

TABLE A-6.6.7

TABLE A-6.6.7 Prices and Annual Fixed Cost of Grassland Machineries

Machinery	Specification	Price R.O.	Endurance Period Yr	Annual fixed cost				Total R.O.
				Depreciation R.O.	Maintenance Coefficient %	Maintenance Cost R.O.		
Riding tractor	60 p.s.	8,000	5	1,600	7.00	560	2,160	
Disc plow	14" x 3	1,100	5	220	4.00	440	660	
Disk harrow	20" x 24	1,500	5	300	4.00	600	900	
Tooth harrow	30 x 4 rows	820	5	164	4.00	328	492	
Manure spreader	V-shaft 2.3ton	3,000	5	600	3.00	90	690	
Front loader	—	2,300	5	460	2.00	46	506	
Broadcaster	660 ℓ	750	5	150	2.00	15	165	
Packer seeder	2.4 m	2,950	5	590	4.00	118	708	
Total	—	20,420	—	4,084	—	2,197	6,281	

TABLE A-6.6.7

(2) Management, Harvest and Transport Works

Machinery	Specification	Price R.O.	Endurance Period Yr	Annual fixed cost			Total R.O.
				Depreciation R.O.	Maintenance Coefficient %	Maintenance Cost R.O.	
Riding tractor	60 p.s.	8,000	5*	1,600	7.00	560	2,160
Broadcaster	660 ℓ	850	5	170	2.00	17	187
Rotary mower	2.0 m	2,700	5	540	5.00	135	675
Tedder	4 rotor	1,650	5	330	4.00	66	396
Rake	cylinder type	1,750	5	350	4.00	70	420
Tight baler	40×40×50cm	9,300	5*	1,860	5.00	465	2,325
Pront loader	-	2,300	5	460	2.00	46	506
Truck	4 ton	10,000	5	2,000	5.00	500	2,500
Total	-	36,550	-	7,310	-	1,859	9,169

1. Prices are according to the reserch report edited by National Federation of Farmers' Cooperatives.

2. Endurance year. Final selling rate and maintenance coefficient is quoted from Norin Tokei Kyokai, 1985.4.

Endurance year with \* is assumed as 5 years, in spite that its life time being 8 years.

TABLE A-6.6.8

TABLE A-6.6.8 Variable Cost for Grassland Machineries

## (1) Land Reclamation and Seeding Works (For 25ha)

Item	Machinery	Machinery operating time hr	Working hours		Oil Consumption ℓ	Oil cost R.O.	Lubrication oil cost* R.O.	Labour cost		Total R.O.
			Operator hr	Assistant hr				Operator R.O.	Assistant R.O.	
Compost spreading	Manure spreader	25.0	75.0	75.0	225	6.8	136.4	70.5	236.2	
	Front loader	25.0			225	6.8			29.3	
Plowing	Bottom plow	25.0	62.5	62.5	450	13.5	113.6	58.7	230.8	
	Disk harrow	50.0	62.5	-	450	13.5	113.6		172.1	
Reclamation	Tooth harrow	50.0	37.5	-	225	6.8	68.2		97.5	
	Broadcaster	25.0	50.0	50.0	180	5.4	90.9	47.0	161.3	
Seeding	Packer seeder	37.5	62.5	125.0	270	8.1	113.6	117.4	266.1	
	Packer seeder	25.0	37.5	-	180	5.4	68.2		91.6	
	Total	262.5	387.5	312.5	2,205	66.3	704.5	293.6	1,284.9	

Note) \* Lubrication oil cost = 30% of oil cost

TABLE A-6.6.8

(2) Management and Harvest (per one harvest)

Item	Machinery	Machinery operating time hr	Working hours		Oil Consumption ℓ	Variable cost				Total R.O.
			Operator hr	Assistant hr		Oil cost R.O.	Lubrication oil cost* R.O.	Labour cost		
								Operator R.O.	Assistant R.O.	
Compost spreading	Broadcaster	12.5	17.5	17.5	112.5	11.3	3.4	31.8	18.4	62.9
Reaping	Rotary mower	20.0	25.0	25.0	180.0	18.0	5.4	45.5	23.5	92.4
Turning over	Tedder	52.5	60.0	60.0	377.5	37.8	11.3	109.0	56.4	214.5
Gathering	Rake	12.5	17.5	17.5	90.0	9.0	2.7	31.8	18.4	59.9
Packing	Tight baler	25.0	50.0	200.0	225.0	22.5	6.8	90.9	187.9	308.1
Loading	Front loader	25.0	50.0	200.0	225.0	22.5	6.8	90.9	187.9	308.1
	Packer seeder	25.0	50.0	-	225.0	22.5	6.8	90.9	-	120.2
	Total	172.5	270.0	520.0	1,412.5	143.6	43.2	490.8	488.5	1,166.1

Note) \* Lubrication oil cost = 30% of oil cost

TABLE A-6.6.8

(3) Transportation Work (per one harvest)

Item	Machinery	Machinery operating time hr	Working hours		Oil Consumption ℓ	Variable cost				
			Operator hr	Assistant hr		Oil cost R.O.	Lubrication oil cost* R.O.	Labour cost		Total R.O.
Transportation	Truck	100.0	150.0	300.0	900.0	90.0	27.0	272.7	281.8	671.5

Note) \* Lubrication oil cost = 30% of oil cost

TABLE A-6.6.9 Grass Production Cost per one farm of 50ha for a period of 5years

Item	Quantity	Unit rate	Cost (R.O.)	Remarks
1. Seed	kg 1,500	5.8	8,700	
2. Compost	t 500	23.3	11,650	
3. Chemical fertilizer	Basal dose t 62.50	70.0	4,375	40 times
	Top dose t 900	70.0	63,000	
4. Oil consumption	LR l 4,400	0.1	440	40 times
	MHT l 185,000	0.1	18,500	
5. Lubrication oil	LR		132	30% oil consumption
	MHT		5,550	
6. Rope	role 4,000	10	40,000	
7. Manual operator	LR hour 775	1.8	1,195.0	40 times
	MHT hour 33,600	1.8	60,480	
Labour assistant	LR hour 625	1.0	625	40 times
	MHT hour 65,600	1.0	65,600	
8. Depreciation	LR		4,084	
	MHT		73,100	
9. Maintenance cost	LR		2,197	5 years
	MHT		18,590	
Total			378,218	

LR-land reclamation, MHT-Maintenance, harvest and transport

- 1) Time limit to keep grassland-5 years
- 2) 10 times harvest in a year, 40 times of harvest in 5 years.
- 3) Total production of dry grass 4-5 t/ha in one time. 8,000 ~ 10,000 t/50ha in 40 times of harvest

\* Production cost of 1ton of dry grass =  $\frac{378,218}{(8,000 \sim 10,000)} = 38 \sim 47 \text{ R.O.}$

## 2) Variable cost

The variable cost for 25 ha area is shown in TABLE A-6.6.8 since the area of one unit of farm for land reclamation and grass production is planned as 25 ha.

The total variable cost for land reclamation and seeding work is 1,284.9 R.O. For management and harvest work the total variable cost is 1,166.1 R.O. and for transport it amounts to 671.5 R.O. for each time of harvest operation.

## 3) Grass production cost

Grass production cost per one farm of 50 ha area for a period of 5 years is shown in Table A-6.6.9.

The total production cost amounts to 378,218 R.O., assuming 40 times of harvest in 5 years.

Production cost for 1 ton of dry grass is 38 - 47 R.O.

TABLE A-6.6.10 Quantity Estimation for the Project of the Case Study

ITEMS	SPECIFICATION	Unit	NAGHA -1	DAUKA-1	NAGHA -2	DAUKA-2	NAGHA -3	DAUKA-3	NAGHA -4	DAUKA-4	NAGHA -5	DAUKA-5
1	PREPARATRY WORK	EA	1	1	1	1	1	1	1	1	1	1
2	LAND RECLAMATION	EA	1	1	1	1	1	1	1	1	1	1
3	INTAKE-FACILITY											
	50Ha	EA	1	1	1	1	1	1	1	1	1	1
	Depth=330m-2Nos	EA	0	0	1	0	1	0	1	0	1	0
	Depth=430m-2Nos	EA	0	0	1	0	1	0	1	0	1	0
	Depth=330m-2Nos	EA	1	0	0	0	1	0	1	0	1	0
	Depth=430m-2Nos	EA	0	1	0	1	0	1	0	1	0	1
	e S. M. PUMP	EA	1	0	1	0	1	0	1	0	1	0
	f PUMP HUT	EA	1	0	1	0	1	0	1	0	1	0
	25sq. m - 2Nos	EA	1	0	1	0	1	0	1	0	1	0
	65KVA-2Nos	EA	1	0	1	0	1	0	1	0	1	0
	g GENERATOR	EA	1	0	1	0	1	0	1	0	1	0
	h GENERATOR HUT	EA	1	0	1	0	1	0	1	0	1	0
	60 sq. m	EA	11	11	11	11	11	11	11	11	11	11
	i STORAGE-L	Km	0	0	11	0	11	0	11	0	11	0
	J O/M ROAD	Km	0	0	11	0	11	0	11	0	11	0
4	CONNECTION ROAD	Km	1	10	0	0	0	0	0	0	0	0
5	IRRIGATION FACILITY											
	a FARM POND	EA	1	1	1	1	1	1	1	1	1	1
	b BOOSTER PUMP	EA	1	1	1	1	1	1	1	1	1	1
	65Kw. T. H=60m	EA	1	1	1	1	1	1	1	1	1	1
	c PUMP STATION	EA	1	1	1	1	1	1	1	1	1	1
	48 sq. m	EA	1	1	1	1	1	1	1	1	1	1
	d GENERATOR	EA	1	1	1	1	1	1	1	1	1	1
	100KVA-2Nos	EA	1	1	1	1	1	1	1	1	1	1
	e GENERATOR HUT	EA	1	1	1	1	1	1	1	1	1	1
	60 sq. m	EA	1	1	1	1	1	1	1	1	1	1
	f LINE FOR DRIP	EA	1	1	1	1	1	1	1	1	1	1
	g LINE FOR C. P	EA	1	1	1	1	1	1	1	1	1	1
	h DRIP SYSTEM	EA	1	1	1	1	1	1	1	1	1	1
	i CENTRE PIVOT	EA	1	1	1	1	1	1	1	1	1	1
	d=400m	EA	1	1	1	1	1	1	1	1	1	1
	j WINDBREAK-TREE	EA	1	1	1	1	1	1	1	1	1	1
	3Line-Tree	EA	1	1	1	1	1	1	1	1	1	1
	k WINDBREAK-FENCE	EA	1	1	1	1	1	1	1	1	1	1
	l TRUNK-ROAD	EA	1	1	1	1	1	1	1	1	1	1
	m CULTIVATION-PASS	EA	1	1	1	1	1	1	1	1	1	1
6	HOUSING	EA	1	1	1	1	1	1	1	1	1	1
7	VEHICLE	EA	1	1	1	1	1	1	1	1	1	1
	4WD-1No. H. C-1No	EA	1	1	1	1	1	1	1	1	1	1
8	MACHINERY											
	a Seeding	EA	1	0	0	0	0	1	0	0	0	0
	b Seeding ----- (Renewal )	EA	0	0	0	0	0	0	0	0	0	0
	SUM	EA	1	0	0	0	0	2	0	0	0	0
	c Harvesting	EA	2	0	2	0	2	0	2	0	2	0
	NAGHA -AREA	EA	0	0	0	0	0	0	0	0	0	0
	d Harvesting (Renewal )	EA	0	0	0	0	0	2	0	2	0	2
	NAGHA -AREA	EA	0	0	0	0	0	0	0	0	0	0
	e Harvesting	EA	0	2	0	2	0	2	0	2	0	2
	DAUKA-AREA	EA	0	0	0	0	0	0	0	0	0	0
	f Harvesting (Renewal )	EA	0	0	0	0	0	0	2	0	2	0
	DAUKA-AREA	EA	2	2	2	2	2	2	2	2	2	2
	SUM	EA	2	2	2	2	2	4	4	4	4	4



