

**Table D.6.1 Relationship between Elevation, Waterspread Area and Capacity of Pilot Tank Areas**

Tank	Full Tank Level (m)		Sill Level (m)		Live Storage Capacity (Mm <sup>3</sup> )		Relationship between H, Q, A		Water Depth, H (m)	
	Inventory List	Topographic Survey	Inventory List	Topographic Survey	Inventory List	Topographic Survey	H - Q	H - A	Sill Level	FTL
Echur	21.00	21.00	19.31	18.50	0.530	0.464	87.5 Q = 0.068H <sup>2</sup> -0.1146H+0.0187	A = 4.1257H <sup>2</sup> -1.9372H+0.1216	0	3.50
Cherukkanur	110.06	110.06	27.20	105.50	1.077	1.518	140.9 Q = 0.0796H <sup>2</sup> -0.1214H+0.0391	A = 1.7873H <sup>2</sup> -6.077H+1.3068	0	5.10
Polambakkam	44.45	45.00	40.40	40.00	0.480	1.507	314.0 Q = 0.0885H <sup>2</sup> -0.2453H+0.0973	A = 3.9565H <sup>2</sup> -4.6758H+0.0977	0	5.50
Enadur	92.00	92.00	-	88.50	0.560	3.205	572.3 Q = 0.2669H <sup>2</sup> -0.279H+0.0418	A = 3.7562H <sup>2</sup> +34.651H-8.5462	0	4.00
Vadakkupattu	47.76	47.76	-	43.00	2.580	2.538	98.4 Q = 0.1378H <sup>2</sup> -0.2746H+0.0911	A = 5.0253H <sup>2</sup> +0.8401H-0.2291	0	5.26
Siruvalai	74.52	74.52	72.78	72.50	0.310	0.374	120.6 Q = 0.0804H <sup>2</sup> -0.0575H+0.0051	A = 2.6786H <sup>2</sup> +8.1355H-0.7636	0	2.52
Kurumbi	30.65	30.70	25.16	28.50	0.130	0.151	116.2 Q = 0.0343H <sup>2</sup> -0.0366H+0.0042	A = 2.2917H <sup>2</sup> -0.4879H+0.3071	0	2.65
A. Ramalingapuram	60.00	60.00	59.00	57.00	0.394	0.636	161.4 Q = 0.1045H <sup>2</sup> -0.2173H+0.0537	A = 11.577H <sup>2</sup> -18.684H+3.1487	0	3.50
Sengangulam	31.70	31.70	29.41	29.00	0.631	2.124	336.6 Q = 0.414H <sup>2</sup> -0.756H+0.1478	A = 29.566H <sup>2</sup> -20.675H-3.7028	0	3.20
Pandikanmoi	8.00	8.00	6.00	6.00	0.514	0.382	74.3 Q = 0.1041H <sup>2</sup> -0.1177H+0.0141	A = 6.7147H <sup>2</sup> +2.0672H-1.4279	0	2.50

H = Water depth (m);

Q = Capacity (Mm<sup>3</sup>); A = Water Spread Area (ha)

**Table D.7.1 Countermeasures for Rehabilitation of Pilot Tanks**

**Pilot Tanks in Northern Study Area**

Component	Rehabilitation works		Echur Tank		Cherukkanur Big Tank		Polambakkam Tank		Enalur Big Tank		Vadakupattu Tank	
Tank Bund Improvement (Total Bund Length)	• Strengthening of the bund for reshaping to standard size.	298m (121.8m)	2 units	183m (1605m)	2 units	1275m (1310m)	2 units	2512m (2665m)	2 units	1343m (1483m)	2 units	2 units
Intake works (Sluice)	• Modification for intake system using gearing shutter.	Wing wall type Tower head type	2 units	Wing wall type Tower head type	2 units	Tower head type	2 units	Tower head type	2 units	Tower head type	2 units	2 units
Surplus arrangement	• Protection of back-fill for side slope.	Bye-wash type weir	1 unit	B.C. type weir	1 unit	B.C. type weir	1 unit	-	-	B.C. weir	2 units	2 units
	• Widening as 16.5m of width of Bye-wash type weir.											
	• Provision of rough stone for revetment											
Tank supply channel	• Reshaping of cross section	600m as main	2 units	2,006m	2 units	1610m as main	2 units	Concrete lining	1 unit	7480m as main	1 unit	1 unit
Selective Lining for Field Channel including On-farm development	• Installation of lining canal up to 10ha	1,350m as branch	3 units	850m as main 930m as branch	1 unit	890m as branch	1 unit	4920m as main Earthen lining	1 unit	4370m as branch	7 units	7 units
	• Provision of diversion boxes with paddle shutter for equal distribution.							1,100m as main 7370m as branch	1 unit 9 units			
	• Reshaping of existing canal.							50m <sup>2</sup>	1 Nos.	50m <sup>2</sup>	1 Nos.	1 Nos.
Building for Farmers' Association	• Provision of incidental device such as cart, cattle, and canal/crossing.	50m <sup>2</sup>	1 Nos.									
	• Provision of community hall for WUA, local farmers and inhabitation.											

**Pilot Tanks in Southern Study Area**

Component	Rehabilitation works		Siruvaiyil Tank		A. Ramalingapuram Tank		Pandikannoi Tank		Senganguram Tank		Kurumbi Tank	
Tank Bund Improvement (Total Bund Length)	• Strengthening of the bund for reshaping to standard size.	2010m (2010m)	3 units	1940m (2016m)	3 units	2855m (2855m)	3 units	4250m (4250m)	3 units	1120m (1120m)	3 units	3 units
Intake works (Sluice)	• Modification for intake system using gearing shutter.	Tower head type Wing wall type	3 units 3 units	Protection of bund using rough stone.	3 units	Wing wall type	3 units	Protection of bund using rough stone for preventing irrigation canal along the tank bund.	2 units 3 units	Tower head type Wing wall type	2 units 3 units	Head tower type
Surplus arrangement	• Protection of back-fill for side slope.	B.C. weir	1 unit									
	• Repairing of water cushion by clogging wet masonry											
Selective Lining for Field Channel including On-farm development	• Installation of lining canal	950m as main	1 unit	1930m as main	3 units	1550m as main	3 units	1220m as main	3 units	670m as main 470m as branch	1 unit 3 units	1 unit 3 units
	• Provision of diversion boxes with paddle shutter for equal distribution.	840m as branch	5 units									
	• Reshaping of existing canal.											
Building for Farmers' Association	• Provision of incidental device such as cart, cattle, and canal/crossing.	50m <sup>2</sup>	1 Nos.									
Community well	• Provision of community hall for WUA, local farmers and inhabitation.											
	• Provision for irrigation as supplemental use											

**Table D.7.2 Drainage Capacity of the Existing Spillway**

Name of Tank	No. of Weir	Type of Weir	Coefficient discharge	F.T.L (m)	M.W.L (m)	Weir Dimensions			Regulating Arrangement			Capacity		Applicable	Remark	
						Length (m)	Depth of Overflow (m)	Nos.	Width (m)	Height (m)	Drainage (m <sup>3</sup> /sec)	(m <sup>3</sup> /sec/m)				
Echur	2	1 B.C.	0.562	21.00	21.30	12.55	0.30	-	-	-	3.42	0.27				
		2 Bye-wash	0.500	21.00	21.30	11.40	0.30	-	-	-	2.76	0.24				Rough stone
Cherukkanur Big	2	1 B.C.	0.562	110.06	110.36	5.66	0.30	-	-	-	1.54	0.27				
		2 B.C.	0.562	110.06	110.36	19.93	0.30	-	-	-	5.43	0.27				
Polambakkam	2	1 Bye-wash	0.500	44.45	45.05	25.80	0.60	-	-	-	17.70					Rough stone
		2 B.C.	0.562	44.45	45.05	10.00	0.60	-	-	-	7.71	0.77				
Enadur Big	3	1 B.C.	0.562	92.00	92.70	45.70	0.70	-	-	-	44.40	0.97				
		2 B.C.	0.562	92.00	92.70	42.90	0.70	-	-	-	41.68	0.97				
		3 B.C.	0.562	92.00	92.70	16.50	0.70	-	-	-	16.03	0.97				
Vadakupattu	2	1 B.C.	0.562	47.76	48.58	16.20	0.82	-	-	-	19.95	1.23				
		2 B.C.	0.562	47.76	48.58	21.10	0.82	-	-	-	25.99	1.23				
Siruvalai	2	1 B.C.	0.562	74.52	75.00	61.50	0.48	-	-	-	33.92	0.55				
		2 B.C.	0.562	74.52	75.00	6.00	0.48	-	-	-	3.31	0.55				
A. Ramalingapuram	1	1 H.C.	0.824	60.00	60.90	78.20	0.90	-	-	-	162.38	2.08				
		Regulating Arrangement	0.620					2	1.20	1.49	12.59					
Pandikannoi	1	1 Bye-wash	0.437	7.96	8.60	40.00	0.64	-	-	-	26.41	0.66				
								-	-	-	26.41					
Senganguram	1	1 -	-	31.70	32.00	-	0.30	-	-	-	-	-				
Kurumbi	1	1 B.C.	0.562	30.65	31.25	47.60	0.60	-	-	-	36.70					
								-	-	-	36.70					

Table D.7.3 List of Material and Labor Cost

Tank Number	A. Remalingapuram									
	1	2	3	4	5	6	7	8	9	10
Tank Name	Echar	Cherukkanur Big	Pothambakkam	Enadar	Yadakkupattu	Siruvajai	Pandikannoi	Seppogaram	Kurumbi	
1) Cement	Mt	3,612.65	3,684.61	3,646.65	3,612.65	3,634.70	3,596.58	3,624.53	3,635.38	3,620.32
2) Steel	Mt	27,116.33	21,151.55	27,156.75	21,116.35	21,161.14	21,102.09	21,148.69	21,161.96	21,143.88
3) Sand	m3	167.00	216.67	212.30	140.05	91.93	121.57	128.05	134.59	203.29
4) for Filling	m3	162.00	123.35	207.30	135.05	80.93	110.17	117.05	123.59	192.29
5) Brick Jelly	m3	222.45	268.79	259.65	238.45	274.17	239.94	313.20	236.29	206.50
6) Rough stone	m3	273.45	238.21	279.35	267.35	339.30	289.88	395.90	357.08	319.19
7) for Revetment	m3	238.45	223.21	264.55	252.35	329.30	279.58	385.90	347.08	309.19
8) Bond stone	m3	303.45	268.21	309.55	297.35	394.30	344.58	450.90	412.08	374.19
9) Broken stone Jelly	m3	355.45	320.21	361.55	349.35	444.30	394.58	500.90	462.08	424.19
10) 20mm size	m3	510.95	475.71	517.05	504.85	554.30	504.58	610.90	572.08	534.19
11) Country Bricks	1000	110.05	1,263.77	1,071.15	1,136.15	1,118.05	983.64	968.16	1,056.18	1,007.48
12) Pressed tiles	1000	3,099.90	3,132.38	2,985.50	2,950.60	3,312.26	3,125.20	3,214.19	3,329.87	3,203.36
13) Cutstone	m3	1,991.00	1,892.16	1,989.00	1,961.60	1,727.25	1,638.89	1,889.68	1,751.69	1,699.60
14) Roughly dressed	m3	2,981.00	2,482.16	2,539.00	2,551.60	2,027.25	1,953.89	2,189.68	2,051.69	1,999.60
15) Fully dressed	m3	858.45	927.77	861.55	849.25	733.09	708.13	726.56	733.68	724.03
16) Country wood	m3	19,472.95	19,477.65	19,477.65	19,459.25	18,073.09	18,048.13	18,066.56	18,093.68	18,064.03
17) Scantlings upto 4m, 30cm thick	m3	21,278.95	21,277.65	21,278.95	21,259.25	21,073.09	21,048.13	21,066.56	21,093.68	21,064.03
18) Silver Oak	m3	8,872.95	8,877.65	8,872.95	8,859.25	14,073.09	14,048.13	14,066.56	14,093.68	14,064.03
19) Planks	m3	9,672.95	9,677.65	9,672.95	9,659.25	73.09	9,642.71	9,666.56	9,668	64.03
20) Lime concrete	m3	98.10	96.10	98.10	96.10	88.69	97.29	88.69	88.69	88.69
21) Cement concrete	m3	85.85	85.85	85.85	85.85	74.11	82.71	74.11	74.11	74.11
24) Mason	I	91.00	91.00	91.00	91.00	94.00	94.00	94.00	94.00	94.00
25) Mason	II	78.00	78.00	78.00	78.00	85.00	85.00	85.00	85.00	85.00
26) Mazeloor	I	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00
27) Mazeloor	II	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
28) Wodder	I	55.00	56.00	56.00	56.00	55.00	55.00	55.00	55.00	55.00

Table D.7.3 List of Material and Labor Cost

Tank Number	Tank Name	Unit	A. Ramalingapuram									
			Ebur	Cherukkanur Big	Polambakkam	Enadur	Vadakkupattu	Siruvai	Pandikannoi	Sengaluram	Kurumbi	
1)	Cement	Mt	3,612.65	3,684.61	3,646.65	3,612.65	3,649.05	3,634.70	3,596.58	3,624.33	3,635.38	3,620.32
2)	Steel	Mt	21,316.35	21,131.55	21,156.75	21,116.35	21,159.60	21,161.14	21,102.09	21,148.69	21,161.96	21,143.88
3)	Sand	m <sup>3</sup>	167.00	216.67	212.10	140.05	187.70	91.93	121.57	128.05	134.59	203.29
4)	for Mortar	m <sup>3</sup>	162.00	124.35	207.10	135.05	182.70	80.93	110.17	117.05	123.59	192.29
5)	Brick Jelly	m <sup>3</sup>	222.45	268.79	259.65	238.45	251.70	274.17	239.94	313.20	236.29	246.50
6)	Rough stone	m <sup>3</sup>	273.45	238.21	279.55	267.35	244.25	339.30	289.58	395.90	357.08	319.19
7)	for Revetment	m <sup>3</sup>	258.45	221.21	264.55	252.35	229.25	329.30	279.58	385.90	347.08	309.19
8)	Bond stone	m <sup>3</sup>	303.45	268.21	309.55	297.35	274.25	394.30	344.58	450.90	412.08	374.19
9)	Broken stone Jelly	m <sup>3</sup>	355.45	309.21	361.55	349.35	326.25	444.30	394.58	500.90	462.08	424.19
10)	20mm size	m <sup>3</sup>	510.95	475.71	517.05	504.85	481.75	554.30	504.58	610.90	572.08	534.19
11)	Country Bricks	1000	1,110.05	1,263.77	1,207.15	1,136.15	1,158.20	1,118.05	983.64	968.16	1,056.18	1,007.48
12)	Pressed tiles	1000	3,009.90	3,132.38	2,996.90	2,950.60	3,022.90	3,312.26	3,135.20	3,214.19	3,329.87	3,203.56
13)	Cutstone	m <sup>3</sup>	1,991.00	1,892.16	1,949.00	1,961.60	1,900.40	1,727.25	1,658.89	1,889.68	1,751.69	1,699.60
14)	Fully dressed	m <sup>3</sup>	2,581.00	2,482.16	2,539.00	2,551.60	2,490.40	2,027.25	1,958.89	2,189.68	2,051.69	1,999.60
15)	Shell lime	m <sup>3</sup>	858.45	927.77	851.55	849.25	865.95	733.09	708.13	726.56	753.68	724.03
16)	Country wood	m <sup>2</sup>	19,472.95	19,477.65	19,469.95	19,459.25	19,475.95	18,073.09	18,048.13	18,066.56	18,093.68	18,064.03
17)	Planks upto 4m, 30cm thick	m <sup>2</sup>	21,272.95	21,277.65	21,269.95	21,259.25	21,275.95	21,073.09	21,048.13	21,066.56	21,093.68	21,064.03
18)	Silver Oak	m <sup>2</sup>	8,872.95	8,877.65	8,869.95	8,859.25	8,875.95	14,073.09	14,048.13	14,066.56	14,093.68	14,064.03
19)	Planks	m <sup>2</sup>	9,672.95	9,677.65	9,669.95	9,659.25	9,675.95	73.09	9,642.71	9,666.56	9,693.68	9,664.03
20)	Lime concrete	m <sup>2</sup>	96.10	96.10	96.10	96.10	96.10	88.69	97.29	88.69	88.69	88.69
21)	Cement concrete	m <sup>2</sup>	85.85	85.85	85.85	85.85	85.85	74.11	82.71	74.11	74.11	74.11
24)	Mason	Nos.	91.00	91.00	91.00	91.00	91.00	94.00	94.00	94.00	94.00	94.00
25)	Mason		78.00	78.00	78.00	78.00	78.00	85.00	85.00	85.00	85.00	85.00
26)	Mazefloor		54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00	54.00
27)	Mazefloor		50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
28)	Wodder		56.00	56.00	56.00	56.00	56.00	55.00	55.00	55.00	55.00	55.00

