	27.9	13.7
4	Dam 2 (R.B. A)	1.99	0.25	22	17.9	8.8	0.39	22	27.9	13.7
5	1,2,3	2.50	0.28	30	19.4	9.5	0.44	30	30.6	15.0
6	4	0.83	0.36	15	14.8	7.2	0.62	15	25.4	12.4
7	Dam 3 (Ennasr)	0.83	0.36	15	14.8	7.2	0.62	15	25.4	12.4
8	4,5	1.03	0.37	20	14.8	7.3	0.65	20	26.0	12.8
9	1,2,3,4,5	3.53	0.30	30	29.4	14.4	0.50	30	49.0	24.0
10	Dam 4 (EGU-4)	3.53	0.30	30	29.4	14.4	0.50	30	49.0	24.0
11	1,2,3,4,5,6	5.05	0.38	42	40.3	19.7	0.59	42	62.6	30.7
12	1,2,3,4,5,6,7	6.02	0.41	59	39.1	19.2	0.62	59	59.2	29.0
13	1,2,3,4,5,6,7,8	7.06	0.43	74	39.9	19.5	0.64	74	59.3	29.1
14	Dam 5 (EGU-7)	7.06	0.43	74	39.9	19.5	0.64	74	59.3	29.1
15	1,2,3,4,5,6,7,8,9	8.23	0.43	97	37.1	18.2	0.65	97	56.1	27.5
16	11	1.14	0.20	19	9.3	4.5	0.20	19	9.3	4.5
17	Dam 6 (B.Foriche)	1.14	0.20	19	9.3	4.5	0.20	19	9.3	4.5
18	11,12	3.28	0.28	32	24.3	11.9	0.47	32	40.7	19.9
19	Dam 7 (ERO-3)	3.28	0.28	32	24.3	11.9	0.47	32	40.7	19.9
20	11,12,13	3.60	0.28	34	25.2	12.4	0.50	34	45.1	22.1
21	Dam 8 (ERO-3b)	3.60	0.28	34	25.2	12.4	0.50	34	45.1	22.1
22	11,12,13,14	6.20	0.35	68	30.6	15.0	0.63	68	55.0	26.9
23	11,12,13,14,15	7.43	0.38	76	36.3	17.8	0.66	76	63.0	30.8
24	11,12,13,14,15,16	9.44	0.41	101	39.3	19.2	0.67	101	64.2	31.4
25	Dam 9 (ERO-5)	9.44	0.41	101	39.3	19.2	0.67	101	64.2	31.4
26	11,12,13,14,15,16,17	9.78	0.41	112	37.3	18.3	0.68	112	61.9	30.3
27	1-9,11-17	18.01	0.42	112	70.4	34.5	0.67	112	112.3	55.0
28	1-17	18.87	0.42	130	65.2	31.9	0.67	130	104.0	50.9

Tableau 3.17 Calcul des Débits de Base à Tunis (4/6)

Oued Gariana Basin		(Runoff Calculation by Rational Formula)								
Calc. Point	Sub-basin Combination	Total Area (sq.km)	Present Land Use Condition				Future Land Use Condition			
			Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)	Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)
1	1	2.36	0.20	30	13.1	6.4	0.68	30	44.6	21.8
2	Dam 1 (EGE-5)	2.36	0.20	30	13.1	6.4	0.68	30	44.6	21.8
3	1-2	3.99	0.20	33	20.5	10.0	0.68	33	69.6	34.1
4	15	4.47	0.24	37	25.0	12.3	0.62	37	64.7	31.7
5	Dam 2 (EGE-4)	4.47	0.24	37	25.0	12.3	0.62	37	64.7	31.7
6	3-15	5.80	0.23	45	26.5	13.0	0.65	45	74.8	36.6
7	1-3-15	9.79	0.22	45	42.7	20.9	0.66	45	128.2	62.8
8	1-4-15	13.26	0.22	51	52.2	25.5	0.68	51	161.3	79.0
9	Dam 3 (EGE-3)	13.26	0.22	51	52.2	25.5	0.68	51	161.3	79.0
10	1-5-15	13.63	0.22	54	51.1	25.0	0.68	54	158.1	77.4
11	6	9.94	0.24	57	38.9	19.0	0.32	57	51.9	25.4
12	Dam 4 (EGE-2)	9.94	0.24	57	38.9	19.0	0.32	57	51.9	25.4
13	6-7	10.26	0.24	60	38.5	18.8	0.33	60	52.9	25.9
14	1-7-15	23.89	0.23	60	85.9	42.0	0.53	60	197.9	96.9
15	1-8-15	27.26	0.23	65	91.7	44.9	0.53	65	211.3	103.4
16	9	1.59	0.52	30	23.0	11.2	0.80	30	35.3	17.3
17	Dam 5 (D.Hicher)	1.59	0.52	30	23.0	11.2	0.80	30	35.3	17.3
18	1-9-15	28.85	0.25	65	105.5	51.6	0.54	65	227.8	111.5
19	1-10-15	33.72	0.26	74	115.1	56.4	0.55	74	243.5	119.2
20	Dam 6 (EGE-6)	33.72	0.26	74	115.1	56.4	0.55	74	243.5	119.2
21	1-11-15	41.60	0.28	79	144.9	70.9	0.55	79	284.6	139.3
22	1-12-15	42.65	0.29	88	140.7	68.9	0.56	88	271.6	133.0
23	Dam 7 (EBA-1)	42.65	0.29	88	140.7	68.9	0.56	88	271.6	133.0
24	16	3.47	0.20	31	18.8	9.2	0.38	31	35.7	17.5
25	Dam 8 (EBA-5)	3.47	0.20	31	18.8	9.2	0.38	31	35.7	17.5
26	17	3.23	0.24	30	21.5	10.5	0.50	30	44.9	22.0
27	16-17	6.70	0.22	36	35.2	17.2	0.44	36	70.4	34.5
28	Dam 9 (EBA-6)	6.70	0.22	36	35.2	17.2	0.44	36	70.4	34.5
29	16-18	15.84	0.25	47	75.8	37.1	0.58	47	175.8	86.1
30	Dam 10 (EBA-6)	15.84	0.25	47	75.8	37.1	0.58	47	175.8	86.1
31	16-19	19.11	0.31	56	98.0	48.0	0.62	56	196.1	96.0
32	20	3.11	0.32	42	20.9	10.2	0.80	42	52.3	25.6
33	20-21	5.43	0.39	47	40.5	19.8	0.80	47	83.1	40.7
34	Dam 11 (EBA-3)	5.43	0.39	47	40.5	19.8	0.80	47	83.1	40.7
35	16-21	24.54	0.32	56	130.0	63.6	0.66	56	268.0	131.2
36	16-22	24.90	0.33	61	126.7	62.0	0.66	61	253.3	124.0
37	23	1.15	0.44	28	14.9	7.3	0.80	28	27.1	13.3
38	Dam 12 (Ettamhden)	1.15	0.44	28	14.9	7.3	0.80	28	27.1	13.3
39	23-24	3.39	0.49	31	44.9	22.0	0.80	31	73.3	35.9
40	23-25	4.20	0.46	39	43.2	21.1	0.74	39	69.5	34.0
41	Dam 13 (EBA-2)	4.20	0.46	39	43.2	21.1	0.74	39	69.5	34.0
42	16-25	29.10	0.35	61	157.0	76.9	0.67	61	300.6	147.2
43	16-26	29.98	0.35	70	144.3	70.6	0.67	70	276.2	135.2
44	1-12-15-26	72.63	0.31	88	256.1	125.4	0.60	88	495.6	242.6
45	1-13-15-26	72.80	0.31	90	251.9	123.3	0.60	90	487.6	238.7
46	27	3.83	0.56	61	33.1	16.2	0.80	61	47.2	23.1
47	1-13-15-27	76.63	0.33	90	282.3	138.2	0.61	90	521.8	255.5
48	1-27	86.52	0.34	96	311.2	152.4	0.62	96	567.6	277.9
49	28	128.78	0.24	96	327.0	160.1	0.44	96	599.5	293.5
50	29	25.84	1.00	96	273.4	133.9	1.00	96	273.4	133.9
51	1-29	241.14	0.36	96	918.5	449.7	0.57	96	1454.3	712.0

Tableau 3.17 Calcul des Débits de Base à Tunis (5/6)

Oued Bou Khamsa Basin (Runoff Calculation by Rational Formula)										
Calc. Point	Sub-basin Combination	Total Area (sq.km)	Present Land Use Condition				Future Land Use Condition			
			Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)	Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)
1	1	0.82	0.24	16	9.2	4.5	0.44	16	16.9	8.3
2	1,2	1.36	0.24	29	9.3	4.6	0.54	29	21.0	10.3
3	3	0.29	0.24	10	4.8	2.4	0.55	10	11.0	5.4
4	1,2,3	1.65	0.24	29	11.3	5.5	0.54	29	25.5	12.5
5	1,2,3,4	2.17	0.24	37	12.2	6.0	0.54	37	27.4	13.4
6	5	0.79	0.28	44	4.5	2.2	0.80	44	12.8	6.3
7	1,2,3,4,5	2.96	0.25	44	15.0	7.3	0.61	44	36.5	17.9
8	1,2,3,4,5,6	3.05	0.26	47	15.2	7.4	0.62	47	36.2	17.7
9	7	0.50	0.52	83	3.1	1.5	0.74	83	4.4	2.2
10	1,2,3,4,5,6,7	3.55	0.29	83	12.3	6.0	0.63	83	26.7	13.1
11	1,2,3,4,5,6,7,8	3.67	0.30	91	12.2	6.0	0.64	91	26.0	12.7
12	14	0.61	0.20	9	9.2	4.5	0.20	9	9.2	4.5
13	Dam No. 1	0.61	0.20	9	9.2	4.5	0.20	9	9.2	4.5
14	13,14	1.22	0.24	14	15.3	7.5	0.29	14	18.5	9.1
15	12,13,14	1.42	0.27	15	18.9	9.3	0.34	15	23.8	11.7
16	11,12,13,14	1.52	0.28	29	12.2	6.0	0.35	29	15.2	7.4
17	9	0.78	0.60	56	7.7	3.8	0.80	56	10.3	5.1
18	1-9,11-14	5.97	0.33	91	21.8	10.7	0.59	91	39.0	19.1
19	1-14	6.20	0.34	100	21.6	10.6	0.59	100	37.4	18.3

Tableau 3.17 Calcul des Débits de Base à Tunis (6/6)

Oued Ain Zerga Basin (Runoff Calculation by Rational Formula)										
Calc. Point	Sub-basin Combination	Total Area (sq.km)	Present Land Use Condition				Future Land Use Condition			
			Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)	Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)
1	1	2.52	0.20	15	24.9	12.2	0.20	15	24.9	12.2
2	Dam No.1	2.52	0.20	15	24.9	12.2	0.20	15	24.9	12.2
3	1,2	2.64	0.20	18	22.4	11.0	0.21	18	23.5	11.5
4	3	0.27	0.20	14	2.8	1.4	0.31	14	4.4	2.1
5	1,2,3	2.91	0.20	18	24.7	12.1	0.22	18	27.2	13.3
6	Dam No.2	2.91	0.20	18	24.7	12.1	0.22	18	27.2	13.3
7	1,2,3,4	3.05	0.21	23	22.2	10.9	0.25	23	26.4	12.9
8	1,2,3,4,5	3.17	0.21	35	16.3	8.0	0.27	35	20.9	10.2
9	8	0.73	0.20	15	7.2	3.5	0.50	15	18.0	8.8
10	8,7	1.00	0.21	21	7.8	3.8	0.58	21	21.7	10.6
11	1,2,3,4,5,7,8	4.17	0.21	35	21.4	10.5	0.34	35	34.7	17.0
12	1,2,3,4,5,6,7,8	4.20	0.21	39	19.7	9.6	0.35	39	32.8	16.1

Tableau 3.18 Calcul des Débits de Ruissellement à Tunis (1/5)

Oued Ennkhiilet Basin							
Calc. Point	Sub-basin Combination	Future Land Use Condition					
		Basic Q(100) (cu.m/s)	Basic Q(10) (cu.m/s)	ENK-1 Q(100) (cu.m/s)	ENK-1 Q(10) (cu.m/s)	ENK-2 Q(100) (cu.m/s)	ENK-2 Q(10) (cu.m/s)
1	1	4.9	2.4	4.9	2.4	4.9	2.4
2	2	9.8	4.8	9.8	4.8	9.8	4.8
3	1-2	10.9	5.4	10.9	5.4	10.9	5.4
4	1-3	13.1	6.4	13.1	6.4	13.1	6.4
5	6	11.3	5.5	11.3	5.5	11.3	5.5
6	4	16.7	8.2	16.7	8.2	16.7	8.2
7	4-5	16.2	7.9	16.2	7.9	16.2	7.9
8	1-6	37.7	18.4	37.7	18.4	37.7	18.4
9	1-7	33.7	16.5	33.7	16.5	33.7	16.5
10	9	15.8	7.7	15.8	7.7	15.8	7.7
11	Dam No. 1	15.8	7.7	0.0	0.0	0.0	0.0
12	9-10	21.4	10.5	8.4	4.1	8.4	4.1
13	9-11	25.4	12.5	12.2	5.8	12.2	5.8
14	8	5.6	2.8	5.6	2.8	5.6	2.8
15	8,18	6.3	3.1	6.3	3.1	6.3	3.1
16	8-11,18	28.9	14.1	15.6	7.6	15.6	7.6
17	8-12,18	22.9	11.2	13.7	6.5	13.7	6.5
18	1-12,18	48.9	24.0	42.4	20.3	42.4	20.3
19	1-13,18	46.6	22.8	40.5	19.4	40.5	19.4
20	14	14.8	7.3	14.8	7.3	14.8	7.3
21	Dam No. 2	14.8	7.3	0.0	0.0	14.8	7.3
22	14-15	18.6	9.1	8.4	4.0	18.6	9.1
23	14-16	21.2	10.4	13.9	6.2	21.2	10.4
24	1-16,18	62.3	30.5	51.5	24.0	56.2	27.0
25	1-16,17-18	68.1	33.3	58.5	27.6	62.7	30.2
26	20	14.6	7.1	14.6	7.1	14.6	7.1
27	19-20	21.3	10.4	21.3	10.4	21.3	10.4
28	1-20	79.7	39.0	70.2	33.4	74.4	36.0
29	1-20,23	72.1	35.3	60.2	30.4	67.7	32.6
30	21	5.7	2.8	5.7	2.8	5.7	2.8
31	22	6.3	3.1	6.3	3.1	6.3	3.1
32	21-22	12.0	5.9	12.0	5.9	12.0	5.9
33	21-22,25	13.9	6.8	13.9	6.8	13.9	6.8
34	1-23,25	84.1	41.2	76.2	36.0	79.7	38.3
35	1-25	77.8	38.1	71.1	33.5	74.0	35.6
36	26	328.0	160.6	328.0	160.6	328.0	160.6
37	27	300.7	147.2	300.7	147.2	300.7	147.2
38	1-27	706.5	345.9	699.8	341.3	702.7	343.4

Tableau 3.18 Calcul des Débits de Ruissellement à Tunis (2/5)

Oued Greb Basin									
Calc. Point	Sub-basin Combination	Future Land Use Condition							
		Basic Q(100) (cu.m/s)	Basic Q(10) (cu.m/s)	GB-1 Q(100) (cu.m/s)	GB-1 Q(10) (cu.m/s)	GB-2 Q(100) (cu.m/s)	GB-2 Q(10) (cu.m/s)	GB-3' Q(100) (cu.m/s)	GB-3' Q(10) (cu.m/s)
1	1	10.9	5.3	10.9	5.3	10.9	5.3	10.9	5.3
2	Dam 1 (B.greb)	10.9	5.3	0.0	0.0	0.0	0.0	0.0	0.0
3	1,2	27.9	13.7	12.5	6.1	12.5	6.1	12.5	6.1
4	Dam 2 (R.B. A)	27.9	13.7	12.5	6.1	0.0	0.0	0.0	0.0
5	1,2,3	30.6	15.0	17.2	8.4	6.4	3.1	6.2	3.1
6	4	25.4	12.4	25.4	12.4	25.4	12.4	25.4	12.4
7	Dam 3 (Ennasr)	25.4	12.4	5.6	0.2	5.6	0.2	5.6	0.2
8	4,5	26.0	12.8	10.9	2.7	10.9	2.7	10.9	2.7
9	1,2,3,4,5	49.0	24.0	24.9	10.9	12.6	4.9	12.3	4.9
10	Dam 4 (EGU-4)	49.0	24.0	11.3	0.7	2.4	0.0	2.0	0.0
11	1,2,3,4,5,6	62.6	30.7	32.9	10.9	23.6	9.3	22.7	9.3
12	1,2,3,4,5,6,7	59.2	29.0	37.5	14.0	29.8	12.1	28.5	12.1
13	1,2,3,4,5,6,7,8	59.3	29.1	41.9	16.6	35.3	14.6	33.7	14.6
14	Dam 5 (EGU-7)	59.3	29.1	29.9	8.4	24.8	6.8	23.3	6.8
15	1,2,3,4,5,6,7,8,9	56.1	27.5	34.7	11.6	30.3	10.0	28.7	10.0
16	11	9.3	4.5	9.3	4.5	9.3	4.5	9.3	4.5
17	Dam 6 (B.Roriche)	9.3	4.5	0.0	0.0	0.0	0.0	0.0	0.0
18	11,12	40.7	19.9	26.9	13.0	26.9	13.0	26.6	13.0
19	Dam 7 (ERO-3)	40.7	19.9	7.2	0.2	7.2	0.2	0.2	0.0
20	11,12,13	45.1	22.1	12.4	2.1	12.4	2.1	4.2	1.9
21	Dam 8 (ERO-3b)	45.1	22.1	8.7	0.2	8.7	0.2	0.8	0.0
22	11,12,13,14	55.0	26.9	35.0	12.1	35.0	12.1	25.3	11.3
23	11,12,13,14,15	63.0	30.8	45.0	17.0	45.0	17.0	35.1	15.9
24	11,12,13,14,15,16	64.2	31.4	50.7	20.6	50.7	20.6	42.3	19.5
25	Dam 9 (ERO-5)	64.2	31.4	44.8	16.6	44.8	16.6	34.1	13.0
26	11,12,13,14,15,16,17	61.9	30.3	45.2	17.0	45.2	17.0	34.9	13.6
27	1-9,11-17	112.3	55.0	77.5	27.9	73.4	26.2	61.4	22.9
28	1-17	104.0	50.9	75.1	27.8	71.4	26.2	60.5	23.2

Tableau 3.18 Calcul des Débits de Ruissellement à Tunis (3/5)

Oued Gariana Basin							
Calc. Point	Sub-basin Combination	Future Land Use Condition					
		Basic Q(100) (cu.m/s)	Basic Q(10) (cu.m/s)	GR-1 Q(100) (cu.m/s)	GR-1 Q(10) (cu.m/s)	GR-2 Q(100) (cu.m/s)	GR-2 Q(10) (cu.m/s)
1	1	44.6	21.8	44.6	21.8	44.6	21.8
2	Dam 1 (EGE-5)	44.6	21.8	44.6	21.8	0.0	0.0
3	1-2	69.6	34.1	69.6	34.1	28.5	13.9
4	15	64.7	31.7	64.7	31.7	64.7	31.7
5	Dam 2 (EGE-4)	64.7	31.7	64.7	31.7	0.0	0.0
6	3,15	74.8	36.6	74.8	36.6	17.2	8.4
7	1-3,15	128.2	62.8	128.2	62.8	38.8	19.0
8	1-4,15	161.3	79.0	161.3	79.0	78.2	38.3
9	Dam 3 (EGE-3)	161.3	79.0	115.5	47.6	60.9	22.7
10	1-5,15	158.1	77.4	117.7	48.8	62.8	24.0
11	6	51.9	25.4	51.9	25.4	51.9	25.4
12	Dam 4 (EGE-2)	51.9	25.4	29.0	9.4	29.0	9.4
13	6-7	52.9	25.9	31.4	10.6	31.4	10.6
14	1-7,15	197.9	96.9	141.8	56.0	100.7	37.5
15	1-8,15	211.3	103.4	162.9	67.0	122.5	48.9
16	9	35.3	17.3	35.3	17.3	35.3	17.3
17	Dam 5 (D.Hicher)	35.3	17.3	12.5	1.4	8.5	0.3
18	1-9,15	227.8	111.5	170.6	68.8	127.1	50.1
19	1-10,15	243.5	119.2	197.5	83.1	155.1	64.8
20	Dam 6 (EGE-6)	243.5	119.2	163.1	60.2	126.4	44.8
21	1-11,15	284.6	139.3	212.8	85.2	176.1	70.0
22	1-12,15	271.6	133.0	211.6	85.8	175.0	70.6
23	Dam 7 (EBA-1)	271.6	133.0	203.9	80.7	169.2	66.2
24	16	35.7	17.5	35.7	17.5	35.7	17.5
25	Dam 8 (EBA-5)	35.7	17.5	35.7	17.5	0.0	0.0
26	17	44.9	22.0	44.9	22.0	44.9	22.0
27	16-17	70.4	34.5	70.4	34.5	33.9	16.6
28	Dam 9 (EBA-6)	70.4	34.5	70.4	34.5	0.0	0.0
29	16-18	175.8	86.1	175.8	86.1	101.5	49.7
30	Dam 10 (EBA-6)	175.8	86.1	145.7	64.7	87.0	35.8
31	16-19	196.1	96.0	174.3	79.4	115.6	51.0
32	20	52.3	25.6	52.3	25.6	52.3	25.6
33	20-21	83.1	40.7	83.1	40.7	83.1	40.7
34	Dam 11 (EBA-3)	83.1	40.7	46.1	14.8	46.1	14.8
35	16-21	268.0	131.2	219.1	94.7	156.5	64.4
36	16-22	253.3	124.0	210.9	91.3	150.8	62.5
37	23	27.1	13.3	27.1	13.3	27.1	13.3
38	Dam 12 (Ettamhden)	27.1	13.3	14.3	4.4	14.3	4.4
39	23-24	73.3	35.9	62.3	27.9	62.3	27.9
40	23-25	69.5	34.0	61.6	28.0	61.6	28.0
41	Dam 13 (EBA-2)	69.5	34.0	61.6	28.0	49.0	18.0
42	16-25	300.6	147.2	253.6	110.7	185.4	75.3
43	16-26	276.2	135.2	238.5	104.7	175.9	72.4
44	1-12,15-26	495.6	242.6	400.1	166.6	314.5	125.9
45	1-13,15-26	487.6	238.7	395.6	164.9	310.9	124.7
46	27	47.2	23.1	47.2	23.1	47.2	23.1
47	1-13,15-27	521.8	255.5	429.3	181.3	343.2	140.4
48	1-27	567.6	277.9	484.2	209.4	399.5	169.3
49	28	599.5	293.5	599.5	293.5	599.5	293.5
50	29	273.4	133.9	273.4	133.9	273.4	133.9
51	1-29	1440.5	705.3	1357.1	638.8	1272.4	596.6

Tableau 3.18 Calcul des Débits de Ruissellement à Tunis (4/5)

Oued Bou Khamsa Basin					
Calc. Point	Sub-basin Combination	Future Land Use Condition			
		Basic Q(100) (cu.m/s)	Basic Q(10) (cu.m/s)	Alt. Q(100) (cu.m/s)	Alt. Q(10) (cu.m/s)
1	1	16.9	8.3	16.9	8.3
2	1,2	21.0	10.3	21.0	10.3
3	3	11.0	5.4	11.0	5.4
4	1,2,3	25.5	12.5	25.5	12.5
5	1,2,3,4	27.4	13.4	27.4	13.4
6	5	12.8	6.3	12.8	6.3
7	1,2,3,4,5	36.5	17.9	36.5	17.9
8	1,2,3,4,5,6	36.2	17.7	36.2	17.7
9	7	4.4	2.2	4.4	2.2
10	1,2,3,4,5,6,7	26.7	13.1	26.7	13.1
11	1,2,3,4,5,6,7,8	26.0	12.7	26.0	12.7
12	14	9.2	4.5	9.2	4.5
13	Dam No.1	9.2	4.5	0.1	0.0
14	13,14	18.5	9.1	7.8	3.7
15	12,13,14	23.8	11.7	11.1	5.3
16	11,12,13,14	15.2	7.4	7.7	3.6
17	9	10.3	5.1	10.3	5.1
18	1-9,11-14	39.0	19.1	20.3	9.6
19	1-14	37.4	18.3	20.2	9.5

