

**MINISTRY OF WATER RESOURCES AND IRRIGATION  
ARAB REPUBLIC OF EGYPT**

**THE PREPARATORY SURVEY  
FOR  
THE REHABILITATION AND  
IMPROVEMENT  
OF  
DIROUT GROUP OF REGULATORS  
IN  
THE ARAB REPUBLIC OF EGYPT**

**APPENDIX**

OCTOBER, 2010

**JAPAN INTERNATIONAL COOPERATION AGENCY**

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**SANYU CONSULTANTS INC.**

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ATTACHMENT : Soft Copy of the filed survey

## Appendixes : Filed survey report and Formulation of the new DGR

1. The report of the survey concerning the existing DGR
2. The examination of the Under-flow type gate and the Over-flow type gate
3. The discharge volume each gate type
4. The examination of the apron size for the regulator (Bahr Yusef and Ibrahimia)
5. The examination for the stability of the Regulator (Bahr Yusef and Ibrahimia)
6. The roughly examination of the pile foundation
7. The cost estimation for unite prices and gates
8. The alternative of width and number for the vents as for the cost estimation

## 1. Report of the survey concerning the existing DGR

Concerning the survey of the existing DGR and site condition are recorded on the compact disk (CD) which is attached at back of this report. Additionally the drawings which is provided and examined from this survey are recorded by Auto-Cad data. These contents is shown as follow;

Topographic survey : Plane survey at U.S of DGR

Profile leveling on four canal at U.S of DGR

Cross leveling on four canal at U.S of DGR

Geological survey : Borehole drilling

20 m x 2 holes, 30 m x 6 holes, though the regulator body x 2 holes)

Laboratory test : Density, Water content, Grain size analysis, Standard penetration test, Liquidity limit test, Plasticity limit test)

Structure survey : the measurement of the regulator, Making the drawing, Unconfined compression test of the regulator body, diving survey on the apron.

The record of the rehabilitation of the Bahr Yusef and Ibrahimia regulator

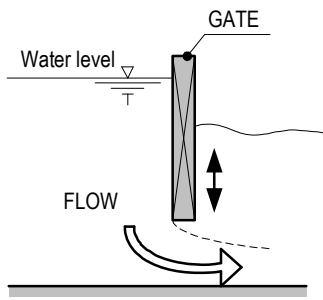
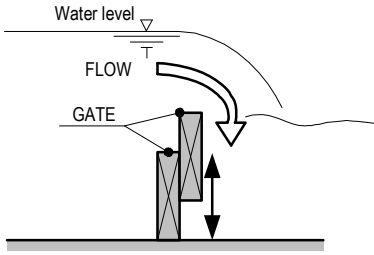
## 2. The examination of the Under-flow type gate and the Over-flow type gate

In general the over-flow gate has the feature and advantage as follows;

- less water fluctuation on upstream by the gate operation than under flow-gate
- available the high accurate operation and discharge
- the small velocity of the discharge from the gate comparison with under-flow

Additionally there is the two types of discharge from the gate, Under-flow type which is discharge under the gate and Over-flow type which is discharge over the gate. According to the follow table, in the new DGR will be considered to require and adopt the over-flow type gate.

Fig Comparison table of the Under-flow and Over-flow gate

Item	Under-flow gate	Over-flow gate
Illust.		
Hydraulic performance	In this gate the discharge vol. and velocity is large and high for the open degree. And it is difficult to stable the water level on U.S because of the approach velocity and vortex flow. Depending on the water depth, for example, on the condition of the 6.3 meter depth on U.S, in comparison with the over-flow type the difference of the discharge volume against the same open degree is average 7 times as large as over-flow type. It cause of difficulty of the operation by the discharge control.	It is easy to discharge because the flow type is critical flow which has clear the hydraulic condition. As well as above feature, it is easy to catch the discharge volume and stable the water level on U.S. Additionally, since the discharge will be fallen into the D.S over the gate, the discharge velocity will be diminished.
Structure feature	It is easy structure in comparison with over-flow type because there are one hoist and one gate each vent.	It is complex structure in comparison with under-flow type because there are two hoists and two gates each vent.
Adaptation to the New DGR		
Stable water level on upstream	Difficult to operate because of the water fluctuation (Refer to the follow simulation figure)	Easy to operate because of the less water fluctuation (Refer to the follow simulation figure)
High accurate discharge	Difficult to match the target discharge volume because of the large discharge volume for the unite open degree	Easy to match the target discharge volume because of the moderate discharge volume for the unite open degree
Velocity of the discharge	High velocity discharge	Low velocity discharge
Auto-remote control	Difficult to operate by the auto-remote control, because the large discharge volume for unite open degree and unstable water level. Therefore the gates would be moved frequently.	Easy to operate by the auto-remote control because of the stable water level and discharge
Adaptation to the New DGR	Not Good	Very Good (Adoption)

It is shown the result of the simulation which examines the fluctuation of the water level on U.S compared under-flow type with over-flow type. The condition of simulation is shown as follows;

1. As the objection of simulation it is turn into the operation of one gate on vent
2. Range of the time is 60 minutes and during course of the simulation it is changed the discharge  $40\text{m}^3/\text{s}$  to  $60\text{m}^3/\text{s}$

3. The gate operation is responded on changing the in-flow volume
4. The simulation of operation keeps the water level stable EL 46.3m on U.S and the each open degree is 10 centimeter which is decided from the performance of the hoist.

As the shown of follow graph, in case of the operation of over-flow is kept the stable water level and the changing in-flow volume is match by the gate operation. On the contrast the under-flow can be seen the fluctuation of the water level for each gate operation, furthermore, the repeating of the gate operation frequency is due to the not diminishing of water fluctuation. This mean that discharge volume is unstable.

Accordingly, it is clear that the over-flow type has advantage compared with under-flow type, in addition, the over-flow type should be adopted in order to appropriate distribute to the seven canals stably.

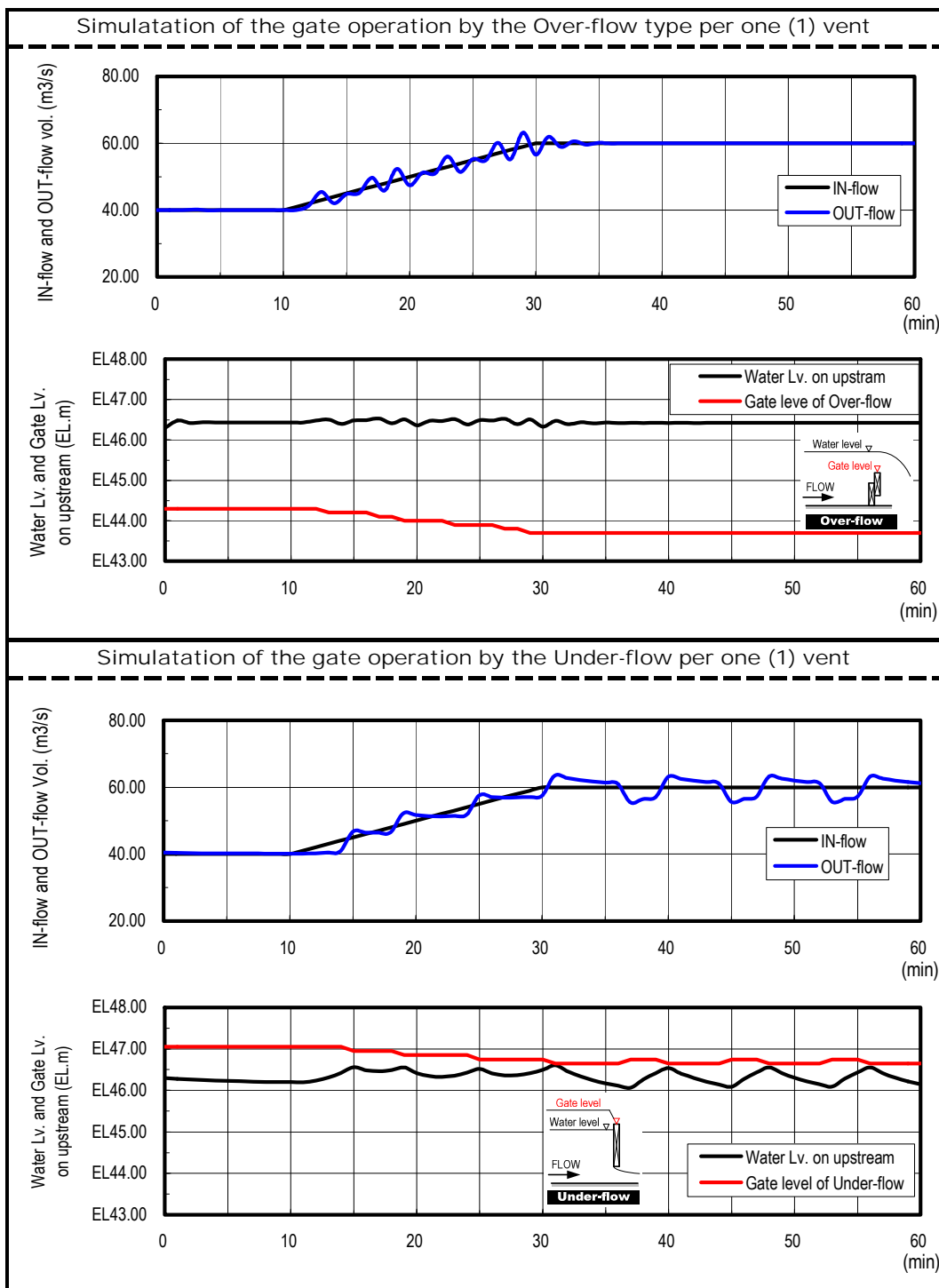


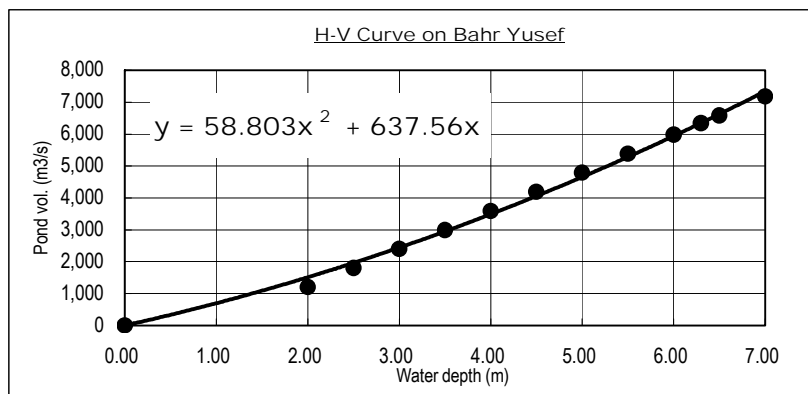
Fig the simulation of gate operation

※Basic information for the gate simulation

(1) H-V curve at the pond on upstream

Referring to the longitudinal topography, the range of pond is from the gate of regulator on Bahr Yusef to 150 meter at upstream. In this simulation, the width of pond at cross section is 8 meter as well as gate width, because of examine the operation of one gate. It is shown the H-V curve on this condition as follows;

Water level (m)	Total (m2)	Vents W=8m	Oubic (m3)	Water Depth (m)
WL47.000	898	8.00	7,184	7.00
WL46.500	823	8.00	6,584	6.50
WL46.300	793	8.00	6,344	6.30
WL46.000	748	8.00	5,984	6.00
WL45.500	673	8.00	5,384	5.50
WL45.000	599	8.00	4,792	5.00
WL44.500	524	8.00	4,192	4.50
WL44.000	449	8.00	3,592	4.00
WL43.500	374	8.00	2,992	3.50
WL43.000	300	8.00	2,400	3.00
WL42.500	225	8.00	1,800	2.50
WL42.000	150	8.00	1,200	2.00
WL40.000	0	8.00	0	0.00



(2) Discharge volume from the gate

The discharge volume of the gate is calculated as follow calculation formula. The result of calculation is shown next page.

$$Q_{max} = C_r \cdot B \cdot H^{3/2}$$

$$C_r = 1.706 \times \frac{1 + 1.146 (W/h_1)}{1 + 1.250 (W/h_1)} \dots\dots\dots ①$$

Remarks :  $2.5 < L/h_1 < 10$

$$C_r = 1.373 \times \frac{0.984 + (L/h_1)}{0.500 + (L/h_1)} \dots\dots\dots ②$$

Remarks :  $0.3 < L/h_1 < 2.5$

- ここに、
- Q ; discharge volume (m<sup>3</sup>/s)
  - H ; energy of head of over-flow (m) ≒ h1
  - C<sub>r</sub> ; coefficient of discharge
  - B ; vent or gate width
  - L ; thickness of the gate
  - W ; height of the gate
  - h<sub>1</sub> ; the water depth of over-flow

### 3. The discharge volume each gate type

Under-flow type		Degree of opening : a (m)	Width of gate : B (m)	Water depth of U.S (m)	Coefficient of discharge	Discharge (m <sup>3</sup> /s)	Remarks
<p>(Cross section at side)</p>	0.10	8.0	6.3	0.61	5.40	Free flow	
	0.20	8.0	6.3	0.61	10.75	Free flow	
	0.30	8.0	6.3	0.61	16.05	Free flow	
	0.40	8.0	6.3	0.61	21.29	Free flow	
	0.50	8.0	6.3	0.61	26.49	Free flow	
	1.00	8.0	6.3	0.61	51.80	Free flow	
	1.50	8.0	6.3	0.61	76.05	Free flow	
	2.00	8.0	6.3	0.61	99.32	Free flow	
	2.50	8.0	6.3	0.61	121.70	Free flow	
	3.00	8.0	6.3	0.61	143.28	Free flow	

Over-flow type / Double-leaf		Degree of opening : a(m)	Width of gate : B (m)	Thick of gate : L(m)	Height of gate : W(m)	Water depth of over-flow : h (m)	Coefficient of gate 1 : L/h	Coefficient of gate 2 : W/h	Coefficient of discharge	Discharge per meter (m <sup>3</sup> /s/m)	Discharge (m <sup>3</sup> /s)
<p>(Cross section at side)</p>	0.10	6.5	1.30	6.20	0.10	13.000	62.000	1.422	0.045	0.292	
	0.20	6.5	1.30	6.10	0.20	6.500	30.500	1.568	0.140	0.912	
	0.30	6.5	1.30	6.00	0.30	4.333	20.000	1.570	0.258	1.677	
	0.40	6.5	1.30	5.90	0.40	3.250	14.750	1.571	0.397	2.583	
	0.50	6.5	1.30	5.80	0.50	2.600	11.600	1.573	0.556	3.615	
	1.00	6.5	1.30	5.30	1.00	1.300	5.300	1.742	1.742	11.323	
	1.50	6.5	1.30	4.80	1.50	0.867	3.200	1.859	3.415	22.199	
	2.00	6.5	1.30	4.30	2.00	0.650	2.150	1.658	4.691	30.488	
	2.50	6.5	1.30	3.80	2.50	0.520	1.520	1.721	6.804	44.225	
	(MAX) 3.00	6.5	1.30	3.30	3.30	0.433	1.100	1.772	9.209	59.858	

Remarks: In case the gate opening will close to the D.S water level, the discharge will be effected by the D.S water level. Therefore the coefficient of discharge should be decreased to 85%. It show the coefficient with under line

Over-flow type / Radial gate with flap		Degree of opening : a(m)	Width of gate : B (m)	Thick of gate : L(m)	Height of gate : W(m)	Water depth of over-flow : h (m)	Coefficient of gate 1 : L/h	Coefficient of gate 2 : W/h	Coefficient of discharge	Discharge per meter (m <sup>3</sup> /s/m)	Discharge (m <sup>3</sup> /s)
<p>(Cross section at side)</p>	0.10	6.5	1.30	6.20	0.10	13.000	62.000	1.422	0.045	0.292	
	0.20	6.5	1.30	6.10	0.20	6.500	30.500	1.568	0.140	0.912	
	0.30	6.5	1.30	6.00	0.30	4.333	20.000	1.570	0.258	1.677	
	0.40	6.5	1.30	5.90	0.40	3.250	14.750	1.571	0.397	2.583	
	0.50	6.5	1.30	5.80	0.50	2.600	11.600	1.573	0.556	3.615	
	1.00	6.5	1.30	5.30	1.00	1.300	5.300	1.742	1.742	11.323	
	1.50	6.5	1.30	4.80	1.50	0.867	3.200	1.859	3.415	22.199	
	2.00	6.5	1.30	4.30	2.00	0.650	2.150	1.658	4.691	30.488	
	2.50	6.5	1.30	3.80	2.50	0.520	1.520	1.721	6.804	44.225	
	(MAX) 1.60	6.5	1.60	4.70	4.70	1.60	1.000	2.938	1.816	3.675	23.890

Remarks: The radial gate with flap has 1.6 meter of the height at flap gate. Furthermore, in case of this gate, the discharge will not be effected by the D.S water level because of higher enough than the D.S water level.



#### 4. Examination of the apron size for the regulator (Bahr Yusef and Ibrahimia)

The size of apron is examined by referring Japanese standard design for the Head Works, provided two case of the condition.

#### Case 1. At the normal condition : U.S WL 46.3m, D.S WL 43.0m

(For the purpose of the examination of Length of apron and piping)

#### Case 2 At the maintenance condition : U.S WL 46.3m, D.S nothing

(For the purpose of the examination of thickness of apron)

It is shown the length of the apron, thickness and sheet pile length as follows;

■ The examination of the gated weir : Normal condition

(1) Model section

Check for thickness of apron		
A点	2.50	≥ 1.62 OK
B点	1.70	≥ 1.11 OK

The thickness apron will be decided by case 2 which is condition of "ΔH=6.8m", provided using the safety factor is 1.0 because of the rare case is maintenance term. This case is shown on the other sheet.

Length of sheet pile		Check for length of sheet pile	
① S.P	0.00 m	A=② S.P+③ S.P	13.00
② S.P	13.00 m	B=length of midd apron	17.50
③ S.P	0.00 m	Check (B>A)	OK
④ S.P	2.00 m		

(1) Design creep length

Horizontal creep length : ZH = 47.50 m 1 Consider of the UP apron : 1, Not consider UP apron : 2  
 Vertical creep length : ZV = 36.80 m 1 Consider of the UP apron : 1, Not consider UP apron : 2  
 Design creep length : ZL = ZV + ZH = 84.30 m  
 (According to the Japanese desing standard "Head works", the vertical length of Cut-off at DS apron is not considered.)

(2) Length of the apron

apply the Japanese desing standard "Head works"

$$L1 = 0.9 \times C \sqrt{D1}$$

$$= 0.90 \times 15 \sqrt{6.80}$$

$$= 35.20 \text{ m}$$

Check of the design length of apron	
A : Required apron leng	35.20 m
B : Design apron length	35.60 m
Check (B>A)	OK

(3) Piping

apply the Japanese desing standard "Head works"

a) Bligh method

$$S' = C \times \Delta H$$

$$= 15 \times 3.30$$

$$= 49.50 \text{ m}$$

$$S = 84.30 \text{ m}$$

Check of the piping by Bligh method	
A : Required creep leng	49.50 m
B : Design creep length	84.30 m
Check (B>A)	OK

b) Lane Method

$$L' = C \times \Delta H$$

$$= 7.0 \times 3.30$$

$$= 23.10 \text{ m}$$

$$L = ZV + 1/3ZH$$

$$= 36.80 + 1/3 \times 47.50$$

$$= 52.63 \text{ m}$$

Check of the piping by Lane method	
A : Required creep leng	23.10 m
B : Design creep length	52.63 m
Check (B>A)	OK

(4) Thickness of apron

apply the Japanese desing standard "Head works"

Lost water head at Point A (D.S of the gate) : 1.66 m 1 Consider of the UP apron : 1,  
 Lost water head at Point B (D.S of the apron) : 2.18 m Not consider UP apron : 2

a) At Pint A

$$t \geq \frac{4}{3} \times \frac{\Delta H - HFA}{\gamma - 1} \text{ and } HFA = \frac{\Delta H}{S} \times Sa'$$

$$= \frac{4}{3} \times \frac{3.30 - 1.66}{2.35 - 1} = 1.62 \text{ m}$$

Sa' : Creep length up to point A  
 S : Total creep length

b) At Point B

$$t \geq \frac{4}{3} \times \frac{\Delta H - HFB}{\gamma - 1} \text{ and } HFB = \frac{\Delta H}{S} \times Sb'$$

$$= \frac{4}{3} \times \frac{3.30 - 2.18}{2.35 - 1} = 1.11 \text{ m}$$

Sb' : Creep length up to point B  
 S : Total creep length

■ The examination of the gated weir : Maintenance condition (Check of thickness of apron only)

(1) Model section

Check for thickness of apron		
A点	2.50	≥ 2.50 OK
B点	1.70	≥ 1.70 OK

Length of sheet pile		Check for length of sheet pile	
① S.P	0.00 m	A=② S.P+③ S.P	13.00
② S.P	13.00 m	B=length of midd apron	17.50
③ S.P	0.00 m	Check (B>A)	OK
④ S.P	2.00 m		

(1) Design creep length

Horizontal creep length : ZH = 47.50 m 1 Consider of the UP apron : 1, Not consider UP apron : 2  
 Vertical creep length : ZV = 36.80 m 1 Consider of the UP apron : 1, Not consider UP apron : 2  
 Design creep length : ZL = ZV + ZH = 84.30 m  
 (According to the Japanese desing standard "Head works", the vertical length of Cut-off at DS apron is not considered.)

(2) Thickness of apron

apply the Japanese desing standard "Head works"

Lost water head at Point A (D.S of the gate) : 3.42 m 1 Consider of the UP apron : 1,  
 Lost water head at Point B (D.S of the apron) : 4.50 m Not consider UP apron : 2

a) At Pint A

$$t \geq \frac{1}{1} \times \frac{\Delta H - HFA}{\gamma - 1} \text{ and } HFA = \frac{\Delta H}{S} \times Sa'$$

$$= \frac{1}{1} \times \frac{6.80 - 3.42}{2.35 - 1} = 2.50 \text{ m}$$

Sa' : Creep length up to point A  
 S : Total creep length

b) At Point B

$$t \geq \frac{1}{1} \times \frac{\Delta H - HFB}{\gamma - 1} \text{ and } HFB = \frac{\Delta H}{S} \times Sb'$$

$$= \frac{1}{1} \times \frac{6.80 - 4.50}{2.35 - 1} = 1.70 \text{ m}$$

Sb' : Creep length up to point B  
 S : Total creep length

Geological feature	C : Bligh	C' : Lane
Very fine sand and clay	18	8.5
Fine sand	15	7.0
Medium sand		6.0
Coarse sand	12	5.0
Gravel		4.0
Coarse gravel		3.5
Gravel with sand	9	
Gravel with cobble stone and gravel		3.0
Rocks with cobble stone and gravel		2.5
Rocks with gravel and sand	4~6	
Soft clay		3.0
Medium Clay		2.0
Heavy Clay		1.8
Hard Clay		1.6

## 5. Examination for the stability of the Regulator (Bahr Yusef and Ibrahimia)

The calculation for the stability of the regulator on the main canal, Bahr Yusef and Ibrahimia will be done on following case. As the result of the calculation for each case, all case are shown "OK" as to the check for the sliding and fall down.

Result of the calculation for the stability

Pier	Case	Direction	Vertical force V (kN)	Resistant moment V · x (kN · m)	Horizontal force H (kN)	Torque moment H · y (kN · m)	For the sliding		For the fall down		For the ground bearing	
							Safe ratio		Eccentricity e (m)	B/6 (bearing)	Ground reaction Q1 (kN/m <sup>2</sup> )	Ground reaction Q2 (kN/m <sup>2</sup> )
							Bearing	Desing				
Abat Pier	1	Flow	20,843.79	179,395.62	196.65	2,534.42	1.50	63.60	-0.02	2.92	139.17	141.09
	2	Flow	22,693.72	192,804.52	647.07	2,995.69	1.50	21.04	-0.12	2.92	146.29	158.84
	3	Flow	28,320.34	243,981.93	211.77	2,592.27	1.50	80.24	-0.04	2.92	187.78	193.00
	4	R.Flow	21,453.79	80,901.03	3,961.70	12,346.05	1.50	3.25	-1.05	1.42	37.33	251.12
	5	R.Flow	23,598.33	94,135.50	5,156.33	20,700.57	1.50	2.75	-1.14	1.42	30.98	286.31
	6	R.Flow	29,588.23	127,978.64	5,327.16	20,452.61	1.50	3.33	-0.62	1.42	111.86	285.97
Middle Pier	1	Flow	18,171.54	157,188.60	259.85	3,330.77	1.50	41.96	0.08	2.92	106.69	100.99
	2	Flow	19,293.67	159,978.44	1,158.43	5,215.57	1.50	9.99	-0.19	2.92	103.07	117.43
	3	Flow	24,187.64	207,229.90	280.01	3,407.91	1.50	51.83	-0.04	2.92	136.32	140.11
	4	R.Flow	17,911.54	89,557.70	295.20	3,040.56	1.50	36.41	-0.17	1.67	91.91	112.79
	5	R.Flow	19,103.67	95,518.35	356.33	3,623.88	1.50	32.17	-0.19	1.67	96.72	121.61
	6	R.Flow	23,997.64	119,988.20	595.33	4,459.02	1.50	24.19	-0.19	1.67	121.50	152.76

### •Middle pier

#### Calculation of stability for the Middle pier

##### 1.Design condition

##### (1)Measurement of form [unit : m]

A(1)= 17.50	A(2)= 0.00	A(3)= 0.00	A(4)= 1.80	A(5)= 9.90	A(6)= 1.80	A(7)= 4.00
A(8)= 1.00	A(9)= 15.50	A(10)= 1.00	A(11)= 2.00	A(12)= 1.50	A(13)= 2.80	A(14)= 1.40
A(15)= 7.80	A(16)= 3.00	A(17)= 5.70	A(18)= 8.80	A(19)= 2.85	A(20)= 2.85	A(21)= 0.50
A(22)= 0.50	A(23)= 1.00	A(24)= 1.00	A(25)= 0.60	A(26)= 1.20	A(27)= 5.83	A(28)= 2.98
A(29)= 0.00	A(30)= 13.00					
B(1)= 4.00	B(2)= 2.00	B(3)= 4.00	B(4)= 10.00	B(5)= 2.00	B(6)= 0.70	B(7)= 0.60
B(8)= 0.70	B(9)= 0.60	B(10)= 0.80	B(11)= 0.60			
C(1)= 2.00	C(2)= 8.00	C(3)= 8.00	C(4)= 2.00	C(5)= 0.00	C(6)= 0.50	C(7)= 7.50
C(8)= 7.00	C(9)= 1.00	C(10)= 0.60	C(11)= 0.20	C(12)= 0.20	C(13)= 4.00	C(14)= 0.20

##### (2)Case of examination

Case	Water Level	Direction	Situation of gate	Condi.	Additional	(m)
Case1	Up-St. WL46.30m	Full water	Up-stream to Down-stream	Close gate	Regular	—
	Dw-St. WL46.30m	Full water	Down-stream	Close gate	Regular	—
Case2	Up-St. WL46.60m	over-flow	Up-stream to Down-stream	Close gate	Regular	Depth of over-flow sedimentation 0.3
	Dw-St. WL43.00m	Regular	Down-stream	Close gate	Regular	0.7
Case3	Up-St. —	Empty	Up-stream to Down-stream	Close gate	Regular	—
	Dw-St. —	Empty	Down-stream	Close gate	Regular	—
Case4	Up-St. WL46.30m	Full water	right angle for flow	Close gate	Regular	—
	Dw-St. WL46.30m	Full water	Down-stream	Close gate	Regular	—
Case5	Up-St. WL46.60m	over-flow	right angle for flow	Close gate	Regular	Depth of over-flow sedimentation 0.3
	Dw-St. WL43.00m	Regular	Down-stream	Close gate	Regular	0.7
Case6	Up-St. —	Empty	right angle for flow	Close gate	Regular	—
	Dw-St. —	Empty	Down-stream	Close gate	Regular	—

##### (3)Main level of foundation

Foundation level :	EL39.50m
Gate level :	EL40.00m

##### (4)Unit weight [unit : kN/m<sup>3</sup>]

RC :	25.00	Soil (Wet) :	18.00	Soil (Saturation) :	20.00
Concrete :	23.50	Soil [in water] :	8.00	Water :	10.00

##### (5)Degree of the desing earth force

※Should not be take into consideration, because there is few earthquake, if any

##### (6)Coefficient of earth pressure

Internal friction : $\varphi = 30^\circ$	Regular case	Eathquake case	Ep of sedimentation
Friction for wall	15°	0°	—
Active EP coe.	0.301	—	0.5
Passive EP coe.	4.977	—	—

##### (7)Weight of the gate facility

Item of design load	Gate on left	Gate on right	Remarks
Gate leaf (kN/vent)	370	370	Upper 120 Lower 250
Hoist (Emergency) (kN/vent)	450	450	including the hoist weight
Hoist (kN/vent)	190	190	Upper 60 Lower 130
Actual vent wide (m)	8.00	8.00	
Height of gate (m)	6.40	6.40	Upper 3.00 Lower 3.40

##### (8)Weight of the bridge

Item of design load	Regular case	Eathquake case
Vertical load (Static load) (kN)	1140.00	—
Vertical load (Dynamic load) (kN)	930.00	—
Horizontal force by wind (kN)	77.76	—
Counter force for up-to-down st. (kN)	—	—
Counter force for right angle (kN)	—	—

Height of the guard wall= 1.10 (m)  
Thick of the bridge= 1.60 (m)

##### (9)Other load

q= 10.0 (kN/m<sup>2</sup>)      q= 3.0 (kN/m<sup>2</sup>)

##### (10)Wind pressure

w= 3.0 (kN/m<sup>2</sup>)      [coefficient of form plane: 1.20 round : 0.70 ]

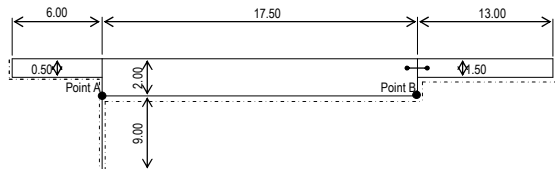
##### (11)Operation deck

Item of design load	W	Point on act : x	Point on act : y	Point on act : z
Deck (Static load) (kN/vent)	1407.10 (kN)	5.850 (m)	18.000 (m)	5.000 (m)
Deck (Dynamic load) (kN/vent)	240.00 (kN)	5.850 (m)	18.000 (m)	5.000 (m)
Wind pressure to deck (kN/vent)	13.13 (kN)	5.850 (m)	18.630 (m)	5.000 (m)

Thick of the deck= 1.25 (m)

##### (12)Calculation of up-lift

Design permeable length ZL= 57.00 (m)  
Permeable length at point A ZLa= 26.00 (m)  
Permeable length at point B ZLb= 43.50 (m)



##### (13)Bearing of the foundation

Qa= (kN/m<sup>2</sup>)

##### (14)Friction coefficient for foundation

Fc= 0.60

2. Calculation of the regulator weight

N	W	x	W·x	y	W·y	z	W·z
1	0.00	0.00	0.00	1.00	0.00	5.00	0.00
2	5850.00	5.85	34222.50	1.00	5850.00	5.00	29250.00
3	3335.00	14.60	48691.00	1.15	3835.25	5.00	16675.00
4	112.50	1.20	135.00	2.17	244.13	5.00	562.50
5	1153.50	6.75	7786.13	2.25	2595.38	5.00	5767.50
6	45.00	12.30	553.50	2.37	106.65	5.00	225.00
7	-25.00	0.50	-12.50	2.25	-56.25	5.00	-125.00
8	22.50	0.60	13.50	2.33	52.43	5.00	112.50
9	9.00	12.90	116.10	2.43	21.87	5.00	45.00
10	30.00	15.00	450.00	2.40	72.00	5.00	150.00
11	4965.00	8.75	43443.75	6.25	31031.25	5.00	24825.00
12	302.38	16.92	5116.27	6.15	1859.64	5.00	1511.90
13	314.16	0.58	182.21	6.00	1884.96	5.00	1570.80
14	525.00	3.75	1968.75	13.50	7087.50	5.00	2625.00
15	490.00	8.00	3920.00	13.50	6615.00	5.00	2450.00
16	1710.00	7.35	12568.50	17.50	29925.00	5.00	8550.00
17	240.00	2.00	480.00	9.70	2328.00	5.00	1200.00
18	-60.00	2.00	-120.00	9.70	-582.00	5.00	-300.00
19	112.50	2.00	225.00	6.25	703.13	5.00	562.50
20	20.00	2.00	40.00	2.40	48.00	5.00	100.00
21	735.00	5.90	4336.50	6.25	4593.75	5.00	3675.00
22	24.00	5.85	140.40	2.40	57.60	5.00	120.00
Σ	19,910.54		164,256.61		98,273.29		99,552.70

3. Calculation of the regulator center

$$X = \Sigma W \cdot x / \Sigma W = \frac{164,256.61}{19,910.54} = 8.25(m)$$

$$Y = \Sigma W \cdot y / \Sigma W = \frac{98,273.29}{19,910.54} = 4.94(m)$$

$$Z = \Sigma W \cdot z / \Sigma W = \frac{99,552.70}{19,910.54} = 5.00(m)$$

4. Case of the examination

[CASE1 : Regular / Direction for up-to-down st./ Full water level / Close the gate]

Laod	V (kN)	x (m)	V·x (kN·m)	H (kN)	y (m)	H·y (kN·m)
Weigth of Reg.	19,910.54	8.25	164,261.96			
Op. deck (static)	1,407.10	5.85	8,231.54			
Op. deck (dynamic)	240.00	5.85	1,404.00			
Gate on left	185.00	5.85	1,082.25			
Gate on right	185.00	5.85	1,082.25			
Hoist on left	225.00	5.85	1,316.25			
Hoist on right	225.00	5.85	1,316.25			
Bridge (static)	1,140.00	14.52	16,552.80			
Bridge (dynamic)	930.00	14.52	13,503.60			
Weigth of water	8,598.90	9.14	78,593.95			
Up-lift pre.	-14,675.00	8.75	-130,156.25			
Wind pre (Reg. body)				71.04	13.10	930.62
Wind pre (Gate. body)				97.92	13.00	1,272.96
Wind pre (Bridge. body)				77.76	11.35	882.58
Wind pre (Op. deck body)				13.13	18.63	244.61
Sum	18,171.54		157,188.60	259.85		3,330.77

Note : The water pressure should be canceled out for the symmetrical force.

a) Examination for the slide force

Fc for sliding : Fc=0.60  
 Safe ratio : F<sub>s</sub>=ΣV·μ/ΣH= 41.96 ≥ F<sub>sa</sub>=1.5 ⇒OK

b) Examination for the fall down

Foundation width : B= 17.50 (m)  
 Foundation length : L= 10.00 (m)  
 Act point of the total force : X=(ΣV·x+ΣH·y)/ΣV= 8.83 (m)  
 Eccentric distance : e=X-B/2= 0.08 (m) ≤ B/6=2.92(m) ⇒OK  
 (compare with absolute value)

c) Examination for the bearing on foundation

Q1=ΣV/B/L(1+6·e/B)= 106.69  
 Q2=ΣV/B/L(1-6·e/B)= 100.99

[CASE2 : Regular / Direction for up-to-down st./ Regular water level / open the gate]

Laod	V (kN)	x (m)	V·x (kN·m)	H (kN)	y (m)	H·y (kN·m)
Weigth of Reg.	19,910.54	8.25	164,261.96			
Op. deck (static)	1,407.10	5.85	8,231.54			
Op. deck (dynamic)	240.00	5.85	1,404.00			
Gate on left	92.50	5.85	541.13			
Gate on right	92.50	5.85	541.13			
Hoist on left	95.00	5.85	555.75			
Hoist on right	95.00	5.85	555.75			
Bridge (static)	1,140.00	14.52	16,552.80			
Bridge (dynamic)	930.00	14.52	13,503.60			
Weigth of water	5,630.42	7.60	42,791.19			
Up-lift pre.	-10,397.63	8.61	-89,523.59			
Sedimentation	58.24	9.67	563.18			
Wind pre (Reg. body)				69.78	13.05	910.63
Wind pre (Gate. body)				—	—	—
Wind pre (Bridge. body)				77.76	11.35	882.58
Wind pre (Op. deck body)				13.13	18.63	244.61
Water pre. (up-st.)				2,520.50	2.37	5,973.59
Water pre. (dw-st.)				-1,512.50	1.83	-2,767.88
Earth pre. (sed.)				-10.24	2.73	-27.96
Sum	19,293.67		159,978.44	1,158.43		5,215.57

a) Examination for the slide force

Fc for sliding : Fc=0.60  
 Safe ratio : F<sub>s</sub>=ΣV·μ/ΣH= 9.99 ≥ F<sub>sa</sub>=1.5 ⇒OK

b) Examination for the fall down

Foundation width : B= 17.50 (m)  
 Foundation length : L= 10.00 (m)  
 Act point of the total force : X=(ΣV·x+ΣH·y)/ΣV= 8.56 (m)  
 Eccentric distance : e=X-B/2= -0.19 (m) ≤ B/6=2.92(m) ⇒OK  
 (compare with absolute value)

c) Examination for the bearing on foundation

Q1=ΣV/B/L(1+6·e/B)= 103.07  
 Q2=ΣV/B/L(1-6·e/B)= 117.43

[CASE3 : Regular / Direction for up-to-down st./ Empty / open the gate]

Laod	V (kN)	x (m)	V·x (kN·m)	H (kN)	y (m)	H·y (kN·m)
Weigth of Reg.	19,910.54	8.25	164,261.96			
Op. deck (static)	1,407.10	5.85	8,231.54			
Op. deck (dynamic)	240.00	5.85	1,404.00			
Gate on left	185.00	5.85	1,082.25			
Gate on right	185.00	5.85	1,082.25			
Hoist on left	225.00	5.85	1,316.25			
Hoist on right	225.00	5.85	1,316.25			
Bridge (static)	1,140.00	14.52	16,552.80			
Bridge (dynamic)	930.00	14.52	13,503.60			
Weigth of water	—	—	—			
Up-lift pre.	—	—	—			
Wind pre (Reg. body)				91.20	11.05	1,007.76
Wind pre (Gate. body)				97.92	13.00	1,272.96
Wind pre (Bridge. body)				77.76	11.35	882.58
Wind pre (Op. deck body)				13.13	18.63	244.61
Water pre. (up-st.)				—	—	—
Water pre. (dw-st.)				—	—	—
Sum	24,187.64		207,229.90	280.01		3,407.91

a) Examination for the slide force

Fc for sliding : Fc=0.60  
 Safe ratio : F<sub>s</sub>=ΣV·μ/ΣH= 51.83 ≥ F<sub>sa</sub>=1.5 ⇒OK

b) Examination for the fall down

Foundation width : B= 17.50 (m)  
 Foundation length : L= 10.00 (m)  
 Act point of the total force : X=(ΣV·x+ΣH·y)/ΣV= 8.71 (m)  
 Eccentric distance : e=X-B/2= -0.04 (m) ≤ B/6=2.92(m) ⇒OK  
 (compare with absolute value)

c) Examination for the bearing on foundation

Q1=ΣV/B/L(1+6·e/B)= 136.32  
 Q2=ΣV/B/L(1-6·e/B)= 140.11

[CASE4 : Regular / Direction for right angle to flow / Full water level / open the gate]

Laod	V (kN)	z (m)	V·z (kN·m)	H (kN)	y (m)	H·y (kN·m)
Weigth of Reg.	19,910.54	5.00	99,552.70			
Op. deck (static)	1,407.10	5.00	7,035.50			
Op. deck (dynamic)	240.00	5.00	1,200.00			
Gate on left	185.00	5.00	925.00			
Gate on right	185.00	5.00	925.00			
Hoist on left	95.00	5.00	475.00			
Hoist on right	95.00	5.00	475.00			
Bridge (static)	1,140.00	5.00	5,700.00			
Bridge (dynamic)	930.00	5.00	4,650.00			
Weigth of water	8,598.90	5.00	42,994.50			
Up-lift pre.	-14,875.00	5.00	-74,375.00			
Wind pre.(Reg. body)				295.20	10.30	3,040.56
Wind pre.(Gate. body)				—	—	—
Wind pre.(Bridge. body)				—	—	—
Wind pre.(Op. deck body)				—	—	—
Sum	17,911.54		89,557.70	295.20		3,040.56

a)Examination for the slide force

Fc. for sliding : Fc=0.60  
 Safe ratio :  $Fs=ZV \cdot \mu / \Sigma H = 36.41 \geq Fsa=1.5 \Rightarrow OK$

b)Examination for the fall down

Foundation width : B= 10.00 (m)  
 Foundation length : L= 17.50 (m)  
 Act point of the total force :  $X=(ZV \cdot x - \Sigma H \cdot y) / \Sigma V = 4.83$  (m)  
 Eccentric distance :  $e=X-B/2 = -0.17$  (m)  $\leq B/6=1.67$ (m)  $\Rightarrow OK$   
 (compare with absolute value)

c)Examination for the bearing on foundation

$Q1=ZV/B/L(1+6 \cdot e/B) = 91.91$   
 $Q2=ZV/B/L(1-6 \cdot e/B) = 112.79$

[CASE6 : Regular / Direction for right angle to flow / Empty / open the gate]

Laod	V (kN)	x (m)	V·x (kN·m)	H (kN)	y (m)	H·y (kN·m)
Weigth of Reg.	19,910.54	5.00	99,552.70			
Op. deck (static)	1,407.10	5.00	7,035.50			
Op. deck (dynamic)	240.00	5.00	1,200.00			
Gate on left	185.00	5.00	925.00			
Gate on right	185.00	5.00	925.00			
Hoist on left	0.00	5.00	0.00			
Hoist on right	0.00	5.00	0.00			
Bridge (static)	1,140.00	5.00	5,700.00			
Bridge (dynamic)	930.00	5.00	4,650.00			
Weigth of water	—	—	—			
Up-lift pre.	—	—	—			
Wind pre.(Reg. body)				595.33	7.49	4,459.02
Wind pre.(Gate. body)				—	—	—
Wind pre.(Bridge. body)				—	—	—
Wind pre.(Op. deck body)				—	—	—
Water pre.(up-st.)				—	—	—
Water pre.(dw-st.)				—	—	—
Sum	23,997.64		119,988.20	595.33		4,459.02

a)Examination for the slide force

Fc. for sliding : Fc=0.60  
 Safe ratio :  $Fs=ZV \cdot \mu / \Sigma H = 24.19 \geq Fsa=1.5 \Rightarrow OK$

b)Examination for the fall down

Foundation width : B= 10.00 (m)  
 Foundation length : L= 17.50 (m)  
 Act point of the total force :  $X=(ZV \cdot x - \Sigma H \cdot y) / \Sigma V = 4.81$  (m)  
 Eccentric distance :  $e=X-B/2 = -0.19$  (m)  $\leq B/6=1.67$ (m)  $\Rightarrow OK$   
 (compare with absolute value)

c)Examination for the bearing on foundation

$Q1=ZV/B/L(1+6 \cdot e/B) = 121.50$   
 $Q2=ZV/B/L(1-6 \cdot e/B) = 152.76$

[CASE5 : Regular / Direction for right angle to flow / Regular water level / close the gate]

Laod	V (kN)	x (m)	V·x (kN·m)	H (kN)	y (m)	H·y (kN·m)
Weigth of Reg.	19,910.54	5.00	99,552.70			
Op. deck (static)	1,407.10	5.00	7,035.50			
Op. deck (dynamic)	240.00	5.00	1,200.00			
Gate on left	92.50	5.00	462.50			
Gate on right	92.50	5.00	462.50			
Hoist on left	0.00	5.00	0.00			
Hoist on right	0.00	5.00	0.00			
Bridge (static)	1,140.00	5.00	5,700.00			
Bridge (dynamic)	930.00	5.00	4,650.00			
Weigth of water	5,630.42	5.00	28,152.10			
Up-lift pre.	-10,397.63	5.00	-51,988.15			
Sedimentation	58.24	5.00	291.20			
Wind pre.(Reg. body)				356.33	10.17	3,623.88
Wind pre.(Gate. body)				—	—	—
Wind pre.(Bridge. body)				—	—	—
Wind pre.(Op. deck body)				—	—	—
Sum	19,103.67		95,518.35	356.33		3,623.88

Note : The water pressure should be canceled out for the symmetrical force.

a)Examination for the slide force

Fc. for sliding : Fc=0.60  
 Safe ratio :  $Fs=ZV \cdot \mu / \Sigma H = 32.17 \geq Fsa=1.5 \Rightarrow OK$

b)Examination for the fall down

Foundation width : B= 10.00 (m)  
 Foundation length : L= 17.50 (m)  
 Act point of the total force :  $X=(ZV \cdot x - \Sigma H \cdot y) / \Sigma V = 4.81$  (m)  
 Eccentric distance :  $e=X-B/2 = -0.19$  (m)  $\leq B/6=1.67$ (m)  $\Rightarrow OK$   
 (compare with absolute value)

c)Examination for the bearing on foundation

$Q1=ZV/B/L(1+6 \cdot e/B) = 96.72$   
 $Q2=ZV/B/L(1-6 \cdot e/B) = 121.61$

# ●Abut Pier

## 1.Design condition

### (1)Measurement of form [unit : m]

A(1)= 17.50	A(2)= 0.00	A(3)= 0.00	A(4)= 1.80	A(5)= 9.90	A(6)= 1.80	A(7)= 4.00
A(8)= 1.00	A(9)= 15.50	A(10)= 1.00	A(11)= 2.00	A(12)= 1.50	A(13)= 2.80	A(14)= 1.40
A(15)= 7.80	A(16)= 3.00	A(17)= 5.70	A(18)= 8.80	A(19)= 2.85	A(20)= 2.85	A(21)= 0.50
A(22)= 0.50	A(23)= 1.00	A(24)= 1.00	A(25)= 0.60	A(26)= 1.20	A(27)= 5.83	A(28)= 2.98
A(29)= 0.00	A(30)= 13.00					
B(1)= 4.00	B(2)= 1.50	B(3)= 3.00	B(4)= 8.50	B(5)= 1.50	B(6)= 0.00	B(7)= 0.60
B(8)= 0.70	B(9)= 0.00	B(10)= 0.80	B(11)= 0.60			
C(1)= 2.00	C(2)= 8.00	C(3)= 8.00	C(4)= 2.00	C(5)= 0.00	C(6)= 0.50	C(7)= 7.50
C(8)= 7.00	C(9)= 1.00	C(10)= 0.60	C(11)= 0.20	C(12)= 0.20	C(13)= 4.00	C(14)= 0.20

### (2)Case of examination

Case	Up-St.	Water Level	Full water	Direction	Situation of gate	Condi.	Additional	(m)
Case1	Up-St.	WL46.30m	Full water	Up-stream to	Close gate	Regular	-	-
	Dw-St.	WL46.30m	Full water	Down-stream				
Case2	Up-St.	WL46.60m	over-flow	Up-stream to	Close gate	Regular	Depth of over-flow	0.3
	Dw-St.	WL43.00m	Regular	Down-stream				
Case3	Up-St.	-	Empty	Up-stream to	Close gate	Regular	-	-
	Dw-St.	-	Empty	Down-stream				
Case4	Up-St.	WL46.30m	Full water	right angle for	Close gate	Regular	-	-
	Dw-St.	WL46.30m	Full water	flow				
Case5	Up-St.	WL46.60m	over-flow	right angle for	Close gate	Regular	Depth of over-flow	0.3
	Dw-St.	WL43.00m	Regular	flow				
Case6	Up-St.	-	Empty	right angle for	Close gate	Regular	-	-
	Dw-St.	-	Empty	flow				

### (3)Main level of foundation

Foundation level : EL39.50m  
 Gate level : EL40.00m

### (4)Unit weight [unit : kN/m<sup>3</sup>]

RC : 25.00      Soil (Wet) : 18.00      Soil (Saturation) : 20.00  
 Concrete : 23.50      Soil (in water) : 8.00      Water : 10.00

### (5)Degree of the desing earth force

※Should not be take into consideration, because there is few earthquake, if any

### (6)Coefficient of earth pressure

	Regular case	Eathquake case	Ep of sedimentation
Internal friction : $\phi=30^\circ$			
Friction for wall	15°	0°	-
Active EP coe.	0.301	-	0.5
Passive EP coe.	4.977	-	-

### (7)Weight of the gate facility

Item of design load	Gate on left	Gate on right	Remarks
Gate leaf (kN/vent)	370	0	Upper 120 Lower 250
Hoist (Emergency) (kN/vent)	450	0	Including the hoist weight
Hoist (kN/vent)	190	0	Upper 60 Lower 130
Actual vent wide (m)	8.00	0.00	
Height of gate (m)	6.40	0.00	Upper 3.00 Lower 3.40

### (8)Weight of the bridge

Item of design load	Regular case	Eathquake case	
Vertical load (Static load) (kN)	510.00	-	Height of the guard wall= 1.10 (m) Thick of the bridge= 1.60 (m)
Vertical load (Dynamic load) (kN)	630.00	-	
Horizontal force by wind (kN)	38.88	-	
Counter force for up-to-down st. (kN)	-	-	
Counter force for right angle (kN)	-	-	

### (9)Other load

q= 10.0 (kN/m<sup>2</sup>)      q= 3.0 (kN/m<sup>2</sup>)

### (10)Wind pressure

w= 3.0 (kN/m<sup>2</sup>) [coefficient of form plane: 1.20 round : 0.70]

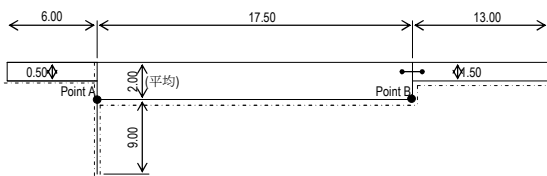
### (11)Operation deck

	W	Point on act : x	Point on act : y	Point on act : z
Deck (Static load) (kN/vent)	1407.10 (kN)	5.850 (m)	18.000 (m)	4.500 (m)
Deck (Dynamic load) (kN/vent)	240.00 (kN)	5.850 (m)	18.000 (m)	4.500 (m)
Wind pressure to deck (kN/vent)	13.13 (kN)	5.850 (m)	18.600 (m)	4.500 (m)

Thick of the deck= 1.20 (m)

### (12)揚圧力算定用諸元

設計浸透路長  $L= 51.00$  (m)  
 A点浸透路長  $L_a= 20$  (m)  
 B点浸透路長  $L_b= 37.5$  (m)



### (13)Bearing of the foundation

Qa= (kN/m<sup>2</sup>)

### (14)Friction coefficient for foundation

$\mu= 0.60$

### (15)Grand level of the embankment

採用盛土タイプ : 2

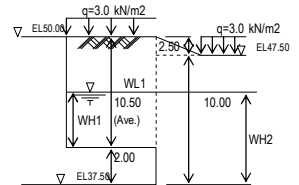
#### a)Model height of the embankment and load on embankment

	盛土高(m)	上載(kN/m <sup>2</sup> )
At case weight of site	10.50	3.0
At case of earth pres.	10.00	3.0

#### b)Water depth of the condition at the examination

	case1	case2	case3	case4	case5	case6
Design.WL1	WL46.30	WL44.80	-	WL46.30	WL44.80	-
At case weight of site.WH1	6.80	5.30	0.00	6.80	5.30	0.00
At case earth pres. WH2	8.80	7.30	0.00	8.80	7.30	0.00

※In case there is difference water level between Up-down stream, average water level of both of them should be adopted.