**Table D.7.4 Unit Cost for Pilot Tanks (1/2)**

Item Description	Unit	Echur	Cherukkanur Big	A.							Kurumbi
				Polambakkam	Enadur Big	Vadakkupattu	Siruvai	Ramalingapuram	Pandikamoi	Senganguram	
1. Clearing Semab Jungle	m <sup>2</sup>	1.15	1.15	1.15	1.15	1.15	1.15	0.90	0.90	0.90	0.90
2. Clearing light Jungle	m <sup>2</sup>	2.00	2.00	2.00	2.00	2.00	2.00	1.65	1.65	1.65	1.65
3. Clearing Juliflora Jungle with Uprooting	m <sup>2</sup>	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
4. Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	12.30	12.30	12.30	12.30	12.30	10.40	10.40	12.30	10.40
5. Earth work excavation and deposition on bank within an initial lead of 2m in hard stiff clay, stiff black cotton soil, hard red earth shales, mudams, gravel, stoney earth and earth mixed with small sized boulders and hard gravelly soil S.S.20B.	m <sup>3</sup>	17.60	17.60	17.60	17.60	17.60	17.60	14.30	14.30	14.30	14.30
6. Earth work excavation and deposition on bank within an initial lead of 2m in hard stiff clay, stiff black cotton soil, hard red earth shales, mudams, gravel, stoney earth and earth mixed with small sized boulders and hard gravelly soil having a width of (	m <sup>3</sup>	103.02	103.20	103.50	103.02	103.02	103.02	88.93	99.25	88.93	88.93
7. Earth work for Desilting using Machine (Rate of earth work Rs. x 1.20)	m <sup>3</sup>	-	-	-	-	-	-	-	-	-	-
8. Double rate for narrow cutting.	m <sup>3</sup>	35.20	35.20	35.20	35.20	35.20	35.20	28.60	28.60	28.60	28.60
9. Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.40	1.40	1.40	1.40	1.40	1.40	1.90	1.90	1.90	1.90
10. Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.40	1.40	1.40	1.40	1.40	1.40	1.90	1.90	1.90	1.90
11. Benching old embankment slopes of 45x45cm to receive the earth as per S180	m	0.90	0.90	0.90	0.90	0.90	0.90	0.75	0.90	0.75	0.75
12. Dismantling cleaning away and carefully stacking materials useful for reuse for any thickness of wall	m <sup>3</sup>	125.34	125.34	125.34	125.34	125.34	232.16	124.99	124.99	124.99	124.99
13. Removing and refixing cur stone (or) R.C.C. slabs	m <sup>3</sup>	170.00	170.00	170.00	170.00	196.00	170.00	170.00	170.00	170.00	170.00
14. Removing and repacking the old stone revetment including stacking the same within lead for premeasurement.	m <sup>3</sup>	-	-	-	-	131.72	-	-	-	-	-
16. Rough stone dry packing using new stones	m <sup>3</sup>	361.58	326.34	367.68	355.48	332.38	432.11	382.39	449.89	488.71	412.00

Table D.7.4 Unit Cost for Pilot Tanks (2/2)

Item	Description	Unit	Echur	Cherukkanur Big	Polambakkam	Enadur Big	Vadiakkupattu	Siruvai	A.			Kurumbi
									Ramalingapuram	Pandikanmoi	Senganguram	
17	Dismantling and cleaning away and carefully stocking materials useful for reuse for any thickness of wall brick or stone masonry under 3m height	m <sup>3</sup>	2,934.63	2,855.01	2,903.23	2,906.18	2,858.22	2,458.28	2,399.70	2,604.24	2,483.91	3,315.83
18	Cement Mortar 1:2 (per m <sup>3</sup> )	m <sup>3</sup>	-	-	-	-	2,137.96	-	-	-	-	-
19	Cement Mortar 1:3 (per m <sup>3</sup> )	m <sup>3</sup>	1,452.50	1,515.66	1,498.57	1,432.29	1,481.13	1,403.69	1,412.19	1,427.04	1,435.93	1,482.03
20	Cement Mortar 1:4 (per m <sup>3</sup> )	m <sup>3</sup>	1,202.52	1,262.98	1,248.40	1,180.96	1,229.57	1,148.34	1,161.07	1,174.25	1,182.66	1,233.28
21	Cement Mortar 1:5 (per m <sup>3</sup> )	m <sup>3</sup>	1,336.92	1,401.58	1,385.50	1,314.47	1,365.94	1,280.99	1,293.37	1,307.74	1,316.76	1,369.15
22	Cement Concrete 1:4:8 (per m <sup>3</sup> )	m <sup>3</sup>	771.23	767.89	790.59	759.98	760.78	813.33	794.43	859.70	836.63	828.24
23	Cement Concrete 1:3:6	m <sup>3</sup>	958.22	955.78	977.65	947.42	948.30	971.79	941.47	1,017.30	994.38	984.49
24	Plastering with Cement Mortar 1:3 20mm thick	m <sup>3</sup>	3,212.50	3,275.66	3,258.57	3,192.29	3,241.13	3,193.69	3,202.19	3,217.04	3,225.93	3,272.03
25	Random Rubble Masonry in Cement Mortar 1:4 (per m <sup>3</sup> )	m <sup>3</sup>	699.02	686.37	714.51	689.27	686.26	747.08	709.92	794.25	766.57	749.59
26	Rough Stone dry packing for Apron and Revetment	m <sup>3</sup>	360.58	325.34	366.68	354.48	331.38	431.11	381.39	487.71	448.89	411.00
27	Cut stone Fully dressed and Set in Cement Mortar 1:4	m <sup>3</sup>	2,925.99	2,849.12	2,881.35	2,897.67	2,851.61	2,458.79	2,401.61	2,602.39	2,484.59	2,446.67
28	Sand filling	m <sup>3</sup>	177.00	138.35	222.10	150.05	197.70	95.93	125.17	132.05	138.59	207.29
29	Plastering with Cement Mortar 1:4 20mm thick	m <sup>3</sup>	2,962.52	3,022.98	3,008.40	2,940.96	2,989.57	2,938.34	2,951.07	2,964.25	2,972.66	3,025.28
30	Pointing with cement mortar 1:3 flush pointing - m <sup>2</sup>	m <sup>2</sup>	2,883.62	2,946.77	2,929.68	2,863.40	2,912.24	2,881.47	2,889.97	2,904.82	2,913.70	2,959.81
31	T.B.L Stone	Nos.	100.00	100.00	100.00	100.00	100.00	43.40	43.40	43.40	43.40	43.40
32	Screw Gearing Shutter	Nos.	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00
33	Padol Shutter 30x30	Nos.	3,000.00	3,000.00	3,000.00	3,000.00	3,000.00	3,000.00	3,000.00	3,000.00	3,000.00	3,000.00
34	Padol Shutter 30x45	Nos.	4,500.00	4,500.00	4,500.00	4,500.00	4,500.00	4,500.00	4,500.00	4,500.00	4,500.00	4,500.00
35	Padol Shutter 45x60	Nos.	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00	7,000.00
36	Padol Shutter 60x75	Nos.	9,000.00	9,000.00	9,000.00	9,000.00	9,000.00	9,000.00	9,000.00	9,000.00	9,000.00	9,000.00
28		m <sup>3</sup>										
29	R.C.C. 1:2:4 using 20mm FBGS metal for R.C.C. works	m <sup>3</sup>	1,496.69	1,506.98	1,523.93	1,483.64	1,492.84	1,507.66	1,475.27	1,554.95	1,533.89	1,527.93
30	RTS rod	Nos.	21,183.35	21,218.55	21,223.75	21,183.35	21,226.60	21,227.14	21,168.09	21,214.69	21,227.96	21,209.88

**Table D.7.5 Estimate of Construction Cost for Echur Tank (1/2)**

Item Description	Unit	Unit Cost (Rs.)	Quantity	Cost	No. of Unit Cost
<b>1. Tank Bund Improvement</b>					
* Clearing Scrub Jungle	m <sup>2</sup>	1.15	2890.60	3324.19	1
Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	569.18	7000.91	4
* Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.40	569.18	796.85	9
* Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.40	569.18	796.85	10
* Benching old embankment slopes of 45x45cm to receive the earth as per S180	m	0.90	596.00	536.40	11
* T.B.L Stone	Nos.	100.00	3.00	300.00	31
<b>Subtotal</b>				<b>13,000.00</b>	
<b>2. Intake Works Improvement</b>					
Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	986.61	12135.24	4
Earth work excavation and deposition on bank within an initial lead of 2m in hard stiff clay, stiff black cotton soil, hard red earth shales, murams, gravel, stoney earth and earth mixed with small sized boulders and hard gravelly soil S.S.20B.	m <sup>3</sup>	17.60	493.30	8682.12	5
* Double rate for narrow cutting.	m <sup>3</sup>	35.20	986.61	34728.50	8
* Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.40	986.61	1381.25	9
* Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.40	493.30	690.62	10
* Dismantling clearing away and carefully stacking materials useful for reuse for any thickness of wall	m <sup>3</sup>	125.34	1.69	211.51	12
* Dismantling and clearing away and carefully stacking materials useful for reuse for any thickness of wall brick or stone masonry under 3m height	m <sup>3</sup>	2934.63	28.73	84306.17	17
* Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	771.23	16.06	12386.34	22
* Plastering with Cement Mortar 1:3 20mm thick	m <sup>3</sup>	3212.50	1.35	4339.76	24
* Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	699.02	20.35	14227.41	25
* Rough Stone dry packing for Apron and Revetment	m <sup>3</sup>	360.58	2.00	721.15	26
* Sand filling	m <sup>3</sup>	177.00	4.02	710.68	28
* R.C.C. 1:2:4 using 20mm HBGS metal for R.C.C. works	m <sup>3</sup>	1496.69	4.70	7028.31	38
* RTS rod	150kg/m <sup>3</sup>	21183.35	0.70	14921.23	39
<b>Subtotal</b>				<b>196,000.00</b>	



**Table D.7.5 Estimate of Construction Cost for Echur Tank (2/2)**

Item Description	Unit	Unit Cost (Rs.)	Quantity	Cost	No. of Unit Cost
<b>3. Surplus Arrangement Improvement</b>					
• Double rate for narrow cutting.	m <sup>3</sup>	35.20	238.10	8381.12	8
• Dismantling clearing away and carefully stacking materials useful for reuse for any thickness of wall	m <sup>3</sup>	125.34	4.98	624.19	12
• Dismantling and clearing away and carefully stacking materials useful for reuse for any thickness of wall brick or stone masonry under 3m height	m <sup>3</sup>	2934.63	2.96	8686.52	17
• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	771.23	46.07	35530.56	22
• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	699.02	2.96	2069.09	25
• Pointing with cement mortar 1:3 flush pointing - 10m <sup>2</sup>	m <sup>2</sup>	2883.62	20.00	57672.30	30
Subtotal				113,000.00	
<b>4. Selective Lining for Field Channel</b>					
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	1682.77	20698.07	4
• Removing and refixing cut stone (or) R.C.C. slabs	m <sup>3</sup>	170.00	3.00	510.00	13
• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	771.23	412.88	318425.42	22
• Cement Concrete 1:3:6	m <sup>3</sup>	958.22	1.70	1628.98	23
• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	699.02	669.18	467767.46	25
• Sand filling	m <sup>3</sup>	177.00	275.25	48719.25	28
• Plastering with Cement Mortar 1:4 20mm thick	m <sup>3</sup>	2962.52	17.61	52170.03	29
• Padol Shutter 30x30	Nos.	3000.00	34.00	102000.00	33
Subtotal				1,012,000.00	
<b>5. On-farm Development</b>					
• 25% of Cost for Field Channel		1,012,000	0.25	253000.00	
Subtotal				253,000.00	
<b>6. Building for Farmers Association</b>					
• Building (50m <sup>2</sup> )	Nos.	130,000	1	130,000.00	
Subtotal				130,000.00	
<b>TOTAL</b>				<b>1,717,000.00</b>	

**Table D.7.6 Estimate of Construction Cost for Cherukkanur Big Tank (1/2)**

Item	Description	Unit	Unit Cost (Rs.)	Quantity	Cost	No. of Unit Cost
<b>1. Tank Bund Improvement</b>						
	• Clearing Scrub Jungle	m <sup>2</sup>	1.15	576.00	662.40	1
	• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	172.44	2,121.01	4
	• Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /10	1.40	172.44	241.42	9
	• Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.40	172.44	241.42	10
	• Benching old embankment slopes of 45x45cm to receive the earth as per S180	m	0.90	366.00	329.40	11
	• T.B.L Stone	Nos.	100.00	2.00	200.00	31
	Subtotal				4,000.00	
<b>2. Intake Works Improvement</b>						
	• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	1121.13	13789.84	4
	• Earth work excavation and deposition on bank within an initial lead of 2m in hard stiff clay, stiff black cotton soil, hard red earth shales, murams, gravel, stoney earth and earth mixed with small sized boulders and hard gravelly soil S.S.20B.	m <sup>3</sup>	17.60	560.56	9865.90	5
	• Double rate for narrow cutting.	m <sup>3</sup>	35.20	1121.13	39463.60	8
	• Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.40	1121.13	1569.58	9
	• Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.40	560.56	784.79	10
	• Dismantling clearing away and carefully stacking materials useful for reuse for any thickness of wall	m <sup>3</sup>	125.34	1.69	211.51	12
	• Dismantling and clearing away and carefully stocking materials useful for reuse for any thickness of wall brick or stone masonry under 3m height	m <sup>3</sup>	2855.01	29.73	81879.45	17
	• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	767.87	16.06	12332.38	22
	• Plastering with Cement Mortar 1:3 20mm thick	m <sup>3</sup>	3275.66	1.35	4425.08	24
	• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	686.37	20.35	13970.02	25
	• Rough Stone dry packing for Apron and Revetment	m <sup>3</sup>	325.34	2.00	650.68	26
	• Sand filling	m <sup>3</sup>	138.35	4.02	555.49	28
	• R.C.C. 1:2:4 using 20mm HBGS metal for R.C.C. works	m <sup>3</sup>	1506.98	6.30	9487.19	38
	• RTS rod	150kg/m <sup>3</sup>	21218.55	0.91	20037.21	39
	Subtotal				212,000.00	

**Table D.7.6 Estimate of Construction Cost for Cherukkanur Big Tank (2/2)**

Item	Description	Unit	Unit Cost (Rs.)	Quantity	Cost	No. of Unit Cost
<b>3. Surplus Arrangement Improvement</b>						
	• Double rate for narrow cutting.	m <sup>3</sup>	35.20	1905.92	67088.38	8
	• Dismantling and clearing away and carefully stocking materials useful for reuse for any thickness of wall brick or stone masonry under 3m height	m <sup>3</sup>	2855.01	128.97	368210.64	17
	• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	767.89	247.88	190344.57	22
	• Rough Stone dry packing for Apron and Revetment	m <sup>3</sup>	325.34	18.48	6012.28	26
	• Pointing with cement mortar 1:3 flush pointing - 10m <sup>2</sup>	m <sup>2</sup>	2946.77	190.97	562744.67	30
Subtotal					<b>1,194,000.00</b>	
<b>4. Tank Supply Channel Improvement</b>						
	• Earth work excavation and deposition on bank within an initial lead of 2m in hard stiff clay, stiff black cotton soil, hard red earth shales, murams, gravel, stoney earth and earth mixed with small sized boulders and hard gravelly soil S.S.20B.	m <sup>3</sup>	17.60	2006.00	35000.00	5
Subtotal					<b>35,000.00</b>	
<b>5. Selective Lining for Field Channel</b>						
	• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	1750.38	21529.67	4
	• Removing and refixing cut stone (or) R.C.C. slabs	m <sup>3</sup>	170.00	3.00	510.00	13
	• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	767.89	396.68	304606.61	22
	• Cement Concrete 1:3:6	m <sup>3</sup>	955.78	1.60	1529.25	23
	• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	686.37	696.54	478084.16	25
	• Sand filling	m <sup>3</sup>	138.35	264.45	36586.66	28
	• Plastering with Cement Mortar 1:4 20mm thick	m <sup>3</sup>	3022.98	24.77	74879.21	29
	• Pointing with cement mortar 1:3 flush pointing - 10m <sup>2</sup>	m <sup>2</sup>	2946.77	1.60	4714.83	30
	• Padol Shutter 30x30	Nos.	3000.00	32.00	96000.00	33
Subtotal					<b>1,018,000.00</b>	
<b>6. On-farm Development</b>						
	• 25% of Cost for Field Channel		1,018,000.00	0.25	254,500.00	
Subtotal					<b>255,000.00</b>	
<b>7. Building for Farmers' Association</b>						
	• Building (50m <sup>2</sup> )	Nos.	130,000	1	130,000	
Subtotal					<b>130,000</b>	
<b>TOTAL</b>					<b>2,848,000.00</b>	

