FEASIBILITY REPORT
ON
THE MORAGAHAKANDA AGRICULTURAL DEVELOPMENT PROJECT

VOLUME II
DOWNSTREAM DEVELOPMENT

OCTOBER 1979

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Democratic Socialist Republic of Sri Lanka
The Ministry of Mahaweli Development

FEASIBILITY REPORT ON THE MORAGAHAKANDA AGRICULTURAL DEVELOPMENT PROJECT

VOLUME Ⅲ
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FEASIBILITY STUDY REPORT
ON
THE MORAGAHAKANDA AGRICULTURAL DEVELOPMENT PROJECT

VOLUME III :

DOWNSTREAM DEVELOPMENT

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ANNEX V : SOIL SURVEY

Contents

I Summary and Conclusion

Most of soils in project area is fairly good for agricultural development.

Soil units in project area can be classified into six main groups, that is, Reddish Brown Earths-well drained series, Reddish Brown Earths-imperfecttly drained series, Low Humic Gley soils, Alluvial Soils, Solonetz soils and Rockey and Shallow phase soils.

These former four soil units, which acreage are shown in the following table, are suitable for agricultural development.

Table 5-1 Suitability of Soils for Agricultural Development

Suitability for Agriculture Development	Acreage (Acre)					
	A/D	D_1S	D_1N	D_2	G	Total
Suitable	15,745	51,920	26,640	14,330	15,460	124,095
Unsuitable	2,165	6,895	1,600	370	7,720	18,750

Note

1. The above Table shows only acreage of undeveloped area in the proposed project site.
2. D_1-N area is locating on the west and north side of A/D area.
3. The final suitable acreage for agriculture will be changed to the result of topographical survey.

In project area, six main soil units are existing and the cropping potential in each unit are as follows.

a) Reddish Brown Earths, well drained series

Very good to good land for upland crops.
All upland crops of dry zone can be grown.
Organic matter should be added.

b) Reddish Brown Earths, imperfectly drained series

Very good for lowland rice.
Lowland rice, sugar cane and pastures can be grown.

c) <u>Low humic gley soils</u>

Not so good for upland crops.

Only lowland rice can be grown.
(Partly upland crops in Yala Season.)

Drainage would be beneficial.

d) <u>Alluvial soils, wellto moderately drained series</u>

Very good to good for cash crops.

Profitable cash crops such as tobacco and vegetables can be grown.

These soils are only existing in D_2 area.

e) <u>Alluvial soils, imperfectly drained series</u>

Not so good for upland crops.

Only lowland rice can be grown.

Drainage would be beneficial.

Prevention of flood is necessary.

f) <u>Solonetz</u>

Generally very poor to poor.

These Lands are generally unsuitable for crops.

It would be better to abondon these land.

(Generally, leave these soils until determine their salt content by future survey.)

g) <u>Shallow and Rocky phase, rock knob plain</u>

These lands are unsuitable for crops, but good for settlement. (household area)

h) <u>Erosional Remnants</u>

Generally unsuitable for development.

Acreage of the above soils are given in Table 5-2 in the next page.

Table 5-2 Acreage of Main Soil Units in Underdeveloped Area (Acres)

	A/D	D_1S /1	D_1N /2	D_2	G	Total
Reddish brown earths well drained series	5,510	13,645	12,640	130	7,370	39,295
Reddish brown earths imperfectly drained series	5,215	9,980	6,030	0	5,470	26,695
Low humic gley soils	1,260	25,150	6,030	0	2,050	34,490
Alluvial soils well to moderately drained series	0	0	970	3,650	570	5,190
Alluvial soils imperfectly drained series	3,760	3,145	970	10,550	0	18,425
Solonetz	0	2,825	0	0	0	2,825
Shallow and Rocky phase, rock knob plain and Remnants	2,165	4,070	1,600	370	7,720	15,925
Total	17,910	58,815	28,240	14,700	23,180	142,845

/1,/2: S = South, N = North

The soil maps of D_2 area and undeveloped D_1 area (west side of A/D area) have not completed yet. The new soil maps of these areas will be completed in future at the Land Use Division by air photo interpretation, which are also not detailed map but valuable for general understanding of the soils.

As time passes after first reclamation, the crop yield decrease rapidly. This phenomena seem to be closely related to the decrease of nutrient content and reduction of soils itself. Therefore, it is most important to improve the drainage condition especially on the poor drained land and need to organize a good extension system relating with the technics of application of chemical fertilizers and organic matters.

II Soil Observation and Analysis

Number of the Soil Observation Points

Soil observation was done on both developed area and undeveloped area of project site. The number of soil observation points are given in Table 5-3.

Table 5-3 Soil Observation Points

System	A/D	D_1	D_2	G	Total
Developed Area	-	47	14	9	70
Undeveloped Area	15	30	15	10	70

Soil Analysis

Twenty one soil samples, that is seven samples of developed area and fourteen samples of undeveloped area respectively were analysed.

The purpose of analysing soil samples of developed area is to determine the best soil condition for paddy and upland crops. For this purpose, soil samples were taken from both good and poor paddy as well as upland to compare these soil conditions.

The other purpose of analyzing soil samples of developed area is to know the chemical characteristics of four soil units, such as reddish brown earths, well drained series, reddish brown earths, imperfectly draines series, low humic gley soils and alluvial soils and to check the cropping potential of each soil unit.

This soil analysis was completed at the Soil Science Laboratory, Land Use Division, Irrigaiton Department of Sri Lanka in compliance with the request made by the Japanese Feasibility Study Team. The location of soil survey is shown in the DWG. No. 5-1.

III Soil Units in Project Area and Their Characteristics

Introduction

Soil groups in Sri Lanka are mainly based on their morphology, which shows the main feature of soil profile. Twelve main great soil groups and subgroups are found in the different natural condition of Sri Lanka. (C.R. Panabokke, Ph.D., Soils of Ceylon and fertilizer use, page 67-81, 1967, Metro Printers Ltd.)

An abridge soil map of Ceylon of 1971 which is annexed to the main report shows the main soil groups which occurs in different parts of the island.

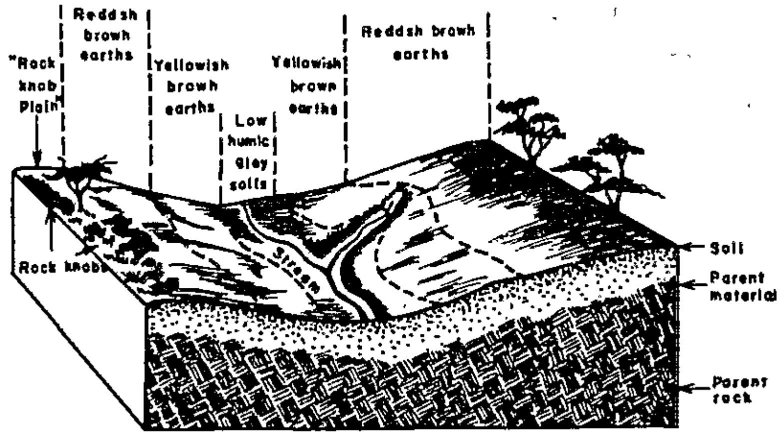
Soil maps of undeveloped area in the project area, (system A/D, D_1 and G) have been complied in 1978 on scale of 1 mile to 1 inch Map (1 : 31,673) by the soil survey staff of the Land Use Division of the Irrigation Department. Soil report showing the cropping potential of these areas has prepared by the Land Use Division.

In these soil maps, we find that soil groups are closely related to the topography of small catchment area. In the project area, four soil units respectively Reddish Brown Earths (well drained) Reddish Brown Earths (imperfectly drained), Low Humic Gley Soils (poor drained) and Alluvial Soils are existing. That is, the most important and extensive soil groups in the project area are the drainage catenary association of Reddish Brown Earths and Low Humic Gley Soils as well as Alluvial soils.

Drainage Catena

As above, four main soil units are found in the dry zone, that is, Reddish Brown Earths (well drained), Reddish Brown Earths (imperfectly drained), Low Humic Gley Soils and Alluvial soils. In most of the undulating landscape units of dry zone as well as in the project area, these former three are forming a drainage catena. That is to say, reddish brown earths, well drained, occur in the higher aspect of landscape, reddish brown earths, imperfectly drained, occur middle and lower aspect of landscape, and the low humic gley soils occur in the lower aspect of landscape, as given in Fig. 5-1.

Fig. 5.1 Soil Association or Soil Catena



<u>Reddish Brown Earths, well drained</u>

The A horizon is dark brown to dark reddish brown, the B horizon is more red than the A horizon, usually reddish brown to dark red. These red colours of soils indicates the presence of unhydrated iron oxide which can only exist in well drained condition. That is to say, these soils are oxidized very well.

<u>Reddish Brown Earths, imperfectly drained</u>

The A and B horizons are dark brown to dark yellow brown. This yellowish colour of soils indicates the presence of hydrate iron oxide which never exist in well drained condition. That is to say, these soils are oxidized not so well.

<u>Low Humic Gley Soils</u>

Top soils are brownish gley to gley. This gley colour indicates the presence of ferric iron which can only exist in poor drained condition and reducted condition.

As above, the drainage catena is closely related to landscape unit, drainage condition and soil colour. Moreover, this is closely related to the nature of clay minerals and potentiality of soils. In other words, it is considered that potentiality of soils of project area as well as dry zone is related to a great extent to landscape unit and soil colour.

3.1 Reddish Brown Earths, well drained series

3.1.1 Location

These soils are located on the upper aspect of the slopes, mainly from the ridges to the almost flat aspect.

3.1.2 General description

The modal profile derived from this soil survey is as follows.

Horizon A

Depth : Usually 10 - 15 cm
Colour : Dark brown to dark reddish
Texture : Sandy loam to sandy clay loam

Horizon B

Depth : 90 - 110 cm
Colour : Dark reddish brown to reddish brown
Texture : Sandy clay loam

Horizon C

Depth : Deeper that 120 - 150 cm
Colour : Light yellowish brown to pale brown

3.1.3 Physical Characteristics

According to SOGREAN report Vol. III, physical characteristics are as follows.

Bulk Density	:		1.5 - 1.6
Soil Porosity	:		30 - 40 %
Available Moisture	:	Deep phase	100 - 125 mm
		Shallow phase	25 - 50 "
Infiltration rates	:	Deep phase	5 - 15 cm/hr
After 1 hour	:	Gravelly soil	25 "

3.1.4 Chemical Characteristics

Soil analysis data are given in Table 5-4

Table 5-4 Chemical Characteristics of R.B.E. well drained

Sample No.:	PH 1:2.5	E.C. 1:5 m.mhos/cm	PH 1:2.5 kcl	CEC Meg/100g	Ca Meg/100g	Mg Meg/100g	Na Meg/100g	K Meg/100g	Org:C%	N%	P ppm	P(Abs Coeff:) mg/100g	EX. H
D_2D 4 78/240	5.90	0.07	4.80	9.62	5.25	2.49	0.20	0.133	0.96	0.074	Nil	-	5.74
D_1D 1	6.10	0.08	5.60	10.03	7.04	2.24	0.16	0.325	1.33	0.099	3	1,300	4.28
D_1U 2 78/232	6.70	0.05	5.50	10.48	7.43	2.80	0.18	0.112	0.99	0.071	Nil	-	3.81
G 5 (Good)	6.90	0.06	5.60	12.89	7.37	4.38	0.18	0.213	0.79	0.157	Nil	3,850	4.80
G 6 78/244	6.50	0.11	5.45	10.96	5.85	2.65	0.18	1.381	0.58	0.092	4	2,600	3.83
G 11 Poor	5.40	0.06	4.70	11.06	6.87	2.48	0.10	0.089	0.77	0.099	3	3,000	5.73

Based on the above data and results of related analysises, the chemical characteristics of this soil in general will be explained as follows.

Ph (H_2O)	5.4 - 7.0
Organic matter	0.6 - 1.3 %
C.E.C.	9.6 - 13.0 me/100g
Exc. Ca.	5.0 - 7.4 me/100g
K	0.1 - 1.4 me/100g
Mg	2.0 - 4.4 me/100g

MODAL PROFILE - REDDISH BROWN EARTH - WELL DRAINED

LAND USE DIVISION

Soil and Site Description

Location :

Bore No. :

Area :

Date :

Topography :

Photo No. :

Slop :

Drainage : Well drained

Land Use :

Site Feature :

Depth	Colour	Texture	Moisture, Structure, Consistence, Cutants, Gravels, Concretion, Pores, Roots, Mottling etc.
0- 4	5 yR 4/2	Sl.Scl	Slight organic matter ns & np (w)
4-12	5 yR 4/3	Scl	SS & Sp (W); mica feldspar; few soft Mn concretion
12-18	5 YR 4/4	Scl	SS & Sp (W); mica feldspar; few soft Mn concretion
28-36	5 YR 4/6	Scl	SS & Sp (W): mica feldspar; few soft Mn concretion
36-40	2.5 yR 4/6	Scl-grscl	SS & Sp (W); mica feldspar; few soft Mn concretion
40-44	2.5 yR 4/6	gr Scl	SS & Sp (W); to S & P (W) few mica, feldspar; Mn stains
44-48	10 R 4/6	gr Scl	S & P (W); mica feldspar; Mn concretion

Remarks :

Classification : R.B.E. - Well drained.

3.2 Reddish Brown Earths, imperfectly drained series

3.2.1 Location

These soils are mostly found in the flat or nearly flat areas which occur on the lower aspect of slopes.

3.2.2 General Description

The model profile derived from this soil survey is as follows.

Horizon A

Depth	:	
Colour	:	Dark brown to dark yellowish brown
Texture	:	Sandy clay loam to sandy loam

Horizon B

Depth	:	
Colour	:	Dark yellowish brown to yellowish brown
Texture	:	Sandy clay loam

Horizon C

Depth	:	90 - 120 cm
Colour	:	Yellowish brown

3.2.3 Physical Characteristics

According to SOGREAH report Vol. III, physical characteristics are as follows.

Soil Porosity	:	30 - 40 %
Available Moisture	:	75 - 100 mm
Infiltration rate	:	Comparatively lower than RBE well drained series

3.2.4 Chemical Characteristics

Soil analysis data are given in Table 5-5

Table 5-5 Chemical Characteristics of R.B.E. imperfectly drained

Sample No.:	PH 1:2.5	E.C. 1:5 m.mhos/cm	PH 1:2.5 kcl	CEC Meg/100g	Ca Meg/100g	Mg Meg/100g	Na Meg/100g	K Meg/100g	Org:C%	N%	P ppm	P(Abs Coeff:) mg/100g	EX. H
D_2D 7 78/242	6.75	0.96	5.40	8.58	7.08	1.62	0.10	0.150	0.66	0.079	9	750	3.81
D_1U 18 78/235	6.30	0.04	4.90	10.39	7.11	2.38	0.10	0.151	1.10	0.089	3	1,750	4.30
G 17	6.00	0.07	5.30	10.57	6.90	3.41	0.18	0.086	0.87	0.092	63	5,400	0.00
D_1D 10	6.10	0.07	5.50	11.43	6.92	4.07	0.18	0.125	1.68	1.121	7	-	5.31
G 16 78/246	6.65	0.05	5.20	10.21	7.04	1.19	0.15	0.431	1.24	0.120	3	2,250	5.28
D_1U 4 78/233	6.70	0.23	5.60	19.55	14.50	6.47	0.34	0.152	1.31	0.082	Nil	1,250	4.42
AD 4	6.10	0.04	5.30	10.31	6.88	3.33	0.18	0.103	1.19	0.101	3	-	5.86

Based on the above data and results of related analysises, the chemical characteristics of this soil in general will be explained as follows.

PH (H_2O)	6 - 6.8
Organic matter	0.6 - 1.7 %
C.E.C.	9 - 20 me/100g
Exc. Ca	6.9 - 14.5 me/100g
K	0.1 - 0.5 me/100g
Mg	1.2 - 6.5 me/100g

MODAL PROFILE - REDDISH BROWN EARTHS - IMPERFECTLY DRAINED

LAND USE DIVISION

Soil and Site Description

Location :

Area :

Topography :

Slope :

Land Use :

Site Features :

Bore No. :

Date :

Photo No. :

Drainage : Imperfectly Drained

Depth	Colour	Texture	Moisture, Structure, Consistence, Cutants, Gravels, Concretion, Pores, Roots, Motting etc.
0- 4	10 yR 3/3	Sl	Slight organic matter ns & np (w)
4-12	10 yR 4/3	Scl	SS & sp (W) faint mottling; Mottle colour 7.5 R 4/4; few soft Mn Concretion
12-28	10 yR 4/4	Scl	SS & Sp (W) C 1d mottles of colour 7.5 yR 4/4 feldspar few soft Mn Concretion
28-40	10 yR 5/6	Scl	SS & Sp (W) C 2d mottles of colour 7.5 yR 4/4 feldspar few soft Mn Concretion
40-48	10 yR 5/6	Scl	SS & sp (W) C 2d mottles of colour 7.5 yR 4/4 few Iron Stones, Mn Stains
48-54	10 yR 5/3	Scl-grscl	SS & sp (W) C 1p mottles of colour 7.5 yR 4/4 feldspar; Mn Stains

Remarks :

Classification : R.B.E. Imperfectly drained

3.3 Low Humic Gley Soils

3.3.1 Location

These soils are located on the almost the whole extents of valleys.

3.3.2 General Description

The model profile derived from this soil survey is as follows.

Horizon A

Depth	:	25 - 30 cn
Colour	:	Dark gley Brown to Brown or bluer
Texture	:	Loomy sand to sandy Loam

Horizon B

Colour	:	A lighter colour than A horizon strongly mottled or Pseudo-gley appear
Texture	:	Sandy clay Loam to Sandy Clay

3.3.3. Physical Characteristics

Soil Porosity	:	Less than the porosity of RBE
Available Moisture	:	Usually more than that of RBE
Infiltration rate	:	Usually less than 5 cm/hr

3.3.4 Chemical Characteristics:

Soil analysis data are given in Table 5-6

Table 5-6 Chemical Characteristics of L.H.G. Soils

Sample No.:	PH 1:2.5	E.C. 1:5 m.mhos/	PH 1:2.5 kcl	CEC Meg/ 100g	Ca Meg/ 100g	Mg Meg/ 100g	Na Meg/ 100g	K Meg/ 100g	Org:C%	N%	P ppm	P(Abs Coeff:) mg/100g	EX. H
D_1U - 1	7.05	0.74	6.00	42.12	25.53	14.23	4.44	0.349	1.47	0.153	12	-	8.91
D_1U 1-poor P 78/231	7.00	0.08	6.10	14.22	10.40	4.72	0.31	0.258	1.58	0.075	2	-	2.91
D_1U 11	7.10	0.10	6.00	10.12	6.07	3.64	0.36	0.177	0.83	0.057	Nil	1,500	2.85
D_1U 12 Poor	5.80	0.06	5.10	9.42	6.45	2.06	0.13	0.133	0.99	0.077	Nil	2,400	3.81
D_1U 21	6.80	0.11	5.80	22.49	13.80	8.78	0.21	0.223	1.80	0.116	Nil	-	5.82
D_1U 24 78/237	7.10	0.11	5.40	6.05	2.74	1.82	1.09	0.091	0.05	0.084	12	1,150	0.97
D_2D 9 poor Y	6.05	0.55	4.80	11.14	6.74	3.61	0.20	0.109	0.56	0.076	10	2,600	5.21
D_2D 3 78/238	6.30	0.07	5.30	18.05	11.80	4.83	0.26	0.142	1.25	0.138	10	-	7.39

MODAL PROFILE - LOW HUMIC GLEY

LAND USE DIVISION

Soil and Site Description

Location :

Bore No. :

Area :

Date :

Topography : Concave bottom

Photo No. :

Slop : 0 - 2/1 %

Drainage : Poorly drained

Land Use :

Site Feature :

Depth	Colour	Texture	Moisture, Structure, Consistence, Cutants, Gravels, Concretion, Pores, Roots, Motting etc.
0- 4	10 yR 3/2	Sl-SCl	Slight organic matter ns & np (W) faint mottles of colour 7.5 yR 4/4
4-14	10 yR 4/3	SCl	C_1d mottles of colour 7.5 yR 4/4 SS & Sp (W) slightly gleyed 5y 5/1 few soft MN Concretion
14-24	2.5 y 5/2	SCl	C_1d mottles to C_2d mottles of colour 7.5y 4/4 SS & Sp (W) to S & p Common gleying 5y 5/1 few soft MN concretion
24-40	2.5 y 5/2	SCl-SC	C_1d to C_2d mottles of colour 7.5 yR 5/6 Common gleying of colour 2/2 yR 6/2 few soft MN concretion S & p (W)
40-48	5 y 5/1	SC	C_2d mottles of colour 7.5 yR 5/6 Common gleying; Commons soft MN Concretion S & P (W)

Remarks :

Classification : L.H.G.

3.4 Alluvial Soils

3.4.1 Location

These soils occur in narrow strips along valleys. Especially fairly large amount of these soils is occured in D_2 area.

3.4.2 General Description

Alluvial soils are developed on recent water laid deposits in which no profile development other than accumulation of some organic matter in A horizon has taken places.

3.4.3 Physical Characteristics

Generally texture of these soils varies from heavy clay to coarse sand. Although these soils which occur in D_2 area have faily good physical properties.

3.4.4. Chemical Characteristics

Soil analysis data are given in Table 5-7.

Table 5-7 Chemical Characteristics of Alluvial Soils

Sample No.:	PH 1:2.5	E.C. 1:5 m.mhos/cm	PH 1:2.5 kcl	CEC Meg/100g	Ca Meg/100g	Mg Meg/100g	Na Meg/100g	K Meg/100g	Org:C%	N%	P ppm	P(Abs Coeff:) mg/100 g	EX. H
D_2U4 78/239	6.70	0.09	5.70	20.01	14.30	4.87	0.23	0.310	1.77	0.208	5	4,250	-

MODAL PROFILE - WELL DRAINED TO MOD. - WELL DRAINED

LAND USE DIVISION

Soil and Site Description

Location :

Area :

Topography : Convex Slope

Slope : 1 - 1 1/2 %

Land Use :

Site Features :

Bore No. :

Date :

Photo No. :

Drainage : W. Drained to M. W. Drained

Depth	Colour	Texture	Moisture, Structure, Consistence, Cutants, Gravels, Concretion, Pores, Roots, Mottling etc.
0- 4	10 yR 4/2	Sl to Cl	Organic Matter, ns & np (W)
4-18	Varing colour	Cl	ns & np (W) to SS & Sp
18-40	10 yR 5/4	Cl	SS & Sp (W)
40-48	10 yR 5/3	Cl	SS & Sp (W) few soft Mn Concretion

Remarks :

Classification : Alluvium - Well drained to Mod. Well drained.

IV Land Classification

It is to be desired that land classification should be done taking account of many factors such as soil factors, Topographic factors and drainage factors as refered in the general land classification specification of U. S. Bureau of Reclamation. However, it is very difficult to classify the land according to the U. S. B. R. specification during this short soil survey period.

However, land classification that is only taking account of soil factors such as texture, depth (limited by gravel, rock or impervious material), salinity, chemical characteristics and permeability seems to be enough to know the datas which showing approximate land potential at present.

Therefore, this simple land classification has been made in this report.

4.1 Cropping Potential of each soil unit

4.1.1 Reddish Brown Earths, well drained series

Very good to good lands on which no limitation are imposed on the choice of crops. On this well drained soil, a wide range of upland crops of the dry zone can be grown, although the cultivation of paddy is not recommended because of high permeability of these soils. (According to the SOGREAH REPORT Vol. III, the average permeability of reddish brown earths is $K = 1 \times 10^{-5}$ to 6×10^{-5} m/sec, this value is too high comparing with the adequate value that is $3\text{-}5 \times 10^{-7}$ m/sec in case of paddy field.

Depending on the depth of these soils the range of crops that can be successfully grown are given in Table 5-8.

Soil structure of reddish brown earths is so weak that the maintenance of soil structure by providing adequate quantities of organic matter is important. This could be succeeded by the application of cattle manure wherever a pattern of mixed farming could be practised; and where sufficient quantities would not be available, it will be definitely beneficial to introduce green manure crops in rotational cropping system.

Table 5-8 Cropping Potential Depending on the Depth of Soils

Soil Group	Depth Phase	Depth to Prominent gravel layer (cm)	Depth to Bed Rock (cm)	Crops that can be grown on each soil during the two seasons	
				MAHA	YALA
Reddish Brown Well Drained	Very deep	120	150	Fruit Crop	Fruit Crop
	Deep	90 - 120	120 - 150	All upland crops such as Sugar cane, tabacco, cotton, Chillies, onion, ground nut, Soya Bean, Cowpea, green gram, Turdhal, upland rice, maize .	All upland crops of the dry zone
	Moderately	60 - 90	90 - 120		
	Moderately shallow	30 - 60	60 - 90		
	shallow	30	60	Settlement and home-stead areas	
Reddish Brown Earth, Imperfectly Drained	Very deep to Moderatly deep	60	90	Lowland rice, sugar cane, pastures	Upland rice, sugar cane, Pastures
Low humic gley soil				Lowland rice	Lowland rice

Note: 1) The optimum water requirement in depth of paddy field is said as 20-30 mm/day in general. In other words, this value in same as 3-5 x 10^{-7}m/sec in permeability.

2) The following table is showing the exchangeable value between permeability and water requirement in depth.

Exchangeable Value between Permeability and Water Requirement in Depth

Permeability k - m/sec	Water requirement in depth mm/day
1×10^{-9}	0.1
1×10^{-8}	0.9
1×10^{-7}	8.6
1×10^{-6}	86.4
1×10^{-5}	864.0

4.1.2 Reddish brown earths, imperfectly drained series

The choice of crops is limited by dry and wet season, because of low permeability of these soils (According to the SOGEAH report Vol. III, the average permeability of imperfectly drained reddish brown earths is $K = 1.5 \times 10^{-6}$ to 9×10^{-6} m/s.)

As Soil moisture is so high at wet seasons, only limited crops can be sucessfully grown on these soils, that is lowland paddy, sugar cane and pastures.

But if adequate surface drainage is provided, some of the other upland crops of dry zone could be cultivated during yala season.

Rice yield on these soil series is highest among the all soil groups that are existing in project area, because these soils are fertile and not so reduced.

But, in a course of time after reclamation the tendency of decrease of yield was found in this survey. The reason of this phenomenon is regarded mainly as the reduction of soils and lowering of its fertilities. Reduction of soils is caused by high soil moisture and lack of air, so drainage should be considered. (This is largely due to poor water management in the upper slopes.)

The depth of these soils are usually deep or moderately deep so that the depth of soilds would not become restricted for root penetration.

4.1.3 Low humic gley soil

The choice of crops is severely limited. Because of low permeability of these soils (According to the SOGREAH report Vol. III the average permeability of Low humic gley soil is $K = 1.5 \times 10^{-6}$ to 9×10^{-6} m/s.) Soil moisture is too high, so only lowland paddy can be successfully grown on these soils.

In the case of imperfectly drained Reddish Brown Earths, as time passes after reclamation the tendency for decrease in yield was found, too. This would be due to lack of sufficient fertilizer application, but drainage may also be useful on its improvement.

So, drainage would be necessary. Open drains will generally be beneficial for the removal of the drained water.

4.1.4 Alluvial Soils

Drainage of these soils is mostly poor, so that these are best soils suitable for cultivation of lowland rice.

While, there are some well drained to moderately drained alluvial soils mainly in D_2 area./1 In this area, the cultivation of paddy is not recommendable because of high permeability of soils. However, the exact distribution of well drained Alluvial soils in D_2 area is not certain. So, further soil survey is necessary to demarkate the exact distribution of these soils, and to plan the cropping pattern for these area which corresponding to the soil condition./2

Note

/1 : Along the bank of the Mahaweli river.

/2 : An exact demarkation and location of this well drained Alluvial soils is not available during this short survey.

4.1.5 Solodized Solonetz

Very poor to poor lands because of saline or saline - alkaline soil condition. So these lands are normally unsuitable for crops. But these lands could be reclaimed when amelioration of these soils would be possible by provision of chemical amendents, drainage and leaching to remove existing sodium and/or salts and cheap water would be available in excess.

But as these lands are always found on the lower parts of landscape, it would be dofficult to ameliorate these land by provision of drainage and leaching. So on the slightly saline or saline - alkaline lands, only lowland rice could grow, although yields are likely to be smaller.

Therefore, until detailed soil survey to be proceeded and determined the level of salinity in these soils at different locations, it would be better to abandon these lands.

4.1.6 Others

Shallow and Rocky phases and rock knob plain are unsuitable for crops, because these soils restrict to extending root of crops, and thereby yield would be very poor.

However, these lands could be used for settlement, homestead, building sites, communication center and play land.

Erosional remnants is not suitable for agriculture or settlement.

4.2 Cropping Potential of Undeveloped Area

As stated above, cropping potential of each land is depending on soil condition and classified to four types, as follows.

(1) Upland crop type

These lands are suitable for upland crops, that is, fruit crop, cotton, chillies, onion, groundnuts, soya bean, cowpea, green gram, turdhal upland rice, maize, sugar cane, tobacco, etc.

However, fruit crops are suitable only on very deep phase, that is, depth to prominent gravel layer is more than 120 cm or depth to bed rock is more than 150 cm.

(2) Lowland and Upland Crop Type

These lands are suitable for lowland rice, sugar cane and pastures.

The yield of lowland rice on these lands are highest.

(3) Lowland Crop Type

These lands are suitable only for lowland rice.

(4) Unsuitable for Crop Type

Cropping potential map annexed with this report the classified by these criteria.

The acreage of each classification corresponding to undeveloped area, that is A/D, D_1, D_2 and G respectively is given in Table 5-9.

Table 5-9 Land Use Possibility (Acre)

Area / Type	A/D (Ac.)	D_1 (South) (Ac.)	D_1 (North) (Ac.)	D_2 (Ac.)	G (Ac.)
Upland crop type	5,510	13,645	13,610	3,780	17,940
Lowland and Upland crop type	3,945	9,980	6,030	0	5,470
Lowland crop type	6,290	28,295	7,000	10,550	2,050
Unsuitable to crop type	2,165	7,350	1,600	370	7,720
Total	17,910	59,270	28,240	14,700	23,180

Note: 1. This figure shows the acreage of land use possibility depending on the result of soil survey. The definite suitable acreage for agriculture will be changed by the detailed topographical survey.

2. D_1 (South & North) and D_2 Area are undeveloped area only.

3. This figure was calculated by using the new soil map that is made by airphoto interpretation during this short survey period and not checked by detailed field soil survey.

V Recommendation

5.1 Fertilizer Recommendation

Fertilizer demand of plants varies according to their species. There seems to be tendency of increase fertilizer demand as follows.

Low Demand	Gingelly
	Castor
	Legume
	Such as groundnuts, Soya Bean etc.
	Sorghum
	Paddy
High Demand	Chilly

From a point of view of soil condition, fertilizer recommendation should be different among four main soil units, that is (a) reddish brown earths, well drained series, (b) reddish brown earths, imperfectly drained series, (c) low humic gley soils and (d) alluvial soils. But as shown in Chapter III, IV, the Chemical properties of each soils are not so different among them and it is not necessary to distinguish each other.

Although there would be the tendency that plants on the reddish brown earths, well drained series demand more fertilizer than the others.

According to the Agriculture Research Station of Maha - Illuppallama, crop - wise fertilizer recommendations for Low Country of Dry Zone which are including project area are as follows.

Gingelly

	Super Phosphate	KCL	Ammonium Sulfate	lb/acre
Basal	112	28	-	
Top dressing	-	-	112	

Soya bean

	N	P_2O_5	K_2O	lb/acre
With inoculum Basal	10	60	40	
Without inoculum Basal	10	60	40	
Top Dressing after 3 weeks *	3	-	-	
Top Dressing after 11 weeks *	11	-	-	

*: From Planting

Maize and Sorghum

	N	P_2O_5	K_2O	lb/acre
Basal	15			
Basal	15	40	25	
Top Dressing after 4 weeks *	45	-	-	

*: From Planting

Cotton

	N	P_2O_5	K_2O	lb/acre
Basal	-	50	33	
Top Dressing after 4 weeks *	22	-	-	

*: From Germination

Jute and Kenaf

	N	P_2O_5	K_2O	lb/acre
Basal	-	50	30	
Top Dressing after 3-4 weeks *	11	-	-	
Top Dressing after 8-10 weeks *	11	-	-	

*: From Germination

Bandakka

	N	P_2O_5	K_2O	lb/ acre
Basal	20	60	30	
Top Dressing after 3 weeks *	20	-	-	
Top Dressing after 6 weeks *	20	-	-	

*: From Planting

Brinjal

	N	P_2O_5	K_2O	lb/acre
Basal	40	100	80	
Top Dressing after 3 weeks *	40	-	-	
Top Dressing after 6 weeks *	40	-	-	

*: From Planting

Tomato and Capsicum

	N	P_2O_5	K_2O	lb/acre
Basal	25	60	25	
Top Dressing after 4 weeks *	25	-	25	

*: From planting

According to New Fertilizer Recommendations, for Rice Production, October, 1971, Agricultural Information Division, 102, Union Place, Colombo, general fertilizer recommendation for rice production for low - country of dry zone are as follows.

A) 3 Months Varieties for a yield of - 60 Bushels/Acre

	Quantity of Apply lb/Acre
Basal; Mixture V_1	168
Top Dressing 2 weeks; Urea	56
Top Dressing 6-7 weeks; Urea	84

Note:

1. Content of N,P and K of Mixture V_1 is as follows:

N	2.68 %
P_2O_5	27.4 %
K_2O	12.9 %

2. Timing of top dressing: after sowing

B) 4 - 4 1/2 Months Varities for a yield of - 80 Bushels/Acre

	Quantity of Apply lb/Acre
Basal; Mixture V_1	168
Top Dressing 2 weeks; Urea /1	56
Top Dressing 6 weeks; Urea /1 or 4 weeks /2	56
Top Dressing 10 weeks; Urea /1 or 8 weeks /2	56

/1. After sowing.

/2. After transplanting.

According to recent findings at the Maha-Illuppallama Research Station, paddy in well drainied RBE soils require more nitrogen than in imperfectly drained RBE soils.