## 2.Calculation of the regulator weight

N	W	x	W-x	y	W-y	z	W-z
1	0.00	0.00	0.00	1.00	0.00	4.25	0.00
2	4972.50	5.85	29089.13	1.00	4972.50	4.25	21133.13
3	2834.75	14.60	41387.35	1.15	3259.96	4.25	12047.69
4	95.63	1.20	114.76	2.17	207.52	4.75	454.24
5	978.38	6.75	6604.07	2.25	2201.36	4.75	4647.31
6	38.25	12.30	470.48	2.37	90.65	4.75	181.69
7	-18.75	0.50	-9.38	2.25	-42.19	4.75	-89.06
8	16.88	0.60	10.13	2.33	39.33	4.75	80.18
9	6.75	12.90	87.08	2.43	16.40	4.75	32.06
10	22.50	15.00	337.50	2.40	54.00	4.75	106.88
11	3935.63	8.75	34436.76	6.25	24597.69	4.75	18694.24
12	151.19	16.92	2558.13	6.15	929.82	4.75	718.15
13	157.08	0.58	91.11	6.00	942.48	4.75	746.13
14	393.75	3.75	1476.56	13.50	5315.63	4.75	1870.31
15	367.50	8.00	2940.00	13.50	4961.25	4.75	1745.63
16	1425.00	7.35	10473.75	17.50	24937.50	4.75	6768.75
17	210.00	2.00	420.00	9.70	2037.00	4.50	945.00
18	-52.50	2.00	-105.00	9.70	-509.25	4.50	-236.25
19	56.25	2.00	112.50	6.25	351.56	4.30	241.88
20	17.50	2.00	35.00	2.40	42.00	4.50	78.75
21	367.50	5.90	2168.25	6.25	2296.88	4.35	1598.63
22	21.00	5.85	122.85	2.40	50.40	4.50	94.50
Σ	15,996.79		132,821.03		76,752.49		71,859.84

## 3.Calculation of the regulator ceter

$$X = \frac{\Sigma W \cdot x}{\Sigma W} = \frac{132,821.03}{15,996.79} = 8.30 \text{ (m)}$$

$$Y = \frac{\Sigma W \cdot y}{\Sigma W} = \frac{76,752.49}{15,996.79} = 4.80 \text{ (m)}$$

$$Z = \frac{\Sigma W \cdot z}{\Sigma W} = \frac{71,859.84}{15,996.79} = 4.49 \text{ (m)}$$

4. Case of the examination

【CASE1 : Regular / Direction for up-to-down st./ Full water level / Close the gate】

荷重	V (kN)	x (m)	V·x (kN·m)	H (kN)	y (m)	H·y (kN·m)
Weight of Reg.	15,996.79	8.30	132,773.36			
Op. deck (static)	703.55	5.85	4,115.77			
Op. deck (dynamic)	120.00	5.85	702.00			
Gate on left	185.00	5.85	1,082.25			
Gate on right	0.00	5.85	0.00			
Hoist on left	225.00	5.85	1,316.25			
Hoist on right	0.00	5.85	0.00			
Bridge (static)	510.00	14.52	7,405.20			
Bridge (dynamic)	630.00	14.52	9,147.60			
Weight of water	4,323.20	9.03	39,038.50			
Weight of soile	10,794.00	8.75	94,447.50			
Up-lift pre.	-12,643.75	8.75	-110,632.81			
Wind pre.(Reg. body)				53.28	13.10	697.97
Wind pre.(Gate. body)				97.92	13.00	1,272.96
Wind pre.(Bridge. body)				38.88	11.35	441.29
Wind pre.(Op. deck body)				6.57	18.60	122.20
合計	20,843.79		179,395.62	196.65		2,534.42

Note : The water pressure should be canceled out for the symmetrical force.

a) Examination for the slide force

Fc. for sliding :  $\mu=0.60$   
 Safe ratio :  $F_s=ZV \cdot \mu/ZH=$  63.60  $\geq$   $F_{sa}=1.5 \Rightarrow OK$

b) Examination for the fall down

Foundation width : B= 17.50 (m)  
 Foundation length : L= 8.50 (m)  
 Act point of the total force :  $X=(ZV \cdot x + ZH \cdot y)/ZV=$  8.73 (m)  
 Eccentric distance :  $e=X-B/2=$  -0.02 (m)  $\leq$   $B/6=2.92(m) \Rightarrow OK$   
 (compare with absolute value)

c) Examination for the bearing on foundation

$Q1=ZV/B/L(1+6 \cdot e/B)=$  139.17  
 $Q2=ZV/B/L(1-6 \cdot e/B)=$  141.09

【CASE3 : Regular / Direction for up-to-down st./ Empty / open the gate】

Laod	V (kN)	x (m)	V·x (kN·m)	H (kN)	y (m)	H·y (kN·m)
Weight of Reg.	15,996.79	8.30	132,773.36			
Op. deck (static)	703.55	5.85	4,115.77			
Op. deck (dynamic)	120.00	5.85	702.00			
Gate on left	185.00	5.85	1,082.25			
Gate on right	0.00	5.85	0.00			
Hoist on left	95.00	5.85	555.75			
Hoist on right	0.00	5.85	0.00			
Bridge (static)	510.00	14.52	7,405.20			
Bridge (dynamic)	630.00	14.52	9,147.60			
Weight of water	—	—	—			
Weight of soile	10,080.00	8.75	88,200.00			
Up-lift pre.	—	—	—			
Wind pre.(Reg. body)				68.40	11.05	755.82
Wind pre.(Gate. body)				97.92	13.00	1,272.96
Wind pre.(Bridge. body)				38.88	11.35	441.29
Wind pre.(Op. deck body)				6.57	18.60	122.20
Water pre.(up-st.)				—	—	—
Water pre.(dw-st.)				—	—	—
Sum	28,320.34		243,981.93	211.77		2,592.27

a) Examination for the slide force

Fc. for sliding :  $\mu=0.60$   
 Safe ratio :  $F_s=ZV \cdot \mu/ZH=$  80.24  $\geq$   $F_{sa}=1.5 \Rightarrow OK$

b) Examination for the fall down

Foundation width : B= 17.50 (m)  
 Foundation length : L= 8.50 (m)  
 Act point of the total force :  $X=(ZV \cdot x + ZH \cdot y)/ZV=$  8.71 (m)  
 Eccentric distance :  $e=X-B/2=$  -0.04 (m)  $\leq$   $B/6=2.92(m) \Rightarrow OK$   
 (compare with absolute value)

c) Examination for the bearing on foundation

$Q1=ZV/B/L(1+6 \cdot e/B)=$  187.78  
 $Q2=ZV/B/L(1-6 \cdot e/B)=$  193.00

【CASE2 : Regular / Direction for up-to-down st./ Regular water level / open the gate】

Laod	V (kN)	x (m)	V·x (kN·m)	H (kN)	y (m)	H·y (kN·m)
Weight of Reg.	15,996.79	8.30	132,773.36			
Op. deck (static)	703.55	5.85	4,115.77			
Op. deck (dynamic)	120.00	5.85	702.00			
Gate on left	92.50	5.85	541.13			
Gate on right	0.00	5.85	0.00			
Hoist on left	95.00	5.85	555.75			
Hoist on right	0.00	5.85	0.00			
Bridge (static)	510.00	14.52	7,405.20			
Bridge (dynamic)	630.00	14.52	9,147.60			
Weight of water	2,848.40	7.46	21,249.06			
Weight of soile	10,636.50	8.75	93,069.38			
Up-lift pre.	-8,968.14	8.59	-77,036.32			
Sedimentation	29.12	9.67	281.59			
Wind pre.(Reg. body)				52.34	13.05	683.04
Wind pre.(Gate. body)				—	—	—
Wind pre.(Bridge. body)				38.88	11.35	441.29
Wind pre.(Op. deck body)				6.57	18.60	122.20
Water pre.(up-st.)				1,386.28	2.37	3,285.48
Water pre.(dw-st.)				-831.88	1.83	-1,522.34
Earth pre.(sed.)				-5.12	2.73	-13.98
Sum	22,693.72		192,804.52	647.07		2,995.69

a) Examination for the slide force

Fc. for sliding :  $\mu=0.60$   
 Safe ratio :  $F_s=ZV \cdot \mu/ZH=$  21.04  $\geq$   $F_{sa}=1.5 \Rightarrow OK$

b) Examination for the fall down

Foundation width : B= 17.50 (m)  
 Foundation length : L= 8.50 (m)  
 Act point of the total force :  $X=(ZV \cdot x + ZH \cdot y)/ZV=$  8.63 (m)  
 Eccentric distance :  $e=X-B/2=$  -0.12 (m)  $\leq$   $B/6=2.92(m) \Rightarrow OK$   
 (compare with absolute value)

c) Examination for the bearing on foundation

$Q1=ZV/B/L(1+6 \cdot e/B)=$  146.29  
 $Q2=ZV/B/L(1-6 \cdot e/B)=$  158.84

【CASE4 : Regular / Direction for right angle to flow./ Full water level / open the gate】

Laod	V (kN)	z (m)	V·z (kN·m)	H (kN)	y (m)	H·y (kN·m)
Weight of Reg.	15,996.79	4.49	71,825.59			
Op. deck (static)	703.55	4.50	3,165.98			
Op. deck (dynamic)	120.00	4.50	540.00			
Gate on left	185.00	4.50	832.50			
Gate on right	0.00	4.50	0.00			
Hoist on left	95.00	4.50	427.50			
Hoist on right	0.00	4.50	0.00			
Bridge (static)	510.00	4.50	2,295.00			
Bridge (dynamic)	630.00	4.50	2,835.00			
Weight of water	4,323.20	2.00	8,646.40			
Weight of soile	10,794.00	3.50	37,779.00			
Up-lift pre.	-12,643.75	4.25	-53,735.94			
Sedimentation	—	—	—			
Wind pre.(Reg. body)				295.20	10.30	3,040.56
Wind pre.(Gate. body)				—	—	—
Wind pre.(Bridge. body)				—	—	—
Wind pre.(Op. deck body)				—	—	—
Water pre.(canal side)				-5,871.20	2.78	-16,321.94
Water pre.(embk. side)				6,776.00	2.27	15,381.52
Earth pre.(Emb.)	740.00	8.50	6,290.00	2,761.70	3.71	10,245.91
Earth pre.(sed.)				—	—	—
Sum	21,453.79		80,901.03	3,961.70		12,346.05

a) Examination for the slide force

Fc. for sliding :  $\mu=0.60$   
 Safe ratio :  $F_s=ZV \cdot \mu/ZH=$  3.25  $\geq$   $F_{sa}=1.5 \Rightarrow OK$

b) Examination for the fall down

Foundation width : B= 8.50 (m)  
 Foundation length : L= 17.50 (m)  
 Act point of the total force :  $X=(ZV \cdot x + ZH \cdot y)/ZV=$  3.20 (m)  
 Eccentric distance :  $e=X-B/2=$  -1.05 (m)  $\leq$   $B/6=1.42(m) \Rightarrow OK$   
 (compare with absolute value)

c) Examination for the bearing on foundation

$Q1=ZV/B/L(1+6 \cdot e/B)=$  37.33  
 $Q2=ZV/B/L(1-6 \cdot e/B)=$  251.12

【CASE5 : Regular / Direction for right angle to flow / Regular water level / close the gate】

Laod	V (kN)	x (m)	V·x (kN·m)	H (kN)	y (m)	H·y (kN·m)
Weigth of Reg.	15,996.79	4.49	71,825.59			
Op. deck (static)	703.55	4.50	3,165.98			
Op. deck (dynamic)	120.00	4.50	540.00			
Gate on left	92.50	4.50	416.25			
Gate on right	0.00	4.50	0.00			
Hoist on left	95.00	4.50	427.50			
Hosit on right	0.00	4.50	0.00			
Bridge (static)	510.00	4.50	2,295.00			
Bridge (dynamic)	630.00	4.50	2,835.00			
Weigth of water	2,848.40	2.00	5,696.80			
Weigth of sole	10,636.50	3.50	37,227.75			
Up-lift pre.	-8,968.14	4.25	-38,114.60			
Sedimentation	29.12	4.50	131.04			
Wind pre.(Reg. body)				356.33	10.17	3,623.88
Wind pre.(Gate. body)				—	—	—
Wind pre.(Bridge. body)				—	—	—
Wind pre.(Op. deck body)				—	—	—
Water pre.(canal side)				-3,231.52	2.07	-6,689.25
Water pre.(embk. side)				4,662.88	2.37	11,051.03
Earth pre. (Embk.)	904.61	8.50	7,689.19	3,376.06	3.77	12,727.75
Earth pre. (sed.)				-7.42	1.73	-12.84
Sum	23,598.33		94,135.50	5,156.33		20,700.57

a)Examination for the slide force

Fc. for sliding :  $\mu=0.60$   
 Safe ratio :  $F_s = \Sigma V \cdot \mu / \Sigma H = 2.75 \geq F_{sa}=1.5 \Rightarrow \text{OK}$

b)Examination for the fall down

Foundation width : B= 8.50 (m)  
 Foundation length : L= 17.50 (m)  
 Act point of the total force :  $X = (\Sigma V \cdot x - \Sigma H \cdot y) / \Sigma V = 3.11$  (m)  
 Eccentric distance :  $e = X - B/2 = -1.14$  (m)  $\leq B/6 = 1.42$  (m)  $\Rightarrow \text{OK}$   
 (compare with absolute value)

c)Examination for the bearing on foundation

$Q1 = \Sigma V / B / L (1 + 6 \cdot e / B) = 30.98$   
 $Q2 = \Sigma V / B / L (1 - 6 \cdot e / B) = 286.31$

【CASE6 : Regular / Direction for right angle to flow / Empty / open the gate】

Laod	V (kN)	x (m)	V·x (kN·m)	H (kN)	y (m)	H·y (kN·m)
Weigth of Reg.	15,996.79	4.49	71,825.59			
Op. deck (static)	703.55	4.50	3,165.98			
Op. deck (dynamic)	120.00	4.50	540.00			
Gate on left	185.00	4.50	832.50			
Gate on right	0.00	4.50	0.00			
Hoist on left	95.00	4.50	427.50			
Hosit on right	0.00	4.50	0.00			
Bridge (static)	510.00	4.50	2,295.00			
Bridge (dynamic)	630.00	4.50	2,835.00			
Weigth of water	—	—	—			
Weigth of sole	10,080.00	3.50	35,280.00			
Up-lift pre.	—	—	—			
Sedimentation	—	—	—			
Wind pre.(Reg. body)				595.33	7.49	4,459.02
Wind pre.(Gate. body)				—	—	—
Wind pre.(Bridge. body)				—	—	—
Wind pre.(Op. deck body)				—	—	—
Water pre.(canal side)				—	—	—
Water pre.(embk. side)				—	—	—
Earth pre. (Embk.)	1,267.89	8.50	10,777.07	4,731.83	3.38	15,993.59
Earth pre. (sed.)				—	—	—
Sum	29,588.23		127,978.64	5,327.16		20,452.61

a)Examination for the slide force

Fc. for sliding :  $\mu=0.60$   
 Safe ratio :  $F_s = \Sigma V \cdot \mu / \Sigma H = 3.33 \geq F_{sa}=1.5 \Rightarrow \text{OK}$

b)Examination for the fall down

Foundation width : B= 8.50 (m)  
 Foundation length : L= 17.50 (m)  
 Act point of the total force :  $X = (\Sigma V \cdot x - \Sigma H \cdot y) / \Sigma V = 3.63$  (m)  
 Eccentric distance :  $e = X - B/2 = -0.62$  (m)  $\leq B/6 = 1.42$  (m)  $\Rightarrow \text{OK}$   
 (compare with absolute value)

c)Examination for the bearing on foundation

$Q1 = \Sigma V / B / L (1 + 6 \cdot e / B) = 111.86$   
 $Q2 = \Sigma V / B / L (1 - 6 \cdot e / B) = 285.97$

## 6 The roughly examination of the pile foundation

According to the examination of the foundation of the apron by the geological survey, the new DGR is assumed to construct at boundary between clay layer and fine sand layer. The direct foundation type by the concrete on fine layer is considered although, it is considered of suitable foundation by pile, because the direct type foundation will be approx. 5m of thickness. In this examination it is roughly examined of the number of the pile for regulator on Bahr Yusef and Ibrahima. canal, provided the RC pile will be driven by the hummer.

However, it should be needed the detail examination to decide the foundation type for the implementation with take into consideration of the geological survey at designed point of new DGR.

### • Examination of the number of the pile

According to the size of apron, the foundation of apron is EL 37.5 m and then, the bearing layer (  $N > 30$  ) is around EL 32.3m.. Therefore the length of pile will be 7.0m, provided the embedded length of pile will be 1.5 meter.

$$EL37.5m - EL32.3m + 1.5m = 6.7m \rightarrow 7.0m$$

Furthermore according to "the specifications for highway bridges by Japan Road Association", the maximum bearing layer at end of the pile by driven is calculated by the right figure. Therefore "qd / N" equals 180 kN/m<sup>2</sup>, then the maximum bearing layer at end equals 6,600 kN/m<sup>2</sup>, provided that the diameter of RC pile is 0.5m.

$$qd = \{ (300\text{kN/m}^2 - 100\text{kN/m}^2) / 5 \times 1.5\text{m (embedded length)} / 0.5\text{m (Diameter pile)} + 100 \} \times 30\text{ (N value)} = 6,600\text{kN/m}^2$$

Accordingly, the bearing of such layer per one pile is 550kN/pc, considering the size of RC pile is 0.5m square and one-third as safety factor for maximum bearing layer. Incidentally according to the calculation of stability pier, the maximum vertical weight of pier is 24,000kN for middle pier and 29,600kN for abut pier.

Finally, the required piles is 45 pc for middle pier and 54 pc for abut pier. (Refer to the follow calculation)

$$6,600\text{kN/m}^2 \times 0.5\text{m} \times 0.5\text{m} \times 1/3 = 550\text{ kN/pc}$$

$$\text{Pile number of middle pier} : 24,000\text{kN} \times 1/550\text{ kN/pc} = 43.6\text{ pc} \rightarrow 45\text{ pc (9 line} \times 5\text{ line)}$$

$$\text{Pile number of abut pier} : 29,600\text{kN} \times 1/550\text{ kN/pc} = 53.8\text{ pc} \rightarrow 54\text{ pc (9 line} \times 6\text{ line)}$$

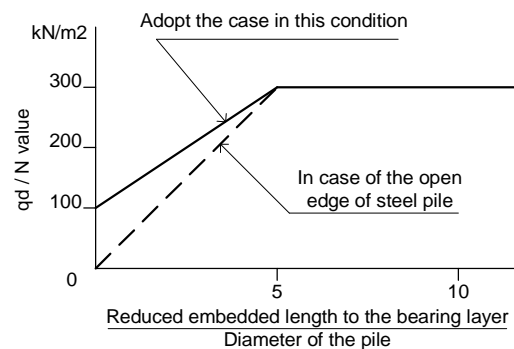



Fig : Calculation figure of the maximum bearing layer at edge of the pile



7. The cost estimation for unite prices and gates

(1) Basic price of the labor and others

The basic price for labor and other unite price is decided by the experience of other project and request for quotation and it is shown as follow;



الشركة الهندسية للصناعات والتشييد  
Industrial Construction & Engineering Company

Messers: SANYU CONSULTANTS INC.

Sub: Study for the Rehabilitation and Improvement of Dirout Group Regulators

Sirs:

Thanks a lot for your visit and request for the unit price of the concern study; we have the honor to attach our price list for the requested items:


Our price based on the following:

1. Manpower
  - The business market present condition
  - Social insurance and allowance
2. Construction Material
  - Market price
  - Handing the material at project site
  - Availability of material in the local market
3. Construction Equipment
  - Market price include operator
  - Availability
  - Fuel is excluded



We are ready to cooperate with you, so pls. keep in touch; looking forward for good future cooperation with you.

Yours Faithfully,

Engineer Mohamed Mohsen  
Technical manager  
Industrial Construction & Engineering Co. (SIAC)

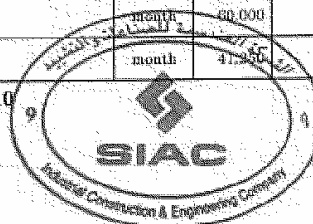


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No.	Description	Specification	Unit	Price	Remarks
AA	Manpower				including social insurance, allowance, etc.
01	Foreman		month	5,250	
02	Heavy Equipment Operator	for crane, excavator, bulldozer, etc.	month	5,500	
03	Light Equipment Operator	for track, roller, etc.	month	3,950	
04	Mechanic / Electrician		month	3,950	
05	Skilled Labour	Carpenter, Steel worker, etc.	month	3,750	
06	Semi-Skilled Labour	Concrete works, bed protection works, etc.	month	2,875	
07	Unskilled Labour		month	1,765	
EB	Construction Material				at site
01	Backfilling Sand		m <sup>3</sup>	32	
02	Gravel	30mm min.	m <sup>3</sup>	75	
03	Riprap stone	D=300mm	m <sup>3</sup>	100	
04	Portland Cement	OPC	t	696	
05	Fine Aggregate		m <sup>3</sup>	41	
06	Coarse Aggregate		m <sup>3</sup>	93	
07	Concrete Admixture	superplasticizer	kg	45	
08	Ready Mix Concrete	24N/mm <sup>2</sup>	m <sup>3</sup>	440	
09	Reinforcement bar	Grade 40	t	4,900	
10	Plywood	t=12mm	m <sup>2</sup>	120	
11	Steel Sheet Pile		t	7,900	
12	Shaped Steel	H-300	t	7,200	
CC	Construction Equipment				with Operator + without Fuel
01	Dump Truck	12m <sup>3</sup> 385kW	month	17,750	
02	Bulldozer	21t 152kW	month	45,000	
03	Wheel Loader	1.6m <sup>3</sup> 80kW	month	28,000	
04	Excavator	1.0m <sup>3</sup> 116kW	month	29,000	
05	Giant Breaker	1300kg (Base machine: 116kW)	month	43,000	
06	Clamshell Crane	1.2m <sup>3</sup> 132kW	month	65,000	
07	Vibratory Roller	10t 77kW	month	26,750	
08	Tire Roller	20t max. 71kW	month	30,000	
09	Grader	3.7m 115kW	month	48,000	
10	Crawler Crane	50t 132kW	month	60,000	
11	Wheel Crane	25t 193kW	month	47,250	

RATES ARE VALID TILL END OF MAY 2010



(2) Price of the gate manufacture and design

The price of gate manufacture and design is decided by the request for quotation. However the price of gate manufacture and design is from Japanese gate manufacturer, so the team got an appraisal the original quotation. It is shown as follow;

Gate estimation by Japanese manufacturer

(Million YEN)

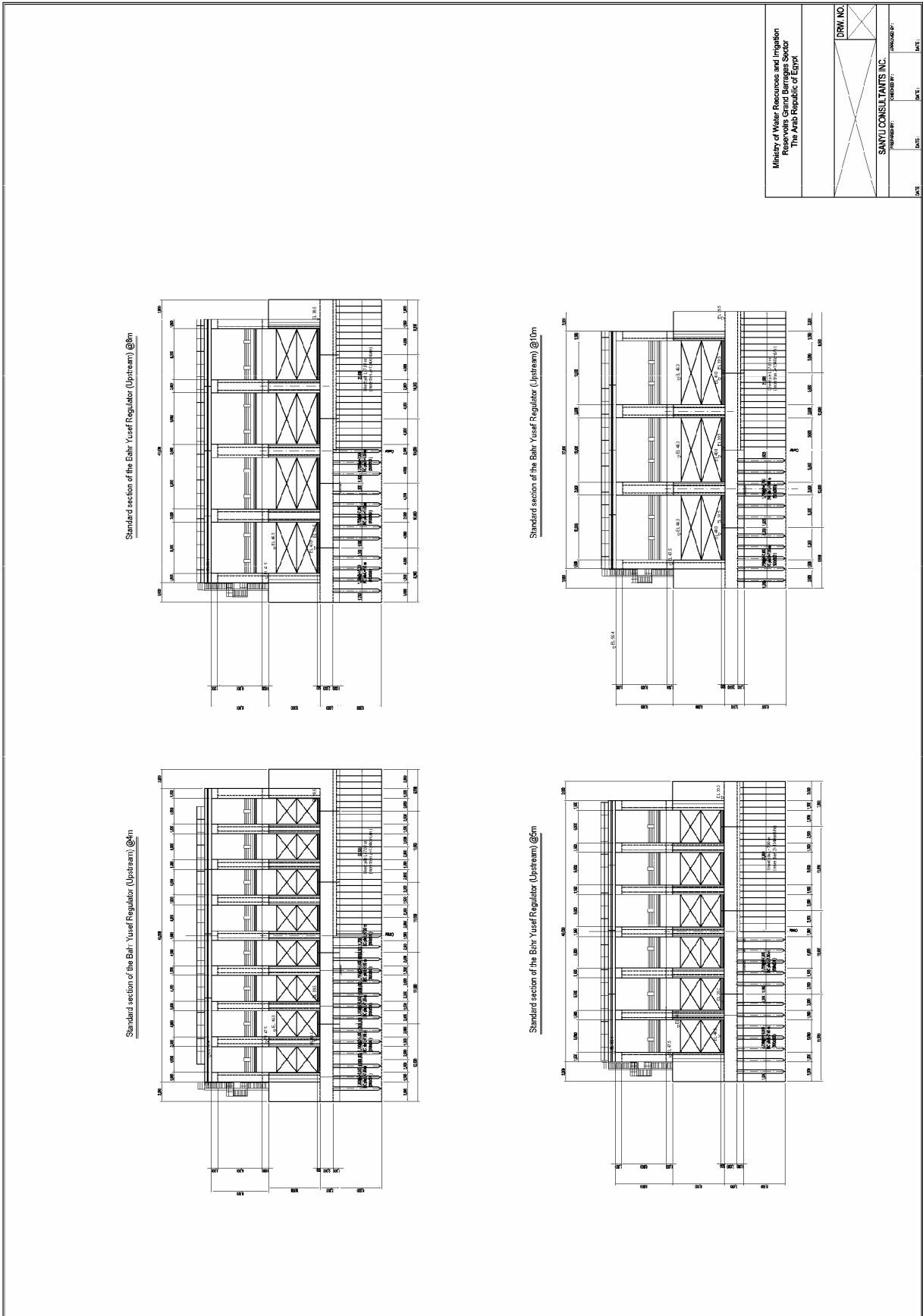
Reglator Gate type	Bahr Yusef		Ibrahimia		Badraman	Sahelyia	Abo Gabal	Sulice gate orinal size and price
	Double	Radial	Double	Radial	Sulice	Sulice	Sulice	
Gete height (m)	6.30	6.30	6.30	6.30	2.80	2.30	2.30	4.00
Gete wide (m)	8.00	8.00	8.00	8.00	4.00	4.00	4.00	4.00
Gate	65	70	65	70	13	10	10	18
Guide	22	9	22	9	6	5	5	9
Hoist and rocal c/p	98	91	98	91	11	9	9	15
Other(supprt parts etc)	---	0.150	---	0.150	---	---	---	---
Cost of the gate per 1 vent	185	170	185	170	30	24	24	42

Gate estimation by evaluation of consaltants discount

(Million YEN)

Reglator Gate type	Bahr Yusef		Ibrahimia		Badraman	Sahelyia	Abo Gabal	
	Double	Radial	Double	Radial	Sulice	Sulice	Sulice	
Gete height (m)	6.30	6.30	6.30	6.30	2.80	2.30	2.30	
Gete wide (m)	8.00	8.00	8.00	8.00	4.00	4.00	4.00	
Consaltants discount rate	0.80	0.60	0.80	0.60	0.60	0.60	0.60	
Gate	52	42	52	42	8	6	6	
Guide	18	5	18	5	4	3	3	
Hoist and rocal c/p	78	55	78	55	7	5	5	
Other(supprt parts etc)	---	0	---	0	---	---	---	
Cost of the gate per 1 vent	148	102	148	102	18	14	14	
Vent No.	4		3		2	1	1	
Cost of the gate	592		444		36	14	14	
Installation work	76		76		8	8	8	
Sum	668		520		44	22	22	
Entire cost of the gate works with Double leaf gate gate and Sulice gate							1,276	

8. The alternative of width and number for the vents as for the cost estimation



## Appendixes : Possibility study of Hydropower Generation Plan

Appendix Table 4.2.3-1	Estimation of generation and ration effective water head and water head by the Lahoun case
Appendix Table 4.2.3-2	Assumption of turbine diameter at the DGR hydropower generation plant
Appendix Table 4.2.3-3	Construction cost
Appendix Table 4.2.3-4	Construction cost for electric equipment
Appendix Table 4.2.3-5	Estimation of annual O & M cost
Appendix Table 4.2.3-6	Annual generation output (1/6 to 6/6)
Appendix Table 4.2.3-7	Cash flow estimation(1/5 to 5/5)
Appendix Table 4.2.3-8	Unit cost method for each Project (for reference)
Appendix Table 4.2.3-9	Unit construction cost for cost (LE)/KW & cost (LE)/KWh
Appendix Figure 4.2.3-1	Cumulative cash flow
Appendix Dwg 4.2.3-1	General layout of DGR hydropower plant

## **Appendix 4.2.3 Possibility study of hydropower generation plan**

### **(1) Introduction and progress of the study**

#### 1) The situation of development the mini-hydropower generation in Japan

The developing activity on Japanese mini-hydropower generation is sluggish in generally, it is a special attention that some of major enterprises are going to withdrawal from the mini-hydropower development in spite of a former positively developing the mini-hydropower activities. Thus tendency is the opposite to the positively increasing hydropower output in European countries with various supporting policies to develop and prompt the hydropower generation. On the other hand, it seems very few cases that the experience of water head less than the case of three (3) meter of low water head and it is no experience the case of big discharge and less than two (2) meter of water effective head as the DGR case, but on the contrary it will be a special case that the development of micro-hydropower is special active, that is specially small discharge as less than 10kw of generation capacity.

There were four to five opinions that it was impossible to design a turbine in such case of less than two (2) meter of effective water head by interviews to Japanese major heavy electric enterprises. The design case of the turbine less than two meter of effective water head is to be uneconomical zone and it will also be supposed to be very low priority to the project.

And European countries has being promptly introduced clean energies including hydropower generation and generation of solar, wind and biomass as hopeful to recyclable energy, but it will be disappointing in low level of Japanese except solar energy development.

For the reference, answers for interview by Japanese enterprises are as follows;

- Enterprises considering withdrawal from small scale hydropower generation two (2)
- Enterprises answered impossible to design turbine such small water head five (5)
- Enterprises answered other opinions (uneconomical, unfeasible) four (4)

#### 2) Present situation in Europe

All of European country seems to be activity the development of hydropower generation regardless of east and north countries and to be positive to carbon emission measure as recyclable clean energy with governmental supports. There are some major enterprises to develop hydropower plants and supply electricity widely to citizen.

In present, each European country is carrying out legal obligation both to improve river water quality and increase ratio of recycle energy generation with environmental consideration.

It is also active to introduce hydropower generation to redevelopment the Nile on the improvement of the barrages such as Naga Hammadi, Esna, Assiut, Delta-Barrage with the certain scale of several ten thousands kilowatts with European cooperation.

It is said as a rule that minimum effective water head is limited at two meters in Europe, then the case of the DGR with less than two meters of effective water head would be very severe case.

### **(2) The scale of hydropower plant and estimation of annual hydropower generation**

#### 1) Case study of annual hydropower generation

- a. Discharge and water head

Results of discharge and water level records for ten (10) years at Bahr-Yusef and Ibrahimia main canals

(Refer to Figure 3.4.8 for Ibrahimia and Figure 3.4.9 for Bahr-Yusef)

Effective water head (water head – water head losses) will be estimated by the results of Lahoun case.

b. Generation efficiency

Generation efficiency will be estimated by the results of Lahoun case, (See Appendix Table 4.2.3-1 Estimation of generation efficiency and ratio effective water head and water head by the Lahoun case)

c. Type of hydropower generation and size of turbine

Kaplan turbine (indicated at Lahoun H.P.P) equal to S shape tubular type (named in Japan)

(Refer to Appendix Table 4.2.3-2 Assumption of turbine diameter at the DGR hydropower generation plant)

d. Rated discharge per one unit of generation plant

As maximum usable discharge for hydropower generation will be  $150\text{m}^3/\text{s}$ , and  $50\text{m}^3/\text{s}$  will be per one unit by divided three units the discharge.

Estimate output of generation at each one unit to three units for Bahr-Yusef, and Ibrahimia respectively.

e. Construction costs

<Civil works>

Estimation of the cost for civil works based on the general layout plan on generation plant for the rated discharge

Refer to the general layout (See Appendix Dwg. 4.2.3-1 General layout of generation plants)

Refer to the construction cost (See Appendix 4.2.3-3 Construction cost)

<Electric equipment cost>

Cost estimation criteria for study at most optimized selection for development ((a foundation) headquarters edition for new energy hydropower, medium and small scale Hydropower Guide Book)

(Refer to Appendix Table 4.2.3-4 Construction cost for electric equipment)

f. Finance

Assumed that ten years deferment, repayment for 30 years and 0.3% of annual interest (Foreign portion)

g. Annual escalation rate 8 %

h. Price of sell electricity

15 Pt (approx. 2.5Yen)/kwh (H.P.P.A) (Hydropower Plant Authority (Ministry of Energy and Electricity))

i. Annual O & M cost

Approx. 0.4 % of construction cost (Estimate O & M cost) by H.P.P.A

(Refer to Appendix Table 4.2.3-5 Estimation of annual O & M cost)

j. Working life time

30 years for electro-mechanical works, and 50 years for civil works

And g, h, i. are based on H.P.P.A

2) Scale of hydropower generation plant and estimation of output of annual generation

An scale of facilitate generation (Kw) is calculated by the following formula

$$(9.8 \times Q \times H_e \times E_f) \text{ max (KW)}$$

Annual generation (Kwh) is calculated by the following formula and shown in Appendix Table

4.2.3-6 Annual generation output (1/6 to 6/6)

$$\sum (9.8 \times Q \times H_e \times E_f \times 24\text{hr}) \times \text{annual generation days}$$

Where,

Q : Rated discharge(m<sup>3</sup>/s) 50m<sup>3</sup>/s×unit (1 to 3 units)

He : Effective water head (total water head H— head losses Δ h ) (m)

Effective water head is estimated by the study of the Lahoun Case

Total water head = upstream water level – downstream water level

E<sub>f</sub> : Integrated generation efficiency (approx. 0.6 by the study of Lahoun case)

※ Integrated generation efficiency (efficiency of turbine × efficiency of generation) will be difficult because of too small of effective water head for the DGR then it will also refer to the study of Lahoun case. (See Appendix Table 4.2.3-1)

**(3) Evaluation method and conclusion (effect of development)**

The cash flow method will be made use of for the evaluation and unit cost for construction method for reference will be shown at Appendix Table 4.2.3-7 Cash flow estimation (1/5 to 5/5).

The case for cash flow estimations will be studied with and without of refinance after working life time and the case of Assiut will be estimated for reference.

1) Evaluation and conclusion

As shown the cash flow sheets, any of case for the DGR is still in negative (deficit) for more than 50 years and it will never turn to positive side. (See Appendix Figure 4.2.3-1 Cumulative cash Flow)

2) Reference (compared to other projects)

The unit cost method is comparably shown for reference under going Assiut and completed Naga Hammadi cases in Egypt, the result is cleared that the DGR case is only one / several tenth of other two cases of unit cost value (Construction cost / kW).

Table Appendix 4.2.3-8 Unit cost method for each Project (for reference)

Projects	Construction Cost/kW (LE)	Construction Cost/kWh (LE)
DGR	147,000 (10.5)	29.1 (15.3)
Assiut	26,000 (1.9)	3.5 (1.8)
Naga Hammadi	14,000 (1.0)	1.9 (1.0)

( ) shown a ratio for the DGR case to the other projects case.

(Refer to Appendix Table 4.2.3-9 Unit construction cost for cost (LE)/KW & cost (LE)/KWh)



**Appendix Table 4.2.3-1 Estimation of generation efficiency and ratio effective water head and water head by the Lahoun case.**

Efficiency of hydropower generation may be assumed by a examination of the Lahoun case

The results of the following calculations based on the gauge indication, the ration of effective water head/gross water head will be 0.7 and intergated generation efficiency will be approximately 0.6.

Condition (1) at design point	calculated	upstream(u.s)	downstream(d.s)	remarks
Discharge(m <sup>3</sup> /s)	31	shown in the drawing		
effective water head(m)	1.81	(ditto)		
Generation capacity(KW)	500	(ditto)		
Integrative efficiency of generation	0.91	(calculated backward)		too high

Condition (2) at exisisting operation	calculated	upstream(u.s)	downstream(d.s)	remarks
Discharge(m <sup>3</sup> /s)	35			gauge indication
water head difference between u.s and d.s. (m)	2.64	26.82	24.18	gauge indication
effective water head(m)	1.90	(2.64×0.72)		
ratio of effective head and water head difference	0.72	(assumed)		
Generation capacity(KW)	391	approx.390		gauge indication
Integrative efficiency of hydropower genera	0.6	(assumed)		

Condition (3) at existing operation	calculated	upstream(u.s)	downstream(d.s)	remarks
Discharge(m <sup>3</sup> /s)	17.18			gauge indication
water head difference between u.s and d.s. (m)	1.56	25.78	24.22	gauge indication
effective water head(m)	1.09	(1.56×0.7)		
ratio of effective head and water head difference	0.7	(assumed)		
Generation capacity(KW)	115.8			gauge indication
Integrative efficiency of generation	0.6	(assumed)		

### Appendix Table 4.2.3-5 Estimation of annual O & M cost

The table for the calculation of the O&M cost assumption.

Item	unit	Case J	Case E & J	Case A	Remarks
Fixed condition		Case of Japanese cost	Case of Egyptian (civil) & Japanese (electric)	Assiut case	
cost for repair					
Loan interest					
General administration cost					
Construction cost		374,000	320,200	847,700	
Annual output	(kwh)	11,000,000	11,000,000	243,000,000	
Annual output for sell possibility	(kwh)	10,670,000	10,670,000	235,710,000	
Max. generation capacity	(kw)	2,174	2,174	32,000	
Max. theoretical capacity	(kw)				
Ordinary theoretical capacity	(kw)				
Calculation condition					
Cost for personnel		LE/month	person for DGR	person for Assiut	
Engineer	(LS)	5,000	3	9	three sift
Technician	(LS)	2,500	9	27	
Labor	(LS)	1,000	18	54	
Maintenance cost for common use	(per)				neglect

unit: 1,000LE

Item	Case J	Case E & J	Case A	remarks
Construction cost	374,000	320,200	847,700	
Construction cost of local portion	205,700	51,621	466,235	
Construction cost of foreign portion	168,300	243,754	381,465	
Direct O&M cost				
Cost for personnel	666.0	666.0	1,998.0	
Cost for repair	434.8	434.8	3,200.0	max. generation capacity*200 to 100LE
Others expenditures	130.4	130.4	1,920.0	max. generation capacity* 60LE
Sub total	1,231.2	1,231.2	(7,118)	
Capitals				
Depreciation expenses	0.0	0.0	0.0	construction cost *0.9/lifetime(30 to 40year)
Loan interest	0.0	0.0	0.0	(foreign portion*(1+ i)^29-foreign portion)/30year
General administration cost	0.0	0.0	0.0	Depreciation expenses/2
Fixed property tax	0.0	0.0	0.0	
Sub total	0.0	0.0	0.0	
Cost for maintenance sector				O&M cost from Assiut Barrage extension feasibility report
Maintenance cost for general use	0.0	0.0	2,331.2	0.275%of construction cost
Others	0.0	0.0	1,089.0	4.62 LE/MWh of fixed cost
Sub total	0.0	0.0	3,420.2	
Total	1,231.2	1,231.2	3,420.2	
Prime generation cost (LE/kwh)				
Ratio of O&M cost / construction cost	0.0033	0.0038	0.0040	Total/construction cost
	0.33%	0.38%	0.40%	

**Appendix Table 4.2.3-6 Annual hydropower output(1/6) (case 1-1)**

Possibility of hydropower plan maximum

Items for study	unit	month	Jan.	Feb.	Mar.	Apr.	may.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
10-year monthly average discharge	m <sup>3</sup> /sec		45	130	157	160	167	206	208	208	165	150	137	100
Gross water head	m		1.3	1.3	0.9	1	0.9	0.3	0.2	0.3	0.9	1.1	1.3	1.7
total	m		1.5	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Loss of head through vent	m		2.8	1.5	1.1	1.1	1	0.4	0.3	0.4	1	1.2	1.4	1.9
$(0.8*(Q/90)^{2/2g})$	m		0.01	0.09	0.12	0.13	0.14	0.21	0.22	0.22	0.14	0.11	0.09	0.05
Total head (H)	m		2.79	1.41	0.98	0.97	0.86	0.19	0.08	0.18	0.86	1.09	1.31	1.85
effective head (loss of trash rack and others	m	20%of H	2.23	1.13	0.78	0.78	0.69				0.69	0.87	1.04	1.48
proposed discharge of HP unit	m <sup>3</sup> /sec	50		3	3	3	3				3	3	3	2
efficiency of turbine		approx.		0.6	0.6	0.6	0.6				0.6	0.3	0.3	0.6
	kw			998	689	685	606				609	383	461	870
	kwh			670,865	512,258	493,299	451,191	0	0	0	438,336	285,220	331,598	647,322
														3,830,089

max. 870 kw

max.

3,830,089

Ibrahimiya

Items for study	unit	month	Jan.	Feb.	Mar.	Apr.	may.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
10-year monthly average discharge	m <sup>3</sup> /sec		48	118	124	137	137	174	174	170	144	146	121	103
Gross water head	m		1.5	1.5	1.4	1.4	1.3	0.8	0.8	0.9	1.3	1.5	1.6	1.8
total	m		1.5	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Loss of head for through vent	m		3	1.7	1.6	1.5	1.4	0.9	0.9	1	1.4	1.6	1.7	2
$(0.8*(Q/126)^{2/2g})$	m		0.01	0.04	0.04	0.05	0.05	0.08	0.08	0.07	0.05	0.05	0.04	0.03
Total head (H)	m		2.99	1.66	1.56	1.45	1.35	0.82	0.82	0.93	1.35	1.55	1.66	1.97
effective head (loss of trash rack and others	m	20%of H	2.40	1.33	1.25	1.16	1.08	0.66	0.66	0.74	1.08	1.24	1.33	1.58
proposed discharge of HP unit	m <sup>3</sup> /sec	50		2	2	3	3	3	3	3	3	3	2	2
efficiency of turbine				0.6	0.6	0.6	0.3	0.3	0.3	0.3	0.3	0.6	0.6	0.6
	kw			783	734	1,024	477	290	290	327	475	1,090	782	928
	kwh			526,069	546,129	737,533	354,811	208,842	215,804	242,981	342,081	811,177	563,021	690,410

max. 1,090

5,238,857

9,068,946 (annual output kwh)

total of annual hydro-power capacity kw 1,960

**Appendix Table 4.2.3-6 Annual hydropower output(2/6) (case 1-2)**

Possibility of hydropower plan maximum

Bahr-Yousef

Items for study	unit	month	Jan.	Feb.	Mar.	Apr.	may.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
10-year monthly average discharge	m <sup>3</sup> /sec		45	130	157	160	167	206	208	208	165	150	137	100
Gross water head	m		1.3	1.3	0.9	1	0.9	0.3	0.2	0.3	0.9	1.1	1.3	1.7
			1.5	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
total	m		2.8	1.5	1.1	1.1	1	0.4	0.3	0.4	1	1.2	1.4	1.9
Loss of head through vent	m		0.01	0.09	0.12	0.13	0.14	0.21	0.22	0.22	0.14	0.11	0.09	0.05
$(0.8*(Q/90)^{2/2g})$														
Total head (H)	m		2.79	1.41	0.98	0.97	0.86	0.19	0.08	0.18	0.86	1.09	1.31	1.85
effective head (loss of trash rack and others	m	20%of H	2.23	1.13	0.78	0.78	0.69				0.69	0.87	1.04	1.48
proposed discharge of HP unit	m <sup>3</sup> /sec	50			2	2	2				2	2	2	2
efficiency of turbine		approx.			0.6	0.6	0.6				0.6	0.6	0.6	0.6
					666	459	457	404			406	511	614	870
	kw													
	kwh			447,243	341,505	328,866	300,794	0	0	0	292,224	380,293	442,131	647,322
														3,180,379
														max.
														870 kw

Ibrahimiya

Items for study	unit	month	Jan.	Feb.	Mar.	Apr.	may.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
10-year monthly average discharge	m <sup>3</sup> /sec		48	118	124	137	137	174	174	170	144	146	121	103
Gross water head	m		1.5	1.5	1.4	1.4	1.3	0.8	0.8	0.9	1.3	1.5	1.6	1.8
			1.5	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
total	m		3	1.7	1.6	1.5	1.4	0.9	0.9	1	1.4	1.6	1.7	2
Loss of head for through vent	m		0.01	0.04	0.04	0.05	0.05	0.08	0.08	0.07	0.05	0.05	0.04	0.03
$(0.8*(Q/126)^{2/2g})$														
Total head (H)	m		2.99	1.66	1.56	1.45	1.35	0.82	0.82	0.93	1.35	1.55	1.66	1.97
effective head (loss of trash rack and others	m	20%of H	2.40	1.33	1.25	1.16	1.08	0.66	0.66	0.74	1.08	1.24	1.33	1.58
proposed discharge of HP unit	m <sup>3</sup> /sec	50			2	2	2				2	2	2	2
efficiency of turbine		approx.			0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
					783	734	683	636	387	387	435	727	782	928
	kw													
	kwh			526,069	546,129	491,689	473,081	278,456	287,738	323,974	456,107	540,785	563,021	690,410
														5,177,459
														max.
														928 kw
														1,798 kw
														8,357,838 (annual output kwh)

Appendix Table 4.2.3-6 Annual hydropower output(3/6) (case 1-3)

Possibility of hydropower plan maximum

Items for study	unit	month	Jun.	Feb.	Mar.	Apr.	may.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
10-year monthly average discharge	m <sup>3</sup> /sec		45	130	157	160	167	206	208	208	165	150	137	100
Gross water head	m		1.3	1.3	0.9	1	0.9	0.3	0.2	0.3	0.9	1.1	1.3	1.7
total	m		1.5	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Loss of head through vent	m		2.8	1.5	1.1	1.1	1	0.4	0.3	0.4	1	1.2	1.4	1.9
(0.8*(Q2/90) <sup>2</sup> /2g)	m		0.01	0.09	0.12	0.13	0.14	0.21	0.22	0.22	0.14	0.11	0.09	0.05
Total head (H)	m		2.79	1.41	0.98	0.97	0.86	0.19	0.08	0.18	0.86	1.09	1.31	1.85
effective head (loss of trash rack and others)	m	20%of H	1.95	0.99	0.68	0.68	0.60	0.13	0.06	0.13	0.60	0.76	0.91	1.29
proposed discharge of HP unit	m <sup>3</sup> /sec	50			1	1	1	0	0	0	1	1	1	1
ratio Qa/Q0				2.60	3.14	3.20	3.34				3.30	3.00	2.74	2.00
efficiency of turbine		approx.		0.6	0.6	0.6	0.6				0.6	0.6	0.6	0.6
	kw			291	201	200	177				178	224	269	381
	kwh			195,669	149,409	143,879	131,597	0	0	0	127,848	166,378	193,432	283,203
														max. 381 kw
														1,391,416

Ibrahimiya

Items for study	unit	month	Jun.	Feb.	Mar.	Apr.	may.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
10-year monthly average discharge	m <sup>3</sup> /sec		48	118	124	137	137	174	174	170	144	146	121	103
Gross water head	m		1.5	1.5	1.4	1.4	1.3	0.8	0.8	0.9	1.3	1.5	1.6	1.8
total	m		1.5	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Loss of head for through vent	m		3	1.7	1.6	1.5	1.4	0.9	0.9	1	1.4	1.6	1.7	2
(0.8*(Q2/126) <sup>2</sup> /2g)	m		0.01	0.04	0.04	0.05	0.05	0.08	0.08	0.07	0.05	0.05	0.04	0.03
Total head (H)	m		2.99	1.66	1.56	1.45	1.35	0.82	0.82	0.93	1.35	1.55	1.66	1.97
effective head (loss of trash rack and others)	m	20%of H	2.10	1.16	1.09	1.02	0.95	0.58	0.58	0.65	0.94	1.08	1.16	1.38
proposed discharge of HP unit	m <sup>3</sup> /sec	50			1	1	1	1	1	1	1	1	1	1
ratio Qa/Q0				2.36	2.48	2.74	2.74	3.48	3.48	3.40	2.88	2.92	2.42	2.06
efficiency of turbine				0.6	0.6	0.6	0.6	0.3	0.3	0.3	0.3	0.6	0.6	0.6
	kw			342	321	299	139	85	85	95	139	318	342	406
	kwh			230,155	238,932	215,114	103,486	60,912	62,943	70,869	99,773	236,593	246,322	302,054
														max. 406 kw
														1,867,154
														3,258,570 (annual output kwh)

total of annual hydro-power capacity 787

**Appendix Table 4.2.3-6 Annual hydropower output(4/6) (case 2-1)**

Possibility of hydropower plan maximum

Bahr-Yousef

Items for study	unit	month	Jun.	Feb.	Mar.	Apr.	may.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
10-year monthly average discharge	m <sup>3</sup> /sec		45	130	157	160	167	206	208	208	165	150	137	100
Gross water head	m		1.7	1.7	1.3	1.4	1.3	0.7	0.6	0.7	1.3	1.5	1.7	2.1
total	m		3.2	1.9	1.5	1.5	1.4	0.8	0.7	0.8	1.4	1.6	1.8	2.3
Loss of head through vent (0.8*(Q2/90) <sup>2</sup> /2g)	m		0.01	0.09	0.12	0.13	0.14	0.21	0.22	0.22	0.14	0.11	0.09	0.05
Total head (H)	m		3.19	1.81	1.38	1.37	1.26	0.59	0.48	0.58	1.26	1.49	1.71	2.25
effective head (loss of trash rack and others	m	20%of H	2.55	1.45	1.10	1.10	1.01	0.47	0.39	0.47	1.01	1.19	1.36	1.80
proposed discharge of HP unit	m <sup>3</sup> /sec	50		3	3	3	3	0	0	0	3	3	3	2
efficiency of turbine		approx.		0.6	0.6	0.6	0.6				0.6	0.6	0.6	0.6
	kw			1,281	971	967	889	0	0	0	891	1,049	1,203	1,058
	kwh			860,530	722,245	696,512	661,177	0	0	0	641,549	780,426	866,409	787,313

max. 1,058 kw  
6,016,161

Ibrahimiya

Items for study	unit	month	Jun.	Feb.	Mar.	Apr.	may.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
10-year monthly average discharge	m <sup>3</sup> /sec		48	118	124	137	137	174	174	170	144	146	121	103
Gross water head	m		1.9	1.9	1.8	1.8	1.7	1.2	1.2	1.3	1.7	1.9	2	2.2
total	m		3.4	2.1	2	1.9	1.8	1.3	1.3	1.4	1.8	2	2.1	2.4
Loss of head for through vent (0.8*(Q2/126) <sup>2</sup> /2g)	m		0.01	0.04	0.04	0.05	0.05	0.08	0.08	0.07	0.05	0.05	0.04	0.03
Total head (H)	m		3.39	2.06	1.96	1.85	1.75	1.22	1.22	1.33	1.75	1.95	2.06	2.37
effective head (loss of trash rack and others	m	20%of H	2.72	1.65	1.57	1.48	1.40	0.98	0.98	1.06	1.40	1.56	1.65	1.90
proposed discharge of HP unit	m <sup>3</sup> /sec	50		2	2	3	3	3	3	3	3	3	2	2
efficiency of turbine				0.6	0.6	0.6	0.6	0.3	0.3	0.3	0.6	0.6	0.6	0.6
	kw			971	922	1,307	1,236	431	431	468	1,232	1,373	970	1,116
	kwh			652,512	686,120	940,746	919,608	310,449	320,797	347,974	887,374	1,021,163	698,496	830,401

max. 1,373 kw  
7,615,640

total of annual hydro-power capacity kw 2,431

13,631,802 (annual output kwh)

Appendix Table 4.2.3-6 Annual hydropower output(5/6) (case 2-2)

Possibility of hydropower plan maximum

Bahr-Yousef

Items for study	unit	month	Jun.	Feb.	Mar.	Apr.	may.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
10-year monthly average discharge	m <sup>3</sup> /sec		45	130	157	160	167	206	208	208	165	150	137	100
Gross water head	m		1.7	1.7	1.3	1.4	1.3	0.7	0.6	0.7	1.3	1.5	1.7	2.1
total	m		3.2	1.9	1.5	1.5	1.4	0.8	0.7	0.8	1.4	1.6	1.8	2.3
Loss of head through vent (0.8*(Q2/90) <sup>2</sup> /2g)	m		0.01	0.09	0.12	0.13	0.14	0.21	0.22	0.22	0.14	0.11	0.09	0.05
Total head (H)	m		3.19	1.81	1.38	1.37	1.26	0.59	0.48	0.58	1.26	1.49	1.71	2.25
effective head (loss of trash rack and others	m	20%of H	2.55	1.45	1.10	1.10	1.01				1.01	1.19	1.36	1.80
proposed discharge of HP unit	m <sup>3</sup> /sec	50			2	2	2	0	0	0	2	2	2	2
efficiency of turbine		approx.			0.6	0.6	0.6				0.6	0.6	0.6	0.6
	kw			854	647	645	592	0	0	0	594	699	802	1,058
	kwh			573,687	481,497	464,341	440,785	0	0	0	427,699	520,284	577,606	787,313

max. 1,058

4,273,212

Ibrahimiya

Items for study	unit	month	Jun.	Feb.	Mar.	Apr.	may.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
10-year monthly average discharge	m <sup>3</sup> /sec		48	118	124	137	137	174	174	170	144	146	121	103
Gross water head	m		1.9	1.9	1.8	1.8	1.7	1.2	1.2	1.3	1.7	1.9	2	2.2
total	m		3.4	2.1	2	1.9	1.8	1.3	1.3	1.4	1.8	2	2.1	2.4
Loss of head for through vent (0.8*(Q2/126) <sup>2</sup> /2g)	m		0.01	0.04	0.04	0.05	0.05	0.08	0.08	0.07	0.05	0.05	0.04	0.03
Total head (H)	m		3.39	2.06	1.96	1.85	1.75	1.22	1.22	1.33	1.75	1.95	2.06	2.37
effective head (loss of trash rack and others	m	20%of H	2.72	1.65	1.57	1.48	1.40	0.98	0.98	1.06	1.40	1.56	1.65	1.90
proposed discharge of HP unit	m <sup>3</sup> /sec	50			2	2	2	2	2	2	2	2	2	2
efficiency of turbine				0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	kw			971	922	871	824	575	575	624	822	915	970	1,116
	kwh			652,512	686,120	627,164	613,072	413,932	427,729	463,965	591,583	680,776	698,496	830,401

max. 1,116 KW

6,685,750 2174 kw

total of annual hydro-power capacity kw 2174

10,958,962 (annual output kwh)

Appendix Table 4.2.3-6 Annual hydropower output(6/6) (case 2-3)

Possibility of hydropower plan maximum

Items for study	unit	month	Jun.	Feb.	Mar.	Apr.	may.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
10-year monthly average discharge	m <sup>3</sup> /sec		45	130	157	160	167	206	208	208	165	150	137	100
Gross water head	m		1.7	1.7	1.3	1.4	1.3	0.7	0.6	0.7	1.3	1.5	1.7	2.1
total	m		1.5	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Loss of head through vent	m		0.01	0.09	0.12	0.13	0.14	0.21	0.22	0.22	0.14	0.11	0.09	0.05
(0.8*(Q2/90) <sup>2</sup> /2g)														
Total head (H)	m		3.19	1.81	1.38	1.37	1.26	0.59	0.48	0.58	1.26	1.49	1.71	2.25
effective head (loss of trash rack and others	m	20%of H	2.55	1.45	1.10	1.10	1.01	0	0	1.01	1.01	1.19	1.36	1.80
proposed discharge of HP unit	m <sup>3</sup> /sec	50		1	1	1	1	0	0	0	1	1	1	1
ratio Qa/Q0				2.60	3.14	3.20	3.34				3.30	3.00	2.74	2.00
efficiency of turbine		approx.		0.6	0.6	0.6	0.6				0.6	0.6	0.6	0.6
	kw			427	324	322	296	0	0	0	297	350	401	529
	kwh			286,843	240,748	232,171	220,392	0	0	0	213,850	260,142	288,803	393,656

max. 529 kw  
2,136,606

Ibrahimiya

Items for study	unit	month	Jun.	Feb.	Mar.	Apr.	may.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
10-year monthly average discharge	m <sup>3</sup> /sec		48	118	124	137	137	174	174	170	144	146	121	103
Gross water head	m		1.9	1.9	1.8	1.8	1.7	1.2	1.2	1.3	1.7	1.9	2	2.2
total	m		1.5	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Loss of head for through vent	m		3.4	2.1	2	1.9	1.8	1.3	1.3	1.4	1.8	2	2.1	2.4
(0.8*(Q2/120) <sup>2</sup> /2g)			0.01	0.04	0.04	0.05	0.05	0.08	0.08	0.07	0.05	0.05	0.04	0.03
Total head (H)	m		3.39	2.06	1.96	1.85	1.75	1.22	1.22	1.33	1.75	1.95	2.06	2.37
effective head (loss of trash rack and others	m	20%of H	2.72	1.65	1.57	1.48	1.40	0.98	0.98	1.06	1.40	1.56	1.65	1.90
proposed discharge of HP unit	m <sup>3</sup> /sec	50		1	1	1	1	1	1	1	1	1	1	1
ratio Qa/Q0				2.36	2.48	2.74	2.74	3.48	3.48	3.40	2.88	2.92	2.42	2.06
efficiency of turbine				0.6	0.6	0.6	0.6	0.3	0.3	0.3	0.6	0.6	0.6	0.6
	kw			486	461	436	412	144	144	156	411	458	485	558
	kwh			326,256	343,060	313,582	306,536	103,483	106,932	115,991	295,791	340,388	349,248	415,200

max. 558 kw  
3,016,468

total of annual hydro-power capacity

5,153,074 (annual output kwh)



**Appendix Table 4.2.3-7 Cash flow estimation (1/5)** (with refinement)  
 Case 1-2 Output: 8,700,000 kwh Initial construction cost: 320,200 thousand LE Price increase rate=0.08 Annual O&M cost 0.38% unit: 1,000LE

Year	Financial source			Balance of the budget for the construction of generation plant			Balance of the budget after construction of generation plant			Real annual O&M cost	The year for recovery of construction cost	Remarks
	Construction cost (A)	State Budget (B)	Loan Budget (C)	Break down of revenue	Net general revenue	Cumulative total of revenue	Electric bill produce by generation plant	Annual cost for O&M maintenance (c)	Governmental subsidy (d)			
	(A)	(B)	(C)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	320,200	76,400	243,800	76,400	265,926	76,400	76,400	8,000,000	0.38% of initial	0	74	74
2								1,305	1,231	0	80	80
3								1,305	1,330	0	153	153
4								1,409	1,330	0	80	80
5								1,522	1,436	0	86	86
6								1,644	1,551	0	93	93
7								1,775	1,675	0	100	100
8								1,917	1,809	0	108	108
9								2,071	1,954	0	117	117
10								2,239	2,110	0	126	126
11								2,415	2,279	0	137	137
12								2,609	2,461	0	147	147
13								2,817	2,658	0	159	159
14								3,043	2,871	0	172	172
15								3,286	3,100	0	186	186
16								3,549	3,349	0	201	201
17								3,833	3,616	0	217	217
18								4,140	3,906	0	234	234
19								4,471	4,218	0	253	253
20								4,829	4,556	0	273	273
21								5,215	4,920	0	295	295
22								5,632	5,314	0	318	318
23								6,083	5,739	0	344	344
24								6,569	6,199	0	371	371
25								7,093	6,694	0	401	401
26								7,656	7,229	0	433	433
27								8,275	7,808	0	468	468
28								8,937	8,432	0	505	505
29								9,652	9,107	0	546	546
30								10,424	9,835	0	589	589
31								11,258	10,622	0	636	636
32								12,159	11,473	0	687	687
33								13,132	12,390	0	742	742
34								14,182	13,381	0	802	802
35								15,317	14,451	0	866	866
36								16,542	15,607	0	935	935
37								17,866	16,856	0	1,010	1,010
38								19,295	18,204	0	1,091	1,091
39								20,838	19,665	0	1,178	1,178
40								22,506	21,254	0	1,272	1,272
41								24,309	22,982	0	1,374	1,374
42								26,250	24,867	0	1,484	1,484
43								28,351	26,748	0	1,602	1,602
44								30,619	28,888	0	1,731	1,731
45								33,068	31,199	0	1,869	1,869
46								35,713	33,695	0	2,019	2,019
47								38,571	36,390	0	2,180	2,180
48								41,663	39,302	0	2,354	2,354
49								44,999	42,446	0	2,543	2,543
50								48,588	45,842	0	2,746	2,746
51								52,439	49,509	0	2,966	2,966
52								56,573	53,470	0	3,203	3,203
53								61,027	57,747	0	3,459	3,459
54										0		

Note: The price of electricity may be included governmental subsidy but it will be out of project cost  
 electricity price is 0.16LE/kwh  
 30year repayment interest 0.39%  
 243,800 \*(1+0.003)<sup>30</sup>  
 265,926 /30years  
 8,864 year

