APPENDIX K.

ENVIRONMENT

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Table K.1.1 Location of Water Quality Survey in and around the Study Area

- I. Principal irrigation canal
 - 1. Raiah Abbasee canal, at midstream
 - 2. Bahr Shebin canal, at midstream and downstream end
- II. Main irrigation canal
 - 1. Bahr Mallah canal, at midstream and downstream end
 - 2. Bahr Tera canal, at midstream and downstream end
 - 3. Bahr El Sahel canal, at midstream and downstream end
 - 4. Bahr Basandila canal, at midstream and downstream end

III. Branch canal

- 1. El Balamoun canal, at midstream and downstream end
- 2. Bahr Hafir Shehab El Deen canal, at midstream and downstream end
- 3. Bahr El Maasara canal, at midstream and downstream end
- 4. Bahr El Banawan canal, at midstream and downstream end

IV. Delivery canal

- 1. El Mansour canal, at midstream and downstream end
- 2. Bahr Biyala canal, at midstream and downstream end

V. Reuse of drainage water

- 1. Hamoul pumping station, before station and mixed point to Bahr Tera irrigation canal
- 2. No.3 pumping station, before station and mixed point to irrigation canal
- 3. Near Hafir pumping station, El Gharbia drain and mixed point to Bahr Tera irrigation canat

VI. Drainage canal

- 1. Lower no.1 drainage canal, at upstream end and midstream
- 2. No.4 drainage canal, at upstream end and midstream
- 3. Zifta drainage canal, at upstream end and midstream

VI. Around of the Study Area, in the Kahwagy USAID project area

- 1. Kahwagy irrigation canal, at intake from Bahr Yazeed canal, midstream, and downstream end
- 2. Atwa drain pumping station, before station and mixed point to Kahwagy irrigation canal

W. Around of the Study Area, in the El Nazl ISAWIP project area

- 1. El Bahr El Saghir irrigation canal, at start of area, midstream, and end of area
- 2. Upper Sirw pumping station, before point
- 3. Lower Sirw pumping station, before point

IX. Around of the Study Area, in the Bahr Saidi USAID project area

- 1. Bahr El Saidi irrigation canal, at start of area and midstream
- 2. Sakhawi irrigation canal, intake from Bahr El saidi canal and intake to Sakhawi East canal
- 3. Qassabi irrigation canal, at midstream
- 4. Abu Ismail irrigation canal, at intake from Ganayma canal
- 5. Zafrani drainage canal, end of downstream
- 6. Kom El Arab drainage canal, end of downstream

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Table K.1.2.1 Water Quality of Abbases Principal Inigation Canal in the Study Area

Location	Midatmen					
Date, Month		2. May		13, May		24 Oct
measurement time				10:25		9:10
Water Dow				Fast		Modium
Water quantity				Much		Much
Water Temperature ("C)				24.3		ลี
Hd				7.31		7.60
Turbidity (NTU)	\$	ห	4	ដ	9	1.5
Electric Conductivity (dS/m)				0.376		0.354
Diasofved Oxygen (mg/l)				5,73		5.3
Total Dissolved Solids (mg/)				340		ลี
Sodium (mee/l)	•		Ŀ	•		12
Calcium (mee/1)			•	•		5
Magnesium (meq/l)				•		1.0
Sodium Adsorption Ratio	•		4	4		0,0

Note 1. The measurement was done by JICA Study Team in 1998.
2. The data on 11th, and 25rd, May were measured in the IIP Tanta Office after collected samples at 8 officient in the moming. The other data were determined on the field.
3. Pth, May was rainy during Ayrime.
4. Water flow level was decided by technical expert, stop, slow, medium, and fast, respectively. And also, water quantity were fully. The and much.
5. Tota discoved solids(TDS) is calculated from Electric Conductivity by doing 640 times, referred to Reuse Monitoring Frogram Report 39 by Drainage Research Enstitute, 1995.
6. Guideline 3. Yaner quarky for irrigation are shown as follows by FAO Irrigation and Drainage Paper 29, 1985.
6. Forderline 3. Nano 6.7 > Slight to Moderate 450-2000. Seven 2.0
6. Total Discoved Solids(MD): Nane 650 >, Slight to Moderate 450-2000. Seven 2.00

S.	Severe	< 7.0	× 20	< 2.0	
Influence of impation was evaluated by SAR and ECW.	Slight to Moderate	0.7 - 0.2			
D SEW (D)C)	None	0.7 <	1	1.9 <	
Influence of 1miga	SAR	0-3 and ECW- 0.7 <	۲	55	

13 >	2.9 >	to Moderate 3-9 SAR, Severe 9 SAR <
29 - 1.3	5.0 - 2.9	no 3 SAR >, Slight to A
202	5.0 <	[outoity(Na): No
12-20	20-40	- Specific Ion Toy
:		

Table K.1.2.2 Water Quality of Bahr Shebin Principal Irrigation Canal in the Study Area

Date, Month Measurement time	10, April 12:30	11 May			
Measurement time	8		20. May	C3. May	รั 8 ส์
	2	10:30	10:30	10:00	5:45
Water Cow	į	<u>Á</u>	Slow	, Q Z	Medium
Water quantity	<u>Á</u>	, Q Z	Much	92	Much
Water Temperature (C)	21.5	24.3	24.0	23.9	ខ្ល
p.H.	8.29	7.81	7.52	7.81	7.74
Turbidity (NTU)	ŝ	14	11	14	10
Electric Conductivity (dS/m)	0.397	0.379	0.369	0.372	0.353
Dissolved Oxygen (mg/l)	3.05	3,91	6.03	4.60	5.59
Total Dissolved Solids (mg/l)	8	3	26	240	ลี
Sodium (meq/1)	•	•	•		2
Calcium (meg/l)	•				5
Mamesium (mee/l)	•				6
Sodium Adsomntion Ratio					
Coention	End of downstream	wnstream			
Date. Month	S. April	IL MAV	16 May	21. May	0 %
Measurement time	10:45	11:55	8	11:55	9:45
Water Dow	ġ	ÁZ	Medium	A Z	Fast
Wator quantity	, P Z	Ą Z	Medium	92	Much
Water Temperature (C)	20.0	25	24.3	22.9	20
P.Y.	7,95	7.50	7.72	7.94	7.97
Judiary (NTC)	15	16	8	ā	51
Electric Conductivity (dS/m)	0.384	0.332	0.336	0.368	0.391
Dissolved Oxygen (mg/l)	7.70	4.26	6.35	4.24	4.70
Total Dissolved Solids (mg/l)	8	22	28	25	20
Sodium (moq/l)			•	1	1.5
Calcum (meo/l)	•		•		3.4
Magnesium (meq/l)		•			1
Sedime Advantion Datio					

Area
Study
the
.14
Canal
Irrigation
Main I
AailaM
of Bahr
Water Quality
Table K.1.2.3

1.connon	Midatream	6			
Date, Month	2, May		13. May	ZJ. May	24 Oct
Measurement time	05:51		12:00	10:03	ร
Water Dow	205		Fast		Medium
Water quentity	Linto		Much		Medium
Water Tempenture (C)	24.4		24.0		11
Ha	7,93		7.62		7.36
Turbieity (NJU)	TOL	8	35	37	2
Electric Conductivity (dS/m)	0.405		0.567		0.384
Dissolved Orygen (mg/)	6.74		5,94		5.54
Total Dissolved Solids (mg/l)	8		940		ž
Sodium (mog/l)			•		4
Calcium (mool)					33
(Negnesium (moogl)	•				1
Sedium Adsorption Ratio					00

Location	End of do	whistream		
Data, Month	11. May	L3, May	23. May	24. Oct.
Measurement time	10:40	8:21		11:55
Water Dow	Å2	Slow		Moduum
Water quentity	Ź	Medium		Much
Water Temperature (°C)	2	ŝ		200
pH.	7.67	7.56		7.67
Tublety (NTU)	ន	23		8
Electric Conductivity (45/m)	0.473	0.393	0.374	0.367
Dissolved Oxygen (mg/)	3.61	463		5.76
Total Dissolved Solids (mg/)	8	200		540
Sodium (moq/l)		•		1
Chicium (mod/l)			•	4.5
Magnesium (moqA)			_•	1.1
Sodium Adsorption Ratio	•			0.0

Area	
e Study	
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Canol in th	
Irrigetion C	
Main.	
F.	
A de	
Quality of Bahr Tora Main Irrigeti	
4 Water Qual	
olo K1.24	
Tablo	

Location	Midetream					
Date, Month	10. April	4. May	11, MAY	13. May	23. MAY	2. Or.
Measumment time	14:15	16:20	•	04:57	12.49	13:20
Water Dow	Ą	Medium		Nedium	Q Z	Slow
Water quantity	ÁZ	Medium		Medium	Q Z	Line
Water Temperature ('C)	2.5	24.7		3.1	27.6	24.1
pH	8.32	7.95		7.59	7.73	11
Tubidity (NTU)	s	¥	38	2	3	31
Electric Conductivity (dS/m)	0.402	0.385		0.376	067.0	0,358
Dissolved Oxygen (mg1)	8.8	6.73		5.62	3.67	4.35
Total Dissolved Solids (mg/)	8	ង្ក		940	250	ห
Sodium (meq.1)	•	:		•		1.3
Calcium (mody)	. •	,			•	3.0
Magnesium (meq/l)	•				•	11
Sodium Advorption Ratio						0.0
Location	End of downstream	Amatream.				r-
Date, Month	3, May	11 May	13, May	23. May	5 5	r
Measurement time	14:10	12:25	15:35	12:40	14:35	
Water 10w	Slow	N.D.	Slow	.92 192	Medium	
Water quantity	Medium	Ņ.	Little	Â Z	Medium	
1.0.1 D		-				

Lecation	End of compating	with the second			
Date, Month	3, May	11 May	113, May	23. May	24 Oct.
Measurement time	14:10	12:25	15:35	12:40	14:35
Water 10w	Slow	N. N. N. N. N. N. N. N. N. N. N. N. N. N	NON	<u>9</u> 2	Medium
Water quantity	Modium	, N N	Linlo	Â Z	Medium
Water Temperature ('C)	25.3	5	24.4	24.1	24.6
Hd	3.15	7,43	7.90	7.52	5.39
Turbidity (NTU)	41	11	\$	4	পু
Electric Conductivity (dS/m)	117	3.77	1.50	1.34	1.16
Dissolved Chrygen (mg/l)	52	0.63	2.62	0.47	4.73
Total Dissolved Solids (mg/)	750	2 4 6	000	800	46
Sodium (meg/l)	•			•	5.1
Calcium (meq/)	•				3.9
Magnesium (meq/l)	-		•	•	4
Sodium Adsorption Ratio	•	-	.,		I.C

1. The measurement was done by JICA Study Team in 1998.
2. The data on 11th and 23rd, May were measured in the IIP Tarma Office after collected samples
3. Oth, May was miny during daytime.
4. Water flow level was decided by technical expert, stop, slow, medium, and fast, respectively. And also, water flow level was decided by technical expert, stop, slow, medium, and fast, respectively. And also, water flow level was decided by technical expert, stop, slow, medium, and fast, respectively. And also, water flow level was decided by technical expert, stop, slow, medium, and fast, respectively. And also, water flow level was build. The other data were determined on the faild.
5. Otal disolved solids (TDS) is calculated from Elsertic Conductivity by doing 640 times, referred to Rause Manitoring Programme Report. 39 by Dianage Research Dariny. 1995.
6. Guideline of water quality for irrigation are shown as follows by PAO Irrigation and Dminage Paper 29, 1985.
7. Pitt Nermai mage 0.5-5.4.
7. Conductivity (dSfm): None 0.7 - Slight to Moderate 0.7-3.0. Severe 3.0.4.
7. Total Dissolved Solids (mg/): Nas e 450 - Slight to Moderate 0.7-3.0. Severe 2.00.
7. Total Dissolved Solids (mg/): Nas e 450 - Slight to Moderate 450-2000, Severe 2000

SAR	None	light to Moden	Sec. 3
G	v= 0,7 <	0.7 - 0.2	0.2 >
ž	× 11	1.2 - 0.3	< 0.0
6-12	1.9 <	1.9 - 0.5	0.5 >
841	2.9 <	29 - 13	۲ م ا
20-40	5.0 <	5.0 - 2.9	2.9 >

. .

- Specific ion Toxicity (Na): None 3 SAR >. Slight to Moderate 3-9 SAR, Severe 9 SAR <

• • :

Table K1.2.5 Water Quality of Bahr El Sahel Main Irrigation Canal in the Study	Area	
5 Water Quality of Bahr El Sahel Main Imigation Canal	- ¥1	
5 Water Quality of Bahr El Sahel Main Imigation (
5 Water Quality of Bahr El S	Canal	
5 Water Quality of Bahr El S	sation	
5 Water Quality of Bahr El S	jų K	
5 Water Quality of Bahr El S	el Ma	
5 Water Quality of Bahr	G C C C C C C C C C C	
5 Water Quality of		
s V	No No	
s V	Qual	
Table X1.2.5	Water	
	Table X.1.2.5	

Date, Monuh Meesurement time Water flow						
Messurenst time Water flow		6 May	11. May	17. May	Z3. May	20, Oct.
Water flow	15:00	94%	10:15	02:0	10:53	9:20
	Medium	Medium	Á Z	Stop	9 Z	Stop
Water quantity	Much	Medium	Á Z	Medium	n Z	Much
Water Temperature ('C)	20.3	24.4	24.6	24.1	24.1	3.1
PH	3.32	7.02	7.16	7.70	7,70	7.0%
Turbiaiv (NTU)	10	10	20	38	16	8
Electric Conductivity (dS/m)	0.432	0,460	0.420	0.415	0.424	0.426
Diasolved Oxygen (mg/l)	5.50	6.30	3.26	+ L	5.35	3.65
Total Dissolved Solids (mg/l)	280	80	082	22	20	2
Sodium (meg/l)	•	,	•			13
Calcium (meg/l)		•	•	. •	•	3.0
Magnesium (mee/l)		1	•	,	•	1.2
Sodium Adsorption Ratio	-	•	•			0.0
Location	End of downstream	wostream				
Date, Month	6, May	11. May	17. May	23, May	30 90	
Measurement time		10:20	10:05	11:01	201	-
Water flow		ĤZ.	Fast	42	Fast	
Water quantity		92	Much	AZ.	Much	-
Water Temperature ('C)	26.7	25.5	26.6	24.0	23.3	
, Hq		7.45	7.57	7.66	13	
Turbidity (NTU)		4	s	1	ន	
Electric Conductivity (45/m)	223	0.571	0.566	0.512	0.423	
Dissolved Oxygen (mg/)	7.40	2.74	2.60	3.74	3,65	
Total Dissolved Solids (mg/)	370	370	360	330	270	
Sodium (meqA)	•	•	•	,	ŋ	
Culaium (meg/l)	1		<u> </u>		3.0	
Magnosium (moqA)	4		•	•	12	

Location	Midstream				
Date, Month	28. April	11, May	[16. May	23. May	50 8
Measurement time	9:50	8	IL:30	11.53	8.11
Water Dow	Medium	Ģ Z	Medium	Á Z	Medium
Water quantity	Medium	9 <u>2</u>	Much	, ÁZ	Medium
Water Temperature ("C)	21.3	33	24.2	ខ្លួ	ព
PH	7.91	7.68	7.76	7.94	7 80
Turbidity (NTU)	8	ห	2	4	8
Electric Conductivity (dS/m)	0.391	0.354	162.0	0.334	404-0
Dissolved Oxygen (mg/l)	5.73	4.C	800	3,60	4.47
Total Dissolved Solids (mg/l)	82	ล	22	82	260
Sodium (meq/)	.		1	•	1
Calcium (meq.1)	•	•	•		3.6
Magnesium (meq/1)			. •		11
Sodium Adsorption Ratio		•	.,		1.1

Table K.12.6 Water Quality of Bahr Basandila Main Lrigation Canal in the Study Area

Electric Conductivity (dS/m) Dissolved Oxygen (mg/l)	0.391 5.73	0.354	10.391	0.334	10 10 10	
Dissolved Oxygen (mg/l)	5.7	3.40	× v	3.60	7 47	
	200		3			
Total Dissolved Solids (mg/l)	Ŋ	20	8	8	260	
Sodium (meq/)			İ.	İ .	11	
Calcium (mog/l)		•			3.6	
Magnesium (meq/l)	•				51	
Sodium Adsorption Ratio	-		•		1.1	
						1
Location	End of downstream	wistream				r ~
Date, Month	23. April	11, May	16. May	ATX EZ	26. Oct.	r-
Measurement time	11:00	12:05	12:00	8	11:35	_
Water Dow	Modium	ND.	Medium	92	Medium	
Wator quantity	Medium	ÂZ.	Much	Q Z	Much	
Water Temperature (C)	20.0	543	22.4	0. 12	33	
Ha	7.55	7.36	7.84	7.37	8.00	
Tubidity (NTU)	121	ន	247	75	195	
Electric Conductivity (dS/m)	3,330	100.0	2.27	280	80	-
Dissolved Oxygen (mg/l)	224	0.71	1.97	2.08	2.31	
Total Dissolved Solids (mg/l)	2.JOO	440	1.500	1,300	1900	
Sodium (meg/l)	. <u>.</u>	<u>.</u>			17.7	
Calcium (meq/1)	•			4	5.4	
Magnesium (meg/l)			•	•	5.3	
Sodium Adsorption Ratio	•		•		2.5	

- Note 1. The measurement was done by JICA Study Team in 1993. 2. The data on 11th, and 23rd. May were measured in the IIP Tanta Office after collected samples at 3 o'clock in the morning. The other data were determined on the field. 3. 9th, May was rainy during daytime. 4. Water flow level was decided by technical expert, stop, alow, medium, and fast, respectively. And also,

- water quantity were little, medium, and muen, more anon mounted and take, respectively. And allo, water quantity were little, medium, and muen. 5. Total dissolved solids(TDS) is calculated from Electric Conductivity by doing 640 times, referred to Rouse Monitoring Programme Report 30 by Drainage Research Itatinue, 1995. 6. Guideline of water quality for imgation are shown as follows by FAO Irrigation and Drainage Paper 29, 1985. pE: Normal range 6.5-6.4 Conductivity(dS/m): None 0.7 >. Slight to Moderate 0.7-3.0, Sevore 3.0 < Conductivity(dS/m): None 0.7 >. Slight to Moderate 0.7-3.0, Sevore 3.0 < Conductivity(dS/m): None 9.5 >. Slight to Moderate 450-2000, Severe 2000 <

, c.

ECW	Severe	0.2 >	< 5'0	0.5 >	13 >	100
walvated by SAR and	Slight to Mederate	0-3 and ECwm 0.7 < 0.7 - 0.2 0.2 >	1.2 - 0.3	2.0 - 0.5	29. LJ	50.20
100 443	None	0.7 <	š	х г	20×	5.0 K
- Intivence of imga	SAR	0-3 and ECwa	9	512	12-20	20-40

- Specific ion Toxicity(Na): None 3 SAR >, Sight to Modernte 3.9 SAR <

Table K.1.2.7 Water Quality of El Balamoun Branch Irrigation Canal in the Study Area

.

Date, Month Measurement time						
viessurement time		11. May	17, May	23. May	20, Oct.	
	10:10	10:20	54:6	11:04	10:05	
Water Dow	Fast	ńż	Slow	QZ	Medium	
Water quantity	Much	ĤŻ	Medium	9Z	Medium	
Water Temperature (*C)	3.0	24.7	533	24.7	24.5	
Hd	7.50	7.64	7.67	7.63	7.58	
Turbidiy (NTU)	<u>8</u>	Ś	38	ব	л Л	
Electric Conductivity (dS/m)	0.563	0.556	0.550	0.555	0.426	
Dissolved Oxygen (mg/l)	4.31	3.22	4.47	3.93	3.82	
Total Dissolved Solids (mgA)	360	360	350	360	270	-
Sodium (meq/l)	•	•			1.3	
Calcium (mee/l)	•			,	3.0	
Magnesium (mea/l)	,	_,		_,	11	
Sodium Adsorption Ratio	•	,			0.0	
Location	End of downstream	Whatream				
Date, Month	5. April		11, May	17 May	23. May	20 04
Measurement time	16:15	10:50	10:25	10.20	11:07	10:45
Water Dow	Modium		ЧX ЧX	Medium	, AZ	Medium
Water quantity	Linle		A Z	Medium	9Z	Medium
Water Temperature (*C)	20.4		252	24.2	24.1	523
Hq	7.11		7.53	7.13	7.23	7.57
Turbidity (NTU)	22		12	20	19	63
Electric Conductivity (dS/m)	1.36		0.797	0.334	0.694	1.63
Dissolved Oxygen (mg/l)	0.15		0.40	0.03	3.93	0.04
Total Dissolved Solids (mgA)	570		510	530	4 6	2007
Sodium (meq/l)	•			4		6.6
Calcium (meq.1)	_!	•		•		2.6
Magnesium (meq/l)	•					
	_					

Table K.1.2.8 Water Quality of Bahr Hafir Shehab El Deen Bennch Irrigation Canal in the Study Area

Arres Martin	TIBD/ISPRIA				
DIGDTA' 'OTEL		11, May	15, May	ZJ, May	50 131 131
Measurement time		12:10	9:50	12:12	10:00
Water flow		0 7	Medium	0 7	Medium
Water quantity		97	Much	o Z	Much
Water Temperature (C)	24.3	24.2	23.0	21.0	22.9
PH		7.75	7.82	7.90	7,89
Turbidity (NTU)		30	4	\$	£
Electric Conductivity (dS/m)	0.389	0.333	0.375	0.389	0.375
Dissolved Oxygen (mg/l)	9.36	3.63	5,74	4.06	5,33
Total Dissolved Solids (mg/l)	ង្ក	ร	240	250	3
Sodium (meq/l)	,	•		•	4.4
Calcium (mog/l)				•	3.1
Magnesium (mee/l)			,	_,	13
Sodium Adserption Patio	-		•		0.5
ocation	End of downstream	wnstream			
Date, Month	L3, April	11. May	15, May	23, May	750 %. 751 Oct
Measurement time	11:20	12:15	10:10	1215	10.25
Water flow	Stop	Q N	Stop	Q Z	Šlop
Water quantity	Link	ND.	Little	QZ.	Medium
Water Temperature (°C)	27.2	24.5	4 1	22.9	5
pH _	7,43	7.63	7.33	7.05	7.85
Tubidity (NTU)	អ	ŝ	116	SS	55
Electric Conductivity (dS/m)	5.42	0.437	0.407	0.460	0.430
Dissolved Oxygen (mg/l)	10.92	1.74	5.21	2.55	4.45
Total Dissolved Solids (mg/l)	3,500	230	260	28	530
Sodium (meg/l)					5.3
Calcium (meg/l)	_•	•		. •	3.1
Magnesium (meq/l)	<u></u>		•	•	1.4
Cadiman Advances - MC		_			

- Note 1. The measurement was done by JICA Study Team in 1998.
 2. The data on 11th, and 23rd. May were measured in the ILP Tanta Office after collected samples at 8 octock in the moming. The other data were determined on the field.
 3. 9th, May was rainy during daytime.
 4. Water flow level was decided by forcinical expert, step, slow, medium, and fast, respectively, And slao, water quartity were firth, modium. and much.
 5. Total dissolved solids(TDS) is calculated from Electric Conductivity by doing 640 times, referred to Reuse Monitoring Programme Report 39 by Drainage Research Institute, 1995.
 6. Guideline of water quarky for irrigation are shown as follows by FAO Irrigation and Dminage Paper 29, 1985.
 9 pH: Normal range 6.55.4.
 Conductivity (ds/m): None 0.7 > Slight to Moderne 4.50-2000, Severe 2.00
 2. Total Dissolved Solids (may evolution and Electric Onderne 4.50-2000, Severe 2.00

SAR	187	Slight to Moderate	ter and
0-3 and BOWE	0.7 <	0-3 and BCw= 0.7 < 0.7 - 0.2 0.2 >	0.2 >
9	1.2 <	12-03	< F0
21-9	ŝ	1.9 - 0.5	
12-20	2.9 <	10-13	
04-02	202		1.

