JAPAN INTERNATIONAL COOPERATION AGENCY(JICA)

MINISTRY OF PUBLIC WORKS AND WATER RESOURCES (MPWWR)
ARAB REPUBLIC OF EGYPT

THE MASTER PLAN STUDY FOR THE IMPROVEMENT OF IRRIGATION WATER MANAGEMENT AND ENVIRONMENTAL CONSERVATION IN THE NORTH-EAST REGION OF THE CENTRAL NILE DELTA

FINAL REPORT

APPENDIX-II

AUGUST, 1999

SANYU CONSULTANTS INC.

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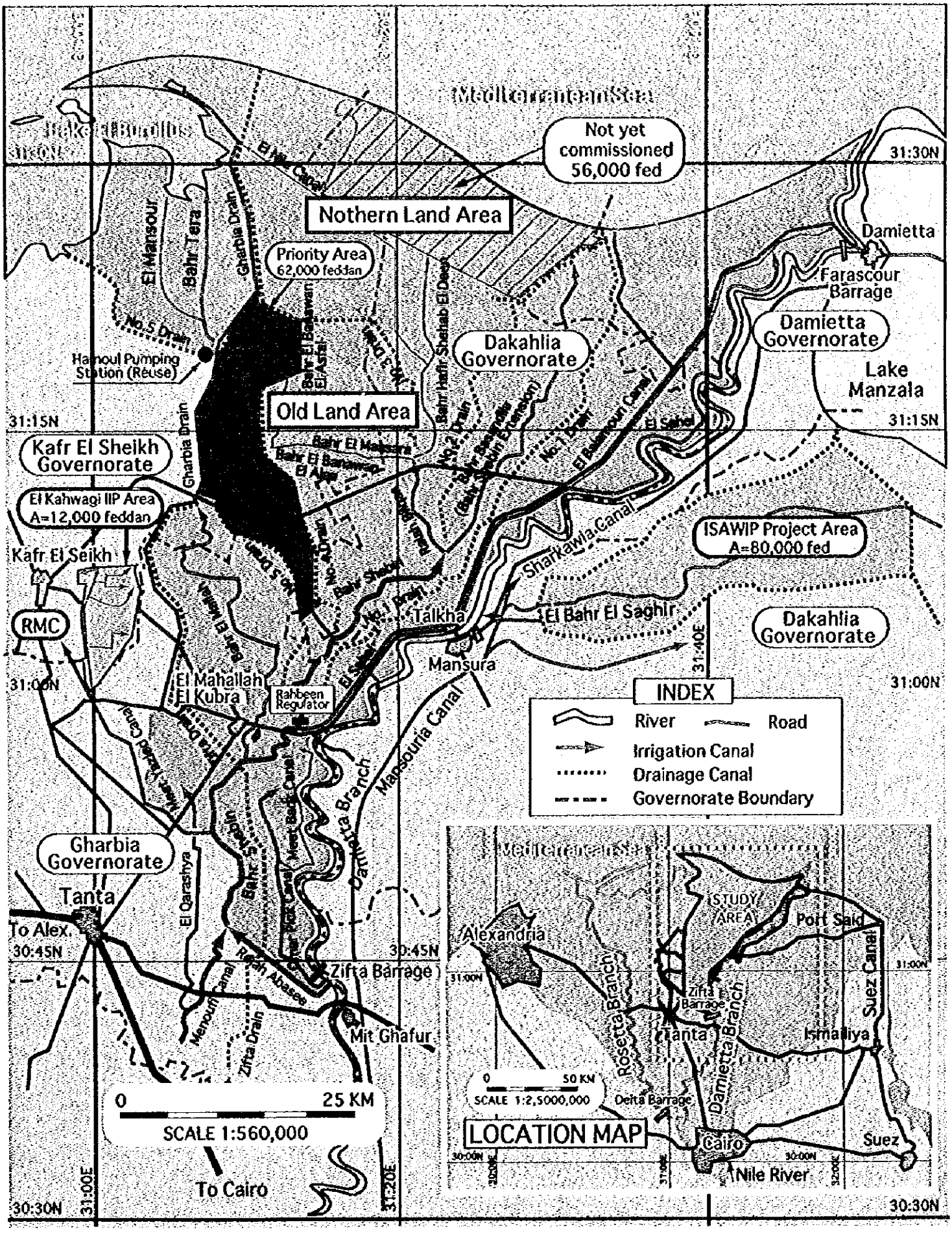
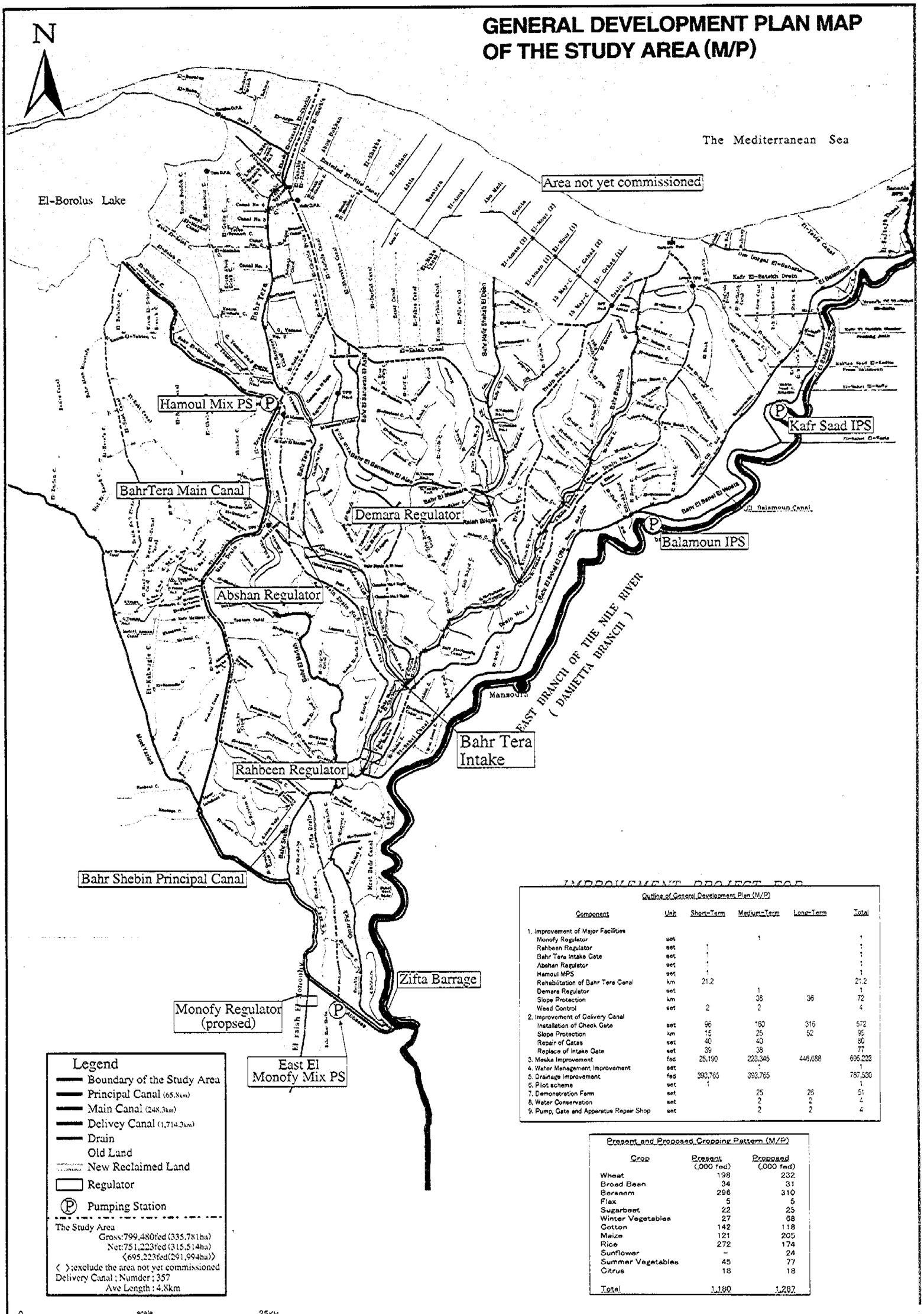
General Map of Study Area



GENERAL DEVELOPMENT PLAN MAP OF THE STUDY AREA (M/P)



IMPROVEMENT PROJECT FOR

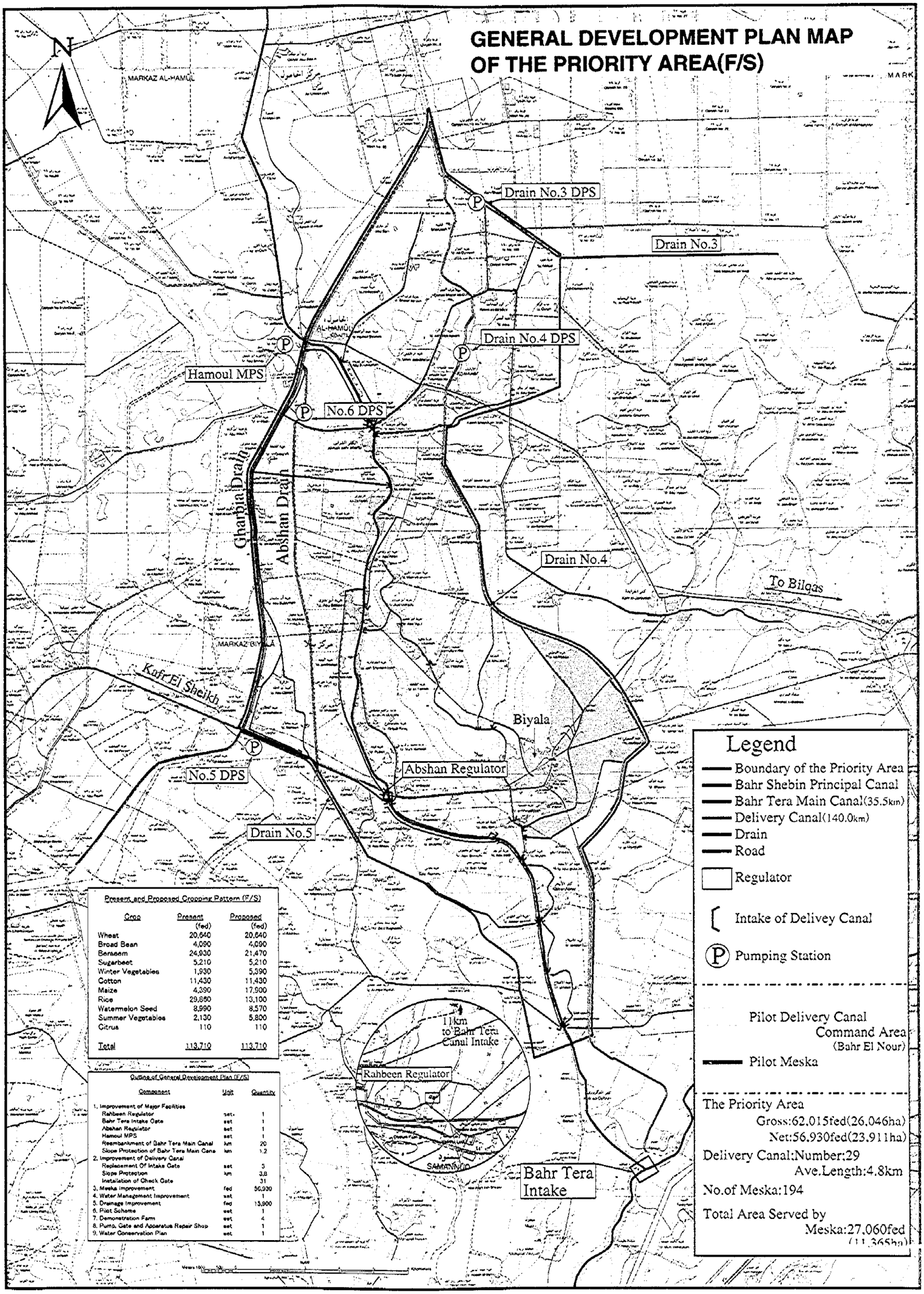
Outline of General Development Plan (M/P)

Component	Unit	Short-Term	Medium-Term	Long-Term	Total
1. Improvement of Major Facilities					
Monofy Regulator	set		1		1
Rahbeen Regulator	set	1			1
Bahr Tera Intake Gate	set	1			1
Abshan Regulator	set	1			1
Hamoul MPS	set	1			1
Rehabilitation of Bahr Tera Canal	km	21.2			21.2
Demara Regulator	set		1		1
Slope Protection	km		36	36	72
Weed Control	set	2	2		4
2. Improvement of Delivery Canal					
Installation of Check Gate	set	96	160	316	572
Slope Protection	km	15	25	52	95
Repair of Gates	set	40	40		80
Replace of Intake Gate	set	39	38		77
3. Meska Improvement	fed	25,190	220,345	446,688	695,223
4. Water Management Improvement	set		1		1
5. Drainage Improvement	fed	393,765	393,765		787,530
6. Pilot scheme	set	1			1
7. Demonstration Farm	set		25	26	51
8. Water Conservation	set		2	2	4
9. Pump, Gate and Apperatus Repair Shop	set		2	2	4

Present and Proposed Cropping Pattern (M/P)

Crop	Present (,000 fed)	Proposed (,000 fed)
Wheat	198	232
Broad Bean	34	31
Boraaom	296	310
Flax	5	5
Sugarbeet	22	25
Winter Vegetables	27	68
Cotton	142	118
Maize	121	205
Rice	272	174
Sunflower	-	24
Summer Vegetables	45	77
Citrus	18	18
Total	1,180	1,287

GENERAL DEVELOPMENT PLAN MAP OF THE PRIORITY AREA(F/S)



Present and Proposed Cropping Pattern (F/S)

Crop	Present (fed)	Proposed (fed)
Wheat	20,640	20,640
Broad Bean	4,090	4,090
Berseem	24,930	21,470
Sugarbeet	5,210	5,210
Winter Vegetables	1,930	5,390
Cotton	11,430	11,430
Maize	4,390	17,900
Rice	29,860	13,100
Watermelon Seed	8,990	8,570
Summer Vegetables	2,130	5,800
Citrus	110	110
Total	113,710	113,710

Outline of General Development Plan (F/S)

Component	Unit	Quantity
1. Improvement of Major Facilities		
Rahbeen Regulator	set	1
Bahr Tera Intake Gate	set	1
Abshan Regulator	set	1
Hamoul MPS	set	1
Reembankment of Bahr Tera Main Canal	km	20
Slope Protection of Bahr Tera Main Cana	km	1.2
2. Improvement of Delivery Canal		
Replacement Of Intake Gate	set	3
Slope Protection	km	3.8
Installation of Check Gate		31
3. Meska improvement	fed	56,930
4. Water Management Improvement	set	1
5. Drainage Improvement	fed	15,900
6. Pilot Scheme	set	1
7. Demonstration Farm	set	4
8. Pump, Gate and Apparatus Repair Shop	set	1
9. Water Conservation Plan	set	1

Legend

- Boundary of the Priority Area
- Bahr Shebin Principal Canal
- Bahr Tera Main Canal(35.5km)
- Delivery Canal(140.0km)
- Drain
- Road
- Regulator
- Intake of Delivey Canal
- Pumping Station
- Pilot Delivery Canal Command Area (Bahr El Nour)
- Pilot Meska

The Priority Area
Gross:62,015fed(26,046ha)
Net:56,930fed(23,911ha)

Delivery Canal:Number:29
Ave.Length:4.8km

No.of Meska:194

Total Area Served by Meska:27,060fed (11,365ha)

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APPENDIX G.

IRRIGATION AND DRAINAGE FACILITIES

Appendix G Irrigation and Drainage Facilities

G.1 Major Irrigation and Drainage Facilities

G.1.1 Rahbeen Regulator

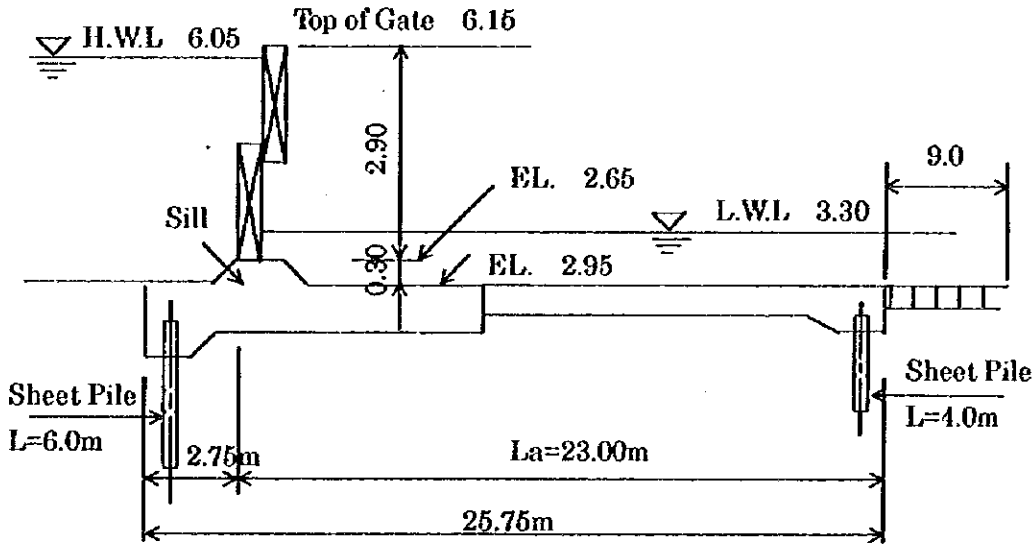
(1) Design Conditions

Dam up by Gate	;	2.90m : 2 Leaves
Base	;	Concrete Base
Bridge	;	Width : 10.0m
Upstream	;	WL : 6.05m
Lower stream	;	WL : 3.30m

(2) The Geological Conditions

Presumed with fine sand (20km upstream in same canal, no data at present)

(3) Plan of Design



i) Eplon Length

$$La = 0.6 \times 15 \times \sqrt{2.75} \times 1.5 = 22.4 \fallingdotseq 23.0m$$

ii) Path of Percolation Length

$$Lp = C \cdot H = 15 \times 2.75 \fallingdotseq 42\ m$$

Where : Lp ; Creep Length

C ; Bligh Coefficient

Fine Sand : 15

H ; 6.05 -3.3 : 2.75 m

- Eplon Length : 25.75 m
- Sheet Pile : 12 m (Front) + 8 m (Back) = 20 m

  42m - 25.75 m = 16.25 m < 20 m

Canal Bed Protection

$$L = Lb - La$$

$$Lb = 0.67c\sqrt{H \cdot q} \times f$$

Where : Lb ; Length of Protection

La ; Eplon Length (m) : 23.0m

H ; Surplus Water Head : 2.75m

f ; Safety Factor : 1.5

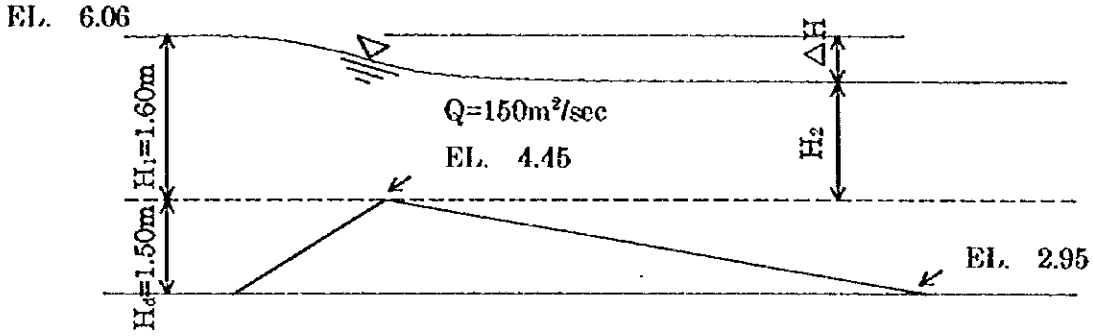
C ; Bligh Coefficient : 15

$$Lb = 0.67 \times 15 \times \sqrt{2.75 \times 1.6} \times 1.5 \fallingdotseq 32.0m$$

$$q = 60m/s/37.5m = 1.6m^3/s/m$$

$$L = 32.0 - 23.0 = 9.0m$$

Note : Exsisting Regulator



Sub:

$M=0.05+0.38\ H_1/Hd$

$=0.05+0.38\times 1.60/1.50$

$=0.455$

Flow coefficient (m') under submerge:

$m'=2.6m=1.18$

$Q=m'BH_2\sqrt{2g(H_1-H_2)}$

$Q=150m^3/s$ (Max discharge), $B=37.5m$, $H_1=1.60m$

$150=1.18\times 37.5\times H_2\times\sqrt{2\times 9.8\times(1.60-H_2)}$

$H_2=0.949$

$\therefore\Delta H=H_1-H_2=1.60-0.949=0.651\fallingdotseq 0.70m$

G.1.2 Water Loss Head in Rahbeen Regulator

(1) Hydraulic Conditions

After completion of the new regulator, a flow section will be made by a rectangle canal formation, the water loss head between upstream and down stream will be calculated based on the following:

(2) Friction Loss Head

$$hf = \frac{n^2 V^2}{R^{4/3}} \times l$$

where : n=0.035
V=Velocity (m/s)
R=Hydraulic Main Depth
l =65m Canal Length

$$V = \frac{Q}{A} = \frac{150}{3.10 \times 45.5} = 1.06 m/s$$
$$S = 2 \times 3.10 + 45.5 = 51.7 m$$
$$R = A/S = 3.10 \times 45.5 / 51.7 = 2.73 m$$
$$hf = \frac{0.035^2 \times 1.06^2}{2.73^{4/3}} \times 65$$
$$= 0.023$$

Miscellaneous water loss head about 10% in total

$$h = 1.1hf = 1.1 \times 0.023 = 0.025 m$$

As a result of hydraulic aspect is calculated only 2.5cm as negligible.