**Appendix Table 4.2.3-7 Cash flow estimation (2/5)** (without refinancing)

Case 1-2

Output: 8,700,000 kwh Initial construction cost: 320,200 thousand LE Price increase rate=0.08 Annual O&M cost 0.38%

unit: 1,000LE

Year	Financial source				Balance of the budget for the construction of generation plant				Balance of the budget after construction of generation plant				Real annual O&M cost	The year for recovery of construction cost	Remarks	
	Constructi on cost (A)	State Budget (B)	Loan Budget (C)	Public property (1)	General revenue		Net general revenue (D)=(a)	Cumulative total of revenue (D)=(a)	Electric bill produce by generation plant (b)	Annual cost for maintenance (c)	Governmental subsidy (d)	Cost for Income E=b-(c+d)				Cumulative total income (E)
					Break down of repayment	Total										
1	320,200	76,400	243,800	76,400	0	76,400	76,400	8,700,000	0.38%	0	0	0	0			
2								*0.15	1,231	1,231	0	74	74	-76,326	1	As shown the table, annual income will be debt through more than 50 years after construction
3									1,305	1,305	0	0	0	80	2	
4									1,409	1,409	0	0	0	153	3	
5									1,522	1,522	0	86	86	86	4	
6									1,644	1,644	0	93	93	86	5	
7									1,775	1,775	0	100	100	100	6	
8									1,917	1,917	0	108	108	108	7	
9									2,071	2,071	0	117	117	117	8	
10									2,237	2,237	0	126	126	126	9	
11									2,415	2,415	0	137	137	137	10	
12									2,609	2,609	0	147	147	147	11	
13									2,817	2,817	0	159	159	159	12	
14									3,043	3,043	0	172	172	172	13	
15									3,286	3,286	0	186	186	186	14	
16									3,549	3,549	0	201	201	201	15	
17									3,833	3,833	0	217	217	217	16	
18									4,140	4,140	0	234	234	234	17	
19									4,471	4,471	0	253	253	253	18	
20									4,829	4,829	0	273	273	273	19	
21									5,215	5,215	0	295	295	295	20	
22									5,632	5,632	0	318	318	318	21	
23									6,083	6,083	0	344	344	344	22	
24									6,569	6,569	0	371	371	371	23	
25									7,095	7,095	0	401	401	401	24	
26									7,662	7,662	0	433	433	433	25	
27									8,275	8,275	0	468	468	468	26	
28									8,937	8,937	0	505	505	505	27	
29									9,652	9,652	0	546	546	546	28	
30									10,424	10,424	0	589	589	589	29	
31									11,258	11,258	0	636	636	636	30	
32									12,159	12,159	0	687	687	687	31	
33									13,132	13,132	0	742	742	742	32	
34									14,182	14,182	0	802	802	802	33	
35									15,317	15,317	0	866	866	866	34	
36									16,542	16,542	0	935	935	935	35	
37									17,866	17,866	0	1,010	1,010	1,010	36	
38									18,204	18,204	0	1,091	1,091	1,091	37	
39									19,295	19,295	0	1,178	1,178	1,178	38	
40									20,306	20,306	0	1,272	1,272	1,272	39	
41									21,374	21,374	0	1,374	1,374	1,374	40	
42									22,507	22,507	0	1,484	1,484	1,484	41	
43									23,715	23,715	0	1,602	1,602	1,602	42	
44									25,000	25,000	0	1,731	1,731	1,731	43	
45									26,369	26,369	0	1,869	1,869	1,869	44	
46									27,824	27,824	0	2,019	2,019	2,019	45	
47									29,369	29,369	0	2,180	2,180	2,180	46	
48									31,008	31,008	0	2,354	2,354	2,354	47	
49									32,744	32,744	0	2,543	2,543	2,543	48	
50									34,581	34,581	0	2,746	2,746	2,746	49	
51									36,524	36,524	0	2,966	2,966	2,966	50	
52									38,578	38,578	0	3,203	3,203	3,203	51	
53									40,747	40,747	0	3,459	3,459	3,459		
54									43,035	43,035	0	3,737	3,737	3,737		

Note: The price of electricity may be electricity price is 0.15LE/kwh included governmental subsidy but it will be out of project cost

30year repayment interest 0.3%  
243,800 \*(1+0.003)<sup>29</sup>  
265,926 / 30years  
8,864 year

**Appendix Table 4.2.3-7 Cash flow estimation (3/5)** (with refinancing)

Case2-2

Output: 1,100,000 kwh

Initial construction cost: 320,200 thousand LE

Price increase rate=0.08 Annual O&M cost 0.38%

unit: 1,000LE

Year	Balance of the budget for the construction of generation plant										Balance of the budget after construction of generation plant				Real annual O&M cost D-E	The year for recovery of construction cost ΣD-ΣE	Remarks
	Construction cost (A)	Financial source		General revenue		Net general source of revenue (D)=(a)-(b)-(c)-(d)	Cumulative total source of revenue (ΣD)	Electric bill produce by generation plant (b)	O&M cost		Cost for Income E=b-(c+d)	Cumulative income ΣE					
		State Budget (B)	Loan Budget (C)	Break down of revenue	Public property (1)				Cumulative total (a)=(1)+(2)	Annual cost for maintenance (c)			Government subsidy (d) note				
														State Budget			
1	320,200	76,400	243,800	76,400	0	76,400	76,400	11,000,000	0.38% constr. cost	0	419	419	-75,981	-75,981	1	As shown the table, annual income will be debt through more than 50 years after construction	
2					265,926	76,400	76,400	*0.15	1,650	1,231	0	452	452	-75,529	-75,529		2
3						76,400	76,400		1,782	1,361	0	488	488	-75,041	-75,041		3
4						76,400	76,400		1,925	1,436	0	528	528	-74,513	-74,513		4
5						76,400	76,400		2,079	1,551	0	570	570	-73,943	-73,943		5
6						76,400	76,400		2,245	1,675	0	615	615	-73,328	-73,328		6
7						76,400	76,400		2,424	1,809	0	665	665	-72,663	-72,663		7
8						76,400	76,400		2,618	1,954	0	718	718	-71,946	-71,946		8
9						76,400	76,400		2,828	2,110	0	775	775	-71,171	-71,171		9
10						76,400	76,400		3,054	2,279	0	837	837	-70,334	-70,334		10
11						76,400	76,400		3,298	2,461	0	904	904	-69,441	-69,441		11
12						76,400	76,400		3,562	2,658	0	976	976	-68,494	-68,494		12
13						76,400	76,400		3,850	2,871	0	1,055	1,055	-67,493	-67,493		13
14						76,400	76,400		4,155	3,100	0	1,139	1,139	-66,437	-66,437		14
15						76,400	76,400		4,487	3,349	0	1,230	1,230	-65,326	-65,326	15	
16						76,400	76,400		4,846	3,616	0	1,328	1,328	-64,160	-64,160	16	
17						76,400	76,400		5,234	3,906	0	1,435	1,435	-62,940	-62,940	17	
18						76,400	76,400		5,653	4,218	0	1,549	1,549	-61,665	-61,665	18	
19						76,400	76,400		6,105	4,556	0	1,673	1,673	-60,336	-60,336	19	
20						76,400	76,400		6,592	4,920	0	1,807	1,807	-58,953	-58,953	20	
21						76,400	76,400		7,112	5,314	0	1,952	1,952	-57,516	-57,516	21	
22						76,400	76,400		7,669	5,739	0	2,108	2,108	-56,026	-56,026	22	
23						76,400	76,400		8,260	6,198	0	2,277	2,277	-54,483	-54,483	23	
24						76,400	76,400		8,887	6,694	0	2,459	2,459	-52,887	-52,887	24	
25						76,400	76,400		9,552	7,229	0	2,655	2,655	-51,238	-51,238	25	
26						76,400	76,400		10,257	7,808	0	2,868	2,868	-49,536	-49,536	26	
27						76,400	76,400		11,000	8,432	0	3,097	3,097	-47,783	-47,783	27	
28						76,400	76,400		11,784	9,107	0	3,345	3,345	-45,980	-45,980	28	
29						76,400	76,400		12,609	9,835	0	3,613	3,613	-44,128	-44,128	29	
30						76,400	76,400		13,478	10,622	0	3,902	3,902	-42,228	-42,228	30	
31						76,400	76,400		14,392	11,472	0	4,214	4,214	-40,270	-40,270	31	
32						76,400	76,400		15,352	12,390	0	4,551	4,551	-38,254	-38,254	32	
33						76,400	76,400		16,360	13,381	0	4,915	4,915	-36,181	-36,181	33	
34						76,400	76,400		17,418	14,451	0	5,308	5,308	-34,051	-34,051	34	
35						76,400	76,400		18,528	15,607	0	5,733	5,733	-31,865	-31,865	35	
36						76,400	76,400		19,692	16,856	0	6,192	6,192	-29,624	-29,624	36	
37						76,400	76,400		20,915	18,204	0	6,687	6,687	-27,328	-27,328	37	
38						76,400	76,400		22,289	19,661	0	7,222	7,222	-24,977	-24,977	38	
39						76,400	76,400		23,824	21,234	0	7,800	7,800	-22,572	-22,572	39	
40						76,400	76,400		25,424	22,932	0	8,423	8,423	-20,114	-20,114	40	
41						76,400	76,400		27,092	24,767	0	9,097	9,097	-17,604	-17,604	41	
42						76,400	76,400		28,932	26,748	0	9,825	9,825	-15,045	-15,045	42	
43						76,400	76,400		30,948	28,888	0	10,611	10,611	-12,438	-12,438	43	
44						76,400	76,400		33,144	31,199	0	11,460	11,460	-9,783	-9,783	44	
45						76,400	76,400		35,528	33,695	0	12,377	12,377	-7,078	-7,078	45	
46						76,400	76,400		38,104	36,390	0	13,367	13,367	-4,323	-4,323	46	
47						76,400	76,400		40,876	39,302	0	14,436	14,436	-1,518	-1,518	47	
48						76,400	76,400		43,848	42,436	0	15,591	15,591	1,237	1,237	48	
49						76,400	76,400		47,016	45,842	0	16,839	16,839	3,982	3,982	49	
50						76,400	76,400		50,384	49,509	0	18,186	18,186	6,727	6,727	50	
51						76,400	76,400		54,948	53,470	0	19,641	19,641	9,462	9,462	51	
52						76,400	76,400		60,712	57,747	0	21,209	21,209	12,107	12,107	52	
53						76,400	76,400		67,680	62,447	0	22,894	22,894	14,736	14,736	53	
54						76,400	76,400		75,956	67,588	0	24,701	24,701	17,355	17,355	54	

Note: The price of electricity may be included governmental subsidy but it will be out of project cost

electricity price=0.15LE/kwh  
30year repayment interest 0.3%  
243,800 \*(1+0.003)<sup>29</sup>  
265,926 / 30years  
8,864 year

30year after renewal of electro-mechanical of 10% of initial cost for 2 years  
243,800 \*0.1\*(1+0.02)<sup>29</sup> 43,295

**Appendix Table 4.2.3-7 Cash flow estimation (4/5)** (without refinancing)

Case2-2 Output: 11,000,000 kwh Initial construction cost: 320,200 thousand LE Price increase rate=0.08 Annual O&M cost 0.38% unit: 1,000LE

Year	Balance of the budget for the construction of generation plant				Balance of the budget after construction of generation plant				Real annual O&M cost D-E	The year for recovery of construction cost ΣD-ΣE	Remarks	
	Construction cost		Financial source		Electric bill produce by generation plant (b)	Annual cost for maintenance (c)	Governmental subsidy (d) note	Cost for Income E-b-(c+d)				Cumulative income ΣE
	(A)	(B)	(C)	(D)								
1	320,200	76,400	243,800		11,000,000	0.38%						
2		76,400	265,926		1,650	1,231	0	419	419	-75,981	As shown the table, annual income will be debt through more than 50 years after construction	
3		76,400			1,650	1,231	0	419	871	452		
4		76,400			1,782	1,330	0	452	1,322	452		
5		76,400			1,925	1,436	0	488	1,810	488		
6		76,400			2,079	1,551	0	528	1,887	528		
7		76,400			2,245	1,675	0	570	1,957	570		
8		76,400			2,424	1,809	0	615	2,029	615		
9		76,400			2,618	1,954	0	665	2,104	665		
10		76,400			2,828	2,110	0	718	2,182	718		
11		76,400			3,054	2,279	0	775	2,262	775		
12		76,400			3,298	2,461	0	837	2,341	837		
13		76,400			3,562	2,658	0	904	2,426	904		
14		76,400			3,847	2,871	0	976	2,516	976		
15		76,400			4,155	3,100	0	1,055	2,611	1,055		
16		76,400			4,487	3,349	0	1,139	2,711	1,139		
17		76,400			4,846	3,616	0	1,230	2,816	1,230		
18		76,400			5,234	3,906	0	1,328	2,926	1,328		
19		76,400			5,653	4,218	0	1,435	3,041	1,435		
20		76,400			6,105	4,556	0	1,549	3,170	1,549		
21		76,400			6,593	4,920	0	1,673	3,303	1,673		
22		76,400			7,121	5,314	0	1,807	3,450	1,807		
23		76,400			7,691	5,739	0	1,952	3,602	1,952		
24		76,400			8,306	6,198	0	2,108	3,760	2,108		
25		76,400			8,970	6,694	0	2,277	3,927	2,277		
26		76,400			9,688	7,229	0	2,459	4,102	2,459		
27		76,400			10,463	7,808	0	2,655	4,285	2,655		
28		76,400			11,300	8,432	0	2,868	4,474	2,868		
29		76,400			12,204	9,107	0	3,097	4,670	3,097		
30		76,400			13,180	9,835	0	3,345	4,872	3,345		
31		76,400			14,235	10,622	0	3,613	5,081	3,613		
32		76,400			15,374	11,472	0	3,902	5,297	3,902		
33		76,400			16,603	12,390	0	4,214	5,520	4,214		
34		76,400			17,932	13,381	0	4,551	5,751	4,551		
35		76,400			19,366	14,451	0	4,915	6,000	4,915		
36		76,400			20,915	15,607	0	5,308	6,266	5,308		
37		76,400			22,589	16,856	0	5,733	6,549	5,733		
38		76,400			24,396	18,204	0	6,192	6,849	6,192		
39		76,400			26,347	19,661	0	6,687	7,166	6,687		
40		76,400			28,450	21,234	0	7,222	7,499	7,222		
41		76,400			30,722	22,932	0	7,800	7,849	7,800		
42		76,400			33,190	24,768	0	8,423	8,216	8,423		
43		76,400			35,845	26,748	0	9,097	8,599	9,097		
44		76,400			38,713	28,883	0	9,825	9,000	9,825		
45		76,400			41,810	31,199	0	10,611	9,425	10,611		
46		76,400			45,155	33,695	0	11,460	9,875	11,460		
47		76,400			48,767	36,390	0	12,377	10,349	12,377		
48		76,400			52,669	39,302	0	13,367	10,848	13,367		
49		76,400			56,882	42,446	0	14,436	11,372	14,436		
50		76,400			61,433	45,842	0	15,591	11,921	15,591		
51		76,400			66,347	49,509	0	16,839	12,495	16,839		
52		76,400			71,655	53,470	0	18,186	13,104	18,186		
53		76,400			77,388	57,747	0	19,641	13,748	19,641		
54		76,400					0					

Note: The price of electricity may be electricity price=0.15LE/kwh included governmental subsidy but it will be out of project cost

30year repayment interest 0.39%  
243,800 \*(1+0.003)<sup>30</sup>  
265,926 /30years  
8,864 year

**Appendix Table 4.2.3-7 Cash flow estimation (5/5) (with refinancing)**

Case:Assuit      Out put: 243,000,000 kwh      Initial constr. Cost: 847,700 thousand LE      Price increase rate=0.08      Annual O&M cost      0.40%      unit: 1,000LE

Year	Construction cost		Financial source				Balance of the budget for the construction of generation plant				General revenue				Remarks					
	(A)	(B)	State subsidy	(C)	(D)	Loan budget	Public property	(1)	(2)	Break down of revenue	Net general revenue		Cumulative total of revenue	Electric bill produce by generation plant						
											Total					Annual cost for maintenance	Governmental subsidy	Cumulative total income	Cost for Income	
											(a)=(1)+(2)	(D)=(a)								(b)
(55%)	466,235	381,465	0	466,235	0	466,235	0	0	509,067	0	0	0	0	0	0	0	0	0		
6				466,235		466,235					466,235		36,450	33,030	33,030	-433,205	433,205	1		
7				466,235		466,235					466,235		39,366	36,700	68,700	35,672	35,672	-397,533	2	
8				466,235		466,235					466,235		42,515	39,850	107,228	38,526	38,526	-359,007	3	
9				466,235		466,235					466,235		45,917	4,308	148,336	41,608	41,608	-317,389	4	
10				466,235		466,235					466,235		49,590	4,653	193,773	44,937	44,937	-272,462	5	
11				466,235		466,235					466,235		53,557	5,025	242,305	48,532	48,532	-223,930	6	
12				466,235		466,235					466,235		57,842	5,427	294,719	52,414	52,414	-171,516	7	
13				466,235		466,235					466,235		62,469	5,862	351,326	56,607	56,607	-114,909	8	
14				466,235		466,235					466,235		67,466	6,300	412,462	61,136	61,136	-63,773	9	
15				466,235		466,235					466,235		72,864	6,837	478,489	66,027	66,027	-12,254	10	
16				466,235		466,235					466,235		78,693	7,384	549,798	70,309	70,309	66,594	11	
17				466,235		466,235					466,235		84,988	7,975	626,812	75,014	75,014	121,358	12	
18				466,235		466,235					466,235		91,787	8,613	709,986	80,928	80,928	182,286	13	
19				466,235		466,235					466,235		99,130	9,302	799,815	87,584	87,584	249,871	14	
20				466,235		466,235					466,235		107,061	10,046	896,830	94,773	94,773	324,644	15	
21				466,235		466,235					466,235		115,626	10,849	1,001,806	102,537	102,537	407,181	16	
22				466,235		466,235					466,235		124,876	11,717	1,114,765	110,922	110,922	498,103	17	
23				466,235		466,235					466,235		134,866	12,655	1,236,976	119,978	119,978	598,081	18	
24				466,235		466,235					466,235		145,655	13,667	1,368,964	129,757	129,757	707,838	19	
25				466,235		466,235					466,235		157,307	14,760	1,511,511	140,320	140,320	828,158	20	
26				466,235		466,235					466,235		169,892	15,941	1,665,461	151,727	151,727	959,885	21	
27				466,235		466,235					466,235		183,483	17,216	1,831,728	164,046	164,046	1,103,931	22	
28				466,235		466,235					466,235		198,162	18,594	2,011,296	177,531	177,531	1,261,282	23	
29				466,235		466,235					466,235		214,011	20,081	2,205,230	192,334	192,334	1,433,003	24	
30				466,235		466,235					466,235		231,136	21,688	2,414,678	209,448	209,448	1,620,243	25	
31				466,235		466,235					466,235		249,627	23,423	2,640,982	236,204	236,204	1,824,243	26	
32				466,235		466,235					466,235		269,597	25,297	2,885,182	264,300	264,300	2,046,344	27	
33				466,235		466,235					466,235		291,165	27,320	3,149,027	283,844	283,844	2,287,994	28	
34				466,235		466,235					466,235		314,458	29,506	3,433,979	303,932	303,932	2,550,757	29	
35				466,235		466,235					466,235		339,615	31,867	3,741,727	328,965	328,965	2,836,322	30	
36				466,235		466,235					466,235		366,784	34,416	4,074,095	358,957	358,957	3,142,143	31	
37				466,235		466,235					466,235		396,127	37,169	4,433,052	389,574	389,574	3,491,714	32	
38				466,235		466,235					466,235		427,817	40,143	4,820,726	421,674	421,674	3,889,194	33	
39				466,235		466,235					466,235		462,042	43,354	5,239,414	458,688	458,688	4,319,237	34	
40				466,235		466,235					466,235		499,005	46,822	5,691,597	498,043	498,043	4,799,468	35	
41				466,235		466,235					466,235		538,926	50,568	6,179,955	538,358	538,358	5,316,468	36	
42				466,235		466,235					466,235		581,040	54,614	6,700,001	581,040	581,040	5,853,316	37	
43				466,235		466,235					466,235		626,603	58,983	7,259,222	626,603	626,603	6,483,317	38	
44				466,235		466,235					466,235		675,891	63,701	7,855,597	675,891	675,891	7,163,453	39	
45				466,235		466,235					466,235		730,203	68,797	8,505,597	730,203	730,203	7,903,869	40	
46				466,235		466,235					466,235		791,859	74,301	9,204,154	791,859	791,859	8,401,427	41	
47				466,235		466,235					466,235		855,208	80,245	9,958,116	855,208	855,208	9,163,389	42	
48				466,235		466,235					466,235		923,624	86,685	10,780,766	923,624	923,624	9,989,348	43	
49				466,235		466,235					466,235		997,514	93,598	11,700,722	997,514	997,514	10,991,264	44	
50				466,235		466,235					466,235		1,077,315	101,086	12,719,561	1,077,315	1,077,315	12,083,493	45	
51				466,235		466,235					466,235		1,163,500	109,173	13,800,548	1,163,500	1,163,500	13,337,821	46	
52				466,235		466,235					466,235		1,256,580	117,907	14,959,222	1,256,580	1,256,580	14,746,494	47	
53				466,235		466,235					466,235		1,357,107	127,339	16,188,989	1,357,107	1,357,107	15,606,262	48	
54				466,235		466,235					466,235		1,465,675	137,526	17,511,138	1,465,675	1,465,675	16,503,411	49	
55				466,235		466,235					466,235		1,582,929	148,529	18,951,539	1,582,929	1,582,929	17,468,812	50	
56				466,235		466,235					466,235		1,709,564	160,411	20,500,692	1,709,564	1,709,564	18,017,965	51	

assume 0.3% of construction cost

electricity price=0.15LE/kwh

Refinancing cost assumed 30year repayment interest 1%

70,000,000 LE for 2 years

after 30years

70,000\*(1+0.08)<sup>29</sup>

= 652,000

381,465 \*(1+0.01)<sup>29</sup>

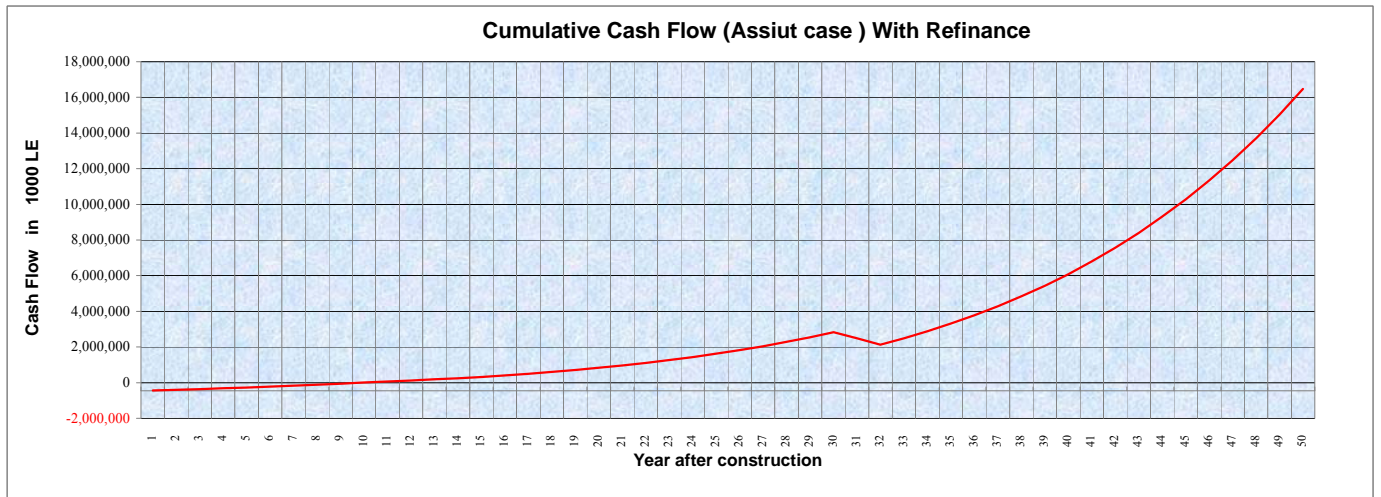
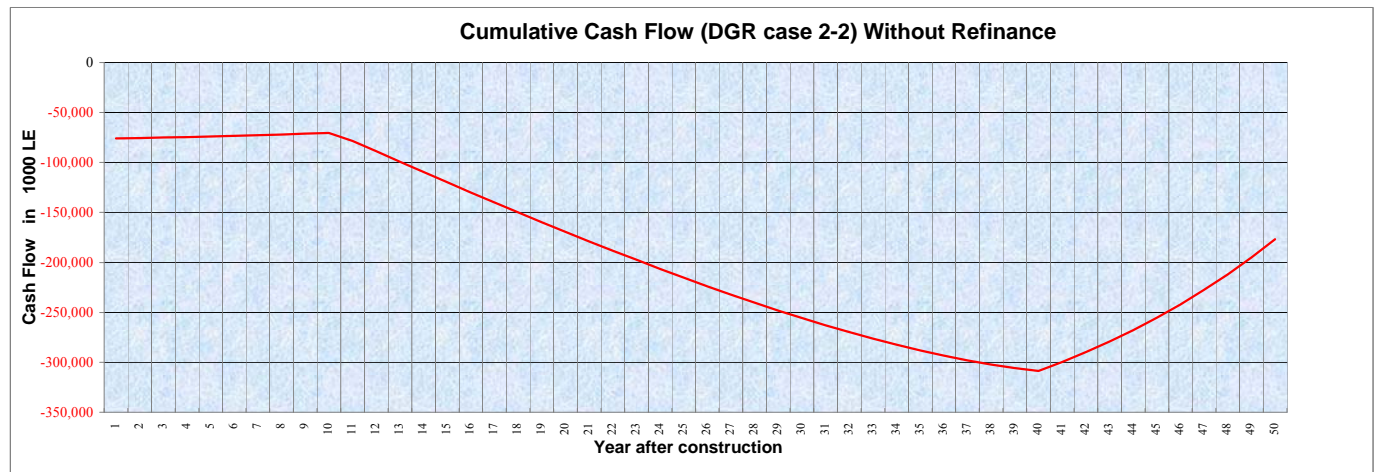
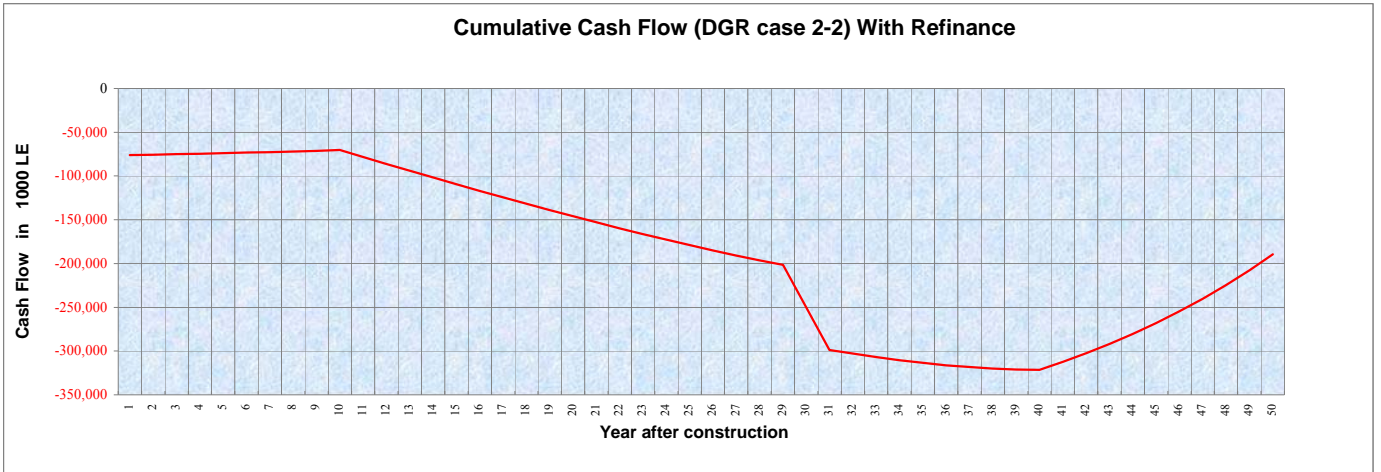
509,067 / 30years

16,969 year

= 652,000

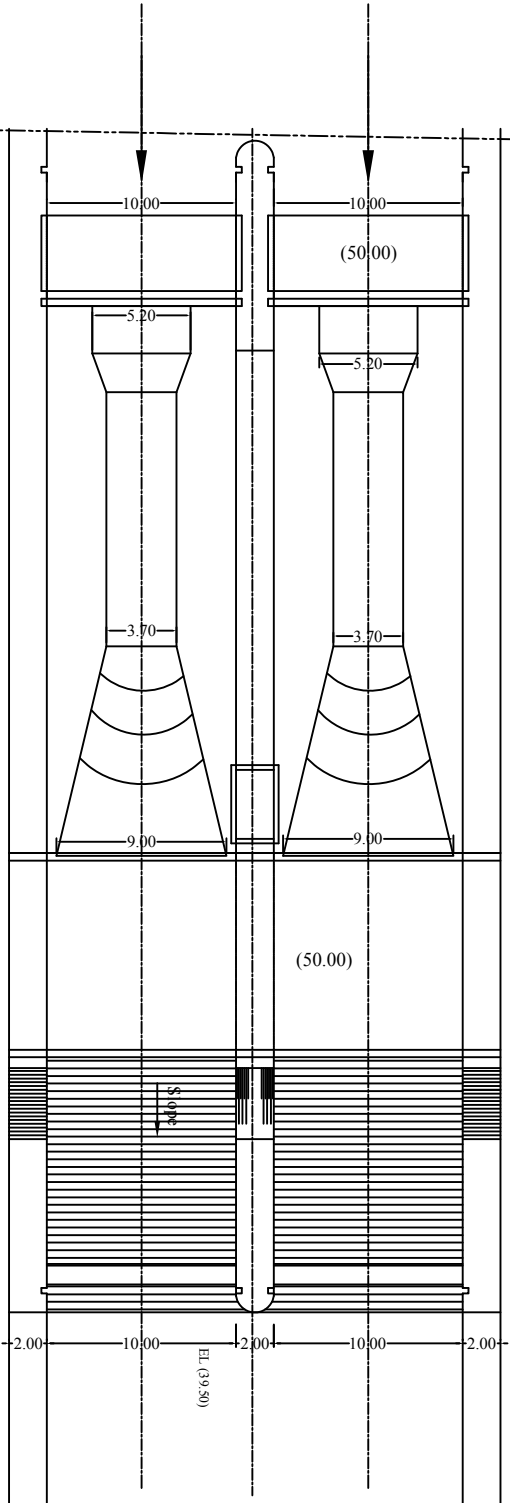
lifetime civil works

lifetime for electro-mechanical works

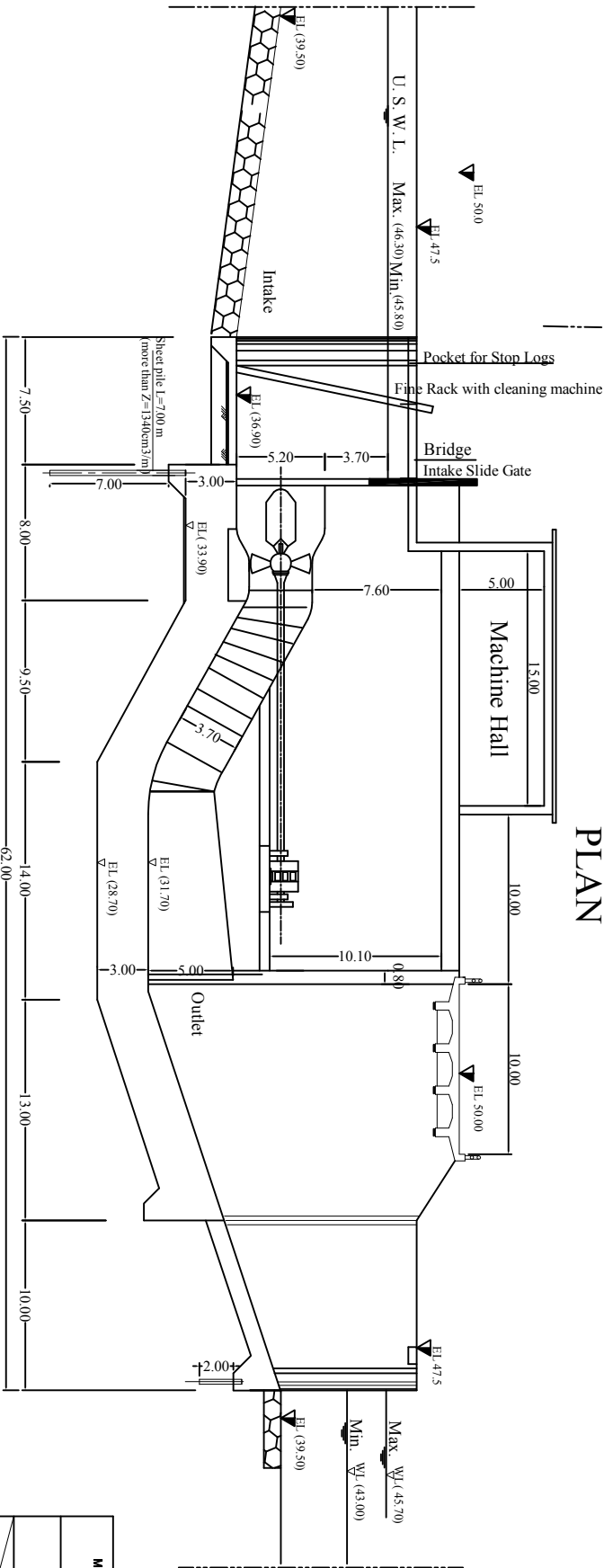


**Appendix. Figure 4.2.3-1 Cumulative Cash Flow**

# Hydropower Generation Plan for 50 m<sup>3</sup>/s x 2 units



PLAN



SECTION ELEVATION

Appendix : Figure 4.2.3-1 General layout of the DGR Hydropower plant

Ministry of Water Resources and Irrigation Reservoirs Grand Embages Sector The Arab Republic of Egypt		DRW/ NO.	
SAWU CONSULTANTS INC.		DATE:	
PROJECT NO.:	DATE:	PROJECT NO.:	DATE:
DATE:	DATE:	DATE:	DATE:

## APPENDIX: Water Management

Table	1	Monthly Discharge Records at Assiut Barrage (1999-2009)
Table	2	Monthly Discharge Records at Ibrahimia Intake (1999-2009)
Table	3	Monthly Discharge Records at Bahr Yusef (1999-2009)
Table	4	Monthly Discharge Records at Ibrahimia Dirout (1999-2009)
Table	5	Monthly Discharge Records at Sakoula Regulator (1999-2009)
Table	6	Monthly Discharge Records at Hassan Wasef (1999-2009)
Table	7	Monthly Discharge Records at Lahoun Regulator (1999-2009)
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Figure	2	Synopsis of East Minya
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Figure	5	Synopsis of Fayoum
Figure	6	Synopsis of Giza
Figure	7	Synopsis of Assiut ( Ababic version )
Figure	8	Synopsis of East Minya ( Ababic version )
Figure	9	Synopsis of West Minya ( Ababic version )
Figure	10	Synopsis of Beni Suef ( Ababic version )
Figure	11	Synopsis of Fayoum ( Ababic version )
Figure	12	Synopsis of Giza ( Ababic version )
Figure	13	Water Distribution
Figure	14	Water Distribution(Arabic)



Table 1 Monthly Discharge Records at Assiut Barrage (1999-2009)

unit:MCM

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1999	2,846	2,973	3,587	3,920	4,567	5,041	5,163	4,698	4,607	3,313	3,087	2,347	46,149
2000	2,865	2,490	3,561	***	4,499	5,234	5,089	4,735	2,891	***	2,235	2,492	***
2001	2,471	2,018	2,827	3,144	3,684	5,139	5,222	4,951	5,461	4,512	2,500	2,052	43,981
2002	2,070	2,146	3,162	3,358	4,755	5,302	5,242	4,767	3,455	2,225	2,449	1,686	40,617
2003	1,697	2,189	2,295	2,669	3,942	4,959	5,122	4,521	2,992	2,383	2,441	1,775	36,985
2004	1,629	2,052	2,564	3,545	4,655	4,987	5,052	4,812	2,958	2,381	2,431	1,729	38,795
2005	1,760	1,977	2,881	3,204	4,155	4,986	5,194	4,698	3,064	2,631	2,508	1,630	38,688
2006	1,851	2,085	2,969	3,180	4,302	5,070	5,134	4,637	3,119	2,855	2,554	1,724	39,480
2007	1,907	1,996	2,991	3,112	4,066	5,125	5,244	4,943	4,550	5,100	3,843	2,048	44,925
2008	2,379	2,180	3,144	3,756	4,566	5,119	5,326	5,026	3,927	3,099	2,533	2,337	43,392
2009	2,124	2,335	3,198	3,559	4,199	4,928	5,033	4,423	2,957	2,870	2,401	1,867	39,893
10 years Average	2,145	2,222	3,016	3,345	4,308	5,081	5,166	4,746	3,635	3,137	2,635	1,972	41,291

Table 2 Monthly Discharge Records at Ibrahimia Intake (1999-2009)

unit:MCM

Year	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1999	498	597	875	836	951	1,117	1,194	1,207	908	851	727	620	10,381
2000	175	765	833	847	922	1,159	1,235	1,207	908	808	711	562	10,132
2001	284	700	845	846	901	1,149	1,227	1,199	918	875	707	555	10,206
2002	305	617	839	816	902	1,144	1,208	1,203	879	747	668	549	9,877
2003	187	650	738	778	860	1,133	1,209	1,207	886	781	716	550	9,695
2004	269	668	761	808	899	1,127	1,199	1,206	911	761	727	556	9,892
2005	219	657	786	831	877	1,145	1,216	1,210	918	788	723	537	9,907
2006	258	633	855	848	894	1,185	1,217	1,181	935	785	741	595	10,271
2007	358	728	849	897	916	1,158	1,197	1,223	991	933	894	640	10,784
2008	260	749	929	986	1,025	1,161	1,234	1,250	1,019	942	792	718	11,065
2009	297	774	953	904	922	1,091	1,161	1,136	834	765	703	555	10,094
Ave '99~'09	283	685	842	854	915	1,143	1,209	1,203	919	821	737	585	10,209
Ave '05~'09	278	708	874	893	927	1,148	1,205	1,200	939	843	771	609	10,396

Table 3 Monthly Discharge Records at Bahr Yusef (1999-2009)

unit:MCM

Year	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1999	187	293	394	360	447	521	545	555	427	397	353	280	4,759
2000	55	369	414	406	440	523	550	545	427	384	335	242	4,690
2001	120	310	423	410	446	535	558	551	421	403	334	241	4,752
2002	118	286	435	389	451	521	555	543	392	374	329	247	4,640
2003	81	313	390	393	425	538	558	556	401	376	332	245	4,608
2004	95	303	393	409	435	538	559	558	429	382	361	260	4,722
2005	96	298	403	421	432	541	559	558	419	395	357	256	4,735
2006	174	290	435	425	465	548	563	553	426	422	378	288	4,967
2007	138	346	424	442	441	534	559	564	461	432	403	306	5,050
2008	130	365	492	486	487	551	573	575	469	451	376	326	5,281
2009	139	423	491	446	434	537	568	565	445	445	389	308	5,190
Ave '99~'09	121	327	427	417	446	535	559	557	429	406	359	273	4,854
Ave '05~'09	135	344	449	444	452	542	564	563	444	429	381	297	5,045

Table 4 Monthly Discharge Records at Ibrahimia Dirout (1999-2009)

													unit:MCM	
Year	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
1999	274	303	408	411	431	540	522	526	409	***	352	327	***	
2000	104	327	346	356	381	455	472	451	365	341	311	273	4,182	
2001	128	301	332	331	350	441	460	449	369	359	300	264	4,084	
2002	142	274	315	334	350	436	451	442	353	312	293	263	3,965	
2003	81	290	302	302	331	430	445	438	335	314	292	261	3,821	
2004	124	270	289	409	332	418	433	432	342	305	291	262	3,907	
2005	87	275	303	307	329	423	448	444	354	305	286	243	3,804	
2006	74	253	324	318	345	442	460	420	378	327	299	263	3,903	
2007	151	281	340	382	403	448	475	485	412	397	379	301	4,454	
2008	117	318	373	403	422	465	491	479	405	392	334	301	4,500	
2009	123	286	376	373	385	412	442	432	326	291	292	237	3,975	
Ave.	'99~'09	128	289	337	357	369	446	464	454	368	334	312	272	4,060
	'05~'09	110	283	343	357	377	438	463	452	375	342	318	269	4,127

Table 5 Monthly Discharge Records at Sakoula Regulator (1999-2009)

													unit:MCM	
Year	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
1999	105	227	335	311	379	458	480	477	379	348	318	263	4,080	
2000	68	293	357	343	379	458	493	477	388	341	302	197	4,096	
2001	138	260	375	343	379	464	489	485	373	351	290	230	4,177	
2002	21	248	387	325	400	472	500	491	368	325	295	220	4,052	
2003	34	285	357	342	363	470	499	499	376	353	309	221	4,108	
2004	32	281	356	337	368	466	501	499	392	367	332	235	4,166	
2005	82	257	362	351	361	477	503	500	397	383	330	252	4,255	
2006	119	207	380	339	392	484	504	493	405	369	320	240	4,252	
2007	60	326	386	363	374	475	502	506	406	375	342	256	4,371	
2008	101	242	395	403	397	454	478	472	406	372	305	306	4,331	
2009	71	290	352	315	310	400	428	421	332	332	291	235	3,775	
Ave.	'99~'09	76	265	367	343	373	462	489	484	384	356	312	241	4,151
	'05~'09	87	264	375	354	367	458	483	478	389	366	318	258	4,197

Table 6 Monthly Discharge Records at Hassan Wasef (1999-2009)

													unit:MCM	
Year	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
1999	46	66	85	79	92	110	115	116	93	83	77	63	1,025	
2000	32	65	80	78	93	111	120	120	96	81	77	58	1,011	
2001	39	61	82	82	88	108	118	115	95	85	75	64	1,012	
2002	23	70	84	72	90	110	116	112	91	79	75	63	985	
2003	29	73	87	76	78	104	114	111	91	77	75	65	980	
2004	28	78	80	77	85	107	116	112	95	81	78	69	1,006	
2005	34	74	78	73	82	102	112	110	94	85	78	70	992	
2006	44	59	86	74	86	107	117	109	92	86	79	71	1,010	
2007	43	76	88	83	86	107	116	112	98	81	74	73	1,037	
2008	44	67	89	89	97	114	128	122	101	101	90	86	1,128	
2009	33	83	91	85	91	106	116	113	93	94	86	77	1,068	
Ave.	'99~'09	36	70	85	79	88	108	117	114	94	85	79	69	1,023
	'05~'09	40	72	86	81	88	107	118	113	96	89	81	75	1,047

Table 7 Monthly Discharge Records at Lahoun Regulator (1999-2009)

													unit:MCM	
Year	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
1999	88	108	143	136	154	175	171	182	150	144	138	130	1,719	
2000	39	115	141	147	159	163	174	172	155	146	139	122	1,672	
2001	54	97	147	144	152	169	185	183	158	148	132	113	1,682	
2002	17	111	148	126	153	179	195	189	155	142	131	113	1,659	
2003	30	115	139	124	136	171	186	185	154	141	133	111	1,625	
2004	17	128	131	127	143	172	192	186	159	142	134	118	1,649	
2005	28	110	148	133	138	164	189	186	165	145	134	122	1,662	
2006	51	87	153	129	141	167	189	181	161	147	137	118	1,661	
2007	19	135	154	145	147	165	189	184	161	145	134	115	1,693	
2008	57	93	160	145	154	168	189	186	158	142	129	134	1,715	
2009	34	123	144	109	127	154	163	161	143	137	121	98	1,513	
Ave.	'99~'09	39	111	146	133	146	168	184	181	156	144	133	118	1,659
	'05~'09	38	110	152	132	141	164	184	180	158	143	131	117	1,649

Table 8 Monthly Discharge Records at Giza Intake (1999-2009)

													unit:MCM
Year	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1999	65	80	91	94	103	97	91	87	93	93	81	77	1,052
2000	55	69	87	95	105	97	90	86	89	92	84	84	1,033
2001	53	80	80	87	100	91	87	86	90	93	85	81	1,013
2002	53	72	82	94	96	94	90	86	79	80	73	68	967
2003	35	65	68	68	77	82	90	83	79	***	61	53	***
2004	27	52	56	71	83	83	84	86	88	75	105	53	863
2005	28	54	71	73	78	77	81	82	79	80	76	72	851
2006	42	54	66	80	101	78	89	75	90	83	87	78	923
2007	58	71	78	89	96	81	71	86	86	99	105	97	1,017
2008	41	72	99	101	104	87	80	81	106	100	82	104	1,057
2009	82	53	94	93	94	91	95	83	83	71	84	68	991
Ave.	'99~'09	49	66	79	86	94	87	86	84	87	84	76	977
	'05~'09	50	61	82	87	95	83	83	81	89	87	84	968

Table 9 Monthly Discharge Records at Maghagha Regulator (1999-2009)

													unit:MCM	
Year	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
1999	132	132	155	155	171	200	213	211	176	171	146	141	2,003	
2000	85	150	161	155	172	208	219	212	178	171	152	142	2,005	
2001	77	148	165	159	167	206	219	214	178	179	152	152	2,016	
2002	62	142	160	159	171	206	219	216	171	154	145	136	1,941	
2003	50	150	161	150	163	200	219	217	161	153	145	135	1,904	
2004	74	132	143	151	162	196	219	218	155	150	146	136	1,882	
2005	75	144	160	155	160	188	211	204	181	154	143	100	1,875	
2006	64	131	162	155	163	203	219	205	188	160	148	126	1,924	
2007	108	134	166	170	185	200	209	217	187	185	179	167	2,107	
2008	70	136	165	174	191	209	216	213	180	185	163	160	2,062	
2009	72	121	173	174	185	187	208	204	156	132	132	121	1,866	
Ave.	'99~'09	79	138	161	160	172	200	216	212	174	163	150	138	1,962
	'05~'09	78	133	165	166	177	197	213	209	178	163	153	135	1,967

Table 10 Monthly Discharge Records at El Wasta Reg. (1999-2009)

													unit:MCM	
Year	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
1999	8	9	9	9	10	9	9	9	9	10	9	10	111	
2000	3	8	10	9	10	9	9	9	9	9	9	9	103	
2001	3	8	9	8	9	9	9	9	9	10	9	8	101	
2002	4	8	9	9	10	9	10	10	8	9	10	8	104	
2003	0	9	10	7	9	8	10	10	9	8	9	7	96	
2004	2	8	7	9	9	9	8	9	9	8	9	7	95	
2005	0	6	7	7	6	9	6	8	6	9	8	6	78	
2006	0	6	7	9	4	6	9	9	6	4	8	9	76	
2007	5	8	8	10	10	10	10	10	10	11	10	8	109	
2008	2	8	5	5	7	10	10	10	11	13	12	12	106	
2009	4	4	5	4	3	2	4	3	2	3	3	3	40	
Ave.	'99~'09	3	7	8	8	8	8	9	9	8	9	9	8	93
	'05~'09	2	6	6	7	6	7	8	8	7	8	8	8	82

Table 11 Monthly Discharge Records at Abo El Shekok (1999-2009)

													unit:MCM	
Year	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
1999	36	57	65	73	81	78	73	71	79	81	72	72	839	
2000	25	52	67	76	86	83	77	74	77	82	74	71	842	
2001	23	67	68	77	85	77	76	73	78	78	72	63	839	
2002	27	62	72	85	87	85	87	76	71	68	65	55	841	
2003	3	57	62	64	71	73	83	83	79	72	62	54	762	
2004	8	43	57	68	76	74	70	70	77	68	58	51	718	
2005	11	48	57	60	67	66	71	73	80	73	58	50	714	
2006	9	33	61	69	80	75	85	71	77	72	60	50	741	
2007	20	45	79	74	80	66	62	72	80	75	58	59	770	
2008	19	19	71	83	85	78	81	81	67	71	55	44	753	
2009	14	27	77	71	79	84	88	84	73	71	32	31	731	
Ave.	'99~'09	18	46	67	73	80	76	78	75	76	74	61	55	777
	'05~'09	15	34	69	71	78	74	77	76	75	72	53	47	742

Table 12 Monthly Water Level of Quarun Lake (Jan.1999-May.2010)

Year	Month	Min.	Max.	Average WL
1999	1	-43.4	-43.2	-43.3
	2	-43.2	-43.2	-43.2
	3	-43.2	-43.2	-43.2
	4	-43.2	-43.2	-43.2
	5	-43.2	-43.2	-43.2
	6	-43.4	-43.3	-43.3
	7	-43.6	-43.4	-43.5
	8	-43.8	-43.6	-43.7
	9	-43.8	-43.8	-43.8
	10	-43.8	-43.8	-43.8
	11	-43.8	-43.6	-43.7
	12	-43.6	-43.4	-43.5
2000	1	-43.4	-43.3	-43.3
	2	-43.3	-43.2	-43.3
	3	-43.2	-43.2	-43.2
	4	-43.2	-43.2	-43.2
	5	-43.2	-43.2	-43.2
	6	-43.4	-43.2	-43.3
	7	-43.6	-43.4	-43.5
	8	-43.7	-43.6	-43.7
	9	-43.7	-43.7	-43.7
	10	-43.7	-43.6	-43.7
	11	-43.6	-43.4	-43.5
	12	-43.4	-43.1	-43.2
2001	1	-43.1	-43.0	-43.0
	2	-43.0	-43.0	-43.0
	3	-43.0	-43.0	-43.0
	4	-43.0	-42.9	-43.0
	5	-43.0	-42.9	-43.0
	6	-43.2	-43.0	-43.1
	7	-43.3	-43.2	-43.2
	8	-43.4	-43.3	-43.4
	9	-43.4	-43.4	-43.4
	10	-43.4	-43.3	-43.4
	11	-43.3	-43.1	-43.2
	12	-43.1	-42.9	-43.0
2002	1	-42.9	-42.9	-42.9
	2	-42.9	-42.8	-42.9
	3	-42.8	-42.8	-42.8
	4	-42.8	-42.8	-42.8
	5	-42.9	-42.8	-42.9
	6	-43.0	-42.9	-43.0
	7	-43.2	-43.0	-43.1
	8	-43.3	-43.2	-43.3
	9	-43.3	-43.3	-43.3
	10	-43.3	-43.3	-43.3
	11	-43.3	-43.1	-43.2
	12	-43.1	-42.9	-43.0
2003	1	-43.0	-43.0	-43.0
	2	-43.0	-43.0	-43.0
	3	-43.0	-42.9	-42.9
	4	-42.9	-42.9	-42.9
	5	-43.0	-42.9	-42.9
	6	-43.1	-43.0	-43.1
	7	-43.3	-43.1	-43.2
	8	-43.4	-43.3	-43.4
	9	-43.4	-43.4	-43.4
	10	-43.4	-43.4	-43.4
	11	-43.4	-43.2	-43.3
	12	-43.2	-43.0	-43.1

Year	Month	Min.	Max.	Average WL
2004	1	-43.0	-42.9	-42.9
	2	-43.0	-42.9	-42.9
	3	-42.9	-42.9	-42.9
	4	-42.9	-42.9	-42.9
	5	-43.0	-42.9	-42.9
	6	-43.1	-43.0	-43.0
	7	-43.3	-43.1	-43.2
	8	-43.5	-43.3	-43.4
	9	-43.5	-43.4	-43.5
	10	-43.5	-43.4	-43.5
	11	-43.4	-43.2	-43.3
	12	-43.2	-43.0	-43.1
2005	1	-43.0	-42.9	-42.9
	2	-43.0	-42.9	-42.9
	3	-42.9	-42.9	-42.9
	4	-42.9	-42.8	-42.8
	5	-42.9	-42.8	-42.8
	6	-43.0	-42.9	-43.0
	7	-43.2	-43.0	-43.1
	8	-43.4	-43.2	-43.3
	9	-43.4	-43.4	-43.4
	10	-43.4	-43.3	-43.4
	11	-43.3	-43.2	-43.3
	12	-43.2	-42.9	-43.0
2006	1	-42.9	-42.7	-42.8
	2	-42.9	-42.7	-42.8
	3	-42.9	-42.7	-42.8
	4	-42.7	-42.6	-42.7
	5	-42.7	-42.6	-42.7
	6	-42.9	-42.7	-42.8
	7	-43.0	-42.9	-43.0
	8	-43.2	-43.0	-43.1
	9	-43.2	-43.2	-43.2
	10	-43.2	-43.2	-43.2
	11	-43.2	-43.1	-43.1
	12	-43.1	-42.8	-42.9
2007	1	-42.8	-42.8	-42.8
	2	-42.8	-42.7	-42.8
	3	-42.7	-42.7	-42.7
	4	-42.7	-42.6	-42.6
	5	-42.7	-42.6	-42.7
	6	-42.9	-42.7	-42.8
	7	-43.1	-42.9	-43.0
	8	-43.2	-43.1	-43.2
	9	-43.3	-43.2	-43.2
	10	-43.3	-43.2	-43.2
	11	-43.2	-43.1	-43.1
	12	-43.0	-42.8	-42.9
2008	1	-42.7	-42.7	-42.7
	2	-42.7	-42.6	-42.7
	3	-42.7	-42.5	-42.6
	4	-42.6	-42.6	-42.5
	5	-42.6	-42.5	-42.5
	6	-42.7	-42.6	-42.6
	7	-42.7	-42.6	-42.6
	8	-42.9	-42.7	-42.8
	9	-43.0	-42.9	-43.0
	10	-43.0	-42.9	-42.9
	11	-42.9	-42.8	-42.8
	12	-42.8	-42.5	-42.6

Year	Month	Min.	Max.	Average WL
2009	1	-42.5	-42.4	-42.4
	2	-42.4	-42.4	-42.4
	3	-42.4	-42.2	-42.3
	4	-42.4	-42.2	-42.3
	5	-42.4	-42.3	-42.4
	6	-42.6	-42.4	-42.4
	7	-42.7	-42.6	-42.6
	8	-42.9	-42.7	-42.8
	9	-42.9	-42.9	-42.9
	10	-42.9	-42.9	-42.9
	11	-42.9	-42.8	-42.9
	12	-42.8	-42.7	-42.7
2010	1	-42.7	-42.6	-42.6
	2	-42.6	-42.5	-42.6
	3	-42.5	-42.5	-42.5
	4	-42.5	-42.5	-42.5
	5	-42.6	-42.5	-42.6

Table 13 Water Consumption for Various Crops in Middle Egypt Area

M<sup>3</sup>/Feddan

Crop Type	Crop	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Winter Crops	Wheat	265.44	328.02	557.34	485.1	70.98						47.46	242.34	1996.68	
	Beans	272.16	302.4	500.22	101.6							142.8	248.64	1567.82	
	Barley		495	325								480	500	1800	
	Fenugreek	230	265	300									285	1080	
	Lupines	220	270	300									290	1080	
	Chick beans	230	265	310									300	1105	
	Lentil	357	357	151.2								58.8	201.6	1503.6	
	S. Berseem	247.8	352.8										235.2	1092	
	L. Berseem	247.8	352.8	541.8	663.6	550.2							231.6	2839.8	
	Flax	399	430	273									147	1522	
	W. Onion	315	373.8	466.2	378									189	1722
	Garlic	117.6	67.2	71.4	58.8					29.4	210		373.8	1608.6	
	W. Vegetables	117.6	67.2	71.4	58.8					29.4	210		373.8	1608.6	
	Others	420	399	273										146	1238
Summer Crops	Cotton			127.68	390.6	664.02	806.4	915.18	429.66	207.6				3541.14	
	Rice					21	130.2	1289.4	1457.4	1423.8	369.6			4691.4	
	Maize					205.8	638.4	640.8	680.4	147				2312.4	
	Sorghum					194.3	620.1	930	660.8	140				2545.2	
	Soya Beans					575.4	945	890.4	176.4					2587.2	
	Sugarcane	195.3	294	428.4	516.6	716.1	768.6	859.32	950.46	894.6		690.06	541.8	7167.72	
	Sesame					300	520	550	520	365				2255	
	Peanut					500	580	1200	1400					3680	
	Onions													0	
	S. Vegetables			92.4	142.8	260.4	697.2	432.6	432.6	201.6	184.8	197.4	117.6	2326.8	
	Others			0				147	147	520.8	609	537.6	474.6	2402.4	
Nil/Crops	N. Maize							252	663.6	751.8	529.2	163.4		2360	
	Sorghum							241.3	650.2	740	515.1	110.2		2256.8	
	N. Vegetables					21	100.8	260.4	403.2	344.4	277	197.4		1604.2	
	Gardens			298	449.4	478.8	520.8	600.6	680.4	659.4	453			4140.4	