Specific Ion Toxicity (Na): None 3 SAR >, Slight to Moderate 3-9 SAR, Severe 9 SAR

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1 control	Midemon				
Date, Month	12. April	TL Mav	15. May	23 May	23, 00.
Measurement time	11.30		9:30	1203	05:0
Water Cow	ÖZ.		Medium	ĤZ.	Medium
Water quantity	Ĥ		Modium	Ĥ Z	Medium
Water Temperature ("C)	24.5		33	23.0	3 8 2
Hd	5.13		7.46	7.93	7.76
Turbidity (NTC)	8		\$	ž	2
Electric Conductivity (dS/m)	040	0.373	0.392	0.334	0.366
Dissolved Oxygen (mg/l)	8.80	3.76	5.85	3.51	6,16
Total Dissolved Solids (mg/)	260	240	250	22	30
Sodium (mog/l)					2.0
Calcium (moo/l)			•	. •	1.1
Magnesium (meg/l)				. •	1.0
Sodium Adsorption Ratio	•	•		1	20
Location	End of downstmam	wastream			_
Date, Month	11. May	15, May	T. May	150 Qci	,
Measurement time	12:05	11:15	28	11:30	
Water flow	9 X	Medium	<u>92</u>	Fast	
Water quantity	ĤZ.	Much	Ä	Much	
Water Temperature ("C)	24.1	ลื	ส์	23.3	
Hd	7.85	7.83	7.36	7,98	
Tubidiv (NTU)	ş	116	36	90	

Location	End of downstream	wastream		
Date, Month	11, May	15. May	Nay 72	NO S
Measurement time	12:05	11:15	8 2	11:30
Water flow	Q Z	Medium	9 Z	Fast
Water quantity	QZ.	Much	Ä	Much
Water Temperature ("C)	24.1	5 .	នំ	23.3
Hd	7.85	7.83	7,36	7.98
Tubidity (NTU)	8	116	16	\$
Electric Conductivity (dS/m)	0.386	0.407	0.383	0.387
Dissolved Oxygen (mg/t)	3.72	5.21	3.70	5.45
Total Dissolved Solids (mg/)	ห้	260	220	20
Sodium (meq/l)	•			32
Calcium (mee/l)	•		•	3,2
Magnesium (meq/l)	•		•	12
Setting Advention Ratio				

Date, Month Moasurement time Water Dow	12 Anni				
deasurement time Vater Dow		IL. MAY	L5. May	23. May	28, Oct.
Vater Dow	12:45	12:10	83	17:00	8
	ġ <u>z</u>	ġ	Medium	ND.	Modium
Water quantity	A Z	ġŻ	Much	, Q X	Line
Water Temperature ('C)	30.2	24.4	ភ្	ដ	54.0
Hd	7.96	7.57	7,83	7.35	8.17
Turbidity (NTU)	574	45	35	35	145
Electric Conductivity (dS/m)	0.749	0.465	0.389	0.450	0.940
Dissolved Oxygen (mg/l)	4.04	2.35	6.15	3.13	5.59
Total Dissolved Solids (mg/l)	450	85	2	88	ş
Sodium (meess)		•	•	<u>.</u>	10.7
Calcium (meq/)			•		5.0
Magnesium (meq/l)		•	-	. ,	
Sodium Adsorption Ratio					4.0
Location	End of downstream	whistmenn			r
Date, Month	11. May	15. Mav	23. May	20.05	_
Measurement time	12:30	12-10	12:52	12:35	_
Water Dow	N.D.Y.	Mcdium	92	Necium	
Water quantity	ND.	Much	92	Modium	
Water Temperature (*C)	23.9	23.0	55	23.8	
PH	7.68	7.67	3.05	8.32	
Turbidity (NTC)	53	171	3	26	
Electric Conductivity (45/m)	1.96	អ្	1.41	2.10	
Dissolved Oxygen (mg/l)	1.07	1.82	2.91	0.20	
Total Dissolved Solids (mg/l)	1,300	790	8	1,300	
Sodium (meq/l)		•	•	27.6	
Calcium (moq/l)	•	•		5.4	
Magnesium (meg/l)				5	

- Note 1. The measurement was done by JICA Shudy Team in 1998.
 2. The data on 11th, and 23rd. May were measured in the ILP Tarita Office after collected samples as 8 objock in the moming. The other data were determined on the ILP Tarita Office after collected samples as 8 objock in the moming. The other data were determined on the ILP Tarita Office after collected samples 3. 9th, May was rainy during dayline.
 3. 9th, May was rainy during dayline.
 4. White flow level was decided by freation expert, stop, slow, medium, and fast, mapectively. And also, water quantity were little, medium, and much.
 5. Total dissolved solids(TDS) is calculated from Electric Conductivity by doing 640 times, referred to Reuse Monitoring Programme Report 39 by Drainage Research Institue, 1995.
 6. Guidatine of wate quality for irrigation are shown as follows by FAO Irrigation and Drainage Paper 29, 1985.
 9. PH. Normal range 6.5.4.
 Conductivity(45Im): None 0.7 > Slight to Moderate 450.-Score 5.0
 7. Total Dissolved Solids(TDS) is and FLW.
 6. Guidatine of Wate Golds (MD): None 0.7 > Slight to Moderate 450.-Score 5.0
 7. Total Dissolved Solids(TDS) is and FLW.

HUMBING OF INTERIOR WAS FYDIURIED IN SAM AND LOW SAR None Slight to Moderate Source 0-3 and ECw= 0.7 0.7 0.2 0.2 3-6 1.2 1.2 0.7 0.3 0.3 0.3 1.2 1.2 1.2 0.7 0.3 0.3 > 1.2 1.2 1.2 1.2 0.3 0.3 > 1.2 2.9 1.3 1.3 0.5 >							
- Liture of instance was equilated by SAR and SAR None Night of Moderate 0.7 and ECw= 0.7 <	ECK	Severe	< 7.0	< 5.0	0.5 >	1.3 >	
- JALWENCE OF ITTABLES WAS 2.8.R. None 0.4 and ECwa 0.7 < 3.4 0.12 - 1.0 < 1.2 < 1.2 < 1.2 < 0.12 < 1.2 < 0.1 < 0.1 < 0.1 < 0.1	evaluated by SAK and	Slight to Moderate	0.7 - 0.2	1.2 - 0.3	5.0 - 0.5	29 - 1.3	
411000000 01100000000000000000000000000	1)CD W25	None	0.7 <	ě	× 61	ş	1
	- TOUNGUCE OF ILLIES	SAR	0-3 and ECw=	3-6	51-9 51-9	02-51	40 VV

20-40 50 < 5.0 < 5.0 2.9 2.9 > • Specific for Toxicity(Na): None 3 SAR > slight to Moderate 3-9 SAR, Severe 9 SAR <

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Table K.1.2.11 Water Quality of Mansour Derivery Impation Canal in the Study Area

	1 THAT SUPPRING	ł	ļ	
Date, Month	11. May	1.3. May	Nav Ki	ង ខ្ល
Measurement time	12:30	14:40	12:55	13:55
Water flow	AZ	Medium	QZ	Medium
Water quantity	Á.	Medium	, Q Z	Linle
Water Temperature ("C")	24.0	អ្	24.6	5
oli i	7.63	7.32	7.45	3.43
Turbidity (NTC)	ži	203	33	ដ
Electric Conductivity (dS/m)	112	2.10	1.13	10.0
Dissolved Oxvren (mg/l)	0.68	0.83	0.50	9.61
Total Dissolved Solids (mgA)	3	1.400	760	2580
Sodium (meq.1)				13.1
Calcium (mee/l)			•	6.1
Magnesium (meo/)	•	_1	•	5
Sodium Adsorption Ratio	,			7 8
Louton	End of downstream	WILLINGT		
Date, Month	LL, May		23, May	22, Oct.
Measurement time	12:35		8337	14:20
Water Dow	Ĥ Z		, Q X	Stop
Water quantity	Ŕ	Linte	, Q Z	Little
Water Temperature (C)	5		24.4	25.2
변	16.7		7.55	3.47
Tublity (NTC)	8		Fi	169
Electric Conductivity (dS/m)	151		4 4	9.70
Diasolved Orygan (mg/l)	2	7.33	0.45	12.00
Total Dissolved Solids (mg/)	970	~	930	6,200
Sodium (mog/l)			•	46.3
Calcium (meq/)				53
Magnesium (meq.1)			•	3.5
Sedium Advoming Ratio	•		_!	51.5

Table K.I.2.12 Water Quality of Bahr Biyala Delivery Irrigation Canal in the Study Area	of Bahr Bi	aley.	Delivery	Ē	gation	Canal i	n the	Study Area	
Lucation	Midstream	6					Γ		
	11 MALL PLANT PRAIL	e	MAR	ĉ	Matu	2	;		

Date, Month	II. May	21 May	UNAN CI	37	
Measurement time	11:15	13:45	11:47	15:45	
Water Dow	ų Ž	Medium	, N Z	Medium	
Water quantity	ų Ž	Medium	Ģ Z	Medium	
Water Temperature (C)	2.2	26.4	23.6	20.7	
Hd	6.8	7.30	7.68	3.07	
Tubidity (NTU)	65	35	16	33	
Electric Conductivity (dS/m)	0.517	0.395	0.399	0.491	
Dissolved Oxygen (mg/l)	1.82	6.64	2,96	5.71	
Total Dissolved Solids (mg/l)	330	250	80	310	
Sodium (meg/l)	•		•	4	
Calcium (meq/l)	•			2.5	
Magnesium (meq/)	1			5.0	
Sodium Adsorption Ratio		•		;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;	
					_
Lontion	Find of downstmam	wnstmann			
Date, Month	11. May	2L May	23. May	15. Nov.	
Moasurement time	11:15	14:40	11:50	14:55	

Location	End of downstmam	whistman		
Date, Month	11. May	21. May	23, May	15. Nov.
Moasurement time	11:15	14:40	11:50	14:55
Water Dow	Ą.	Stop	92	Stop
Water quantity	92	Much	Ĥ Z	Medium
Water Temperature ('C)	24.5	28.5	24.0	21.3
Hd	7.32	3.78	7.04	8.46
(Tubidity (NTC)	98	400	27	81
Electric Conductivity (dS/m)	0.783	1.34	140	1.29
Dissolved Oxygen (mg/)	53	13,45	8	10.11
Total Dissolved Solids (mg/l)	8	360	280	830
Sodium (meen)				6.7
Calcium (mea/l)				4.6
Magnesium (meq.1)		•		5.0
Sodium Adsorption Ratio		•		3.1

The measurement was done by ICA Study Team in 1998.
 The data on 11th, and 23rd. May were measured in the DP Tanta Office after collected samples at 3 oblock in the moming. The other data were determined on the field.
 Any was miny during daytime.
 Water flow level was devided by fechnical expert, stop, slow, medium, and fast, respectively. And also,

wster quantity wore little, medium, and much. 5. Total dissolved solids(TDS) is calculated from Electric Conductivity by doing 640 times, referred to Reve Maximure Report 39 by Drainage Research Institute, 1995. 6. Guideline of water quality for irrigation are shown as follows by FAO Erigation and Drainage Paper 29, 1985.

Conductivity(dS/m): None 0.7 >, Slight to Moderate 0.7.3.0, Severe 3.0
 Total Dissolved Solids(mg/l): None 450 >, Slight to Moderate 450-2000, Severe 2000
 Influence of infaction was evaluated by SAR and ECw.

						lerate 3-9 SAR, Severe 9 SAR <
Severe	0.2 \	< د <u>ر</u>	0.5 >	^ f]	2.9 >	13
Slight to Moderate		1.2 - 0.3	1.9 - 0.5	2.9 - 1.3	5.0 - 2.9	None 3 NAR 2, Slight to N
None	0,7 <	1.2 ×	r.9 <	2:9 <	5.0 K	ity(Na):
NAR	0-3 and ECwa	1 10	6-12	12-20	20-40	- Specific Ion Toxic

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Month. Date Measurement time Water flow	144					
vleasurement time Vater flow	í í	3 May	11, May	13, May	21. May	7. Nov.
Water Dow	14:45	12:20	12:35		13:00	12:05
	92	Slow	ĤZ.		, A Z,	Medium
Water quantity	A Z	Much	Å Z	~	, A	Medium
Water Temperature (°C)	21.9	5	24.1		25.5	21.3
Ha . Ha	7.12	7.86	7.64	15	1.32	3.26
Turbidity (NTU)	2	169	45		2	\$
Electric Conductivity (dS/m)	1.73	2 \$	55	23	7	1.58
Dissolved Oxygen (mg/)	0.07	0.63	0.40	0.12	0.36	0. 1 6
Total Dissolved Solids (mg/l)	1200	70	80	1,300	1200	00 1
Sodium (mean)	•	,	•			13.7
Calcium (moc/)			•			5,0
Mamesium (mea/l)		,			•	5.8
Sodium Adsorption Ratio		•	-	-	•	5.0
Location	After mixe	Mer mixed with Bahr	hr Tem imig	Tem invigition canal		
Month. Date	LS, Apr.	3, May	11. May	13. May	ZA, May	7. NOV.
Measurement time	11:45	년 (1 (1) (1) (1) (1) (1) (1) (1) (1) (1)	12:40	13:55	13:03	12:20
Water Dow	97	Fast	, A Z	Medium	Ą	Modium
Water manfity	92	Much	Å X	Medium	A Z	Medium
Water Temperature ("C)	152	24.2	300	2.4 2	23.3	21.9
ън	7.63	8	7.72	7.85	7.51	3.24
Turbidiv (NTU)	115	S4	64	501	3	8
Electric Conductivity (dS/m)	1.41	0.636	2.17	11	1.62	0.07
Dissolved Oxygen (mg/l)	0,12	5.62	0.72	0.55	0.17	3,68
Total Dimolved Solids (mgl)	8	\$50	1,500	36	1,100	620
Sodium (meq/l)			•		,	7.9
Calcium (mod/l)			<u>.</u>		•	4
Magnosium (meq/l)	•	•		·	•	2.7
				_		-

e in the Study Area	
Pumping Station for Rew	Rotner mixed
Table K.1.2.14 Water Quality of No.3 Pumping Station for Reuse in the Study Area	1201
Table K.1.2.14	T AMPLON

Date Vonth	T? Anni 11	11 May	VaV 21	23. May	30.04
		10.40			
Measurement time		4	1	3	i
Water Dow	ġ.	RZ	Medium	ġ.	Modium
Water guantity	Q Z	, AZ	Medium	.0 Z.	Much
Water Temperature (*C)	27.0	23.5	20.5	ភ្	ន័
P.H.	7.72	7.79	7.26	7.68	3.26
	N.		ŝ	0.0	19.4
	3		1	2	
Electric Conductivity (dS/m)	0		221	2.30	
Dissolved Oxygen (mg/l)	3.15	1.63	8	0.51	3.40
Total Dissolved Solids (mg/l)	2.20	~	1,400	1.500	1.500
Sodium (mee/l)	•		•	•	12.3
Calcium (meal)	_1			_•	4.3
Magnesum (meq/l)	•	•	•	•	3
Sodium Adsorption Ratio			-	-	5,4
Location	Arer mixed	Ø			
Date, Month	112 April	11, May	L5. May	2.3. May	ชื่ ส
Measurement time	14:40	12.45	00101	13:09	242
Water flow	<u>é</u> z	Q Z	Medium	, A Z	Medium
Water montity	67	Q Z	Much	A Z	Much
	v	227	e çe	1 10	Ę
	ŝ			1	;
bra Lind	10.1	c		8	3.44
Tubidity (NTU)	360	319	ន	130	ž
Electric Conductivity (dS/m)	80	2.51	ដ	29	530
Dissolved Oxygen (mg/)	2.36	12.51	5,41	0.87	4.34
Total Dissolved Solida (mg/)	80	1,600	140	1,500	1,500
Sodium (mee/l)			•	•	11.5
Calcium (mean)				•	
Vermanium (mach)	· •				11
A ANTIN TIME ANTING WALL	-		1		:

Note 1. The measurement was done by JICA Shudy Team in 1904.
2. The data on 11th and 25th, Nay were measured in the LIP Tanta Office after collected samples at 8 o'clock in the morning. The other data were determined on the field.
3. Ph, May was many during dayinas.
4. Water flow level was decided by tochnical expert, stop, slow, medium, and fast, respectively. And also, wester quantity were little, medical protein expert, stop, slow, medium, and fast, respectively. And also, wester quantity were little, medical protein Electric Conductivity by doing 640 times, referred to Reuse Monitoring Tragramm Report 39 by Drainage Reaserth Institute, 1995.
5. Total diasolved solids(TDS) is calculated from Electric Conductivity by doing 640 times, referred to Reuse Monitoring Tragramm Report 39 by Drainage Reaserth Institute, 1995.
6. Cuideline of water quality for imgetion are shown as follows by FAO Irrigation and Darinage Paper 29, 1985, p. 21. Somal range 0.5-5.4.
6. Conductivity(dS/m): None 0.7.> Slight to Moderate 0.7-3.0. Severe 3.0.
7. Possible Solids(mg/): None 9.5-5.1.
7. Conductivity(dS/m): None 0.7.> Slight to Moderate 0.7-3.0. Severe 3.0.
7. Total Diasolved Solids(mg/): None 450>, Slight to Moderate 450-2000, Severe 200.0.
7. 1.2. 1.2. 1.2. 0.2. 0.2.> 0.

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E.

Data, Month					
a second and the second second second second second second second second second second second second second se	4. May	11, May	14, May	23, May	2, OG.
	15:45	12:45	13:45	12:43	15:20
Water Dow	Medium	Ĥ.	Medium	Ą	Medium
Water quantity	Medium	92 2	Much	<u>Å</u>	Much
Water Temperature ("C)	25.2	24.1	20	5	22
Hd	7.93	7.74	7.78	7.8	7.93
Turbistry (NTC)	156	31	2	4	z
Electric Conductivity (45/m)	1.62	1.40	2.34	1.7 1	1.99
Dissolved Oxygen (mg/)	r,	7	0.29	0.63	22
Total Dissolved Solids (mg/l)	1000	8	1,500	1100	90 1
Sodium (meq/l)		•	,		53
Calcium (meq/l)		,	_		5.3
Magnesium (meg/l)	1	1		_	2.5
Sodium Adsorption Ratio	•			4	4
Location	After mix	After mixed with Bahr	r Tom imis	Tors impation canal	
Date, Month	4. May	IL, May	14, May	C3. May	2, Od. 2,
Measurement tume	15:50	12:50	13:35	त ३	00:51
Water flow	medium	2	Modium	92	Modium
Water quantity	Medium	92	Much	Ŕ	medium
Water Temperature ('C)	122	ด์ส์	ส์	24.0	24.7
Hd	7.87	7.69	7.58	7.03	8.04
Tubiety (NTU)	41	,	ŝ	\$	142
Electric Conductivity (dS/m)	1.13	11	28	1.74	0.97
Dissolved Oxygen (mg/)	227	1.9	0.13	0.31	4.16
Total Dissolved Solids (mg/)	760	20	1,300	1 100 1	620
Sodium (meq/)	•	•	•	•	40
Calcium (meqA)	.	•	<u>.</u>		14
Magnesium (moq/l)		•	_		า
Codium Adecade Datio					

Location	Upstream end	nd		
Date, Month	[11, May	10. May	T. May	26. Oct.
Measurement time	9:40	13:50	10:30	9:20
Water Bow	, Q Z	Medium	<u>9</u>	Medium
Water quantity	QN.	Linte	QZ	Linte
Water Temperature (*C)	27.22	22.6	23.4	21.3
PH	7.17	7.61	1.7	5 33
Tubidity (NTU)	Z	51	11	33
Electric Conductivity (dS/m)	1.19	1.65	1.31	1.66
Dissolved Oxygen (mg/l)	1.58	0.64	1.49	2.22
Total Dissolved Solids (mg/l)	760	1,100	340	1,100
Sodium (mea/l)		•	•	10.2
Calcium (meq/l)		ļ	•	5.5
Magnesium (meq/l)	•	•	<u>.</u>	4.2
Sodium Adsorption Ratio	•	•		4.0
- Construct	THE TRIBUNA			
Date, Month	11L May	16. May	Xa Way	26, 061.
Measurement time	9:45	12:50	10:35	10:25
Water Dow	NO.	Fust	ų Ž	Fast
Water quantity	ND.	Medium	QN N	Medium
Water Temperature (°C)	25	23.5	13.1	22.4
Hd	3.93	8.6	8.75	9.03
Turbidity (NTU)	4S	93	12	47
Electric Conductivity (dS/m)	1.40	1.37	L33	1.48
Dissolved Oxygen (mg/)	1.02	1.20	1.16	0.91
Total Dissolved Solids (mg/l)	80	830	\$50	950
Sodium (meq.1)			4	6.7
Calcium (meg/l)		•	_ .	4.2
Magnesium (moq/l)		•	. <u>.</u>	4.6
Solium Adomico Ratio		•		2.7

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Note 1. The measurement was done by JICA Study Team in 1998.
2. The dara on 11th, and 23rd. May were measured in the JIP Thata Office after collected samples at 8 oclock in the moming. The other data were determined on the field.
3. Rh, May was rang during dayime.
4. Water flow level was decided by technical expert, stop, slow, medium, and fast, respectively. And also, water quantity were little, modium, and much.
5. Total dissolved solids(TDS) is calculated from Electric Conductivity by doing 640 times. referred to Reue Monitoring Programme Report 39 by Drainage Research Institute, 1905.
6. Guideline of wate quality for irrigation are shown as follows by FAO Irrigation and Dminage Paper 29, 1085.
7. PER Normal range 6.5-5.4.
Conductivity(dSIM): None 0.7 >, Slight to Modernte 0.7-3.0, Severe 3.0
7. Total Dissolved Solids(mg/1); None 4.90 >, Slight to Modernte 450-2000, Severe 2000

20-40 5.0 < 5.0 < 5.0 - 2.9 > • Specific Ion Toxicity(Na): None 3 SAR >, Slight to Moderate 3-9 SAR Severe 9 SAR <

Date, Month Measurement time	Upstream end	end				
Measumment time	14, April	Z. May	11, May	13, May	23. May	2. Og.
	11:00	11:10	11:35	10:40	8 8	55
Water Dow	Fast	Fast	92	Faust	ŔŻ	Medium
Water quantity	Mediun	M / much	92	Much	, AZ	Medium
Water Temperature ('C)	55	22.6	320	111	222	21.9
Ha	7.65	7.93	7.63	7.30	7.91	3,12
Turbidity (NTC)	35	82	5	51	R	2
Electric Conductivity (dS/m)	2.05	1.51	1.47	1.20	1.65	1.93
Dissolved Oxvgen (mg/l)	1.23	0.07	140	3,73	0.86	3.50
Total Dissolved Solids (me/l)	1,300	020	940	770	1,100	1200
Sodium (meq/1)	•					3.0
Calcium (mea/l)	•				•	6.5
Mamesium (mea/l)					•	6.3
Sodium Advomtion Ratic			•		1	4
Location	Midstream					
Date, Month	14, April	2. May	11. May	13. Mary	23. May	24. Oct.
Measurement time	13:15	14:00	13:00	8.5	11:45	12:50
Water flow	Medium	Medium	ND.	Medium	, Q Z	Medium
Water quantity	Medium	Medium	A Z	Much	A Z	Much
Water Temperature ('C)	29.2	1.12	24.6	i î	24.0	r E
XIC	7.27	7.46	7.60	7.62	3.6	7.76
Turbidiy (NTC)	2	53	40	22	45	9.
Electric Conductivity (dS/m)	1.71	1.66	1.69	1.36	122	1.45
Dissolved Oxygen (mg/l)	0.57	0.29	0.47	0.11	0.82	620
Total Dissolved Solids (mg/l)	7	1,100	1,100	370	88	930
Sodium (meq/l)						6.5
Calcium (meq/l)	•			•		4.7
Magnosium (meq/l)				•		4
Sodium Adsomition Ratio						*

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Note	

The measurement was done by JICA Study Team in 1998.
 The data on 11th, and 23rt, May were measured in the IIP Tanta Office after collected samples

at 8 o'clock in the monting. The other data were determined on the field. 3. 9th, May was rainy during daytime. 4. Water flow level was decided by technical expert, stop, slow, medium, and fast, respectively. And also,

water quantity were lifte, medium, and much.
5. Total dissolved solids(TDS) is calculated from Electric Conductivity by doing 640 times, referred to Reus Monitong Programme Report 39 by Drainage Research Institute, 1995.
6. Guideline of water quality for irrigation are shown as follows by FAO Irrigation and Drainage Paper 20, 1985.
PIL Normal range 6.5-8.4
Canductivity(dSm); None 6.7 >. Slight to Moderate 0.7-3.0, Severe 3.0
Total Dissolved Solids(mpf): None 450 >. Slight to Moderate 0.7-3.0, Severe 2000
End Dissolved Solids(mpf): None 450 >. Slight to Moderate 0.7-3.0, Severe 2000

Difference of imperiod Number of imperiod Num							
- <u>Difference of Interior was solution of SAR</u> <u>SAR</u> 0-3 and ECw= 0.7 < 0.7 - 0.3 3-6 1.2 < 1.9 < 1.9 - 0.5 1.2 - 0.	51.W.	Severe	< 1.0	ר כי רי	0.5 >	1.3 >	
- <u>ILIURING OLITIZATION WAR</u> <u>ORA</u> O-3 and ECW= 0.7 < 0.7 < 0.12 < 0.12 < 0.12 < 0.12 < 0.12 < 0.12 < 0.12 < 0.12 < 0.12 < 0.12 < 0.12 < 0.12 < 0.12 10.	EVANUATED IN SAN AND 2	Slight to Moderate	0.7 - 0.2	1.2 - 0.3	1.9 - 0.5	29 - 13	
- 101/101/00 - 101/101/00	TION WIS	None	0.7 <	¥ 1	1.9 <	× 61	
	adduct to action from -	SAR	0-3 and ECW=	3-6	6-12	02-21	