**Table D.7.7 Estimate of Construction Cost for Polambakkam Tank (1/2)**

Item Description	Unit	Unit Cost (Rs.)	Quantity	Cost	No. of Unit Cost
<b>1. Tank Bund Improvement</b>					
• Clearing Scrub Jungle	m <sup>2</sup>	1.15	12742	14,653.30	1
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.3	14143.62	173,966.53	4
• Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.4	14143.62	19,801.07	9
• Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.4	14143.62	19,801.07	10
• Benching old embankment slopes of 45x45cm to receive the earth as per SI80	m	0.9	2548.4	2,293.56	11
• T.B.L Stone	Nos.	100	13	1,300.00	31
<b>Total</b>				<b>232,000.00</b>	
<b>2. Intake Works Improvement</b>					
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	1182.31	14542.38	4
• Earth work excavation and deposition on bank within an initial lead of 2m in hard stiff clay, stiff black cotton soil, hard red earth shales, murams, gravel, stoney earth and earth mixed with small sized boulders and hard gravelly soil S.S.20B.	m <sup>3</sup>	17.60	591.15	10404.30	5
• Double rate for narrow cutting.	m <sup>3</sup>	35.20	1182.31	41617.21	8
• Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.40	1182.31	1655.23	9
• Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.40	591.15	827.61	10
• Dismantling clearing away and carefully stacking materials useful for reuse for any thickness of wall	m <sup>3</sup>	125.34	1.69	211.51	12
• Dismantling and clearing away and carefully stacking materials useful for reuse for any thickness of wall brick or stone masonry under 3m height	m <sup>3</sup>	2903.23	28.73	83403.99	17
• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	790.59	16.06	12697.27	22
• Plastering with Cement Mortar 1:3 20mm thick	m <sup>3</sup>	3258.57	1.35	4401.99	24
• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	714.51	20.35	14542.77	25
• Rough Stone dry packing for Apron and Revetment	m <sup>3</sup>	366.68	2.00	733.36	26
• Sand filling	m <sup>3</sup>	222.10	4.02	891.76	28
• R.C.C. 1:2:4 using 20mm HBGS metal for R.C.C. works	m <sup>3</sup>	1523.93	7.32	11152.88	38
• RTS rod	150kg/m <sup>3</sup>	21223.75	1.10	23298.90	39
<b>Total</b>				<b>220,000.00</b>	

**Table D.7.7 Estimate of Construction Cost for Polambakkam Tank (2/2)**

Item Description	Unit	Unit Cost (Rs.)	Quantity	Cost	No. of Unit Cost
<b>3. Surplus Arrangement Improvement</b>					
• Double rate for narrow cutting.	m <sup>3</sup>	35.20	90.10	3171.52	8
• Dismantling clearing away and carefully stacking materials useful for reuse for any thickness of wall	m <sup>3</sup>	125.34	7.50	940.05	12
• Dismantling and clearing away and carefully stacking materials useful for reuse for any thickness of wall brick or stone masonry under 3m height	m <sup>3</sup>	2903.23	3.53	10248.40	17
• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	790.59	19.02	15037.02	22
• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	714.51	3.31	2365.03	25
• Rough Stone dry packing for Apron and Revetment	m <sup>3</sup>	366.68	12.30	4510.16	26
<b>Total</b>				<b>36,000.00</b>	
<b>4. Selective Lining for Field Channel</b>					
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	2415.98	29716.55	4
• Removing and refixing cut stone (or) R.C.C. slabs	m <sup>3</sup>	170.00	6.00	1020.00	13
• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	790.59	571.28	451648.26	22
• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	714.51	1070.46	764854.37	25
• Sand filling	m <sup>3</sup>	222.10	380.85	84586.79	28
• Plastering with Cement Mortar 1:4 20mm thick	m <sup>3</sup>	3008.40	14.09	42388.36	29
• Pointing with cement mortar 1:3 flush pointing - 10m <sup>2</sup>	m <sup>2</sup>	2929.68	2.00	5859.36	30
• Padol Shutter 30x30	Nos.	3000.00	40.00	120000.00	33
<b>Total</b>				<b>1,500,000.00</b>	
<b>5. On-farm Development</b>					
• 25% of Cost for Field Channel		1,500,000	0.25	375,000.00	
<b>Total</b>				<b>375,000.00</b>	
<b>6. Building for Farmers' Association</b>					
• Building (50m <sup>2</sup> )	Nos.	130,000	1	130,000	
<b>Subtotal</b>				<b>130,000</b>	
<b>TOTAL</b>				<b>2,493,000.00</b>	

**Table D.7.8 Estimate of Construction Cost for Enadur Big Tank (1/2)**

Item Description	Unit	Unit Cost (Rs.)	Quantity	Cost	No. of Unit Cost
<b>1. Tank Bund Improvement</b>					
• Clearing Scrub Jungle	m <sup>2</sup>	1.15	32651.7	37,552.91	1
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.3	37954.81	466,844.16	4
• Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.4	37954.81	53,136.73	9
• Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.4	37954.81	53,136.73	10
• Benching old embankment slopes of 45x45cm to receive the earth as per S180	m	0.9	7535.7	6,782.13	11
• T.B.I. Stone	Nos.	100	25	2,500.00	31
Subtotal				620,000.00	
<b>2. Intake Works Improvement</b>					
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	2217.08	27270.02	4
• Earth work excavation and deposition on bank within an initial lead of 2m in hard stiff clay, stiff black cotton soil, hard red earth shales, murams, gravel, stoney earth and earth mixed with small sized boulders and hard gravelly soil S.S.20B.	m <sup>3</sup>	17.60	2217.08	39020.52	5
• Double rate for narrow cutting.	m <sup>3</sup>	35.20	2217.08	78041.04	8
• Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.40	2217.08	3103.91	9
• Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.40	2217.08	3103.91	10
• Dismantling clearing away and carefully stacking materials useful for reuse for any thickness of wall	m <sup>3</sup>	125.34	3.38	423.02	12
• Dismantling and clearing away and carefully stocking materials useful for reuse for any thickness of wall brick or stone masonry under 3m height	m <sup>3</sup>	2906.18	58.26	169314.05	17
• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	759.98	20.55	15615.31	22
• Plastering with Cement Mortar 1:3 20mm thick	m <sup>3</sup>	3192.29	1.58	5033.59	24
• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	689.27	31.19	21497.96	25
• Rough Stone dry packing for Apron and Revetment	m <sup>3</sup>	354.48	2.00	708.96	26
• Sand filling	m <sup>3</sup>	150.05	5.14	770.77	28
• R.C.C. 1:2:4 using 20mm HBGS metal for R.C.C. works	m <sup>3</sup>	1483.64	2.25	3338.19	38
• RTS rod	150kg/m <sup>3</sup>	21183.35	0.34	7149.38	39
Subtotal				374,000.00	

**Table D.7.8 Estimate of Construction Cost for Enadur Big Tank (2/2)**

Item Description	Unit	Unit Cost (Rs.)	Quantity	Cost	No. of Unit Cost
<b>3. Selective Lining for Field Channel</b>					
• Double rate for narrow cutting.	m <sup>3</sup>	35.20	16727.60	588811.52	8
• Removing and refixing cut stone (or) R.C.C. slabs	m <sup>3</sup>	170.00	3.00	510.00	13
• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	759.98	2172.93	1651383.34	22
• Cement Concrete 1:3:6	m <sup>3</sup>	917.42	3.60	3410.71	23
• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	689.27	7041.00	4853150.07	25
• Sand filling	m <sup>3</sup>	150.05	1448.62	217365.43	28
• Plastering with Cement Mortar 1:4 20mm thick	m <sup>3</sup>	2940.96	125.70	369678.67	29
• Padol Shutter 30x30	Nos.	3000.00	192.00	576000.00	33
Subtotal				8,260,000.00	
<b>4. On-farm Development</b>					
• 25% of Cost for Field Channel		8,260,000	0.25	2,065,000.00	
Subtotal				2,065,000.00	
<b>5. Building for Farmers' Association</b>					
• Building (50m <sup>2</sup> )	Nos.	130,000	1	130,000	
Subtotal				130,000	
<b>TOTAL</b>				<b>11,449,000.00</b>	

**Table D.7.9 Estimate of Construction Cost for Vadakkupattu Tank (1/2)**

Item Description	Unit	Unit Cost RP	Quantity	Cost	No. of Unit Cost
<b>1. Tank Bund Improvement</b>					
• Clearing Scrub Jungle	m <sup>2</sup>	1.15	14769.70	16,985.16	1
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	8418.73	103,550.38	4
• Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.40	8418.73	11,786.22	9
• Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.40	8418.73	11,786.22	10
• Benching old embankment slopes of 45x45cm to receive the earth as per S180	m	0.90	4028.10	3,625.29	11
• T.B.L Stone	Nos.	100.00	13.00	1,300.00	31
Subtotal				149,000.00	
<b>2. Inatake Works Improvement</b>					
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	1523.43	18738.13	4
• Earth work excavation and deposition on bank within an initial lead of 2m in hard stiff clay, stiff black cotton soil, hard red earth shales, murams, gravel, stoney earth and earth mixed with small sized boulders and hard gravelly soil S.S.20B.	m <sup>3</sup>	17.60	1523.43	26812.28	5
• Double rate for narrow cutting.	m <sup>3</sup>	35.20	1523.43	53624.56	8
• Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.40	1523.43	2132.80	9
• Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.40	1523.43	2132.80	10
• Dismantling clearing away and carefully stacking materials useful for reuse for any thickness of wall	m <sup>3</sup>	232.16	3.38	783.54	12
• Dismantling and clearing away and carefully stocking materials useful for reuse for any thickness of wall brick or stone masonry under 3m height	m <sup>3</sup>	2858.22	58.76	167949.01	17
• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	760.78	20.55	15631.75	22
• Plastering with Cement Mortar 1:3 20mm thick	m <sup>3</sup>	3241.13	1.58	5110.60	24
• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	686.26	31.19	21404.08	25
• Rough Stone dry packing for Apron and Revetment	m <sup>3</sup>	331.38	2.00	662.76	26
• Sand filling	m <sup>3</sup>	197.70	5.14	1015.54	28
• R.C.C. 1:2:4 using 20mm HBGS metal for R.C.C. works	m <sup>3</sup>	1492.84	2.25	3358.89	38
• RTS rod	150kg/m <sup>3</sup>	21226.60	0.34	7163.98	39
Subtotal				327000.00	



**Table D.7.9 Estimate of Construction Cost for Vadakkupattu Tank (2/2)**

Item Description	Unit	Unit Cost RP	Quantity	Cost	No. of Unit Cost
<b>3. Surplus Arrangement Improvement</b>					
• Random Rubble Masonry in Cement Mortar 1:4 (per m <sup>3</sup> )	m <sup>3</sup>	686.26	36.55	25082.80	25
• Pointing with cement mortar 1:3 flush pointing - m <sup>2</sup>	m <sup>2</sup>	2912.24	180.78	526174.75	30
Subtotal				552,000.00	
<b>4. Selective Lining for Field Channel</b>					
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	15334.54	188614.84	4
• Removing and refixing cut stone (or) R.C.C. slabs	m <sup>3</sup>	196.00	9.00	1764.00	13
• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	760.78	3062.51	2329896.36	22
• Random Rubble Masonry in Cement Mortar 1:4 (per m <sup>3</sup> )	m <sup>3</sup>	686.26	6889.62	4728070.62	25
• Sand filling	m <sup>3</sup>	197.70	2041.67	403638.16	28
• Plastering with Cement Mortar 1:4 20mm thick	m <sup>3</sup>	2989.57	164.67	492292.49	29
• Pointing with cement mortar 1:3 flush pointing - m <sup>2</sup>	m <sup>2</sup>	2912.24	8.70	25336.49	30
• Padol Shutter 30x30	Nos.	3000.00	174.00	522000.00	33
Total				8,692,000.00	
<b>4. On-farm Development</b>					
• 25% of Cost for Field Channel		8,692,000.00	0.25	2,173,000.00	
Subtotal				2,173,000.00	
<b>5. Building for Farmers' Association</b>					
• Building (50m <sup>2</sup> )	Nos.	130,000.00	1	130,000.00	
Subtotal				130,000	
<b>TOTAL</b>				<b>12,023,000.00</b>	

**Table D.7.10 Estimate of Construction Cost for Siruvalai Tank (1/2)**

Item Description	Unit	Unit Cost RP	Quantity	Cost	No. of Unit Cost
<b>1. Tank Bund Improvement</b>					
• Clearing Scrub Jungle	m <sup>2</sup>	0.90	15075.00	13567.50	1
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	10.40	8884.20	92395.68	4
• Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.90	8884.20	16879.98	9
• Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.90	8884.20	16879.98	10
• Benching old embankment slopes of 45x45cm to receive the earth as per S180	m	0.75	4020.00	3015.00	11
• T.B.I. Stone	Nos.	43.40	20.00	868.00	31
<b>Total</b>				<b>144,000.00</b>	
<b>2. Intake Works Improvement</b>					
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	10.40	2473.13	25720.50	4
• Earth work excavation and deposition on bank within an initial lead of 2m in hard stiff clay, stiff black cotton soil, hard red earth shales, murams, gravel, stoney earth and earth mixed with small sized boulders and hard gravelly soil S.S.20B.	m <sup>3</sup>	14.30	1236.56	17682.84	5
• Double rate for narrow cutting.	m <sup>3</sup>	28.60	2473.13	70731.38	8
• Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.90	2473.13	4698.94	9
• Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.90	1236.56	2349.47	10
• Dismantling clearing away and carefully stacking materials useful for reuse for any thickness of wall	m <sup>3</sup>	124.99	68.99	8623.06	12
• Dismantling and clearing away and carefully stacking materials useful for reuse for any thickness of wall brick or stone masonry under 3m height	m <sup>3</sup>	2458.28	106.93	262863.88	17
• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	813.33	48.18	39187.46	22
• Plastering with Cement Mortar 1:3 20mm thick	m <sup>3</sup>	3193.69	4.05	12943.04	24
• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	747.08	61.06	45617.04	25
• Rough Stone dry packing for Apron and Revetment	m <sup>3</sup>	431.11	6.00	2586.66	26
• Sand filling	m <sup>3</sup>	95.93	12.05	1155.51	28
• R.C.C. 1:2:4 using 20mm HBGS metal for R.C.C. works	m <sup>3</sup>	1507.66	15.06	22711.69	38
• RTS rod	150kg/m <sup>3</sup>	21227.14	2.26	47965.48	39
<b>Subtotal</b>				<b>565,000.00</b>	

**Table D.7.10 Estimate of Construction Cost for Siruvalal Tank (2/2)**

Item Description	Unit	Unit Cost RP	Quantity	Cost	No. of Unit Cost
<b>3. Surplus Arrangement Improvement</b>					
• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	747.08	11.16	8337.41	25
• Sand filling	m <sup>3</sup>	95.93	1.30	124.71	28
• Pointing with cement mortar 1:3 flush pointing - 10m <sup>2</sup>	m <sup>2</sup>	2881.47	43.32	124825.28	30
Subtotal				133,000.00	
<b>4. Selective Lining for Field Channel</b>					
• Double rate for narrow cutting.	m <sup>3</sup>	28.60	589.90	16871.14	8
• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	813.33	107.64	87546.84	22
• Cement Concrete 1:3:6	m <sup>3</sup>	971.79	1.70	1652.04	23
• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	747.08	209.76	156707.50	25
• Sand filling	m <sup>3</sup>	95.93	71.76	6883.94	28
• Plastering with Cement Mortar 1:4 20mm thick	m <sup>3</sup>	2938.34	5.52	16219.64	29
• Padol Shutter 30x30	Nos.	3000.00	34.00	102000.00	33
Subtotal				388,000.00	
<b>5. On-farm Development</b>					
• 25% of Cost for Field Channel		388,000.00	0.25	97,000.00	
Subtotal				97,000.00	
<b>6. Building for Farmers' Association</b>					
• Building (50m <sup>2</sup> )	Nos.	130,000.00	1	130,000.00	
Subtotal				130,000	
<b>7. Community Well</b>					
•	Nos.	200,000.00	2	400,000.00	
Subtotal				400,000	
<b>TOTAL</b>				<b>1,857,000.00</b>	

**Table D.7.11 Estimate of Construction Cost for Ramalingapuram Tank (1/2)**

Item Description	Unit	Unit Cost (Rs.)	Quantity	Cost	No. of Unit Cost
<b>1. Tank Bund Improvement</b>					
* Clearing Scrub Jungle	m <sup>2</sup>	0.90	16470.00	14,823.00	1
Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	10.40	3880.00	40,352.00	4
* Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.90	3880.00	7,372.00	9
* Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.90	3880.00	7,372.00	10
* Benching old embankment slopes of 45x45cm to receive the earth as per SI80	m	0.75	3880.00	2,910.00	11
* Rough stone dry packing using new stones	m <sup>3</sup>	382.39	4695.17	1,795,386.06	16
* T.B.L. Stone	Nos.	43.40	19.00	824.60	31
<b>Total</b>				<b>1,869,000.00</b>	
<b>2. Intake Works Improvement</b>					
Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	10.40	981.26	10205.13	4
* Double rate for narrow cutting.	m <sup>3</sup>	28.60	981.26	28064.11	8
* Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.90	981.26	1864.40	9
Dismantling clearing away and carefully stacking materials useful for reuse for any thickness of wall	m <sup>3</sup>	124.99	63.93	7990.61	
* Cement Concrete 1:4:8 (per m <sup>3</sup> )	m <sup>3</sup>	784.43	17.36	13618.49	22
* Plastering with Cement Mortar 1:3 20mm thick	m <sup>3</sup>	3202.19	1.69	5403.70	24
* Random Rubble Masonry in Cement Mortar 1:4 (per m <sup>3</sup> )	m <sup>3</sup>	709.92	14.28	10135.00	25
* Rough Stone dry packing for Apron and Revetment	m <sup>3</sup>	381.39	3.00	1144.17	26
* Sand filling	m <sup>3</sup>	125.17	4.34	543.27	28
* R.C.C. 1:2:4 using 20mm HBGS metal for R.C.C. works	m <sup>3</sup>	1475.27	10.18	15022.08	29
* RTS rod	150kg/m <sup>3</sup>	21168.09	1.53	32331.93	
<b>Total</b>				<b>126,000.00</b>	
<b>3. Selective Lining for Field Channel</b>					
Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	10.40	1585.33	16487.43	4
* Removing and refixing cut stone (or) R.C.C. slabs	m <sup>3</sup>	170.00	9.00	1530.00	13
* Cement Concrete 1:4:8 (per m <sup>3</sup> )	m <sup>3</sup>	784.43	420.89	330158.74	22