Tableau 3.18 Calcul des Débits de Ruissellement à Tunis (5/5)

Oued Ain Zerga Basin									
Calc. Point	Sub-basin Combination	Future Land Use Condition							
		Basic Q(100) (cu.m/s)	Basic Q(10) (cu.m/s)	AZ-2 Q(100) (cu.m/s)	AZ-2 Q(10) (cu.m/s)	AZ-3 Q(100) (cu.m/s)	AZ-3 Q(10) (cu.m/s)	AZ-4 Q(100) (cu.m/s)	AZ-4 Q(10) (cu.m/s)
1	1	24.9	12.2	24.9	12.2	24.9	12.2	24.9	12.2
2	Dam No.1	24.9	12.2	0.0	0.0	24.9	12.2	0.0	0.0
3	1,2	23.5	11.5	1.1	0.5	23.5	11.5	1.1	0.5
4	3	4.4	2.1	4.4	2.1	4.4	2.1	4.4	2.1
5	1,2,3	27.2	13.3	3.6	1.8	27.2	13.3	3.6	1.8
6	Dam No.2	27.2	13.3	3.6	1.8	0.1	0.0	0.0	0.0
7	1,2,3,4	26.4	12.9	4.6	2.2	1.4	0.6	1.2	0.6
8	1,2,3,4,5	20.9	10.2	4.4	2.2	2.1	0.8	1.7	0.8
9	8	18.0	8.8	18.0	8.8	18.0	8.8	18.0	8.8
10	8,7	21.7	10.6	21.7	10.6	21.7	10.6	21.7	10.6
11	1,2,3,4,5,7,8	34.7	17.0	14.2	6.7	11.9	5.1	10.5	5.1
12	1,2,3,4,5,6,7,8	32.8	16.1	13.7	6.4	11.7	4.9	10.1	4.5

Tableau 3.19 Analyse Statistique (pluie journalière)

Station : Tunis-Manoubia (47836)
Year : 1968/69 - 1986/87

Return Period T (year)	Unit : (mm)			Used	Design Rainfall Ratio			Design Rainfall Ratio		
	Weibull Plot	Hazen Plot	Gumbel Method		26-Mar-73 73 Upper-1 86.6	26-Mar-73 73 Lower-1 37.8	26-Mar-73 73 Whole-1 71.5	29-Sep-86 86 Upper-1 51.5	30-Sep-86 86 Lower-1 113.3	30-Sep-86 86 Whole-1 50.0
1000	231.69	196.25	189.41	189						
500	207.97	178.17	174.55	175						
400	200.57	172.49	169.76	170						
300	191.20	165.26	163.59	164						
250	185.35	160.73	159.67	160						
200	178.29	155.25	154.88	155						
150	169.35	148.26	148.70	149						
100	157.02	139.57	139.97	140	1.617	3.704	1.958	2.718	1.236	2.800
80	150.37	133.31	135.16	135						
60	141.93	126.60	128.95	129						
50	136.66	122.38	125.01	125	1.443	3.307	1.748	2.427	1.103	2.500
40	130.29	117.27	120.18	120						
30	122.19	110.72	113.92	114						
25	117.12	106.60	109.94	110	1.270	2.910	1.538	2.136	0.971	2.200
20	110.97	101.58	105.05	105						
15	103.14	95.14	98.69	99						
10	92.22	86.09	89.62	90	1.039	2.381	1.259	1.748	0.794	1.800
8	86.26	81.09	84.54	85						
5	73.71	70.45	73.54	74	0.855	1.958	1.035	1.437	0.653	1.480
4	67.70	65.29	68.10	68						
3	59.79	58.43	60.74	61						
2	48.02	48.02	49.25	49	0.566	1.296	0.685	0.951	0.432	0.980

Note :

- 73 Upper : Upper basin of Bir M'cherga Dam;
- 73 Lower : Lower basin of Bir M'cherga Dam;
- 73 Whole : Whole basin;
- 86 Upper : Upper basin of Bir M'cherga Dam;
- 86 Lower : Lower basin of Bir M'cherga Dam;
- 86 Whole : Whole basin;
- weighted average of 1-day rainfall at 46232 and 45246
- 1-day rainfall at 47836
- weighted average of 1-day rainfall at 46232, 45246 and 47836
- 1-day rainfall at 40961
- 1-day rainfall at 44542
- weighted average of 1-day rainfall at 40961 and 44542

Tableau 3.20 Résultats du Modèle de Simulation

	Calculation Point	Peak Discharge (cu.m/s)			
		Mar. 27 '73 Flood		Sep. 30 '86 Flood	
		Observed	Model (ML-1)	Observed	Model (ML-1)
1	Upstream of Channel No.1		88.86		185.23
2	Downstream of Channel No.1		88.12		174.22
3	Outflow of Kebir Dam		69.83		174.22
4	Upstream of Channel No.2		96.55		231.29
5	Downstream of Channel No.2		94.06		228.17
6	Upstream of Channel No.3		94.65		229.13
7	Downstream of Channel No.3		94.32		221.58
8	Upstream of Channel No.13		105.70		273.34
9	Downstream of Channel No.13		85.40		179.62
10	After confluence of Basin No.8		123.04		262.40
11	Upstream of Channel No.14		151.07		295.92
12	Downstream of Channel No.14		121.85		126.61
13	K12		215.09		317.31
14	Upstream of Channel No.4		217.75		318.54
15	Downstream of Channel No.4		217.62		314.95
16	Upstream of Channel No.15		72.45		172.44
17	Downstream of Channel No.15		72.12		147.33
18	Upstream of Channel No.16		73.79		147.70
19	Downstream of Channel No.16		74.54		154.49
20	K18		282.78	476	415.59
21	Upstream of Channel No.5		420.79		721.08
22	Downstream of Channel No.5	416	407.17	693	592.64
23	Outflow of Bir M'cherga Dam		62.49		592.64
24	Upstream of Channel No.6		62.63		592.74
25	Downstream of Channel No.6		62.63		600.24
26	Upstream of Channel No.7		63.64		627.33
27	Downstream of Channel No.7		63.61		563.07
28	(Outflow of Retarding Basin A)		63.61		563.07
29	Upstream of Channel No.8		66.79		598.12
30	Downstream of Channel No.8		65.88		582.49
31	Upstream of Channel No.9		69.80		591.74
32	Downstream of Channel No.9		69.16		572.41
33	(Outflow of El Hamma Dam)		27.08		360.36
34	Upstream of Channel No.17		54.62		660.04
35	Downstream of Channel No.17 (K08)	70	51.66	500 - 600	678.20
36	Upstream of Channel No.18		54.66		731.10
37	Downstream of Channel No.18		53.21		716.35
38	Upstream of Channel No.10		102.35		957.84
39	Downstream of Channel No.10 (K05)		102.05		1000.24
40	Upstream of Channel No.11		103.19		1022.12
41	Downstream of Channel No.11		102.09		970.50
42	(Inflow from Sijoumi Basin)		0.00		0.00
43	(After confluence of Sijoumi Basin)		102.09		970.50
44	After confluence of Basin No.24		105.44		1040.72
45	Upstream of Channel No.12		105.87		1049.58
46	Downstream of Channel No.12		105.30		1056.44

Tableau 3.21 Calcul des Débits de Base dans le Bassin de Meliyan

(Unit : cu.m/s)

	Calculation Point	Catchment Area (sq.km)	w/o Dam (100)		Basic Q (100)	w/o Dam (10)		Basic Q (10)
			'73-W1 1.958	'86-L1 1.236		'73-W1 1.259	'86-L1 0.794	
1	Upstream of Channel No.1	272	209		209	122		122
2	Downstream of Channel No.1	272	212		212	122		122
3	Outflow of Kebir Dam	272	212		212	122		122
4	Upstream of Channel No.2	365	272		272	162		162
5	Downstream of Channel No.2	365	270		270	155		155
6	Upstream of Channel No.3	367	272		272	156		156
7	Downstream of Channel No.3	367	268		268	157		157
8	Upstream of Channel No.13	267	255		255	140		140
9	Downstream of Channel No.13	267	220		220	117		117
10	After confluence of Basin No.8	380	299		299	169		169
11	Upstream of Channel No.14	449	383		383	205		205
12	Downstream of Channel No.14	449	379		379	196		196
13	K12	816	644		644	354		354
14	Upstream of Channel No.4	827	654		654	357		357
15	Downstream of Channel No.4	827	650		650	359		359
16	Upstream of Channel No.15	188	283		283	96		96
17	Downstream of Channel No.15	188	308		308	98		96
18	Upstream of Channel No.16	192	312		312	98		98
19	Downstream of Channel No.16	192	311		311	98		98
20	K18	1,019	944		944	445		445
21	Upstream of Channel No.5	1,398	1,636		1,636	626		626
22	Downstream of Channel No.5	1,398	1,556		1,556	610		610
23	Outflow of Bir M'cherga Dam	1,398	1,556	938	1,556	610	487	610
24	Upstream of Channel No.6	1,419	1,577	939	1,577	615	488	615
25	Downstream of Channel No.6	1,419	1,574	945	1,574	614	470	614
26	Upstream of Channel No.7	1,551	1,601	974	1,601	637	489	637
27	Downstream of Channel No.7	1,551	1,529	878	1,529	626	451	626
28	(Outflow of Retarding Basin A)	1,551	1,529	878	1,529	626	451	626
29	Upstream of Channel No.8	1,643	1,545	963	1,545	639	471	639
30	Downstream of Channel No.8	1,643	1,506	904	1,506	636	455	636
31	Upstream of Channel No.9	1,684	1,512	930	1,512	641	460	641
32	Downstream of Channel No.9	1,684	1,518	934	1,518	640	447	640
33	(Outflow of El Hamma Dam)	123	76	455	455	40	272	272
34	Upstream of Channel No.17	222	144	827	827	79	508	508
35	Downstream of Channel No.17 (K08)	222	131	877	877	74	493	493
36	Upstream of Channel No.18	242	140	946	946	79	530	530
37	Downstream of Channel No.18	242	144	929	929	76	502	502
38	Upstream of Channel No.10	1,946	1,561	1,366	1,561	678	728	728
39	Downstream of Channel No.10 (K05)	1,946	1,537	1,372	1,537	677	702	702
40	Upstream of Channel No.11	1,957	1,539	1,404	1,539	678	718	718
41	Downstream of Channel No.11	1,957	1,544	1,402	1,544	678	705	705
42	(Inflow from Sijoumi Basin)	1,957	0	0	0	0	0	0
43	(After confluence of Sijoumi Basin)	1,957	1,544	1,402	1,544	678	705	705
44	After confluence of Basin No.24	1,991	1,548	1,480	1,548	685	732	732
45	Upstream of Channel No.12	1,996	1,549	1,491	1,549	686	734	734
46	Downstream of Channel No.12	1,996	1,555	1,569	1,569	685	754	754

Tableau 3.22 Calcul des Débits de Ruissellement dans le Bassin de Meliyan

(Unit : cu.m/s)

Calcu. Point	ALT.- ML-1 (100)	ALT.- ML-1 (10)	ALT.- ML-2 (100)	ALT.- ML-2 (10)	ALT.- ML-3 (100)	ALT.- ML-3 (10)	ALT.- ML-4 (100)	ALT.- ML-4 (10)
1	209	122	209	122	209	122	209	122
2	212	122	212	122	212	122	212	122
3	171	87	171	87	171	87	171	87
4	255	120	255	120	255	120	255	120
5	251	117	251	117	251	117	251	117
6	253	118	253	118	253	118	253	118
7	252	117	252	117	252	117	252	117
8	255	140	255	140	255	140	255	140
9	220	117	220	117	220	117	220	117
10	299	169	299	169	299	169	299	169
11	383	205	383	205	383	205	383	205
12	379	196	379	196	379	196	379	196
13	628	297	628	297	628	297	628	297
14	638	300	638	300	638	300	638	300
15	637	301	637	301	637	301	637	301
16	283	96	283	96	283	96	283	96
17	308	96	308	96	308	96	308	96
18	312	98	312	98	312	98	312	98
19	311	98	311	98	311	98	311	98
20	930	387	930	387	930	387	930	387
21	1,623	589	1,623	589	1,623	589	1,623	589
22	1,537	556	1,537	556	1,537	556	1,537	556
23	111	72	111	72	111	72	111	72
24	178	74	178	74	178	74	178	74
25	136	74	136	74	136	74	136	74
26	194	108	194	108	194	108	194	108
27	136	75	136	75	136	75	136	75
28	136	75	136	75	105	74	105	74
29	390	218	390	218	366	209	366	209
30	363	190	363	190	343	185	343	185
31	513	252	513	252	492	248	492	248
32	482	230	482	230	457	226	457	226
33	455	272	139	68	455	272	139	68
34	827	508	518	265	827	508	518	265
35	877	493	477	245	877	493	477	245
36	946	530	538	282	946	530	538	282
37	929	502	549	294	929	502	549	294
38	1,346	724	1,016	517	1,335	722	1,004	515
39	1,361	700	1,025	485	1,353	698	1,005	482
40	1,392	716	1,043	495	1,384	714	1,024	492
41	1,356	696	1,063	513	1,339	694	1,047	510
42	0	0	0	0	0	0	0	0
43	1,356	696	1,063	513	1,339	694	1,047	510
44	1,433	723	1,140	540	1,424	721	1,124	537
45	1,454	726	1,151	542	1,447	723	1,135	539
46	1,536	749	1,147	508	1,523	746	1,134	506

Tableau 3.2.3 Pluie Mensuelle à Sousse (1/2)

Station: 73510		KALAA SEGHIRA												Unit : (mm)			
Year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Total				
66/67		41.0	11.0	7.0		39.5	3.0	7.5	15.0			6.0					
67/68	95.0				46.0	75.2	39.5	0.0	19.5		0.0	0.0					
68/69	10.0	4.5	0.0	7.0	21.0	17.0	15.0	10.0	22.0	0.0	0.0	7.0	113.5				
69/70	134.0	629.0	0.0	13.5	10.0	0.0	9.0	13.0	6.8	0.0	0.0	1.0	816.3				
70/71	7.5	9.0	0.0	126.0	47.5	93.5	5.0	7.0	12.5	0.0	0.0						
71/72	36.5	144.5	23.2	126.0	37.5	12.5	49.5	60.4	20.0	0.0	4.0	7.5	521.6				
72/73	9.0	94.0	3.5			35.5	93.0	23.5	0.0	0.0	0.0	35.0					
73/74	0.0	69.0	41.0	364.5	5.0	25.0		24.5	0.0		0.0	5.0					
74/75	54.5	41.5	10.0	7.0	10.0		22.5	10.0	10.0	0.0	0.0	27.0					
75/76	0.0	72.0	34.0	31.0	78.0	45.0	53.0	0.0	44.0	4.0	0.0	0.0	361.0				
76/77	37.0	16.2	160.2	7.5	53.0	5.0	15.0	24.5	6.2	0.0	0.0	0.0	324.6				
77/78	42.7	14.7	38.1	19.6	10.3	25.2	20.2	11.4	17.7	0.0	0.0	2.0	201.9				
78/79	0.0	75.5	72.1	4.6	6.3	60.7	56.7	14.7	14.0	0.0	0.0	0.0	304.6				
79/80	100.7	5.7	29.6	0.0	1.5	8.2	44.6	48.8	7.5	0.0	0.0	4.5	251.1				
80/81	3.8	6.5	5.4	24.1	27.7	33.8	7.1	6.5	6.6	3.3	0.0	3.0	127.8				
81/82	3.3	28.7	1.4	15.7	109.0	10.9	10.9	38.8	15.3	0.0	4.5	2.5	241.0				
82/83	6.4	215.0	102.9	42.7	16.8	0.0	20.1	0.0	11.0	7.5	0.0	0.0	422.4				
83/84	13.2	85.7	16.6	15.0	5.0	18.3	42.7	13.1	0.0	0.0	0.0	10.2	219.8				
84/85	21.1	127.9	5.8	153.0	25.9	56.7	27.4	10.2	28.7	1.0	0.0	0.0	457.7				
85/86	35.5	32.6	2.2	0.5	4.1	6.6	86.9	12.0	1.2	3.1	2.1	0.0	186.8				
86/87	3.4	69.7	57.0	178.3	8.1	12.5	29.0	27.1	9.8	0.0	0.0	0.0	394.9				
87/88	37.0	12.0	41.2	25.0	2.0		0.0	29.0		12.2	0.0	0.0					
88/89	14.6	7.0	107.2	24.7	69.3	44.1	6.1	10.8	0.0	8.3	0.0	2.8	294.9				
89/90	19.2	113.0	17.2	91.0	140.0	0.0	42.0	82.6			4.0	10.2					
90/91		10.0	39.0	66.0	39.5	59.5	64.9	35.5	12.0	5.5	0.0						
91/92																	
Data	23	24	24	23	23	23	24	25	23	21	24	23	16				
Ave.	29.8	80.2	34.1	58.7	33.6	29.8	31.8	20.8	12.2	2.1	0.6	5.4	327.5				

Source : "Annuaire Pluviométrique de Tunisie", Direction General des Ressources en Eau

Tableau 3.23 Pluie Mensuelle à Sousse (2/2)

Year	Station: 74603 MASAKEN DELG SM												Unit : (mm)			
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Total			
66/67	10.0	49.3	15.0	7.0	0.0	43.5	13.1	10.7	15.5	0.0	0.0	24.0	188.1			
67/68	60.7	45.8	56.8	2.0	42.0	57.0	27.5	23.8	13.5	33.5	0.0	0.0	362.6			
68/69	23.5	4.5	4.3	23.9	28.1	11.5	28.0	32.0	19.0	4.0	0.0	0.0	178.8			
69/70	187.6	424.5	17.5	21.1	9.5	0.0	8.3	11.7	4.5	2.5	0.0	2.5	689.7			
70/71	18.0	6.5	0.0	189.2	40.6	72.0	11.0	11.0	1.0	0.0	0.0	0.0	349.3			
71/72	67.5	182.6	20.1	1.5	18.7	15.5	55.0	88.3	4.0	0.0	0.0	2.1	455.3			
72/73	10.1	34.5	8.6	88.1	41.0	49.5	84.5	26.5	3.0	6.5	1.0	30.0	383.3			
73/74	0.0	67.5	83.0	403.6	5.1	30.5	24.0	33.5	0.0	10.0	1.6	9.5	668.3			
74/75	28.6	30.1	9.2	17.1	6.9	139.7	33.5	31.9	17.5	0.0	0.0	19.6	334.1			
75/76	15.0	37.1	112.2	43.8	42.1	28.7	54.1	37.3	81.1	35.6	9.5	49.9	546.4			
76/77	58.5	65.6	100.0	9.5	43.7	5.0	19.6	43.9	8.7	0.0	0.0	0.0	354.5			
77/78	73.4	2.0	46.5	10.6	18.3	31.6	19.0	17.4	15.4	16.9	0.0	8.0	259.1			
78/79	403.0		57.2	5.0	7.3	58.1	68.2	23.8	18.1	0.2	0.0	20.7				
79/80	94.1	28.0	16.8	0.0	0.2	10.4	122.0	50.5	11.9	0.0	0.0	0.1	334.0			
80/81	14.6	0.5	4.5	33.5	4.8	17.3	6.6	5.8	4.4	4.0	0.0	0.5	96.5			
81/82	4.5	21.2	2.3	17.5	88.7	17.0	8.4	23.0	10.2	0.0	0.0	0.0	192.8			
82/83	10.9	155.2	123.0	40.1	11.7	0.0	22.7	9.0	15.3	4.5	0.0	0.0	392.4			
83/84	16.5	22.5	12.0	13.5	7.0	16.5	46.0	20.0	0.0	0.0	0.0	10.0	164.0			
84/85	15.5	109.5	7.5	98.5	31.0	29.0	27.0	17.0	19.0	0.0	0.0	0.0	354.0			
85/86	44.0	45.5	1.0	8.0	7.0	5.0	88.0	7.5	4.0	11.4	5.0	0.0	226.4			
86/87	1.0	96.4	61.5	111.6	8.5	13.5	24.5	10.0	10.0	0.0	0.0	0.0	337.0			
87/88	28.0	11.0	45.0	9.5	0.0		0.0	12.0	1.0	9.0	0.0	0.0				
88/89	15.0	0.0	126.0	32.0	59.5	29.5	2.0	9.0	0.0	2.0	0.0	26.0	301.0			
89/90	15.0	105.0	13.5	87.0	161.5	0.0	20.0	69.0			2.0	3.0				
90/91	14.0	33.0	73.5	53.5	36.5	43.5	73.0	38.0	5.5	7.0	0.0	0.0	377.5			
91/92																
Data	25	24	25	25	25	24	25	25	24	24	25	25	22			
Ave.	49.2	65.7	40.7	53.1	28.8	30.2	35.4	26.5	11.8	6.1	0.8	8.2	343.0			

Source : "Annuaire Pluviométrique de Tunisie", Direction General des Ressources en Eau

Tableau 3.24 Enregistrements de Niveau d'eau dans le Bassin de l'oued Hammam

Station : Kalaa Sghira					Station : Hammam Sousse			
Date	Time	Water Level (cm)	Water Depth (m)	Estimated Discharge (cu.m/s)	Date	Time	Water Level (cm)	
26-Sep-89	21:30	106	0.56	4.4	04-Feb-91	08:20	136	
25-Oct-89	08:30	160	1.10	24.8	16-Mar-91	02:30	169	
04-Dec-89	00:30	127	0.77	11.1	25-Apr-91	20:00	147	
22-Jan-90	11:00	103	0.53	3.5	04-Sep-91	19:00	163	
15-Mar-91	21:00	104	0.54	3.8	07-Sep-91	17:00	172	
23-Nov-91	20:00	110	0.60	5.5	23-Nov-91	23:00	215	
22-Feb-92	08:40	97	0.47	2.3	28-Feb-92	17:00	201	
06-Nov-92	01:10	114	0.64	6.7	06-Nov-92	00:40	182	
18-Dec-92	08:00	85	0.35	0.8	18-Dec-92	15:45	197	
					28-Dec-92	01:10	182	

Tableau 3.25 Calcul des débits de Base à Sousse (1/4)

Oued Blibene Basin (Runoff Calculation by Rational Formula)										
Calc. Point	Sub-basin Combination	Total Area (sq.km)	Present Land Use Condition				Future Land Use Condition			
			Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)	Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)
1	1	3.98	0.24	51	19.9	9.1	0.32	51	26.5	12.1
2	1-2	4.48	0.24	60	19.9	9.1	0.31	60	25.7	11.7
3	3	2.18	0.24	33	15.0	6.9	0.38	33	23.8	10.9
4	1-3	6.66	0.24	60	29.5	13.5	0.34	60	41.8	19.1
5	1-4	7.03	0.24	68	28.4	13.0	0.33	68	39.1	17.9
6	5	0.85	0.24	24	7.4	3.4	0.50	24	15.5	7.1
7	1-5	7.88	0.24	68	31.8	14.6	0.35	68	46.4	21.2
8	1-6	9.14	0.24	88	30.5	14.0	0.36	88	45.8	20.9
9	11	0.37	0.40	16	7.3	3.3	0.80	16	14.5	6.6
10	10-11	0.94	0.47	25	15.6	7.1	0.80	25	26.5	12.1
11	8-10-11	1.29	0.49	35	17.4	8.0	0.80	35	28.4	13.0
12	9	0.16	0.36	11	3.7	1.7	0.80	11	8.3	3.8
13	8-11	1.45	0.47	35	18.8	8.6	0.80	35	31.9	14.6
14	7-11	1.50	0.47	37	18.6	8.5	0.80	37	31.7	14.5
15	12	0.34	0.60	24	7.4	3.4	0.80	24	9.9	4.5
16	1-12	10.98	0.28	88	42.8	19.6	0.44	88	67.2	30.7
17	1-13	11.51	0.29	101	41.9	19.2	0.45	101	65.1	29.7
18	18	2.36	0.24	36	15.3	7.0	0.32	36	20.4	9.3
19	17-18	2.91	0.27	57	15.1	6.9	0.41	57	22.9	10.5
20	1-13-17-18	14.42	0.29	101	52.5	24.0	0.44	101	79.7	36.4
21	1-14-17-18	14.50	0.29	106	51.0	23.3	0.44	106	77.3	35.4
22	18	0.45	0.56	17	11.8	5.4	0.80	17	16.9	7.7
23	1-14-16-18	14.95	0.30	106	54.4	24.9	0.46	106	83.4	38.1
24	1-18	15.13	0.30	116	51.5	23.5	0.46	116	78.9	36.1