Table 14 Area Served by Each Canal from Ibrahimia Dirout

Saheliya canal				
NO	Canal / branch name	Area served fedds	I.D. TOWN	Total length km
1	Saheliya Canal	2800	DIROUT	18.950
2	Beni yhea C	187	DIROUT	1.400
3	Shalash C	500	DIROUT	3.800
4	El Sharika C	770	DIROUT	1.758
5	El Sharika Br.	250	DIROUT	2.020
6	El Garf C	213	DIROUT	2.035
7	El Saadat C	800	DIROUT	2.755
8	Khooor Khzaam Br.	300	DIROUT	1.820
9	El Saadat extension	200	DIROUT	2.900
10	Abo El Reesh Br.	300	DIROUT	1.800
11	El Molla C	500	DIROUT	1.220
12	Galal C	200	DIROUT	1.980
13	Galal Br.	200	DIROUT	0.700
14	Saheliya Canal	2394	MALLAWI	13.530
15	Eastern Rairamoon Br.	300	MALLAWI	1.630
16	western Rairamoon Br.	1306	MALLAWI	0.875
17	G. El Saheliya	444	MALLAWI	3.670
18	El Deesa C	1165	MALLAWI	5.680
19	G. El Deesa	310	MALLAWI	2.350
20	Eastern Badawi Kasheef Carrier	415	MALLAWI	0.160
21	Eastern Badawi Kasheef Br.	0	MALLAWI	1.930
22	Western Badawi Kasheef Br.	390	MALLAWI	1.460
23	Extension Western Badawi Kasheef Br.	0	MALLAWI	0.800
24	Saheel and Gazeera Br.	295	MALLAWI	2.700
25	Zakaria Mahran Br.	300	MALLAWI	1.750
26	El Fabrika Br.	530	MALLAWI	1.290
Total Area Served		15069		
		(15100)		

Dairotiah Canal				
NO	Canal / branch name	Area served fedds	I.D. TOWN	Total length km
	Dairotiah Canal	1885	DIROUT	15.500
1	GB Shrif Lower	425	DIROUT	2.600
2	Shrif 3 Br.	275	DIROUT	1.320
3	Shrif 4 Br.	265	DIROUT	1.680
4	Eastern G. Dermauas	2915	DIROUT	10.940
5	El Sawaqi Br.	1100	DIROUT	8.720
6	Hanna Br.	115	DIROUT	0.950
7	Shrkas Br.	220	DIROUT	1.270
8	Faraag Br.	60	DIROUT	1.570
9	Faraag Conjunction	380	DIROUT	1.705
10	Western G. Dermauas	400	DIROUT	7.880
11	Kharbia 1 Br.	500	DIROUT	2.140
12	Kharbia2 Br.	500	DIROUT	1.920
13	Kharbia 3 Br.	500	DIROUT	2.230
14	Kharbia 4 Br.	600	DIROUT	2.750
15	Dairotiah Canal	1400	MALLAWI	7.500
16	Kharbia 5 Br.	1100	MALLAWI	4.395
17	El Manshia C	1500	MALLAWI	10.500
18	Manshia 1 Br.	300	MALLAWI	1.550
19	Manshia 2 Br.	300	MALLAWI	1.610
20	Manshia 3 Br.	500	MALLAWI	1.800
21	Manshia 4 Br.	400	MALLAWI	1.100
22	G. El Manshia	300	MALLAWI	1.200
23	G. El Manshia Conjunction	0	MALLAWI	
24	El Salmouni Br.	450	MALLAWI	1.980
25	South El Safia Br.	750	MALLAWI	3.120
26	North El Safia Br.	700	MALLAWI	3.530
27	North El Safia 2 Br.	120	MALLAWI	2.000
28	Yussef Bic Br.	285	MALLAWI	1.575
29	G. El Ashmunan	670	MALLAWI	4.560
30	G. Ashmunan 1 Br.	370	MALLAWI	1.650
31	G.Ashmunan 2 Br	260	MALLAWI	1.760
32	Hamdun and its Extension Br.	724	MALLAWI	1.450
33	Hamdun Br. Extension	200	MALLAWI	1.610
34	Herz C	6850	MALLAWI	7.580
35	Nawai C	2350	MALLAWI	7.590
36	El Raies Fifth Br.	190	MALLAWI	1.330
37	Eastern G.Globa	1135	MALLAWI	7.760
38	Eastern G.Globa Br.	215	MALLAWI	2.320

39	Western G. Ibrahimia	1400	MALLAWI	5.420
40	The Extension	0	MALLAWI	2.400
41	El Ashmunan C.	1905	MALLAWI	19.500
42	Ashmunan 1 Br.	655	MALLAWI	2.590
43	Ashmunan 2 Br.	565	MALLAWI	2.515
44	Ashmunan 3 Br.	425	MALLAWI	2.380
45	Ashmunan 4 Br.	285	MALLAWI	1.860
46	Ashmunan 5 Br.	1515	MALLAWI	10.310
47	Western Btqa Br.	200	MALLAWI	1.450
48	Eastern Btqa Br.	270	MALLAWI	1.700
49	Ashmunan 6 Br.	230	MALLAWI	1.225
50	Khalil Gaheen Br.	340	MALLAWI	1.930
51	Ashmunan 7 Br.	260	MALLAWI	1.310
52	Beni Rooh Br.	350	MALLAWI	1.395
53	Eshadat Br.	300	MALLAWI	1.570
54	Mhamed Ismael Br.	120	MALLAWI	1.250
55	Hur Br.	610	MALLAWI	2.250
56	Kasr Hur Br.	485	MALLAWI	2.060
57	Manaa Br.	180	MALLAWI	1.000
58	El Saliba Br.	530	MALLAWI	2.115
<b>Total Area Served</b>		<b>41834</b>		
		<b>(41800)</b>		

Badraman Canal				
NO	Canal / branch name	Area served feds	I.D. TOWN	Total length km
1	G. Shrif Upper	825	DIROUT	5.570
2	Shrif 1 Br.	200	DIROUT	1.015
3	Shrif 2 Br.	100	DIROUT	0.760
4	G. El Badraman	185	DIROUT	2.800
5	Shinawi Br.	130	DIROUT	0.660
6	Badraman 1 Br.	435	DIROUT	1.870
7	Badraman 2 Br.	965	DIROUT	3.170
8	Badraman Canal	2954	Dermauas	28.990
	Carrier	0	Dermauas	
9	G. El Naseria First	315	Dermauas	2.575
10	Naseria 1 Br.	835	Dermauas	3.575
11	Zmored Br.	100	Dermauas	1.040
12	El Naseria C	1236	Dermauas	14.850
13	Naseria 3 Br.	810	Dermauas	3.480
14	G. El Naseria Second	495	Dermauas	1.885
15	Naseria 5 Br.	755	Dermauas	3.100
16	Naseria 2 Br.	315	Dermauas	1.490
17	Naseria 4 Br.	515	Dermauas	2.000
18	El Mhram Br.	720	Dermauas	3.285
19	G. Tanuf Eastern	680	Dermauas	4.410
20	El Abaad Br.	160	Dermauas	1.385
21	G. Tanuf Western	615	Dermauas	5.030
22	G. Tanuf western 1 Br.	390	Dermauas	2.220
23	G. Tanuf western 2 Br.	450	Dermauas	2.325
24	Naseria 6 Br.	400	Dermauas	2.260
25	Naseria 7 Br.	500	Dermauas	2.435
26	Naseria 8 Br.	280	Dermauas	1.630
27	Tukh Br.	240	Dermauas	1.675
28	Naseria 9 Br.	290	Dermauas	1.680
29	Naseria 10 Br.	392	Dermauas	2.040
30	El Mallawania C.	520	Dermauas	4.690
	El Mallawania Conjunction	0	Dermauas	0.850
31	G. El Arous	560	Dermauas	4.875
32	Arous 1 Br.	150	Dermauas	1.370
33	Arous 2 Br.	220	Dermauas	1.990
34	Arous 3 Br.	520	Dermauas	2.580
35	G. Beni Haram	365	Dermauas	4.885
36	Beni Haram Br.	250	Dermauas	3.045
37	Shukry Br.	150	Dermauas	1.270
38	El Arous C.	2800	Dermauas	9.700
39	Arous 4 Br.	200	Dermauas	1.620
	G. Right	0	Dermauas	1.620
	G. Left	0	Dermauas	1.370
40	Arous 5 Br.	725	Dermauas	3.050
41	El Kashef Br.	360	Dermauas	2.090
42	Arous 6 Br.	515	Dermauas	2.650
43	Mahmoud Br.	880	Dermauas	6.500
	The Conjunction	0	Dermauas	0.820
44	Badraman 3 Br.	350	Dermauas	1.825
45	Badraman 4 Br.	381	Dermauas	1.730



46	Abd El Sameeh Br.	290	Dermauas	2.300
47	Badraman 5 Br.	180	Dermauas	0.745
48	Um El Kesur C.	1395	Dermauas	5.560
49	G. El Manikki	1020	Dermauas	6.245
50	Derwa Br.	820	Dermauas	2.580
51	Arnaar Br.	220	Dermauas	2.100
52	Nakhla Br.	350	Dermauas	2.650
53	El Redi Br.	210	Dermauas	1.450
<b>Total Area Served</b>		<b>29718</b>		
		<b>(29700)</b>		

Irad Delgawi Canal				
NO	Canal / branch name	Area served feds	I.D. TOWN	Total length km
1	Irad Delgawi Canal	6490	DIROUT	15.300
2	G. Kum Engasha	2160	DIROUT	7.100
3	Kum Engasha 1 Br.	550	DIROUT	1.950
4	Kum Engasha 2 Br.	650	DIROUT	3.190
5	G. El Kudia	700	DIROUT	1.725
6	G. El Ryad	900	DIROUT	2.600
7	G. Baweet	1920	DIROUT	7.100
8	Baweet Br.	460	DIROUT	2.100
9	South Irad Delgawi Br.	300	DIROUT	1.820
10	North Irad Delgawi Br.	700	DIROUT	3.250
11	Irad Delgawi Canal	0	DIROUT	15.500
12	Dashlout Br.	500	DIROUT	1.630
13	El Deba El Bada Br.	500	DIROUT	1.840
14	Abo Kareem Br.	1190	DIROUT	4.261
15	Irad Delgawi Canal	3360	Dermauas	14.900
16	El Deba El Souda Br.	2500	Dermauas	7.200
17	El Busa C.	1000	Dermauas	4.055
18	Aiaad North Br.	800	Dermauas	2.500
19	El Akoula Br.	630	Dermauas	2.420
20	Mubarak Br.	350	Dermauas	1.600
21	Derwa C.	2228	Dermauas	10.340
22	El Areen C.	1700	Dermauas	8.720
	Areen 1 Br.	0	Dermauas	1.090
13	El Nazez Br.	250	Dermauas	1.960
14	Marwan Br.	200	Dermauas	1.400
15	El Demerdash Br.	400	Dermauas	1.900
16	The Conjunction	0	Dermauas	0.800
17	Derwa 1 Br.	175	Dermauas	1.015
18	Derwa 2 Br.	75	Dermauas	0.780
19	Derwa 3 Br.	77	Dermauas	0.700
20	Derwa 4 Br.	45	Dermauas	0.590
<b>Total Area Served</b>		<b>30810</b>		
		<b>(30800)</b>		

Assiut I.D.

Abo Gabal Canal				
NO	Canal / branch name	Area served feds	I.D. TOWN	Total length km
1	Abo Gabal Canal	11300	DIROUT	8.800
2	Mahmoud Basha C.	2250	DIROUT	5.800
3	Mahmoud Basha 1 Br.	500	DIROUT	1.485
4	Mahmoud Basha 2 Br.	600	DIROUT	1.600
5	Mahmoud Basha 3 Br.	450	DIROUT	1.675
6	Shulkamy C.	1150	DIROUT	5.256
7	El Sawi C.	1400	DIROUT	5.550
8	Amshul C.	1150	DIROUT	4.630
9	Sarqna C.	1000	DIROUT	4.065
10	Abo Gabal Canal	1500	DIROUT	7.200
11	Kum El Zarzur Br.	400	DIROUT	1.400
12	Zabara Br.	300	DIROUT	1.235
<b>Total Area Served</b>		<b>22000</b>		
		<b>(22000)</b>		

Assiut I.D.

NO.	CANAL NAME	AREA SERVED FEDDANS
1	Saheliya canal	15069
2	Dairotiah Canal	41834
3	Badraman Canal	29718
4	Irad Delgawi Canal	30810
5	Abo Gabal Canal	22000
<b>TOTAL AREA</b>		<b>160146</b>



Table 15 Command Area along the Ibrahimia Canal

NC	Name of the Branch Canal Intake	Served Area (feddan)		Ratio(%) (Area/Total)
		(After correction)	(■ = 5000feddan)	
52	maghagha Regulator			0.0
53	maghagha Weir			0.0
54	EL-fant canal	7,000	■	1.2
55	saedaia EL-fashnea canal	6,000	■	1.1
56	south EL-fashnea canal	2,000		0.4
57	middle EL-fashnea canal	4,000		0.7
58	North EL-fashnea canal	4,000		0.7
59	EL-Abadea canal	1,000		0.2
60	Left Abo shosha ganabia	1,000		0.2
61	Main Abo shosha canal	19,000	■■■■	3.4
62	right Abo shosha ganabia	1,000		0.2
63	EL-sharahna canal Aquaduct	1,000		0.2
64	Absog canal	7,000	■	1.2
65	south EL-sharahna canal	1,000		0.2
66	EL-soultane canal in take	48,000	■■■■■■■■■■	8.5
67	south Ahmad bsha canal	7,000	■	1.2
68	EL-sharahna ganabia	0		0.0
69	EL-sharahna Regulator			0.0
70	North EL-sharahna canal	4,000		0.7
71	North Ahmad basha canal	5,000	■	0.9
72	Abo Romh meska	0		0.0
73	Left Tansa ganabia	0		0.0
74	Tansa conjunction	25,000	■■■■■	4.4
75	west EL-magrofa canal	3,000		0.5
76	Right Tansa ganabia	3,000		0.5
77	Right Tansa branch	1,000		0.2
78	EL-shekh Haron canal	1,000		0.2
79	Tazmant canal	3,000		0.5
80	south EL-shekh Haron ganabia	1,000		0.2
81	North EL-shekh Haron ganabia	0		0.0
82	south Nasrat meska Aquaduct	0		0.0
83	New Bany swif canal	2,000		0.4
84	Ahnasya canal	6,000	■	1.1
85	Bany haron conjunction	0		0.0
86	EL-Azhare canal	11,000	■■	2.0
87	Ganazera branch	0		0.0
88	EL-sayda canal	3,000		0.5
89	EL-sahara canal	6,000	■	1.1
90	EL-Gandy Regulator			0.0
91	EL-Gandy ganabia	2,000		0.4
92	Bosh canal	11,000	■■	2.0
93	old Bosh ganabia	0		0.0
94	New Bosh ganabia	2,000		0.4
95	EL-zayton canal	1,000		0.2
96	south ashmont canal & North Nasrat meska	5,000	■	0.9
97		0		0.0
98	Left EL-mansour ganabia	0		0.0
99	EL-mansour canal	10,000	■■	1.8
100	ashmont Regulator			0.0
101	Right EL-mansour ganabia	1,000		0.2

Table 15 Command Area along the Ibrahimia Canal

NC	Name of the Branch Canal Intake	Served Area (feddan)		Ratio(%) (Area/Total)
		(After correction)	(■ = 5000feddan)	
102	south kashesha ganabia	7,000	■	1.2
103	Ashmont canal	4,000		0.7
104	middle kashesha ganabia	8,000	■	1.4
105	Bany hader weir	0		0.0
106	North kashesha ganabia	1,000		0.2
107	kashesha Aquaduct	0		0.0
108	Abo zead branch	0		0.0
109	EL-zawya canal	1,000		0.2
110	EL-maslob branch	0		0.0
111	Atoab conjunction	0		0.0
112	EL-homa canal	2,000		0.4
113	Medom canal	5,000	■	0.9
114	afwah canal	0		0.0
115	Ibrahimia ganabia	2,000		0.4
116	Atoab canal	5,000	■	0.9
117	North EL-wasta Regulator			0.0
118	ganabia 2 conjunction	0		0.0
119	Ibrahimia canal at El-Gza	20,000	■■■■	3.5
<b>TOTAL</b>		<b>564,000</b>		<b>100</b>

NOTE Relative uncertainty

2.2 (%)

$$=(576,700-564,000)/576,700=2\% < 10\% \Rightarrow \text{OK}$$

Table 16 Cumulative Ration of Command Area (Ibrahimia Canal)

NO	Name of the Branch Canal Intake	Comand Area (feddan)	Ratio(%)	Cumulative Ratio (%)	Rank Within 80%
2	Serry	90,000	16	16	<u>1</u>
66	EL-soultane	47,920	8	24	<u>2</u>
74	Tansa	24,950	4	29	<u>3</u>
4	West hafez	23,246	4	33	<u>4</u>
18	Safsafa canal	21,840	4	37	<u>5</u>
119	El-Giza Canal	19,600	3	40	<u>6</u>
61	Main Abo shosha	19,000	3	43	<u>7</u>
47	EL-gendia	12,240	2	46	<u>8</u>
3	East hafez	12,050	2	48	<u>9</u>
12	south EL- hoasia&	11,504	2	50	<u>10</u>
92	Bosh	11,410	2	52	<u>11</u>
86	EL-Azhare	11,000	2	54	<u>12</u>
27	Adkarak	10,350	2	56	<u>13</u>
99	EL-mansour	9,870	2	57	<u>14</u>
33	Abo haseba	8,950	2	59	<u>15</u>
42	west aba	8,300	1	60	<u>16</u>
104	middle kashesha	7,880	1	62	<u>17</u>
102	south kashesha	7,270	1	63	<u>18</u>
1	Sahelia Abo korkas	7,000	1	64	<u>19</u>
54	EL-fant	7,000	1	66	<u>20</u>
17	Damareas	6,950	1	67	<u>21</u>
29	south Daroush	6,900	1	68	<u>22</u>
24	Abo esa	6,820	1	69	<u>23</u>
64	Absog	6,585	1	70	<u>24</u>
67	south Ahmad bsha	6,500	1	71	<u>25</u>
89	EL-sahara	6,200	1	73	<u>26</u>
15	El-dosot	5,810	1	74	<u>27</u>
55	saedaia EL-fashnea	5,780	1	75	<u>28</u>
39	EL-gharabawy	5,725	1	76	<u>29</u>
84	Ahnasya canal	5,600	1	77	<u>30</u>
32	matay canal	5,450	1	78	<u>31</u>
113	Medom canal	5,420	1	79	<u>32</u>
116	Atoab canal	5,346	1	79	<u>33</u>
21	samalot canal	5,200	1	80	<u>34</u>
71	North Ahmad basha canal	5,000	1	81	
96	south ashmont canal & North Nasrat meska	4,730	1	82	
70	North EL-sharahna canal	4,380	1	83	
50	EL-fashnea canal	4,250	1	84	
51	maghagha canal	4,050	1	84	
58	North EL-fashnea canal	3,690	1	85	
57	middle EL-fashnea canal	3,550	1	86	
30	shoab canal	3,524	1	86	
40	East aba canal	3,500	1	87	
103	Ashmont canal	3,500	1	87	
36	Besher canal	3,310	1	88	
88	EL-sayda canal	3,240	1	89	
79	Tazmant canal	3,200	1	89	
8	Left koam EL-zaher branch	3,175	1	90	
76	Right Tansa ganabia	3,100	1	90	
75	west EL-magrofa canal	2,888	1	91	
31	matay ganabia	2,754	0	91	
94	New Bosh ganabia	2,434	0	92	

Table 16 Cumulative Ration of Command Area (Ibrahimia Canal)

NO	Name of the Branch Canal Intake	Comand Area (feddan)	Ratio(%)	Cumulative Ratio (%)	Rank Within 80%
11	Abo EL-mhde branch	2,274	0	92	
56	south EL-fashnea canal	2,215	0	93	
37	south Abo asser canal	2,150	0	93	
112	EL-homa canal	2,140	0	93	
45	North Dahrout canal	2,000	0	94	
83	New Bany swif canal	2,000	0	94	
35	Bany mazar culvert	1,970	0	94	
91	EL-Gandy ganabia	1,866	0	95	
115	Ibrahimia ganabia	1,650	0	95	
7	west abuoha branch	1,500	0	95	
109	EL-zawya canal	1,478	0	95	
23	Nazlet kolosna canal and extension	1,470	0	96	
78	EL-shekh Haron canal	1,300	0	96	
62	right Abo shosha ganabia	1,270	0	96	
46	Atala canal	1,200	0	96	
44	Ali fahme canal	1,100	0	97	
60	Left Abo shosha ganabia	1,080	0	97	
95	EL-zayton canal	1,065	0	97	
14	south makosa branch	1,000	0	97	
28	Right Adkak ganabia	1,000	0	97	
77	Right Tansa branch	1,000	0	97	
43	south Dahrout canal	960	0	98	
41	EL-Rashede branch	950	0	98	
65	south EL-sharahna canal	920	0	98	
13	North EL- hoaslia ganabia	875	0	98	
26	Left Adkak ganabia	850	0	98	
38	east EL-zobone canal	790	0	98	
59	EL-Abadea canal	700	0	99	
63	EL-sharahna canal Aquaduct	685	0	99	
106	North kashesha ganabia	625	0	99	
6	Daurotia EL-Ibrahimia ganabia	600	0	99	
101	Right EL-mansour ganabia	510	0	99	
80	south EL-shekh Haron ganabia	500	0	99	
49	maghagha ganabia	475	0	99	
110	EL-maslob branch	475	0	99	
114	afwah canal	475	0	99	
98	Left EL-mansour ganabia	465	0	99	
118	ganabia 2 conjunction	460	0	99	
68	EL-sharahna ganabia	433	0	100	
108	Abo zead branch	433	0	100	
48	EL-fashnea ganabia	400	0	100	
111	Atoab conjunction	357	0	100	
73	Left Tansa ganabia	350	0	100	
85	Bany haron conjunction	320	0	100	
10	old EL-hoaslia branch	300	0	100	
25	Abo esa ganabia	300	0	100	
93	old Bosh ganabia	64	0	100	
5	New hafez Regulator		0	100	
9	Right koam EL-zaher branch	-	0	100	
16	old EL-minia Regulator	-	0	100	
19	New EL-minia Regulator		0	100	

Table 16 Cumulative Ration of Command Area (Ibrahimia Canal)

NO	Name of the Branch Canal Intake	Comand Area (feddan)	Ratio(%)	Cumulative Ratio (%)
20	safsafa canal (at El-borgaia 1 fider)	-	0	100
22	safsafa canal (at north samalot fider)	-	0	100
34	matay Regulator		0	100
52	maghagha Regulator		0	100
53	maghagha Weir		0	100
69	EL-sharahna Regulator		0	100
72	Abo Romh meska	-	0	100
81	North EL-shekh Haron ganabia	-	0	100
82	south Nasrat meska Aquaduct	-	0	100
87	Ganazera branch	-	0	100
90	EL-Gandy Regulator		0	100
97		-	0	100
100	ashmont Regulator		0	100
105	Bany hader weir	-	0	100
107	kashesha Aquaduct	-	0	100
117	North EL-wasta Regulator		0	100

Rank  
Within 80%

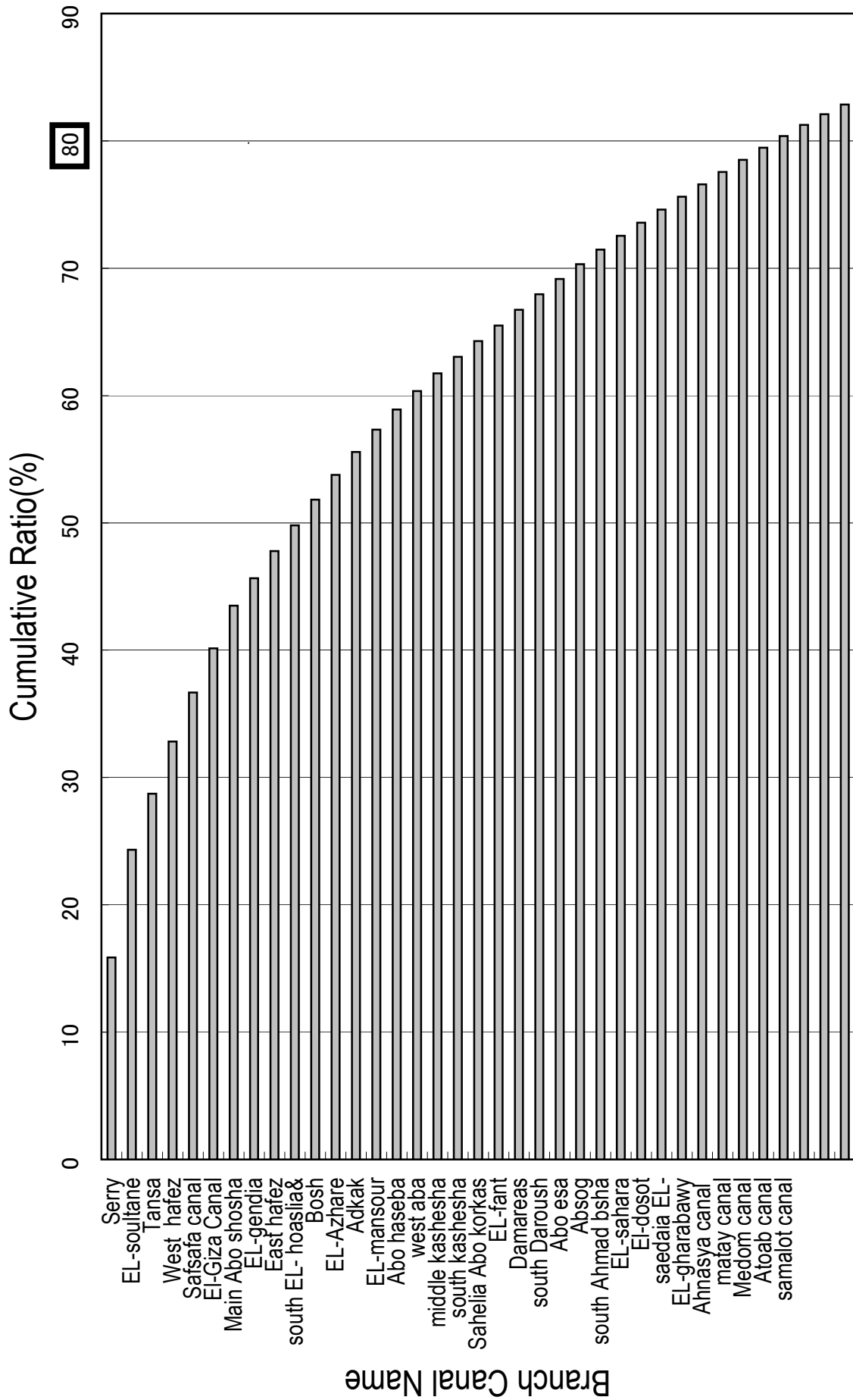




Table 17 Command Area along the Bahr Yusef Canal

NC	Name of the Branch Canal Intake	Served Area (feddan)		Ratio (%) (Area/Total)
		(After correction)	(= 5000feddan)	
1	Arab Bany khaled Pumb station			0.0
2	Arab Bany khaled canal	2,130		0.4
3	Bany khaled Pumb station			0.0
4	Bany khaled canal	2,550		0.5
5	Mousa Branch	300		0.1
6	Asmant Branch	450		0.1
7	Khour Balansora Branch	350		0.1
8	EL-Soultan Hassan Branch	300		0.1
9	EL-Nabt Branch	200		0.0
10	Mabrok Branch	1,100		0.2
11	Manshat EL-zahab conjunction	74,850	████████████████████	13.4
12	Dahab Regulator			0.0
13	Old suction basin (1)	19,550	■■■■■	3.5
14	New suction basin (1)			0.0
15	EL-Bhnasa conjunction	4,710		0.8
16	Sahel EL-Bhnasa branch	1,125		0.2
17	EL-Hareka and Sabaa conjunction	72,250	████████████████████	12.9
18	Sakola Regulator			0.0
19	Old Sakola suction basin (4)	12,000	■■■	2.1
20	Main Mazora canal new pumb station (0)	2,000		0.4
21	Main Mazora canal Old pumb station (0)	35,000	██████████	6.3
22	Magror EL-Regha canal	2,000		0.4
23	Koftan canal	1,276		0.2
24	Mazoura Regulator			0.0
25	Wadi EL-Rayan canal	268		0.0
26	Matrabat Meana canal	2,000		0.4
27	EL-Asra canal	5,500	■	1.0
28	Meana canal	2,000		0.4
29	Adrasya canal	500		0.1
30	Fanouk canal	600		0.1
31	Bhbashen conjunction	23,000	■■■■■	4.1
32	First right EL-giza ganabla	3,300		0.6
33	Hassan Wasel	150,000	████████████████████	26.8
34	EL-giza canal	140,000	████████████████████	25.0
35	Lahoun Reg.	251,000	████████████████████	
	TOTAL	810,309		
	TOTAL(excluding of Lahoun Reg)	559,309		

NOTE: Relative uncertainty =  $\frac{(808,000 - 810,309) / 808,800 = 2\% > 10\% \Rightarrow OK}{-0.3\%}$

NO	Name of the Branch Canal Intake	Command Area (feddan)	Ratio(%)	Cumulative Ratio (%)
35	Lahoun Reg	251,000		
33	Hassan Wasef	150,000	27	27
34	El-giza canal	140,000	25	52
11	Manshat EL-Dahab	74,850	13	65
17	EL-Hareka and Sabaa	72,250	13	78
21	Main Mazora canal Old P.S	35,000	6	84
31	Bhbashen	23,000	4	89
13	Old sudion basin (1)	19,550	3	92
19	Old Skidastion basin (4)	12,000	2	94
27	EL-Ara canal	5,500	1	95
15	EL-Bhmasa conjunction	4,710	1	96
32	First right EL-gizaganbia	3,300	1	97
4	Bany khated canal	2,550	0	97
2	Arab Bany khated canal	2,130	0	97
20	Main Mazora canal new pumb station (0)	2,000	0	98
22	Magror EL-Regha canal	2,000	0	98
26	Matrabat Meena canal	2,000	0	98
28	Meena canal	2,000	0	99
23	Koftan canal	1,276	0	99
16	Sahel EL-Bhmasa branch	1,125	0	99
10	Madrok Branch	1,100	0	99
30	Fanous canal	600	0	100
29	Adrasya canal	500	0	100
6	Asmant Branch	450	0	100
7	Khour Balansora Branch	350	0	100
5	Mousa Branch	300	0	100
8	EL-Souttan Hassan Branch	300	0	100
25	Wadi EL-Rayan canal	268	0	100
9	EL-Nadot Branch	200	0	100

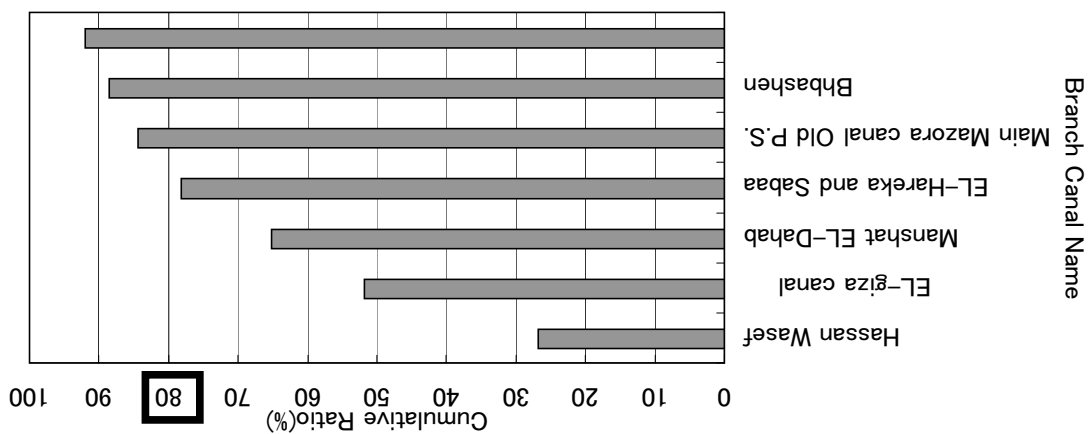


Table 18 Cumulative Ration of Command Area (Bahr Yusef Canal)

Table 19 Quota of Existing Water Distribution

water distribution in Ibrahemea canal in Asuit among governorates ( Assuit,Minia,Beni Suef,Fayyum&Geza)

no.	governorate	before losses	area se.	percent	remarks
1	Asuit	104,900	110,145	6.70%	
2	s. Minia	75,600	79,380	4.83%	
3	Ibrahemea down s. Dirout	576,700	605,430	36.84%	
	a. East Minia	177,200	193,954	11.80%	
	west Minia	120,000	126,930	7.73%	
	b. Beni Suef	259,700	264,815	16.11%	Magaga
	c. Giza	19,600	19,731	1.30%	weir
4	Bahr Yusef	808,000	848,400	51.63%	
	a. Minia	202,100	221,867	13.50%	
	b. Beni Suef	64,500	73,755	4.49%	
	c. Fayyum	401,900	408,599	24.87%	
	d. Giza	139,500	144,179	8.77%	
5	down s. Sakola	605,900	626,523	38.13%	
6	down s. Magaga weir	279,300	284,546	17.31%	
		1,565,100			

no.	governorate	before losses	after losses	percent
1	Asuit	104,900	110,145	6.70%
2	Minia	575,000	622,121	37.86%
3	Beni Suef	333,700	338,570	20.60%
4	Fayyum	401,900	408,599	24.86%
5	Giza	149,600	163,910	9.98%
	total of Ibrahemea including modified area		1,643,345	

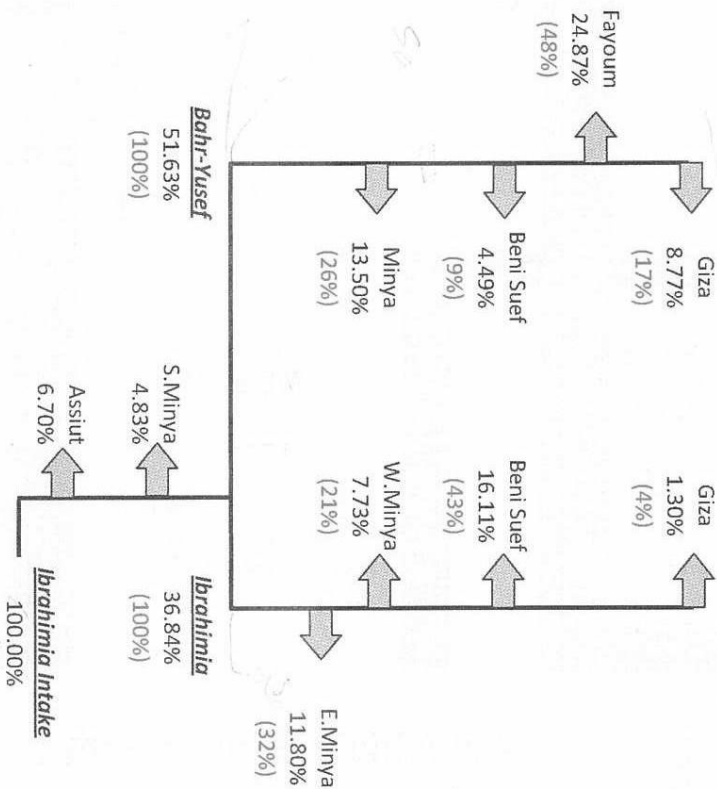


Table 20 Monthly Water Distribution Ratio at DGR ( 5 Year's average;2005-2009)

	Jan.	Feb.	Mar.	Apr.	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Winter crop		Summer crop	
													Feb-May	Wheat	Jun-Sep	Maize
5years Average MCM	278.4	708.2	874.4	893.2	926.8	1148	1205	1200	939.4	842.6	770.6	609	3,403	4,492	MCM	
5years Average MCM	135.4	344.4	449	444	451.8	542.2	564.4	563	444	429	380.6	296.8	1,689	2,114	MCM	
Bahr-Yusef %	48.6	49	51	50	49	47	47	47	47	47	49.4	48.7	50	47	(%)	
5years Average MCM	110.4	282.6	343.2	356.6	376.8	438	463.2	452	375	342.4	318	269	1,359	1,728	MCM	
Ibrahimia %	39.7	40	39	40	41	38	38	38	40	40.6	41.3	44.2	40	38	(%)	
	88.3	88.5	90.5	89.6	89.4	85.4	85.2	84.6	87.2	91.5	90.7	92.9				
Bahr-Yusef %	51.63	51.63	51.63	51.63	51.63	51.63	51.63	51.63	51.63	51.63	51.63	51.63	52	52	(%)	
Ibrahimia %	36.84	36.84	36.84	36.84	36.84	36.84	36.84	36.84	36.84	36.84	36.84	36.84	37	37	(%)	

Table 21 Monthly Water Distribution Ratio at Bahr Yusef ( 5 Year's average;2005-2009)

	Jan.	Feb.	Mar.	Apr.	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Winter crop		Summer crop	
													Feb-May	Wheat	Jun-Sep	Maize
5years Average MCM	135.4	344.4	449	444	451.8	542.2	564.4	563	444	429	380.6	296.8	1,689	2,114	MCM	
El Mirnya %	36.0	23.2	16.5	20.2	18.8	15.5	14.4	15.0	12.3	14.6	16.6	13.1	19	14	(%)	
5years Average MCM	86.6	264.4	375	354.2	366.8	458	483	478.4	389.2	366.2	317.6	257.8	1,360	1,809	MCM	
Beni Swef %	-41	22.2	55.2	54	42.4	104.4	98.2	104.2	47.2	47	18.4	-18.8	174	354	(%)	
	-30.3	6.4	12.3	12.2	9.4	19.3	17.4	18.5	10.6	11.0	4.8	-6.3	10	17	(%)	
5years Average MCM	39.6	71.8	86.4	80.8	88.4	107.2	117.8	113.2	95.6	89.4	81.4	75.4	327	434	MCM	
5years Average MCM	37.8	109.6	151.8	132.2	141.4	163.6	183.8	179.6	157.6	143.2	131	117.4	535	685	MCM	
Fayoum %	57.2	52.7	53.1	48	50.9	49.9	53.4	52	57	54.2	55.8	65	51	53	(%)	
5years Average MCM	50.2	60.8	81.6	87.2	82.8	83.2	81.4	88.8	86.6	86.6	86.8	83.8	324	336	MCM	
Giza %	37.1	17.7	18.2	19.6	20.9	15.3	14.7	14.5	20.0	20.2	22.8	28.2	19	16	(%)	
	100.0	100.0	100.1	100.0	100.0	100.0	99.9	100.0	99.9	100.0	100.0	100.0				

Table 22 Plan of the Technical Cooperation

Required Expert and Year	1st			2nd			3rd			1st 2nd 3rd			Total (MM)
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd	
<Long-term expert>													
(1) Team leader (Water resources planning)	■ ■ ■	■ ■ ■	■ ■ ■							6	6	6	18
(2) Irrigation Eng. (Water management)	■ ■ ■	■ ■ ■	■ ■ ■							6	6	6	18
(3) System Eng. (Data management)	■ ■ ■	■ ■ ■	■ ■ ■							6	6	6	18
(4) Hydraulic Eng. (Field monitoring)	■ ■ ■	■ ■ ■	■ ■ ■							6	6	6	18
(5) Irrigation Eng. (On-farm water management)	■ ■ ■	■ ■ ■	■ ■ ■							6	6	6	18
(6) Coordinator (Training program)	■ ■ ■	■ ■ ■	■ ■ ■							6	6	6	18
										36	36	36	108
<Short-term expert>													
Hydraulic Eng (Filed monitoring)	■ ■ ■	■ ■ ■	■ ■ ■							3	3	3	9
Water management Eng. (O/M)	■ ■ ■	■ ■ ■	■ ■ ■							3	3	3	9
Computer programmer	■ ■ ■	■ ■ ■	■ ■ ■							3	3	3	9
Telecommunication facilities Eng.	■ ■ ■	■ ■ ■	■ ■ ■							3	3	3	9
Specialist (as required)	■ ■ ■	■ ■ ■	■ ■ ■							3	3	3	9
										15	15	15	45
													153

1000yen/MM	1000yen	Flight fee	
		1000yen/flight	Times
3,000	54,000	1,000	9
3,000	54,000	1,000	9
3,000	54,000	1,000	9
3,000	54,000	1,000	9
3,000	54,000	1,000	9
3,000	54,000	1,000	9
3,000	27,000	1,000	3
3,000	27,000	1,000	3
3,000	27,000	1,000	3
3,000	27,000	1,000	3
3,000	27,000	1,000	3
	459,000		
		Sub-total(1000yen)	
		528,000	
		Others (30% of Sub-total)	
		158,400	
		Total	
		686,400 (1000yen)	
		41,349 (1000LE)	

Table 23 Construction Cost for Telemetry System ↓

Item	Unit Cost (LE)	Quantity	Amount (LE)
Central Control House	11,330,000	1	11,330,000
Dirout Control House	8,271,000	1	8,271,000
Main Canal Regulator telemetry station			
Bahr Yusef Canal			
Telemetry Type-1	480,000	4	1,920,000
Telemetry Type-2	310,000	1	310,000
Ibrahimia Canal			
Telemetry Type-4	410,000	1	410,000
Telemetry Type-2	310,000	5	1,550,000
Telemetry Type-3	230,000	3	690,000
sub total			4,880,000
Branch Canal Intake telemetry station			
Bahr Yusef Canal	200,000	4	800,000
Ibrahimia Canal	200,000	34	6,800,000
Quarun lake	200,000	1	200,000
sub total			7,800,000
Enhancement of O/M	2,000,000	1	2,000,000
<b>TOTAL</b>			<b>34,281,000</b>

34,000,000(LE)

Item	Local C. (LE)	Foreing C. (LE)	Total (LE)	Exchange to "YEN"
(1) Construction cost	3,400,000	30,600,000	34,000,000	564,400,000
(2) Engineering service(10% of (1))	340,000	3,060,000	3,400,000	56,440,000
(3) Sub Total	3,740,000	33,660,000	37,400,000	620,840,000
(4) Physical contingency(5% of (3))	187,000	1,683,000	1,870,000	31,042,000
(5) Price contingency(5% of (3) and (4))	196,350	1,767,150	1,963,500	32,594,100
<b>Total Cost</b>	<b>4,123,350</b>	<b>37,110,150</b>	<b>41,233,500</b>	<b>684,476,100</b>

Table 23 Construction Cost for Telemetry System

Type-1

Dahab, Sakoura, Mazoura, Lahoun

Item	Remarks	Unit price (1000Yen)	Quantity	Amount (1000Yen)
<b>&lt;Telemetry equipment&gt;</b>				
Telemetry basic parts	Normal type(1:n porlling)	2,000	1	2,000
Input/Output parts	Analog input type	150	15	2,250
Telemetry equipment box	Outdoor station	1,500	1	1,500
<b>&lt;Input/Output equipment&gt;</b>				
Basic parts	Normal type	1,000	1	1,000
Input/Output parts	Analog input type	100	15	1,500
<b>&lt;Electric power source equipment&gt;</b>				
Lightning resistant transfer		150	1	150
Total telemetry equipment cost				8,400
Installation, adjustment, overhead cost				3,360
Total cost of subsidiary station				11,760

Assesd amount( 70% ) 8,000

**480,000(LE)**

Type-2 (Remote terminal unit )

New Hafze, New Minya, Matay, Maghagha, El Sharahna, Abo El Shekok

Item	Remarks	Unit price (LE)	Quantity	Amount (LE)
<b>&lt;Remote Terminal Unit&gt;</b>				
Data Logger	Cambell data logger CR1000	20,000	1	20,000
GSM/GPRS modem	AirLink Raven E3214-C	10,000	1	10,000
Solar power panel and Solar regulator	Solar panel, Solar regulator, Battery	10,000	1	10,000
RTU total cost				40,000
<b>&lt;Mesurement equipment&gt;</b>				
Pressure Type Water level gage		10,000	2	20,000
Gate positioning level gage		10,000	6	60,000
Total				80,000
<b>&lt;Site preparation, Instllation&gt;</b>				
Site preparation		40,000	1	40,000
Installation, adjustment cost				80,000
Overhead cost				72,000
Total cost of Remote Terminal Unit				312,000

Assesed amount **310,000(LE)**

Table 23 Construction Cost for Telemetry System

Type-3 (Remote terminal unit )  
 El Gandy,Ashmont,EL Wasta

Item	Remarks	Unit price (LE)	Quantity	Amount (LE)
<b>&lt;Remote Terminal Unit&gt;</b>				
Data Logger	Cambell data logger CR1000	20,000	1	20,000
GSM/GPRS modem	AirLink Raven E3214-C	10,000	1	10,000
Solar power panel and Solar regulator	Solar panel, Solar regulator, Battery	10,000	1	10,000
RTU total cost				40,000
<b>&lt;Measurement equipment&gt;</b>				
Pressure Type Water level gage		10,000	2	20,000
Gate positioning level gage		10,000	3	30,000
Total				50,000
<b>&lt;Site preparation, Instllation&gt;</b>				
Site preparation		30,000	1	30,000
Installation, adjustment cost				60,000
Overhead cost				54,000
Total cost of Remote Terminal Unit				234,000

Assesed amount **230,000(LE)**

Type-4 (Remote terminal unit )  
 Ibrahimia intake

Item	Remarks	Unit price (LE)	Quantity	Amount (LE)
<b>&lt;Remote Terminal Unit&gt;</b>				
Data Logger	Cambell data logger CR1000	20,000	1	20,000
GSM/GPRS modem	AirLink Raven E3214-C	10,000	1	10,000
Solar power panel and Solar regulator	Solar panel, Solar regulator, Battery	10,000	1	10,000
RTU total cost				40,000
<b>&lt;Measurement equipment&gt;</b>				
Pressure Type Water level gage		10,000	2	20,000
Gate positioning level gage		10,000	9	90,000
Total				110,000
<b>&lt;Site preparation, Instllation&gt;</b>				
Site preparation		60,000	1	60,000
Installation, adjustment cost				105,000
Overhead cost				94,500
Total cost of Remote Terminal Unit				409,500

Assesed amount **410,000(LE)**



Table 23 Construction Cost for Telemetry System

Type-5 (Remote terminal unit )  
Branch canal intake

Item	Remarks	Unit price (LE)	Quantity	Amount (LE)
<b>&lt;Remote Terminal Unit&gt;</b>				
Data Logger	Cambell data logger CR1000	20,000	1	20,000
GSM/GPRS modem	AirLink Raven E3214-C	10,000	1	10,000
Solar power panel and Solar regulator	Solar panel, Solar regulator, Battery	10,000	1	10,000
RTU total cost				40,000
<b>&lt;Measurement equipment&gt;</b>				
Pressure Type Water level gage		10,000	2	20,000
Gate positioning level gage		10,000	2	20,000
Total				40,000
<b>&lt;Site preparation, Instllation&gt;</b>				
Site preparation		20,000	1	20,000
Installation, adjustment cost				50,000
Overhead cost				45,000
Total cost of Remote Terminal Unit				195,000

Assesed amount **200,000(LE)**

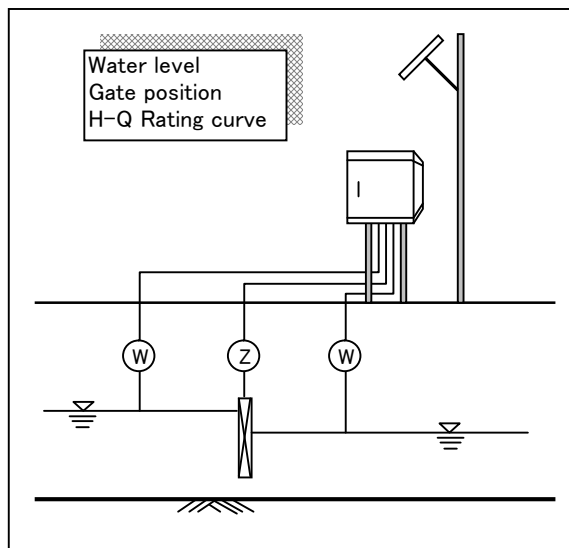


Table 24 Construction Cost for Dirout Control House

Item		Amount (LE)	
Water management facilities	Equipment cost	Data transfer equipment/ Information equipment	3,125,000
		Mesurement equipment	1,096,000
		Software	1,687,000
		Sub Total	5,908,000
	Installation, adjustment cost	2,363,000	
Sub total		8,271,000	
-		-	
Total		8,271,000	

Table 25 Construction Cost for Central Control House

Item		Amount (LE)	
Water management facilities	Equipment cost	Data transfer equipment/ Information equipment	2,815,000
		Software	4,849,000
		Sub Total	7,664,000
	Installation, adjustment,overhead cost	3,066,000	
Sub total		10,730,000	
Control house		600,000	
Sub Total		11,330,000	

Table 26 Operation and Maintenance Cost for Water Management System

Work Title	Item	Amount
Improving Water Distribution System	Maintenance cost	<u>100,000LE/year</u> (≐ 8,000,000LE × 1%) 1% of equipment cost <u>300,000LE/year</u> (≐ 26,000,000LE × 1%) 1% of equipment cost <u>400,000LE/year</u>
	Transmission Network Cost	<u>50,000LE/year</u> (≐ 1,000LE/station/year × 50station)
	Electricity Cost	<u>10,000LE/year</u> (≐ 2,500kWh × 0.3LE/kWh × 12 Month) <u>20,000LE/year</u> (≐ 5,000kWh × 0.3LE/kWh × 12 Month) 30,000LE/year
	Personnel Expenses	<u>300,000LE/year</u> (≐ 5 persons × 2 Shift × 2,000LE/Month × 12 Month) <u>400,000LE/year</u> (≐ 10 person × 3,000LE/Month × 12Month) 700,000LE/year  <b>1,180,000LE/year</b> <b>≐ 1,500,000LE/year</b>

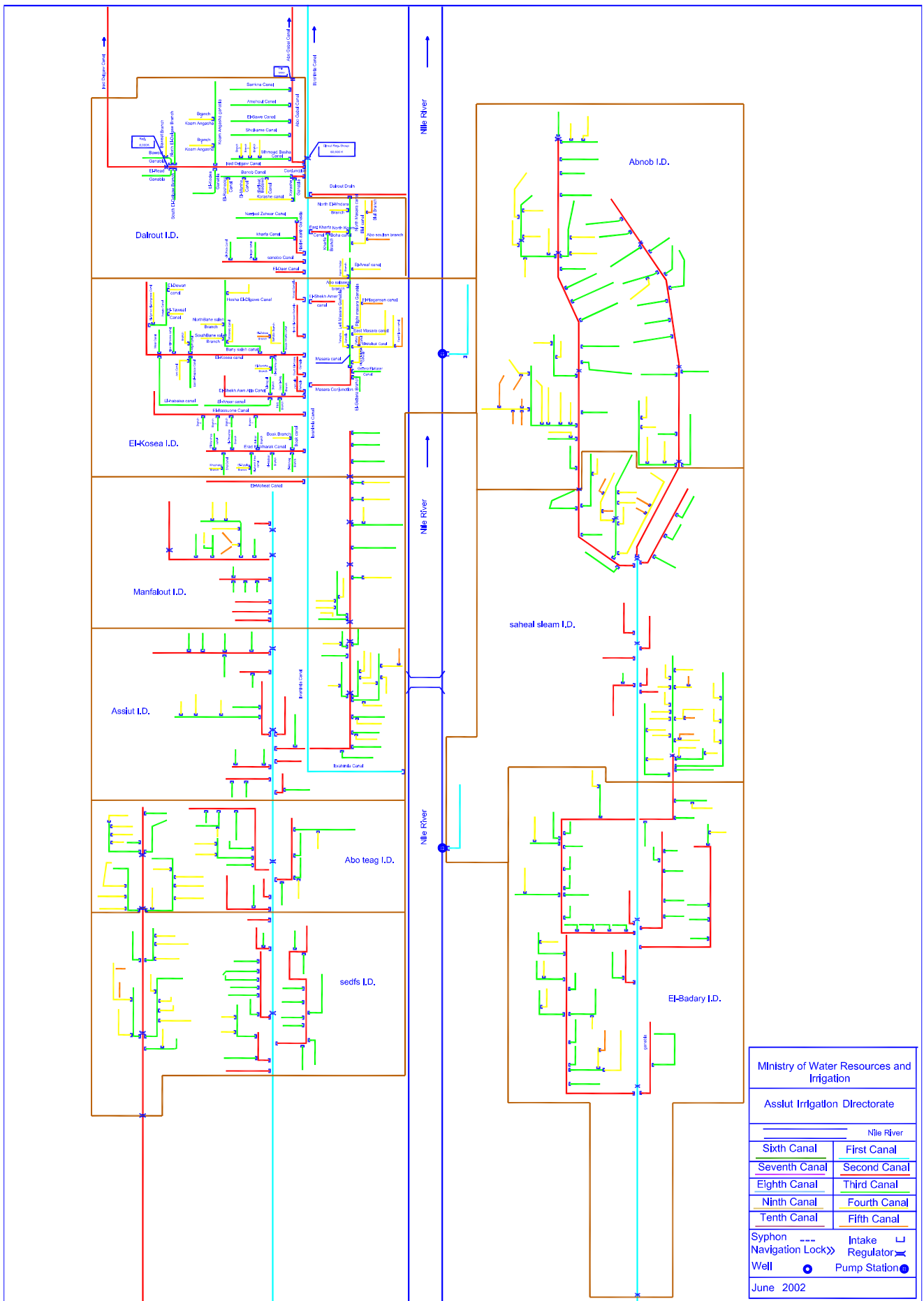


Figure 1 Synopsis of Assiut

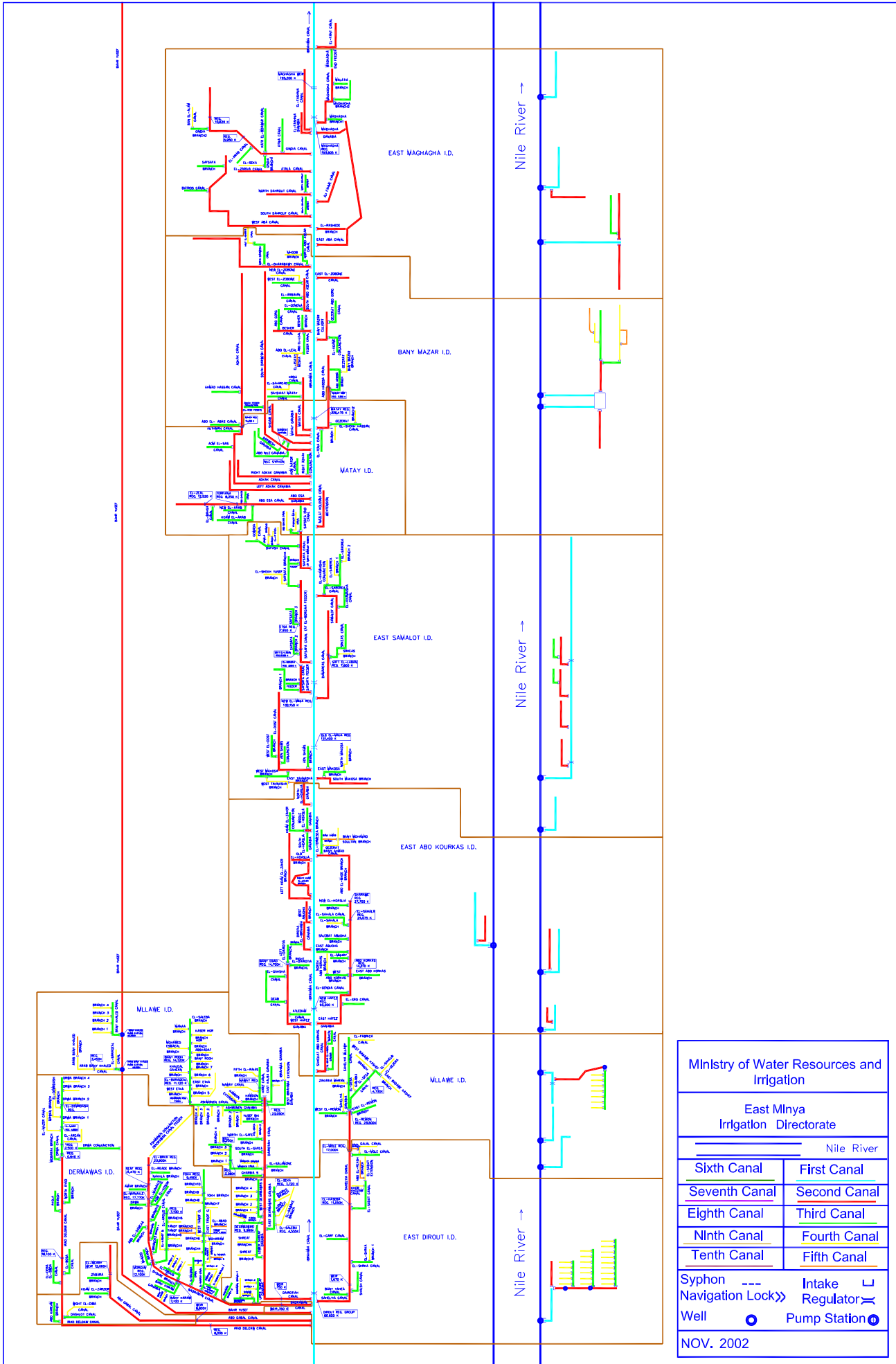
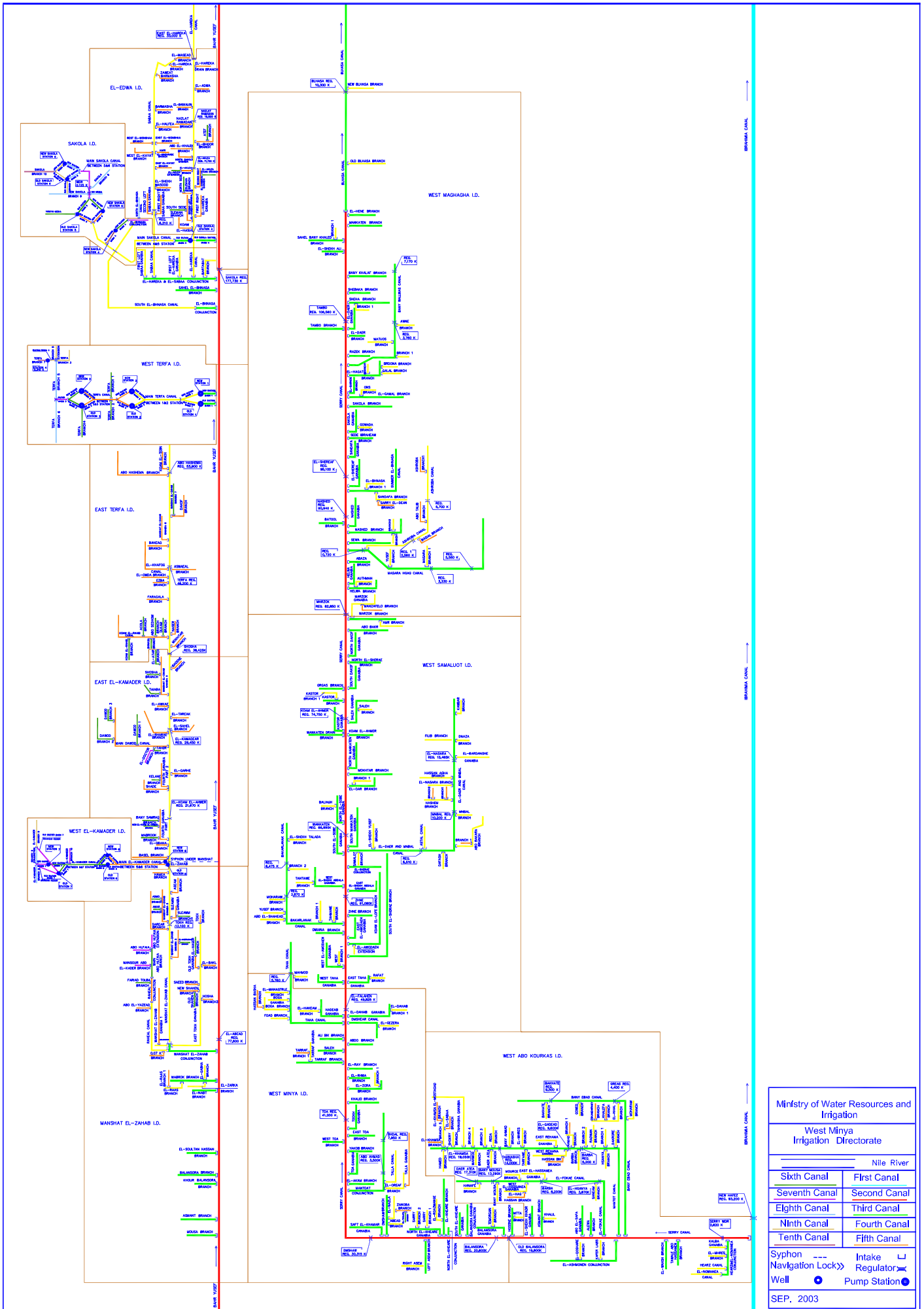