TABLE A-6.6.11

TABLE A-6.6.11 Cost-estimates for the Project of the Case Study

Unit : Riials Omani

ITEMS	NAGHA -1		DAUKA-1		NAGHA -2		DAUKA-2		NAGHA -3		DAUKA-3		NAGHA -4		DAUKA-4		NAGHA -5		DAUKA-5		TOTAL	
	7,500	625	7,500	625	7,500	625	7,500	625	7,500	625	7,500	625	7,500	625	7,500	625	7,500	625	7,500	625		
1 CIVIL																						
1-1 PREPARATORY WORKS	7,500	625	7,500	625	7,500	625	7,500	625	7,500	625	7,500	625	7,500	625	7,500	625	7,500	625	7,500	625	7,500	625
1-2 LAND RECLAMATION																						
1-3 INTAKE-FACILITY																						
a PROD'N WELL	112,870	149,100	112,870	149,100	112,870	149,100	112,870	149,100	112,870	149,100	112,870	149,100	112,870	149,100	112,870	149,100	112,870	149,100	112,870	149,100	112,870	149,100
b MONIT'N WELL	101,583	134,190	101,583	134,190	101,583	134,190	101,583	134,190	101,583	134,190	101,583	134,190	101,583	134,190	101,583	134,190	101,583	134,190	101,583	134,190	101,583	134,190
c S.M. PUMP & HUT	33,675	0	33,675	0	33,675	0	33,675	0	33,675	0	33,675	0	33,675	0	33,675	0	33,675	0	33,675	0	33,675	0
d GENERATOR & HUT	17,375	0	17,375	0	17,375	0	17,375	0	17,375	0	17,375	0	17,375	0	17,375	0	17,375	0	17,375	0	17,375	0
e STORAGE-L	507,886	46,171	507,886	507,886	507,886	507,886	507,886	507,886	507,886	507,886	507,886	507,886	507,886	507,886	507,886	507,886	507,886	507,886	507,886	507,886	507,886	
f O/M ROAD	0	0	41,250	0	41,250	0	41,250	0	41,250	0	41,250	0	41,250	0	41,250	0	41,250	0	41,250	0	41,250	0
* SUM	773,389	329,451	814,639	791,176	814,639	832,426	814,639	832,426	814,639	832,426	814,639	832,426	814,639	832,426	814,639	832,426	814,639	832,426	814,639	832,426	814,639	832,426
1-4 IRRIGATION-FACILITY																						
a FARM POND	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585
b BOOSTER PUMP	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750
c PUMP STATION	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
d GENERATOR & HUT	19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000	19,000
e LINE FOR DRIP	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710
f LINE FOR C.P	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624
g DRIP SYSTEM	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207
h CENTRE PIVOT	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019
i WINDBREAK-TREE	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318
j WINDBREAK-FENCE	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717
k TRUNK ROAD	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711
* SUM	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164
1-5 CONNECTION ROAD	10,000	100,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-6 HOUSING	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375
** TOTAL	1,308,053	954,125	1,339,303	1,315,840	1,339,303	1,357,090	1,339,303	1,357,090	1,339,303	1,357,090	1,339,303	1,357,090	1,339,303	1,357,090	1,339,303	1,357,090	1,339,303	1,357,090	1,339,303	1,357,090	1,339,303	1,357,090
2 EQUIP'T																						
2-1 VEHICLE	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350
2-2 MACHINERY	20,420	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Seeding	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100
HARVEST	100,870	80,450	80,450	80,450	80,450	80,450	80,450	80,450	80,450	80,450	80,450	80,450	80,450	80,450	80,450	80,450	80,450	80,450	80,450	80,450	80,450	80,450
** TOTAL	1,408,923	1,034,575	1,419,753	1,396,290	1,419,753	1,457,960	1,419,753	1,457,960	1,419,753	1,457,960	1,419,753	1,457,960	1,419,753	1,457,960	1,419,753	1,457,960	1,419,753	1,457,960	1,419,753	1,457,960	1,419,753	1,457,960
3 TOTAL (1-2)	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400
4 PROJECT FACILITY	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700
5 ADMINISTRATION	113,000	83,000	114,000	112,000	114,000	117,000	114,000	114,000	114,000	114,000	114,000	114,000	114,000	114,000	114,000	114,000	114,000	114,000	114,000	114,000	114,000	114,000
6 CONSULTANT SERVICE	1,535,023	1,130,675	1,546,853	1,521,390	1,546,853	1,588,060	1,546,853	1,588,060	1,546,853	1,588,060	1,546,853	1,588,060	1,546,853	1,588,060	1,546,853	1,588,060	1,546,853	1,588,060	1,546,853	1,588,060	1,546,853	1,588,060
7 SUB-TOTAL (3-4-5-6)	153,502	113,068	154,685	152,139	154,685	158,806	154,685	158,806	154,685	158,806	154,685	158,806	154,685	158,806	154,685	158,806	154,685	158,806	154,685	158,806	154,685	158,806
8 PHYSICAL CONTINGENCY (6 x 0.1)																						
9 GRAND TOTAL (7-8)	1,688,525	1,243,743	1,701,538	1,673,529	1,701,538	1,746,866	1,701,538	1,746,866	1,701,538	1,746,866	1,701,538	1,746,866	1,701,538	1,746,866	1,701,538	1,746,866	1,701,538	1,746,866	1,701,538	1,746,866	1,701,538	1,746,866

TABLE A-6.6.12 Summary of Annual O/M Cost on Each Works  
Unit : Riats Omant

ITEMS	Specification	Durable Period	Mainte'ce Ratio	Cost	Depreci-ation	Mainte'ce Cost	Fuel Cost	Total	
<b>1 Water Resources for NAGIAH-ARLA</b>									
a	Production Well	Depth-330m 2Nos	30yr	0.0%	112,870	3,762	0	3,762	
b	Monitoring Well	Depth-330m 2Nos	30yr	0.0%	101,583	3,386	0	3,386	
c	Submersible Pump	L.H-50m 45KW	10yr	2.0%	27,425	2,743	549	3,292	
d	Pump Hut	25s.m	30yr	0.1%	6,250	208	6	214	
e	Generator	65KVA-2NOS	10yr	5.0%	9,875	988	494	17,549	
f	Generator Hut	60s.m	30yr	0.1%	7,500	250	8	258	
SUB-TOTAL						11,337	1,057	16,067	28,461
g	O/H Road	11km	30yr	0.1%	41,250	1,375	41	1,416	
SUB						12,712	1,098	16,067	29,877
<b>2 Water Resources for DAUKA-ARLA</b>									
a	Production Well	Depth-430m 2Nos	30yr	0.0%	149,100	4,970	0	4,970	
b	Monitoring Well	Depth-430m 2Nos	30yr	0.0%	134,190	4,473	0	4,473	
SUB-TOTAL						9,443	0	9,443	
c	O/H Road	11km	30yr	0.1%	41,250	1,375	41	1,416	
SUB						10,818	41	10,859	
3	Storage line	11Km	30yr	0.1%	507,886	16,930	508	17,438	
4	Storage line	1Km	30yr	0.1%	46,171	1,539	46	1,585	
<b>5 On-farm Facility</b>									
a	Farm Pond		30yr	0.1%	32,585	1,086	33	1,119	
b	Booster Pump	L.H-60m 65KW	10yr	5.0%	151,750	15,175	7,588	22,763	
c	Pump Hut	48s.m	30yr	0.1%	6,000	200	6	206	
d	Generator	100KVA-2NOS	10yr	5.0%	11,500	1,150	575	14,669	
e	Generator Hut	60s.m	30yr	0.1%	7,500	250	8	258	
f	Drip System		5yr	1.0%	16,207	3,241	162	3,403	
g	Line for Drip		30yr	0.1%	41,710	1,390	42	1,432	
h	Line for C.P		30yr	0.1%	37,624	1,254	38	1,292	
i	Centre Pivot	r=400m	10yr	3.0%	28,019	2,802	841	3,643	
j	Trunk Road		30yr	0.1%	25,711	857	26	883	
k	Cultivation Pass		30yr	0.1%	1,523	51	2	53	
l	Windbreak Tree		30yr	0.1%	17,318	577	17	594	
m	Windbreak Fence		10yr	1.0%	79,717	7,972	797	8,769	
SUB						36,005	10,135	12,944	59,084
6	Connection Road	1Km	30yr	0.1%	10,000	333	10	343	
7	Connection Road	10Km	30yr	0.1%	100,000	3,333	100	3,433	
8	Housing		30yr	0.1%	59,375	1,979	59	2,038	
9	Vehicle	4WD & H.C	10yr	5.0%	7,350	735	368	1,303	
<b>10 On-farm Machinery</b>									
a	Stabilization		5yr	10.8%	20,420	4,004	2,197	6,855	
b	Harvesting		5yr	5.1%	73,100	14,620	3,718	23,148	
SUB						18,704	5,915	5,384	30,003

TABLE A-6.6.13

TABLE A-6.6.13 Summary of O/M cost of Each Farm for the Project

I T E M S	Unit : Riials Omani										T o t a l
	1st YEAR NAGHA -1	2nd YEAR DAUKA-1	3rd YEAR NAGHA -2	4th YEAR DAUKA-2	5th YEAR NAGHA -3	6th YEAR DAUKA-3	7th YEAR NAGHA -4	8th YEAR DAUKA-4	9th YEAR NAGHA -5	10th YEAR DAUKA-5	
1 WATER RESOURCE (R.O)	28,461	9,443	28,461	9,443	28,461	9,443	28,461	9,443	28,461	9,443	189,520
2 STORAGE LINE (R.O)	17,438	1,585	17,438	17,438	17,438	17,438	17,438	17,438	17,438	17,438	158,527
3 O/M ROAD (R.O)	0	0	1,416	1,416	1,416	1,416	1,416	1,416	0	1,416	8,496
*SUM (R.O)	45,899	11,028	47,315	26,881	47,315	28,297	28,297	28,297	45,899	28,297	358,543
4 DEVELOPED YIELDED WATER(C.M)	1,736,400	1,736,400	1,736,400	1,736,400	1,736,400	1,736,400	1,736,400	1,736,400	1,736,400	1,736,400	0.021
5 WATER COST (R.O/C.M)	0.026	0.006	0.027	0.015	0.027	0.016	0.027	0.016	0.026	0.016	0.021
6 CONNECTION ROAD (R.O)	343	3,433	0	0	0	0	0	0	0	0	3,776
7 ON-FARM FACILITY (R.O)	59,084	59,084	59,084	59,084	59,084	59,084	59,084	59,084	59,084	59,084	590,840
8 HOUSING (R.O)	2,038	2,038	2,038	2,038	2,038	2,038	2,038	2,038	2,038	2,038	20,380
*SUM (7 & 8) (R.O)	61,122	61,122	61,122	61,122	61,122	61,122	61,122	61,122	61,122	61,122	611,220
9 VEHICLE (R.O)	1,303	1,303	1,303	1,303	1,303	1,303	1,303	1,303	1,303	1,303	13,030
10 SEEDING (R.O)	6,855	6,855	6,855	6,855	6,855	6,855	6,855	6,855	6,855	6,855	68,550
11 HARVESTING (R.O)	23,148	23,148	23,148	23,148	23,148	23,148	23,148	23,148	23,148	23,148	231,480
*SUM (10 & 11) (R.O)	30,003	30,003	30,003	30,003	30,003	30,003	30,003	30,003	30,003	30,003	300,030
TOTAL (R.O)	138,670	106,889	139,743	119,309	139,743	120,725	139,743	120,725	138,327	120,725	1,284,599

I T E M S	Unit : Riials Omani										T O T A L
	1st YEAR	2nd YEAR	3rd YEAR	4th YEAR	5th YEAR	6th YEAR	7th YEAR	8th YEAR	9th YEAR	10th YEAR	
1 WATER RESOURCE (R.O)	28,461	37,904	66,365	75,808	104,269	113,712	142,173	151,616	180,077	189,520	1,089,905
2 STORAGE LINE (R.O)	17,438	19,023	36,461	53,899	71,337	88,775	106,213	123,651	141,089	158,527	816,413
3 O/M ROAD (R.O)	0	0	1,416	1,416	2,832	4,248	5,664	7,080	7,080	8,496	38,232
*SUM (R.O)	45,899	56,927	104,242	131,123	178,438	206,735	254,050	282,347	328,246	356,543	1,944,550
4 DEVELOPED YIELDED WATER(C.M)	1,736,400	3,472,800	5,209,200	6,945,600	8,682,000	10,418,400	12,154,800	13,891,200	15,627,600	17,364,000	95,502,000
5 WATER COST (R.O/C.M)	0.026	0.016	0.020	0.019	0.021	0.020	0.021	0.020	0.021	0.021	0.020
6 CONNECTION ROAD (R.O)	343	3,776	3,776	3,776	3,776	3,776	3,776	3,776	3,776	3,776	34,327
7 ON-FARM FACILITY (R.O)	59,084	118,168	177,252	236,336	295,420	354,504	413,588	472,672	531,756	590,840	3,249,620
8 HOUSING (R.O)	2,038	4,076	6,114	8,152	10,190	12,228	14,266	16,304	18,342	20,380	112,090
*SUM (7 & 8) (R.O)	61,122	122,244	183,366	244,488	305,610	366,732	427,854	488,976	550,098	611,220	3,361,710
9 VEHICLE (R.O)	1,303	2,606	3,909	5,212	6,515	7,818	9,121	10,424	11,727	13,030	71,665
10 SEEDING (R.O)	6,855	6,855	6,855	6,855	6,855	6,855	6,855	6,855	6,855	6,855	68,550
11 HARVESTING (R.O)	23,148	46,296	69,444	92,592	115,740	138,888	162,036	185,184	208,332	231,480	1,273,140
*SUM (10 & 11) (R.O)	30,003	53,151	76,299	99,447	122,595	145,743	168,891	192,039	215,187	238,335	1,341,690
TOTAL (R.O)	138,670	238,704	371,592	484,046	616,934	730,804	863,692	977,562	1,109,034	1,222,904	6,753,942

#### 6.6.5 Cost Estimation for farm dispersal case (Semi-scattered type)

As discussed in section 6.3.3 in the Main Report, four areas viz. Nagha area, Dauka area, Shasr area and Wadi Makhawrim area were proposed and among these four areas Nagha & Dauka areas were selected for the case study and cost-estimation were made as discussed in the previous sections.