Table G.1.1 Daily Water Operation Records in Rahbeen Regulator For 1997-1998

	WINTER						SUMMER					
	December	1997	January	1998	February	1998	June	1998	July	1998	August	1998
	U·S	D·S	U·S	D·S	U·S	D·S	U·S	D·S	U·S	D·S	U·S	D·S
1	5.70	4.30	5.52	4.15	4.10	3.80	5.45	5.10	5.64	5.46	5.56	5.25
2	5.64	4.20	5.33	4.20	4.20	4.00	5.48	5.12	5.70	5.46	5.55	5.22
3	5.58	4.10	5.40	4.20	4.25	4.00	5.45	5.10	5.70	5.45	5.56	5.25
4	5.52	4.05	5.40	4.20	4.28	4.00	5.45	5.10	5.20	5.47	5.68	5.30
5	5.52	4.05	5.40	4.20	4.28	4.00	5.48	5.13	5.71	5.49	5.56	5.26
6	5.50	4.05	5.46	4.20	4.28	4.00	5.55	5.25	5.76	5.57	5.58	5.30
7	5.47	4.05	5.46	4.10	4.28	4.00	5.62	5.38	5.78	5.58	5.58	5.30
8	5.45	3.95	5.48	4.00	4.32	4.10	5.69	5.45	5.75	5.55	5.58	5.30
9	5.38	3.85	5.44	3.80	4.32	4.10	5.70	5.50	5.74	5.55	5.57	5.21
10	5.40	3.85	5.30	3.70	4.32	4.10	5.70	5.50	5.70	5.50	5.58	5.28
11	5.32	3.75	5.26	3.50	4.27	4.15	5.70	5.50	5.75	5.50	5.60	5.28
12	5.32	3.65	5.70	3.30	4.56	4.15	5.70	5.50	5.74	5.50	5.54	5.22
13	5.35	3.60	5.80	3.50	4.22	4.05	5.70	5.50	5.76	5.58	5.55	5.22
14	5.43	3.60	5.75	3.50	4.30	3.95	5.71	5.51	5.72	5.52	5.53	5.22
15	5.63	3.55	5.60	3.50	4.10	3.95	5.70	5.50	5.74	5.53	5.55	5.22
16	5.90	3.50	5.88	3.30	4.10	3.95	5.70	5.50	5.74	5.55	5.58	5.22
17	5.80	3.50	5.80	3.50	4.10	3.85	5.70	5.50	5.75	5.55	5.55	5.42
18	5.80	3.50	5.60	3.50	4.05	3.85	5.74	5.54	5.78	5.60	5.50	5.15
19	5.78	3.50	5.70	3.50	4.05	3.80	5.75	5.50	5.78	5.59	5.50	5.15
20	5.80	3.50	5.60	3.55	4.15	3.80	5.72	5.50	5.72	5.51	5.48	5.12
21	5.80	3.50	5.55	3.90	4.30	3.80	5.75	5.55	5.74	5.53	5.50	5.12
22	5.70	3.50	5.75	3.50	4.35	3.80	5.73	5.55	5.80	5.62	5.48	5.10
23	5.60	3.50	5.60	3.50	4.50	3.80	5.72	5.55	5.70	5.52	5.50	5.12
24	5.55	3.50	5.60	3.50	4.50	3.80	5.71	5.52	5.70	5.50	5.48	5.12
25	5.65	3.50	5.60	3.50	4.65	3.80	5.73	5.54	5.72	5.50	5.47	5.10
26	5.75	3.60	5.60	3.50	4.66	3.80	5.71	5.52	5.74	5.50	5.55	5.12
27	5.60	3.75	5.50	3.65	4.55	3.80	5.72	5.52	5.73	5.53	5.58	5.12
28	5.65	3.75	5.65	3.90	4.15	3.80	5.70	5.50	5.70	5.52	5.58	5.12
29	5.70	3.80	5.40	3.90	-	-	5.75	5.55	5.60	5.38	5.55	5.12
30	5.80	3.90	5.34	3.90	-	-	5.62	5.42	5.50	5.20	5.54	5.10
31	5.75	4.10	5.42	4.50	-	-	-	-	5.52	5.20	5.50	5.10

Table G.1.2 Daily Water Operation Records in Bah Tera Intake For 1997-1998

	WINTER						SUMMER					
	December	1997	January	1998	February	1998	June	1998	July	1998	August	1998
	U·S	D·S	U·S	D·S	U·S	D·S	U·S	D·S	U·S	D·S	U·S	D·S
1	3.64	3.20	3.56	3.10	3.30	3.10	4.20	3.80	4.50	3.95	4.45	3.60
2	3.57	3.15	3.65	3.10	3.57	3.20	4.27	3.80	4.54	3.95	4.45	3.60
3	3.57	3.10	3.67	3.05	3.71	3.30	4.23	3.80	4.60	3.90	4.44	3.65
4	3.57	3.05	3.63	3.05	3.70	3.37	4.23	3.80	4.55	3.90	4.52	3.65
5	3.56	3.05	3.65	3.05	3.65	3.40	4.23	3.80	4.56	3.90	4.60	3.65
6	3.55	3.05	3.63	3.05	3.79	3.40	4.40	3.80	4.65	3.90	4.50	3.65
7	3.55	3.05	3.65	3.05	3.80	3.40	4.50	3.80	4.70	3.90	4.43	3.65
8	3.50	3.00	3.50	3.05	3.77	3.40	4.54	3.87	4.60	3.90	4.47	3.65
9	3.35	2.95	3.33	2.95	3.82	3.45	4.62	3.90	4.65	3.90	4.40	3.63
10	3.35	2.90	3.20	2.90	3.83	3.45	4.65	3.90	4.58	3.90	4.50	3.63
11	3.32	2.85	3.12	2.80	3.85	3.45	4.58	3.95	4.60	3.90	4.57	3.63
12	3.25	2.85	2.95	2.64	3.84	3.45	4.64	3.95	4.73	3.90	4.45	3.63
13	3.15	2.85	2.76	2.68	3.80	3.40	4.67	3.95	4.70	3.90	4.40	3.60
14	3.25	2.85	3.30	2.70	3.58	3.30	4.64	3.95	4.62	3.90	4.40	3.60
15	3.25	2.80	3.10	2.70	3.64	3.30	4.60	3.95	4.63	3.90	4.43	3.60
16	3.03	2.80	3.08	2.55	3.60	3.25	4.61	3.95	4.63	3.90	4.45	3.60
17	3.03	2.75	3.16	2.70	3.45	3.25	4.65	3.95	4.69	3.85	4.40	3.60
18	3.24	2.80	3.20	2.60	3.53	3.25	4.64	3.95	4.72	3.85	4.36	3.58
19	3.18	2.80	3.20	2.50	3.40	3.20	4.63	4.00	4.70	3.80	4.32	3.58
20	3.03	2.80	3.04	2.55	3.50	3.20	4.58	4.00	4.64	3.80	4.30	3.58
21	3.14	2.80	3.39	2.50	3.59	3.15	4.60	4.00	4.63	3.80	4.40	3.58
22	3.10	2.80	3.10	2.50	3.65	3.15	4.67	4.00	4.80	3.80	4.39	3.55
23	3.15	2.80	3.06	2.60	3.59	3.15	4.60	4.00	4.68	3.80	4.38	3.55
24	3.03	2.78	3.14	2.60	3.63	3.20	4.55	4.00	4.64	3.80	4.38	3.55
25	3.10	2.80	3.31	2.60	3.63	3.20	4.56	4.00	4.68	3.85	4.30	3.65
26	3.10	2.80	2.93	2.45	3.60	3.25	4.59	4.00	4.69	3.80	4.40	3.55
27	3.30	2.80	3.36	2.80	3.57	3.25	4.59	4.00	4.65	3.80	4.38	3.55
28	3.40	2.80	3.37	2.90	3.55	3.25	4.57	3.95	4.65	3.75	4.40	3.55
29	3.42	2.80	3.32	2.90	–	–	4.64	3.95	4.58	3.65	4.40	3.55
30	3.52	2.90	3.41	2.90	–	–	4.50	3.95	4.40	3.60	4.36	3.53
31	3.70	3.00	3.45	3.00	–	–	–	–	4.40	3.60	4.40	3.53

G.2 Improvement of Delivery Canals

Table G.2.1 Slope Protection for Delivery Canals (M/P)

Canal Improvement in Water District (1)Bahary Zifta 1A/17

Main Canal				Branch Canal (Delivery)								
	Water Dist.	LNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Mesqa	Area by Mesqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
Omar Pick	1	8	0.7			0.0		23,626	13.73			
					Directly from Omar Pick			3,660			17	3,660
				5	Omar Pick Ganabia No.1 Left	3.0	L	2,050	3.60		8	1,520
				7	El Sabouny El Neely	5.0	L	1,700	5.54		8	1,700
				6	Omar Pick Ganabia No.2 Left	5.0	R	300	0.97		-	
				11	Meet Badr	5.8	R	3,931	12.31		15	2,894
Meet Badr	1	6	2	12	Meet Badr Ganabia	3.0	R	1,065	4.60		5	1,065
				13	Bona Abouseer Ganabia	6.0	R	370	1.76		-	
				18	Abou Seer	10.0	L	1,500	6.62		-	
				19	Abou Seer Ganabia	10.0	R	800	3.78		-	
				14	El Yamany	13.0	Ext.	2,140	10.36		12	2,140
				15	Meet Habeeb	3.0	R	1,300	3.84		7	930
				16	Manial El Taweel	5.0	R	1,000	3.00		5	375
				17	El Yamany Wasla	6.8	L	300	1.40		-	
				22	Mahallah Tareek El Mahallah	7.0	L	1,750	3.74		10	1,640
				23	El Manzalawy	8.5	L	1,760	2.50		2	190
Dahtoura Ganabia	1			4		0.0		2,000	9.50		21	2,000

Notes :

Three(3) main canal (Omar Pick,Meet Badr,G.Ahtoura) are under principal canal (El Raeiah Abasee)

LNOG : Location number of offtake gate along the main canal

Mesqa No. : Required farm pomp station

Main Canal				Branch Canal (Delivery)								
	Water Dist.	LNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Mesqa	Area by Mesqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
Bahr Shershaba	1	1	0.5					7,100	9.50			
				8	Directly from Bahr Shershaba			1,750			10	1,750
				9	Shershaba Ganabia No.3 R	6.2	L	550	4.75		-	
				2	Abou Obya	8.9	R	1,800	4.30		7	600
				1	El Sabouny El Saify	8.9	L	3,000	7.10		2	330
Bahr Shebin	1	10	2.1					9,970				
				10	Ganabia No.4 Right	14.0	R	200	2.27		-	
				20	Ganabia No.5 Right	15.0	R	150	1.60		-	
				3	Ganabia No.6 Right	15.3	R	450	1.75		-	
				21	Ganabia No.6 Right	15.7	R	400	1.55		-	
				25	Ganabia No.7 Right	22.0	R	800	2.14		-	
				26	Momtaz Ganabia	24.0	R	1,700	4.90		7	1,173
				27	Mokhtar Ganabia	26.0	R	1,000	3.97		4	880
				28	Ganabia No.8 Right	29.0	R	600	1.33		-	
				29	Kafr Hegazy Ganabia No.1	29.5	R	230	1.17		1	150
				24	Houd El Behera	31.0	R	2,040	4.60		10	1,830
				30	El Badrawy	32.0	R	1,830	5.79		9	1,620
				31	Kafr Hegazy Ganabia No.2	0.1	L	570	1.98		1	100
Total	-	25	5.3	-	-	-	-	42,696	146.0	7.30	161	26,557

Main Canal				Branch Canal (Delivery)								
	Water Dist.	LNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Mesqa	Area by Mesqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
Bahr El Malah	2	7	1.5		Batina		R	1,300	4.37	0.5	4	650
Bahr Shebin	2	2	2					18,470				
				40	El Kaisiriah	37.4	L	4,850	13.50		17	2,150
				42	Hassan Agha	6.8	L	550	2.43		-	
				45	Ganabia No.1 El Gharbia Left	37.4	L	900	4.00		-	
				35	El Nozha	37.4	R	2,300	6.90		3	1,200
				39	Ganabia No.1 El Sharkia Right	37.4	R	1,670	4.60		1	310
				43	Ganabia No.2 El Gharbia Left	41.3	L	5,200	3.60		8	600
				44	Ganabia No.3 El Gharbia Left	42.0	L	2,000	4.00		-	
				38	Ganabia No.2 El Sharkia Right	42.0	R	1,000	4.80		8	850
El Sahel	2	5	6			36.8		8,020				
					Directly from El Sahel			1,480			8	
				36	El Thobania	3.3	R	450	2.60		-	
				32	Meet Asas	6.7	R	1,800	6.80		4	600
				33	Behbeet	7.7	R	1,530	7.10		6	1,000
				34	El Nawya	2.1	R	1,760	3.35		9	1,100
				37	El Maktaa	7.9	R	1,000	1.75		-	
Total	-	14	9.5	-	-	-	-	27,790	69.8	3.5	68	8,460

Canal Improvement in Water District (3)Bishbesh

Main Canal				Branch Canal (Delivery)									
	Water Dist.	LNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Mesqa	Area by Mesqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
Bahr El Mallah	3	4	1.3					39,190	13.90			
					Directly from Bahr El Mallah	33.3	L	5,770			15	
				51	Meet El Serag	10.6	R	3,520	11.57		14	2,931
				52	El Sawaky El Kobar	3.5	L	750	2.30		3	400
				53	Halak El Gamal	3.5	L	850	2.70		2	220
				54	Lomana	6.0	L	1,780	4.37		8	1,460
Bahr El Mallah	3	5		58	El Sergany	12.0	R	1,350	3.69		5	830
				59	El Kisa	17.6	L	1,300	2.95		6	595
				46	Bishbeesh	21.4	R	2,800	5.27		6	1,095
				50	Sonbara	21.4	R	950	3.17		2	300
				47	Shimy	23.0	R	2,850	5.30		8	1,290
				55	Tonbara El Gedida	24.2	L	1,650	6.00		5	210
				48	East Tonbara G. El Sharkia	24.5	R	4,180	11.43		10	2,180
				49	West Tonbara G. El Gharbia	24.5	L	6,890	11.60		9	2,600
				56	Dakhmees	2.8	L	1,450	4.20		4	332
				57	Shaheedy	3.8	L	1,900	4.10		5	584
				60	Demaksh	6.7	L	1,200	3.83		-	
Total	-	9	1.3	-	-	-	-	39,190	96.4	4.8	102	15,027

Main Canal				Branch Canal (Delivery)									
	Water Dist.	LNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Mesqa	Area by Mesqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
Bahr Shebin	4	2										
El Mahallah	4	2				30.2	L	4,860	5.32		2	200
					Directly from El Mahallah			1,100				
El Mahallah	4	4		63	Balat	1.5	R	460	1.54		-	
				62	El Ameriah	2.3	R	3,300	10.20		16	1,520
Bahr Shebin	4	3	2					2,775				
				64	Ganabia No.9 Left (A)	31.5	L	275	1.45		3	230
				66	El Mallah Ganabia Left	33.2	L	1,300	3.25		-	
				67	El Borg	3.0	L	1,100	3.40		4	100
El Borg				70	Meet El Leith El Kadim	3.4	L	50	3.00		1	50
Meet El Leith Kadim				71	Bahr El Maash El Kadim	3.0	Ext.	50	3.00		-	
Bahr El Mallah		4				33.2	L	26,590	10.20		3	1,050
					Directly from Bahr El Mallah			4,520				
Bahr El Mallah	4	4		68	Bahr El Maash El Gedid	3.8	L	635	4.60		8	635
				69	Meet Leith El Gedid	2.4	/ R	3,635	5.86		20	3,600
				72	El Faroukia	3.3	L	1,400	5.70		8	1,400
				73	Sandisens	1.1	R	7,000	11.86		28	630
				74	El Rawateb	4.7	L	1,600	3.62		9	1,350
Bahr El Maash El Gedid	4			75	El Samoul	4.1	R	7,800	14.32		32	7,800
Bahr Shebin	4	3	2	65	Ganabia No.9 Left also (B)	31.8	L	120	1.00		-	
Total	-	22	4	-	-	-	-	34,345	88.3	4.4	134	18,565

Main Canal				Branch Canal (Delivery)								
	Water Dist.	LNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Mesqa	Area by Mesqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
El Korashia Ganabia	5						L	21,100	23.13			
					Directly from El Korashia Ganabia			2,000				
				77	Abou Wafa	23.1	R	800	6.14		1	350
				78	Bolkena	6.0	L	4,000	12.90		15	3,630
				79	Nawara	6.0	L	2,550	3.38		2	1,000
				80	El Misk	1.8	L	750	3.20		1	400
				81	El Hayatem	23.1	L	8,000	13.88		10	7,015
				82	El Nashk	1.7	L	2,000	4.15		5	1,100
				83	Labsheet	9.2	L	1,000	2.40		1	500
Bahr Shebin		2	0.6					2,300				
				84	Ganabia No.5 Left	21.2	L	750	2.20		-	
				85	Ganabia No.6 Left	23.5	L	950	2.83		-	
				86	Ganabia No.7 Left	26.5	L	600	3.58		-	
Total	-	2	0.6	-	-	-	-	23,400	77.8	3.9	35	13,995

Main Canal				Branch Canal (Delivery)								
	Water Dist.	LNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Mesqa	Area by Mesqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
Bahr Tera	6							37,605	18.00			
					Directly from Bahr Tera			10,800			16	
				87	El Magaz	47.1	R	3,500	5.93		8	2,100
				88	El Magaz Branch	1.4	R	1,200	3.39		4	800
Bahr Tera	6	6		89	Branch No.1 Left Tera	47.7	L	1,300	2.50		3	1,000
				90	Branch No.2 Left Tera	50.6	L	1,300	2.40		8	1,100
				91	Branch No.3 A Tera	52.0	L	905	2.40		5	700
				92	Branch No.4 Tera	53.4	L	1,350	2.50		4	900
				93	El Helmia	53.4	R	700	1.50		4	600
				94	El Khashaa	54.0	L	1,300	7.80		11	1,100
				95	Branch No.1 (A) Left	3.4	R	1,950	1.50		11	1,600
Bahr Tera	6	5		96	Ganabia El Khashaa	58.6	L	800	2.70		4	600
				104	Ganabia El Gharbia	60.0	R	1,500	5.00		11	1,100
				97	Branch No.1 (A) Right El Khashaa	61.4	R	1,600	2.50		16	1,300
				98	Branch No.2 El Khashaa	63.0	R	1,400	2.80		13	1,250
				99	Balteem	64.8	R	2,000	1.50		7	1,300
				100	El Sheikh El Mobarak	2.8	L	1,000	1.50		8	850
				101	El Mobarak Branch	1.3	R	1,000	2.40		5	800
Bahr Tera	6	3		102	West Borollos	65.0	R	3,000	7.54		4	2,200
				103	El Robaa	4.9	R	1,000	3.00		2	650
Total	-	14	1.2	-	-	-	-	37,605	76.9	3.8	144	19,950

Main Canal				Branch Canal (Delivery)									
	Water Dist.	LNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Mesqa	Area by Mesqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
El Mansour	7					37.4		45,700	24.10			
					Directly from El Mansour			5,300			34	
				105	El Khaleeg	2.5	L	6,000	17.50		9	1,850
				109	El Khaleeg Branch	1.0	R	1,000	2.21		-	
				110	Kom El Teen	8.5	L	3,500	8.90		8	1,650
				111	Kom El Teen Branch	3.6	R	2,000	2.95		6	1,200
				112	El Blashnah	6.6	R	3,200	4.90		10	2,100
El Mansour	7	5		113	Ganabia No.2 Right Mansour	2.6	R	1,300	5.50		-	
				114	Ganabia No.2 Left Mansour	2.6	L	1,500	5.40		-	
				105	El Hallab	8.8	L	7,000	10.50		22	5,200
				115	Kom El Nesf	8.8	R	1,500	2.11		5	1,000
				116	Kom Abo Hallaf	11.6	R	1,800	4.50		5	1,050
				107	Kataa El Zalat	15.7	L	3,900	1.50		6	1,450
				117	Kom El Bondok	4.6	R	3,100	7.03		12	1,500
El Mansour	7	6		118	El Melahah	15.7	R	1,200	2.00		2	500
				119	El Gediah	1.5	L	2,000	6.75		11	1,750
				120	Branch No.1	2.1	R	1,000	1.00		1	200
				121	Branch No.2	4.7	R	400	1.00		-	
Total	-	11	0.6	-	-	-	-	45,700	107.9	5.4	131	19,450

Main Canal				Branch Canal (Delivery)									
	Water Dist.	LNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Mesqa	Area by Mesqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
Bahr Tera	8	3			Before mixing			30,555	14.00			
					Directly from Bahr Tera			3,100				
				137	El Banawan El Asfal	31.2	R	7,000	5.00		-	
				124	El Kafr El Sharkie	31.5	L	1,425	7.06		4	565
				125	Ragheb Basha	31.7	R	2,050	5.50		-	
				126	El Mahatta	31.7	L	2,500	2.57		-	
				127	Ganabia No.7 Left	31.8	L	1,150	3.25		5	680
				138	Ganabia No.10 Right	31.8	R	500	2.48		-	
				128	Zobaa	34.0	R	3,800	6.15		3	750
				129	El Walda	35.5	R	1,000	5.60		-	
El Walda	8	3		130	El Walda Branch	5.2	L	850	3.50		-	
				139	El Wosta	5.6	fed	3,850	6.00		2	780
Bahr Tera	8	2		133	Ganabia No.1 Right Hamoul	35.5	R	3,000	6.20		-	
				134	Ganabia No.1 Left Hamoul	35.5	L	330	1.65		-	
Bahr Tera	8	3			After mixing			11,300				
				122	Ganabia No1. Left Mansour	37.4	L	700	2.50		1	350
				123	Ganabia No1 Right El Mansour	37.4	L	1,300	5.50		1	250
				140	Ganabia Left Hamoul B	37.4	L	1,800	3.75		2	1,100
Ganabia Left Hamoul B	8	3		141	El Sherka	0.4	L	1,300	2.56		-	
Bahr Tera	8	2		135	Ganabia No.2 Right Hamoul	41.0	R	1,600	3.70		1	155
				136	Ganabia No.2 Left Hamoul	41.1	L	1,700	3.75		-	
				131	El Thalatheen	44.7	R	1,200	1.40		1	370
				133	Ganabia No.3 Right Hamoul	45.5	R	1,000	3.75		1	350
				132	Abo Soliman	46.5	R	700	2.15		3	450
Total	-	16	1.5	-	-	-	-	41,855	98.0	4.9	24	5,800

Main Canal				Branch Canal (Delivery)									
	Water Dist.	LNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Mesqa	Area by Mesqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
Bahr Tera						47.2		38,505	31.65			
					Directly from Bahr Tera			5,753				
				162	Ganabia No.2 Right	1.0	R	1,400	2.60		2	260
				146	Ganabia No.2 Left	6.2	L	840	3.62		2	240
				163	Ganabia No.3 Right	7.0	R	680	0.51		-	
				148	Foda	10.8	L	1,650	3.90		10	1,420
				149	Ganabia No.4 Right	10.8	R	1,440	2.67		8	770
				147	Ganabia No.3 Left	11.6	L	300	0.75		-	
				152	Bahr Biyala	11.8	R	5,470	13.80		12	2,135
Bahr Biyala	9	4		153	El Agamy	0.9	R	850	4.44		6	350
				154	Bahr El Nour	1.2	R	2,500	7.39		21	2,395
				150	Bahr Biyala & El Nour	1.2	R	1,150	1.65		-	
				156	Tahweelah Bahr Biyala	3.3	R	1,320	1.35		3	420
				155	El Shorafa	3.8	R	840	4.82		6	465
				158	Hazek	7.2	L	750	2.78		2	130
Bahr Tera	9	5		143	Ganabia No.4 Left	13.5	L	1,950	3.84		5	510
				151	Ganabia No.6 Right	13.5	R	1,150	3.66		5	850
				157	El Sharkaweiah	15.2	R	1,712	4.48		12	925
				144	Abshan	17.4	L	3,750	17.00		16	1,210
				159	Kom El Hegna	2.2	L	700	5.34		4	350
Bahr Tera	9	3		145	El Nezam	17.4	L	2,850	8.39		10	850
				160	Marzouk	24.4	R	1,000	3.18		-	
				161	Ganabia No.7 Right	25.4	R	450	0.94		-	
Total	-	12	1.8	-	-	-	-	38,505	128.7	6.4	124	13,280

Main Canal				Branch Canal (Delivery)								
	Water Dist.	LNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Mesqa	Area by Mesqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
El Nile	10	2		168	El Nail	13.1		11,621	22.75			
					Directly from El Nile			6,340			4	500
				169	El Naka	15.3	L	2,500	2.30		1	150
				167	Amar	20.2	L	2,781	2.75		3	350
El Eslah	10	5		164	El Eslah	4.6	L	18,981	9.65			
					Directly from El Eslah			3,038			2	300
				170	Koum El Tebn	2.3	R	3,500	7.20		3	500
				171	El Nakaah	4.4	R	4,200	8.00		2	250
				165	Basar	6.6	R	4,028	9.20		2	200
				166	El Drafeel	8.5	R	4,215	11.37		3	350
Total	-	7	1.1	-	-	-	-	30,602	73.2	3.7	20	2,600