Tableau 3.25 Calcul des débits de Base à Sousse (2/4)

Oued Hallouf Basin (Runoff Calculation by Rational Formula)										
Calc. Point	Sub-basin Combination	Total Area (sq.km)	Present Land Use Condition				Future Land Use Condition			
			Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)	Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)
1	1	1.48	0.52	33	22.1	10.1	0.80	33	34.0	15.6
2	2	1.34	0.28	23	14.1	6.4	0.80	23	40.3	18.4
3	1-2	2.82	0.41	33	33.2	15.2	0.80	33	64.9	29.6
4	1-3	3.37	0.40	47	29.8	13.6	0.80	45	61.6	28.2
5	1-4	3.70	0.38	57	27.0	12.3	0.80	54	59.1	27.0
6	6	1.51	0.24	32	10.7	4.9	0.50	32	22.2	10.2
7	6-7	3.09	0.26	53	16.3	7.4	0.53	53	33.2	15.2
8	1-4, 6-7	6.79	0.33	57	43.0	19.7	0.68	54	92.2	42.1
9	1-7	7.01	0.33	67	39.4	18.0	0.68	63	84.9	38.8
10	18	0.70	0.56	17	18.4	8.4	0.80	17	26.3	12.0
11	17-18	1.09	0.55	27	20.0	9.1	0.80	27	29.1	13.3
12	16-18	1.55	0.51	37	20.9	9.5	0.80	37	32.8	15.0
13	15-18	1.73	0.50	49	18.6	8.5	0.80	49	29.7	13.6
14	14	0.46	0.56	28	8.4	3.8	0.80	28	11.9	5.5
15	13-14	0.60	0.54	42	7.8	3.6	0.80	42	11.5	5.3
16	1-7, 13-18	9.34	0.37	67	56.8	26.9	0.71	63	118.1	54.0
17	1-8, 13-18	10.01	0.36	80	53.8	24.6	0.70	77	107.6	49.2
18	12	0.56	0.52	27	9.7	4.4	0.80	27	14.9	6.8
19	1-8, 12-18	10.57	0.37	80	58.4	26.7	0.70	77	113.6	51.9
20	1-9, 12-18	10.65	0.37	85	56.2	25.7	0.70	82	109.3	50.0
21	10	1.63	0.48	63	13.9	6.4	0.68	63	19.7	9.0
22	1-10, 12-18	12.28	0.39	85	68.4	31.2	0.70	82	126.0	57.6
23	1-18	12.34	0.39	90	65.9	30.1	0.70	87	121.2	55.4

Tableau 3.25 Calcul des débits de Base à Sousse (3/4)

Oued Hammam Basin (Runoff Calculation by Rational Formula)										
Calc. Point	Sub-basin Combination	Total Area (sq.km)	Present Land Use Condition				Future Land Use Condition			
			Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)	Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)
1	1	46.00	0.20	260	57.4	26.2	0.20	260	57.4	26.2
2	2	13.00	0.20	100	32.9	15.0	0.20	100	32.9	15.0
3	1-2	59.00	0.20	260	73.6	33.7	0.20	260	73.6	33.7
4	1-3	99.00	0.20	344	100.4	45.9	0.20	344	100.4	45.9
5	4	14.60	0.20	84	42.0	19.2	0.20	84	42.0	19.2
6	1-4	113.60	0.20	344	115.3	52.7	0.20	344	115.3	52.7
7	Dam 3 (Laia)	113.60	0.20	344	115.3	52.7	0.20	344	115.3	52.7
8	1-5	135.40	0.20	436	115.3	52.7	0.21	436	121.0	55.3
9	6	12.60	0.20	136	25.4	11.6	0.23	136	29.2	13.4
10	1-6	148.00	0.20	436	126.0	57.6	0.21	436	132.3	60.5
11	Dam 4 (R.B.-A)	148.00	0.20	436	126.0	57.6	0.21	436	132.3	60.5
12	1-7	163.00	0.20	506	124.3	56.8	0.22	506	136.7	62.5
13	Dam 5 (R.B.-B)	163.00	0.20	506	124.3	56.8	0.22	506	136.7	62.5
14	1-8	163.40	0.20	516	122.8	56.1	0.22	516	135.1	61.8
15	12	8.50	0.20	78	25.9	11.8	0.20	78	25.9	11.8
16	Dam 2 (M'darrej)	8.50	0.20	78	25.9	11.8	0.20	78	25.9	11.8
17	12-13	9.70	0.22	102	26.6	12.2	0.27	102	32.7	14.9
18	10	12.60	0.20	76	39.1	17.9	0.23	76	44.9	20.5
19	Dam 1 (Guemgame)	12.60	0.20	76	39.1	17.9	0.23	76	44.9	20.5
20	10-11	13.10	0.20	84	37.7	17.2	0.25	84	47.2	21.6
21	10-13	22.80	0.21	102	59.7	27.3	0.26	102	73.9	33.8
22	10-14	23.90	0.22	128	55.4	25.3	0.29	128	73.1	33.4
23	15	4.10	0.28	52	23.6	10.8	0.44	52	37.0	16.9
24	10-15	28.00	0.22	128	64.9	29.7	0.31	128	91.5	41.8
25	10-16	28.30	0.22	138	62.1	28.4	0.31	138	87.5	40.0
26	17	10.60	0.20	90	29.6	13.5	0.23	90	34.0	15.5
27	10-17	39.10	0.22	138	85.8	39.2	0.29	138	113.1	51.7
28	10-18	44.90	0.22	168	85.2	38.9	0.32	168	123.9	56.6
29	1-8,10-18	208.30	0.21	516	164.4	75.1	0.24	516	187.9	85.9
30	1-18	222.30	0.21	576	161.7	73.9	0.26	576	200.2	91.5

Tableau 3.25 Calcul des débits de Base à Sousse (4/4)

Oued Hamdoun Basin (Runoff Calculation by Rational Formula)											
Calc. Point	Sub-basin Combination	Total Area (sq.km)	Present Land Use Condition				Future Land Use Condition				
			Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)	Runoff Coeff. f	Design tc (min)	Calc. Q(100) (cu.m/s)	Calc. Q(10) (cu.m/s)	
1	1	120.30	0.22	402	119.6	54.7	0.23	402	125.1	57.2	
2	1-2	144.40	0.22	458	130.4	59.6	0.22	458	130.4	59.6	
3	3	13.00	0.22	136	28.8	13.2	0.23	136	30.1	13.8	
4	1-3	157.40	0.22	458	142.1	65.0	0.23	458	148.6	67.9	
5	1-4	170.60	0.22	500	144.4	66.0	0.25	500	164.1	75.0	
6	5	7.80	0.20	114	17.9	8.2	0.26	114	23.3	10.6	
7	1-5	178.40	0.22	500	151.0	69.0	0.25	500	171.6	78.4	
8	1-6	179.00	0.22	508	149.7	68.4	0.25	508	170.1	77.8	
9	7	11.30	0.20	118	25.3	11.6	0.20	118	25.3	11.6	
10	1-7	190.30	0.22	508	159.2	72.8	0.25	508	180.9	82.7	
11	1-8	193.10	0.22	548	152.7	69.8	0.25	548	173.5	79.3	
12	18	21.70	0.22	142	46.6	21.3	0.23	142	48.7	22.3	
13	Dam 1 (R.B.-A)	21.70	0.22	142	46.6	21.3	0.23	142	48.7	22.3	
14	18-19	23.10	0.22	160	45.4	20.8	0.23	160	47.5	21.7	
15	20	4.50	0.20	68	15.2	6.9	0.20	68	15.2	6.9	
16	18-20	27.60	0.22	160	54.3	24.8	0.23	160	56.7	25.9	
17	18-21	33.50	0.21	226	48.7	22.3	0.26	226	60.3	27.6	
18	1-8,18-21	226.60	0.22	548	179.2	81.9	0.25	548	203.6	93.1	
19	1-9,18-21	226.70	0.22	552	178.3	81.5	0.25	552	202.6	92.6	
20	10	6.90	0.20	120	15.3	7.0	0.20	120	15.3	7.0	
21	1-10,18-21	233.60	0.22	552	183.7	84.0	0.25	552	208.8	95.4	
22	1-11,18-21	234.60	0.22	566	181.1	82.8	0.25	566	205.8	94.1	
23	22	20.40	0.20	166	35.5	16.2	0.26	166	46.1	21.1	
24	1-11,18-22	255.00	0.22	566	196.9	90.0	0.25	566	223.7	102.3	
25	1-12,18-22	256.50	0.22	576	195.5	89.4	0.25	576	222.1	101.5	
26	Dam 2 (R.B.-B)	256.50	0.22	576	195.5	89.4	0.25	576	222.1	101.5	
27	1-13,18-22	265.40	0.22	604	195.3	89.3	0.25	604	221.9	101.4	
28	14	7.50	0.20	86	21.2	9.7	0.20	86	21.2	9.7	
29	1-14,18-22	272.90	0.22	604	200.8	91.8	0.25	604	228.2	104.3	
30	1-15,18-22	284.90	0.22	672	193.7	88.6	0.25	672	220.1	100.6	
31	16	28.20	0.22	174	48.4	22.1	0.23	174	50.6	23.1	
32	1-16,18-22	311.10	0.22	672	211.5	96.7	0.25	672	240.4	109.9	
33	1-22	312.80	0.22	692	208.1	95.1	0.25	692	236.5	108.1	

Tableau 3.26 Calcul des Débits de Ruissellement à Sousse (1/2)

Calc. Point	Sub basin Combination	Oued Hammam Basin													
		Future Land Use Condition													
		Basic	Basic	HM-2	HM-2	HM-3	HM-3	HM-4	HM-4	HM-5	HM-5	HM-6	HM-6	HM-7	HM-7
		Q(100)	Q(10)	Q(100)	Q(10)	Q(100)	Q(10)	Q(100)	Q(10)	Q(100)	Q(10)	Q(100)	Q(10)	Q(100)	Q(10)
		(cu.m/s)	(cu.m/s)	(cu.m/s)	(cu.m/s)	(cu.m/s)	(cu.m/s)	(cu.m/s)	(cu.m/s)	(cu.m/s)	(cu.m/s)	(cu.m/s)	(cu.m/s)	(cu.m/s)	(cu.m/s)
1	1	57.4	26.2	57.4	26.2	57.4	26.2	57.4	26.2	57.4	26.2	57.4	26.2	57.4	26.2
2	2	32.9	15.0	32.9	15.0	32.9	15.0	32.9	15.0	32.9	15.0	32.9	15.0	32.9	15.0
3	1-2	73.6	33.7	73.6	33.7	73.6	33.7	73.6	33.7	73.6	33.7	73.6	33.7	73.6	33.7
4	1-3	100.4	45.9	100.4	45.9	100.4	45.9	100.4	45.9	100.4	45.9	100.4	45.9	100.4	45.9
5	4	42.0	19.2	42.0	19.2	42.0	19.2	42.0	19.2	42.0	19.2	42.0	19.2	42.0	19.2
6	1-4	115.3	52.7	115.3	52.7	115.3	52.7	115.3	52.7	115.3	52.7	115.3	52.7	115.3	52.7
7	Dam 3 (Lala)	115.3	52.7	115.3	52.7	115.3	52.7	115.3	52.7	115.3	52.7	115.3	52.7	115.3	52.7
8	1-5	121.0	55.3	121.0	55.3	121.0	55.3	121.0	55.3	121.0	55.3	121.0	55.3	121.0	55.3
9	6	29.2	13.4	29.2	13.4	29.2	13.4	29.2	13.4	29.2	13.4	29.2	13.4	29.2	13.4
10	1-6	132.3	60.5	132.3	60.5	132.3	60.5	132.3	60.5	132.3	60.5	132.3	60.5	132.3	60.5
11	Dam 4 (R.B.A)	132.3	60.5	132.3	60.5	132.3	60.5	132.3	60.5	132.3	60.5	132.3	60.5	132.3	60.5
12	1-7	136.7	62.5	136.7	62.5	136.7	62.5	136.7	62.5	136.7	62.5	136.7	62.5	136.7	62.5
13	Dam 5 (R.B.B)	136.7	62.5	136.7	62.5	136.7	62.5	136.7	62.5	136.7	62.5	136.7	62.5	136.7	62.5
14	1-8	135.1	61.8	135.1	61.8	135.1	61.8	135.1	61.8	135.1	61.8	135.1	61.8	135.1	61.8
15	12	25.9	11.8	25.9	11.8	25.9	11.8	25.9	11.8	25.9	11.8	25.9	11.8	25.9	11.8
16	Dam 2 (M'darre)	25.9	11.8	25.9	11.8	25.9	11.8	25.9	11.8	25.9	11.8	25.9	11.8	25.9	11.8
17	12-13	32.7	14.9	32.7	14.9	32.7	14.9	32.7	14.9	32.7	14.9	32.7	14.9	32.7	14.9
18	10	44.9	20.5	44.9	20.5	44.9	20.5	44.9	20.5	44.9	20.5	44.9	20.5	44.9	20.5
19	Dam 1 (Guemgame)	44.9	20.5	44.9	20.5	44.9	20.5	44.9	20.5	44.9	20.5	44.9	20.5	44.9	20.5
20	10-11	47.2	21.6	47.2	21.6	47.2	21.6	47.2	21.6	47.2	21.6	47.2	21.6	47.2	21.6
21	10-13	73.9	33.1	73.9	33.1	73.9	33.1	73.9	33.1	73.9	33.1	73.9	33.1	73.9	33.1
22	10-14	73.1	33.4	73.1	33.4	73.1	33.4	73.1	33.4	73.1	33.4	73.1	33.4	73.1	33.4
23	15	37.0	16.9	37.0	16.9	37.0	16.9	37.0	16.9	37.0	16.9	37.0	16.9	37.0	16.9
24	10-15	91.5	41.8	91.5	41.8	91.5	41.8	91.5	41.8	91.5	41.8	91.5	41.8	91.5	41.8
25	10-16	87.5	40.0	87.5	40.0	87.5	40.0	87.5	40.0	87.5	40.0	87.5	40.0	87.5	40.0
26	17	34.0	15.5	34.0	15.5	34.0	15.5	34.0	15.5	34.0	15.5	34.0	15.5	34.0	15.5
27	10-17	113.1	51.7	113.1	51.7	113.1	51.7	113.1	51.7	113.1	51.7	113.1	51.7	113.1	51.7
28	10-18	123.9	56.6	123.9	56.6	123.9	56.6	123.9	56.6	123.9	56.6	123.9	56.6	123.9	56.6
29	1-8,10-18	187.9	85.9	187.9	85.9	187.9	85.9	187.9	85.9	187.9	85.9	187.9	85.9	187.9	85.9
30	1-18	200.2	91.5	200.2	91.5	200.2	91.5	200.2	91.5	200.2	91.5	200.2	91.5	200.2	91.5

Tableau 3.26 Calcul des Débits de Ruissellement à Sousse (2/2)

Calc. Point	Sub basin Combination	Future Land Use Condition							
		Basic Q(100) (cu.m/s)	Basic Q(10) (cu.m/s)	HD 2 Q(100) (cu.m/s)	HD 2 Q(10) (cu.m/s)	HD 3 Q(100) (cu.m/s)	HD 3 Q(10) (cu.m/s)	HD 4 Q(100) (cu.m/s)	HD 4 Q(10) (cu.m/s)
1	1	125.1	57.2	125.1	57.2	125.1	57.2	125.1	57.2
2	1-2	130.4	59.6	130.4	59.6	130.4	59.6	130.4	59.6
3	3	30.1	13.6	30.1	13.6	30.1	13.6	30.1	13.6
4	1-3	148.6	67.9	148.6	67.9	148.6	67.9	148.6	67.9
5	1-4	164.1	75.0	164.1	75.0	164.1	75.0	164.1	75.0
6	5	23.3	10.6	23.3	10.6	23.3	10.6	23.3	10.6
7	1-5	171.6	78.4	171.6	78.4	171.6	78.4	171.6	78.4
8	1-6	170.1	77.8	170.1	77.8	170.1	77.8	170.1	77.8
9	7	25.3	11.6	25.3	11.6	25.3	11.6	25.3	11.6
10	1-7	180.9	82.7	180.9	82.7	180.9	82.7	180.9	82.7
11	1-8	173.5	79.3	173.5	79.3	173.5	79.3	173.5	79.3
12	18	48.7	22.3	48.7	22.3	48.7	22.3	48.7	22.3
13	Dam 1 (R.B.-A)	48.7	22.3	0.0	0.0	48.7	22.3	0.0	0.0
14	18-19	47.3	21.7	2.9	1.3	47.3	21.7	2.9	1.3
15	20	15.2	6.9	15.2	6.9	15.2	6.9	15.2	6.9
16	18-20	56.7	25.9	12.1	5.5	56.7	25.9	12.1	5.5
17	18-21	60.3	27.6	21.2	9.7	60.3	27.6	21.2	9.7
18	1-8,18-21	203.6	93.1	184.1	84.2	203.6	93.1	184.1	84.2
19	1-9,18-21	202.6	92.6	183.2	83.8	202.6	92.6	183.2	83.8
20	10	15.3	7.0	15.3	7.0	15.3	7.0	15.3	7.0
21	1-10,18-21	208.8	95.4	189.4	86.6	208.8	95.4	189.4	86.6
22	1-11,18-21	205.8	94.1	186.8	85.4	205.8	94.1	186.8	85.4
23	22	46.1	21.1	46.1	21.1	46.1	21.1	46.1	21.1
24	1-11,18-22	223.7	102.3	204.7	93.6	223.7	102.3	204.7	93.6
25	1-12,18-22	222.1	101.5	203.3	93.0	222.1	101.5	203.3	93.0
26	Dam 2 (R.B.-B)	222.1	101.5	203.3	93.0	131.0	41.0	118.2	35.4
27	1-13,18-22	221.9	101.4	203.8	93.1	136.6	43.8	124.0	38.3
28	14	21.2	9.7	21.2	9.7	21.2	9.7	21.2	9.7
29	1-14,18-22	226.2	104.3	210.0	96.0	142.9	46.7	130.3	41.2
30	1-15,18-22	220.1	100.6	203.4	93.0	146.9	49.2	134.5	44.0
31	16	50.6	23.1	50.6	23.1	50.6	23.1	50.6	23.1
32	1-16,18-22	240.4	109.9	223.6	102.2	167.2	58.5	154.8	53.2
33	1-22	236.5	108.1	220.1	100.6	166.4	58.3	154.0	53.1

Tableau 4.1 Nature de l'Occupation de Terrains Actuelle dans le Grand Tunis

LAND USE CATEGORY	GOVERNORATE			
	TUNIS	ARIANA	BEN AROUS	TOTAL
	AREA (km2)	AREA (km2)	AREA (km2)	AREA (km2)
URBAN AREAS	105	122	109	331
AGRICULTURAL AREAS	100	1053	358	1497
SEBKHET	26 (Sijoumi)	50 (Ariana)	—	76
LAKE	42 (Tunis lake)	—	—	42
GREEN AREAS	15	333	220	582
TOTAL	288	1,558	687	2,528

Source : Identification Brochure of each Governorate

Tableau 4.2 Agglomérations Urbaines dans le Grand Tunis

CATEGORY	GOVERNORATE							
	TUNIS		ARIANA		BEN AROUS		TOTAL	
	AREA (km2)	(%)	AREA (km2)	(%)	AREA (km2)	(%)	AREA (km2)	(%)
FORMAL HOUSING	38.91	53	15.22	21	18.92	26	73.05	100
SPONTANEOUS HABITAT	10.57	31	19.16	54	5.17	15	34.90	100
SOCIAL INFRASTRUCTURES	8.89	49	5.98	33	3.33	18	18.20	100
INDUSTRIAL ZONES	5.76	34	3.66	22	7.32	44	16.74	100
TOTAL	64.13		44.02		34.74		142.89	

Source : Brochure of the Governorate of Tunis

Tableau 4.3 Etendue des Localités Inondables dans le Grand Tunis (1/4)

LOCATION	ENCOUNTERED PROBLEM	OBSERVATIONS
<u>Governorate of Ariana</u>		
1. Cité Al-Intilaka Municipality of M'nihla East of MC 31 road to Raoued	Temporary flooding area resulting from housing constructions that obstruct the stormwater flows.	Presence of dike that was constructed by ONAS to divert flows to storm basin at Nougra. However problems still persist.
2. Cité Al-tadhamen Municipality of Wadi-Elil West of MC 31 road to Raoued North of Sebket Ariana	Serious flooding problem resulting from construction of spontaneous settlements in the river bed of Oued Gariana and obstruction of stormwater flows.	Absence of drains, road gullies and stormwater system.
3. Sidi Amor-Municipality of Ariana. Along the RVE 533 road to Raoued. North of Sebket Ariana	Important flooding problem due to the presence of wastewater canal of ONAS that obstructs the run off of stormwater flows.	Flat lands that do not dispose of any drainage infrastructure. Presence of spontaneous habitat. Drainage design works are needed.
4. Borj El-Khsous at Raoued in the Municipality of Ariana.	Temporary flooding area due to the presence of canal ONAS that blocks the discharge of stormwater flows	Flat area deprived of drainage infrastructure and requires design work.
5. Borj-Louzir. Municipality of Ariana. In the the plain of Choutrana between GP10 and GP8 roads	Serious flooding problems resulting from construction of spontaneous settlements that obstruct the existing stormwater earth drains.	Flat lands deprived of drainage infrastructure and presence of water table at shallow depth.
6. Cité Mosrakbal-Municipality of Ariana between the GP8 and the RVE 533 road to Raoued	Significant flooding problem resulting from the construction of spontaneous housing that obstruct the natural flow of stormwater.	Flat land deprived of drainage infrastructure.
7. El-Boustenc-Municipality of Ariana-in the plain of Choutrana North of GP10 road	Serious permanent flooding problems resulting from construction of spontaneous settlements that obstruct the existin stormwater earth drains.	Flat land deprived of drainage infrastructure and presence of water table at shallow depth.

Source : District of Tunis

Tableau 4.3 Etendue des Localités Inondables dans le Grand Tunis (2/4)

LOCATION	ENCOUNTERED PROBLEM	OBSERVATIONS
8. El-Mansoura-Municipality of Ariana-plain of Choutrana East of GP8 road	Critical permanent flooding of spontaneous settlements due to the absence of drains and poor soil conditions.	Flat area deprived of drainage and sewerage infrastructure and high water table.
9. La Soukra-Municipality of Ariana. South of Sebkhel Ariana along the GP10 road	Serious permanent stagnation of water as a result of absence of drains and poor soil conditions.	Flat area deprived of drainage infrastructure and high water table.
10. Dar Fadhal- Municipality of Ariana- South of Sebkhel Ariana along the GP10	serious permanent flooding of water due to absence of drains and unsuitable soil conditions.	Problem area is deprived of drainage infrastructure and high water table.
11. Raoued-Municipality of Ariana-North and East of sebkhel Ariana	Area suffering from significant flooding problems during rain season due to the presence of canal ONAS to the north, the road to Gammarth on the East and poor soil conditions that hinder run off and discharge operations.	Relatively flat lands deprived of drainage facilities and having a high water table level.
<u>Governorate of Tunis</u>		
12. Al-kram and Khayreddinen-Municipality of La Goulette at the north-east corner of Tunis Lake	Serious flooding during the rain season due to housing constructions that obstruct run off flows.	The canal ONAS that is supposed to serve the area is obstructed and is not allowed to discharge in the North lake.
13. Faubourg of the Medina. La Fayette and Petite Sicile-Municipality of Tunis in the city center west of Tunis Lake	Area of temporary flooding during rainy season due to low lying flat lands in heavily constructed areas.	The existing drainage system is under sized and laid flat. ONAS is in the process to rehabilitate the existing system.
14. As-Saïda. Al Mallassine- Municipality of Bardo-North bank of Sebkhel Sejourmi	Area suffering from important flooding problem during raining events due to low lying lands that receive the run off flows of higher lands situated on the north side.	Flat basin area surrounded by higher lands and the Sebkhel Sejourmi-Absence of drainage protection facilities.