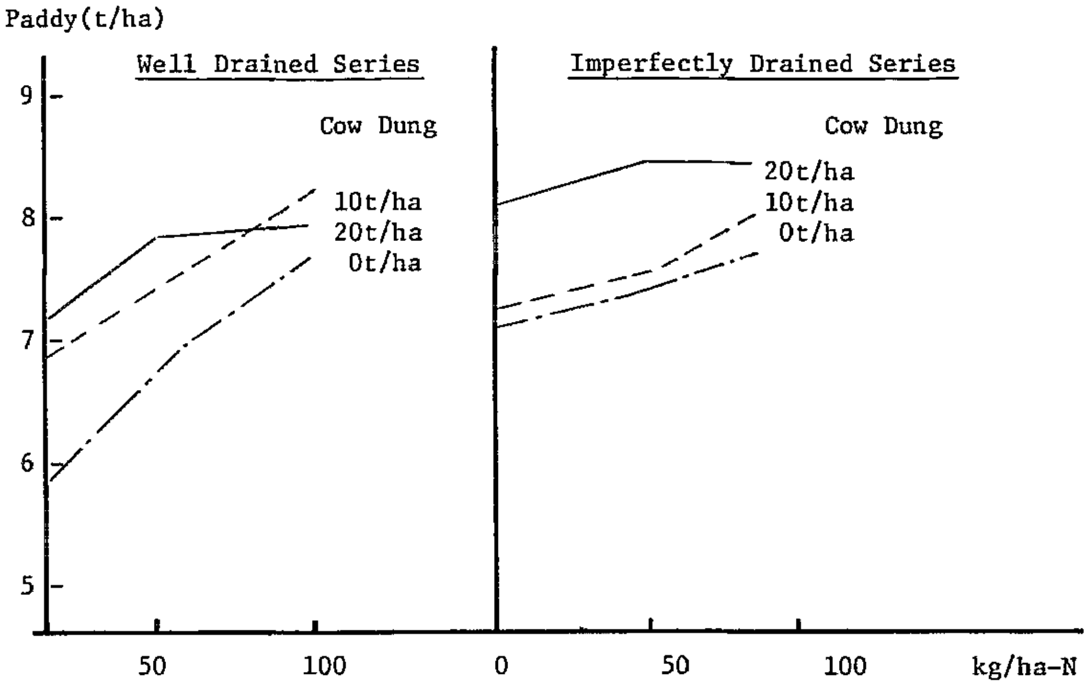
Such information is not available for low humic gley soils. However, inferring from above, it may be said that low humic gley soils would be closen to imperfectly drained RBE soils than the well drained series.

Therefore, the above fertilizer recommendation should be adjusted according to the yield expected and soil characteristics which vary in each field.

5.2 Manuring of Organic Matter

According to Handawela, J, Agricultural Research Station, Maha Illuppallama, the result of nigrogen reponse in Paddy in two drainage members in Reddish Brown Earths is as fig. 5-2.

Fig. 5-2 Nitrogen Respons in Paddy in two Drainage members in RBE.



As shown in Fig. 5-2, manuring respons of cow dung is quite effective, especially in imperfectly drained series.

Manuring of organic matter has advantage not only applying the nutrient of plant but also producing a crumbly soil, which is well drained and well aerated.

In ideal case, manuring 10 t/ha of organic matter is recommended.

5.3 Canal Construction and Drainage

According to SOGREAH report Vol. III - Land Classification July, 1972, soil permeability values determined by auger hole method are as follows.

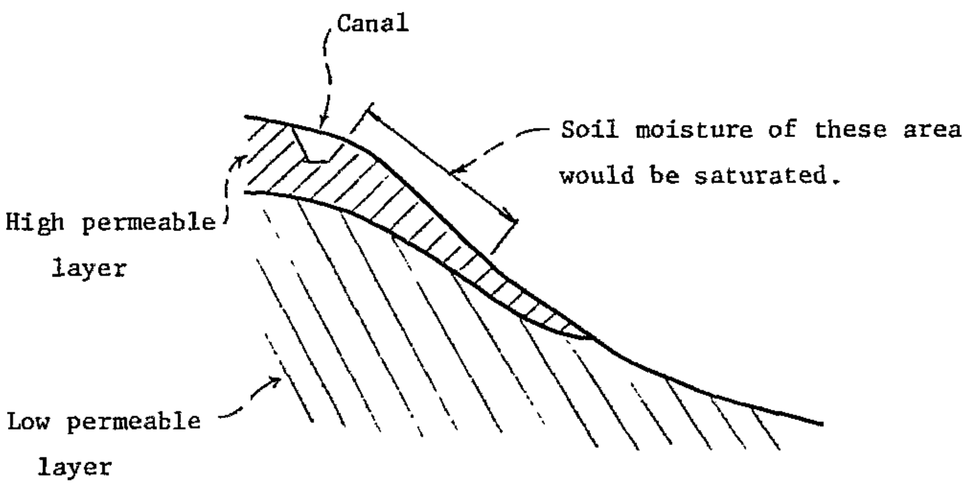
	Condition of lower Horizon and topography	Permeability Values
RBE	GSL to Sl overlying the decomposing Rock	1×10^{-5} to 6×10^{-5} m/s
RBE	More thicker SCL layers in B Horizon	1×10^{-5}
RBE	More sandy and gravelly layer overlying the decomposing Rock	1×10^{-4}
RBE Imperfectly drained LHG	SCL to SC layers at depth 3 and 7 feet, Lower aspect of the slope	1.5×10^{-6} 9×10^{-6}
LHG	Lower aspect of slopes	6×10^{-6} - 5×10^{-5}
LHG	SCL to SC without any interlayers of Sand or Gravel	1×10^{-6} - 3×10^{-6}

The above estimated values of permeability seem to be adequate.

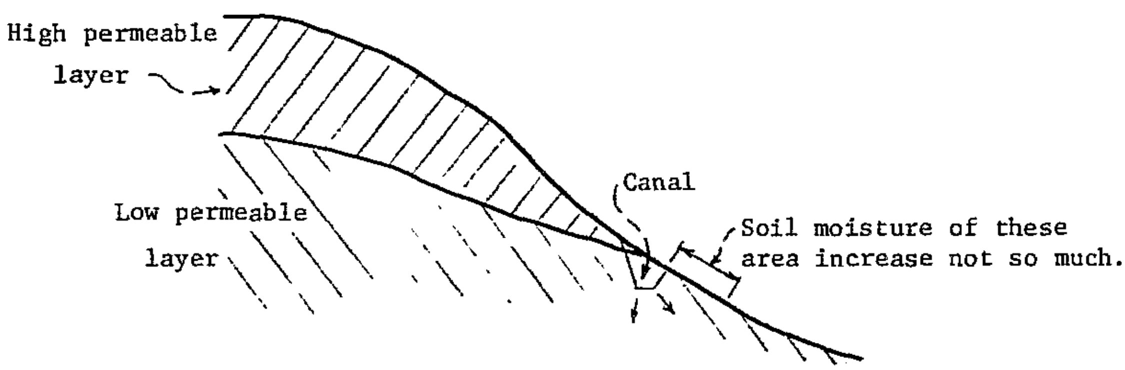
From a point of view of land use, the appropriate canal is better to construct on lower aspect of slope and not higher aspect. Because, if the canal is constructed at the higher aspect of slope, the soil moisture of lower parts of canal will be always so high depending on the high permeability of the soils where canal constructed, that upland crops are unsuitable at this part. (View point from soil sciences.)

However, if the canal is constructed at lower aspect, the soil moisture of lower part of canal would not increase so much depending on the low permeability of the soil where canal is constructed, that lowland paddy is not affected by the high increase of soil moisture.

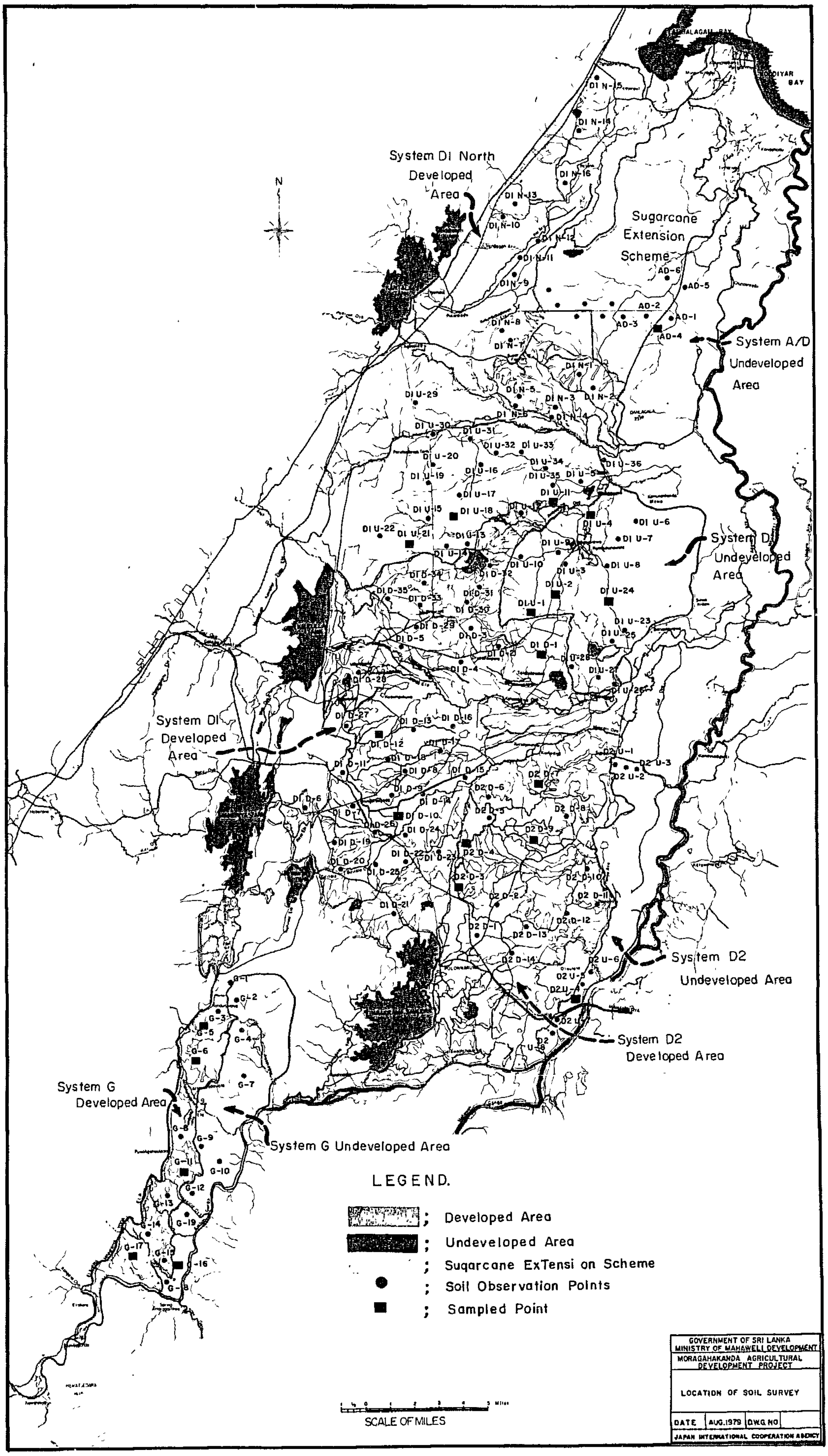
Unrecommendable



Recommendable



Moreover, the lose of water from canal at high aspect of slope is less than that at low aspect.



System D1 North Developed Area
Sugarcane Extension Scheme
System A/D Undeveloped Area
System D1 Undeveloped Area
System D1 Developed Area
System D2 Undeveloped Area
System D2 Developed Area
System G Developed Area
System G Undeveloped Area
N
LEGEND.
; Developed Area
; Undeveloped Area
; Sugarcane ExTension Scheme
; Soil Observation Points
; Sampled Point
SCALE OF MILES
GOVERNMENT OF SRI LANKA
MINISTRY OF MAHAWELI DEVELOPMENT
MORAGAHAKANDA AGRICULTURAL DEVELOPMENT PROJECT
LOCATION OF SOIL SURVEY
DATE AUG.1979 DWG.NO
JAPAN INTERNATIONAL COOPERATION AGENCY

ANNEX VI IRRIGATION AND LAND DEVELOPMENT

Contents

I: ENGINEERING STUDIES AND INVESTIGATIONS

1.1 PRESENT IRRIGATION AND DRAINAGE SYSTEMS

1.1.1 Irrigable Area

The area covered by Moragahakanda dam comprises the existing cultivated lands being irrigated by main irrigation canals and a group of tanks following as the starting point Elahera and Amgamedilla headworks intaking water from Amban Ganga and the new land reclaimed by an increase in water supply through the dam.

This region corresponds to Systems D_1, D_2, G and A/D of the Mahaweli Ganga Development; the total area irrigated by the dam covers approximately 1,200 km^2 (460 $mile^2$).

As a result of the survey, the area irrigated by the existing tanks and main irrigation canals is summarized in Table 6.1.1. The result indicates that the irrigated area has become larger than that mentioned in the report prepared by M.D.B; this is mainly because, in the previous survey, the area reclaimed without any permission or irrigated by re-intaking water has not been included in a part of the irrigated area, but the area irrigated by main tanks only included.

Table 6.1.1 Existing Irrigated Area

Report / System	MDB (1977)	JICA F/S Team
G	4,800 ac	4,800 ac
D_1	49,400 "	69,100 "
D_2	19,000 "	25,000 "
A/D	-	-
Total	73,200 ac (29,600 ha)	98,900 ac (40,000 ha)

1.1.2 Irrigation System

The present irrigation system shows that the planting condition realized after completion of Polgolla-Bowatenna Complex in May 1976 is taking a favourable turn in comparison with the previous years. The planting conditions obtained by conducting local interviews are summarized in Table 6.1.2. In addition, variations in the tank storage capacity before and after completion of the Polgolla-Bowatenna Complex are shown in Figs. 6.1.2 to 6.1.6.

Juding from these data, it is obvious that supplied water has become more abundant; however, it is anticipated that this situation will be slightly deteriorated in the near future, because the newly reclaimed land proposed under the Polgolla-Bowatenna Complex has not yet been completed.

There are some parts suffering from shortage of irrigation water during the Yala season in spite of supplying more irrigation water than projected. This is because that the existing agricultural facilities (irrigation canals and diversion facilities) have old vintage and the dead water caused by their superannuation has become more abundant and also because that due to loosening water supply management surplus water is being intaken on the upstream side.

The reason why the planting condition at Parakrama Samudra is more favourable than the others is that Kalu Ganga, a branch river of Amban Ganga, is abundant in river water discharge and, moreover, irrigation water management is facilitated due to the existence of one tank.

Table 6.1.2 Existing Irrigation Area

(unit: acs)

System	Scheme	Acreage under specification	Acreage under unauthorized cultivation	Total
G	Elahera	4,800	-	4,800
D_1	Minneriya	13,500	4,500	18,000
	Giritale	6,200	1,300	7,500
	Kaudulla	10,500	2,500	13,000
	Kantalai Vendarasan-kulam Paravipanchan-kulam	20,800	3,100	23,900
	Galamuna (Minneri oya)	3,300	1,700	5,000
	Kahambiliya	500	100	600
	Wan Ela	1,000	100	1,100
	(Sub total)	(55,800)	(13,300)	(69,100)
D_2	Parakrama samudra	19,600	5,400	25,000
A/D	-	-	-	-
	Total	80,200 (32,400 ha)	18,700 (7,600 ha)	98,900 (40,000 ha)

1.1.3 Drainage System

For as the present drainage system, drained water is all flowing down through the drainage canal system consisting of such natural rivers as Aru, Oya and Ganga and mostly flowing into Mahaweli Ganga in the end.

Since there exists almost no embankment along Mahaweli Ganga, but partially, the river is overflooded over a few miles wide during the flood season.

Particularly, System D_2 encircled by rivers is isolated during the flood season and most parts of which are inundated due to its gentle undulations and low lands.

In addition, System A/D is embanked along Mahaweli Ganga; however, draining is not so smooth because of its location near to the river mouth and low lands are inundated.

Branch rivers are all naturally formed and overflooded during the Maha season; there are many parts inundated in the vicinity due to mazy river channels and the low flow capacity.

Fig. 6-1-1 Cropped Area (M.D.B Data)

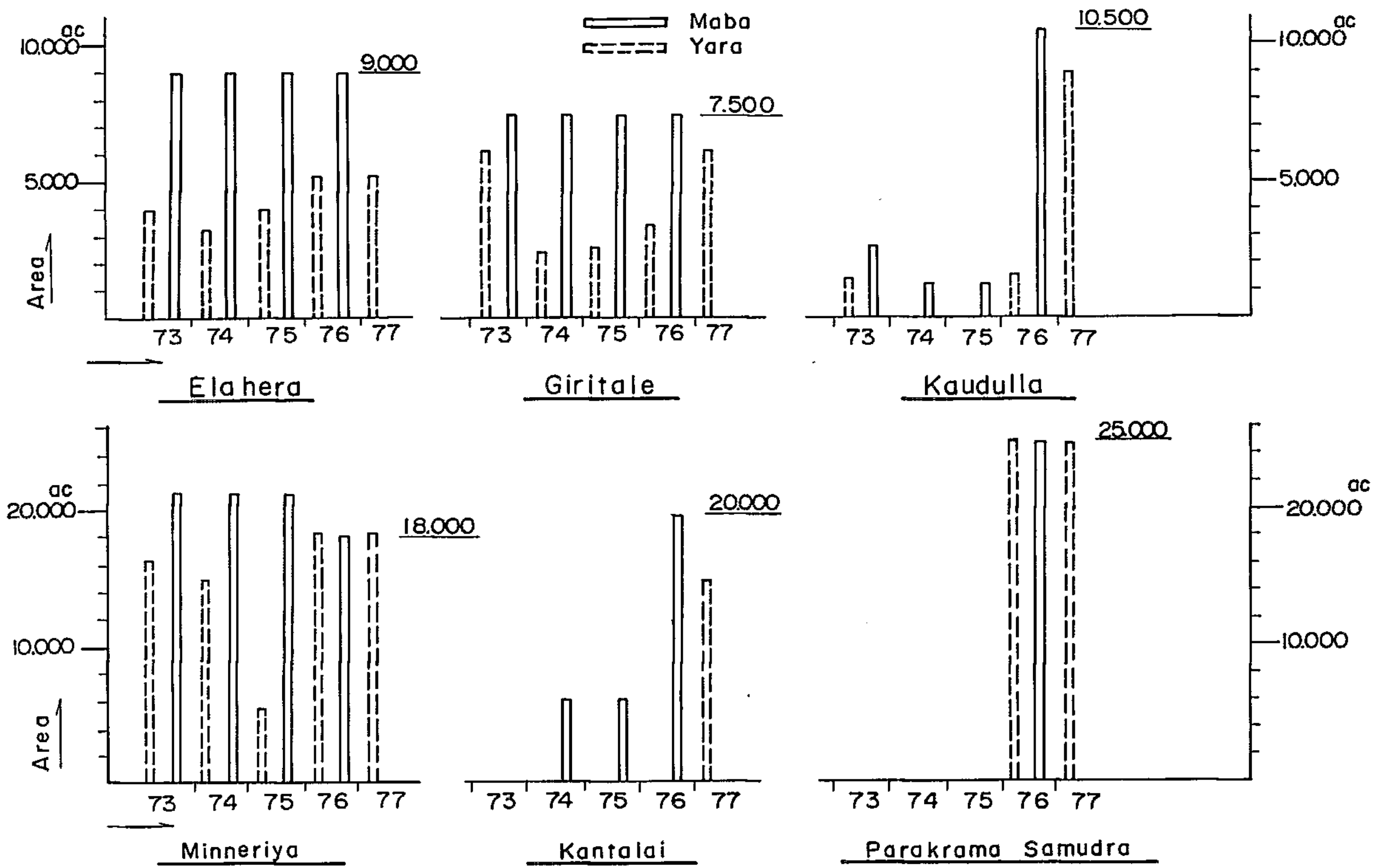


Fig. 6-1-2 Minneriya

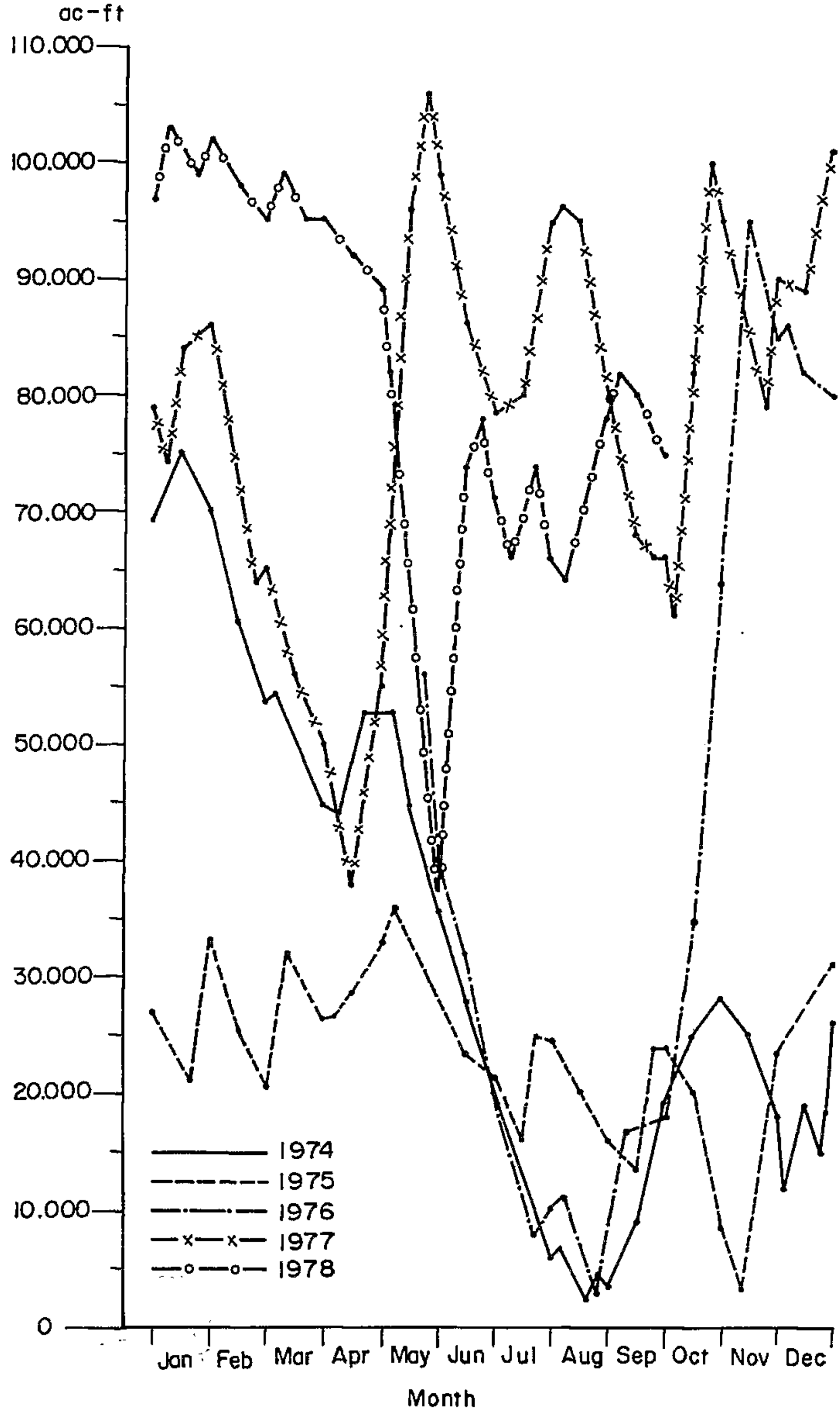


Fig. 6-1-3

Giritale

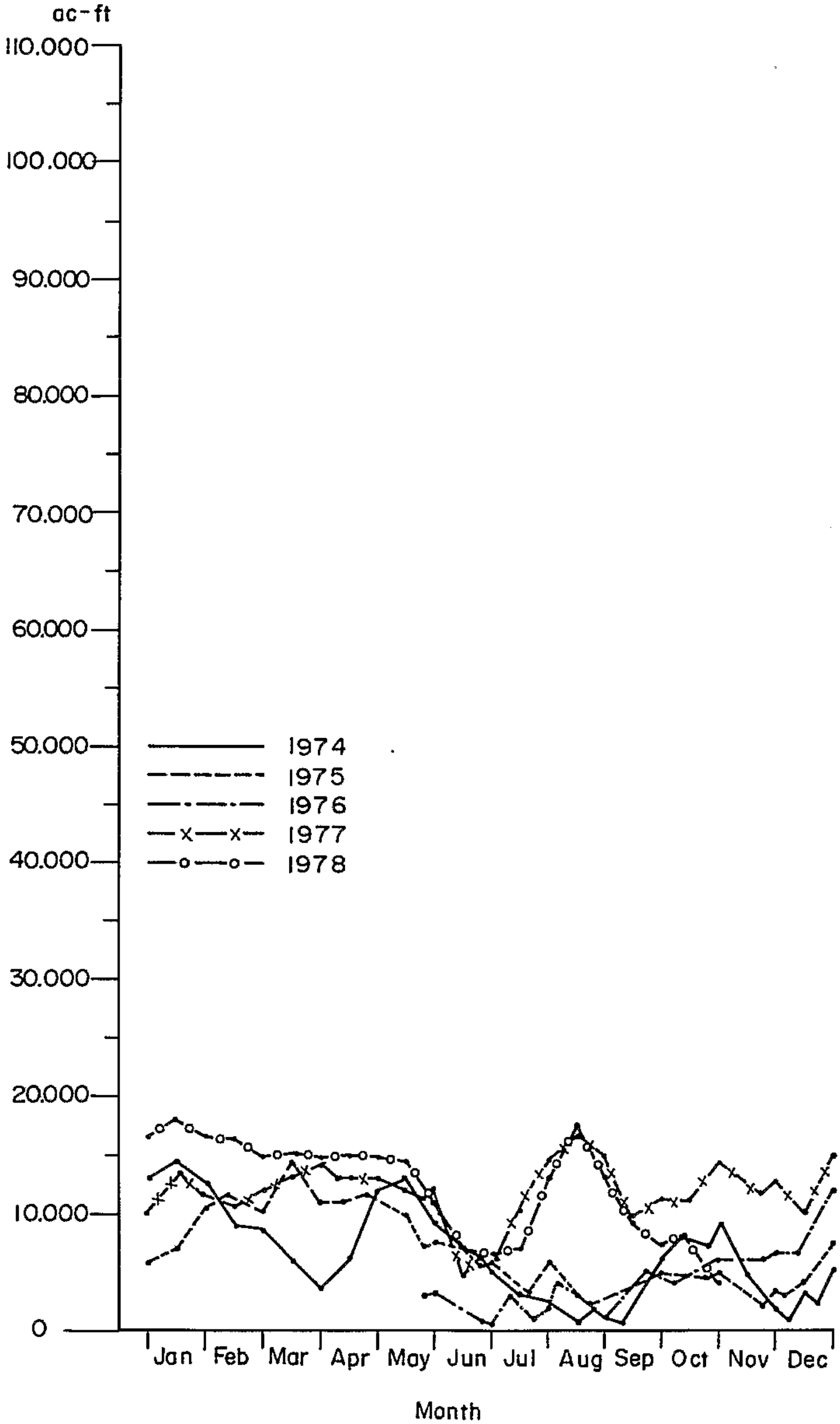


Fig. 6-1-4

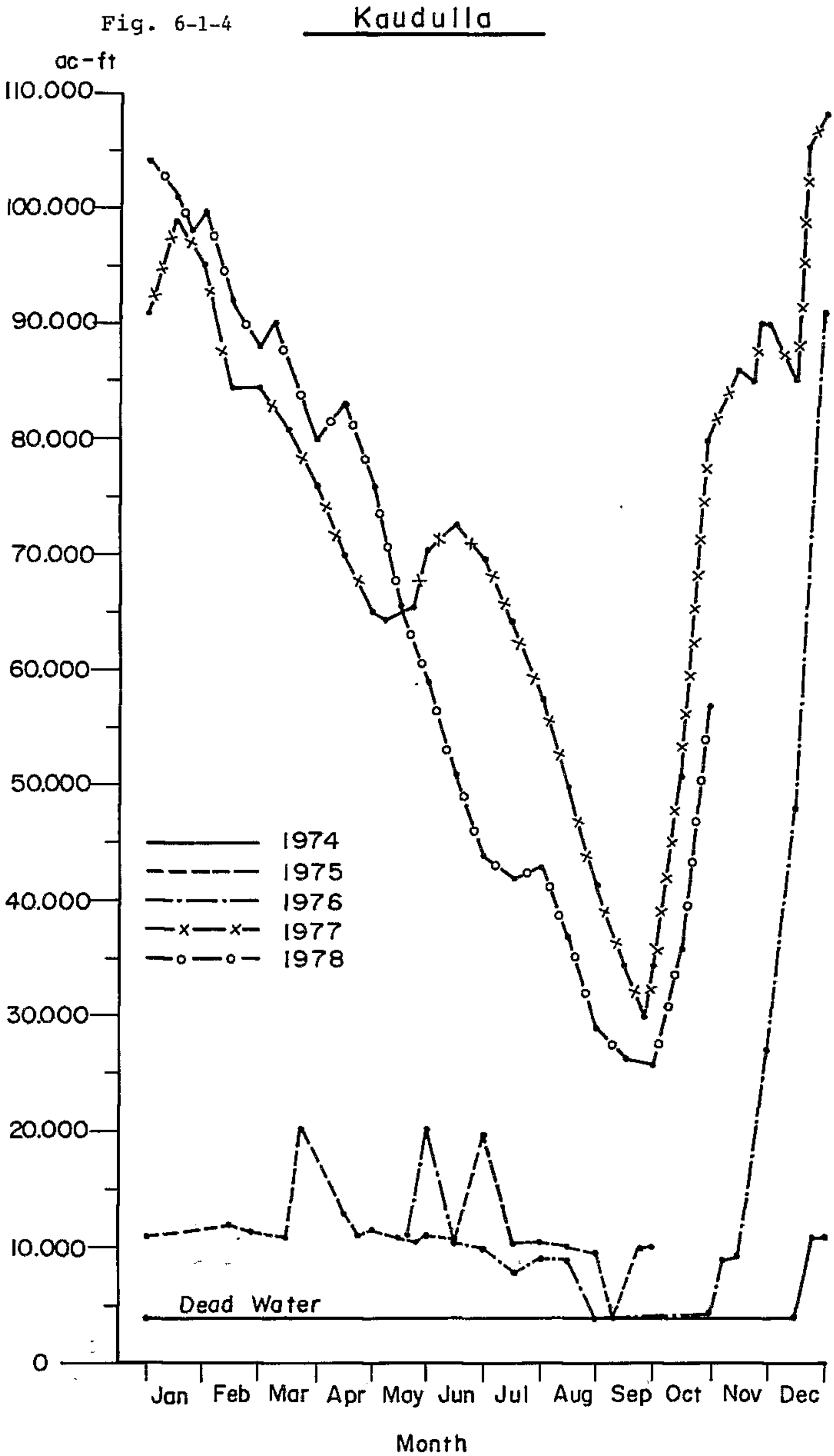

Kaudulla
ac-ft
110.000
100.000
90.000
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0
1974
1975
1976
1977
1978
Dead Water
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

Fig. 6-1-5

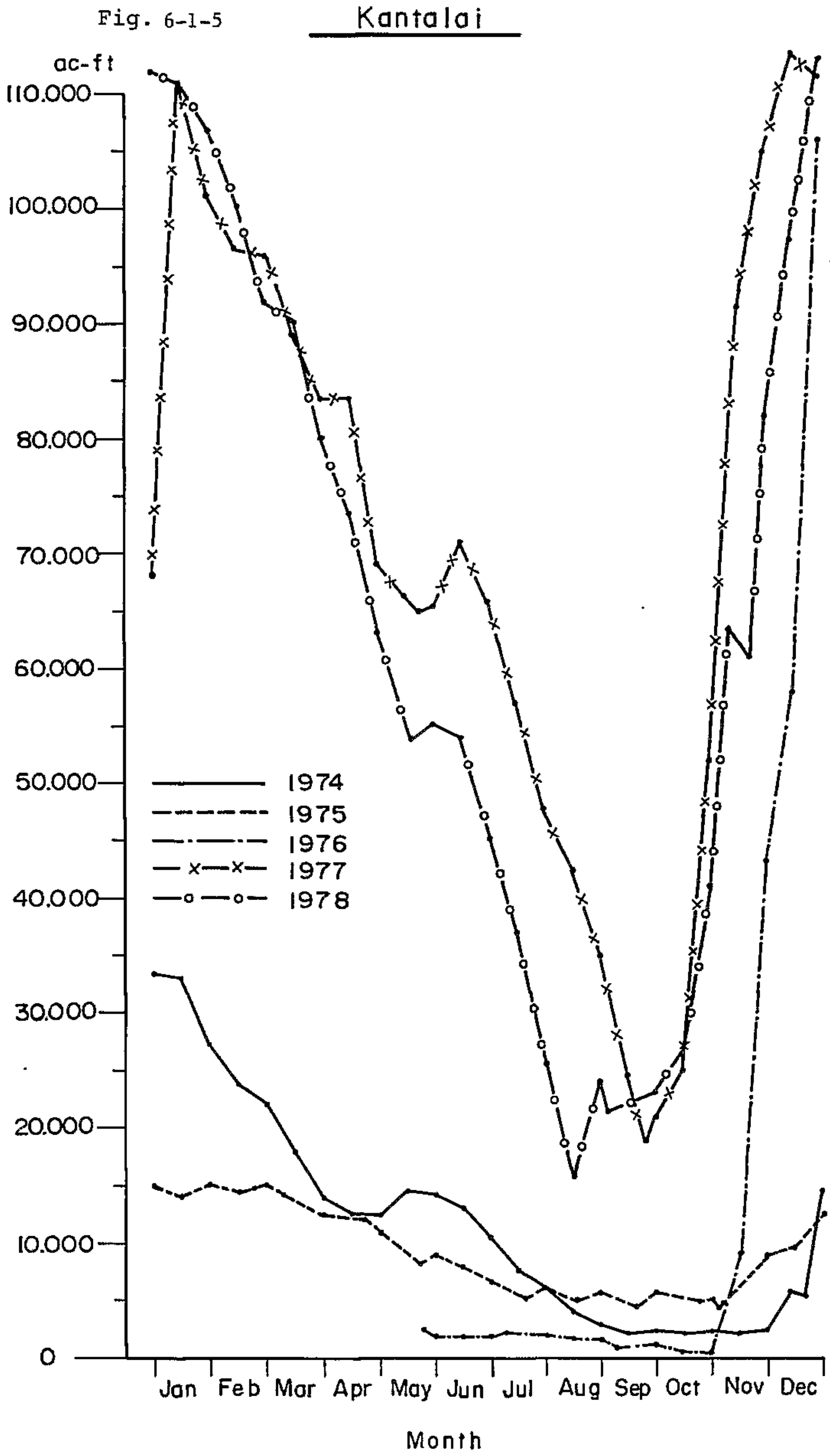

Kantalai
ac-ft
110,000
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
1974
1975
1976
1977
1978
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