As a case-study, Nagha and Dauka areas were selected as the suitable development areas because of the reasons discussed in section 6.6.3. The final site selection should be done based on the land use plans which are currently being prepared for P.C.D.E.S.R.

As a possible alternative to the case study mentioned in the previous sections, a cost estimate has been made, considering that the agriculture development will be made in all the four areas.

The location of the farms and production wells for the dispersal case (Semi-scattered type) is shown in FIG. A-6.6.4 and the cost estimate is shown in TABLE A-6.6.14. Although the cost for the intake facility is lesser than case study project (TABLE A-6.6.11), the cost for the connection road is much higher than previous case ultimately, the average construction cost of a 50 ha farm is higher, which amounts to R.O.2,119,300.

FIG. A-6.6.4 Location of Farms for Farm Dispersal Case (Semi-scattered Type)

FIG. A-6.6.4

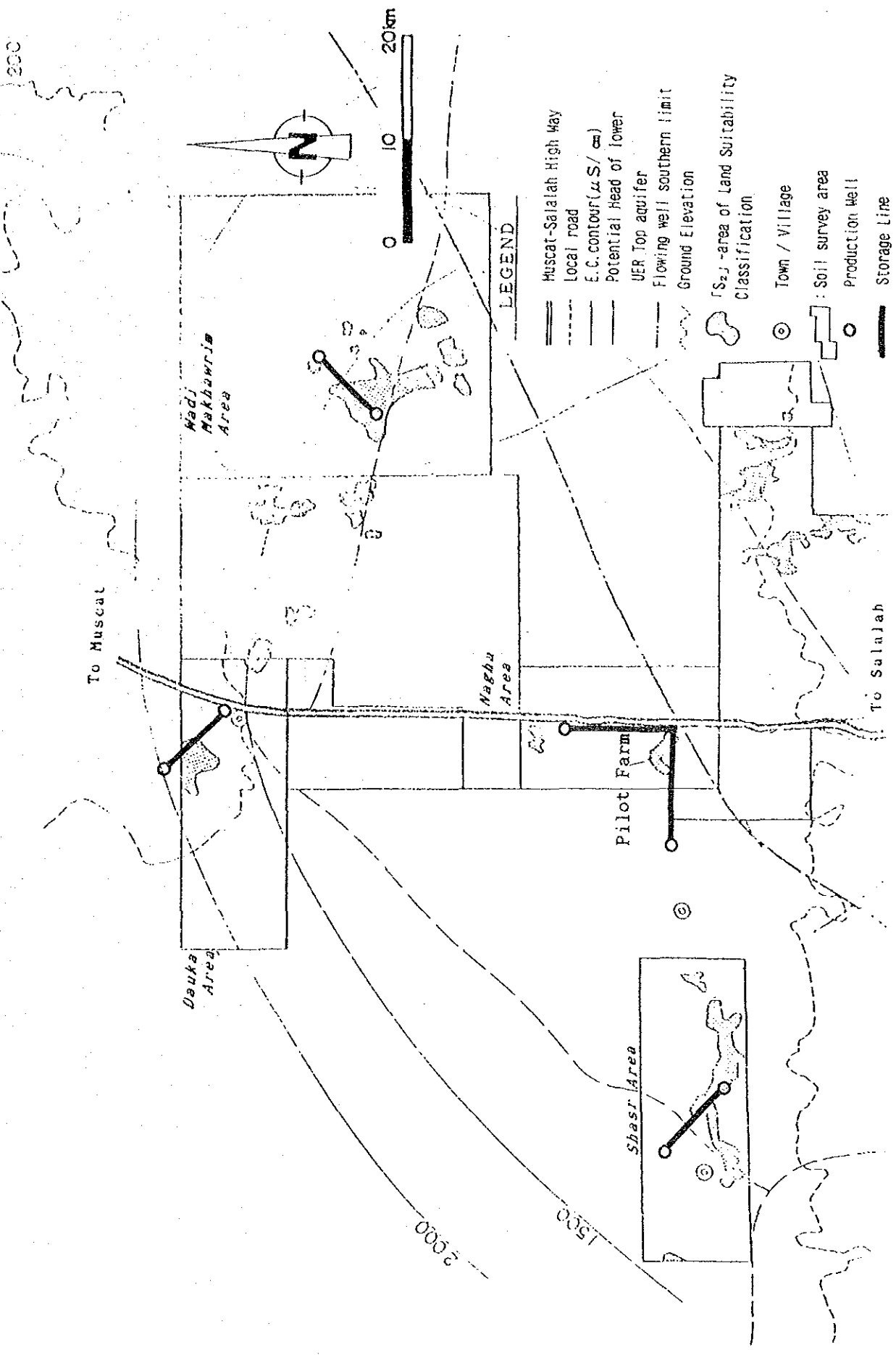


TABLE A-6.6.14 Project Cost Estimate of Farm Dispersal Case

ITEMS	DAUKA	WADI MOKHA	WADI MOKHA	NAGHA	SHASR	TOTAL
	100HA	WRIM - 1 50HA	WRIM - 2 100HA	100HA	150 HA	500HA
1. CIVIL WORKS						
1-1 PREPARATORY WORKS	15000	7500	15000	15000	22500	75000
1-2 LAND RECLAMATION	1250	625	1250	1250	1875	6250
1-3 INTAKE FACILITY						
PRODUCTION WELL	298200	149100	298200	225740	338610	1309850
MONITORING WELL	268380	134190	268380	203166	304749	1178865
SUBM. PUMP & HUT	0	33675	67350	67350	0	168375
GENER. & HUT	0	17375	34750	34750	0	86875
STORAGE LINE	554057	46171	554057	1015772	600228	2770285
O/M ROAD	0	0	41250	41250	41250	123750
* SUM	1120637	380511	1263987	1588028	1284837	5638000
1-4 IRRIG. FACILITY						0
FARM POND	65170	32585	65170	65170	97755	325850
BOOSTER PUMP	303500	151750	303500	303500	455250	1517500
PUMP STATION	12000	6000	12000	12000	18000	60000
GENER. & HUT	38000	19000	38000	38000	57000	190000
LINE FOR DRIP	83420	41710	83420	83420	125130	417100
LINE FOR CE. PIVOT	75248	37624	75248	75248	112872	376240
DRIP SYSTEM	32414	16207	32414	32414	48621	162070
CENTRE PIVOT	56038	28019	56038	56038	84057	280190
WIND BREAK TREE	34636	17318	34636	34636	51954	173180
WIND BREAK FENCE	159434	79717	159434	159434	239151	797170
TRUNK ROAD	51422	25711	51422	51422	77133	257110
CULTIV. PASS	3046	1523	3046	3046	4569	15230
* SUM	914328	457164	914328	914328	1371492	4571640
1-5 CONNECTING ROAD	651250	1302500	1953750	65125	1953750	5926375
1-6 HOUSING	118750	59375	118750	118750	178125	593750
** TOTAL	2821215	2207675	4267065	2702481	4812579	16811015
2. EQUIPMENTS						
2-1 VEHICLE	14700	7350	14700	14700	22050	73500
2-2 MACHINERY SEEDING	20420	20420	20420	20420	20420	102100
MACHINERY HARVEST	146200	73100	146200	146200	219300	731000
** TOTAL	181320	100870	181320	181320	261770	906600
3. TOTAL (1+2)	3002535	2308545	4448385	2883801	5074349	17717615
4. PROJECT FACILITY	14800	7400	14800	14800	22200	74000
5. ADMINISTRATION	11400	5700	11400	11400	17100	57000
6. CONSUL. SERV(3+0.08)	240200	185000	356000	230700	406000	1417900
7. SUB TOTAL (3+4+5+6)	3268935	2506645	4830585	3140701	5519649	19266515
8. PHY. CONTING. (7+0.01)	326894	250665	483059	314070	551965	1926652
9. GRAND TOTAL (7+8)	3595829	2757310	5313644	3454771	6071614	21193167

#### 6.6.6 Submersible Pump Selection

In the arid region like the Nejd, any agricultural development plans are absolutely under the control of the technical and economical characteristics of available water resources, particularly groundwater.

Present groundwater investigation disclosed the target aquifer in the project site to be strongly pressured confined one and it will store almost stagnant fossil water. Since any extraction of water causes inevitable decline of waterhead, it is necessary to envisage a limited availability of groundwater both in terms of volume and span for its agricultural use.

It would be too costly for any agricultural development scheme to make use of the phreatic groundwater which lies three hundred metres deep. In no occasion would it be used for the time being, though the volume of reserve is enormous.

So artesian groundwater, the water table of which is upto a hundred meters deep, would be a target resource for the agricultural development projects in general.

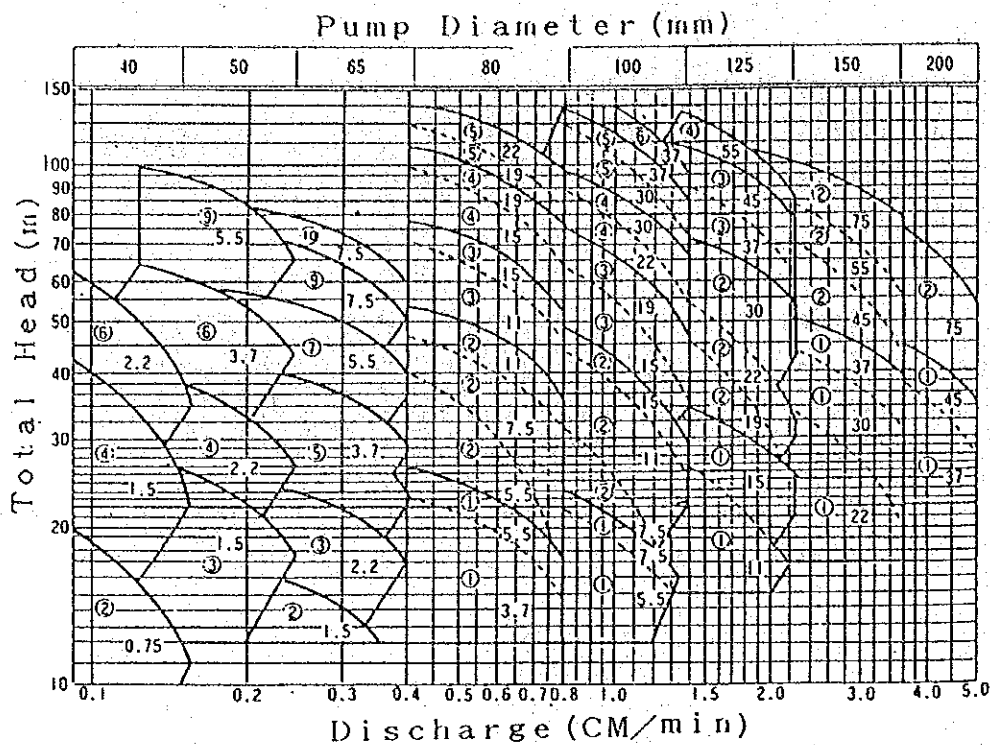
##### (1) Ordinary submersible pump selection diagram.

FIG.A-6.6.4 shows the selection of an ordinary submersible pump. Although the figure is prepared by a pump manufacturer, it is clear that the total head of a pump required for a discharge of about 3.6 cubic meters per minute which was the estimated value for the pilot farm, would be within sixty meters or so. If the pumping requirement is out of the diagram then the pumps should be manufactured by an order with new dimensions.

Generally, ordering a pump with more capacity than those prescribed in the diagram will cost higher and also will have bigger outer-diameter than the ordinary one.