Source : District of Tunis

Tableau 4.3 Etendue des Localités Inondables dans le Grand Tunis (3/4)

LOCATION	ENCOUNTERED PROBLEM	OBSERVATIONS
<u>Governorate of Ben-Arous</u>		
15. Port de Rades-Municipality of Rades-East of Tunis Lake	Important temporary flooding problem due to presence of depression and poor soil conditions.	Flat low lying area deprived of drainage system and suffering from high water table problems.
16. Mouth of Oued Milyane- Municipality of Rades	Serious flooding problem during rainy season due to low lands near mouth of oued Milyane.	Area situated in basin of Oued Milyane with flat topography and presence of high water table.
17. Sidi Fathallah -Municipality of Boumhel- Area located between GP1 and MC 39 roads	Important Flooding area due to housing constructions that obstruct the natural drainage of area.	Flat lands suffering from insufficient drainage protection facilities.
18. Municipality of Boumhel - Area located between GP10 and MC 39 road.	Important Flooding area due to housing constructions that obstruct the natural drainage of the area.	Flat lands suffering from insufficient drainage protection facilities.
19. Bir-Alkusa'a. Municipality of Ben Arous between the Autoroute and GP1 road.	Area experiencing seasonal inundations due to the presence of constructions.	Flat land surrounded by higher grounds and deprived of proper drainage protection system.
20. Wadi Traboulsiya- Municipality of Hammam-Lif South of GP1 Road	Serious flooding problem due to the presence of spontaneous settlements that obstruct the natural drainage of stormwater.	Flat low lying area surrounded by higher lands and deprived of an adequate drainage protection system.
21. Zouiet Mornag and Mornag- Municipality of Mornag along MC 35 road	Important flooding problem during rainy season resulting from housing construction that obstruct the drainage operation.	Area with flat topography deprived of an adequate drainage protection system.
22. Sidi-Sand-Municipality of Mornag- along Oued Hama.	Serious flooding problem caused by overflows from Oued Hama and run off from surrounding areas.	Flat area surrounded by higher grounds deprived of an adequate drainage protection with existing system that needs maintenance.

Source : District of Tunis

Tableau 4.3 Etendue des Localités Inondables dans le Grand Tunis (4/4)

LOCATION	ENCOUNTERED PROBLEM	OBSERVATIONS
23. Al-khalidya-Municipality of Mornag- along MC 36 road	Important flooding problem during rainy season due to spontaneous housing that obstruct the natural drainage flow.	Area requiring an adequate drainage an adequate drainage protection system.
24. Fouchana center-Municipality of Fouchana on GP 3 road.	Serious flooding problem during rainy season due to spontaneous settlements that obstruct the natural drainage flow.	Low lying area requiring an adequate drainage system.
25. Hammam-Chatt Municipality of Hammam Chatt Nord of GP 1 road	Area suffering from serious flooding problems due to poor topographic and soil conditions.	Flat low area surrounded by Mount Bougornine to the south and the sea to the north and deprived of adequate drainage protection system and suffering from high water table.

Source : District of Tunis

Tableau 4.4 Allocation des Terrains pour l'Urbanisation dans le Grand Tunis

TASK N°	PROJECT DESCRIPTION	AREA/ EXPECTED YEAR OF COMPLETION
1	<u>YEARS 1993-1996</u>	
2	- Densification of present Urban areas - Restructuring of urban expansion areas in the North and West	
3	- Execution of the following urban projects :	
3.a	North of the Ariana	171 ha/ 1996
3.b	Zone west of GP8 road	140 ha/ 1996
3.c	Residence Annasr II & II a	250 ha/ after 1996
3.d	The North Tunis lake	482 ha/ 1993
3.e	Residence El-Mourouj IV	120 ha/ 1993
3.f	Residence El-Mourouj V	120 ha/ 1996
3.g	Borj Cedria	230 ha/ 1996
4	<u>YEARS 2001, 2006 & 2011</u>	
5	- Densification and restructuring operation of urban expansion areas - Development of the South Tunis lake.	495 ha/ 2001- 2011
6	- Development of urban expansion areas (UAE) in the South	
6.a	Fouchana and Mhandia UAE	1900 ha/ to be developed on the basis of supply and demand
6.b	Zahra and Hammam Lif UAE	540 ha/ 1996-2001
7	- Development of urban expansion areas (UEA) in the Ouest	
7.a	El-Manzah and Mnhila UAE	880 ha/ 1996-2001
7.b	West bank of Sobkhet Sejoumi UAE	1120 ha/ to be developed on the basis of supply and demand
8	- Development of urban expansion areas (UAE) in the North	
8.a	Community of Ariana North	904 ha/ 2001-2011
8.b	Zone of Raoud	700 ha/ 2001- 2011

Source : Municipal Urban Development Plans of Ariana, Tunis, El-Mourouj, Hammam-Chott, Fouchana, Mhandia and Sejoumi.

Tableau 4.5 Projets de Développement Concevables pour Sebkheth Ariana

TASK N°	PROJECT DESCRIPTION	OBSERVATIONS
1	DREDGING - Dredging operation of the bottom of the Sebkheth to increase its depth and therefore its capacity. - Dredged materials can be used for land reclamation along the banks and for the existing landfill site on the East bank of the Sebkheth.	The Average depth of water in the Sebkheth is around 70 cm which entails a moderate cost for dredging operation.
2	FISH BREEDING - Fish farming, shellfish and seaweed growing can be considered potential operations as a result of dredging works. However, these operations need to be justified through a feasibility study.	A study is to be carried out to determine the type of waters to be used (i.e. sweet or salty waters), the quality and the quantities of water needed, the existing and the planned infrastructures and the market demands.
3	LEISURE ACTIVITIES - Creation of recreational areas along the banks of the Sebkheth particularly during the summer season when the water surface is reduced.	The selection of the type of recreational activities will require site preparation and installation of basic infrastructure facilities.
4	SALT WORKS - Creation of salt works at Bair El-Azrag just west of the existing treatment plant coastal North.	This operation will require a feasibility study before its implementation.
5	LAND RECLAMATION - Reclamation of the entire Sebkheth for urban development.	This is a large scale and a long term operation that is to be justified by a feasibility study based on the orientations and the needs for future development.

Source : JICA Study Team (1993)

Tableau 4.6 Nature de l'Occupation de Terrains Actuelle dans le Grand Sousse

LAND USE CATEGORY	DELEGATIONS									
	SOUSSE* Area (Ha)	HAMMAM SOUSSE Area (Ha)	KALAA KBIRA Area (Ha)	MSAKEN Area (Ha)	KALAA SCHIRA Area (Ha)	AKOUDA Area (Ha)	AZ- ZOUHOUR Area (Ha)	ZAOUIAT SOUSSE Area (Ha)	KSIBA Area (Ha)	TOTAL Area (Ha)
URBAN AREAS	1,014	853	340	616	210	150	46	70	116	3,415
AGRICULTURAL AREAS	380	1,310	1,680	4,920	810	970	1,525	590	528	12,713
INDUSTRIAL AREAS	414	245	17	162	40	12	-	-	4	894
GREEN AREAS	148	150	110	200	32	50	5	5	49	749
SEBKHET/LAKE	80	-	-	-	-	-	-	-	-	80
TOTAL	2,036	2,558	2,147	5,898	1,092	1,182	1,576	665	697	17,851

Source : Urban Development Master Plan of Sousse and Monastir - March 1993

* Sousse + Sousse Rindh

Tableau 4.7 Etendue des Localités Inondables dans le Grand Sousse (1/3)

LOCATION	ENCOUNTERED PROBLEM	OBSERVATIONS
<u>Sousse</u>		
1. Oued Naouar south of the port of Sousse on Avenue Taieb Ghachem	Serious flooding area due to the depression of the site and the obstruction of existing outlet structure.	Rehabilitation works are required. The existing oued is to be replaced by a concrete canal.
2. La place Lubliana West of the Port of Sousse near the cemetery	Important flooding area during rainy season as a result of obstruction of storm flows.	Low-lying area deprived of drainage infrastructure.
3. West of the Medina at the intersection of Bejnoui road and Ave. Karoui	Temporary flooding area due to the presence of construction.	Low-lying area deprived of adequate drainage system.
4. Canal Sidi Bou Kacem between the GP12 and RVE 822 roads near Al-Aouina	Serious flooding problem resulting from overflows of canal.	Low-lying depressed area requiring flood protection works.
5. Oued Kharroub South of the GP1 road	Flooding of the upstream sections of the oued due to existing constructions obstructing the runoff flows and shallow river bed.	Rehabilitation of the bed of the Oued is needed to improve the carrying capacity.
<u>Hammam Sousse</u>		
6. North of khazna El-Gharbia along the GP1 road.	Serious flooding problem in rainy events due to the depressed site and presence of constructions	Low-lying area deprived of adequate drainage facilities
7. Area located between the GP1 and the touristic road	Frequent flooding problem resulting from runoff flows from the area west of GP1.	Low lying area receiving the storm flows from surrounding higher grounds and deprived of a drainage system.

Source : DHU documentation Service.

Tableau 4.7 Etendue des Localités Inondables dans le Grand Sousse (2/3)

LOCATION	ENCOUNTERED PROBLEM	OBSERVATIONS
<u>Hamnam Sousse</u>		
8. Area situated north of Oued Hamnam between the GPI and the touristic road	Frequent flooding problem resulting from runoff flows from the area west of the GPI.	Low lying area deprived of a proper drainage facilities.
9. Oued Hamnam west of the GPI	Serious flooding problem caused by existing construction and degraded river bed.	Rehabilitation works of the river bed are required.
<u>Zaouiet Sousse</u>		
10. Area located north of Zaouiet Sousse along the RVE 822 road	Important flooding problem during rainy season.	Low lying area deprived of proper drainage infrastructures.
<u>Akouda</u>		
11. Urban zone at intersection of Oued Kebir and MC 48 road	Important flooding problem during rainy events resulting from heavy deposits and flat river bed.	Relatively flat area requiring rehabilitation of drainage works.
12. Areas located along the MC 48 road	Temporary flooding problem caused by heavy runoff flows from higher grounds.	Area with mild slopes surrounded by heavily urbanized zones and deprived of proper drainage facilities.
<u>Kala'a Kbir</u>		
13. At confluence of Oued Mdharrej and oued Guemguem on MC48 road	Serious flooding during rainy season due to presence of constructions and very shallow river bed.	Area with relatively flat slope requiring rehabilitation works of the existing river bed and drainage structure.
14. At intersection Oued Sghir and the road of June 1 st	Serious flooding due to the presence of constructions in the river bed.	Very flat area where river bed is flush with adjacent roads existing drainage is inadequate.
15. Adjacent zones of Oued Kebir between railway bridge and entrance of Akouda	Important flooding due to the presence of a depressed zone in an agricultural area.	Relatively flat area that needs improvement works for the evacuation of storm flows.

Source : DHU documentation Service

Tableau 4.7 Etendue des Localités Inondables dans le Grand Sousse (3/3)

LOCATION	ENCOUNTRED PROBLEM	OBSERVATIONS
<u>Kala'a Sghira</u>		
16. Zone located between the rail road and Ave H. Bourguiba	Serious flooding due to runoff flows from adjacent higher grounds with water level attaining 60 cm.	Area depressed with flat roads and deprived of any proper drainage facilities.
<u>Msaken</u>		
17. South side of the town along the road in Ceinture	Temporarily flooded area due to the elevated road in Ceinture that obstructs runoff flows.	Area deprived of basic drainage infrastructure.
18. Area adjacent to the bridge on Oued Melah and the GPI road	important flooding problem due to existing constructions and narrow waterway under the existing bridge.	Area requiring improvement works of river bed to enhance drainage operation.
19. area between Oued Djebli and the GPI road on the North-West side of town	Serious flooding problem due to the construction of roads in the existing river bed.	Low area respect to adjacent grounds that required drainage facilities.

Source : DHU documentation Service.

Tableau 4.8 Distribution des Groupements d'Habitat Spontané dans le Grand Sousse

DELEGATION	HOUSING UNITS	LOCATION
- SOUSSE	400	Oued Kharroub/ Blibene, North-West of town between GPI and Avenue 20 Mars.
- Hammam Sousse	22	Oued Hammam East of the intersection with the GPI road.
- Akouda	40	Oued Laya (U/S of Oued Hammam) South of the Avenue de la République.
- Kala'a kebira	25	Oued Sghir South side of town
- Kala' Sghira	18	Oued Laya west of RVE 819 road on the North side of town
- Msaken	20	Oued Melah (u/s of Oued Hamdoun) on the South-East side of town.

Source : Rehabilitation program of the 4 Oued in Greater Sousse. Nov. 1991

Tableau 4.9 Nature de l'Occupation de Terrains Future dans le Grand Sousse

LAND USE CATEGORY	DELEGATIONS									
	SOUSSE* Area (Ha)	HAMMAM SOUSSE Area (Ha)	KALAA KBIRA Area (Ha)	MSAKEN Area (Ha)	KALAA SCHIRA Area (Ha)	AKOUDA Area (Ha)	AZ- ZOUHOUR Area (Ha)	ZAOUIAT SOUSSE Area (Ha)	KSIBA Area (Ha)	TOTAL Area (Ha)
URBAN AREAS	2595	1253	715	970	410	220	194	80	155	6592
AGRICULTURAL AREAS	380	1310	1950	5900	810	970	1525	590	528	13963
INDUSTRIAL AREAS	516	278	34	215	50	35	11	37	10	1186
GREEN AREAS	305	250	113	300	34	66	35	50	65	1218
TOTAL	3796	3091	2812	7385	1304	1291	1765	757	758	22959

Sources : 1) Urban Development Plans of the Communities of Greater Sousse
2) Urban Development Master Plans of Sousse and Monastir - March 1993

* Sousse + Sousse Riadh

Tableau 6.1 Résumé des Conditions Environnementales Existantes dans le Grand Tunis (1/3)

No.	River or Sebkhel	Important Reaches and/or Sub-basins	River or Sebkhel Characteristics	Economic Development in River Basin	Problem of Flooding and Causes	Environmental problems	River/Sebkhel Water Quality
1.	Oued Enkhiliet	Drainage area of areas west of Sebkhel Ariana	Length: 21 km Catchment Area: 17.12 km ²	General Development: Urban area upstream areas significant housing development is being made; downstream area has scattered spontaneous housing; tendency is towards increased urban development in the basin - both planned and unplanned; Housing area in the upstream areas is planned with several flood control measures such as dam, retention pond, and channel improvement	1. Eutrophication of river bed with dense vegetation growth 2. Crossings and culverts constructed by private means causing blockage or preventing flow. 3. Garbage dumped into river blocks flow. 4. Lack of drainage system in Chouirana area. 5. No embankment or pavement on road side; road some elevation as adjoining land. 6. The ONAS canal of treated waste water as well as topography of downstream area makes drainage of river into Sebkhel Ariana difficult.	1. Spread of spontaneous settlements in middle and lower reaches. 2. Illegal and poorly constructed crossings and culverts blocking river flow. 3. Garbage disposal in middle and downstream reaches into river. 4. Erosion of roads due to problem of water stagnation and flooding. 5. Discharge of domestic waste water by spontaneous settlements into river.	Mediocre due to some domestic wastewater discharge and garbage in river.
2.	Sebkhel Ariana & surrounding area	Protected agricultural zone west of Sebkhel Ariana	area: 33.73 km ²	General Development: Agricultural plain of Soukra (protected agricultural zone) west of Sebkhel Ariana; Some urban extension plans in areas north of the Sebkhel; significant tourism development is also taking place including many hotels and a golf course in areas near the sea and north east part of Sebkhel	Problem of flooding in north part of the Sebkhel due to topographical conditions	1. Rapid urbanization and loss of agricultural land. 2. Spread of spontaneous settlements especially in the Soukra area south and south east of Sebkhel Ariana. 3. Landfill site in south east corner of the Sebkhel is a source of pollution. 4. Some wintering birds - flamingoes seen;	Sebkhel is relatively unpolluted; it dries up completely in summer
3.	Oued Greb	Drains water of urban areas north west of Tunis lake	Length: 11 km Catchment Area: 18.87 km ²	Highly urbanised; planned settlements; planned urban settlements occurring in upstream areas with several flood control measures constructed.	Flooding problem controlled with adequate flood control measures;	1. Some garbage dumped into the river. 2. Eutrophication of river bed.	relatively clean and unpolluted

Tableau 6.1 Résumé des Conditions Environnementales Existantes dans le Grand Tunis (2/3)

4.	Oued Gariana and its tributaries	Drains water of urban areas north of Sebkheth Sijoumi	Length: 21 km catchment area: 86.52 km ²	General development: Highly urbanised	1. Garbage and waste water disposed into the river by spontaneous settlements. Many culverts and crossings are blocked.	1. Spread of spontaneous settlements. 2. Discharge of domestic wastewater directly into the river. Oued Gariana is a virtual sewer. 3. Garbage thrown into river. 4. Very poor riverine landscape.	River water quality extremely poor due to domestic waste water discharges and garbage disposal
5.	Sebkheth Sijoumi	Acts like a retaining basin north of waters of surrounding areas and Oued Gariana	Area: 25.84 km ² Avg. Depth:	General Development: urbanized in north and north east part; agricultural areas in western and southern areas of the Sebkheth. Sebkheth not used for any purpose; large part of it dries up in summer.	Flooding problem in spontaneous settlement areas in west part due to lack of drainage system	1. Existence of about 50 discharge points of waste water along the banks of the Sebkheth. The largest part of these is domestic waste water from the cities Essaitia and industrial El Manouba, Mellassine, Bir Aniba, Ezzouh waste water Sidi Hassine Sijoumi, Fouchana, Meghira, El Ouardia and part of El Mourouj; Oued Gariana and the tanneries of Manouba are major sources of pollution; over 500 m ³ /d of waste water flows into the Sebkheth. 2. Pollution problems caused by landfill at Henchir El Yahoudia located in south east part of lake. 3. Eutrophication of Sebkheth Sijoumi.	Sebkheth water quality mediocre due to domestic and industrial discharge
6.	Tunis North lake		area: 26 km ² Avg. Depth: 60 cm	General development: surrounding areas urbanised; the rehabilitation of the lake due to works carried out by ONAS has resulted in improvement in its quality; north-east part of the lake east of the airport is being developed for urban settlements; there already exists a shopping complex and road infrastructure land use planning with adequate green areas being done	some flooding problems in the Soukra area in spontaneous settlements in the north east part of the lake due to lack of drainage facilities.	1. The lake is protected by construction of a canal along the west bank of the lake against waste water discharges. 2. Existence of some spontaneous housing in the north east part of lake which lack adequate drainage and sanitation facilities.	Lake water quality good;

Tableau 6.1 Résumé des Conditions Environnementales Existantes dans le Grand Tunis (3/3)

7.	Tunis South Lake	area: 16 km ² avg. depth: 60 cm	Major Development: urbanised; existed of major navigation port and related dock facilities as well as the urban and industrial region of Ben Arous south of the lake.	1. Some flooding problems (temporary) in the Medina, Fayette and Petite Sicily municipalities of Tunis city west of the lake due to low lying flat lands in densely populated areas. 2. Temporary flooding problem in the Port of Rades municipality of Rades in eastern part of the lake due to the presence of depression and poor soil conditions.	Water Pollution and lake eutrophication. The south lake of Tunis is heavily polluted receiving 40,000 m ³ /d of waste water mostly industrial through drainage canals coming from the Ben Arous area. The polluting industries spread all over the Governorate of Ben Arous about 450 in number of which about 270 are in zones managed by the AFI. The waste water discharges have resulted in eutrophication of the South lake and a total disequilibrium of this water body.	Extremely poor and a health hazard
8.	Oued Malyan and its tributaries	length: 52 km catchment area: 1996 km ²	Major Development: Longest river of the study area; catchment basin mainly agricultural with some industrial development in downstream reaches in the governorate of Ben Arous. Water of Oued Malyan upstream of Bir Mithiga dam (primary purpose flood protection) is used to a limited extent for irrigation; problem of excessive salinity of Malyan limits its water use for irrigation.	1. Major flooding problem near mouth of river due to low lands in surrounding area. 2. Isolated problems in Zaouiet Mornag, Mornag municipality, and some parts of Ben Arous governorate due to spontaneous housing settlements obstructing the natural drainage of the area.	1. Increasing urbanisation and loss of agricultural lands. 2. Spread of spontaneous settlements in downstream areas in the governorate of Ben Arous. 3. Improper siting of industries; spread throughout the governorate of Ben Arous making pollution control costly and difficult. 4. Water erosion: floods resulting from high localised run-off over short periods have produced high levels of erosion (bank and bed erosion). 5. Water pollution by domestic and industrial waste discharges in downstream reaches. 6. salinity of Oued Malyan preventing its use even for irrigation 7. Garbage dumped into river when flowing in urban settlements area. 8. Eutrophication and growth of dense vegetation in river bed blocking flow.	salinity problems and discharge of domestic and industrial waste water in downstream areas tender classification of water as mediocre.
9.	Oued Magzeite, Boukhamza, Ain Zerga	length: 2 to 3 km catchment area: 4.2 to 6.98 km ²	Major development: upstream areas agricultural or forested; downstream areas urbanised; major coastal towns Ezrahira and hammam L'if.	1. Spontaneous settlements 2. Lack of drainage facilities. 3. Low lying coastal areas. 4. Lack of flood protection structures. 5. Eutrophication and dense vegetation growth blocking flow.	1. Presence of spontaneous settlements. 2. Lack of proper drainage and sanitation systems. 3. Eutrophication of rivers.	Poor due to domestic waste water discharges

Tableau 6.2 Résumé des Conditions Environnementales Existantes à Sousse (1/2)

No.	River or Sebkhel	Important Reaches and/or Sub-basins	River or Sebkhel Characteristics	Economic Development in River Basin	Problem of Flooding and Causes	Environmental problems	River/Sebkhel Water Quality
1.	Oued Hammam		Length: 15 km Catchment Area: 222 km ²	Olive and arboriculture with several urbanized areas. Major towns are Akouda, Kalaa Kebira, Hammam Sousse and Kalaa Seghira. Main industry is olive processing and leather goods production. 2. Lack of adequate or very poorly maintained drainage infrastructures in urban areas. 3. Significant Eutrophication of river bed with dense vegetation growth. Coastal area well developed for tourism. Limited coastal fishery.	1. Occupancy of river bed & drainage areas by the people due to rarity and weak manifestation of floods. 2. Lack of adequate or very poorly maintained drainage infrastructures in urban areas. 3. Ill effects of rapid tourism development. 4. Erosion problems: layer and claw erosion. 5. River Pollution by discharge of domestic waste water into rivers from major urban areas and spontaneous settlements. 6. Very significant eutrophication of river bed in many places blocking water flow and creating water stagnation. 7. Coastal area pollution in prime beach resort area by discharge of polluted rivers into the sea. 8. Poor landscaping (riverine) especially in coastal tourist zone. 9. Garbage disposal heaps in river basin and in river bed itself.	1. Rapid Urban Growth and the concurrence of city-countryside. 2. Spontaneous human settlements in potential hazard zones (river bed and drainage watershed). 3. Ill effects of rapid tourism development. 4. Erosion problems: layer and claw erosion. 5. River Pollution by discharge of domestic waste water into rivers from major urban areas and spontaneous settlements. 6. Very significant eutrophication of river bed in many places blocking water flow and creating water stagnation. 7. Coastal area pollution in prime beach resort area by discharge of polluted rivers into the sea. 8. Poor landscaping (riverine) especially in coastal tourist zone. 9. Garbage disposal heaps in river basin and in river bed itself.	River water quality very poor in downstream areas of all major towns.
2.	Oued Bilibane & tributaries	Collects drainage water of north part of Sousse city	Length: 3.5 km catchment area: 15.13 km ²	Highly urbanised; main industry is tourism in coastal zone.	1. Significant eutrophication of river beds with dense vegetation growth obstructing flow. 2. Poor maintenance of existing infrastructure. 3. garbage disposal in river bed blocking flow.	1. High population density - 500-1000 p/km ² 2. Spontaneous settlements near river bed. 3. Garbage disposal into river. 4. Domestic waste water discharge by spontaneous settlements into river. 5. Significant eutrophication of river bed. 6. Poor riverine landscape.	River quality poor in upstream reaches, but improves with natural purification in touristic coastal zone.