Fig. 6-1-6 Parakrama Samudra

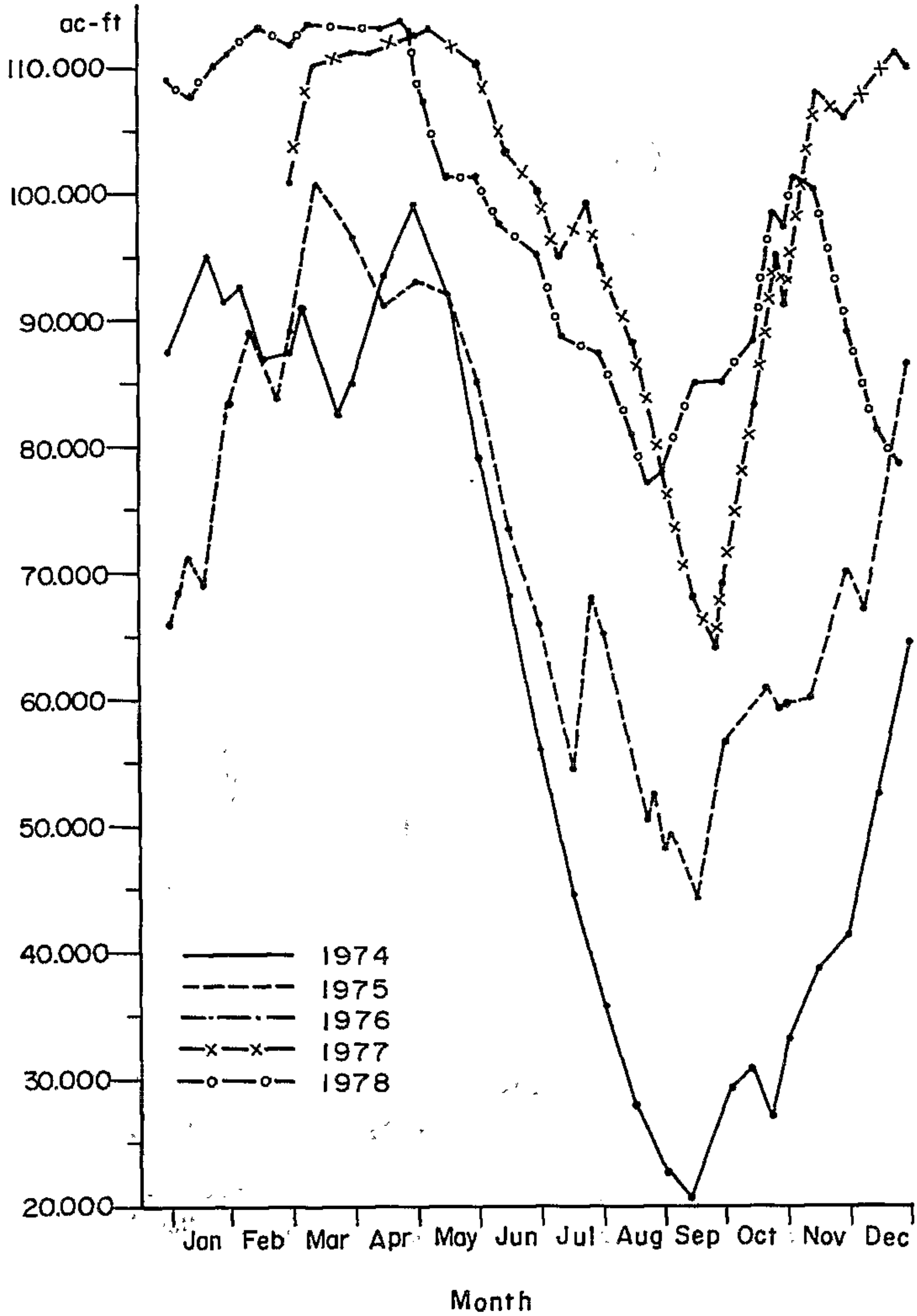
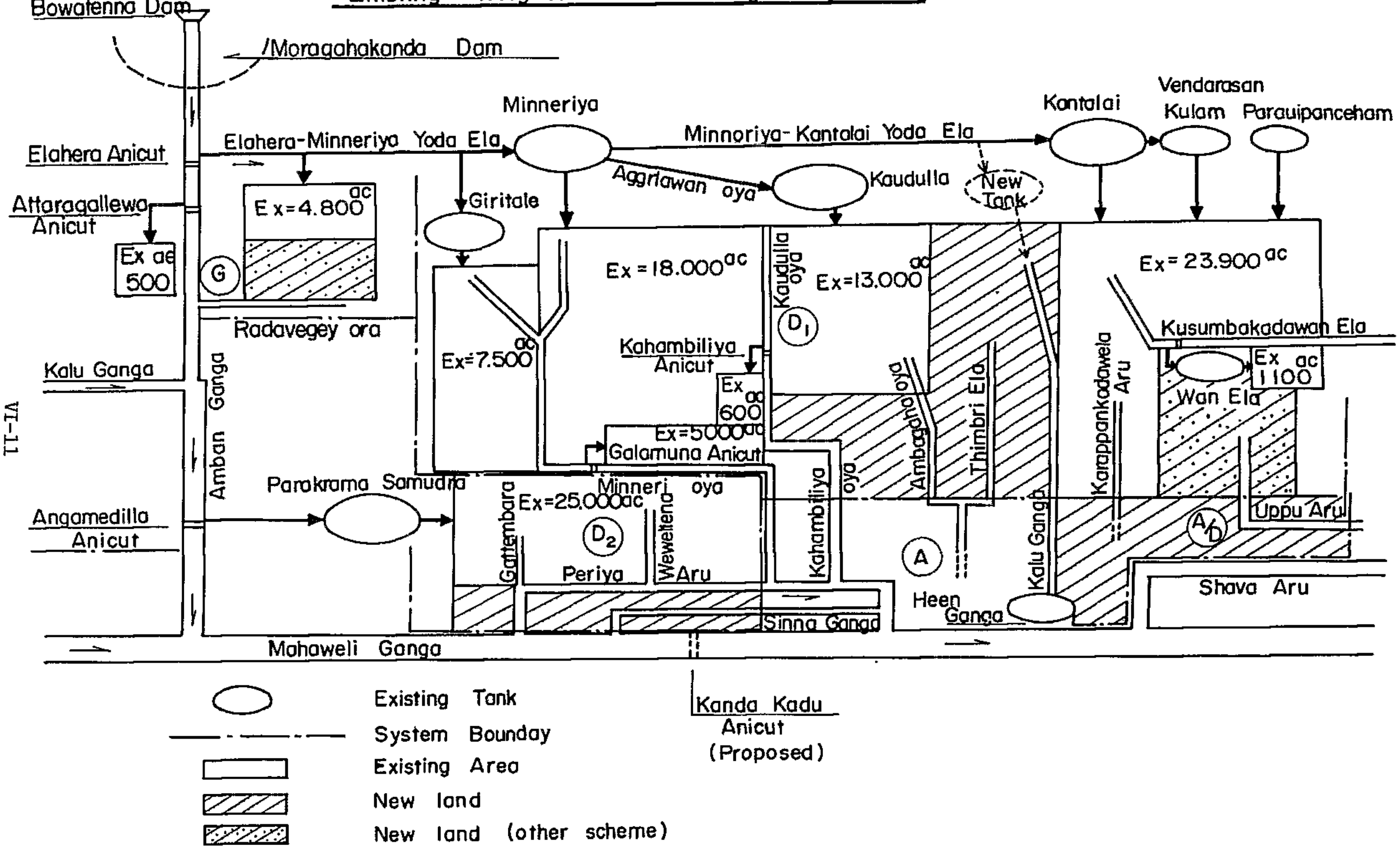


Fig. 6-1-7 Existing Irrigation & Drainage System



1.1.4 Existing Irrigation Facilities

They mainly consist of tanks, anicuts and some lift-irrigation facilities as follows:

(1) Tanks

Besides those shown in Table 6-1-3 below, the details of which have been obtained from Polonnaruwa C.I.E office and I.EE offices at Minneriya (Hingrakgoda) and Kantalai, there are numerous minor tanks which are of much smaller scale in their storage capacities and irrigable areas, hence they have been taken into account supplementarily to the major irrigation schemes in water balance study.

Table 6-1-3 Existing Tank Capacities

	Name	Capacity		Dead Storage		Available Storage Capacity	
		1000 ac-ft	$10^6 m^3$	1000 ac-ft	$10^6 m^3$	1000 ac-ft	$10^6 m^3$
D_1	Kaudulla	104.0	128.0	4.5	5.0	99.5	123.0
	Minneriya	110.0	136.0	4.0	5.0	106.0	131.0
	Kantalai	110.0	136.0	4.0	5.0	106.0	131.0
	Vendarasan Kulan	20.2	25.0	-	-	20.2	25.0
	Giritale	18.8	23.0	0	-	18.8	23.0
	Sub Total	363.0	448.0	12.5	15.0	350.5	433.0
D_2	Parakkama Samudra	110.0	136.0	15.0	19.0	95.0	117.0
Total		473.0	584.0	27.5	34.0	445.5	550.0

Table 6-1-4 List of Existing Tank

Item \ Tank System	Unit	Kaudulla D_1	Minneriya D_1	Kantalai D_1	Giritale D_1	Parakrama Samudra D_2	Vendarasan Kulam D_1	Paravipanchan Kulam D_1
Catchment area	Mile^2	32.0	92.6	Kantalai 77.1 Gal OYA 83.0 Aluth OYA 28.0 Total 188.1	9.4	28.0	4.3	5.5
Capacity	AC-ft	104,000	110,000	110,000	18,800	110,000	20,200	4,500
Dead storage	"	4,500	4,000	4,000	-	15,000	-	-
Area at F.S.L ( )	AC (M.S.L)	6,100 (242.0)	6,300 (307.42)	5,950 (194.5)	760 (302.0)	6,275 (194.0)	1,100 (180.0)	225 (135.0)
Area at Sill	AC	550	200					
Irrigable area (outside spec)	AC (M.S.L)	10,500 (13,000)	13,500 (18,000)	20,800 (23,900)	6,200 (7,500)	19,600 (25,000)	Kantalai area	Kantalai area
Bound (Dam) Length Top Level " Width Slopes	 Mile-ft M.S.L ft on	mile ft 5 3900 252.0 25.0 U/S 1 on 3.0 D/S 1 on 2.5	mile ft 1 3900 318.65 25.0 U/S 1 on 2 D/S 1 on 3	mile ft 2 1584 208.0 to 202.0 45.0 U/S 1 on 3.75-2.0 D/S 1 on 3.0 -2.0	ft 1700 310.0 to 319.0 30.0 U/S 1 on 2.0 D/S 1 on 2.0	mile ft 8 2320 200.0 12.0 U/S 1 on 3.0-2.75 D/S 1 on 2.5-2.0	ft 3800 185.0 12.0 U/S 1 on 2.5 D/S 1 on 2.5	ft 1430 146.5 12.0 U/S 1 on 3.0 D/S 1 on 2.5
Spill		Radial Gate 12^{NOS} 12/20'x12.6' (262') H.F.L 246.8^{MSL} Crest.L 240^{MSL}	L.B NO.1(Kantalai) Radial G 2^{NOS}/15'x8' Slide G 2^{NOS}/16'x5' Sill L 294.9^{MSL} L.B NO.2(Kaudulla) Radial G 7^{NOS}/20'x12'-6" Crest.L 307.4^{MSL} Sill L 294.9^{MSL}	Radial G 10^{NOS} 10/15'x8' H.F.L 201.5^{MSL} Crest L 194.5^{MSL} Sill L 186.5^{MSL}	Clear Overfall with Ogee Sets Length 125' Crest L 302.0^{MSL} H.F.L 304.0^{MSL}	Natural Spill Length 440' Crest L 195.0^{MSL} Radial G Length 100' No.10/ Crest L 194.0^{MSL}	Casuseway Cum Length 50' Crest L 180.0^{MSL} H.F.L 183.0^{MSL}	Chate Type Length 120' Crest L 135.0^{MSL} H.F.L 141.15^{MSL}
Sluice		Low Level(R.B) Type R.C. Tower Opening 4'ϕ Cast Iyon Sill L 210.0'^{MSL} Hight Level(L.B) Type R.C. Tower Opening 3/3'-9"x5'0 Sill L 215.0	Low(R.B) Masonary 2/4'-9"x3.0' 269.32^{MSL} 4'-7"x3.0' 279.73^{MSL} Jayanthi(R.B) R.C.C 3/2'-8"x4' 275.0^{MSL} Higth(L.B)Raja Ela R.C.C 1/3'x2'-6" 278.34^{MSL}	L.B 2/2'x4' Sill L 152.6^{MSL} Max.Q 570^{cusec} Area 10,640^{ac} R.B(old) 2/2^1/4' x 4' 2' x 2^1/2' Sill L 153.4^{MSL} Max.Q 440^{cusec} Area RB_1(P)1515^{ac} " RB_2(S)7427^{ac} R.B(Montana) 2/4'x 2^1/2' Sill L 155.74^{MSL} Max.Q 614^{cusec} Link Sluice 4/3^1/2ϕ Sill L 175.0^{MSL} Q 820^{cusec} Area 1,287^{ac}	L.B Tower Sluice 1/2'-6"x1'-6" U/S 259.35^{MSL} R.B Tower Sluice 2/4'-0"x32" U/S 264.75^{MSL}	D_1 R.C. Tower (H.P) 4/42"ϕ H.P Sill U/S 169.0^{MSL} D/S 168.23 " Q 350^{cusec} D_2 R.C. Tower (culvert) 1/4'-3"x4.0' Sill U/S 170.0^{MSL} D/S 169.62 " Q 115^{cusec} D_3 R.C. Tower 1/36"ϕ H.P Sill U/S 170.0 D/S 169.17 Q 35^{cusec}	Sill E 140.5^{MSL} 1/3'0ϕ	Sill E 110.0^{MSL}

Table 6-1-5

List of Minor Tanks (Capacity 30^{ac})

Name of Minor Tanks	Name of Minor Tanks	Capacity	Caltivable Area
		ac-ft	ac
Kaudulla			
	Ambagaswewa	2,102.5	1,188
Parakrama Samudra			
	Kalahagala		30
	Kadawala Wewa	100.0	300
	Amaulunda		108
	Aluth Wewa	150	60
	Kirinatidamanawewa	500	99
	Uradikulamwewa		30
Giritale			
	Ilukwewa		30
	Gallida	516	177
	Paluwewa	159	50
	Baddepanwiwla	270	70
	Divalamkadawala	313	100
	Pahalasiyambalawewa	110	36
	Wewalawewa	138	40
	Deegannawewa	240	80
	Nikawewa	306	102
	Wijerajawewa	225	75
	Ihalasiyambalawewa	129	33
	Madaymalawewa	300	100

(2) Anicuts

Besides Elahera and Angamedilla anicuts on the Amban Ganga, there are some anicuts which collect the drainage water flown into the the riverlets such as at Galamuna, Kahambiliya, etc. The particularsof Elahera and Angamedilla Anicuts are shown in Table 6-1-6.

(3) Lift Irrigation

Small acreage (19 - 200 ac) in being irrigated by low-head pumps; more than one-half of lift irrigated land is in System G (600 ac) and about 600 ac in other Systems, totalling 1100 ac. Details of lift irrigation schemes will be known from Table 6-1-7.

Table 6-1-6

Existing Anicut

Item	Unit	Elahera Anicut Amban Ganga	Elahera Anicut Kuda Ganga	Angamedilla Anicut
Catchment Area	$Mile^2$			540.0
Length	ft	585.3	105 - 3'	90.0
Crest Level	MSL	455.5	455.5	226.4
Scour Gate		-	Fixed Wheel Gate 2 Nos 10' x 5'	Hand wind 1 Nos 5' x 4'
Sill Level	MSL	-	437.1	216.5
Crest Level of divide wall	MSL	-	442.1	226.91
Head Sluice No. of Opening			Fixed Wheel Gate 2 Nos 11' x 8'	R.C with Gates 2 Nos 10' x 4'-6"
Level	MSL	-	439.1	219.2
F.S.L.	MSL	-	447.1	D/S 223.73
H.F.L.				230.67
Capable of Discharging	Cusec	-	Normal 1,500 Overload 2,000	1,000

Table 6-1-7

List of Irrigation Scheme (Polonaruwa C.I.E. Office)

Name	Pump St No.	No.of Pump	No.of fore Bay	Acreage under Each fore Bay	Total Acrege
(Kaudulla)					
Stage 1 TR 5	1	1/6" dia.	1	32	32
TR 5	2	1/7" "	1	52	52
					Sub.T 84
(Minneriya)					
Stage 3 LB7	3	1/6" dia.	1	22)	49
LB9	3	1/6" "	1	27)	
(Giritale)					
LB	6	1/4" dia	1	27	
RB Tract 5	7	1/6' "	3	(30.75) (35.25) 16.50)	82.5
" " 3	7	1/6" dia.	1	45	45
					Sub.T 127.5
(G. System)					
Konduru Stage II	8	1/4" dia	1	30)	
Wewa		2/8" "	2	90) 80)	200
Stage I	9	1/6" dia 1/6" "	1 2	66) 32) 62)	158
Bakamuna Stage III	10	1/6" dia	1	72	72
" II	11	1/8" "	1	104	104
" I	11	1/6" "		60	60
					Sub.T 594
(Minneriya Oya) Sunga Wila	12	1/6" dia. 1/6")	2	67) 18)	85
(P.P.S.) D1 Kalinga Ela				(0.8)	
Unit I	13	1/6" dia.	2	(26)	92
II	13	1/4"	1	32)	
III	14	1/6"	1	26)	
D2 LB 4	15	1/6" dia	1	48	48
D3	16	1/3" dia.	1	19	
					Sub.T 159
Total					1,098.5 ≒ 1,100 ac

II. PLANS AND STUDIES

2.1 Identification of Irrigable Area

The area currently irrigated totalling 98,900 ac (40,000 ha) has been included in its entirety into the irrigable area, together with 19,500 ac (7,900 ha) which will be developed under Polgolla-Bowatenne Complex (10,000 ac or 4,100 ha in System G and 9,500 ac or 3,800 ha in System D1) and the land extending over 34,400 ac (13,900 ha) in Systems D1, D2 and A/D which will be made newly irrigable by constructing the Moragahakanda reservoir, and undeveloped sugar cane area of 1,000 ac (400 ha) in the downstream of Kantalai Tank. The total irrigable area, therefore, would be 153,800 ac (62,200 ha) as is detailed in Table 6-2.-1.

Topographic maps used for identification of the newly reclaimable area were both outdated and incomplete; to cover such gaps coaser maps (1 inch to 1/2 mile = 1/31680) had to be used, as follows:

System D1	....	1 inch = 4 chains (1/3168) and 1 inch = 12 chains (1/9504) in parts
" D2	....	1 inch = 1/2 mile (1/31680)
" A/D	....	1 inch = 1/2 mile (1/31680) and 1/10000

Contours:

1 inch = 4 chains & 12 chains	....	2 feet
1 " = 1/2 mile	....	20 "
1 " = 10000	....	5 meters

Demarkation of the newly reclaimable area(s) has been done somewhat differently between Systems: in System D1, the main canal route was first determined and then the irrigable area has been planimeterd, while in System D2 and A/D for which contours on the maps used were too wide, making it difficult to chalk out the irrigable areas, therefore, the ratio between the gross area and net irrigable area in the adjacent places has been applied for determining the irrigable areas there.

Since development of 19,500 ac under the Polgolla-Bowatenne Complex and 1,000 ac sugarcane field in the downstream of Kantalai Tank should be feasible without the Moragahakanda reservoir, these two areas were first put under the 'Other Schemes' apart from the Project's irrigable area, but as it was found out that the reservoir can make them irrigable together with other new lands, they have been included in the Project benefit area (see Table 6-2-2).

System D1

The newly irrigable area corresponds to that covered by Stages III and IV of Kaudulla Scheme. Under Kaudula Scheme, it was made 28,000 ac (11,300 ha) but has been revised to 22,400 ac (9,100 ha) by the present study (Stage III = 11,500 ac and Stage IV = 10,900 ac). According to a recent I.D plan (January 1979), the cultivation area in System D1 was estimated at 70 per cent of the total, that is, Stage III 13,715 ac plus Stage IV 13,985 ac = 27,700 ac which seems to be an over-estimation.

System D2

The newly reclaimable area is spreading in the downstream of the existing Parakrama Samudra Tank. It is a lowland encircled by the Mahaweli Ganga and the Periya Aru, habitually inundated during Maha season. It was originally estimated at 9,100 ac (3,700 ha) but, as a result of the present survey, it has been identified as net irrigable area 5,400 ac (2,200 ha) out of the gross area of 12,000 ac. This irrigable acreage may be subject to change after the Kandukadu anicut will be completed.

System A/D

This area was previously included in System A, to be made irrigable by Kandukadu anicut, but has been put in System A/D from water balance, priority and topographic points-of-view. This area is lowly situated and liable to the influences of the Mahaweli Ganga like System D2 area but is now protected by embankment. It was originally planned to irrigate 9,100 ac (3,700 ha) but irrigability has been reduced to 6,600 ac (2,700 ha) as a result of the present survey. There is a plot of land which was developed by the Tobacco Corporation to the extent of 2,000 ac and Heen Ganga Tank has been constructed to irrigate this plot by storing the Kalu Ganga runoff. MDB is planning to develop this land.

Table 6-2-1 Proposed Irrigable Area

Unit ac (ha)

System	Existing	New Land			Total	Remarks
		Other Scheme	Moragahakanda	Sub Total		(Other Scheme)
G	4,800 (1,900)	10,000 (4,100) * 1,000 (400)	-	10,000 (4,100)	14,800 (6,000)	EEC/UNDP/FAO Mission
D1	69,100 (28,000)	9,500 (3,800)	22,400 (9,100)	32,900 (13,300)	102,000 (41,300)	Sugar Corporation "
D2	25,000 (10,100)	-	5,400 (2,200)	5,400 (2,200)	30,400 (12,300)	
A/D	-	-	6,600 (2,600)	6,600 (2,600)	6,600 (2,600)	
Total	98,900 (40,000)	20,500 (8,300)	34,400 (13,900)	54,900 (22,200)	153,800 (62,200)	

* under construction

Table 6-2-2

Proposed Project Area

(unit : ac)

System	Tanks or Canals (Head Work)	UNDP/FAO 1968 Report: Existing	UNDP/FAO 1968 Report: New	UNDP/FAO 1968 Report: Total	1977 NOV MDV Report: Existing	1977 NOV MDV Report: Unauthoraised & Pol Comp.	1977 NOV MDV Report: New	1977 NOV MDV Report: Total	Result of Field Survey by F/S Team: Existing under spec	Result of Field Survey by F/S Team: Existing outside spec	Result of Field Survey by F/S Team: Other sheme	Result of Field Survey by F/S Team: New	Result of Field Survey by F/S Team: Total	Proposed Area, Gross Area: Existing	Proposed Area, Gross Area: Other sheme	Proposed Area, Gross Area: New	Proposed Area, Gross Area: Total	Proposed Area, Irrigable Area: Existing under spec	Proposed Area, Irrigable Area: Existing outside spec	Proposed Area, Irrigable Area: Other sheme	Proposed Area, Irrigable Area: New	Proposed Area, Irrigable Area: Total
G	Erahera-Minneriya Yoda Ela	4,800	6,200	11,000	4,800	6,200	-	11,000	4,800	-	10,000	-	14,800	8,000	23,200	-	31,200	4,800	-	10,000	-	14,800
	Giritale	4,400	-	4,400					6,200	1,300	-	-	7,500	11,200	-	-	11,200	6,200	1,300	-	-	7,500
	Minneriya	14,325	-	14,325					13,500	4,500	-	-	18,000	26,300	-	-	26,300	13,500	4,500	-	-	18,000
	Kaudulla	10,230							10,500	2,500	-	22,400	35,400	25,600	-	55,700	81,300	10,500	2,500	-	22,400	35,400
	Kantalai				49,400	13,800	28,000	91,200														
D1	Vendarasan Kulam	22,230	29,200	61,660					20,800	3,100	9,500 1,000	-	34,400	42,800	18,700	-	61,500	20,800	3,100	10,500	-	34,400
	Paravipan-cham																					
	Galamuna Ani (Minneri Oya	-	-	-					3,300	1,700	-	-	5,000	6,500	-	-	6,500	3,300	1,700	-	-	5,000
	Kahambiliya Oya Ani	-	-	-					500	100	-	-	600	1,100	-	-	1,100	500	100	-	-	600
	Wan Ela	-	-	-					1,000	100	-	-	1,100	2,200	-	-	2,200	1,000	100	-	-	1,100
	Sub-Total	51,185	29,200	80,385	49,400	13,800	28,000	91,200	55,800	13,300	10,500	22,400	102,000	115,700	18,700	55,700	190,100	55,800	13,300	10,500	22,400	102,000
D2	Parakrama Samudra	18,200	9,100	27,300	19,000	-	9,100	28,100	19,600	5,400	-	5,400	30,400	42,000	-	12,000	54,000	19,600	5,400	-	5,400	30,400
A/D	Kantalai	-	-	-	-	-	9,100	9,100	-	-	2,500	4,100	6,600	-	-	14,400	14,400	-	-	-	6,600	6,600
	Total	74,185	44,500	118,685	73,200	20,000	46,200	139,400	80,200	18,700	23,000	31,900	152,800	165,700	41,900	82,100	289,700	80,200	18,700	20,500	34,400	153,800

2.2 Estimation of Irrigation Water Requirements

2.2.1 Rainfall and Meteorological Data

Major rainfall and meteorological stations located in and around the project area are illustrated in Fig. 6.2.1. Meteorological stations are as follows:

(a) Maha-Illuppallama

(b) Annuradhapura

(c) Trincomalee

Rainfall stations are as follows:

(a) Elahera (Bakamuna)

(b) Polonnaruwa

(c) Hingurakgoda

(d) Kantalai

Besides, there are several rainfall stations in and around the project area. But, from recording years observed and location, the typical rainfall stations are above four stations.

Meteorological data of three meteorological stations are shown in Table 6.2.3 - 6.2.6 The mean monthly rainfalls for the last twenty eight (28) years (from 1950 to 1977) recorded at each rainfall stations are shown in Table 6.2.7 - 6.2.10. The meteorological observation at the Kandulla Tank left bank is continued from 1978 by Irrigation Department. As the Kandulla area is located at the centre of the project area, the observed data will be effective meteorological data for the detailed design.

Fig. 6.2.1.

Location Map of Rainfall and Meteorological Station

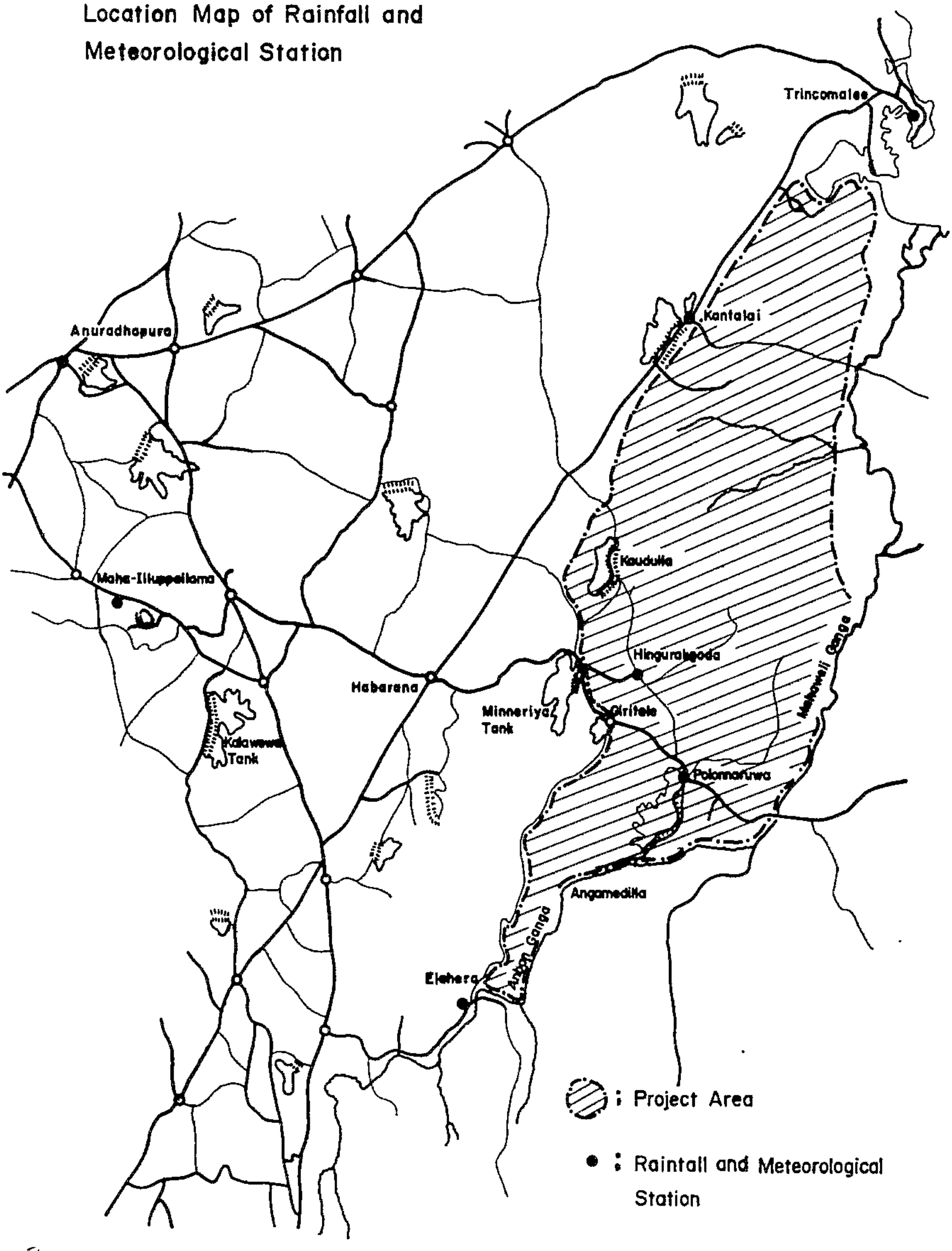


Table 6-2-3

Climatological Table of Observatories in Sri Lanka

Station:MAHA ILLUPPALLAMA Lat:08°07'N Long:80°28'E Barometer:452ft. Anemometer:10ft. I=0830 S.L.S.T. II=1730 S.L.S.T.

Month		Mean Sea Level Pressure	Dry bulb temp.	Relative humidity	Mean daily max. temp.	Mean daily min. temp.	Highest Max. temp. recorded	Lowest Min. temp. recorded	Mean wind speed at hour	Mean daily wind speed	Prevailing wind direction	Monthly rainfall	Number of rainy days	Rainfall driest month	Rainfall wettest month	Heaviest rainfall in 24 hrs.	No. of hrs. of sunshine per day	Cloudiness (Octas)	No. of days of thunder	No. of days of fog
		mb.	°C	%	°C	°C	°C	°C	kmph.	kmph.		mm.		mm.	mm.	mm.				
January	I	1013.2	23.2	88	29.1	20.4	33.3	14.4	6.9	7.2	NE	113.8	9	0	404.6	127.0	7.1	4.7	1	4
	II	1010.0	26.2	70			1956.29	1957.28	9.0		NE			2 yrs.	1921	1921.9		5.0		
February	I	1012.7	23.8	86	31.1	20.4	36.2	13.4	6.6	7.1	NE	51.3	5	0	230.1	107.9	8.4	3.8	2	2
	II	1009.2	28.1	62			1973.28	1956.13	9.3		NE			6 yrs.	1922	1967.4		4.3		
March	I	1012.0	25.7	82	33.4	21.7	38.1	15.9	6.4	6.3	Var.	89.7	6	5.6	285.0	106.7	9.0	3.2	6	4
	II	1008.3	30.2	57			1973.20	1961.1	9.0		NE			1941	1920	1920.5		4.3		
April	I	1010.5	26.8	82	33.6	23.2	36.6	19.8	5.8	5.9	Var.	182.9	11	7.1	455.7	143.8	8.7	4.1	17	1
	II	1007.0	29.3	69			1957.9	1966.30	7.9		Var.			1936	1921	1944.1		6.0		
May	I	1008.5	27.4	80	32.4	24.4	36.7	20.6	13.4	12.1	SW	99.3	7	0	347.0	171.7	8.2	5.6	5	0
	II	1005.9	28.8	71			1953.22	1971.20	13.4		SW			4 yrs.	1933	1927.1		5.9		
June	I	1008.6	26.9	78	32.2	24.4	37.1	21.0	17.9	16.4	SW	19.3	4	0	165.9	121.9	7.9	6.2	0	0
	II	1006.4	28.5	67			1953.11	1964.17	18.8		SW			7 yrs.	1912	1912.4		6.0		
July	I	1008.8	26.6	77	32.5	24.0	37.4	20.8	16.9	15.8	SW	30.2	3	0	217.4	92.7	7.7	6.1	2	0
	II	1006.5	28.5	65			1973.22	1963.26	17.5		SW			17 yrs.	1960	1960.11		6.0		
August	I	1009.1	26.6	76	32.9	24.0	36.3	19.9	17.1	15.8	SW	56.9	4	0	271.5	89.9	8.1	6.1	3	0
	II	1006.4	28.6	63			1953.6	1965.16	17.4		SW			14 yrs.	1933	1933.11		6.0		
September	I	1009.9	26.8	75	33.1	23.8	37.2	20.0	17.1	15.0	SW	66.5	4	0	340.4	148.8	7.7	5.8	5	0
	II	1006.9	28.5	62			1959.16	1960.13	16.7		SW			10 yrs.	1951	1974.13		5.8		
October	I	1010.9	26.0	81	31.7	22.9	37.0	18.5	10.0	8.9	SW	226.1	14	88.9	522.2	148.8	6.8	5.6	12	2
	II	1007.9	27.1	72			1959.16	1967.27	10.1		SW			1950	1962	1962.10		6.3		
November	I	1012.1	24.8	86	30.0	21.8	34.9	16.0	5.0	5.5	Var.	253.5	17	61.5	509.8	145.3	6.1	5.2	9	3
	II	1009.2	26.1	78			1974.20	1964.29	5.5		Var.			1947	1963	1922.28		6.2		
December	I	1012.7	23.8	88	28.7	21.1	33.2	15.6	6.4	6.5	NE	238.0	14	36.3	1076.4	375.9	5.6	5.3	3	3
	II	1009.7	25.4	78			1955.2	1970.5	7.7		NE			1926	1957	1907.15		5.8		
Anual	I	1010.8	25.7	82	31.7	22.7	38.1	13.4	10.0	10.2	-	1427.5	98	797.0	2499.4	375.9	7.6	5.1	65	19
	II	1007.8	27.9	68					11.9					1956	1957			5.6		
Period of data (Yrs.)		23	23	23	23	23	23	2 3	18	18	10	30	30	71	71	71	22	23	10	10

Table 6-2-4

Climatological Table of Observatories in Sri Lanka

Station:ANURADHAPURA Lat:09°21'N Long:80°22'E Barometer:305ft. Anemometer:- I=0830 S.L.S.T. II=1730 S.L.S.T.