**Table D.7.11 Estimate of Construction Cost for Ramalingapuram Tank (2/2)**

Item Description	Unit	Unit Cost (Rs.)	Quantity	Cost	No. of Unit Cost
• Cement Concrete 1:3:6	m <sup>3</sup>	941.47	1.60	1506.35	23
• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	709.92	680.58	483157.35	25
• Sand filling	m <sup>3</sup>	125.17	280.59	35121.45	28
• Plastering with Cement Mortar 1:4 20mm thick	m <sup>3</sup>	2951.07	17.91	52853.66	29
• Padol Shutter 30x30	Nos.	3000.00	22.00	66000.00	33
<b>Total</b>				<b>987,000.00</b>	
<b>4. On-farm Development</b>					
• 25% of Cost for Field Channel		987,000.00	0.25	247,000.00	
Subtotal				<b>247,000.00</b>	
<b>5. Building for Farmers' Association</b>					
• Building (50m <sup>2</sup> )	Nos.	130,000.00	1	130,000.00	
Subtotal				<b>130,000</b>	
<b>6. Community Well</b>					
•	Nos.	200,000.00	2	400,000.00	
Subtotal				<b>400,000</b>	
<b>TOTAL</b>				<b>3,759,000.00</b>	

**Table D.7.12 Estimate of Construction Cost for Pandikanmol Tank (1/2)**

Item Description	Unit	Unit Cost RP	Quantity	Cost	No. of Unit Cost
<b>1. Tank Bund Improvement</b>					
• Clearing Scrub Jungle	m <sup>2</sup>	0.90	27122.50	24410.25	1
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	6249.60	76870.08	4
• Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.90	6249.60	11874.24	9
• Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.90	6249.60	11874.24	10
• Benching old embankment slopes of 45x45cm to receive the earth as per SI80	m	0.75	5710.00	4282.50	11
• T.B.L Stone	Nos.	43.40	29.00	1258.60	31
Subtotal				131,000.00	
<b>2. Intake Works Improvement</b>					
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	1236.56	15209.72	4
• Double rate for narrow cutting.	m <sup>3</sup>	28.60	1236.56	35365.69	8
• Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.90	1236.56	2349.47	9
• Dismantling clearing away and carefully stacking materials useful for reuse for any thickness of wall	m <sup>3</sup>	124.99	31.50	3937.19	12
• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	859.70	17.36	14925.25	22
• Plastering with Cement Mortar 1:3 20mm thick	m <sup>3</sup>	3217.04	1.69	5428.76	24
• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	791.25	14.28	11338.91	25
• Rough Stone dry packing for Apron and Revetment	m <sup>3</sup>	487.71	3.00	1463.13	26
• Sand filling	m <sup>3</sup>	132.05	4.34	573.13	28
• R.C.C. 1:2:4 using 20mm HBGS metal for R.C.C. works	m <sup>3</sup>	1554.95	11.49	17872.44	38
• RTS rod	150kg/m <sup>3</sup>	21214.69	1.72	36575.93	39
Total				145,000.00	
<b>3. Selective Lining for Field Channel</b>					
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	1088.10	13383.63	4
• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	859.70	313.88	269812.61	22

**Table D.7.12 Estimate of Construction Cost for Pandikanmoi Tank (2/2)**

Item Description	Unit	Unit Cost RP	Quantity	Cost	No. of Unit Cost
* Cement Concrete 1:3:6	m <sup>3</sup>	1017.30	1.20	1220.76	23
* Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>2</sup> )	m <sup>3</sup>	794.25	488.25	387792.56	25
* Sand filling	m <sup>3</sup>	132.05	209.25	27631.46	28
* Plastering with Cement Mortar 1:4 20mm thick	m <sup>3</sup>	2964.25	6.98	20690.47	29
* Padol Shutter 30x30	Nos.	3000.00	24.00	72000.00	33
Subtotal				793,000.00	
<b>4. On-farm Development</b>					
* 25% of Cost for Field Channel		793,000	0.25	198,000.00	
Subtotal				198,000.00	
<b>5. Building for Farmers' Association</b>					
* Building (50m <sup>2</sup> )	Nos.	130,000	1	130,000	
Subtotal				130,000	
<b>6. Community Well</b>					
*	Nos.	200,000	2	400,000	
Subtotal				400,000	
<b>TOTAL</b>				<b>1,797,000.00</b>	

**Table D.7.13 Estimate of Construction Cost for Songanguram Tank (1/2)**

Item Description	Unit	Unit Cost RP	Quantity	Cost	No. of Unit Cost
<b>1. Tank Bund Improvement</b>					
• Clearing Scrub Jungle	m <sup>2</sup>	0.90	33840.00	30,456.00	1
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	10.40	21682.98	225,502.99	4
• Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.90	21682.98	41,197.66	9
• Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.90	21682.98	41,197.66	10
• Benching old embankment slopes of 45x45cm to receive the earth as per S180	m	0.75	8460.00	6,345.00	11
• Rough Stone dry packing for Apron and Revetment	m <sup>3</sup>	448.89	70.50	31,646.75	26
• T.B.L Stone	Nos.	43.40	42.00	1,822.80	31
Subtotal				378,000.00	
<b>2. Intake Works Improvement</b>					
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	10.40	2060.94	21433.78	4
• Earth work excavation and deposition on bank within an initial lead of 2m in hard stiff clay, stiff black cotton soil, hard red earth shales, murams, gravel, stoney earth and earth mixed with small sized boulders and hard gravelly soil S.S.20B.	m <sup>3</sup>	14.30	824.38	11783.56	5
• Double rate for narrow cutting.	m <sup>3</sup>	28.60	1648.75	47154.25	8
• Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.90	2060.94	3915.79	9
• Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.90	824.38	1566.32	10
• Dismantling clearing away and carefully stacking materials useful for reuse for any thickness of wall	m <sup>3</sup>	124.99	3.38	421.84	12
• Dismantling and clearing away and carefully stocking materials useful for reuse for any thickness of wall brick or stone masonry under 3m height	m <sup>3</sup>	2483.91	71.50	177599.57	17
• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	836.63	37.91	31716.64	22
• Plastering with Cement Mortar 1:3 20mm thick	m <sup>3</sup>	3225.93	3.26	10516.53	24
• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	766.57	45.47	34855.91	25
• Rough Stone dry packing for Apron and Revetment	m <sup>3</sup>	448.89	4.00	1795.56	26
• Sand filling	m <sup>3</sup>	138.59	9.48	1313.83	28



**Table D.7.13 Estimate of Construction Cost for Senganguram Tank (2/2)**

Item Description	Unit	Unit Cost RP	Quantity	Cost	No. of Unit Cost
* R.C.C. 1:2:4 using 20mm HBGS metal for R.C.C. works	m <sup>3</sup>	1533.89	14.00	21474.46	38
* RTS rod	150kg/m <sup>3</sup>	21227.96	1.51	32096.68	39
Subtotal				398000.00	
<b>3. Selective Lining for Field Channel</b>					
Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	10.40	780.77	8,120.01	4
* Cement Concrete 1:4:8 (per m3)	m <sup>3</sup>	836.30	274.95	229,940.69	22
* Cement Concrete 1:3:6	m <sup>3</sup>	994.38	1.2	1,193.26	23
* Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	766.57	409.5	313,910.42	25
* Sand filling	m <sup>3</sup>	138.59	183.3	25,403.55	28
* Plastering with Cement Mortar 1:4 20mm thick	m <sup>3</sup>	2972.66	8.78	26,099.95	29
* Pointing with cement mortar 1:3 flush pointing - 10m <sup>2</sup>	m <sup>2</sup>	2913.70	1.2	3,496.44	30
* Padol Shutter 30x30	Nos.	3000.00	24	72,000.00	33
Subtotal				680,000.00	
<b>4. On-farm Development</b>					
* 25% of Cost for Field Channel		680,000	0.25	170,000.00	
Subtotal				170,000.00	
<b>5. Building for Farmers' Association</b>					
* Building (50m <sup>2</sup> )	Nos.	130,000	1	130,000	
Subtotal				130,000	
<b>6. Community Well</b>					
*	Nos.	200,000	2	400,000	
Subtotal				400,000	
<b>TOTAL</b>				<b>2,156,000.00</b>	

**Table D.7.14 Estimate of Construction Cost for Kurumbi Tank (1/2)**

Item Description	Unit	Unit Cost (Rs.)	Quantity	Cost	No. of Unit Cost
<b>1. Tank Bund Improvement</b>					
• Clearing Scrub Jungle	m <sup>2</sup>	0.90	8960.00	8,064.00	1
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	2587.20	31,822.56	4
• Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.90	2587.20	4,915.68	9
• Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.90	2587.20	4,915.68	10
• Benching old embankment slopes of 45x45cm to receive the earth as per S180	m	0.75	2240.00	1,680.00	11
• T.B.L Stone	Nos.	43.40	11.00	477.40	31
Subtotal				52,000.00	
<b>2. Intake Works Improvement</b>					
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	470.94	5792.53	4
• Earth work excavation and deposition on bank within an initial lead of 2m in hard stiff clay, stiff black cotton soil, hard red earth shales, murams, gravel, stoney earth and earth mixed with small sized boulders and hard gravelly soil S.S.20B.	m <sup>3</sup>	17.60	470.94	8288.50	5
• Double rate for narrow cutting.	m <sup>3</sup>	28.60	470.94	13468.81	8
• Extra lead for every additional lead of 10m (or) part there or over the initial lead	m <sup>3</sup> /m	1.90	470.94	894.78	9
• Extra for every additional lift of 1m or part thereof over the initial lift	m <sup>3</sup> /m	1.90	470.94	894.78	10
• Dismantling clearing away and carefully stacking materials useful for reuse for any thickness of wall	m <sup>3</sup>	124.99	1.69	210.92	12
• Dismantling and clearing away and carefully stocking materials useful for reuse for any thickness of wall brick or stone masonry under 3m height	m <sup>3</sup>	3315.83	25.71	85249.99	17
• Cement Concrete 1:4:8 (per 10m <sup>3</sup> )	m <sup>3</sup>	828.24	10.27	8508.92	22
• Plastering with Cement Mortar 1:3 20mm thick	m <sup>3</sup>	3272.03	0.79	2579.66	24
• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	749.59	15.59	11689.65	25
• Rough Stone dry packing for Apron and Revetment	m <sup>3</sup>	411.00	1.00	411.00	26
• Sand filling	m <sup>3</sup>	207.29	2.57	532.40	28
• R.C.C. 1:2:4 using 20mm HIBGS metal for R.C.C. works	m <sup>3</sup>	1527.93	1.13	1718.92	38
• RTS rod	150kg/m <sup>3</sup>	21209.88	0.17	3579.17	39
Subtotal				144,000.00	

**Table D.7.14 Estimate of Construction Cost for Kurumbi Tank (2/2)**

Item Description	Unit	Unit Cost (Rs.)	Quantity	Cost	No. of Unit Cost
<b>3. Selective Lining for Field Channel</b>					
• Earth work excavation and deposition on bank within an initial lead of 10m and initial lift of 2m in sand silt or other loose soil wet sand, or silt not under water sandy loam and ordinary soil including excavated earth S.S.20B.	m <sup>3</sup>	12.30	1052.88	12950.42	4
• Cement Concrete 1:4:8 (per m3)	m <sup>3</sup>	828.24	229.77	190301.70	22
• Cement Concrete 1:3:6	m <sup>3</sup>	984.49	1.00	984.49	23
• Random Rubble Masonry in Cement Mortar 1:4 (per 10m <sup>3</sup> )	m <sup>3</sup>	749.59	360.18	269987.33	25
• Sand filling	m <sup>3</sup>	207.29	153.18	31752.68	28
• Plastering with Cement Mortar 1:4 20mm thick	m <sup>3</sup>	3023.28	7.70	23279.26	29
• Pointing with cement mortar 1:3 flush pointing - 10m <sup>2</sup>	m <sup>2</sup>	2959.81	1.00	2959.81	30
• Padol Shutter 30x30	Nos.	3000.00	20.00	60000.00	33
Subtotal				592,000.00	
<b>5. On-farm Development</b>					
• 25% of Cost for Field Channel		592,000.00	0.25	148,000.00	
Subtotal				148,000.00	
<b>6. Building for Farmers' Association</b>					
• Building (50m <sup>2</sup> )	Nos.	130,000.00	1	130,000.00	
Subtotal				130,000	
<b>7. Community Well</b>					
•	Nos.	200,000.00	2	400,000.00	
Subtotal				400,000.00	
<b>TOTAL</b>				<b>1,466,000.00</b>	