FIG. A-6.6.5 Submersible Pump Selection Diagram

(60Hz 3600rpm)



Legend ② or ③ shows Number of Propeller  
11 or 22 shows Motor Capacity (Kw)

This diagram indicates the ordinary submersible pump selection  
The cost of pumps out of the diagram would increase higher  
than the ordinary because of order-made.

(2) Water cost of pumps clarified by head

TABLE A-6.6.15 summarizes roughly the unit water cost of the pumps clarified by head under the assumptions mentioned below. Although it is hard to see the actual rate of the water cost against the benefit because of the rough estimation, it is clear that the water cost increases rapidly with increase in pumping head.



TABLE A-6.6.15 Water Cost by Pump Head

Total load (m)	(1) Discharge (cub. m/min)	(2) Discharge (cub. m/yr)	Pump O. D (mm)	Well I. D (mm)	(3) Pump Power (KW)	(4) Generat'g Power (KVA)	(5) Fuel Consump'n (l /hr)	(6) Pump Cost (R. O. )	(7) Genera'r Cost (R. O. )	(8) Water Cost (R. O. /cub. m)
30	3.6	1,419,120	200	300	28	38	11.5	20,300	3,300	0.012
50	3.6	1,419,120	200	300	45	60	14.1	27,000	3,500	0.014
100	3.6	1,419,120	250	350	100	135	30.6	56,300	7,700	0.027
200	3.6	1,419,120	300	400	220	295	86.0	147,500	16,950	0.067

\* Note:

(2) = (1) x 60min x 18hr x 365days

(4) = (3) x 0.746

(8) = ( Well Depreciation  
 + Pump Depreciation  
 + Pump Maintenance  
 + Generator Depreciation  
 + Generator Maintenance  
 + fuel for Generator  
 + Lubricating oil for Generator ) ÷ (2)

Assumption

Well Depreciation ..... R. O. 40,000/yr (Production & Observation Well)  
 Pump Depreciation ..... (6) ÷ 10yrs  
 Pump Maintenance ..... (6) x 2.0 %  
 Generator Depreciation ..... (7) ÷ 10yrs  
 Generator Maintenance ..... (7) x 5.0 %  
 Fuel for Generator ..... (5) x 18hr x 365days  
 Lubricating oil for Generator ... (5) x 18hr x 365days ) x 30.0 %



APPENDIX - 7

PROJECT APPRAISAL



7	<u>PROJECT APPRAISAL</u>	<u>Page</u>
7.1	<u>National Policy for Agriculture-Livestock and Its Related Sectors</u> (None)	
7.2	<u>Regional Policy of the Southern Region</u> (None)	
7.3	<u>The Nejd Sub-Region and Its Potential Role in the Southern Region</u> (None)	
7.4	<u>Significance of Pilot Farm</u> (None)	
7.5	<u>Appraisal of the Nejd Agriculture Development Plan</u>	
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TABLE A-7.5.1

TABLE A-7.5.1 Capital Investment Schedule		UNIT: RO (JAN. 1989 PRICE)										USE LIFE	
		1ST YEAR	2ND YEAR	3RD YEAR	4TH YEAR	5TH YEAR	6TH YEAR	7TH YEAR	8TH YEAR	9TH YEAR	10TH YEAR	TOTAL	
		MAGPAH-1	DAUKA-1	MAGPAH-2	DAUKA-2	MAGPAH-3	DAUKA-3	MAGPAH-4	DAUKA-4	MAGPAH-5	DAUKA-5		
4	CIVIL PREPARATORY WORK, P	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	75,000	--
5	WORK WATER PRODUCT WELL	112,870	149,100	112,870	149,100	112,870	149,100	112,870	149,100	112,870	149,100	1,309,850	30
6	SUPPLY MONIT'N WELL	101,583	134,190	101,583	134,190	101,583	134,190	101,583	134,190	101,583	134,190	1,178,865	30
7	SUBM. PUMP	27,425	0	27,425	0	27,425	0	27,425	0	27,425	0	137,125	10
8	PUMP HOUSE	6,250	0	6,250	0	6,250	0	6,250	0	6,250	0	31,250	30
9	GENERATOR	9,875	0	9,875	0	9,875	0	9,875	0	9,875	0	49,375	10
10	GEN. HOUSE	7,500	0	7,500	0	7,500	0	7,500	0	7,500	0	37,500	30
11	PIPE LINE	507,886	46,171	507,886	507,886	507,886	507,886	507,886	507,886	507,886	507,886	4,617,145	30
12	SUM	773,389	329,461	773,389	791,176	773,389	791,176	773,389	791,176	773,389	791,176	7,361,110	
13	ROAD O/M ROAD	0	0	41,250	0	41,250	41,250	41,250	41,250	0	41,250	247,500	30
14	CONNECT ROAD	10,000	100,000	0	0	0	0	0	0	0	0	110,000	30
15	SUM	10,000	100,000	41,250	0	41,250	41,250	41,250	41,250	0	41,250	357,500	
16	WATER+ROAD: TOTAL	783,389	429,461	814,639	791,176	814,639	832,426	814,639	832,426	773,389	832,426	7,718,610	
17	LAND RECLAMATION	625	625	625	625	625	625	625	625	625	625	6,250	--
18	IRRI-GA- FARM POND	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585	32,585	325,850	30
19	TION BOOST. PUMP	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750	151,750	1,517,500	10
20	PUMP STATION	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	60,000	30
21	GENERATOR	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	11,500	115,000	10
22	GEN. HOUSE	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	75,000	30
23	LINE FOR DRIP	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710	41,710	417,100	30
24	LINE FOR C.P.	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624	37,624	376,240	30
25	DRIP SYSTEM	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207	16,207	162,070	5
26	CENTRE PILOT	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019	28,019	280,190	10
27	WINDBK-TREE	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318	17,318	173,180	30
28	WINDBK-FENCE	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717	79,717	797,170	30
29	TRUNK ROAD	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711	25,711	257,110	30
30	CULTIV. PASS	1,523	1,523	1,523	1,523	1,523	1,523	1,523	1,523	1,523	1,523	15,230	30
31	SUM	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164	457,164	4,571,640	
32	HOUSING	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375	59,375	593,750	30
33	TOTAL	1,368,053	954,125	1,339,303	1,318,899	1,339,303	1,357,090	1,339,303	1,357,090	1,298,053	1,357,090	12,965,250	
34	EQUIP- VEHICLE	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350	7,350	73,500	10
35	FERT MACHIN- STABILIZER	20,420	0	0	0	0	20,420	0	0	0	0	40,840	5
36	ERY HARVESTER	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100	73,100	731,000	5
37	TOTAL	100,870	80,450	80,450	80,450	80,450	100,870	80,450	80,450	80,450	80,450	804,500	
38	L REC+IRRI+HOUSE+EQP	618,034	597,614	597,614	597,614	597,614	618,034	597,614	597,614	597,614	597,614	6,016,990	
39	TOTAL T	1,408,923	1,034,575	1,419,753	1,396,250	1,419,753	1,457,960	1,419,753	1,457,960	1,378,503	1,457,960	13,810,590	
40	A: PROJECT FACILITY	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	7,400	74,000	
41	B: ADMINISTRATION	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700	5,700	57,000	
42	C: CONSULTANT SERVICE	113,000	83,000	114,000	112,000	114,000	117,000	114,000	115,000	110,000	115,000	1,107,000	
43	D: PHYSICAL CONTINGENCY	153,502	113,068	154,685	152,139	154,685	158,806	154,685	156,564	150,160	156,564	1,504,859	
44	GRAND TOTAL	1,668,525	1,243,743	1,701,538	1,673,529	1,701,538	1,746,866	1,701,538	1,722,204	1,651,763	1,722,204	16,553,450	

TABLE A-7.5.2 Water Supply, Road and Farm-Wise Investment: Depreciation, Maintenance and Fuel Costs Replacement Capital		UNIT: RO (JAN. 1989 PRICE)										
		1ST YEAR	2ND YEAR	3RD YEAR	4TH YEAR	5TH YEAR	6TH YEAR	7TH YEAR	8TH YEAR	9TH YEAR	10TH YEAR	TOTAL
		MAGPAH-1	DAUKA-1	MAGPAH-2	DAUKA-2	MAGPAH-3	DAUKA-3	MAGPAH-4	DAUKA-4	MAGPAH-5	DAUKA-5	
45	A+B+C+D+P	287,102	216,658	289,285	284,739	289,285	296,406	289,285	292,164	280,760	292,164	2,817,859
46	(WATER+ROAD)/(1+G)/(T-P)	943,878	520,059	981,509	953,983	981,509	1,002,535	981,509	1,002,495	931,767	1,002,495	9,301,144
47	FARM (T-P-WATER-ROAD)/(1+G)/(T-P)	744,647	723,684	720,029	720,141	720,029	744,331	720,029	719,709	719,996	719,709	7,252,305
48	TOTAL	1,668,525	1,243,743	1,701,538	1,673,529	1,701,538	1,746,866	1,701,538	1,722,204	1,651,763	1,722,204	16,553,450
49	WATER + ROAD	23,600	14,315	29,642	26,373	29,642	27,748	29,642	27,748	28,267	27,748	277,480
50	DEPRECIATION COST	17,642	146	17,673	508	17,673	549	17,673	549	17,632	549	176,420
51	MAINTENANCE + FUEL COST	46,242	14,461	47,315	26,861	47,315	28,297	47,315	28,297	45,899	28,297	462,060
52	TOTAL	57,423	53,339	53,339	53,339	53,339	57,423	53,339	53,339	53,339	53,339	533,339
53	DEPRECIATION COST	35,005	32,234	32,234	32,234	32,234	35,005	32,234	32,234	32,234	32,234	322,340
54	MAINTENANCE + FUEL COST	92,428	85,573	85,573	85,573	85,573	92,428	85,573	85,573	85,573	85,573	855,730
55	TOTAL	139,670	100,034	132,898	112,454	132,898	120,725	132,898	113,870	131,472	113,870	1,138,770
56	WATER + ROAD CUMULATIVE	23,600	42,915	72,557	98,930	128,572	156,320	185,962	213,710	241,977	269,725	2,697,250
57	DEPRECIATION COST	17,642	17,788	35,461	35,969	53,642	54,191	71,864	72,413	90,045	90,594	905,940
58	MAINTENANCE + FUEL COST	46,242	60,703	108,018	134,899	162,214	210,511	257,826	286,123	332,022	360,319	3,603,190
59	TOTAL CUMULATIVE	57,423	107,066	156,749	206,412	256,075	309,322	355,809	401,796	447,783	493,770	4,937,770
60	DEPRECIATION COST	35,005	64,468	93,931	123,394	152,637	185,091	211,783	238,476	265,167	291,859	2,918,590
61	MAINTENANCE + FUEL COST	92,428	171,554	250,680	329,806	408,932	494,913	567,592	640,271	712,950	785,629	7,856,290
62	TOTAL	139,670	232,257	353,898	464,705	591,146	705,424	825,418	926,394	1,044,972	1,145,948	11,453,940
63	REPLACEMENT	37,300	0	37,300	0	37,300	0	37,300	0	37,300	0	373,000
64	WATER+ROAD	746,099	429,461	777,339	791,176	777,339	832,426	777,339	832,426	736,089	832,426	7,532,110
65	FARM	109,727	89,307	89,307	89,307	89,307	109,727	89,307	89,307	89,307	89,307	933,910
66	10 YEARS	198,619	198,619	198,619	198,619	198,619	198,619	198,619	198,619	198,619	198,619	1,986,190
67	30 YEARS	309,063	309,063	309,063	309,063	309,063	309,063	309,063	309,063	309,063	309,063	3,090,630
68	* SEE TABLE A-7.4.1											
69	A: PROJECT FACILITY	D. PHYSICAL CONTINGENCY										
70	B: ADMINISTRATION	P. PREPARATORY WORK										
71	C: CONSULTANT SERVICE	T. TOTAL										
72	TOTAL	PRE+LAND.RE										81,250
73	TOTAL											13,810,590