Month		Mean Sea Level Pressure	Dry bulb temp.	Relative humidity	Mean daily max. temp.	Mean daily min. temp.	Highest max. temp. recorded	Lowest min. temp. recorded	Mean wind speed at hour	Mean dialy wind speed	Prevailing wind direction	Monthly rainfall	Number of rainy days	Rainfall driest month	Rainfall wettest month	Heaviest rainfall in 24 hrs.	No. of hrs.of sunshine per day	Cloudiness (Octas)	No. of days of thunder	No. of days of fog
		mb.	°C	%	°C	°C	°C	°C	kmph.	kmph.		mm.		mm.	mm.	mm.				
January	I	1013.4	23.3	91	28.6	20.7	36.3	13.0	4.8	6.0	NE	123.2	12	0.8	537.5	166.4	7.0	4.4	1	0
	II	1010.2	26.4	73			1919.9	1950.3	8.0		NE			1916	1923	1963.6		4.7		
February	I	1012.8	23.9	89	30.7	20.7	37.1	12.7	4.7	6.3	E	53.6	6	0	195.1	136.9	7.8	3.6	2	0
	II	1009.2	28.3	64			1916.29	1957.7	7.9		ENE			11 yrs.	1922	1922.12		4.2		
March	I	1012.2	25.9	85	33.2	21.9	38.6	14.1	4.8	5.6	E	98.8	7	0	357.4	119.4	8.3	3.0	6	0
	II	1008.3	30.3	60			1915.1	1935.1	7.2		E			1988 & 1910	1936	1919.19		4.1		
April	I	1010.5	27.4	84	33.3	23.6	38.1	18.1	5.3	5.2	SW	186.9	13	13.2	457.7	158.8	8.4	3.8	17	0
	II	1006.9	29.4	71			1914.24	1950.1	6.1		W			1911	1890	1955.19		5.9		
May	I	1008.2	27.5	83	32.7	24.6	38.0	20.2	11.6	10.3	SW	99.6	8	0	493.3	160.8	7.9	5.8	5	0
	II	1005.5	29.2	71			1973.2	1935.11	10.9		SW			3 yrs.	1891	1932.14		5.7		
June	I	1008.4	27.3	79	32.2	24.7	37.7	21.3	14.2	13.5	SW	13.5	4	0	176.3	72.6	7.9	6.2	0	0
	II	1006.1	29.1	66			1915.18	1912.5	15.1		SW			10 yrs.	1885	1906.10		5.7	0	
							1953.1													
July	I	1008.5	26.8	78	32.7	24.3	38.3	20.8	13.2	12.7	SW	31.8	3	0	208.0	94.0	7.7	6.0	2	0
	II	1006.1	29.0	64			1918.22	1949.19	13.2		SW			24 yrs.	1910	1938.31		6.1		
August	I	1008.8	26.9	77	33.0	24.2	38.2	20.0	13.5	12.7	SW	46.7	5	0	217.9	110.7	7.4	5.9	5	0
	II	1006.0	29.1	63			1912.10	1939.10	13.2		SW			8 yrs.	1965	1965.15		5.9		
September	I	1009.7	26.9	77	33.4	24.0	38.4	20.5	12.9	11.8	SW	69.6	5	0	349.2	99.1	7.8	5.7	5	0
	II	1006.6	28.9	62			1914.17	1925.15	12.2		SW			8 yrs.	1929	1914.19		5.8		
October	I	1010.8	26.1	83	31.8	23.1	37.4	18.4	8.2	7.7	SW	232.9	16	52.1	547.1	132.8	6.4	5.7	11	0
	II	1007.7	27.4	73			1918.1	1928.28	7.6		SW			1870	1902	1924.24		6.2		
							1957.13													
Novemver	I	1012.2	25.1	89	29.9	21.9	34.8	14.1	4.2	4.5	Calm	248.4	19	45.7	593.6	150.6	6.2	5.0	8	0
	II	1009.2	26.3	80			1916.5	1934.13	5.0		NE			1904	1920	1920.23		6.2		
December	I	1012.7	23.8	91	28.5	21.3	33.1	14.1	5.0	5.6	NE	242.3	17	62.5	927.1	319.5	5.9	5.0	2	0
	II	1009.7	25.8	79			1972.10	1937.6	6.8		NE			1886	1957	1948.31		5.4		
Annual	I	1010.7	25.9	84	31.7	22.9	38.6	12.7	8.5	8.5		1447.3	115	745.2	2426.5	319.5	7.4	5.0	64	0
	II	1007.6	28.3	69					9.4					1956	1957			5.5		
Period of Date(Years)		22	25	25	30	30	65	65	25	24	10	30	30	105	105	75	5	25	10	10

Table 6-2-5

Climatological Table of Observatories in Sri Lanka

Station:TRINCOMALEE Lat:06°35'N Long:81°15'B Barometer:10ft. Anemometer:14ft. I=0830 SLL.S.T. II=1730 S.L.S.T.

Month		Mean Sea Level Pressure	Dry bulb temp.	Relative humidity	Mean daily max. temp.	Mean daily min. temp.	Highest Max. temp. recorded	Lowest Min. temp. recorded	Mean wind speed at hour	Mean daily wind speed	Prevailing wind direction	Monthly rainfall	Number of rainy days	Rainfall driest month	Rainfall wettest month	Heaviest rainfall in 24 hrs.	No. of hrs.of sunshine per day	Cloudiness (Octas)	No. of days of thunder	No. of days of fog
		mb.	°C	%	°C	°C	°C	°C	kmph.	kmph.		mm.		mm.	mm.	mm.				
January	I	1013.7	25.7	78	27.0	24.2	31.7	19.6	16.6	18.8	NE	210.6	13	0.8	739.6	208.5	6.6	5.4	0	0
	II	1010.6	26.2	76			1912.14	1950.3	20.4		NE			1973	1913	1921.9		5.8		
February	I	1013.2	26.2	77	28.1	24.3	34.3	18.3	12.4	14.3	NE	95.2	6	0	551.4	227.8	7.5	4.7	1	0
	II	1010.1	27.2	72			1915.26	1947.28	16.6		NE			6 yrs.	1965	1965.14		4.9		
March	I	1012.2	27.3	78	29.9	24.8	37.4	19.8	8.0	10.5	NE	48.3	5	0	282.4	239.0	8.8	3.8	3	0
	II	1008.8	28.6	71			1915.27	1947.1	12.2		NE			12 yrs.	1944	1944.1		4.1		
April	I	1010.7	28.5	77	32.0	25.4	28.6	20.9	7.9	10.3	SW	76.7	7	0	237.7	141.0	8.9	4.3	8	0
	II	1007.1	29.7	72			1956.25	1943.15	11.1		E			5 yrs.	1873	1955.18		5.2		
May	I	1008.0	28.9	72	33.6	26.1	38.7	19.4	16.7	16.7	SW	67.8	6	0	434.3	271.5	8.0	5.2	6	0
	II	1004.9	30.8	65			1915.25	1920.3	15.9		SW			1921 & 1956	1930	1930.5		5.9		
June	I	1007.6	28.6	70	33.7	26.2	38.3	20.6	21.1	21.8	SW	18.5	2	0	181.1	79.5	7.7	5.8	2	0
	II	1001.3	31.2	57			1953.2	1938.26	19.5		SW			23 yrs.	1973	1911.2		6.2		
July	I	1008.0	28.0	71	33.7	25.6	38.4	21.2	19.3	19.8	SW	54.1	4	0	219.2	99.8	7.3	5.7	4	0
	II	1005.1	30.6	59			1918.19	1911.3	17.2		SW			7 yrs.	1971	1926.12		6.5		
August	I	1008.3	27.7	71	33.5	25.3	37.8	20.8	18.8	18.4	SW	102.9	7	0.5	298.2	107.4	8.2	5.3	8	0
	II	1005.1	30.0	62			1969.12	1921.17	16.3		SW			1931	1909	1930.28		6.4		
September	I	1009.3	27.8	71	33.5	25.1	37.6	21.1	17.5	16.4	SW	88.9	6	3.0	289.3	128.5	7.8	5.2	8	0
	II	1005.8	29.7	65			1967.17	1911.17 & 1948.29	15.0		SW			1948	1901	1919.15		6.3		
October	I	1010.7	27.1	77	31.3	24.3	27.6	21.0	13.0	13.4	SW	234.7	16	26.2	565.7	154.2	6.9	5.3	10	0
	II	1007.3	28.1	73			1915.16	1951.8	13.4		NE			1974	1972	1952.3		6.5		
November	I	1011.8	26.4	81	28.7	23.8	35.9	18.7	10.8	13.8	SW	355.1	19	54.6	953.5	264.7	5.6	5.5	4	0
	II	1000.6	27.1	77			1927.2	1944.29	17.1		NNE			1973	1957	1904.19		6.2		
December	I	1012.9	25.9	80	27.3	24.0	32.6	19.4	17.0	18.4	N	373.9	18	56.4	819.9	322.8	5.5	5.9	2	0
	II	1009.9	26.2	78			1911.3 & 1915.8	1922.31	21.3		NNE			1930	1948	1949.17		6.1		
Annual	I	1010.5	27.4	75	21.0	24.9	38.7	18.3	14.9	16.0	-	1726.7	109	886.2	2578.4	322.8	7.4	5.2	56	0
	II	1007.3	28.8	69					16.3		-			1889	1963			5.8		
Period of data (yrs.)		30	25	25	30	30	65	65	25	30	10	30	30	107	107	85	10	25	10	

Table 6-2-6

AVERAGE MONTHLY AND ANNUAL PAN EVAPORATION
(Millimeters)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Anual
°Anuralhapura	118	134	189	174	198	207	220	220	207	143	108	102	2020
Badulla	93	101	143	129	143	138	158	164	159	127	90	78	1523
Batticaloa	133	143	164	183	205	207	220	214	198	164	138	118	2087
Colombo	143	134	180	159	143	144	143	143	138	133	129	133	1722
Diyatalawa	102	115	133	114	133	138	158	164	144	112	84	87	1484
Galle	143	148	180	174	174	168	174	180	183	164	138	143	1969
Hambantota	189	193	205	183	180	192	205	205	192	174	153	158	2229
Jaffna	158	162	214	213	245	222	214	198	213	158	129	112	2238
Kankesanturai	164	171	198	207	229	228	214	198	207	158	129	133	2236
Katugastota	174	185	205	174	174	159	164	174	159	143	129	143	1983
Kurunegaia	174	185	214	192	198	168	189	198	183	158	138	143	2140
°Maha Illuppallama	127	157	205	174	205	213	229	220	222	164	123	118	2157
Mannar	158	157	220	198	214	198	189	198	192	149	129	133	2135
Nuwara Eliya	118	129	174	138	112	114	102	102	108	93	90	102	1382
Puttalam	164	162	205	168	198	198	189	214	207	149	123	127	2104
Ratnapura	143	162	164	144	133	123	133	143	129	127	114	127	1642
°Trincomalee	164	162	198	207	251	258	282	260	243	174	138	133	2470
Vavuniya	133	134	180	174	190	213	220	220	207	143	123	102	2039

Table 6-2-7

Monthly Rainfall at Bakamuna (Elahera)

(Unit: inch)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Total	Maha Oct-Mar.	Yala Apr-Sept.
1950	6.38	5.24	5.32	1.29	1.88	0	0	0.25	0.84	2.95	6.14	8.34	38.63	34.37	4.26
51	26.20	5.64	5.11	4.88	5.27	0.34	0.47	3.15	4.71	6.24	20.17	11.63	93.81	74.99	18.82
52	17.21	6.70	0.95	8.32	4.33	0	0.73	0	5.67	3.89	7.37	14.34	69.51	50.46	19.05
53	11.80	3.77	2.52	14.98	0	0.06	1.79	4.15	1.73	12.54	13.61	14.14	81.00	58.38	22.62
54	15.54	5.26	12.08	8.49	0	0	0.99	3.18	0	8.28	5.84	20.73	80.39	67.73	12.66
55	17.70	4.50	1.93	8.20	1.42	0	0.18	1.02	4.56	1.13	3.74	7.50	51.88	36.50	15.38
56	7.42	2.97	3.51	3.57	0	0	0	0	0	1.92	20.93	25.42	65.74	62.17	3.57
57	8.62	13.39	0	1.37	2.52	0	0.60	0	3.03	15.40	17.02	51.67	111.10	103.58	7.52
58	6.83	4.50	8.73	4.99	3.75	0	0.08	0	0	2.20	5.50	12.60	49.18	40.36	8.82
59	3.27	1.03	0.45	5.23	3.54	2.70	0.25	0.59	0.17	6.98	14.45	14.01	52.67	40.18	12.48
60	11.08	23.55	0.14	15.75	0.68	0	2.73	0	0.06	3.40	19.09	8.07	84.54	65.32	19.22
61	9.97	7.38	8.08	3.73	0.90	0.12	0.04	0	0.05	6.32	14.88	21.03	72.53	67.66	4.87
62	14.21	1.44	0.94	10.74	3.75	0	0.04	1.58	0.04	7.69	7.78	10.81	59.02	42.87	16.15
63	14.94	8.64	2.76	15.24	1.02	0.03	0.28	0	0.38	5.01	19.35	26.27	93.92	76.97	16.95
64	11.05	4.64	1.50	7.37	3.16	0	6.93	0.35	1.52	11.31	4.34	8.41	60.58	41.25	19.33
65	4.83	10.88	5.04	10.41	5.69	0	0	4.71	0	11.07	14.56	18.56	85.75	64.94	20.81
66	16.60	0.82	5.72	4.40	0	0	0	0.71	2.25	13.38	11.31	9.53	64.18	57.36	6.82
67	0.93	4.70	1.72	5.98	0.38	0.96	0	0	0	15.63	20.20	7.60	58.10	50.78	7.32
68	6.16	0	9.87	2.46	0	0	0	0	0	8.88	11.98	8.40	47.75	45.29	2.46
69	8.89	3.58	0.63	5.85	0.09	0	0	7.57	0.80	9.55	5.36	27.29	69.61	55.30	14.31
70	18.79	23.61	4.17	4.79	0.85	0	0	0	2.01	4.77	11.36	12.68	83.03	75.38	7.65
71	9.79	7.29	5.07	8.46	1.21	0.15	0	7.11	0.45	2.34	5.42	27.19	74.48	57.10	17.38
72	1.11	0	2.00	7.36	4.25	0	0	0	4.37	18.10	14.85	11.60	63.64	47.66	15.98
73	0	3.78	0.04	1.19	0	0	0	0	1.35	7.15	12.58	28.45	54.54	52.00	2.54
74	0	3.99	0	5.08	0.20	0	0	1.35	5.20	1.22	0.74	14.36	32.14	20.31	11.83
75	4.70	3.02	7.16	3.40	1.80	0.25	3.98	0	0.05	0	10.85	11.56	46.77	37.29	9.48
76	5.79	1.88	0.41	4.41	0	0	0.31	0.43	0	5.94	12.49	13.39	45.05	39.90	5.15
77	4.97	0.44	1.40	0.81	1.66	0	1.45	1.10	2.58	10.51	12.59	12.12	49.63	42.03	7.60
Mean	9.46	5.81	3.47	6.38	1.73	0.17	0.74	1.33	1.49	7.28	11.59	16.35	65.79	53.86	11.93

Table 6-2-8

Monthly Rainfall at Polonnaruwa

(Unit: inch)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Maha Oct-Mar.	Yala Apr-Sept.
1950	5.29	2.02	6.65	0.55	2.43	0	0	3.24	0.71	4.63	6.76	7.03	39.31	32.38	6.93
51	19.70	4.28	2.97	5.31	0.54	0	2.18	1.63	5.82	2.45	15.12	10.44	70.44	54.96	15.48
52	18.26	5.02	1.83	5.25	3.82	0	2.08	0	4.15	7.05	7.31	8.94	63.71	48.41	15.30
53	8.82	3.52	2.88	8.45	0	2.91	6.75	1.42	5.24	10.46	9.64	17.20	76.39	52.52	23.87
54	11.69	3.84	8.33	4.43	0	0	3.58	2.55	0	7.86	7.26	22.76	72.30	61.74	10.56
55	10.27	4.16	1.22	5.03	1.75	0	0	5.28	6.86	6.48	4.04	5.80	50.89	31.97	18.92
56	4.94	2.51	2.35	4.13	0.02	4.37	0.48	2.17	0.17	8.82	12.28	11.84	54.08	42.74	11.34
57	4.44	12.42	0	2.80	5.01	0.09	3.22	0.71	0.58	7.02	24.12	47.98	108.39	95.98	12.41
58	7.56	3.59	4.08	3.20	2.37	0	0	6.29	1.23	8.35	8.93	15.65	61.25	48.16	13.09
59	10.55	0.60	0.56	3.80	1.15	0.85	0	1.18	0.68	14.62	13.33	10.16	57.48	49.82	7.66
60	10.82	16.11	3.34	12.07	6.47	0	5.52	0.94	1.48	3.98	10.42	5.08	76.23	49.75	26.48
61	16.65	10.23	4.08	4.55	5.54	0.27	0	0	0.36	5.69	13.73	20.21	81.31	70.59	10.72
62	8.17	2.58	2.83	3.77	3.00	0	0.19	1.07	5.00	6.65	8.09	8.75	50.10	37.07	13.03
63	19.24	10.13	4.00	8.54	1.55	0.07	1.88	0.20	5.28	7.41	19.31	17.01	94.62	77.10	17.52
64	6.40	8.69	10.06	3.12	1.51	0	4.08	1.83	2.87	3.43	5.79	6.11	53.89	22.96	30.93
65	4.15	16.23	0.90	7.16	6.25	0.85	0	5.98	0.02	9.50	23.47	22.60	97.11	76.85	20.26
66	9.52	0.69	6.36	9.44	0.10	0.10	0.21	4.71	2.05	16.61	20.25	10.07	80.11	63.50	16.61
67	2.58	4.85	2.08	3.45	0.43	0	0	0.03	0.59	10.23	18.37	19.90	62.51	58.01	4.50
68	5.28	0	4.80	3.88	0.05	0	0	0.16	1.28	7.46	12.36	8.39	43.66	38.29	5.37
69	4.37	1.66	1.11	10.67	0	0	3.80	3.44	1.35	10.62	4.30	27.93	69.25	49.99	19.26
70	7.08	11.92	0.74	7.75	5.42	3.75	0	4.07	1.40	8.65	19.24	12.87	82.89	60.50	22.39
71	6.94	4.00	6.32	6.62	1.19	0	5.86	11.13	0.10	7.88	7.09	31.42	88.55	63.65	24.90
72	1.58	0	0	5.44	5.21	0	0.46	0.02	16.03	24.31	22.81	17.14	93.00	65.84	27.16
73	0.80	4.60	1.75	1.45	3.50	2.60	13.70	1.76	15.05	7.24	15.41	49.47	117.33	79.27	38.06
74	0	2.18	1.30	5.70	2.58	0	0	0.03	5.95	1.00	7.54	9.32	35.60	21.34	14.26
75	5.83	6.85	8.03	7.54	4.44	0	20.00	3.81	0	8.27	11.24	15.04	91.05	55.26	35.79
76	9.06	0.60	0.15	2.32	0	1.76	0.68	3.10	4.15	4.97	23.88	27.00	77.67	65.66	12.01
77	6.06	1.95	5.71	7.51	4.78	0.19	6.53	3.29	6.09	10.29	26.38	20.31	99.09	70.70	28.39
Mean	8.07	5.19	3.37	5.50	2.47	0.60	2.90	2.50	3.37	8.28	13.52	17.37	73.14	55.18	17.96

Table 6-2-9

Monthly Rainfall at Hingurakgoda

(Unit: inch)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Total	Maha Oct-Mar.	Yala Apr-Sept.
1950	5.20	3.70	6.48	0.74	5.02	0	0.22	3.86	1.85	3.64	7.76	6.56	45.03	33.34	11.69
51	22.04	4.17	1.48	5.68	5.99	0.23	0.32	1.25	3.72	3.46	19.45	7.19	74.98	57.79	17.19
52	15.89	2.19	1.05	4.38	3.62	0.02	1.21	0	5.48	5.28	6.48	7.13	52.73	38.02	14.71
53	9.58	1.88	0.61	10.19	0.07	0.06	9.19	2.77	2.76	12.17	7.60	18.31	75.19	50.15	25.04
54	10.74	1.35	6.79	7.14	0.05	0	3.46	1.34	0	7.28	6.48	16.39	61.02	49.03	11.99
55	10.52	4.90	2.08	7.49	1.93	0	0.04	3.62	4.04	2.66	6.23	6.97	50.48	33.36	17.12
56	6.40	1.81	0.72	3.01	0.05	2.81	0.03	1.09	0.03	9.38	11.27	10.49	47.09	40.07	7.02
57	4.27	10.05	0	2.05	4.43	0.16	2.72	1.45	1.92	7.56	23.90	52.81	111.32	98.59	12.73
58	9.27	4.47	4.49	2.52	2.69	0.03	0.43	6.18	1.95	4.83	8.42	8.29	53.57	39.77	13.80
59	6.88	0.44	0.26	4.47	4.48	2.07	0.13	0.52	1.97	11.32	13.73	10.51	56.78	43.14	13.64
60	11.07	16.63	2.35	8.13	8.94	0.10	6.35	1.16	5.80	7.18	19.12	4.10	90.93	60.45	30.48
61	17.87	8.54	6.14	4.92	2.41	0.41	0.27	0.05	1.21	9.99	12.08	19.81	83.70	74.43	9.27
62	7.75	2.91	3.59	4.04	2.04	0	0	3.66	5.12	5.49	8.66	8.27	51.53	36.67	14.86
63	17.93	7.68	7.24	4.76	0.64	0	3.39	0.83	5.55	4.77	23.11	19.72	95.62	80.45	15.17
64	5.55	5.28	4.91	1.33	4.49	0	4.06	0.62	2.23	7.01	4.67	5.26	45.41	32.68	12.73
65	3.67	7.10	0.62	8.50	8.86	0	0.39	4.77	0	16.22	15.76	21.50	87.39	64.90	22.49
66	6.81	0.98	6.07	5.43	0.08	0.02	0.15	2.13	6.18	20.93	16.20	8.46	73.44	59.45	13.99
67	1.35	3.64	3.50	2.69	1.73	0.19	0.06	0.40	2.91	13.59	19.21	22.71	71.98	64.06	7.92
68	5.84	0	5.49	2.45	0.46	0	0	3.36	5.29	7.35	9.03	8.38	47.65	36.09	11.56
69	3.33	2.49	0.11	6.25	0.64	0	4.07	2.37	6.32	12.96	11.06	33.55	83.15	63.50	19.65
70	4.82	8.87	2.12	7.39	3.30	1.65	0.02	4.55	1.90	2.36	11.23	13.06	61.27	42.46	18.81
71	8.79	3.68	1.82	8.89	4.71	0.47	1.43	2.34	1.00	3.50	5.22	25.33	67.18	48.34	18.84
72	2.93	0.07	0.67	4.94	5.41	0	0	0.01	14.53	12.27	14.69	12.15	67.67	42.78	24.89
73	0	2.28	2.00	1.56	2.12	2.99	8.93	0.50	3.72	5.52	3.71	18.74	52.07	32.25	19.82
74	0	2.25	0.38	4.05	6.56	0	0	0.13	3.35	0.24	4.55	16.66	38.17	24.08	14.09
75	5.60	2.26	2.60	6.80	5.22	0	8.38	2.74	5.50	1.91	9.45	7.13	57.14	28.95	28.19
76	1.27	0.85	0.18	6.31	0.62	0	1.43	1.90	1.15	3.48	12.56	19.53	49.28	37.87	11.41
77	3.31	1.44	2.23	0.84	1.29	0	1.93	1.55	8.60	14.03	14.74	14.76	64.72	50.51	14.21
Mean	7.45	4.00	2.71	4.89	3.14	0.40	2.09	1.97	3.70	7.73	11.66	15.13	64.87	48.69	16.19

Table 6-2-10

Monthly Rainfall at Kantalai

(Unit: inch)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Total	Maha Oct-Mar.	Yala Apr-Sept
1950	2.78	3.18	1.45	0.60	6.85	0	0	4.26	2.57	5.10	10.57	10.71	47.80	33.79	14.01
51	18.78	4.20	2.24	5.90	2.65	0	1.80	1.13	5.68	3.65	13.48	9.42	68.93	51.77	17.16
52	16.61	1.30	0.05	5.72	2.77	0	1.64	0	2.66	1.14	9.25	6.68	47.82	35.03	12.79
53	9.98	2.46	3.66	12.10	0	0.41	11.49	0.90	1.28	6.30	7.04	12.08	67.70	41.52	26.18
54	12.69	2.10	4.17	4.96	0.61	0	2.30	3.76	2.04	7.45	5.95	24.95	70.98	57.31	13.67
55	13.75	5.41	1.13	11.92	5.95	0	0.50	13.91	6.06	4.83	3.02	8.77	75.25	36.91	38.34
56	5.88	1.97	0.15	4.01	0.12	2.79	2.66	2.77	4.43	10.45	15.39	8.00	58.62	41.84	16.78
57	4,70	5.24	0.05	0.31	2.62	0.08	2.54	0.88	3.44	10.96	20.15	37.98	88.95	79.08	9.87
58	3.96	2.75	5.16	4.25	0.46	0	1.64	6.67	3.06	6.34	5.56	8.03	47.88	31.80	16.08
59	6.50	0.65	0.22	3.83	0.42	5.42	0	5.40	1.89	7.65	12.93	12.49	57.40	40.44	16.96
60	9.13	11.24	1.02	7.32	2.21	0	7.28	0	2.44	5.00	17.92	4.52	68.08	48.83	19.25
61	16.19	4.73	3.65	2.15	1.59	0.16	0.59	0.08	4.16	11.40	17.39	22.53	84.62	75.89	8.73
62	10.04	2.19	1.18	4.10	3.99	0	0.70	1.38	3.17	5.20	7.94	12.67	52.56	39.33	13.34
63	14.43	6.42	3.77	5.93	3.48	0	2.14	0.99	3.86	5.81	26.21	19.72	92.76	76.36	16.40
64	4.44	1.27	5.92	1.86	0.40	0	5.17	4.84	0.35	8.80	5.24	6.09	44.38	31.76	12.62
65	2.81	9.69	0.93	7.11	4.73	0.24	0	11.88	1.94	10.83	15.83	27.94	93.93	68.03	25.90
66	9.81	1.86	3.17	5.55	0	0	0.28	8.35	4.42	16.24	16.41	9.21	75.30	56.70	18.60
67	1.18	4.40	1.63	3.28	1.08	0	0	4.61	2.20	13.55	19.21	18.45	69.59	58.42	11.17
68	5.84	0.11	5.49	4.32	1.00	0.10	0	3.36	5.29	4.53	15.03	14.35	59.47	45.40	14.07
69	4.80	4.94	0	4.87	0.85	0	4.03	7.05	1.57	11.31	9.87	20.37	69.66	51.29	18.37
70	6.80	6.77	2.19	5.31	3.80	0.41	0.03	2.64	3.74	4.19	14.05	9.12	59.05	43.12	15.93
71	6.81	0.53	1.45	1.97	1.85	0.03	2.54	4.39	4.81	4.24	7.16	25.08	60.86	45.27	15.59
72	1.21	1.49	0.78	1.75	2.46	1.68	1.63	0	8.49	12.15	9.85	11.08	52.57	36.56	16.01
73	0.75	1.33	0.28	0.24	2.11	8.23	3.05	1.55	5.44	10.98	2.59	20.34	56.89	36.27	20.62
74	0	1.91	0.08	4.65	4.65	0	2.80	1.44	4.11	0.95	4.50	14.12	39.21	21.56	17.65
75	2.26	1.10	1.99	1.06	3.51	0	3.74	3.67	1.85	3.25	9.32	7.42	39.17	25.34	13.83
76	0.85	0.12	0.07	2.53	0	1.50	3.12	3.03	3.53	5.26	10.61	15.61	46.23	35.52	13.71
77	1.77	5.26	2.67	1.83	1.84	0.09	1.03	1.55	8.60	14.35	12.90	12.15	64.04	49.10	14.94
Mean	6.96	3.38	1.95	4.27	2.21	0.76	2.24	3.59	3.68	7.57	11.62	14.64	62.85	46.22	16.73

2.2.2 Effective Rainfall

The effective rainfall, which is useful for reduction of Irrigation water requirement when the rainfall reached on the soil surface and supplied the soil moisture, vary with natural features, especially rainfall intesity, rainfall, permeability of soils, kind of crops, growing period of crops, condition of farm management. Generally little rainfall is not effective. On the crops, the effective rainfall for paddy different from for upland crops naturally.

In the calculation of the water requirements under the project, effective rainfall is separately computed for lowland paddy and upland crops as follows:

(1) For as lowland paddy

The following formula is applied to paddy.

ER = (R - 1) x 0.67

ER = 9 inches (228.6 mm) when ER $\geqq$ 9 inches.

ER = 0 when R $\leqq$ 1 inche (25.4 mm)

where ER : effective rainfall, and R : monthly rainfall

(2) For as upland crops

The effective rainfall for upland crops vary with rainfall, soils, crops and etc.. In this project, it is assumed that effective rainfall for upland crops is computed in terms of the S.C.S. Method adopted by U.S.D.A. (United States, Department of Agriculture's Soil Conservation Service Method).

The effective rainfall is computed by following formula.

ER = R x Ratio (%)

where, ER = effective rainfall

R = monthly rainfall

The ratios of the effective rainfall have been obtained as following Table 6.2.11 by Irrigation and Drainage Pater No. 25, Effective Rainfall, prepared by F.A.O.

Table 6.2.11 Ratio of the Effective Rainfall to the Monthly Rainfall

(Unit: %)

Crops	Month	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Upland Crops	New Land	-	-	-	65	75	80	70	75	65	-	-	-
	System G	-	50	65	65	75	80	70	-	-	-	-	-
Sugar Cane		60	65	70	65	65	80	70	75	80	65	40	30

2.2.3 Method of Calculating Water Requirements

(1) Definition

The following terminological definitions, which are the same as have been used in the development plans worked out in Asian Development Bank and other international agencies, are used for water requirement.

Evapotranspiration = Evaporation + Transpiration

Water Requirement = Evaporation + Percolation

Irrigation Requirement = Water Requirement + Farm Waste - Effective Rainfall

Farm Turnouts Requirement = Irrigation Requirement + Farm Ditch Loss

Diversion Requirement = Farm Turnouts Requirement + Conveyance Loss in the Main Canal and Lateral up to Farm Turnout

(2) Evapotranspiration

Evapotranspiration is calculated by the following formula;

ET = ETo x Crop Factor

where ET : Evapotranspiration

ETo : Reference Evapotranspiration

Monthly Reference Evapotranspiration (ETo), as shown in Table 6.2.12, have been calculated by adopting the Modified Penman Method in reference to the meteorological data obtained at Maha-Illuppallama.

Table 6.2.12 Monthly ETo

(Unit: inch)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
ETo	4.7	5.0	6.2	5.9	6.4	6.9	7.5	7.6	7.5	6.2	4.3	4.5	72.7

Crop factors are shown in Table 6.2.13.

Table 6.2.13 Crop Factor

Crop and Crop Factor	Initial Stage	Crop Development Stage	Mid Stage	Late Stage
Lowland Rice (135 days)	30 days	40 days	45 days	20 days
Crop factor	1.00	1.15	1.20	0.90
Lowland Rice (100 days)	20 days	30 days	30 days	20 days
Crop factor	1.00	1.15	1.20	0.90
Lowland Rice (90 days)	20 days	25 days	30 days	15 days
Crop factor	1.00	1.15	1.20	0.90
Upland Rice (100 days)	20 days	30 days	30 days	20 days
(Crop factor	0.90	1.00	1.05	0.90
Upland Rice (90 days)	20 days	25 days	30 days	15 days
Crop factor	0.90	1.00	1.05	0.90
Green Gram (75 days)	15 days	20 days	25 days	15 days
Crop factor	0.50	0.80	1.05	0.70
Chillies (150 days)	25 days	25 days	75 days	25 days
Crop factor	0.65	0.85	1.00	0.90
Ground Nuts (110 days)	20 days	30 days	40 days	20 days
Crop factor	0.65	0.80	1.00	0.80
Soya Bean (105 days)	15 days	20 days	50 days	20 days
Crop factor	0.65	0.85	1.05	0.75
Cowpea (90 days)	15 days	25 days	35 days	15 days
Crop factor	0.70	0.90	1.10	1.00
Pulses (95 days)	15 days	30 days	35 days	15 days
Crop factor	0.50	0.80	1.05	0.50
Cotton (165 days)	25 days	45 days	55 days	40 days
Crop factor	0.65	0.90	1.05	0.90

2.2.4 Irrigation Efficiency and Losses

(a) Water requirements for pudding and Land preparation

Water requirements for pudding have been determined at 7 inches (177.8 mm) per crop of paddy, while those for land preparation of upland crops at 1.5 inches (38.1 mm).

(b) Percolation

Percolation is assumed to be 6 inches (152.4 mm) per month under the project.