Tableau 6.2 Résumé des Conditions Environnementales Existantes à Sousse (2/2)

No.	River or Sebkheth	Important Reaches and/or Sub-basins	River or Sebkheth Characteristics	Economic Development in River Basin	Problem of Flooding and Causes	Environmental problems	River/Sebkheth Water Quality
3.	Oued Hamdoun and its tributaries	Southern part of Sousse city	Length: 2.5 km Catchment Area: 12.34 km ²	Highly urbanised. A sweet manufacturing unit is present.	1. Significant eutrophication. 2. Garbage disposal into river bed. 3. Poor maintenance of existing infrastructure.	1. High Population density: 500-1000 p/km ² 2. Spontaneous settlements. 3. garbage disposal in river. 4. Discharge of treated waste water of South Sousse treatment plant into river. 5. Some domestic waste water discharge as well as waste from confectionary unit into river. 6. Significant eutrophication. 7. Poor riverine landscape.	Poor to mediocre due to waste water discharge and garbage disposed into river.
4.	Oued Hamdoun and its tributaries	drains water of areas from M'saken to South Sousse	Length: 14 km catchment area: 312 km ²	Olive and other arboriculture with significant number of industries in all urban areas. Major towns include M'saken city and southern industrial areas of Sousse city. Major olive processing area with around 70 units in M'saken. Tanneries, textiles and some chemical industries also present.	1. Significant eutrophication of river bed with dense vegetation growth. 2. Poor river maintenance.	1. Water Pollution: This river is the most polluted in the region. It receives the untreated waste water of M'saken city as well as urban areas situated along the river for a distance of 1.5 km until it reaches the sea. Further, the discharge of margines of over 70 olive processing units of M'saken as well as waste water from tannery units and dyeing units are major sources of pollution. sea. 2. Rapid urban growth and concurrence of city country side. 3. Some spontaneous settlements in river drainage area. 4. Significant eutrophication of river bed with dense vegetation growth causing water stagnation in many places. 5. very poor riverine landscape. 6. garbage disposal heaps very near or in the river at many places. 7. Erosion problems: layer and clay erosion, croston by wear and tear; bank erosion.	River water quality extremely poor due to domestic and industrial waste discharges over a stretch of over 15 km upto the sea.

Tableau 6.3 Résultat des Analyses de la Qualité de l'eau au Grand Tunis

Sampling Point	Sampling Date	Weather	Ambient Temp.	D.O mg/l	Water Temp C	Turbidity NTU	pH	Conductivity ms/cm	s. solid mg/l	salinity g/l	BOD mg/l	COD mg/l
1(Enkhilel)	24/4/93 8.00 am	sunny	22	3.64	18.2	8	7.51	3.8	6.8	1.9	20	30
2 (Gariana)	24/4/93 9.30 am	sunny	24	6.08	21.6	54	8.13	3.1	32	1.5	17	71
3(Greb)	24/4/93 10.00 am	sunny	24	6.55	23.4	62	8.38	2.38	43.3	1.1	21	72
4(Maliyan)	24/4/93 10.35 am	sunny	25	2.55	23.5	67	7.54	4.34	84	2.2	28	104
5(Magzette)	no flow											
6(Bouhamsa)	no flow											
7(Ain Zerga)	no flow											
8(Maliyan) near Nasan	24/4/93 12.10 pm	sunny	27	4.6	22.4	58	7.46	4.51	12	2.3	12	32
9(Maliyan) near Mornag	24/4/93 11.50 am	sunny	27	6.68	26.6	60	8.4	4.39	110	2.2	65	187
10(Maliyan) near Al Khidya	24/4/93 12.35 pm	sunny	27	7.35	22.5	203	8.26	4.64	80	2.3	19	55

Tableau 6.4 Résultat des Analyses de la Qualité de l'eau à Sousse

Sampling Point	Sampling Date	Weather	Ambient Temp.	D.O mg/l	Water Temp C	Turbidity NTU	pH	Conductivity ms/cm	s. solid mg/l	salinity g/l	BOO mg/l	COO mg/l	Total coliform MPN/100 ml
1	21/4/93 10.00 am	sunny	22	6.76	19.7	10	7.49	7.97	8.8	4.4	29	67	11000
2	21/4/93 10.25 am	sunny	23	4.92	20.9	17	7.75	2.21	35.6	1	83	193	
3	21/4/93 10.45 am	sunny	23	3.91	22	> 999	8.42	2.54	725	1.2	155	1185	
4	21/4/93 11.10 am	sunny	24	6.52	23.6	26	7.35	1.6	990	0.7	350	1932	
5	21/4/93 9.30 am	sunny	20	8.45	19.6	10	8.03	7.55	40	4.2	25	61	1500
6	21/4/93 8.45 am	sunny	19	4.4	16.4	10	7.45	3.32	8.6	1.6	25	54	14000
7	21/4/93 8.00 am	sunny	19	7.13	14.4	14	7.76	6.54	12	3.4	62	138	2100
8	no flow												
9	21/4/93 12.05 pm	sunny	27	4.2	26.7	10	7.82	11.9	11.6	0.67	25	119	

Tableau 6.5 Evaluation Environnementale pour le Grand Tunis

[illegible]

Tableau 6.6 Evaluation Environnementale pour Sousse

Environmental Parameters	Guest Humint Baseline Evaluation Present Condition	Without Project	Guest Inhibne Baseline Evaluation Present Condition	Without Project	Guest Humint Baseline Evaluation Present Condition	Without Project	Guest Humint Baseline Evaluation Present Condition	Without Project
NATURAL ENVIRONMENT								
Ground Phenomena								
Earthquake	1		1		1		1	
Topography								
Slope Failure	1		1		1		1	
Blackwater inundation								
Coastal Erosion	3		3		3		3	
Stream Bed Erosion	1	-2	1		1		1	
Geology								
Soil Erosion	3	3	3		3		3	
Soil Contamination	1		1		1		1	
Hydropheric Phenomena								
Trans Basin Diversion	1		1		1		1	
Groundwater	1		1		1		1	
Flood Regime (Water Balance)	3	-3	3	1	3	-2	3	-2
Water Quality								
Eutrophication	3	3	3		3	3	3	3
Turbid/Polluted water	1		1		1		1	
Dissolved Oxygen	3	3	3		3	-2	3	-2
Saltwater Intrusion	1		1		1		1	
Sediment Deposit								
Deposit Composition	1		1		1		1	
Biosphere								
Terrestrial Flora	1		1		1		1	
Terrestrial Fauna	1		1		1		1	
Aquatic Flora and Fauna	1		1		1		1	
Ecosystem								
Atmosphere								
Air Pollution	1		1		1		1	
Local Climate								
Heat Balance	1		1		1		1	
Offensive Odor	1		1		1		1	
Noise and Vibration								
Offensive Noise & Vibration	1		1		1		1	
SOCIAL ENVIRONMENT								
Human Settlements								
Spontaneous Settlements	3	-3	3	1	3	-2	3	-2
Planned Settlements	3	-3	3	1	3	-2	3	-2
Living Condition								
Power and Water Supply	1		1		1		1	
Recreation								
Education	1		1		1		1	
Employment	1		1		1		1	
Industry								
Agriculture	3	-3	3	1	3		3	
Public Safety	1		1		1		1	
Industry	1		1		1		1	
Tourism								
Communication Systems	1		1		1		1	
Transportation								
Land Transportation	1		1		1		1	
River & Sea Transportation								
Utilization of Water	1		1		1		1	
Water and Fishing Right								
Spread of water borne diseases	3	-3	3	3	3	-2	3	-2
Landscape								
Valuable Landscape or Scenery	3	-3	3	3	3	-2	3	-2

Importance Rating	Criteria	Present Condition Rating	Criteria	Without Project impacts (positive or negative) Rating	Criteria
1 (not important)	not affected by flooding	1	worse quality than 20 years ago	" +/- 3	high significance
2 (important)	affected partly by flooding	2	almost same as 20 years ago	" +/- 2	medium significance
3 (very important)	affected significantly by flooding	3	better quality than 20 years ago	" +/- 1	low significance
x (not clear)	x	x	lack of data, further study necessary	x	impact not clear, further study necessary

Tableau 6.7 Examen Initial de l'Environnement dans le Grand Tunis (1/2)

Environmental Parameters	Oued Enkhil and Ariana Lake				Oued Greb and Tunis Lake				Oued Gariana and Sijoum Lake									
	Baseline Evaluation		With Project	ENK1	Baseline Evaluation		With Project	ENK4	Baseline Evaluation		With Project	GB3	Baseline Evaluation		With Project	GF2	GF3	GF4
	Present	Without Project	ENK2		ENK3	Present	Without Project		GB1	GB2	Present		Without Project	GF1				
	Condition	Project			Condition	Project			Condition	Project			Condition	Project				
NATURAL ENVIRONMENT																		
Ground Phenomena																		
Stream Bed Erosion	1	-1	1	1	1	-1	1	1	1	1		1						
Geology																		
Soil Erosion	1	-2	2	2	2	-2	2	2	1	-2	1	2	1	-2	1	1	1	1
Hydrospheric Phenomena																		
Groundwater	1	-1	1	1	1			1										
Flow Regime (water Balance)	1	-1	1	1	1			1										
Flood	1	-2	-1	-1	2	-2	2	2	1	-2	2	2	1	-2	1	2	2	2
Water Quality																		
Eutrophication	1	-2	2	2	2	-2	2	2	1	-2		2						
Turbid/Polluted water	1	-2	1	1	1	-2	1	1	1	-2		1		-2	1	1	1	1
Dissolved Oxygen	1	-2	1	1	1	-2	1	1	1	-2		1		-2	1	1	1	1
Saltwater Intrusion																		
Biosphere																		
Terrestrial Flora	x	0	0	x	x	0	0	x	x	0	0	0	x	0	0	0	x	x
Terrestrial Fauna	x	0	0	x	x	0	0	x	x	0	0	0	x	0	0	0	x	x
Aquatic Flora and Fauna	x	0	0	x	x	0	0	x	x	0	0	0	x	0	0	0	x	x
Ecosystem	x	0	0	x	x	0	0	x	x	0	0	0	x	0	0	0	x	x
SOCIAL ENVIRONMENT																		
Settlements																		
Spontaneous settlements	1	-2	-1	1	1			1	1				1	-2	0	0	1	1
Planned settlements	1	-1	-1	2	2	-1	3	2	3	-1	1	2	2	-2	1	2	2	2
Industry																		
Agriculture	1	-2	1	-1	-1													
Sanitary Condition																		
Spread of water borne diseases	3	-2	1	1	2	-1	3	2	3	-1	1	1	3	-2	1	2	2	2
Landscape																		
Valuable Landscape or Scena	2	-1	1	1	1	-1	1	1	1	-1	1	1	1	-2	1	1	1	1

Present condition rating		Impact rating (positive or negative)	
Rating	Criteria	Rating	Criteria
1	worse quality than 20 years ago	+/-3	high significance
2	almost same as 20 years ago	+/-2	medium significance
3	better quality than 20 years ago	+/-1	low significance
x	lack of data, further study necessary	x	impact not clear, further study necessary
		0	no significant impact

Tableau 6.7 Examen Initial de l'Environnement dans le Grand Tunis (2/2)

Environmental Parameters	Oued Malyan			With Project			Oued Ain Zerga			With Project		
	Baseline Evaluation	Present	Without Project	ML1	ML2	ML3	ML4	ML5	Present Condition	Without Project	AZ1	AZ2
NATURAL ENVIRONMENT												
Ground Phenomena												
Stream Bed Erosion		1	-2	1	1	2	3	3	1	-2	1	2
Geology												
Soil Erosion		1	-2	1	2	2	2	2	1	-2	1	2
Hydrospenic Phenomena												
Groundwater												
Flow Regime (Water Balance)		2	-1	1	2	2	2	2				
Flood		1	-2	1	2	2	3	3	1	-2	1	2
Water Quality												
Eutrophication		1	-2	1	2	2	2	2	1	-2	1	1
Turbid/Polluted water		1	-2	1	2	2	2	2	1	-2	1	1
Dissolved Oxygen		1	-2	1	2	2	2	2	1	-2	1	1
Saltwater Intrusion		1	-2	x	x	x	x	x				
SOCIAL ENVIRONMENT												
Human settlements												
Spontaneous settlements		1	-2	0	0	0	0	0	1	-2	0	0
Planned settlements		1	-2	1	1	2	2	2	1	-2	1	2
Industry												
Agriculture		2	-2	1	2	2	2	2				
Sanitary Condition												
Spread of water borne diseases		3	-2	1	2	2	2	2	3	-2	1	2
Landscape												
Valuable Landscape or Scenery		2	-1	1	1	1	1	1	2	-1	1	1

Present condition rating

Rating	Criteria
1	worse quality than 20 years ago
2	almost same as 20 years ago
3	better quality than 20 years ago
x	lack of data, further study necessary

Impact rating (positive or negative)

Rating	Criteria
"-/-3	High significance
"-/-2	medium significance
"-/-1	low significance
x	impact not clear, further study necessary
0	no significant impact

Tableau 6.8 Examen Initial de l'Environnement à Sousse

Environmental Parameters	Oued Hammam			With Project												Oued Hamdoun			With Project																										
	Baseline Evaluation			Without			HM1			HM2			HM3			HM4			HM5			HM6			HM7			Baseline Evaluation			Without			HD1			HD2			HD3			HD4		
	Present	Condition	Project	Present	Condition	Project	Present	Condition	Project	Present	Condition	Project	Present	Condition	Project	Present	Condition	Project	Present	Condition	Project	Present	Condition	Project	Present	Condition	Project	Present	Condition	Project	Present	Condition	Project	Present	Condition	Project	Present	Condition	Project						
NATURAL ENVIRONMENT																																													
Ground Phenomena																																													
Stream Bed Erosion																																													
Geology																																													
Soil Erosion																																													
Hydrospheric Phenomena																																													
Flood																																													
Water Quality																																													
Eutrophication																																													
Turbid/Polluted water																																													
Dissolved Oxygen																																													
SOCIAL ENVIRONMENT																																													
Human Settlements																																													
Spontaneous Settlements																																													
Planned Settlements																																													
Industry																																													
Agriculture																																													
Sanitary Condition																																													
Spread of Water Borne Diseases																																													
Landscape																																													
Valuable Landscape or Scenal																																													

Present Condition Rating			Impact rating (positive or negative)		
Rating	Criteria		Rating	Criteria	
1	worse quality than 20 years ago		*+/-3	high significance	
2	almost same as 20 years ago		*+/-2	medium significance	
3	better quality than 20 years ago		*+/-1	low significance	
x	lack of data, further study necessary		x	impact not clear, further study necessary	
			0	no significant impact	

Tableau 7.1 Inondations et durées (1/3)

Oued Ennkhilet

Return Period (yr)	Present Land Use Condition		Future Land Use Condition (2020)	
	Flood Area (ha)	Duration (hr)	Flood Area (ha)	Duration (hr)
1.05	26	1.5	32	2.5
2	64	4.0	78	7.0
5	108	6.5	132	11.5
10	157	10.0	191	17.0
25	210	13.5	256	22.5
50	267	16.5	324	28.5
100	326	20.5	396	35.0

Oued Greb

Return Period (yr)	Present Land Use Condition		Future Land Use Condition (2020)	
	Flood Area (ha)	Duration (hr)	Flood Area (ha)	Duration (hr)
1.05	6	4.0	21	6.0
2	12	5.0	30	8.0
5	22	6.5	59	10.5
10	34	8.0	82	12.5
25	69	10.5	114	17.0
50	90	13.0	139	21.0
100	112	16.5	159	22.0

Oued Gariana

Return Period (yr)	Present Land Use Condition		Future Land Use Condition (2020)	
	Flood Area (ha)	Duration (hr)	Flood Area (ha)	Duration (hr)
1.05	58	4.0	106	7.0
2	94	7.0	171	11.5
5	125	9.0	228	15.5
10	153	11.0	278	19.0
25	179	13.0	326	22.0
50	204	15.0	370	25.0
100	227	16.5	412	28.0

Oued Maliyan

Return Period (yr)	Present Land Use Condition		Future Land Use Condition (2020)	
	Flood Area (ha)	Duration (hr)	Flood Area (ha)	Duration (hr)
1.05	30	1.5	30	1.5
2	130	2.0	130	2.0
5	800	5.0	800	5.0
10	2,630	14.0	2,630	14.0
25	4,210	20.0	4,210	20.0
50	6,070	28.0	6,070	28.0
100	7,300	35.0	7,300	35.0

Tableau 7.1 Inondations et durées (2/3)

Oued Mayzette

Return Period (yr)	Present Land Use Condition		Future Land Use Condition (2020)	
	Flood Area (ha)	Duration (hr)	Flood Area (ha)	Duration (hr)
1.05	3	0.5	6	1.0
2	11	1.5	20	3.5
5	23	3.5	42	6.5
10	39	6.0	70	11.5
25	59	9.0	104	17.0
50	82	12.5	145	23.5
100	108	16.5	191	31.0

Oued Bou Khamza

Return Period (yr)	Present Land Use Condition		Future Land Use Condition (2020)	
	Flood Area (ha)	Duration (hr)	Flood Area (ha)	Duration (hr)
1.05	27	3.5	55	7.5
2	41	5.5	83	11.5
5	53	7.0	106	14.5
10	63	8.5	126	17.0
25	72	10.0	144	19.5
50	80	11.0	160	22.0
100	88	12.0	176	24.0

Oued Ain Zerga

Return Period (yr)	Present Land Use Condition		Future Land Use Condition (2020)	
	Flood Area (ha)	Duration (hr)	Flood Area (ha)	Duration (hr)
1.05	2	0.5	3	1.0
2	5	1.0	7	2.0
5	9	2.0	12	4.0
10	14	3.0	18	5.5
25	18	4.0	25	7.5
50	24	5.0	32	9.5
100	29	6.0	39	12.0

Oued Hammam

Return Period (yr)	Present Land Use Condition		Future Land Use Condition (2020)	
	Flood Area (ha)	Duration (hr)	Flood Area (ha)	Duration (hr)
1.05	20	3.5	23	4.5
2	50	8.5	59	11.0
5	86	15.0	102	18.5
10	127	22.0	150	27.5
25	171	30.0	203	37.5
50	219	38.0	260	48.0
100	270	47.0	320	59.0

Tableau 7.1 Inondations et durées (3/3)

Oued Blibene

Return Period (yr)	Present Land Use Condition		Future Land Use Condition (2020)	
	Flood Area (ha)	Duration (hr)	Flood Area (ha)	Duration (hr)
1.05	7	4.0	9	6.0
2	8	5.0	12	7.5
5	11	7.0	14	10.5
10	13	8.5	17	13.5
25	16	12.0	21	17.0
50	19	15.0	26	23.0
100	23	19.0	31	27.0

Oued Hallouf

Return Period (yr)	Present Land Use Condition		Future Land Use Condition (2020)	
	Flood Area (ha)	Duration (hr)	Flood Area (ha)	Duration (hr)
1.05	23	3.0	32	5.0
2	26	3.5	38	6.0
5	31	5.0	47	10.0
10	38	6.5	54	12.0
25	46	9.0	66	16.5
50	54	11.0	72	19.5
100	61	14.0	77	23.0

Oued Hamdoun

Return Period (yr)	Present Land Use Condition		Future Land Use Condition (2020)	
	Flood Area (ha)	Duration (hr)	Flood Area (ha)	Duration (hr)
1.05	138	10.0	144	11.0
2	151	12.5	159	15.0
5	172	17.0	181	19.0
10	192	21.5	206	25.0
25	222	29.5	237	35.0
50	244	37.0	261	41.5
100	277	48.0	293	52.0

Tableau 8.1 Prix Unitaires Pour Les Travaux de Construction

Work Items	Unit	Unit Cost (DT)
<u>1. River improvement</u>		
1) Excavation, common	m3	5.0
2) Excavation, levee	m3	6.0
3) Backfill	m3	4.0
4) Concrete, Type A (240kg/cm2)	m3	80.0
5) Concrete, Type B (150kg/cm2)	m3	65.0
6) Reinforcement bar	ton	1000.0
7) Asphalt pavement	m2	2.5
8) Steel sheet pile	m2	230.0
9) Bridge RC-T	m2	850.0
10) Demolishing of structures	L.S.	
<u>2. Construction of dam and retarding basin</u>		
1) Excavation, common	m3	5.0
2) Embankment	m3	7.0
3) Riprap	m3	20.0
4) Concrete, Type A (240kg/cm2)	m3	80.0
5) Concrete, Type B (150kg/cm2)	m3	65.0
6) Reinforcement bar	ton	1000.0
7) Sodding	m3	1.0
8) Curtain grout	ton	150.0
<u>3. Tunnel construction</u>		
1) Tunnel excavation	m3	80.0
2) lining concrete	m3	100.0
<u>4. Dredging/reclamation</u>		
1) Dredging and land reclamation	m3	5.0

Coût de la Construction de l'Oued Ennkhlilet

Tableau 8.2

First Stage (for 10 yr Flood)					
Work Items	Unit	Unit Price (DT)	Volume	Amount (DT)	
I Preparatory Works (8% of II & III)				656,000	
II River Improvement					
1. Excavation, common	m3	5	201,400	1,007,000	
2. Embankment, dike	m3	6	68,100	408,600	
3. Backfill	m3	4	48,900	195,600	
4. Structural concrete	m3	80	22,650	1,812,000	
5. Mass concrete	m3	65	0	0	
6. Reinforcement steel bar	ton	1000	2,545	2,545,000	
7. Asphalt pavement	m2	2.5	2,145	5,363	
8. Road bridge, RC-T	m2	850	918	780,300	
9. Railway bridge	m	5000	0	0	
10. Other crossing facilities	L.S.	-	-	78,000	
11. Demolish of existing structure	m3	30	4,740	142,200	
12. Miscellaneous works (15%)	L.S.	-	-	1,046,114	
Sub-Total of II				8,020,000	
III Dam & Retarding Basin					
1. Excavation, common	m3	5	5,150	25,750	
2. Embankment, dike	m3	7	9,800	68,600	
3. Riprap	m3	20	510	10,200	
4. Structural concrete	m3	80	340	27,200	
5. Mass concrete	m3	65	0	0	
6. Reinforcement steel bar	ton	1000	23	23,000	
7. Siding	m2	1	1,020	1,020	
8. Curtain Groat	m	150	0	0	
9. Miscellaneous works (15%)	L.S.	-	-	23,366	
Sub-Total of III				179,000	
Total of I to III				8,855,000	
IV Land Acquisition and Compensation					
1. Land acquisition	m2	15	95,600	1,434,000	
2. Compensation	m2	200	2,400	480,000	
Sub-Total of IV				1,914,000	
V Engineering Services (10% of I to III)				886,000	
VI Gov. Administration (5% of I to IV)				538,000	
VII Contingency (15% of I to VI)				1,829,000	
TOTAL				14,022,000	

Second Stage (for 100 yr Flood)					
Work Items	Unit	Unit Price (DT)	Volume	Amount (DT)	
I Preparatory Works (8% of II & III)				598,000	
II River Improvement					
1. Excavation, common	m3	5	143,200	716,000	
2. Embankment, dike	m3	6	60,200	361,800	
3. Backfill	m3	4	67,800	271,200	
4. Structural concrete	m3	80	27,950	2,236,000	
5. Mass concrete	m3	65	0	0	
6. Reinforcement steel bar	ton	1000	2,916	2,916,000	
7. Asphalt pavement	m2	2.5	0	0	
8. Road bridge, RC-T	m2	850	0	0	
9. Railway bridge	m	5000	0	0	
10. Other crossing facilities	L.S.	-	-	0	
11. Demolish of existing structure	m3	30	0	0	
12. Miscellaneous works (15%)	L.S.	-	-	975,150	
Sub-Total of II				7,476,000	
III Dam & Retarding Basin					
1. Excavation, common	m3	5	0	0	
2. Embankment, dike	m3	7	0	0	
3. Riprap	m3	20	0	0	
4. Structural concrete	m3	80	0	0	
5. Mass concrete	m3	65	0	0	
6. Reinforcement steel bar	ton	1000	0	0	
7. Siding	m2	1	0	0	
8. Curtain Groat	m	150	0	0	
9. Miscellaneous works (15%)	L.S.	-	-	0	
Sub-Total of III				0	
Total of I to III				8,074,000	
IV Land Acquisition and Compensation					
1. Land acquisition	m2	15	23,900	358,500	
2. Compensation	m2	200	0	0	
Sub-Total of IV				358,500	
V Engineering Services (10% of I to III)				807,000	
VI Gov. Administration (5% of I to IV)				422,000	
VII Contingency (15% of I to VI)				1,449,000	
TOTAL				11,111,000	