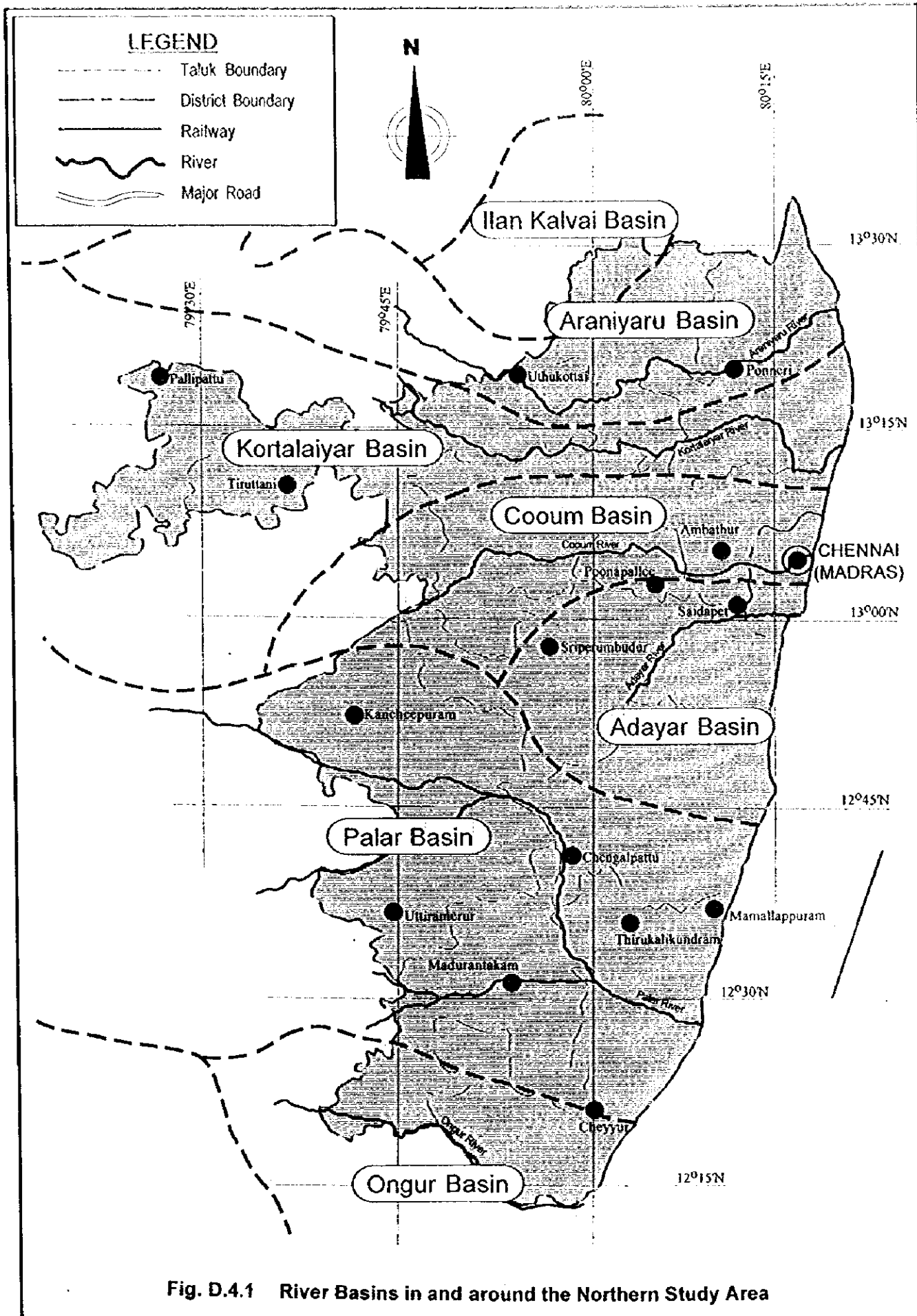


Fig. D.4.1 River Basins in and around the Northern Study Area

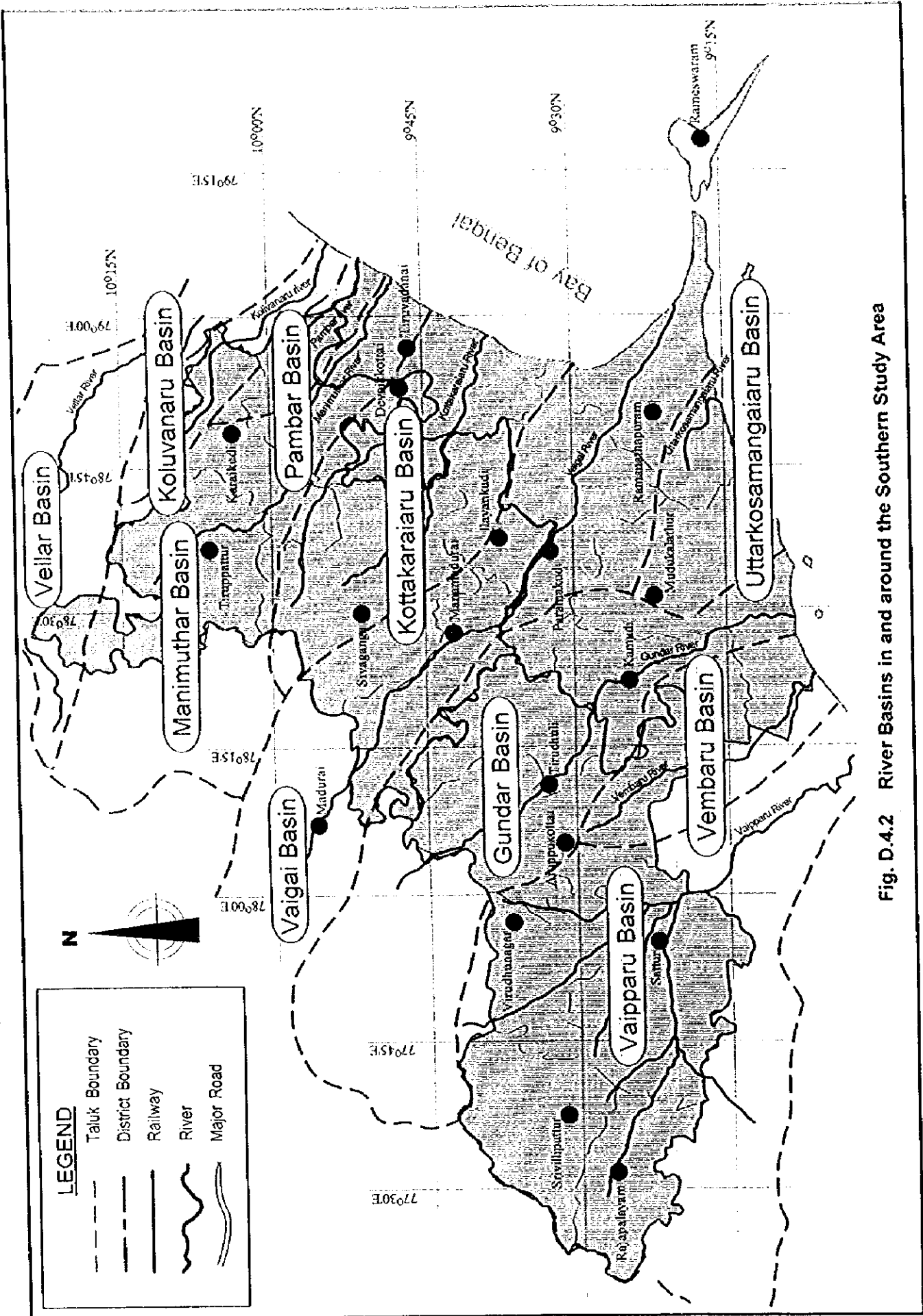


Fig. D.4.2 River Basins in and around the Southern Study Area

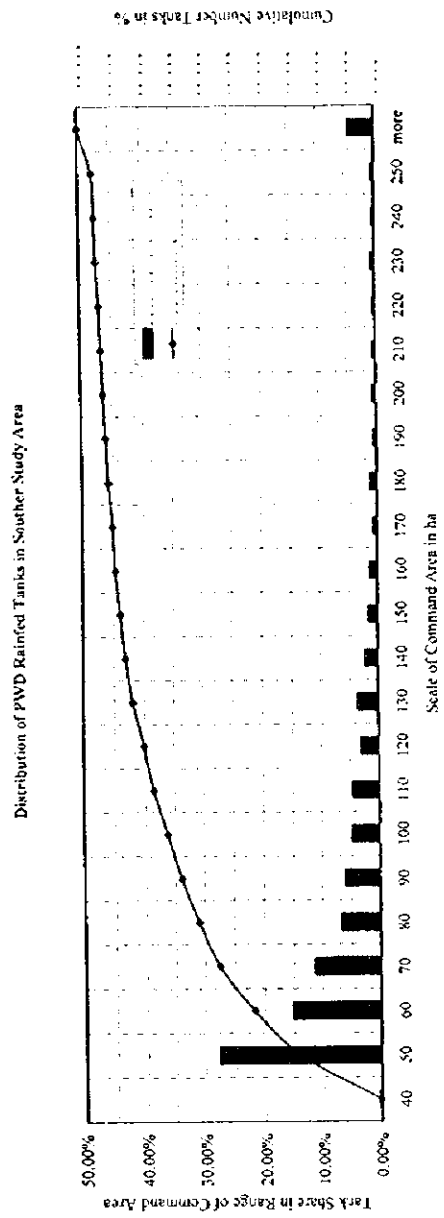
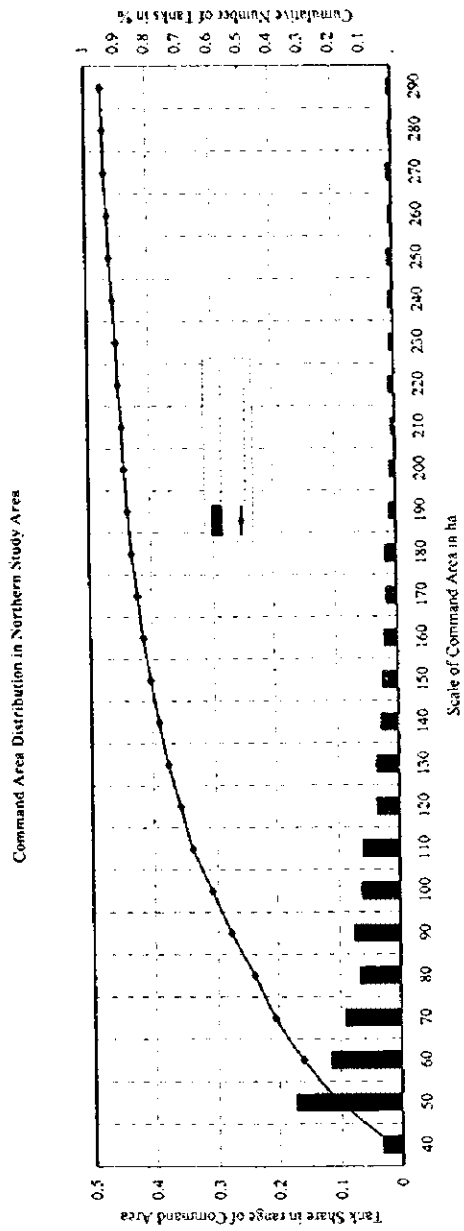
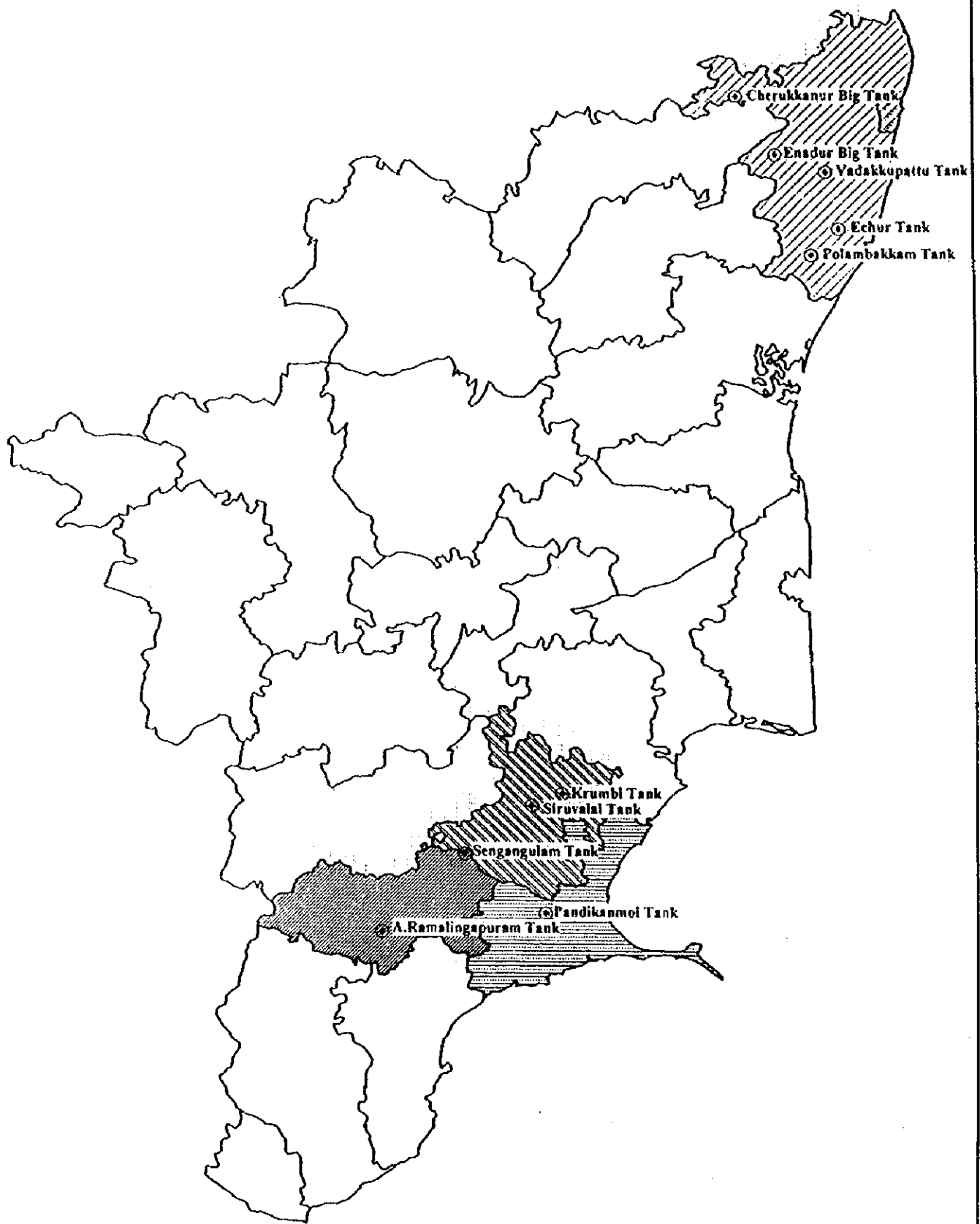