(c) Irrigation efficiency

Irrigation efficiency, which is used in estimating irrigation requirement for upland crops, is assumed to be 50%.

(d) Conveyance and diversion losses

The losses due to conveyance and diversion are combinedly estimated at 30% of the diversion requirement.

(e) Conveyance loss at Yoda Ela

The conveyance loss from Elahera and Amgamedilla headworks to each of the tanks is estimated at 0.3% per mile.

2.2.5 Proposed Cropping Patterns

The proposed cropping patterns under the project are shown in Table 6.2.14 (see Chapter 5, Agricultural Development Plan, Volume-I, Main Report.)

Table 6.2.14 Proposed Cropping Pattern

Pattern	Maha-Yala Crop	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Remarks
P-A	Paddy-Paddy	Paddy 135 days			Paddy 105 days								P	
P-B	Paddy-Chillies	Paddy 135 days			Chillies 150 days								P	35%
	Paddy-Soyabean-Veg. (1)	Paddy 105 days			Soyabean 105 days (or Copsicum or Groundnut)			Vegetable(1) 60 days					P	30%
	Paddy-Pulses-Veg. (2)	Paddy 135 days			Pulses(Cowpea) 75 days (or Onion)			Vegetable(2) 60 days					P	35%

2.2.6 Irrigation Requirements and Diversion Requirements

The crop water requirements have been calculated on the proposed cropping pattern. In the case of excluding the effective rainfall, the irrigation requirements and diversion requirements have been computed as shown in Table 6.2.15 to 6.2.17.

(The amount of the total requirements are based on the relation with the total acreage of each cropping patterns.)

Table 6-2-15 Irrigation Requirements & Diversion Requirements (Newland, System D & A/D)

(excluding Effective Rainfall)

Cropping Pattern	Water Req.	Crops	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Pattern - A	Irrigation Require- ment	Lowland Rice: Maha	11.55	11.65	5.91						0.88	6.80	9.96	11.09	57.84
		- do - : Yala				3.50	9.76	13.73	14.85	12.01	1.58				55.43
		Sub-Total	11.55	11.65	5.91	3.50	9.76	13.73	14.85	12.01	2.46	6.80	9.96	11.09	113.27
	Diver- sion Re- quirement	Div.R.(inches)	16.52	16.66	8.45	5.01	13.96	19.63	21.24	17.17	3.52	9.72	14.24	15.86	161.98
		1,000Ac Div.R(acft)	1,377	1,388	704	418	1,163	1,636	1,770	1.431	293	810	1,187	1,322	13,499
Pattern - B	Irrigation Requirement	Lowland Rice: Maha	8.09	8.16	4.14						0.62	4.76	6.97	7.76	40.50
		" : Maha	3.45	3.50	1.89							0.26	1.97	3.10	14.17
		Chillies				3.07	3.77	4.83	5.25	5.00	1.21				23.13
		Pulses				3.44	4.57	3.77							11.78
		Soyabean				2.81	3.73	4.39	2.70						11.63
		Vegetable(1)								3.61	4.83	1.09			9.53
		- do - (2)							3.06	4.19	1.13				8.38
		Sub-Total	11.54	11.66	6.03	9.32	12.07	12.99	11.01	12.80	7.79	6.11	8.94	10.86	121.12
	Diver- sion Re- quirement	Div.R.(inches)	16.50	16.67	8.62	13.33	17.26	18.58	15.74	18.30	11.14	8.74	12.78	15.53	173.19
		1,000Ac Div.R(acft)	1,375	1,389	718	1,111	1,438	1,548	1,312	1,525	928	728	1,065	1,294	14,431

Table 6-2-16 Irrigation Requirements & Diversion Requirements (System G)

(excluding Effective Rainfall)

Cropping Pattern	Water Req.	Crops	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Pattern - A	Irrigation Requirement	Lowland Rice: Maha	10.15	3.55						2.34	8.56	12.09	10.90	11.36	58.95
		- do - : Yala	0.58	4.98	10.68	12.73	13.36	8.69	1.10						52.12
		Green Manure Crop						1.56	8.76	12.00	4.33				26.98
		Sub-Total (inches)	10.73	8.53	10.68	12.73	13.36	10.25	9.86	14.34	12.89	12.09	10.90	11.36	138.05
	Diversion Requirement	Div.R.(inches)	15.34	12.20	15.27	18.20	19.10	14.66	14.10	20.51	18.43	17.29	15.59	16.24	196.93
		1,000Ac D.R(acft)	1,278	1,017	1,272	1,517	1,592	1,222	1,175	1,709	1,536	1,441	1,299	1,353	16,411
Pattern - B	Irrigation Requirement	Lowland Rice: Maha	10.15	3.55						2.34	8.56	12.09	10.90	11.36	58.95
		Chillies		2.63	3.65	4.13	4.48	4.78	3.73						23.40
		Pulses				3.44	4.57	3.77							11.78
		Oil Crops			2.91	3.43	4.07	2.48							12.89
		Sub-Total (inches)	10.15	6.18	6.56	11.00	13.12	11.03	3.73	2.34	8.56	12.09	10.90	11.36	107.02
	Diversion Requirement	Div.R.(inches)	14.51	8.84	9.38	15.73	18.76	15.77	5.33	3.35	12.24	17.29	15.59	16.24	153.03
		1,000Ac Div.R(acft)	1,209	737	782	1,311	1,563	1,314	444	279	1,020	1,441	1,299	1,353	12,752

Table 6-2-17 Irrigation Requirements & Diversion Requirements (Sugar cane)

Item		Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Irrigation Requirement (Inches)		9.40	9.30	10.66	9.56	10.12	10.90	12.46	13.68	14.70	12.64	8.94	9.36	131.72
Diversion Requirement	D.R.(inches)	13.44	13.30	15.24	13.67	14.47	15.59	17.82	19.56	21.02	18.08	12.78	13.38	188.35
	1,000 AC D.R.(ac.ft)	1,120	1,108	1,270	1,139	1,206	1,299	1,485	1,630	1,752	1,507	1,065	1,115	15,696

2.2.7 Tank-wise Diversion Requirements

The project area is divided into 6 systems in terms of the existing tanks; however, as in Kantalai region further divided into paddy upland and the sugarcane farm managed by the Sugar Coporation, diversion requirements calculation would be made according to the divided 7. The rainfall data used in calculation of tank-wise diversion requirements are as follows:

No.	Tank or System	Rainfall Station
1	Parakrama Samudra	Polonnaruwa
2	Minneriya Tank	Hingurakgoda
3	Giritale Tank	
4	Kaudulla Tank	
5	Kantalai Tank(Paddy and Upland)	Kantalai
6	Kantalai Tank(Sugarcane)	
7	System G	Elahera (Bakamuna)

2.2.7.1 Tank-wise Diversion Requirements (Case 1)

In this case (case 1), diversion requirements are computed on the following conditions;

(a) Existing area; Cropping Pattern A, 97.5%
Cropping Pattern B, 2.5%

(b) New Land : Cropping Pattern A. 80 %
Cropping Pattern B, 20 %

(c) For Elahera region (System G), the cropping patterns used in the report on the Integrated Small Farmer Development Project have been adopted.

(d) For Kantalai tank, diversion requirements have been determined by summing up the diversion requirements culculated for Kantalai farm managed by the Sugar Corporation (Table 6.2.24) and for paddy and upland (Table 6.2.23).

Table 6-2-18 Irrigation Area in Case 1

(Unit:ac)

	Existing Area			New Land		
	P - A	P - B	Total	P - A	P - B	Total
Parakrama Samudra	24,375	625	25,000	4,000	1,400	5,400
Minneriya Tank	22,400	600	23,000	-	-	-
Giritale "	7,300	200	7,500	-	--	-
Kandulla "	13,260	340	13,600	21,000	1,400	22,400
Kantalai "	17.160	440	17,600	2,600	4,000	6,600
Kantalai (Sugar Coop)			17,900	-	-	-
Elahera (System G)	12,400	2,400	14,800	-	-	-

Table 6-2-19

Diversion Requirements for Parakrama Samudra Tank

1 acft = 1,233.48m^3

(Unit : acft)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	31,427	39,731	7,725	13,911	31,795	49,561	52,870	37,451	9,975	15,394	21,855	25,484	337,179	
51	9,235	34,245	16,657	2,654	35,719	49,561	49,460	41,682	0	20,685	3,246	17,207	280,351	
52	9,235	32,449	19,424	2,808	28,143	49,561	49,721	43,699	1,610	9,520	20,520	20,848	287,538	
53	22,859	36,090	16,876	0	35,915	46,496	37,563	42,233	86	1,562	14,865	7,516	262,061	
54	15,893	35,313	3,648	5,181	35,915	49,561	45,816	39,264	10,198	7,554	20,641	7,516	268,984	
55	19,339	34,537	20,905	3,376	33,582	49,561	52,870	32,091	0	10,904	28,457	28,469	314,091	
56	32,276	38,541	18,162	5,697	35,907	40,239	52,708	40,263	10,145	5,277	8,457	13,809	301,481	
57	33,490	14,488	21,439	9,128	25,017	49,526	46,753	43,442	10,016	9,593	3,246	7,516	273,654	
58	25,917	35,920	13,963	8,096	31,953	49,561	52,870	29,438	9,254	6,365	16,588	7,516	287,441	
59	18,660	42,207	21,439	6,548	35,159	49,233	52,870	42,864	9,985	0	5,908	17,887	302,760	
60	18,004	9,603	15,759	0	21,180	49,561	40,765	43,359	8,569	16,972	12,972	30,217	266,961	
61	9,235	19,804	13,963	4,614	23,624	49,456	52,870	43,699	10,085	12,821	4,938	7,516	252,625	
62	24,437	38,372	16,997	6,626	30,298	49,561	52,806	43,153	162	10,491	18,627	21,309	312,839	
63	9,235	20,046	14,157	0	34,108	49,534	50,241	43,627	74	8,646	3,246	7,516	240,430	
64	28,733	23,541	0	8,302	34,213	49,561	44,514	41,156	4,912	18,307	24,209	27,716	305,164	
65	34,194	9,603	21,439	3	21,758	49,233	52,870	30,252	10,192	3,736	3,246	7,516	318,670	
66	21,160	42,207	8,429	0	35,879	49,522	52,799	33,589	7,027	0	3,246	18,105	271,963	
67	38,004	32,862	18,818	7,451	35,759	49,561	52,870	43,688	10,013	2,083	3,246	7,516	301,871	
68	31,451	42,207	12,216	6,342	35,897	49,561	52,870	43,641	9,117	8,525	8,262	22,183	322,272	
69	33,660	40,605	21,172	0	35,915	49,561	45,243	36,926	8,925	1,199	27,826	7,516	308,548	
70	27,082	15,702	21,439	0	23,939	41,883	52,870	35,270	8,788	5,662	3,246	11,309	247,190	
71	27,422	34,925	8,526	172	35,054	49,561	39,880	17,661	10,167	7,506	21,054	7,516	259,444	
72	40,432	42,207	21,439	2,318	24,491	49,561	52,715	43,692	0	0	3,246	7,516	287,617	
73	41,839	33,469	19,619	12,609	28,984	44,932	21,441	41,340	0	9,059	3,246	7,516	264,054	
74	41,839	39,342	20,711	1,648	31,401	49,560	52,870	43,688	0	24,204	19,962	19,926	345,151	
75	30,116	28,007	4,376	0	26,514	49,561	19,780	35,954	10,198	6,559	10,981	7,516	229,562	
76	22,276	42,207	21,439	10,366	35,915	47,159	52,640	37,819	1,610	14,569	3,246	7,516	296,762	
77	29,558	39,901	10,007	0	25,621	49,487	38,136	37,320	0	1,947	3,246	7,516	242,749	
Mean	25,965	13,980	15,384	4,209	31,059	48,560	47,203	38,867	5,754	8,541	11,494	13,829	253,909	

Table 6-2-20

Diversion Requirements for Minneriya Tank

(Unit : acft)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	23,921	26,910	6,216	10,008	19,140	37,666	40,416	27,378	5,494	13,674	14,878	20,222	245,922	
51	6,900	26,220	15,416	1,034	17,246	37,636	40,404	32,364	1,960	13,904	2,464	19,072	214,618	
52	6,900	29,670	16,106	3,618	21,754	37,660	39,866	32,950	6	10,684	17,178	19,072	235,464	
53	15,870	30,360	16,112	0	26,842	37,660	25,088	29,514	3,618	0	15,108	5,732	205,904	
54	13,800	31,280	5,532	0	26,842	37,666	35,606	32,134	7,054	7,004	17,178	5,732	219,828	
55	14,260	24,840	14,266	0	25,070	37,666	40,434	27,856	1,258	15,514	17,638	19,308	238,110	
56	21,844	30,360	16,112	6,208	26,842	33,982	40,434	32,606	7,048	3,136	8,438	12,868	239,878	
57	25,754	15,410	16,112	7,866	20,326	37,648	37,028	32,112	5,264	6,538	2,464	5,732	212,264	
58	16,554	25,530	9,896	7,152	23,648	37,660	40,392	23,100	5,258	11,374	13,498	17,002	231,064	
59	20,930	31,970	16,112	3,388	20,320	35,410	40,422	32,890	5,258	0	3,838	12,862	223,400	
60	13,110	7,360	13,806	0	11,872	37,654	30,166	32,600	0	7,228	2,464	24,598	180,858	
61	6,900	18,170	6,682	2,450	24,126	37,618	40,410	32,944	6,704	2,016	6,828	5,732	190,580	
62	19,320	28,520	11,506	4,096	24,834	37,666	40,434	28,328	36	10,224	13,262	17,002	235,228	
63	6,900	19,556	4,836	2,910	26,776	37,666	35,842	32,860	0	11,604	2,464	5,732	187,146	
64	23,230	24,150	8,982	9,276	20,096	37,666	37,650	32,878	4,562	7,464	20,398	22,522	245,874	
65	26,680	20,700	16,112	0	12,096	37,666	40,398	25,714	7,054	0	2,464	5,732	194,616	
66	20,930	31,970	6,906	1,506	26,836	37,660	40,422	30,700	0	0	2,464	16,772	216,166	
67	31,050	27,140	11,512	6,686	25,318	37,642	40,428	32,902	3,376	0	2,464	5,732	224,250	
68	22,770	31,970	8,056	7,158	26,800	37,666	40,434	28,328	18	6,774	12,572	16,772	239,318	
69	27,370	29,210	16,112	84	26,776	37,666	34,426	30,228	0	0	8,668	5,732	216,272	
70	24,610	17,480	14,042	0	22,462	36,130	40,434	26,186	5,264	15,974	8,438	8,262	219,282	
71	17,250	26,916	14,726	0	19,848	37,612	39,618	30,234	6,954	13,904	19,478	5,732	232,276	
72	28,060	31,970	16,112	2,450	18,426	37,666	40,434	32,944	0	0	2,464	9,872	220,398	
73	31,740	29,670	14,272	8,810	24,604	33,740	25,536	32,896	1,960	10,224	22,238	5,732	241,422	
74	31,740	29,670	16,112	4,096	16,290	37,666	40,434	32,932	2,668	18,504	20,628	5,732	256,472	
75	23,230	29,670	13,346	36	18,898	37,666	26,432	29,520	42	16,894	11,658	5,732	213,124	
76	35,050	31,970	16,112	78	26,782	37,666	39,618	31,178	6,716	13,904	5,908	5,732	250,714	
77	27,370	31,050	14,036	9,996	26,262	37,666	38,674	31,886	0	0	2,464	5,732	225,136	
Mean	20,859	26,418	12,684	3,532	22,396	37,251	37,567	30,649	3,128	7,734	10,000	11,302	223,414	

Table 6-2-21

Diversion Requirements for Giritale Tank

(Unit : acft)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	7,800	8,775	2,027	3,266	6,240	12,282	13,177	8,926	1,793	4,458	4,851	6,594	80,189	
51	2,250	8,550	5,027	338	5,622	12,272	13,173	10,553	640	4,553	803	6,219	69,980	
52	2,250	9,675	5,252	1,181	7,093	12,280	12,997	10,745	2	3,483	5,601	6,219	76,778	
53	5,175	9,900	5,254	0	8,754	12,280	8,176	9,623	1,181	0	4,926	1,869	67,138	
54	4,500	10,200	1,804	0	8,754	12,282	11,607	10,478	2,303	2,283	5,601	1,869	71,681	
55	4,650	8,100	4,652	0	8,175	12,282	13,183	9,082	411	5,058	5,751	6,296	79,460	
56	7,123	9,900	5,254	2,026	8,754	11,079	13,183	10,632	2,301	1,022	2,751	4,196	78,221	
57	8,398	5,025	5,254	2,567	6,627	12,276	12,071	10,474	1,718	2,131	803	1,869	69,213	
58	5,398	8,325	3,227	2,334	7,711	12,280	13,169	7,530	1,716	3,708	4,401	5,544	75,343	
59	6,825	10,425	5,254	1,106	6,625	11,545	13,179	10,725	1,716	0	1,251	4,194	72,845	
60	4,275	2,400	4,502	0	3,869	12,278	9,832	10,630	0	2,356	803	8,021	58,966	
61	2,250	5,925	2,179	800	7,867	12,266	13,175	10,743	2,188	657	2,226	1,869	62,145	
62	6,300	9,300	3,752	1,337	8,098	12,282	13,183	9,236	12	3,333	4,324	5,544	76,701	
63	2,250	6,377	1,577	950	8,732	12,282	11,684	10,715	0	3,783	803	1,869	61,022	
64	7,575	7,875	2,929	3,027	6,552	12,282	11,295	10,521	1,489	2,433	6,651	7,344	79,973	
65	8,700	6,750	5,254	0	3,942	12,282	13,171	8,383	2,303	0	803	1,869	63,459	
66	6,825	10,425	2,252	492	8,752	12,280	13,179	10,010	0	0	803	5,469	70,487	
67	10,125	8,850	3,754	2,182	8,256	12,274	13,181	10,729	1,102	0	803	1,869	73,125	
68	7,425	10,425	2,627	2,336	8,740	12,282	13,183	9,236	6	2,208	4,099	5,469	78,036	
69	8,925	9,525	5,254	28	8,732	12,282	11,222	9,856	0	0	2,826	1,869	70,519	
70	8,025	5,700	4,579	0	7,324	11,780	13,183	8,537	1,718	5,208	2,751	2,694	71,499	
71	5,625	8,777	4,802	0	6,471	12,264	12,916	9,858	2,271	4,533	6,351	1,869	75,737	
72	9,150	10,425	5,254	800	6,007	12,282	13,183	10,743	0	0	803	3,219	71,866	
73	10,350	9,675	4,654	2,875	8,023	11,000	8,322	10,727	640	3,333	7,251	1,869	78,719	
74	10,350	9,675	5,254	1,337	5,310	12,282	13,183	10,739	871	6,033	6,726	1,869	83,629	
75	7,575	9,675	4,352	12	6,161	12,282	8,614	9,625	14	5,508	3,801	1,869	69,488	
76	10,125	10,425	5,254	26	8,734	12,282	12,916	10,166	2,192	4,533	1,926	1,869	80,448	
77	8,925	10,125	4,577	3,262	8,564	12,282	12,608	10,397	0	0	803	1,869	73,412	
Mean	6,755	8,269	4,136	1,152	7,303	11,708	12,213	9,986	960	2,521	3,260	3,684	72,860	

Table 6-2-22

Diversion Requirements for Kaudulla Tank

(Unit : acft)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	37,475	42,220	9,628	16,022	29,792	58,748	62,846	42,663	8,717	21,215	23,087	31,547	383,960	
51	10,937	40,869	23,999	1,889	26,836	58,672	62,817	50,614	3,087	21,732	3,919	29,737	335,108	
52	10,937	46,560	25,235	5,796	34,057	58,742	61,985	51,687	10	16,501	26,766	29,909	368,185	
53	24,886	47,451	25,379	0	42,328	58,728	38,225	45,984	5,972	0	23,547	8,918	321,418	
54	21,552	48,975	8,737	8	42,334	58,748	55,177	50,340	11,659	10,752	26,766	8,918	343,958	
55	22,184	38,770	22,274	0	39,205	58,748	62,899	43,394	2,126	24,032	27,484	30,369	371,485	
56	34,026	47,652	25,379	9,912	42,334	52,865	62,902	51,101	11,651	4,840	12,998	20,251	375,911	
57	40,149	23,968	25,379	12,797	31,589	58,695	57,416	50,005	8,497	9,948	3,919	8,918	331,280	
58	25,777	40,007	15,348	11,385	36,890	58,738	62,786	35,595	8,406	17,794	21,190	26,575	360,491	
59	32,647	49,981	25,379	5,525	31,437	55,135	62,873	51,525	8,346	0	5,927	20,194	328,775	
60	20,603	11,371	21,499	0	18,128	58,715	46,433	50,888	0	11,040	3,919	38,618	242,596	
61	10,937	28,308	10,605	4,173	37,743	58,612	62,832	51,671	10,729	3,171	10,670	8,918	289,451	
62	30,146	44,491	17,934	6,817	38,870	58,748	62,910	44,186	107	15,897	20,500	26,632	327,236	
63	10,937	30,780	7,443	4,654	42,150	58,748	55,389	51,429	0	17,967	3,919	8,918	292,334	
64	36,469	37,678	14,140	14,961	31,406	58,748	53,361	51,494	7,564	11,528	31,968	35,284	384,601	
65	41,873	32,447	25,379	0	18,347	58,748	62,797	39,891	11,659	0	3,919	8,918	303,978	
66	32,848	49,981	10,806	2,640	42,325	58,742	62,867	47,933	0	0	3,919	26,086	338,147	
67	48,541	42,392	18,193	10,874	39,815	58,685	62,893	51,562	5,521	0	3,919	8,918	351,313	
68	35,636	49,981	12,473	11,595	42,206	58,748	62,910	44,186	61	10,551	19,436	26,316	374,099	
69	42,850	45,698	25,379	248	42,150	58,748	53,331	47,202	0	0	13,601	8,918	315,285	
70	38,568	27,359	22,160	0	35,032	56,423	62,905	40,561	8,560	24,894	13,113	12,864	342,439	
71	27,157	42,277	23,022	0	30,736	58,592	61,319	47,294	11,389	21,617	30,387	8,918	362,708	
72	44,000	49,981	25,379	4,113	28,604	58,748	62,910	51,684	0	0	3,919	15,480	344,818	
73	49,547	46,302	22,505	14,270	38,626	52,313	38,936	51,531	3,087	15,811	34,728	8,918	376,574	
74	49,547	46,388	25,379	6,787	25,100	58,748	62,910	51,646	4,199	28,803	32,313	8,918	400,738	
75	36,326	46,359	20,780	100	29,183	58,748	40,440	46,075	125	26,187	18,229	8,918	331,470	
76	48,771	49,981	25,379	232	42,157	58,748	61,319	48,634	10,917	21,675	9,290	8,918	386,021	
77	42,908	48,716	21,843	15,995	41,155	58,748	59,806	49,700	0	0	3,919	8,918	351,708	
Mean	32,437	41,319	19,894	5,743	35,019	56,264	58,078	47,874	5,084	11,998	15,617	17,668	344,146	

Table 6-2-23

Diversion Requirements for Kantalai Tank (Paddy and Upland Crops)

(Unit : acft)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	29,864	29,390	16,238	12,760	15,343	39,204	40,793	26,529	5,342	10,747	9,692	13,099	249,001	
51	7,349	27,419	14,711	1,384	24,662	39,204	38,198	33,951	0	13,548	4,070	15,591	220,087	
52	7,349	33,022	17,107	1,792	24,378	39,204	38,568	35,053	5,138	18,398	12,243	20,885	253,137	
53	15,952	30,781	11,967	0	29,368	38,856	18,418	34,339	8,493	8,428	16,513	10,452	223,567	
54	10,716	31,476	10,982	3,513	28,884	39,204	37,039	27,714	6,542	6,206	18,619	5,906	226,797	
55	8,668	25,081	16,856	0	16,837	39,204	40,423	7,912	0	11,268	24,280	16,847	207,376	
56	23,874	31,728	17,107	5,666	29,273	34,018	36,204	30,062	1,128	1,103	2,261	18,335	230,759	
57	26,154	25,410	17,107	12,960	24,733	39,136	36,482	34,354	3,371	299	2,261	5,906	228,173	
58	27,584	30,221	9,069	5,122	29,003	39,203	38,569	20,814	4,232	8,351	19,373	18,277	249,818	
59	22,676	33,602	17,107	6,074	29,035	27,642	40,793	23,825	6,895	5,819	5,133	9,659	228,260	
60	17,595	13,817	17,068	0	25,706	39,204	25,493	35,053	5,636	10,940	2,261	25,059	186,420	
61	7,349	26,395	11,987	9,880	27,176	39,068	40,356	34,989	1,740	0	2,261	5,906	207,107	
62	15,836	31,303	16,759	5,462	21,485	39,204	40,275	33,358	3,982	10,553	14,774	9,312	242,303	
63	7,354	23,130	11,755	1,316	22,694	39,204	37,410	34,267	2,419	9,375	2,261	5,906	197,091	
64	26,656	33,080	7,601	10,537	29,051	39,204	30,385	25,153	9,674	3,706	19,991	22,025	257,063	
65	29,806	16,811	17,107	41	19,730	39,000	40,793	11,115	6,769	504	2,261	5,906	189,843	
66	16,281	31,940	12,914	2,177	29,368	39,204	40,585	16,830	1,150	0	2,261	15,997	208,707	
67	32,955	27,033	15,890	7,320	28,385	39,204	40,793	25,699	6,180	0	2,261	5,906	231,626	
68	23,951	33,602	8,432	4,964	28,575	39,119	40,793	28,663	155	11,848	2,261	6,066	228,429	
69	25,961	25,989	17,107	3,718	28,694	39,204	33,028	19,913	7,733	0	11,045	5,906	218,298	
70	22,096	22,453	14,808	2,721	21,935	38,856	40,771	30,370	2,691	12,505	2,969	16,171	250,281	
71	22,077	33,602	16,238	10,287	26,559	39,178	36,482	26,220	485	12,408	16,281	5,906	245,723	
72	32,897	32,655	17,107	10,786	25,113	36,709	38,592	35,053	0	0	11,084	12,384	252,380	
73	33,303	32,964	17,107	13,008	25,943	20,924	35,300	32,955	52	267	25,111	5,906	242,280	
74	33,303	31,844	17,107	4,216	19,920	39,204	35,879	33,216	1,853	18,668	21,421	6,510	263,141	
75	30,869	33,409	15,194	12,349	22,623	39,204	33,700	27,928	7,000	14,321	12,108	19,456	268,161	
76	33,303	33,602	17,107	9,019	29,368	37,145	35,137	29,445	3,167	10,437	9,615	5,906	253,251	
77	31,815	25,370	13,880	10,605	26,583	39,127	39,983	32,955	0	0	5,191	10,316	235,825	
Mean	22,271	28,826	14,765	5,988	25,372	37,744	36,830	28,133	7,273	7,132	9,995	11,618	231,960	

Table 6-2-24

Diversion Requirements for Kantalai Sugar Corporation Farm

(Unit : acft)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	12,969	11,049	18,430	18,728	3,370	23,251	26,578	15,572	22,611	12,841	1,067	6,271	172,737	
51	0	8,191	16,083	4,053	14,249	23,250	21,202	25,597	11,988	16,851	0	7,935	117,490	
52	0	16,254	22,611	4,565	13,907	23,250	21,715	29,181	22,312	23,805	3,285	11,433	169,879	
53	0	13,652	11,817	0	21,586	21,885	0	26,322	27,005	9,514	7,082	4,522	117,064	
54	0	14,036	10,324	6,655	19,923	23,251	19,710	17,150	24,402	6,314	8,916	0	108,531	
55	0	4,863	19,368	0	5,119	23,251	25,085	0	10,708	13,609	13,950	8,746	81,612	
56	5,034	14,377	22,312	9,300	21,288	13,737	18,643	20,350	16,254	0	0	9,727	141,850	
57	8,020	5,333	22,611	19,539	14,334	22,995	19,027	26,365	19,624	0	0	0	110,494	
58	9,940	12,244	7,338	8,618	20,350	23,251	21,715	7,850	20,947	9,386	9,599	9,727	160,962	
59	3,413	18,045	22,099	9,812	20,435	4,778	26,578	11,902	24,914	5,759	0	4,010	148,761	
60	0	0	19,710	128	15,486	23,251	4,863	29,181	23,037	13,097	0	14,206	116,893	
61	0	6,741	11,860	14,462	17,192	22,739	24,829	28,925	17,193	0	0	0	98,506	
62	0	13,780	19,240	9,044	10,537	23,251	24,488	24,786	20,563	12,543	5,546	3,754	161,901	
63	0	1,920	11,519	3,968	11,945	23,251	20,222	26,024	18,217	10,879	0	0	80,332	
64	8,703	16,340	5,077	15,273	20,478	23,251	11,177	13,694	30,162	2,560	10,153	12,201	169,068	
65	12,889	0	19,966	683	8,490	22,440	26,578	0	24,744	0	0	0	73,207	
66	0	14,718	13,310	5,034	21,587	23,251	25,768	2,474	16,297	0	0	8,191	98,634	
67	17,065	7,636	17,875	11,305	18,600	23,251	26,578	14,462	23,848	0	0	0	132,720	
68	5,119	19,539	6,357	8,447	18,814	22,909	26,578	18,430	13,310	14,420	0	1,621	148,975	
69	7,764	6,143	22,739	6,911	19,240	23,251	14,548	6,655	26,024	0	2,261	0	125,041	
70	2,645	1,067	16,211	5,674	11,049	21,885	26,493	20,734	18,600	15,358	0	8,319	143,130	
71	2,645	18,387	18,430	14,932	16,467	23,165	19,027	15,145	14,974	15,230	6,869	0	153,155	
72	16,979	15,742	20,435	15,572	14,804	17,534	21,715	29,181	2,389	0	2,261	5,802	155,715	
73	18,131	16,169	21,928	19,752	15,742	0	17,491	24,232	12,799	0	14,676	0	146,585	
74	20,051	14,548	22,525	7,508	8,703	23,251	18,217	24,573	17,363	24,360	11,391	1,920	194,409	
75	14,292	16,809	16,809	17,491	11,860	23,251	15,444	17,449	25,042	17,961	3,200	10,495	190,100	
76	17,875	19,539	22,568	13,396	21,587	18,131	17,278	19,496	19,326	12,415	981	0	182,592	
77	15,529	5,290	14,804	15,358	16,510	23,336	23,507	24,232	2,005	0	0	4,437	128,880	
Mean	7,109	11,552	16,941	9,507	15,488	20,868	20,181	18,570	18,809	8,461	3,616	4,761	136,758	

Table 6-2-25 DIVERSION REQUIREMENTS FOR SYSTEM G (ELAHERA) (Unit: ac.ft)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	12,409	8,671	12,303	21,607	22,371	18,301	15,637	21,859	21,495	17,502	11,069	9,939	193,163	
51	728	8,135	12,570	17,148	18,044	18,316	15,699	19,319	17,104	13,622	2,808	3,487	146,980	
52	2,885	6,944	17,657	12,891	19,243	18,301	15,637	21,859	15,975	16,391	9,797	3,575	161,155	
53	5,989	10,560	15,773	5,512	23,494	18,316	14,753	18,138	20,631	13,146	3,620	3,783	153,715	
54	2,885	8,593	4,817	12,674	23,494	18,301	15,637	19,284	21,495	11,206	11,422	3,487	153,295	
55	2,885	9,132	16,507	13,038	22,960	18,316	15,637	21,841	17,281	19,654	13,891	10,927	182,069	
56	11,157	12,004	14,552	18,774	23,494	18,301	15,637	21,859	21,495	18,719	2,808	3,487	182,287	
57	9,214	340	17,657	21,495	21,546	18,316	15,637	21,859	19,096	4,566	2,808	3,487	156,021	
58	11,863	9,558	8,184	18,395	19,986	18,301	15,637	21,859	21,495	18,459	11,822	5,379	180,938	
59	15,944	14,331	17,657	16,723	20,250	16,110	15,637	21,859	21,495	12,741	2,808	3,487	179,042	
60	6,853	0	17,624	5,512	23,494	18,301	13,459	21,859	21,495	16,973	2,808	10,257	158,635	
61	8,159	6,295	8,891	18,572	23,494	18,316	15,637	21,859	21,495	13,534	2,808	3,487	162,547	
62	3,150	13,775	17,657	9,883	19,986	18,301	15,637	21,171	21,495	11,911	9,398	7,078	169,442	
63	2,885	5,039	15,474	5,512	23,474	18,316	15,637	21,859	21,495	15,068	2,808	3,487	151,054	
64	5,411	9,371	17,092	14,063	20,728	18,301	8,703	21,859	20,878	7,654	13,186	9,869	167,115	
65	14,226	2,822	12,646	10,302	17,504	18,316	15,637	17,510	21,495	7,908	2,808	3,487	144,661	
66	2,885	14,371	11,810	17,741	23,494	18,301	15,637	21,859	20,014	5,615	5,896	8,528	166,149	
67	18,758	9,289	16,771	15,780	23,494	18,316	15,637	21,859	21,495	4,566	2,808	10,821	179,594	
68	12,656	14,371	7,004	20,143	23,494	18,301	15,637	21,859	21,495	10,501	5,231	9,869	180,561	
69	9,430	10,829	17,657	15,947	23,494	18,301	15,637	14,688	21,495	9,707	11,986	3,487	172,658	
70	2,885	0	13,736	17,259	23,494	18,301	15,637	21,859	20,296	15,350	5,852	5,216	159,885	
71	8,370	6,384	12,613	12,709	23,224	18,301	15,637	15,146	21,495	18,225	11,916	0	164,020	
72	18,635	14,371	16,415	14,078	19,340	18,301	15,637	21,859	17,510	4,566	2,808	6,294	169,814	
73	18,758	10,826	17,657	21,719	23,494	18,301	15,637	21,859	21,089	12,546	4,640	3,487	190,013	
74	18,735	10,249	17,653	13,436	23,486	18,290	15,626	21,450	16,527	19,539	17,115	3,487	195,593	
75	14,375	11,594	10,015	20,206	22,448	18,305	11,878	21,838	21,495	19,809	6,354	6,516	184,833	
76	13,080	13,149	17,653	17,722	23,486	18,290	15,626	21,838	21,495	13,958	4,729	4,522	188,548	
77	14,061	14,356	17,159	21,955	22,643	18,305	15,062	21,734	19,617	8,572	4,625	6,066	184,155	
Mean	9,600	9,120	14,400	15,386	22,113	18,227	15,127	20,846	20,355	12,929	7,204	5,607	170,534	

2.2.7.2 Tank-wise Diversion Requirements (Case 2)

In this case (Case 2), the diversion requirements are computed on the following conditions;

(a) Existing area and New land

Cropping Pattern A, 80%

Cropping Pattern B, 20%

(b) For Elahera region (System G), the cropping patterns used in the report on the Integrated Small Farmer Development Project have been adopted.