Table K1.217 Water Quality of No.4 Drainage Canal in the Shudy Area

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Date, Month	11, MAY 1			
•			New Si	<u>รี</u> ส
Measurement time	8:21	11:10	11:39	800
Water Dow	92	Slow	я Х	et de la
Water quantity	92	Line	ń Z	Linic
Water Temperature ("C)	1.4	21.1	4	9.15
Hd	1.51	1.21	7.54	7.63
Turbidity (NTC)	4	76	1 3	103
Electric Conductivity (dS/m)	130	123	1.14	1,30
Dissolved Oxygen (mg/l)	0.87	1.80	8.0	0.32
Total Dissolved Solids (mg/l)	330	828	860	1,200
Sodium (meq/l)				7.4
Calcium (mog/l)	•	•	•	4,4
Magnesium (meq.1)		•	•	5.0
Sodium Adsorption Ratio		-	-	3,4
Loution	Midstream			ļ
Date, Month	AL. MAY	21, May	Z3. May	ชื่ ส
Measurement time	12:55	14:45	11.42	11:00
Water flow	AZ	Medium		Medium
Water quantity	, AZ	Medium		Medium
Water Temperature ('C)	24.5	25.3		ลี
Ha	7.48	7.78		8.03
(DLA) (NLA)	75	145		8
Electric Conductivity (dS/m)	2.32	1.80	1.30	122
Dissolved Oxygen (mg/l)	0,83	2.84		1.58
Total Dissolved Solids (mg/l)	1,500	1.200		1,400
Sotium (meq/l)	•			11.8
Calcium (meq/l)	•	•	•	4,8
Magnosium (moq/l)	•	,	•.	5.4
				ŝ

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Varwade)	
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Table	

	Intake fr	Intake from Mit Yazood Canal	Cond Canal			
Date, Month	9. April	7. May	11, May	15, May	23, May	31. Oct.
Measurement time	10:00	8.8	10:40	••••		8:40
Water Dow	AZ	Past	ĄZ	Fast	Υ.Ρ.	Faxt
Water quantity	A Z	Much	ġ	Much	Ĥ	Kadium
Water Temperature ("C)	20.3	2.7	អ	240	2	ន៍
Hd	1.1	2.6	17	7.59	7.82	7.76
Turbidity (NTU)	12	8	ង	35	ន	ង
Electric Conductivity (dS/m)	0.433	0.375	0.420	0.403	0.391	0,403
Dissolved Oxygen (mg/l)	6.43 2	3	3.83	5.01	3.70	5.65
Total Dissoved Solids (mg/)	200	540	270	8	ลี	38
Sodium (modil)	•	•	•	•	•	<u>55</u>
Calcium (meq/l)			•			5
Magnesium (meq.1)	•			-	•	1.0
Sodium Advention Ratio	4	ļ		-	•	4.2
T amrian						
Date Meet	INTRA TRATIL			F	F	
	rudy v	V. MAY	11. May	-		но 11 12
		2	10:45	88	10:15	9 2 2
Water 10w	A	Fast		Medium	92	Medium
Wator quantity	Ą	AMANA		Much	92	Medium
Water Temperature (C)	412	4	26.4	330	រដ	22
Hd	8.13	7.60	7.63	7.62	7.85	7.93
Juneigry (NTC)	65	3	R	<u>8</u>	8	3
Electric Conductivity (dS/m)	160'0	0.413	0.436	0.412	0,413	0.375
Dissolved Oxygen (mg/)	7.26	5.14	3.57	5,71	3.34	5.37
Total Dissoved Solids (mg/l)	520	8	082	8	260	25
Sodium (moq/i)	•	•	•	•		5.1
Calcium (meq/l)	•	•				3.0
Magnesium (meq/l)	•		•			12
Sodium Adsorption Ratio	•	-				
t Am Kan						
	pud of d	the of downstream		ľ		
	V. Muy	LL. MAY	18, May		31, Oct.	
	2	10:00	9:30	10:26	9:45	
water now	2010	Ŕ	Stop	9	Sign	-
Water quantity	Modium	9	Much	9	Medium	
water Lemperature ('C')	0110	2	3.1	142	31.6	
	7.97	7.67	7.71	2.8	7.74	
	0	<u>-</u>	61	43	8	
Dischool Deven (mal)	174 n	3	0.420	0.416	0.412	
Total Dissolved Solids (man)		2		Į,	5.12	
Sodium (mood)	2	2	2.2	P.N	200	
	•	•		•	61	
Memorium (menu)	•	<u> </u>		•	3.1	
Sodium Adamtion Perio		<u>.</u>		•	21	
				ŀ	3.9	

Table K.1.2.20 Water Ouslity of Atwa Dminage Canai in the Kawhagy Area	(Atwa Dmina	ge Canal in	the Kawha	gy Arca	
Location	Before mi	the of a pum	Before mixed at pumping station for reuse	for reuse	
Date, Month	7. May	11, May	13, May	23. May	9 3 3
Measurement time	9:20	10:45	9:10	10:15	
Water flow	Stop	Ą	Medium	92	
Water quantity	Medium	Å.	Much	9 Z	
Water Temperature ("C)	20.5	25.5	21.8	0.53	21.1
þH	6.67	7.79	7.35	7.67	7.74
Tubidiy (NTC)	63	2	132	53	33
Electric Conductivity (dS/m)	2.82	2.10	0.786	1.40	1.1X
Dissolved Oxygen (mg/)	4.03	4.55	1.15	131	3.76
Total Dissolved Solids (mg/l)	L,800	1.300	80	020	760
Sodium (meq/)	•	•			13.0
Calcium (mea/l)	•	_		,	
Mamesium (mea/l)	4		<u> </u>		
Sodium Adsomntion Ranio			•;	•	
					3
Location	After mixe	After mixed to Kahwaev Canal	aev Canal		
Date, Month	9. April	7. Mav	11 May	13. Mav	ZI, MAV
Measuremnt time	10:45	9:20	10.50	88	10.21
Water Dow	02	Fest	92	Medium	l S
Water quantity	92	MMuch	n Z	Much	i q
Water Tennenstum ("C)	104	2.4		22.5	F

two and the	ATC: MI	ATTER MIXED TO KANWARY CANAL	DEV CARA		
Date, Month	9. April	7, May	11, May	13, Mav	VAN 23
Measurement time	10:45	9:20	10:50	88	10:23
Water Dow	9 <u>2</u>	Fast	9 2	Medium	9
Water quantity	92	Monuch		Mich	ŝ
Water Temperature ("C)	10.4	3.4	26.1	23.6	1
pH	7.77	2.7	7.66	7.62	774
Tubidity (NTC)	5	8	4	28	2
Electric Conductivity (dS/m)	0.384	0.414	0.441	0.412	0170
Dimolved Oxygen (mg/l)	3.10	5.00	1.70	12.5	147
Total Dissolved Solids (mg/l)	9	270	250	590	Ş
Sodium (mea/l)	<u>.</u>				,
Calcium (mean)				. ,	
Vernering (mech)		•	•		•
	•	•			•
SOUVE Adjointion Ratio		•	•	•	
 at 8 objects in the moming. The other data were determined on the field. 3. Ph. May was many during daytime. a. Water flow lovel was decided by technical expert, stop, alow, medium, and fast, respectively. And also, water quantity were this, medium, and much. b. Total diasolved aolids(TDS) is calculated from Electric Conductivity by doing 640 times, referred to Reuse Monitoing Programme Report 39 by Drainage Research Institute, 1995, e. Guideline of water quality for imigation are shown as follows by FAO Infigrition and Drainage Paper 20, 1985. c. PiE: Normal mage 6.5-8.4 c. Conductivity(dS/m); None 0.7 >, Slight to Moderate 0.7.3,0, Severe 3.0 d. Dial Diasobred Solids(mg/); None 850 >, Slight to Moderate 450-2000, Severe 2000 b. Influence of imfeation was planted to Some. 	oming. The oth uning daytime. 5 decided by teo 5 decided by teo 1816, medium, a 6 (TDS) is calo 6 gramme Repor 6 gramme Repor 6 gramme Repor 5.5.8,4): None 0,7 >,1): None 0,7 >,1 (ids(mg/l): None None Nilth	er data were thatical oxpert und much. Ulatod from 1, 7 39 by Drain ion are show Siight to No. Siight to No. Siight to Moden ar	determined on 4 stop, slow, n use Research mage Research m as follows b dente 0.7-3.0, dente 0.7	on the field " medium, - nductivity b nductivity b ndu	t and faat, res y doing 640 , 1905, rigation and rigation and 00, Severe 2
NA ECW	0.7 <	0.7 - 0.2			
9	ž	1.2 - 0.3		•	
6-12	1.9 <	10.05	v	,	

0.7 - 0.2 1.2 - 0.3 1.9 - 0.5 2.9 - 1.3 5.0 - 2.9 2001020 2001020 2001020 ដំដូ ដំដូ

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- Specific Ion Toxicity(Na): None 3 SAR >, Slight to Moderate 3-9 SAR, Severe 9 SAR <

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Table X

	R R R R R R R R R R R R R R R R R R R	113. May 113. May 24.9 24.9 25.0 25.0 25.0 25.0 13. May 12.10 13. May 12.10 13. May 12.10 13. May 12.10 13. May 12.10 13. May 13. May	22. May 22. May 22. May 22. May 22. May 23. May 24. May 24. May 24. May 24. May 25. May 26. May 27. Ma	2. Nov. 9:55 9:55 22.8 22.8 2.26 0.352 2.8 2.8 2.8 1.16 1.16 1.16 2.8 2.8 0 3.5 2.4 1.16 2.8 3.5 2.4 2.5 2.8 0.352 2.8 0.352 2.8 0.352 3.5 5 3.5 5 3.5 5 3.5 5 3.5 5 5 5 5 5 5
t time 10:15 Nection Medium Medium Nection Medium Medium Medium Medium 22.2 acrevity (45/m) 2.2.2 acrevity (45/m) 2.3.3 acrevity (45/m) 2.3.3 applied (12) 2.3.3 applied (12) 2.3.4 applied (12) 2.3.4 applied (12) 2.3.4 applied (12) 2.3.4 applied (13) 2.4 applied (13) 2.4 applied (13) 2.4 applied (13) 2.4 applied		Fast Much 7,289 26,9 26,9 26,0 26,0 26,0 26,0 2,4 2,4 2,4 2,4 2,4 2,4 2,4 2,4 2,4 2,4	ND: 1212 ND:	9:35 Medium 2228 226 5.05 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0
rru rru canture (°C) canture (°C) cygen (mg/l) rog(l) ano(l) ano(l) ano(l) rutime rutime rutime rutime ano(l) reg(l) ano(l) rutime rutime rutime rutime		Fast Much 24.9 2.8 2.8 0.35 2.9 2.8 2.8 2.8 2.8 1.3 2.8 1.3 2.8 0.3 2.8 0.3 2.8 0.3 5 2.8 0.3 5 2.8 0.3 5 2.8 0.3 5 5 2.8 0.3 5 6 3.5 5 6 3.5 5 6 3.5 5 6 3.5 7 7 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	ND: 102 123 123 123 123 123 123 123 123 123 12	Medium Xuch 22.6 2.5 2.5 5.05 2.5 5.05 2.5 2.5 5.05 2.5 2.5 1.1.2 2.5 1.1.2 2.5 5.05 5.0
N canture (°C) TU) canture (°C) aucrivity (aSim) eq.() eq.() eq.() cangl) pq.() pq.() cangl) c		Fast 26,9 26,9 26,9 26,0 26,0 26,0 13, May 12,10 Modium Modium 70,4 77,4	22.22 24.22 24.25	Mechum 2228 2250 2352 2355 2355 2355 2355 2355 2355
y ensure (°C) ensure (°C) cuertwity (dS/m) vygen (mg/l) vygen (mg/l) eq/l) eq/l) eq/l) ep/lin Ratio t time vy ensture (°C) ensure (mg/l) ensure vy ensture (mg/l) ensure (mg/l) ensure ensure t time		Much 24.9 25.8 25.8 25.8 25.8 2.8 2.8 1.2 2.8 1.1 2.5 1.2 2.7 3 2.5 1.2 2.7 3 2.7 3 2.7 3 2.7 3 2.7 3 2.7 3 2.7 3 2.7 3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	N N N N N N N N N N N N N N N N N N N	Much Much Much Much Much Much Much Much
orature (*C) TTU TTU TTU TTU Searching (aS/m) Searching (aS/		24.9 17.58 126 126 1369 1358 14 12510 14 12510 125111 12511 12511 12511 12511 12511 125111 12511 12511 12511 12511	23.8 7.91 4.53 4.53 2.60 2.60 2.60 2.60 2.60 2.60 2.60 2.70 2.70 2.70 2.70 2.70 2.70 2.70 2.7	228 7.36 2.25 2.26 2.25 2.26 2.26 2.26 2.26 2.2
TTU) truction (dS/m) truction (dS/m)		7.38 26 5.52 2.80 2.80 2.80 1.13. May 1.13.10 Modium Modium 2.5.1 7.74 7.73	791 14 855 855 855 855 855 855 855 855 855 85	736 6.05 6.05 2.0 2.0 2.0 2.0 2.0 1.0 2.0 0 2.0 5.05 2.0 5.05 2.0 5.05 2.0 5.05 2.0 5.05 2.0 5.05 2.0 5.05 2.0 5.05 5.05
TTU) Auctivity (aSym) rygen (mg/l) and Solida (mg/l) anol/l) (moo/l) anol/l) anol/l) anol/l) anture (°C) anture		7.26 (1.26 (1.26) 5.92 5.92 5.92 1.13 1.14 May Machum Machum 7.73 7.73 7.73 7.73 7.73 7.73 7.73	2001 200 200	2000 200 2000 2
TU) ductivity (dS/m) vey Sen (mg/l) ved Solids (mg/l) ved Solids (mg/l) (meg/l) perion Ratio t time t time t time t time		256 0.369 0.369 2.802 2.802 1.3. May Machum Machum Machum 7.7.4	24 4 55 4 55 4 55 4 55 4 55 5 7 5 7 5 7 5 7 5 7 5 7 5 7	26 0.352 0.352 2.005 3.5 1.12 2.4 0.355 2.6 0.352 2.6 0.352 2.6 0.352 2.6 0.352 2.6 0.352 2.6 0.352 2.6 0.3552 2.6 0.3552 2.6 0.3552 2.6 0.3552 2.6 0.3552 2.6 0.3552 2.6 0.3552 2.6 0.5 5.6 0.5 5.6 0.5 5.6 0.5 5.6 0.5 5.6 0.5 5.7 1.6 0.5 5.6 0.5 5.7 1.6 0.5 1.6 0.5 1.6 0.5 1.6 0.5 1.6 0.5 1.6 0.5 1.6 0.5 1.6 0.5 1.6 0.5 1.6 0.5 1.6 0.5 1.6 0.5 1.6 0.5 1.6 0.5 1.6 0.5 1.6 0.5 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6
cuertwity (dS/m) vygen (mg/l) vygen (mg/l) eq/l) eq/l) (meq/l) orption Ratio t time t time ord Solida (mg/l) orption Ratio orption Ratio		0.269 5.522 2.40 2.40 1.15.10 Machum Machum 2.5.1 7.74 7.74	0.373 4.555 2.60 2.60 2.60 2.60 2.60 2.60 2.60 2.60	0.352 2.360 2.350 2.350 2.350 2.350 1.120 Meetium 2.200 2.300 2.300 2.300 2.300 2.300 2.300 2.300 2.300 2.300 2.350 3.500 2.350 3.500 2.350 3.500 2.350 3.500 2.350 3.500 2.350 3.500 2.5000 2.50000 2.50000 2.50000000000
crgen (mg/) eq/) eq/) (meq/) (meq/) r time r time r time crgen (mg/) crgen (mg/) crgen (mg/) crgel) crgel) crgel)		5.92 2.40 	455 240 23. May N.D. 7357 7452 7452 7452 7452 7452 7452 7452 74	8.05 8.05 Much 2.05 Much 2.05 2.05 2.05 2.05 2.05 2.05 2.05 2.05
A Solida (mg/l) A Solida (mg/l) A (meq/l) (meq/l) orgion Ratio TTU) orgida (mg/l) A Solida (mg/l) A Solida (mg/l) A Solida (mg/l) Cmeq/l) orgida (mg/l)		240 	2000	2.2.4 3.5.8 3.5.8 3.5.8 Much Much Much 3.6 3.6 3.6 3.6 3.5 3.5 4 1.6 1.0 5 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6 1.6
red Solids (mg(1) eq.(1) eq.(1) (meq.(1) (meq.(1) true true (mg(1) (meq.(1) (meq.(1) (meq.(1) (meq.(1)) (meq.(1) (meq.(1)) (me			2	2.2 Nov. 1.6 2 Much Medium 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.0
e(1) eq(1) (meq(1) pricion Batio prime trume trume trume eq(1) prime prime trume trume et inne				2.4 3.5 3.5 3.5 3.5 1.1.2 1.1.2 1.1.2 1.1.0 Much Much Much 2.2 2.7 2.2 2.7 2.2 2.7 2.6 2.0 3.0 2.7 2.6 2.6 2.6 2.6 2.6 2.6 2.6 2.6 2.6 2.6
eq.(1) (moq.(1) (moq.(1) (mod.(1)) (mod.(1)) (mod.(1)) (moq.(1) (moq.(1)) (moq.(1)) (moq.(1)) (moq.(1)) (moq.(1)) (moq.(1)) (moq.(1)) (mod.(1)) (m		18. May 12:10 Medium 25:1 7.74 70		3.5 1.6 1.1.0 1.000 Much Much 2.22 7 2.22 7 2.00 2.5 2.0 2 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2
(aneqA) option Ratio t time ty enture (°C) enture (°		- 13. May 12:10 Medium 25.1 7.74 70		1.6 1.6 1.6 1.0 1.0 0 0 1.6 0 0 1.6 0 1.5 0 1.5 0 1.5 0 1.5 0 1.5 0 1.5 0 1.5 0 1.5 0 1.5 0 1.5 0 1.5 0 1.5 0 1.5 0 1.5 1 1 1 1
amption Ratio anture (*C) anture (*C) ant		13. May 12:10 Medium 25.1 7.74 70		1.6 2.00 Much 2227 8.03
t time ty enstare (°C) enstring (aS/m) thereforing (aS/m) typen (mg/l) end (mg/l) end (meq/l) ention Pario		13. May 12:10 Medium 25:1 7:74 70	23. May 12221 N.D. N.D. 7.02 24	2. Nov. 10:00. Much 222.7 8.03
t time ty enture (°C) enture (°C) entive (°C) vygen (mg/l) entive (mg/l) entive (mg/l) entive (mg/l) entive (mg/l) entive (regil) entive (regil)		13. May 12:10 Modium Medium 25:1 7.74 70	25 27 27 27 27 27 27 27 27 27 27 27 27 27	2. Nov. 2. Nov. Much Much 22.7 8.03
t time ty ensture (°C) enstricty (4S/m) typen (mg/l) end end end (mg/l) end (meq/l) environ Pario		18. May 12:10 Medium 25.1 7.74 70	23. May 122. May 122. 1 122. 1 122. 1 123. 1	2, Nov. 10:00 Much 22.7 3.03
t time ty enture (°C) arru's arru's (°S/m) vgan (°B) vd Solida (mg/) vd Solida (mg/) vd Solida (mg/) vd Solida (mg/) time time		18. May 12:10 Medium 25.1 7.74 70	And And And And And And And And And And	2. Nov. 10:00 Much 22.7 3.03
r time w menture (°C) mrU) (°C) vygen (mg/) vygen (mg/) ed Solida (mg/) ed Solida (mg/) ed Solida (mg/) time t time		Nedium Medium 25.1 7.74 7.74	NAN SE S	10:00 Much 22.7 8.03
ty ensture (°C) ensture (°C) auctivity (dS/m) cycers (mg/l) cycl) end Solids (mg/l) end ((meq/l) envice Ratio	99782 86 99782 86	Medium Medium 25.1 7.74 70	22858	Medium Much 3.03 3.03
ty ensture (°C) TU') TU') Auctivity (dS/m) vest (mg/) vest (mg/) onl) onl) coso() coso	N 22 20 22	Medium 25.1 7.74 70	2858	With 2012
v ensture (°C) TUV) tuctivity (dS/m) vygen (mg/) colog(1) coog(1) c	26.7	112 22 22 22 22 22 22 22 22 22 22 22 22	N 2 1	193
andure (C) TTU) ductivity (dS/m) vygen (mg/) vod Solida (mg/) od) mption Ratio	22 22 22 22 22 22 22 22 22 22 22 22 22	12.8	22.2	18.
TU) ductivity (45/m) vygen (mg/) vygen (mg/) q/) q/) cnoq/) cmoq/) cmoq/) cmoq/) cmoq/) cmoq/)	20	8	2.12	3.6
TU) ducivity (dS/m) ducivity (dS/m) ed Solids (mg/) od) cop(20 0.378	8	2	~
ductivity (dS/m) vygen (mg/l) vd Solida (mg/l)	0.378			
tygen (mg/) ved Solids (mg/) eq/) cnsq/) orriton Pario orriton Pario		0.370	0.371	0.352
ed Solida (mgr) ed) conql) conql) orriton Ratio	3.61	5.65	5.2	6.32
q1) q1) caoq1) crooq1) crooq1) artice time	240	240	240	230
of the second se				46
avir. (meq.1) organica Ratio time	1	I 4		t vi ž e
orption Ratio	•	•		
ormition Reatio	•	•		Ĵ.
t time	•			1.5
t tìme				
t time	downstream			
t tìme	111 May	1X. May	23. May	2. Nov.
		v e	10.01	i v
		Ned in the	ç	
		in the second	į	
		Medium	į	Medium
ter Temperature (C)	26.3	2	1	8
	7.68	7.75	7.90	7.82
<u>a</u>	13	8	า	ន
(m)	0.335	0.378	0.370	0.361
អ	3.60	<u>6.2</u>	3.97	5,53
Total Dissolved Solids (mg/l) 260	22	<u>8</u>	3	ន្តី
Sodium (meq/)		•	•	52
Celoim (mog/l)			•	3.6
Mamasium (mee/l)		. •		5
Solvin Advantion Ratio				

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Table K

Location	Upper NIT	Upper Sirw pumping station	STATION		
Date, Month	29. April	1L May	18, May	23. May	2 Nov.
Measurement time	13:15	11:50	23 23	12:27	11:25
Water Dow	Medium	ЧХ.	Medium	92	Fa.
Water quantity	Medium	<u>AN</u>	Medium	92	Modium
Water Temperature (°C)	21.6	27.3	30	225	ឆ
Ha	7.80	7.53	7,80	17	3.09
Tubier (NTC)	33	30	143	67	53
Electric Conductivity (dS/m)	1.63	1.27	0.93	1.76	1.64
Dissolved Oxygen (mg/l)	4	2.02	2.26	1.21	250
Total Dissolved Solids (mg/l)	1,000	810	8	1,100	1100
Sodium (mea/l)	ł			•	10.5
Calcium (mog/l)	. • .	•		•	4.7
Magnesium (meq.1)	•			•	4.2
Sodium Adsomntion Ratio	•	•		•	7.8

Note 1. The measurement was done by JICA Study Team in 1998. 2. The data on 11th, and 23rd, May wore measured in the IDP Tanta Office after collected samples at 8 o'clock in the moming. The other data were determined on the field. 3. 9th, May was rainy during daytime. 4. Water flow level was decided by technical expert, stop, slow, medium, and fast, respectively. And also,

water quantity were little, medium, and much. S. Total diasolved solids (TDS) is calculated from Electric Conductivity by doing 040 times, referred to Reuse Manitoring Programme Report 39 by Dminage Research Institute, 1995. G. Guideline of varer quality for irrigation are shown as follows by FAO Irrigation and Dminage Paper 29, 1085. P.R. Normal mage 6.55.4 - P.R. Normal mage 6.55.8 - Conductivity(dSm): None 6.7 >, Slight to Moderate 6.7-3.0, Severe 3.0 < - Total Diasolved Solids(mg/l): None 450 >, Slight to Moderate 450-2000, Severe 2000 < - Influence of imgation was evaluated by SAR and EOvr

SAR	None	Slight to Moderate	Sever
0-3 and ECw-	0.7 <	0.7 - 0.2	0.2 >
3-6	1.2 <	1.2 • 0.3	< 5.0
6-12	1.9 <	1.9 - 0.5	0.5 >
12-20	2.9 <	2.9 - 1.3	< 51 <
20-40	5.0 <	5.0 - 2.9	× 0.0
pecific ion Toxic	city(Na):]	None 3 SAX >, Slight to N	to Moderate 3-9 SAR Severe 9 SAR <

Table K1223 Water Quality of Lower Sirv Drainage Canal in the El Nazi Area

Location	Lower Sin	Lower Sirw pumping station	station		
Date, Month	29. April	11. May 18. May	13. May	23, May	2. Nov.
Measurement time	12:30	11:55	21:51	12:30	12:00
Water Dow	Medium	ЧZ.	Past	ND.	Medium
Water quentity	Modium	ZD.	Much	.9 Z	Medium
Water Temperatum ("C)	21.3	27.3	3.6	553	5
pH	7.76	7.64	7.87	7.29	3.20
Tunidity (NTU)	128	105	4 4	39	269
Electric Conductivity (dS/m)	1.84	1.74	1.83	0.757	507
Dissolved Oxygen (mg/)	2.89	1.91	3.32	4	8.6
Total Dissolved Solids (mg/l)	1,200	1,100	1,200	480	670
Sodium (meq.)		•	•	•	10.9
Calcium (meq/l)	. `	,	_1_	•	5.4
Magneaium (moq/l)				1	3.8
Sodium Adsorption Ratio				•	5,3

Note 1 The measurement was done by MCA Study Team in 1998.