TABLE A-7.5.2

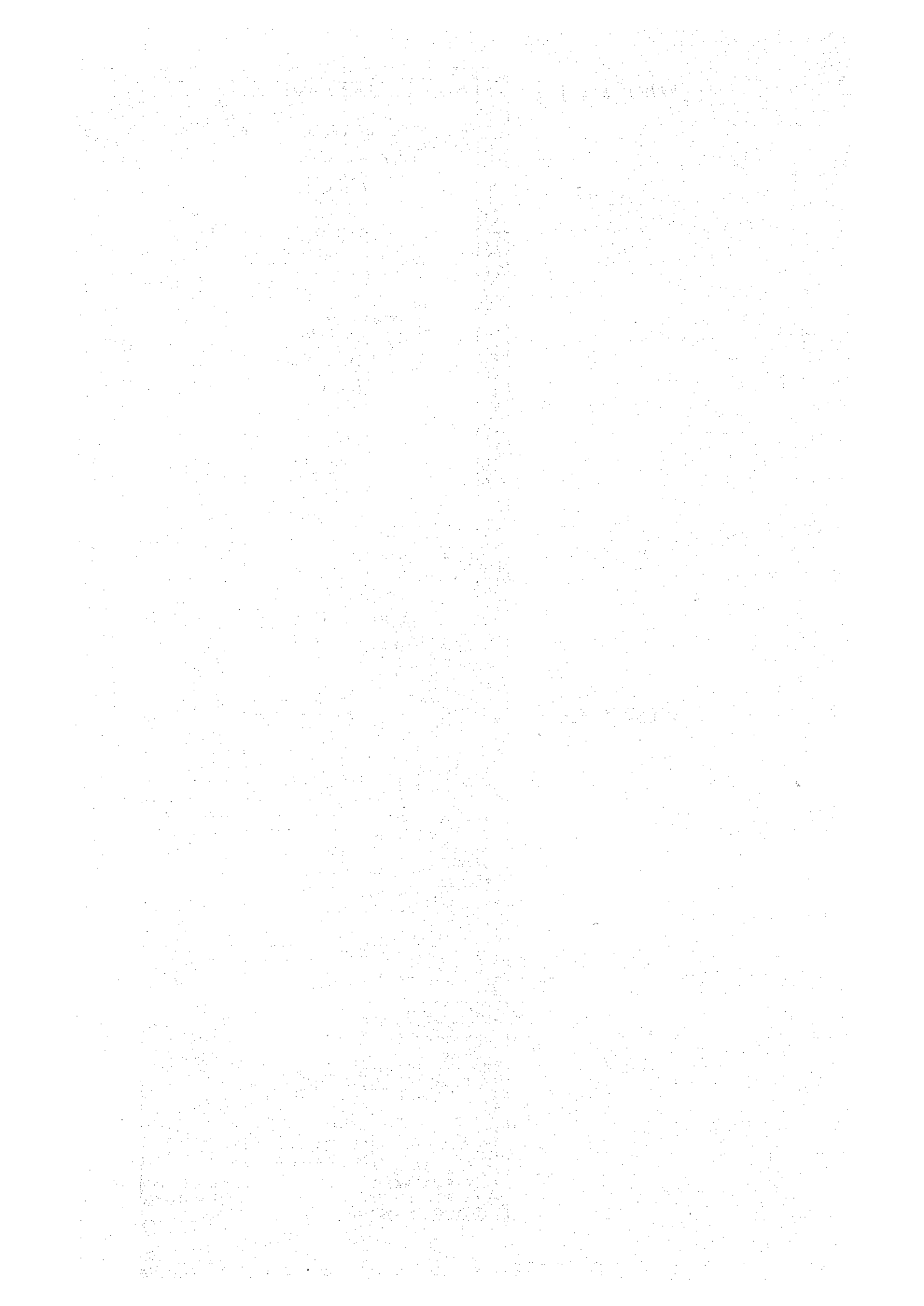
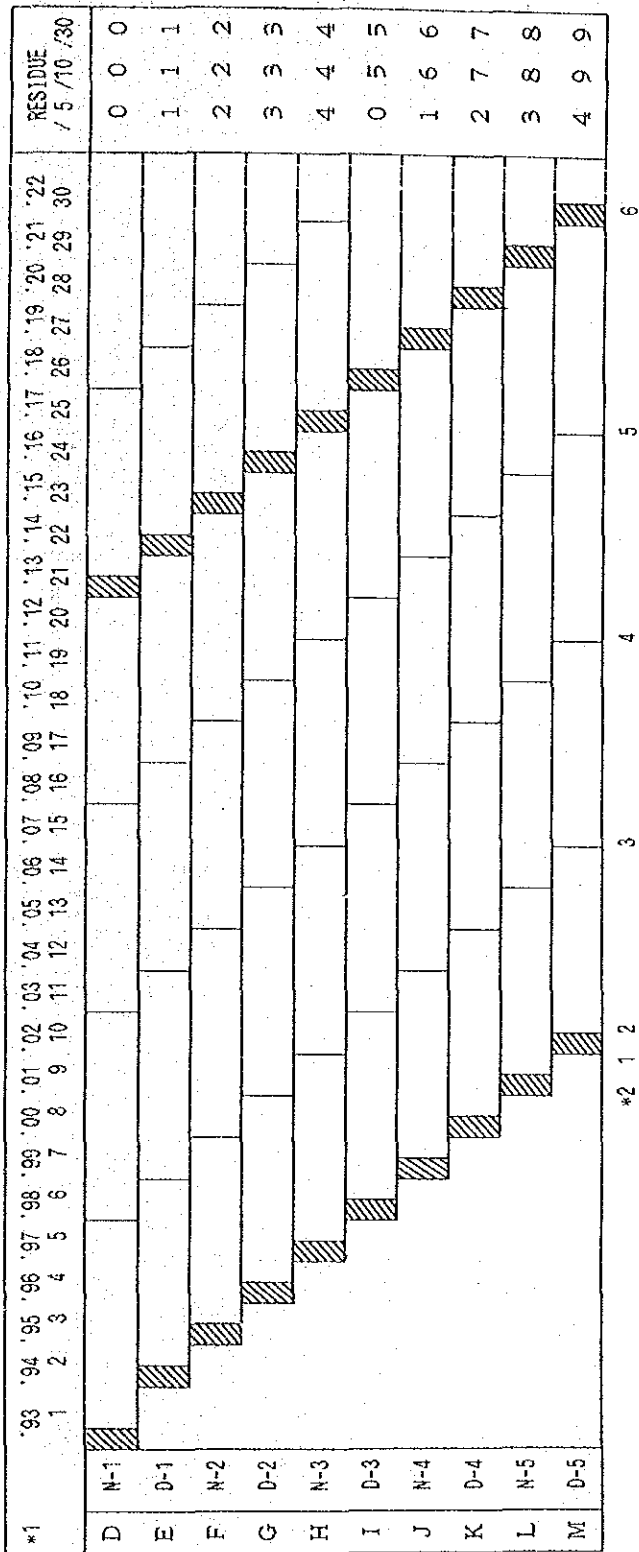


FIG. A-7.5.1

FIG. A-7.5.1 Reference Chart for Repayment Schedule of Each Sub-Unit



\* 1 Correspond to the Columns of TABLE A-7.5.1

\* 2

Construction Period	Replacement	Repayment
1		
2		
3	5 year	End of Grace Period
4	5+10 year	End of Grace Period
5	5 year	End of Amortization
6	5+10 year	End of Amortization



TABLE A-7.5.3(1) Investment, Replacement & O/M Cost and Residue Value										TABLE A-7.5.3(2) Income, Production Cost and FIRR														
Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21				
NO	YEAR	INVESTMENT		REPLACEMENT			MAINTENANCE+FUEL		TOTAL			AREA			INCOME: B		PRO.COST: P		B-C-P		PROD.WELL+ MAINTENANCE		B-C-P-PW	
		W+R	FARM	W+R	FARM: 5Y	FARM: 10Y	W+R	FARM	W+R	FARM C	TOTAL C	ha	RO	RO	RO	RO	RO	RO	RO	RO	PIP GENRTR + FUEL: P+R	RO	RO	
1	1993	943,878	744,647				8,821	17,503	952,699	762,150	1,714,849	25	100,000	31,310	-1,646,158	-693,459	163,920	8,562	-865,941					
2	1994	520,059	723,684				17,715	48,351	537,774	772,035	1,309,809	75	300,000	93,929	-1,103,738	-565,964	149,100	17,124	-732,169					
3	1995	981,509	720,029				26,625	77,814	1,008,134	797,843	1,805,977	125	500,000	156,548	-1,462,524	-454,390	163,920	34,248	-652,559					
4	1996	953,388	720,141				35,715	107,277	989,103	827,418	1,816,521	175	700,000	219,167	-1,335,689	-346,584	149,100	34,248	-529,932					
5	1997	981,509	720,029				44,806	136,740	1,026,315	856,769	1,883,084	225	900,000	281,786	-1,264,869	-259,554	163,920	51,372	-453,845					
6	1998	1,002,535	744,331			109,727	53,917	167,589	1,056,451	1,021,647	2,078,098	275	1,100,000	344,405	-1,322,503	-266,051	149,100	51,372	-466,523					
7	1999	981,509	720,029			89,307	63,026	195,666	1,044,537	1,005,002	2,049,539	325	1,300,000	407,024	-1,156,562	-112,025	163,920	68,496	-344,441					
8	2000	1,002,495	719,709			89,307	72,139	222,358	1,074,633	1,031,374	2,106,007	375	1,500,000	469,643	-1,075,650	-1,017	149,100	68,496	-218,613					
9	2001	951,767	719,996			89,307	81,229	249,050	1,012,996	1,058,353	2,071,349	425	1,700,000	532,262	-903,611	109,335	163,920	85,620	-140,155					
10	2002	1,002,495	719,709			89,307	90,320	275,742	1,092,814	1,084,758	2,177,573	475	1,900,000	594,891	-872,453	220,361	149,100	85,620	-14,359					
11	2003			37,300	219,454	198,619	90,594	291,859	127,894	709,932	837,826	500	2,000,000	626,190	535,984	663,878	37,300	85,620	540,958					
12	2004			0	178,614	198,619	90,594	291,859	90,594	669,092	759,686	500	2,000,000	626,190	614,124	704,718	0	85,620	619,093					
13	2005			37,300	178,614	198,619	90,594	291,859	127,894	669,092	796,986	500	2,000,000	626,190	576,824	704,718	37,300	85,620	531,799					
14	2006			0	178,614	198,619	90,594	291,859	90,594	669,092	759,686	500	2,000,000	626,190	614,124	704,718	0	85,620	619,093					
15	2007			37,300	178,614	198,619	90,594	291,859	127,894	669,092	796,986	500	2,000,000	626,190	576,824	704,718	37,300	85,620	531,799					
16	2008			0	178,614	198,619	90,594	291,859	90,594	669,092	759,686	500	2,000,000	626,190	614,124	704,718	0	85,620	619,093					
17	2009			37,300	178,614	198,619	90,594	291,859	127,894	669,092	796,986	500	2,000,000	626,190	576,824	704,718	37,300	85,620	531,799					
18	2010			0	178,614	198,619	90,594	291,859	90,594	669,092	759,686	500	2,000,000	626,190	614,124	704,718	0	85,620	619,093					
19	2011			37,300	178,614	198,619	90,594	291,859	127,894	669,092	796,986	500	2,000,000	626,190	576,824	704,718	37,300	85,620	531,799					
20	2012			0	178,614	198,619	90,594	291,859	90,594	669,092	759,686	500	2,000,000	626,190	614,124	704,718	0	85,620	619,093					
21	2013			37,300	219,454	198,619	90,594	291,859	127,894	709,932	837,826	500	2,000,000	626,190	535,984	663,878	37,300	85,620	540,958					
22	2014			0	178,614	198,619	90,594	291,859	90,594	669,092	759,686	500	2,000,000	626,190	614,124	704,718	0	85,620	619,093					
23	2015			37,300	178,614	198,619	90,594	291,859	127,894	669,092	796,986	500	2,000,000	626,190	576,824	704,718	37,300	85,620	531,799					
24	2016			0	178,614	198,619	90,594	291,859	90,594	669,092	759,686	500	2,000,000	626,190	614,124	704,718	0	85,620	619,093					
25	2017			37,300	178,614	198,619	90,594	291,859	127,894	669,092	796,986	500	2,000,000	626,190	576,824	704,718	37,300	85,620	531,799					
26	2018			0	178,614	198,619	90,594	291,859	90,594	669,092	759,686	500	2,000,000	626,190	614,124	704,718	0	85,620	619,093					
27	2019			37,300	178,614	198,619	90,594	291,859	127,894	669,092	796,986	500	2,000,000	626,190	576,824	704,718	37,300	85,620	531,799					
28	2020			0	178,614	198,619	90,594	291,859	90,594	669,092	759,686	500	2,000,000	626,190	614,124	704,718	0	85,620	619,093					
29	2021			37,300	178,614	198,619	90,594	291,859	127,894	669,092	796,986	500	2,000,000	626,190	576,824	704,718	37,300	85,620	531,799					
30	2022	-1,183,357	-463,595	-74,800	-178,614	-595,167	90,594	291,859	-1,167,363	-1,045,516	-2,212,879	500	2,000,000	626,190	3,536,689	2,419,324	-74,600	85,620	2,408,506					
34	AVERAGE=		725,231																					
35	PR/HA=		4,000																					
35	FIRR=		1.12%																					
35	NPV(10%)=		478,060																					
35	B-C-P-PW		6,94%																					