Total of First and Second Stages					
Work Items	Unit	Unit Price (DT)	Volume	Amount (DT)	
I Preparatory Works (8% of II & III)				1,254,000	
II River Improvement					
1. Excavation, common	m3	5	344,600	1,723,000	
2. Embankment, dike	m3	6	128,400	770,400	
3. Backfill	m3	4	116,700	466,800	
4. Structural concrete	m3	80	50,600	4,048,000	
5. Mass concrete	m3	65	0	0	
6. Reinforcement steel bar	ton	1000	5,461	5,461,000	
7. Asphalt pavement	m2	2.5	5,363	13,408	
8. Road bridge, RC-T	m2	850	918	780,300	
9. Railway bridge	m	5000	0	0	
10. Other crossing facilities	L.S.	-	-	78,000	
11. Demolish of existing structure	m3	30	4,740	142,200	
12. Miscellaneous works (15%)	L.S.	-	-	2,021,264	
Sub-Total of II				15,496,000	
III Dam & Retarding Basin					
1. Excavation, common	m3	5	5,150	25,750	
2. Embankment, dike	m3	7	9,800	68,600	
3. Riprap	m3	20	510	10,200	
4. Structural concrete	m3	80	340	27,200	
5. Mass concrete	m3	65	0	0	
6. Reinforcement steel bar	ton	1000	23	23,000	
7. Siding	m2	1	1,020	1,020	
8. Curtain Groat	m	150	0	0	
9. Miscellaneous works (15%)	L.S.	-	-	23,366	
Sub-Total of III				179,000	
Total of I to III				16,929,000	
IV Land Acquisition and Compensation					
1. Land acquisition	m2	15	119,500	1,792,500	
2. Compensation	m2	200	2,400	480,000	
Sub-Total of IV				2,273,000	
V Engineering Services (10% of I to III)				1,693,000	
VI Gov. Administration (5% of I to IV)				940,000	
VII Contingency (15% of I to VI)				3,278,000	
TOTAL				25,133,000	

Tableau 8.3 Coût de la Construction de l'Oued Greb

First Stage (for 10 yr Flood)					
Work Items	Unit	Unit Price (DT)	Volume	Amount (DT)	
I Preparatory Works (8% of II & III)				171,000	
II River Improvement				202,500	
1. Excavation, common	m3	5	40,500	202,500	
2. Embankment, dike	m3	6	10,000	60,000	
3. Backfill	m3	4	20,200	80,800	
4. Structural concrete	m3	80	6,480	518,400	
5. Mass concrete	m3	65	0	0	
6. Reinforcement steel bar	ton	1000	530	530,000	
7. Asphalt pavement	m2	2.5	200	500	
8. Road bridge, RC-T	m2	850	0	0	
9. Railway bridge	m	5000	0	0	
10. Other crossing facilities	L.S.	-	-	0	
11. Demolish of existing structure	m3	30	2,540	76,200	
12. Miscellaneous works (15%)	L.S.	-	-	220,260	
Sub-Total of II				1,689,000	
III Dam & Retarding Basin				304,000	
1. Excavation, common	m3	5	60,800	304,000	
2. Embankment, dike	m3	7	5,700	39,900	
3. Riprap	m3	20	510	10,200	
4. Structural concrete	m3	80	275	22,000	
5. Mass concrete	m3	65	0	0	
6. Reinforcement steel bar	ton	1000	18	18,000	
7. Soldering	m2	1	1,020	1,020	
8. Curtain Groat	t	150	0	0	
9. Miscellaneous works (15%)	L.S.	-	-	59,268	
Sub-Total of III				454,000	
Total of I to III				2,314,000	
IV Land Acquisition and Compensation				1,470,000	
1. Land acquisition	m2	70	21,000	1,470,000	
2. Compensation	m2	200	1,000	200,000	
Sub-Total of IV				1,670,000	
V Engineering Services (10% of I to III)				231,000	
VI Gov. Administration (5% of I to IV)				199,000	
VII Contingency (15% of I to VI)				662,000	
TOTAL				5,076,000	

Second Stage (for 100 yr Flood)					
Work Items	Unit	Unit Price (DT)	Volume	Amount (DT)	
I Preparatory Works (8% of II & III)				398,000	
II River Improvement				587,000	
1. Excavation, common	m3	5	117,400	587,000	
2. Embankment, dike	m3	6	0	0	
3. Backfill	m3	4	33,500	134,000	
4. Structural concrete	m3	80	22,230	1,778,400	
5. Mass concrete	m3	65	0	0	
6. Reinforcement steel bar	ton	1000	1,682	1,682,000	
7. Asphalt pavement	m2	2.5	400	1,000	
8. Road bridge, RC-T	m2	850	60	51,000	
9. Railway bridge	m	5000	0	0	
10. Other crossing facilities	L.S.	-	-	5,100	
11. Demolish of existing structure	m3	30	2,740	82,200	
12. Miscellaneous works (15%)	L.S.	-	-	648,105	
Sub-Total of II				4,969,000	
III Dam & Retarding Basin				0	
1. Excavation, common	m3	5	0	0	
2. Embankment, dike	m3	7	0	0	
3. Riprap	m3	20	0	0	
4. Structural concrete	m3	80	0	0	
5. Mass concrete	m3	65	0	0	
6. Reinforcement steel bar	ton	1000	0	0	
7. Soldering	m2	1	0	0	
8. Curtain Groat	t	150	0	0	
9. Miscellaneous works (15%)	L.S.	-	-	0	
Sub-Total of III				0	
Total of I to III				5,367,000	
IV Land Acquisition and Compensation				1,260,000	
1. Land acquisition	m2	70	18,000	1,260,000	
2. Compensation	m2	200	1,000	200,000	
Sub-Total of IV				1,460,000	
V Engineering Services (10% of I to III)				537,000	
VI Gov. Administration (5% of I to IV)				341,000	
VII Contingency (15% of I to VI)				1,156,000	
TOTAL				8,861,000	

Total of First and Second Stages					
Work Items	Unit	Unit Price (DT)	Volume	Amount (DT)	
I Preparatory Works (8% of II & III)				569,000	
II River Improvement				789,500	
1. Excavation, common	m3	5	157,900	789,500	
2. Embankment, dike	m3	6	10,000	60,000	
3. Backfill	m3	4	53,700	214,800	
4. Structural concrete	m3	80	28,710	2,296,800	
5. Mass concrete	m3	65	0	0	
6. Reinforcement steel bar	ton	1000	2,212	2,212,000	
7. Asphalt pavement	m2	2.5	600	1,500	
8. Road bridge, RC-T	m2	850	60	51,000	
9. Railway bridge	m	5000	0	0	
10. Other crossing facilities	L.S.	-	-	5,100	
11. Demolish of existing structure	m3	30	5,280	158,400	
12. Miscellaneous works (15%)	L.S.	-	-	868,365	
Sub-Total of II				6,657,000	
III Dam & Retarding Basin				304,000	
1. Excavation, common	m3	5	60,800	304,000	
2. Embankment, dike	m3	7	5,700	39,900	
3. Riprap	m3	20	510	10,200	
4. Structural concrete	m3	80	275	22,000	
5. Mass concrete	m3	65	0	0	
6. Reinforcement steel bar	ton	1000	18	18,000	
7. Soldering	m2	1	1,020	1,020	
8. Curtain Groat	t	150	0	0	
9. Miscellaneous works (15%)	L.S.	-	-	59,268	
Sub-Total of III				454,000	
Total of I to III				7,688,000	
IV Land Acquisition and Compensation				2,730,000	
1. Land acquisition	m2	70	99,000	2,730,000	
2. Compensation	m2	200	2,000	400,000	
Sub-Total of IV				3,130,000	
V Engineering Services (10% of I to III)				768,000	
VI Gov. Administration (5% of I to IV)				541,000	
VII Contingency (15% of I to VI)				1,818,000	
TOTAL				13,937,000	

Tableau 8.4 Coût de la Construction de l'Oued Gariana

First Stage (for 10 yr Flood)					
Work Items	Unit	Unit Price (DT)	Volume	Amount (DT)	
I Preparatory Works (8% of II & III)				2,923,000	
II River Improvement					
1. Excavation, common	m ³	5	423,000	2,115,000	
2. Embankment, dike	m ³	6	0	0	
3. Backfill	m ³	4	285,000	1,140,000	
4. Structural concrete	m ³	80	92,200	7,376,000	
5. Mass concrete	m ³	65	0	0	
6. Reinforcement steel bar	ton	1000	6,460	6,460,000	
7. Asphalt pavement	m ²	2.5	19,100	47,750	
8. Road bridge, R.C-T	m ²	850	9,540	8,109,000	
9. Railway bridge	m	5000	15	75,000	
10. Other crossing facilities	L.S.	-	-	810,900	
11. Demolish of existing structure	m ³	30	29,650	889,500	
12. Miscellaneous works (15%)	L.S.	-	-	4,053,473	
Sub-Total of II				31,077,000	
III Dam & Retarding Basin					
1. Excavation, common	m ³	5	607,500	3,037,500	
2. Embankment, dike	m ³	7	159,900	1,119,300	
3. Riprap	m ³	20	9,800	196,000	
4. Structural concrete	m ³	80	2,510	200,800	
5. Mass concrete	m ³	65	0	0	
6. Reinforcement steel bar	ton	1000	176	176,000	
7. Sodding	m ²	1	19,700	19,700	
8. Curtain Groat	t	150	0	0	
9. Miscellaneous works (15%)	L.S.	-	-	712,395	
Sub-Total of III				5,462,000	
Total of I to III				39,462,000	
IV Land Acquisition and Compensation					
1. Land acquisition	m ²	26.27	372,000	9,772,440	
2. Compensation	m ²	200	15,200	3,040,000	
Sub-Total of IV				12,812,000	
V Engineering Services (10% of I to III)				3,946,000	
VI Gov. Administration (5% of I to IV)				2,614,000	
VII Contingency (15% of I to VI)				8,833,000	
TOTAL				67,659,000	

Second Stage (for 100 yr Flood)					
Work Items	Unit	Unit Price (DT)	Volume	Amount (DT)	
I Preparatory Works (8% of II & III)				1,165,000	
II River Improvement					
1. Excavation, common	m ³	5	401,000	2,005,000	
2. Embankment, dike	m ³	6	0	0	
3. Backfill	m ³	4	3,200	14,000	
4. Structural concrete	m ³	80	70,800	5,664,000	
5. Mass concrete	m ³	65	0	0	
6. Reinforcement steel bar	ton	1000	4,960	4,960,000	
7. Asphalt pavement	m ²	2.5	0	0	
8. Road bridge, R.C-T	m ²	850	0	0	
9. Railway bridge	m	5000	0	0	
10. Other crossing facilities	L.S.	-	-	0	
11. Demolish of existing structure	m ³	30	750	22,500	
12. Miscellaneous works (15%)	L.S.	-	-	1,899,825	
Sub-Total of II				14,565,000	
III Dam & Retarding Basin					
1. Excavation, common	m ³	5	0	0	
2. Embankment, dike	m ³	7	0	0	
3. Riprap	m ³	20	0	0	
4. Structural concrete	m ³	80	0	0	
5. Mass concrete	m ³	65	0	0	
6. Reinforcement steel bar	ton	1000	0	0	
7. Sodding	m ²	1	0	0	
8. Curtain Groat	t	150	0	0	
9. Miscellaneous works (15%)	L.S.	-	-	0	
Sub-Total of III				0	
Total of I to III				15,730,000	
IV Land Acquisition and Compensation					
1. Land acquisition	m ²	50	148,000	7,400,000	
2. Compensation	m ²	200	14,800	2,960,000	
Sub-Total of IV				10,360,000	
V Engineering Services (10% of I to III)				1,573,000	
VI Gov. Administration (5% of I to IV)				1,304,000	
VII Contingency (15% of I to VI)				4,345,000	
TOTAL				33,312,000	

Total of First and Second Stages					
Work Items	Unit	Unit Price (DT)	Volume	Amount (DT)	
I Preparatory Works (8% of I & II)				4,088,000	
II River Improvement					
1. Excavation, common	m ³	5	824,000	4,120,000	
2. Embankment, dike	m ³	6	0	0	
3. Backfill	m ³	4	288,500	1,154,000	
4. Structural concrete	m ³	80	163,000	13,040,000	
5. Mass concrete	m ³	65	0	0	
6. Reinforcement steel bar	ton	1000	11,420	11,420,000	
7. Asphalt pavement	m ²	2.5	19,100	47,750	
8. Road bridge, R.C-T	m ²	850	9,540	8,109,000	
9. Railway bridge	m	5000	15	75,000	
10. Other crossing facilities	L.S.	-	-	810,900	
11. Demolish of existing structure	m ³	30	30,400	912,000	
12. Miscellaneous works (15%)	L.S.	-	-	5,953,298	
Sub-Total of II				45,642,000	
III Dam & Retarding Basin					
1. Excavation, common	m ³	5	607,500	3,037,500	
2. Embankment, dike	m ³	7	159,900	1,119,300	
3. Riprap	m ³	20	9,800	196,000	
4. Structural concrete	m ³	80	2,510	200,800	
5. Mass concrete	m ³	65	0	0	
6. Reinforcement steel bar	ton	1000	176	176,000	
7. Sodding	m ²	1	19,700	19,700	
8. Curtain Groat	t	150	0	0	
9. Miscellaneous works (15%)	L.S.	-	-	712,395	
Sub-Total of III				5,462,000	
Total of I to III				55,192,000	
IV Land Acquisition and Compensation					
1. Land acquisition	m ²	33.023	530,000	17,717,960	
2. Compensation	m ²	200	30,000	6,000,000	
Sub-Total of IV				23,717,960	
V Engineering Services (10% of I to III)				5,519,000	
VI Gov. Administration (5% of I to IV)				3,918,000	
VII Contingency (15% of I to VI)				13,170,000	
TOTAL				100,971,000	

Tableau 8.5 Coût de la Construction de l'Oued Maliyan

First Stage (for 10 yr Flood)				Second Stage (for 100 yr Flood)				Total of First and Second Stages			
Work Items				Work Items				Work Items			
Unit	Unit Price (DT)	Volume	Amount (DT)	Unit	Unit Price (DT)	Volume	Amount (DT)	Unit	Unit Price (DT)	Volume	Amount (DT)
I Preparatory Works (8% of II & III)				I Preparatory Works (8% of II & III)				I Preparatory Works (8% of II & III)			
II River Improvement				II River Improvement				II River Improvement			
1. Excavation, common	m3	5 927,000	4,635,000	1. Excavation, common	m3	5 390,600	1,953,000	1. Excavation, common	m3	5 1,317,600	6,588,000
2. Embankment, dike	m3	6 284,600	1,707,600	2. Embankment, dike	m3	6 272,400	1,634,400	2. Embankment, dike	m3	6 557,000	3,342,000
3. Backfill	m3	4 0	0	3. Backfill	m3	4 0	0	3. Backfill	m3	4 0	0
4. Structural concrete	m3	80 0	0	4. Structural concrete	m3	80 0	0	4. Structural concrete	m3	80 0	0
5. Mass concrete	m3	65 0	0	5. Mass concrete	m3	65 0	0	5. Mass concrete	m3	65 0	0
6. Reinforcement steel bar	ton	1,000 0	0	6. Reinforcement steel bar	ton	1,000 0	0	6. Reinforcement steel bar	ton	1,000 0	0
7. Asphalt pavement	m2	2.5 3,000	7,500	7. Asphalt pavement	m2	2.5 0	0	7. Asphalt pavement	m2	2.5 3,000	7,500
8. Road bridge, RC-T	m2	850 2,000	1,700,000	8. Road bridge, RC-T	m2	850 0	0	8. Road bridge, RC-T	m2	850 2,000	1,700,000
9. Railway bridge	m	5,000 0	0	9. Railway bridge	m	5,000 0	0	9. Railway bridge	m	5,000 0	0
10. Other crossing facilities	L.S.	-	170,000	10. Other crossing facilities	L.S.	-	0	10. Other crossing facilities	L.S.	-	170,000
11. Demolish of existing structure	m3	30 2,500	75,000	11. Demolish of existing structure	m3	30 0	0	11. Demolish of existing structure	m3	30 2,500	75,000
12. Miscellaneous works (15%)	L.S.	-	1,444,000	12. Miscellaneous works (15%)	L.S.	-	538,000	12. Miscellaneous works (15%)	L.S.	-	1,782,000
Sub-Total of II			9,540,000	Sub-Total of II			4,126,000	Sub-Total of II			13,665,000
III Hamma Dam (Allocated Cost) *			3,769,000	III Hamma Dam (Allocated Cost)			0	III Hamma Dam (Allocated Cost)			3,769,000
Total of I to III			14,374,000	Total of I to III			4,456,000	Total of I to III			18,829,000
IV Land Acquisition and Compensation				IV Land Acquisition and Compensation				IV Land Acquisition and Compensation			
1. Land acquisition	m2	1 920,000	920,000	1. Land acquisition	m2	1 162,000	162,000	1. Land acquisition	m2	1 1,082,000	1,082,000
2. Compensation	m2	200 1,780	356,000	2. Compensation	m2	200 0	0	2. Compensation	m2	200 1,780	356,000
Sub-Total of IV			1,276,000	Sub-Total of IV			162,000	Sub-Total of IV			1,438,000
V Engineering Services (10% of I to III)			1,437,000	V Engineering Services (10% of I to III)			446,000	V Engineering Services (10% of I to III)			1,883,000
VI Gov. Administration (5% of I to IV)			783,000	VI Gov. Administration (5% of I to IV)			231,000	VI Gov. Administration (5% of I to IV)			1,014,000
VII Contingency (15% of I to VI)			2,681,000	VII Contingency (15% of I to VI)			794,000	VII Contingency (15% of I to VI)			3,475,000
TOTAL			20,551,000	TOTAL			6,088,000	TOTAL			26,639,000

Note *: Construction cost and land acquisition cost of Hamma Dam was estimated in the report of "BARRAGE SUR L'OUED EL HAMMA : ETUDE D'AVANT - PROJET, MOA, April 1990".

The cost is up-dated taking trend of consumer prices of recent 5 years into consideration and is allocated to flood control purpose.

Tableau 8.6 Coût de la Construction de l'Oued Mayzette

First Stage (for 10 yr Flood)					Second Stage (for 100 yr Flood)					Total of First and Second Stages				
Work Items					Work Items					Work Items				
Unit	Unit Price (DT)	Volume	Amount (DT)		Unit	Unit Price (DT)	Volume	Amount (DT)		Unit	Unit Price (DT)	Volume	Amount (DT)	
I Preparatory Works (8% of II & III)					I Preparatory Works (8% of II & III)					I Preparatory Works (8% of II & III)				
II River Improvement					II River Improvement					II River Improvement				
1. Excavation, common	m3	5	80,000	400,000	1. Excavation, common	m3	5	70,500	352,500	1. Excavation, common	m3	5	150,500	752,500
2. Embankment, dike	m3	6	22,100	132,600	2. Embankment, dike	m3	6	5,500	33,000	2. Embankment, dike	m3	6	27,600	165,600
3. Backfill	m3	4	16,900	67,600	3. Backfill	m3	4	16,900	67,600	3. Backfill	m3	4	33,800	135,200
4. Structural concrete	m3	80	7,400	592,000	4. Structural concrete	m3	80	7,400	592,000	4. Structural concrete	m3	80	14,800	1,184,000
5. Mass concrete	m3	65	0	0	5. Mass concrete	m3	65	0	0	5. Mass concrete	m3	65	0	0
6. Reinforcement steel bar	ton	1,000	580	580,000	6. Reinforcement steel bar	ton	1,000	580	580,000	6. Reinforcement steel bar	ton	1,000	1,160	1,160,000
7. Asphalt pavement	m2	2.5	390	975	7. Asphalt pavement	m2	2.5	390	975	7. Asphalt pavement	m2	2.5	780	1,950
8. Road bridge, RC-T	m2	850	560	476,000	8. Road bridge, RC-T	m2	850	560	476,000	8. Road bridge, RC-T	m2	850	1,120	952,000
9. Railway bridge	m	5,000	0	0	9. Railway bridge	m	5,000	0	0	9. Railway bridge	m	5,000	0	0
10. Other crossing facilities	L.S.	-	-	48,000	10. Other crossing facilities	L.S.	-	-	48,000	10. Other crossing facilities	L.S.	-	-	96,000
11. Demolish of existing structure	m3	30	0	0	11. Demolish of existing structure	m3	30	0	0	11. Demolish of existing structure	m3	30	0	0
12. Miscellaneous works (15%)	L.S.	-	-	345,000	12. Miscellaneous works (15%)	L.S.	-	-	323,000	12. Miscellaneous works (15%)	L.S.	-	-	668,000
Sub-Total of II				2,642,000	Sub-Total of II				2,473,000	Sub-Total of II				5,115,000
III Dam & Retarding Basin					III Dam & Retarding Basin					III Dam & Retarding Basin				
1. Excavation, common	m3	5	0	0	1. Excavation, common	m3	5	0	0	1. Excavation, common	m3	5	0	0
2. Embankment, dike	m3	7	0	0	2. Embankment, dike	m3	7	0	0	2. Embankment, dike	m3	7	0	0
3. Riprap	m3	20	0	0	3. Riprap	m3	20	0	0	3. Riprap	m3	20	0	0
4. Structural concrete	m3	80	0	0	4. Structural concrete	m3	80	0	0	4. Structural concrete	m3	80	0	0
5. Mass concrete	m3	65	0	0	5. Mass concrete	m3	65	0	0	5. Mass concrete	m3	65	0	0
6. Reinforcement steel bar	ton	1,000	0	0	6. Reinforcement steel bar	ton	1,000	0	0	6. Reinforcement steel bar	ton	1,000	0	0
7. Sodding	m2	1	0	0	7. Sodding	m2	1	0	0	7. Sodding	m2	1	0	0
8. Curtain Grout	t	150	0	0	8. Curtain Grout	t	150	0	0	8. Curtain Grout	t	150	0	0
9. Miscellaneous works (15%)	L.S.	-	-	0	9. Miscellaneous works (15%)	L.S.	-	-	0	9. Miscellaneous works (15%)	L.S.	-	-	0
Sub-Total of III				0	Sub-Total of III				0	Sub-Total of III				0
Total of I to III				2,853,000	Total of I to III				2,671,000	Total of I to III				5,524,000
IV Land Acquisition and Compensation					IV Land Acquisition and Compensation					IV Land Acquisition and Compensation				
1. Land acquisition	m2	15	15,500	232,500	1. Land acquisition	m2	15	15,500	232,500	1. Land acquisition	m2	15	31,000	465,000
2. Compensation	m2	200	500	100,000	2. Compensation	m2	200	500	100,000	2. Compensation	m2	200	1,000	200,000
Sub-Total of IV				333,000	Sub-Total of IV				333,000	Sub-Total of IV				665,000
V Engineering Services (10% of I to III)					V Engineering Services (10% of I to III)					V Engineering Services (10% of I to III)				
VI Gov. Administration (5% of I to IV)					VI Gov. Administration (5% of I to IV)					VI Gov. Administration (5% of I to IV)				
VII Contingency (15% of I to VI)					VII Contingency (15% of I to VI)					VII Contingency (15% of I to VI)				
TOTAL				4,175,000	TOTAL				3,933,000	TOTAL				8,108,000