Main Canal				Branch Canal (Delivery)								
	Water Dist.	LNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Mesqa	Area by Mesqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
Bahr Shebin								3,025				
					Toson Ganabia El Youmna	65.8	R	1,095	3.85		3	500
					Toson Ganabia El Yousra	65.8	L	1,930	5.40		2	300
Bahr Basandila	11	11				65.8		59,137	34.50	9.8		
					Directly fr Basandila			8,027				
				175	Meet Zonkor Ganabia	4.0	R	1,300	2.75		1	200
				158	El Gawadia Ganabia	5.4	L	440	3.66		-	
				176	El Tahweelah	1.0	L	510	2.53		2	200
Bahr Basandila	11	4		177	Thabet Ganabia	8.7	R	580	2.40		-	
				179	Gawadia	9.1	L	1,800	5.50		2	300
				184	Monshaah Basandila Ganabia	9.3	R	950	2.80		-	
				180	El Ahmadia	10.4	L	1,270	5.40		-	
				188	Kom El Diba Ganabia	10.6	L	1,600	3.22		-	
				185	El Khat	12.8	R	800	2.95		1	100
				181	Om Shtiwy	13.9	L	1,100	5.20		4	500
				182	El Ramla	13.2	L	3,500	11.93		-	
				186	El Ghanama Ganabia A	14.0	L	850	1.30		-	
				194	El Khala	14.7	R	2,905	7.46		3	600
				195	El Fasel El Olia	14.9	R	1,635	6.20		1	500
				183	El Sawaki	15.5	L	577	5.40		2	100
				187	El Ghanama Ganabia B	0.0	R	923	1.30		1	100
Bahr Basandila	11	6		201	Bahr El Samar, Left	16.5	L	6,000	6.80		3	400
				202	Bahr El Samar El Aiman, Right	16.5	L	3,840	14.97		4	800
				189	Om Arad	8.5	L	800	1.90		2	100
				190	El Mawars	10.2	R	1,331	3.80		1	70
Bahr Basandila	11	3		191	El Haj Sherbiny Ganabia	16.5	L	890	4.20		1	500
				192	Abo Said Ahmed Ganabia	21.0	L	900	2.20		-	
				198	Abo Zaher	22.0	R	535	4.39		1	300
				196	El Fasel El Olia Extension	2.2	L	535	1.23		1	500
Bahr Basandila	11	5		197	El Fasel El Sofla	23.0	R	1,425	3.52		2	400
				199	El Malha	0.7	L	445	2.83		-	
Bahr Basandila	11	7		193	Abo Said Ahmed G2	23.2	L	620	2.95		-	
				203	Abo Said	25.2	R	1,355	3.70		-	
				172	El Hododa	28.0	R	1,579	5.45		1	100
				206	Kafr El Wekala	29.4	R	2,355	5.30		1	150
				207	El Salsoul	29.9	L	770	4.35		-	
				205	Om El Nazer	30.2	R	1,380	5.2		-	
				208	Om Khonisra	32.0	R	690	3.0		3	400
				204	El Khazan	32.5	R	1,150	7.85		3	200
				203	Abou Alad	32.8	L	420	2.14		-	
				209	Bahr El Dafna	33.9	L	770	1.63		-	
				210	Zaian	1.6	L	2,000	6.1		2	0
Bahr Basandila	11	5		211	Om Alfa El Keblia	34.1	R	580	5.5		1	150
				212	Om Alfa El Baharia	1.3	L	770	4.7		1	200
Total	-	41	3.7	-	-	-	-	62,162	217.5	10.9	49	7670

Canal Improvement in Water District (12)Bilqas

Main Canal				Branch Canal (Delivery)									
	Water Dist.	LNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Mesqa	Area by Mesqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
Bahr Shebin								3,240				
				214	Kafr Demira Ganabia	65.8	R	2,000	5.00		3	600
				215	Bohot Ganabia	65.8	L	1,240	4.65		2	400
Raiah Bilqas						65.8		11,748	9.70			
				216	Bohot Branch	4.8	L	1,090	3.10		1	100
				217	Bohot Ganabia No.2	4.8	L	1,010	2.70		-	
				218	Bilqas Ganabia	5.0	R	1,339	3.65		-	
				219	Shehab El Deen	1.0	R	470	3.60		1	250
				213	Zolfakar	7.2	L	1,160	7.80		-	
				229	Tahwela Bahr El Maasara	8.3	L	-	1.80		-	
				220	Bashawat	9.0	R	3,416	9.40		12	2,500
				230	Daheem	0.8	R	610	3.50		-	
Raiah Bilqas	12	5		231	Hafir Ganabia Right	9.4	R	1,242	3.50		2	200
				232	Hafir Ganabia Left	9.4	L	311	4.40		1	100
				233	Azakeen	0.8	L	1,100	3.10		-	
Bahr Hafir Shehab El Deen	12	5				9.4		31,481	24.00	5.1		
					Directly fr Bahr Hafir Shehab El Deen			2,422				
				234	Hafir Ganabia No.2	3.0	R	1,000	4.40		1	200
				221	Abo Khedra	1.3	R	1,000	3.02		1	150
Bahr Hafir Shehab El Deen	12	6		235	Hafir Ganabia No.2	4.5	L	498	2.35		-	
				236	El Nashra	1.2	L	600	1.75		2	200
Bahr Hafir Shehab El Deen	12	7		237	Hafir Ganabia No.3	7.2	L	1,100	3.60		2	300
				227	El Shawamy Ganabia No.1 Right	8.1	R	650	2.70		1	250
				222	Shawamy	8.1	R	9,150	15.75		6	1,200
				238	Gharbawi	7.4	R	500	2.40		-	
				239	Shawamy Ganabia No.2 Left	8.2	L	500	2.60		1	150
				240	El Had	9.1	L	750	3.11		-	
				241	Wastania	9.1	L	200	5.20		1	100
Bahr Hafir Shehab El Deen	12	4		228	El Shawamy Ganabia No.1 Left	8.2	R	650	2.55		3	650
				242	Hafir Ganabia No.3 Right	8.3	R	1,400	4.85		3	1,000
				243	Abo Deshisha	11.2	L	2,050	7.40		-	
				244	Hafir Ganabia No.4 Left	11.2	L	2,311	0.95		2	800
				226	Satamony	16.5	R	1,500	4.20		1	150
				223	El Manial	18.6	R	2,000	4.50		-	
				224	El Roda	21.0	R	1,200	3.69		-	
				225	El Gezira	22.5	R	2,000	5.70		1	200
Total	-	29	7.0	-	-	-	-	46,469	170.6	8.5	47	9,500

Canal Improvement in Water District (13) Maasara

Main Canal				Branch Canal (Delivery)								
	Water Dist.	LNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Masqa	Area by Masqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
Raish Bilqas								2,500				
				261	Maasara Ganabia No.1 Right	9.1	R	1,200	2.44		-	
Maasara G. No.1 R	13			262	Batna	1.2	R	1,300	3.45		2	400
Bahr El Maasara	13	2	1			9.7		32,280	7.20	3.9		
					Directly from Bahr El Maasara			1,214				
				263	Maasara Ganabia No.1 Left	1.6	L	1,287	4.40		-	
				255	Sabaa	2.3	R	2,690	7.50		4	600
				264	El Tal	3.1	R	1,100	4.45		-	
				265	El Seteen	4.9	R	1,110	3.60		1	100
				266	Monsour	8.1	R	350	1.30		-	
Bahr El Maasara	13	1		267	Maasara Ganabia No.2 Right	2.3	R	2,000	1.27		-	
				268	El Bahr El Gedid	4.4	L	578	2.25		2	200
				259	Maasara Ganabia No.2 Left	4.4	L	500	2.70		-	
				256	Areed	5.3	R	2,050	6.97		-	
				260	Maasara Ganabia No.3 Right	5.4	R	500	2.27		-	
				246	El Gard	7.2	L	1,690	3.85		-	
				251	Bahr El Bashma	7.7	R	5,374	14.50		1	100
Bahr El Bashma	13	2		252	Serio	5.5	L	1,093	6.00		-	
				257	Habib	6.2	R	1,300	3.70		2	350
				247	Shotot	7.8	L	937	3.20		-	
				258	Komosion	9.1	R	3,200	5.10		-	
				245	Katf	9.9	R	1,405	4.10		-	
				248	Roz El Farkh	11.5	R	780	2.35		-	
Bahr El Maasara	13	2		249	Saberta	7.7	R	2,420	6.35		-	
Saberta	13	3		250	Sheldb	2.2	L	702	4.80		-	
Bahr El Banawan El Alaa						7.7		5,698	13.90	2.4		
					Directly from Bahr El Banawan El Aala			5,012				
				253	El Banawan El Aala Branch	4.6	L	170	4.50		-	
				254	Tahwita	9.8	L	516	3.00		-	
Bahr El Banawan El Asfal						13.9		-	4.70			
Total	-	10	1	-	-	-	-	40,478	125.1	6.3	12	1,750

Main Canal				Branch Canal (Delivery)								
	Water Dist.	UNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Mesqa	Area by Mesqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
El Eslah								11,420	3.03			
				269	El Sharakwa	12.7	R	4,716	13.65		8	3,000
El Shrakwa	14	1	0.5	273	Faraa 1	4.2	R	815	1.30		-	
				274	Faraa 2	7.8	R	905	2.00		-	
				275	Faraa 3 (Faraa El Shrakwa)	10.7	R	996	1.60		-	
El Eslah	14	3	0.5	271	El Tarfania	12.7	Ext.	3,988	13.00		9	1,350
El Nile								23,980	10.05			
					Directly from El Nile			3,271				
				270	El Soiah El Sharkia	24.2	L	2,898	3.20		1	150
				277	El Sheikha	24.2	R	3,900	5.00		-	
				278	Dokhan	29.2	R	6,100	6.50		11	2,200
				272	El Soiah El Gharbia	29.2	L	5,811	3.75		3	600
El Soiah El Gharbia	14	1		276	Eastern Ganabia of El Gharbia Main Drain	56.5		2,000	8.20		4	850
Total	-	5	1	-	-	-	-	35,400	71.3	3.6	36	8,150

Main Canal				Branch Canal (Delivery)									
	Water Dist.	UNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Meaqa	Area by Meaqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
El Sahel El Olia	15	5	5.5			36.8	R	11,650	42.70			
					Directly from El Sahel El Olia			8,510				
				294	Meet Nabet	12.0	R	720	4.50		-	
				282	Bahr Wish	12.5	L	1,090	4.50		1	200
				295	Sorsok	14.9	L	100	3.00		-	
				283	Arab	18.0	L	800	4.40		-	
				296	Bawra	1.6	L	430	1.85		-	
Bahr Shebin	15	4						36,284				
				280	Tera Ganabia Left	47.2	L	1,979	5.10		4	750
				290	Tera Ganabia Right	47.3	L	3,000	6.10		4	890
				297	Tonekh Ganabia Right	47.7	R	900	4.50		1	130
				298	Tonekh Ganabia Left	47.8	L	660	3.50		3	600
				284	Dreen	50.9	L	2,400	6.70		1	1,000
				292	El Hessa Ganabia Left	50.9	L	2,325	3.80		1	250
				293	El Hessa Ganabia Right	50.9	R	600	1.35		-	
				291	Kafr El Genina	53.2	R	1,310	4.50		2	300
				300	Kafr El Genina Ganabia	53.8	R	1,095	1.25		1	150
				279	Nasha	55.1	L	3,355	11.50		5	1,500
				301	Maashet	8.3	R	1,360	3.66		1	300
Bahr Shebin	15	3		302	New Nabro	55.7	R	1,350	3.37		-	
				303	Nabro Ganabia Right	55.7	R	840	3.40		-	
				285	Taiba	56.2	L	2,070	11.00		5	1,500
Taiba	15	5		286	Katosha	2.7	R	660	2.30		1	200
				287	Hosha	4.9	R	2,000	9.00		3	800
				304	Sharkawia	5.4	L	400	3.35		2	400
				288	Taba Branch (Taiba)	6.6	R	1,655	3.78		3	600
				281	Gard El Agamy	8.1	L	600	2.55		3	600
Bahr Shebin	15	7		305	Nabro Ganabia Left	56.3	L	280	2.25		-	
				289	Kafr Bohot	58.7	L	1,690	4.50		2	350
				295	El Taftish Ganabia Left	59.6	L	1,460	6.00		3	600
				306	Kofour El Arab Ganabia	60.2	R	940	2.05		2	300
				307	Kafr Demira El Kadim	62.0	R	1,020	3.10		2	400
				308	Om Dorman Talkha	63.1	R	1,675	3.60		2	420
				309	El Taftish Ganabia Right	64.1	R	660	1.04		1	250
Total	-	24	5.5	-	-	-	-	47,934	174.2	8.7	53	12490

Main Canal				Branch Canal (Delivery)								
	Water Dist.	LNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Mesqa	Area by Mesqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
El Sahel El Olia	16	8	8.6					19,952		6.1	5	
				312	Batra Ganabia	34.0	L	869	1.80		3	350
				313	Abd Ellah	35.9	L	250	2.40		1	80
				321	Deel	39.6	R	572	1.70		-	
				322	El Omda	40.4	R	890	1.85		-	
				310	El Khet	41.0	L	2,463	5.00		4	900
				323	El Dawar	5.0	R	980	2.85		1	50
El Sahel El Olia	16	3		324	El Sheikh Smit	41.5	L	740	2.27		-	
				314	Bahr El Hesas	41.8	L	1,600	8.00	0.3	3	250
Bahr El Hesas	16	4		315	El Sherka El Gedida	2.2	R	800	4.50		-	
				316	El Sherka El Kadima	4.1	R	1,340	3.00		1	250
					(extension of El Sahel El Alia)	42.7	Ext.	9,448	25.40		-	
					(Branch of El Sahel)	42.7	L	22,860	39.50			
					Directly from El Balamoun			3,560			3	
				317	El Balamoun Ganabia	0.8	L	1,000	3.70		1	50
				318	El Bosha	4.0	L	2,145	5.40		-	
				325	El Balamoun Ganabia No.3	7.0	L	890	2.10		1	280
				326	El Ghashasha	0.1	L	570	3.50		-	
El Balamoun	16	2		319	Abou Galal	10.2	L	4,140	8.40	0.4	3	250
				320	Sidy Saleh	6.0	L	1,425	3.00		1	40
El Balamoun	16	3		327	El Balamoun Ganabia No.4	10.2	L	1,710	1.70		1	100
				311	Ras El Khelig	10.2	L	4,060	8.40	0.6	2	250
				329	El Bank	6.1	R	1,870	8.40		1	50
El Balamoun	16	4		328	El Balamoun Ganabia No.5	12.2	L	1,490	5.10		-	
Total	-	24	8.6	-	-	-	-	42,812	148.0	7.4	31	2,900

Main Canal				Branch Canal (Delivery)									
	Water Dist.	UNOG	Slope Prot.			Location		Area Ser.	Length	Slope Prot.	Meaqa	Area by Meaqa
Name	No.	No.	Km	No.	Name	Km	Lft/Rht	Fed.	Km	Km	No.	Fed.
Balamoun	17	3	11		Km from intake of El Sahel El Alia	42.7		44,600	21.20			
					Directly fr Balamoun			1,838				
				331	Wastanie	17.2	L	6,350	10.50		3	1,950
				342	Wastanie Branch	8.0	L	300	1.10		-	
Balamoun	17	4		332	Maktа Kafr Saad El Gedid	19.5	L	4,500	12.25		5	2,250
				343	No.1 Branch	2.5	R	720	2.20		-	
				344	No.2 Branch	6.5	L	1,260	0.65		-	
				345	Rokabia	12.5	R	935	5.05		-	
				333	Maktaa Saad El Kadim from Balamoun	14.6	L	600	1.74		-	
				334	Mashaleb	21.8	L	5,335	9.40		-	
				335	Om Amer	7.5	R	2,153	4.85		-	
				336	Kafr Salman	22.9	L	2,990	7.10		-	
				337	Sharida	25.0	L	2,340	4.92		-	
				346	Om Dongol	29.3	L	5	4.90		-	
				347	Om Dongl El Keblia	0.5	L	2,990	12.90		-	
				348	Om Dongol El Baharia	0.5	R	0	13.80		-	
Om Dongol El Baharia	17	3		349	Shabrawy	7.2	R	1,071	3.80		-	
				350	Om Reda	9.9	R	2,340	3.00		-	
				351	Shalaby	12.5	R	2,205	3.00		-	
				338	Tabia	33.0	L	2,808	5.60		1	2,808
				330	Sanania	37.2	L	1,800	6.40		-	
				355	Madi	0.7	R	600	3.32		-	
				356	Arfy	4.3	R	800	0.40		-	
Balamoun	17	4		357	Zaher	38.6	L	600	3.70		-	
El Sahel El Softa	17	3	11			25.4		8,280	19.50			
					Directly fr El Sahel El Softa			2,980				
				352	Maktaa Saad El Kadim	1.0	L	400	3.30		1	400
				339	Kafr El Manazla	5.5	L	1,500	3.95		-	
				340	El Lozy	7.0	L	1,200	2.40		-	
				341	El Badry	11.5	L	1,200	2.30		-	
				353	Branch of El Sahel El Softa (extension)	34.0		1,000	3.40		-	
Nile Canal from Damietta Branch (Km from Delta Barrage)						215.0		5,400	7.10		3	1,350
Total	-	17	22	-	-	-	-	58,280	183.7	9.2	13	8758

Table G.2.2 List of Delivery Canal In the Priority Area (F/S)

(as of November,1998)

STA	Cumulative Distance (m)	Distance (m)	Bottom Width (m)	Side Slope (:1)	Bed Slope (cm/km)	Structure and Conditions							Length w/in Village (m)
						Width (m)	Height (m)	Sill EL (m)	Nos.	Good	Repair	Replace	
Bahr Biyala ald Tahwalah Bahr Biyala													
1	0-900	900	1.5	1:1	1.3	1.1	2.00	0.90	2	*			
2	900-1340	440	1.0	1:1	1.3								
EL Kafr EL Sharkie													
1	0-4470	4470	1.5	3:2	10	1.0	2.70	0.15	1			*	
Ganab. (10) right													
1	0-470	470	1.0	1:1	10	1.0	2.65	0.30	1			*	
Bahr EL Nor No.10													
1	0-4100	4100	5.0	1:1	4	3.0	3.45	0.80	1	*			
2	4100-5500	1400	4.0	1:1	horiz								
3	5500-7170	1670	3.0	1:1	horiz								
Ragheb Basha													
1	0-2200	2200	2.0	1:1	5	1.0	2.20	0.50	1	*			
2	2200-5910	3710	1.5	1:1	5								
Foda													
1	0-1000	1000	2.0	1:1	8	2.0	2.85	1.35	1	*			
2	1000-3925	2925	1.5	1:1	8								
El Nezam													
1	0-1170	1170	4.0	1:1	7	2.0	3.10	1.00	1	*			
2	1170-4350	3180	3.0	1:1	7								
3	4350-5700	1350	2.5	1:1	7								
4	5700-8330	2630	2.0	1:1	7								

Table G.2.2 List of Delivery Canal In the Priority Area (F/S)

(as of November,1998)

STA	Cumulative Distance (m)	Distance (m)	Bottom Width (m)	Side Slope (:1)	Bed Slope (cm/km)	Structure and Conditions							Length w/in Village (m)
						Width (m)	Height (m)	Sill EL (m)	Nos.	Good	Repair	Replace	
EL Mahatta													
1	0-2565	2565	1.0	1:1	10	0.8	2.40	(0.40)	1			•	
Bahr Biala No.7													
1	0-3400	3400	5.0	3:2	2	2.0	4.25	1.15	2	•			
2	3400-7600	4200	3.0	3:2	6								
3	7600-1400	6400	2.0	3:2	horiz								
Marzouk													
1	0-2320	2320	1.5	3:2	12	1.0	2.2	1.05	1	•			
2	2320-3150	830	1.0	3:2	12								
Bahr Biyala & El Nour													
1	0-1200	1200	9.0	1:1	horiz	3.0	3.8	0.85	2	•			
2	1200-1550	350	6.0	1:1	horiz								
Abshan													
1	0-3140	3140	4.0	1:1	7	3.0	4.3	0.6	1	•			
2	3140-6540	3400	3.5	1:1	7								
3	6540-9600	3060	3.0	1:1	7								
4	9600-12400	2800	2.0	1:1	7								
5	12400-15400	3000	1.5	1:1	7								
6	15400-17558	2158	1.0	1:1	7								
El Agamy													
1	0-440	440	1.5	1:1	10	2.0	4.15	0.65	1	•			
Ganab (4) left													
1	0-1450	1450	2.0	3:2	5	1.5	3	1.5	1	•			
2	1450-3900	2450	1.5	3:2	5								

Table G.2.2 List of Delivery Canal In the Priority Area (F/S)

(as of November,1998)

STA	Cumulative Distance (m)	Distance (m)	Bottom Width (m)	Side Slope (:1)	Bed Slope (cm/km)	Structure and Conditions							Length w/in Village (m)
						Width (m)	Height (m)	Sill EL (m)	Nos.	Good	Repair	Replace	
Ganab (2) right													
1	0-1500	1500	2.0	1:1	horiz	1.5	2.9	2.30	1	•			
2	1500-2620	1120	1.5	1:1	horiz								
EL Shorafa													
1	0-2000	2000	1.5	3:2	8	1.0	2.45	0.95	1	•			
2	2000-4300	2300	1.0	3:2	8								
EL Sharkaweiah													
1	0-2500	2800	2.0	1:1	7	2.0	2.85	1.30	1	•			
2	2500-3400	960	1.5	1:1	7								
3	3400-4810	1410	1.0	1:1	7								
Ganab (3) left													
1	0-740	740	1.0	3:2	13	1.0	2.20	2.20	1	•			
Ganab (7) right													
1	0-1000	1000	1.0	3:2	5	0.6	2.55	0.90	1	•			
Ganab (3) right													
1	0-1510	1510	1.5	1:1	10	1.0	2.40	2.60	1	•			
Ganab (2) left													
1	0-3615	3615	1.0	3:2	12	1.0	2.75	2.50	1	•			
Ganab (7) left													
1	0-1500	1500	1.5	3:2	8	1.0	2.75	0.20	1	•			
2	1500-3250	1750	1.0	3:2	8								

Table G.2.2 List of Delivery Canal in the Priority Area (F/S)

(as of November,1998)

STA	Cumulative Distance (m)	Distance (m)	Bottom Width (m)	Side Slope (:1)	Bed Slope (cm/km)	Structure and Conditions							Length w/in Village (m)
						Width (m)	Height (m)	Sill EL (m)	Nos.	Good	Repair	Replace	
Ganb (6) right													
1	0-3660	3660	1.5	3:2	10	1.0	2.75	1.75	1	•			
Bahr El Banawan Lower													
1	0-8800	8800	7.5	3:2	7	2.5	3.25	0.40	2	•			
2	8800-11200	2400	6.0	3:2	8								
Zobaa													
1	0-3000	3000	3.0	3:2	Horiz	2.5	3.25	0.50	1	•			
2	3000-5660	2660	2.0	3:2	Horiz								
Kom El Hegna													
1	0-5370	5370	1.0	1:1	10	1.5	2.40	0.90	1	•			
Hazek													
1	0-1000	1000	1.5	1:1	10	1.1	2000.00	0.90	1	•			
2	1000-2780	1780	1.0	1:1	10								

G.3 Categorization of Delivery Canals

G.3.1 Data Collection and Items

To be able to categorize the delivery canals in the Study Area and to grasp the problems and constraints on the present irrigation and drainage system, data were collected by the following methods:

- Workshop

Workshop type meetings were held with relevant irrigation officers, such as, directors, inspectors and district water engineers during which present problems and constraints were presented.

- Questionnaire

A questionnaire was provided to the 17 relevant water district officers, inquiring present condition, such as, water shortage and the reason, drainage reuse, tail condition and wastage spillage from the tail, intake condition, domestic waste and washing in canals.

On water quality, the result of the water quality test in the Study Area was applied since there are no available data for the categorization of the delivery canals. On farming practices, the statistical data by district were collected since there are no available data by delivery canals.

-Field Observation

The collected data on structures were verified by field observations. The farm economy survey for 240 farm households were conducted to supplement the statistical data on farming practices.