Fig. D.4.3 Command Area Distribution in the Study Area



**Fig. D.6.1** Location of the Representative Tanks in the Study Area

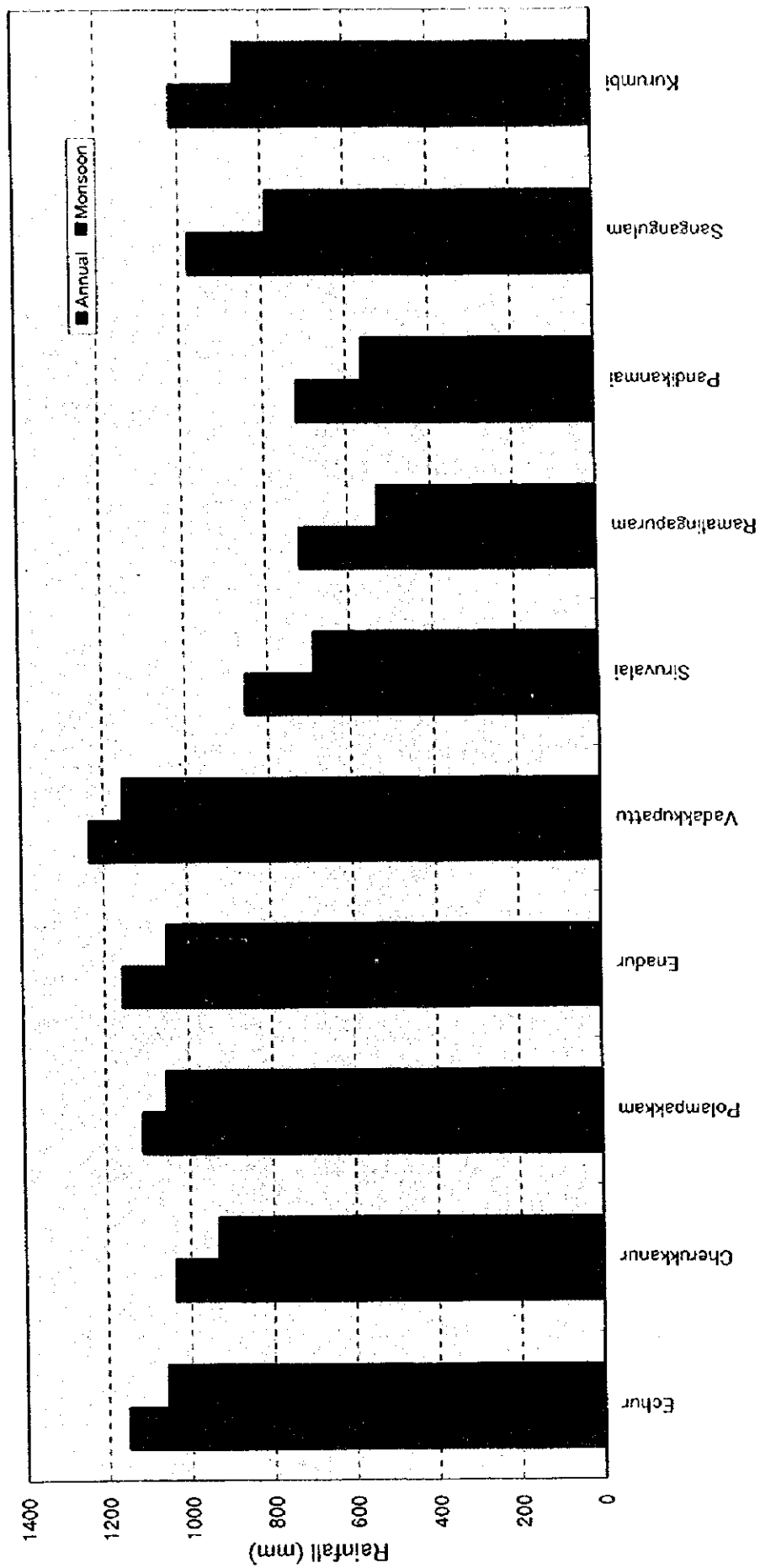


Fig. D.6.2 Annual and Monsoon Rainfall in Pilot Tank Areas



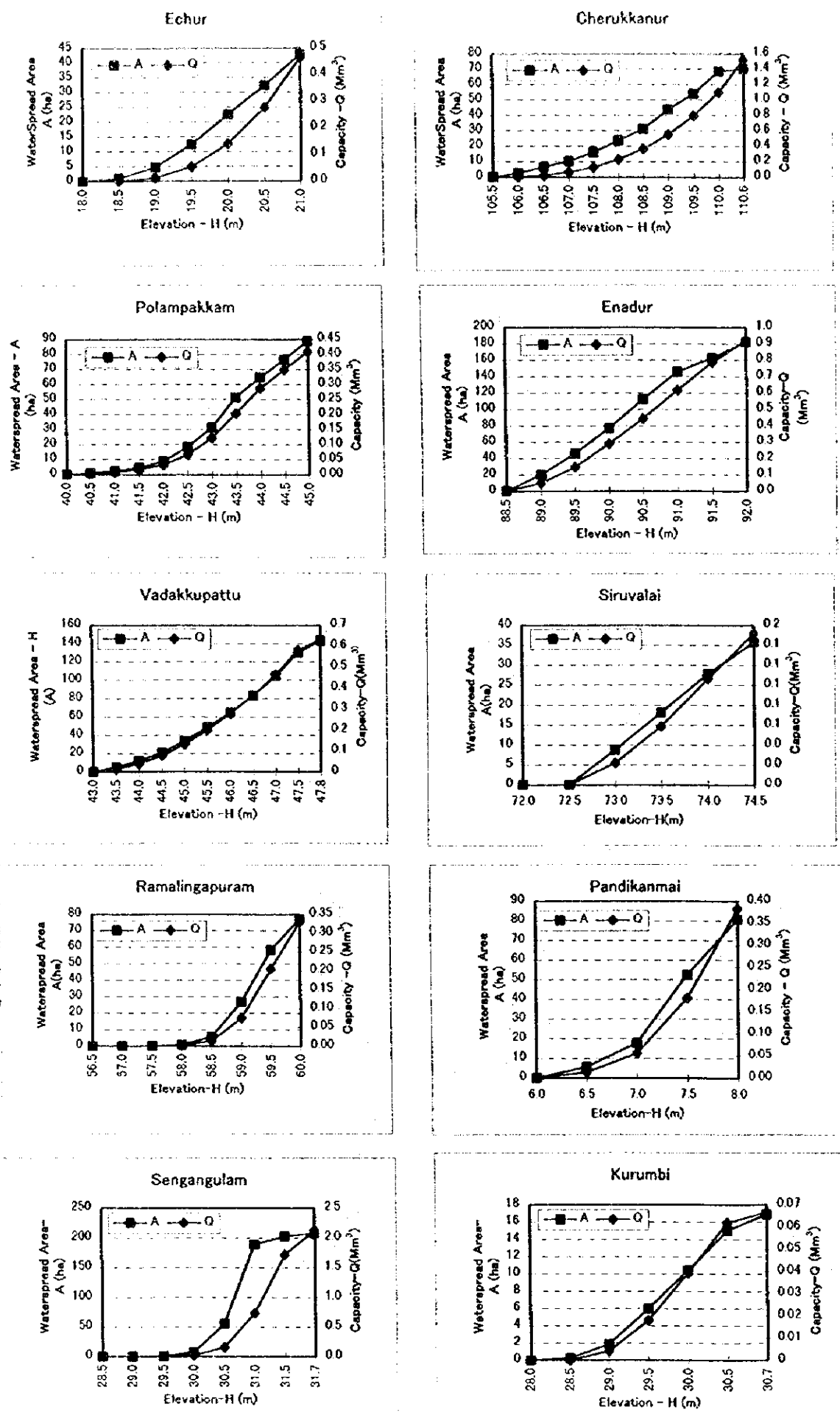
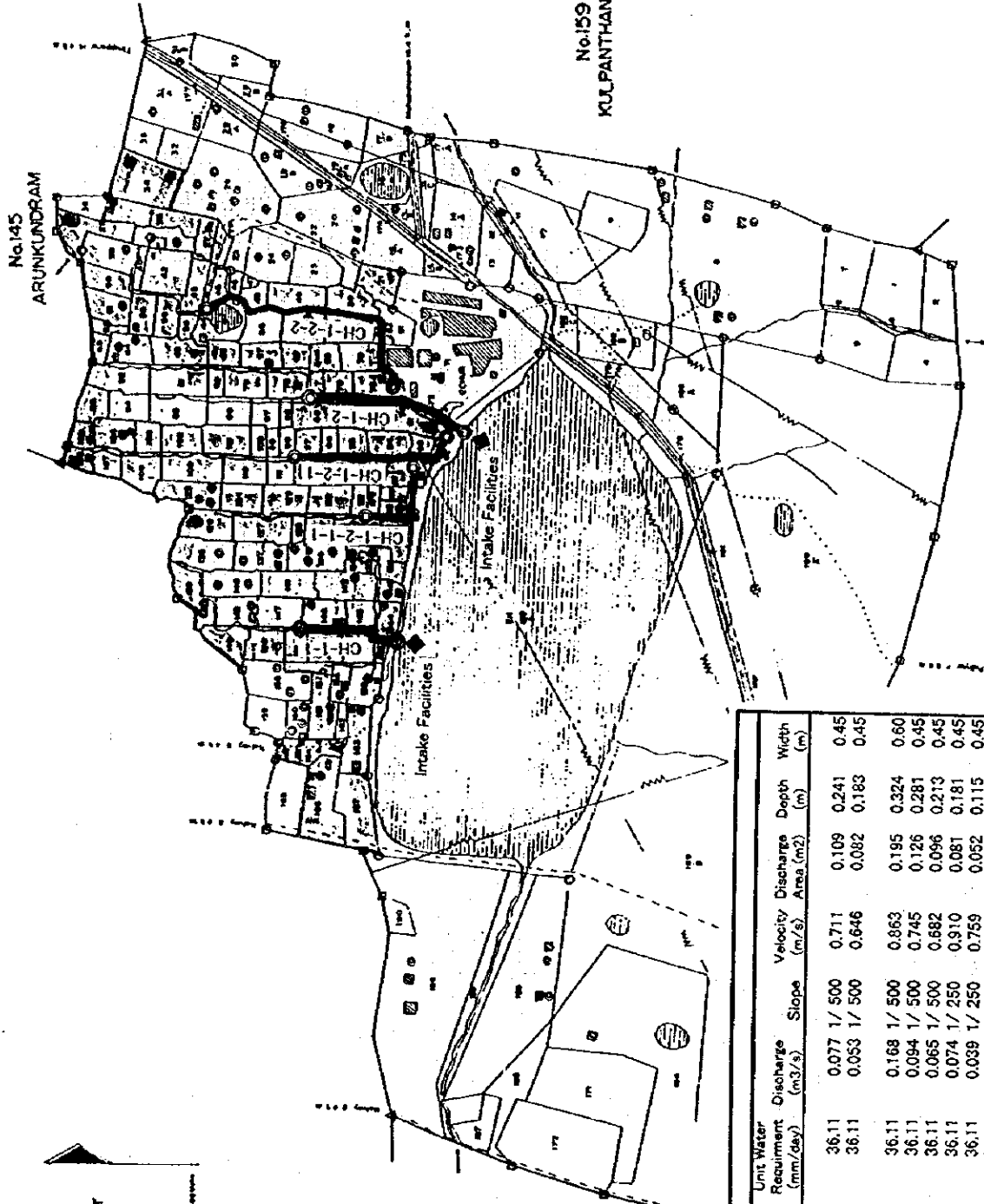


Fig. D.6.3 Elevation - Capacity - Water Spread Area Curves for Pilot Tank Areas

No.160  
**ECHUR**  
 CHENGALPATTU TALUK  
 CHENGALPATTU M.G.R. DISTRICT

Scale 1:2000



**STANDARD ABBREVIATIONS**

Water supply line	Water supply line
Electricity line	Electricity line
...	...

Canal Number	Length (m)	Beneficial Area (ha)	Unit Water			Velocity (m/s)	Discharge Area (m <sup>2</sup> )	Slope	Discharge (m <sup>3</sup> /s)	Discharge (mm/day)	Depth (m)	Width (m)
			Requirement (mm/day)	Discharge (m <sup>3</sup> /s)	Discharge (mm/day)							
<b>Intake Facilities</b>												
CH-1-1	20	18.4	36.11	0.077	1/500	0.711	0.109	0.241	0.45			
	220	12.8	36.11	0.053	1/500	0.646	0.082	0.183	0.45			
<b>Intake Facilities</b>												
CH-1-2	20	40.3	36.11	0.168	1/500	0.853	0.195	0.324	0.60			
	140	22.6	36.11	0.094	1/500	0.745	0.126	0.281	0.45			
CH-1-2-1	200	15.6	36.11	0.065	1/500	0.882	0.096	0.213	0.45			
	140	17.7	36.11	0.074	1/250	0.910	0.081	0.181	0.45			
CH-1-2-1-1	270	9.4	36.11	0.039	1/250	0.759	0.052	0.115	0.45			
	240	8.3	36.11	0.035	1/400	0.822	0.056	0.125	0.45			
CH-1-2-2	700	16.4	36.11	0.069	1/300	0.835	0.083	0.184	0.45			

Fig. D.7.1 Layout of Selective Lining for Field Channel in Echur Tank

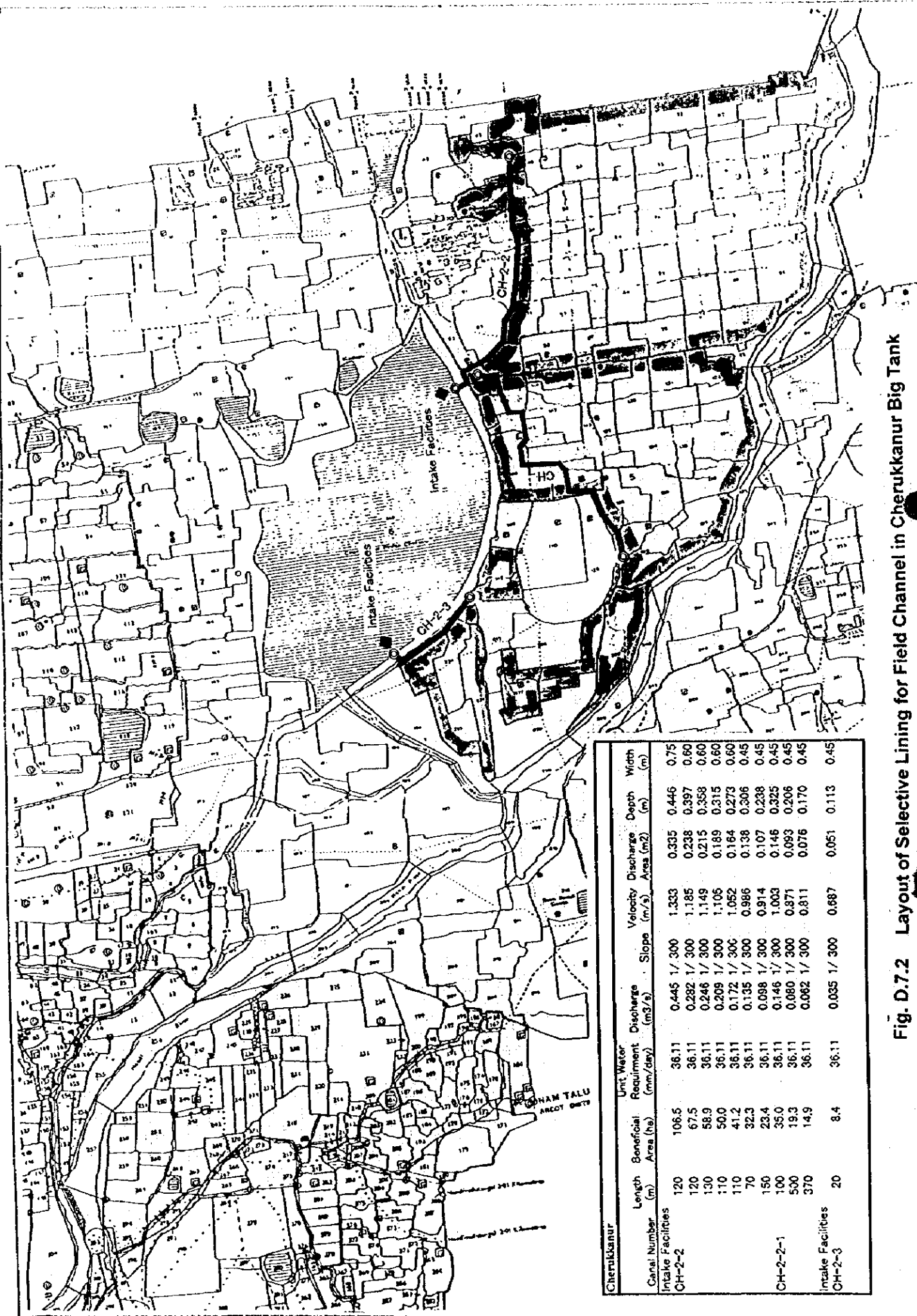
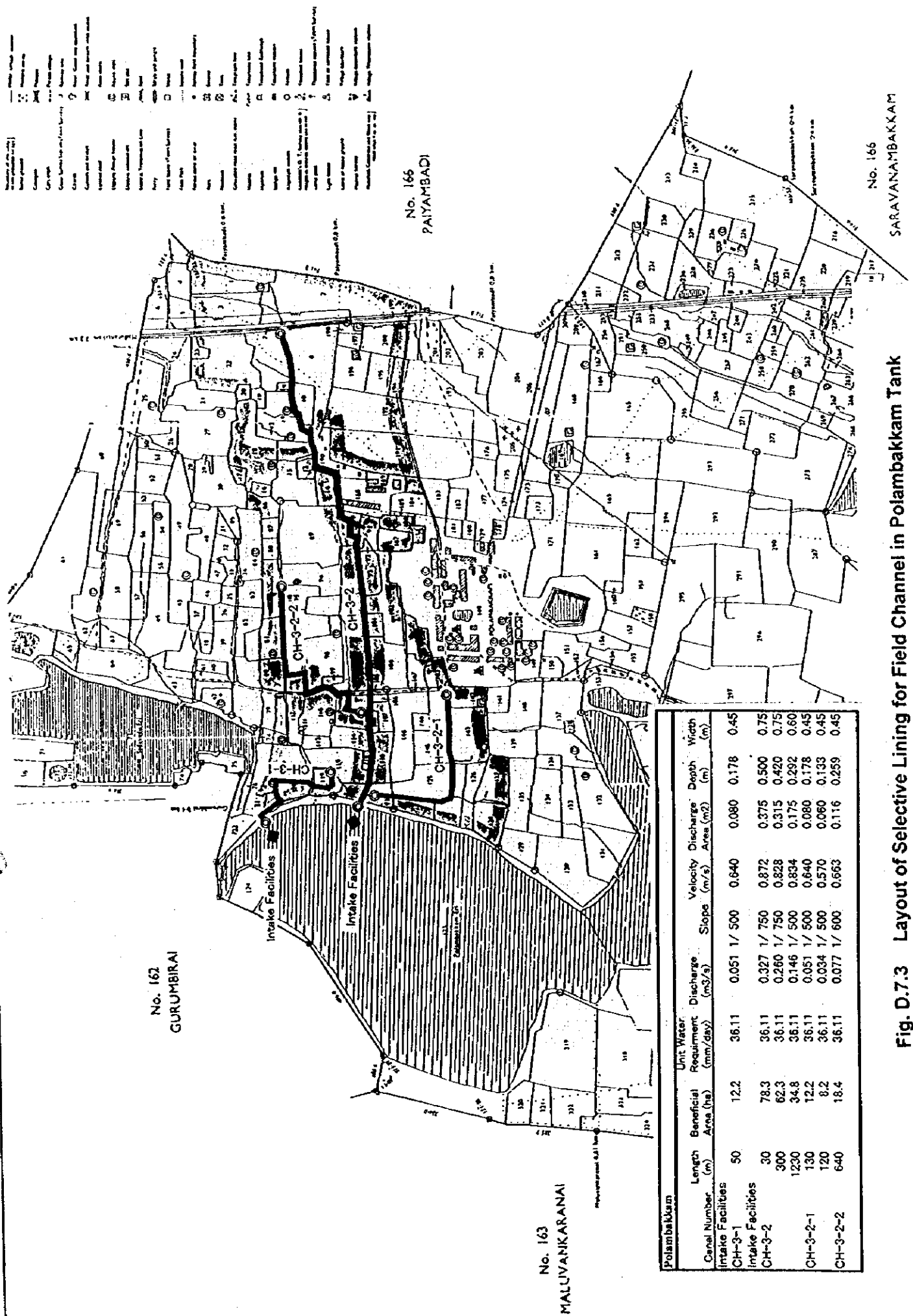


Fig. D.7.2 Layout of Selective Lining for Field Channel in Cherkkanur Big Tank

Cherkkanur Canal Number	Length (m)	Beneficial Area (ha)	Unit Water Requirement (mm/day)	Discharge (m <sup>3</sup> /s)	Slope	Velocity (m/s)	Discharge Area (m <sup>2</sup> )	Depth (m)	Width (m)
Intake Facilities CH-2-2	120	106.5	36.11	0.445	1/300	1.333	0.335	0.446	0.75
	120	67.5	36.11	0.282	1/300	1.185	0.238	0.397	0.60
	130	58.9	36.11	0.246	1/300	1.149	0.215	0.358	0.60
	110	50.0	36.11	0.209	1/300	1.105	0.189	0.315	0.60
	110	41.2	36.11	0.172	1/300	1.052	0.164	0.273	0.60
CH-2-2-1	70	32.3	36.11	0.135	1/300	0.986	0.138	0.306	0.45
	150	23.4	36.11	0.098	1/300	0.914	0.107	0.238	0.45
	100	35.0	36.11	0.146	1/300	1.003	0.146	0.325	0.45
	500	19.3	36.11	0.080	1/300	0.871	0.093	0.206	0.45
	370	14.9	36.11	0.062	1/300	0.811	0.076	0.170	0.45
Intake Facilities CH-2-3	20	8.4	36.11	0.035	1/300	0.687	0.051	0.113	0.45



No. 162  
GURUMBIRAI

No. 166  
PAIYAMBADI

No. 163  
MALLIVANKARANAI

No. 166  
SARAVANAMBAKKAM

Canal Number	Length (m)	Beneficial Area (ha)	Unit Water			Velocity (m/s)	Discharge Area (m <sup>2</sup> )	Depth (m)	Width (m)
			Requirement (mm/day)	Discharge (m <sup>3</sup> /s)	Slope				
Intake Facilities	50	12.2	36.11	0.051	1/500	0.640	0.080	0.178	0.45
CH-3-1	30	78.3	36.11	0.327	1/750	0.872	0.375	0.500	0.75
Intake Facilities	300	62.3	36.11	0.260	1/750	0.828	0.315	0.420	0.75
CH-3-2	1230	34.8	36.11	0.146	1/500	0.894	0.175	0.292	0.60
CH-3-2-1	130	12.2	36.11	0.051	1/500	0.640	0.080	0.178	0.45
CH-3-2-2	120	8.2	36.11	0.034	1/500	0.570	0.060	0.133	0.45
CH-3-2-2	640	18.4	36.11	0.077	1/600	0.663	0.116	0.259	0.45