Coût de la Construction de l'Oued Bou Khamsa

Tableau 8.7

First Stage (for 10 yr Flood)					Second Stage (for 100 yr Flood)					Total of First and Second Stages				
Work Items					Work Items					Work Items				
Unit	Unit Price	Volume	Amount	(DT)	Unit	Unit Price	Volume	Amount	(DT)	Unit	Unit Price	Volume	Amount	(DT)
I Preparatory Works (8% of II & III)					I Preparatory Works (8% of II & III)					I Preparatory Works (8% of II & III)				
II River Improvement					II River Improvement					II River Improvement				
1. Excavation, common	m3	5	51,300	256,500	1. Excavation, common	m3	5	51,100	255,500	1. Excavation, common	m3	5	102,400	512,000
2. Embankment, dike	m3	6	0	0	2. Embankment, dike	m3	6	0	0	2. Embankment, dike	m3	6	0	0
3. Backfill	m3	4	20,700	82,800	3. Backfill	m3	4	20,400	81,600	3. Backfill	m3	4	41,100	164,400
4. Structural concrete	m3	80	8,400	672,000	4. Structural concrete	m3	80	8,400	672,000	4. Structural concrete	m3	80	16,800	1,344,000
5. Mass concrete	m3	65	0	0	5. Mass concrete	m3	65	0	0	5. Mass concrete	m3	65	0	0
6. Reinforcement steel bar	ton	1,000	900	900,000	6. Reinforcement steel bar	ton	1,000	900	900,000	6. Reinforcement steel bar	ton	1,000	1,800	1,800,000
7. Asphalt pavement	m2	2.5	7,700	19,250	7. Asphalt pavement	m2	2.5	7,700	19,250	7. Asphalt pavement	m2	2.5	15,400	38,500
8. Road bridge, RC-T	m2	850	140	119,000	8. Road bridge, RC-T	m2	850	0	0	8. Road bridge, RC-T	m2	850	140	119,000
9. Railway bridge	m	5,000	17	82,500	9. Railway bridge	m	5,000	0	0	9. Railway bridge	m	5,000	17	82,500
10. Other crossing facilities	L.S.	-	-	12,000	10. Other crossing facilities	L.S.	-	-	0	10. Other crossing facilities	L.S.	-	-	12,000
11. Demolish of existing structure	m3	30	280	8,400	11. Demolish of existing structure	m3	30	0	0	11. Demolish of existing structure	m3	30	280	8,400
12. Miscellaneous works (15%)	L.S.	-	-	323,000	12. Miscellaneous works (15%)	L.S.	-	-	290,000	12. Miscellaneous works (15%)	L.S.	-	-	612,000
Sub-Total of II				2,475,000	Sub-Total of II				2,218,000	Sub-Total of II				4,693,000
III Dam & Retarding Basin					III Dam & Retarding Basin					III Dam & Retarding Basin				
1. Excavation, common	m3	5	0	0	1. Excavation, common	m3	5	0	0	1. Excavation, common	m3	5	0	0
2. Embankment, dike	m3	7	0	0	2. Embankment, dike	m3	7	0	0	2. Embankment, dike	m3	7	0	0
3. Riprap	m3	20	0	0	3. Riprap	m3	20	0	0	3. Riprap	m3	20	0	0
4. Structural concrete	m3	80	0	0	4. Structural concrete	m3	80	0	0	4. Structural concrete	m3	80	0	0
5. Mass concrete	m3	65	0	0	5. Mass concrete	m3	65	0	0	5. Mass concrete	m3	65	0	0
6. Reinforcement steel bar	ton	1,000	0	0	6. Reinforcement steel bar	ton	1,000	0	0	6. Reinforcement steel bar	ton	1,000	0	0
7. Sodding	m2	1	0	0	7. Sodding	m2	1	0	0	7. Sodding	m2	1	0	0
8. Curtain Grout	t	150	0	0	8. Curtain Grout	t	150	0	0	8. Curtain Grout	t	150	0	0
9. Miscellaneous works (15%)	L.S.	-	-	0	9. Miscellaneous works (15%)	L.S.	-	-	0	9. Miscellaneous works (15%)	L.S.	-	-	0
Sub-Total of III				0	Sub-Total of III				0	Sub-Total of III				0
Total of I to III				2,673,000	Total of I to III				2,395,000	Total of I to III				5,068,000
IV Land Acquisition and Compensation					IV Land Acquisition and Compensation					IV Land Acquisition and Compensation				
1. Land acquisition	m2	15	6,400	96,000	1. Land acquisition	m2	15	6,400	96,000	1. Land acquisition	m2	15	12,800	192,000
2. Compensation	m2	200	1,000	200,000	2. Compensation	m2	200	1,000	200,000	2. Compensation	m2	200	2,000	400,000
Sub-Total of IV				296,000	Sub-Total of IV				296,000	Sub-Total of IV				592,000
V Engineering Services (10% of I to III)					V Engineering Services (10% of I to III)					V Engineering Services (10% of I to III)				
				267,000					240,000					507,000
VI Gov. Administration (5% of I to IV)					VI Gov. Administration (5% of I to IV)					VI Gov. Administration (5% of I to IV)				
				148,000					135,000					283,000
VII Contingency (15% of I to VI)					VII Contingency (15% of I to VI)					VII Contingency (15% of I to VI)				
				508,000					460,000					968,000
TOTAL				3,892,000	TOTAL				3,526,000	TOTAL				7,418,000

Tableau 8.8 Coût de la Construction de l'Oued Ain Zerga

First Stage (for 10 yr Flood)				Second Stage (for 100 yr Flood)				Total of First and Second Stages			
Work Items				Work Items				Work Items			
Unit	Unit Price (DT)	Volume	Amount (DT)	Unit	Unit Price (DT)	Volume	Amount (DT)	Unit	Unit Price (DT)	Volume	Amount (DT)
I Preparatory Works (8% of II & III)				I Preparatory Works (8% of II & III)				I Preparatory Works (8% of II & III)			
121,000				121,000				252,000			
II River Improvement				II River Improvement				II River Improvement			
1. Excavation, common				1. Excavation, common				1. Excavation, common			
m3	5	32,400	162,000	m3	5	32,400	162,000	m3	5	62,100	310,500
2. Embankment, dike				2. Embankment, dike				2. Embankment, dike			
m3	6	0	0	m3	6	0	0	m3	6	0	0
3. Backfill				3. Backfill				3. Backfill			
m3	4	14,600	58,400	m3	4	14,600	58,400	m3	4	23,800	95,200
4. Structural concrete				4. Structural concrete				4. Structural concrete			
m3	80	7,200	576,000	m3	80	7,200	576,000	m3	80	8,700	696,000
5. Mass concrete				5. Mass concrete				5. Mass concrete			
m3	65	0	0	m3	65	0	0	m3	65	0	0
6. Reinforcement steel bar				6. Reinforcement steel bar				6. Reinforcement steel bar			
ton	1,000	520	520,000	ton	1,000	520	520,000	ton	1,000	640	640,000
7. Asphalt pavement				7. Asphalt pavement				7. Asphalt pavement			
m2	2.5	0	0	m2	2.5	0	0	m2	2.5	1,100	2,750
8. Road bridge, RC-T				8. Road bridge, RC-T				8. Road bridge, RC-T			
m2	850	0	0	m2	850	0	0	m2	850	540	459,000
9. Railway bridge				9. Railway bridge				9. Railway bridge			
m	5,000	0	0	m	5,000	0	0	m	5,000	14	70,000
10. Other crossing facilities				10. Other crossing facilities				10. Other crossing facilities			
L.S.	-	-	0	L.S.	-	-	0	L.S.	-	-	46,000
11. Demolish of existing structure				11. Demolish of existing structure				11. Demolish of existing structure			
m3	30	0	0	m3	30	0	0	m3	30	50	1,500
12. Miscellaneous works (15%)				12. Miscellaneous works (15%)				12. Miscellaneous works (15%)			
L.S.	-	-	197,500	L.S.	-	-	197,500	L.S.	-	-	348,200
Sub-Total of II				Sub-Total of II				Sub-Total of II			
1,514,000				1,514,000				2,670,000			
III Dam & Retarding Basin				III Dam & Retarding Basin				III Dam & Retarding Basin			
1. Excavation, common				1. Excavation, common				1. Excavation, common			
m3	5	0	0	m3	5	0	0	m3	5	7,100	35,500
2. Embankment, dike				2. Embankment, dike				2. Embankment, dike			
m3	7	0	0	m3	7	0	0	m3	7	31,300	219,100
3. Riprap				3. Riprap				3. Riprap			
m3	20	0	0	m3	20	0	0	m3	20	1,100	22,000
4. Structural concrete				4. Structural concrete				4. Structural concrete			
m3	80	0	0	m3	80	0	0	m3	80	500	40,000
5. Mass concrete				5. Mass concrete				5. Mass concrete			
m3	65	0	0	m3	65	0	0	m3	65	0	0
6. Reinforcement steel bar				6. Reinforcement steel bar				6. Reinforcement steel bar			
ton	1,000	0	0	ton	1,000	0	0	ton	1,000	40	40,000
7. Sodding				7. Sodding				7. Sodding			
m2	1	0	0	m2	1	0	0	m2	1	2,100	2,100
8. Curtain Grout				8. Curtain Grout				8. Curtain Grout			
t	150	0	0	t	150	0	0	t	150	370	55,500
9. Miscellaneous works (15%)				9. Miscellaneous works (15%)				9. Miscellaneous works (15%)			
L.S.	-	-	0	L.S.	-	-	0	L.S.	-	-	62,200
Sub-Total of III				Sub-Total of III				Sub-Total of III			
477,000				477,000				477,000			
Total of I to III				Total of I to III				Total of I to III			
1,764,000				1,635,000				3,399,000			
IV Land Acquisition and Compensation				IV Land Acquisition and Compensation				IV Land Acquisition and Compensation			
1. Land acquisition				1. Land acquisition				1. Land acquisition			
m2	30	400	12,000	m2	30	400	12,000	m2	30	7,000	210,000
2. Compensation				2. Compensation				2. Compensation			
m2	200	0	0	m2	200	0	0	m2	200	0	0
Sub-Total of IV				Sub-Total of IV				Sub-Total of IV			
12,000				12,000				210,000			
V Engineering Services (10% of I to III)				V Engineering Services (10% of I to III)				V Engineering Services (10% of I to III)			
163,000				163,000				340,000			
VI Gov. Administration (5% of I to IV)				VI Gov. Administration (5% of I to IV)				VI Gov. Administration (5% of I to IV)			
82,000				82,000				181,000			
VII Contingency (15% of I to VI)				VII Contingency (15% of I to VI)				VII Contingency (15% of I to VI)			
284,000				284,000				620,000			
TOTAL				TOTAL				TOTAL			
2,574,000				2,176,000				4,750,000			

Tableau 8.9 Coût de la Construction de l'Oued Hammam

First Stage (for 10 yr Flood)				Second Stage (for 100 yr Flood)				Total of First and Second Stages			
Work Items				Work Items				Work Items			
Unit	Unit Price (DT)	Volume	Amount (DT)	Unit	Unit Price (DT)	Volume	Amount (DT)	Unit	Unit Price (DT)	Volume	Amount (DT)
I Preparatory Works (8% of II & III)				I Preparatory Works (8% of II & III)				I Preparatory Works (8% of II & III)			
II River Improvement				II River Improvement				II River Improvement			
1. Excavation, common	m3	5 218,500	1,092,500	1. Excavation, common	m3	5	0	1. Excavation, common	m3	5 218,500	1,092,500
2. Embankment, dike	m3	6 26,200	157,200	2. Embankment, dike	m3	6	54,000	2. Embankment, dike	m3	6 80,200	481,200
3. Backfill	m3	4	0	3. Backfill	m3	4	0	3. Backfill	m3	4	0
4. Structural concrete	m3	80	0	4. Structural concrete	m3	80	0	4. Structural concrete	m3	80	0
5. Mass concrete	m3	65	0	5. Mass concrete	m3	65	0	5. Mass concrete	m3	65	0
6. Reinforcement steel bar	ton	1,000	0	6. Reinforcement steel bar	ton	1,000	0	6. Reinforcement steel bar	ton	1,000	0
7. Asphalt pavement	m2	2.5 5,000	12,500	7. Asphalt pavement	m2	2.5	0	7. Asphalt pavement	m2	2.5 5,000	12,500
8. Road bridge, RC-T	m2	850 2,500	2,125,000	8. Road bridge, RC-T	m2	850	0	8. Road bridge, RC-T	m2	850 2,500	2,125,000
9. Railway bridge	m	5,000	0	9. Railway bridge	m	5,000	0	9. Railway bridge	m	5,000	0
10. Other crossing facilities	L.S.	-	213,000	10. Other crossing facilities	L.S.	-	0	10. Other crossing facilities	L.S.	-	213,000
11. Demolish. of existing structure	m3	30 500	15,000	11. Demolish. of existing structure	m3	30	0	11. Demolish. of existing structure	m3	30 500	15,000
12. Miscellaneous works (15%)	L.S.	-	542,300	12. Miscellaneous works (15%)	L.S.	-	48,600	12. Miscellaneous works (15%)	L.S.	-	590,900
Sub-Total of II			4,158,000	Sub-Total of II			373,000	Sub-Total of II			4,531,000
III Dam & Retarding Basin				III Dam & Retarding Basin				III Dam & Retarding Basin			
1. Excavation, common	m3	5	0	1. Excavation, common	m3	5	0	1. Excavation, common	m3	5	0
2. Embankment, dike	m3	7	0	2. Embankment, dike	m3	7	0	2. Embankment, dike	m3	7	0
3. Riprap	m3	20	0	3. Riprap	m3	20	0	3. Riprap	m3	20	0
4. Structural concrete	m3	30	0	4. Structural concrete	m3	80	0	4. Structural concrete	m3	80	0
5. Mass concrete	m3	65	0	5. Mass concrete	m3	65	0	5. Mass concrete	m3	65	0
6. Reinforcement steel bar	ton	1,000	0	6. Reinforcement steel bar	ton	1,000	0	6. Reinforcement steel bar	ton	1,000	0
7. Sodding	m2	1	0	7. Sodding	m2	1	0	7. Sodding	m2	1	0
8. Curtain Grout	t	150	0	8. Curtain Grout	t	150	0	8. Curtain Grout	t	150	0
9. Miscellaneous works (15%)	L.S.	-	0	9. Miscellaneous works (15%)	L.S.	-	0	9. Miscellaneous works (15%)	L.S.	-	0
Sub-Total of III			0	Sub-Total of III			0	Sub-Total of III			0
Total of I to III			4,491,000	Total of I to III			403,000	Total of I to III			4,894,000
IV Land Acquisition and Compensation				IV Land Acquisition and Compensation				IV Land Acquisition and Compensation			
1. Land acquisition	m2	15 19,700	295,500	1. Land acquisition	m2	15	11,900	1. Land acquisition	m2	15 31,800	474,000
2. Compensation	m2	200	0	2. Compensation	m2	200	0	2. Compensation	m2	200	0
Sub-Total of IV			295,500	Sub-Total of IV			178,000	Sub-Total of IV			474,000
V Engineering Services (10% of I to III)				V Engineering Services (10% of I to III)				V Engineering Services (10% of I to III)			
			450,000				40,000				490,000
VI Gov. Administration (5% of I to IV)				VI Gov. Administration (5% of I to IV)				VI Gov. Administration (5% of I to IV)			
			240,000				29,000				269,000
VII Contingency (15% of I to VI)				VII Contingency (15% of I to VI)				VII Contingency (15% of I to VI)			
			822,000				98,000				920,000
TOTAL			6,299,000	TOTAL			748,000	TOTAL			7,047,000

Tableau 8.10 Coût de la Construction de l'Oued Blibène

First Stage (for 10 yr Flood)				Second Stage (for 100 yr Flood)				Total of First and Second Stages			
Work Items		Unit	Amount (DT)	Work Items		Unit	Amount (DT)	Work Items		Unit	Amount (DT)
I Preparatory Works (8% of II & III)				I Preparatory Works (8% of II & III)				I Preparatory Works (8% of II & III)			
II River Improvement				II River Improvement				II River Improvement			
1. Excavation, common	m3	5	28,600	1. Excavation, common	m3	5	0	1. Excavation, common	m3	5	28,600
2. Embankment, dike	m3	6	300	2. Embankment, dike	m3	6	400	2. Embankment, dike	m3	6	700
3. Backfill	m3	4	0	3. Backfill	m3	4	0	3. Backfill	m3	4	0
4. Structural concrete	m3	80	2,800	4. Structural concrete	m3	80	200	4. Structural concrete	m3	80	3,000
5. Mass concrete	m3	65	0	5. Mass concrete	m3	65	0	5. Mass concrete	m3	65	0
6. Reinforcement steel bar	ton	1,000	200	6. Reinforcement steel bar	ton	1,000	20	6. Reinforcement steel bar	ton	1,000	220
7. Asphalt pavement	m2	2.5	4,400	7. Asphalt pavement	m2	2.5	0	7. Asphalt pavement	m2	2.5	4,400
8. Road bridge, RC-T	m2	850	2,190	8. Road bridge, RC-T	m2	850	0	8. Road bridge, RC-T	m2	850	2,190
9. Railway bridge	m	5,000	0	9. Railway bridge	m	5,000	0	9. Railway bridge	m	5,000	0
10. Other crossing facilities	L.S.	-	0	10. Other crossing facilities	L.S.	-	0	10. Other crossing facilities	L.S.	-	0
11. Demolish of existing structure	m3	30	200	11. Demolish of existing structure	m3	30	0	11. Demolish of existing structure	m3	30	200
12. Miscellaneous works (15%)	L.S.	-	395,200	12. Miscellaneous works (15%)	L.S.	-	5,800	12. Miscellaneous works (15%)	L.S.	-	401,000
Sub-Total of II			3,030,000	Sub-Total of II			44,000	Sub-Total of II			3,074,000
III Dam & Retarding Basin				III Dam & Retarding Basin				III Dam & Retarding Basin			
1. Excavation, common	m3	5	0	1. Excavation, common	m3	5	0	1. Excavation, common	m3	5	0
2. Embankment, dike	m3	7	0	2. Embankment, dike	m3	7	0	2. Embankment, dike	m3	7	0
3. Riprap	m3	20	0	3. Riprap	m3	20	0	3. Riprap	m3	20	0
4. Structural concrete	m3	80	0	4. Structural concrete	m3	80	0	4. Structural concrete	m3	80	0
5. Mass concrete	m3	65	0	5. Mass concrete	m3	65	0	5. Mass concrete	m3	65	0
6. Reinforcement steel bar	ton	1,000	0	6. Reinforcement steel bar	ton	1,000	0	6. Reinforcement steel bar	ton	1,000	0
7. Sodding	m2	1	0	7. Sodding	m2	1	0	7. Sodding	m2	1	0
8. Curtain Grout	t	150	0	8. Curtain Grout	t	150	0	8. Curtain Grout	t	150	0
9. Miscellaneous works (15%)	L.S.	-	0	9. Miscellaneous works (15%)	L.S.	-	0	9. Miscellaneous works (15%)	L.S.	-	0
Sub-Total of III			0	Sub-Total of III			0	Sub-Total of III			0
Total of I to III			3,273,000	Total of I to III			47,000	Total of I to III			3,320,000
IV Land Acquisition and Compensation				IV Land Acquisition and Compensation				IV Land Acquisition and Compensation			
1. Land acquisition	m2	40	1,800	1. Land acquisition	m2	40	200	1. Land acquisition	m2	40	2,000
2. Compensation	m2	200	200	2. Compensation	m2	200	0	2. Compensation	m2	200	200
Sub-Total of IV			112,000	Sub-Total of IV			8,000	Sub-Total of IV			120,000
V Engineering Services (10% of I to III)				V Engineering Services (10% of I to III)				V Engineering Services (10% of I to III)			
			323,000				4,000				332,000
VI Gov. Administration (5% of I to IV)				VI Gov. Administration (5% of I to IV)				VI Gov. Administration (5% of I to IV)			
			170,000				2,000				172,000
VII Contingency (15% of I to VI)				VII Contingency (15% of I to VI)				VII Contingency (15% of I to VI)			
			583,000				9,000				592,000
TOTAL			4,466,000	TOTAL			70,000	TOTAL			4,536,000

Tableau 8.11 Coût de la Construction de l'Oued Hallouf

First Stage (for 10 yr Flood)				Second Stage (for 100 yr Flood)				Total of First and Second Stages			
Work Items				Work Items				Work Items			
Unit	Unit Price (DT)	Volume	Amount (DT)	Unit	Unit Price (DT)	Volume	Amount (DT)	Unit	Unit Price (DT)	Volume	Amount (DT)
I Preparatory Works (8% of I & III)				I Preparatory Works (8% of I & III)				I Preparatory Works (8% of I & III)			
II River Improvement				II River Improvement				II River Improvement			
1. Excavation, common	m3	5	99,900	1. Excavation, common	m3	5	94,600	1. Excavation, common	m3	5	194,500
2. Embankment, dike	m3	6	0	2. Embankment, dike	m3	6	0	2. Embankment, dike	m3	6	0
3. Backfill	m3	4	57,900	3. Backfill	m3	4	20,600	3. Backfill	m3	4	78,500
4. Structural concrete	m3	80	6,300	4. Structural concrete	m3	80	6,700	4. Structural concrete	m3	80	13,000
5. Mass concrete	m3	65	0	5. Mass concrete	m3	65	0	5. Mass concrete	m3	65	0
6. Reinforcement steel bar	ton	1,000	610	6. Reinforcement steel bar	ton	1,000	660	6. Reinforcement steel bar	ton	1,000	1,270
7. Asphalt pavement	m2	2.5	13,000	7. Asphalt pavement	m2	2.5	4,000	7. Asphalt pavement	m2	2.5	17,000
8. Road bridge, RC-T	m2	2,700	2,295,000	8. Road bridge, RC-T	m2	850	0	8. Road bridge, RC-T	m2	850	2,295,000
9. Railway bridge	m	90	450,000	9. Railway bridge	m	5,000	0	9. Railway bridge	m	5,000	90
10. Other crossing facilities	L.S.	-	230,000	10. Other crossing facilities	L.S.	-	0	10. Other crossing facilities	L.S.	-	230,000
11. Demolish of existing structure	m3	30	13,200	11. Demolish of existing structure	m3	30	0	11. Demolish of existing structure	m3	30	13,200
12. Miscellaneous works (15%)	L.S.	-	730,000	12. Miscellaneous works (15%)	L.S.	-	264,000	12. Miscellaneous works (15%)	L.S.	-	994,000
Sub-Total of II			5,596,000	Sub-Total of II			2,025,000	Sub-Total of II			7,621,000
III Dam & Retarding Basin				III Dam & Retarding Basin				III Dam & Retarding Basin			
1. Excavation, common	m3	5	0	1. Excavation, common	m3	5	0	1. Excavation, common	m3	5	0
2. Embankment, dike	m3	7	0	2. Embankment, dike	m3	7	0	2. Embankment, dike	m3	7	0
3. Riprap	m3	20	0	3. Riprap	m3	20	0	3. Riprap	m3	20	0
4. Structural concrete	m3	80	0	4. Structural concrete	m3	80	0	4. Structural concrete	m3	80	0
5. Mass concrete	m3	65	0	5. Mass concrete	m3	65	0	5. Mass concrete	m3	65	0
6. Reinforcement steel bar	ton	1,000	0	6. Reinforcement steel bar	ton	1,000	0	6. Reinforcement steel bar	ton	1,000	0
7. Sodding	m2	1	0	7. Sodding	m2	1	0	7. Sodding	m2	1	0
8. Curtain Grout	t	150	0	8. Curtain Grout	t	150	0	8. Curtain Grout	t	150	0
9. Miscellaneous works (15%)	L.S.	-	0	9. Miscellaneous works (15%)	L.S.	-	0	9. Miscellaneous works (15%)	L.S.	-	0
Sub-Total of III			0	Sub-Total of III			0	Sub-Total of III			0
Total of I to III			6,044,000	Total of I to III			2,187,000	Total of I to III			8,231,000
IV Land Acquisition and Compensation				IV Land Acquisition and Compensation				IV Land Acquisition and Compensation			
1. Land acquisition	m2	40	30,900	1. Land acquisition	m2	40	14,300	1. Land acquisition	m2	40	45,200
2. Compensation	m2	200	1,000	2. Compensation	m2	200	1,000	2. Compensation	m2	200	400,000
Sub-Total of IV			1,436,000	Sub-Total of IV			772,000	Sub-Total of IV			2,208,000
V Engineering Services (10% of I to III)				V Engineering Services (10% of I to III)				V Engineering Services (10% of I to III)			
			604,000				219,000				823,000
VI Gov. Administration (5% of I to IV)				VI Gov. Administration (5% of I to IV)				VI Gov. Administration (5% of I to IV)			
			374,000				143,000				522,000
VII Contingency (15% of I to VI)				VII Contingency (15% of I to VI)				VII Contingency (15% of I to VI)			
			1,269,000				499,000				1,768,000
TOTAL			9,727,000	TOTAL			3,825,000	TOTAL			13,552,000