The indices for categorization of delivery canals are as follows;

(1) canal length (length and intake point)
(2) command area
(3) amount of water supply (degree on water shortage)
(4) pattern of irrigation water supply (rotational or continuous)
(5) operation of ineffective water release (attention to affect downstream area)
(6) maintenance condition of irrigation facilities (needs for repair and/or rehabilitation)
(7) situation of irrigation water contamination
(8) practice of drain water reuse
(9) situation of salt accumulation and damage by salinity
(10) custom on farming practices and water distribution

(11) relation with rural life (necessity of domestic water supply)
(12) present condition of Meska (canal number and service area)

G.3.2 Data Analysis

(1) Command area

The total command irrigation water area conveyed through the 357 delivery canals is calculated at 617,069 feddan (about 259,169 ha) which is equivalent to 89% of the total irrigation area. The remaining 11% of the irrigation area is directly irrigated from the main canals. The average command area of a delivery canal is 1,728 feddan (about 726ha).

(2) Amount of water supply (degree on water shortage)

About 44% of the delivery canals have water shortage during the summer season. occurs at (156 delivery canals). The command area of the delivery canals in question is 412,088 feddan (about 173,100ha). By region, 43 delivery canals in question are distributed in the lower part of Bahr Tera main canal where water shortage is about 74%. Therefore, this area is considered as a water shortage area. Also, 65% of the delivery canals served by Bahr El Mallah main canal suffer from water shortage followed by the area served by Bahr El Maasara (59%). The remaining areas have delivery canals with less than 50% water shortage. The main causes of water shortage are prior irrigation in the upstream area and increase of irrigation by illegal rice cultivation.

(3) Pattern of irrigation water supply (rotational or continuous)

At present, five (5) days rotational irrigation is practiced in all delivery canals during the summer season (from seeding to harvesting of cotton). Rotation is changed to four (4) days when rice cultivation starts until the end of the irrigation term for cotton. In winter season, the rotation change to five (5) days-on with ten (10) days-off. The continuos flow is not adopted. The Irrigation Improvement Project has been carried out with continuous flow as a precondition.

(4) Operation of ineffective water release

In summer season, ineffective water release from the end point of a delivery canal is not found. There are some ineffective water release at some delivery canals (26 delivery canals, 7% of all) in winter season. Therefore, water management is considered to be relatively effective. The result of field investigation shows that, ineffective water release at the tail of

meska are frequently found. This is caused by the unnecessary operation of opening intake gates in the supply of water by rotational irrigation. This indicates the lack of farmers realization for efficient water management and the defect of the rotational irrigation system.

(5) Maintenance condition of irrigation facilities(needs for repair and/or rehabilitation)

At present, 56% of the delivery canals have no problems with their facilities. The intake facilities of the remaining 22% of delivery canals needs repair. Also, 22% of the delivery canals needs rehabilitation. Most of the intake facilities with problems have been in used for more than 30 years.

(6) Situation of irrigation water contamination

Water quality becomes worse as water flows at the downstream reaches of the delivery canals. Especially, at the downstream area served by the Bahr Tera main canal, all the delivery canals have problems on water quality. There are also water quality problems in the Masalla branch canal and Basandeila main canal command area at the downstream of the Bahr Shebin principal canal. These areas are new reclaimed lands. For the rest of the areas, water quality problems have not been identified at present.

(7) Practice of drain water reuse

The reuse of drainage is somehow related to water shortage situation. The reuse of drainage is executed at 97% of delivery canals in the lower part of Bahr Tera main canal. In the Study Area, the reuse of drainage is executed at 135 delivery canals (35% of all the delivery canals). Of this, 73 delivery canals are officially approved for reuse of drainage. For the other 62 delivery canals, the reuse of drainage water is unofficially executed by the farmers.

(8) Situation of salt accumulation and damage by salinity

There is no problem on salt accumulation in the irrigation water from the Nile river as it can be used for domestic water use as well as agricultural use. In the downstream reaches of the Study Area (mostly new reclaimed area), water is mixed with drainage (one fresh water to one drainage water) to make up for water shortage. The fresh and drainage water are mixed empirically without any water quality observation. Although there are no statistical data on salt affected damages on crops, the reason cited for the low yield of farm products at the downstream area, such as, the north new reclaimed area are water shortage and salinity .

(9) Custom on farming practices and water distribution

Since there are no available data on agriculture by delivery canals, the statistical agricultural data by district were applied for each delivery canal. Hence, the same agricultural data were distributed into the delivery canals that belong to the same district.

The custom on water distribution is that the upper land is irrigated before the lower part but the quantity of water retained should not reach above the ankle. However, since there are no water user's organization, the farmers complain individually to the local officers of the Irrigation Department in Tanta. As a response, the local staff control check gates after the evaluation of the complaint, but their control is based on experience.

(10) Relation with rural life (necessity of domestic water supply)

Due to the inadequate amount of potable water supplied by the village water supply system, most women wash cloths and tableware at the irrigation canal. Well water is not used in the downstream area due to salt accumulation. Farmers and their family, who live along the irrigation canal, throw their garbage into the canal. This is one reason for the contamination of water in the irrigation canal and canal itself. It also causes the inefficient gate facility operation.

Some relations exist between length of delivery canals and service area, length of delivery canals and share of Meska service area, crop unit yield and length of delivery canal etc. There is a relatively apparent trend that the longer delivery canal, the bigger is the service area is. (Refer to Figure G.3.1)

G.3.3 Case Study

(1) Principal component analysis

The principal component analysis searches for the linear combination (principal component) which would best represent the interrelations between indices. Principal components are new variables made by integrating many original variables by mathematical method so that with few variables (two or three) the trend of data can be easily grasped. When the original variable is $X_1, X_2, \ldots X_p$, principal component variables are defined as follows;

$$Z_1 = a_{11}*X_1 + a_{12}*X_2 + \ldots + a_{1p}*X_p$$
$$Z_2 = a_{21}*X_1 + a_{22}*X_2 + \ldots + a_{2p}*X_p$$
$$\ldots\ldots\ldots\ldots$$
$$Z_n = a_{n1}*X_1 + a_{n2}*X_2 + \ldots + a_{np}*X_p$$

(Z_n: principal component variable, a_{np} :intercept)

Principal Component variables are fewer than the original variables and normally the first and second principal component variable will be utilised for data analysis. Therefore, the loss of information of original variables, when integrated into principal component variables, should be minimised to make the analysis significant. The level of significance is measured by an index called contribution. Also the meaning of principal component variables has to be defined though it depends on subjectivity of analyser.

With several trials, three (3) cases were analysed with the quantitative indices of delivery canals as follows;

Case1(9 variables): Delivery canal service area, length of delivery canal, % of Meska service area, cropping intensity, and unit yield of major summer crops(rice, cotton, maize)

Case2(5 variables): Delivery canal service area, length of delivery canal, % of meska service area, cropping intensity and unit yields of rice

Case3(7 variables): Delivery canal service area, length of delivery canal, % of meska service area, total cropping intensity of summer season and unit yields of rice, wheat and maize

(Refer to Table G.3.1)

The result of these case studies showed lower significance and less clear in characterising the data with the first and second principal component variable. (Refer to Table G.3.2~G.3.4)

Case	Meaning of 1st, 2nd principal component variable	Contribution
Case1	1st: Agricultural affluence 2nd: Degree of water shortage	0.452
Case2	1st: Degree of water shortage 2nd: Agricultural affluence	0.613
Case3	1st: Agricultural affluence 2nd: Degree of water shortage	0.520

(2)Discriminate analysis

Discriminate analysis is normally adopted to define a datum which to belong to categories given. As each delivery canal described as either rare, often, very often, or always in water shortage, discriminate analysis was applied to examine if this description made clear category of the delivery canals. There are several methods to carry out discriminate analysis.

In this study, the method of multiple regression analysis was applied. Object variable is grade of water shortage (rare, often very, often and always) and the explanatory variables are 13 items (delivery canal service area, length of delivery canals, % of Meska service area, cropping intensity and unit yield of major summer crops (rice, cotton, maize) intake condition (good or repair) and salinity (none or slight)). Regression equation obtained by these variables are adopted as discriminate function which is described as follows;

$$Y = a_1*X_1 + a_2*X_2 + \ldots\ldots\ldots\ldots + a_{13}*X_{13}$$

Y : Objective variable
X_n: Explanatory variable
a_n: interception

Since the discriminate analysis with multiple regression analysis can be applied to distinguish two (2) categories at one time, the object variables are combined as follows;

Analysis 1: Water shortage is "rare" or "often, very often and always"
Analysis 2: Water shortage is "rare and often" or "very often and always"
Analysis 3: Water shortage is "rare, often and very often" or "always"

Value of objective variable (Y) depends on the number of data in a category. Provide the number of data belonging to category A is N_1 and data belonging to Category B as N_2, the value of objective variable will be one (1) and $-N_1/N_2$. Accordingly, the value of object variable on the analysis is determined as follows;

Analysis 1: "rare"; Y= 1
"often, very often and always"; Y= -1
Analysis 2: "rare and often"; Y= 1
"very often and always"; Y= -5
Analysis 3: "rare, often and very often"; Y= 1
"always"; Y= -19

The discriminate functions determined with these variables are applied to examine if the function discriminate each delivery canal correctly. For example, for analysis 1, if Y>0, the delivery canal belongs to "rare" category and if Y<0, the delivery canal belongs to "often, very often and always" category. By this examination, the ratios of correct discrimination were 70% in Analysis 1, 62% in Analysis 2 and 59% in Analysis 3. The result may indicate that the character of water shortage for delivery canals does not significantly categorise the delivery canals. (Refer to Table G.3.5, G.3.5.1~G.3.5.3)

(3) Cluster analysis

The cluster analysis is a method of categorisation of data. Categorisation by the cluster analysis is based on the similarity (distance) of the data. The similarity (distance) among data is defined by mathematical method (Euclid's distance, Mahalanobis' distance etc.) With the defined distance, numbers of clusters (categories) are organised. To make a certain number of clusters, combination and separation of the clusters will be processed. Distance between clusters is the criteria of combination and separation of the clusters and the method of combination and separation are based on mathematical methods (nearest neighbour method, furthest neighbour method, centroid method etc.).

While the principal component analysis and discriminate analysis include testing indicators of the validity, such as, contribution ratio and correct discrimination ratio, the validity of cluster analysis is judged by the categorised cluster itself. Several cases were tested and the major six (6) case studies conducted are described as follows;

Case	Variable	No. of Cluster
Case1.1	Water shortage, Intake condition, Salinity	4
Case1.2	Water shortage, Intake condition, Salinity	8
Case2.1	Water shortage, Intake condition, Salinity, Agr. Income	4
Case2.2	Water shortage, Intake condition, Salinity, Agr. Income	8
Case3.1	Water shortage, Intake condition, Salinity, Agr. Income, Domestic waste	4
Case3.2	Water shortage, Intake condition, Salinity, Agr. Income, Domestic waste	8

Note: 1) Variables are ranking data.

2) The furthest neighbour method was adapted in these cases.

The indicators of delivery canals according to the cluster (category) were examined on the significance of the result of each case. The result of cases of four (4) clusters are as follows;

Case 1.1	Case 2.1	Case 3.1
Category A: 232 delivery canals B: 63 delivery canals C: 32 delivery canals D: 30 delivery canals	Category A: 189 delivery canals B: 112 delivery canals C: 33 delivery canals D: 23 delivery canals	Category A: 155 delivery canals B: 98 delivery canals C: 59 delivery canals D: 45 delivery canals
Water shortage is rare in category A and B. Water quality is good in A but bad in B. Water shortage is severe in Category C and D. Length of delivery canals is remarkably long in C and % of Meska service area is remarkably large in D	Character of categories is similar to case 1.1. However the distinction between A and B is less clear than case 1.1 in terms of water quality.	Distinction between categories becomes less clear than cases 1.1 and 2.1.

With the analysis of case1.2, 2.2 and 3.2, the adoption of case1 (1.1 and 1.2) is decided to be the clearest case. (Refer to Table G.3.7~G.3.13, Figure G.3.2~G.3.4)

Figure G.3.1 Basis of Data Distribution

Figure 1 Relation between Length and Served Area of delivery Canal

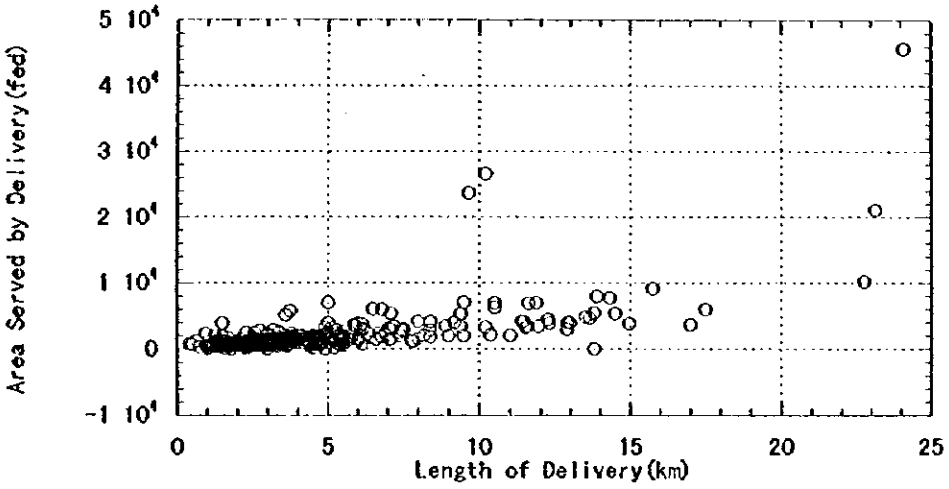


Figure 2 Relation between Share of Meska Command Area and Length of delivery Canal

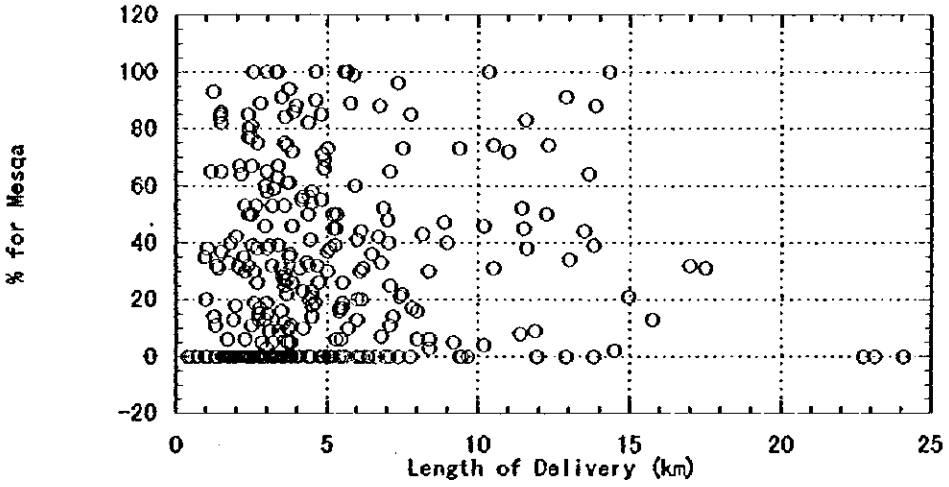


Figure 3 Relation between Share of Meska Command Area and Served Area of delivery Canal

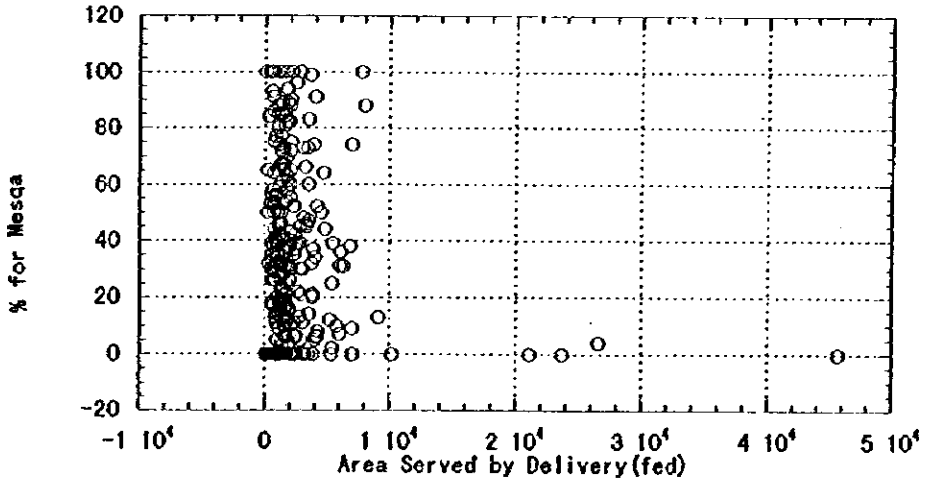


Figure 4 Relation between Unit Yield(rice) and Served Area of delivery Canal

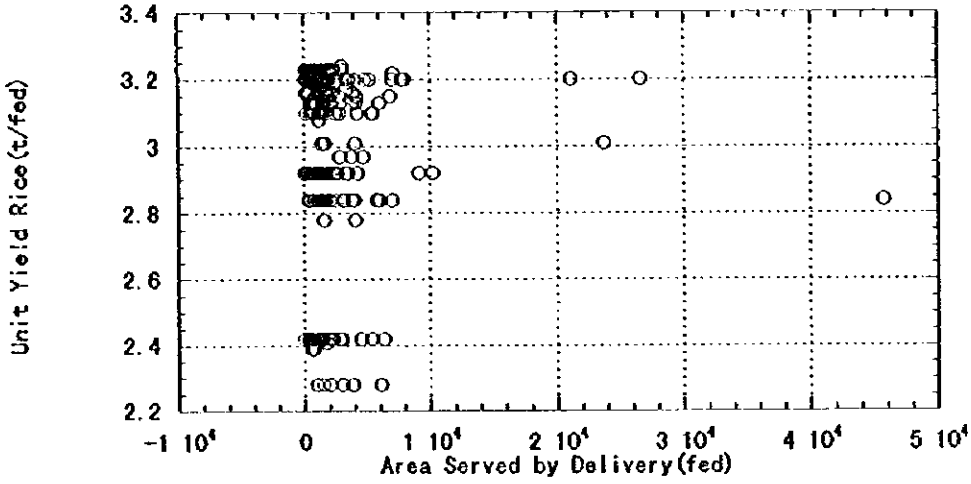
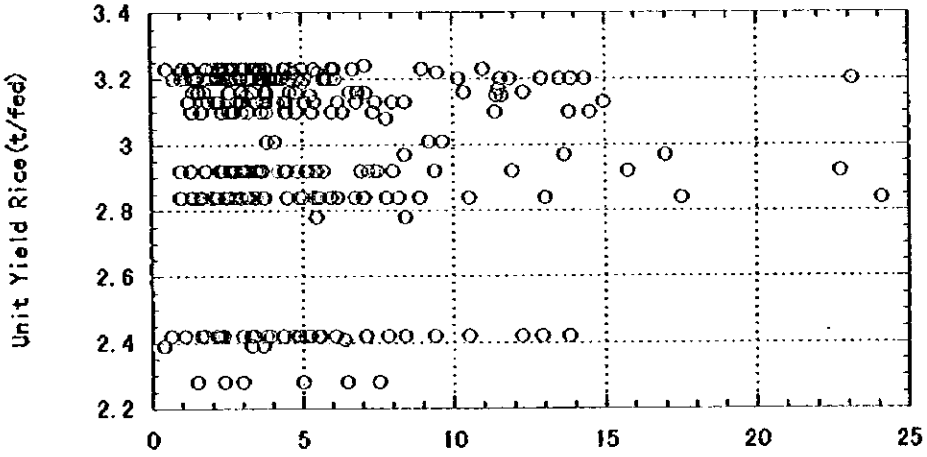


Figure 5 Relation between Unit Yield(rice) andlength of delivery Canal



(1) Principal Component Analysis

Table G.3.1 Data Variables for Case Study

Case 1

Data by Delivery

District Name	Water District Name	Delivery No.	Delivery Name	Area Ser. Feddan	Length km	% for Mango	Cropping Intensity % Main System Crops Cotton	Maize	Rice	Crop Unit Yield (1993/94, 1994/95) Cotton (ton)	Maize (ton)	Rice (ton)
				X1	X2	X3	X4	X5	X6	X7	X8	X9
Zifta	Bahary Zifta	1	Omar Pick Garabia No.1 Left	2,050	3.80	35	152	54.1	88	0.78	2.44	3.22
Zifta	Bahary Zifta	2	El Sabourry El Nady	1,700	5.54	100	152	54.1	88	0.78	2.44	3.22
Zifta	Bahary Zifta	3	Omar Pick Garabia No.2 Left	300	0.97	0	152	54.1	88	0.78	2.44	3.22
Samanoud	Bahary Zifta	4	West Badr	3,931	12.31	74	14.9	27.8	46.8	0.79	2.69	3.18
Samanoud	Bahary Zifta	5	West Badr Garabia	1,065	4.80	100	14.9	27.8	46.8	0.79	2.69	3.18
Samanoud	Bahary Zifta	6	Bone Abouseer Garabia	370	1.78	0	14.9	27.8	46.8	0.79	2.69	3.18
Samanoud	Bahary Zifta	7	Abou Seer	1,500	6.82	0	14.9	27.8	46.8	0.79	2.69	3.18
Samanoud	Bahary Zifta	8	Abou Seer Garabia	800	3.78	0	14.9	27.8	46.8	0.79	2.69	3.18
Samanoud	Bahary Zifta	9	El Yamany	2,140	10.36	100	14.9	27.8	46.8	0.79	2.69	3.18
Samanoud	Bahary Zifta	10	West Habeeb	1,300	3.84	72	14.9	27.8	46.8	0.79	2.69	3.18
Samanoud	Bahary Zifta	11	Marzid El Tawed	1,000	3.00	36	14.9	27.8	46.8	0.79	2.69	3.18
Samanoud	Bahary Zifta	12	El Yamany Wada	300	1.40	0	14.9	27.8	46.8	0.79	2.69	3.18
El Mahalla El Kubra	Bahary Zifta	13	Mahallah Tarsek El Mahallah	1,750	3.74	84	24.4	29.4	48.8	0.80	2.71	3.20
El Mahalla El Kubra	Bahary Zifta	14	El Marzabany	1,760	2.50	11	24.4	29.4	48.8	0.80	2.71	3.20
Zifta	Bahary Zifta	15	Dahtoura Garabia	2,000	8.50	0	15.2	54.1	88	0.78	2.44	3.22
Zifta	Bahary Zifta	16	Bahr Shershaba	3,100	8.50	0	15.2	54.1	88	0.78	2.44	3.22
Zifta	Bahary Zifta	17	Shershaba Garabia No.3 R	550	4.75	0	15.2	54.1	88	0.78	2.44	3.22
Zifta, Samanoud	Bahary Zifta	18	Abou Obya	1,800	4.30	33	24.7	41.8	27.8	0.78	2.87	3.20
Santa, Zifta, El Mahalla El Kubra	Bahary Zifta	19	El Sabourry El Sally	3,000	7.10	11	18.8	40.5	28.5	0.79	2.58	3.24
Zifta	Bahary Zifta	20	Garabia No.4 Right	200	2.27	0	15.2	54.1	88	0.78	2.44	3.22
Samanoud	Bahary Zifta	21	Garabia No.5 Right	150	1.80	0	14.9	27.8	46.8	0.79	2.69	3.18
Samanoud	Bahary Zifta	22	Garabia No.6 Right	400	1.55	0	14.9	27.8	46.8	0.79	2.69	3.18
Santa, Samanoud	Bahary Zifta	23	Garabia No.8 Right	450	1.75	0	14.7	41.0	27.8	0.78	2.87	3.20
El Mahalla El Kubra	Bahary Zifta	24	Garabia No.7 Right	800	2.14	0	24.4	29.4	48.8	0.80	2.71	3.20
El Mahalla El Kubra	Bahary Zifta	25	Mantaz Garabia	1,700	4.90	82	24.4	29.4	48.8	0.80	2.71	3.20
El Mahalla El Kubra	Bahary Zifta	26	Mokhtar Garabia	1,000	3.87	88	24.4	29.4	48.8	0.80	2.71	3.20
El Mahalla El Kubra	Bahary Zifta	27	Garabia No.9 Right	800	1.33	0	24.4	29.4	48.8	0.80	2.71	3.20
El Mahalla El Kubra	Bahary Zifta	28	Kafr Hegazy Garabia No.1	230	1.17	83	24.4	29.4	48.8	0.80	2.71	3.20
El Mahalla El Kubra	Bahary Zifta	29	Houd El Behera	2,040	4.80	90	24.4	29.4	48.8	0.80	2.71	3.20
El Mahalla El Kubra	Bahary Zifta	30	El Badrawy	1,800	5.79	89	24.4	29.4	48.8	0.80	2.71	3.20