Figure 2 Synopsis of East Minya  
3-30



Ministry of Water Resources and Irrigation  
 West Minya Irrigation Directorate

Nile River

Sixth Canal	First Canal
Seventh Canal	Second Canal
Eighth Canal	Third Canal
Ninth Canal	Fourth Canal
Tenth Canal	Fifth Canal

Syphon --- Navigation Lock --- Intake --- Regulator --- Well --- Pump Station

SEP, 2003

Figure 3 Synopsis of West Minya 3-31

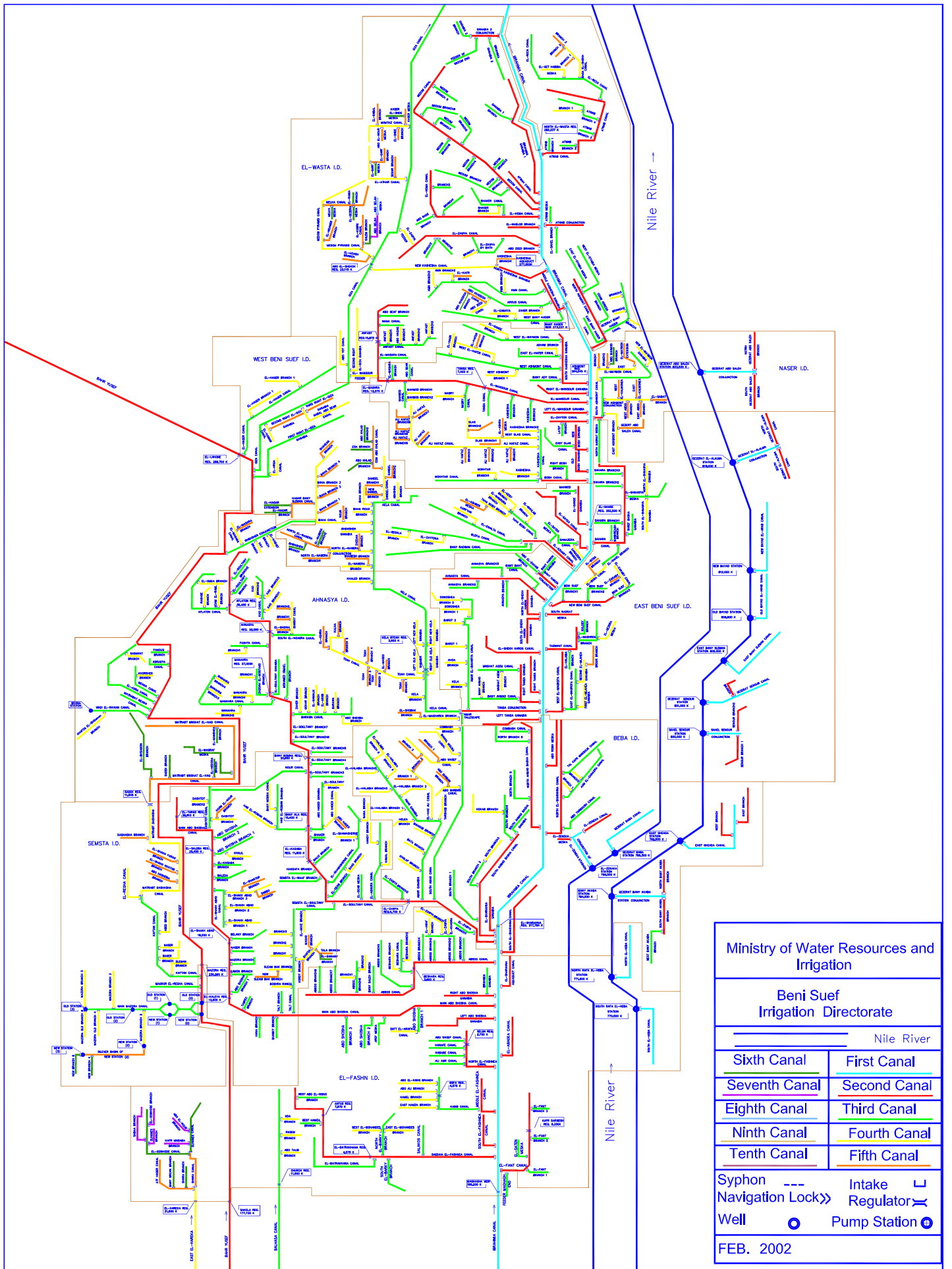


Figure 4 Synopsis of Beni Suef

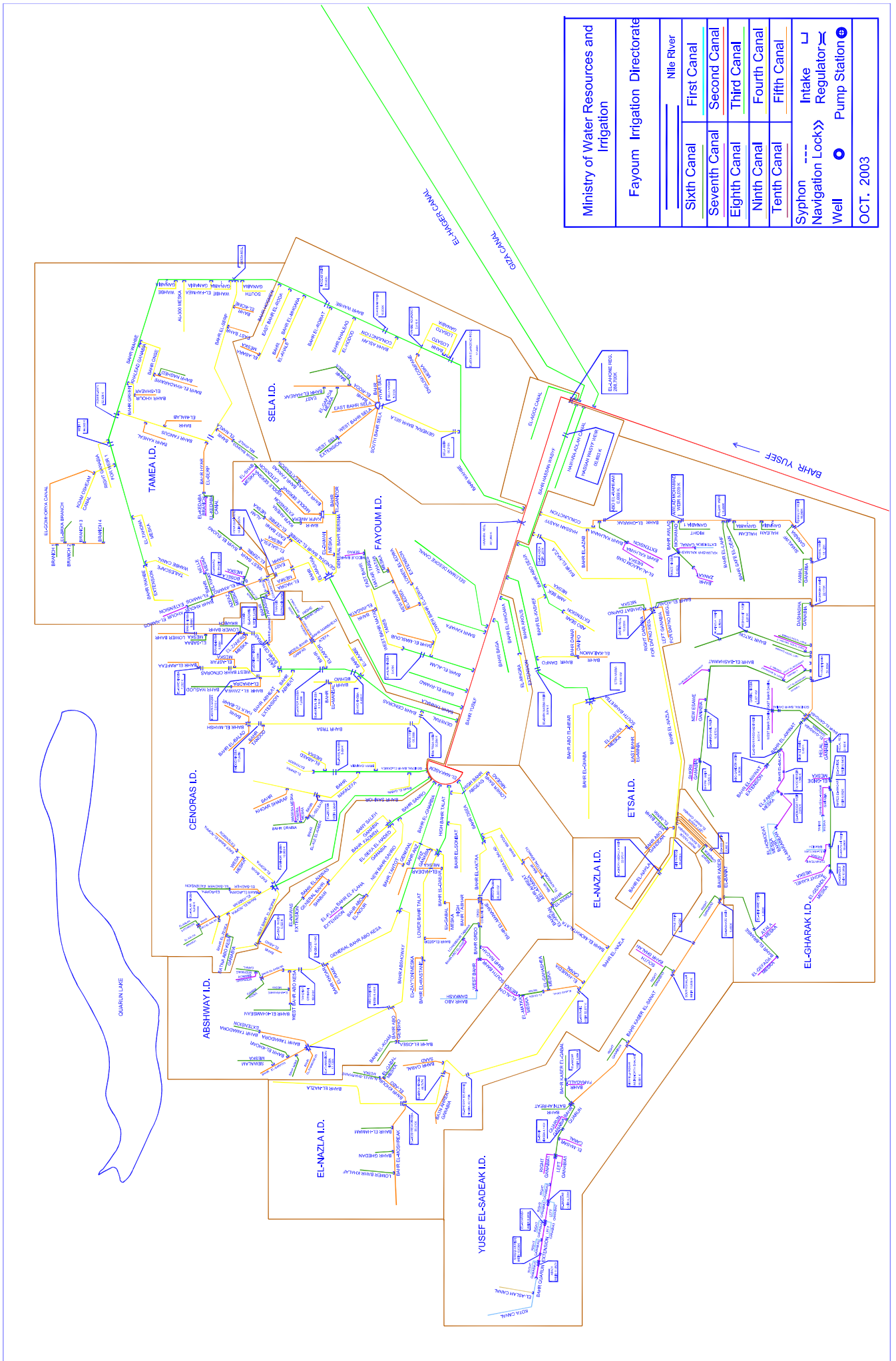
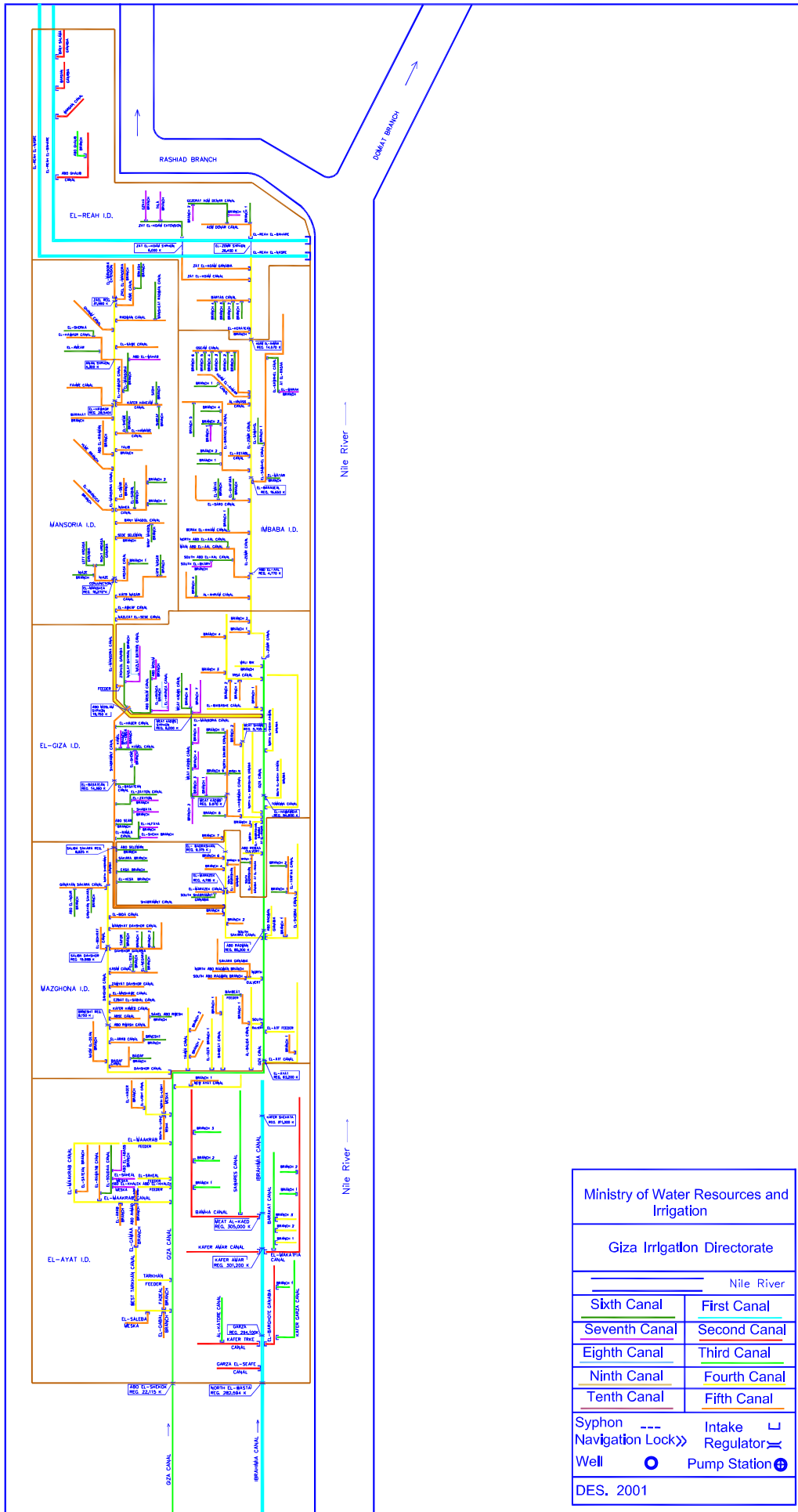


Figure 5 Synopsis of Fayoum





Ministry of Water Resources and Irrigation	
Giza Irrigation Directorate	
Nile River	
Sixth Canal	First Canal
Seventh Canal	Second Canal
Eighth Canal	Third Canal
Ninth Canal	Fourth Canal
Tenth Canal	Fifth Canal
Syphon	Intake
Navigation Lock	Regulator
Well	Pump Station
DES. 2001	

Figure 6 Synopsis of Giza

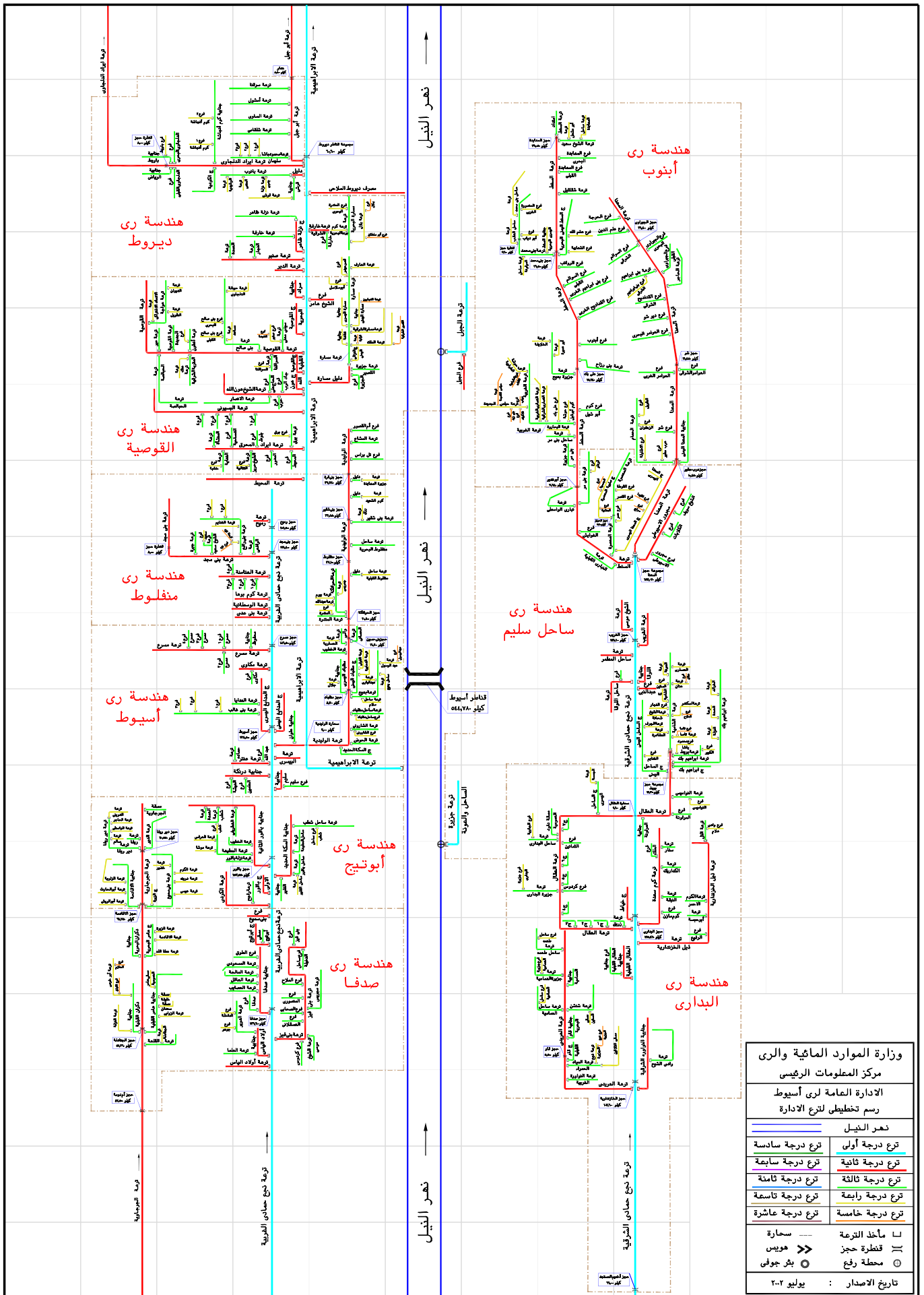
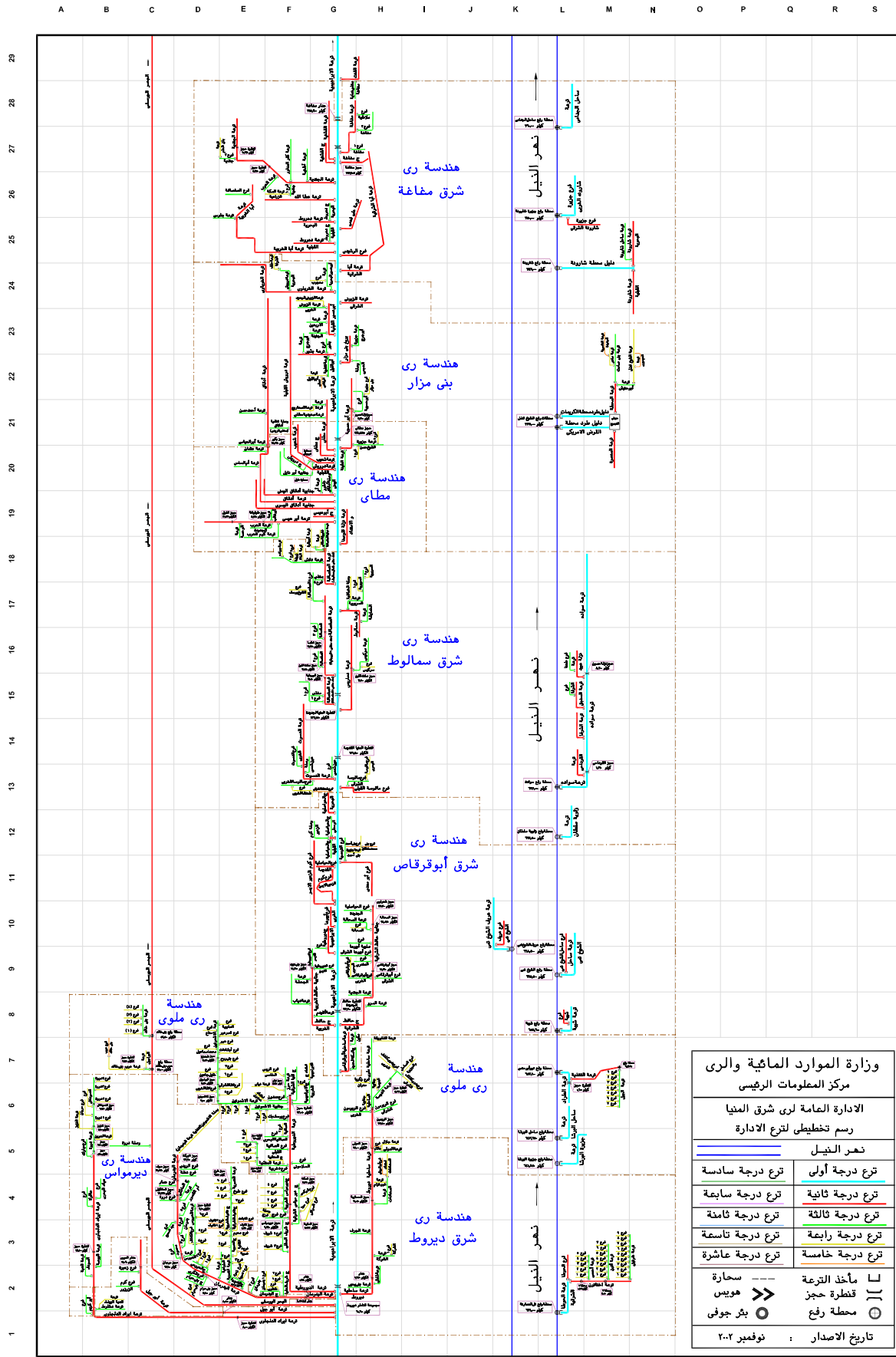
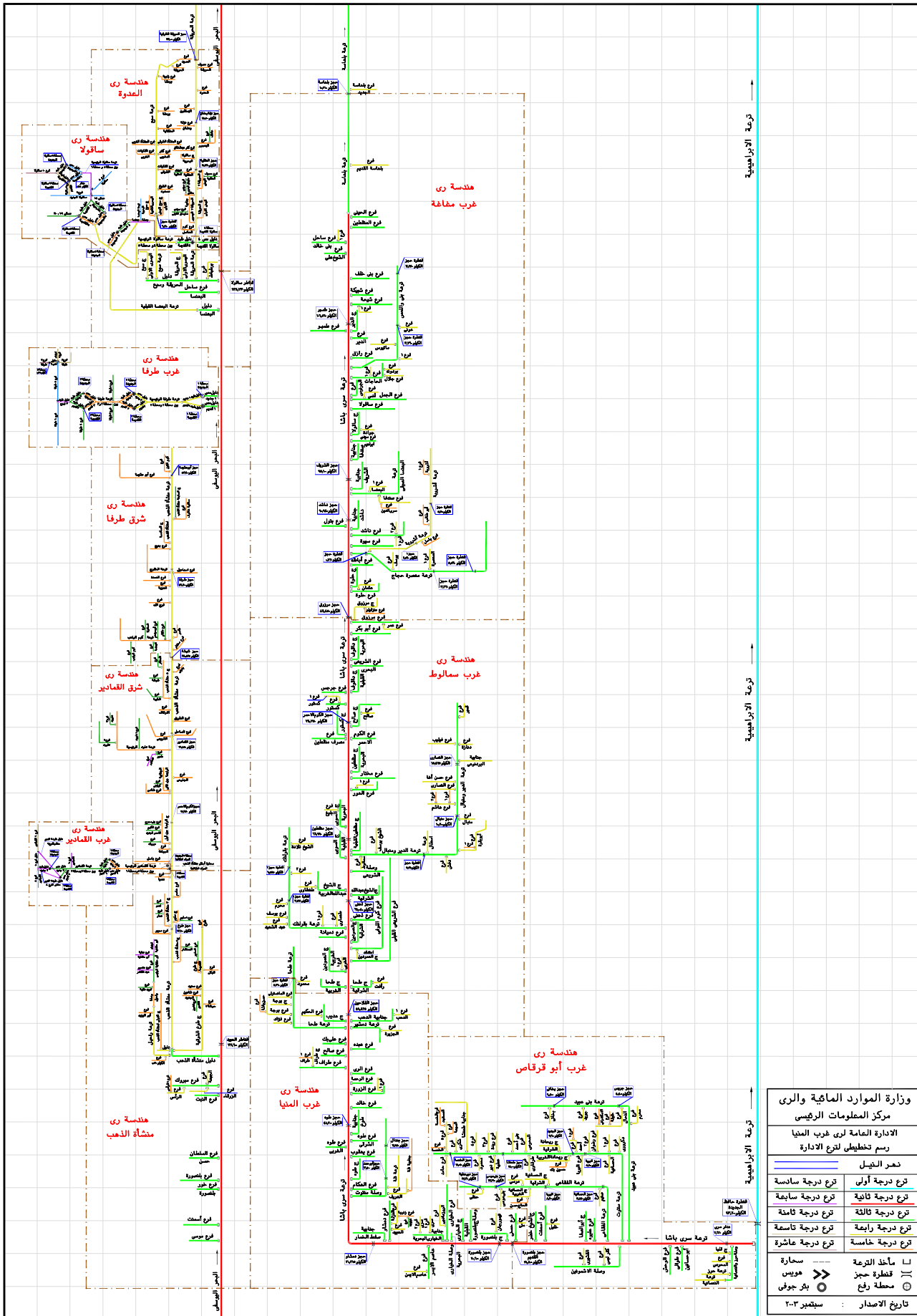


Figure 7 Synopsis of Assiut ( Ababic version )



وزارة الموارد المائية والري مركز المعلومات الريسي الادارة العامة لري شرق المنيا رسم تخطيطي لترع الادارة	
نهر النيل	
ترع درجة أولى	ترع درجة سادسة
ترع درجة ثانية	ترع درجة سابعة
ترع درجة ثالثة	ترع درجة ثامنة
ترع درجة رابعة	ترع درجة تاسعة
ترع درجة خامسة	ترع درجة عاشرة
مأخذ التزعة قنطرة حجز محطة رفع	سحارة هويس بئر جوفى
تاريخ الاصدار : نوفمبر ٢٠٠٢	

Figure 8 Synopsis of East Minya ( Ababic version )



وزارة الموارد المائية والري  
مركز المعلومات الرئيسي  
الإدارة العامة لري غرب المنيا  
رسم تخطيطي لري الإدارة

نهر النيل	
قناة درجة سادسة	قناة درجة أولى
قناة درجة سابعة	قناة درجة ثالثة
قناة درجة ثامنة	قناة درجة رابعة
قناة درجة تاسعة	قناة درجة خامسة
قناة درجة عاشره	

سحارة	← مأخذ التربة
→	قناة حيز
○	محطة رفع
●	بئر جوفى

تاريخ الاصدار : 2-3-2003

Figure 9 Synopsis of West Minya ( Ababic version )

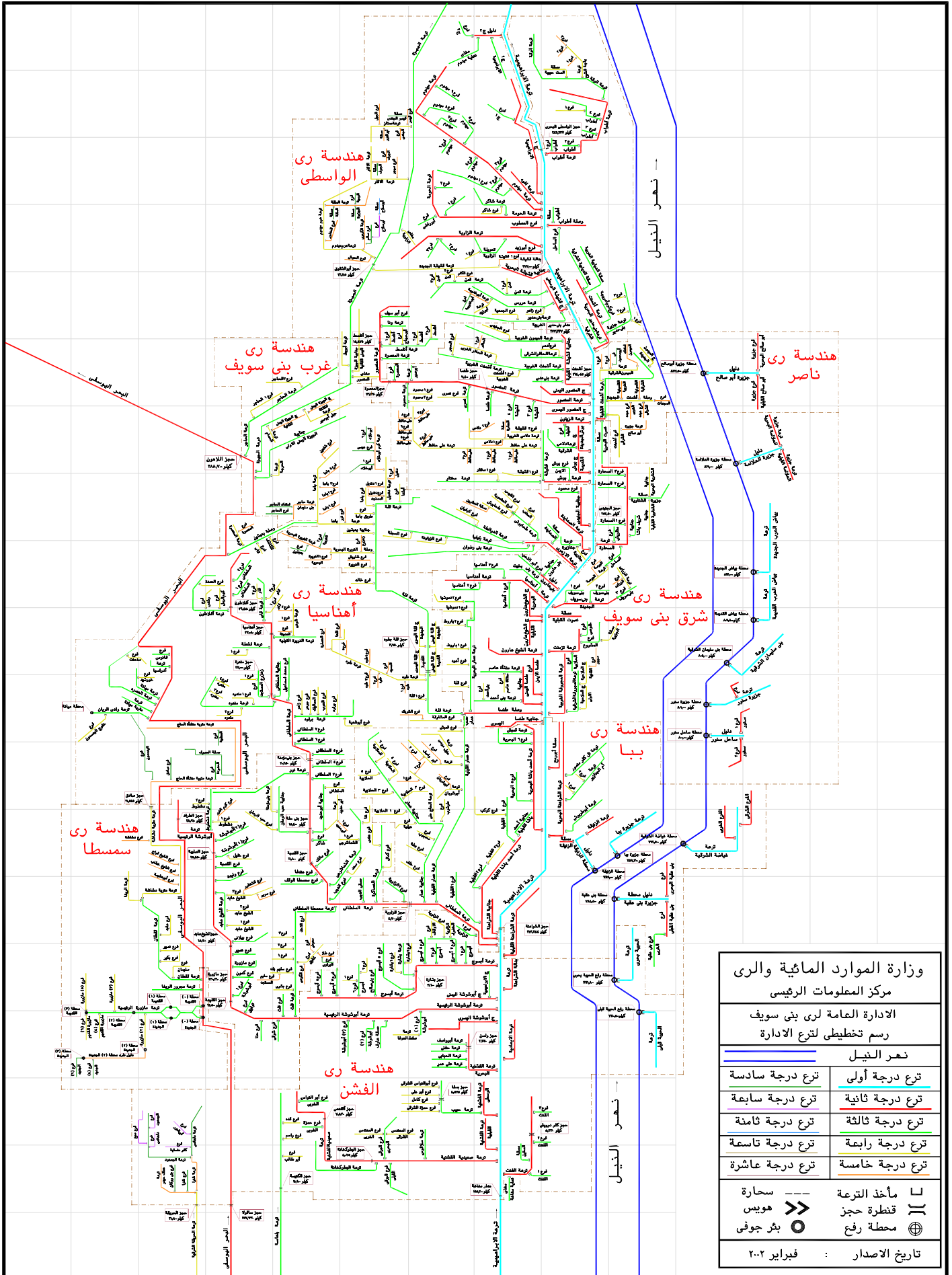
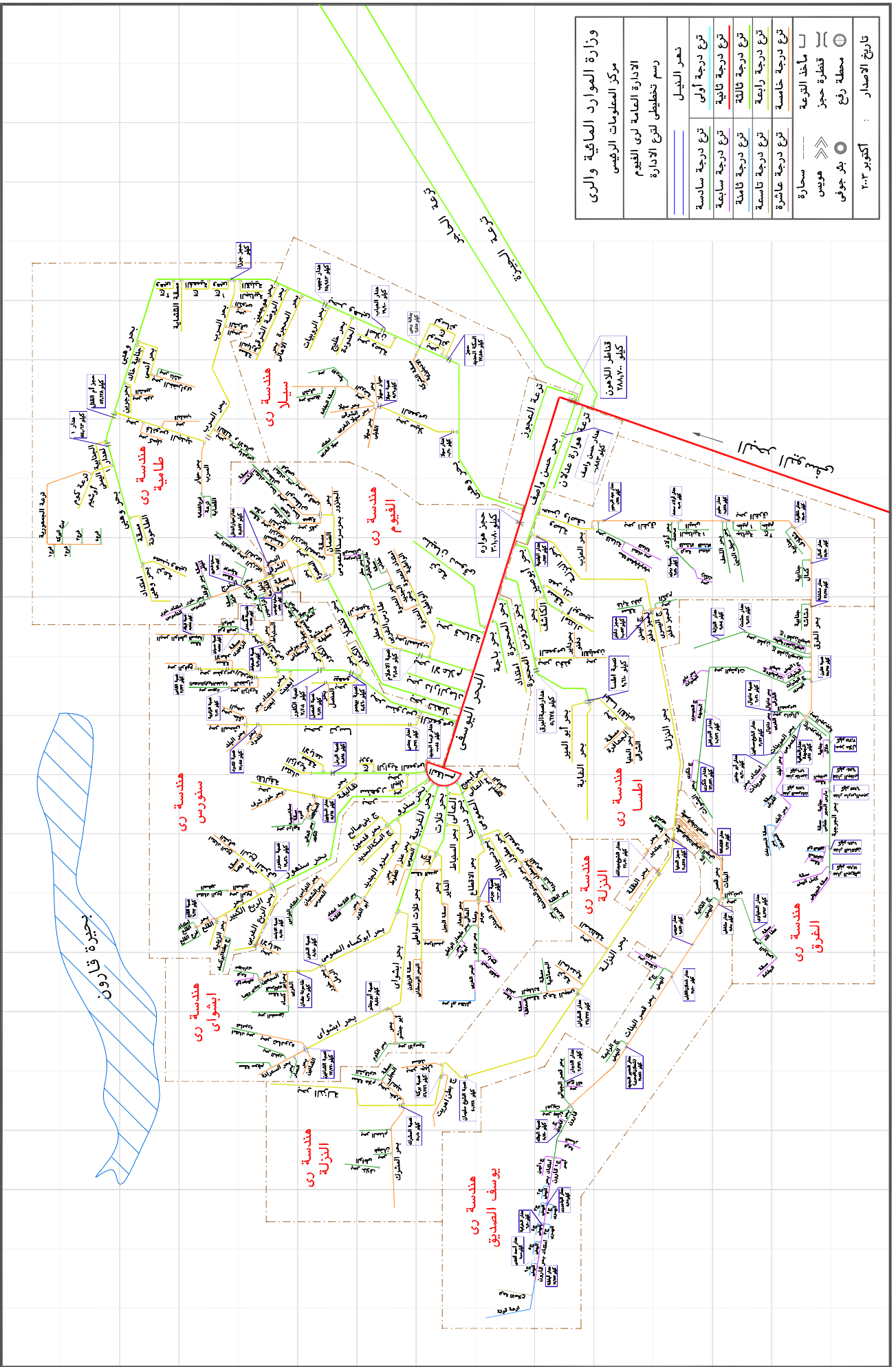


Figure 10 Synopsis of Beni Suef ( Ababic version )



15 14 13 12 11 10 9 8 7 6 5 4 3 2 1  
Figure 11 Synopsis of Fayoum ( Ababic version )

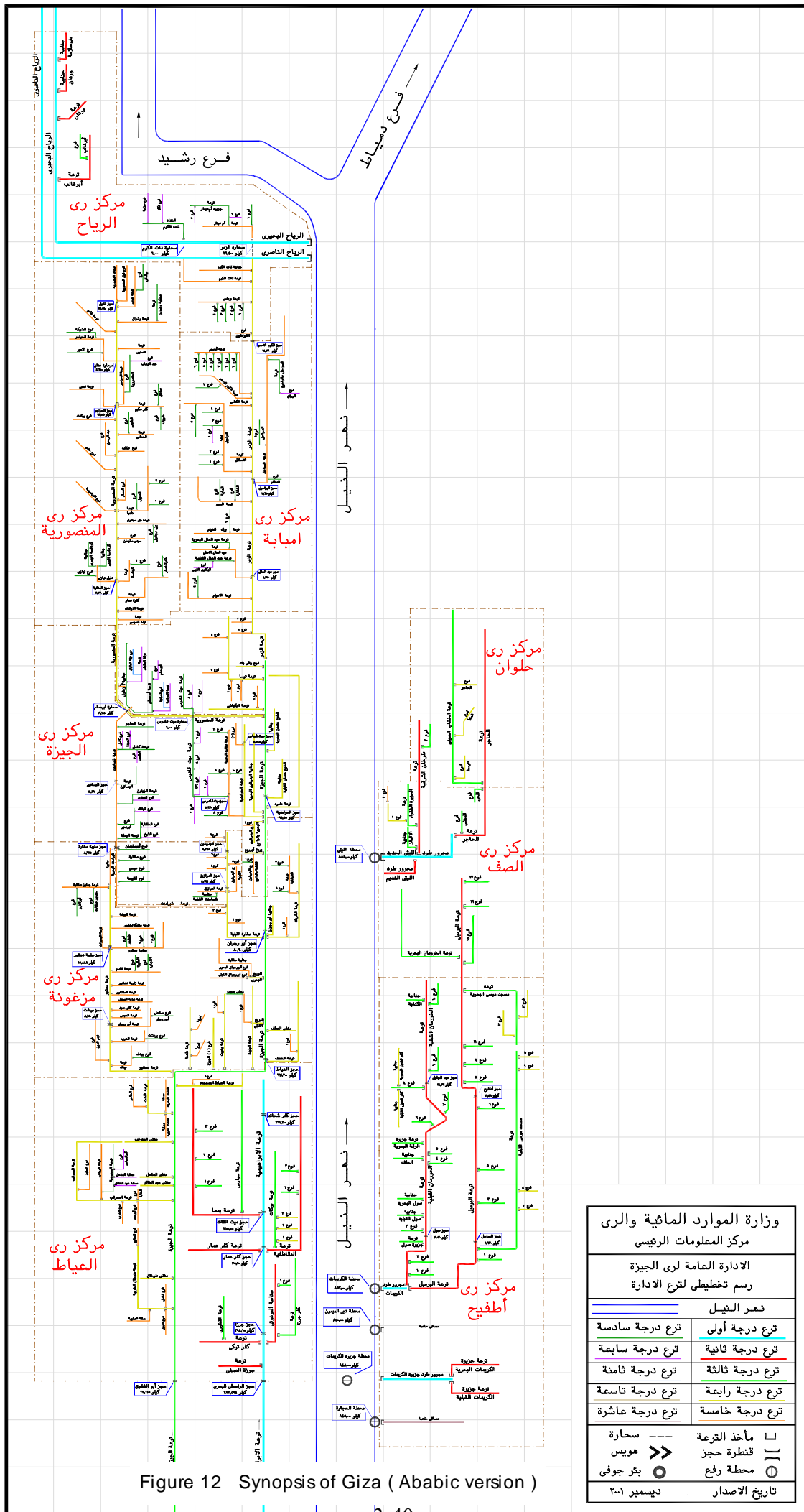


Figure 12 Synopsis of Giza ( Ababic version )

وزارة الموارد المائية والري مركز المعلومات الرئيسي	
الادارة العامة لري الجيزة رسم تخطيطي لترع الادارة	
نهر النيل	
ترع درجة أولى	ترع درجة سادسة
ترع درجة ثانية	ترع درجة سابعة
ترع درجة ثالثة	ترع درجة ثامنة
ترع درجة رابعة	ترع درجة تاسعة
ترع درجة خامسة	ترع درجة عاشره
مأخذ الترعة قنطرة حجز محطة رفع	سحارة هويس بئر جوفى
ديسمبر ٢٠١٠ تاريخ الاصدار	

### Ibrahimia & Bahr Yousef

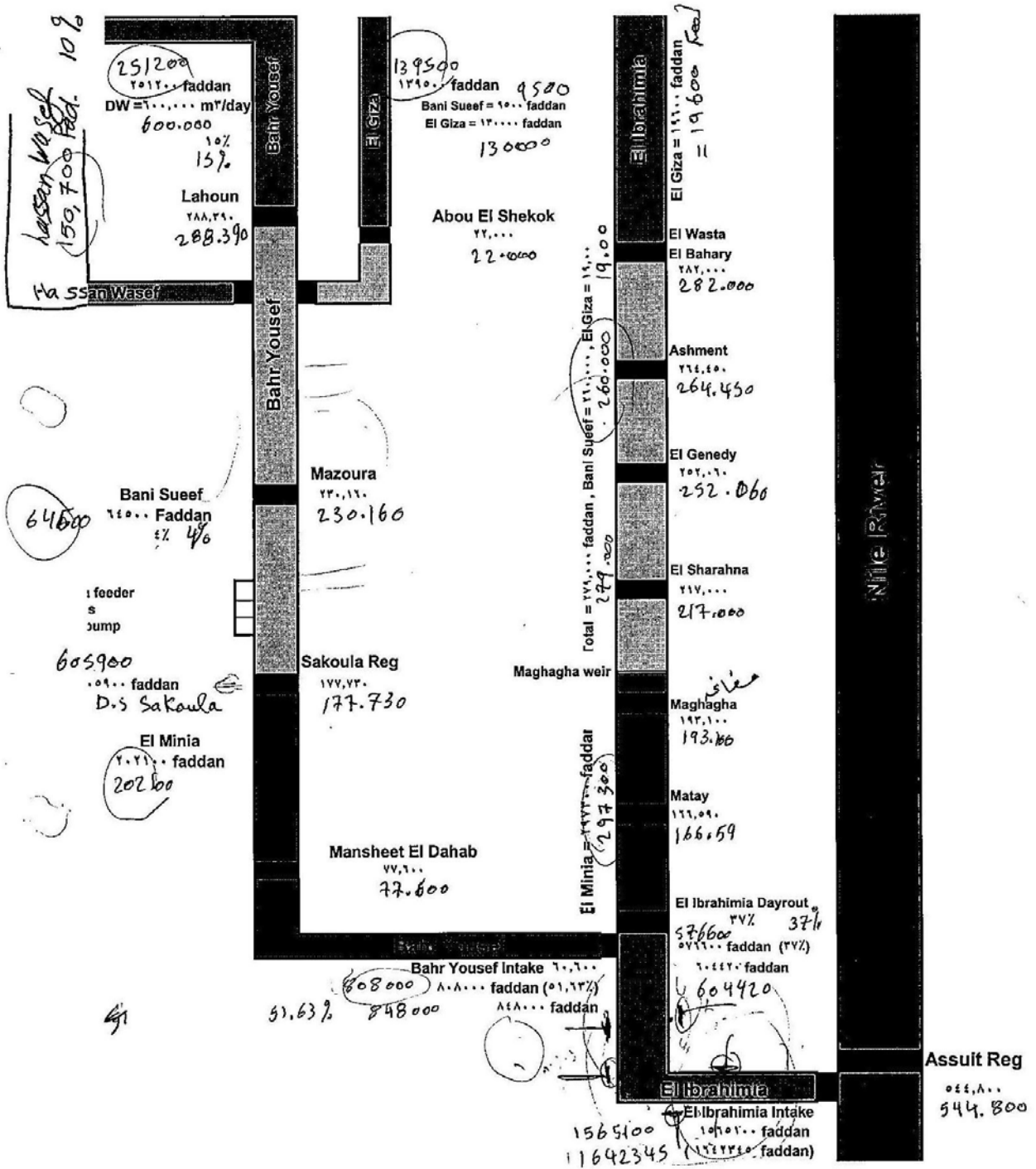


Figure 13 Water Distribution



## بيان تفريع الابراهيمية و البحر اليوسفي

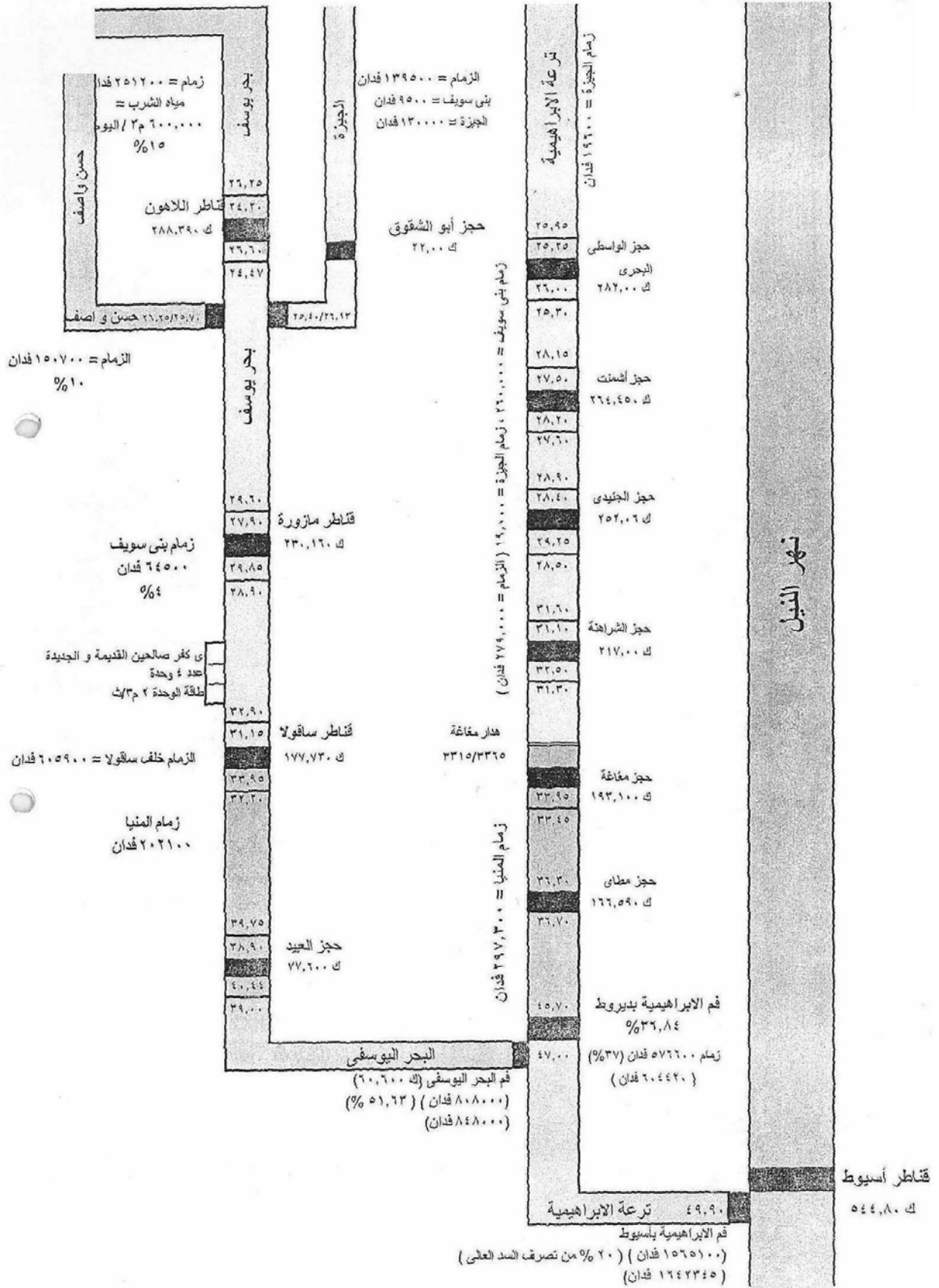


Figure 14 Water Distribution (Arabic)

## APPENDIX: PROJECT EVALUATION

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**Table 1 Unit Price Applied for Project Evaluation (Financial Price and Economic Price)**

Item	Unit	Financial Price	Economic Price	Remark
<b>Products</b>				
<b>Winter</b>				
Wheat	ton	1,600	1,090	Border price
Wheat by-product	ton	8,000	7,440	SCF 0.93
Berseem	ton	960	893	SCF 0.93
Winter Tomato	ton	810	753	SCF 0.93
Onion	ton	660	614	SCF 0.93
Marjoram	ton	4,000	3,720	SCF 0.93
<b>Summer</b>				
Maize	ton	1,000	888	Border price
Maize by-product	ton	143	133	SCF 0.93
Sorghum	ton	1,571	1,461	SCF 0.93
Sorghum by-product	ton	214	199	SCF 0.93
Sun flower	ton	2,300	2,139	SCF 0.93
Sun flower by-product	ton	40	37	SCF 0.93
Summer / Nile Tomato	ton	850	791	SCF 0.93
Cucumber	ton	750	698	SCF 0.93
Water Melon	ton	875	814	SCF 0.93
<b>Perennial</b>				
Sugar cane	ton	200	186	SCF 0.93
Cotton	ton	4,444	4,133	SCF 0.93
Cotton by-product	ton	190	177	SCF 0.93
Citrus	ton	1,250	1,163	SCF 0.93
Grape	ton	1,350	1,256	SCF 0.93
<b>Seeds/Seedlings</b>				
<b>Winter</b>				
Wheat	kg	16.7	15.5	SCF 0.93
Long Berseem	kg	50.0	47.0	SCF 0.93
Winter Tomato	Seeding	0.025	0.023	SCF 0.93
Onion	Seeding	150.0	140.0	SCF 0.93
Marjoram (Other crop)	Seeding	3.75	3.49	SCF 0.93
<b>Summer</b>				
Maize	kg	10.0	9.0	SCF 0.93
Sorghum	kg	25.0	23.0	SCF 0.93
Summer /Nile Tomato	Seeding	0.90	0.84	SCF 0.93
Cucumber	kg	400.0	372.0	SCF 0.93
Water Melon	kg	70.0	65.0	SCF 0.93
<b>Perennial</b>				
Sugar cane	kg	283.0	263.0	SCF 0.93
Cotton	kg	30.0	28.0	SCF 0.93
<b>Materials</b>				
Azotes fertilizers	sacks50kg	75	70	SCF 0.93
nitrate 31%	sacks50kg	40	37	SCF 0.93
uria 46%	sacks50kg	40	37	SCF 0.93
triple phosphate 46%	sacks50kg	29	27	SCF 0.93
potassium sulphate	sacks50kg	100	93	SCF 0.93
manure	Ghabeet (0.33m3)	50	47	SCF 0.93
Farm Labor (Crops)	man-day	20	13	LCF 0.63
Farm Labor (Fruit trees)	man-day	25	16	LCF 0.63

Source: Agriculture Directorate in Minya, Assuit, MALR and the Baseline survey by JICA Study Team

Standard Conversion Factor: see Table 2

Labor Conversion Factor: Project Appraisal Report, Ain Sokhna Thermal Power Project, Aug 2008, AfDB

**Table 2 Estimation of Standard Conversion Factor (SCF)**

(Unit: million LE)

Item	2004/05	2005/06	2006/07	2007/08	2008/09	Average
(1) Import	70,292.00	75,919.00	81,997.00	88,561.00	95,650.00	82,483.80
(2) Export	46,666.00	50,557.00	54,773.00	59,339.00	64,287.00	55,124.40
(3) Import Tax	9,327.00	7,826.00	9,754.00	10,507.00	10,507.00	9,584.20
(4) Export Tax	2.00	1.00	2.00	22.00	22.00	9.80
(5) Subsidy for Export						
(6) = (1) + (2)	116,958.00	126,476.00	136,770.00	147,900.00	159,937.00	137,608.20
(7) = (1) + (2) + (3) - (4) + (5)	126,283.00	134,301.00	146,522.00	158,385.00	170,422.00	147,182.60
(8) SCF = (6) ÷ (7)	0.9262	0.9417	0.9334	0.9338	0.9385	<b>0.9349</b>

Source: IMF "Government Finance Statistics" and "International Financial Statistics", quoted from "Project Appraisal Report for Rural Income and Economic Enhancement, Egypt (Oct. 2009 African Development Bank)"

**Table 3 Economic Price of Wheat (Imported)**

Border Price Estimation	Value	Remark
IMF Primary Commodity Price		
World Price	196 US\$/ton	(April 2010)
Ocean Freight and Insurance	24 US\$/ton	
CIF at Alexsabdria Port	220 US\$/ton	
Equivalent to LE (1US\$=5.60LE)	1,232 LE/ton	
Wastage and loss (3%)	37 LE/ton	
Importer handling charge (5%)	62 LE/ton	
Price at Alexsabdria port	1,331 LE/ton	
Transport Cost to Market (Cairo)	65 LE/ton	(0.35LE/km) 70LE*SCF
Transport Cost to Farm to Cairo (ave. 170km)	55 LE/ton	60LE*SCF
Trader's margin (10%)	121 LE/ton	
<b>Farm-gate Price</b>	<b>1,090 LE/ton</b>	

**Table 4 Economic Price of Maize (Imported)**

Border Price Estimation	Value	Remark
IMF Primary Commodity Price		
World Price	163 US\$/ton	(April 2010)
Ocean Freight and Insurance	20 US\$/ton	
CIF at Alexsabdria Port	183 US\$/ton	
Equivalent to LE (1US\$=5.60LE)	1,025 LE/ton	
Wastage and loss (3%)	31 LE/ton	
Importer handling charge (5%)	51 LE/ton	
Price at Alexandria port	1,107 LE/ton	
Transport Cost to Market (Cairo)	65 LE/ton	(0.35LE/km) 70LE*SCF
Transport Cost to Farm to Cairo (ave. 170km)	55 LE/ton	60LE*SCF
Trader's margin (10%)	99 LE/ton	
<b>Farm-gate Price</b>	<b>888 LE/ton</b>	

**Table 5 Cropped Area by Representative Crop and by Governorate (1)**

Season	Crop	Giza			Beni Suef			Fayoum							
		Area (fed)	Share (%)	representative	Area (fed)	Share (%)	representative	Area (fed)	Share (%)	representative					
Winter	Wheat	27,227	8.2%	Wheat	37,999	11.4%	Wheat	163,179	26.0%	Wheat	157,545	21.7%	Wheat	173,621	23.9%
	L. Berseem	36,054	10.9%	L. Berseem	36,503	11.0%	L. Berseem	53,726	8.6%	L. Berseem	105,298	14.5%	L. Berseem	125,393	17.2%
	Sugar beet	449	0.1%	L. Berseem		0.0%	Wheat		0.0%	Wheat	13,263	1.8%	Wheat		0.0%
	Legums	150	0.0%	Wheat		0.0%	Wheat		0.0%	Wheat	2,813	0.4%	Wheat		0.0%
	Vegetables	45,030	13.6%	Vegetables (W. Tomato)	45,030	13.6%	Vegetables (Onion)	40,378	6.4%	Vegetables (Tomato)	34,563	4.8%	Vegetables (Tomato)	34,563	4.8%
Summer	Other crops	3,142	0.9%	Wheat		0.0%	S. Berseem	13,014	2.1%	Other crops (Marjoram)	24,516	3.4%	Other crops (Marjoram)	24,516	3.4%
	S. Berseem	7,480	2.3%	Wheat		0.0%	S. Berseem	26,696	4.3%	S. Berseem	20,095	2.8%	L. Berseem		0.0%
	Rice	0	0.0%	-		0.0%	Maize	667	0.1%	Maize	20,497	2.8%	Maize		0.0%
	Maize	21,692	6.5%	Maize	46,675	14.1%	Maize	129,142	20.6%	Maize	141,822	22.6%	Maize	135,039	18.6%
	Sorghum	299	0.1%	Maize		0.0%	Maize	1,001	0.2%	Maize	68,323	9.4%	Sorghum	68,323	9.4%
Nile	Oil Crops	3,441	1.0%	Maize		0.0%	Maize	5,673	0.9%	Maize	10,048	1.4%	Maize		0.0%
	Vegetables	67,021	20.2%	Vegetables (S. Tomato)	67,021	20.2%	Vegetables (Cucumber)	35,372	5.6%	Vegetables (Melon)	29,339	4.0%	Vegetables (Melon)	29,339	4.0%
	Other Crops	21,243	6.4%	Maize		0.0%	Maize	5,339	0.9%	Maize	56,266	7.7%	Maize		0.0%
	Maize	22,440	6.8%	Maize	36,951	11.1%	Maize	73,748	11.8%	Maize	31,348	4.3%	Maize	71,940	9.9%
	Sorghum	299	0.1%	Maize		0.0%	Maize	6,007	1.0%	Maize	2,411	0.3%	Maize		0.0%
Perennial	Vegetables	24,385	7.3%	Vegetables (S. Tomato)	24,385	7.3%	Maize	7,675	1.2%	Maize	20,497	2.8%	Maize		0.0%
	Other Crops	14,212	4.3%	Maize		0.0%	Maize	2,670	0.4%	Maize	17,684	2.4%	Maize		0.0%
	Sugar cane	1,945	0.6%	Fruit trees		0.0%	Fruit trees	1,001	0.2%	Fruit trees	402	0.1%	Fruit trees		0.0%
	Cotton	0	0.0%	-		0.0%	Cotton	45,383	7.2%	Cotton	28,535	3.9%	Cotton	28,535	3.9%
	Fruit trees	35,455	10.7%	Fruit trees (Citrus)	37,400	11.3%	Fruit trees (Citrus)	16,685	2.7%	Fruit trees (Citrus)	17,686	2.8%	Fruit trees (Citrus)	35,367	4.9%
Cultivated Area (fed)	149,600	100.0%		331,964	100.0%		627,356	100.0%		727,038	100.0%		401,900	100.0%	
Cropping intensity (%)	222%			188%						181%					

Note: The table shows the proposed cropping pattern with Project based on the data from MALR, Agriculture Directorates in Giza, Beni Suef, Fayoum and Minya.