Tableau 8.12 Coût de la Construction de l'Oued Hamdoun

First Stage (for 10 yr Flood)				Second Stage (for 100 yr Flood)				Total of First and Second Stages			
Work Items				Work Items				Work Items			
Unit	Unit Price	Volume	Amount (DT)	Unit	Unit Price	Volume	Amount (DT)	Unit	Unit Price	Volume	Amount (DT)
I Preparatory Works (8% of I & III)				I Preparatory Works (8% of II & III)				I Preparatory Works (8% of I & III)			
II River Improvement				II River Improvement				II River Improvement			
m3	5	361,200	1,806,000	m3	5	459,100	2,295,500	m3	5	820,300	4,101,500
m3	6	0	0	m3	6	0	0	m3	6	0	0
m3	4	0	0	m3	4	0	0	m3	4	0	0
m3	80	0	0	m3	80	0	0	m3	80	0	0
m3	65	0	0	m3	65	0	0	m3	65	0	0
ton	1,000	0	0	ton	1,000	0	0	ton	1,000	0	0
m2	2.5	3,800	9,500	m2	2.5	0	0	m2	2.5	3,800	9,500
m2	850	1,880	1,598,000	m2	850	0	0	m2	850	1,880	1,598,000
m	5,000	0	0	m	5,000	0	0	m	5,000	0	0
L.S.	-	0	160,000	L.S.	-	0	0	L.S.	-	0	160,000
m3	30	120	3,600	m3	30	0	0	m3	30	120	3,600
L.S.	-	0	536,600	L.S.	-	0	344,300	L.S.	-	0	880,900
Sub-Total of II				Sub-Total of II				Sub-Total of II			
4,114,000				2,640,000				6,754,000			
III Dam & Retarding Basin				III Dam & Retarding Basin				III Dam & Retarding Basin			
m3	5	0	0	m3	5	0	0	m3	5	0	0
m3	7	0	0	m3	7	0	0	m3	7	0	0
m3	20	0	0	m3	20	0	0	m3	20	0	0
m3	80	0	0	m3	80	0	0	m3	80	0	0
m3	65	0	0	m3	65	0	0	m3	65	0	0
ton	1,000	0	0	ton	1,000	0	0	ton	1,000	0	0
m2	1	0	0	m2	1	0	0	m2	1	0	0
L.S.	150	0	0	L.S.	150	0	0	L.S.	150	0	0
Sub-Total of III				Sub-Total of III				Sub-Total of III			
0				0				0			
Total of I to III				Total of I to III				Total of I to III			
4,444,000				2,851,000				7,295,000			
IV Land Acquisition and Compensation				IV Land Acquisition and Compensation				IV Land Acquisition and Compensation			
m2	30	0	0	m2	30	0	0	m2	30	0	0
m2	200	0	0	m2	200	0	0	m2	200	0	0
Sub-Total of IV				Sub-Total of IV				Sub-Total of IV			
0				0				0			
V Engineering Services (10% of I to III)				V Engineering Services (10% of I to III)				V Engineering Services (10% of I to III)			
445,000				285,000				730,000			
VI Gov. Administration (5% of I to IV)				VI Gov. Administration (5% of I to IV)				VI Gov. Administration (5% of I to IV)			
223,000				142,000				365,000			
VII Contingency (15% of I to VI)				VII Contingency (15% of I to VI)				VII Contingency (15% of I to VI)			
767,000				492,000				1,259,000			
TOTAL				TOTAL				TOTAL			
5,879,000				3,770,000				9,649,000			

Tableau 9.1 Distribution des Coûts / Bénéfices pour Oued Ennkhielt

ERR = 12%

(Unit : 1,000 DT)

No.	Year	River	Drain	Cost River+Drain	O&M	Total	Benefit	Net Benefit
1	1995	2,167	209	2,376	0	2,376	0	-2,376
2	1996	2,167	209	2,376	12	2,388	390	-1,997
3	1997	2,167	209	2,376	24	2,399	781	-1,619
4	1998	2,167	209	2,376	36	2,411	1,171	-1,240
5	1999	2,167	209	2,376	48	2,423	1,562	-862
6	2000	2,167	209	2,376	59	2,435	1,952	-483
7	2001	2,167	209	2,376	71	2,447	2,031	-416
8	2002	2,167	209	2,376	83	2,459	2,110	-349
9	2003	2,167	209	2,376	95	2,471	2,189	-282
10	2004	2,167	209	2,376	107	2,483	2,268	-215
11	2005	1,513	209	1,722	119	1,841	2,347	506
12	2006		209	209	127	336	2,426	2,090
13	2007		209	209	128	337	2,505	2,168
14	2008		209	209	129	338	2,584	2,246
15	2009		209	209	131	339	2,663	2,324
16	2010		209	209	132	340	2,742	2,402
17	2011		209	209	133	341	2,821	2,480
18	2012		209	209	134	342	2,900	2,558
19	2013		209	209	135	343	2,979	2,635
20	2014		209	209	136	344	3,058	2,713
21	2015		209	209	137	345	3,137	2,791
22	2016		209	209	138	346	3,216	2,869
23	2017		209	209	139	347	3,295	2,947
24	2018		209	209	140	348	3,374	3,025
25	2019		209	209	141	349	3,453	3,103
26	2020		209	209	142	351	3,532	3,181
27	2021				143	361	3,611	3,468
28	2022				143	361	3,611	3,468
29	2023				143	361	3,611	3,468
30	2024				143	361	3,611	3,468
31	2025				143	361	3,611	3,468
32	2026				143	361	3,611	3,468
33	2027				143	361	3,611	3,468
34	2028				143	361	3,611	3,468
35	2029				143	361	3,611	3,468
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50	2044				143	361	3,611	3,468

Tableau 9.2 Distribution des Coûts / Bénéfices pour Oued Greb

ERR = 8%

(Unit : 1,000 DT)

No.	Year	River	Drain	Cost River+Drain	O&M	Total	Benefit	Net Benefit
1	1995	802	351	1,152	0	1,152	0	-1,152
2	1996	802	351	1,152	6	1,158	149	-1,009
3	1997	802	351	1,152	12	1,164	298	-866
4	1998	802	351	1,152	17	1,170	447	-723
5	1999	802	351	1,152	23	1,175	596	-579
6	2000	802	351	1,152	29	1,181	745	-436
7	2001	802	351	1,152	35	1,187	806	-381
8	2002	802	351	1,152	40	1,193	866	-326
9	2003	802	351	1,152	46	1,198	927	-271
10	2004	802	351	1,152	52	1,204	988	-216
11	2005	802	351	1,152	58	1,210	1,049	-161
12	2006	802	351	1,152	63	1,216	1,109	-106
13	2007	802	351	1,152	69	1,222	1,170	-51
14	2008	802	351	1,152	75	1,227	1,231	4
15	2009	802	351	1,152	81	1,233	1,292	58
16	2010	802	351	1,152	86	1,239	1,352	113
17	2011	226	351	577	92	669	1,413	744
18	2012		351	351	95	446	1,474	1,028
19	2013		351	351	97	448	1,534	1,087
20	2014		351	351	99	449	1,595	1,146
21	2015		351	351	100	451	1,656	1,205
22	2016		351	351	102	453	1,717	1,264
23	2017		351	351	104	455	1,777	1,323
24	2018		351	351	106	456	1,838	1,382
25	2019		351	351	107	458	1,899	1,441
26	2020		351	351	109	460	1,960	1,500
27	2021				111	111	2,020	1,909
28	2022				111	111	2,020	1,909
29	2023				111	111	2,020	1,909
30	2024				111	111	2,020	1,909
31	2025				111	111	2,020	1,909
32	2026				111	111	2,020	1,909
33	2027				111	111	2,020	1,909
34	2028				111	111	2,020	1,909
35	2029				111	111	2,020	1,909
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50	2044				111	111	2,020	1,909

Tableau 9.3 Distribution des Coûts / Bénéfices pour Oued Gariana

EIRR = 4% (Unit : 1.000 DT)									
No.	Year	Cost			Benefit			Net	
		River	Drain	River+Drain	O&M	Total	Benefit	Benefit	
1	1995	10,520	1,433	11,953	0	11,953	0	-11,953	
2	1996	10,520	1,433	11,953	60	12,013	956	-11,057	
3	1997	10,520	1,433	11,953	120	12,073	1,912	-10,161	
4	1998	10,520	1,433	11,953	179	12,132	2,867	-9,265	
5	1999	10,520	1,433	11,953	239	12,192	3,823	-8,369	
6	2000	10,520	1,433	11,953	299	12,252	4,779	-7,473	
7	2001	10,520	1,433	11,953	359	12,312	5,735	-6,577	
8	2002	10,520	1,433	11,953	418	12,372	6,691	-5,681	
9	2003	10,465	1,433	11,898	478	12,376	7,647	-4,729	
10	2004		1,433	1,433	538	1,971	8,603	-3,845	
11	2005		1,433	1,433	598	2,031	9,559	-2,921	
12	2006		1,433	1,433	658	2,091	10,515	-1,977	
13	2007		1,433	1,433	718	2,151	11,471	-1,021	
14	2008		1,433	1,433	778	2,211	12,427	-1,021	
15	2009		1,433	1,433	838	2,271	13,383	-1,021	
16	2010		1,433	1,433	898	2,331	14,339	-1,021	
17	2011		1,433	1,433	958	2,391	15,295	-1,021	
18	2012		1,433	1,433	1,018	2,451	16,251	-1,021	
19	2013		1,433	1,433	1,078	2,511	17,207	-1,021	
20	2014		1,433	1,433	1,138	2,571	18,163	-1,021	
21	2015		1,433	1,433	1,198	2,631	19,119	-1,021	
22	2016		1,433	1,433	1,258	2,691	20,075	-1,021	
23	2017		1,433	1,433	1,318	2,751	21,031	-1,021	
24	2018		1,433	1,433	1,378	2,811	21,987	-1,021	
25	2019		1,433	1,433	1,438	2,871	22,943	-1,021	
26	2020		1,433	1,433	1,498	2,931	23,899	-1,021	
27	2021				1,558	3,000	24,855	-1,021	
28	2022				1,618	3,060	25,811	-1,021	
29	2023				1,678	3,120	26,767	-1,021	
30	2024				1,738	3,180	27,723	-1,021	
31	2025				1,798	3,240	28,679	-1,021	
32	2026				1,858	3,300	29,635	-1,021	
33	2027				1,918	3,360	30,591	-1,021	
34	2028				1,978	3,420	31,547	-1,021	
35	2029				2,038	3,480	32,503	-1,021	
50	2044				659	659	6542	5,883	

Tableau 9.4 Distribution des Coûts / Bénéfices pour Oued Maliyan

EIRR = 12% (Unit : 1.000 DT)									
No.	Year	Cost			Benefit			Net	
		River	Drain	River+Drain	O&M	Total	Benefit	Benefit	
1	1995	3,150	588	3,738	0	3,738	0	-3,738	
2	1996	3,150	588	3,738	19	3,757	389	-3,368	
3	1997	3,150	588	3,738	37	3,776	778	-2,998	
4	1998	3,150	588	3,738	56	3,794	1,167	-2,627	
5	1999	3,150	588	3,738	75	3,813	1,556	-2,257	
6	2000	3,150	588	3,738	93	3,832	1,945	-1,887	
7	2001	3,150	588	3,738	112	3,850	2,334	-1,526	
8	2002	2,426	588	3,015	131	3,146	2,504	-642	
9	2003		588	588	146	734	2,784	2,049	
10	2004		588	588	149	737	3,063	2,326	
11	2005		588	588	152	740	3,343	2,602	
12	2006		588	588	155	743	3,622	2,879	
13	2007		588	588	158	746	3,902	3,156	
14	2008		588	588	161	749	4,181	3,432	
15	2009		588	588	164	752	4,461	3,709	
16	2010		588	588	167	755	4,740	3,985	
17	2011		588	588	169	758	5,020	4,262	
18	2012		588	588	172	761	5,299	4,539	
19	2013		588	588	175	764	5,579	4,815	
20	2014		588	588	178	767	5,859	5,092	
21	2015		588	588	181	770	6,138	5,368	
22	2016		588	588	184	773	6,418	5,645	
23	2017		588	588	187	776	6,697	5,922	
24	2018		588	588	190	779	6,977	6,198	
25	2019		588	588	193	781	7,256	6,475	
26	2020		588	588	196	784	7,536	6,751	
27	2021				199	787	7,815	7,028	
28	2022				199	790	8,094	7,304	
29	2023				199	793	8,370	7,580	
30	2024				199	796	8,646	7,856	
31	2025				199	799	8,922	8,132	
32	2026				199	802	9,198	8,408	
33	2027				199	805	9,474	8,684	
34	2028				199	808	9,750	8,960	
35	2029				199	811	10,026	9,236	
50	2044				199	815	7,815	7,616	

Tableau 9.5 Distribution des Coûts / Bénéfices pour Oued Mayrette

EIRR = 10%		(Unit : 1,000 DT)				
No.	Year	River	Drain	River+Drain	O&M	Net Benefit
1	1995	641	83	724	0	724
2	1996	641	83	724	4	728
3	1997	641	83	724	7	732
4	1998	641	83	724	11	735
5	1999	641	83	724	14	739
6	2000	641	83	724	18	742
7	2001	641	83	724	22	746
8	2002	641	83	724	25	750
9	2003	641	83	724	29	753
10	2004	641	83	724	33	757
11	2005	641	83	724	36	760
12	2006	421	83	504	40	544
13	2007		83	83	42	125
14	2008		83	83	43	126
15	2009		83	83	43	126
16	2010		83	83	44	127
17	2011		83	83	44	127
18	2012		83	83	44	128
19	2013		83	83	45	128
20	2014		83	83	45	128
21	2015		83	83	46	129
22	2016		83	83	46	129
23	2017		83	83	47	130
24	2018		83	83	47	130
25	2019		83	83	47	130
26	2020		83	83	48	131
27	2021				48	1248
28	2022				48	1248
29	2023				48	1248
30	2024				48	1248
31	2025				48	1248
32	2026				48	1248
33	2027				48	1248
34	2028				48	1248
35	2029				48	1248
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50	2044				48	1248

Tableau 9.6 Distribution des Coûts / Bénéfices pour Oued Bou Khamsa

EIRR = 7%		(Unit : 1,000 DT)				
No.	Year	River	Drain	River+Drain	O&M	Net Benefit
1	1995	598	95	693	0	693
2	1996	598	95	693	3	696
3	1997	598	95	693	7	700
4	1998	598	95	693	10	703
5	1999	598	95	693	14	707
6	2000	598	95	693	17	710
7	2001	598	95	693	21	714
8	2002	598	95	693	24	717
9	2003	598	95	693	28	721
10	2004	598	95	693	31	724
11	2005	598	95	693	35	728
12	2006	263	95	358	38	396
13	2007		95	95	40	135
14	2008		95	95	40	136
15	2009		95	95	41	136
16	2010		95	95	41	137
17	2011		95	95	42	137
18	2012		95	95	42	138
19	2013		95	95	43	138
20	2014		95	95	43	139
21	2015		95	95	44	139
22	2016		95	95	44	140
23	2017		95	95	45	140
24	2018		95	95	45	141
25	2019		95	95	46	141
26	2020		95	95	46	141
27	2021				47	147
28	2022				47	147
29	2023				47	147
30	2024				47	147
31	2025				47	147
32	2026				47	147
33	2027				47	147
34	2028				47	147
35	2029				47	147
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50	2044				47	147

Tableau 9.7 Distribution des Coûts / Bénéfices pour Oued Ain Zerga

EIRR = 10%		(Unit : 1,000 DT)					
No.	Year	Cost			Benefit		Net
		River	Drain	River+Drain	O&M	Total	
1	1995	395	24	419	0	419	0
2	1996	395	24	419	2	421	62
3	1997	395	24	419	4	423	123
4	1998	395	24	419	6	425	185
5	1999	395	24	419	8	427	246
6	2000	395	24	419	10	429	308
7	2001	395	24	419	13	432	321
8	2002	395	24	419	15	434	334
9	2003	395	24	419	17	436	348
10	2004	395	24	419	19	438	361
11	2005	412	24	419	21	440	374
12	2006		24	41	23	64	387
13	2007		24	24	23	48	401
14	2008		24	24	23	48	414
15	2009		24	24	23	48	427
16	2010		24	24	24	48	440
17	2011		24	24	24	48	454
18	2012		24	24	24	48	467
19	2013		24	24	24	48	480
20	2014		24	24	24	48	493
21	2015		24	24	24	48	507
22	2016		24	24	24	49	520
23	2017		24	24	24	49	533
24	2018		24	24	25	49	546
25	2019		24	24	25	49	560
26	2020		24	24	25	49	573
27	2021				25	25	586
28	2022				25	25	586
29	2023				25	25	586
30	2024				25	25	586
31	2025				25	25	586
32	2026				25	25	586
33	2027				25	25	586
34	2028				25	25	586
35	2029				25	25	586
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50	2044				25	25	586

Tableau 9.8 Distribution des Coûts / Bénéfices pour Oued Hammam

EIRR = 18%		(Unit : 1,000 DT)					
No.	Year	Cost			Benefit		Net
		River	Drain	River+Drain	O&M	Total	
1	1995	963	524	1,487	0	1,487	0
2	1996	963	524	1,487	7	1,494	327
3	1997	963	524	1,487	15	1,502	655
4	1998	963	524	1,487	22	1,509	982
5	1999	963	524	1,487	30	1,517	1,310
6	2000	963	524	1,487	37	1,524	1,637
7	2001	702	524	1,226	45	1,270	1,704
8	2002		524	262	51	313	1,772
9	2003		524	524	52	576	1,839
10	2004		524	524	55	578	1,906
11	2005		524	524	57	581	1,974
12	2006		524	524	60	583	2,041
13	2007		524	524	63	586	2,108
14	2008		524	524	65	589	2,176
15	2009		524	524	68	591	2,243
16	2010		524	524	70	594	2,311
17	2011		524	524	73	597	2,378
18	2012		524	524	76	599	2,445
19	2013		524	524	78	602	2,513
20	2014		524	524	81	604	2,580
21	2015		524	524	83	607	2,647
22	2016		524	524	86	610	2,715
23	2017		524	524	89	612	2,782
24	2018		524	524	91	615	2,849
25	2019		524	524	94	617	2,917
26	2020		524	524	97	620	2,984
27	2021				99	99	3,051
28	2022				99	99	3,051
29	2023				99	99	3,051
30	2024				99	99	3,051
31	2025				99	99	3,051
32	2026				99	99	3,051
33	2027				99	99	3,051
34	2028				99	99	3,051
35	2029				99	99	3,051
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50	2044				99	99	3,051

Tableau 9.9 Distribution des Coûts / Bénéfices pour Oued Blibene

EIRR = 5% (Unit : 1,000 DT)									
No.	Year	Cost			Benefit			Net	
		River	Drain	River+Drain	O&M	Total	Benefit	Benefit	
1	1995	681	153	834	0	834	0	-834	
2	1996	681	153	834	4	838	66	-772	
3	1997	681	153	834	8	843	133	-710	
4	1998	681	153	834	13	847	199	-648	
5	1999	681	153	834	17	851	266	-585	
6	2000	750	153	903	21	924	332	-592	
7	2001		153	153	25	179	340	161	
8	2002		153	153	26	179	348	188	
9	2003		153	153	27	180	355	175	
10	2004		153	153	28	181	363	182	
11	2005		153	153	28	182	371	189	
12	2006		153	153	29	182	379	196	
13	2007		153	153	30	183	387	203	
14	2008		153	153	31	184	395	211	
15	2009		153	153	32	185	402	218	
16	2010		153	153	32	186	410	225	
17	2011		153	153	33	186	418	232	
18	2012		153	153	34	187	426	239	
19	2013		153	153	35	188	434	246	
20	2014		153	153	35	189	441	253	
21	2015		153	153	36	189	449	260	
22	2016		153	153	37	190	457	267	
23	2017		153	153	38	191	465	274	
24	2018		153	153	38	192	473	281	
25	2019		153	153	39	192	481	288	
26	2020		153	153	40	193	488	295	
27	2021				41	41	496	456	
28	2022				41	41	496	456	
29	2023				41	41	496	456	
30	2024				41	41	496	456	
31	2025				41	41	496	456	
32	2026				41	41	496	456	
33	2027				41	41	496	456	
34	2028				41	41	496	456	
35	2029				41	41	496	456	
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50	2044				41	41	496	456	

Tableau 9.10 Distribution des Coûts / Bénéfices pour Oued Hallouf

EIRR = 13% (Unit : 1,000 DT)									
No.	Year	Cost			Benefit			Net	
		River	Drain	River+Drain	O&M	Total	Benefit	Benefit	
1	1995	1505	242	1748	0	1748	0	-1748	
2	1996	1505	242	1748	9	1756	298	-1459	
3	1997	1505	242	1748	17	1765	596	-1170	
4	1998	1505	242	1748	26	1774	893	-880	
5	1999	1505	242	1748	35	1783	1191	-591	
6	2000	1505	242	1748	44	1791	1489	-302	
7	2001	1505	242	1748	52	1800	1536	-264	
8	2002	1505	242	1748	61	1809	1584	-225	
9	2003	564	242	806	70	876	1631	755	
10	2004		242	242	74	316	1679	1363	
11	2005		242	242	75	318	1726	1409	
12	2006		242	242	76	319	1774	1455	
13	2007		242	242	78	320	1821	1501	
14	2008		242	242	79	321	1869	1548	
15	2009		242	242	80	322	1916	1594	
16	2010		242	242	81	324	1964	1640	
17	2011		242	242	82	325	2011	1686	
18	2012		242	242	84	326	2059	1733	
19	2013		242	242	85	327	2106	1779	
20	2014		242	242	86	329	2154	1825	
21	2015		242	242	87	330	2201	1871	
22	2016		242	242	88	331	2249	1918	
23	2017		242	242	90	332	2296	1964	
24	2018		242	242	91	333	2344	2010	
25	2019		242	242	92	335	2391	2057	
26	2020		242	242	93	336	2439	2103	
27	2021				95	95	2486	2392	
28	2022				95	95	2486	2392	
29	2023				95	95	2486	2392	
30	2024				95	95	2486	2392	
31	2025				95	95	2486	2392	
32	2026				95	95	2486	2392	
33	2027				95	95	2486	2392	
34	2028				95	95	2486	2392	
35	2029				95	95	2486	2392	
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50	2044				95	95	2486	2392	

Tableau 9.11 Distribution des Coûts / Bénéfices pour Oued Hamdoun

ERR = 5%		(Unit : 1,000 DT)				
No.	Year	Cost			Benefit	
		River	Drain	River+Drain	O&M	Net Benefit
1	1995	894	608	1,502	0	-1,502
2	1996	894	608	1,502	8	-1,322
3	1997	894	608	1,502	15	-1,141
4	1998	894	608	1,502	23	-961
5	1999	894	608	1,502	30	-780
6	2000	894	608	1,502	38	-600
7	2001	894	608	1,502	45	-590
8	2002	894	608	1,502	53	-580
9	2003	894	608	1,502	60	-570
10	2004	761	608	1,369	68	-426
11	2005		608	608	74	345
12	2006		608	608	77	359
13	2007		608	608	81	373
14	2008		608	608	84	388
15	2009		608	608	87	402
16	2010		608	608	90	417
17	2011		608	608	93	431
18	2012		608	608	96	445
19	2013		608	608	99	460
20	2014		608	608	102	474
21	2015		608	608	105	489
22	2016		608	608	108	503
23	2017		608	608	111	517
24	2018		608	608	114	532
25	2019		608	608	117	546
26	2020		608	608	120	561
27	2021				123	1,183
28	2022				123	1,183
29	2023				123	1,183
30	2024				123	1,183
31	2025				123	1,183
32	2026				123	1,183
33	2027				123	1,183
34	2028				123	1,183
35	2029				123	1,183
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50	2044				123	1,183