Case 2

Data by Delivery

District Name	Water District Name	Delivery No.	Delivery Name	Area Ser. Feddan	Length km	% for Mango	Crop Intensity Rice	Unit Yield Rice (ton)
				X1	X2	X3	X4	X5
Zifta	Bahary Zifta	1	Omar Pick Garabia No.1 Left	2,050	3.80	35	88	3.22
Zifta	Bahary Zifta	2	El Sabourry El Nady	1,700	5.54	100	88	3.22
Zifta	Bahary Zifta	3	Omar Pick Garabia No.2 Left	300	0.97	0	88	3.22
Samanoud	Bahary Zifta	4	West Badr	3,931	12.31	74	46.8	3.18
Samanoud	Bahary Zifta	5	West Badr Garabia	1,065	4.80	100	46.8	3.18
Samanoud	Bahary Zifta	6	Bone Abouseer Garabia	370	1.78	0	46.8	3.18
Samanoud	Bahary Zifta	7	Abou Seer	1,500	6.82	0	46.8	3.18
Samanoud	Bahary Zifta	8	Abou Seer Garabia	800	3.78	0	46.8	3.18
Samanoud	Bahary Zifta	9	El Yamany	2,140	10.36	100	46.8	3.18
Samanoud	Bahary Zifta	10	West Habeeb	1,300	3.84	72	46.8	3.18
Samanoud	Bahary Zifta	11	Marzid El Tawed	1,000	3.00	36	46.8	3.18
Samanoud	Bahary Zifta	12	El Yamany Wada	300	1.40	0	46.8	3.18
El Mahalla El Kubra	Bahary Zifta	13	Mahallah Tarsek El Mahallah	1,750	3.74	84	48.8	3.20
El Mahalla El Kubra	Bahary Zifta	14	El Marzabany	1,760	2.50	11	48.8	3.20
Zifta	Bahary Zifta	15	Dahtoura Garabia	2,000	8.50	0	88	3.22
Zifta	Bahary Zifta	16	Bahr Shershaba	3,100	8.50	0	88	3.22
Zifta	Bahary Zifta	17	Shershaba Garabia No.3 R	550	4.75	0	88	3.22
Zifta, Samanoud	Bahary Zifta	18	Abou Obya	1,800	4.30	33	27.8	3.20
Santa, Zifta, El Mahla El Kubra	Bahary Zifta	19	El Sabourry El Sally	3,000	7.10	11	28.5	3.24
Zifta	Bahary Zifta	20	Garabia No.4 Right	200	2.27	0	88	3.22
Samanoud	Bahary Zifta	21	Garabia No.5 Right	150	1.80	0	46.8	3.18
Samanoud	Bahary Zifta	22	Garabia No.6 Right	400	1.55	0	46.8	3.18
Santa, Samanoud	Bahary Zifta	23	Garabia No.8 Right	450	1.75	0	27.8	3.20
El Mahalla El Kubra	Bahary Zifta	24	Garabia No.7 Right	800	2.14	0	48.8	3.20
El Mahalla El Kubra	Bahary Zifta	25	Mantaz Garabia	1,700	4.90	88	48.8	3.20
El Mahalla El Kubra	Bahary Zifta	26	Mokhtar Garabia	1,000	3.87	88	48.8	3.20
El Mahalla El Kubra	Bahary Zifta	27	Garabia No.9 Right	800	1.33	0	48.8	3.20
El Mahalla El Kubra	Bahary Zifta	28	Kafr Hegazy Garabia No.1	230	1.17	83	48.8	3.20
El Mahalla El Kubra	Bahary Zifta	29	Houd El Behera	2,040	4.80	90	48.8	3.20
El Mahalla El Kubra	Bahary Zifta	30	El Badrawy	1,800	5.79	89	48.8	3.20

Case 3

Data by Delivery

District Name	Water District Name	Delivery No.	Delivery Name	Area Ser. Feddan	Length km	% for Mango	Crop Intensity (summer)	Crop Unit Yield (1993/94, 1994/95) Cotton (ton)	Maize (ton)	Rice (ton)
				X1	X2	X3	X4	X5	X6	X7
Zifta	Bahary Zifta	1	Omar Pick Garabia No.1 Left	2,050	3.80	35	77.9	0.78	2.44	3.22
Zifta	Bahary Zifta	2	El Sabourry El Nady	1,700	5.54	100	77.9	0.78	2.44	3.22
Zifta	Bahary Zifta	3	Omar Pick Garabia No.2 Left	300	0.97	0	77.9	0.78	2.44	3.22
Samanoud	Bahary Zifta	4	West Badr	3,931	12.31	74	88.6	0.79	2.69	3.18
Samanoud	Bahary Zifta	5	West Badr Garabia	1,065	4.80	100	88.6	0.79	2.69	3.18
Samanoud	Bahary Zifta	6	Bone Abouseer Garabia	370	1.78	0	88.6	0.79	2.69	3.18
Samanoud	Bahary Zifta	7	Abou Seer	1,500	6.82	0	88.6	0.79	2.69	3.18
Samanoud	Bahary Zifta	8	Abou Seer Garabia	800	3.78	0	88.6	0.79	2.69	3.18
Samanoud	Bahary Zifta	9	El Yamany	2,140	10.36	100	88.6	0.79	2.69	3.18
Samanoud	Bahary Zifta	10	West Habeeb	1,300	3.84	72	88.6	0.79	2.69	3.18
Samanoud	Bahary Zifta	11	Marzid El Tawed	1,000	3.00	36	88.6	0.79	2.69	3.18
Samanoud	Bahary Zifta	12	El Yamany Wada	300	1.40	0	88.6	0.79	2.69	3.18
El Mahalla El Kubra	Bahary Zifta	13	Mahallah Tarsek El Mahallah	1,750	3.74	84	99.7	0.80	2.71	3.20
El Mahalla El Kubra	Bahary Zifta	14	El Marzabany	1,760	2.50	11	99.7	0.80	2.71	3.20
Zifta	Bahary Zifta	15	Dahtoura Garabia	2,000	8.50	0	77.9	0.78	2.44	3.22
Zifta	Bahary Zifta	16	Bahr Shershaba	3,100	8.50	0	77.9	0.78	2.44	3.22
Zifta	Bahary Zifta	17	Shershaba Garabia No.3 R	550	4.75	0	77.9	0.78	2.44	3.22
Zifta, Samanoud	Bahary Zifta	18	Abou Obya	1,800	4.30	33	83.2	0.78	2.87	3.20
Santa, Zifta, El Mahla El Kubra	Bahary Zifta	19	El Sabourry El Sally	3,000	7.10	11	86.9	0.79	2.58	3.24
Zifta	Bahary Zifta	20	Garabia No.4 Right	200	2.27	0	77.9	0.78	2.44	3.22
Samanoud	Bahary Zifta	21	Garabia No.5 Right	150	1.80	0	88.6	0.79	2.69	3.18
Samanoud	Bahary Zifta	22	Garabia No.6 Right	400	1.55	0	88.6	0.79	2.69	3.18
Santa, Samanoud	Bahary Zifta	23	Garabia No.8 Right	450	1.75	0	83.3	0.78	2.87	3.20
El Mahalla El Kubra	Bahary Zifta	24	Garabia No.7 Right	800	2.14	0	99.7	0.80	2.71	3.20
El Mahalla El Kubra	Bahary Zifta	25	Mantaz Garabia	1,700	4.90	88	99.7	0.80	2.71	3.20
El Mahalla El Kubra	Bahary Zifta	26	Mokhtar Garabia	1,000	3.87	88	99.7	0.80	2.71	3.20
El Mahalla El Kubra	Bahary Zifta	27	Garabia No.9 Right	800	1.33	0	99.7	0.80	2.71	3.20
El Mahalla El Kubra	Bahary Zifta	28	Kafr Hegazy Garabia No.1	230	1.17	83	99.7	0.80	2.71	3.20
El Mahalla El Kubra	Bahary Zifta	29	Houd El Behera	2,040	4.80	90	99.7	0.80	2.71	3.20
El Mahalla El Kubra	Bahary Zifta	30	El Badrawy	1,800	5.79	89	99.7	0.80	2.71	3.20

Table G.3.2 Result Case1

(Correlation Matrx)

	X1	X2	X3	X4	X5	X6	X7	X8	X9
X1	1								
X2	0.63828	1							
X3	-0.02905	0.093125	1						
X4	0.051259	-0.00372	-0.06562	1					
X5	-0.01733	-0.01608	0.144778	-0.37518	1				
X6	-0.03776	-0.02591	-0.10683	0.379756	-0.21324	1			
X7	0.051651	0.102663	0.149493	-0.13463	0.345297	-0.03079	1		
X8	-0.01742	0.042232	0.068372	-0.46014	0.503383	0.222723	0.573135	1	
X9	-0.01885	-0.01789	0.093	0.014881	0.583539	0.406557	0.458872	0.729883	1

Eigenvalue	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9
	2.416495	1.648982	1.276708	1.003657	0.967972	0.837569	0.564851	0.341971	-0.0582
Eigenvalue Vector									
X1	0.019585	0.692884	-0.09127	0.08842	-0.13982	-0.0453	0.162463	0.676852	0.025798
X2	0.060388	0.702875	-0.04872	0.00035	0.006882	0.012771	-0.11235	-0.6977	-0.02279
X3	0.137551	0.095974	0.319873	-0.0724	0.806466	-0.45106	-0.03016	0.090479	0.037007
X4	-0.36084	0.037381	-0.2779	-0.14234	0.459314	0.520835	0.488407	-0.04677	0.21895
X5	0.429153	-0.03453	0.381463	0.059509	-0.1617	0.001338	0.767901	-0.14278	-0.17139
X6	0.087779	-0.05146	-0.23446	0.925113	0.216055	0.070172	-0.00136	-0.01909	-0.16393
X7	0.407407	0.05827	0.249687	-0.12139	0.183407	0.688668	-0.34495	0.155594	-0.32043
X8	0.621606	-0.0604	-0.26221	-0.00155	-0.00492	0.045499	-0.0581	-0.00328	0.731931
X9	0.320297	-0.06793	-0.69164	-0.30936	0.112067	-0.20445	0.097445	0.003612	-0.50484
Square root ofEig	1.554508	1.284127	1.129915	1.001827	0.983856	0.915188	0.751568	0.584783	-
Contribution	0.268499	0.18322	0.141856	0.111517	0.107552	0.093063	0.062761	0.037997	-0.00647
Cumulated Cont.	0.268499	0.45172	0.593576	0.705093	0.812646	0.905709	0.96847	1.006467	1
Facotr Weight	0.030413	0.689751	-0.10312	0.088545	-0.13756	-0.04146	0.122102	0.395694	-
	0.093874	0.902581	-0.05279	0.00035	0.00677	0.011688	-0.08444	-0.408	-
	0.213824	0.123243	0.36143	-0.07253	0.793446	-0.41281	-0.02267	0.052911	-
	-0.56093	0.048002	-0.314	-0.1426	0.451899	0.476662	0.36707	-0.02735	-
	0.687122	-0.04434	0.43102	0.059617	-0.15909	0.001223	0.577128	-0.0835	-
	0.136454	-0.06608	-0.26491	0.926803	0.212567	0.064221	-0.00102	-0.01116	-
	0.633317	0.072257	0.282125	-0.12162	0.180446	0.630261	-0.25925	0.090989	-
	0.966291	-0.07756	-0.29627	-0.00155	-0.00484	0.04164	-0.04366	-0.0019	-
	0.497904	-0.08723	-0.78149	-0.30993	0.110258	-0.18711	0.073236	0.002112	-

Z1: The first principal component; Agricultural affluence
Z2: The second principal component; degree of water shortage

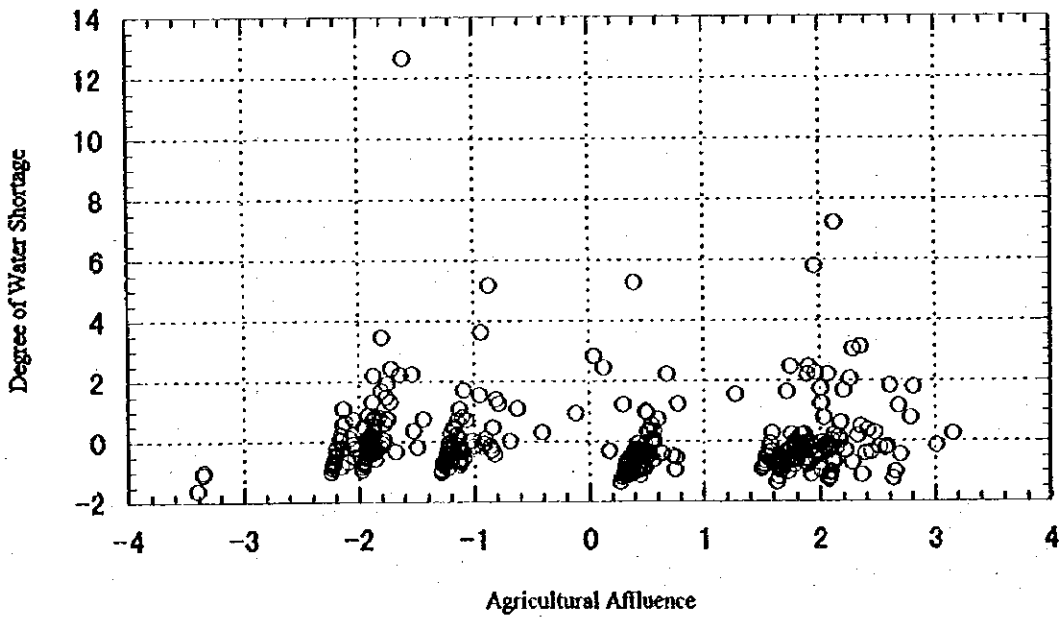


Table G.3.3 Result Case2

(Correlation Matrix)

	X1	X2	X3	X4	X5
X1	1				
X2	0.63826	1			
X3	−0.02905	0.093125	1		
X4	−0.03776	−0.02591	−0.10683	1	
X5	−0.01885	−0.01789	0.093	0.406557	1

Eigenvalue	Z1	Z2	Z3	Z4	Z5
	1.648928	1.416498	1	0.57984	0.354733
Eigenvalue Vector					
X1	0.690721	0.123712	−0.1328	−0.02839	0.699398
X2	0.702266	0.080729	−5.20E-09	0.018686	−0.70708
X3	0.11688	−0.1615	0.958599	0.175737	0.102291
X4	−0.0978	0.699977	−4.39E-09	0.707436	0.001482
X5	−0.08063	0.679801	0.251896	−0.68374	−0.02054
Square root ofEig.	1.284106	1.190167	1	0.761472	0.595595
Contribution	0.329786	0.2833	0.2	0.115968	0.070947
Cumulated Cont.	0.329786	0.613085	0.813085	0.929053	1
Facotr Weight	0.886959	0.147238	−0.1328	−0.02162	0.416558
	0.901784	0.096081	−5.2E-09	0.014229	−0.42113
	0.150086	−0.19221	0.958599	0.133819	0.060924
	−0.12558	0.833089	−4.4E-09	0.538693	0.000883
	−0.10354	0.809077	0.251896	−0.52065	−0.01223

Z1: The first principal component; degree of water shortage
Z2: The second principal component; Agricultural affluence

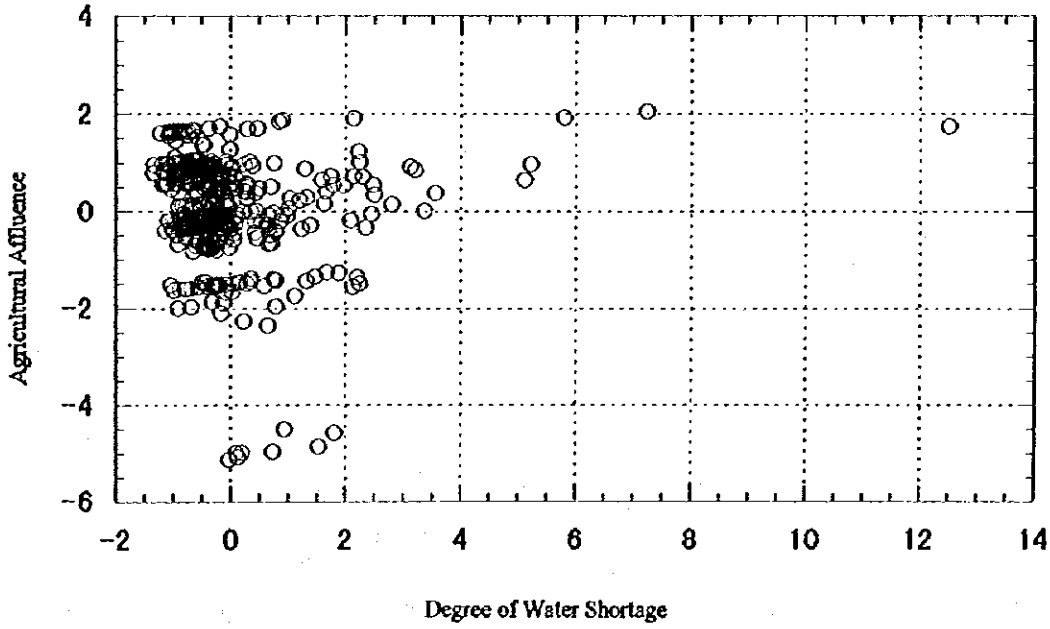


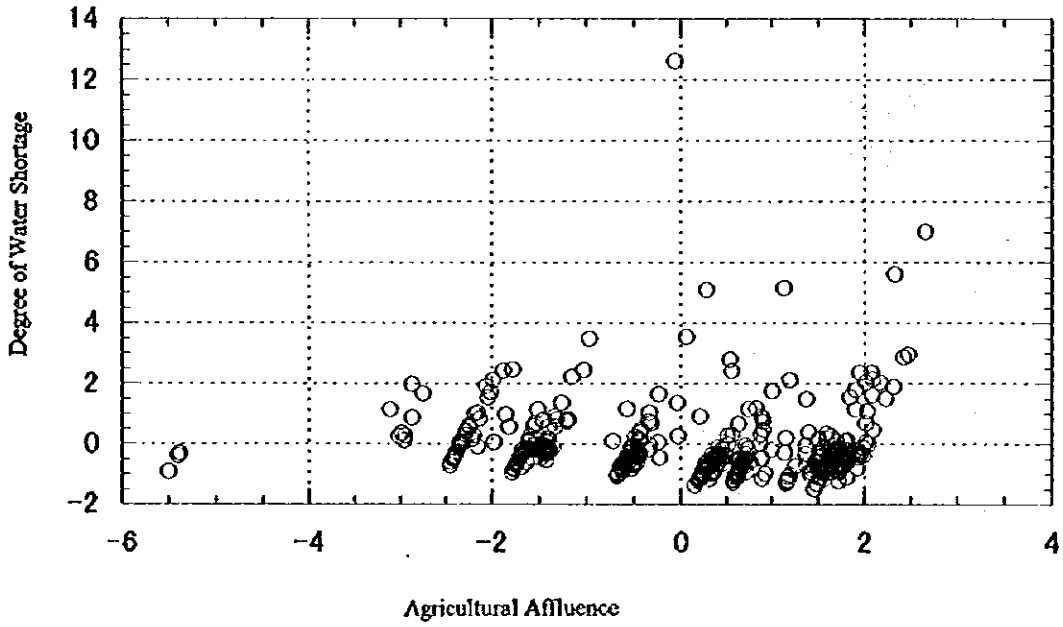
Table G.3.4 Result Case3

(Correlation Matrix)

	X1	X2	X3	X4	X5	X6	X7
X1	1						
X2	0.63826	1					
X3	-0.02905	0.093125	1				
X4	-0.01038	-0.0299	-0.02468	1			
X5	0.051651	0.102663	0.149493	0.112023	1		
X6	-0.01742	0.042232	0.068372	0.216083	0.573135	1	
X7	-0.01885	-0.01789	0.093	0.642296	0.458672	0.729883	1

Eigenvalue	Z1	Z2	Z3	Z4	Z5	Z6	Z7
	1.991849	1.645675	1.113121	1.022315	0.816825	0.348393	0.059821
Eigenvalue Vector							
X1	0.068798	0.689112	-0.15601	0.111909	-0.04056	0.694062	0.012674
X2	0.125633	0.694038	-0.03	0.003732	0.013307	-0.70812	0.000725
X3	0.122018	0.095495	0.567857	-0.56172	-0.57607	0.077415	0.012359
X4	0.193368	-0.07005	0.242407	0.789346	-0.51054	-0.05017	-0.1127
X5	0.449547	0.020147	0.527726	0.047187	0.575498	0.087781	-0.42175
X6	0.685848	-0.11284	-0.08596	-0.0068	0.065743	0.016658	0.710526
X7	0.504702	-0.12755	-0.55466	-0.21587	-0.26485	-0.01866	-0.5516
Square root ofEig.	1.411329	1.282839	1.055045	1.011096	0.90489	0.590248	0.244584
Contribution	0.28455	0.235096	0.159017	0.146045	0.116975	0.04977	0.008546
Cumulated Cont.	0.28455	0.519646	0.678664	0.824709	0.941684	0.991454	1
Facotr Weight	0.097096	0.88402	-0.1646	0.11315	-0.0367	0.409669	0.0031
	0.17731	0.890339	-0.03165	0.003774	0.012042	-0.41797	0.000177
	0.172208	0.122504	0.599115	-0.56795	-0.52128	0.045694	0.003023
	0.272905	-0.08987	0.25575	0.798105	-0.46198	-0.02961	-0.02757
	0.634459	0.025845	0.556775	0.04771	0.520762	0.051813	-0.10315
	0.987957	-0.14475	-0.0907	-0.00667	0.05949	0.009832	0.173783
	0.7123	-0.16363	-0.5852	-0.21826	-0.23966	-0.01101	-0.13491

Z1: The first principal component; Agricultural affluence
Z2: The second principal component; degree of water shortage