TABLE A-7.5.4(1) Debt Service Schedule with Cash Flow, P/L Statement & B/S of the 50ha Farm													
(1) CASH FLOW													
38	NO	YEAR	LOAN	SALE	IN FLOW	INVEST-MENT	WATER	O/M	PRODUCTION COST	AMORTIZA-TION	RE-MUNERATION	OUTFLOW	CUMULATIVE BALANCE
39													
40	1	1993	725,231	100,000	825,231	725,231	3,418	14,593	31,310	0	18,000	792,551	52,680
41	2	1994		200,000	200,000		6,836	29,186	62,619	0	36,000	134,641	89,059
42	3	1995		200,000	200,000		6,836	29,186	62,619	0	36,000	134,641	163,398
43	4	1996		200,000	200,000		6,836	29,186	62,619	0	36,000	134,641	229,757
44	5	1997		200,000	200,000		6,836	29,186	62,619	0	36,000	134,641	294,116
45	6	1998		200,000	200,000	93,391	6,836	29,186	62,619	48,349	36,000	276,380	217,756
46	7	1999		200,000	200,000		6,836	29,186	62,619	48,349	36,000	182,989	234,747
47	8	2000		200,000	200,000		6,836	29,186	62,619	48,349	36,000	182,989	251,757
48	9	2001		200,000	200,000		6,836	29,186	62,619	48,349	36,000	182,989	269,766
49	10	2002		200,000	200,000		6,836	29,186	62,619	48,349	36,000	182,989	287,775
50	11	2003		200,000	200,000	292,010	6,836	29,186	62,619	48,349	36,000	474,999	10,779
51	12	2004		200,000	200,000		6,836	29,186	62,619	48,349	36,000	182,989	27,789
52	13	2005		200,000	200,000		6,836	29,186	62,619	48,349	36,000	182,989	44,800
53	14	2006		200,000	200,000		6,836	29,186	62,619	48,349	36,000	182,989	61,810
54	15	2007		200,000	200,000		6,836	29,186	62,619	48,349	36,000	182,989	78,821
55	16	2008		200,000	200,000	93,391	6,836	29,186	62,619	48,349	36,000	276,380	2,440
56	17	2009		200,000	200,000		6,836	29,186	62,619	48,349	36,000	182,989	19,451
57	18	2010		200,000	200,000		6,836	29,186	62,619	48,349	36,000	182,989	36,461
58	19	2011		200,000	200,000		6,836	29,186	62,619	48,349	36,000	182,989	53,472
59	20	2012		200,000	200,000		6,836	29,186	62,619	48,349	36,000	182,989	70,482

TABLE A-7.5.4(2) P/L Statement									
38	NO	YEAR	++ SALE	-- WATER	-- O/M	-- PRODUCTION COST	-- DEPRECIATION	-- REMUNERATION	NET PROFIT
39									
40	1	1993	100,000	3,418	14,593	31,310	0	18,000	32,680
41	2	1994	200,000	6,836	29,186	62,619	48,342	36,000	16,517
42	3	1995	200,000	6,836	29,186	62,619	48,342	36,000	16,517
43	4	1996	200,000	6,836	29,186	62,619	48,342	36,000	16,517
44	5	1997	200,000	6,836	29,186	62,619	48,342	36,000	16,517
45	6	1998	200,000	6,836	29,186	62,619	48,342	36,000	16,517
46	7	1999	200,000	6,836	29,186	62,619	48,342	36,000	16,517
47	8	2000	200,000	6,836	29,186	62,619	48,342	36,000	16,517
48	9	2001	200,000	6,836	29,186	62,619	48,342	36,000	16,517
49	10	2002	20						

TABLE A-7.5.6(1) Investment, Replacement & O/M Cost and Residue Value										TABLE A-7.5.6(2) Income, Production Cost and FIRR									
NO.	YEAR	INVESTMENT		REPLACEMENT		MAINTENANCE + FUEL		TOTAL		GRAND TOTAL	AREA	INCOME	PROD. COST	B-C-P	B-C-P	PROD. WELL + MAINTENANCE	B-C-P-PW		
		W+R	FARM	W+R	FARM	W+R	FARM	W+R	FARM		ha	RO	RO	RO	RO	PMP, GINTR + FUEL, PW	RO		
4	1993	945,878	744,647			8,821	17,503	352,699	752,150	1,714,849	25	70,000	31,310	-1,676,158	-723,459	163,920	8,562		
5	1994	520,059	723,684			17,715	48,351	537,774	772,035	1,309,809	75	210,000	93,929	-1,193,738	-655,964	149,100	17,124		
6	1995	981,509	720,029			26,625	77,814	1,008,134	797,843	1,805,977	125	350,000	156,548	-1,612,524	-604,390	163,920	34,248		
7	1996	953,368	720,141			35,715	107,277	989,103	827,418	1,816,521	175	490,000	219,187	-1,545,668	-558,584	149,100	34,248		
8	1997	981,509	720,029			44,806	136,740	1,026,315	856,769	1,883,084	225	630,000	281,736	-1,534,869	-508,554	163,920	51,372		
9	1998	1,002,535	744,331		109,727	53,917	167,589	1,056,451	1,021,647	2,078,098	275	770,000	344,405	-1,652,503	-586,051	149,100	51,372		
10	1999	981,509	720,029		89,307	63,028	195,666	1,044,537	1,005,002	2,049,539	325	910,000	407,034	-1,546,562	-502,025	163,920	68,496		
11	2000	1,002,495	719,709		89,307	72,139	222,358	1,074,633	1,031,374	2,106,008	375	1,050,000	469,643	-1,525,650	-451,017	149,100	68,496		
12	2001	931,767	719,996		89,307	81,229	249,050	1,012,996	1,050,353	2,071,349	425	1,100,000	532,262	-1,413,611	-400,615	163,920	85,620		
13	2002	1,002,495	719,709		89,307	90,320	275,742	1,092,814	1,084,758	2,177,573	475	1,350,000	594,831	-1,442,453	-349,639	149,100	85,620		
14	2003			37,300	219,454	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-64,016	63,878	37,300	85,620		
15	2004			0	178,614	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-23,176	104,718	0	85,620		
16	2005			37,300	178,614	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-23,176	104,718	37,300	85,620		
17	2006			0	178,614	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-23,176	104,718	0	85,620		
18	2007			37,300	178,614	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-23,176	104,718	37,300	85,620		
19	2008			0	219,454	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-26,716	63,878	0	85,620		
20	2009			37,300	178,614	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-23,176	104,718	37,300	85,620		
21	2010			0	178,614	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-23,176	104,718	0	85,620		
22	2011			37,300	178,614	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-23,176	104,718	37,300	85,620		
23	2012			0	178,614	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-23,176	104,718	0	85,620		
24	2013			37,300	219,454	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-64,016	63,878	37,300	85,620		
25	2014			0	178,614	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-23,176	104,718	0	85,620		
26	2015			37,300	178,614	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-23,176	104,718	37,300	85,620		
27	2016			0	178,614	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-23,176	104,718	0	85,620		
28	2017			37,300	178,614	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-23,176	104,718	37,300	85,620		
29	2018			0	219,454	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-26,716	63,878	0	85,620		
30	2019			37,300	178,614	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-23,176	104,718	37,300	85,620		
31	2020			0	178,614	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-23,176	104,718	0	85,620		
32	2021			37,300	178,614	198,619	90,594	291,859	127,894	709,932	500	1,400,000	626,190	-23,176	104,718	37,300	85,620		
33	2022	-1,183,357	-463,595	-74,603	-178,614	-695,157	90,594	291,859	-1,167,363	-1,045,516	-2,212,879	500	1,400,000	626,190	2,596,889	1,813,325	-74,603	85,620	
34	AVERAGE=		725,231																
35	FIRR=																		
36	NPV(10%)=																		

TABLE A-7.5.7(1) Debt Service Schedule with Cash Flow, P/L Statement & B/S of the 50ha Farm

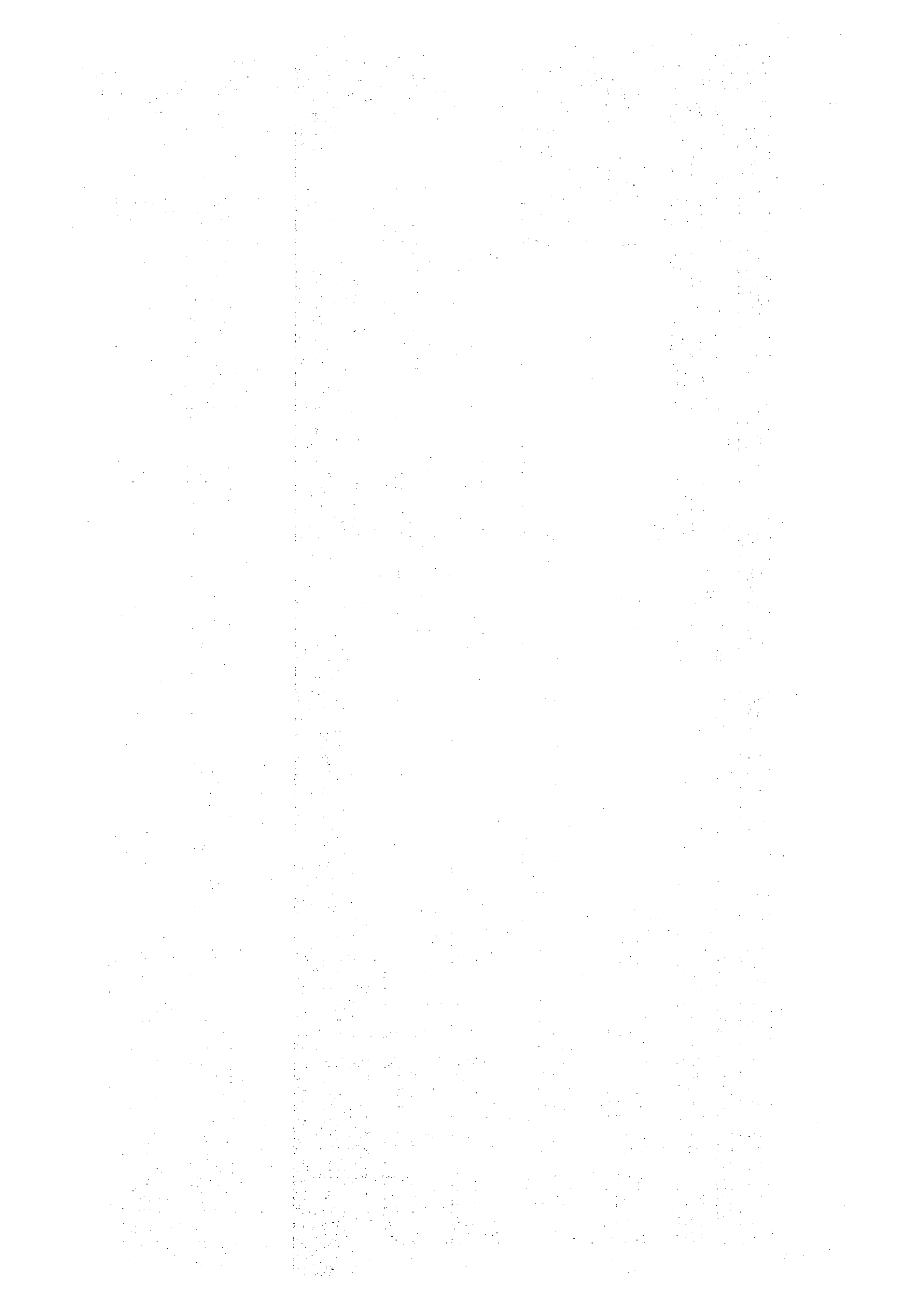
NO.	YEAR	LOAN	SALE	IN FLOW	INVEST-MENT	WATER	O/M	PRODUCTION COST	AMORTIZA-TION	REMUNERATION	OUTFLOW	CUMULATIVE BALANCE
38	1993	725,231	70,000	795,231	725,231	3,418	14,593	31,310	0	0	774,551	20,680
39	1994		140,000	140,000		6,836	29,186	62,619	0	0	98,641	62,039
40	1995		140,000	140,000		6,836	29,186	62,619	0	0	98,641	103,398
41	1996		140,000	140,000		6,836	29,186	62,619	0	0	98,641	144,757
42	1997		140,000	140,000		6,836	29,186	62,619	0	0	98,641	186,116
43	1998		140,000	140,000	93,391	6,836	29,186	62,619	43,349	0	240,380	85,736
44	1999		140,000	140,000		6,836	29,186	62,619	43,349	0	146,989	78,747
45	2000		140,000	140,000		6,836	29,186	62,619	43,349	0	146,989	71,757
46	2001		140,000	140,000		6,836	29,186	62,619	43,349	0	146,989	64,768
47	2002		140,000	140,000		6,836	29,186	62,619	43,349	0	146,989	57,778
48	2003		140,000	140,000	292,010	6,836	29,186	62,619	43,349	0	438,999	-241,221
49	2004		140,000	140,000		6,836	29,186	62,619	43,349	0	146,989	-243,211
50	2005		140,000	140,000		6,836	29,186	62,619	43,349	0	146,989	-255,200
51	2006		140,000	140,000		6,836	29,186	62,619	43,349	0	146,989	-267,190
52	2007		140,000	140,000		6,836	29,186	62,619	43,349	0	146,989	-269,179
53	2008		140,000	140,000	93,391	6,836	29,186	62,619	43,349	0	240,380	-240,380
54	2009		140,000	140,000		6,836	29,186	62,619	43,349	0	146,989	-376,549
55	2010		140,000	140,000		6,836	29,186	62,619	43,349	0	146,989	-388,539
56	2011		140,000	140,000		6,836	29,186	62,619	43,349	0	146,989	-390,528
57	2012		140,000	140,000		6,836	29,186	62,619	43,349	0	146,989	-392,518