(c) For Kantalai tank, the diversion requirements have been determined by summing up the diversion requirements culculated for Kantalai farm managed by the Sugar Corporation (Table 6.2.24) and for paddy and upland (Table 6.2.31).

Table 6-2-26 Irrigation Area in Case 2

	Existing Area			Newland		
	P-A	P-B	Total	P-A	P-B	Total
Parakrama Samudra	20,000	5,000	25,000	4,320	1,C80	5,400
Minneriya Tank	18,400	4,600	23,000	-	-	-
Giritale Tank	6,000	1,500	7,500	-	-	-
Kaudulla Tank	10,880	2,720	13,600	17,920	4,480	22,400
Kantalai Tank	14,080	3,520	17,600	5,280	1,320	6,600
Kantalai (Sugar Coop.)			17,900			-
Elabera			14,800			-

Table 6-2-27 DIVERSION REQUIREMENTS FOR PARAKRAMA SAMUDRA TANK (Unit: ac.ft)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	31,312	39,824	7,722	13,476	31,616	49,309	51,011	36,176	12,039	14,531	21,463	25,354	333,833	
51	9,120	34,352	16,781	3,465	36,358	49,309	46,634	41,040	0	19,699	2,675	17,145	276,578	
52	9,120	32,528	19,517	3,670	27,482	49,309	46,756	44,080	2,250	8,756	19,943	20,794	284,205	
53	22,800	36,176	16,842	0	36,966	44,992	33,014	41,770	243	1,459	14,470	7,418	256,150	
54	15,808	35,264	3,708	6,323	36,966	49,309	42,256	38,365	12,707	6,627	20,247	7,418	274,998	
55	19,456	34,656	21,037	4,438	33,622	49,309	51,011	25,797	0	9,971	27,847	24,394	301,538	
56	32,224	38,608	18,301	6,992	36,905	40,235	50,524	39,520	12,525	4,621	8,026	13,801	302,286	
57	33,440	14,592	21,402	10,700	24,781	49,187	43,351	43,290	12,160	8,756	2,675	7,418	271,752	
58	25,840	35,872	14,045	9,546	31,677	49,309	51,011	26,995	10,944	5,411	15,990	7,418	284,058	
59	18,544	42,256	21,402	7,783	35,446	48,336	51,011	42,499	12,039	0	5,350	17,754	302,420	
60	17,936	9,728	15,868	0	19,456	49,309	36,662	43,047	10,093	16,051	12,343	30,218	260,711	
61	9,120	19,760	14,045	5,655	22,192	49,005	51,011	44,080	12,343	12,039	4,438	7,418	251,106	
62	24,320	38,304	17,085	8,086	29,792	49,309	50,828	42,864	486	9,667	18,118	21,158	310,017	
63	9,120	20,064	14,105	0	34,291	49,187	47,424	43,837	243	7,843	2,675	7,418	236,207	
64	28,819	23,4	0	9,910	34,352	49,309	40,796	40,371	5,898	17,510	23,590	27,542	301,565	
65	34,048	9,728	21,402	0	19,943	48,336	51,011	27,847	12,707	3,188	2,675	7,418	238,808	
66	21,219	42,256	8,573	0	36,845	49,187	50,848	31,616	8,390	0	2,675	18,058	269,667	
67	38,000	32,832	18,908	8,876	36,480	49,309	51,011	44,020	12,160	1,702	2,675	6,318	302,291	
68	31,312	42,256	12,282	7,727	36,905	49,309	51,011	43,898	10,883	7,539	7,783	22,010	322,915	
69	33,744	40,736	21,341	0	36,966	49,309	41,830	35,690	10,761	973	27,238	7,418	306,006	
70	27,056	15,808	21,402	0	22,557	39,580	51,011	33,805	10,457	4,864	2,675	11,126	240,689	
71	27,360	34,960	8,573	547	35,446	49,309	35,568	15,078	12,586	6,627	20,550	7,418	254,022	
72	40,432	42,256	21,402	3,101	23,287	49,309	50,585	44,020	0	0	2,675	7,418	284,485	
73	41,952	33,440	19,578	14,653	28,272	43,107	18,483	40,675	0	8,147	2,675	7,418	258,400	
74	41,952	39,277	20,733	2,371	31,251	49,309	51,011	44,020	0	23,347	19,334	19,881	342,486	
75	30,096	27,968	4,378	0	25,536	49,309	17,024	34,534	12,707	5,716	10,518	7,418	225,204	
76	22,192	42,256	21,402	12,099	36,966	45,783	50,342	36,541	2,250	13,619	2,675	7,418	293,543	
77	24,788	39,824	10,093	0	24,441	49,066	33,684	36,115	0	1,702	2,675	7,418	229,806	
Mean	25,755	32,109	15,426	4,979	32,259	48,034	44,526	37,914	6,671	7,870	10,953	13,550	279,134	

Table 6-2-28 DIVERSION REQUIREMENTS FOR MINNERIYA TANK (Unit: ac.ft)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	23,920	26,910	6,256	12,328	17,940	37,306	38,456	25,898	6,854	12,834	14,398	20,102	243,202	
51	6,900	26,220	15,456	1,794	15,686	37,076	38,364	31,924	2,760	13,064	2,024	8,952	200,220	
52	6,900	29,670	16,146	4,738	21,114	37,260	37,306	33,350	46	9,844	16,698	18,952	232,024	
53	15,870	30,360	16,192	0	27,922	37,260	20,608	28,474	4,738	0	14,628	5,612	201,664	
54	13,800	31,280	5,612	0	27,922	37,246	32,246	31,694	9,614	6,164	16,698	5,612	217,948	
55	14,260	24,840	14,306	0	25,070	37,306	38,594	26,496	1,978	14,674	17,158	19,228	233,910	
56	21,804	30,360	16,192	7,728	27,922	32,062	38,594	32,246	9,568	2,576	7,958	12,788	239,798	
57	25,714	15,410	16,192	9,706	19,366	37,168	33,948	31,602	6,624	5,658	2,024	5,612	209,024	
58	16,514	25,530	9,936	8,832	23,368	37,260	38,272	20,700	6,578	10,534	13,018	16,882	227,424	
59	20,930	31,970	16,192	4,508	19,320	33,810	38,502	32,890	6,578	0	3,358	12,742	220,800	
60	13,110	7,360	13,846	0	9,752	37,214	25,806	32,200	0	6,348	2,024	24,518	172,178	
61	6,900	18,170	6,762	3,450	23,966	36,938	38,410	33,304	8,464	1,656	6,348	5,612	189,980	
62	19,320	28,520	11,546	5,336	24,794	37,306	38,594	27,048	276	9,384	12,742	16,882	231,748	
63	6,900	19,596	4,876	3,910	27,416	37,306	32,522	32,660	0	10,764	2,024	5,612	183,586	
64	23,230	24,150	9,062	11,316	19,136	37,306	31,050	32,798	5,842	6,624	19,918	22,402	242,834	
65	26,680	20,700	16,192	0	9,936	37,260	38,318	23,874	9,614	0	2,024	5,612	190,210	
66	20,930	31,970	6,946	2,346	27,876	37,260	38,502	29,900	0	0	2,024	16,652	214,406	
67	31,050	27,140	11,592	8,326	25,438	37,122	38,548	32,982	4,416	0	2,024	5,612	224,250	
68	22,770	31,970	8,096	8,878	27,600	37,306	38,594	27,048	138	5,934	12,052	16,652	237,038	
69	27,370	29,210	16,192	644	27,416	37,306	30,866	29,348	0	0	8,188	5,612	212,152	
70	24,610	17,480	14,122	0	21,942	34,730	38,594	24,426	6,624	15,134	7,958	8,142	213,762	
71	17,250	26,956	14,766	0	18,768	36,892	36,938	29,394	8,878	13,064	18,998	5,612	227,516	
72	28,060	31,970	16,192	3,450	17,066	37,306	38,594	33,304	0	0	2,024	9,752	217,718	
73	31,740	29,670	14,352	10,810	24,564	31,740	20,976	32,936	2,760	9,384	21,758	5,612	236,302	
74	31,740	29,673	16,192	5,336	14,490	37,306	38,594	33,212	3,588	17,664	20,148	5,612	253,555	
75	23,230	29,670	13,386	276	17,618	37,306	21,712	28,520	322	16,054	11,178	5,612	204,884	
76	31,050	31,970	16,192	598	27,464	37,306	36,938	30,498	8,556	13,064	5,428	5,612	244,676	
77	27,370	31,050	14,076	12,236	26,542	37,306	35,834	31,326	0	0	2,024	5,612	223,376	
Mean	19,734	26,421	12,745	4,520	22,051	36,642	34,796	30,002	4,101	7,158	9,530	10,629	219,507	

Table 6-2-29 DIVERSION REQUIREMENTS FOR GIRITALE TANK (Unit: ac.ft)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	7,800	8,775	2,040	4,020	5,850	12,165	12,540	8,445	2,235	4,185	4,695	6,555	79,305	
51	2,250	8,550	5,040	585	5,115	12,090	12,510	10,410	900	4,260	660	6,180	68,550	
52	2,250	9,675	5,265	1,545	6,885	12,150	12,165	10,875	15	3,210	5,445	6,180	75,660	
53	5,175	9,900	5,280	0	9,105	12,150	6,720	9,285	1,545	0	4,770	1,830	65,760	
53	4,500	10,200	1,830	0	9,105	12,165	10,515	10,335	3,135	2,010	5,445	1,830	71,070	
55	4,650	8,100	4,665	0	8,175	12,165	12,585	8,640	645	4,785	5,595	6,270	76,275	
56	7,110	9,900	5,280	2,520	9,105	10,455	12,585	10,515	3,120	840	2,595	4,170	78,195	
57	8,385	5,025	5,280	3,165	6,315	12,120	11,070	10,305	2,160	1,845	660	1,830	68,160	
58	5,385	8,325	3,240	2,880	7,620	12,150	12,480	6,750	2,145	3,435	4,245	5,505	74,160	
59	6,825	10,425	5,280	1,470	6,300	11,025	12,555	10,725	2,145	0	1,095	4,155	72,000	
60	4,275	2,400	4,515	0	3,180	12,135	8,415	10,500	0	2,070	660	7,995	56,145	
61	2,250	5,925	2,205	1,125	7,815	12,045	12,525	10,860	2,760	540	2,070	1,830	61,950	
62	6,300	9,300	3,765	1,740	8,085	12,165	12,585	8,820	90	3,060	4,155	5,505	75,570	
63	2,250	6,390	1,590	1,275	8,940	12,165	10,605	10,650	0	3,510	660	1,830	59,865	
64	7,575	7,875	2,955	3,690	6,240	12,165	10,125	10,695	1,905	2,160	6,495	7,305	79,185	
65	8,700	6,750	5,280	0	3,240	12,150	12,495	7,785	3,135	0	660	1,830	62,025	
66	6,825	10,425	2,265	765	9,090	12,150	12,555	9,750	0	0	660	5,430	69,915	
67	10,125	8,850	3,780	2,715	8,295	12,105	12,570	10,755	1,440	0	660	1,830	73,125	
68	7,425	10,425	2,640	2,895	9,000	12,165	12,585	8,820	45	1,935	3,930	5,430	77,295	
69	8,925	9,525	5,280	210	8,940	12,165	10,065	9,570	0	0	2,670	1,830	69,180	
70	8,025	5,700	4,605	0	7,155	11,325	12,585	7,965	2,160	4,935	2,595	2,655	69,705	
71	5,625	8,790	4,815	0	6,120	12,030	12,045	9,585	2,895	4,260	6,195	1,830	74,190	
72	9,150	10,425	5,280	1,125	5,565	12,165	12,585	10,860	0	0	660	3,180	70,995	
73	10,350	9,675	4,680	3,525	8,010	10,350	6,840	10,740	900	3,060	7,095	1,830	77,055	
74	10,350	9,675	5,280	1,740	4,725	12,165	12,585	10,830	1,170	5,760	6,570	1,830	82,680	
75	7,575	9,675	4,365	90	5,745	12,165	7,080	9,300	105	5,235	3,645	1,830	66,810	
76	10,125	10,425	5,280	195	8,955	12,165	12,045	9,945	2,790	4,260	1,770	1,830	79,785	
77	8,925	10,125	4,590	3,990	8,655	12,165	11,685	10,215	0	0	660	1,830	14,040	
Mean	6,754	8,616	4,156	1,474	7,190	11,985	11,346	9,428	1,337	2,334	3,108	3,648	69,595	

Table 6-2-30 DIVERSION REQUIREMENTS FOR KAUDULLA TANK (Unit: ac.ft)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	37,438	42,118	9,790	12,005	28,078	58,391	60,190	40,607	10,726	20,087	22,535	31,463	373,428	
51	10,800	41,048	24,190	2,824	24,550	58,031	60,046	49,967	4,318	20,447	3,167	29,663	329,051	
52	9,504	46,438	25,450	12,432	30,179	56,526	46,922	53,990	2,762	11,643	23,984	29,126	348,956	
53	24,838	47,518	25,701	0	48,540	56,526	0	39,907	12,432	0	20,743	8,245	284,450	
54	21,600	48,958	8,782	0	43,702	58,391	69,536	49,607	15,046	9,647	26,135	8,783	360,187	
55	22,318	38,878	22,569	0	39,238	56,779	52,163	35,377	6,320	19,203	24,705	29,736	347,286	
56	34,127	47,518	25,343	12,094	43,702	50,182	60,406	50,470	14,974	4,031	12,455	20,014	375,316	
57	40,246	24,118	25,343	15,190	30,311	58,174	53,134	52,917	10,366	8,854	3,167	8,783	330,603	
58	25,847	39,959	15,550	13,824	35,844	56,318	59,902	32,399	10,295	16,487	20,376	26,424	353,225	
59	32,759	50,039	25,365	7,056	30,239	52,920	60,262	51,479	10,295	0	5,255	19,942	345,611	
60	18,576	14,904	19,512	2,520	22,536	57,816	47,736	51,840	5,184	9,216	4,464	32,400	286,704	
61	14,688	31,680	12,024	6,336	37,944	58,389	60,408	24,708	8,496	4,320	11,880	12,312	283,185	
62	30,240	44,640	18,072	8,352	38,808	58,386	60,408	42,336	432	14,688	19,944	26,424	362,730	
63	10,800	30,672	7,632	6,120	42,912	58,392	50,904	51,120	0	16,848	3,168	8,784	287,352	
64	36,360	37,800	14,184	17,712	29,952	58,392	48,600	51,336	9,144	10,368	31,176	35,064	380,088	
65	41,760	32,400	25,344	0	15,552	58,392	59,976	37,368	15,048	0	3,168	8,784	297,792	
66	32,760	50,040	10,872	3,672	43,632	58,320	60,264	48,800	0	0	3,168	26,064	335,592	
67	48,600	42,480	18,144	13,032	39,816	58,104	60,336	51,624	6,912	0	3,168	8,784	351,000	
68	35,640	50,040	12,672	13,896	43,200	58,392	60,408	42,336	216	9,288	18,864	26,064	371,016	
69	42,840	45,720	25,344	1,008	42,912	58,392	48,312	45,936	0	0	12,816	8,784	332,064	
70	38,520	27,360	22,104	0	34,344	54,360	60,408	38,232	10,368	23,688	12,456	12,744	334,586	
71	27,000	42,192	23,112	0	29,376	57,744	57,816	46,008	13,896	20,448	29,736	8,784	356,112	
72	43,822	49,929	25,288	5,387	26,646	58,261	60,266	52,014	0	0	3,159	15,230	340,002	
73	49,570	46,337	22,417	16,890	38,362	49,562	32,741	51,438	4,314	14,652	33,978	8,764	369,025	
74	49,570	46,337	25,288	8,338	22,622	58,261	60,266	51,870	5,607	27,583	31,464	8,764	395,970	
75	36,279	46,337	20,906	432	27,510	58,261	33,890	44,537	504	25,069	17,455	8,764	319,944	
76	48,492	49,929	25,288	936	42,891	58,261	57,677	47,627	13,370	20,399	8,475	8,764	382,109	
77	42,745	48,492	21,983	19,118	41,453	58,261	55,952	48,921	0	0	3,159	8,764	348,848	
Mean	32,419	39,819	19,938	7,113	34,816	57,028	53,534	45,885	6,822	10,968	14,794	17,365	342,223	

Table 6-2-31 DIVERSION REQUIREMENTS FOR KANTALAI TANK (PADDY AND UPLAND CROPS) (Unit:ac.ft)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	29,766	29,330	16,264	13,068	15,198	39,252	40,608	26,330	5,518	10,598	9,584	13,164	248,680	
51	7,260	27,346	14,810	1,548	24,586	39,252	37,994	33,880	0	13,504	4,016	15,584	219,780	
52	7,260	32,960	17,036	1,838	24,298	39,252	38,334	35,090	5,228	18,344	12,244	20,910	252,794	
53	15,972	30,734	11,954	0	29,428	38,864	18,004	34,266	8,664	8,422	16,360	10,502	233,170	
54	10,648	31,460	10,986	3,582	28,896	39,252	36,834	27,540	6,680	6,196	18,536	5,904	226,514	
55	8,712	25,168	16,794	0	16,698	39,252	40,222	7,744	0	11,084	24,296	16,794	206,764	
56	23,958	31,702	17,036	5,856	29,330	33,782	35,960	29,960	1,210	1,162	2,130	18,296	230,382	
57	26,136	25,410	17.036	13,262	24,634	29,156	36,252	34,314	3,484	388	2,130	5,904	228,106	
58	27,588	30,250	9,052	5,276	29,040	39,252	38,334	20,570	4,356	8,178	19,264	18,248	249,408	
59	22,748	33,638	17,036	6,194	29,040	27,248	40,608	23,618	6,970	5,758	4,984	9,584	227,426	
60	17,666	13,794	17,036	0	25,750	39,252	25,072	35,090	5,808	10,842	2,130	25,022	217,462	
61	7,260	26,378	11,954	10,164	27,250	39,106	40,124	34,992	1,790	0	2,130	5,904	207,052	
62	15,730	31,218	16,746	5,616	21,346	39,252	40,076	33,300	4,066	10,358	14,664	9,292	241,664	
63	7,260	23,232	11,712	1,308	22,748	39,252	37,170	34,218	2,420	9,340	2,130	5,904	196,694	
64	26,620	33,154	7,600	10,744	29,088	39,252	30,056	24,878	9,824	3,678	19,990	22,120	257,004	
65	29,766	16,746	17,036	48	19,700	39,010	40,608	10,842	6,922	580	2,130	5,904	189,292	
66	16,214	31,944	12,922	2,178	29,428	39,252	40,414	16,408	1,210	0	2,130	16,070	208,170	
67	32,912	27,104	15,826	7,550	28,508	39,252	40,608	27,394	2,468	10,260	2,130	6,098	240,110	
68	23,953	33,638	8,518	5,034	28,583	39,356	40,608	28,458	146	11,808	2,130	6,148	228,380	
69	25,894	25,894	17,036	3,872	28,702	39,252	32,718	19,698	7,938	0	11,034	5,904	217,942	
70	22,022	22,506	14,810	2,760	21,876	38,864	40,608	30,250	2,712	12,488	2,806	16,118	227,820	
71	22,022	33,638	16,264	10,502	26,668	39,204	36,252	26,040	532	12,294	16,310	5,904	245,630	
72	32,912	32,670	17,036	11,036	25,168	36,542	38,334	35,090	0	0	11,034	12,440	252,262	
73	33,396	31,375	17,036	13,310	25,846	20,522	35,042	32,960	48	194	25,012	5,904	240,705	
74	33,396	31,944	17,036	4,404	19,796	39,252	35,622	33,250	1,838	18,586	21,442	6,438	263,004	
75	30,926	33,396	15,294	12,536	22,506	39,252	33,348	27,830	7,210	14,228	12,004	19,458	267,988	
76	33,396	33,638	17,036	9,098	29,428	37,074	27,197	29,332	3,242	10,358	9,584	5,904	245,287	
77	31,702	20,420	13,892	10,794	26,668	39,156	39,786	32,960	0	0	5,226	10,260	230,864	
Mean	22,253	28596	14,743	6,128	25,365	37,738	36,314	28,082	3,582	7,452	9,915	11,632	231,798	

Table 6-2-32 DIVERSION REQUIREMENTS FOR KAUDULLA TANK (FOR EXISTING AREA) (Unit: ac.ft)

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	14,143	15,911	3,698	7,289	10,607	22,059	22,738	15,340	4,052	7,588	8,513	11,886	143,824	
51	4,080	15,513	9,138	1,060	9,274	21,923	22,684	18,876	1,631	7,724	1,196	11,206	124,305	
52	4,080	17,543	9,547	2,801	12,484	22,031	22,059	19,719	299	5,820	9,873	11,206	137,462	
53	9,383	17,951	9,574	0	16,509	22,031	12,185	16.836	2,801	0	8,648	3,318	119,236	
54	8,160	18.495	3,318	0	16,509	22,059	19,066	18,740	5,684	3,644	9,873	3,318	128,866	
55	8,431	14,687	8,458	0	14,823	22,059	22,820	15,666	1,169	8,676	10,145	11,369	138,303	
56	12,892	17,951	9,574	4,568	16,509	18,958	22,820	19,066	5,657	1,523	4,705	7,560	141,783	
57	15,204	9,111	9,574	5,738	11,451	21,977	20,073	22,140	3,916	3,345	1,196	3,318	127,043	
58	9,764	15,095	5,874	5,222	13,086	22,031	22,629	12,239	3,889	6,228	7,697	9,982	133,736	
59	12,375	18,903	9,574	2,665	11,423	19,992	22,765	19,447	3,889	0	1,985	7,533	130,551	
60	7,018	5,631	7,371	952	8,513	21,841	18,033	19,584	1,958	3,482	1,687	12,240	108,310	
61	5,549	11,968	4,542	2,394	14,334	22,059	22,821	18,060	3,209	1,632	4,488	4,651	115,707	
62	11,424	16,864	6,827	3,156	14,660	22,053	22,821	15,993	163	5,549	7,534	9,982	137,029	
63	4,080	11,587	2,883	2,312	16,211	22,059	19,230	19,312	0	6,365	1,197	3,318	108,554	
64	13,736	14,280	5,358	6,691	11,315	22,059	18,360	19,393	3,454	3,916	11,777	13,246	143,585	
65	15,776	12,240	9,574	0	5,875	22,059	22,658	14,116	5,685	0	1,197	3,318	112,498	
66	12,376	18,904	4,107	1,387	16,483	22,032	22,767	17,680	0	0	1,197	9,846	126,779	
67	18,360	16,048	6,854	4,923	15,042	21,950	22,794	19,502	2,611	0	1,197	3,318	132,599	
68	13,464	18,904	4,787	5,250	16,320	22,059	22,821	15,993	82	3,509	7,126	9,846	140,161	
69	16,184	17,272	9,574	381	16,211	22,059	18,252	17,354	0	0	4,841	3,318	125,446	
70	14,552	10,336	8,351	0	12,974	20,536	22,821	14,443	3,917	8,949	4,706	4,815	126,400	
71	10,200	15,940	8,731	0	11,098	21,814	21,841	17,381	5,249	7,725	11,234	3,318	134,531	
72	16,494	18,793	9,518	2,032	10,026	21,928	22,679	19,578	0	0	1,188	5,732	127,968	
73	18,658	17,441	8,437	6,362	14,439	18,650	12,312	19,361	1,626	5,513	12,788	3,298	138,885	
74	18,658	17,441	9,518	3,142	8,510	21,928	22,679	19,524	2,113	10,380	11,842	3,298	149,033	
75	13,655	17,441	7,869	163	10,351	21,928	12,744	16,761	190	9,434	6,569	3,298	120,403	
76	18,252	18,793	9,518	354	16,146	21,928	21,702	17,925	5,037	7,676	3,189	3,298	143,818	
77	16,089	18,252	8,274	7,202	15,603	21,928	21,053	18,412	0	0	1,188	3,298	131,299	
Mean	12,251	15,689	7,515	2,716	13,100	21,643	20,651	17,801	2,439	4,238	5,671	6,576	130,290	

Table 6-2-33

Diversion Requirements for Kantalai Tank (for Existing Area)

(Unit: Acft)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	21,648	21,331	11,828	9,504	11,053	28,547	29,533	19,149	4,013	7,708	6,970	9,574	180,858	
51	5,280	19,888	10,771	1,126	17,881	28,547	27,632	24,640	0	9,821	2,921	11,334	159,841	
52	5,280	23,971	12,390	1,337	17,671	28,547	27,879	25,520	3,802	13,341	8,905	15,207	183,850	
53	11,616	22,352	8,694	0	21,402	28,265	13,094	24,921	6,301	6,125	11,898	7,638	162,306	
54	7,744	22,880	7,990	2,605	21,015	28,547	26,788	20,029	4,858	4,506	13,481	4,294	164,737	
55	6,336	18,304	12,214	0	12,144	28,547	29,252	5,632	0	8,061	17,670	12,214	150,374	
56	17,424	23,056	12,390	4,259	21,331	24,569	26,153	21,789	880	845	1,549	13,306	167,551	
57	19,008	18,480	12,390	9,645	17,916	28,477	26,365	24,956	2,534	282	1,549	4,294	165,896	
58	20,064	22,000	6,583	3,837	21,120	28,547	27,879	14,960	3,168	5,948	14,010	13,271	181,387	
59	16,544	24,464	12,390	4,505	21,120	19,817	29,533	17,177	5,069	4,188	3,625	6,970	165,395	
60	12,848	10,032	12,390	0	18,727	28,547	18,234	25,520	4,224	7,885	1,549	18,198	158,154	
61	5,280	19,184	8,694	7,396	19,818	28,441	29,181	25,449	1,302	0	1,549	4,294	150,588	
62	11,440	22,704	12,179	4,084	15,524	28,547	29,146	24,218	2,957	7,533	10,665	6,758	175,755	
63	5,280	16,896	8,518	951	16,544	28,547	27,033	24,886	1,760	6,793	1,549	4,294	143,051	
64	19,360	24,112	5,527	7,814	21,155	28,547	21,859	18,093	7,145	2,675	14,538	16,087	186,912	
65	21,648	12,179	12,390	35	14,327	28,371	29,533	7,885	5,034	422	1,549	4,294	137,667	
66	11,792	23,232	9,398	1,584	21,402	28,547	29,392	11,933	880	0	1,549	11,687	151,396	
67	23,936	19,712	11,510	5,491	20,733	28,547	29,533	19,923	1,795	7,462	1,549	4,435	174,626	
68	17,424	24,464	6,195	3,661	20,768	28,677	29,533	20,697	106	8,588	1,549	4,471	166,133	
69	18,832	18,832	12,390	2,816	20,874	28,547	23,795	14,326	5,773	0	8,025	4,294	158,504	
70	15,016	16,368	10,771	2,007	15,910	28,265	29,533	22,000	1,972	9,082	2,041	11,722	164,687	
71	16,016	24,464	11,828	7,638	19,395	28,512	26,365	18,938	387	8,941	11,862	4,294	178,640	
72	23,936	23,760	12,390	8,026	18,304	26,576	27,879	25,520	0	0	8,025	9,047	183,463	
73	24,288	24,007	12,390	9,680	18,797	14,925	25,485	23,971	35	141	18,234	4,294	176,247	
74	24,288	23,232	12,390	3,203	14,397	28,547	25,907	24,182	1,337	13,517	15,594	4,682	191,276	
75	22,492	24,288	11,123	9,117	16,368	28,547	24,253	20,240	5,244	10,348	8,730	14,151	194,901	
76	24,288	24,464	12,390	6,617	21,402	26,963	25,309	21,332	2,358	7,533	6,970	4,294	183,920	
77	23,056	18,480	10,103	7,850	19,395	28,477	28,935	23,971	0	0	3,801	7,462	171,530	
Mean	16,149	20,969	10,722	4,457	18,446	27,448	26,607	20,423	2,605	5,419	7,211	8,460	168,916	

Table 6-2-34 Diversion Requirements for Parakrama Samudra (for Existing Area)

(Unit: Acft)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	25,750	32,750	6,350	10,550	26,000	40,550	41,950	29,750	9,900	11,950	17,650	20,850	274,000	
51	7,500	28,250	13,800	2,850	29,900	40,550	38,350	33,750	0	16,200	2,200	14,100	227,450	
52	7,500	26,750	16,050	3,100	22,600	40,550	38,450	36,250	1,850	7,200	16,400	17,100	233,800	
53	18,750	29,750	13,850	0	30,400	37,000	27,150	34,350	200	1,200	11,900	6,100	210,650	
54	13,000	29,000	3,050	5,200	30,400	40,550	34,750	31,550	10,450	5,450	16,650	6,100	226,150	
55	16,000	28,500	17,300	3,650	27,650	40,550	41,950	24,700	0	8,200	22,900	19,350	250,750	
56	26,500	31,750	15,050	5,750	30,350	33,550	41,550	32,500	10,300	3,800	6,600	11,350	249,050	
57	27,500	12,000	17,600	8,800	19,500	40,450	35,650	35,600	10,000	7,200	2,200	6,100	222,600	
58	21,250	29,500	11,550	7,850	26,050	40,550	41,950	22,200	9,000	4,450	13,150	6,100	233,600	
59	15,250	34,750	17,600	6,400	29,150	39,750	41,950	34,950	9,900	0	4,400	14,600	248,700	
60	14,750	8,000	13,050	0	16,000	40,550	30,150	35,400	8,300	13,200	10,150	24,850	214,400	
61	7,500	16,250	11,550	4,650	18,250	40,300	41,950	36,250	10,150	9,900	3,650	6,100	206,500	
62	20,000	31,500	14,050	6,650	24,500	40,550	41,800	35,250	400	7,950	14,900	17,400	254,950	
63	7,500	16,500	11,600	0	28,200	40,450	39,000	36,050	200	6,450	2,200	6,100	194,250	
64	23,700	19,300	0	8,150	28,250	40,550	33,550	33,200	4,850	14,400	19,400	22,650	248,000	
65	28,000	8,000	17,600	0	16,400	39,750	41,950	22,900	10,450	2,626	2,200	6,100	195,976	
66	17,450	34,750	7,050	0	30,300	40,450	41,800	26,000	6,900	0	2,200	14,850	221,750	
67	31,250	27,000	15,550	7,300	30,000	40,550	41,950	36,200	10,000	1,400	2,200	5,000	248,400	
68	25,750	34,750	10,100	6,355	30,350	40,550	41,950	36,100	8,950	6,200	6,400	18,100	265,555	
69	27,750	33,500	17,550	0	30,400	40,550	34,400	29,350	8,850	800	22,400	6,100	251,650	
70	22,250	13,000	17,600	0	18,550	32,550	41,950	27,800	8,600	4,000	2,200	9,150	197,650	
71	22,500	28,750	7,050	450	29,150	40,550	29,250	12,400	10,350	5,450	16,900	6,100	208,900	
72	33,250	34,750	17,600	2,550	19,150	40,550	41,600	36,200	0	0	2,200	6,100	233,950	
73	34,500	27,500	16,100	12,050	23,250	35,450	15,200	33,450	0	6,700	2,200	6,100	212,500	
74	34,500	32,300	17,050	1,950	25,700	40,550	41,950	36,200	0	19,200	15,900	16,350	281,650	
75	24,750	23,000	3,600	0	21,000	40,550	14,000	28,400	10,450	4,700	8,650	6,100	185,200	
76	18,250	34,750	17,600	9,950	30,400	37,650	41,400	30,050	1,850	11,200	2,200	6,100	241,400	
77	24,250	32,750	8,300	0	20,100	40,350	27,700	29,700	0	1,400	2,200	6,100	192,850	
Mean	21,318	26,405	12,686	4,079	25,427	39,517	36,616	31,304	5,782	6,472	9,007	11,111	229,724	

2.2.7.3. Tank-wise Diversion Requirements (Case 3)

In this case (Case 3), the diversion requirements are computed on the following conditions;

(a) Existing Area only,

(b) Cropping Pattern A, 97.5%
Cropping Pattern B, 2.5%

(c) For Elahera region (System G), the cropping patterns used in the report on the Integrated Small Farmer Development Project have been adopted. Diversion requirements are shown in Table 6.2.25.

(d) For Kantalai tank, the diversion requirements have been determined by summing up the diversion requirements culculated for Kantalai farm managed by the Sugar Corporation (Table 6 .2.24) and for paddy and upland (Table 6.2.37).

(e) For Minneriya and Giritale Tank, the diversion requirements are shown in Table 6.2.20 and 6.2.21 as same as Case 1.