(2) Discriminate Analysis

Table G.3.5 Data Variables

District Name	Water District Name	Canal No	Canal Name	Water Shortage Y	Area (fed) X1	Length (km) X2	% for Mesqa X3	Cropping Intensity: Cotton X4	Maize X5	Rice X6	Crop Unit Yield: Cotton X7	Maize X8	Rice X9	Intake Condition: good X10	repair X11	None X12	Slight X13
Zifta	Bahary Zifta	5	Omar Pasha Ganabia No.1 Left	1	2,550	3.6	76	16.2	64.1	8.6	4.93	17.46	3.22	1	0	1	0
Zifta	Bahary Zifta	7	[illegible]	1	1,700	5.64	100	16.2	64.1	8.6	4.93	17.46	3.22	0	1	1	0
Zifta	Bahary Zifta	6	Omar Pasha Ganabia No.2 Left	1	300	0.97	0	16.2	64.1	8.6	4.93	17.46	3.22	0	1	1	0
Samanoud	Bahary Zifta	11	[illegible]	1	3,951	12.31	74	14.1	27.8	46.6	5.00	19.21	3.16	0	0	1	0
Samanoud	Bahary Zifta	12	[illegible] Ganabia	-1	1,086	4.6	100	14.1	27.8	46.6	5.00	19.21	3.16	1	0	1	0
Samanoud	Bahary Zifta	13	[illegible] Ganabia	-1	370	1.76	0	14.1	27.8	46.6	5.00	19.21	3.16	1	0	1	0
Samanoud	Bahary Zifta	16	[illegible]	-1	1,900	6.62	0	14.1	27.8	46.6	5.00	19.21	3.16	1	0	0	1
Samanoud	Bahary Zifta	19	[illegible] Ganabia	-1	800	3.78	0	14.1	27.8	46.6	5.00	19.21	3.16	1	0	0	1
Samanoud	Bahary Zifta	14	El [illegible]	1	2,140	10.58	100	14.1	27.8	46.6	5.00	19.21	3.16	0	0	1	0
Samanoud	Bahary Zifta	18	[illegible]	1	1,300	3.94	72	14.1	27.8	46.6	5.00	19.21	3.16	1	0	1	0
Samanoud	Bahary Zifta	15	[illegible]	1	1,000	3	59	14.1	27.8	46.6	5.00	19.21	3.16	1	0	1	0
Samanoud	Bahary Zifta	17	El [illegible]	1	300	1.4	0	14.1	27.4	46.6	5.00	19.21	3.16	1	0	1	0
El Mahalla El Kubra	Bahary Zifta	22	[illegible]	-1	1,750	8.74	94	24.4	28.4	46.9	5.05	19.33	3.20	1	0	1	0
El Mahalla El Kubra	Bahary Zifta	23	El [illegible]	-1	1,760	2.8	11	24.4	28.4	46.9	5.05	19.39	3.20	1	0	1	0
Zifta	Bahary Zifta	4	[illegible] Ganabia	-1	2,000	9.6	0	16.2	64.1	8.6	4.93	17.46	3.22	1	0	1	0
Zifta	Bahary Zifta	8	[illegible]	-1	7,100	9.6	0	16.2	64.1	8.6	4.93	17.46	3.22	1	0	1	0
Zifta	Bahary Zifta	9	[illegible] Ganabia No.3 R	1	550	4.75	0	16.2	64.1	8.6	4.93	17.46	3.22	0	0	1	0
Zifta, Samanoud	Bahary Zifta	2	[illegible]	-1	1,800	4.8	30	14.7	41.0	27.6	4.97	18.30	3.20	1	0	1	0
Santa, Zifta, El Mahalla El Kubra	Bahary Zifta	1	El [illegible]	-1	3,000	7.1	11	18.8	40.2	26.8	5.00	18.40	3.24	0	0	1	0
Zifta	Bahary Zifta	10	Ganabia No.4 Right	1	700	2.27	0	16.2	64.1	8.6	4.93	17.46	3.22	1	0	1	0
Samanoud	Bahary Zifta	20	Ganabia No.5 Right	1	180	1.6	0	14.1	27.8	46.6	5.00	19.21	3.16	1	0	1	0
Samanoud	Bahary Zifta	21	Ganabia No.6 Right	1	400	1.85	0	14.1	27.8	46.6	5.00	19.21	3.16	1	0	1	0
Santa, Samanoud	Bahary Zifta	3	Ganabia No.3 Right	1	450	1.75	0	14.7	41.0	27.6	4.97	18.30	3.20	1	0	1	0
El Mahalla El Kubra	Bahary Zifta	25	Ganabia No.7 Right	1	900	2.14	0	24.4	28.4	46.9	5.05	19.30	3.20	1	0	1	0
El Mahalla El Kubra	Bahary Zifta	26	[illegible] Ganabia	1	1,700	4.9	69	24.4	28.4	46.9	5.05	19.33	3.20	0	0	1	0
El Mahalla El Kubra	Bahary Zifta	27	[illegible] Ganabia	1	1,000	3.87	88	24.4	28.4	46.9	5.05	19.33	3.20	0	0	1	0
El Mahalla El Kubra	Bahary Zifta	28	Ganabia No.8 Right	1	800	1.29	0	24.4	28.4	46.9	5.05	19.33	3.20	0	1	1	0
El Mahalla El Kubra	Bahary Zifta	29	[illegible] Ganabia No.1	1	250	1.17	65	24.4	28.4	46.9	5.05	19.33	3.20	0	1	1	0
El Mahalla El Kubra	Bahary Zifta	24	[illegible]	-1	2,040	4.8	90	24.4	28.4	46.9	5.05	19.33	3.20	0	1	1	0
El Mahalla El Kubra	Bahary Zifta	30	El [illegible]	-1	1,880	6.79	49	24.4	28.4	46.9	5.05	19.33	3.20	0	1	1	0

Table G.3.5.1 Analysis 1 (Objective Variable)

Y= 1 Water Shrtage=Rare

Y=−1 Water Shrtage=often, very often, always

Summary

Statistics of Regression	
multiple correlation coefficient	0.42753669
coefficient of determination	0.182787621
adjusted multiple correlation	0.151814557
standard error	0.915548003
No. of sample	357

	Coefficient	Standard Error	t-value	P-value
y-intercept	−0.170031522	0.727793059	−0.233653673	0.815393243
X1	9.24195E-06	1.86045E-05	0.496758427	0.619677642
X2	−0.069219297	0.018362504	−3.769600088	0.000192469
X3	−0.001437262	0.001647561	−0.872357521	0.383623613
X4	0.011912232	0.011749475	1.01385224	0.311367895
X5	0.004551059	0.010530809	0.432166136	0.665892227
X6	−0.000158593	0.007485515	−0.021186713	0.983109032
X7	0.06024933	0.117895453	0.511040319	0.609651603
X8	0.006131345	0.051249842	0.119636378	0.904841242
X9	−0.184695005	0.441742882	−0.41810522	0.676131624
X10	−0.203938566	0.128568693	−1.586222594	0.113610256
X11	0.052049077	0.150478829	0.345889697	0.729637666
X12	0.947057556	0.240643948	3.9355137	0.000100527
X13	0.694181781	0.154570353	4.491040922	9.69653E-06

Discriminant Function: Y=9.24195E-06*X1−0.0069219*X2−0.0014372*X3+.....

Correct Discrimination: 70%

Table G.3.5.2 Analysis 2 (Objective Variable)

Y= 1 Water Shortage=Rare, Often
Y=−5 Water Shortage= Very Often, always

Summary

Statistics of Regression	
multiple correlation coefficient	0.417404014
coefficient of determination	0.174228111
adjusted multiple correlation	0.142928558
standard error	2.107208494
No. of sample	357

	coefficient	standard error	t -value	P-value
y-Intercept	3.340998543	1.675075157	1.994536501	0.04688454
X1	1.3441E-05	4.28198E-05	0.313895829	0.753790975
X2	-0.134845438	0.042262803	-3.190641173	0.001550628
X3	-0.005864837	0.003791998	-1.546583053	0.12288594
X4	0.071504008	0.027042377	2.644146509	0.008566018
X5	0.053738461	0.024237518	2.217077718	0.027273004
X6	0.013389049	0.017228525	0.777144255	0.437609305
X7	-0.59846833	0.271346014	-2.198183499	0.028903658
X8	0.399983961	0.117955697	3.390987738	0.000777707
X9	-3.492867397	1.016707317	-3.4352732	0.000684582
X10	-0.087510644	0.295911348	-0.295732642	0.767813219
X11	-0.427030456	0.346339313	-1.232982917	0.2184265
X12	1.497184651	0.553861698	2.703174194	0.00721001
X13	0.91092141	0.35575929	2.560239792	0.010887793

Discriminant Function: Y=1.3441*10^-5*X1-0.134845*X2 -0.005865*X3.....

Correct Discrimination: 82%

Table G.3.5.3 Analysis 3

(Objective Variable)
Y= 1 Water Shortage=Rare, Often, Very Often
Y=−19 Water Shortage= always

Summary

Statistics of Regression	
multiple correlation coe	0.542640122
coefficient of determina	0.294458301
adjusted multiple corre	0.267717654
standard error	3.750129563
No. of sample	357

	coefficient	standard error	t -value	P-value
y-Intercept	-1.215408136	2.981076094	-0.407707854	0.683742526
X1	-0.000143994	7.6205E-05	-1.889554534	0.059659345
X2	-0.238705654	0.075213718	-3.147107466	0.001793427
X3	-0.019394017	0.00674849	-2.873830425	0.004308077
X4	0.262662162	0.048126427	5.457753213	9.26078E-08
X5	0.172371872	0.043134712	3.996128953	7.8844E-05
X6	0.125151987	0.030661039	4.081792184	5.5644E-05
X7	-0.795115313	0.482905564	-1.646523403	0.100571921
X8	0.974990142	0.209921869	4.64453622	4.86366E-06
X9	-8.244283398	1.80940053	-4.556361789	7.2459E-06
X10	0.568255366	0.526623678	1.079053961	0.281321884
X11	-0.745611539	0.616368669	-1.20958436	0.227233103
X12	0.179415807	0.985689425	0.182020627	0.855674062
X13	-0.344553062	0.633127754	-0.5442078	0.586652071

Discriminant Function: Y=-0.0001439*X1-0.2386705*X2.....

Correct Discrimination: 59%

Table G.3.6 Indicators of Dedlivery Canal by Degree of Water Shortage in Summer Season

Water Shortage in Summer	Area Ser. feddan	Length km	% for Mesqa	Cropping Intensity (%) Major Summer Crops				Crop Unit Yield (1993/94-1995/96)		
				Cotton	Maize	Rice	total	Cotton (ton)	Maize (ton)	Rice (ton)
Rare	1,579	4.00	25	25.0	18.9	46.2	97.8	0.74	2.35	3.02
Often	2,442	5.47	25	24.7	17.1	45.2	93.7	0.72	2.30	2.93
Very Often	1,999	5.31	29	28.4	15.1	48.5	99.3	0.72	2.18	2.96
Always	5,231	8.60	53	19.7	16.0	32.2	85.0	0.72	2.05	2.78
Total	2,043	4.78	27	25.1	17.8	45.5	96.2	0.73	2.30	2.98

Water Shortage in Summer	Delivery		Mesqa Area (fed)	Cropping Area (fed)			Crop Production (ton)		
	fed/km	km/fed		Cotton	Maize	Rice	Cotton	Maize	Rice
Rare	389	0.009	412	384	310	719	284	766	2,186
Often	481	0.003	560	630	420	1,082	461	1,007	3,201
Very Often	415	0.003	580	554	314	969	401	736	2,899
Always	532	0.003	1,422	1,417	705	2,140	1,011	1,380	6,217
Total	424	0.007	522	525	360	917	382	857	2,745

Table No. of Delivery by Intake Condition and Salinity Problem

Water Shortage in Summer	Total No.	Salinity(No. of Del)			Intake Condition(No. ofDel)		
		none	slight	moderate to strong	good	repair	replace
Rare	201	34	138	29	103	49	49
Often	95	11	50	34	66	12	17
Very Often	43	0	22	21	25	10	8
Always	18	1	6	11	6	9	3
Total	357	46	216	95	200	80	77

(3) Cluster Analysis

Table G.3.7 Variables for Cluster Analysis

Variable	Rank	Remark
Water Shortage	1=rare, 2=often, 3=very often, 4=always	
Intake Condition	1=good, 2=repair, 3=replacement	
Salinity	1=none, 2=slight, 3=moderate to strong	1: Ece<2dS/m 2: 2-4dS/m 3: 4dS/m>
Agr. Income	1=high, 2=middle, 3=low	1: upper25%, 2: middle60%, 3: lower15%
Domestic waste	1=little, 2=considerable amount, 3=much	

Table G 3.8 Indicators of Delivey Canal by Category (Case 1.1)

Category	No of Delivery	Location				Water Shortage				Intake Condition		
		Upstream	Midstream	Downstre East	Downstrea West	rare	often	very often	always	good	repair	replace
A	232	78	100	34	20	172	60	0	0	136	46	50
B	63	0	18	19	28	29	34	0	0	32	15	16
C	32	7	9	5	11	0	1	25	6	32	0	0
D	30	1	8	5	16	0	0	18	12	0	19	11
Total/average	357	86	131	63	77	201	95	43	18	200	80	77

Category	Salinity			Official Drain Reuse	Domestic Waste			Agr. net income		
	none	slight	moderate to strong		little	considerable	much	high	middle	low
A	45	187	0	12	155	61	6	73	131	28
B	0	0	63	30	43	16	1	0	42	21
C	1	18	13	13	18	13	1	5	28	1
D	0	11	19	18	12	18	0	7	17	6
Total/average)	46	216	95	73	241	108	8	85	218	58

Category	Area Ser. feddan	Length km	% for Mesqa	Cropping Intensity (%) Major Summer Crops				Crop Unit Yield (1993/94-1995/96)		
				Cotton	Maize	Rice	total	Cotton (ton)	Maize (ton)	Rice (ton)
A	1,801	4.43	28	24.8	20.2	45.8	81.3	0.75	2.44	3.06
B	2,031	4.57	21	26.9	11.8	42.8	81.4	0.66	1.97	2.72
C	4,212	8.38	28	27.1	14.7	45.2	88.0	0.74	2.25	2.97
D	1,825	4.07	44	24.8	15.9	41.0	81.7	0.71	2.02	2.85
Total/average)	9,418	5.36	30	25.8	15.8	44.2	85.8	0.71	2.17	2.90

Table G 3.9 Indicators of Delivey Canal by Category (Case 2.1)

Category	No of Delivery	Location				Water Shortage				Intake Condition		
		Upstream	Midstream	Downstre East	Downstrea West	rare	often	very often	always	good	repair	replace
A	189	87	57	33	29	120	68	1	0	170	18	1
B	112	12	59	21	20	81	27	4	0	0	43	69
C	33	7	10	8	10	0	0	27	6	30	3	0
D	23	0	5	0	18	0	0	11	12	0	16	7
Total/average	357	86	131	63	77	201	95	43	18	200	80	77

Category	Salinity			Official Drain Use	Domestic Waste			Agr. net income		
	none	slight	moderate to strong		little	considerable	much	high	middle	low
A	40	117	32	27	139	46	4	62	92	35
B	5	78	31	15	75	34	3	15	82	15
C	1	19	13	13	18	14	1	8	25	0
D	0	4	19	18	9	14	0	0	17	6
Total/average)	46	218	95	73	241	108	8	85	218	58

Category	Area Ser. feddan	Length km	% for Mesqa	Cropping Intensity (%) Major Summer Crops				Crop Unit Yield (1993/94-1995/96)		
				Cotton	Maize	Rice	total	Cotton (ton)	Maize (ton)	Rice (ton)
A	2,048	4.81	27	24.1	19.3	45.8	89.0	0.75	2.40	3.00
B	1,507	3.89	22	26.2	16.7	47.0	89.9	0.69	2.24	2.87
C	4,004	7.93	27	27.0	15.5	47.8	89.9	0.74	2.28	3.00
D	1,806	4.31	54	24.5	15.9	35.0	74.6	0.69	1.89	2.79
Total/average)	9,341	5.24	32	25.5	18.6	43.5	85.9	0.72	2.20	2.93

Table G 3.10 Indicators of Delivey Canal by Category (Case 3.1)

Category	No of Delivery	Location				Water Shortage				Intake Condition		
		Upstream	Midstream	Downstre East	Downstrea West	rare	often	very often	always	good	repair	replace
A	155	68	47	28	15	90	47	15	3	155	0	0
B	98	18	54	16	14	68	0	0	0	0	49	49
C	59	4	18	15	24	0	29	18	12	0	31	28
D	45	0	14	8	23	13	19	10	3	45	0	0
Total/average	357	86	131	63	77	201	95	43	18	200	80	77

Category	Salinity			Official Drain Reuse	Domestic Waste			Agr. net income		
	none	slight	moderate to strong		little	considerable	much	high	middle	low
A	34	121	0	12	105	46	4	55	81	19
B	9	73	18	9	72	24	2	20	66	12
C	3	22	34	25	28	29	2	10	33	18
D	0	0	45	27	36	9	0	0	36	9
Total/average)	46	216	95	73	241	108	8	85	216	58

Category	Area Ser. feddan	Length km	% for Mesqa	Cropping Intensity (%) Major Summer Crops				Crop Unit Yield (1993/94-1995/96)		
				Cotton	Maize	Rice	total	Cotton (ton)	Maize (ton)	Rice (ton)
A	2,321	5.39	29	23.4	20.0	48.3	89.7	0.77	2.50	3.06
B	1,303	3.59	23	26.3	18.5	46.8	91.7	0.72	2.28	3.02
C	1,790	4.43	34	24.4	15.5	43.0	82.8	0.67	2.06	2.83
D	3,048	5.73	19	29.3	12.0	43.2	84.5	0.70	1.95	2.79
Total/average)	8,112	4.76	26	25.8	16.5	44.9	87.2	0.71	2.20	2.92

Table G.3.11 Indicators of Delivery Canal by category (Case 1-2)

Category	No. of Delivery	Location				Water Shortage				Intake Condition		
		Upstream	Midstream	Downstream East	Downstream West	rare	often	very often	always	good	regular	reliance
A	132	41	63	19	9	132	0	0	0	90	42	0
B	51	25	8	10	8	0	51	0	0	43	4	0
C	50	12	29	5	4	40	10	0	0	0	0	50
D	42	0	11	13	21	20	23	0	0	32	15	0
E	30	7	8	5	10	0	0	25	5	30	0	0
F	30	1	6	5	18	0	0	18	12	0	19	11
G	16	0	5	4	7	9	2	0	0	0	0	16
H	1	0	1	0	0	0	0	0	1	1	0	0
Total(Average)	357	86	131	63	77	201	95	43	18	200	80	77

Category	Salinity			Official Drain Use	Domestic Waste			Agricultural income		
	none	slight	moderate to strong		little	considerable	much	high	middle	low
A	29	103	0	7	105	25	2	42	72	15
B	10	41	0	5	27	20	4	20	23	8
C	6	44	0	0	34	16	0	11	37	2
D	0	0	47	22	35	11	1	0	31	16
E	0	12	13	12	17	12	1	5	24	1
F	0	11	19	18	12	18	0	2	17	6
G	0	0	16	7	11	5	0	0	11	5
H	1	0	0	1	0	1	0	0	1	0
Total(Average)	46	216	95	73	241	108	8	85	216	56

Category	Area Ser. fedden	Length km	% for Mesqa	Cropping Intensity (%) Major Summer Crops				One Unit Yield (1993/94-1996/97)		
				Cotton	Maize	Rice	total	Cotton (ton)	Maize (ton)	Rice (ton)
A	9,525	596	27	262	203	459	914	0.75	2.43	3.06
B	3,019	630	30	233	204	458	895	0.77	2.51	3.04
C	9,323	387	21	261	200	475	937	0.73	2.37	3.09
D	2,042	497	23	267	117	432	816	0.65	1.87	2.72
E	4,194	824	28	273	149	456	886	0.73	2.24	2.96
F	1,628	467	44	248	159	410	817	0.73	2.02	2.85
G	1,955	338	17	274	129	414	808	0.72	1.96	2.73
H	9,470	1380	35	466	107	422	695	0.85	2.84	3.10
Total(Average)	2,569	807	29	245	152	449	846	0.74	2.29	2.94

Table G.3.12 Indicators of Delivery Canal by category (Case 2-2)

Category	No. of Delivery	Location				Water Shortage				Intake Condition		
		Upstream	Midstream	Downstream East	Downstream West	rare	often	very often	always	good	regular	reliance
A	134	58	48	11	16	88	43	0	0	119	12	0
B	60	0	30	14	16	42	18	0	0	0	43	17
C	47	11	28	8	0	30	0	0	0	0	0	47
D	39	2	9	12	15	13	25	1	0	29	9	0
E	33	7	10	8	10	0	0	22	8	30	3	0
F	23	0	5	0	18	0	0	11	12	0	16	7
G	19	6	0	13	0	19	0	0	0	12	6	1
H	5	1	1	3	0	0	1	4	0	0	0	5
Total(Average)	357	86	131	63	77	201	95	43	18	200	80	77

Category	Salinity			Official Drain Use	Domestic Waste			Agricultural income		
	none	slight	moderate to strong		little	considerable	much	high	middle	low
A	31	100	0	3	93	25	9	62	69	0
B	0	29	31	15	42	15	3	0	45	15
C	5	42	0	0	32	15	0	10	37	0
D	3	4	32	19	30	8	1	0	23	15
E	1	19	13	13	19	14	1	0	25	8
F	0	4	19	18	9	14	0	0	17	6
G	6	13	0	7	14	2	0	0	0	13
H	0	5	0	0	1	4	0	5	0	0
Total(Average)	46	216	95	73	241	108	8	85	216	56

Category	Area Ser. fedden	Length km	% for Mesqa	Cropping Intensity (%) Major Summer Crops				One Unit Yield (1993/94-1996/97)		
				Cotton	Maize	Rice	total	Cotton (ton)	Maize (ton)	Rice (ton)
A	2,118	473	31	241	201	489	931	0.77	2.55	3.12
B	1,648	391	21	281	142	450	853	0.86	2.10	2.88
C	1,337	288	22	265	195	483	942	0.72	2.39	3.10
D	2,746	567	15	264	147	405	816	0.71	2.02	2.78
E	4,004	753	27	270	151	478	899	0.74	2.28	3.00
F	1,806	431	54	245	151	350	746	0.69	1.89	2.76
G	1,155	362	22	189	233	323	765	0.72	2.08	2.67
H	1,412	376	23	254	195	585	1035	0.75	2.47	3.16
Total(Average)	1,958	473	27	250	177	446	873	0.72	2.22	2.93

Table G.3.13 Indicators of Delivery Canal by category (Case 3-2)

Category	No. of Delivery	Location				Water Shortage				Intake Condition		
		Upstream	Midstream	Downstream East	Downstream West	rare	often	very often	always	good	regular	reliance
A	90	36	35	13	6	90	0	0	0	90	0	0
B	82	16	39	10	6	82	0	0	0	0	42	40
C	65	30	12	13	10	0	47	15	3	65	0	0
D	45	1	14	10	24	0	26	11	12	0	26	23
E	32	0	12	4	16	0	19	10	3	32	0	0
F	16	0	4	6	6	16	0	0	0	0	7	9
G	13	0	2	4	7	13	0	0	0	13	0	0
H	10	3	2	5	0	0	3	7	0	0	5	5
Total(Average)	357	86	131	63	77	201	95	43	18	200	80	77

Category	Salinity			Official Drain Use	Domestic Waste			Agricultural income		
	none	slight	moderate to strong		little	considerable	much	high	middle	low
A	25	65	0	0	70	20	0	32	46	12
B	9	73	0	1	64	18	2	22	53	7
C	0	56	0	6	35	26	4	23	35	7
D	1	14	34	25	25	23	1	0	33	14
E	0	0	22	10	24	8	0	0	28	4
F	0	0	16	8	6	8	0	0	11	5
G	0	0	13	6	12	1	0	0	0	5
H	2	8	0	0	3	0	1	10	0	0
Total(Average)	46	216	85	73	241	108	8	85	216	56

Category	Area Ser. fedden	Length km	% for Mesqa	Cropping Intensity (%) Major Summer Crops				One Unit Yield (1993/94-1996/97)		
				Cotton	Maize	Rice	total	Cotton (ton)	Maize (ton)	Rice (ton)
A	1,736	414	25	235	203	463	901	0.76	2.48	3.06
B	1,152	260	23	253	197	423	835	0.72	2.36	3.08
C	3,129	712	28	232	155	462	849	0.77	2.53	3.06
D	1,856	456	35	242	145	400	787	0.65	2.00	2.77
E	2,238	558	22	305	128	442	869	0.68	1.93	2.82
F	2,072	553	36	285	121	417	823	0.68	1.81	2.72
G	2,572	619	11	268	128	407	788	0.71	2.01	2.71
H	1,363	389	31	253	202	578	1034	0.76	2.50	3.18
Total(Average)	2,149	481	27	258	158	456	870	0.72	2.21	2.92