- 2. The data on 11th, and 23rd, May were measured in the IDP Tanta Office after collected samples at 8 o'clock in the morning. The other data were determined on the field.
 - 3. 9th. May was rainy during daytimo.
- 4. Weter flow level was decided by technical expert, stop, slow, medium, and fast, respectively. And also, water quantity were little, medium, and much.
 - 5. Total dissolved solids(TDS) is calculated from Electric Conductivity by doing 640 times, reformed to Rouse Monitoring Programme Report 39 by Drainage Research Institute, 1995.
- 6. Guideline of water quality for irrigation are shown as follows by FAO Irrigation and Drainage Paper 29, 1985.
 - pH: Normal range 6.5-8.4
 - Conductivity (dS/m): None 0.7 >, Slight to Moderate 0.7-3.0, Severe 3.0 <
- Total Dissolved Solids(mgl): None 450 >. Slight to Moderate 450-2000, Severe 2000 <

Č P S Influence of intestion use evolvered by SAP .

	TOTION	THE AND ALL THE PARTING ON SAME AND FLAT.	SUW:
SAR	None	Slight to Moderate	Severe
0-3 and ECw-	0.7 <	0.7 - 0.2	~ 건 건 0
1	х ст	1.2 - 0.3	0.3 V
11-3 11-3	1.9 <	1.9 - 0.5	0.5 >
12-20	2.9 <	29 - 1.3	13 >
20-40	5.0 <	5.0 - 2.9	2.9 >

Specific loa Toxicity(Na): None 3 SAR >, Slight to Moderate 3.4 SAR Severe 9 SAR <

Table X.1.2.24 Water Quality of Bahr El Saidi Main Canal in the Bahr El- Saidi Area

Location	Start of Area	a a				
Date, Month	30, April 9, May	9. May	11. May	20, May	23. May 4, Nov.	4. NQ.
Measurement time	10.10	523	13:00	11:30	11:12	9:50
Water Dow	Slow	Fast	ų	Medium	, Q N	Fast
Water quantity	M/Much	L'ale	ų.	Medium	ЧЧ.	Medium
Water Temperature (*C)	21.6	ខ្ល	24.2	S.C.	24.0	220
Hq	7.33	7.29	7.46	7.15	7.75	7.76
Turbidity (NTC)	12	ន	17	\$	20	32
Electric Conductivity (dS/m)	0.554	0.513	0.494	0.437	0.484	0.387
Dissolved Oxygen (mg/l)	ដ	4,03	2.31	4.55	3.13	5.66
Total Dissolved Solids (mg/l)	360	330	320	310	310	22
Sodium (meq/l)	•					26
Calcium (meq/i)	•	•		•	_ <u>•</u>	3.7
Magnosium (meqA)		•				4
Sodium Adsorption Ratio	Þ	<u> </u>	<u> </u>		<u>,</u>	1.6

Location	Midstream					
Date, Month	30. April 9. May	9, May	11. May	20. May	23. May	4 Nov.
Measurement time	2251	11:50	13:05	14:10	11:20	12:35
Water flow	Medium	Medium	ЧР.	Fast	, N N	Medium
Water quantity	Medium	Medium	ND.	Much	Ū.X	Medium
Water Temperature (C)	24.1	20.5	3.5	ห	23.1	21.3
Hd	7.76	6.91	7.81	7.76	7.78	8.12
Turbidity (NTU)	\$	74	4	r	72	94
Electric Conductivity (dS/m)	0.617	1.7	0.990	1.85	1.45	2.47
Dissolved Oxygen (mg/l)	4.04	1.93	1.20	2.93	0.96	2.89
Total Dissolved Solids (mg/t)	ŝ	1,100	630	1,200	026	1,600
Sodium (meg/l)	•		٠	+	•	28.7
Calcium (meq/l)	-		1	1	1	6.7
Magnesium (meq/l)	- •		1	1		5.3
Sodium Adsorption Ratio	•		_!			114

	Intako						Location	Midstream	F				
Date, Month	30, April		11. May	20, May	Nay 2	4. Nov.	Date, Month	30. April	9. May	11 May	20. May	ZJ. May	A. Nov.
Measurement tume	12:50		13:00	12:55	11:16	11:50	Measurement time	10:20	13:20	13:10	11:55	11:28	10:05
Water flow	Medium	_	Ĥ X	Fust	Ч. И	Medium	Water Dow	Medium	Medium	Q.	Medium	ND.	Fast
Water quantity	M/Much		92.	Medium	ų.	Much	Water quantity	Medium	Medium	NO.	Medium	0 Z	Modium
Water Temperature (°C)	n Si		23.9	24.8	21.7	442	Water Temperature (*C)	5 4	ŝ	24.7	24.5	2,0	21.9
Hd	7.85	_	7.47	7.62	7.69	5.22	Rd	7.87	7.00	7.54	7.59	7.69	7.87
Turbidity (NTU)	47		19	32	3	ž	Turbidity (NTU)	31	8	13	47	ន	33
Electric Conductivity (dS/m)	0.556		6.493	0.494	0.491	195.0	Electric Conductivity (dS/m)	0.558	0.521	0.504	0.497	0.493	0.703
Dissolved Oxygan (mg/l)	3.63		2.13	6.4	3.13	5.63	Dimolved Oxygen (mg/)	3.43	4	2.30	4.59	3.43	5.46
Total Dissolved Solids (mg/l)	360		320	320	310	250	Total Dissolved Solida (mg/l)	360	520	320	320	320	83
Socium (meq/l)	•		•	•	•	2.7	Sodium (meg/)		.				4.3
Calcium (meq.1)	•				•	3.7	Calcium (meg/l)		.				3.6
Magnesium (meg/l)	,		<u>.</u>	•	•	2.5	Magnesium (meq/1)		•				51
Sodium Adsorption Ratio						1.7	Sodium Adsorption Ratio						2.7
Date, Month	30, April 9, May	9. May	11, May 13.10	20. May	Nav 12	4, NQ.	2. The data on 11th, and 23rd, May were measured in the IIP Tarta Office after collected samples	23rd May were	measured in	the IIP Tar	nta Office au	ter collecto	d samples
Measurement time	12:30	12:50	13:10	13:40	11:24	11:50	at 8 oktock in the momine. The other data were determined on the field	omine. The other	· data were c	determined o	m the field.		
Water Dow	E	Fast	, ND.	Medium	ĤZ	Medium	3. 9th, May was rainy during dayrime.	luring daytime.					
Water quantity	Medium	Medium	A.	Medium	9 2	Much	4. Water flow level was decided by technical expert, stop, slow, medium, and fast, respectively. And also,	decided by tech	mical expert.	, stop, slow,	medium, ar	id fast, resp	ectively. And
Water Temperatu re (*C)	e ez	21.7	24.3	25.6	2.5	22.0	water quantity were little, medium, and much.	irtle, medium, an	id much				•
ЪЙ	7.74	7.54	7.41	7.67	7.62	3.03	5. Total dissolved solids (TDS) is calculated from Electric Conductivity by doing 640 times referred to	s(TDS) is calcu	lated from E	Electric Conc	tuctivity by	doing 640	imes, referr
Tubidiy (NTU)	35	5	51	ß	ង	ম	Reuse Monitoring Programme Report 39 by Drainage Research Institute, 1995.	ogramme Report	39 by Drain	uge Researc	th Institute.	1995.	•
Electric Conductivity (dS/m)	202.0	0.530	0.521	0.503	0.502	0.400	6. Guideline of water quality for irritation are shown as follows by FAO Irritation and Dminnee Paner 20, 1033,	multiv for imigatic	on are shown	n as follows	ev PAO In	iration and	Drainage Pa
Dissolved Oxygen (mg/l)		2.95	237	4.82	3.26	5.85	- pH: Normal runge 6,5-8,4	5.5-8.4				•	
Total Dissolved Solids (mg/l)	360	340	330	320	320	260	- Total Dissolved Solids (mgl): None 450 >, Slight to Moderate 450-2000. Severe 2000 <	mg/1): None 45	0 >, Silicht t	o Moderate	450-2000. 3	evere 2000	v
Sodium (meq/l)				•	4	4.7	- Influence of imigation was evaluated by SAR and ECW:	vas evaluated by	SAR and E	Š			
Calcium (moq/l)				•	4	3.7	SAR	None Slight	Slight to Moderate	e Severe	i		
Magnesium (moqA)	•				•	12.7	0-3 and ECwa		0.7 - 0.2	0.2 >	1		
Sodium Adsorption Ratio						2.9	3-6	1.2 < 1	1.2 - 0.3	< 0.3 >			
							6-12	1.9 < 1	1.9 - 0.5	0.5 >			
						-	2-21	2.9 < 2	2.9 - 1.3	1.3 >			

Table K.I.2.27 Water Quality of Abu Ismail Imgation Canal in the Bahr El Saidi Area

Medium Medium 4. No. 10:20 84.0 21.7 7.33 2 8 2 512 ZJ. Nevy 0.516 11:31 ЯŻ ĝ 8 Ň 4 8 8 20, May Medium End of downstream 12:10 0.508 Fart 6 2 3 3.14 8 II, May 13:20 0.527 ų A <u>Å</u> 24.7 1.13 30 3 శ Total Dissolved Solids (mg/l) Electric Conductivity (dS/m) Dissolved Oxygan (mg/l) Water Temperature ('C) Sodium Adsorption Ratio Magnosium (moo/A) Measurement time Turbidity (NTC) Sodium (meq/l) Calcium (meq/) Water quantity Date, Month Water Dow Location ਸ਼

Note 1. The measurement was done by JICA Study Team in 1998.

- 2. The data on 11th, and 23rd, May were measured in the IIP Tanta Office after collected samples
- at 3 o'clock in the moming. The other data were determined on the field.
 - 3. 9th. May was rainy during daytime.
- 4. Water flow level was decided by technical expert, stop, slow, medium, and fast, respectively. And also
 - water quantity were little, medium, and much.
- 5. Total discolved solids(TDS) is calculated from Electric Conductivity by doing 640 times, reforred to Rowe Manitering Pregramme Report 39 by Dminage Research Institute, 1995.
- 6. Oudeline of water quality for infigation are abown as follows by PAO Infigation and Drainage Paper 29, 1985,
 - pH. Nomai rage 6.5-3.4
- Conductivity(dS/m): None 0.7 >, Slight to Moderate 0.7-3.0, Severe 3.0 <
- Total Dissolved Solids(mg/): None 450->, Slight to Moderate 450-2000, Severe 2000 <

ECM	Severe	ŝ	
Influence of irrigation was evaluated by SAR and ECw.	Slight to Moderate	0.7 - 0.2	
tion was	None	0.7 <	
- Influence of imiga	SAR	0-3 and ECw-	

WW.	NONS	Sught to Moderate	eses
0-3 and ECw	0.7 <	2,7 - 0,2	^ 20
3-6	ž	1.2 - 0.3	0.3 >
21-9	1.9 <	2.9 - 0.5	0.5 >
12-20	š	29 - 1.3	13 >
20-10	5.0 <	5.0 - 2.9	2.9 ×

- Specific Ion Taxicity(Na): None 3 SAR >, Slight to Moderate 3-9 SAR, Severe 9 SAR <

Table K.1.2.28 Water Quality of Zafrani Drainage Canal in the Bahr El Saidi Area

Location	End of downstream	WINITE		
Date, Month	11, May	20. May	Z3. May	4. NQ.
Measurement time	13:20	12:30	11:24	10:45
Water Cow	97.	Medium	, ez	Modium
Water quantity	Â.	Little	GN	Modium
Water Temperature ("C)	242	25.0	2.7	20.1
Hd	7.86	7.8	7.87	7.37
Turbidity (NTU)	156	476	163	150
Electric Conductivity (dS/m)	1.38	អ្ន	1.62	1.59
Dissolved Oxygen (mg/l)	1.72	4.20	2.05	5.05
Total Dissolved Solids (mg/l)	330	780	1,000	1,000
Sodium (meq/)		•		13.9
Calcium (meq.1)		•	.	4.7
Magnosium (meq/1)	•	4	•	7.5
Sodium Adsorption Ratio	_,	•		7.7

Table K.1.2.29 Water Quality of Kom El Arab Drainage Canal in Bahr El Saidi Area

Location	End of down	stream		
Date, Month	£1, May	20, May	23, May	4, Nov.
Measurement time	13.25	13:05	11:37	11:20
Water flow	N.D.	Medium	N.D.	Medium
Water quantity	N.D.	Little	ND.	Medium
Water Temperature (°C)	24.5	25.0	22.9	20.7
pH	7.89	7.93	7.77	8.35
Turbidity (NIU)	135	305	452	185
Electric Conductivity (dS/m)	2.99	2.68	3.00	3.72
Dissolved Oxygen (mg/l)	2.21	4.86	2.35	5.34
Total Dissolved Solids { eng/1 }	1,900	1,700	1,900	2,400
Sodium (meq.1)			.	27.9
Calcium (meg))	-	.		5.7
Magnesium (meq:1)				12.5
Sodium Adsorption Ratio				9.2

Note 1. The measurement was done by JICA Study Team in 1993.

2. The data on 11th, and 23rd, May were measured in the IIP Tanta Office after collected samples

at 8 o'clock in the morning. The other data were determined on the field.

- 3.9th, May was rainy during daytime.
- 4. Water flow level was decided by technical expert, stop, slow, medium, and fast, respectively. And also, water quantity were little, medium, and much.
- 5. Total dissolved solids (TDS) is esteulated from Electric Conductivity by doing 640 times, referred to

Reuse Monitoring Programme Report 39 by Drainage Research Institute, 1995.

- 6. Guideline of water quality for infgation are shown as follows by FAO Irrigation and Drainage Paper 29, 1955.
 - pH: Normal range 6.5-8.4

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- Conductivity (dS/m) : None 0.7 >, Slight to Moderate 0.7-3.0, Severe 3.0 <
- Total Dissolved Solids (mg/l) : None 450 >, Slight to Moderate 450-2000, Severe 2000 <
- Influence of irrigation was evaluated by SAR and ECw:

SAR	None	Slight to Moderate	Severe	
0-3 and ECw=	0.7 <	0.7 - 0.2	0.2 >	
3-6	£.2 <	1.2 - 0.3	0.3 >	
6-12	<u>+.9</u> <	1.9 - 0.5	0.5 >	
12-20	2.9 <	2.9 - 1.3	13 >	
20-40	5.0 <	5.0 - 2.9	29 >	

- Specific Ion Toxicity (Na) : None 3 SAR >, Slight to Moderate 3-9 SAR, Severe 9 SAR <

Item	Used place	Disposal place	Note
1. Bathe of cattle	Irrigation canal	Inside of cana	al
2. Washing	ditto	ditto	
3. Tabeware wash	ditto	ditto	
4. Cooking	Inside of house	Underground	permeation
5. Bathroom	ditto	ditto	-
6. Lavatory	ditto	ditto	Mosque can discharge to drain

Table K.1.2.30 Situation of process for water supply and disposal of life in village

Note: Investigation place of hearing: Midstream of Bahr Bella branch canal, at Hazik village

Table K.1.2.31	Water Quality	y of Drinking Water
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Place	1.	2.	3.	4.	5.
Measurement of Month, Date	17, May	17, May	28, April	21, May	17, May
Water Source	Clean W.	Ground W.	Clean W.	Clean W.	BARAKA
Water Temperature (°C)	23.5	21.7	22.1	23.8	24.9
pH	7.12	7.92	7.71	8.15	7.53
Turbidity (NTU)	1	3	2	3	1
Electric Conductivity (ds/m)	0.738	1.02	0.470	0.379	0.725
Dissolved Oxygen (mg/l)	3.59	1.94	6.47	6.95	6.17
Salinity (% indicated as Nacl)	0.03	0.04	0.01	0.01	0.03
Total Dissolved Solids (mg/l)	<u>470</u>	650	300	240	460

Note 1. The measurement was done by JICA Study Team in 1998.

- 2. Place no. are as follows.
 - 1. Supplied water in Tanta city, near the Tanta Office of HP
 - 2. Ground water in Tanta city, near the Tanta Office of IIP
 - 3. Supplied water in Balaweya village from Dakahlia Governorate
 - 4. Supplied water in Hazik village from water station in Ebshan village intaked from Bahr Tera irrigation canal
 - 5. Marketing water named "BARAKA"

Table K.1.2.32 Underdrainage Water Quality from Crop Field

Place	1.	2.
Measurement of Date, Nonth	21, May	21, May
Measurement Time	14:30	14:50
Main Crop	Cotton	Cotton
Wates Flow	Medium	Medium
Water Quantity	Medium	Medium
Water Temperature (°C)	26.9	27.9
pH	7.53	8.11
Turbidity (NTU)	312	630
Electric Conductivity (ds/m)	0.531	0.980
Dissolved Oxygen (mg/l)	4.76	6.63
Salinity (% indicated as Nacl)	0.02	0.04
Total Dissolved Solids (mg/l)	<u>340</u>	630

Note: 1. The measurement was done by JICA Study Team in 1998.

2. Place no. are as follows.

- 1. Underdrainage water canal from crop field in Kom El Malaha village
- 2. Inflow water from underdrainage pipe to No.4 drainage canal

Water Flow:	Mediun	1			Medium
Water Quantity:	Medium	ł			Medium
Mesurement Time	9:55	11:50	13:30	14:50	11:00
Water Temperatere (°C)	21.3	22.3	23.1	23.4	23.3
рН	7.91	8.09	8.05	8.23	7.89
Turbidity(NTU)	30	33	54	39	29
Dissolved Oxygen(mg/l)	5.73	6.19	6.53	6.96	4.47
Electric Conductivity (dS/m)	0.391	0.400	0.408	0.406	0.404
Total Dissolved Solids(mg/l)	250	260	260	260	260
Sodium(meg/1)	-	-	-	-	1.7
Calcium(mcq//1)	-		-	-	3.6
Magnesium (meq/l)	-	-	-	-	1.3
Sodium Adsorption Ratio	-	-	-	-	1.1

Table K.1.2.33 Change of Water Quality by the Time Passing through the Villages at the Bahr Basandila Canal

Downstream, 31 Km from start of the Bahr Basandila canal

Water Flow:	Medium	1		· · · ·	Medium
Water Quantity:	Medium	ı			Much
Mesurement Time	11:00	12:45	14:10	15:20	11:35
Water Temperatere (°C)	20.0	20.4	20.8	21.3	22.3
рН	7.88	7.87	7.72	7.79	8.09
Turbidity(NTU)	121	130	165	164	195
Dissolved Oxygen(mg/l)	2.24	2.21	2.39	2.61	2.31
Electric Conductivity(dS/m)	3.83	3.86	4.15	4.06	3.00
Total Dissolved Solids (mg/l)	2,500	2,500	2,700	2,600	1,900
Sodium(meq/1)		-	•	-	17.7
Calcium(meq//1)	-	-	-	-	5.4
Magnesium (meq/1)	-	-	. '	-	5.8
Sodium Adsorption Ratio	-	-	-	-	7.5

Note 1. Start to 16.8Km of Bahr Basandila canal is continuous irrigation, and 16.8Km to end is intermittent irrigation, 1-6 date(off), 7-11 date (on), 12-21 date(off), 22-28(on), in April.

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2. The measurement was done by JICA Study Team in 28th, April, 1998 and most right value is in 26th, October, 1998.

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Table K.2.1 Location of Water Quality Survey in the Feasibility Study Area

I. Main canal

1. Bahr Tera canal, at upstream, midstream and downstream

II. Branch canal

1. Bahr El Banawan canal, at upstream, midstream and downstream

III. Delivery canal

Bahr Biyala canal, at upstream, midstream, downstream, and meska
 Zobaa canal, at upstream, midstream, downstream, and meska
 Ibshan canal, at upstream, midstream, downstream, and meska
 El Nezam canal, at upstream, midstream, downstream, and meska
 Bahr El Nour canal, at upstream, midstream, downstream, and meska
 El Mahatta canal, at upstream, midstream, downstream, and meska
 El Mahatta canal, at upstream, midstream, downstream, and meska
 El Mahatta canal, at upstream, midstream, downstream, and meska
 El Sharka canal, at upstream, midstream, downstream, and meska
 El Sharkaweiah canal, at upstream, midstream, and downstream
 Foda canal, at upstream, midstream, and downstream
 El Kafr El Sharkie canal, at upstream, midstream, downstream, and meska
 Ganabia No.7 Left canal, at upstream, midstream, and downstream

12. Ganabia No.6 Right canal, at upstream, midstream, downstream, and meska

13. Marzouk canal, at upstream, midstream, and downstream

14. El Shorafa canal, at upstream, midstream, and downstream

15. Hazek canal, at upstream, midstream and, downstream

16. Abou Iweida canal, at upstream, midstream, and downstream

IV. Drainage canal

1. No.4 drainage canal, at upstream, midstream, and downstream

2. Et Gharbia drainage canal, at upstream, midstream, and downstream

3. No.5 drainage canal, at upstream, midstream, and downstream

4. El Sharqawlya drainage canal, at midstream and downstream

5. Ibshan drainage canal, at upstream, midstream, and downstream

6. El Banawan drainage canal, at upstream, midstream, and downstream

7. El Hagg Yused drainage canal, at upstream and downstream

8. Biyala drainage canal, at upstream and downstream

9. No.3 drainage canal, at upstream and downstream

10. El Komsan drainage canal, at midstream

11. El Zoraba drainage canal, at downstream end

V. Subsurface drainage water from crop field ---

1. No.4 drainage canal, at midstream

2. El Komsan drainage canal, at midstream

Table K.2.2.1 Summary of Field Survey on Water Quality in the F/S Area

1. Irrigation Canal

Name of canal	Bahr Tera				
Measurement Point	Upstream, 1	Upstream, 2	Midstream, 1	Midstream, 2	
Date, Month	15, Nov.	15, Nov.	18, Nov.	23, Nov.	
Water Flow	Medium	Medium	Medium	Medium	
Water Quantity	Much	Međium	Medium	Medium	
Measurement Time	12:25	11:15	14:40	14:05	
Water Temperature(°C)	23.1	20.2	20.7	21.6	
рН	8.09	8.15	7.60	7.58	
Dissolved Oxygen(mg/l)	6.20	6.64	7.69	5.08	
Turbidity(NTU)	39	21	32	33	
Conductivity(dS/m, 25 °C)	0.386	0.382	0.365	0.393	
Total Dissolved Solids(mg/l)	250	240	230	250	
Sodium(meq/1)	1.9	1.9	1.7	1.5	
Calcium(meq/l)	3.4	3.2	3.0	3.1	
Magnesium(meq/l)	2.3	2.7	1.3	0.8	
Sodium Adsorption Ratio	<u> </u>	1.1	1.2	<u> </u>	

Name of canal	Bahr Tera		
Measurement Point	Downstream, 1	Downstream, 2	
Date, Month	23, Nov.	22, Nov.	
Water Flow	Medium	Medium	
Water Quantity	Much	Medium	
Measurement Time	13:20	9:00	
Water Temperature(°C)	21.1	20.8	
pH	8.12	6.73	
Dissolved Oxygen(mg/l)	5.13	4.79	
Turbidity(NTU)	28	29	
Conductivity(dS/m, 25 °C)	0.376	0.393	
Total Dissolved Solids(mg/l)	240	250	
Sodium(meq/l)	1.4	2.0	
Calcium(meq/l)	3.0	3.1	
Magnesium(meq/l)	0.8	0.9	
Sodium Adsorption Ratio	<u>1.0</u>	1.4	

Name of canal	· ·	Bahr Banawan		
Measurement Point	Upstream, 1	Upstream, 2	Midstream, 1	Midstream, 2
Date, Month	25, Nov.	25, Nov.	25, Nov.	25, Nov.
Water Flow	Medium	Medium	Medium	Medium
Water Quantity	Medium	Medium	Much	Much
Measurement Time	12:25	12:05	14:40	14:20
Water Temperature(°C)	20.5	20.3	20.5	20.6
pH ·	8.13	8.07	7.53	8.09
Dissolved Oxygen(mg/l)	4.27	5.37	3.99	4.21
Turbidity(NTU)	49	32	55	51
Conductivity(dS/m, 25 °C)	0.491	0.428	0.990	0.823
Total Dissolved Solids(mg/l)	310	270	630	530
Sodium(meq/1)	2.6	2.0	4.5	4.2
Calcium(meq/l)	3.2	3.0	3.7	3.6
Magnesium(mcq/l)	1.3	1.3	2.5	3.3
Sodium Adsorption Ratio	1.7	1.4	2.6	2.3