TABLE A-7.5.7(2) P/L Statement

NO.	YEAR	SALE	WATER	O/M	PRODUCTION COST	DEPRECIATION	REMUNERATION	NET PROFIT
38	1993	70,000	3,418	14,593	31,310	0	0	20,680
39	1994	140,000	6,836	29,186	62,619	48,842	0	-7,483
40	1995	140,000	6,836	29,186	62,619	48,842	0	-7,483
41	1996	140,000	6,836	29,186	62,619	48,842	0	-7,483
42	1997	140,000	6,836	29,186	62,619	48,842	0	-7,483
43	1998	140,000	6,836	29,186	62,619	48,842	0	-7,483
44	1999	140,000	6,836	29,186	62,619	48,842	0	-7,483
45	2000	140,000	6,836	29,186	62,619	48,842	0	-7,483
46	2001	140,000	6,836	29,186	62,619	48,842	0	-7,483
47	2002	140,000	6,836	29,186	62,619	48,842	0	-7,483
48	2003	140,000	6,836	29,186	62,619	48,842	0	-7,483
49	2004	140,000	6,836	29,186	62,619	48,842	0	-7,483
50	2005	140,000	6,836	29,186	62,619	48,842	0	-7,483
51	2006	140,000	6,836	29,186	62,619	48,842	0	-7,483
52	2007	140,000	6,836	29,186	62,619	48,842	0	-7,483
53	2008	140,000	6,836	29,186	62,619	48,842	0	-7,483
54	2009	140,000	6,836	29,186	62,619	48,842	0	-7,483
55	2010	140,000	6,836	29,186	62,619	48,842	0	-7,483
56	2011	140,000	6,836	29,186	62,619	48,842	0	-7,483
57	2012	140,000	6,836	29,186	62,619	48,842	0	-7,483

TABLE A-7.5.7(3) Balance Sheet

NO.	YEAR	FIXED ASSETS	CUMULATIVE DEPRECIATION	CURRENT ASSETS	ASSETS TOTAL	LIABILITIES	CAPITAL	RETAINED EARNINGS	CAPITAL TOTAL
61	1993	725,231	0	20,680	745,910	725,231	0	20,680	745,910
62	1994	676,388	48,842	13,197	738,427	725,231	0	13,197	738,427
63	1995	627,546	97,684	5,714	730,444	725,231	0	5,714	730,444
64	1996	578,704	146,527	-1,769	723,461	725,231	0	-1,769	723,461
65	1997	529,862	195,369	-9,252	715,976	725,231	0	-9,252	715,976
66	1998	574,411	150,820	-16,735	708,495	676,882	48,349	-16,735	708,495
67	1999	525,568	199,662	-24,218	701,012	628,533	96,697	-24,218	701,012
68	2000	476,726	248,504	-31,701	693,529	580,184	145,046	-31,701	693,529
69	2001	427,884	297,347	-39,184	686,046	531,836	193,395		



Reference Program for the Table between A-7.5.1 ~7.5.8

(1) TABLE A-7.5.3

1) INVESTMENT

S4, S13= D49:M49  
 S33=  $(-E72-F72*2-G72*3-H72*4-I72*5-J72*6-K72*7-L72*8-M72*9)/30$   
 T4:T13= D50:M50  
 T33=  $(-E75-F75*2-G75*3-H75*4-I75*5-J75*6-K75*7-L75*8-M75*9)/30$

2) REPLACEMENT

U14:U23= D71:M71 (U24:U32=REPEATING)  
 U33=  $(M71-(E71+F71*2+G71*3+H71*4+I71*5+J71*6+K71*7+L71*8))/10$   
 Y9:Y13= D73:H73 Y14:Y18= D73\*2:H73\*2(Y19:Y32=REPEATING)  
 Y33=  $((H73+M73)-(E73+J73)-(F73+K73)*2-(G73+L73)*3)/5$   
 W14= D74 (W15:W32=REPEATING)  
 W33=  $(M74-E74-F74*2-G74*3-H74*4-I74*5-J74*6-K74*7-L74*8)/10$

3) MAINTENANCE + FUEL

X4= D63/2 X5= E63-E54/2 ... X12= M63-M54/2  
 X13= M63 X14, X33= M63  
 Y4= D67/2 Y4= E67-E58/2 ... Y12= M67-M58/2  
 Y13= M67 Y14:Y33 M67

(2) TABLE A -7.5.3

1) INCOME:B

AE4= AE34\*AD4 AE33= AE34\*AD33

2) PRODUCTION COST:P

AF4=  $((174+233+87.5+27.9+12.5)/5+(1260+800+1209.6+1312)/4)*AD4$   
 Above figures are extracted from crop budget given in A-6.6.9  
 AF33=  $((174+233+87.5+27.9+12.5)/5+(1260+800+1209.6+1312)/4)*AD33$

(3) TABLE A-7.5.4

1) CASH FLOW

S40=T34=Y40 T40=R04,000\*50/2 T41=R04,000\*50  
 W41= M64/10\*AK65 W40=W41/2 AK65=1-SUM(AK62:AK64)  
 X41= Y33/10 X40=X41/2  
 Y41= AF14/10 Y40=Y41/2  
 Z45= S40/15  
 AA41= R0670/ha\*50ha AA40=AA41/2

2) P/L STATEMENT

AI41=  $(N73/5+N74/10+N75/30)/10$

3) BALANCE SHEET

S64+T64=S82+T82=S63  
 U63=Y63-AK40 ..... U82=Y82-AK59  
 W63+X63=W82+X82=S40

TABLE A-7.5.5

1) INTEREST

AE63= S40\*AE62

2) MONITORING WELL

AK61=  $N12+N15-(N7+N9)*2/3$   
 AF63=  $N49*AF62/10+AF64/2$  AF62=AK62=N6/AK61  
 AF64= M63/10\*AF62  
 AF72=  $(M63+N71)/10*AF62+AF71$