Figure G.3.2 Distribution of Clusters Case1.2

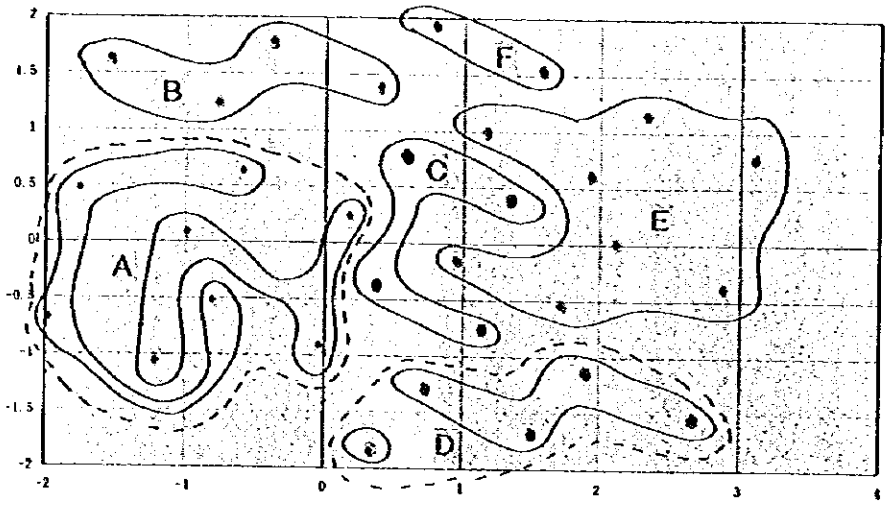


Figure G.3.3 Distribution of Clusters Case2.2

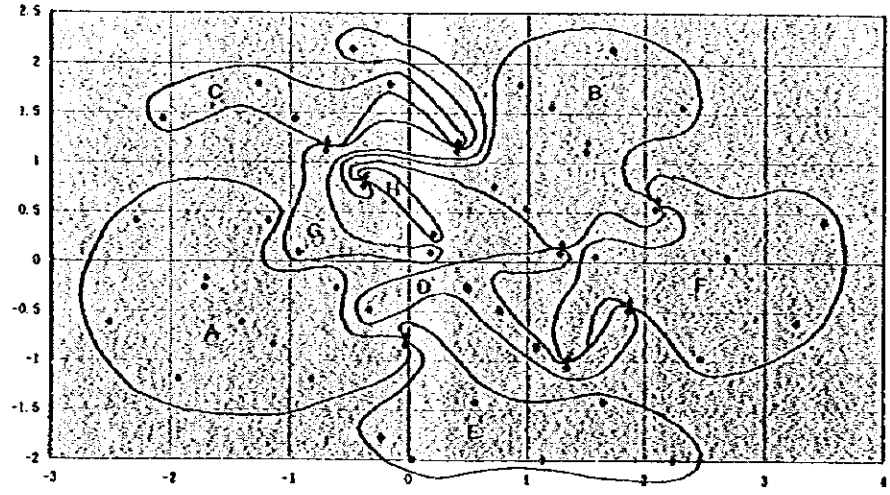
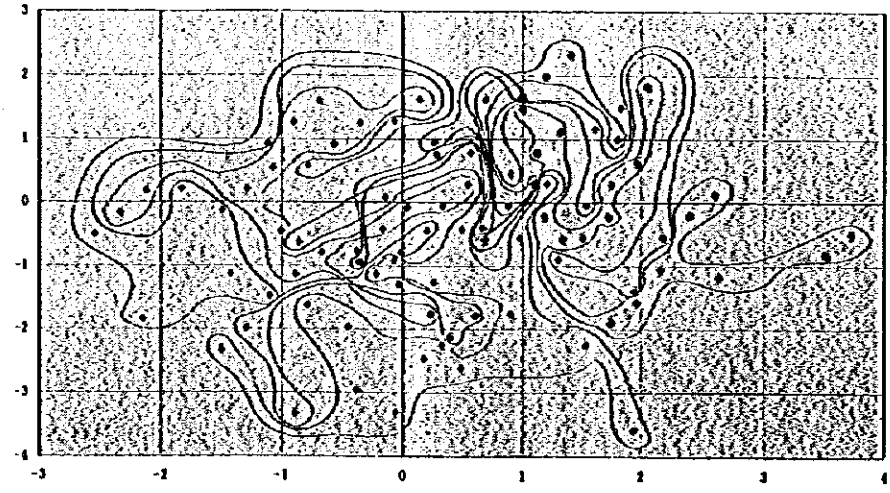


Figure G.3.4 Distribution of Clusters Case3.2



G.4 Improvement of Meska Irrigation System

G.4.1 Specification of Meska Works (Concrete and Brick Works)

1. The Field

These standards include standards of the pre-cast concrete blocks and bricks with their different kinds like the solid, the hollow and the perforated bricks, and don't include bricks and blocks of specific sizes, measures or shapes.

2. Definitions

2.1 The bricks

The masonary unit which its nominal measures don't exceed 300 millimeters of length, 200 millimeters of width and 200 millimeters of height, whether it is solid, hollow or perforated.

2.2 Solid bricks

The masonary unit in which the size of the small or narrow holes that pass through or don't pass through it, don't exceed the rate of 25% of the total size. The holes are considered small or narrow if their measures are less than 20 millimeters or their areas are less than 500 millimeters^2 -that is for each single hole- and permit a number of holes of bigger sizes which are not more than three holes the area of each one doesn't exceed 3,250 millimeters^2 in order to ease bricks' handing-over. These holes' areas are calculated or sumed up within the limited size (25%).

2.3 Perforated brick

The masonary unit in which the small holes' rate doesn't exceed 25% of the total size of the brick, and permit a number of big holes which are not more than three, the area of each one of them doesn't exceed 3,250 millimeters^3, in order to facilate the brick's handing over.

2.4 Hollow brick

The masonary unit, in which the holes' size is between 25% to 50% of the whole size of the brick and the brick is of larger size than that is shown in paragraph 2.3. It's considered a hole if its measure is more than 20 millimeters or its area is more than 500 millimeter^2.

2.5 The block

The masonary unit which in length, width and height exceeds the brick's measurments so that the height of the block might not exceed the length or six-fold of the width.

2.6 Solid block

The masonary unit in which the rate of the solid part is not less than 75% of the whole size of the block, and is calculated on the bases of the outer sizes of the block.

2.7 Hollow block

The masonary unit which has more than one hole the size of the solid part is between 50% and 75% of the whole size of the block and which is calculated on the bases of of the outer measurments of the block.

2.8 Aerated cellular block

The mansonary unit which is treated with steam under a high pressure. It's consisted of concrete materials with the addition or without the addition of soft dusty concrete. Porousness is formed by generating a gas formed our of a chemical interaction in the mixture before becoming solid or by getting air into the mixture by using a foam chemical material in a suitable mixturing apparatus.

2.9 Light block or brick

The masonary unit is considered of the light kind, if the weight of the cubic meter is not more than 1,000 kilogram.

2.10 Total thickness or density

Is the density which is calculated by dividing the total weight on the size concluding holes and gaps.

Note: The thickness of walls, inner sinews of the brick or the hollow block must not be less than 25 millimeters.

3. Connecting materials

The connecting materials which are used in making bricks or block are following the Egyptian standards, which are listed in the following.

3.1 Normal portland concrete and quick solidifying portland concrete

The Egyptian standards 373-1963.

3.2 Sulfate resistant portland concrete

The Egyptian standard 583-1965.

3.3 Iron portland concrete 35

The Egyptian standards 974-1969.

3.4 Lime can be used as a connecting material or by adding concrete in the cases of the kinds which are treated with steam under a high pressure, also, different kinds of concrete can be used according what has been dealt on between the producer and the consumer.

4. Dust

Dust which is used in making bricks or blocks is from natural sources, extracted and collected from deserts or from breaking the solid stoned. The little grains are solid, resistant, clean and devoid of stuck covers, wide little grains or of the organic grains.

Dust grains must not contain harmful materials or constituents like iron sulfate, coat, Mika, mud or the likes of the layer chips' materials, the organic surpluses, sea-shells, salts or the alkalines with a quantity which harmfully affects their bearing extant with the passing of time and the solders. The dust is one of or a mixture of the following kinds.

4.1 Dust from the natural sources which conforms with the Egyptian standards.

The Egyptian standards 1109-1971.

4.2 Expanded clay of the iron blast furnace which are cooled in air, so that the whole density may not be less than 1,100 kgm/m^3 calculated on grains which don't exceed 13 millimeters.

4.3 The light dust

Like the cavity stone which is void of mud or remains, pumice,vermiculite and the espestous.

5. Additions

The following materials can be added to the connecting materials or the mixture's constituents in order that may not have a harmful effected on these materials.

5.1 Pigments

They must conform with the Egyptian standards when using the products treated with steam under the high or the normal pressure, the pigments must be of the kinds which are

suitable for use in these cases.

5.2 Materials which are added to control the period of solidity

5.3 Materials which are added to improve processing or reducing water transparancy.

5.4 Materials which are added to make the products water in sulating.

5.5 Materials which are added produce a foam or a gas material.

6. Measurements (sizes)

6.1 Measurements or sizes of concrete bricks are according to what is shown at table No.1, and the blocks' measurements or sizes are according to what is shown at table No.2.

6.2 Nominal size

Is the size which equals the space that the masonary unit occupy by adding the thickness of concrete so that it my coincide to the usual measure mental system.

6.3 Actual size

It is the production's size as the masonary unit with what relates to it of concrete occupies the best size of the unit.

6.4 Over stepping the nominal sizes for concrete bricks and blocks is as the following:

As for the bricks

±3 millimeters in length

±2 millimeters in width or height

As for the blocks

±3, -5 in length and height

±3 in width

7. Compression resistance

Compression resistance of concrete blocks or bricks is according to the required compression as for use as it is shown in table No.(3). Bricks and blocks are divided as for resistance and aim of use and whether they are solid or hollow, into the next seven kinds:

Solid bricks and blocks M1, M2 M3, M4-

Hollow bricks and blocks F1, F2, F3

Note:

1. If we use hollow blocks or bricks in building non-load bearing walls we can neglect the compression's resistant limits that are shown in table No.3 according to the deal which was made between the producer and the consumer or buyer so that the units can bear pressures and loads which lie on them, resistance must not be less than 1.5 Neoten/millimeters^2.
2. 1,000 pound power = 70 kgm power/cm^2 =700 Neoten/cm^2 = 7 Neoten/milimeters^2.

8. Technical conditions

8.1 Shape

Concrete blocks or bricks are of regular shape, the sides are straight and the angles are right.

8.2 Joints

Surfaces of the units' beds are or thogonal with the sides, the edge which make the vertical joints whether they take the shape of a bolt an cavity or the shape of a double cavity.

9. The producer's certificate

The producer makes the regular periodical tests on concrete blocks and bricks which he produces so that the production may coincide with the Egyptian standards' requirements, also he has to provide the buyer or the consumer with a certificate which proves that, when it is required.

10. Checking, acceptance and refusal

10.1 Samples of concrete blocks and bricks are taken from the site of production or during transporting to be representatives of the orthogonated production at the rate of 20 bricks for every 50,000 bricks or less and 10 bricks for every 100,000 following brick, and at the rate of 10 bricks for every 50,000 block or less, and 5blocks for every following 10,000 block.

10.2 In case of one the samples' in consistence with one of the Egyptian standards listed tests the test is re-made on double of the first quantity, so, if the replay samples passed the tests successfully, the agreed on or contracted portion is accepted. In case of the replay samples' failing to pass any of the agreed on tests the portion is considered in consistent with the standards.

11. Technical terminology

Concrete bricks

Concrete blocks

Solid brick

Perforated brick

Hollow brick

Aerated cellular brick

Nominal size

Actual size

Joint

Holes

Cavity

Pumice (Expanded perlite)

Vermiculite

Expanded clay

Blast-furnace slag

Pigments

12. References

British standards Bs 1180, 1972

Concrete bricks and fixing bricks.

-British standards Bs 2028, 1364, 1960 precast concrete blocks.

-American standards STM.G 129-70 concrete masonary units

Hollow non-load bearing.

-Designing fundamentals and conditions of Applying and finishing brick masonary work

A.T.M 7-1973.

Authorities which participated in putting these standards

-Public administration of constructional planning, building and housing researches.

-Misr company for ferroconcrete work.

-Egyptian public administration for masonary materials and thermals.

-Faculty of engineering- Een shams university

-Chemistry administration

Egyptian organization for standardization

Law No.2 for the year 1957, dictated the foundation of an independent administration, which will be the national reference for all the country's organizational standardization, and accepts the task of determining the standards for all what the industries depend on of raw materials, products, technical operations or processes, devices, machinery, measurment's unit and authorized references of unified terminologies and symbols.

For carrying out that law, the republic's elecision No.29 for the year 1957 was issued, which dictated the foundation of the Egyptian public administration or organization for standardization, specified with co-operating work of the authorities, directions or administrations working on standardization and directing it to the following aims:

1. Providing authorized references for unified criteria.
2. Issuing standards for the materials and the products added to this the specifications, technical terminologies, definitions and unified symbols.
3. Preparing and providing aims which are responsible for achieving materials and commodities' coincidence to the authorized standards.
4. Facilating finding the exchanged parts and raising the level of the local production.
5. Co-ordinating standardization's work in the Arab Republic of Egypt with their international correspondings.

   The administration is managed by an administration's council headed by the specified under secretary of ministry which includes 23 members representing the different administrations specified with standardization, production-quality and checking.

   The administration has two permanent comittes, one of them is for qualifications and the other is for checking. They are both specified with planning and following the execution of the technical programmes in the light of the authorized plan from the administration's council.

   The administration follows the system of putting the quality labels on the commodities and the products which are identical to the Egyptian standards as a means for protecting consumers and encouraging producers to improve the level of their production to reach the level of the Egyptian standards. This system is executed by the executive committee of the quality label which is organized according to the decision and order of the administration's managemental council. The quality-label is consisted of the symbols of the letters ESS for the Egyptian standards also it contains the letters ES as symbols of the Egyptian standard.

Table G.4.1 Questionnaire for Present Conditions of Improved Meska in IIP Area

(as of May 1998)

Reason Why

(1) high cost of pump operation
(2) small pump capacity
(3) available water near the field
(4) troubles between WUA members
(5) no activity by IAS
(6) no water surface to be seen
(7) bad construction, Meska broken, and/or necessary repair
(8) weak IAS activities after Project
(9) no completion of construction of Improved Meska
(10) Illegal direct irrigation
(11) others

Summary of Improvement Meskas
in Kahwagy Canal Command Area
Under IIP

Contract No.	No. of Farmers		Area	Meska Length (m)			Improved Type		Operation Period		if PO, Why (major reasons)										
	under WUA	within B. Area	Served (feddan)	Pipe Line	Raised Open	Total	Pipe Line	Raised Open	Full	Portialy	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1	229	353	487.75	5,403	800	6,203	7	1	2	6	6	0	0	0	0	0	2	0	0	6	4
2	205	268	707.07	7,895	550	8,445	10	1	2	9	6	0	9	0	0	0	0	0	1	9	9
3	405	516	1,048.51	10,335	895	11,230	15	3	6	12	2	0	3	7	0	1	0	0	0	13	8
4	175	203	500.00	3,355	1,660	5,015	5	3	4	4	0	0	0	2	0	0	2	0	2	5	4
Total	1,014	1,340	2,743.33	26,988	3,905	30,893	37	8	14	31	14	0	12	9	0	1	4	0	3	33	25
	75.7	100.0																			
				87.4	12.6	100.0															
Ratio (%)							82.2	17.8													
									31.1	68.9											
											31.1	0	26.7	20	0	2.2	8.9	0	6.7	73.3	55.6
Density																					
per Meska			61	729	488	687															
per ha						26.8															

List of Improvement Meskas

in Kahwagy Canal Command Area

Name of Meska	No. of Farmers under WUA	No. of Farmers within B. Area	Area Served (feddan)	Type of Impr'd Meska	Total Length (m)	Operation Period: full	Operation Period: Partially Operation (PO) months	from	to	if PO, Why (major reasons) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1-1	12	21	26.00	Pipe Line	1,000		y			y						y			y	y
1-2	15	32	46.33	Pipe Line	400		y			y									y	
1-3	9	19	62.00	Pipe Line	900		y			y									y	
1-4	64	64	68.00	Raised Open	800	y														
1-5	23	29	54.00	Pipe Line	665	y														
1-6	30	56	68.50	Pipe Line	1,010		y			y									y	y
1-7	26	50	103.92	Pipe Line	653		y			y						y			y	y
1-8	50	82	59.00	Pipe Line	775		y			y									y	y
Total	229	353	487.75	8	6,203	2	6	0	0	6	0	0	0	0	0	2	0	0	6	4
		Pipe Line =		7	L=	5,403														
		Raised Open =		1	L=	800														

List of Improvement Meskas

in Kahwagy Canal Command Area

Name of Meska	No. of Farmers under WUA	No. of Farmers within B. Area	Area Served (feddan)	Type of Impr'd Meska	Total Length (m)	Operation Period: full	Operation Period: Partially Operation (PO) months	PO from	PO to	if PO, Why (major reasons) (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2-1	24	35	60.25	Pipe Line	540		y			y		y							y	y
2-2	27	35	73.16	Pipe Line	685		y			y		y							y	y
2-3	17	24	45.83	Pipe Line	740		y			y		y							y	y
2-4	10	14	36.00	Pipe Line	490		y			y		y							y	y
2-5	16	22	53.33	Pipe Line	480		y			y		y							y	y
2-6	7	9	43.25	Pipe Line	250		y			y		y							y	y
2-7	13	13	45.83	Raised Open	550	y												y		
2-8	19	25	71.25	Pipe Line	840		y					y							y	y
2-9	33	33	93.67	Pipe Line	1,640	y														
2-10	18	24	94.50	Pipe Line	1,030		y					y							y	y
2-11	21	34	90.00	Pipe Line	1,200		y					y							y	y
Total	205	268	707.07	11	8,445	2	9	0	0	6	0	9	0	0	0	0	0	1	9	9
			Pipe Line =	10	L=	7,895														
			Raised Open =	1	L=	550														

List of Improvement Meskas

in Kahwagy Canal Command Area

Name of Meska	No. of Farmers under WUA	No. of Farmers within B. Area	Area Served (feddan)	Type of Impr'd Meska	Total Length (m)	Operation Period				if PO, Why (major reasons)										
						full	Partially Operation (PO)			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
							months	from	to											
3-1	12	12	28.00	Raised Open	255	y														
3-2	25	25	29.58	Pipe Line	360	y														
3-3	40	40	42.04	Pipe Line	275	y														
3-4	20	28	55.67	Pipe Line	660		y					y							y	y
3-5	20	29	70.29	Pipe Line	565		y					y							y	y
3-6	32	51	82.88	Pipe Line	865		y					y							y	y
3-7	9	13	49.00	Pipe Line	575		y						y						y	y
3-8	19	25	80.08	Pipe Line	715		y						y						y	y
3-9	16	25	79.29	Pipe Line	715		y						y						y	y
3-10	22	27	81.13	Pipe Line	750		y						y						y	y
3-11	12	18	49.75	Pipe Line	340		y						y						y	y
3-12	43	43	27.96	Raised Open	240	y													y	
3-13	23	23	20.00	Raised Open	400	y														
3-14	21	21	35.88	Pipe Line	475	y														
3-15	8	12	86.25	Pipe Line	1,235		y						y						y	
3-16	35	57	71.58	Pipe Line	1,090		y						y		y				y	
3-17	26	37	79.00	Pipe Line	815		y			y									y	
3-18	22	30	80.13	Pipe Line	900		y			y									y	
Total	405	516	1,048.51	18	11,230	6	12			2	0	3	7	0	1	0	0	0	13	8

Pipe Line = 15 L= 10,335

Raised Open = 3 L= 895

List of Improvement Meskas

in Kahwagy Canal Command Area

Name of Meska	No. of Farmers under WUA	No. of Farmers within B. Area	Area Served (feddan)	Type of Impr'd Meska	Total Length (m)	Operation Period: full	Operation Period: Partially Operation (PO) months	from	to	if PO, Why (major reasons): (1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
4-1	10	21	65.29	Pipe Line	800		y						y						y	y
4-2	10	19	51.21	Pipe Line	410		y						y						y	y
4-3	36	36	72.50	Raised Open	655	y														
4-4	45	45	65.83	Pipe Line	740	y												y		
4-5	14	20	104.42	Pipe Line	800		y									y			y	y
4-6	35	35	31.96	Raised Open	525	y												y	y	
4-7	21	21	64.21	Raised Open	480	y										y			y	y
4-8	4	6	44.58	Pipe Line	605		y													
Total	175	203	500.00	8	5,015	4	4	0	0	0	0	0	2	0	0	2	0	2	5	4
		Pipe Line =		5	L=	3,355														
		Raised Open =		3	L=	1,660														

Summary of Improvement Meskas in Bahr El Saidi Canal Command Area under IIP

Contract No.	Present No. of WUA Member	No. of Benefi-cialies	Area Served (feddan)	Meska Length (m)			Improved Type		Operaton Period		if PO, Why (major reasons)										
				Pipe Line	Raised Open	Total	Pipe Line	Raisd Open	Full	Partialy	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1	330	514	2,030.25	16,970	7,830	24,800	19	7	7	16	18	18	18	19	0	0	0	0	0	19	15
2	405	575	1,449.46	21,078	4,165	25,243	22	5	11	14	14	14	14	16	0	0	0	0	0	16	16
3	229	303	808.62	9,635	1,520	11,155	5	4	5	4	6	6	6	6	0	0	0	0	0	6	6
4	158	362	1,108.14	12,665	0	12,665	14	0	2	12	10	9	9	11	0	0	0	0	0	7	6
5	138	288	702.29	6,282	0	6,282	10	0	3	7	2	6	7	6	0	0	0	0	0	7	7
6	390	623	1,700.59	12,460	0	12,460	21	0	8	13	1	11	13	9	1	1	0	0	0	14	14
7	261	379	1,044.89	10,605	0	10,605	15	0	4	11	2	11	11	2	0	0	0	0	0	9	10
8	265	510	1,019.03	9,680	0	9,680	21	0	4	17	16	16	15	17	0	0	2	0	0	17	16
9	42	111	231.83	2,315	0	2,315	4	0	1	3	2	3	1	3	0	2	0	0	0	3	3
10	249	372	830.39	4,830	1,900	6,730	12	2	6	8	6	7	3	7	0	2	0	0	0	5	5
11	132	282	825.84	8,740	400	9,140	13	1	3	11	9	8	9	7	0	0	0	0	0	10	10
12	236	506	1,500.17	15,760	1,405	17,165	26	2	9	19	11	11	10	15	0	0	0	0	0	10	10
13	72	211	567.55	5,970	0	5,970	10	0	0	10	5	4	2	6	0	0	0	0	0	6	6
Tota	2,907	5,036	13,819.05	136,990	17,220	154,210	192	21	63	145	102	124	118	124	1	5	2	0	0	129	124
	57.7	100.0																			
				88.8	11.2	100.0															
Ratio(%)							90.1	9.9													
									30.3	69.7											
											47.9	58.2	55.4	58.2	0.5	2.3	0.9	0.0	0.0	60.6	58.2
Density																					
per Meska			65	713	820	724															
per ha						26.6															

Note: Since in the cotract No. 9, only 4 data are available (No.9-1 to 9-5), the data of 4 meska are used for the total.
Because in the contract No.10 and 13, some data are missing, the total is summed up excluding those data.