**Table 6 Cropped Area by Representative Crop and by Governorate (2)**

Season	Crop	Minya			Assuit			Total							
		Area (fed)	Share (%)	representative	Area (fed)	Share (%)	representative	Area (fed)	Share (%)	representative					
Winter	Wheat	214,872	22.5%	Wheat	228,006	23.8%	Wheat	67,070	23.8%	Wheat	613,350	21.0%	Wheat	669,875	22.9%
	L. Berseem	118,731	12.4%	L. Berseem	155,507	16.3%	L. Berseem	34,926	12.4%	L. Berseem	45,743	16.3%	L. Berseem	348,735	11.9%
	Sugar beet	7,880	0.8%	Wheat		0.0%	Wheat	2,318	0.8%	Wheat		0.0%	Wheat	35,923	1.2%
	Legums	5,254	0.5%	Wheat		0.0%	Wheat	1,545	0.5%	Wheat		0.0%	Wheat	10,429	0.4%
	Vegetables	37,301	3.9%	Vegetables (W. Tomato)	37,301	3.9%	Vegetables (W. Tomato)	10,972	3.9%	Vegetables (W. Tomato)	10,972	3.9%	Vegetables	168,244	5.8%
Summer	Other crops	31,522	3.3%	L. Berseem		0.0%	L. Berseem	9,272	3.3%	L. Berseem		0.0%	L. Berseem	81,466	2.8%
	S. Berseem	5,254	0.5%	L. Berseem		0.0%	L. Berseem	1,545	0.5%	L. Berseem		0.0%	L. Berseem	61,070	2.1%
	Rice	0	0.0%	-		0.0%	-	0	0.0%	-		0.0%	-	0	0.0%
	Maize	273,187	28.6%	Maize	285,796	29.9%	Maize	80,361	28.6%	Maize	84,070	29.9%	Maize	552,610	18.9%
	Sorghum	8,931	0.9%	Maize		0.0%	Maize	2,627	0.9%	Maize		0.0%	Maize	81,181	2.8%
Nile	Oil Crops	36,775	3.8%	Oil Crops (Sun flower)	36,775	3.8%	Oil Crops (Sun flower)	10,818	3.8%	Oil Crops (Sun flower)	10,818	3.8%	Oil Crops (Sun flower)	66,755	2.3%
	Vegetables	70,924	7.4%	Vegetables (S. Tomato)	102,446	10.7%	Vegetables (S. Tomato)	20,863	7.4%	Vegetables (S. Tomato)	30,135	10.7%	Vegetables	223,519	7.6%
	Other Crops	3,678	0.4%	Maize		0.0%	Vegetables	1,082	0.4%	Vegetables		0.0%	Vegetables	87,608	3.0%
	Maize	0	0.0%	-		0.0%	-	0	0.0%	-		0.0%	-	0	0.0%
	Sorghum	0	0.0%	-		0.0%	-	0	0.0%	-		0.0%	-	0	0.0%
Perennial	Vegetables	31,522	3.3%	S. Vegetables		0.0%	S. Vegetables	9,272	3.3%	S. Vegetables		0.0%	S. Vegetables	93,351	3.2%
	Other Crops	0	0.0%	-		0.0%	-	0	0.0%	-		0.0%	-	0	0.0%
	Sugar cane	41,503	4.3%	Sugar cane	41,503	4.3%	Sugar cane	12,209	4.3%	Sugar cane	12,209	4.3%	Sugar cane	57,060	2.0%
	Cotton	36,775	3.8%	Cotton	36,775	3.8%	Cotton	10,818	3.8%	Cotton	10,818	3.8%	Cotton	121,511	4.2%
	Fruit trees	32,047	3.4%	Fruit trees (Grape)	32,047	3.4%	Fruit trees (Grape)	9,427	3.4%	Fruit trees (Grape)	9,427	3.4%	Fruit trees	128,981	4.4%
Cultivated Area (fed)	956,156	100.0%		956,156	100.0%		281,262	100.0%		281,262	100.0%		2,923,776	100.0%	
Cropping intensity (%)	182%			182%			154,540	182%		154,540	182%		1,565,100	187%	

Note: The table shows the proposed cropping pattern with Project based on the data from MALR, Agriculture Directorates in Giza, Beni Suef, Fayoum and Minya.

**Table 7 Cost and Benefit of Crops per Fed/Season: Wheat (Financial Price)**  
 Winner : (Increase of Unit Yield with Project: 2.0%)  
 Crop: Wheat (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	1,600	2.80	4,480	2.86	4,570
By-product	ton	8,000	0.15	1,200	0.15	1,224
<b>Total Gross Income</b>				<b>5,680</b>		<b>5,794</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	20	-	-	-	-
(2) leveling land	Man/Day	20	-	-	-	-
(3) lining land	Man/Day	20	-	-	-	-
(4) cleaning lines	Man/Day	20	-	-	-	-
(5) dividing land	Man/Day	20	6	120	6	120
(6) planting	Man/Day	20	3	60	3	60
(7) planting missing parts	Man/Day	20	-	-	-	-
(8) irrigation by gravity	Man/Day	20	6	120	6	120
(9) irrigation by labor	Man/Day	20	-	-	-	-
(10) scatter fertilizers	Man/Day	20	6	120	6	120
(11) lightning	Man/Day	20	-	-	-	-
(12) hoe (dig up)	Man/Day	20	-	-	-	-
(13) cleaning (cutting grasses)	Man/Day	20	10	200	10	200
(14) fighting diseases (manual)	Man/Day	20	1	20	1	20
(15) fighting diseases (mechanical)	Man/Day	20	-	-	-	-
(16) harvest	Man/Day	20	25	500	26	520
(17) moving crop	Man/Day	20	-	-	-	-
(18) thresh	Man/Day	20	5	100	6	120
(19) scattering	Man/Day	20	-	-	-	-
(20) transporting	Man/Day	20	3	60	4	80
(21) peeling or drying crops	Man/Day	20	3	60	4	80
Boys	Man/Day	75	-	75	-	75
<b>Sub-total</b>			<b>68</b>	<b>1,435</b>	<b>72</b>	<b>1,515</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	150	1	150	1	150
irrigation machine (Above Labor (8))	times	30	6	180	6	180
motor (Above Labor (14))	hr	30	1	30	1	30
tractor (Above Labor (18))	hr	25	4	100	4	100
car (Above Labor (21))	times	50	1	50	1	50
<b>Sub-total</b>				<b>510</b>		<b>510</b>
<b>(c) Materials</b>						
seeds	kg	17	6	100	6	100
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	40	5	200	5	200
uria 46%	sacks50kg	-	-	-	-	-
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	-	-	-	-	-
treble phosphate 46%	sacks50kg	29	3	87	3	87
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabbeet (0.33m3)	-	-	-	-	-
insecticides	kg or liter	50	2	100	2	100
<b>Sub-total</b>				<b>487</b>		<b>487</b>
<b>(d) Rent</b>						
Land	fed	2,000	1	2,000	1	2,000
Other cost	fed	100	1	100	1	100
<b>Sub-total</b>				<b>2,100</b>		<b>2,100</b>
<b>Grand Total</b>				<b>4,532</b>		<b>4,612</b>
<b>(C) Net Return</b>				<b>1,181</b>		<b>1,181</b>
(D) Family Labor	% of labor		80	1,148	80	1,212
(E) Production Cost exclude family labor				3,394		3,400
(F) Net Income				<b>2,296</b>		<b>2,393</b>
Incremental Achievement					100%	100%

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 8 Cost and Benefit of Crops per Fed/Season: Wheat (Economic Price)**  
 Winner : (Increase of Unit Yield with Project: 2.0%)  
 Crop: Wheat (Economic Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	1,090	2.80	3,052	2.86	3,113
By-product	ton	7,440	0.15	1,116	0.15	1,138
<b>Total Gross Income</b>				<b>4,168</b>		<b>4,251</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	13	-	-	-	-
(2) leveling land	Man/Day	13	-	-	-	-
(3) lining land	Man/Day	13	-	-	-	-
(4) cleaning lines	Man/Day	13	-	-	-	-
(5) dividing land	Man/Day	13	6	78	6	78
(6) planting	Man/Day	13	3	39	3	39
(7) planting missing parts	Man/Day	13	-	-	-	-
(8) irrigation by gravity	Man/Day	13	6	78	6	78
(9) irrigation by labor	Man/Day	13	-	-	-	-
(10) scatter fertilizers	Man/Day	13	6	78	6	78
(11) lightning	Man/Day	13	-	-	-	-
(12) hoe (dig up)	Man/Day	13	-	-	-	-
(13) cleaning (cutting grasses)	Man/Day	13	10	130	10	130
(14) fighting diseases (manual)	Man/Day	13	1	13	1	13
(15) fighting diseases (mechanical)	Man/Day	13	-	-	-	-
(16) harvest	Man/Day	13	25	325	26	338
(17) moving crop	Man/Day	13	-	-	-	-
(18) thresh	Man/Day	13	5	65	6	78
(19) scattering	Man/Day	13	-	-	-	-
(20) transporting	Man/Day	13	3	39	4	52
(21) peeling or drying crops	Man/Day	13	3	39	4	52
Boys	Man/Day	47	-	47	-	47
<b>Sub-total</b>			<b>68</b>	<b>931</b>	<b>72</b>	<b>963</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	140	1	140	1	140
irrigation machine (Above Labor (8))	times	28	6	168	6	168
motor (Above Labor (14))	hr	28	1	28	1	28
tractor (Above Labor (18))	hr	23	4	92	4	92
car (Above Labor (21))	times	47	1	47	1	47
<b>Sub-total</b>				<b>475</b>		<b>475</b>
<b>(c) Materials</b>						
seeds	kg	16	6	93	6	93
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	37	5	185	5	185
uria 46%	sacks50kg	-	-	-	-	-
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	-	-	-	-	-
treble phosphate 46%	sacks50kg	27	3	81	3	81
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabbeet (0.33m3)	-	-	-	-	-
insecticides	kg or liter	47	2	94	2	94
<b>Sub-total</b>				<b>453</b>		<b>453</b>
<b>(d) Rent</b>						
Land	fed	1,860	1	1,860	1	1,860
Other cost	fed	93	1	93	1	93
<b>Sub-total</b>				<b>1,953</b>		<b>1,953</b>
<b>Grand Total</b>				<b>3,812</b>		<b>3,864</b>
<b>(C) Net Return</b>				<b>356</b>		<b>387</b>
(D) Family Labor	% of labor		80	745	80	786
(E) Production Cost exclude family labor				3,067		3,078
(F) Net Income				<b>1,101</b>		<b>1,174</b>
Incremental Achievement					100%	100%

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 9 Cost and Benefit of Crops per Fed/Season: Long Berseem (Financial Price)**  
 Winner : (Increase of Unit Yield with Project: 2.0%)  
 Crop: Long Berseem (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	960	6.47	6,211	6.60	6,335
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>6,211</b>		<b>6,335</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	20	-	-	-	-
(2) leveling land	Man/Day	20	-	-	-	-
(3) lining land	Man/Day	20	-	-	-	-
(4) cleaning lines	Man/Day	20	-	-	-	-
(5) dividing land	Man/Day	20	4	80	4	80
(6) planting	Man/Day	20	1	20	1	20
(7) planting missing parts	Man/Day	20	-	-	-	-
(8) irrigation by gravity	Man/Day	20	-	-	-	-
(9) irrigation by labor	Man/Day	15	8	120	8	120
(10) scatter fertilizers	Man/Day	20	-	-	-	-
(11) lightning	Man/Day	20	-	-	-	-
(12) hoe (dig up)	Man/Day	20	-	-	-	-
(13) cleaning (cutting grasses)	Man/Day	20	-	-	-	-
(14) fighting diseases (manual)	Man/Day	20	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	20	-	-	-	-
(16) harvest	Man/Day	20	50	1,000	51	1,020
(17) moving crop	Man/Day	20	-	-	-	-
(18) thresh	Man/Day	20	-	-	-	-
(19) scattering	Man/Day	20	-	-	-	-
(20) transporting	Man/Day	20	-	-	-	-
(21) peeling or drying crops	Man/Day	20	-	-	-	-
Boys	Man/Day	20	-	375	-	375
<b>Sub-total</b>			<b>63</b>	<b>1,595</b>	<b>64</b>	<b>1,615</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	30	4	120	4	120
irrigation machine (Above Labor (8))	times	15	10	150	10	150
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	25	8	200	8	200
<b>Sub-total</b>				<b>470</b>		<b>470</b>
<b>(c) Materials</b>						
seeds	kg	50	2	100	2	100
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	-	-	-	-	-
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	29	3	87	3	87
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabaet (0.33m3)	-	-	-	-	-
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>187</b>		<b>187</b>
<b>(d) Rent</b>						
Land	fed	2,100	1	2,100	1	2,100
Other cost	fed	100	1	100	1	100
<b>Sub-total</b>				<b>2,200</b>		<b>2,200</b>
<b>Grand Total</b>				<b>4,482</b>		<b>4,472</b>
<b>(C) Net Return</b>				<b>1,759</b>		<b>1,863</b>
(D) Family Labor	% of labor	-	90	1,436	90	1,454
(E) Production Cost exclude family labor				3,017		3,019
(F) Net Income				<b>3,195</b>		<b>3,317</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team. Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 10 Cost and Benefit of Crops per Fed/Season: Long Berseem (Economic Price)**  
 Winner : (Increase of Unit Yield with Project: 2.0%)  
 Crop: Long Berseem (Economic Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	893	6.47	5,778	6.60	5,893
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>5,778</b>		<b>5,893</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	13	-	-	-	-
(2) leveling land	Man/Day	13	-	-	-	-
(3) lining land	Man/Day	13	-	-	-	-
(4) cleaning lines	Man/Day	13	-	-	-	-
(5) dividing land	Man/Day	13	4	52	4	52
(6) planting	Man/Day	13	1	13	1	13
(7) planting missing parts	Man/Day	13	-	-	-	-
(8) irrigation by gravity	Man/Day	13	-	-	-	-
(9) irrigation by labor	Man/Day	9	8	72	8	72
(10) scatter fertilizers	Man/Day	13	-	-	-	-
(11) lightning	Man/Day	13	-	-	-	-
(12) hoe (dig up)	Man/Day	13	-	-	-	-
(13) cleaning (cutting grasses)	Man/Day	13	-	-	-	-
(14) fighting diseases (manual)	Man/Day	13	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	13	-	-	-	-
(16) harvest	Man/Day	13	50	650	51	663
(17) moving crop	Man/Day	13	-	-	-	-
(18) thresh	Man/Day	13	-	-	-	-
(19) scattering	Man/Day	13	-	-	-	-
(20) transporting	Man/Day	13	-	-	-	-
(21) peeling or drying crops	Man/Day	13	-	-	-	-
Boys	Man/Day	13	-	236	-	236
<b>Sub-total</b>			<b>63</b>	<b>1,023</b>	<b>64</b>	<b>1,036</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	28	4	112	4	112
irrigation machine (Above Labor (8))	times	14	10	140	10	140
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	23	8	184	8	184
<b>Sub-total</b>				<b>436</b>		<b>436</b>
<b>(c) Materials</b>						
seeds	kg	47	2	94	2	94
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	-	-	-	-	-
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	27	3	81	3	81
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabaet (0.33m3)	-	-	-	-	-
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>175</b>		<b>175</b>
<b>(d) Rent</b>						
Land	fed	1,953	1	1,953	1	1,953
Other cost	fed	93	1	93	1	93
<b>Sub-total</b>				<b>2,046</b>		<b>2,046</b>
<b>Grand Total</b>				<b>2,098</b>		<b>2,693</b>
<b>(C) Net Return</b>				<b>2,098</b>		<b>2,200</b>
(D) Family Labor	% of labor	-	90	921	90	932
(E) Production Cost exclude family labor				2,759		2,761
(F) Net Income				<b>3,018</b>		<b>3,133</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team. Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 11 Cost and Benefit of Crops per Fed/Season: Winter Tomato (Financial Price)**  
 Winner : (Increase of Unit Yield with Project: 2.0%)  
 Crop: W. Tomato (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	810	16,69	13,519	17,02	13,789
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>13,519</b>		<b>13,789</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	20	-	-	-	-
(2) leveling land	Man/Day	20	-	-	-	-
(3) lining land	Man/Day	20	-	-	-	-
(4) cleaning lines	Man/Day	20	2	40	2	40
(5) dividing land	Man/Day	20	-	-	-	-
(6) planting	Man/Day	20	6	120	6	120
(7) planting missing parts	Man/Day	20	-	-	-	-
(8) irrigation by gravity	Man/Day	20	-	-	-	-
(9) irrigation by labor	Man/Day	20	18	360	18	360
(10) scatter fertilizers	Man/Day	20	-	-	-	-
(11) lightning	Man/Day	20	3	60	3	60
(12) hoe (dig up)	Man/Day	20	-	-	-	-
(13) cleaning (cutting grasses)	Man/Day	20	18	360	18	360
(14) fighting diseases (manual)	Man/Day	20	4	80	4	80
(15) fighting diseases (mechanical)	Man/Day	20	33	660	33	660
(16) harvest	Man/Day	20	70	1,400	72	1,440
(17) moving crop	Man/Day	20	-	-	-	-
(18) thresh	Man/Day	20	-	-	-	-
(19) scattering	Man/Day	20	-	-	-	-
(20) transporting	Man/Day	20	-	-	-	-
(21) peeling or drying crops	Man/Day	20	-	-	-	-
Boys	Man/Day			1,005		1,005
<b>Sub-total</b>			154	<b>4,085</b>	156	<b>4,125</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	30	5	150	5	150
irrigation machine (Above Labor (8))	times	30	18	540	18	540
motor (Above Labor (14))	hr	30	4	120	4	120
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	-	-	-	-	-
<b>Sub-total</b>				<b>810</b>		<b>810</b>
<b>(c) Materials</b>						
seeds	kg	0.025	14,000	350	14,000	350
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	40	16	640	16	640
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	-	-	-	-	-
treble phosphate 46%	sacks50kg	29	6	174	6	174
potassium sulphate	sacks50kg	100	1	100	1	100
manure	Chabbeet (0.33m3)	-	-	-	-	-
insecticides	kg or liter	75	4	300	4	300
<b>Sub-total</b>				<b>1,564</b>		<b>1,564</b>
<b>(d) Rent</b>						
Land	fed	2,000	1	2,000	1	2,000
Other cost	fed	100	1	100	1	100
<b>Sub-total</b>				<b>2,100</b>		<b>2,100</b>
<b>Grand Total</b>				<b>8,599</b>		<b>8,599</b>
<b>(C) Net Return</b>				<b>4,960</b>		<b>5,190</b>
(D) Family Labor	% of labor		70	2,860	70	2,888
(E) Production Cost exclude family labor				5,700		5,712
(F) Net Income				<b>7,819</b>		<b>8,078</b>
Incremental Achievement						100%

Note: Analysis is based on the data collected from General Directorate of agricultural Office. Baseline survey of the JICA Study Team. Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 12 Cost and Benefit of Crops per Fed/Season: Winter Tomato (Economic Price)**  
 Winner : (Increase of Unit Yield with Project: 2.0%)  
 Crop: W. Tomato (Economic Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	753	16,69	12,568	17,02	12,819
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>12,568</b>		<b>12,819</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	13	-	-	-	-
(2) leveling land	Man/Day	13	-	-	-	-
(3) lining land	Man/Day	13	-	-	-	-
(4) cleaning lines	Man/Day	13	2	26	2	26
(5) dividing land	Man/Day	13	-	-	-	-
(6) planting	Man/Day	13	6	78	6	78
(7) planting missing parts	Man/Day	13	-	-	-	-
(8) irrigation by gravity	Man/Day	13	-	-	-	-
(9) irrigation by labor	Man/Day	13	18	234	18	234
(10) scatter fertilizers	Man/Day	13	-	-	-	-
(11) lightning	Man/Day	13	3	39	3	39
(12) hoe (dig up)	Man/Day	13	-	-	-	-
(13) cleaning (cutting grasses)	Man/Day	13	18	234	18	234
(14) fighting diseases (manual)	Man/Day	13	4	52	4	52
(15) fighting diseases (mechanical)	Man/Day	13	33	429	33	429
(16) harvest	Man/Day	13	70	910	72	936
(17) moving crop	Man/Day	13	-	-	-	-
(18) thresh	Man/Day	13	-	-	-	-
(19) scattering	Man/Day	13	-	-	-	-
(20) transporting	Man/Day	13	-	-	-	-
(21) peeling or drying crops	Man/Day	13	-	-	-	-
Boys	Man/Day			633		633
<b>Sub-total</b>			154	<b>2,635</b>	156	<b>2,661</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	28	5	140	5	140
irrigation machine (Above Labor (8))	times	28	18	504	18	504
motor (Above Labor (14))	hr	28	4	112	4	112
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	-	-	-	-	-
<b>Sub-total</b>				<b>756</b>		<b>756</b>
<b>(c) Materials</b>						
seeds	kg	0.023	14,000	322	14,000	322
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	37	16	592	16	592
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	-	-	-	-	-
treble phosphate 46%	sacks50kg	27	6	162	6	162
potassium sulphate	sacks50kg	93	1	93	1	93
manure	Chabbeet (0.33m3)	-	-	-	-	-
insecticides	kg or liter	70	4	280	4	280
<b>Sub-total</b>				<b>1,449</b>		<b>1,449</b>
<b>(d) Rent</b>						
Land	fed	1,860	1	1,860	1	1,860
Other cost	fed	93	1	93	1	93
<b>Sub-total</b>				<b>1,953</b>		<b>1,953</b>
<b>Grand Total</b>				<b>6,793</b>		<b>6,819</b>
<b>(C) Net Return</b>				<b>5,775</b>		<b>6,000</b>
(D) Family Labor	% of labor		70	1,845	70	1,863
(E) Production Cost exclude family labor				4,949		4,956
(F) Net Income				<b>7,619</b>		<b>7,863</b>
Incremental Achievement						100%

Note: Analysis is based on the data collected from General Directorate of agricultural Office. Baseline survey of the JICA Study Team. Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%



**Table 13 Cost and Benefit of Crops per Fed/Season: Onion (Financial Price)**  
 Winner : (Increase of Unit Yield with Project: 2.0%)  
 Crop: Onion (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	660	10.73	7,081	10.94	7,223
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>7,081</b>		<b>7,223</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	20	-	-	-	-
(2) leveling land	Man/Day	20	-	-	-	-
(3) lining land	Man/Day	20	-	-	-	-
(4) cleaning lines	Man/Day	20	5	100	5	100
(5) dividing land	Man/Day	20	-	-	-	-
(6) planting	Man/Day	20	15	300	15	300
(7) planting missing parts	Man/Day	20	-	-	-	-
(8) irrigation by gravity	Man/Day	20	-	-	-	-
(9) irrigation by labor	Man/Day	20	3	60	3	60
(10) scatter fertilizers	Man/Day	20	-	-	-	-
(11) lightning	Man/Day	20	6	120	6	120
(12) hoe (dig up)	Man/Day	20	-	-	-	-
(13) cleaning (cutting grasses)	Man/Day	20	-	-	-	-
(14) fighting diseases (manual)	Man/Day	20	2	40	2	40
(15) fighting diseases (mechanical)	Man/Day	20	15	300	15	300
(16) harvest	Man/Day	20	40	800	41	820
(17) moving crop	Man/Day	20	-	-	-	-
(18) thresh	Man/Day	20	-	-	-	-
(19) scattering	Man/Day	20	-	-	-	-
(20) transporting	Man/Day	20	-	-	-	-
(21) peeling or drying crops	Man/Day	20	-	-	-	-
Boys	Man/Day			300		300
<b>Sub-total</b>			86	<b>2,110</b>	87	<b>2,130</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	30	5	150	5	150
irrigation machine (Above Labor (8))	times	30	3	90	3	90
motor (Above Labor (14))	hr	30	2	60	2	60
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	50	1	50	1	50
<b>Sub-total</b>				<b>350</b>		<b>350</b>
<b>(c) Materials</b>						
seeds	kg	150	3	450	3	450
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	40	2	80	2	80
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	-	-	-	-	-
treble phosphate 46%	sacks50kg	29	5	145	5	145
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabbert (0.33m3)	-	-	-	-	-
insecticides	kg or liter	50	2	100	2	100
<b>Sub-total</b>				<b>775</b>		<b>775</b>
<b>(d) Rent</b>						
Land	fed	2,000	1	2,000	1	2,000
Other cost	fed	100	1	100	1	100
<b>Sub-total</b>				<b>2,100</b>		<b>2,100</b>
<b>Grand Total</b>				<b>5,355</b>		<b>5,355</b>
<b>(C) Net Return</b>				<b>1,868</b>		<b>1,868</b>
(D) Family Labor	% of labor		70	1,477	70	1,491
(E) Production Cost exclude family labor				3,858		3,864
(F) Net Income				<b>3,223</b>		<b>3,359</b>
Incremental Achievement						100%

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 14 Cost and Benefit of Crops per Fed/Season: Onion (Economic Price)**  
 Winner : (Increase of Unit Yield with Project: 2.0%)  
 Crop: Onion (Economic Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	614	10.73	6,588	10.94	6,719
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>6,588</b>		<b>6,719</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	13	-	-	-	-
(2) leveling land	Man/Day	13	-	-	-	-
(3) lining land	Man/Day	13	-	-	-	-
(4) cleaning lines	Man/Day	13	5	65	5	65
(5) dividing land	Man/Day	13	-	-	-	-
(6) planting	Man/Day	13	15	195	15	195
(7) planting missing parts	Man/Day	13	-	-	-	-
(8) irrigation by gravity	Man/Day	13	-	-	-	-
(9) irrigation by labor	Man/Day	13	3	39	3	39
(10) scatter fertilizers	Man/Day	13	-	-	-	-
(11) lightning	Man/Day	13	6	78	6	78
(12) hoe (dig up)	Man/Day	13	-	-	-	-
(13) cleaning (cutting grasses)	Man/Day	13	-	-	-	-
(14) fighting diseases (manual)	Man/Day	13	2	26	2	26
(15) fighting diseases (mechanical)	Man/Day	13	15	195	15	195
(16) harvest	Man/Day	13	40	520	41	533
(17) moving crop	Man/Day	13	-	-	-	-
(18) thresh	Man/Day	13	-	-	-	-
(19) scattering	Man/Day	13	-	-	-	-
(20) transporting	Man/Day	13	-	-	-	-
(21) peeling or drying crops	Man/Day	13	-	-	-	-
Boys	Man/Day			246		246
<b>Sub-total</b>			86	<b>1,364</b>	87	<b>1,377</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	28	5	140	5	140
irrigation machine (Above Labor (8))	times	28	3	84	3	84
motor (Above Labor (14))	hr	28	2	56	2	56
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	47	1	47	1	47
<b>Sub-total</b>				<b>327</b>		<b>327</b>
<b>(c) Materials</b>						
seeds	kg	140	3	420	3	420
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	37	2	74	2	74
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	-	-	-	-	-
treble phosphate 46%	sacks50kg	27	5	135	5	135
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabbert (0.33m3)	-	-	-	-	-
insecticides	kg or liter	47	2	94	2	94
<b>Sub-total</b>				<b>723</b>		<b>723</b>
<b>(d) Rent</b>						
Land	fed	1,860	1	1,860	1	1,860
Other cost	fed	93	1	93	1	93
<b>Sub-total</b>				<b>1,953</b>		<b>1,953</b>
<b>Grand Total</b>				<b>4,367</b>		<b>4,380</b>
<b>(C) Net Return</b>				<b>2,221</b>		<b>2,339</b>
(D) Family Labor	% of labor		70	965	70	964
(E) Production Cost exclude family labor				3,412		3,416
(F) Net Income				<b>3,175</b>		<b>3,303</b>
Incremental Achievement						100%

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 15 Cost and Benefit of Crops per Fed/Season: Marjoram (Financial Price)**  
 Winner : (Increase of Unit Yield with Project: 2.0%)  
 Crop: Marjoram (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	4,000	3.51	14,028	3.58	14,309
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>14,028</b>		<b>14,309</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	20	-	-	-	-
(2) leveling land	Man/Day	20	-	-	-	-
(3) lining land	Man/Day	20	-	-	-	-
(4) cleaning lines	Man/Day	20	7	140	7	140
(5) dividing land	Man/Day	20	-	-	-	-
(6) planting	Man/Day	20	12	240	12	240
(7) planting missing parts	Man/Day	20	-	-	-	-
(8) irrigation by gravity	Man/Day	20	-	-	-	-
(9) irrigation by labor	Man/Day	20	2	40	2	40
(10) scatter fertilizers	Man/Day	20	9	180	9	180
(11) lightning	Man/Day	20	-	-	-	-
(12) hoe (dig up)	Man/Day	20	30	600	30	600
(13) cleaning (cutting grasses)	Man/Day	20	3	60	3	60
(14) fighting diseases (manual)	Man/Day	20	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	20	30	600	30	600
(16) harvest	Man/Day	20	20	400	21	420
(17) moving crop	Man/Day	20	-	-	-	-
(18) thresh	Man/Day	20	-	-	-	-
(19) scattering	Man/Day	20	-	-	-	-
(20) transporting	Man/Day	20	-	-	-	-
(21) peeling or drying crops	Man/Day	20	-	-	-	-
Boys	Man/Day	20	-	-	-	-
<b>Sub-total</b>			113	<b>2,260</b>	114	<b>2,280</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	30	5	150	5	150
irrigation machine (Above Labor (8))	times	30	2	60	2	60
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	30	3	90	3	90
car (Above Labor (21))	times	-	-	-	-	-
<b>Sub-total</b>			-	<b>300</b>	-	<b>300</b>
<b>(c) Materials</b>						
seeds	kg	3.75	20	75	20	75
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	40	16	640	16	640
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	29	6	174	6	174
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	100	1	100	1	100
manure	Chabbeet (0.33m3)	-	-	-	-	-
insecticides	kg or liter	50	2	100	2	100
<b>Sub-total</b>			2	<b>1,089</b>	2	<b>1,089</b>
<b>(d) Rent</b>						
Land	fed	2,500	1	2,500	1	2,500
Other cost	fed	100	1	100	1	100
<b>Sub-total</b>			1	<b>2,600</b>	1	<b>2,600</b>
<b>Grand Total</b>				<b>6,249</b>		<b>6,269</b>
<b>(C) Net Return</b>				<b>7,779</b>		<b>8,040</b>
(D) Family Labor	% of labor	-	70	1,582	70	1,586
(E) Production Cost exclude family labor				4,667		4,673
(F) Net Income				<b>9,361</b>		<b>9,636</b>
Incremental Achievement						100%

Note: Analysis is based on the data collected from General Directorate of agricultural Office. Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 16 Cost and Benefit of Crops per Fed/Season: Marjoram (Economic Price)**  
 Winner : (Increase of Unit Yield with Project: 2.0%)  
 Crop: Marjoram (Economic Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	3,720	3.51	13,046	3.58	13,307
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>13,046</b>		<b>13,307</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	13	-	-	-	-
(2) leveling land	Man/Day	13	-	-	-	-
(3) lining land	Man/Day	13	-	-	-	-
(4) cleaning lines	Man/Day	13	7	91	7	91
(5) dividing land	Man/Day	13	-	-	-	-
(6) planting	Man/Day	13	12	156	12	156
(7) planting missing parts	Man/Day	13	-	-	-	-
(8) irrigation by gravity	Man/Day	13	-	-	-	-
(9) irrigation by labor	Man/Day	13	2	26	2	26
(10) scatter fertilizers	Man/Day	13	9	117	9	117
(11) lightning	Man/Day	13	-	-	-	-
(12) hoe (dig up)	Man/Day	13	30	390	30	390
(13) cleaning (cutting grasses)	Man/Day	13	3	39	3	39
(14) fighting diseases (manual)	Man/Day	13	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	13	30	390	30	390
(16) harvest	Man/Day	13	20	260	21	273
(17) moving crop	Man/Day	13	-	-	-	-
(18) thresh	Man/Day	13	-	-	-	-
(19) scattering	Man/Day	13	-	-	-	-
(20) transporting	Man/Day	13	-	-	-	-
(21) peeling or drying crops	Man/Day	13	-	-	-	-
Boys	Man/Day	13	-	-	-	-
<b>Sub-total</b>			113	<b>1,469</b>	114	<b>1,482</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	28	5	140	5	140
irrigation machine (Above Labor (8))	times	28	2	56	2	56
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	28	3	84	3	84
car (Above Labor (21))	times	-	-	-	-	-
<b>Sub-total</b>			-	<b>280</b>	-	<b>280</b>
<b>(c) Materials</b>						
seeds	kg	3.49	20	70	20	70
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	37	16	592	16	592
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	27	6	162	6	162
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	93	1	93	1	93
manure	Chabbeet (0.33m3)	-	-	-	-	-
insecticides	kg or liter	47	2	94	2	94
<b>Sub-total</b>			2	<b>1,011</b>	2	<b>1,011</b>
<b>(d) Rent</b>						
Land	fed	2,325	1	2,325	1	2,325
Other cost	fed	93	1	93	1	93
<b>Sub-total</b>			1	<b>2,418</b>	1	<b>2,418</b>
<b>Grand Total</b>				<b>5,178</b>		<b>5,191</b>
<b>(C) Net Return</b>				<b>7,868</b>		<b>8,116</b>
(D) Family Labor	% of labor	-	70	1,028	70	1,037
(E) Production Cost exclude family labor				4,150		4,153
(F) Net Income				<b>8,897</b>		<b>9,154</b>
Incremental Achievement						100%

Note: Analysis is based on the data collected from General Directorate of agricultural Office. Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 17 Cost and Benefit of Crops per Fed/Season: Short Berseem (Financial Price)**  
 Winner : (Increase of Unit Yield with Project: 2.0%)  
 Crop: Short Berseem (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	960	3,235	3,106	3,30	3,168
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>3,106</b>		<b>3,168</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	20	-	-	-	-
(2) leveling land	Man/Day	20	-	-	-	-
(3) lining land	Man/Day	20	-	-	-	-
(4) cleaning lines	Man/Day	20	-	-	-	-
(5) dividing land	Man/Day	20	2	40	2	40
(6) planting	Man/Day	10	1	5	1	5
(7) planting missing parts	Man/Day	20	-	-	-	-
(8) irrigation by gravity	Man/Day	20	-	-	-	-
(9) irrigation by labor	Man/Day	15	4	60	4	60
(10) scatter fertilizers	Man/Day	20	-	-	-	-
(11) lightning	Man/Day	20	-	-	-	-
(12) hoe (dig up)	Man/Day	20	-	-	-	-
(13) cleaning (cutting grasses)	Man/Day	20	-	-	-	-
(14) fighting diseases (manual)	Man/Day	20	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	20	-	-	-	-
(16) harvest	Man/Day	20	25	500	26	520
(17) moving crop	Man/Day	20	-	-	-	-
(18) thresh	Man/Day	20	-	-	-	-
(19) scattering	Man/Day	20	-	-	-	-
(20) transporting	Man/Day	20	-	-	-	-
(21) peeling or drying crops	Man/Day	20	-	-	-	-
Boys	Man/Day		32	188	33	188
<b>Sub-total</b>				<b>793</b>		<b>813</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	30	2	60	2	60
irrigation machine (Above Labor (8))	times	15	5	75	5	75
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	25	4	100	4	100
<b>Sub-total</b>				<b>235</b>		<b>235</b>
<b>(c) Materials</b>						
seeds	kg	50	1	50	1	50
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	-	-	-	-	-
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	29	2	44	2	44
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabaet (0.33m3)	-	-	-	-	-
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>94</b>		<b>94</b>
<b>(d) Rent</b>						
Land	fed	1,050	1	1,050	1	1,050
Other cost	fed	50	1	50	1	50
<b>Sub-total</b>				<b>1,100</b>		<b>1,100</b>
<b>Grand Total</b>				<b>2,221</b>		<b>2,241</b>
<b>(C) Net Return</b>				<b>885</b>		<b>927</b>
(D) Family Labor	% of labor		90	713	90	731
(E) Production Cost exclude family labor				1,508		1,510
(F) Net Income				<b>1,598</b>		<b>1,658</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team. Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 18 Cost and Benefit of Crops per Fed/Season: Short Berseem (Economic Price)**  
 Winner : (Increase of Unit Yield with Project: 2.0%)  
 Crop: Short Berseem (Economic Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	893	3,235	2,889	3,30	2,947
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>2,889</b>		<b>2,947</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	13	-	-	-	-
(2) leveling land	Man/Day	13	-	-	-	-
(3) lining land	Man/Day	13	-	-	-	-
(4) cleaning lines	Man/Day	13	-	-	-	-
(5) dividing land	Man/Day	13	2	26	2	26
(6) planting	Man/Day	6	1	3	1	3
(7) planting missing parts	Man/Day	13	-	-	-	-
(8) irrigation by gravity	Man/Day	13	-	-	-	-
(9) irrigation by labor	Man/Day	9	4	36	4	36
(10) scatter fertilizers	Man/Day	13	-	-	-	-
(11) lightning	Man/Day	13	-	-	-	-
(12) hoe (dig up)	Man/Day	13	-	-	-	-
(13) cleaning (cutting grasses)	Man/Day	13	-	-	-	-
(14) fighting diseases (manual)	Man/Day	13	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	13	-	-	-	-
(16) harvest	Man/Day	13	25	325	26	338
(17) moving crop	Man/Day	13	-	-	-	-
(18) thresh	Man/Day	13	-	-	-	-
(19) scattering	Man/Day	13	-	-	-	-
(20) transporting	Man/Day	13	-	-	-	-
(21) peeling or drying crops	Man/Day	13	-	-	-	-
Boys	Man/Day		32	118	33	118
<b>Sub-total</b>				<b>508</b>		<b>521</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	28	2	56	2	56
irrigation machine (Above Labor (8))	times	14	5	70	5	70
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	23	4	92	4	92
<b>Sub-total</b>				<b>218</b>		<b>218</b>
<b>(c) Materials</b>						
seeds	kg	47	1	47	1	47
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	-	-	-	-	-
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	27	2	41	2	41
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabaet (0.33m3)	-	-	-	-	-
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>88</b>		<b>88</b>
<b>(d) Rent</b>						
Land	fed	977	1	977	1	977
Other cost	fed	47	1	47	1	47
<b>Sub-total</b>				<b>1,024</b>		<b>1,024</b>
<b>Grand Total</b>				<b>1,838</b>		<b>1,851</b>
<b>(C) Net Return</b>				<b>1,051</b>		<b>1,096</b>
(D) Family Labor	% of labor		90	457	90	469
(E) Production Cost exclude family labor				1,380		1,382
(F) Net Income				<b>1,509</b>		<b>1,565</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team. Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 19 Cost and Benefit of Crops per Fed/Season: Maize (Financial Price)**  
 Summer : Increase of Unit Yield with Project: 4.5%  
 Crop: Maize (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	1,000	3.30	3,300	3.45	3,449
By-product	ton	143	0.70	100	0.73	105
<b>Total Gross Income</b>				<b>3,400</b>		<b>3,553</b>
<b>(B) Procution Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	20	-	-	-	-
(2) leveling land	Man/Day	20	-	-	-	-
(3) lining land	Man/Day	20	-	-	-	-
(4) cleaning lines	Man/Day	20	4	80	4	80
(5) dividing land	Man/Day	20	-	-	-	-
(6) planting	Man/Day	20	4	80	4	80
(7) planting missing parts	Man/Day	20	-	-	-	-
(8) irrigation by gravity	Man/Day	20	7	140	7	140
(9) irrigation by labor	Man/Day	20	-	-	-	-
(10) scatter fertilizers	Man/Day	20	3	60	3	60
(11) lightning	Man/Day	20	-	-	-	-
(12) hoe (dig up)	Man/Day	20	6	120	6	120
(13) cleaning (cutting grasses)	Man/Day	20	-	-	-	-
(14) fighting diseases (manual)	Man/Day	20	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	20	-	-	-	-
(16) harvest	Man/Day	20	6	120	7	140
(17) moving crop	Man/Day	20	-	-	-	-
(18) thresh	Man/Day	20	-	-	-	-
(19) scattering	Man/Day	20	-	-	-	-
(20) transporting	Man/Day	20	-	-	-	-
(21) peeling or drying crops	Man/Day	20	-	-	-	-
Boys	Man/Day			60		60
<b>Sub-total</b>			30	<b>660</b>	31	<b>680</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	25	4	100	4	100
irrigation machine (Above Labor (8))	times	30	7	210	7	210
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	50	1	50	1	50
<b>Sub-total</b>				<b>360</b>		<b>360</b>
<b>(c) Materials</b>						
seeds	kg	10	15	150	15	150
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	40	10	400	10	400
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	-	-	-	-	-
treble phosphate 46%	sacks50kg	29	4	116	4	116
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabaert (0.33m3)	-	-	-	-	-
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>666</b>		<b>666</b>
<b>(d) Rent</b>						
Land	fed	1,100	1	1,100	1	1,100
Other cost	fed	100	1	100	1	100
<b>Sub-total</b>				<b>1,200</b>		<b>1,200</b>
<b>Grand Total</b>				<b>2,866</b>		<b>2,906</b>
<b>(C) Net Return</b>				<b>514</b>		<b>647</b>
(D) Family Labor	% of labor		80	528	80	544
(E) Production Cost exclude family labor				2,358		2,362
(F) Net Income				<b>1,042</b>		<b>1,191</b>
Incremental Achievement						100%

Note: Analysis is based on the data collected from General directorate of agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 20 Cost and Benefit of Crops per Fed/Season: Maize (Economic Price)**  
 Summer : Increase of Unit Yield with Project: 4.5%  
 Crop: Maize (Economic Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	888	3.30	2,930	3.45	3,062
By-product	ton	133	0.70	93	0.73	97
<b>Total Gross Income</b>				<b>3,024</b>		<b>3,160</b>
<b>(B) Procution Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	13	-	-	-	-
(2) leveling land	Man/Day	13	-	-	-	-
(3) lining land	Man/Day	13	-	-	-	-
(4) cleaning lines	Man/Day	13	4	52	4	52
(5) dividing land	Man/Day	13	-	-	-	-
(6) planting	Man/Day	13	4	52	4	52
(7) planting missing parts	Man/Day	13	-	-	-	-
(8) irrigation by gravity	Man/Day	13	7	91	7	91
(9) irrigation by labor	Man/Day	13	-	-	-	-
(10) scatter fertilizers	Man/Day	13	3	39	3	39
(11) lightning	Man/Day	13	-	-	-	-
(12) hoe (dig up)	Man/Day	13	6	78	6	78
(13) cleaning (cutting grasses)	Man/Day	13	-	-	-	-
(14) fighting diseases (manual)	Man/Day	13	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	13	-	-	-	-
(16) harvest	Man/Day	13	6	78	7	91
(17) moving crop	Man/Day	13	-	-	-	-
(18) thresh	Man/Day	13	-	-	-	-
(19) scattering	Man/Day	13	-	-	-	-
(20) transporting	Man/Day	13	-	-	-	-
(21) peeling or drying crops	Man/Day	13	-	-	-	-
Boys	Man/Day			38		38
<b>Sub-total</b>			30	<b>428</b>	31	<b>441</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	23	4	92	4	92
irrigation machine (Above Labor (8))	times	28	7	196	7	196
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	47	1	47	1	47
<b>Sub-total</b>				<b>355</b>		<b>355</b>
<b>(c) Materials</b>						
seeds	kg	9	15	135	15	135
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	37	10	370	10	370
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	-	-	-	-	-
treble phosphate 46%	sacks50kg	27	4	108	4	108
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabaert (0.33m3)	-	-	-	-	-
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>613</b>		<b>613</b>
<b>(d) Rent</b>						
Land	fed	1,023	1	1,023	1	1,023
Other cost	fed	93	1	93	1	93
<b>Sub-total</b>				<b>1,116</b>		<b>1,116</b>
<b>Grand Total</b>				<b>2,492</b>		<b>2,505</b>
<b>(C) Net Return</b>				<b>532</b>		<b>655</b>
(D) Family Labor	% of labor		80	342	80	353
(E) Production Cost exclude family labor				2,150		2,152
(F) Net Income				<b>874</b>		<b>1,007</b>
Incremental Achievement						100%

Note: Analysis is based on the data collected from General directorate of agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 21 Cost and Benefit of Crops per Fed/Season: Sorghum (Financial Price)**  
 Summer : Increase of Unit Yield with Project: 4.5%  
 Crop: Sorghum (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	1,571	2.17	3,409	2.27	3,562
By-product	ton	214	0.56	120	0.59	125
<b>Total Gross Income</b>				<b>3,529</b>		<b>3,688</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	20	-	-	-	-
(2) leveling land	Man/Day	20	-	-	-	-
(3) lining land	Man/Day	20	-	-	-	-
(4) cleaning lines	Man/Day	20	4	80	4	80
(5) dividing land	Man/Day	20	-	-	-	-
(6) planting	Man/Day	20	5	100	5	100
(7) planting missing parts	Man/Day	20	-	-	-	-
(8) irrigation by gravity	Man/Day	20	-	-	-	-
(9) irrigation by labor	Man/Day	20	6	120	6	120
(10) scatter fertilizers	Man/Day	20	2	40	2	40
(11) lightning	Man/Day	20	-	-	-	-
(12) hoe (dig up)	Man/Day	20	10	200	10	200
(13) cleaning (cutting grasses)	Man/Day	20	-	-	-	-
(14) fighting diseases (manual)	Man/Day	20	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	20	-	-	-	-
(16) harvest	Man/Day	20	4	80	5	100
(17) moving crop	Man/Day	20	-	-	-	-
(18) thresh	Man/Day	20	-	-	-	-
(19) scattering	Man/Day	20	2	40	3	60
(20) transporting	Man/Day	20	-	-	-	-
(21) peeling or drying crops	Man/Day	20	-	-	-	-
Boys	Man/Day			60		60
<b>Sub-total</b>			33	<b>720</b>	35	<b>760</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	25	4	100	4	100
irrigation machine (Above Labor (8))	times	30	6	180	6	180
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	30	2	60	2	60
car (Above Labor (21))	times	50	1	50	1	50
<b>Sub-total</b>				<b>390</b>		<b>390</b>
<b>(c) Materials</b>						
seeds	kg	25	2	50	2	50
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	40	4	160	4	160
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	29	4	116	4	116
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabaert (0.33m3)	-	-	-	-	-
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>326</b>		<b>326</b>
<b>(d) Rent</b>						
Land	fed	1,100	1	1,100	1	1,100
Other cost	fed	100	1	100	1	100
<b>Sub-total</b>				<b>1,200</b>		<b>1,200</b>
<b>Grand Total</b>				<b>2,636</b>		<b>2,676</b>
<b>(C) Net Return</b>				<b>893</b>		<b>1,012</b>
(D) Family Labor	% of labor		80		80	
(E) Production Cost exclude family labor				2,060		2,068
(F) Net Income				<b>1,469</b>		<b>1,620</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 22 Cost and Benefit of Crops per Fed/Season: Sorghum (Economic Price)**  
 Summer : Increase of Unit Yield with Project: 4.5%  
 Crop: Sorghum (Economic Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	1,461	2.17	3,170	2.27	3,313
By-product	ton	199	0.56	111	0.59	116
<b>Total Gross Income</b>				<b>3,282</b>		<b>3,429</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	13	-	-	-	-
(2) leveling land	Man/Day	13	-	-	-	-
(3) lining land	Man/Day	13	-	-	-	-
(4) cleaning lines	Man/Day	13	4	52	4	52
(5) dividing land	Man/Day	13	-	-	-	-
(6) planting	Man/Day	13	5	65	5	65
(7) planting missing parts	Man/Day	13	-	-	-	-
(8) irrigation by gravity	Man/Day	13	-	-	-	-
(9) irrigation by labor	Man/Day	13	6	78	6	78
(10) scatter fertilizers	Man/Day	13	2	26	2	26
(11) lightning	Man/Day	13	-	-	-	-
(12) hoe (dig up)	Man/Day	13	10	130	10	130
(13) cleaning (cutting grasses)	Man/Day	13	-	-	-	-
(14) fighting diseases (manual)	Man/Day	13	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	13	-	-	-	-
(16) harvest	Man/Day	13	4	52	5	65
(17) moving crop	Man/Day	13	-	-	-	-
(18) thresh	Man/Day	13	-	-	-	-
(19) scattering	Man/Day	13	2	26	3	39
(20) transporting	Man/Day	13	-	-	-	-
(21) peeling or drying crops	Man/Day	13	-	-	-	-
Boys	Man/Day			38		38
<b>Sub-total</b>			33	<b>467</b>	35	<b>493</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	23	4	92	4	92
irrigation machine (Above Labor (8))	times	28	6	168	6	168
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	28	2	56	2	56
car (Above Labor (21))	times	47	1	47	1	47
<b>Sub-total</b>				<b>363</b>		<b>363</b>
<b>(c) Materials</b>						
seeds	kg	23	2	46	2	46
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	37	4	148	4	148
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	27	4	108	4	108
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabaert (0.33m3)	-	-	-	-	-
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>302</b>		<b>302</b>
<b>(d) Rent</b>						
Land	fed	1,023	1	1,023	1	1,023
Other cost	fed	93	1	93	1	93
<b>Sub-total</b>				<b>1,116</b>		<b>1,116</b>
<b>Grand Total</b>				<b>2,248</b>		<b>2,274</b>
<b>(C) Net Return</b>				<b>1,034</b>		<b>1,155</b>
(D) Family Labor	% of labor		80		80	
(E) Production Cost exclude family labor				1,874		1,880
(F) Net Income				<b>1,407</b>		<b>1,550</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 23 Cost and Benefit of Crops per Fed/Season: Sun flower (Financial Price)**  
 Summer : Increase of Unit Yield with Project: 4.5%  
 Crop: Sun flower (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	2,300	1.04	2,392	1.09	2,500
By-product	ton	40	5.00	200	5.23	209
<b>Total Gross Income</b>				<b>2,592</b>		<b>2,709</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	20	-	-	-	-
(2) leveling land	Man/Day	20	-	-	-	-
(3) lining land	Man/Day	20	-	-	-	-
(4) cleaning lines	Man/Day	20	4	80	4	80
(5) dividing land	Man/Day	20	-	-	-	-
(6) planting	Man/Day	20	5	100	5	100
(7) planting missing parts	Man/Day	20	-	-	-	-
(8) irrigation by gravity	Man/Day	20	-	-	-	-
(9) irrigation by labor	Man/Day	20	6	120	6	120
(10) scatter fertilizers	Man/Day	20	2	40	2	40
(11) lightning	Man/Day	20	1	20	1	20
(12) hoe (dig up)	Man/Day	20	8	160	8	160
(13) cleaning (cutting grasses)	Man/Day	20	-	-	-	-
(14) fighting diseases (manual)	Man/Day	20	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	20	-	-	-	-
(16) harvest	Man/Day	20	8	160	9	180
(17) moving crop	Man/Day	20	3	60	4	80
(18) thresh	Man/Day	20	-	-	-	-
(19) scattering	Man/Day	20	3	60	4	80
(20) transporting	Man/Day	20	-	-	-	-
(21) peeling or drying crops	Man/Day	20	-	-	-	-
Boys	Man/Day	20	-	-	-	-
<b>Sub-total</b>			40	<b>800</b>	43	<b>860</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	25	4	100	4	100
irrigation machine (Above Labor (8))	times	30	6	180	6	180
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	-	-	-	-	-
<b>Sub-total</b>			-	-	-	-
<b>(c) Materials</b>				<b>280</b>		<b>280</b>
seeds	kg	-	-	-	-	-
Azotes fertilizers	sacks50kg	3	10	30	10	30
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	-	-	-	-	-
phosphate fertilizers	sacks50kg	40	3	120	3	120
super phosphate 15.5%	sacks50kg	-	-	-	-	-
treble phosphate 46%	sacks50kg	29	1	29	1	29
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabaert (0.33m3)	-	-	-	-	-
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>			-	<b>179</b>	-	<b>179</b>
<b>(d) Rent</b>						
Land	fed	1,100	1	1,100	1	1,100
Other cost	fed	100	1	100	1	100
<b>Sub-total</b>			-	<b>1,200</b>	-	<b>1,200</b>
<b>Grand Total</b>				<b>2,459</b>		<b>2,519</b>
<b>(C) Net Return</b>				<b>133</b>		<b>190</b>
(D) Family Labor	% of labor		80	640	80	688
(E) Production Cost exclude family labor				1,819		1,831
(F) Net Income				<b>773</b>		<b>878</b>
Incremental Achievement						
Note: Analysis is based on the data collected from General Directorate of agricultural Office, Baseline survey of the JICA Study Team.						
Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%						100%