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Name of canal	Bahr Banawan			
Measurement Point	Downstream, 1	Downstream, 2	End of Downstream	
Date, Month	25, Nov.	25, Nov.	25, Nov.	
Water Flow	Slow	Medium	Stop	
Water Quantity	Much	Much	Much	
Measurement Time	14:10	14:55	15:15	
Water Temperature (°C)	20.5	20.6	20.3	
pH	8.17	7.87	7.97	
Dissolved Oxygen(mg/l)	4.71	2.90	2.47	
Turbidity(NTU)	50	59	90	
Conductivity(dS/m, 25 °C)	0.766	1.74	1.94	
Total Dissolved Solids(mg/l)	490	1,100	1,200	
Sodium(meq/l)	3.8	8.0	9.3	
Cateium (mcq/1)	3.4	4.5	4.7	
Magnesium(mcq/l)	2.9	5.0	7.5	
Sodium Adsorption Ratio	2.1	3.7	3.8	

Name of canal	Bahr Biyala			
Measurement Point	Upstream	Midstream, 1	Midstream, 2	Downstream,
Date, Month	15, Nov.	15, Nov.	15, Nov.	15, Nov.
Water Flow	Medium	Medium	Medium	Medium
Water Quantity	Medium	Medium	Medium	Medium
Measurement Time	13:00	13:25	15:45	14:20
Water Temperature(°C)	21.2	20.5	20.7	20.0
pH	8.22	7.97	8.07	7.78
Dissolved Oxygen(mg/l)	6.14	4.26	5.71	4.78
Turbidity(NTU)	26	31	33	73
Conductivity(dS/m, 25 °C)	0.372	0.739	0.491	1.92
Total Dissolved Solids(mg/l)	240	470	310	1,300
Sodium(meq/l)	2.5	4.2	2.2	13.0
Calcium(meq/l)	3.0	3.7	3.2	5.1
Magnesium(meq/l)	2.1	3.3	5.0	5.8
Sodium Adsorption Ratio	1.6	2.2	2.2	5.6

Name of canal	Bahr I	Biyata
Measurement Point	Downstream, 2	Meska of downstream
Date, Month	15, Nov.	15, Nov.
Water Flow	Stop	Stop
Water Quantity	Medium	Medium
Measurement Time	14:55	14:30
Water Temperature(°C)	21.3	20.0
pH	8.46	7.83
Dissolved Oxygen(mg/l)	11.04	7.45
Turbidity(NTU)	100	84
Conductivity(dS/m, 25 °C)	1.29	1.16
Total Dissolved Solids(mg/l)	830	740
Sodium(meq/l)	6.7	7.2
Calcium(meq/1)	4.6	5.0
Magnesium(meq/l)	5.0	5.4
Sodium Adsorption Ratio	3.1	3.2

Name of canal		2	Lobaa	
Measurement Point	Upstream	Midstream	Downstream, 1	Downstream, 2
Date, Month	22, Nov.	22, Nov.	22, Nov.	22, Nov.
Water Flow	Medium	Medium	Stop	Stop
Water Quantity	Medium	Medium	Medium	Medium
Measurement Time	9:10	9:20	9:55	10:05
Water Temperature(°C)	20.7	20.9	20.3	19.1
pH	7.39	7.43	7.46	7.17
Dissolved Oxygen(mg/l)	4.52	2.45	0.56	1.68
Turbidity(NTU)	39	46	42	17
Conductivity(dS/m, 25 °C)	0.386	0.405	0.502	0.608
Total Dissolved Solids(mg/l)	250	260	320	390
Sodium(meq/l)	2.0	2.6	3.7	4.4
Catcium(mcq/l)	3.1	3.3	3.4	3.7
Magnesium(meq/l)	1.0	1.0	2.1	2.1
Sodium Adsorption Ratio	1.4	1.8	2.2	

Name of canal	Zobaa			
Measurement Point	Meska of midstream	Meska of downstream		
Date, Month	22, Nov.	22, Nov.		
Water Flow	Slow	Stop		
Water Quantity	Medium	Medium		
Measurement Time	9:30	9:40		
Water Temperature(°C)	20.0	20.9		
pH	7.13	7.55		
Dissolved Oxygen(mg/l)	0.43	0.43		
Turbidity(NTU)	24	52		
Conductivity(dS/m, 25 °C)	1.52	0.514		
Total Dissolved Solids(mg/l)	970	330		
Sodium(meq/l)	8.7	3.8		
Calcium(meqA)	4.9	3.5		
Magnesium(meq/l)	4.2	2.5		
Sodium Adsorption Ratio	4.1			

Name of canal		1	bshan	
Measurement Point	Upstream	Midstream	Downstream	Meska of downstream
Date, Month	23, Nov.	23, Nov.	23, Nov.	23, Nov.
Water Flow	Medium	Medium	Stop	Medium
Water Quantity	Medium	Medium	Medium	Much
Measurement Time	11:30	11:50	12:25	12:05
Water Temperature(°C)	20.9	21.5	21.6	21.8
pH	6.64	7.38	7.23	7.87
Dissolved Oxygen(mg/l)	4.14	1.77	1.23	3.82
Turbidity(NTU)	37	52	28	61
Conductivity(dS/m, 25 °C)	0.412	0.419	0.456	0.425
Total Dissolved Solids(mg/l)	260	270 [.]	290	270
Sodium(mcq/l)	2.0	2.1	2.3	2.0
Catcium(meq/l)	3.0	3.1	3.3	3.1
Magnesium(meq/1)	1.7	1.4	1.3	1.3
Sodium Adsorption Ratio	1.3	1.4	1.5	1.3

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Name of canal		El Nezam	
Measurement Point	Upstream	Midstream	Downstream, 1
Date, Month	18, Nov.	18, Nov.	18, Nov.
Water Flow	Slow	Slow	Slow
Water Quantity	Medium	Medium	Medium
Measurement Time	14:10	13:55	13:40
Water Temperature(°C)	20.9	20.8	20.5
pH	7.84	7.62	7.52
Dissolved Oxygen(mg/l)	5.62	4.96	2.93
Turbidity (NTU)	20	33	35
Conductivity(dS/m, 25 °C)	0.365	0.380	0.453
Total Dissolved Solids(mg/l)	230	240	290
Sodium(meq/l)	1.5	1.7	2.2
Calcium(meq/l)	2.9	3.0	3.1
Magnesium(meq/l)	2.7	2.7	3.3
Sodium Adsorption Ratio	<u> </u>	1.0	1.2

Name of canal	El Nezam				
Measurement Point	Downstream, 2	Mcska of downstream			
Date, Month	18, Nov.	18, Nov.			
Water Flow	Stop	Stop			
Water Quantity	Medium	Medium			
Measurement Time	13:25	13:10			
Water Temperature(°C)	21.4	19.8			
pH	6.99	6.17			
Dissolved Oxygen(mg/l)	1.50	0.87			
Turbidity(NTU)	14	197			
Conductivity(dS/m, 25 °C)	0.523	0.496			
Total Dissolved Solids(mg/l)	330	320			
Sodium(meg/l)	2.8	2.8			
Calcium (meq/l)	3.3	3.3			
Magnesium(meq/l)	4.2	4.2			
Sodium Adsorption Ratio	<u> 1.4 </u>				

Name of canal		Bahr El Nour	<u>.</u>	
Measurement Point	Upstream	Midstream	Downstream	
Date, Month	13, Nov.	13, Nov.	13, Nov.	
Water Flow	Medium	Medium	Stop	
Water Quantity	Medium	Medium	Medium	
Measurement Time	9:30	10:05	12:20	
Water Temperature(°C)	20.5	20.0	20.3	
pR	7.88	7.85	7.87	
Dissolved Oxygen(mg/l)	7.28	7.00	4.57	· · · ·
Turbidity (NTU)	22	28	36	•
Conductivity (dS/m, 25 °C)	0.385	0.398	0.466	•
Total Dissolved Solids(mg/l)	250	260	. 300	
Sodium(meg/l)	2.5	2.4	2.8	
Calcium(meq/l)	4.0	-3.7	3.7	
Magnesium(meq/l)	1.7	1.4	· 1.7	
Sodium Adsorption Ratio	1.5	1.5	1.7	

Name of canal	Bahr E	l Nour
Measurement Point	Meska of midstream	Meska of downstream
Date, Month	13, Nov.	13, Nov.
Water Flow	Stop	Stop
Water Quantity	Medium	Little
Measurement Time	10:50	12:40
Water Temperature(°C)	19.7	19.0
pH	7.45	7.76
Dissolved Oxygen(mg/l)	4.70	3.04
Turbidity(NTU)	31	26
Conductivity(dS/m, 25 °C)	0.724	0.460
Total Dissolved Solids(mg/l)	460	290
Sodium(meq/l)	4.8	3.2
Calcium(meg/l)	4.5	4.0
Magnesium(meq/1)	3.3	3.2
Sodium Adsorption Ratio	2.4	1.7

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Name of canal	El Mahatta					
Measurement Point	Upstream	Midstream	Downstream	Meska of downstream		
Date, Month	23, Nov.	23, Nov.	23, Nov.	23, Nov.		
Water Flow	Slow	Slow	Stop	Medium		
Water Quantity	Medium	Much	Medium	Medium		
Measurement Time	13:15	13:05	12:45	12:55		
Water Temperature(°C)	21.3	22.3	21.5	21.0		
pH	7.86	7.83	7.38	7.75		
Dissolved Oxygen(mg/l)	5.29	4.43	3.47	3.08		
Turbidity (NTU)	29	39	58	49		
Conductivity(dS/m, 25°C)	0.380	0.402	0.390	0.387		
Total Dissolved Solids(mg/l)	240	260	250	250		
Sodium(meq/1)	1.4	1.6	1.8	1.7		
Calcium(meq/l)	3.0	3.1	3.1	3.1		
Magnesium(meq/l)	1.1	1.3	1.0	1.5		
Sodium Adsorption Ratio	<u> 1.0 </u>	<u> </u>		1.1		

Name of canal		Regheb Bash	a	
Measurement Point	Upstream	Midstream	Downstream	
Date, Month	22, Nov.	22, Nov.	22, Nov.	
Water Flow	Medium	Medium	Stop	
Water Quantity	Medium	Medium	Much	
Measurement Time	11:40	11:05	10:50	· · · · ·
Water Temperature(°C)	21.4	21.1	21.4	
рН	7.74	7.65	7.64	
Dissolved Oxygen(mg/l)	6.11	3.64	1.90	
Turbidity(NTU)	30	36	42	
Conductivity(dS/m, 25 °C)	0.395	0.391	0.438	
Total Dissolved Solids(mg/l)	250	250	280	
Sodium(meq/1)	2.1	2.3	2.5	
Calcium(meq/l)	3.0	3.1	3.1	
Magnesium(meq/l)	1.7	1.3	1.5	
Sodium Adsorption Ratio	1.4	1.6	1.6	

Name of canal	Regheb Basha				
Measurement Point	Meska of upstream	Meska of midstream			
Date, Month	22, Nov.	22, Nov.			
Water Flow	Stop	Slow			
Water Quantity	Medium	Medium			
Measurement Time	11:30	11:20			
Water Temperature(°C)	22.4	21.9			
pH	7.41	7.62			
Dissolved Oxygen(mg/l)	4.35	3.63			
Turbidity(NTU)	52	46			
Conductivity(dS/m, 25 °C)	1.05	0.429			
Total Dissolved Solids(mg/l)	670	270			
Sodium(meq/l)	6.1	2.8			
Calcium(meq/l)	3.7	3.0			
Magnesium(meq/l)	3.3	1.5			
Sodium Adsorption Ratio	3.3	1.9			

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Name of canal	El Sharkaweiah		
Measurement Point	Upstream	Midstream	Downstream
Date, Month	15, Nov.	22, Nov.	22, Nov.
Water Flow	Fast	Medium	Stop
Water Quantity	Much	Medium	Medium
Measurement Time	11:20	13:30	13:55
Water Temperature(°C)	20.2	20.7	21.4
pH	6.93	7.58	6.95
Dissolved Oxygen(mg/l)	5.65	4.86	2.90
Turbidity(NTU)	40	52	18
Conductivity(dS/m, 25 °C)	0.383	0.398	0.524
Total Dissolved Solids(mg/l)	250	250	340
Sodium(mcq/l)	1.9	2.2	2.8
Calcium(meq/l)	3.3	3.1	3.3
Magnesium(meq/1)	2.9	3.3	4.2
Sodium Adsorption Ratio	1.1	1.2	1.4

Name of canal	<u> </u>	Foda		
Measurement Point	Upstream	Midstream	Downstream	
Date, Month	12, Nov.	12, Nov.	12, Nov.	
Water Flow	Medium	Medium	Stop	
Water Quantity	Medium	Medium	Medium	
Measurement Time	12:10	12:00	11:40	
Water Temperature(°C)	21.7	22.3	19.5	
pH	7.93	7.95	8.33	
Dissolved Oxygen(mg/l)	5.42	6.80	3.76	
Turbidity (NTU)	33	83	48	
Conductivity (dS/m, 25 °C)	0.387	0.396	0.426	·
Total Dissolved Solids(mg/l)	250	250	270	
Sodium(meq/l)	1.4	1.5	2.0	
Calcium(meq/l)	2.9	3.8	4.0	
Magnesium(meq/l)	2.3	2.6	2.7	
Sodium Adsorption Ratio	0.9	0.8	1.1	· · · · · ·

Name of canal	El Kaft El Sharkie				
Measurement Point	Upstream	Midstream	Downstream	Meska of midstream	
Date, Month	23, Nov.	23, Nov.	23, Nov.	23, Nov.	
Water Flow	Medium	Slow	Stop	Stop	
Water Quantity	Medium	Medium	Medium	Medium	
Measurement Time	14:25	14:45	15:00	14:35	
Water Temperature(°C)	21.7	23.2	22.7	21.7	
pH	7.26	8.14	7.83	7.52	
Dissolved Oxygen(mg/l)	5.27	5.47	4.63	2.57	
Turbidity(NTU)	45	43	85	56	
Conductivity(dS/m, 25 °C)	0.394	0.384	0.381	0.454	
Total Dissolved Solids(mg/l)	250	250	240	290	
Sodium(meqA)	1.5	1.4	1.5	2.2	
Calcium(meq/1)	3.1	2.9	3.0	3.2	
Magnesium(meq/l)	1.0	1.3	1.5	2.5	
Sodium Adsorption Ratio	1.0	1.0	1.0	1.3	

Name of canal	Ganabia No.7 Left				
Measurement Point	Upstream	Midstream	Downstream		
Date, Month	23, Nov.	23, Nov.	23, Nov.		
Water Flow	Slow	Slow	Stop		
Water Quantity	Medium	Medium	Medium		
Measurement Time	13:30	13:45	13:55		
Water Temperature(°C)	21.5	22.0	22.3		
pH	8.40	8.29	7.60		
Dissolved Oxygen(mg/l)	4.91	4.42	3.32		
Turbidity(NTU)	28	28	52		
Conductivity(dS/m, 25 °C)	0.380	0.397	0.520		
Total Dissolved Solids(mg/l)	240	250	330		
Sodium(mcq/1)	1.4	1.6	3.1		
Calcium(meq/l)	3.0	3.0	2.8		
Magnesium(meq/l)	1.7	1.4	1.8		
Sodium Adsorption Ratio	0.9	1.1	2.0		

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Name of canal	Ganabia No.6 Right					
Measurement Point	Upstream	Midstream	Downstream	Meska of midstream		
Date, Month	15, Nov.	15, Nov.	15, Nov.	15, Nov.		
Water Flow	Stop	Medium	Mcdium	Medium		
Water Quantity	Little	Medium	Medium	Much		
Measurement Time	12:20	12:35	11:30	11:50		
Water Temperature(°C)	20.2	19.4	19.4	17.2		
pH	8.15	8.03	7.91	7.87		
Dissolved Oxygen(mg/l)	4.74	5.03	5.32	4.53		
Turbidity(NTU)	44	82	96	120		
Conductivity(dS/m, 25 °C)	0.411	0.462	0.419	0.537		
Total Dissolved Solids(mg/l)	260	300	270	340		
Sodium(mcq/l)	2.2	2.5	2.2	2.8		
Calcium(meq/l)	3.6	3.6	3.4	4.1		
Magnesium(meq/l)	2.9	2.1	1.3	1.7		
Sodium Adsorption Ratio	<u> </u>	<u> </u>	1.4	<u> </u>		

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Name of canal		Marzouk	
Measurement Point	Upstream	Midstream	Downstream
Date, Month	18, Nov.	18, Nov.	18, Nov.
Water Flow	Slow	Stow	Stop
Water Quantity	Medium	Medium	Little
Measurement Time	14:50	15:00	15:10
Water Temperature(°C)	20.7	21.2	20.6
рН	7.84	7.35	7.56
Disselved Oxygen(mg/l)	5.48	2.42	3.48
Turbidity(NTU)	70	72	40
Conductivity(dS/m, 25°C)	0.366	0.479	0.523
Total Dissolved Solids (mg/l)	230	310	330
Sodium(mcq/l)	1.7	2.4	2.7
Calcium(mcq/l)	2.9	3.4	3.5
Magnesium(meq/l)	1.3	1.8	2.5
Sodium Adsorption Ratio	1.2	1.5	1.6

Name of canal	El Shorafa				
Measurement Point	Upstream	Midstream	Downstream		
Date, Month	15, Nov.	15, Nov.	15, Nov.		
Water Flow	Stop	Stop	Stop		
Water Quantity	Little	Little	Medium		
Measurement Time	13:35	13:45	14:00		
Water Temperature(°C)	20.5	20.4	18.5		
рН	8.27	7.93	7.90		
Dissolved Oxygen(mg/l)	4.24	4.57	7.82		
Turbidity(NTU)	39	34	57		
Conductivity(dS/m, 25 °C)	0.749	1.09	2.62		
Total Dissolved Solids(mg/l)	480	700	1,700		
Sodium(meq/l)	4.2	5.7	16.5		
Calcium(meq/1)	3.7	4.0	5.8		
Magnesium(meq/l)	3.3	4.2	8.3		
Sodium Adsorption Ratio	2.2	2.8	6.2		

Name of canal		Hazek		
Measurement Point	Upstream	Midstream	Downstream	
Date, Month	18, Nov.	18, Nov.	18, Nov.	
Water Flow	Stop	Stop	Medium	
Water Quantity	Medium	Medium	Medium	
Measurement Time	15:50	15:40	15:20	
Water Temperature(°C)	20.7	20.4	20.8	
рН	8.03	7.92	7.54	
Dissolved Oxygen(mg/l)	4.87	4.03	1.21	_
Turbidity(NTU)	25	69	38	
Conductivity(dS/m, 25 °C)	0.477	0.559	0.516	
Total Dissolved Solids(mg/l)	310	360	330	
Sodium(meq/l)	2.2	2.9	2.9	
Catcium(meq/l)	3.2	3.4	3.8	
Magnesium(meq/l)	5.0	3.3	4.2	
Sodium Adsorption Ratio	<u> </u>	<u> 1.6 </u>	1.5	
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Name of canal		Abou Iweida		<u> </u>
Measurement Point	Upstream	Midstream	Downstream, 1	Downstream, 2
Date, Month	22, Nov.	22, Nov.	22, Nov.	25, Nov.
Water Flow	Medium	Medium	Medium	Medium
Water Quantity	Medium	Medium	Medium	Medium
Measurement Time	11:55	12:10	12:25	11:50
Water Temperature(°C)	21.0	21.8	22.0	20.5
pH	7.92	7.78	7.95	8.19
Dissolved Oxygen(mg/l)	5.43	5.31	5.25	5.63
Turbidity(NTU)	61	57	44	33
Conductivity(dS/m, 25 °C)	0.372	0.405	0.403	0.390
Total Dissolved Solids(mg/l)	240	260	260	250
Sodium(mcq/l)	1.9	2.1	2.0	1.9
Catcium (meg/l)	3.0	3.0	3.2	3.3
Magnesium(meq/l)	1.0	1.0	1.0	1.7
Sodium Adsorption Ratio	1.3	1.5		1.2

II. Drainage Canal

Name of canal		No.	4	
Measurement Point	Upstream, 1	Upstream, 2	Midstream, 1	Midstream, 2
Date, Month	12, Nov.	13, Nov.	13, Nov.	22, Nov.
Water Flow	Medium	Medium	Medium	Medium
Water Quantity	Medium	Medium	Medium	Medium
Measurement Time	13:30	11:30	13:10	12:30
Water Temperature(°C)	20.6	19.6	19.6	21.4
pH	7.47	7.25	7.76	6.96
Dissolved Oxygen(mg/l)	0.20	3.27	2.87	2.61
Turbidity(NTU)	59	70	114	65
Conductivity(dS/m, 25 °C)	1.41	2.11	2.24	2.37
Total Dissolved Solids(mg/l)	900	1,400	1,400	1,500
Sodium(meg/l)	11.2	13.4	14.7	15.2
Calcium(meq/l)	4.7	6.2	6.2	5.5
Magnesium(meq/l)	5.8	6.7	7.5	6.3
Sodium Adsorption Ratio	<u> 4.9 </u>	5.3	5.6	6.3

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Name of canal	No	. 4	
Measurement Point	Downstream, 1	Downstream, 2	
Date, Month	22, Nov.	7, Nov.	
Water Flow	Medium	Medium	
Water Quantity	Medium	Much	
Measurement Time	10:40	13:05	
Water Temperature(°C)	20.7	22.3	
pH	7.52	8.20	
Dissolved Oxygen(mg/l)	2.40	4.25	
Turbidity(NTU)	131	111	
Conductivity(dS/m, 25 °C)	1.93	2.12	
Total Dissolved Solids(mg/l)	1,200	1,400	
Sodium(meq/l)	12.9	18.0	
Calcium(meq/l)	5.1	5.6	
Magnesium(mcq/l)	5.0	5.5	
Sodium Adsorption Ratio	<u> </u>		

Name of canal		El G	iharbia	
Measurement Point	Upstream, 1	Upstream, 2	Midstream, 1	Midstream, 2
Date, Month	7, Nov.	7, Nov.	7, Nov.	7, Nov.
Water Flow	Medium	Medium	Medium	Medium
Water Quantity	Medium	Medium	Medium	Much
Measurement Time	11:15	11:30	11:50	12:30
Water Temperature(°C)	21.8	21.9	21.7	22.1
pH	7.52	7.70	7.58	8.03
Dissolved Oxygen(mg/l)	0.13	0.02	1.01	0.46
Turbidity(NTU)	95	35	49	38
Conductivity(dS/m, 25 °C)	1.26	1.26	1.94	1.72
Total Dissolved Solids(mg/l)	810	810	1,200	1,100
Sodium(meq/1)	10.6	10.5	12.3	13.4
Catcium(mcg/1)	4.5	4.6	4.9	5.0
Magnesium(meq/l)	5.5	4.2	4.2	5.8
Sodium Adsorption Ratio	4.7	5.0	5.8	5.8

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Name of canal	EL G	harbia
Measurement Point	Downstream, 1	Downstream, 2
Date, Month	7, Nov.	7, Nov.
Water Flow	Medium	Medium
Water Quantity	Much	Much
Measurement Time	12:45	13:00
Water Temperature(°C)	22.4	22.4
pH	8.07	8.27
Dissolved Oxygen(mg/l)	0.84	1.28
Turbidity(NTU)	43	40
Conductivity(dS/m, 25 °C)	1.58	1.86
Total Dissolved Solids(mg/t)	1,000	1,200
Sodium(mcq/1)	12.5	13.7
Calcium(meq/I)	4.9	5.2
Magnesium(meq/l)	5.8	7.5
Sodium Adsorption Ratio	5.4	5.4

Name of canal		· No	. 5	
Measurement Point	Upstream	Midstream	Downstream, 1	Downstream, 2
Date, Month	12, Nov.	12, Nov.	12, Nov.	12, Nov.
Water Flow	Medium	Medium	Medium	Medium
Water Quantity	Medium	Medium	Medium	Medium
Measurement Time	12:55	11:30	10:40	10:25
Water Temperature(°C)	23.1	19.9	19.3	19.3
pH	6.70	6.85	7.14	7.76
Dissolved Oxygen(mg/l)	0.05	0.71	0.18	1.31
Turbidity(NTU)	90	56	52	68
Conductivity(dS/m, 25 °C)	1.28	1.37	1.33	1.32
Total Dissolved Solids(mg/l)	820	880	850	840
Sodium(mcq/l)	6.2	9.1	9.5	9.4
Calcium(meq/l)	4.0	4.1	5.4	4.7
Magnesium(meq/l)	5.4	5.8	5.8	5.4
Sodium Adsorption Ratio		4.1	4.0	4.2

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Name of canal	El Sharq	awiya
Measurement Point	Midstream	Downstream
Date, Month	18, Nov.	22, Nov.
Water Flow	Medium	Medium
Water Quantity	Medium	Medium
Measurement Time	15:30	12:50
Water Temperature(°C)	19.2	23.4
pH	6.49	7.87
Dissolved Oxygen(mg/l)	3.46	5.56
Turbidity(NTU)	99	260
Conductivity(dS/m, 25 °C)	1.73	1.37
Total Dissolved Solids(mg/l)	1,100	880
Sodium(meq/t)	9.4	8.6
Calcium(meq/l)	5.2	4.1
Magnesium(meq/l)	8.3	3.8
Sodium Adsorption Ratio	3.6	4.3