Fig. D.7.3 Layout of Selective Lining for Field Channel in Polambakkam Tank

Canal Number	Length (m)		Beneficial Area (ha)		Unit Water Requirement (mm/day)		Discharge (m <sup>3</sup> /s)		Slope	Velocity Discharge (m <sup>3</sup> /s)		Depth (m)	Width (m)
	Intake	Outlet	Intake	Outlet	Intake	Outlet	Intake	Outlet		Intake	Outlet		
Intake Facilities CH-4-1	1,600	499.5	36.11	2,088	1/500	1,620	0.859	1.50					
	1,450	414.2	36.11	1,731	1/500	1,528	1.13	0.944					
	900	369.7	36.11	1,545	1/500	1,492	1.04	0.883					
	500	346.0	36.11	1,446	1/500	1,470	0.98	0.819					
	350	308.1	36.11	1,287	1/500	1,433	0.90	0.749					
	220	71.1	36.11	0,297	1/500	0,998	0.30	0.308					
	300	28.4	36.11	0,119	1/500	0,784	0.15	0.337					
	400	18.5	36.11	0,069	1/500	0,427	0.18	0.215					
	550	44.5	36.11	0,186	1/500	0,885	0.21	0.390					
	420	37.9	36.11	0,158	1/500	0,851	0.19	0.310					
Intake Facilities CH-4-1-13	300	165.9	36.11	0,680	1/500	1,222	0.57	0.630					
	600	28.4	36.11	0,119	1/500	0,784	0.15	0.337					
	800	16.5	36.11	0,069	1/500	0,427	0.18	0.215					
	700	16.5	36.11	0,069	1/500	0,427	0.16	0.215					
	33.2	36.11	0,139	1/500	0,856	0.19	0.315						
	16.5	36.11	0,069	1/500	0,427	0.16	0.215						
	170	56.9	36.11	0,228	1/500	0,970	0.29	0.487					
	70	16.5	36.11	0,069	1/500	0,427	0.16	0.215					
	550	37.9	36.11	0,158	1/500	0,851	0.22	0.363					
	450	16.5	36.11	0,069	1/500	0,427	0.18	0.215					
Intake Facilities CH-4-1-16	200	33.2	36.11	0,139	1/500	0,869	0.20	0.337					
	250	16.5	36.11	0,069	1/500	0,427	0.16	0.215					
Intake Facilities CH-4-2	550	33.2	36.11	0,139	1/500	0,845	0.18	0.304					
	500	16.5	36.11	0,069	1/500	0,427	0.16	0.215					

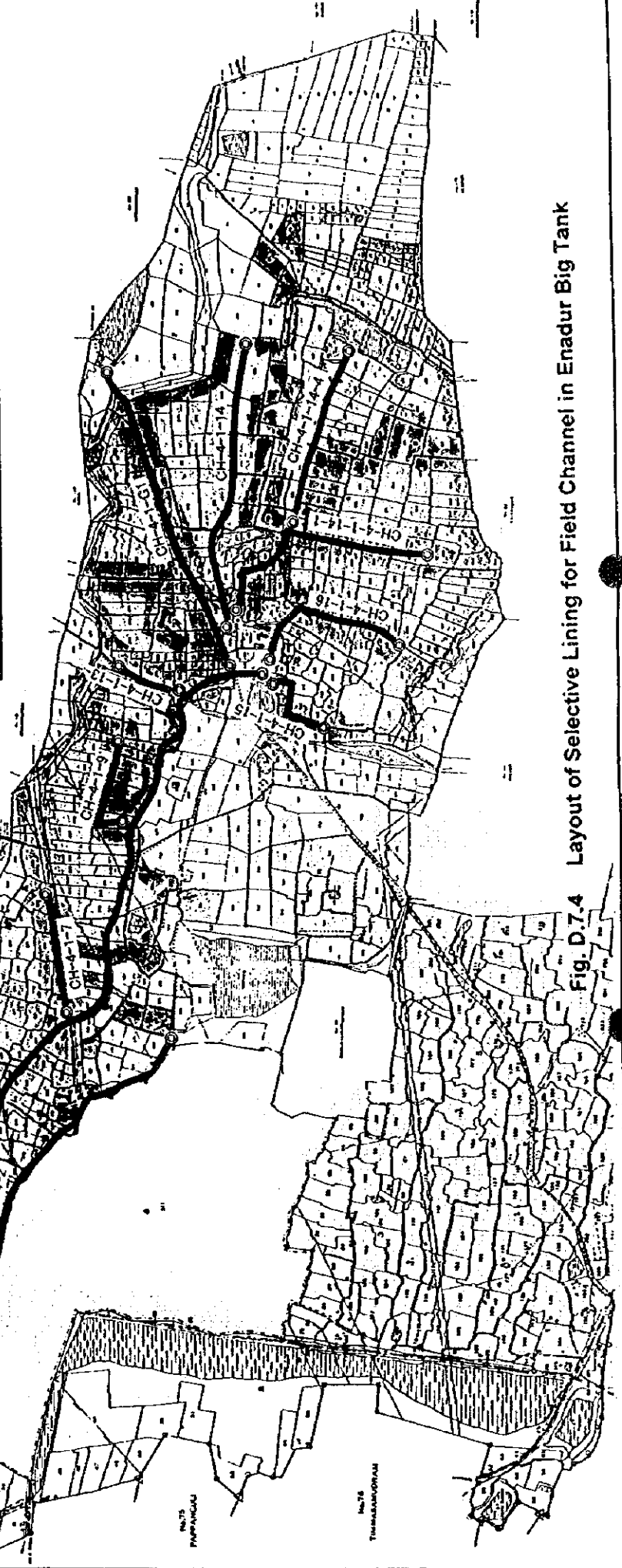


Fig. D.7.4 Layout of Selective Lining for Field Channel in Enadur Big Tank

Vadakkupattu		Length (m)	Beneficial Area (ha)	Unit Water Requirement (mm/day)	Discharge (m <sup>3</sup> /s)	Slope	Velocity (m/s)	Discharge Area (m <sup>2</sup> )	Depth (m)	Width (m)
Intake Facilities										
CH-5-1	50	309.0	36.11	1.291	1/500	1.434	0.901	0.751	1.20	0.75
	1900	76.2	36.11	0.319	1/500	1.013	0.315	0.420	0.75	1.20
CH-5-2	480	232.7	36.11	0.973	1/500	1.340	0.726	0.605	1.20	1.20
	280	219.5	36.11	0.917	1/500	1.320	0.695	0.579	1.20	0.90
	480	187.0	36.11	0.782	1/500	1.254	0.624	0.693	0.90	0.90
	100	136.2	36.11	0.569	1/500	1.170	0.487	0.541	0.90	0.75
	400	95.5	36.11	0.399	1/500	1.067	0.374	0.499	0.75	0.75
	400	75.2	36.11	0.314	1/500	1.009	0.311	0.415	0.75	0.60
	250	49.8	36.11	0.208	1/500	0.908	0.229	0.362	0.60	0.60
	500	38.6	36.11	0.161	1/500	0.855	0.189	0.314	0.60	0.60
CH-5-2-2	670	32.5	36.11	0.136	1/500	0.820	0.167	0.278	0.60	0.60
CH-5-2-7	800	50.8	36.11	0.212	1/500	0.912	0.233	0.388	0.60	0.60
CH-5-2-10	650	40.7	36.11	0.170	1/500	0.866	0.196	0.327	0.60	0.45
CH-5-2-G1	400	20.3	36.11	0.085	1/500	0.728	0.117	0.260	0.45	0.45
CH-5-2-G2	1100	25.4	36.11	0.106	1/500	0.765	0.139	0.308	0.45	0.45
CH-5-2-12	300	11.2	36.11	0.047	1/500	0.625	0.075	0.167	0.45	0.45
CH-5-2-13-1	450	12.2	36.11	0.051	1/500	0.639	0.080	0.177	0.45	0.45
Intake Facilities										
CH-5-3	2640	89.4	36.11	0.374	1/500	1.052	0.356	0.475	0.75	0.75

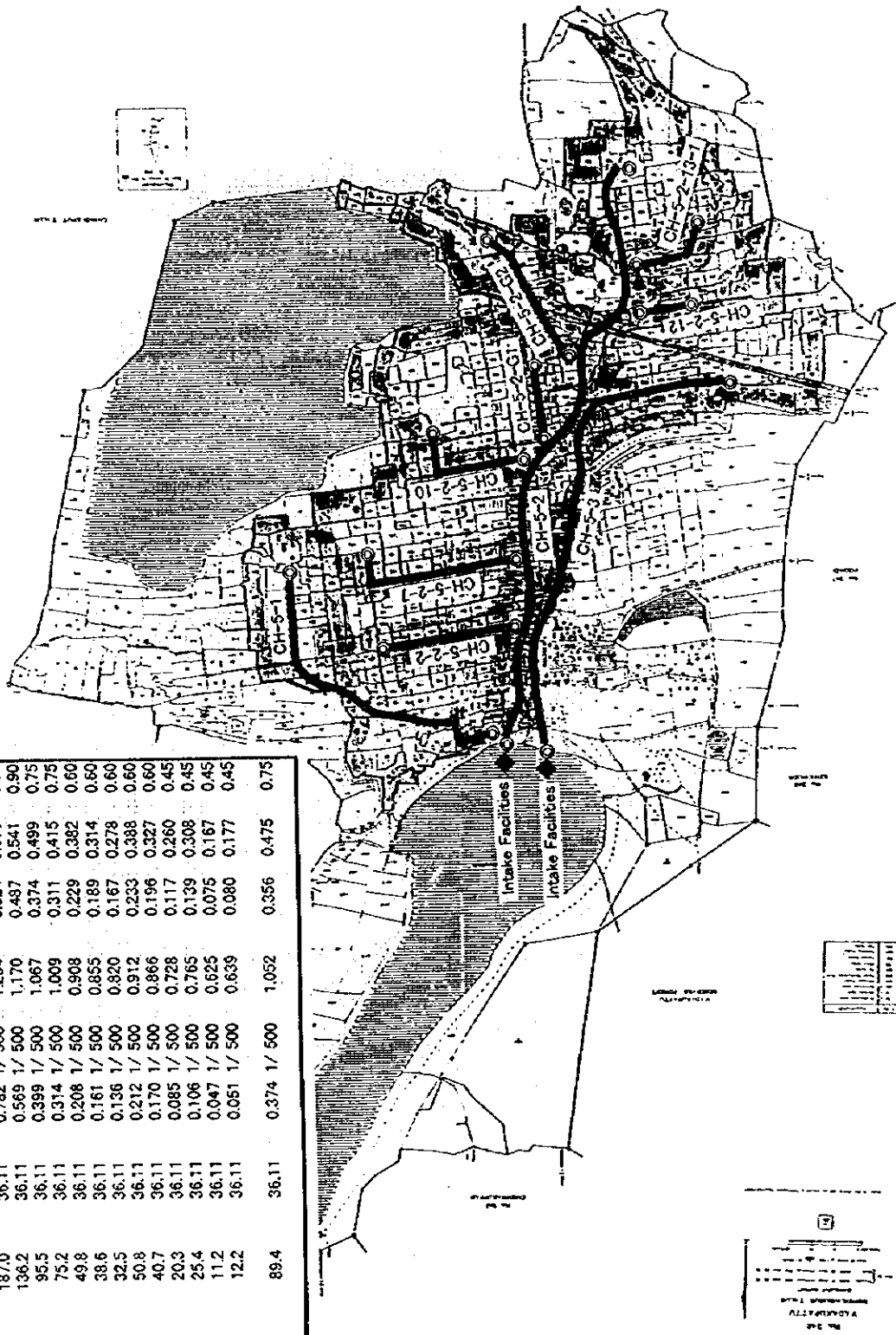
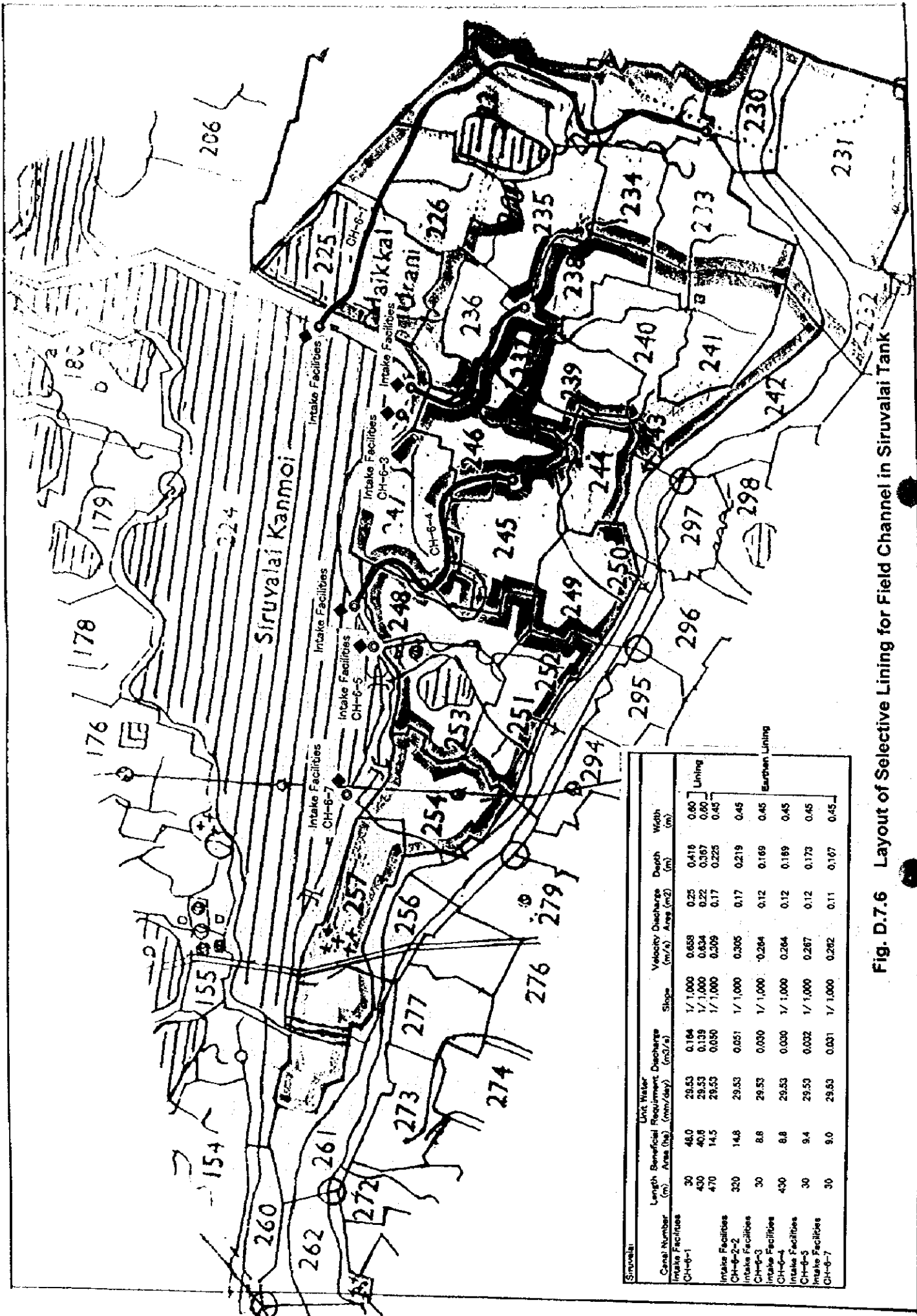
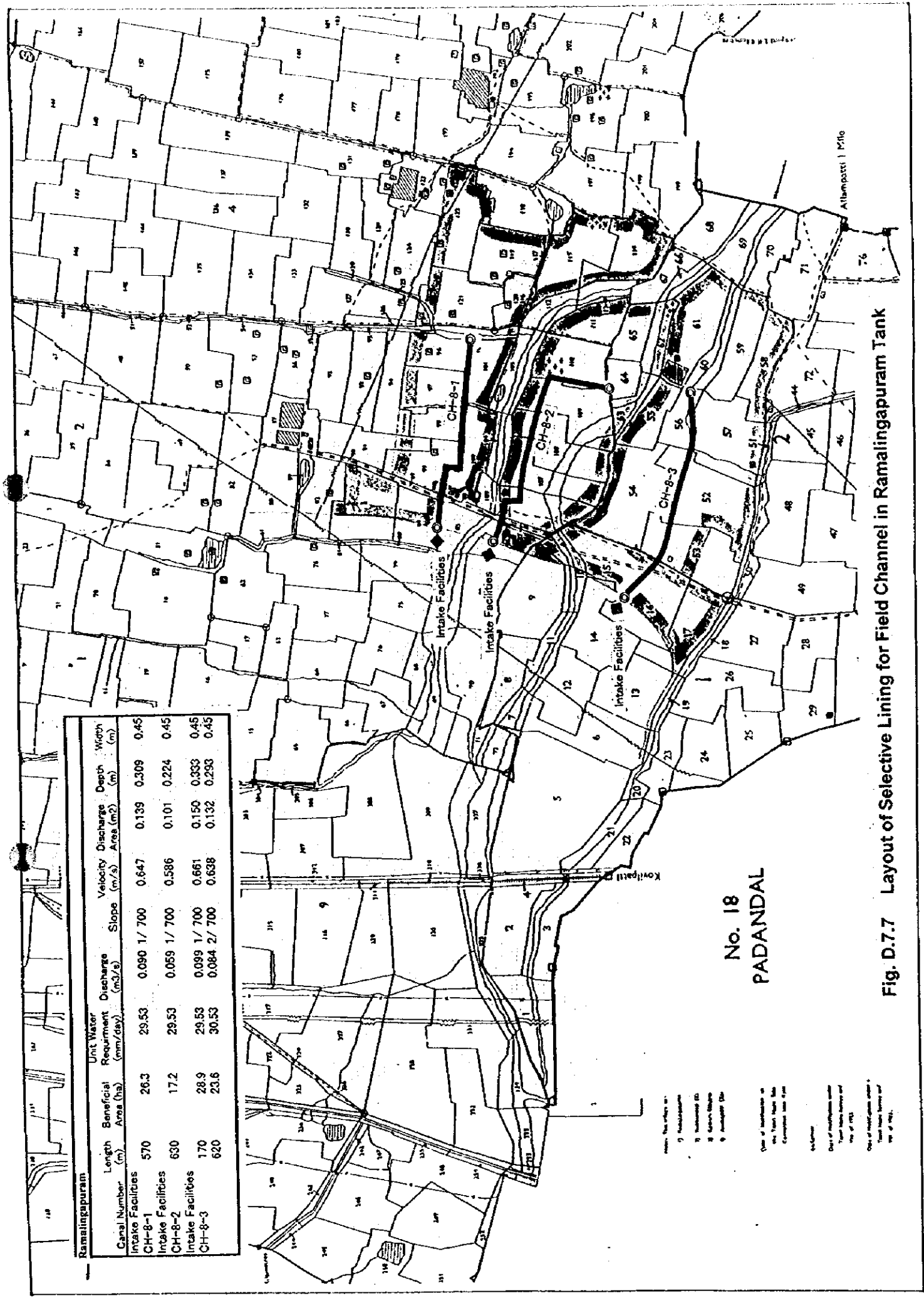