Table 6-2-35

Diversion Requirements for Parakrama Samudra

(Unit: acft)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	25,846	32,672	6,338	10,807	26,194	40,849	43,955	31,117	7,657	12,880	18,099	20,986	277,400	
51	7,596	28,161	13,684	1,959	29,188	40,849	41,431	34,431	0	17,232	2,789	14,179	231,499	
52	7,596	26,684	15,959	2,081	23,334	40,849	41,636	35,839	1,147	8,050	17,002	17,173	237,350	
53	18,800	29,678	13,863	0	29,249	38,644	32,061	34,863	27	1,341	12,351	6,209	217,083	
54	13,071	29,039	2,985	3,961	29,249	40,849	38,560	32,537	7,726	6,433	17,101	6,209	227,720	
55	15,905	28,401	17,177	2,531	27,594	40,849	43,955	26,919	0	9,188	23,529	23,441	259,489	
56	26,544	31,694	14,921	4,369	29,247	33,770	43,905	33,319	7,709	4,533	7,081	11,385	248,477	
57	27,542	11,913	17,616	7,086	20,885	40,838	39,298	35,759	7,670	8,110	2,789	6,209	225,715	
58	21,315	29,538	11,468	6,269	26,318	40,849	43,955	24,841	7,148	5,455	13,768	6,209	237,133	
59	15,346	34,708	17,616	5,043	28,828	40,748	43,955	35,357	7,660	0	4,985	14,738	248,984	
60	14,808	7,896	12,945	0	17,881	40,849	34,583	35,734	6,624	14,178	10,794	24,878	221,170	
61	7,596	16,285	11,468	3,511	19,794	40,817	43,955	35,839	7,691	10,764	4,187	6,209	208,116	
62	20,097	31,554	13,963	5,105	25,021	40,849	43,935	35,583	50	3,348	15,445	17,553	258,003	
63	7,596	16,484	11,628	0	28,005	40,841	42,046	35,816	23	7,331	2,789	6,209	198,768	
64	23,630	19,359	0	6,433	28,088	40,849	37,535	34,019	3,762	15,275	20,036	22,822	251,808	
65	28,121	7,896	17,616	1	18,333	40,748	43,955	25,479	7,724	3,210	2,789	6,209	202,081	
66	17,402	34,708	6,917	0	29,238	40,837	43,933	28,092	5,438	0	2,789	14,918	224,272	
67	31,255	27,023	15,460	5,759	29,201	40,849	43,955	35,835	7,669	1,789	2,789	6,209	247,793	
68	25,866	34,708	10,031	4,880	29,243	40,849	43,955	35,821	7,043	7,231	6,922	18,271	264,820	
69	27,682	33,391	17,396	0	29,249	40,849	38,109	30,706	6,896	1,030	23,010	6,209	254,527	
70	22,273	12,911	17,616	0	20,041	35,050	43,955	29,409	6,792	4,864	2,789	9,329	205,029	
71	22,552	28,720	6,997	53	28,746	40,849	33,885	15,171	7,716	6,393	17,441	6,209	214,732	
72	33,251	34,708	17,616	1,693	20,473	40,849	43,907	35,836	0	0	2,789	6,209	237,331	
73	34,409	27,522	16,119	9,844	23,992	37,425	18,419	34,163	0	7,671	2,789	6,209	218,562	
74	34,409	32,353	17,017	1,162	25,886	40,849	43,955	35,835	0	20,126	16,542	16,415	284,549	
75	24,768	23,031	3,584	0	22,058	40,849	16,992	29,944	7,726	5,615	9,157	6,209	189,933	
76	18,321	34,708	17,616	8,067	29,249	39,160	43,884	31,405	1,147	12,202	2,789	6,209	244,757	
77	24,309	32,819	8,215	0	21,358	40,826	32,512	31,014	0	1,672	2,789	6,209	201,723	
Mean	21,354	26,377	12,637	3,236	25,569	40,117	39,506	34,508	4,394	7,194	9,576	11,401	233,529	

Table 6-2-36

Diversion Requirements for Kaudulla Tank

(Unit: acft)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	14,158	15,949	3,633	5,869	11,350	22,222	23,899	16,234	3,182	8,082	8,760	11,927	145,265	
51	4,132	15,439	9,062	654	10,264	22,207	23,893	19,156	1,102	8,277	1,517	11,243	126,946	
52	4,132	17,589	9,529	2,099	12,918	22,221	23,620	19,496	2	6,301	10,150	11,308	139,365	
53	9,402	17,926	9,583	0	15,907	22,218	14,795	17,454	2,169	0	8,934	3,378	121,766	
54	8,142	18,501	3,296	2	15,908	22,222	21,111	19,055	4,203	4,129	10,150	3,378	130,097	
55	8,381	14,646	8,410	0	14,809	22,222	23,909	16,502	746	9,146	10,422	11,481	140,674	
56	12,855	18,002	9,583	3,622	15,908	20,123	23,910	19,335	4,201	1,873	4,949	7,659	142,020	
57	15,168	9,054	9,583	4,689	12,011	22,211	21,936	18,932	3,103	3,825	1,517	3,378	125,407	
58	9,738	15,113	5,793	4,166	13,959	22,220	23,887	13,637	3,069	6,790	8,044	10,048	136,464	
59	12,334	18,881	9,583	1,999	11,955	20,955	23,904	19,465	3,047	0	2,278	7,638	128,992	
60	7,784	4,295	8,117	0	7,016	22,215	17,887	19,256	0	4,238	1,517	14,598	106,923	
61	4,132	10,694	4,002	1,499	14,272	22,195	23,896	19,493	3,911	1,227	4,069	3,378	112,768	
62	11,389	16,807	6,771	2,477	14,686	22,222	23,911	16,794	21	6,073	7,783	10,070	139,004	
63	4,132	11,628	2,807	1,677	15,872	22,222	21,189	19,446	0	6,855	1,517	3,378	110,723	
64	13,778	14,234	5,337	5,489	11,944	22,222	20,441	19,459	2,758	4,423	12,116	13,338	145,539	
65	15,819	12,258	9,583	0	7,101	22,222	22,889	15,215	4,203	0	1,517	3,378	114,185	
66	12,410	18,881	4,078	932	15,906	22,221	23,903	18,170	0	0	1,517	9,864	127,882	
67	18,338	16,015	6,868	3,977	15,033	22,210	23,910	19,472	2,002	0	1,517	3,378	132,720	
68	13,463	18,881	4,708	4,244	15,883	22,222	23,911	16,794	12	4,053	7,381	9,950	141,502	
69	16,188	17,263	9,583	48	15,872	22,222	20,430	17,902	0	0	5,177	3,378	128,063	
70	14,570	10,336	8,367	0	13,276	21,428	23,910	15,461	3,126	9,472	4,992	4,869	129,807	
71	10,260	15,971	8,693	0	11,697	22,191	23,375	17,935	4,150	3,234	11,518	3,378	137,402	
72	16,623	18,881	9,583	1,477	10,914	22,222	23,911	19,496	0	0	1,517	5,857	130,481	
73	18,718	17,491	8,497	5,233	14,597	19,921	15,070	19,466	1,102	6,040	13,158	3,378	137,438	
74	18,718	17,524	9,583	2,466	9,626	22,222	23,911	19,488	1,513	10,948	12,246	3,378	151,623	
75	13,723	17,513	7,846	19	11,126	22,222	15,652	17,488	25	9,960	6,925	3,378	125,858	
76	18,425	18,881	9,583	45	15,874	22,222	23,375	18,428	3,979	8,256	3,548	3,378	145,994	
77	16,210	18,403	8,247	5,864	15,526	22,222	22,817	18,820	0	0	1,517	3,378	133,004	
Mean	12,254	15,609	7,511	2,091	13,258	21,194	22,116	18,137	1,844	4,579	5,938	6,684	131,711	

Table 6-2-37

Diversion Requirements for Kantalai Tank

(unit: acft)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Total	Remarks
1950	21,722	21,371	11,769	7,605	12,429	28,758	30,944	20,492	3,080	8,407	7,388	9,603	183,505	
51	5,348	19,938	10,659	530	18,122	28,758	29,716	24,963	0	10,445	3,299	11,416	163,194	
52	5,348	24,013	12,402	789	17,948	28,758	29,947	25,230	2,951	13,972	9,243	15,266	185,867	
53	11,605	22,383	8,664	0	20,591	28,723	15,995	25,160	4,958	6,721	12,349	7,678	164,827	
54	7,797	22,889	7,947	1,882	20,543	28,758	28,994	21,153	3,843	5,105	13,880	4,371	167,163	
55	6,307	18,238	12,219	0	13,341	28,758	30,907	6,872	0	8,787	17,997	12,329	149,517	
56	17,366	23,071	12,402	3,249	20,582	26,071	28,475	22,588	405	958	1,963	13,411	170,541	
57	19,024	18,476	12,402	7,625	18,166	28,751	28,648	25,161	1,829	259	1,963	4,371	138,027	
58	20,064	21,975	6,556	2,903	20,555	28,758	29,947	16,937	2,376	6,665	14,428	13,369	184,533	
59	16,495	24,435	12,402	3,507	20,558	22,247	30,944	18,777	4,059	4,824	4,072	7,102	169,422	
60	12,799	10,045	12,373	0	18,760	28,758	21,806	25,230	3,267	8,548	1,963	18,301	161,850	
61	5,348	19,193	8,678	5,924	19,658	28,744	30,901	25,224	793	0	1,963	4,371	150,797	
62	11,521	22,762	12,149	3,119	16,181	28,758	30,893	24,601	2,217	8,267	11,084	6,849	178,401	
63	5,352	16,818	8,509	487	16,920	28,758	29,225	25,153	1,225	7,410	1,963	4,371	146,191	
64	19,390	24,055	5,488	6,341	20,560	28,758	24,851	19,589	5,415	3,219	4,878	16,095	178,639	
65	21,680	12,223	12,402	4	15,109	28,738	30,944	9,653	3,986	437	1,963	4,371	141,510	
66	11,844	23,226	9,352	1,034	20,591	28,758	30,924	14,504	419	0	1,963	11,711	154,326	
67	23,971	19,657	11,516	4,299	20,397	28,758	30,944	19,922	3,612	0	1,963	4,371	169,410	
68	17,422	24,435	6,092	2,803	20,512	28,749	30,944	21,733	15	9,208	1,963	4,488	168,364	
69	18,884	18,898	12,402	2,012	20,524	28,758	26,497	16,387	4,531	0	8,372	4,371	161,636	
70	16,073	16,326	10,729	1,379	16,456	28,723	30,942	22,776	1,397	9,686	2,498	11,837	168,822	
71	16,059	24,435	11,769	6,183	19,281	28,755	28,648	20,241	48	9,616	12,180	4,371	181,586	
72	23,929	23,746	12,402	6,499	18,397	27,685	29,961	25,230	0	0	8,400	9,083	185,332	
73	24,224	23,971	12,402	7,630	18,904	18,171	27,912	24,355	5	232	18,602	4,371	180,779	
74	24,224	23,158	12,402	2,328	15,225	28,758	28,272	24,514	865	14,169	15,918	4,811	194,644	
75	22,453	24,294	11,010	7,491	16,876	28,758	26,916	21,284	4,118	11,007	9,145	14,226	197,578	
76	24,224	24,435	12,402	5,377	20,591	27,947	27,811	22,211	1,700	8,182	7,332	4,371	186,586	
77	23,142	18,448	10,055	6,384	19,296	28,750	30,827	24,355	0	0	4,114	7,579	172,950	
Mean	16,201	20,961	10,698	3,478	18,467	27,979	28,705	21,223	2,040	5,576	7,245	8,531	169,857	

2.2.8 Results of Water Balance Calculation

As a result of the water balance calculation made for the Moragahakanda dam in consideration of tank-wise water use under the project, the past 28-average value of the success percentage (the ratio of the yield area to the whole cultivated area) has been determined at 90.5% (Table 4.2.38).

For reference, if it is assumed that the water-use facilities (being so superannuated at present) of the existing cultivated land were improved under the situation after completion of the Polgolla-Bowatenna Complex, i.e. Post-Polgolla, then the success percentage would have been estimated at 82.9% by applying the cropping pattern proposed under the project and the projected water requirements to the percentage (Table 6 .2.39). In this case, however, the water balance calculation has been made, including System G and the existing proposed site for a programme for increasing sugar production.

Table 6-2-38 Success Percentage of Crop Cultivation under the Project

Tank	Giritale (7500 ac)		Minneriya (23,000 ac)		Kandulla (36,000 ac)		Kantalai (42,100 ac)		P. Samudra (30,400 ac)	
Year	Yala	Maha	Yala	Maha	Yala	Maha	Yala	Maha	Yala	Maha
1950	100	100	100	100	100	100	100	100	100	100
51	100	100	100	100	100	100	100	100	100	100
52	100	100	100	100	100	100	100	100	100	100
53	100	100	49	100	4	100	12	100	18	100
54	100	100	100	100	100	100	100	100	100	100
55	100	100	100	100	100	100	100	100	100	100
56	100	100	62	100	0	100	0	100	2	100
57	100	100	100	100	0	100	6	100	28	100
58	100	100	100	100	100	100	100	100	100	100
59	100	100	100	100	100	100	100	100	100	100
60	100	100	100	100	100	100	100	100	100	100
61	100	100	100	100	100	100	100	100	100	100
62	100	100	100	100	100	100	100	100	100	100
63	100	100	100	100	100	100	100	100	100	100
64	100	100	100	100	100	100	100	100	100	100
65	100	100	100	100	100	100	100	100	100	100
66	100	100	100	100	100	100	100	100	100	100
67	100	100	100	100	100	100	100	100	100	100
68	100	100	100	100	100	100	100	100	100	100
69	100	100	100	100	100	100	100	100	100	100
70	100	100	100	100	100	100	100	100	100	100
71	100	100	100	100	100	100	100	100	100	100
72	100	100	100	100	100	100	100	100	100	100
73	100	100	100	100	65	52	88	100	100	100
74	100	100	100	100	0	0	0	54	50	100
75	100	100	100	100	0	100	0	100	100	100
76	100	100	0	100	0	100	5	100	29	100
77	100	100	100	100	95	100	96	100	100	100
Mean	100	100	93	100	77	95	79	98	83	100

Table 6-2-39 Success Percentage of Crop Cultivation
(Post-Polgolla, after improvement of inflastructures)

Tank / Year	Giritale Yala	Giritale Maha	Minneriya Yala	Minneriya Maha	Kandulla Yala	Kandulla Maha	Kantalai Yala	Kantalai Maha	P. Samudra Yala	P. Samudra Maha
1950	100	100	25	100	100	100	18	100	100	100
51	100	100	100	100	100	100	47	100	63	100
52	100	100	100	100	100	100	99	100	79	100
53	100	100	27	100	0	100	8	100	22	100
54	100	100	100	100	100	100	100	100	49	100
55	100	100	100	100	100	100	100	100	100	100
56	100	100	28	100	0	100	0	100	0	100
57	100	100	100	100	100	100	5	100	84	100
58	100	100	100	100	100	100	100	100	100	100
59	100	100	100	100	100	100	6	100	100	100
60	100	100	100	100	100	100	100	100	100	100
61	100	100	100	100	100	100	39	100	73	100
62	100	100	100	100	100	100	100	100	83	100
63	100	100	100	100	100	100	71	100	48	100
64	100	100	100	100	100	100	70	100	57	100
65	100	100	100	100	100	100	100	100	100	100
66	100	100	100	100	100	100	14	100	12	100
67	100	100	100	100	100	100	0	100	100	100
68	100	100	91	100	100	100	16	100	10	100
69	100	100	100	100	100	100	32	100	61	100
70	100	100	100	100	100	100	100	100	100	100
71	100	100	100	100	100	100	100	100	100	100
72	100	100	27	100	100	100	0	100	76	100
73	100	100	5	100	51	12	0	60	68	100
74	100	100	100	100	0	100	0	31	84	100
75	100	100	100	100	0	100	0	100	100	100
76	100	100	0	100	0	100	0	100	29	100
77	100	100	100	100	100	100	20	100	100	100
Mean	100	100	82	100	80	97	44	96	71	100

2.2.9 Estimation of the Present Success Percentage (Without project)

The success percentage of the existing cultivated land within the project area will be estimated on the following procedures:

(a) By conducting local interviews by experts including farm management experts and agro-economists, tank-wise success percentages under the situation of Post-Polgolla have been determined at 87.8%;

(b) Assuming that the infrastructures of the existing entire cultivated land are improved under such a situation as no river discharge control available for Amban Ganga after completion of the Polgolla-Bowatenna Complex and the proposed cropping patterns and the irrigation requirements are applied, the past 28-average value of the success percentage of the yield area to the entire cultivated area including the area, which has already been proposed under the situation of Post-Polgolla, (new lands in System G and a programme for increasing sugar production at Kantalai), has been estimated at 82.9%, while that in 1977 at 86.4% under the situation of the recent Post-Polgolla; and

(c) Assuming that the success percentage varies proportionally as a result of (1) and (2), the success percentage under the situation of leaving the present infrastructures as they are without any improvements will be estimated as follows:

$$\text{Success Percentage} = \frac{87.8 \times 82.9}{86.4} = 84.2$$

Consequently, the present success percentage will be assumed to be 84.2%.

Table 6-2-40 Success Percentage and Irrigable Area without and with Project

		Without Project (Post-Polgolla)		With Project
		Existing	Post-Polgolla (after improvement of inflastructures)	
Success Percentage		84.2%	82.9%	90.5%
Irrigable Area	Existing D_1 & D_2	94,100 ac	94,100 ac	94,100 ac
	" G	4,800 "	4,800 "	4,800 "
	New Land G	-	10,000 "	10,000 "
	" Sugar Co.	-	(9,500 " (1,000 "	(9,500 " (1,000 "
	" D_1	-	-	22,400 "
	" D_2	-	-	5,400 "
	" A/C	-	-	6,600 "
	Total	98,900 ac	119,400 ac	153,800 ac

2.2.10 Design Discharge of Irrigation Facilities

Water requirements being estimated on the basis of the proposed cropping patterns is 1,770 ac.ft/month per 1,000 ac under A and 1,312 ac.ft/ month under B, culminating to a peak in July. Cropping rates under A and B are 80% and 20%, respectively. No significant effective rainfall is to be hoped for in July. Design water requirements have been calculated as follows:

For each 1,000 ac:

1,770 x 0.8 + 1,312 x 0.2 = 1,678.0 ac.ft/month or 54.1 ac.ft/day

Which can be converted to:

0.0273 ft^3/sec/ac = 36.6 ac/cusec or 1.91 l/sec/ha

In determining a design crossing to meet the above water requirement, Sri Lankan standard design duties which are given below have been taken into consideration:

	Commanded area	Design duty
(1) Main canals	below 1,000 ac	40 ac/cusec
	1,000 - 5,000 ac	50 "
	above 5,000 ac	60 "
(2) Branch canals		40 "
(3) Distributaries		35 "
(4) Field canals		30 "

As it has been considered somewhat uneconomical to design cross sections of all the canals on the basis of the calculated duty of 36.6 ac/cusec and as the existing canals are regulated by the above standards, it has been decided to adop the following:

(1) Main and Branch canals ..... 40 ac/cusec

(2) Distributaries ..... 35 "

III: HYDRAULIC AND STRUCTURAL DESIGN

3.1 Irrigation Plan

On the basis of the irrigation plan for both the existing and the new lands as specified in the Main Report, the existing main and branch canals will be imporved and new main and branch canals constructed as follows:

		length (miles)
(1)	Improvement of Existing Canals	
	System D1	10.18
	System D2	20.80
		30.98
(2)	Construction of New Canals	
	System D1	36.18
	" D2	32.84
	" A/D	21.25
		90.27
(3)	Erahela-Minneriya Yoda Ela (6 - 19.5 miles)	13.5

New Kalu Ganga Tank

1.	Catchment area	6,500 acs (10.2 sq.mis)
2.	Capacity	21,600 ac-ft (26.7 milion m3)
3.	F.W.L.	190 ft M.S.L.
4.	H.F.L.	193.5 ft M.S.L.
5.	Area at F.S.L.	1,700 ac
6.	Bund	
	Lenght	2,41 miles (3.88 km)
	Top Level	200 ft M.S.L.
	Top Width	20 ft
	Hirht	2 ft- - -45 ft
	Slopes U/S	1 on 2.5
	D/S	1 on 2.0
7.	Spillway	Clear overfall 160 ft
8.	Sluice	Tower Sluice

3.1.1 Irrigation Canals

(1) General

The irrigation canals for the purpose of suppling the irrigation water to the proposed irrigation area are consists of newly constructed canals and existing irrigation canals improved to increase the flow capacities. The existing canals to be improved are the Main canal and the Branch canal No. 1 in the D1 irrigation system and the D1-Main canal, the D1-North canal and D1-East canal in the D2 irrigation system.

(2) Type of Canal

In principal, irrigation canals are designed as un-lined-earthen canals. However, in the case of improvement existing canals of the Main canal and the Branch canal No.1 in the system D1, they are designed as thin concrete lining in order that the flow capacities of the canals can be increase without large scale widening and the related structures of the canals are able to be used without reconstruction or repairing.

(3) Design Discharge and Canal Net Work

The design discharge assigned with a command area, the standardized canal types classified by the said discharges, and the diverting discharges of turnouts are summarized in Figs. 6.3.1 to 6.3.3 and Tables 6.3.4 to 6.3.9.

(4) Canal Section

The cross section of canal sould be such as carry the required capacity. As a rule, canals for the Project consists of trapezoidal earth canals. The sections of canals to be newly constructed are determined based mainly upon the design standards in the Mahaweli Ganga Irrigation and Hydro-power Survey carried out by UNDP/FAO.

Fig. 6.3.4 shows the relationship of canal sections to discharges for earthen canals and it is used for the canal design.

a) Velocitiy and Water Depth

Un-lined canal

Velocities and ratios of bed width to water depth usually range from 1.0 to 3.5 fps. and from 2:1 to 8:1, respectively, depending upon discharges.

For this Project, the permissible velocity is determined 2.7 fps. and the water depth is designed less than 5 ft.

Thin-concrete lined canal

Lined canals permit higher velocities than un-lined canals. The maximum velocity for the thin-concrete lined canals is determined 5 fps.

b) Freeboard

Freeboard in a canal will normallv be governed by considerations of the canal size and locaiton, velocity, flooding, wind action, etc. For this Project, the minimum freeboard for the Project is decided as follows.

i) Earth canal

$Q \geq$ 1,500 c.f.s.	3 ft. 0 in.
$Q \geq$ 1,000 c.f.s.	2 ft. 6 ins.
$Q \geq$ 500 c.f.s.	2 ft. 0 in.
$Q \geq$ 100 c.f.s.	1 ft. 6 ins.
$Q \geq$ 10 c.f.s.	1 ft. 3 ins.
$Q \geq$ 2 c.f.s.	1 ft. 0 in.

ii) Open flume and aqueduct 2 ft. 0 in.

iii) Concrete lined canal

In the lined canals these are the existing canals improved for the Project, the berms of 1/2D+2 ft. width are used at the top of lining to be at about 1 ft. above F.S.L. and the freeboard above the top of the lining is determined as same as earth canals.

c) Side Slope

The side slopes of canal depend upon the characteristics of the materials in which it is constructed and height of embankment. For the Project, inside slopes of 1:1.5 (vertical to horizontal) and 1:1.0 are determined for the un-lined canals and for the thin-concrete lined canals, respectively, under ordinary conditions.

d) Bank Top-width and Berm

Since there are no major highways in this area, the canal banks as operation and maitenance roads will also serve as useful communication link for the development of the area. Tha banks have been classified three types according to their traffic density and road requirements.

On the opposite bank, 4 ft. wide bank has been provided. The typical widths of banks/roadways are as follow.

Type of bank/raod	I	II	III
Road class	II	III	IV
Width of bank (ft)	30	16	12
Width of gravel pavement (ft)	8	8	8
Thickness of gravel (ins)	6	6	6
Width of opposite bank (ft)	4	4	4

Where the berm is to be needed, half the water depth plus two feet (0.5d + 2 ft) wide berm has been provided.

(5) Hydraulic Formula

For the purpose of the hydraulic discharge studies, the Manning formula has been adopted for all canal designs. The formula is as follows.

$$V = \frac{1.486}{n} R^{2/3} S^{1/2}$$

$$Q = A\ V$$

where,

V = velocity of water in fps,

S = slope of energy gradient in feet per foot,

R = hydraulic radius in feet,

n = coefficient of roughness

Q = discharge of canal in c.f.s, and

A = cross-sectional area of water in sq.ft.

The meaning coefficient of roughness 'n' used in the design is as follows.

	'n' value
Concrete lining	0.015
Concrete block lining	0.017
Earth canal	0.0225
Existing earth canal	0.030 - 0.040
Natural stream	0.040

Slope of energy gradient of the canals may range from 0.0002 (1/5,000) to 0.00045 (1/2,200) taking into account topographical conditions and proper velocities.

(6) Standard Cross Section

As for the standard cross section, 34 types are designed for the main and branch canals, according to the sectional discharges and the distances between the turnouts. The numbers of proposed standard cross sections in the three irrigation systems are as follows.

System D1	improvement canal	4 types
	new canal	5 types
System D2	improvement canal	10 types
	new canal	10 types
System A/D	new canal	5 types

The hydraulic calcultaitons for determining the standardized cross sections are tabulated in Tables 6.3.10 to 6.3.12. The standard canal sections are illustrated in Figs. 6.3.5 tp 6.3 7.

Fig 6.3.1 System DI Net work and Discharge Assignment

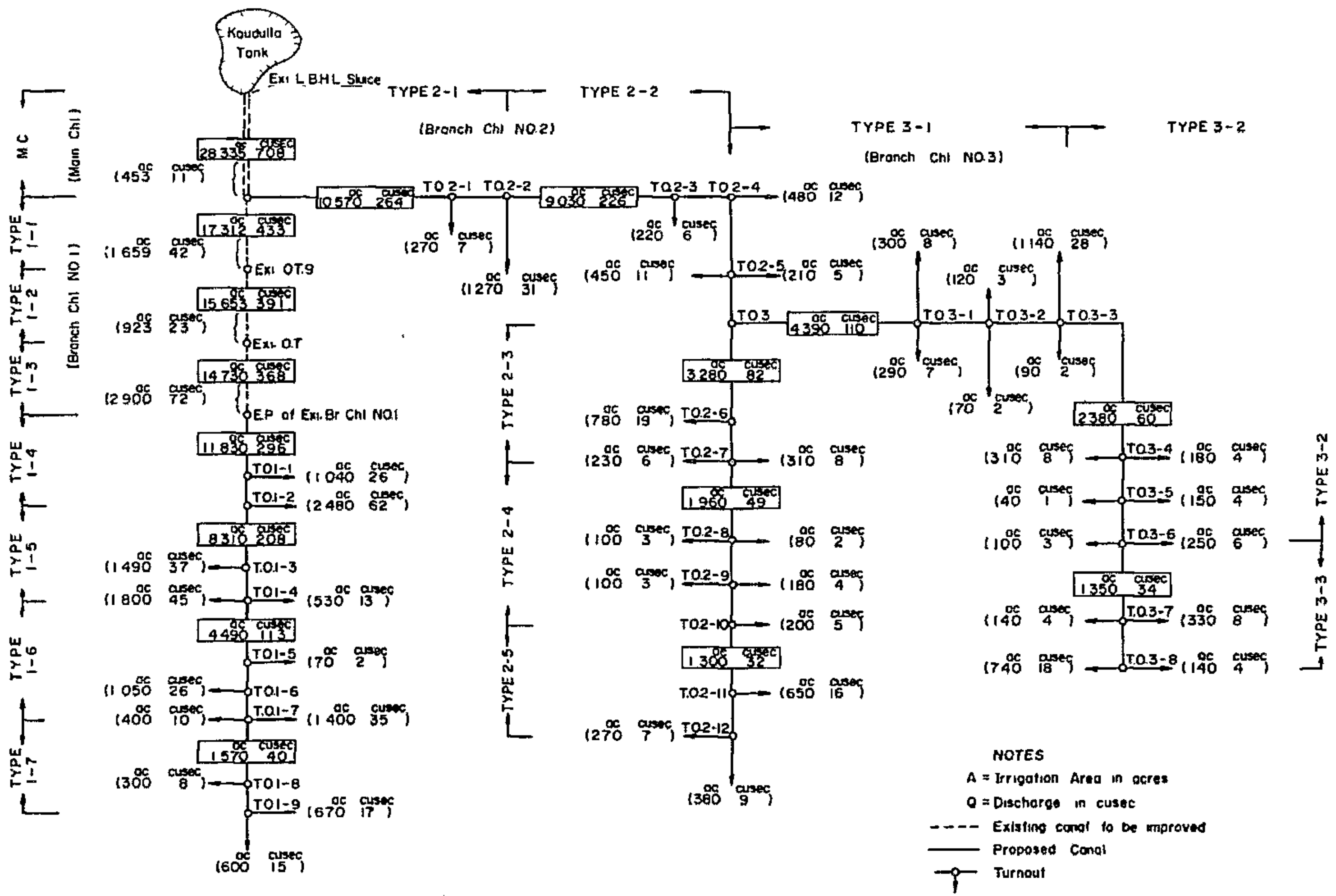


Fig. 6,3.2 System D2 Net Work and Discharge Assignment

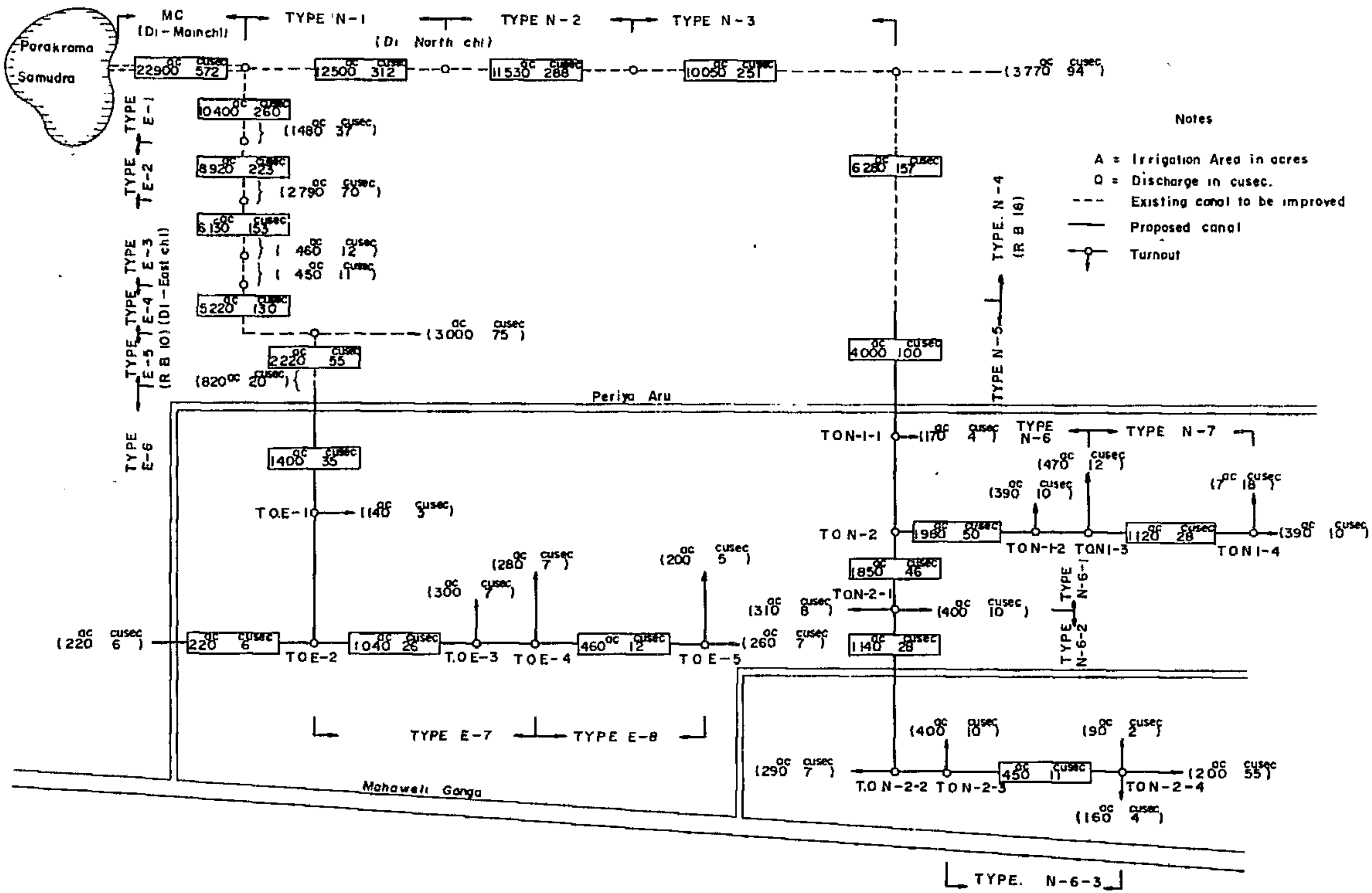


Fig. 6.3.3 System A/D Net Work and Discharge Assignment

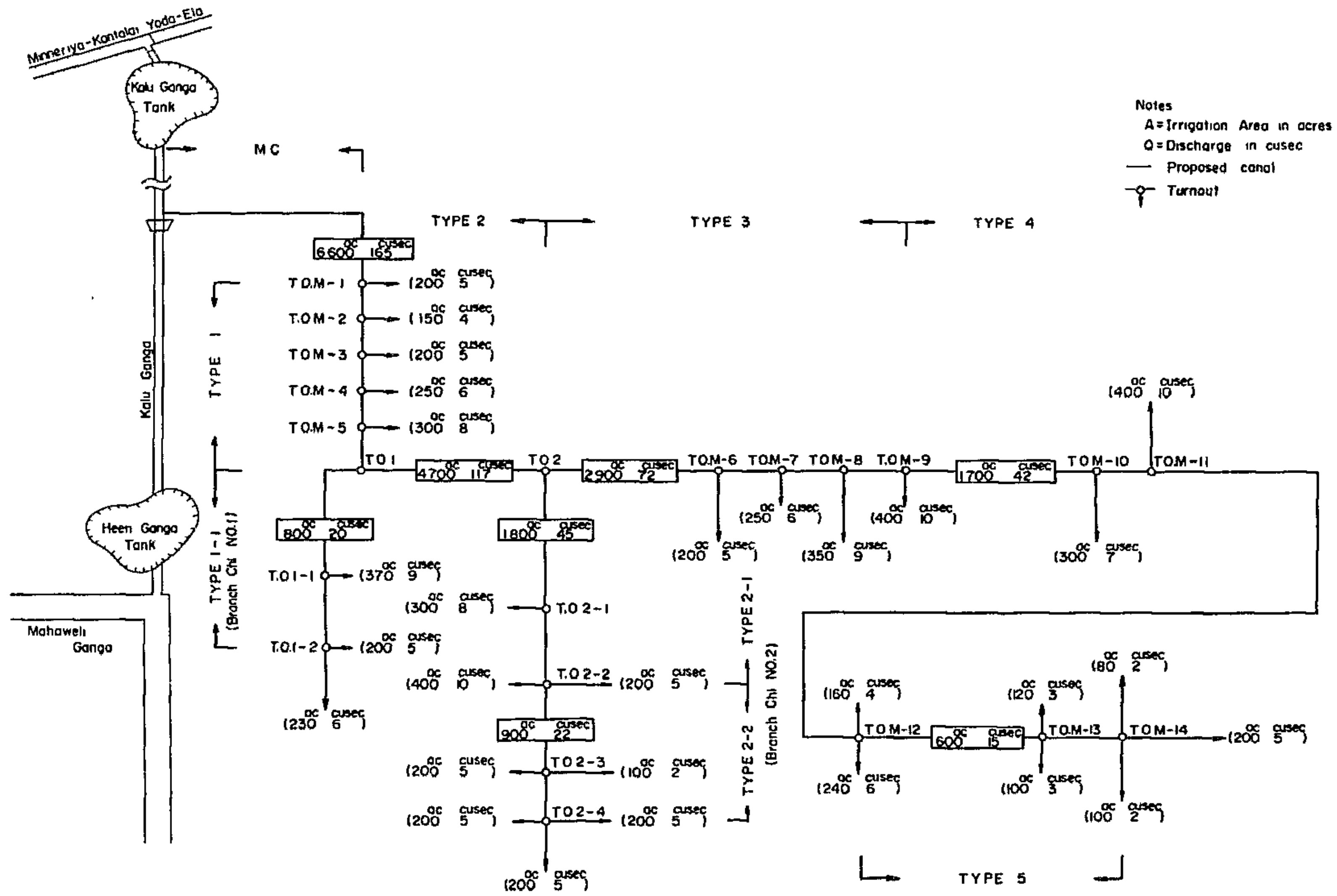


Table 6.3.1 Existing Channel Data in System D-1

Chl.Name	Reach	Command Area	Disch.	Grad.	Bed Width	FSD	Prop. Type
	Ml- Ch	Acs	cusec	‰	ft	ft	
Main Chl.	0 4 - 2.5	16,000	266.7	0.3	20	4.4	M.C.
Branch Chl.No.1	0						
		5,482	137.3	0.3	14	3.6	1-1
	1 - 36						
		4,427	110.7	0.3	13	3.28	
	1 - 50						
		3,823	95.6	0.3	12	3.16	1-2
	2 - 27						
		3,257	81.4	0.3	11	3.03	
	3 - 47						
		2,900	72.5	0.4	14	2.5	1-3
	4 - 30						
		883	23.9	0.4	14	2.3	
	4 - 41						
		756	18.9	0.4	14	2.1	
	6 - 6.7						