Name of Canal		Ibshan	
Measurement Point	Upstream	Midstream	Downstream
Date, Month	7, Nov.	7, Nov.	7, Nov.
Water Flow	Stop	Medium	Medium
Water Quantity	Medium	Little	Medium
Measurement Time	14:15	13:50	11:45
Water Temperature(°C)	28.3	25.5	21.0
pH	8.66	8.32	8.55
Dissolved Oxygen(mg/l)	13.13	7.39	3.92
Turbidity(NTU)	165	105	100
Conductivity(dS/m, 25 °C)	9.40	2.24	3.77
Total Dissolved Solids(mg/l)	6,000	1,400	2,400
Sodium(meq/l)	67.8	19.2	30.9
Calcium(meq/l)	10.4	5.6	7.5
Magnesium(meq/l)	35.0	5.0	6.5
Sodium Adsorption Ratio	14.4	5.8	11.7

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Name of Canal		El Banawan		
Measurement Point	Upstream	Midstream	Downstream	
Date, Month	25, Nov.	25, Nov.	25, Nov.	•
Water Flow	Medium	Medium	Medium	
Water Quantity	Medium	Medium	Little	
Measurement Time	12:45	13:15	13:50	
Water Temperature(°C)	18.9	19.8	19.8	
pH	7.54	7.86	7.77	
Dissolved Oxygen(mg/l)	2.90	4.06	3.65	
Turbidity(NTU)	230	155	308	
Conductivity(dS/m, 25 °C)	1.80	1.48	1.54	
Total Dissolved Solids(mg/l)	1,200	950	990	
Sodium(meq/l)	9.0	7.3	7.7	(1,1,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2
Calcium(meq/1)	4.1	3.7	3.7	4
Magnesium(meq/l)	3.8	3,5	4.3	
Sodium Adsorption Ratio	4.5	3.8	3.9	•

Name of Canal	El Ha	gg Yused
Measurement Point	Upstream	Downstream
Date, Month	22, Nov.	22, Nov.
Water Flow	Medium	Medium
Water Quantity	Little	Medium
Measurement Time	11:45	10:45
Water Temperature(°C)	21.6	20.6
pH	7.94	7.10
Dissolved Oxygen(mg/l)	5.25	2.08
Turbidity (NTU)	50	204
Conductivity(dS/m, 25 °C)	0.412	1.98
Total Dissolved Solids(mgA)	260	1,300
Sodium(meq/1)	2.9	12.3
Calcium(mcq/l)	3.0	5.1
Magnesium(mcq/l)	2.0	7.5
Sodium Adsorption Ratio	1.8	4.9

Name of Canal	Biy	ala
Measurement Point	Upstream	Downstream
Date, Month	25, Nov.	25, Nov.
Water Flow	Medium	Medium
Water Quantity	Medium	Little
Measurement Time	13:40	13:20
Water Temperature(°C)	22.3	20.5
рН	6.88	7.41
Dissolved Oxygen(mg/l)	0.03	0.07
Turbidity(NTU)	318	121
Conductivity(dS/m, 25 °C)	2.86	3.02
Total Dissolved Solids(mg/l)	1,800	1,900
Sodium(meq/1)	27.4	21.5
Calcium(meq/l)	3.7	5.0
Magnesium(meq/l)	9.7	15.0
Sodium Adsorption Ratio	10.6	6.8

Name of Canal	N	o. 3
Measurement Point	Upstream	Downstream
Date, Month	25, Nov.	25, Nov.
Water Flow	Medium	Medium
Water Quantity	Medium	Medium
Measurement Time	14:00	15:15
Water Temperature(°C)	19.5	20.2
pH	7.85	8.37
Dissolved Oxygen(mg/l)	3.66	5.05
Turbidity(NTU)	192	127
Conductivity (dS/m, 25 °C)	2.56	2.69
Total Dissolved Solids(mg/l)	1,600	1,700
Sodium(meg/l)	12.3	12.9
Calcium(meg/l)	4.3	5.0
Magnesium(meq/l)	7.5	10.0
Sodium Adsorption Ratio	5.1	4.7

Name of Canal	El Komsan	Zoraba
Measurement Point	Midstream	End of downstream
Date, Month	22, Nov.	15, Nov.
Water Flow	Medium	Medium
Water Quantity	Medium	Little
Measurement Time	10:20	14:10
Water Temperature(°C)	19.9	22.2
рН	6.96	8.06
Dissolved Oxygen(mg/l)	3.31	5.17
Turbidity(NTU)	70	82
Conductivity(dS/m, 25 °C)	2.39	3.86
Total Dissolved Solids(mg/l)	1,500	2,500
Sodium(meg/l)	14.9	22.1
Calcium(meq/l)	4.7	7.4
Magnesium(meq/l)	8.8	14.2
Sodium Adsorption Ratio	5.7	5.2

III. Subsurface Drainage Water from Crop Field

Location	No. 4 Drain at Midstream, 1	No. 4 Drain at Midstream, 2
Date, Month	13, Nov.	22, Nov.
Water Flow	Medium	Medium
Water Quantity	Medium	Medium
Measurement Time	13:00	12:35
Water Temperature(°C)	20.6	22.9
рН .	7.25	7.93
Dissolved Oxygen(mg/l)	3.35	3.14
Turbidity(NTU)	13	294
Conductivity(dS/m, 25 °C)	4.99	0.626
Total Dissolved Solids(mg/l)	3,200	280
Sodium(meq/I)	39,3	5.2
Calcium(meq/l)	6.9	3.3
Magnesium(meq/l)	20.0	1.3
Sodium Adsorption Ratio	10.7	1.6

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Location	El Komsan at Midstream
Date, Month	22, Nov.
Water Flow	Medium
Water Quantity	Little
Measurement Time	10:15
Water Temperature(°C)	21.4
рН	8.65
Dissolved Oxygen(mg/l)	7.22
Turbidity(NTU)	33
Conductivity(dS/m, 25 °C)	0.439
Total Dissolved Solids(mg/l)	400
Sodium(meq/l)	2.4
Calcium(meq/l)	3.1
Magnesium(meq/l)	1.5
Sodium Adsorption Ratio	3.4

- Note: 1. The measurement was done by JICA Study Team in 1998, and determined on the each point.
 - 2. Water flow level decided by technical expert, stop, slow, medium, and fast, respectively. And also, water quantity were little, medium, and much.
 - 3. Total dissolved solids(TDS)was calculated from conductivity by using 640 times, referred to Reuse Monitoring Programme Report 39 by Drainage Research Institute, 1995.
 - 4. Guidelines of water quality for irrigation are shown as follows by FAO Irrigation and Drainage Paper 29, 1985.
 - pH: Normal range 6.5-8.4

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- Conductivity(dS/m): None 0.7 >, Slight to Moderate 0.7-3.0, Severe 3.0 <
- Total Dissolved Solids(mg/l): None 450 >, Slight to Moderate 450-2000, Severe 2000<
- Influence of infiltration was evaluated by SAR and ECw:

SAR	None	Slight to Moderate	Severe
0-3 and ECw =	0.7 <	0.7-0.2	0.2 >
3-6	1.2 <	1.2-0.3	0.3 >
6-12	1.9 <	1.9-0.5	0.5 >
12-20	2.9 <	2.9-1.3	1.3 >
20-40	5.0 <	5.0-2.9	2.9 >

- Specific Ion Toxicity(Na): None 3 SAR >, Slight to Moderate 3-9 SAR, Severe 9 < SAR

	Table N.C.S			conomy su	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Result of Falin Econolity Survey (2) On Waile Cumity	לזיו			
<ouestion 1=""></ouestion>										(Unit: %)
Option	Foda	No.6 R		Shorata	Hazek	Sharkawya	Sharkie	No 7 L	Zawbaa	Total
Drinking water	0	5	0	27	0	27	13	0	OT	6
Domestic water	0			27	0	33	4	8	8	33
Livestock and poulry	100			100	100	80	100	100	100	5
Others	0	0		27	0	47	13	0	0	11
(Cirection 2)										(Tinit. %)
Oution	Foda	NOGR		Shorata	Hazek	Sharkawya		No.7 Y	Zawbaa	Total
No.	27	0		C	c	C		13	C	5
Domestic waste water	ìc	S3		73	87			12	8	40
Sevare water	0	4		100	100	67		73	8	22
Livestock and poulry	3	100	10	93	100	73	67	80	80	85
Others	0	0		0	0	13		0	0	3
Consection 3>										(11nit. %)
Ontion	Foda	No.6 R	Nour	Shorafa	Hazek	Sharkawva	Sharkie	No.7 L	Zawbaa	Total
No	27	7		0	0	7	6	7	0	6
Discase	73	93	100	100	100	87	33	8	100	22
Not suitable for domestic use	47	67		0	47	27	0	8	30	41
Others	0	0		0	0	13	0	0	0	2
<ouestion 4=""></ouestion>										(Unit: %)
Option	Foda	No.6 R		Shorafa	Hazek	Sharkawya	Sharkie	No.7 L	Zawbaa	Total
No	13	0		0	0	0	0	0	0	5
Drain development and treatment facilitites	27			100	91 01	80	g	<u>9</u> 3	10 10	25
Canal protection against livestock Others	5 5 0	ц С	010 0	010	5 0	93 7	4 &	8 r	ဂ္ဂီ၀	19 19
										F.

Table K.2.3 Result of Farm Economy Survey(2) on Water Quality

Note 1: Survey was done by JICA Study Team in 1998. Note 2: Ouestion is following: Ouestion 1: Do you use canal water apart from irrigation ? Question 2: Do you notice any water pollution on canal water at present ? Question 3: Do you have any problem caused by water pollution ? Question 4: Do you need to improve water quality in canal ?

cunui (250 ppm TDS, 100ppm t 120.6 MCM 120.6 MCM	Bahr Tera cunul (250 ppm TDS, 100ppm NaCl, average in annuel) 120.6 MCM 120.6 MCM	<u>, 1</u>	105.0 MCM		73.6 MCM	68.3 MCM 97.1 MCM
15.6 MCM (11.8 Kg TDS/day/fau) (4.7 Kg NaCl/day/fau)	10.1 MCM (7.6 Kg TDS/day/fod) (3.0 Kg NaCUday/fod)	<pre>b1.4 MCM (11.1 Kg TDS/dny/fod) (4.4 Kg NaCl/day/fod)</pre>	20.2 MCM (7.1 Kg TDS/d#y/fod) (2.8 Kg NaCl/dhy/fod)	38.4 MCM (11.6 Kg TOS/44/fed) (4.6 Kg NaCl/day/fed)	26.3 MCM (7.9 Kg TDS/day/fed) (3.1 Kg NaCl/day/fed)	
Prevent Condition	Planned	Present Condition	Pinned	Present Condition	Planted	Hamoul MPS
Area O 11.000	Area O 11.000	Area 23,500	Area 23,500	Area O 27,500	Area O 27,500	
Population O 37,700	Population O 37.700	Popu. 0100,000	Popu 0 100,000	Popu. O 76,300	Popu. O 76,300	
Paddy Arua O 6,300	Puddy Area O 2240	Upland, O 11,950	Paddy. O 5,360	Paddy. O 11,610	Padily. Octo	
Upland Area O+.100	upland Area O 7,560	Upland, O 8,660	Upland. O 15,250	Upland. O 14,180	Upland. O 20,890	
B.4. Kg TDS/day/fed 4.1 kg NeCNeytiad	S.4 Kg TDS/day/fod	• 124 Kg TDS • 54 Kg NG	• 5.4 Kg TDS	• 44.6Kg TDS	• 30.5 Kg TDS	
Amount of Fartilizar	Amount of Fartilizar	Amount of Fertilizer	Amount of Fortilizer	Amount of Ferrilizer	Amount of Fertilitzer	
Paddy N: • 75	Paddy N: • M	Paddy N: • 143	Paddy N: • 64	Paddy N: • 130	Puddy N: • M	
P2OS: • 25	P205: • 11	P205: • •7	P2O5: • 21	P205: • 46	P205: • 19	
Upland N: • 54	Upland N: • 99	Upland N: • 116	Upland N: • 204	Uplund N: • 150	Upland N: • 279	
P2OS: • 22	P205: • 40	P205: • 46	P2O5: • A1	P205: • 76	P205: • 111	
Buttain 🔸 10.000	Buffalo • 10000	Bultata • 26,000	Buffain 6 26,000	Burtalo 🖝 21,000	Burffulo • 21,000	
Total Loss	Total Loss	Total Lass	Total Loss	Total Laws	Total Lives	
(drain, cvaporation ctc.)	(drain, evaporation etc.)	(drain, evoporation etc.)	(drain, evaporation etc.)	(drain, evuporation ide.)	(drain, evenoration etc.)	

Figure K.3.1 Flow Diagram of Water Quality Environment on Puddiing Period in Summer, June

Note 1: A size of circle shows strength of a load to water quality carvironment. 2: Unit of area and fortilizer are folden, ton, respectively.