**Table 24 Cost and Benefit of Crops per Fed/Season: Sun flower (Economic Price)**  
 Summer : Increase of Unit Yield with Project: 4.5%  
 Crop: Sun flower (Economic Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	2,139	1.04	2,225	1.09	2,325
By-product	ton	37	5.00	185	5.23	193
<b>Total Gross Income</b>				<b>2,410</b>		<b>2,518</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	13	-	-	-	-
(2) leveling land	Man/Day	13	-	-	-	-
(3) lining land	Man/Day	13	-	-	-	-
(4) cleaning lines	Man/Day	13	4	52	4	52
(5) dividing land	Man/Day	13	-	-	-	-
(6) planting	Man/Day	13	5	65	5	65
(7) planting missing parts	Man/Day	13	-	-	-	-
(8) irrigation by gravity	Man/Day	13	-	-	-	-
(9) irrigation by labor	Man/Day	13	6	78	6	78
(10) scatter fertilizers	Man/Day	13	2	26	2	26
(11) lightning	Man/Day	13	1	13	1	13
(12) hoe (dig up)	Man/Day	13	8	104	8	104
(13) cleaning (cutting grasses)	Man/Day	13	-	-	-	-
(14) fighting diseases (manual)	Man/Day	13	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	13	-	-	-	-
(16) harvest	Man/Day	13	8	104	9	117
(17) moving crop	Man/Day	13	3	39	4	52
(18) thresh	Man/Day	13	-	-	-	-
(19) scattering	Man/Day	13	3	39	4	52
(20) transporting	Man/Day	13	-	-	-	-
(21) peeling or drying crops	Man/Day	13	-	-	-	-
Boys	Man/Day	13	-	-	-	-
<b>Sub-total</b>			40	<b>520</b>	43	<b>559</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	23	4	92	4	92
irrigation machine (Above Labor (8))	times	28	6	168	6	168
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	-	-	-	-	-
<b>Sub-total</b>			-	-	-	-
<b>(c) Materials</b>				<b>260</b>		<b>260</b>
seeds	kg	-	-	-	-	-
Azotes fertilizers	sacks50kg	3	10	30	10	30
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	-	-	-	-	-
phosphate fertilizers	sacks50kg	37	3	111	3	111
super phosphate 15.5%	sacks50kg	-	-	-	-	-
treble phosphate 46%	sacks50kg	27	1	27	1	27
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabaert (0.33m3)	-	-	-	-	-
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>			-	<b>168</b>	-	<b>168</b>
<b>(d) Rent</b>						
Land	fed	1,023	1	1,023	1	1,023
Other cost	fed	93	1	93	1	93
<b>Sub-total</b>			-	<b>1,116</b>	-	<b>1,116</b>
<b>Grand Total</b>				<b>2,064</b>		<b>2,103</b>
<b>(C) Net Return</b>				<b>346</b>		<b>415</b>
(D) Family Labor	% of labor		80	640	80	680
(E) Production Cost exclude family labor				1,648		1,656
(F) Net Income				<b>762</b>		<b>862</b>
Incremental Achievement						
Note: Analysis is based on the data collected from General Directorate of agricultural Office, Baseline survey of the JICA Study Team.						
Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%						100%

**Table 25 Cost and Benefit of Crops per Fed/Season: Summer Tomato (Financial Price)**  
 Summer : Increase of Unit Yield with Project: 4.5%  
 Crop: Tomato (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	850	16.94	14,399	17.70	15,047
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>14,399</b>		<b>15,047</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	20	-	-	-	-
(2) leveling land	Man/Day	20	-	-	-	-
(3) lining land	Man/Day	20	-	-	-	-
(4) cleaning lines	Man/Day	20	4	80	4	80
(5) dividing land	Man/Day	20	-	-	-	-
(6) planting	Man/Day	20	8	160	8	160
(7) planting missing parts	Man/Day	20	-	-	-	-
(8) irrigation by gravity	Man/Day	20	-	-	-	-
(9) irrigation by labor	Man/Day	20	15	300	15	300
(10) scatter fertilizers	Man/Day	20	3	60	3	60
(11) lightning	Man/Day	20	-	-	-	-
(12) hoe (dig up)	Man/Day	20	15	300	15	300
(13) cleaning (cutting grasses)	Man/Day	20	-	-	-	-
(14) fighting diseases (manual)	Man/Day	20	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	20	4	80	4	80
(16) harvest	Man/Day	20	80	1,600	84	1,680
(17) moving crop	Man/Day	20	-	-	-	-
(18) thresh	Man/Day	20	-	-	-	-
(19) scattering	Man/Day	20	-	-	-	-
(20) transporting	Man/Day	20	-	-	-	-
(21) peeling or drying crops	Man/Day	20	-	-	-	-
Boys	Man/Day		129	180	133	180
<b>Sub-total</b>				<b>2,760</b>		<b>2,840</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	25	4	100	4	100
irrigation machine (Above Labor (8))	times	30	15	450	15	450
motor (Above Labor (14))	hr	30	4	120	4	120
tractor (Above Labor (18))	hr	60	10	600	10	600
car (Above Labor (21))	times	50	1	50	1	50
<b>Sub-total</b>				<b>1,320</b>		<b>1,320</b>
<b>(c) Materials</b>						
seeds	kg	0.90	800	720	800	720
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	40	16	640	16	640
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	29	6	174	6	174
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	100	1	100	1	100
manure	Chabbeet (0.33m3)	50	4	200	4	200
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>1,834</b>		<b>1,834</b>
<b>(d) Rent</b>						
Land	fed	1,100	1	1,100	1	1,100
Other cost	fed	100	1	100	1	100
<b>Sub-total</b>				<b>1,200</b>		<b>1,200</b>
<b>Grand Total</b>				<b>7,114</b>		<b>7,194</b>
<b>(C) Net Return</b>				<b>7,285</b>		<b>7,853</b>
(D) Family Labor	% of labor		70	1,932	70	1,988
(E) Production Cost exclude family labor				5,182		5,206
(F) Net Income				<b>9,217</b>		<b>9,841</b>
Incremental Achievement						100%

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 26 Cost and Benefit of Crops per Fed/Season: Summer Tomato (Economic Price)**  
 Summer : Increase of Unit Yield with Project: 4.5%  
 Crop: Tomato (Economic Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	791	16.94	13,400	17.70	14,003
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>13,400</b>		<b>14,003</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	13	-	-	-	-
(2) leveling land	Man/Day	13	-	-	-	-
(3) lining land	Man/Day	13	-	-	-	-
(4) cleaning lines	Man/Day	13	4	52	4	52
(5) dividing land	Man/Day	13	-	-	-	-
(6) planting	Man/Day	13	8	104	8	104
(7) planting missing parts	Man/Day	13	-	-	-	-
(8) irrigation by gravity	Man/Day	13	-	-	-	-
(9) irrigation by labor	Man/Day	13	15	195	15	195
(10) scatter fertilizers	Man/Day	13	3	39	3	39
(11) lightning	Man/Day	13	-	-	-	-
(12) hoe (dig up)	Man/Day	13	15	195	15	195
(13) cleaning (cutting grasses)	Man/Day	13	-	-	-	-
(14) fighting diseases (manual)	Man/Day	13	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	13	4	52	4	52
(16) harvest	Man/Day	13	80	1,040	84	1,092
(17) moving crop	Man/Day	13	-	-	-	-
(18) thresh	Man/Day	13	-	-	-	-
(19) scattering	Man/Day	13	-	-	-	-
(20) transporting	Man/Day	13	-	-	-	-
(21) peeling or drying crops	Man/Day	13	-	-	-	-
Boys	Man/Day		129	1,790	133	1,842
<b>Sub-total</b>				<b>1,790</b>		<b>1,842</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	23	4	92	4	92
irrigation machine (Above Labor (8))	times	28	15	420	15	420
motor (Above Labor (14))	hr	28	4	112	4	112
tractor (Above Labor (18))	hr	56	10	560	10	560
car (Above Labor (21))	times	47	1	47	1	47
<b>Sub-total</b>				<b>1,231</b>		<b>1,231</b>
<b>(c) Materials</b>						
seeds	kg	0.84	800	672	800	672
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	37	16	592	16	592
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	27	6	162	6	162
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	93	1	93	1	93
manure	Chabbeet (0.33m3)	47	4	188	4	188
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>1,707</b>		<b>1,707</b>
<b>(d) Rent</b>						
Land	fed	1,023	1	1,023	1	1,023
Other cost	fed	93	1	93	1	93
<b>Sub-total</b>				<b>1,116</b>		<b>1,116</b>
<b>Grand Total</b>				<b>5,844</b>		<b>5,896</b>
<b>(C) Net Return</b>				<b>7,556</b>		<b>8,107</b>
(D) Family Labor	% of labor		70	1,263	70	1,289
(E) Production Cost exclude family labor				4,591		4,607
(F) Net Income				<b>8,009</b>		<b>8,936</b>
Incremental Achievement						100%

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 27 Cost and Benefit of Crops per Fed/Season: Cucumber (Financial Price)**  
 Summer : Increase of Unit Yield with Project: 4.5%  
 Crop: Cucumber (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	750	9.30	6,975	9.72	7,289
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>6,975</b>		<b>7,289</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	20	-	-	-	-
(2) leveling land	Man/Day	20	-	-	-	-
(3) lining land	Man/Day	20	-	-	-	-
(4) cleaning lines	Man/Day	20	-	-	-	-
(5) dividing land	Man/Day	20	-	-	-	-
(6) planting	Man/Day	20	4	80	4	80
(7) planting missing parts	Man/Day	20	-	-	-	-
(8) irrigation by gravity	Man/Day	20	-	-	-	-
(9) irrigation by labor	Man/Day	15	10	150	10	150
(10) scatter fertilizers	Man/Day	20	-	-	-	-
(11) lightning	Man/Day	20	1	20	1	20
(12) hoe (dig up)	Man/Day	20	16	320	16	320
(13) cleaning (cutting grasses)	Man/Day	20	-	-	-	-
(14) fighting diseases (manual)	Man/Day	20	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	20	4	80	4	80
(16) harvest	Man/Day	20	40	800	42	840
(17) moving crop	Man/Day	20	-	-	-	-
(18) thresh	Man/Day	20	-	-	-	-
(19) scattering	Man/Day	20	-	-	-	-
(20) transporting	Man/Day	20	-	-	-	-
(21) peeling or drying crops	Man/Day	20	-	-	-	-
Boys	Man/Day		75	1,365	77	1,365
<b>Sub-total</b>				<b>2,815</b>		<b>2,855</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	30	6	180	6	180
irrigation machine (Above Labor (8))	times	20	10	200	10	200
motor (Above Labor (14))	hr	30	4	120	4	120
tractor (Above Labor (18))	hr	35	10	350	10	350
car (Above Labor (21))	times	30	10	300	10	300
<b>Sub-total</b>				<b>1,150</b>		<b>1,150</b>
<b>(c) Materials</b>						
seeds	kg	400	1	400	1	400
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	40	7	280	7	280
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	29	3	87	3	87
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	100	1	100	1	100
manure	Chabbeet (0.33m3)	-	-	-	-	-
insecticides	kg or liter	50	4	200	4	200
<b>Sub-total</b>				<b>1,067</b>		<b>1,067</b>
<b>(d) Rent</b>						
Land	fed	1,100	1	1,100	1	1,100
Other cost	fed	100	1	100	1	100
<b>Sub-total</b>				<b>1,200</b>		<b>1,200</b>
<b>Grand Total</b>				<b>6,232</b>		<b>6,272</b>
<b>(C) Net Return</b>				<b>743</b>		<b>1,017</b>
(D) Family Labor	% of labor		70	1,971	70	1,999
(E) Production Cost exclude family labor				4,262		4,274
(F) Net Income				<b>2,714</b>		<b>3,015</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 28 Cost and Benefit of Crops per Fed/Season: Cucumber (Economic Price)**  
 Summer : Increase of Unit Yield with Project: 4.5%  
 Crop: Cucumber (Economic Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	698	9.30	6,491	9.72	6,784
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>6,491</b>		<b>6,784</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	13	-	-	-	-
(2) leveling land	Man/Day	13	-	-	-	-
(3) lining land	Man/Day	13	-	-	-	-
(4) cleaning lines	Man/Day	13	-	-	-	-
(5) dividing land	Man/Day	13	-	-	-	-
(6) planting	Man/Day	13	4	52	4	52
(7) planting missing parts	Man/Day	13	-	-	-	-
(8) irrigation by gravity	Man/Day	13	-	-	-	-
(9) irrigation by labor	Man/Day	9	10	90	10	90
(10) scatter fertilizers	Man/Day	13	-	-	-	-
(11) lightning	Man/Day	13	1	13	1	13
(12) hoe (dig up)	Man/Day	13	16	208	16	208
(13) cleaning (cutting grasses)	Man/Day	13	-	-	-	-
(14) fighting diseases (manual)	Man/Day	13	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	13	4	52	4	52
(16) harvest	Man/Day	13	40	520	42	546
(17) moving crop	Man/Day	13	-	-	-	-
(18) thresh	Man/Day	13	-	-	-	-
(19) scattering	Man/Day	13	-	-	-	-
(20) transporting	Man/Day	13	-	-	-	-
(21) peeling or drying crops	Man/Day	13	-	-	-	-
Boys	Man/Day		75	860	77	860
<b>Sub-total</b>				<b>1,795</b>		<b>1,821</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	28	6	168	6	168
irrigation machine (Above Labor (8))	times	19	10	190	10	190
motor (Above Labor (14))	hr	28	4	112	4	112
tractor (Above Labor (18))	hr	33	10	330	10	330
car (Above Labor (21))	times	28	10	280	10	280
<b>Sub-total</b>				<b>1,080</b>		<b>1,080</b>
<b>(c) Materials</b>						
seeds	kg	372	1	372	1	372
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	37	7	259	7	259
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	27	3	81	3	81
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	93	1	93	1	93
manure	Chabbeet (0.33m3)	-	-	-	-	-
insecticides	kg or liter	47	4	188	4	188
<b>Sub-total</b>				<b>993</b>		<b>993</b>
<b>(d) Rent</b>						
Land	fed	1,023	1	1,023	1	1,023
Other cost	fed	93	1	93	1	93
<b>Sub-total</b>				<b>1,116</b>		<b>1,116</b>
<b>Grand Total</b>				<b>4,984</b>		<b>5,010</b>
<b>(C) Net Return</b>				<b>1,507</b>		<b>1,774</b>
(D) Family Labor	% of labor		70	1,257	70	1,275
(E) Production Cost exclude family labor				3,728		3,735
(F) Net Income				<b>2,764</b>		<b>3,048</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%



**Table 29 Cost and Benefit of Crops per Fed/Season: Water Melon (Financial Price)**  
 Summer : Increase of Unit Yield with Project: 4.5%  
 Crop: Melon (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	875	8,90	7,788	9,30	8,138
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>7,788</b>		<b>8,138</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	20	-	-	-	-
(2) leveling land	Man/Day	20	-	-	-	-
(3) lining land	Man/Day	20	-	-	-	-
(4) cleaning lines	Man/Day	20	15	300	15	300
(5) dividing land	Man/Day	20	-	-	-	-
(6) planting	Man/Day	20	5	100	5	100
(7) planting missing parts	Man/Day	20	-	-	-	-
(8) irrigation by gravity	Man/Day	20	-	-	-	-
(9) irrigation by labor	Man/Day	20	2	40	2	40
(10) scatter fertilizers	Man/Day	20	-	-	-	-
(11) lightning	Man/Day	20	-	-	-	-
(12) hoe (dig up)	Man/Day	20	12	240	12	240
(13) cleaning (cutting grasses)	Man/Day	20	-	-	-	-
(14) fighting diseases (manual)	Man/Day	20	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	20	9	180	9	180
(16) harvest	Man/Day	20	40	800	42	840
(17) moving crop	Man/Day	20	-	-	-	-
(18) thresh	Man/Day	20	-	-	-	-
(19) scattering	Man/Day	20	2	40	3	60
(20) transporting	Man/Day	20	-	-	-	-
(21) peeling or drying crops	Man/Day	20	-	-	-	-
Boys	Man/Day			465		465
<b>Sub-total</b>			85	<b>2,165</b>	88	<b>2,225</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	100	4	400	4	400
irrigation machine (Above Labor (8))	times	30	2	60	2	60
motor (Above Labor (14))	hr	35	2	70	2	70
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	40	2	80	2	80
<b>Sub-total</b>				<b>610</b>		<b>610</b>
<b>(c) Materials</b>						
seeds	kg	70	2	105	2	105
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	40	7	280	7	280
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	29	4	116	4	116
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	100	1	100	1	100
manure	Chabbeet (0.33m3)	50	3	150	3	150
insecticides	kg or liter	100	4	400	4	400
<b>Sub-total</b>				<b>1,151</b>		<b>1,151</b>
<b>(d) Rent</b>						
Land	fed	1,700	1	1,700	1	1,700
Other cost	fed	100	1	100	1	100
<b>Sub-total</b>				<b>1,800</b>		<b>1,800</b>
<b>Grand Total</b>				<b>5,786</b>		<b>5,786</b>
<b>(C) Net Return</b>				<b>2,062</b>		<b>2,352</b>
(D) Family Labor	% of labor		70		70	
(E) Production Cost exclude family labor				4,211		4,229
(F) Net Income				<b>3,577</b>		<b>3,909</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 30 Cost and Benefit of Crops per Fed/Season: Water Melon (Economic Price)**  
 Summer : Increase of Unit Yield with Project: 4.5%  
 Crop: Melon (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	814	8,90	7,245	9,30	7,571
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>7,245</b>		<b>7,571</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	13	-	-	-	-
(2) leveling land	Man/Day	13	-	-	-	-
(3) lining land	Man/Day	13	-	-	-	-
(4) cleaning lines	Man/Day	13	15	195	15	195
(5) dividing land	Man/Day	13	-	-	-	-
(6) planting	Man/Day	13	5	65	5	65
(7) planting missing parts	Man/Day	13	-	-	-	-
(8) irrigation by gravity	Man/Day	13	-	-	-	-
(9) irrigation by labor	Man/Day	13	2	26	2	26
(10) scatter fertilizers	Man/Day	13	-	-	-	-
(11) lightning	Man/Day	13	-	-	-	-
(12) hoe (dig up)	Man/Day	13	12	156	12	156
(13) cleaning (cutting grasses)	Man/Day	13	-	-	-	-
(14) fighting diseases (manual)	Man/Day	13	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	13	9	117	9	117
(16) harvest	Man/Day	13	40	520	42	546
(17) moving crop	Man/Day	13	-	-	-	-
(18) thresh	Man/Day	13	-	-	-	-
(19) scattering	Man/Day	13	2	26	3	39
(20) transporting	Man/Day	13	-	-	-	-
(21) peeling or drying crops	Man/Day	13	-	-	-	-
Boys	Man/Day			293		293
<b>Sub-total</b>			85	<b>1,398</b>	88	<b>1,437</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	93	4	372	4	372
irrigation machine (Above Labor (8))	times	28	2	56	2	56
motor (Above Labor (14))	hr	33	2	66	2	66
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	37	2	74	2	74
<b>Sub-total</b>				<b>568</b>		<b>568</b>
<b>(c) Materials</b>						
seeds	kg	65	2	98	2	98
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	37	7	259	7	259
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	27	4	108	4	108
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	93	1	93	1	93
manure	Chabbeet (0.33m3)	47	3	141	3	141
insecticides	kg or liter	93	4	372	4	372
<b>Sub-total</b>				<b>1,071</b>		<b>1,071</b>
<b>(d) Rent</b>						
Land	fed	1,581	1	1,581	1	1,581
Other cost	fed	93	1	93	1	93
<b>Sub-total</b>				<b>1,674</b>		<b>1,674</b>
<b>Grand Total</b>				<b>4,711</b>		<b>4,750</b>
<b>(C) Net Return</b>				<b>2,534</b>		<b>2,821</b>
(D) Family Labor	% of labor		70		70	
(E) Production Cost exclude family labor				3,732		3,744
(F) Net Income				<b>3,513</b>		<b>3,827</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 31 Cost and Benefit of Crops per Fed/Season: Nile Maize (Financial Price)**  
 Nile : increase of Unit Yield with Project: 4.5%  
 Crop: Maize (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	1,000	3.30	3,300	3.45	3,449
By-product	ton	143	0.70	100	0.73	105
<b>Total Gross Income</b>				<b>3,400</b>		<b>3,553</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	20	-	-	-	-
(2) leveling land	Man/Day	20	-	-	-	-
(3) lining land	Man/Day	20	-	-	-	-
(4) cleaning lines	Man/Day	20	4	80	4	80
(5) dividing land	Man/Day	20	-	-	-	-
(6) planting	Man/Day	20	4	80	4	80
(7) planting missing parts	Man/Day	20	-	-	-	-
(8) irrigation by gravity	Man/Day	20	7	140	7	140
(9) irrigation by labor	Man/Day	20	-	-	-	-
(10) scatter fertilizers	Man/Day	20	3	60	3	60
(11) lightning	Man/Day	20	-	-	-	-
(12) hoe (dig up)	Man/Day	20	6	120	6	120
(13) cleaning (cutting grasses)	Man/Day	20	-	-	-	-
(14) fighting diseases (manual)	Man/Day	20	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	20	-	-	-	-
(16) harvest	Man/Day	20	6	120	7	140
(17) moving crop	Man/Day	20	-	-	-	-
(18) thresh	Man/Day	20	-	-	-	-
(19) scattering	Man/Day	20	-	-	-	-
(20) transporting	Man/Day	20	-	-	-	-
(21) peeling or drying crops	Man/Day	20	-	-	-	-
Boys	Man/Day	20	-	60	-	60
<b>Sub-total</b>			<b>30</b>	<b>660</b>	<b>31</b>	<b>680</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	25	4	100	4	100
irrigation machine (Above Labor (8))	times	30	7	210	7	210
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	50	1	50	1	50
<b>Sub-total</b>			<b>1</b>	<b>360</b>	<b>1</b>	<b>360</b>
<b>(c) Materials</b>						
seeds	kg	10	15	150	15	150
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	40	10	400	10	400
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	-	-	-	-	-
treble phosphate 46%	sacks50kg	29	4	116	4	116
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabaert (0.33m3)	-	-	-	-	-
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>666</b>		<b>666</b>
<b>(d) Rent</b>						
Land	fed	1,100	1	1,100	1	1,100
Other cost	fed	100	1	100	1	100
<b>Sub-total</b>				<b>1,200</b>		<b>1,200</b>
<b>Grand Total</b>				<b>2,866</b>		<b>2,906</b>
<b>(C) Net Return</b>				<b>514</b>		<b>647</b>
(D) Family Labor	% of labor		80	528	80	544
(E) Production Cost exclude family labor				2,358		2,362
(F) Net Income				<b>1,042</b>		<b>1,191</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 32 Cost and Benefit of Crops per Fed/Season: Nile Maize (Economic Price)**  
 Nile : increase of Unit Yield with Project: 4.5%  
 Crop: Maize (Economic Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	888	3.30	2,930	3.45	3,062
By-product	ton	133	0.70	93	0.73	97
<b>Total Gross Income</b>				<b>3,024</b>		<b>3,160</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	13	-	-	-	-
(2) leveling land	Man/Day	13	-	-	-	-
(3) lining land	Man/Day	13	-	-	-	-
(4) cleaning lines	Man/Day	13	4	52	4	52
(5) dividing land	Man/Day	13	-	-	-	-
(6) planting	Man/Day	13	4	52	4	52
(7) planting missing parts	Man/Day	13	-	-	-	-
(8) irrigation by gravity	Man/Day	13	7	91	7	91
(9) irrigation by labor	Man/Day	13	-	-	-	-
(10) scatter fertilizers	Man/Day	13	3	39	3	39
(11) lightning	Man/Day	13	-	-	-	-
(12) hoe (dig up)	Man/Day	13	6	78	6	78
(13) cleaning (cutting grasses)	Man/Day	13	-	-	-	-
(14) fighting diseases (manual)	Man/Day	13	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	13	-	-	-	-
(16) harvest	Man/Day	13	6	78	7	91
(17) moving crop	Man/Day	13	-	-	-	-
(18) thresh	Man/Day	13	-	-	-	-
(19) scattering	Man/Day	13	-	-	-	-
(20) transporting	Man/Day	13	-	-	-	-
(21) peeling or drying crops	Man/Day	13	-	-	-	-
Boys	Man/Day	13	-	38	-	38
<b>Sub-total</b>			<b>30</b>	<b>428</b>	<b>31</b>	<b>441</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	23	4	92	4	92
irrigation machine (Above Labor (8))	times	28	7	196	7	196
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	47	1	47	1	47
<b>Sub-total</b>			<b>1</b>	<b>335</b>	<b>1</b>	<b>335</b>
<b>(c) Materials</b>						
seeds	kg	9	15	135	15	135
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	37	10	370	10	370
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	-	-	-	-	-
treble phosphate 46%	sacks50kg	27	4	108	4	108
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabaert (0.33m3)	-	-	-	-	-
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>613</b>		<b>613</b>
<b>(d) Rent</b>						
Land	fed	1,023	1	1,023	1	1,023
Other cost	fed	93	1	93	1	93
<b>Sub-total</b>				<b>1,116</b>		<b>1,116</b>
<b>Grand Total</b>				<b>2,492</b>		<b>2,505</b>
<b>(C) Net Return</b>				<b>532</b>		<b>655</b>
(D) Family Labor	% of labor		80	342	80	353
(E) Production Cost exclude family labor				2,150		2,152
(F) Net Income				<b>874</b>		<b>1,007</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 33 Cost and Benefit of Crops per Fed/Season: Nile Tomato (Financial Price)**  
 Nile : Increase of Unit Yield with Project: 4.5%  
 Crop: Tomato (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Quity	Total Value	Quity	Total Value
<b>(A) INCOME</b>						
Main Product	ton	850	16.94	14,399	17.70	15,047
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>14,399</b>		<b>15,047</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	20	-	-	-	-
(2) leveling land	Man/Day	20	-	-	-	-
(3) lining land	Man/Day	20	-	-	-	-
(4) cleaning lines	Man/Day	20	4	80	4	80
(5) dividing land	Man/Day	20	-	-	-	-
(6) planting	Man/Day	20	8	160	8	160
(7) planting missing parts	Man/Day	20	-	-	-	-
(8) irrigation by gravity	Man/Day	20	-	-	-	-
(9) irrigation by labor	Man/Day	20	15	300	15	300
(10) scatter fertilizers	Man/Day	20	3	60	3	60
(11) lightning	Man/Day	20	-	-	-	-
(12) hoe (dig up)	Man/Day	20	15	300	15	300
(13) cleaning (cutting grasses)	Man/Day	20	-	-	-	-
(14) fighting diseases (manual)	Man/Day	20	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	20	4	80	4	80
(16) harvest	Man/Day	20	80	1,600	84	1,680
(17) moving crop	Man/Day	20	-	-	-	-
(18) thresh	Man/Day	20	-	-	-	-
(19) scattering	Man/Day	20	-	-	-	-
(20) transporting	Man/Day	20	-	-	-	-
(21) peeling or drying crops	Man/Day	20	-	-	-	-
Boys	Man/Day		129	180	133	180
<b>Sub-total</b>				<b>2,760</b>		<b>2,840</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	25	4	100	4	100
irrigation machine (Above Labor (8))	times	30	15	450	15	450
motor (Above Labor (14))	hr	30	4	120	4	120
tractor (Above Labor (18))	hr	60	10	600	10	600
car (Above Labor (21))	times	50	1	50	1	50
<b>Sub-total</b>				<b>1,320</b>		<b>1,320</b>
<b>(c) Materials</b>						
seeds	kg	0.90	800	720	800	720
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	40	16	640	16	640
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	29	6	174	6	174
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	100	1	100	1	100
manure	Chabbeet (0.33m3)	50	4	200	4	200
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>1,834</b>		<b>1,834</b>
<b>(d) Rent</b>						
Land	fed	1,100	1	1,100	1	1,100
Other cost	fed	100	1	100	1	100
<b>Sub-total</b>				<b>1,200</b>		<b>1,200</b>
<b>Grand Total</b>				<b>7,114</b>		<b>7,194</b>
<b>(C) Net Return</b>				<b>7,285</b>		<b>7,853</b>
(D) Family Labor	% of labor		70	1,932	70	1,988
(E) Production Cost exclude family labor				5,182		5,206
(F) Net Income				<b>9,217</b>		<b>9,841</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General directorate of agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 34 Cost and Benefit of Crops per Fed/Season: Nile Tomato (Economic Price)**  
 Nile : Increase of Unit Yield with Project: 4.5%  
 Crop: Tomato (Economic Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Quity	Total Value	Quity	Total Value
<b>(A) INCOME</b>						
Main Product	ton	791	16.94	13,400	17.70	14,003
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>13,400</b>		<b>14,003</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	13	-	-	-	-
(2) leveling land	Man/Day	13	-	-	-	-
(3) lining land	Man/Day	13	-	-	-	-
(4) cleaning lines	Man/Day	13	4	52	4	52
(5) dividing land	Man/Day	13	-	-	-	-
(6) planting	Man/Day	13	8	104	8	104
(7) planting missing parts	Man/Day	13	-	-	-	-
(8) irrigation by gravity	Man/Day	13	-	-	-	-
(9) irrigation by labor	Man/Day	13	15	195	15	195
(10) scatter fertilizers	Man/Day	13	3	39	3	39
(11) lightning	Man/Day	13	-	-	-	-
(12) hoe (dig up)	Man/Day	13	15	195	15	195
(13) cleaning (cutting grasses)	Man/Day	13	-	-	-	-
(14) fighting diseases (manual)	Man/Day	13	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	13	4	52	4	52
(16) harvest	Man/Day	13	80	1,040	84	1,092
(17) moving crop	Man/Day	13	-	-	-	-
(18) thresh	Man/Day	13	-	-	-	-
(19) scattering	Man/Day	13	-	-	-	-
(20) transporting	Man/Day	13	-	-	-	-
(21) peeling or drying crops	Man/Day	13	-	-	-	-
Boys	Man/Day		129	1,790	133	1,842
<b>Sub-total</b>				<b>1,790</b>		<b>1,842</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	23	4	92	4	92
irrigation machine (Above Labor (8))	times	28	15	420	15	420
motor (Above Labor (14))	hr	28	4	112	4	112
tractor (Above Labor (18))	hr	56	10	560	10	560
car (Above Labor (21))	times	47	1	47	1	47
<b>Sub-total</b>				<b>1,231</b>		<b>1,231</b>
<b>(c) Materials</b>						
seeds	kg	0.84	800	672	800	672
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	37	16	592	16	592
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	27	6	162	6	162
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	93	1	93	1	93
manure	Chabbeet (0.33m3)	47	4	188	4	188
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>1,707</b>		<b>1,707</b>
<b>(d) Rent</b>						
Land	fed	1,023	1	1,023	1	1,023
Other cost	fed	93	1	93	1	93
<b>Sub-total</b>				<b>1,116</b>		<b>1,116</b>
<b>Grand Total</b>				<b>5,844</b>		<b>5,896</b>
<b>(C) Net Return</b>				<b>7,556</b>		<b>8,107</b>
(D) Family Labor	% of labor		70	1,263	70	1,289
(E) Production Cost exclude family labor				4,591		4,607
(F) Net Income				<b>8,009</b>		<b>8,396</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General directorate of agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 35 Cost and Benefit of Crops per Fed/Season: Sugar cane (Financial Price)**  
 Perennial: Increase of Unit Yield with Project: 4.5%  
 Crop: Sugar Cane (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	200	46.93	9,386	49.04	9,808
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>9,386</b>		<b>9,808</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	20	-	-	-	-
(2) leveling land	Man/Day	15	1	15	1	15
(3) lining land	Man/Day	20	-	-	-	-
(4) cleaning lines	Man/Day	15	7	105	7	105
(5) dividing land	Man/Day	20	-	-	-	-
(6) planting	Man/Day	20	5	100	5	100
(7) planting missing parts	Man/Day	20	-	-	-	-
(8) irrigation by gravity	Man/Day	20	-	-	-	-
(9) irrigation by labor	Man/Day	15	19	285	19	285
(10) scatter fertilizers	Man/Day	20	-	-	-	-
(11) lightning	Man/Day	20	-	-	-	-
(12) hoe (dig up)	Man/Day	15	28	420	28	420
(13) cleaning (cutting grasses)	Man/Day	20	-	-	-	-
(14) fighting diseases (manual)	Man/Day	20	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	20	-	-	-	-
(16) harvest	Man/Day	15	20	300	21	315
(17) moving crop	Man/Day	20	15	300	16	320
(18) thresh	Man/Day	20	-	-	-	-
(19) scattering	Man/Day	20	-	-	-	-
(20) transporting	Man/Day	20	-	-	-	-
(21) peeling or drying crops	Man/Day	20	-	-	-	-
Boys	Man/Day		95	1,625	97	1,660
<b>Sub-total</b>				<b>1,299</b>		<b>1,299</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	50	3	150	3	150
irrigation machine (Above Labor (8))	times	25	19	475	19	475
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	100	3	300	3	300
<b>Sub-total</b>				<b>925</b>		<b>925</b>
<b>(c) Materials</b>						
seeds	kg	283	2	425	2	425
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	40	15	600	15	600
uria 46%	sacks50kg	-	-	-	-	-
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	29	6	174	6	174
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	100	1	100	1	100
manure	Chabaert (0.33m3)	-	-	-	-	-
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>1,299</b>		<b>1,299</b>
<b>(d) Rent</b>						
Land	fed	3,500	1	3,500	1	3,500
Other cost	fed	100	1	100	1	100
<b>Sub-total</b>				<b>3,600</b>		<b>3,600</b>
<b>Grand Total</b>				<b>7,484</b>		<b>7,484</b>
<b>(C) Net Return</b>				<b>1,938</b>		<b>2,325</b>
(D) Family Labor	% of labor		60	975	60	996
(E) Production Cost exclude family labor				6,474		6,488
(F) Net Income				<b>2,913</b>		<b>3,321</b>
Incremental Achievement						100%

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 36 Cost and Benefit of Crops per Fed/Season: Sugar cane (Economic Price)**  
 Perennial: Increase of Unit Yield with Project: 4.5%  
 Crop: Sugar Cane (Economic Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	186	46.93	8,729	49.04	9,122
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>8,729</b>		<b>9,122</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	13	-	-	-	-
(2) leveling land	Man/Day	9	1	9	1	9
(3) lining land	Man/Day	13	-	-	-	-
(4) cleaning lines	Man/Day	9	7	63	7	63
(5) dividing land	Man/Day	13	-	-	-	-
(6) planting	Man/Day	13	5	65	5	65
(7) planting missing parts	Man/Day	13	-	-	-	-
(8) irrigation by gravity	Man/Day	13	-	-	-	-
(9) irrigation by labor	Man/Day	9	19	171	19	171
(10) scatter fertilizers	Man/Day	13	-	-	-	-
(11) lightning	Man/Day	13	-	-	-	-
(12) hoe (dig up)	Man/Day	9	28	252	28	252
(13) cleaning (cutting grasses)	Man/Day	13	-	-	-	-
(14) fighting diseases (manual)	Man/Day	13	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	13	-	-	-	-
(16) harvest	Man/Day	9	20	180	21	189
(17) moving crop	Man/Day	13	15	195	16	208
(18) thresh	Man/Day	13	-	-	-	-
(19) scattering	Man/Day	13	-	-	-	-
(20) transporting	Man/Day	13	-	-	-	-
(21) peeling or drying crops	Man/Day	13	-	-	-	-
Boys	Man/Day		95	998	97	1,020
<b>Sub-total</b>				<b>998</b>		<b>1,020</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	47	3	141	3	141
irrigation machine (Above Labor (8))	times	23	19	437	19	437
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	93	3	279	3	279
<b>Sub-total</b>				<b>857</b>		<b>857</b>
<b>(c) Materials</b>						
seeds	kg	263	2	395	2	395
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	37	15	555	15	555
uria 46%	sacks50kg	-	-	-	-	-
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	27	6	162	6	162
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	93	1	93	1	93
manure	Chabaert (0.33m3)	-	-	-	-	-
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>1,205</b>		<b>1,205</b>
<b>(d) Rent</b>						
Land	fed	3,255	1	3,255	1	3,255
Other cost	fed	93	1	93	1	93
<b>Sub-total</b>				<b>3,348</b>		<b>3,348</b>
<b>Grand Total</b>				<b>6,408</b>		<b>6,430</b>
<b>(C) Net Return</b>				<b>2,321</b>		<b>2,692</b>
(D) Family Labor	% of labor		60	599	60	612
(E) Production Cost exclude family labor				5,809		5,818
(F) Net Income				<b>2,920</b>		<b>3,304</b>
Incremental Achievement						100%

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 37 Cost and Benefit of Crops per Fed/Season: Cotton (Financial Price)**  
 Perennial: Increase of Unit Yield with Project: 4.5%  
 Crop: Cotton (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	4,444	0.95	4,222	0.99	4,412
By-product	ton	190	0.95	181	0.99	189
<b>Total Gross Income</b>				<b>4,402</b>		<b>4,600</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	20	-	-	-	-
(2) leveling land	Man/Day	20	-	-	-	-
(3) lining land	Man/Day	20	-	-	-	-
(4) cleaning lines	Man/Day	20	-	-	-	-
(5) dividing land	Man/Day	20	-	-	-	-
(6) planting	Man/Day	20	5	100	5	100
(7) planting missing parts	Man/Day	20	1	20	1	20
(8) irrigation by gravity	Man/Day	20	-	-	-	-
(9) irrigation by labor	Man/Day	20	8	160	8	160
(10) scatter fertilizers	Man/Day	20	-	-	-	-
(11) lightning	Man/Day	20	-	-	-	-
(12) hoe (dig up)	Man/Day	20	3	60	3	60
(13) cleaning (cutting grasses)	Man/Day	20	1	20	1	20
(14) fighting diseases (manual)	Man/Day	20	2	40	2	40
(15) fighting diseases (mechanical)	Man/Day	20	3	60	3	60
(16) harvest	Man/Day	20	4	80	5	100
(17) moving crop	Man/Day	20	-	-	-	-
(18) thresh	Man/Day	20	-	-	-	-
(19) scattering	Man/Day	20	-	-	-	-
(20) transporting	Man/Day	20	5	100	6	120
(21) peeling or drying crops	Man/Day	20	-	-	-	-
Boys	Man/Day			210		210
<b>Sub-total</b>			32	<b>850</b>	34	<b>890</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	30	5	150	5	150
irrigation machine (Above Labor (8))	times	30	8	240	8	240
motor (Above Labor (14))	hr	35	2	70	2	70
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	50	1	50	1	50
<b>Sub-total</b>				<b>510</b>		<b>510</b>
<b>(c) Materials</b>						
seeds	kg	30,00	1	30	1	30
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	40	4	160	4	160
uria 46%	sacks50kg	-	-	-	-	-
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	29	4	116	4	116
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabaert (0.33m3)	-	-	-	-	-
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>306</b>		<b>306</b>
<b>(d) Rent</b>						
Land	fed	2,000	1	2,000	1	2,000
Other cost	fed	100	1	100	1	100
<b>Sub-total</b>				<b>2,100</b>		<b>2,100</b>
<b>Grand Total</b>				<b>3,766</b>		<b>3,806</b>
<b>(C) Net Return</b>						
(D) Family Labor	% of labor		60	510	60	534
(E) Production Cost exclude family labor				3,256		3,272
(F) Net Income				<b>1,146</b>		<b>1,328</b>
Incremental Achievement						100%

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 38 Cost and Benefit of Crops per Fed/Season: Cotton (Economic Price)**  
 Perennial: Increase of Unit Yield with Project: 4.5%  
 Crop: Cotton (Economic Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	4,133	0.95	3,926	0.99	4,103
By-product	ton	177	0.95	168	0.99	176
<b>Total Gross Income</b>				<b>4,095</b>		<b>4,279</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	13	-	-	-	-
(2) leveling land	Man/Day	13	-	-	-	-
(3) lining land	Man/Day	13	-	-	-	-
(4) cleaning lines	Man/Day	13	-	-	-	-
(5) dividing land	Man/Day	13	-	-	-	-
(6) planting	Man/Day	13	5	65	5	65
(7) planting missing parts	Man/Day	13	1	13	1	13
(8) irrigation by gravity	Man/Day	13	-	-	-	-
(9) irrigation by labor	Man/Day	13	8	104	8	104
(10) scatter fertilizers	Man/Day	13	-	-	-	-
(11) lightning	Man/Day	13	-	-	-	-
(12) hoe (dig up)	Man/Day	13	3	39	3	39
(13) cleaning (cutting grasses)	Man/Day	13	1	13	1	13
(14) fighting diseases (manual)	Man/Day	13	2	26	2	26
(15) fighting diseases (mechanical)	Man/Day	13	3	39	3	39
(16) harvest	Man/Day	13	4	52	5	65
(17) moving crop	Man/Day	13	-	-	-	-
(18) thresh	Man/Day	13	-	-	-	-
(19) scattering	Man/Day	13	-	-	-	-
(20) transporting	Man/Day	13	5	65	6	78
(21) peeling or drying crops	Man/Day	13	-	-	-	-
Boys	Man/Day			132		132
<b>Sub-total</b>			32	<b>548</b>	34	<b>574</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	28	5	140	5	140
irrigation machine (Above Labor (8))	times	28	8	224	8	224
motor (Above Labor (14))	hr	33	2	66	2	66
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	47	1	47	1	47
<b>Sub-total</b>				<b>477</b>		<b>477</b>
<b>(c) Materials</b>						
seeds	kg	28,00	1	28	1	28
Azotes fertilizers	sacks50kg	-	-	-	-	-
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	37	4	148	4	148
uria 46%	sacks50kg	-	-	-	-	-
phosphate fertilizers	sacks50kg	-	-	-	-	-
super phosphate 15.5%	sacks50kg	27	4	108	4	108
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	-	-	-	-	-
manure	Chabaert (0.33m3)	-	-	-	-	-
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>284</b>		<b>284</b>
<b>(d) Rent</b>						
Land	fed	1,860	1	1,860	1	1,860
Other cost	fed	93	1	93	1	93
<b>Sub-total</b>				<b>1,953</b>		<b>1,953</b>
<b>Grand Total</b>				<b>3,262</b>		<b>3,288</b>
<b>(C) Net Return</b>						
(D) Family Labor	% of labor		60	833	60	991
(E) Production Cost exclude family labor				2,933		3,444
(F) Net Income				<b>1,161</b>		<b>1,335</b>
Incremental Achievement						100%

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 39 Cost and Benefit of Crops per Fed/Season: Citrus (Financial Price)**  
 Perennial: Increase of Unit Yield with Project: 2.0%  
 Crop: Citrus (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	1,250	8.50	10,625	8.67	10,838
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>10,625</b>		<b>10,838</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	25	30	750	30	750
(2) leveling land	Man/Day	-	-	-	-	-
(3) lining land	Man/Day	-	-	-	-	-
(4) cleaning lines	Man/Day	-	-	-	-	-
(5) dividing land	Man/Day	-	-	-	-	-
(6) planting	Man/Day	-	-	-	-	-
(7) planting missing parts	Man/Day	35	10	350	10	350
(8) irrigation by gravity	Man/Day	-	-	-	-	-
(9) irrigation by labor	Man/Day	25	16	400	16	400
(10) scatter fertilizers	Man/Day	25	6	150	6	150
(11) lightning	Man/Day	-	-	-	-	-
(12) hoe (dig up)	Man/Day	-	-	-	-	-
(13) cleaning (cutting grasses)	Man/Day	-	-	-	-	-
(14) fighting diseases (manual)	Man/Day	-	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	-	-	-	-	-
(16) harvest	Man/Day	25	32	800	33	825
(17) moving crop	Man/Day	-	-	-	-	-
(18) thresh	Man/Day	-	-	-	-	-
(19) scattering	Man/Day	-	-	-	-	-
(20) transporting	Man/Day	-	-	-	-	-
(21) peeling or drying crops	Man/Day	-	-	-	-	-
Boys	Man/Day	-	-	-	-	-
<b>Sub-total</b>			<b>94</b>	<b>2,450</b>	<b>95</b>	<b>2,475</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	-	-	-	-	-
irrigation machine (Above Labor (8))	times	-	-	-	-	-
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	-	-	-	-	-
<b>Sub-total</b>				<b>1,800</b>		<b>1,800</b>
<b>(c) Materials</b>						
seeds	kg	-	-	-	-	-
Azotes fertilizers	sacks50kg	75	12	900	12	900
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	-	-	-	-	-
phosphate fertilizers	sacks50kg	50	4	200	4	200
super phosphate 15.5%	sacks50kg	-	-	-	-	-
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	100	3	300	3	300
manure	Chabbeet (0.33m3)	50	20	1,000	20	1,000
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>2,400</b>		<b>2,400</b>
<b>(d) Rent</b>						
Land	fed	3,500	1	3,500	1	3,500
Other cost	fed	100	1	100	1	100
<b>Sub-total</b>				<b>3,600</b>		<b>3,600</b>
<b>Grand Total</b>				<b>10,250</b>		<b>10,275</b>
<b>(C) Net Return</b>						
(D) Family Labor	% of labor		70	375	70	563
(E) Production Cost exclude family labor				8,535		8,543
(F) Net Income				<b>2,090</b>		<b>2,295</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team. Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 40 Cost and Benefit of Crops per Fed/Season: Citrus (Economic Price)**  
 Perennial: Increase of Unit Yield with Project: 2.0%  
 Crop: Citrus (Economic Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	1,163	8.50	9,886	8.67	10,083
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>9,886</b>		<b>10,083</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	16	30	480	30	480
(2) leveling land	Man/Day	-	-	-	-	-
(3) lining land	Man/Day	-	-	-	-	-
(4) cleaning lines	Man/Day	-	-	-	-	-
(5) dividing land	Man/Day	-	-	-	-	-
(6) planting	Man/Day	-	-	-	-	-
(7) planting missing parts	Man/Day	22	10	220	10	220
(8) irrigation by gravity	Man/Day	-	-	-	-	-
(9) irrigation by labor	Man/Day	16	16	256	16	256
(10) scatter fertilizers	Man/Day	16	6	96	6	96
(11) lightning	Man/Day	-	-	-	-	-
(12) hoe (dig up)	Man/Day	-	-	-	-	-
(13) cleaning (cutting grasses)	Man/Day	-	-	-	-	-
(14) fighting diseases (manual)	Man/Day	-	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	-	-	-	-	-
(16) harvest	Man/Day	16	32	512	33	528
(17) moving crop	Man/Day	-	-	-	-	-
(18) thresh	Man/Day	-	-	-	-	-
(19) scattering	Man/Day	-	-	-	-	-
(20) transporting	Man/Day	-	-	-	-	-
(21) peeling or drying crops	Man/Day	-	-	-	-	-
Boys	Man/Day	-	-	-	-	-
<b>Sub-total</b>			<b>94</b>	<b>1,564</b>	<b>95</b>	<b>1,560</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	-	-	-	-	-
irrigation machine (Above Labor (8))	times	-	-	-	-	-
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	-	-	-	-	-
<b>Sub-total</b>				<b>1,564</b>		<b>1,564</b>
<b>(c) Materials</b>						
seeds	kg	-	-	-	-	-
Azotes fertilizers	sacks50kg	70	12	840	12	840
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	-	-	-	-	-
phosphate fertilizers	sacks50kg	47	4	188	4	188
super phosphate 15.5%	sacks50kg	-	-	-	-	-
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	93	3	279	3	279
manure	Chabbeet (0.33m3)	47	20	940	20	940
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>				<b>2,247</b>		<b>2,247</b>
<b>(d) Rent</b>						
Land	fed	3,255	1	3,255	1	3,255
Other cost	fed	93	1	93	1	93
<b>Sub-total</b>				<b>3,348</b>		<b>3,348</b>
<b>Grand Total</b>				<b>8,723</b>		<b>8,739</b>
<b>(C) Net Return</b>						
(D) Family Labor	% of labor		70	1,163	70	1,344
(E) Production Cost exclude family labor				7,628		7,633
(F) Net Income				<b>2,257</b>		<b>2,450</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General Directorate of Agricultural Office, Baseline survey of the JICA Study Team. Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 41 Cost and Benefit of Crops per Fed/Season: Grape (Financial Price)**  
 Perennial: Increase of Unit Yield with Project: 2.0%  
 Crop: Grape (Financial Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	1,350	10,00	13,500	10,20	13,770
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>13,500</b>		<b>13,770</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plowing and weeding	Man/Day	25	18	450	18	450
(2) leveling land	Man/Day	-	-	-	-	-
(3) lining land	Man/Day	-	-	-	-	-
(4) cleaning lines	Man/Day	-	-	-	-	-
(5) dividing land	Man/Day	-	-	-	-	-
(6) planting	Man/Day	-	-	-	-	-
(7) pruning	Man/Day	35	8	280	8	280
(8) irrigation	Man/Day	25	20	500	20	500
(9) irrigation by labor	Man/Day	25	10	250	10	250
(10) scatter fertilizers	Man/Day	25	6	150	6	150
(11) lightning	Man/Day	-	-	-	-	-
(12) hoe (dig up)	Man/Day	-	-	-	-	-
(13) cleaning (cutting grasses)	Man/Day	-	-	-	-	-
(14) fighting diseases (manual)	Man/Day	-	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	-	-	-	-	-
(16) harvest	Man/Day	25	32	800	33	825
(17) moving crop	Man/Day	-	-	-	-	-
(18) thresh	Man/Day	-	-	-	-	-
(19) scattering	Man/Day	-	-	-	-	-
(20) transporting	Man/Day	-	-	-	-	-
(21) peeling or drying crops	Man/Day	-	-	-	-	-
Boys	Man/Day	-	-	-	-	-
<b>Sub-total</b>			94	<b>2,450</b>	95	<b>2,455</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	-	-	-	-	-
irrigation machine (Above Labor (8))	times	-	-	-	-	-
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	-	-	-	-	-
<b>Sub-total</b>			-	<b>1,500</b>	-	<b>1,500</b>
<b>(c) Materials</b>						
seeds	kg	-	-	-	-	-
Azotes fertilizers	sacks50kg	75	6	450	6	450
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	-	-	-	-	-
phosphate fertilizers	sacks50kg	50	4	200	4	200
super phosphate 15.5%	sacks50kg	-	-	-	-	-
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	100	3	300	3	300
manure	m3	50	20	1,000	20	1,000
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>			-	<b>1,950</b>	-	<b>1,950</b>
<b>(d) Rent</b>						
Land	fed	3,500	1	3,500	1	3,500
Other cost	fed	100	1	100	1	100
<b>Sub-total</b>			-	<b>3,600</b>	-	<b>3,600</b>
<b>Grand Total</b>				<b>4,020</b>		<b>4,265</b>
<b>(C) Net Return</b>						
(D) Family Labor	% of labor		70	1,701	70	1,719
(E) Production Cost exclude family labor				7,779		7,787
(F) Net Income				<b>5,721</b>		<b>5,984</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General Directorate of agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 42 Cost and Benefit of Crops per Fed/Season: Grape (Economic Price)**  
 Perennial: Increase of Unit Yield with Project: 2.0%  
 Crop: Grape (Economic Price)

Activities	Unit	Unit Price	Without Project		With Project	
			Qty	Total Value	Qty	Total Value
<b>(A) INCOME</b>						
Main Product	ton	1,256	10,00	12,560	10,20	12,811
By-product	ton	-	-	-	-	-
<b>Total Gross Income</b>				<b>12,560</b>		<b>12,811</b>
<b>(B) Production Cost</b>						
<b>(a) Labor</b>						
(1) plow	Man/Day	16	18	288	18	288
(2) leveling land	Man/Day	-	-	-	-	-
(3) lining land	Man/Day	-	-	-	-	-
(4) cleaning lines	Man/Day	-	-	-	-	-
(5) dividing land	Man/Day	-	-	-	-	-
(6) planting	Man/Day	-	-	-	-	-
(7) planting missing parts	Man/Day	22	8	176	8	176
(8) irrigation by gravity	Man/Day	16	20	320	20	320
(9) irrigation by labor	Man/Day	16	10	160	10	160
(10) scatter fertilizers	Man/Day	16	6	96	6	96
(11) lightning	Man/Day	-	-	-	-	-
(12) hoe (dig up)	Man/Day	-	-	-	-	-
(13) cleaning (cutting grasses)	Man/Day	-	-	-	-	-
(14) fighting diseases (manual)	Man/Day	-	-	-	-	-
(15) fighting diseases (mechanical)	Man/Day	-	-	-	-	-
(16) harvest	Man/Day	16	32	512	33	528
(17) moving crop	Man/Day	-	-	-	-	-
(18) thresh	Man/Day	-	-	-	-	-
(19) scattering	Man/Day	-	-	-	-	-
(20) transporting	Man/Day	-	-	-	-	-
(21) peeling or drying crops	Man/Day	-	-	-	-	-
Boys	Man/Day	-	-	-	-	-
<b>Sub-total</b>			94	<b>1,552</b>	95	<b>1,568</b>
<b>(b) Mechanical</b>						
tractor (Above Labor (1),(2),(3))	hr	-	-	-	-	-
irrigation machine (Above Labor (8))	times	-	-	-	-	-
motor (Above Labor (14))	hr	-	-	-	-	-
tractor (Above Labor (18))	hr	-	-	-	-	-
car (Above Labor (21))	times	-	-	-	-	-
<b>Sub-total</b>			-	<b>1,395</b>	-	<b>1,395</b>
<b>(c) Materials</b>						
seeds	kg	-	-	-	-	-
Azotes fertilizers	sacks50kg	70	6	420	6	420
nitrate 15.5%	sacks50kg	-	-	-	-	-
nitrate 31%	sacks50kg	-	-	-	-	-
uria 46%	sacks50kg	-	-	-	-	-
phosphate fertilizers	sacks50kg	47	4	188	4	188
super phosphate 15.5%	sacks50kg	-	-	-	-	-
treble phosphate 46%	sacks50kg	-	-	-	-	-
potassium sulphate	sacks50kg	93	3	279	3	279
manure	Chabbeet (0.33m3)	47	20	940	20	940
insecticides	kg or liter	-	-	-	-	-
<b>Sub-total</b>			-	<b>1,827</b>	-	<b>1,827</b>
<b>(d) Rent</b>						
Land	fed	3,255	1	3,255	1	3,255
Other cost	fed	93	1	93	1	93
<b>Sub-total</b>			-	<b>3,348</b>	-	<b>3,348</b>
<b>Grand Total</b>				<b>4,122</b>		<b>4,138</b>
<b>(C) Net Return</b>						
(D) Family Labor	% of labor		70	4,438	70	4,673
(E) Production Cost exclude family labor				7,036		7,040
(F) Net Income				<b>5,524</b>		<b>5,771</b>
Incremental Achievement					100%	

Note: Analysis is based on the data collected from General Directorate of agricultural Office, Baseline survey of the JICA Study Team.  
 Incremental Ratio of Crop Yield With Project: Summer 4.5%, Winter 2.0%