3) PIPELINES+MAINTENANCE ROADS

AG63=  $N49*AG62/10+AG64/2$  AG62=AK63=  $(N11+N13)/AK61$   
 AG64= M63/10\*AG62  
 AG72=  $(M63+N71)/10*AG62+AG71$

4) CONNECTING ROAD

AH63=  $H49*AH62/10+AH64/2$  AH62=AK64= N14/AK61  
 AH64= M63/10\*AH62  
 AH72=  $(M63+N71)/10*AH62+AH71$



APPENDIX-8

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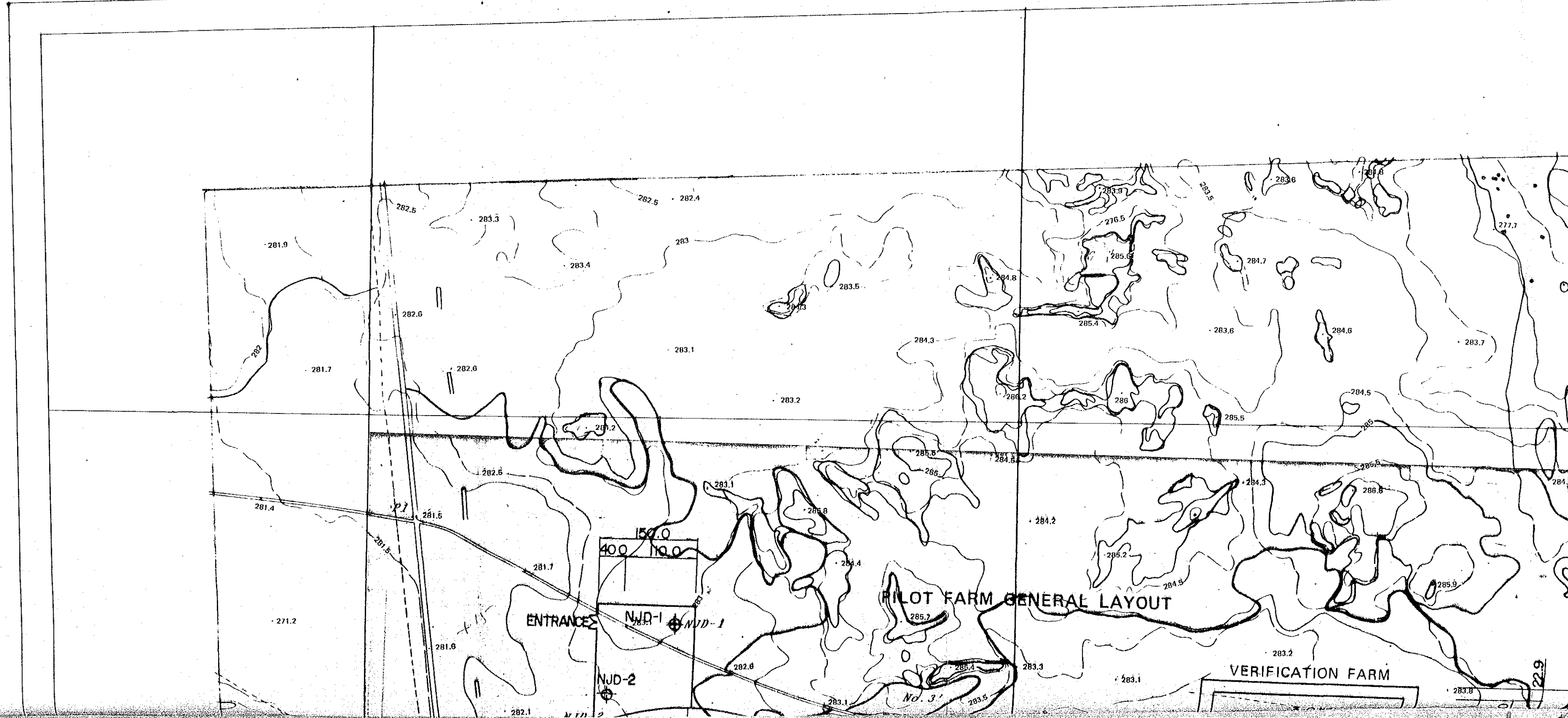
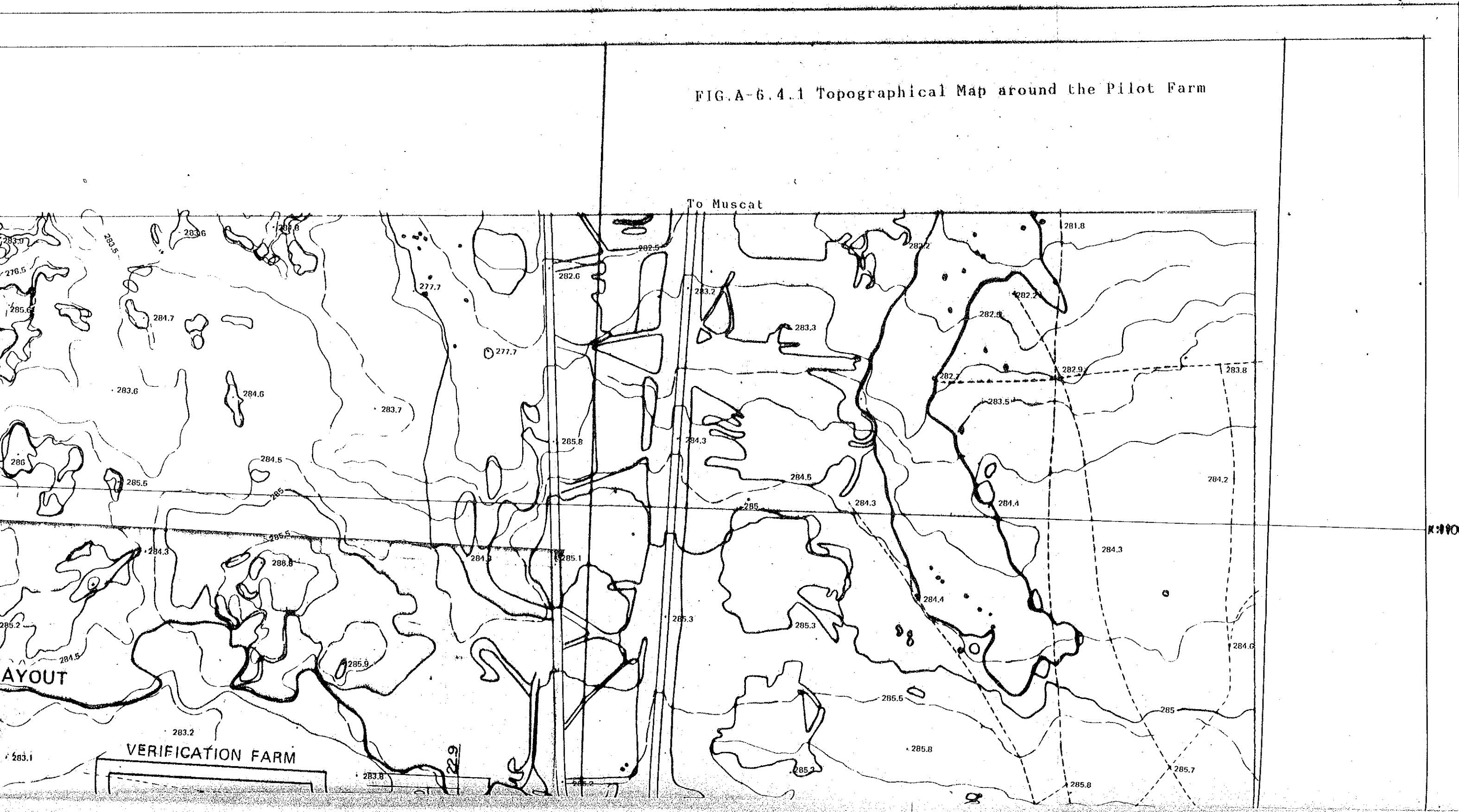
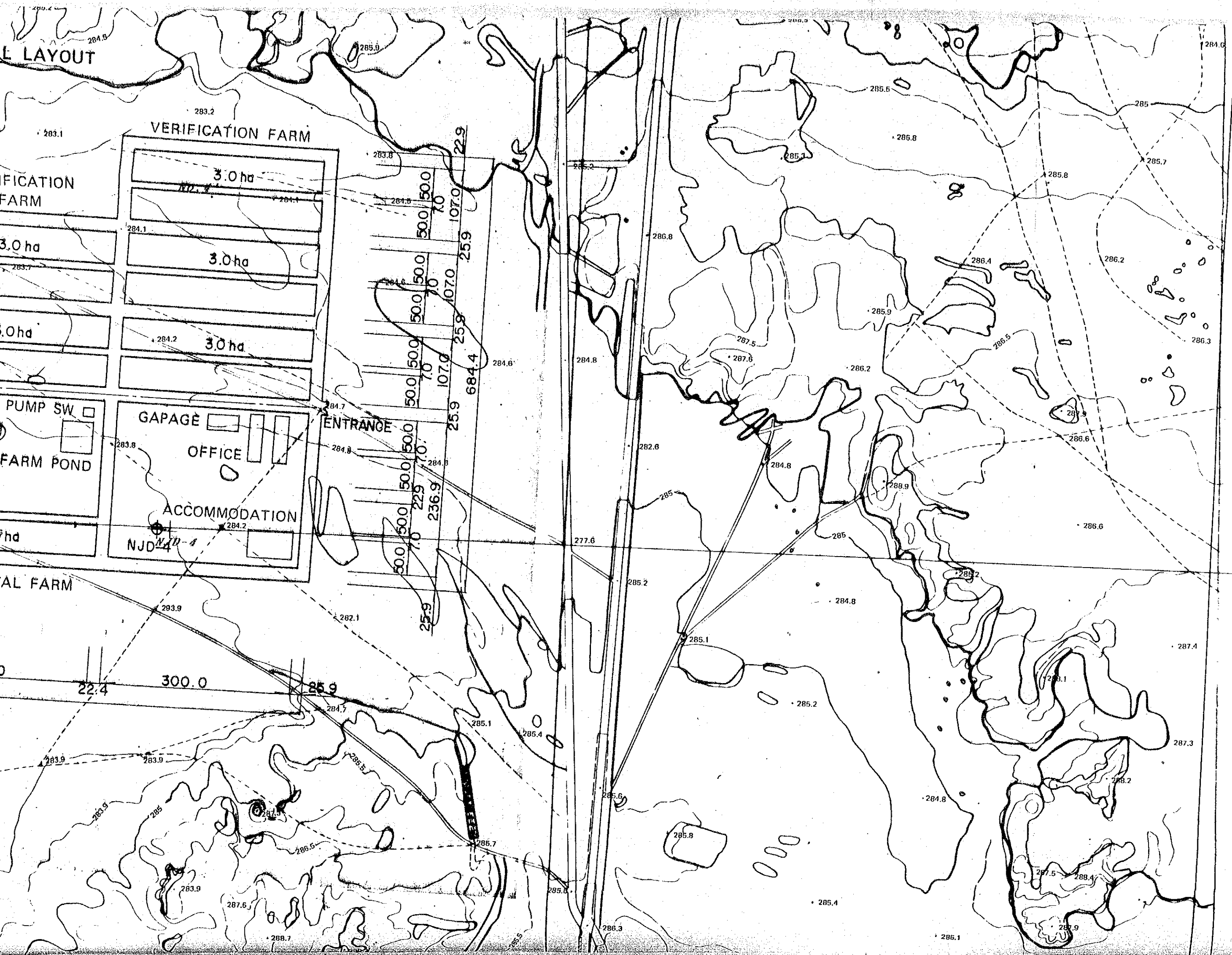


FIG.A-6.4.1 Topographical Map around the Pilot Farm

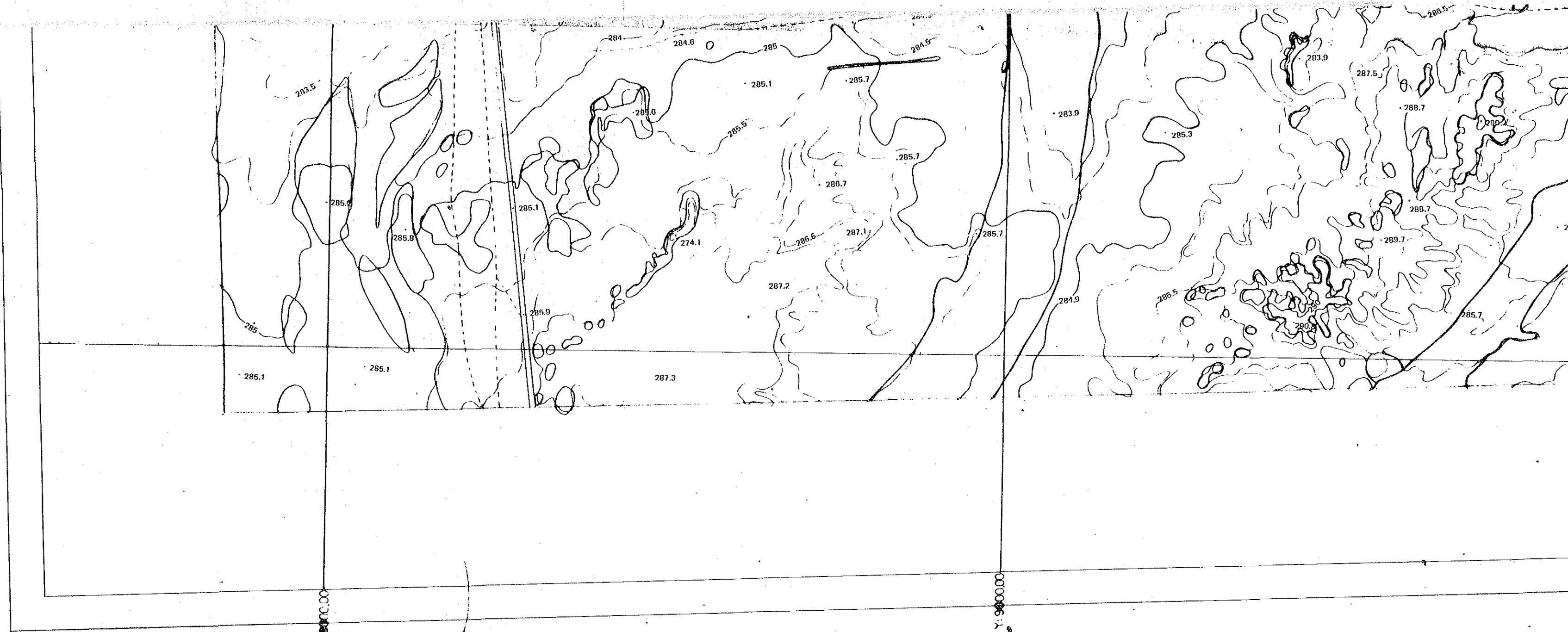


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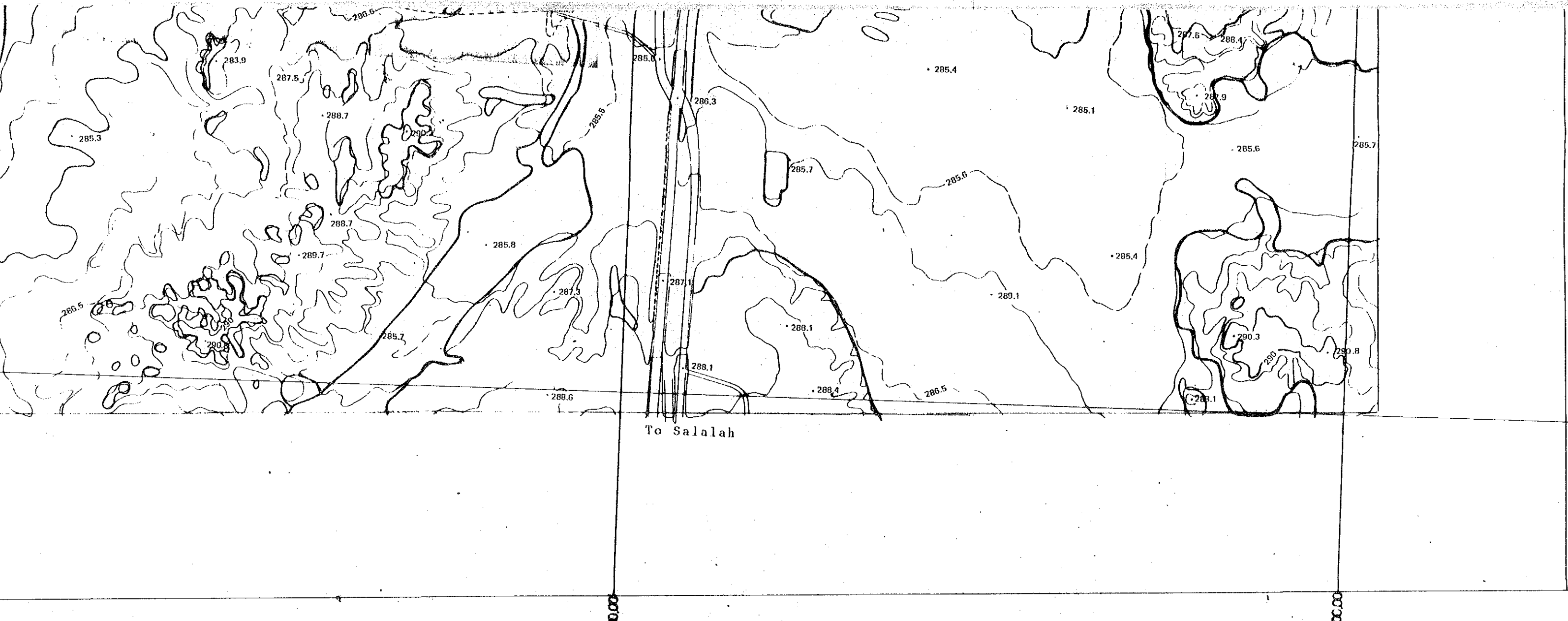




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