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369.0	369.0 MCM 369.0 MCM		322.0 MCM 335.0 MCM		236.0 MCM	277.8 MCM 341.5 MCM
47.0 MCM (8.6 Kg TDS/day/fod)	24.0 MCM (6.2 Kg TDS/Uny/fed)	85.8 MCM (7.4 Kg TDS/diay/fod)	62.6 MCM (5.4 Kg TDS/day/fed)	104.2 MCM (7.7 Kg TDSKinyfed)	76.8 MCM (5.6 Kg TDS/day/fed) (22 V-1 Nurritory)	*
(3.4 Kg NaCl/day/fed) Present Condition	(2.5 Kg NaCl/day/fod)	1(2.9 Kg NaCl/day/ted) Present Condition	(Z.1 Kg NaCUday/red)	Present Condition	ייבר אנ ואבטעשאווכט א	L Hamoul MPS
Artia O 11,240		lä	d	\mathbb{K}	Arei O 27,500	
Population © 37,700 Paddy Arna 🔿 6,300	Population O 37,700 Paddy Area O 2,840	Popu. (100,000 Puudy. () 11,950	Popu. (100,000 Paddy. O 5,360	Paper. () /0,500	Popu. ().500	
Upland Area O 4,100	upland Area O 7,560	Upland. O 8,660	Upiand. O 15,250	Upland. 0 14,180	Upland. C 20,890	
, ,					>	
• 7.9 Kg TDS/day/fod	 5.7 Kg TDS/day/fed 	• 10.6 Kg TDS	S⊄T 7.7 €	🗬 37.8Kg TDS	• 27.9 Kg TDS	
אינג אינגועשיולמי	• 3.1 Kg NaCiviay/fed	09 ± 3X C+ ●	• 1'1 KE MCC	22.1Kg NaC	• 16.3 Kg NaCl	
	~~~~~~					
Amount of Fartilizer	Amount of Fertilizer	Amount of Fertilizer	Amount of Feruilizer	Amount of Fertilizer	Amount of Fertilizer	
Paddy N: • 302	Paddy N: • 136	Paddy N: • 573	Paddy N: • 257	P#ddy N: • 557	Puddy N: • 205	
P205: • 100	P205: • 45 Holand N: • 403	P205: • 101 Unland N: • 464	Votand N:	Voland N: • 760	Upland N: 011,1	
7205: • ₩	×202: ● 1,62	P2O5: • IN7	P205: • 329	7205: • 306	1205: 450	
មិមជើងថៃ 🖝 រជ.ឈ	Buffaio e rocco	Buffaio 🔴 26,000	Buffaio 🔴 26,000	Buifaio 🗣 21,000	Buffaio 🔴 21,000	
Total Loss (Jesin, eveporation etc.)	Total Lous (drain, evaporation etc.)	Total Loss (drain, eveporation etc.) 38 1 MCM	Total Loss (drain, evaporation ctc.) 2:1 MCM	Tatel Lous (drain, curporation etc.) 46.3 MCM	Total Lass (drain, ovaporation etc.) 26.2 MCM	



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<ul> <li>80.8 MCM</li> <li>80.4 Kg TDS/day/fed)</li> <li>(1.3 Kg NaCl/day/fed)</li> <li>(1.3 Kg NaCl/day/fed)</li> <li>(1.3 Kg NaCl/day/fed)</li> <li>Present Contition</li> <li>Present Contition</li> <li>Present Contition</li> <li>Present Continion</li> <li>Presen</li></ul>	Behr	Tere cuttal (250 ppm TDS, 1( 340.4 340.4	Bahr Tere canal (250 ppm TDS, 100ppm NeCl, average in annual) 240.4 MCM 340.4 MCM		310.0 MCM	I I	249.5 MCM 263.3 MCM	310.0 MCM 335.9 MCM
Present Condition Area O 27,500 Popu O 76,300 Wheat. O 8,510 Upland. O 17,280 Upland. O 17,280 Popu. O 17,280 Upland. N: • 638 P205: • 127 Upland N: • 743 P205: • 13 P205: • 13		30,4 MCM (3.2 Kg TDS/day/fed) (1.2 Kg NaCl/day/fed)	26.0 MCM (2.7 Kg TDS/day/fed) (1.0 Kg NeCl/day/fed)	60.5 MCM (3.0 Kg TDS/day/fed) (1.2 Kg NaCl/day/fed)	51.1 MCM (2.5 Kg TDS/duy/fed) (0.9 Kg NaCl/day/fed)	80.8 MCM (3.4 Kg TDS/day/fed) (1.3 Kg NeCl/day/fed)	88.7 MCM (2.9 Kg TDS/day/fed) (1.1 Kg NaCl/day/fed)	
Cope. O 76,300 Wheal. O 8,510 Upland. O 17,280 • 5.14d TDS • 5.14d TDS • 5.14d TDS • 5.14d TDS • 5.14d TDS • 2.0 Xg NuCl P2005; • 127 Upland N: • 743 P2005; • 127 Upland N: • 743 P2005; • 127 Total Loss (drain, evuporation etc.) 35.8 MCM	.:	Present Condition	Planned Artin O	a C	ž I C	ð E		Kamoul MPS
Upland. O 17,280 • 5.1Kg TDS • 5.1Kg TDS • 5.1Kg TDS • 2.0 Kg NeCl TOS • 20 Kg NeCl • 743 P205: • 127 • 743 P205: • 123 P205: • 123 P205: • 123 • 743 P205: • 123 • 743 • 744 • 743 • 744 • 743 • 744 • 743 • 744 • 743 • 744 • 744		Population 0 37,700 Wheat Area 0 3,890	Population C 37,700 Wheat Area C 000,00	O O	Popu. 0 8,240	)ဂ် ဝိ	Popu (76,300 Wheat 0 3,510	
Colored Karlow Colored Karliner Amount of Fertilizer Amount of Fertilizer Amount of Fertilizer P205: • 127 P205: • 1		Upland Area O 6.520	upland Area O 6,520	Upland. O 12,360	Upland. O 12,360		Upland. O 17,230	
• 5.1Kg TOS • 5.1Kg TOS • 2.0 Kg NeCl • 2.0 Kg NeCl Meaul N: • 638 P205: • 127 Upland N: • 743 P205: • 127 P205: • 127 P205: • 127 R20: • 127 R				,				
<ul> <li>2.0 Ke Net</li> <li>2.0 Ke Net</li> <li>Amount of Fertilizer</li> <li>Amount of Fertilizer</li> <li>Wheat N: 658</li> <li>743</li> <li>P205: 0 127</li> <li>P205: 0 414</li> <li>R205: 0 414</li> <li>R205: 0 414</li> <li>R205: 0 414</li> <li>R205: 0 414</li> <li>R205</li> <l< th=""><th></th><th>a to skiewie</th><th>• 2.8 Kg TDSHayford</th><th>• ** Ka TOS</th><th>• 4.1 Kg TDS</th><th>SCT 2, LOS</th><th>● 4.3 Kg TDS</th><th></th></l<></ul>		a to skiewie	• 2.8 Kg TDSHayford	• ** Ka TOS	• 4.1 Kg TDS	SCT 2, LOS	● 4.3 Kg TDS	
Amount of Fentilizer Amount of Fentilizer Wheat N: 638 P205: • 127 Upland N: • 743 P205: • 173 R20:		<ul> <li>Lin Ke Neclyspytod</li> </ul>	• 1.1 Kg heClésyffed	● 1.9 Kg NuCl	DIA KE NED	- 20 XE NeC	• 1.7 Kg NuCi	
Amount of Fertilizer Amount of Fertilizer P205: • 127 Upland, N: • 743 P205: • 414 K20: • 173 Buffalo • 21,000		<	ç	<b></b>	<b>X</b>	¢		
Wheat N: 638 P205: 0127 Upland N: 743 P205: 0414 K20: 0173 Buffalo 21,000 Total Loss (drain, evaporation etc.) 35.8 MCM		Amount of Fertilizer	Amouat of Fertilizer	Amount of Fertilizer	Arnount of Fertilizer	Amount of Fertilizer	Amount of Fertilizer	
280     Upland N: • 280     Upland N: • 280     Upland N: • 280     T43       5: • 14s     P205: • 15s     P205: • 15s     P205: • 15s     P205: • 15s       74:0     P205: • 15s     P205: • 15s     P205: • 15s     P205: • 15s       74:0     P205: • 15s     P205: • 15s     P205: • 15s     P205: • 15s       74:0     P205: • 15s     P205: • 15s     P205: • 15s       74:0     P205: • 15s     P205: • 15s     P205: • 15s       700     Buffalo     1 const     Total Loss       701     Loss     Total Loss     Total Loss       75:000     Buffalo     26,000     Buffalo     21,000       88 MCM     26,9 MCM     17.4 MCM     35.8 MCM		Wheat N: ● 291 P205: ● ∞	Wheat N: • 291	Wheat N: • 618 P205: • 123	Wheat N: • 618 P205: • 123	Wheat N: 638	Wheat N: • 638	
P205: • 414 K20: • 175 Buffalo • 21,000 Total Loss (drain, evaporation etc.) 35.8 MCM		Upland N: • 280	Upland N: 🌩 280	Upland N: • 531	Upland N: • 531	Upland N: • 743	Uplund N: 🌒 743	
0 Buffalo • 21,000 Total Loss (drain, evaporation etc.) 35.8 MCM		7205: • 156 X20: • 45	P205: • 136 K20: • 45	7205: 🖝 296 K20: 🖝 133	P205: ● 296 X20: ● 123	P205: 🔴 414 K20: 🖷 173	P205: • 414 K20: • 173	
(drain, evaporation etc.) 35.8 MCM		Buffalo 🖷 10,000	Buffalo 🔶 10.000	Buffaio 💽 26,000			Buffalo <b>O</b> 21,000	
	Note 1: A	Total Loss (drain, evaporation atc.) 13.5 MCM aize of circle shows strength (	Total Loss (drain, evoporation etc.) 8.8 MCM of a losd to water quality environment.	Total Loss (drain, evaporation etc.) 25.9 MCM 2: Unit of area and fertilizer are	Total Loss (drain, avaporation etc.) 17.4 MCM feddan fon resortively	Total Loss (drain, evaporation etc.) 35.8 MCM	Total Loss (drain, evaporation etc.) 23.4 MCM	

Figure K.3.3 Flow Diagram of Water Quality Environment on Winter Crop Period in Winter, November to May

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r	Table K. 3.4 The Parameters for Analysis of Water Environment	Analysis of Water I	Environment					
l	Parameter		Pudding Period June(30days) Ju	F/S Present Summer Crop Period July to October(123days)	Winter Crop Period November to May(212days)	Pudding Period June(30days) J	F/S Planned I Summer Crop Period July to October(123days) No	Winter Crop Period November to May(212days)
	1. Water Quality of Bahr Tera $(mg/2)$	TDS	250 100	250 100	250 100			
2	<ol> <li>Water Quality of Irrigation Water Upstream (TDS) (Nater Cuality of Lag / 2) Midstream (TDS) (Nater Cuality (Nater Cuality)</li> <li>Midstream (TDS) (Nater Cuality)</li> </ol>	r Upstream (TDS) (NaCl) Midstream (TDS) (NaCl) Downstream (TDS) (NaCl)	1))))) 1280 1280 11))) 1280 11)) 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 1280 128	230 230 360 145 720 720	260 1200 1300 1300 1300 1300 1300 1300 130			
ň	3. Area(fed)	Upstream Midstream Downstream	11,000 23,500 27,500					
4	4. Population	Upstream Midstream Downstream	37,700 100,000 76,300					
ັດ	5. Population Density( /fed)	Upstream Midstream Downstream	1,010 660					
Q	6. Paddy Area(fed)	Upstream Midstream Downstream	6,300 11,950 11,610	6,300 11,950 11,610		2,840 5,360 4,900	8,840 4,5,840 900 900	
2	7. Wheat Crop Area(fed)	Upstream Midstream Downstream			3,890 8,240 8,510			3, 890 8, 510 8, 510
ŝ	8. General Upland Crop Area (fed)	Upstream Midstream Downstream	4,100 8,660 14,180	4,100 8,660 14,180	6,520 12,360 17,280	7,560 15,250 20,890	7,560 15,250 20,890	6,520 12,360 17,280

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9. Amo for F 10. Amo for F	Parameter		Pudding Period June(30days)	F S Present Summer Crop Period July to October(123days)	Winter November	Winter Crop Period November to May(212days)	Crop Period Pudding Period ( to May(212days) Juac(30days) July
	Amount of Fertilizer for Rice(N ton)	Upstream Midstream Downstream	75 143 139	302 573 557			33 58 58
	Amount of Fertilizer for Rice(P 2 O 5 ton)	Upstream Midstream Downstream	25 47	100 181 185			1251
11. Amo for V	Amount of Fertilizer for Wheat(N ton)	Upstream Midstream Downstream			291 618 638	<b>∺</b> 90.00	
12.	Amount of Fertilizer for Wheat(P 2 O 5 ton )	Upstream Midstream Downstream	•		58 123 127		
K-39	Amount of Fertilizer for General Upland Crop(N ton)	Upstream Midstream Downstream	54 116 190	219 464 760	280 531 743		99 204 39
14.	Amount of Fertilizer for General Upland Crop (P 2 O 5 ton )	Upstream Midstream Downstream	76 22 76	88 187 306	156 296 414		40 81 111
15. Amo Gene	Amount of Fertilizer for General Upland Crop (K 2 O ton)	Upstream Midstream Downstream			65 123 173		
16. Nur	16. Number of Buffalo	.Upstream Midstream Downstream	10,000 26,000 21,000	10,000 26,000 21,000	10,000 26,000 21,000		10,000 26,000 21,000
17. Wate Bahr	Water Requirement from Bahr Tera Canal (,000 m')	Upstream Midstream Downstream	15,683 31,455 38,477	47,016 85,892 104,230	30,492 60,575 80,810		10,113 20,250 26,366
18. Tota	18. Total Loss from the Area ( ,000 町)	Upstream Midstream Downstream	6,967 13,974 17,093	20,887 38,158 46,304	13, 546 26, 909 35, 901		3, 450 8, 900 995 995

	Categories of Environmental Impact	Definition
(1)	ial Environment Socio-economic issues 1 Social issues	1
1.	Planned residential settlement	New land settlement implemented in agriculture & rural development projects such as land clearing & leveling sea/swamp reclamation and irrigation development; settlement expected for nomad, landless farmers or shifting cultivators.
2.	Involuntary resettlement	Forced resettlement of the inhabitants from their original dwelling places in the area that will be submerged with the development of the project.
3.	Substantial changes in the way of life	Changes in the way of life of the people in particular in the role of women in family & society brought about by agricultural and rural development.
4.	Conflict among communities and people	Friction due to conflicting interests between beneficiaries and non-beneficiaries, people in favor of and those against development, new settlers and host people, insiders and outsiders, people in a project area and those affected in the surrounding area.
5.	Impact on native people	Adverse effects of development on local communities composed partly or entirely of indigenous people (including tribal groups), low-caste groups, ethnic minorities, or nomads.
(1)-	2 Demographic issues	
6.	Population increase	Significant population increase in a project or surrounding area due to development.
1.	Drastic change in population composition	Drastic change in population composition in a project or surrounding area due to development.
(1)-	3 Economic activities	
8.	Changes in bases of economic activities	Forced or involuntary relocation of economic bases or means such as farmland, fishing grounds, etc., under a project due to land acquisition, changes in land use regulation, and deterioration or depletion of bases or means for economic activities.
9.	Occupational chaoge and loss of job opportunities	Forced or involuntary occupational change due to land acquisition and loss or deterioration of means or bases of economic activities; it includes loss of job opportunities due to farm mechanization.
10.	Increase in income disparities	Increase in income disparities among groups brought about by the development; it implies relative impoverishment of the economically weak.
(1)-	4 Institutional and custor	n related issues
11.	Adjustment & regulation of water or fishing (riparian) rights	Adverse development effects on water or fishing (ripagian) rights and necessary adjustments or regulations.
12.	Changes in social and ` institutional structures	Changes in social and institutional structures as a result of establishment of new or modified rural organizations caused by development.
13.	Changes in existing institutions and customs	Changes in existing institutions and customs involved in or induced by development activities.

# Table K.4.1 Definition of Environmental Impact Categories

	Categories of Environmental Impact	Definition
(2)	Ilealth and sanitary issu	¢5
14.	Increased use of agrochemicals	Increased use of chemical pesticides due to intensification of agriculture; introduction of high-yielding species & new crops and irrigation.
15.	Outbreak of endemic diseases	Spreading of endemic diseases as a result of the adverse effects of development
16.	Spreading of endemic diseases	Spreading of endemic diseases attributable to the adverse effects of developmen
17.	Residual toxicity of agrochemicals	Accumulation in the natural environment (soil, water, etc.) of agrochemicals o chemical substances with high residual toxicity such as organo-chloric insecticides, etc.
18.	Increase in domestic and other human wastes	Increase in domestic and other human wastes due to the consequences of development such as population increase.
(3)	Cultural asset issues	· ·
19.	Impairment of bistoric remains and cultural assets	Direct or indirect impairment or destruction of sites, structures, and remains of archaeological, bistorical, religious, cultural, or aesthetic value as result of development.
20.	Damage to aesthetic sites	Direct or indirect negative effects on aesthetic features as a result of development.
21.	Impairment of buried assets	Impairment or destruction of buried assets due to development activities.
	ural Environment Biological and ecological	issues
22.	Changes in vegetation	Direct or indirect deterioration or degradation of vegetation due to development activities including removal of vegetation cover, alternation of land use, encroachment into forest, alteration of environmental conditions, etc.
23.	Negative impact on important or indigenous fauna and flora	Adverse effects on important or indigenous animal & plant species due to destruction of or changes in habitats.
24.	Degradation of ecosystems with biological diversity	Degradation of ecosystems that allows the wild species of plants and animals to withstand external stress.
25.	Proliferation of exotic and/or hazardous species	Introduction of pathogenic agents or spreading of hazardous species due to creation of environment conductive to their propagation.
26.	Destruction of wetlands and peatlands	Extinction of wetlands or peatlands caused directly by development activities such as large-scale earth filling, or indirectly by changes of hydrological regime such as drying and decomposition.
27.	Decrease of tropical rain forests and wildlands	Decrease or disappearance of tropical rain forests due to direct or indirect effect of development.
28.	Destruction or degradation of mangrove forests	Disappearance of mangrove forests attributable to direct destruction or deterioration of supporting environmental conditions.
_		Disappearance of coral reefs due to direct destruction, or damage to and

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Categories of Environmental Impact	Definition
(5) Soil and land resources (5)-1 Soil resources	
30 Soil crosion	Washing or blowing away of soil from the earth surface by the action of water wind.
31. Soil satinization	Phenomena in which soluble salts accumulate in the surface layer of soil and crops growth is consequently affected.
32. Deterioration of soil fertility	Deterioration of soil productivity due to leaching and decomposition of nutried nutrient absorption by plants, surface soil crosion, salinization, failure in soil management, etc.
33. Soil contamination by agrochemicals and others	Accumulation of agrochemicals in soil with high residual toxicity.
(5).2 Land resources	
34. Devastation or desertification of land	Deterioration of land productivity or desertification caused by artificial or natu impacts.
35. Devastation of binterland	Devastation of area surrounding a project area as a result of secondary or indir- impacts of development.
36. Ground subsidence	Subsidence of ground caused by the dehydration or drying of wetlands, peat swamp, or reclaimed lands, or excessive exploitation of groundwater.
<ul><li>(6) Hydrology, water quality</li><li>(6)-1 Hydrology</li></ul>	and air
37. Change in surface water hydrology	Alteration of river discharge or water level as the effects of reservoir construction, irrigation water intake, or drainage.
38. Change in ground water hydrology	Changes in the groundwater recharge mechanism or groundwater table caused by infiltration of irrigation water and exploitation of groundwater.
39. Inundation and flooding	Overflowing of a river onto the surrounding land or the surrounding of sea wa onto the coastal land. Inundation or flooding are caused by increased river o run-off discharge or poor water management.
40. Sedimentation	Settlement of transported sediment in river, estuaries and reservoir.
41. Riverbed degradation	Degradation of riverbed in lower basin areas due to insufficient sediment load maintain riverbed level.
42. Impediment of inland navigation	Adverse impacts on navigation due to development activities.
(6)-2 Water quality and tem	perature
43. Water contamination and deterioration of water quality	Deterioration of water quality due to development activities.
44. Water eutrophication	Accumulation in water of nutritive soluble salts such as nitrate and phosphate
45. Sea water intrusion	Intrusion of salt water wedge along the riverbed.
46. Change in temperature of water	Adverse impact of low temperate irrigation water on crops.
(6)-3 Atmosphere	
47. Air pollution	Diffusion of agrochemicals, sand dust, steach and exhaust gas from vehicles a machines.

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## Table K.4.2 Checklist for Proving Environmental Impact

Applicable columns with the following impact degree are marked with "X".

SEI: Significant Environmental Impact

- A: The subject SEI is unquestionably induced by the Project.
- B: The subject SEI is likely to be induced by the Project.
- C: There is no possibility that the subject SEI is likely to be induced by the Project.
- D: The SEI is not fully known.

	<b></b>	······
Categories of	Evaluation	
Environmental Impact	ABCD	Evaluation Basis

Social Environment

(1) Socio-economic issues

(1)-1 Social issues

1. Planned residential settlement			X		Nil
2. Involuntary resettlement			X		Nil
3. Substantial changes in the way of life	Τ			X	
4. Conflict among communities and people		X			Possibility of friction by repair
5. Impact on native people			X		Nil

#### (1)-2 Demographic issues

6. Population increase		X	Nil
7. Drastic change in population composition		X	Nil

#### (1)-3 Economic activities

(I) b Beentonnie autoritete	 	-		
8. Changes in bases of economic activities		X		Nil
9. Occupational change and loss of job		X		Nil
opportunities				· · · · · · · · · · · · · · · · · · ·
10. Increase in income disparities			X	

#### (1)-4 Institutional and custom related issues

11. Adjustment & regulation of water or fishing (riparian) rights	x	There is possibility of coordination according to repair
12. Changes in social and institutional structures	x	Ditto
13. Changes in existing institutions and customs	x	Ditto

#### (2) Health and sanitary issues

14. Increased use of agrochemicals			X	may increase by changing of cropping system
15. Outbreak of endemic diseases			X	
16. Spreading of endemic diseases			X	
17. Residual toxicity of agrochemicals		i.	X	
18. Increase in domestic and other			X	
human wastes	 I	ŀ	÷	

Categories of	Evaluation	
Environmental Impact	ABCD	Evaluation Basis

## (3) Cultural asset issues

19. Impairment of historic remains and cultural assets		x		Nil
20. Damage to aesthetic sites		x	_	Nil
21. Impairment of buried assets		X		Nil

#### Natural Environment

(1) Biological and ecological issues			
22. Changes in vegetation	X	Nil	
23. Negative impact on important or indigenous fauna and flora	X	Nil	
24. Degradation of ecosystems with biological diversity	x	Nil	-
25. Proliferation of exotic and/or hazardous species	x	Nil	
26. Destruction of wetlands and peat lands	x	Nil	
27. Decrease of tropical rain forests and wild lands	x	Nil	
28. Destruction or degradation of mangrove forests	x	Nil	
29. Degradation of coral reefs	X	Nil	

# (5) Soil and land resources

30. Soil erosion			Х	
31. Soil satinization	X	_		Dry climate and re-use of drainage water
32. Deterioration of soil fertility			Х	
33. Soil contamination by agrochemicals and others	X			Pollution of irrigation water quality

# (5)-2 Land resources 34. Devastation or desertification of land X 35. Devastation of hinterland X 36. Ground subsidence X

## (6) Hydrology, water quality and air

i

(6)-1 Hydrology	 					
37. Change in surface water hydrology		x				
38. Change in ground water hydrology		X				
39. Inundation and flooding	X		Nil		· · · · ·	
40. Sedimentation	X		Nil	-		· · · ·
41. Riverbed degradation	X		Nil			
42. Impediment of inland navigation	 X		Nil		<u> </u>	

Categories of	Evaluation	
Environmental Impact	ABCD	Evaluation Basis

# (6)-2 Water quality and temperature

43. Water contamination and	X		Pollution of irrigation water during mixing
deterioration of water quality			with drainage water
44. Water eutrophication		x	
45. Sea water intrusion		x	
46.Change in temperature of water		X	

## (6)-3 Atmosphere

147 Air pollution	
47. Air pollution	
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#### Table K.4.3 Soil, Groundwater Level, and Necessary Amount of Gypsum In the Feasibility Study Area