**Table 43 Estimation of Benefit: Giza**

Season	Crop	Cropped Area (fed)				Financial Price (W/O P)		Economic Price (W/O P)		
		Area (fed)	Share (%)	representative	Area (fed)	Share (%)	Net Return	LE/year	LE/fed	Net Return
Winter	Wheat	27,227	8.2%	Wheat	37,999	11.4%	2,296	87,238,104	356	13,527,644
	L. Berseem	36,054	10.9%	L. Berseem	36,503	11.0%	3,195	116,616,134	2,098	76,572,708
	Sugar beet	449	0.1%	to L. Berseem	0	0.0%	0	0	0	0
	Legums	150	0.0%	to Wheat	0	0.0%	0	0	0	0
	Vegetables	45,030	13.6%	Vegetables (W. Tomato)	45,030	13.6%	7,819	352,107,582	5,775	260,028,887
Summer	Other crops	3,142	0.9%	to Wheat	0	0.0%	0	0	0	0
	S. Berseem	7,480	2.3%	to Wheat	0	0.0%	0	0	0	0
	Rice	0	0.0%	none	0	0.0%	0	0	0	0
	Maize	21,692	6.5%	Maize	46,675	14.1%	1,042	48,640,018	532	24,807,763
	Sorghum	299	0.1%	to Maize	0	0.0%	0	0	0	0
Nile	Oil Crops	3,441	1.0%	to Maize	0	0.0%	0	0	0	0
	Vegetables	67,021	20.2%	Vegetables (S. Tomato)	67,021	20.2%	9,217	617,732,557	7,556	506,379,846
	Other Crops	21,243	6.4%	to Maize	0	0.0%	0	0	0	0
	Maize	22,440	6.8%	Maize	22,739	6.8%	1,042	23,696,312	532	12,085,779
	Sorghum	299	0.1%	to Maize	0	0.0%	0	0	0	0
Perennial	Vegetables	24,385	7.3%	Vegetables (S. Tomato)	24,385	7.3%	9,217	224,756,545	7,556	184,241,843
	Other Crops	14,212	4.3%	Maize	14,212	4.3%	1,042	14,810,325	532	7,553,678
	Sugar cane	1,945	0.6%	to Fruit trees	0	0.0%	0	0	0	0
	Cotton	0	0.0%	none	0	0.0%	0	0	0	0
	Fruit trees	35,455	10.7%	Fruit trees (Citrus)	37,400	11.3%	2,090	78,166,000	1,163	43,477,500
Total	331,964	100.0%		331,964	100.0%		1,563,763,577		1,128,675,648	
With Project (Increase of Unit Yield: 4.5% in summer, 2.0% in winter)										
Season	Crop	Cropped Area (fed)				Financial Price (W/P)		Economic Price (W/P)		
		Area (fed)	Share (%)	representative	Area (fed)	Share (%)	Net Return	LE/year	LE/fed	Net Return
Winter	Wheat	27,227	8.2%	Wheat	37,999	11.4%	2,393	90,946,807	387	14,719,293
	L. Berseem	36,054	10.9%	L. Berseem	36,503	11.0%	3,317	121,077,677	2,200	80,316,244
	Sugar beet	449	0.1%	to L. Berseem	0	0.0%	0	0	0	0
	Legums	150	0.0%	to Wheat	0	0.0%	0	0	0	0
	Vegetables	45,030	13.6%	Vegetables (W. Tomato)	45,030	13.6%	8,078	363,742,343	6,000	270,176,461
Summer	Other crops	3,142	0.9%	to Wheat	0	0.0%	0	0	0	0
	S. Berseem	7,480	2.3%	to Wheat	0	0.0%	0	0	0	0
	Rice	0	0.0%	none	0	0.0%	0	0	0	0
	Maize	21,692	6.5%	Maize	46,675	14.1%	1,191	55,594,803	655	30,551,471
	Sorghum	299	0.1%	to Maize	0	0.0%	0	0	0	0
Nile	Oil Crops	3,441	1.0%	to Maize	0	0.0%	0	0	0	0
	Vegetables	67,021	20.2%	Vegetables (S. Tomato)	67,021	20.2%	9,841	659,550,645	8,107	543,307,030
	Other Crops	21,243	6.4%	to Maize	0	0.0%	0	0	0	0
	Maize	22,440	6.8%	Maize	22,739	6.8%	1,191	27,084,525	655	14,883,983
	Sorghum	299	0.1%	to Maize	0	0.0%	0	0	0	0
Perennial	Vegetables	24,385	7.3%	Vegetables (S. Tomato)	24,385	7.3%	9,841	239,971,688	8,107	197,677,473
	Other Crops	14,212	4.3%	Maize	14,212	4.3%	1,191	16,927,977	655	9,302,571
	Sugar cane	1,945	0.6%	to Fruit trees	0	0.0%	0	0	0	0
	Cotton	0	0.0%	none	0	0.0%	0	0	0	0
	Fruit trees	35,455	10.7%	Fruit trees (Citrus)	37,400	11.3%	2,295	85,833,000	1,344	50,273,454
Total	331,964	100.0%		331,964	100.0%		1,660,729,465		1,211,207,980	
Increment (LE)										
W/O P										
W/ P										
Increment										



Table 44 Estimation of Benefit: Beni Suef

Without Project		Cropped Area (fed)				Financial Price (W/O P)			Economic Price (W/O P)			
Season	Crop	Area (fed)	Share (%)	representative	Area (fed)	Share (%)	LE/fed	LE/year	LE/fed	LE/year	Net Return	
Winter	Wheat	150,499	24.0%	Wheat	163,179	26.0%	2,296	374,626,348	356	58,091,724	356	
	L. Berseem	53,726	8.6%	L. Berseem	53,726	8.6%	3,195	171,638,452	2,098	112,701,567	2,098	
	Sugar beet	12,013	1.9%	to Wheat		0.0%		0		0		
	Legums	667	0.1%	to Wheat		0.0%		0		0		
	Vegetables	40,378	6.4%	Vegetables (Onion)	40,378	6.4%	3,223	130,143,947	2,221	89,663,629	2,221	
Other crops	13,014	2.1%	to S. Berseem		0.0%		0		0			
S. Berseem	26,696	4.3%	S. Berseem	39,710	6.3%	1,598	63,450,624	1,051	41,745,336	1,051		
Rice	667	0.1%	to Maize		0.0%		0		0			
Summer	Maize	129,142	20.6%	Maize	141,822	22.6%	1,042	147,792,706	532	75,378,393	532	
	Sorghum	1,001	0.2%	to Maize		0.0%		0		0		
	Oil Crops	5,673	0.9%	to Maize		0.0%		0		0		
	Vegetables	35,372	5.6%	Vegetables (Cucumber)	35,372	5.6%	2,714	95,981,922	1,507	53,319,753	1,507	
	Other Crops	5,339	0.9%	to Maize		0.0%		0		0		
Nile	Maize	73,748	11.8%	Maize	90,100	14.4%	1,042	93,893,210	532	47,888,150	532	
	Sorghum	6,007	1.0%	to Maize		0.0%		0		0		
	Vegetables	7,675	1.2%	to Maize		0.0%		0		0		
	Other Crops	2,670	0.4%	to Maize		0.0%		0		0		
	Sugar cane	1,001	0.2%	to Fruit trees		0.0%		0		0		
Perennial	Cotton	45,383	7.2%	Cotton	45,383	7.2%	1,146	52,022,533	833	37,781,348	833	
	Fruit trees	16,685	2.7%	Fruit trees (Citrus)	17,686	2.8%	2,090	36,963,740	1,163	20,559,975	1,163	
	Total	627,356	100.0%		627,356	100.0%		1,166,513,482		537,129,875		
	With Project (Increase of Unit Yield: 4.5% in summer, 2.0% in winter)											
	Season	Crop	Area (fed)	Share (%)	representative	Area (fed)	Share (%)	LE/fed	LE/year	LE/fed	LE/year	Net Return
Winter	Wheat	150,499	24.0%	Wheat	163,179	26.0%	2,393	390,552,619	387	63,209,017	387	
	L. Berseem	53,726	8.6%	L. Berseem	53,726	8.6%	3,317	178,205,059	2,200	118,211,394	2,200	
	Sugar beet	12,013	1.9%	to Wheat		0.0%		0		0		
	Legums	667	0.1%	to Wheat		0.0%		0		0		
	Vegetables	40,378	6.4%	Vegetables (Onion)	40,378	6.4%	3,359	135,620,124	2,339	94,458,602	2,339	
Other crops	13,014	2.1%	to S. Berseem		0.0%		0		0			
S. Berseem	26,696	4.3%	S. Berseem	39,710	6.3%	1,658	66,837,671	1,096	43,523,435	1,096		
Rice	667	0.1%	to Maize		0.0%		0		0			
Summer	Maize	129,142	20.6%	Maize	141,822	22.6%	1,191	168,924,822	655	92,830,654	655	
	Sorghum	1,001	0.2%	to Maize		0.0%		0		0		
	Oil Crops	5,673	0.9%	to Maize		0.0%		0		0		
	Vegetables	35,372	5.6%	Vegetables (Cucumber)	35,372	5.6%	3,015	106,659,845	1,774	62,732,702	1,774	
	Other Crops	5,339	0.9%	to Maize		0.0%		0		0		
Nile	Maize	73,748	11.8%	Maize	90,100	14.4%	1,191	107,318,515	655	58,975,631	655	
	Sorghum	6,007	1.0%	to Maize		0.0%		0		0		
	Vegetables	7,675	1.2%	to Maize		0.0%		0		0		
	Other Crops	2,670	0.4%	to Maize		0.0%		0		0		
	Sugar cane	1,001	0.2%	to Fruit trees		0.0%		0		0		
Perennial	Cotton	45,383	7.2%	Cotton	45,383	7.2%	1,328	60,286,936	991	44,963,321	991	
	Fruit trees	16,685	2.7%	Fruit trees (Citrus)	17,686	2.8%	2,295	40,589,370	1,344	23,773,688	1,344	
	Total	627,356	100.0%		627,356	100.0%		1,253,994,961		602,678,454		
	Increment (LE)											
	W/O P											
W/P												
Increment												

Table 45 Estimation of Benefit: Fayoum

Season	Crop	Cropped Area (fed)					Financial Price (W/O P)			Economic Price (W/O P)		
		Area (fed)	Share (%)	representative	Area (fed)	Share (%)	LE/fed	LE/year	Net Return	LE/fed	LE/year	Net Return
		157,545	21.7%	Wheat	173,621	23.9%	2,296	398,599,092	356	61,809,076	356	61,809,076
Winter	L. Berseem	105,298	14.5%	L. Berseem	125,393	17.2%	3,195	400,593,017	2,098	263,038,150	2,098	263,038,150
	Sugar beet	13,263	1.8%	to Wheat		0.0%		0		0		0
	Legums	2,813	0.4%	to Wheat		0.0%						0
	Vegetables	34,563	4.8%	Vegetables (Tomato)	34,563	4.8%	7,819	270,261,922	5,775	199,586,463	5,775	199,586,463
	Other crops	24,516	3.4%	Other crops (Marjoram)	24,516	3.4%	9,361	229,494,276	7,868	192,897,772	7,868	192,897,772
Summer	S. Berseem	20,095	2.8%	to L. Berseem		0.0%						0
	Rice	20,497	2.8%	to Maize		0.0%						0
	Maize	48,228	6.6%	Maize	135,039	18.6%	1,042	140,724,142	532	71,773,229	532	71,773,229
	Sorghum	68,323	9.4%	Sorghum	68,323	9.4%	1,469	100,360,338	1,034	70,633,001	1,034	70,633,001
	Oil Crops	10,048	1.4%	to Maize		0.0%						0
Nile	Vegetables	29,339	4.0%	Vegetables (Melon)	29,339	4.0%	3,577	104,945,603	2,534	74,347,960	2,534	74,347,960
	Other Crops	56,266	7.7%	to Maize		0.0%						0
	Maize	31,348	4.3%	Maize	71,940	9.9%	1,042	74,968,674	532	38,236,110	532	38,236,110
	Sorghum	2,411	0.3%	to Maize		0.0%						0
	Vegetables	20,497	2.8%	to Maize		0.0%						0
Perennial	Other Crops	17,684	2.4%	to Maize		0.0%						0
	Sugar cane	402	0.1%	to Fruit trees		0.0%						0
	Cotton	28,535	3.9%	Cotton	28,535	3.9%	1,146	32,709,671	833	23,755,388	833	23,755,388
	Fruit trees	35,367	4.9%	Fruit trees (Citrus)	35,769	4.9%	2,090	74,757,210	1,163	41,581,463	1,163	41,581,463
	Total	727,038	100.0%		727,038	100.0%		1,827,413,945		1,037,658,612		1,037,658,612
With Project (Increase of Unit Yield: 4.5% in summer, 2.0% in winter)												
Season	Crop	Cropped Area (fed)					Financial Price (W/ P)			Economic Price (W/ P)		
		Area (fed)	Share (%)	representative	Area (fed)	Share (%)	LE/fed	LE/year	Net Return	LE/fed	LE/year	Net Return
		157,545	21.7%	Wheat	173,621	23.9%	2,393	415,544,501	387	67,253,831	2,393	415,544,501
Winter	L. Berseem	105,298	14.5%	L. Berseem	125,393	17.2%	3,317	415,919,051	2,200	275,897,729	2,200	275,897,729
	Sugar beet	13,263	1.8%	to Wheat		0.0%		0		0		0
	Legums	2,813	0.4%	to Wheat		0.0%						0
	Vegetables	34,563	4.8%	Vegetables (Tomato)	34,563	4.8%	8,078	279,192,241	6,000	207,375,283	6,000	207,375,283
	Other crops	24,516	3.4%	Other crops (Marjoram)	24,516	3.4%	9,636	236,225,389	8,116	198,975,798	8,116	198,975,798
Summer	S. Berseem	20,095	2.8%	to L. Berseem		0.0%						0
	Rice	20,497	2.8%	to Maize		0.0%						0
	Maize	48,228	6.6%	Maize	135,039	18.6%	1,191	160,845,561	655	88,390,790	655	88,390,790
	Sorghum	68,323	9.4%	Sorghum	68,323	9.4%	1,620	110,663,511	1,155	78,946,642	1,155	78,946,642
	Oil Crops	10,048	1.4%	to Maize		0.0%						0
Nile	Vegetables	29,339	4.0%	Vegetables (Melon)	29,339	4.0%	3,309	114,698,987	2,821	82,768,458	2,821	82,768,458
	Other Crops	56,266	7.7%	to Maize		0.0%						0
	Maize	31,348	4.3%	Maize	71,940	9.9%	1,191	85,688,058	655	47,088,867	655	47,088,867
	Sorghum	2,411	0.3%	to Maize		0.0%						0
	Vegetables	20,497	2.8%	to Maize		0.0%						0
Perennial	Other Crops	17,684	2.4%	to Maize		0.0%						0
	Sugar cane	402	0.1%	to Fruit trees		0.0%						0
	Cotton	28,535	3.9%	Cotton	28,535	3.9%	1,328	37,905,994	991	28,271,123	991	28,271,123
	Fruit trees	35,367	4.9%	Fruit trees (Citrus)	35,769	4.9%	2,295	82,089,855	1,344	48,081,047	1,344	48,081,047
	Total	727,038	100.0%		727,038	100.0%		1,938,773,148		1,123,049,568		1,123,049,568
Increment (LE)												
W/O P												
W/P												
Increment												

Table 46 Estimation of Benefit: Minya

Without Project		Cropped Area (fed)				Financial Price (W/O P)		Economic Price (W/O P)	
Season	Crop	Area (fed)	Share (%)	representative	Area (fed)	Share (%)	LE/fed	LE/year	Net Return
Winter	Wheat	214,872	22.5%	Wheat	228,006	23.8%	2,296	523,456,175	356
	L. Berseem	118,731	12.4%	L. Berseem	155,507	16.3%	3,195	496,798,213	2,098
	Sugar beet	7,880	0.8%	to Wheat		0.0%			
	Legums	5,254	0.5%	to Wheat		0.0%			
	Vegetables	37,301	3.9%	Vegetables (W. Tomato)	37,301	3.9%	7,819	291,671,439	5,775
	Other crops	31,522	3.3%	to L. Berseem		0.0%			
	S. Berseem	5,254	0.5%	to L. Berseem		0.0%			
	Rice	0	0.0%	none		0.0%			
	Maize	273,187	28.6%	Maize	285,796	29.9%	1,042	297,828,012	532
	Sorghum	8,931	0.9%	to Maize		0.0%			
Summer	Oil Crops	36,775	3.8%	Oil Crops (Sun flower)	36,775	3.8%	773	28,427,075	346
	Vegetables	70,924	7.4%	Vegetables (S. Tomato)	102,446	10.7%	9,217	944,244,782	7,556
	Other Crops	3,678	0.4%	to Maize		0.0%			
	Maize	0	0.0%	none		0.0%			
Nile	Sorghum	0	0.0%	none		0.0%			
	Vegetables	31,522	3.3%	to S. Vegetables		0.0%			
	Other Crops	0	0.0%	none		0.0%			
	Maize	0	0.0%	none		0.0%			
Perennial	Sugar cane	41,503	4.3%	Sugar cane	41,503	4.3%	2,913	120,877,488	2,321
	Cotton	36,775	3.8%	Cotton	36,775	3.8%	1,146	42,155,183	833
	Fruit trees	32,047	3.4%	Fruit trees (Grape)	32,047	3.4%	5,721	183,340,887	4,438
	Total	956,156	100.0%		956,156	100.0%		2,928,799,254	1,830,607,513
With Project (Increase of Unit Yield: 4.5% in summer, 2.0% in winter)									
Season	Crop	Area (fed)	Share (%)	representative	Area (fed)	Share (%)	LE/fed	LE/year	Net Return
Winter	Wheat	214,872	22.5%	Wheat	228,006	23.8%	2,393	545,709,560	387
	L. Berseem	118,731	12.4%	L. Berseem	155,507	16.3%	3,317	515,804,900	2,200
	Sugar beet	7,880	0.8%	to Wheat		0.0%			
	Legums	5,254	0.5%	to Wheat		0.0%			
	Vegetables	37,301	3.9%	Vegetables (W. Tomato)	37,301	3.9%	8,078	301,309,197	6,000
	Other crops	31,522	3.3%	to L. Berseem		0.0%			
	S. Berseem	5,254	0.5%	to L. Berseem		0.0%			
	Rice	0	0.0%	none		0.0%			
	Maize	273,187	28.6%	Maize	285,796	29.9%	1,191	340,412,902	655
	Sorghum	8,931	0.9%	to Maize		0.0%			
Summer	Oil Crops	36,775	3.8%	Oil Crops (Sun flower)	36,775	3.8%	878	32,275,211	415
	Vegetables	70,924	7.4%	Vegetables (S. Tomato)	102,446	10.7%	9,841	1,008,166,476	8,107
	Other Crops	3,678	0.4%	to Maize		0.0%			
	Maize	0	0.0%	none		0.0%			
Nile	Sorghum	0	0.0%	none		0.0%			
	Vegetables	31,522	3.3%	to S. Vegetables		0.0%			
	Other Crops	0	0.0%	none		0.0%			
	Maize	0	0.0%	none		0.0%			
Perennial	Sugar cane	41,503	4.3%	Sugar cane	41,503	4.3%	3,321	137,826,068	2,692
	Cotton	36,775	3.8%	Cotton	36,775	3.8%	1,328	48,852,039	991
	Fruit trees	32,047	3.4%	Fruit trees (Grape)	32,047	3.4%	5,984	191,753,225	4,673
	Total	956,156	100.0%		956,156	100.0%		3,122,109,578	1,985,026,443
Increment (LE)									
W/O P									
W/P									
Increment									

Table 47 Estimation of Benefit: Assuit

Without Project		Cropped Area (fed)				Financial Price (W/O P)		Economic Price (W/O P)		
Season	Crop	Area (fed)	Share (%)	representative	Area (fed)	Share (%)	LE/fed	LE/year	Net Return	
Winter	Wheat	63,207	22.5%	Wheat	67,070	23.8%	2,296	153,979,306	356	23,876,920
	L. Berseem	34,926	12.4%	L. Berseem	45,743	16.3%	3,195	146,135,162	2,098	95,955,549
	Sugar beet	2,318	0.8%	to Wheat		0.0%				0
	Legums	1,545	0.5%	to Wheat		0.0%				0
	Vegetables	10,972	3.9%	Vegetables (W. Tomato)	10,972	3.9%	7,819	85,794,457	5,775	63,358,582
	Other crops	9,272	3.3%	to L. Berseem		0.0%				0
Summer	S. Berseem	1,545	0.5%	to L. Berseem		0.0%				0
	Rice	0	0.0%	none		0.0%				0
	Maize	80,361	28.6%	Maize	84,070	29.9%	1,042	87,609,347	532	44,683,205
	Sorghum	2,627	0.9%	to Maize		0.0%				0
	Oil Crops	10,818	3.8%	Oil Crops (Sun flower)	10,818	3.8%	773	8,362,314	346	3,738,268
	Vegetables	20,863	7.4%	Vegetables (S. Tomato)	30,135	10.7%	9,217	277,754,295	7,556	227,686,198
Nile	Other Crops	1,082	0.4%	to Maize		0.0%				0
	Maize	0	0.0%	none		0.0%				0
	Sorghum	0	0.0%	none		0.0%				0
	Vegetables	9,272	3.3%	to S. Vegetables		0.0%				0
	Other Crops	0	0.0%	none		0.0%				0
	Total	281,262	100.0%		281,262	100.0%		861,526,134	24,253	538,484,682
With Project (Increase of Unit Yield: 4.5% in summer, 2.0% in winter)										
Season	Crop	Area (fed)	Share (%)	representative	Area (fed)	Share (%)	LE/fed	LE/year	Net Return	
Winter	Wheat	63,207	22.5%	Wheat	67,070	23.8%	2,393	160,525,338	387	25,980,235
	L. Berseem	34,926	12.4%	L. Berseem	45,743	16.3%	3,317	151,726,055	2,200	100,646,685
	Sugar beet	2,318	0.8%	to Wheat		0.0%				0
	Legums	1,545	0.5%	to Wheat		0.0%				0
	Vegetables	10,972	3.9%	Vegetables (W. Tomato)	10,972	3.9%	8,078	88,629,380	6,000	65,831,138
	Other crops	9,272	3.3%	to L. Berseem		0.0%				0
Summer	S. Berseem	1,545	0.5%	to L. Berseem		0.0%				0
	Rice	0	0.0%	none		0.0%				0
	Maize	80,361	28.6%	Maize	84,070	29.9%	1,191	100,136,155	655	55,028,649
	Sorghum	2,627	0.9%	to Maize		0.0%				0
	Oil Crops	10,818	3.8%	Oil Crops (Sun flower)	10,818	3.8%	878	9,494,310	415	4,489,364
	Vegetables	20,863	7.4%	Vegetables (S. Tomato)	30,135	10.7%	9,841	296,557,179	8,107	244,289,959
Nile	Other Crops	1,082	0.4%	to Vegetables		0.0%				0
	Maize	0	0.0%	none		0.0%				0
	Sorghum	0	0.0%	none		0.0%				0
	Vegetables	9,272	3.3%	to S. Vegetables		0.0%				0
	Other Crops	0	0.0%	none		0.0%				0
	Total	281,262	100.0%		281,262	100.0%		918,390,043	26,120	583,906,344
Increment (LE)										
							W/O P	861,526,134	W/O P	538,484,682
							W/P	918,390,043	W/P	583,908,344
							Increment	56,863,909	Increment	45,423,662

**Table 48 Benefit per feddan (Financial Price)**

Governorate	Cropped Area (fed)	Unit Yiled Increase									
		4.5% in summer, 2.0% in winter Increment (LE)	0.0% in summer, 2.0% in winter Increment (LE)	9.0% in summer, 2.0% in winter Increment (LE/fed)	9.0% in summer, 4% in winter Increment (LE)	9.0% in summer, 4% in winter Increment (LE/fed)	-4.5% in summer, -2.0% in winter Increment (LE)	-4.5% in summer, -2.0% in winter Increment (LE/fed)			
Giza	331,964	96,965,888	27,472,007	183.6	195,144,443	1,304.4	(99,007,492)	(661.8)			
Beni-Suef	627,356	87,481,479	33,981,732	101.8	179,307,059	537.3	(92,412,722)	(276.9)			
Fayoum	727,038	111,359,203	277.1	55,265,520	137.5	227,857,910	567.0	(291.0)			
Minya	956,156	193,310,324	368.0	59,310,168	112.9	392,665,435	747.4	(382.2)			
Assuit	281,262	56,863,909	368.0	17,446,436	112.9	115,505,953	747.4	(382.2)			
Total	2,923,776	545,980,803	348.8	193,475,863	123.6	1,110,480,800	709.5	(363.1)			

**Table 49 Benefit per feddan (Economic Price)**

Governorate	Cropped Area (fed)	Unit Yiled Increase									
		4.5% in summer, 2.0% in winter Increment (LE)	0.0% in summer, 2.0% in winter Increment (LE)	9.0% in summer, 2.0% in winter Increment (LE/fed)	9.0% in summer, 4% in winter Increment (LE)	9.0% in summer, 4% in winter Increment (LE/fed)	-4.5% in summer, -2.0% in winter Increment (LE)	-4.5% in summer, -2.0% in winter Increment (LE/fed)			
Giza	331,964	82,532,332	21,878,713	146.2	168,713,139	1,127.8	(87,967,486)	(588.0)			
Beni-Suef	627,356	65,548,579	196.4	20,413,915	61.2	144,293,640	432.4	(239.8)			
Fayoum	727,038	85,390,956	212.5	38,670,764	96.2	186,168,677	463.2	(253.1)			
Minya	956,156	154,418,930	293.9	39,041,450	74.3	327,284,812	623.0	(334.3)			
Assuit	281,262	45,423,662	293.9	11,484,237	74.3	96,273,679	623.0	(334.3)			
Total	2,923,776	433,314,459	276.9	131,489,079	84.0	922,733,947	589.6	(317.5)			

**Table 50 Benefit with Project by Category of Effect**

Benefit	Estimation of Benefit	Target Area (fed)	Governorate	Benefit (LE/fed)	Area with Benefit (fed)	Annual Benefit (LE)
1	Avoiding decrease of production along Bahr Yusef canal (808,000fed)	808,000	Whole	317.5	100%	256,540,000
2	Yield increase in the command area of Minia Directorate along Bahr Yusef canal (202,100fed)	202,100	Minya	74.3	100%	15,016,030
3	Yield increase in the command area of Bahr Yusef canal (808,000fed)	808,000	Whole	276.9	25%	55,933,800
4	Yield increase in the command areas of the five canals apart from Bahr Yusef and Ibrahimia (180,400fed)	180,400	Minya	293.9	25%	13,254,890
5	Yield increase in the command area of Ibrahimia canal (576,700fed)	576,700	Whole	276.9	25%	39,922,058

**Table 51 Economic Cost of the Project Cost for the Dirout Group of Regulators**

ITEM	Unit	Financial Cost				Economic Cost						
		Local C. (LE)	Foreign C. (US\$ → LE)	Foreign C. (YEN → LE)	Total (LE)	F/C (LE)	L/C (LE)	F/C (%)	L/C (%)	F/C (LE)	L/C (LE)	Total (LE)
Cost of civil works												
Excavation	m <sup>3</sup>	69,600	1,452,000	0	1,452,000	290,400	1,161,600	20	80	290,400	1,080,288	1,370,688
Embankment	m <sup>3</sup>	48,700	3,576,000	0	3,576,000	715,000	2,860,000	20	80	715,000	2,659,800	3,374,800
Demolition work	m <sup>3</sup>	450	80,309	0	80,309	16,062	64,247	20	80	16,062	59,750	75,812
Sheet pile protection	m	415	5,199,000	0	5,199,000	13,260,019	3,315,005	80	20	13,260,019	3,082,964	16,342,973
Rip rap bank protection	m <sup>2</sup>	10,550	3,162,000	0	3,162,000	3,201,699	640,340	80	20	2,561,359	595,516	3,156,875
Canal bed protection	m <sup>2</sup>	9,390	4,599,000	0	4,599,000	5,144,542	1,028,908	80	20	4,115,634	965,885	5,072,519
Concrete works for regulator	m <sup>3</sup>	18,390	24,790,000	0	24,790,000	25,412,590	20,330,072	80	20	20,330,072	4,726,742	25,056,814
Foundation works for regulator	pc	1,306	12,162,000	0	12,162,000	2,432,400	9,729,600	20	80	2,432,400	9,048,528	11,480,928
Road work	m <sup>2</sup>	200	2,312,000	0	2,312,000	1,398,802	932,535	60	40	1,398,802	867,257	2,266,059
Control house	m <sup>2</sup>	300	2,604,000	0	2,604,000	2,681,590	1,608,954	60	40	1,608,954	997,551	2,606,505
Electric works	Unit	1	3,920,000	0	3,920,000	784,000	3,136,000	20	80	784,000	2,916,480	3,700,480
Gate manufacturers and works	Unit	1	0	76,867,470	76,867,470	69,180,723	7,686,747	90	10	69,180,723	7,148,675	76,329,398
Expense of the machine and facility	Unit	1	9,494,000	0	9,494,000	16,836,268	11,785,402	70	30	11,785,402	4,697,325	16,482,727
Sub total : A			73,279,309	0	96,960,541	170,239,850	41,761,023			128,478,827	38,837,751	167,316,578
Cost of temporary works												
Double sheet pile	m	540	4,865,000	0	4,865,000	7,499,337	5,999,470	80	20	5,999,470	1,394,877	7,394,347
Single sheet pile	m	1,020	5,307,000	0	5,307,000	10,925,012	8,420,010	80	20	8,420,010	1,957,652	10,377,662
Temporary bridge	m <sup>2</sup>	1,180	1,273,000	0	1,188,735	2,461,735	1,969,388	80	20	1,969,388	457,883	2,427,271
Deep well	m <sup>2</sup>	23,330	8,996,000	0	8,996,000	1,799,200	7,196,800	20	80	1,799,200	6,693,024	8,492,224
Temporary road and water stop works	Unit	1	5,412,000	0	688,735	6,080,735	3,848,441	60	40	3,648,441	2,262,033	5,910,474
Preparatory works (5% of above works)	%	5	1,293,000	0	485,482	1,778,482	1,091,825	61	39	1,091,825	638,591	1,730,416
Transportation / Shipment	Unit	1	10,090,000	26,979,687	19,079,518	56,149,205	39,304,444	70	30	39,304,444	15,065,628	54,970,072
Sub total : B			37,236,000	26,979,687	29,274,819	93,490,506	62,232,777			62,232,777	29,069,688	91,302,465
Direct cost : C - A+B			110,515,309	26,979,687	126,235,360	263,730,356	190,711,604			190,711,604	67,907,439	238,619,043
Indirect cost (for the direct cost)	%	35	0	92,305,602	92,305,602	25,596,540	66,749,062			66,749,062	23,767,583	90,516,645
Construction cost of the DGR : E (C+D)	Unit	1	110,515,309	26,979,687	216,540,962	356,035,958	257,460,666	96.575,292		257,460,666	91,675,022	349,135,688
Consultant service : F (for the construction cost : E)	%	10	0	36,603,614	36,603,614	32,043,253	3,560,361	90	10	32,043,253	3,311,136	35,354,389
Adm. Cost for RWBS (for the direct cost totally: C)	%	5	13,200,000	0	13,200,000	11,880,000	1,320,000	90	10	11,880,000	1,227,600	13,107,600
Tax for the L.C. : G (for the direct cost L.C. : C)	%	10	11,052,000	0	11,052,000	0	11,052,000	0	100	0	0	0
Base cost of the DGR: H	Unit	1	134,767,309	26,979,687	254,144,576	415,891,572	301,383,919	180	120	301,383,919	96,213,758	397,597,677
Physical contingency : I (for the base cost : H)	%	5	6,738,000	1,347,890	20,793,109	15,069,196	5,723,913			15,069,196	5,323,239	20,392,435
Price contingency for LC (4yrs) : J (for the base cost : H)	%	14.5	19,541,000	0	19,541,000	0	19,541,000	0	100	0	0	0
Price contingency for FC (4yrs) : K (for the base cost : H)	%	2.7	0	729,181	6,861,928	7,591,109	7,591,109	0	100	0	0	0
<b>Project cost of the DGR (H+I+J+K)</b>	Unit	1	161,046,309	29,056,748	273,713,733	463,816,790	324,044,223	70	30	316,453,114	101,536,997	417,990,111

**Table 52 Project Cost: Dirout Group of Regulators and Improving Water Distribution System**

Component	Financial Price (LE)			Economic Price (LE)		
	F/C	Total	L/C	F/C	Total	L/C
Dirout Group of Regulators (DGR)	324,044,223	139,772,519	463,816,790	316,453,114	101,536,997	417,990,111
Improving Water Distribution System (IWDS)	37,110,150	4,123,350	41,233,500	35,343,000	3,652,110	38,995,110
<b>Total</b>	<b>361,154,373</b>	<b>143,895,917</b>	<b>505,050,290</b>	<b>351,796,114</b>	<b>105,189,107</b>	<b>456,985,221</b>

SCF = 0.93

**Table 53 Disbursement of Project Cost**

Year	Financial Price (LE)			Economic Price (LE)		
	DGR	IWDS	Total	DGR	IWDS	Total
1	0.15	69,572,519	69,572,519	0.15	62,698,517	62,698,517
2	0.35	162,335,877	162,335,877	0.35	146,296,539	146,296,539
3	0.35	162,335,877	162,335,877	0.35	146,296,539	146,296,539
4	0.15	69,572,519	69,572,519	0.15	62,698,517	62,698,517
<b>Total</b>		<b>463,816,790</b>	<b>505,050,290</b>	<b>0.15</b>	<b>417,990,112</b>	<b>456,985,222</b>

**Table 54 O&M Cost (LE/year)**

Dirout Group of Regulators (DGR)	Fin. Price	Eco. Price
Dirout Group of Regulators (DGR)	4,638,168	4,179,901
Improving Water Distribution System (IWDS)	1,500,000	1,395,000
<b>Total</b>	<b>6,138,168</b>	<b>5,574,901</b>

**Table 55 Economic Cost of Project Cost for the Minor structures**

Item	Unit	Financial Price (LE)					Economic Price (LE)				
		Giza Pre.	Fayoum Pre.	Beni-Suef Pre.	Minya Pre.	Total (LE)	F/C (70%)	L/C (30%)	F/C (70%)	L/C (30%)	Total (LE)
<b>A : Cost of the direct</b>											
Category "Within 5yrs"		10,266,667	15,398,519	6,775,555	11,367,185						
Category "Within 10yrs"		77,778	1,088,889	142,222	209,630						
Category "Within 20yrs"		39,259	152,593	272,593	0						
Sub-total of the direct cost	Unit	10,383,704	16,640,001	7,190,370	11,576,815						
<b>B : Cost of the indirect</b>											
Category "Within 5yrs"	%	3,593,333	5,389,481	2,371,444	3,978,514						
Category "Within 10yrs"	%	27,222	381,111	49,778	73,371						
Category "Within 20yrs"	%	13,741	53,407	95,408	0						
Sub-total of the indirect cost	Unit	3,634,296	5,823,999	2,516,630	4,051,885						
<b>C=A+B : Cost of the direct and indirect</b>											
Category "Within 5yrs"	Unit	13,860,000	20,788,000	9,147,000	15,345,700	59,140,700	41,398,490	17,742,210	41,398,490	16,500,255	57,898,745
Category "Within 10yrs"	Unit	105,000	1,470,000	192,000	283,000	2,050,000	1,435,000	615,000	1,435,000	571,950	2,006,950
Category "Within 20yrs"	Unit	53,000	206,000	368,000	0	627,000	438,900	188,100	438,900	174,933	613,833
Sub-total of the direct and indirect cost	Unit	14,018,000	22,464,000	9,707,000	15,628,700	61,817,700	43,272,390	18,545,310	43,272,390	17,247,138	60,519,528
<b>D : Consultant service (for the construction cost : C)</b>											
Category "Within 5yrs"	%	1,386,000	2,078,800	914,700	1,534,570	5,914,070	4,139,849	1,774,221	4,139,849	1,650,026	5,789,875
Category "Within 10yrs"	%	10,500	147,000	19,200	28,300	205,000	143,500	61,500	143,500	57,195	200,695
Category "Within 20yrs"	%	5,300	20,600	36,800	0	62,700	43,890	18,810	43,890	17,493	61,383
Sub-total of the Consultant service	Unit	1,401,800	2,246,400	970,700	1,562,870	6,181,770	4,327,239	1,854,631	4,327,239	1,724,714	6,051,953
<b>E : Tax for the LC (for the direct cost : A)</b>											
Category "Within 5yrs"	%	1,026,667	1,539,852	677,556	1,136,719	4,380,794	3,066,556	1,314,238			0
Category "Within 10yrs"	%	7,778	108,889	14,222	20,963	151,852	106,296	45,556			0
Category "Within 20yrs"	%	3,925	15,259	27,259	0	46,443	32,510	13,933			0
Sub-total of the Tax	Unit	1,038,370	1,664,000	719,037	1,157,682	4,579,089	3,205,362	1,373,727	0	0	0
<b>F=C+D+E : Base cost of the Minor structure</b>											
Category "Within 5yrs"	Unit	16,272,667	24,406,652	10,739,256	18,016,989	69,435,564	48,604,895	20,830,669	45,538,339	18,150,281	63,688,620
Category "Within 10yrs"	Unit	123,278	1,725,889	225,422	332,263	2,406,852	1,684,796	722,056	1,578,500	629,145	2,207,645
Category "Within 20yrs"	Unit	62,225	241,859	432,059	0	736,143	515,300	220,843	482,790	192,426	675,216
Sub-total of the base cost	Unit	16,458,170	26,374,400	11,396,737	18,349,252	72,578,559	50,804,991	21,773,568	47,599,629	18,971,852	66,571,481
<b>G : Physical contingency (for the base cost : F)</b>											
Category "Within 5yrs"	%	813,633	1,220,333	536,963	900,850	3,471,779	2,430,245	1,041,533	2,276,917	907,514	3,184,431
Category "Within 10yrs"	%	6,164	86,294	11,271	16,613	120,342	84,240	36,103	78,925	31,457	110,382
Category "Within 20yrs"	%	3,112	12,093	21,603	0	36,808	25,765	11,042	24,140	9,621	33,761
Sub-total of the physical contingency	Unit	822,909	1,318,720	569,837	917,463	3,628,929	2,540,250	1,088,678	2,379,981	948,593	3,328,574
<b>H : Price contingency during 5 yrs (for the base cost : F)</b>											
Category "Within 5yrs"	%	2,359,537	3,538,965	1,557,192	2,612,463	10,068,157	7,047,710	3,020,447			0
Category "Within 10yrs"	%	17,875	32,686	48,178	48,178	348,993	244,295	104,698			0
Category "Within 20yrs"	%	9,023	35,070	62,649	0	106,742	74,719	32,022			0
Sub-total of the price contingency	Unit	2,386,435	3,824,289	1,652,527	2,660,641	10,523,892	7,366,724	3,157,167	0	0	0
<b>Project Cost. of the Minor structure (F+G+H)</b>											
Category "Within 5yrs"	Unit	19,445,837	29,165,950	12,833,411	21,630,302	82,975,500	58,082,850	24,892,649	47,815,256	19,057,795	66,873,051
Category "Within 10yrs"	Unit	147,317	2,062,437	269,379	397,054	2,876,187	2,013,331	862,857	1,657,425	660,602	2,318,027
Category "Within 20yrs"	Unit	74,360	289,022	516,311	0	879,693	615,784	263,907	506,930	202,047	708,977
Total cost	Unit	19,667,514	31,517,409	13,619,101	21,927,356	86,731,380	60,711,965	26,019,413	49,979,610	19,920,445	69,900,055

Table 56 Project Cost per Site for the Minor Structures

Gov't	5 years			10 years			20 years			Total		
	No	Cost (LE)	Cost per Site (LE)	No	Cost (LE)	Cost per Site (LE)	No	Cost (LE)	Cost per Site (LE)	No	Cost (LE)	Cost (LE)
GIZA	4	15,672,126	118,729	1	59,930	59,930	6	15,850,784				
Fayoum	19	23,505,927	1,662,195	2	232,933	232,933	25	25,401,056				
Beni-Suef	23	10,342,923	217,103	5	416,115	416,115	37	10,976,141				
Minya	54	17,352,072	320,002	2	0	0	60	17,672,074				
Total	100	66,873,049	2,318,028	18	2,318,028	2,318,028	128	69,900,055				
GIZA	1	3,918,032	118,729	1	59,930	59,930						
Fayoum	1	1,237,154	415,549	1	116,467	116,467						
Beni-Suef	1	449,692	24,123	1	83,223	83,223						
Minya	1	321,335	80,000	1	-	-						

Table 57 Cost and Benefit Flows of Minor Structures

Year	Giza			Fayoum			Beni-Suef							
	No.	Cost (LE)	Benefit (LE/red)	Area (fed)	Benefit (LE/red)	No.	Cost (LE)	Benefit (LE/red)	Area (fed)	Benefit (LE/red)	No.	Cost (LE)	Benefit (LE/red)	Area (fed)
1	1	3,918,032	1,127.8	419	4,948,616	1,677	463.2	776,737	5	2,248,462	2,096	432.4	906,361	
2	1	3,918,032	1,127.8	419	4,948,616	1,677	463.2	776,737	5	2,248,462	2,096	432.4	906,361	
3	1	3,918,032	1,127.8	419	4,948,616	1,677	463.2	776,737	5	2,248,462	2,096	432.4	906,361	
4	1	3,918,032	1,127.8	419	4,948,616	1,677	463.2	776,737	4	1,798,769	1,677	432.4	725,088	
5	1	118,729	1,127.8	419	415,549	419	463.2	194,184	2	48,245	838	432.4	362,544	
6	1	118,729	1,127.8	419	415,549	419	463.2	194,184	2	48,245	838	432.4	362,544	
7	1	118,729	1,127.8	419	415,549	419	463.2	194,184	2	48,245	838	432.4	362,544	
8	1	118,729	1,127.8	419	415,549	419	463.2	194,184	2	48,245	838	432.4	362,544	
9	1	118,729	1,127.8	419	415,549	419	463.2	194,184	2	48,245	838	432.4	362,544	
10	1	118,729	1,127.8	419	415,549	419	463.2	194,184	2	48,245	838	432.4	362,544	
11	1	118,729	1,127.8	419	415,549	419	463.2	194,184	2	48,245	838	432.4	362,544	
12	1	118,729	1,127.8	419	415,549	419	463.2	194,184	2	48,245	838	432.4	362,544	
13	1	118,729	1,127.8	419	415,549	419	463.2	194,184	2	48,245	838	432.4	362,544	
14	1	118,729	1,127.8	419	415,549	419	463.2	194,184	2	48,245	838	432.4	362,544	
15	1	118,729	1,127.8	419	415,549	419	463.2	194,184	2	48,245	838	432.4	362,544	
16	1	118,729	1,127.8	419	415,549	419	463.2	194,184	2	48,245	838	432.4	362,544	
17	1	118,729	1,127.8	419	415,549	419	463.2	194,184	2	48,245	838	432.4	362,544	
18	1	118,729	1,127.8	419	415,549	419	463.2	194,184	2	48,245	838	432.4	362,544	
19	1	118,729	1,127.8	419	415,549	419	463.2	194,184	2	48,245	838	432.4	362,544	
20	1	118,729	1,127.8	419	415,549	419	463.2	194,184	2	48,245	838	432.4	362,544	

Year	Minya			Total			Accumulation						
	No.	Cost (LE)	Benefit (LE/red)	Area (fed)	Benefit (LE/red)	No.	Cost (LE)	Benefit (LE/red)	Area (fed)	Benefit (LE/red)	No.	Cost (LE)	Benefit (LE/red)
1	11	3,534,681	623.0	4,611	2,872,937	21	14,649,791	8,804	5,028,835	5,028,835	14,649,791	146,498	
2	11	3,534,681	623.0	4,611	2,872,937	21	14,649,791	8,804	5,028,835	10,057,670	29,299,581	146,498	
3	11	3,534,681	623.0	4,611	2,872,937	21	14,649,791	8,804	5,028,835	15,086,505	43,949,372	292,996	
4	11	3,534,681	623.0	4,611	2,872,937	20	14,200,098	8,384	4,847,562	19,934,067	58,149,471	439,494	
5	10	3,213,347	623.0	4,192	2,611,761	17	8,723,578	7,127	3,919,402	23,853,469	66,873,049	581,495	
6	1	80,000	623.0	419	261,176	5	662,523	2,096	1,290,704	25,144,173	67,535,572	668,730	
7	1	80,000	623.0	419	261,176	4	543,794	1,677	817,904	25,962,077	68,079,366	675,356	
8	1	80,000	623.0	419	261,176	4	543,794	1,677	817,904	26,779,981	68,623,160	680,794	
9	1	80,000	623.0	419	261,176	4	543,794	1,677	817,904	27,597,885	69,166,954	686,232	
10	1	80,000	623.0	419	261,176	4	543,794	1,677	817,904	28,415,789	69,714,858	691,670	
11	1	80,000	623.0	419	261,176	4	543,794	1,677	817,904	29,233,693	70,262,762	696,618	
12	1	80,000	623.0	419	261,176	4	543,794	1,677	817,904	30,051,597	70,810,666	701,566	
13	1	80,000	623.0	419	261,176	4	543,794	1,677	817,904	30,869,501	71,358,570	706,514	
14	1	80,000	623.0	419	261,176	4	543,794	1,677	817,904	31,687,405	71,906,474	711,462	
15	1	80,000	623.0	419	261,176	4	543,794	1,677	817,904	32,505,309	72,454,378	716,410	
16	1	80,000	623.0	419	261,176	4	543,794	1,677	817,904	33,323,213	73,002,282	721,358	
17	1	80,000	623.0	419	261,176	4	543,794	1,677	817,904	34,141,117	73,550,186	726,306	
18	1	80,000	623.0	419	261,176	4	543,794	1,677	817,904	34,959,021	74,098,090	731,254	
19	1	80,000	623.0	419	261,176	4	543,794	1,677	817,904	35,776,925	74,646,000	736,202	
20	1	80,000	623.0	419	261,176	4	543,794	1,677	817,904	36,594,829	75,193,904	741,150	



NPV = 842,802.053  
B/C = 2.98

Table 58 Calculation of Economic Internal Ratio of Return (EIRR) Base Case

Year	Construction of DGR	Improving Water Distribution System	Cost (LE)		Benefit (LE)						27% NPV		Net Present Value (I = 12%)				
			O&M	Minor Structures	O&M of Minor Structures	Total	Decrease of Yield without Project	Benefit in Bahir Yusuf	Benefit in Minya	Benefit in the five canals	Benefit in Ibrahimia	Minor Structures	Total	Benefit - Cost	Capital Recovery Factor	Net Present Value (NPV)	CRF (=12%)
1	62,698,517		14,649,791	14,649,791		77,348,308	0	5,028,835	0	0	0	-77,348,308	0.78993	-61,091,987	0.89286	69,060,989	0
2	146,296,539		14,649,791	146,438	146,438	161,092,828	0	161,092,828	0	0	0	-156,063,993	0.62383	-97,367,539	0.79719	128,422,216	4,008,956
3	146,296,539	19,497,555	14,649,791	292,996	180,736,881	180,736,881	0	180,736,881	0	0	0	-170,679,211	0.49272	-84,097,084	0.71778	128,644,942	7,198,951
4	62,698,517	19,497,555	14,200,098	439,494	96,835,664	96,835,664	0	96,835,664	0	0	0	-81,749,159	0.38916	-31,813,910	0.6552	61,540,815	9,587,747
5			8,723,578	581,485	14,879,974	9,866,923	55,933,800	15,016,030	13,254,890	39,922,058	19,934,067	139,047,794	0.30737	42,739,682	0.56743	8,443,297	84,942,749
6			6,622,524	688,730	19,733,846	55,933,800	55,933,800	15,016,030	13,254,890	39,922,058	23,853,469	160,807,938	0.24277	39,039,847	0.50663	3,498,873	84,969,179
7			5,674,901	543,794	6,794,051	39,460,769	55,933,800	15,016,030	13,254,890	39,922,058	18,714,093	172,077,669	0.19175	32,985,793	0.45235	3,073,284	80,912,482
8			5,674,901	680,794	6,359,489	39,460,769	55,933,800	15,016,030	13,254,890	39,922,058	25,962,077	189,556,547	0.15145	27,647,443	0.40388	2,746,200	76,568,710
9			5,674,901	543,794	6,804,927	49,334,615	55,933,800	15,016,030	13,254,890	39,922,058	26,773,981	200,241,374	0.11962	23,138,715	0.36061	2,453,925	72,209,407
10			5,674,901	24,123	6,290,693	59,201,538	55,933,800	15,016,030	13,254,890	39,922,058	27,597,885	204,635,508	0.09448	19,333,717	0.32197	2,025,435	67,912,592
11			5,674,901	83,223	6,350,035	69,068,462	55,933,800	15,016,030	13,254,890	39,922,058	27,773,157	214,624,361	0.07462	16,015,733	0.28748	1,825,433	63,524,958
12			5,674,901	83,223	6,350,035	78,935,385	55,933,800	15,016,030	13,254,890	39,922,058	27,960,429	221,022,891	0.05994	13,241,860	0.25668	1,630,109	59,297,745
13			5,674,901	693,575	6,351,699	88,802,308	55,933,800	15,016,030	13,254,890	39,922,058	28,141,701	241,070,786	0.04655	10,926,551	0.22917	1,455,646	55,247,202
14			5,674,901	694,407	6,352,531	98,669,231	55,933,800	15,016,030	13,254,890	39,922,058	28,327,973	244,766,450	0.03677	8,999,534	0.20462	1,299,854	51,383,919
15			5,674,901	695,240	6,353,364	108,536,154	55,933,800	15,016,030	13,254,890	39,922,058	28,511,881	254,813,813	0.02904	7,399,877	0.18270	1,160,736	47,174,267
16			5,674,901	116,467	6,387,440	118,403,077	55,933,800	15,016,030	13,254,890	39,922,058	28,695,517	271,215,371	0.02294	6,074,336	0.16312	1,041,930	44,241,102
17			5,674,901	116,467	6,388,604	128,270,000	55,933,800	15,016,030	13,254,890	39,922,058	28,879,701	274,887,874	0.01812	4,979,939	0.14564	930,464	40,966,327
18			5,674,901	59,930	6,333,232	138,136,923	55,933,800	15,016,030	13,254,890	39,922,058	29,137,586	285,004,354	0.01431	3,838,496	0.13004	823,571	37,865,420
19			5,674,901	699,001	6,273,902	148,003,846	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	301,677,903	0.01130	3,338,496	0.11611	728,442	35,026,780
20			5,674,901	699,001	6,273,902	157,870,769	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	311,544,232	0.00933	2,724,917	0.10387	650,395	32,296,763
21			5,674,901	699,001	6,273,902	167,737,692	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	321,411,155	0.00755	2,221,784	0.09286	580,710	29,749,692
22			5,674,901	699,001	6,273,902	177,604,615	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	331,278,078	0.00587	1,809,715	0.08254	518,491	27,377,652
23			5,674,901	699,001	6,273,902	187,471,538	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	341,145,001	0.00440	1,472,810	0.07379	462,938	25,172,392
24			5,674,901	699,001	6,273,902	197,338,462	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	351,011,924	0.00347	1,197,546	0.06588	413,338	23,125,404
25			5,674,901	699,001	6,273,902	207,205,385	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	360,878,847	0.00274	972,928	0.05882	369,052	21,228,087
26			5,674,901	699,001	6,273,902	217,072,308	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	370,745,770	0.00217	789,830	0.05282	329,510	19,471,868
27			5,674,901	699,001	6,273,902	226,939,231	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	380,612,693	0.00171	640,719	0.04689	292,264	17,848,292
28			5,674,901	699,001	6,273,902	236,806,154	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	390,479,616	0.00135	519,398	0.04187	264,624	16,349,096
29			5,674,901	699,001	6,273,902	246,673,077	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	400,346,539	0.00107	430,771	0.03738	234,539	14,966,265
30			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00084	340,659	0.03338	209,410	13,692,074
31			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00067	269,962	0.02980	186,973	12,225,066
32			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00053	212,513	0.02661	166,940	10,915,237
33			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00043	167,849	0.02376	149,054	9,745,748
34			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00036	132,572	0.02121	133,084	8,701,560
35			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00030	104,710	0.01894	118,255	7,769,250
36			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00026	82,703	0.01691	106,934	6,936,831
37			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00021	65,321	0.01510	94,726	6,193,599
38			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00016	51,593	0.01348	84,577	5,529,998
39			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00013	40,749	0.01204	75,515	4,937,499
40			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00010	32,165	0.01075	67,424	4,408,481
41			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00008	25,421	0.00960	60,200	3,936,144
42			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00006	20,078	0.00857	53,750	3,514,414
43			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00004	15,868	0.00765	47,991	3,137,870
44			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00003	12,525	0.00683	42,849	2,801,670
45			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00002	9,893	0.00610	38,258	2,501,497
46			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00002	7,814	0.00544	34,159	2,233,474
47			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00002	6,171	0.00486	30,499	1,994,179
48			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00001	4,874	0.00434	27,232	1,760,512
49			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00001	3,880	0.00388	24,314	1,589,743
50			5,674,901	699,001	6,273,902	256,540,000	55,933,800	15,016,030	13,254,890	39,922,058	29,546,885	410,213,463	0.00001	3,041	0.00346	21,769	1,419,413
Total	417,990,112		69,900,055	32,790,867	816,121,590	8,594,090,000	2,572,954,800	690,737,980	609,724,940	1,836,414,645	1,352,286,190	15,666,207,955	14,840,996,365	NPV	426,695,656	1,269,497,709	

**Table 59 Increase of Staple Crop Production: Wheat**

Governorate	Without Project		With Project				DGR + IWDS Increment (t)	Area	Minor Structure				Total Increment (t)	Total Increment (t) (1)	
	Cropped Area (fed)	Benefitted Area (fed)	Yield	Production	Base				Without Project		With Project				
					Yield (t/fed)	Production (t)			Incremental (t/fed)	Production (t)	Yield	Production			
											Minia				Yield
Giza	27,227	6,807	2.80	19,059	2.86	19,467	0	19,467	408	206	577	2.91	600	23	431
Beni Suef	150,499	37,625	2.80	105,349	2.86	107,607	0	107,607	2,257	2,80	6,368	2.91	6,618	250	2,508
Fayoum	157,545	39,386	2.80	110,282	2.86	112,645	0	112,645	2,363	3,723	10,423	2.91	10,833	409	2,773
Minya	214,872	107,436	2.80	300,821	2.86	307,267	0.06	12,892	19,338	5,471	15,920	2.91	15,920	602	19,940
Assiut	63,207	15,802	2.80	44,245	2.86	45,193	0	45,193	948		2,80	2.91	0	0	948
Total	613,350	207,056		579,755		592,179		12,892	605,071	25,316	32,688		33,972	1,284	26,600
Decrease of Production without Project															
Governorate	Cropped Area (fed)	Benefitted Area (fed)	Without Project		With Project		DGR + IWDS Increment(t) (2)	Total Increment (t) (1) + (2)	International Market Price (US\$/t) (y2010)	Value (US\$)					
			Yield	Production	Yield (t/fed)	Production (t)									
Giza	27,227	14,056	2.74	38,570	2.80	39,357	787	1,218	196	238,775					
Beni Suef	150,499	77,697	2.74	213,200	2.80	217,551	4,351	6,859	196	1,344,302					
Fayoum	157,545	81,334	2.74	223,181	2.80	227,736	4,555	7,327	196	1,436,168					
Minya	214,872	110,930	2.74	304,392	2.80	310,604	6,212	26,152	196	5,125,862					
Assiut	63,207	32,631	2.74	89,540	2.80	91,368	1,827	2,775	196	543,990					
Total	613,350	316,649		868,884		886,616	17,732	44,332		8,689,097					

**Table 60 Increase of Staple Crop Production: Maize**

Governorate	Without Project		With Project				DGR + IWDS Increment (t)	Area	Minor Structure				Total Increment (t)	Total Increment (t) (1)	
	Cropped Area (fed)	Benefitted Area (fed)	Yield	Production	Base				Without Project		With Project				
					Yield (t/fed)	Production (t)			Incremental (t/fed)	Production (t)	Yield	Production			
											Minia				Yield
Giza	44,132	11,033	3.30	36,409	3.45	38,064	0	38,064	1,655	334	1,104	3.60	1,204	100	1,755
Beni Suef	202,890	50,723	3.30	167,384	3.45	174,993	0	174,993	7,608	1,142	3,770	3.60	4,113	343	7,951
Fayoum	79,576	19,894	3.30	65,650	3.45	68,634	0	68,634	2,984	5,026	16,584	3.60	18,092	1,508	4,492
Minya	273,187	136,594	3.30	450,759	3.45	471,248	0	471,248	20,489	6,954	22,948	3.60	25,035	2,086	22,575
Assiut	80,361	20,090	3.30	66,298	3.45	69,311	0	69,311	3,014		0	3.60	0	0	3,014
Total	680,146	238,333		786,500		822,250		822,250	35,750		44,407		48,444	4,037	39,787
Decrease of Production without Project															
Governorate	Cropped Area (fed)	Benefitted Area (fed)	Without Project		With Project		DGR + IWDS Increment(t) (2)	Total Increment (t) (1) + (2)	International Market Price (US\$/t) (y2010)	Value (US\$)					
			Yield	Production	Yield (t/fed)	Production (t)									
Giza	44,132	22,784	3.15	71,803	3.30	75,186	3,383	5,139	163	837,603					
Beni Suef	202,890	104,744	3.15	330,101	3.30	345,656	15,555	23,506	163	3,831,415					
Fayoum	79,576	41,082	3.15	129,470	3.30	135,571	6,101	10,592	163	1,726,568					
Minya	273,187	141,036	3.15	444,474	3.30	465,418	20,944	43,519	163	7,093,608					
Assiut	80,361	41,487	3.15	130,747	3.30	136,908	6,161	9,174	163	1,495,426					
Total	680,146	351,133		1,106,595		1,158,738	52,143	91,930		14,984,620					