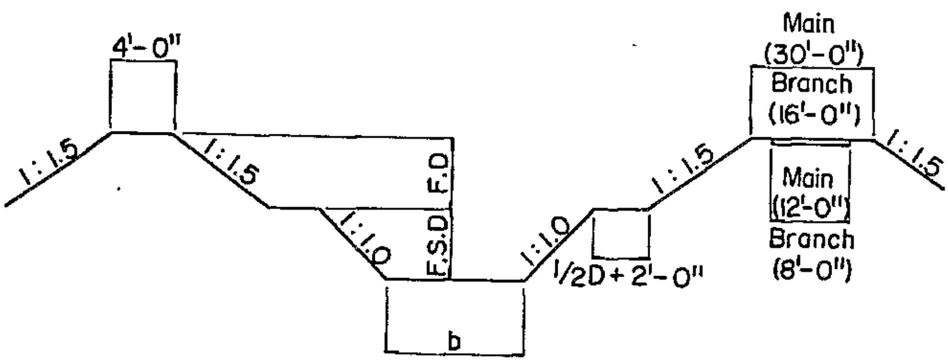


Table 6.3.2 Existing Channel Data in System D-2

Chl.Name	Reach	Command Area	Disch.	Grad.	Bed Width	FSD	Prop. Type
	Ml-Ch	Acs	cusec	‰	ft	ft	
D_1-Main	0 – 3 - 10	17,500	350.0	0.200	45.0	4.50	M.C.
D_1-North	0 – 1 - 0	8,500	175.0	0.252	29.0	3.15	N-1
	1 - 0 – 1 - 45	8,110	167.0	0.237	28.0	3.07	
	1 - 45 – 2 - 28	7,770	160.0	0.238	27.6	3.05	
	2 - 28 – 3 - 0	7,530	155.0	0.238	27.4	3.05	N-2
	3 - 0 – 5 - 0	7,530	155.0	0.240	26.6	3.00	
	5 - 0 – 6 - 0	7,290	150.0	0.234	26.0	2.97	
	6 - 0 – 6 - 28	6,050	124.6	0.245	23.4	2.80	N-3
D_1-North R.B.18	0 – 4 - 26	2,280	47.0	0.290	13.8	2.13	N-4
D_1-East	0 – 1 - 0	9,000	184.0	0.250	30.0	3.20	E-1
	1 - 0 – 2 - 0	7,520	153.7	0.240	30.0	2.99	
	2 - 0 – 3 - 0	7.070	144.5	0.260	25.5	2.94	E-2
	3 - 0 – 5 - 0	4,730	96.7	0.260	20.0	2.65	E-3
	5 - 0 – 5 - 15	3,820	78.0	0.263	18.0	2.45	E-4
D_1-East R.B.10	0 – 1 - 15	820	16.7	0.347			E-5

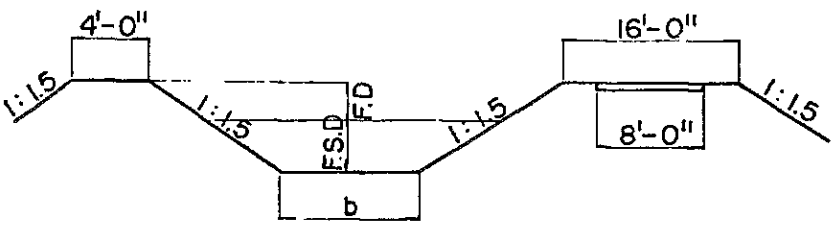


Table 6.3.3 Sectional Discharge and Type & Length of Canal for System D-1 (1)

Canal Type	Canal			Turnout		
	A	Q	L	T.O.	A	q
Main*	28,335	708	4.05			
				Exi.T.O.	453	11
				Exi.Dv. (D.S.)	10,570	264
1-1*	17,312	433	1.94			
				Exi.T.O.	1,055	27
				-do-	604	15
1-2*	15,653	391	1.95			
				-do-	566	14
				-do-	357	9
1-3*	14,730	368	2.24			
				-do-	2,017	50
				-do-	127	3
				-do-	756	19
1-4	11,830	296	1.50			
				T.O. 1-1	1,040	26
				T.O. 1-2	2,480	62
1-5	8,310	208	1.75			
				T.O. 1-3	1,490	37
				T.O. 1-4	R 1,800	45
					L 530	13
1-6	4,490	113	2.25			
				T.O. 1-5	70	2
				T.O. 1-6	1,050	26
				T.O. 1-7	L 1,400	35
					R 400	10
1-7	1,570	40	1.25			
				T.O. 1-8	300	8
				T.O. 1-9	670	17
				(D.S.)	600	15

Notes ; A=commanding are in acres
Q=discharge of canal in cusec.
L=canal length in miles
T.O.=turnout
q=offtake discharge in cusec.
*=existing canal to be improved

Table 6.3.4 Sectional Discharge and Type & Length of Canal for System D-1 (2)

Canal Type	Canal			Turnout		
	A	Q	L	T.O.	A	q
2-1	10,570	264	3.25			
				T.O. 2-1	270	7
				T.O. 2-2	1,270	31
2-2	9,030	226	2.25			
				T.O. 2-3	220	6
				T.O. 2-4	480	12
				T.O. 2-5	R 450	11
					L 210	5
				T.O. 3 (D.S.)	4,390	110
2-3	3,280	82	2.00			
				T.O. 2-6	780	19
				T.O. 2-7	L 310	8
					R 230	6
2-4	1,960	49	2.25			
				T.O. 2-8	R 100	3
					L 80	2
				T.O. 2-9	L 180	4
					R 100	3
				T.O.2-10	200	5
2-5	1,300	32	2.25			
				T.O.2-11	650	16
				T.O.2-12	270	7
				(D.S.)	380	9

Notes ; A=commanding are in acres
Q=discharge of canal in cusec.
L=canal length in miles
T.O.=turnout
q=offtake discharge in cusec.
*=existing canal to be improved

Table 6.3.5 Sectional Discharge and Type & Length of Canal for System D-1 (3)

Canal Type	Canal			Turnout		
	A	Q	L	T.O.	A	q
3-1	4,390	110	1.75			
				T.O. 3-1	L 300	8
					R 290	7
				T.O. 3-2	L 120	3
					R 70	2
				T.O. 3-3	L 1,140	28
					R 90	2
3-2	2,380	60	3.25			
				T.O. 3-4	R 310	8
					L 180	4
				T.O. 3-5	L 150	4
					R 40	1
				T.O. 3-6	L 250	6
					R 100	3
3-3	1,350	34	2.25			
				T.O. 3-7	L 330	8
					R 140	4
				T.O. 3-8 (D.S.)	140	4
					740	18
Total			36.18		28,335	708

Notes ; A=commanding are in acres
Q=discharge of canal in cusec.
L=canal length in miles
T.O.=turnout
q=offtake discharge in cusec.
*=existing canal to be improved

Table 6.3.6 Sectional Discharge and Type & Length of Canal for System D-2 (1)

Canal Type	Canal			Turnout		
	A	Q	L	T.O.	A	q
M.C.*	22,900	572	3.19			
				Exi.T.O.	10,400	260
N-1*	12,500	312	1.85			
				-do-	970	24
N-2*	11,530	288	3.68			
				-do-	1,480	37
N-3*	10,050	251	1.01			
				-do-	3,770	94
N-4*	6,280	157	4.10			
				-do-	2,280	57
N-5	4,000	100	1.45			
				T.O.N-1-1	170	4
				T.O.N-2 (D.S.)	1,850	46
N-6	1,980	50	1.70			
				T.O.N-1-2	390	10
N-7	1,120	28	1.60			
				T.O.N-1-3	470	12
				T.O.N-1-4 (D.S.)	730	18
					390	10
N-6-1	1,850	46	0.95			
				T.O.N-2-1	L 400	10
					R 310	8
N-6-2	1,140	28	1.27			
				T.O.N-2-2	290	7
N-6-3	450	11	1.48			
				T.O.N-2-3	400	10
				T.O.N-2-4 (D.S.)	160	4
					90	2
					200	5

Notes ; A=commanding are in acres
Q=discharge of canal in cusec.
L=canal length in miles
T.O.=turnout
q=offtake discharge in cusec.
*=existing canal to be improved

Table 6.3.7 Sectional Discharge and Type & Length of Canal for System D-2 (2)

Canal Type	Canal			Turnout		
	A	Q	L	T.O.	A	q
E-1*	10,400	260	1.00			
				Exi.T.O.	1,480	37
E-2*	8,920	223	1.00			
				-do-	2,790	70
E-3*	6,130	153	2.00			
				-do-	910	23
E-4*	5,220	130	1.28			
				-do-	3,000	75
E-5*	2,220	55	1.28			
				-do-	820	20
E-6*	1,400	35	1.50			
				T.O. E-1	140	3
				T.O. E-2	220	6
E-7	1,040	26	1.50			
				T.O. E-3	300	7
				T.O. E-4	280	7
E-8	460	12	1.00			
				T.O. E-5	200	5
				(D.S.)	260	7
Total			32.84		22,900	572

Notes ; A=commanding are in acres
Q=discharge of canal in cusec.
L=canal length in miles
T.O.=turnout
q=offtake discharge in cusec.
*=existing canal to be improved

Table 6.3.8 Sectional Discharge and Type & Length of Canal for System A/D (1)

Canal Type	Canal			Turnout		
	A	Q	L	T.O.	A	q
1	6,600	165	6.80			
				T.O. M-1	200	5
				T.O. M-2	150	4
				T.O. M-3	200	5
				T.O. M-4	250	6
				T.O. M-5	300	8
				T.O. 1	800	20
2	4,700	117	0.75			
				T.O. 2 (D.S.)	1,800	45
3	2,900	72	3.10			
				T.O. M-6	200	5
				T.O. M-7	250	6
				T.O. M-8	350	9
				T.O. M-9	400	10
4	1,700	42	1.75			
				T.O. M-10	300	7
				T.O. M-11	400	10
				T.O. M-12	R 240	6
					L 160	4
5	600	15	2.35			
				T.O. M-13	L 120	3
					R 100	3
				T.O. M-14 (D.S.)	100 80 200	2 2 5

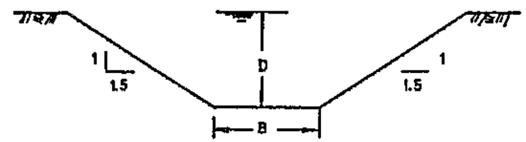
Notes ; A=commanding are in acres
Q=discharge of canal in cusec.
L=canal length in miles
T.O.=turnout
q=offtake discharge in cusec.
*=existing canal to be improved

Table 6.3.9 Sectional Discharge and Type & Length of Canal for System A/D (2)

Canal Type	Canal			Turnout			
	A	Q	L	T.O.		A	q
1-1	800	20	3.00				
				T.O. 1-1		370	9
				T.O. 1-2		200	5
				(D.S.)		230	6
2-1	1,800	45	1.00				
				T.O. 2-1		300	8
				T.O. 2-2	R	400	10
					L	200	5
2-2	900	22	2.50				
				T.O. 2-3	R	200	5
					L	100	2
				T.O. 2-4		200	5
						200	5
						200	5
Total			21.25			6,600	165

Notes ; A=commanding are inrac es
Q=discharge of canal in cusec.
L=canal length in miles
T.O.=turnout
q=offtake discharge in cusec.
*=existing canal to be improved

Fig. 6.3.4 Discharge of Earthen Canals



$A = (1.5D + B)D$

$Q = A \times V$

$V = \frac{1.486}{n} \times R^{2/3} \times S^{1/2}$

S = 0.00045 (bed widths 3.0 – 6.5); S = 0.00040 (bed widths 6.5 – 11); S = 0.00035 (bed widths 11 – 19)

SIDE SLOPES 1ON1.5

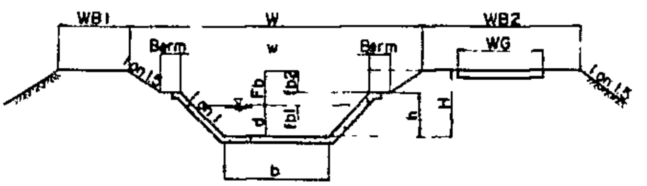
DEPTH \ BED WIDTH	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10	11	12	13	14	15	16	17	18	19	20
1·00																									
1·25	7.0																								
1·50	10.5	12.0																							
1·75		16.0	17.5																						
2·00			22.5	25																					
2·25				31	34																				
2·50					41	44	47	47																	
2·75						53	56	56	60	64															
3·00							66	67	71	75	79	83													
3·25									81	86	91	96	101	106											
3·50											104	110	116	122	128	129									
3·75													131	137	143	144	155	166							
4·00															160	162	173	184	195	208					
4·25																	192	204	217	231	245	260			
4·50																			240	256	272	288	304	322	
4·75																					300	318	336	354	372
5·00																							368	386	404

Table 6-3-10 Hydraulic Calculation of Standard Cross Section of Irrigation Canal for System DI

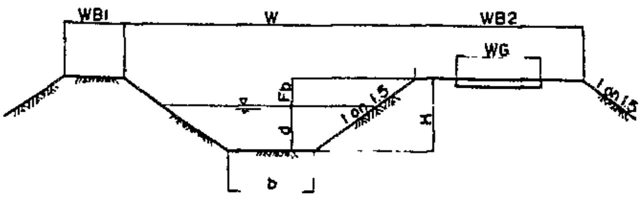
Canal Type		Ac (ac)	Q (cfs)	S	n	$\frac{1.486}{n}\sqrt{S}$	b (ft)	Z	d (ft)	b/d	A (sq ft)	P (ft)	R (ft)	$R^{2/3}$	V (ft/sec)	Qc (cfs)	Fb (ft)	H (ft)	W (ft)	WBI (ft)	WB2 (ft)	WG (ft)	L (mile)
Main Canal X		28335	708	0.0003	0.015	17159	20 0	1 0	6 08	3 3	1586	37 20	4 263	2 629	4 511	715	3.17	9 25	50 5	4.0	30 0	12 0	4 05
X 1-1	A	17312	433	"	"	"	14 0	"	5 5	2 5	1073	29.56	3.629	2 361	4 052	435	2 50	8 0	41.0	"	16 0	8.0	1 94
	B	16257	406	"	"	"	"	"	5 33	2 6	103.3	29 08	3.543	2 324	3 988	411	2 67	"	"	"	"	"	
X 1-2	A	15653	391	"	"	"	"	"	5 25	2 7	101 1	28 85	3.503	2.307	3 958	400	2 25	7 5	39 5	"	"	"	1 95
	B	15087	377	"	"	"	"	"	5.08	2 8	96.93	28 37	3 416	2 268	3.892	377	2.42	"	"	"	"	"	
X 1-3	A	14730	368	0.0004	"	19813	"	"	4 67	3 0	87 19	27 21	3 204	2 174	4 307	375	2 33	7.0	38.0	"	"	"	2 24
	B	12713	318	"	"	"	"	"	4 25	3 3	77.56	26.02	2.981	2.071	4 104	318	2 75	"	"	"	"	"	
	C	12586	315	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	
1-4		11830	296	0.00035	0.0225	12356	18.0	1 5	4.5	4 0	111 4	34.22	3.254	2 196	2 713	302	1.5	6 0	36.0	"	"	"	1.5
1-5		8310	208	"	"	"	15 0	"	4.0	3.8	84.00	29 42	2 855	2.013	2 487	209	"	5 5	31 5	"	"	"	1.75
1-6		4490	113	0.0004	"	1.3209	9 0	"	3 5	2 6	49.88	21 62	2 307	1 746	2.306	115	"	5 0	24 0	"	"	"	2.25
1-7		1570	40	0.00045	"	1.4010	5.0	"	2.5	2.0	21.88	14 01	1 561	1 346	1 885	41	1.25	3 75	16 25	"	"	"	1.25
2-1		10570	264	0.00035	"	12356	16.0	"	4 5	3 6	102.4	32 22	3.177	2 161	2 670	273	1 5	6.0	34 0	"	"	"	3.25
2-2		9080	226	"	"	"	15 0	"	4.25	3 5	90.84	30.32	2.996	2 078	2 568	233	"	5 75	32 25	"	"	"	2.25
2-3		3260	82	0.0004	"	1.3209	7 0	"	3 25	2.2	38.59	18.72	2.062	1.620	2 140	83	1 25	4 5	20 5	"	12.0	"	2 00
2-4		1960	49	"	"	"	6 5	"	2 75	2 4	29.22	16 42	1 780	1 469	1.940	57	"	4 0	18 5	"	"	"	2 25
2-5		1300	32	0.00045	"	1.4010	4 5	"	2 25	2.0	17.72	12 61	1 405	1.254	1 757	31	"	3 5	15 0	"	"	"	"
3-1		4390	110	0.0004	"	1.3209	8 5	"	3 5	2 4	48.13	21 12	2 279	1 732	2 287	110	1 5	5.0	23 5	"	16 0	"	1 75
3-2		2380	60	"	"	"	7 0	"	2 75	2 5	30.59	16.92	1 809	1.484	1 961	60	1.25	4.0	19 0	"	12 0	"	3 25
3-3		1350	34	0.00045	"	1.4010	5 0	"	2.25	2.2	18.84	13.11	1 437	1 273	1 784	34	"	3.5	15.5	"	"	"	2.25

X Existing canals to be improved

TYPICAL CROSS SECTION OF IMPROVEMENT CANALS



TYPICAL CROSS SECTION OF NEW CANALS



Canal Type		fb1 (ft)	fb2 (ft)	h (ft)	w (ft)	Berm (ft)
Main Canal		1 17	2 0	7 25	34 5	5 0
1-1	A	1 0	1 5	6 5	27 0	4 75
	B	1 17	"	"	"	"
1-2	A	0 75	"	6.0	26 0	4 5
	B	0.92	"	"	"	"
1-3	A	0.83	"	5 5	25 0	4 25
	B	1 25	"	"	"	"
	C	"	"	"	"	"

Table 6-3-11 Hydraulic Calculation of Standard Cross Section for Irrigation Canal for System D2

Canal Type	Ac (ac)	Q (cfs)	S	n	$\frac{1.486}{n}\sqrt{S}$	b (ft)	Z	d (ft)	b/d	A (sq ft)	P (ft)	R (ft)	$R^{2/3}$	V (ft/sec)	Qc (cfs)	Fb (ft)	H (ft)	W (ft)	WB1 (ft)	WB2 (ft)	WG (ft)	L (mile)
Main Canal X	22900	572	0.00020	0.0225	0.9340	45	1 5	4 75	9 5	2476	62 13	3 985	2 514	2 348	581	2 0	6 75	65.25	4 0	16 0	8 0	3 19
N-1 X	12500	31 2	0.00025	"	10443	30	"	4 0	7.5	1440	44 42	3 242	2 190	2 287	329	1 5	5.5	46.5	"	"	"	1 85
N-2 X	11530	288	"	"	"	27	"	"	6 8	1320	41 42	3 187	2 166	2 261	298	"	"	43.5	"	"	"	3 68
N-3 X	10050	251	"	"	"	26	"	3 75	6 9	1186	39.52	3 001	2 080	2 173	258	"	5 25	41 75	"	"	"	1 01
N-4 X	6280	157	0.00030	"	1 1439	16	"	3.5	4.6	7438	28 62	2 599	1.890	2 162	161	"	5 0	31.0	"	"	"	4 10
E-1 X	10400	260	0.00025	"	10443	30	"	"	8.6	1234	42 62	2.895	2 031	2 121	262	"	"	45.0	"	"	"	1 0
E-2 X	8920	223	"	"	"	26	"	"	7 4	1094	38 62	2.832	2 002	2.090	229	"	"	41 0	"	"	"	"
E-3 X	6130	153	0.00028	"	10649	22	"	3 0	7 3	7950	32 82	2 422	1 804	1 921	153	"	4 5	35.5	"	"	"	2 0
E-4 X	5220	130	0.00029	"	10711	19	"	"	6 3	7050	29 82	2 364	1.775	1 901	134	"	"	32.5	"	"	"	1.28
E-5 X	2220	55	0.00047	"	12303	9	"	2 5	3 6	31 88	18 01	1 769	1 463	1 800	57	1.25	1.25	20.25	"	12.0	"	"
N-5	4000	100	0.00040	"	13209	"	"	3 25	2 77	4509	20 72	2 177	1 679	2.218	100	1.5	4 75	23.25	"	16 0	"	1.45
N-6	1980	50	"	"	"	6	"	2 75	2 2	2784	15 92	1.749	1 452	1 918	53	1 25	4 0	18.0	"	12.0	"	1.70
N-7	1120	28	0.00045	"	14010	45	"	2 25	2 0	1772	12 61	1 405	1 254	1 757	31	"	3 5	15 0	"	"	"	1 60
N6-1	1850	46	"	"	"	6	"	2.5	2 4	2438	15 01	1 623	1 381	1 935	47	"	3.75	17 25	"	"	"	0.95
N6-2	1140	28	"	"	"	45	"	2 25	2 0	1772	12 61	1 405	1 254	1 757	31	"	3 5	15 0	"	"	"	1 27
N6-3	450	11	"	"	"	35	"	1 5	2 3	8625	8908	0968	09787	1 371	12	"	2 75	11 75	"	"	"	1.48
E-6	1400	35	"	"	"	45	"	2 5	1 8	2063	13 51	1 526	1 326	1 857	38	"	3.75	15.75	"	"	"	1 5
E-7	1040	26	"	"	"	40	"	2.25	"	1659	12 11	1.370	1 234	1 728	29	"	3 5	14 0	"	"	"	1 5
E-8	460	12	"	"	"	35	"	1 5	2 3	8625	8908	0968	09787	1.371	12	"	2.75	11 75	"	"	"	1 0

X Existing canals to be improved

TYPICAL CANAL SECTION

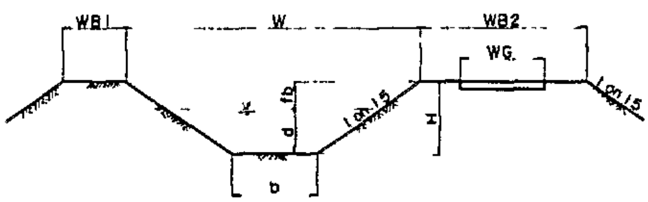


Table 6-3-12 Hydraulic Calculation of Standard Cross Section for Irrigation Canal for System A/D

Canal Type	Ac (ac)	Q (cfs)	S	n	$\frac{1.486}{n}\sqrt{S}$	b (ft)	Z	d (ft)	b/d	A (sq.ft)	P (ft)	R (ft)	$R^{2/3}$	V (ft/sec)	Qc (cfs)	Fb (ft)	H (ft)	W (ft)	WB1 (ft)	WB2 (ft)	WG (ft)	L (ft)
1	6600	165	0.00035	0.0225	1.2356	13.0	1.5	3.75	3.5	69.84	26.52	2.634	1.907	2.356	165	1.5	5.25	28.75	4.0	16.0	8.0	6.8
2	4700	117	0.00040	"	1.3209	9.5	"	3.5	2.7	51.63	22.12	2.334	1.760	2.324	120	"	5.0	24.5	"	"	"	0.75
3	2900	72	"	"	"	7.5	"	3.0	2.5	36.00	18.32	1.965	1.569	2.073	75	1.25	4.25	20.25	"	12.0	"	3.1
4	1700	42	0.00045	"	1.4010	5.5	"	2.5	2.2	23.13	14.51	1.593	1.364	1.911	44	"	3.75	16.75	"	"	"	1.75
5	600	15	"	"	"	3.5	"	1.75	2.0	10.72	9.810	1.093	1.061	1.486	16	"	3.0	12.5	"	"	"	2.35
1-1	800	20	"	"	"	4.0	"	2.0	"	14.00	11.21	1.249	1.160	1.625	23	"	3.25	13.75	"	"	"	3.0
2-1	1800	45	"	"	"	6.0	"	2.5	2.4	24.38	15.01	1.623	1.381	1.935	47	"	3.75	17.25	"	"	"	1.0
2-2	900	22	"	"	"	4.0	"	2.0	2.0	14.00	11.21	1.249	1.160	1.625	23	"	3.25	13.75	"	"	"	2.5

TYPICAL CANAL SECTION

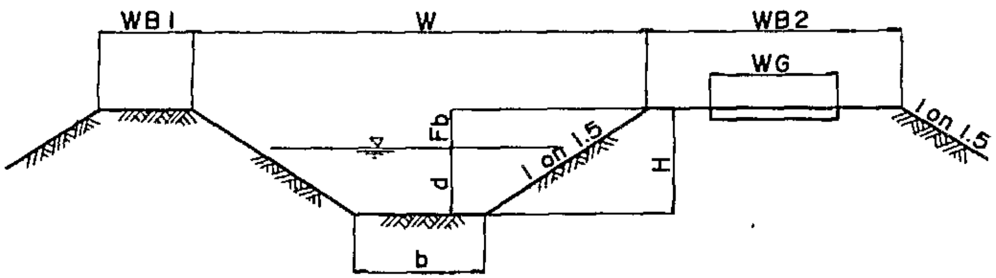


Fig 6.3.5 Standard Cross Sections of Irrigation Canal for System D-I

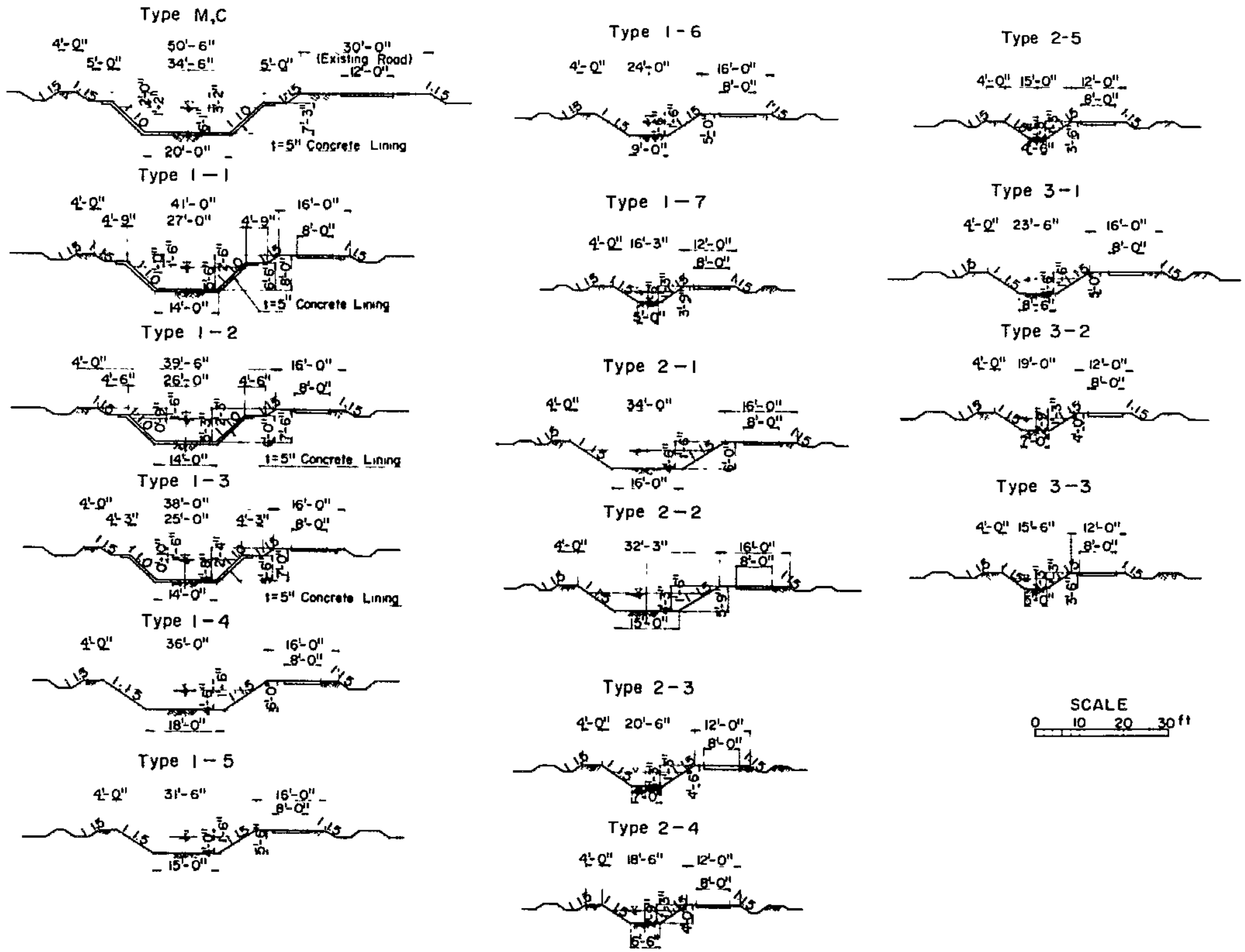


Fig. 6.3.6 Standard Cross Sections of Irrigation Canals for System D-2

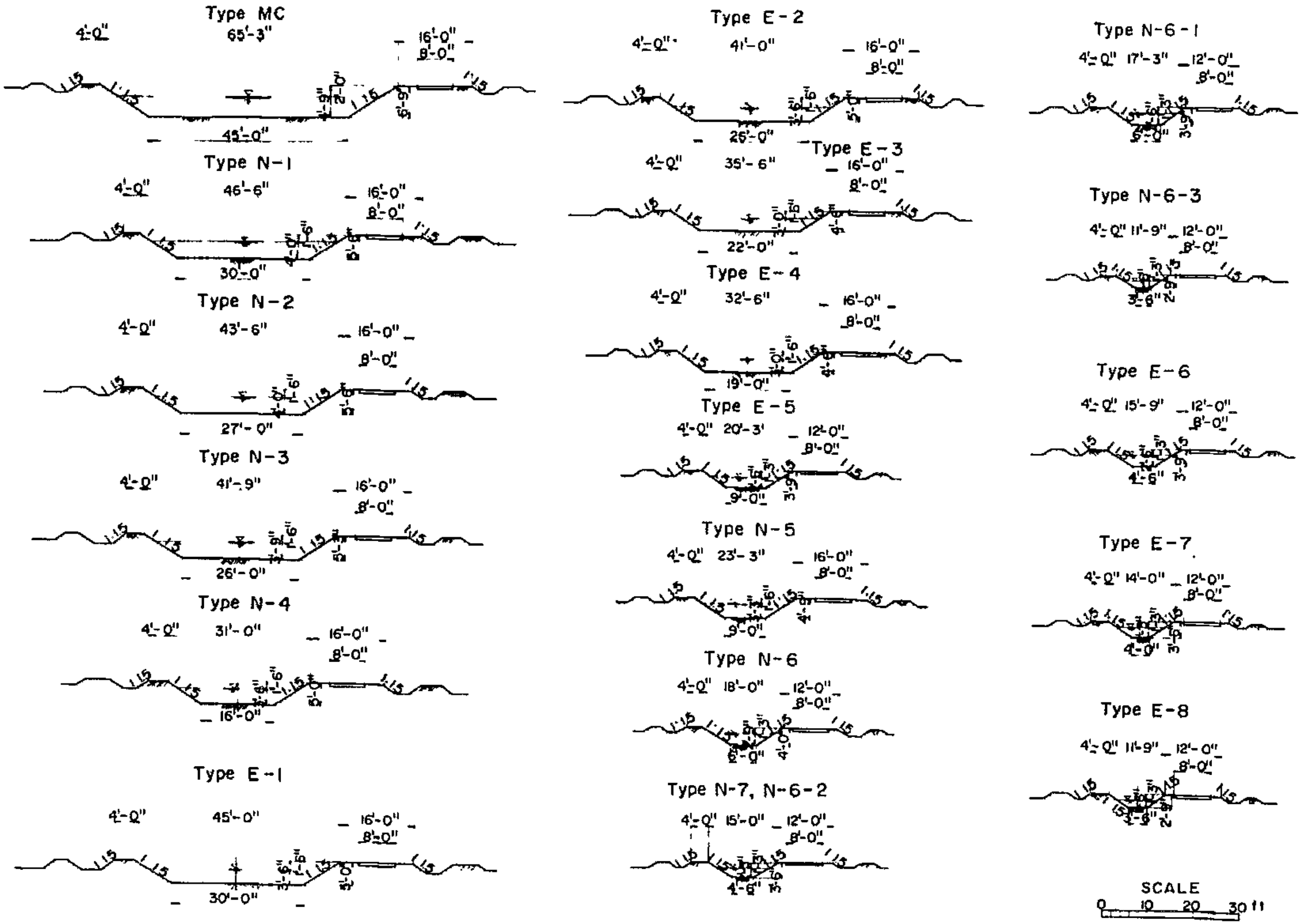


Fig. 6.3.7 Standard Cross Sections of Irrigation Canals for System A/D