#### 1. Biyata District

Credit Cooperative	Soit	Groundwater Level	Amount of Gypsum
Hudah	M 1-2 (M 1)	S 2	G 3
Biyala No. 1	M 1-2 (M 1)	S 1	G 0-3 (G 3)
Biyala No. 4	M 1-4 (M 1/2)	) S 1-2 (S-1)	G 0-3 (G 3)
Abshan	M 1-2 (M 1)	S 2	G 2-3 (G 3)
Shorafa	M 1-2 (M 2)	S 1	G 0-4 (G 3)
Al Navy	M 1-2 (M 1)	S 1	G 0-3 (G 0)
Abu Badawi	M 1-2 (M 1)	S 2-3 (S-2)	G 2-3
Hazek	M 1-3 (M 2)	S 1-2 (S-1)	G 0-4 (G 3)
Al Himmah	M 1-2 (M 1)	S 2	G 2·4 (G 3)
El Saaee	<u>M 1-2 (M 2)</u>	<u>S 2-3</u>	<u>G 2</u>

#### 2. Hamoul District

Credit Cooperative	Soil	Groundwaler Level	Amount of Gypsum
East Banawan	M 2-3	S 2	G 3·4 (G 4)
West Banawan	M 1-2	S 2	G 2-4 (G 3/4)
Sanayit	M 1-3 (M 2)	S 2	G 2-4 (G 3)
Salahib	M 1-3 (M 2/3	) S 2	G 1-5 (G 4)
Zawba	M 1-2	S 2	G 2-4 (G 3/4)
Hamoul	M 1-3 (M 2)	S 2	G 2-5 (G 4)
Kafr Ash Sharikh	<u>M 1-3 (M 1)</u>	<u>S2</u>	<u>G 2-4 (G 2/3)</u>

Note 1. ( ) is occupied high percentage area.

2. Symbol is following.

Soil;

M1 Normal saline soil (TDS < 0.2 %) M2 Medium saline soil (0.2 - 0.5 %) M3 High saline soil (0.5 - 1.0 %) M4 Extra high saline soil ( > 1.0 %)

Groundwater Level;

S1 Low water table( > 120 cm)S2 Medium water table( 70 - 120 cm)S3 High water table( < 70 cm)</td>

#### Amount of Gypsum; G0 -- G5 (ton / feddan)

Source: Executive Authority for Land Improvement Project(LELIP)

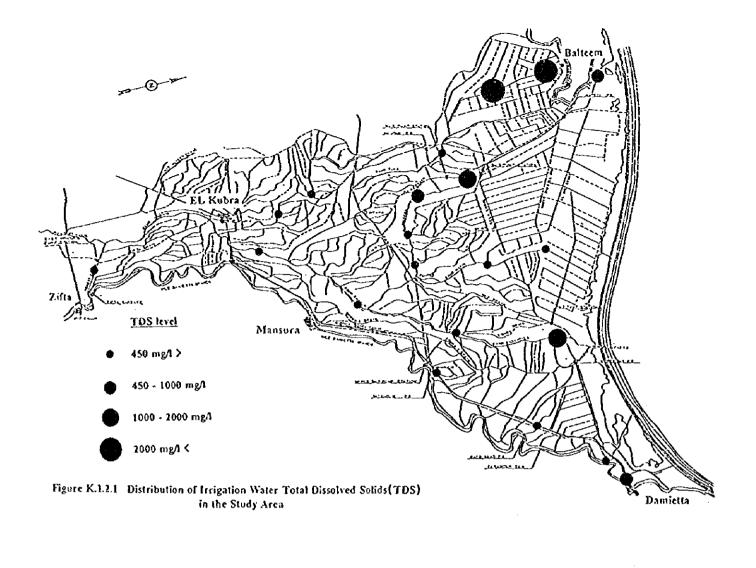
Plan
Improvement
Soil
K.4.4
Table

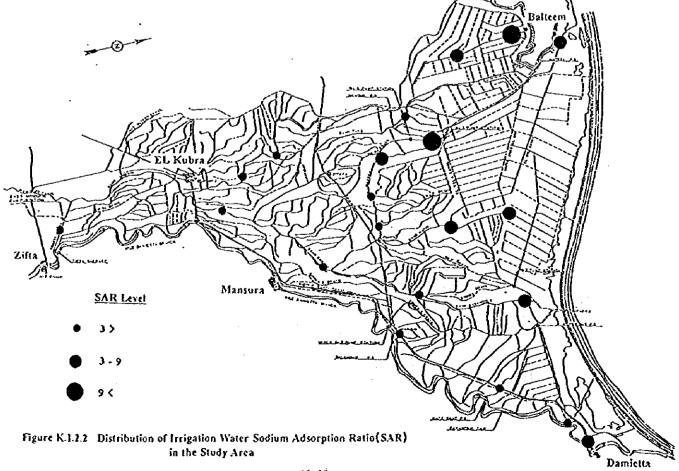
				•		L		
		M/P Area	Area	÷,	¥ 7.	F/S AICA	rca	Ę
Item	Upstream	MidStream	Lowestream	lotat	Upstream	MIGSTEAM	Downstream	TEIOT
Cultivated Area(fed)	167,400	223,900	303,900	695,200	10,500	20,600	25,800	56,900
Land Class 2(ESP 12%)								
Improvement Area Ratio(%) <u>53</u>	%) <u>53</u>	18	8		35		6	
Amount of Gypsum(ton) 301.000	301,000	137,000	83,000	521.000	37,00	sl	6.000	43,000
Land Class 3, 4(ESP 15%)		·						
Improvement Area Ratio(%) 43	%) 43	81	8		<u>85</u>		87	
Amount of Gypsum(ton)	367,000	93,000	1,395,000	1,855,000	103	103.000	115,000	218,000
Improvement Area of Subsoiling(%)	100	100	100		100		100	
Note 1. Exchangeable sodium percentage(ESP) makes 2 % decrease for Land Class 2, and 3 % decrease for Land Class 3, 4	dium percentag	e(ESP) makes	2 % decrease fo	r Land Class 2	and 3 % dec	rease for Land	l Class 3. 4.	

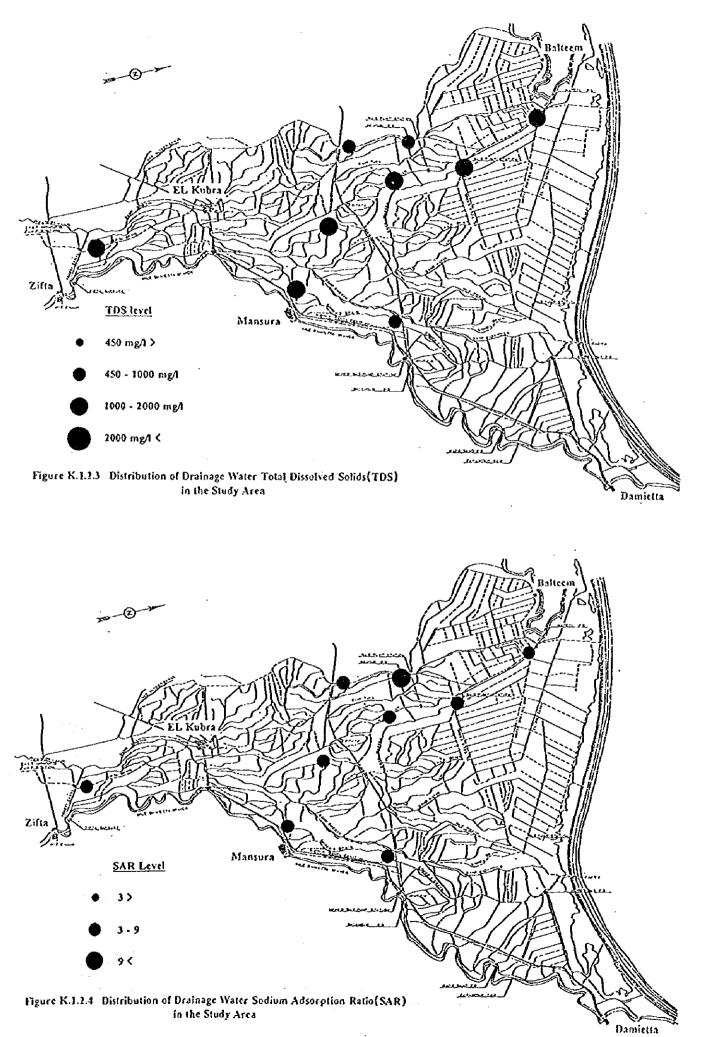
Note 1. Exchangeable sodium percentage (ESP) makes 2 % decrease for Land Class 2, and 3 % decrease for Land Class 3, 4. 2. Improvement makes from soil surface about 30 cm.

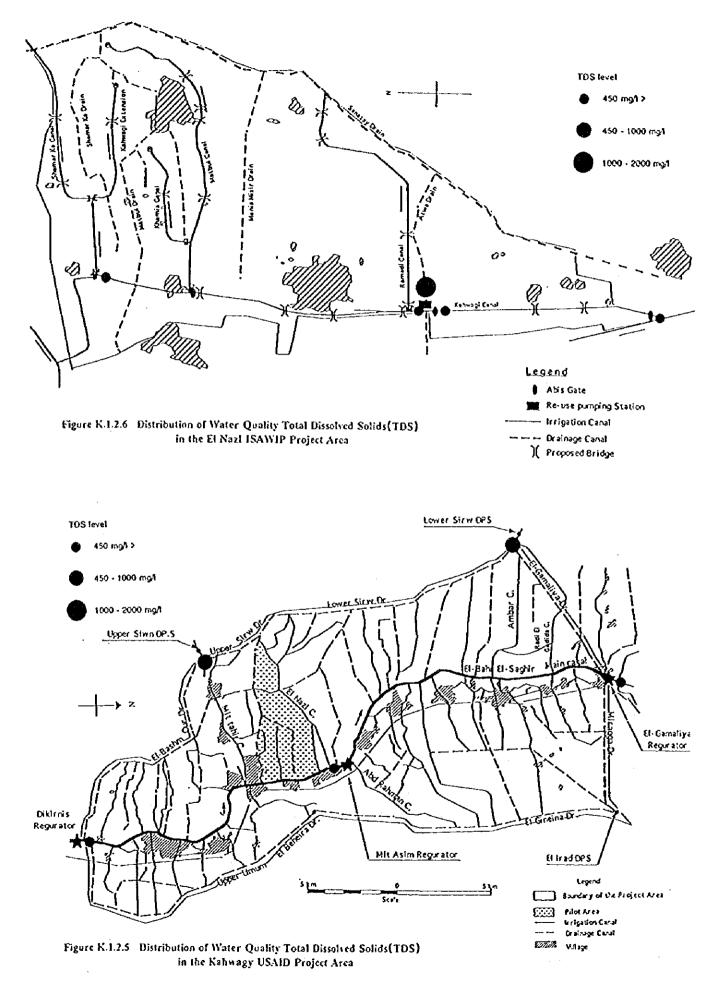
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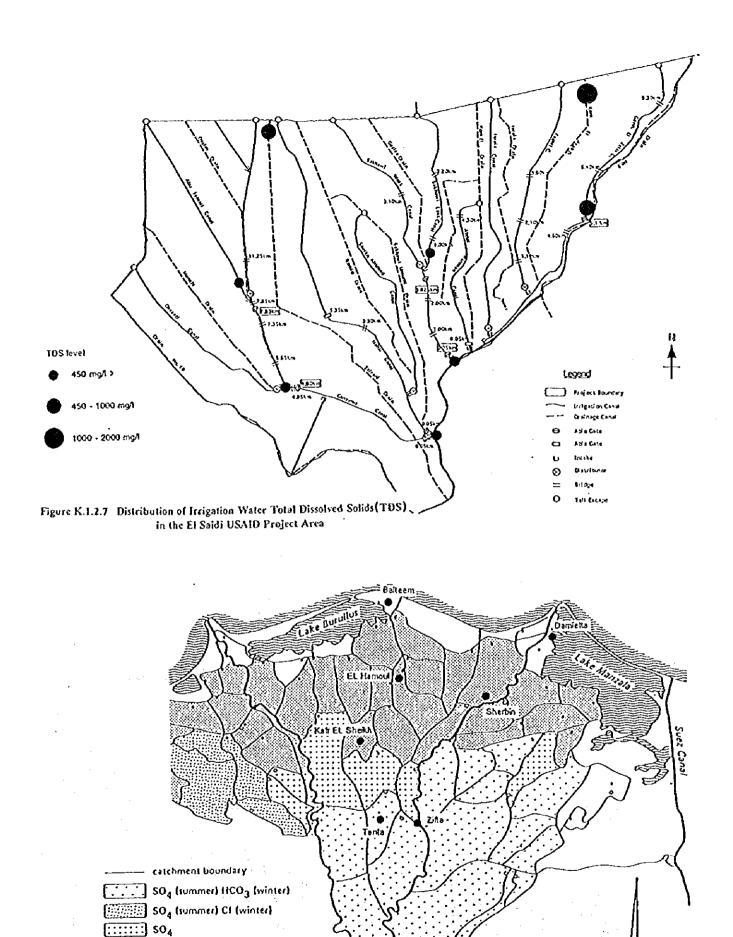
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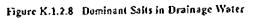












reuse pumping station

drainage pumping station

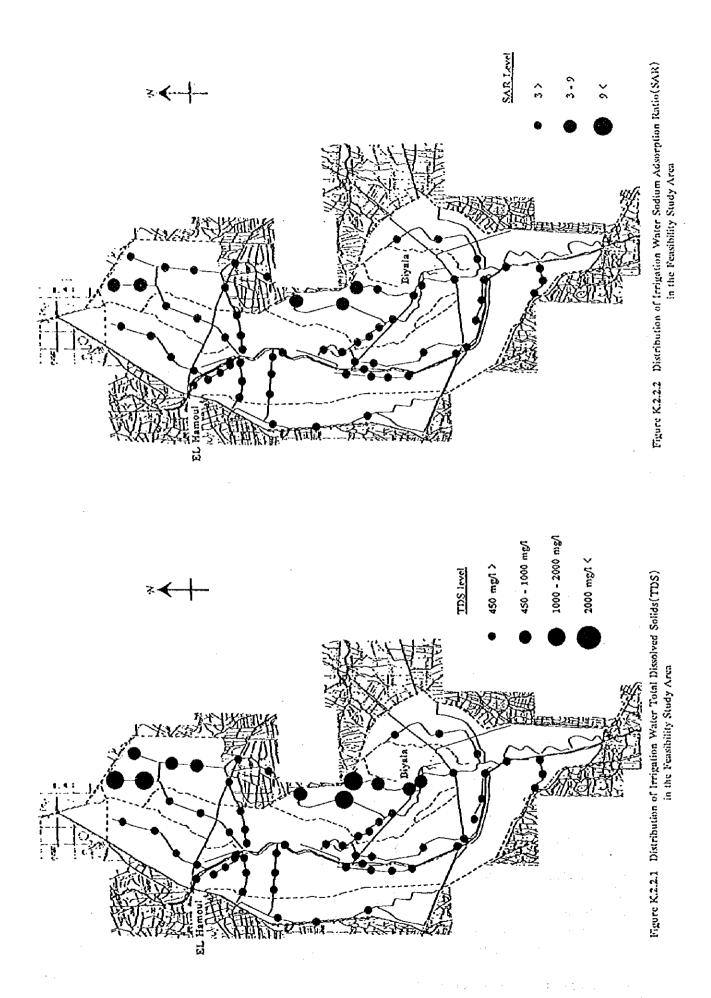
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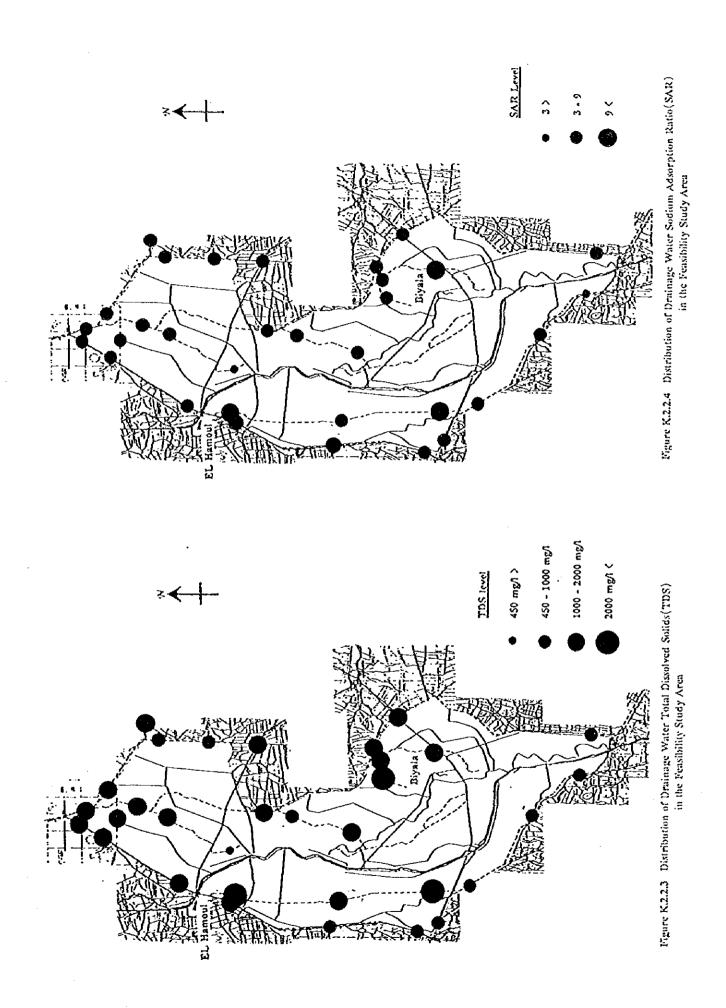
Source: Lend Drainage in Egypt, Cairo Egypt, 1989

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50 km ⊒

Cairo





# APPENDIX L.

# FARM ECONOMY

# Appendix L Farm Economy

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#### **Appendix L Farm Economy**

#### L.1 Farm Economy Survey for the Master Plan

#### L.1.1 Sampling Method of the Survey

The sample farm household economy survey was conducted in the end of April 1998 to 240 sample farmers in the Study area and nearby tow on-going Irrigation Improvement Project (here in after referred to as IIP) areas, namely Kahwagi and Bahr El Saidi both of which are located west side of the Study Area. 18 delivery canals are selected from the Study Area and two (2) delivery canals from IIP areas. For each delivery canal, 12 farm households are selected along the location from upper part to lower part of a delivery canal so as to analyze the effect of farmers' location along the canal. The selection of delivery canals were carried out through a workshop with IAS staff and water district engineers whose jurisdiction include the Study Area, discussing present situation of agricultural and water supply conditions. (Refer to Figure L.1.1)

Considering the different water supply condition from upstream reaches to downstream reaches, the Study area is divided into three (3) regions which are defined as the upstream area (Gharbia governorate), the midstream area (Sherbin and Talkha district in Dakahlia governorate, and Biyala district in Kafr El Sheikh governorate), and the downstream area (Bilqas district in Dakahlia governorate, El Hamoul, and El Bullurus district in Kafr Eł Sheikh governorate, and Damietta govenorate). The downstream area could be separated distinguishably into two regions, as the west area which belongs to around El Hamoul district in kafr El Sheikh governorate and the east area around Damietta governorate. The separation of the downstream area is adopted for the sample farm household economy survey analysis. As for the east downstream area, the sample farmers selected were those who were in relatively better condition of productivity and non-farm job. Therefore the sample farmers in the west downstream area are taken as representative of downstream area for analyzing outline of general farm economy in the Study Area.

The number of the sample farm households are 48 in the upstream area, 72 in the midstream area, 48 in the west downstream area, 48 in the east downstream area and 24 in the on-going Irrigation Improvement Project areas. The characteristics of the sample farmers according to the areas above are described as follows. (Refer to Table L.1.1)

#### L.1.2 Outline of the Result

The family size of the sample farm households is distributed from four (4) to 17

persons. The average family size is 9.6 persons in the upstream area, 7.2 in the midstream area, 7.8 in the west downstream area., 7.3 in the east downstream area and 7.9 in the IIP areas. These contain about equal number of men and women and majority of the labor force in the families are working on their own farms.

Most of the sample farmers are cultivating their own lands and some farmers are renting lands additionally for their farming. Farmers who are leasing their lands are rare. The average farming lands are 2.8 feddan in the upstream area, 3.8 in the midstream area, 4.2 in the downstream area (5.4 in the west downstream area, 3.1 in the east downstream area) and 3.1 in IIP areas. The average farming size of the sample farmers is increasing from upstream to downstream reaches. This tendency is corresponding to the regional statistical data. The farming land per capita is 0.3 feddan in the upstream area as the smallest and 0.7 feddan in the west downstream as the biggest as it's calculated.

Cropping intensity for the sample farm households is almost 200%. However, the general tendency shown in the regional statistical data(referred to Chapter3.3 Agriculture) is higher in the upstream area and contrary lower in the downstream area because there are more fallow lands downstream due to stronger salinity problem. The grown crops are generally rice, cotton, maize, vegetables, wheat, broad bean, berseem, and few of the sample farmers are growing fruits. The cropping intensity of rice are about 40 to 50% in each areas except for IIP areas where rice is planted 66% of the land. The sample farm households are keeping one (1) or two (2) cattle and buffaloes and more than one dozen of poultry such as chicken.

The unit yields of the crops show the tendency of relatively higher rate in the upstream area and the midstream area and lower in the downstream area. (except for the east downstream area ). Also it is observed that the unit yields on the fields positioned at the upper reaches of the delivery canals are higher than the unit yields on the land positioned at the lower part of the delivery canals. This tendency is common in each region from the upstream area to downstream area. For instance, on the delivery canals in the upstream area, the average unit yield of rice is 3,286kg per feddan at the upper-reaches- positioned field and 2,408kg per feddan at the lower-positioned field of the delivery canals. Likewise on the delivery canals in downstream area, the unit yields of rice is higher in the field positioned at the upper reaches of the delivery canals than the field positioned at the lower part of the delivery canals than the field positioned at the lower part of the delivery canals than the field positioned at the lower part of the delivery canals (2,472kg per feddan and 2,027kg per feddan respectively). This indicates that over the socio-economic conditions such as family size, land holdings and so on described above, the effect of conditions on water efficiency and soil condition is evidently related to the productivity. (Refer to Table L.1.2)

L-2

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The farmers themselves consume some agricultural products, such that about 40% of rice are self-consumed on average. Likewise the percentage of self consumption of maize, wheat, bean and berseem are about 32%, 51%, 15% and 56% on average respectively. Especially grains are important for farmers not only for sale but also for their food security.

#### L.2 Farm Economy Survey for the Feasibility Study

#### L.2.1 Sampling Method of the Survey

In the Priority Area, The farm economy survey was conducted in the end of October 1998 to 130 farm households whose irrigation water was served by nine (9) delivery canals according to the location from upstream to downstream reaches of the Priority Area. For the selection of farm households, two (2) factors were considered to grasp the situation of farm households, namely location of the farming land along the canal (condition of water use) and farm size. The procedure of the selection is as follows;

- a) dividing a delivery canal into three (3) areas (upstream, midstream, downstream) equitably according to the canal length.
- b) Based on the three (3) areas, five (5) farm households in each area were picked up from a list of an agricultural cooperative related to the canal.
- c) The five (5) farm households in each area of a delivery canal were selected by the farm size with large-scale farm (more than six (6) feddan, 1 household), middle-scale farm (three (3) to five (5) feddan, two (2) households), and small-scale farm (less than three (3) feddan, two (2) households). The criteria of the separation by scale is based on the result of the Master Plan Study which suggests that the farm size enough to earn a living is at least about three (3) feddan. Actually the selection of farmers were shifted to small-scale farm as a result.
- d) In case there is Meska in each area of a delivery canal, two (2) farm were selected from head side of Meska and so were three (3) from tail of Meska. These farms were, however, satisfied with the condition of above 3). If there is no Meska, the farms directly irrigated were selected.

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(Refer to Figure L.2.1)

#### L.2.2 Outline of the Result

Among the sample farm households the average number of family member is 8.3 and 7.5 for small-scale farm households, 10.0 for middle-scale farm households and 8.4 for large-scale farm households. The number of women is fewer than that of men in a family on average. About 60% of the family members are aged from 15 to 60 years old for each

category of farming size. The large-scale farmers are distributing their labor force to non-farm job more than the other scales. Women's working days are generally shorter than men. (Refer to Table L.2.1)

The average farming size is 3.2 feddan for 130 farm households and according to the category, the average farming size of small, middle and large-scale farm household is 1.8 feddan, 3.8 feddan and 7.2 feddan respectively and the farming land per capita is 0.2 feddan, 0.4 feddan and 0.9 feddan for small, middle and large-scale farm household respectively.

Cropping intensity is 200% and the larger the farming land is, the larger the planting area of most of crops increase except for maize which is considered as less profitable crop. Rice is planted in about 60% of land among sample farmers in summer season and about 20 to 30 % for cotton, three (3) to 10 % for maize and Six (6) to 11 % of the land is used for growing watermelon seeds. In winter season sugar beet is grown in 10% of the land.

On average one (1) or (2) cows, buffaloes and sheep or goats are kept by a farm household. As for poultry, about 14 chicken for egg and 16 chicken for meat are fed by a sample farme household. The large-scale farm households are raising bigger number of livestock and poultry than the middle and small-scale farm households.

Home consumption of rice and wheat is about 30% to 40%. Also about 50 % of maize, and about 20% of bean are self-consumed. The larger the farming size is, the less home consumption ratio is. Berseem is self-consumed with 80 to 90% of the product.

The difference of unit yield between upstream and downstream reaches of delivery canals was observed. Logically the unit yields of the crops would be lower in downstream reaches. The result of the farm economy survey relatively showed this tendency except some samples. (Refer to Table L.2.2)

According to farm income estimate for each category of farming size, the farm income per feddan is the highest in middle-scale farm household with 1,893 LE, followed by large-scale farm with 1,815 LE and small-scale farm with 1,733 LE. (Refer to Table L.2.3)

#### L.2.3 Detailed Farm Economy Survey (Production Cost Survey)

26 farm households out of the 130 samples were selected for the detailed farm economy survey (production cost survey) to estimate production cost by crop. The 26 sample farm households were selected with criteria of average farm size and three (3) samples from

each delivery canal (two (2) were selected from Zobaa canal). The data collected from the sample farm households were evaluated with other research from MALR, preceding IIP project reports, research at universities or institutes and utilized for average input and production cost estimate. (Refer to Appendix E Agriculture, and Appendix N Project Evaluation)

#### L.1 Farm Economy Survey for the Master Plan

ltem	Upstrem		Midstream		Downstream (West)		Downstream (East)		IP Areas	
1) No. of Sample Farm Households	48		72		48		48		24	
2) Family Size (persons)										
Totel	9.6		7.2		7.8		7.3		7.9	
Men	4.6		4.3		4.4		4.1		4.1	
Women	5.0		2.9		3.4		3.2		3.8	
3) Labor Force in a family										
Total	7.1		5.9		5.5		6.7		5.7	
Men	4.2		3.9		3.7		4.1		3.4	
Women	2.9		2.0		1.8		2.6		23	
4) Farming Land(fed.)	2.8		3.8		5.4		3,1		3.1	
5) Farming Land per cepita(fed/capita)	0.3		0.5		0.7		0.4		0.4	
6) Cropping Area(fed) and Intensity(%)	Area	3	Area	<u>*</u>	<u>Are a</u>	2	Area	3	Area	<u>*</u>
Total	5.52	197	7.47	197	10.75	200	6.15	200	6.15	200
Wheat	0.98	35	1.69	- 44	2.07	38	1.09	35	0.85	26
Broad bean	0.27	10	0.64	16	0.51	10	0.78	25	0.80	25
Long Barseem	0.95	34	0.63	16	1.20	22	1.03	34	1.13	36
Short Barseem	0.29	- 11	0.24	5	0.50	10	0.18	6	0.19	6
Sugar Beet	0.16	δ	0.32	1	1.11	2i	0.00	0	0.08	3
Onion	0.04	2	0.00	0	0.00	0	0.00	Q	0.00	0
Winter vegetables	0.03	2	0.15	4	0.00	0	0.00	0	0.00	0
Rice	1.27	45	1.83	48	2.53	47	1.19	39	2.04	66
Cotton	0.85	30	0.97	25	2.23	42	0.99	32	0.63	20
Maize	0.47	16	0.41	10	0.39	7	0.82	26	0.15	4
Summer Vegetables	0.07	2	0.12	3	0.00	0	0.04	2	0.15	4
Water Mellon Seed	0.14	4	0.21	5	0.16	3	0.03	1	0.00	0
Fruits(Citrus)	0.00	0	0.26	7	0.00	0	0.00	0	0.13	5
7) Livestock(No. of Head)										
Cattle	0.9		0.9		1.6		1.7		0.9	
Buffalo	1.9		1.5		1.6		1.6		0.7	
Chicken(meat)	23.0		35.0		10.4		8.3		10.5	
Chicken(egg)	16.4		11.2		12.1		t4.3		¥5.4	
8) % of Home Consumption										
Rice	45		33		34		47		35	
Maizo	40		20		12		-41		45	
Wheat	52		38		49		43		72	
Bean	20		18		6		17		16	
Berseem	72		31		44		58		74	
9) Worker and Working Days(day/year/capita)										
by Status	No.	days	No.	days	No.	<u>days</u>	No.	days	No.	days
Regular Work	100.	2012	1401	vars	110.	0942	112.	nalj	<u></u>	Vake
On Own Farm(male)	2.0	322	2.4	212	2.9	201	2.0	241	1.2	303
On Own Facn(female)	0.9	261	1.2	176	1.8	116	1.0	239	0.7	179
On Other Farm(male)	0.0	0	0.0	0	0.0	Ö	0.2	109	0.0	0
On Other Farm(female)	0.0	ŏ	0.0	ŏ	0.0	ŏ	0.0	0	0.0	ŏ
Non Farm Occupation(male)	0.3	234	0.5	195	0.1	137	0.7	301	0.5	100
Non Farm Occupation(female)	0.1	90	0.1	108	0.0	õ	0.1	61	0.1	50
Temporary Work		~ ~			<b>-</b>	•	₩ ² • ■	-,		~~
On Own Farm(mate)	1.4	159	0.8	108	0.4	43	0.7	72	1.5	105
On Own Farm(female)	1.8	134	0.7	81	0.0	õ	1.4	94	1.3	97
On Other Farm(male)	0.2	33	0.1	21	0.1	ŷ.	1.3	155	0.2	67
On Other Farm(female)	0.1	33	0.0	0	0.0	õ	0.1	43	0.2	58
Non Farm Occupation(male)	0.3	89	0.1	54	0.2	63	0.2	171	0.0	õ
Non Farm Occupation(female)	0.0	0	0.0	0	0.0	0	0.0	0	0.0	ō

Source: Result of Farm Economiy Survey in 1998 by the Study Team

Note: The downstream area is divided into two regions as downstream east and downstream west area. As for the downstream east area,

the farmers who are in relatively better condition of productivity and non-farm job were chosen as samples. Therefore the sample farmers in the downstream west were taken as representative of downstream area for analysing outline of general farm economy in the Study Area

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Table L.1.2 Unit Yields of Crops by Location-Regional Level and Field Position along the Delivry Canals

						55								
Location	Field Position along			3	Winter Crops				ł		Summer Crops	r Crops		
in the Study Area	the Delivery Canal	Bean	Long	<b>trous</b>	Wheat S	Sugar Beet	Onion	Vegetables	Rice	Cotton	Maizo	Vogotables weter Mellon	Watter Mellon	Fruits
			Berseem	Berseem									Service	
Upstream	upstream	2.169	24,958	15,243	2,616	1	14,000	9,000	3,286	967	1,831	1	700	•
	. midstream	1,171	19,355	7,000	1,871	000'61	1	1	2,571	856 856	2,016	5,000	475	1
	downstrem	1,288	23,261	6,695	1,750	17,467	I	I	2,408	006	1,513	5.000	450	ı
Average		1,543	22,525	10,596	2,079	18,233	14,000	9,000	2.755	902	1,759	5,000	510	1
Midstream	upstream	1,294	29,319	7,909	1,839	20,000	1	8,000	2,285	186	2,097	6.000	240	15,000
	midstream	1,336	26,906	6.000	1.793	14,206	ı	6,362	2,202	944	1,633	6,667	250	1
	downstrem	1,188	18,867	24,000	1,786	19,333	1	5,287	2,254	1,013	1,583	6,667	300	8,000
Average		1,286	24,725	13,964	1,806	17,416		6,029	2,247	979	1,804	6,444	263	10,333
Downstream	upstream	1,318	12,825	2,000	1,511	11,286	1	1	2.472	1.030	1.650	1	200	,
(West)	midstream	978	10,443	2,400	1,519	12,448	٩	1	2,023	790	1,937	1	150	ı
	downstrem	620	18.383	5,486	1,139	13.375	1	ı	2,027	798	1,660	ł	301	1
Average		1,042	13,540	4,171	1,406	12,377	1	1	2,174	873	1,776	1	217	1
Downstream	upstream	1,187	34,366	18,000	1,965	1	,	1	2,515	937	2,282	1		1
(East)	midstream	1,180	28,574	20,600	1,873	i	ı	ł	2,168	850	2,167	8,000	ł	1
-	downstrem	1.093	22,607	14,000	1,830	ı	1	1	2.452	862	1,991	4,000	500	I
Average		1,150	28,516	17,533	1,889	ŀ	•		2,712	883	2,161	6,000	500	1
IIP Area	upstream .	1,134	32,200	1	1,562	1	•	ł	2,544	575	006	1	1	3,976
	midstream	1,523	29,291	ı	2,151	ı	ı	ı	2,359	851	2,800	ı	ł	,
	downstrem	1,200	16,790	4,941	1,942	22,000	1	ł	2,381	1,009	1,260	4,167	I	ı
Average		1.316	26.094	4.941	1.885	22.000			2 428	861	1 653	4187	,	3 976

Source: The Result of the Farm Economy Survey in 1998 by the Study Team

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Ame A	(feg)	(jeg)	(ted)	(Jed)	(00)	(ter)	((er))	(fed)	(ted)	(6-4)	(tet)	((ed)	((ed)	() ()
Upstreem	2.6	0.27		0.29	0,96	0.16	8	0.031	42.1	0.85	0.47	0.07	0.14	80
Michigan	3.8	0.04		0.24	1.59	0.32!	0.0	0.15	521	6.0	0.41	0.12	0.21	80
Downstream West	ŦŸ	0.51		090	2,07	1.02.1	0.0	0.00	2.63	2.26	0,39	000	0.16	80
Conversion Fast	÷ e	0.78		0.18	1.09	000	0.0		61 1	860	0.82		0 03	000
IIID Area	1.5	0.0		0.19	0.05	0.08	80	0.00	204	0.63	0.15	0.15	80	0.13
Fem Unit		Bearts	Long Berraem S	Sron Baradem	Wheel	Sugarbeet	Onon Filed	Vegelabies (LEMed)	Rice (LE/led)	Conton (LE/red)	Menze (LE/fed)	(LEVed)	War man bad	(LEVed)
Unstreem		2.003		499	1.003	1,865	3,640		1.691	3,044	ş	1500	3,026	
Midstreem		0491		998	1,445	17	0	1,569.1	1,376	3,204	0.00	1,932	1,950	4 649
Downstreen West		1,362		602	1,126	1,200	0	ō	1,329	2,943	1,005	0	1,650	
Downstreem East		1,493	l +	1,087	1,615	0	0	0	1,660	2,960	1.223	8097	3,750	
IP Areas		1,709		8	1208	2 239	0	0	1.486	2.904	1.485	1221	0	
Farm		Dears	Long Baraeam S	Short Barseem	Wheet A Fresh	Gugarbeet	Onon 1 Frank	Vegetables (LEMAd)	Rice (LFMed)	Conten	Meize (LE/fed)	(LEArd)	(LEVer)	(LEfed)
Unstream		1.237	88	366	1.039	1 100	2.032		609	1,066	314	656	3,162	
Midemeen		918	-	080	88	1 026	0	696	516	1,098	328	1,067	1,340	2,421
Dominan West		613		24	1020	5361	0	0	469	1.471	324		1 045	
Connetteen Esst		748	÷	782	893	ò	0	0	7%	801	609	ž	3,107	
HD ANS		996		8	69	1.470	0	0	519	1 435	257	419	ò	
Farm Total	Total	Seems.	Ę	Short Berteem	Wheel	Sugarbaat	Lomi Lami	Vegetables	Rice	Cotton	Merze	Verticent	Ware many fact	\$1 € -
1	Total 9.439	541	1.327	191	1,630	202	¥	0	2.145	2,067	467	105	536	
Ļ	H						-							
Midetheem		1,069	8	208	2,442	195	0	235	2,622	3.205	418	222	410	1 20
2	per feet 3.122													
Countries Weet	Total 18,019	680	1,007	8	2,329	1 380	0	0	3,302	6.710	392	0	3	
-	╉						ľ					1		
Doundaries in the second	Tetal 10,829	1 100	1.021	8	/40	Б	D	5		NO. 1	000'L	Š	2	
	+-	1.367	1,828	8	1,282	179	٥	0	3,036	1.831	22	130	0	
Ч													_	
Farm	Total	(Bearing	١Ę.	Short Barkeem	Wheel 2. 55	Sugarbeet	ignel.	Vegetables	Rice	Control	Maize	Veorities	With Rith Said	<b>3</b> (1)
	51 16 1 16 1 16 1 16 1	72.6		1215	1 019	144	ξ		1 2002	122	21	Ş	145	
Ļ	+								-					
Midetreem T	-	568	839	139	1,405	326	0	104	344	1,841	139	128	281	529
4							-							
Downstreem West	Total 7,113	313	444	12	1,063	25	õ	0	1.187	3,354	126	0	167	
8	per fed 1.317					-+	-	-	-					
Downsom East	Tet = 5.849	583	1266	141	3	0	0	0	926	1,491	439	8	8	
8	Der fed 1, 687				~									
T MARY CIT	Total 6,146	766	8	5	707	118	0	0	1,253	\$	90 20	8	0	
		-				-				-				

Table L.1.3 Estimate of Farm Income by Region

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