List of Improvement Meskas
in Bahr El Saidi Canal Command Area

Name of Meska	Present No. of WUA Member	No. of Benefi-ciaries	Area Served (feddan)	Type of Impr'd Meska	Total Length (m)	Operation Period				if PO, Why (major reasons)										
						full	Partially Operation (PO)			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
							months	from	to											
1-1	-	-	95.50	Pipe Line	1,130	no/op				y	y	y	y						y	y
1-2	10	16	61.50	Pipe Line	360		y			y	y		y						y	y
1-3	9	17	51.00	Pipe Line	340		y					y	y						y	y
1-4	15	27	135.00	Pipe Line	910		y			y	y	y	y						y	y
1-5	18	36	108.00	Pipe Line	1,555		y			y	y	y	y						y	
1-6	10	10	69.50	Raised Open	1,225	y														
1-7	-	-	100.00	Pipe Line	1,380	no/op				y	y	y	y						y	y
1-8	28	35	104.00	Pipe Line	1,200		y			y	y	y	y						y	y
1-9	29	39	100.00	Pipe Line	975		y			y	y	y	y						y	y
1-10	14	30	108.00	Pipe Line	800		y			y	y	y	y						y	
1-11	8	12	45.00	Pipe Line	450		y			y	y	y	y						y	y
1-13	-	-	50.00	Pipe Line	350	no/op				y	y	y	y						y	
1-14	18	27	71.50	Pipe Line	1,415		y			y	y	y	y						y	y
1-15	45	55	145.00	Pipe Line	1,485	y														
1-16	15	27	100.00	Pipe Line	1,420		y			y	y	y	y						y	y
1-17	10	16	45.00	Pipe Line	275		y			y	y	y	y						y	
1-19	45	98	153.33	Raised Open	2,745		y			y	y	y	y						y	y
1-20	5	7	42.00	Pipe Line	455		y			y	y	y	y						y	y
1-21	14	24	67.00	Pipe Line	1,015		y			y	y	y	y						y	y
1-22	6	6	130.00	Raised Open	1,525	y														
1-23	4	4	82.92	Raised Open	1,025	y														
1-25	3	3	30.00	Raised Open	340	y														
1-26	3	3	30.00	Raised Open	620	y														
1-27	4	4	33.00	Raised Open	350	y														
1-28	14	15	48.00	Pipe Line	620		y			y	y	y	y						y	y
1-29	3	3	25.00	Pipe Line	835		y			y	y	y	y						y	y
Total	330	514	2,030.25	26	24,800	7	16			18	18	18	19	0	0	0	0	0	19	15

Pipe Line = 19 L= 16,970 m

Raised Open = 7 L= 7,830 m

List of Improvement Meskas
in Bahr El Saidi Canal Command Area

Name of Meska	Present No. of WUA Member	No. of Benefi-cialies	Area Served (feddan)	Type of Impr'd Meska	Total Length (m)	Operation Period				if PO, Why (major reasons)										
						full	Partially Operation (PO)			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
							months	from	to											
2-1	28	48	55.00	Pipe Line	930		y			y	y	y	y						y	y
2-2	24	24	45.00	Pipe Line	1,275		y			y	y	y	y						y	y
2-3	30	48	100.00	Pipe Line	1,275		y			y	y	y	y						y	y
2-4	6	6	19.00	Raised Open	550	y														
2-5	9	9	68.00	Raised Open	1,120	y														
2-6	14	24	49.00	Pipe Line	950		y			y	y	y	y						y	y
2-7	28	32	56.00	Pipe Line	790	y														
2-8	8	13	51.00	Pipe Line	1,005		y			y	y	y	y						y	y
2-9	25	25	42.00	Pipe Line	880	y														
2-10	4	4	82.00	Raised Open	1,595	y														
2-11	13	16	43.00	Pipe Line	895		y						y						y	y
2-12	15	23	37.00	Pipe Line	1,045		y						y						y	y
2-13	28	30	59.00	Pipe Line	2,000	y														
2-14	17	17	40.00	Pipe Line	1,000	y														
2-15	25	55	100.00	Pipe Line	1,910		y			y	y	y	y						y	y
2-16	15	22	62.00	Pipe Line	1,105		y			y	y	y	y						y	y
2-17	25	45	60.00	Pipe Line	785					y	y	y	y						y	y
2-18	14	24	56.00	Pipe Line	430					y	y	y	y						y	y
2-19	18	23	45.00	Pipe Line	550		y			y	y	y	y						y	y
2-20	13	22	50.00	Pipe Line	360		y			y	y	y	y						y	y
2-21	6	6	30.00	Raised Open	150	y														
2-22	9	13	80.00	Pipe Line	740		y			y	y	y	y						y	y
2-23	1	1	60.00	Pipe Line	540	y														
2-24	9	15	74.46	Pipe Line	858		y			y	y	y	y						y	y
2-25	15	24	60.00	Pipe Line	785		y			y	y	y	y						y	y
2-26	5	5	26.00	Pipe Line	970	y														
2-31	1	1	0.00	Raised Open	750	y														
Total	405	575	1,449.46	27	25,243	11	14			14	14	14	16	0	0	0	0	0	16	16

Pipe Line = 22 L= 21,078 m

Raised Open = 5 L= 4,165 m

List of Improvement Meskas
in Bahr El Saidi Canal Command Area

(3 of 13)

Name of Meska	Present No. of WUA Member	No. of Benefi-cialies	Area Served (feddan)	Type of Impr'd Meska	Total Length (m)	Operation Period				if PO, Why (major reasons)										
						full	Partially Operation (PO)			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
							months	from	to											
3-1	22	25	76.08	Pipe Line	1,150		y			y	y	y	y						y	y
3-2	-	5	94.58	Pipe Line	1,500	no/op				y	y	y	y						y	y
3-3	28	32	62.50	Raised Open	790	y														
3-4	26	32	47.21	Raised Open	730	y														
3-5	-	9	68.00	Pipe Line	830	no/op				y	y	y	y						y	y
3-6	55	51	102.83	Pipe Line	1,240	y														
3-7	17	19	64.42	Pipe Line	610	y														
3-8	31	51	97.00	Pipe Line	1,165		y			y	y	y	y						y	y
3-9	20	23	36.00	Pipe Line	645	y														
3-10	18	36	82.00	Pipe Line	1,075		y			y	y	y	y						y	y
3-11	12	20	78.00	Pipe Line	1,420		y			y	y	y	y						y	y
Total	229	303	808.62	11	11,155	5	4			6	6	6	6						6	6

Pipe Line = 9 L= 9,635 m

Raised Open = 2 L= 1,520 m

List of Improvement Meskas
in Bahr El Saidi Canal Command Area

Name of Meska	Present No. of WUA Member	No. of Benefi-cialies	Area Served (fedden)	Type of Impr'd Meska	Total Length (m)	Operation Period				if PO, Why (major reasons)										
						full	Partially Operation (PO)			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
							months	from	to											
4-1	6	14	79.50	Pipe Line	835		y			y	y	y	y						y	y
4-2	8	13	73.92	Pipe Line	935		y			y	y	y	y						y	y
4-3	5	5	56.67	Pipe Line	750	y														
4-4	8	12	83.17	Pipe Line	890		y			y	y	y	y						y	y
4-7	18	32	100.50	Pipe Line	910		y			y	y	y	y						y	y
4-11	20	36	79.46	Pipe Line	1,230		y			y	y	y	y						y	y
4-12	16	56	87.42	Pipe Line	780		y			y	y	y	y						y	
4-13	15	25	83.67	Pipe Line	970		y			y	y	y	y							
4-14	17	21	52.08	Pipe Line	515		y			y	y	y	y							
4-15	8	15	83.58	Pipe Line	970		y			y	y	y	y						y	y
4-16	4	4	82.00	Pipe Line	770	y														
4-17	33	49	79.50	Pipe Line	985		y			y										
4-18	-	55	86.67	Pipe Line	1,120		y						y							
4-19	-	25	80.00	Pipe Line	1,005		y						y							
Total	158	362	1,108.14	14	12,665	2	12			10	9	9	11	0	0	0	0	0	7	6

Pipe Line = 14 L= 12,665 m

Raised Open = 0 L= 0 m

List of Improvement Meskas
in Bahr El Saidi Canal Command Area

Name of Meska	Present No. of WUA Member	No. of Benefi-ciaries	Area Served (feddan)	Type of Impr'd Meska	Total Length (m)	Operation Period				if PO, Why (major reasons)										
						full	Partially Operation (PO)			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
							months	from	to											
S-1	20	44	52.00	Pipe Line	582		y				y	y	y						y	y
S-2	26	26	71.67	Pipe Line	465	y														
S-3	21	36	76.00	Pipe Line	695		y			y	y	y	y						y	y
S-5	-	27	69.00	Pipe Line	795		y				y	y	y						y	y
S-6	10	19	91.00	Pipe Line	525		y					y	y						y	y
S-7	21	21	76.00	Pipe Line	735	y														
S-8	22	22	72.00	Pipe Line	485	y														
S-9	18	32	79.33	Pipe Line	835		y			y	y	y	y						y	y
S-10	-	33	61.54	Pipe Line	530		y				y	y	y						y	y
S-11	-	28	53.75	Pipe Line	635		y				y	y							y	y
Total	138	288	702.29	10	6,282	3	7			2	6	7	6	0	0	0	0	0	7	7

Pipe Line = 10 L= 6,282 m

Raised Open = 0 L= 0 m

List of Improvement Meskas
in Bahr El Saidi Canal Command Area

Name of Meska	Present No. of WUA Member	No. of Benefi-cialies	Area Served (feddan)	Type of Impr'd Meska	Total Length (m)	Operation Period				if PO, Why (major reasons)										
						full	Partially Operation (PO)			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
							months	from	to											
6-1	13	24	100.00	Pipe Line	515		y				y	y			y				y	y
6-2	20	20	69.00	Pipe Line	940	y														
6-3	35	35	75.08	Pipe Line	875	y														
6-5	21	21	67.00	Pipe Line	795	y														
6-7	-	28	95.17	Pipe Line	1,145		y			y	y	y	y	y					y	y
6-9	13	25	84.79	Pipe Line	410		y				y	y							y	y
6-10	22	22	83.00	Pipe Line	635	y													y	y
6-11	18	29	69.50	Pipe Line	490		y				y	y	y						y	y
6-12	13	19	54.00	Pipe Line	600		y				y	y	y						y	y
6-13	-	23	79.79	Pipe Line	355		y				y	y	y						y	y
6-14	43	43	97.13	Pipe Line	990	y														
6-15	25	26	102.00	Pipe Line	430		y				y	y	y						y	y
6-16	-	42	109.42	Pipe Line	370		y				y	y	y						y	y
6-17	-	54	122.92	Pipe Line	485		y				y	y	y						y	y
6-18	31	31	64.00	Pipe Line	615	y														
6-19	18	24	50.00	Pipe Line	410		y				y	y							y	y
6-20	40	40	90.25	Pipe Line	315	y														
6-22	22	39	92.54	Pipe Line	615		y				y	y							y	y
6-23	19	35	55.50	Pipe Line	470		y					y	y						y	y
6-24	12	17	53.50	Pipe Line	490		y					y	y						y	y
6-25	25	26	86.00	Pipe Line	510	y														
Total	390	623	1,700.59	21	12,460	8	13			1	11	13	9	1	1	0	0	0	14	14

Pipe Line = 21 L= 12,460 m

Raised Open = 0 L= 0 m

List of Improvement Meskas
in Bahr El Saidi Canal Command Area

Name of Meska	Present No. of WUA Member	No. of Benefi-cialies	Area Served (fedden)	Type of Imp'd Meska	Total Length (m)	Operation Period				if PO, Why (major reasons)										
						full	Partially Operation (PO)													
							months	from	to	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
7-1	47	69	97.42	Pipe Line	1,010		y				y	y							y	y
7-2	12	21	56.67	Pipe Line	545		y												y	y
7-3	9	9	35.50	Pipe Line	265	y														
7-4	29	29	78.75	Pipe Line	1,000	y														
7-7	29	29	78.75	Pipe Line	890	y					y	y								
7-8	11	22	81.25	Pipe Line	790		y				y	y							y	y
7-9	18	29	75.63	Pipe Line	1,330		y												y	y
7-10	16	17	40.75	Pipe Line	495	y					y	y								
7-11	25	32	71.17	Pipe Line	435		y				y	y							y	y
7-12	12	18	74.00	Pipe Line	845		y				y	y							y	y
7-13	27	48	80.00	Pipe Line	395		y				y	y								
7-14	18	28	80.00	Pipe Line	760		y				y	y								y
7-15	8	12	55.00	Pipe Line	645		y				y	y							y	y
7-16	-	7	75.00	Pipe Line	570		y			y	y	y	y						y	y
7-17	-	9	65.00	Pipe Line	630		y			y	y	y	y						y	y
Total	261	379	1,044.89	15	10,605	4	11			2	11	11	2	0	0	0	0	0	9	10

Pipe Line = 15 L= 10,605 m

Raised Open = 0 L= 0 m

List of Improvement Meskas
in Bahr El Saidi Canal Command Area

(8 of 13)

Name of Meska	Present No. of WUA Member	No. of Benefi-cialies	Type of Impr'd Meska	Type of Impr'd Meska	Total Length (m)	Operation Period				if PO, Why (major reasons)										
						full	Partially Operation (PO) months	from	to	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
8-8	25	38	65.00	Pipe Line	955		y			y	y	y	y						y	y
8-9	26	37	52.71	Pipe Line	630		y			y	y	y	y						y	y
8-10	11	16	27.50	Pipe Line	610		y			y	y	y	y						y	y
8-11	22	22	42.25	Pipe Line	305	y														
8-12	18	29	66.71	Pipe Line	520		y			y	y	y	y						y	y
8-13	-	5	65.00	Pipe Line	265		y			y	y	y	y						y	y
8-14	-	24	34.00	Pipe Line	530		y			y	y	y	y						y	y
8-15	24	34	73.58	Pipe Line	555		y			y	y	y	y						y	y
8-16	-	10	57.00	Pipe Line	445		y			y	y	y	y						y	y
8-17	9	15	32.58	Pipe Line	320		y			y	y		y						y	y
8-19	10	17	31.75	Pipe Line	335		y			y	y	y	y						y	y
8-20	22	31	41.63	Pipe Line	765		y						y						y	y
8-21	25	25	32.58	Pipe Line	360	y														
8-22	-	31	45.83	Pipe Line	255		y			y	y	y	y			y			y	y
8-23	-	24	60.33	Pipe Line	265		y			y	y	y	y			y			y	
8-25	23	37	62.29	Pipe Line	665		y			y	y	y	y						y	y
8-26	-	31	58.25	Pipe Line	310		y			y	y	y	y						y	y
8-27	14	14	25.83	Pipe Line	275	y														
8-28	19	25	52.75	Pipe Line	430		y			y	y	y	y						y	y
8-29	-	28	50.75	Pipe Line	455		y			y	y	y	y						y	y
8-30	17	17	40.71	Pipe Line	430	y														
Total	265	510	1,019.03	21	9,680	4	17			16	16	15	17	0	0	2	0	0	17	16

Pipe Line = 21 L= 9,680 m

Raised Open = 0 L= 0 m

List of Improvement Meskas
in Bahr El Saidi Canal Command Area

(9 of 13)

Name of Meska	Present No. of WUA Member	No. of Benefi-cialies	Area Served (feddan)	Type of Impr'd Meska	Total Length (m)	Operation Period				if PO, Why (major reasons)										
						full	Partially Operation (PO)			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
							months	from	to											
9-1	-	38	72.33	Pipe Line	855		y			y	y	y	y		y				y	y
9-2	15	29	53.33	Pipe Line	525		y				y		y						y	y
9-3	18	35	65.67	Pipe Line	485		y			y	y		y		y				y	y
9-5	9	9	40.50	Pipe Line	450	y														
9-6	34	34	50.75	Pipe Line		y														
9-7	-	34	77.67	Pipe Line			y			y	y	y	y		y				y	y
9-8	50	50	99.38	Pipe Line		y														
9-9	21	21	55.83	Pipe Line		y														
9-10	18	18	63.50	Pipe Line		y														
9-11	12	26	66.17	Pipe Line			y			y	y	y	y						y	y
9-12	-	33	74.17	Pipe Line			y				y	y	y		y					
Total	177	327	719.30	11	2,315	5	6			4	6	4	6	0	4	0	0	0	5	5
			Pipe Line =	11	L=	2,315	m													
			Raised Open =	0	L=	0	m													

In case of Meska from No.9-1 to -5

Total	42	111	231.83	4	2,315	1	3	0	0	2	3	1	3	0	2	0	0	0	3	3
			Pipe Line =	4	L=	2,315	m													
			Raised Open =	0	L=	0	m													

Note: Since only 4 data are available, the above total of 4 meska is summed up.

List of Improvement Meskas
in Bahr El Saidi Canal Command Area

Name of Meska	Present No. of WUA Member	No. of Benefi-cialies	Area Served (feddan)	Type of Imp'd Meska	Total Length (m)	Operation Period				if PO, Why (major reasons)										
						full	Partially Operation (PO)													
							months	from	to	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
10-1	13	27	64.17	Pipe Line	250		y			y	y		y						y	y
10-2	32	32	69.17	Pipe Line	425	y														
10-3	35	35	91.71	Pipe Line	375	y														
10-4	10	20	56.67	Pipe Line	130		y			y	y		y							
10-5	42	42	61.00	Pipe Line	60	y														
10-6	11	15	31.00	Pipe Line	200		y			y	y		y							
10-7	-				375															
10-8	27	27	17.00	Raised Open	900	y														
10-9					210															
10-10	20	26	52.00	Raised Open	1,000	y														
10-11			48.00		510															
10-12	-	15	37.42	Pipe Line	600		y			y	y		y						y	y
10-13	-	27	88.00	Pipe Line	915		y				y	y	y		y				y	y
10-14	27	27	50.08	Pipe Line	380	y														
10-15	32	46	41.00	Pipe Line	240		y			y	y	y	y						y	y
10-16	-	16	52.17	Pipe Line	610		y													
10-17	-	17	71.00	Pipe Line	645		y			y	y	y	y		y				y	y
Total	249	372	830.39	14	7,825	6	8			6	7	3	7	0	2	0	0	0	5	5
			Pipe Line =	12	L=	4,830 m														
			Raised Open =	2	L=	1,900 m														

Total excluding Meska No.10-7, 10-9 and 10-11

Total	249	372	830.39	14	6,730	6	8	0	0	6	7	3	7	0	2	0	0	0	5	5
			Pipe Line =	12	L=	4,830 m														
			Raised Open =	2	L=	1,900 m														

List of Improvement Meskas
in Bahr El Saidi Canal Command Area

(11 of 13)

Name of Meska	Present No. of WUA Member	No. of Benefi-cialies	Area Served (feddan)	Type of Imp'd Meska	Total Length (m)	Operation Period				if PO, Why (major reasons)										
						full	Partially Operation (PO)			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
							months	from	to											
11-1	-	15	35.00	Pipe Line	845		y			y	y	y	y						y	y
11-19	-	19	49.50	Pipe Line	1,035		y			y	y	y	y						y	y
11-20	1	30	63.92	Pipe Line	735		y			y	y	y	y						y	y
11-21	17	20	69.50	Pipe Line	615		y					y								
11-22	14	27	68.08	Pipe Line	945		y			y									y	y
11-23	21	27	81.67	Pipe Line	690		y						y						y	y
11-24	18	18	75.00	Raised Open	400	y														
11-25	-	16	35.00	Pipe Line	310		y			y	y	y	y						y	y
11-26	-	20	49.58	Pipe Line	260		y			y	y	y	y						y	y
11-27	-	15	47.71	Pipe Line	530		y			y	y	y	y						y	y
11-28	24	24	71.67	Pipe Line	575	y														
11-29	8	14	45.04	Pipe Line	660		y			y	y	y							y	y
11-31	9	17	58.17	Pipe Line	735		y			y	y	y							y	y
11-32	20	20	76.00	Pipe Line	805	y														
Total	132	282	825.84	14	9,140	3	11			9	8	9	7	0	0	0	0	0	10	10
			Pipe Line =	13	L=	8,740 m														
			Raised Open =	1	L=	400 m														

List of Improvement Meskas
in Bahr El Saidi Canal Command Area

Name of Meska	Present No. of WUA Member	No. of Benefi-cialies	Area Served (feddan)	Type of Impr'd Meska	Total Length (m)	Operation Period				if PO, Why (major reasons)										
						full	Partially Operation (PO)			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
							months	from	to											
12-1	-	23	43.17	Pipe Line	825		y			y	y	y	y						y	y
12-2	-	33	50.25	Pipe Line	505		y			y	y	y	y							
12-3	-	18	65.17	Pipe Line	635		y			y	y	y	y							
12-5	6	20	64.42	Pipe Line	910		y						y						y	y
12-7A	9	16	41.33	Pipe Line	875		y				y								y	y
12-7B	5	13	45.75	Pipe Line	765		y						y						y	y
12-8A	5	13	45.50	Pipe Line	1,140		y				y		y							
12-8B	9	9	53.00	Raised Open	620	y														
12-10A	13	13	48.54	Pipe Line	450	y														
12-10B	15	16	54.33	Pipe Line	685	y														
12-11	18	18	60.75	Pipe Line	230	y														
12-13	-	29	46.92	Pipe Line	335		y			y	y	y	y						y	y
12-14	-	19	50.75	Pipe Line	1,055		y			y	y	y	y						y	y
12-15	-	28	50.92	Pipe Line	240		y			y	y	y	y						y	y
12-16	-	16	56.33	Pipe Line	310		y			y	y	y	y						y	y
12-17	11	15	53.79	Pipe Line	405		y			y										
12-18	11	11	69.08	Raised Open	785	y														
12-19	21	21	50.50	Pipe Line	250	y														
12-20	17	18	45.75	Pipe Line	250	y														
12-21	12	31	82.75	Pipe Line	830		y												y	y
12-22	-	27	30.88	Pipe Line	420		y			y	y	y	y						y	y
12-23	7	8	29.00	Pipe Line	715		y					y								
12-24	10	12	71.00	Pipe Line	580		y						y							
12-25	12	18	49.00	Pipe Line	525		y			y	y		y							
12-27	6	9	95.00	Pipe Line	415		y			y			y							
12-28	10	13	31.21	Pipe Line	590		y					y	y							
12-29	21	21	48.08	Pipe Line	1,030	y														
12-30	18	18	67.00	Pipe Line	790	y														
Total	236	506	1,500.17	28	17,165	9	19			11	11	10	15	0	0	0	0	0	10	10

Pipe Line = 26 L= 15,760 m

Raised Open = 2 L= 1,405 m

List of Improvement Meskas
in Bahr El Saidi Canal Command Area

(13 of 13)

Name of Meska	Present No. of WUA Member	No. of Benefi-cialies	Area Served (feddan)	Type of Impr'd Meska	Total Length (m)	Operation Period				if PO, Why (major reasons)										
						full	Partially Operation (PO)													
							months	from	to	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
13-1	-	26	42.75	Pipe Line	310		y												y	y
13-2	14	33	69.63	Pipe Line	1,050		y				y		y							
13-3	-	20	57.33	Pipe Line	960		y												y	y
13-4	8	16	35.67	Pipe Line	615		y			y			y							
13-5					1,030															
13-6	18	29	49.29	Pipe Line	340		y						y							
13-7	-	14	61.13	Pipe Line	435		y			y	y	y	y						y	y
13-8					1,350															
13-9	-	31	98.25	Pipe Line	490		y			y	y	y	y						y	y
13-10	8	10	29.00	Pipe Line	400		y			y									y	y
13-11	6	8	56.50	Pipe Line	880		y			y	y									
13-12	18	24	68.00	Pipe Line	490		y						y						y	y
Total	72	211	567.55	10	8,350	0	10			5	4	2	6	0	0	0	0	0	6	6
			Pipe Line =	10	L=	5,970 m														
			Raised Open =	0	L=	0 m														

In Case of Exclusive Maska No.13-5 and 13-8

Total	72	211	567.55	10	5,970	0	10	0	0	5	4	2	6	0	0	0	0	0	6	6
			Pipe Line =	10	L=	5,970 m														
			Raised Open =	0	L=	0 m														