Fig. D.7.5 Layout of Selective Lining for Field Channel in Vadakkupattu Tank



Canal Number	Unit Water			Slope	Velocity Discharge (m <sup>3</sup> /s)	Depth (m)	Width (m)	
	Length (m)	Beneficial Area (ha)	Requirement Discharge (mm/day)					
Intake Facilities CH-6-1	30	48.0	29.53	0.184	1/1,000	0.658	0.25	Lining
	430	40.8	29.53	0.139	1/1,000	0.834	0.22	Lining
	470	14.5	29.53	0.050	1/1,000	0.309	0.17	Lining
Intake Facilities CH-6-2	320	14.8	29.53	0.051	1/1,000	0.305	0.17	Earthen Lining
Intake Facilities CH-6-3	30	8.8	29.53	0.030	1/1,000	0.204	0.12	Earthen Lining
Intake Facilities CH-6-4	430	8.8	29.53	0.030	1/1,000	0.204	0.12	Earthen Lining
Intake Facilities CH-6-5	30	9.4	29.53	0.032	1/1,000	0.267	0.12	Earthen Lining
Intake Facilities CH-6-6	30	9.0	29.53	0.031	1/1,000	0.262	0.11	Earthen Lining
Intake Facilities CH-6-7	30	9.0	29.53	0.031	1/1,000	0.262	0.11	Earthen Lining

Fig. D.7.6 Layout of Selective Lining for Field Channel in Siruvalai Tank



Canal Number	Length (m)	Beneficial Area (ha)	Unit Water Requirement (mm/day)	Discharge (m <sup>3</sup> /s)	Slope	Velocity (m/s)	Discharge Area (m <sup>2</sup> )	Depth (m)	Width (m)
Intake Facilities	570	26.3	29.53	0.090	1/700	0.647	0.139	0.309	0.45
CH-B-1									
Intake Facilities	630	17.2	29.53	0.059	1/700	0.586	0.101	0.224	0.45
CH-B-2									
Intake Facilities	170	28.9	29.53	0.099	1/700	0.661	0.150	0.333	0.45
CH-B-3	620	23.6	30.53	0.084	2/700	0.638	0.132	0.293	0.45

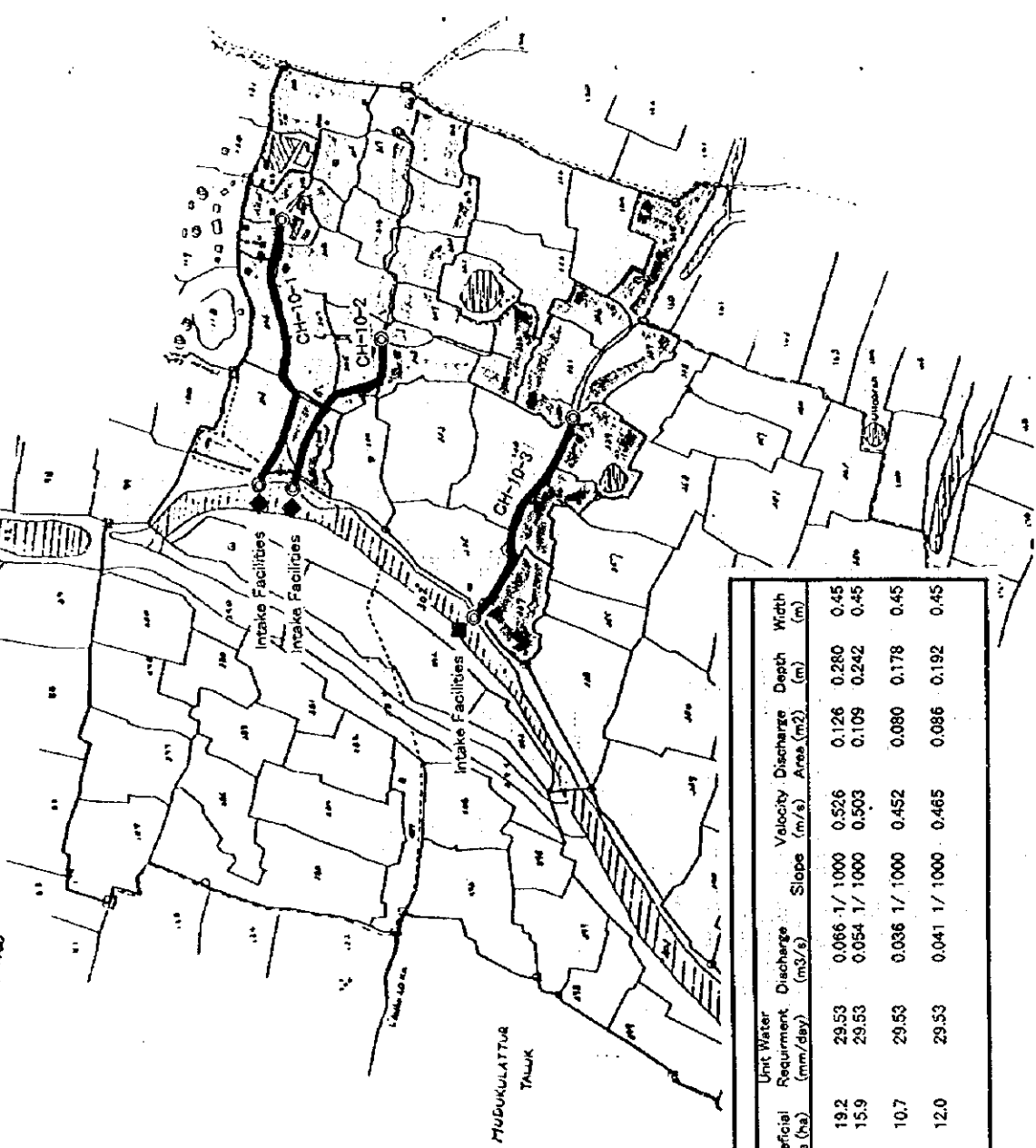
No. 18  
PADANDAL

Fig. D.7.7 Layout of Selective Lining for Field Channel in Ramalingapuram Tank



No.35 PANDI KANMOI

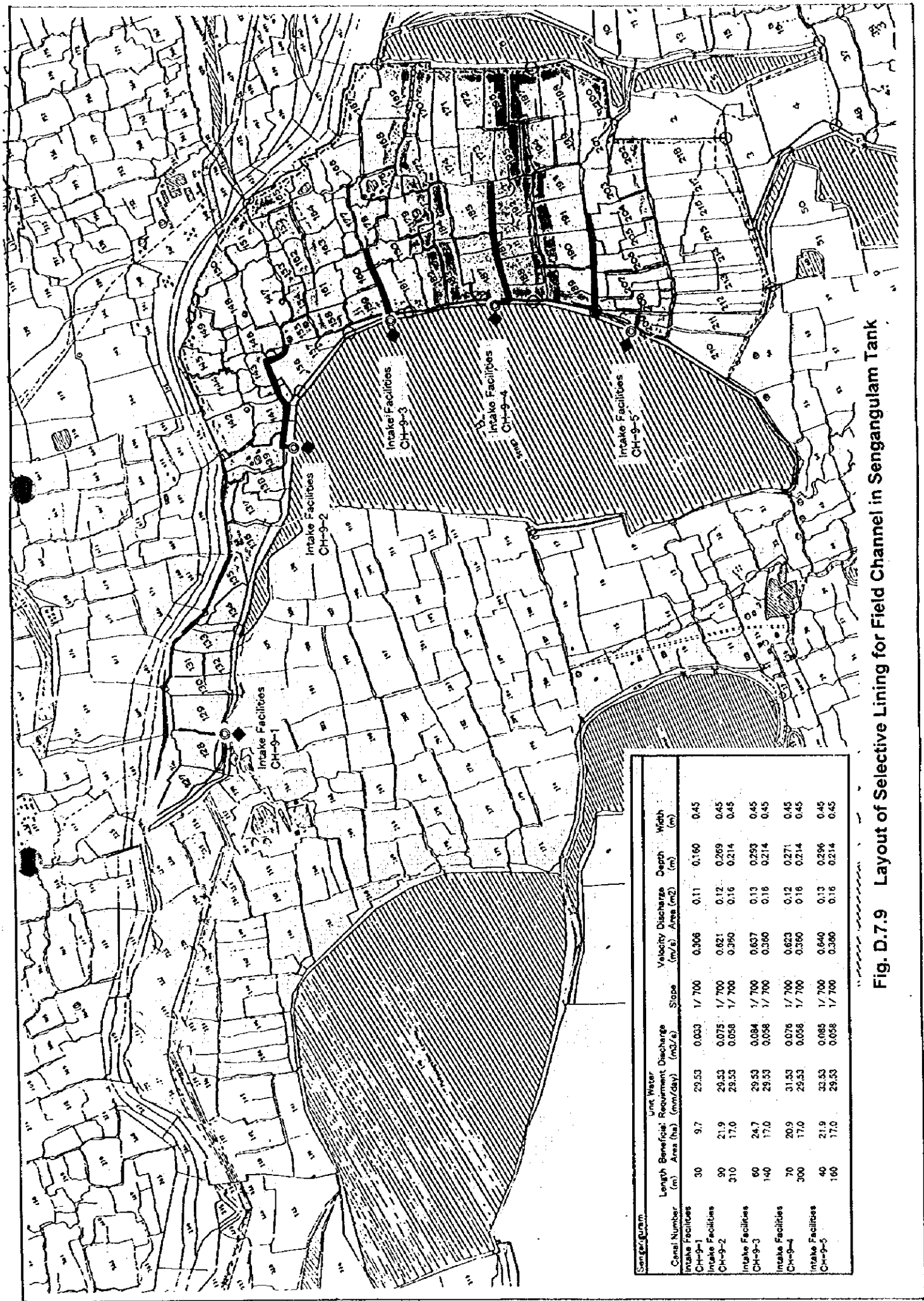
PANDI KANMOI VILLAGE  
 BOBALAR BLOCK  
 PANDI KANMOI TALUK  
 RAMANATHAPURAM - DISTRICT  
 SCALE 1/5000



MUDUKULATTUR  
 TANK

Canal Number	Length (m)	Beneficial Area (ha)	Unit Water Requirement (mm/day)	Discharge (m <sup>3</sup> /s)	Slope	Velocity (m/s)	Discharge Area (m <sup>2</sup> )	Depth (m)	Width (m)
CH-10-1	230	19.2	29.53	0.066 1/1000	0.526	0.126	0.280	0.45	
Intake Facilities	390	15.9	29.53	0.054 1/1000	0.503	0.109	0.242	0.45	
CH-10-2	390	10.7	29.53	0.036 1/1000	0.452	0.080	0.178	0.45	
Intake Facilities	540	12.0	29.53	0.041 1/1000	0.465	0.086	0.192	0.45	

Fig. D.7.8 Layout of Selective Lining for Field Channel in Pandikanmoi Tank



Canal Number	Length (m)	Beneficial Area (ha)	Unit Water Requirement (mm/day)	Discharge (m <sup>3</sup> /s)	Slope	Velocity (m/s)	Discharge Area (m <sup>2</sup> )	Depth (m)	Width (m)
Intake Facilities CH-9-1	30	9.7	29.53	0.030	1/700	0.306	0.11	0.160	0.45
Intake Facilities CH-9-2	90	21.9	29.53	0.075	1/700	0.621	0.12	0.269	0.45
Intake Facilities CH-9-3	140	17.0	29.53	0.058	1/700	0.390	0.16	0.214	0.45
Intake Facilities CH-9-4	60	24.7	29.53	0.084	1/700	0.637	0.13	0.293	0.45
Intake Facilities CH-9-5	160	17.0	29.53	0.058	1/700	0.390	0.16	0.214	0.45

Fig. D.7.9 Layout of Selective Lining for Field Channel in Sengangalam Tank

Canal Number	Unit Water				Discharge (m <sup>3</sup> /s)	Slope	Velocity (m/s)	Discharge Area (m <sup>2</sup> )	Depth (m)	Width (m)
	Length (m)	Beneficial Area (ha)	Requiment (mm/day)	Recoument (mm/day)						
Intake Facilities										
CH-7-1-1	30	52.7	29.53	29.53	0.180	1/600	0.819	0.220	0.367	0.60
CH-7-1-1	640	30.4	29.53	29.53	0.104	1/600	0.709	0.147	0.326	0.45
CH-7-1-1	110	15.4	29.53	29.53	0.053	1/600	0.604	0.083	0.196	0.45
CH-7-1-2	110	11.0	29.53	29.53	0.038	1/600	0.549	0.068	0.152	0.45
CH-7-1-1-1	130	7.0	29.53	29.53	0.024	1/600	0.482	0.050	0.111	0.45
CH-7-1-1-1	110	4.3	29.53	29.53	0.015	1/600	0.417	0.037	0.082	0.45

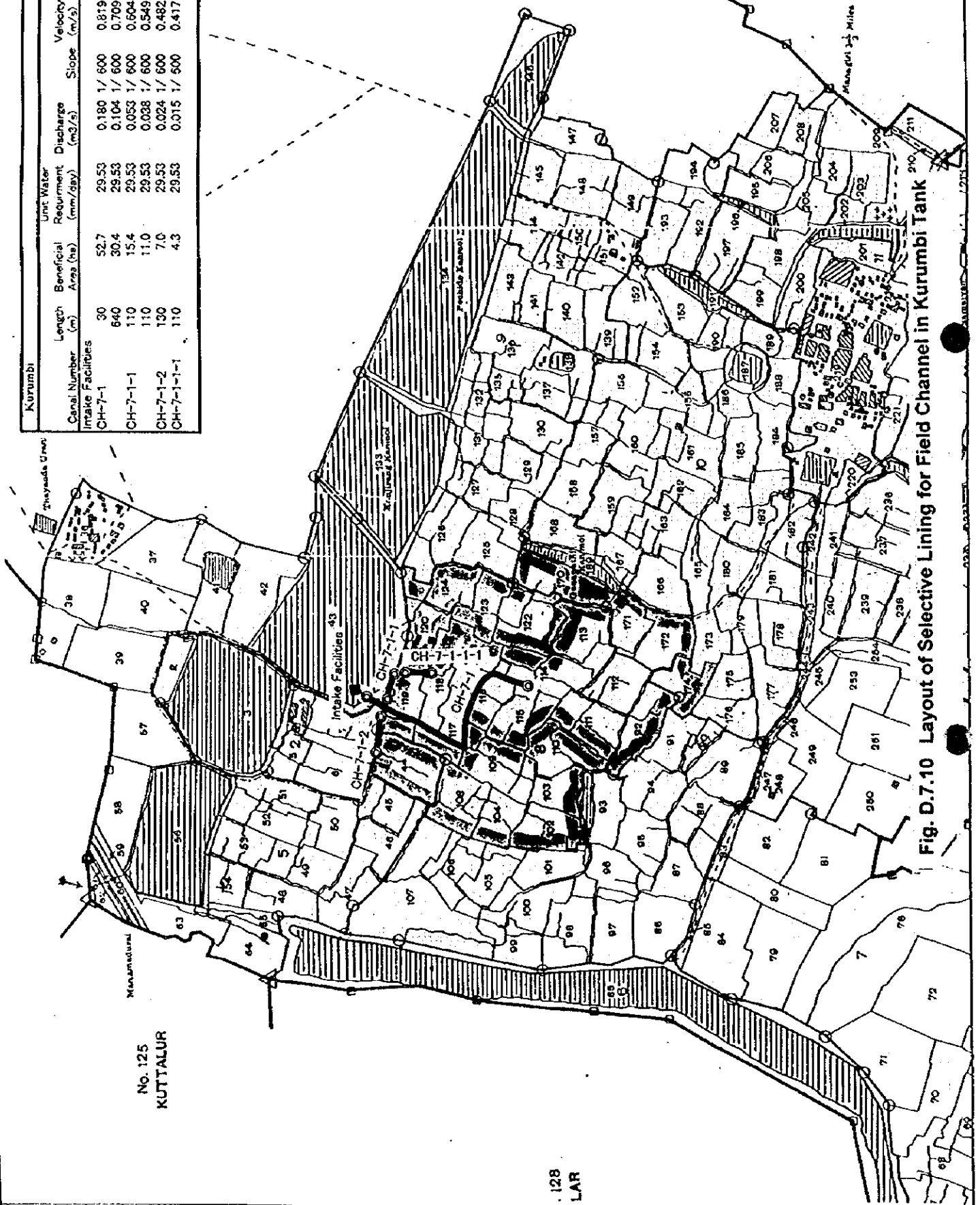


Fig. D.7.10 Layout of Selective Lining for Field Channel in Kurumbi Tank

## E ENVIRONMENTAL ASPECTS

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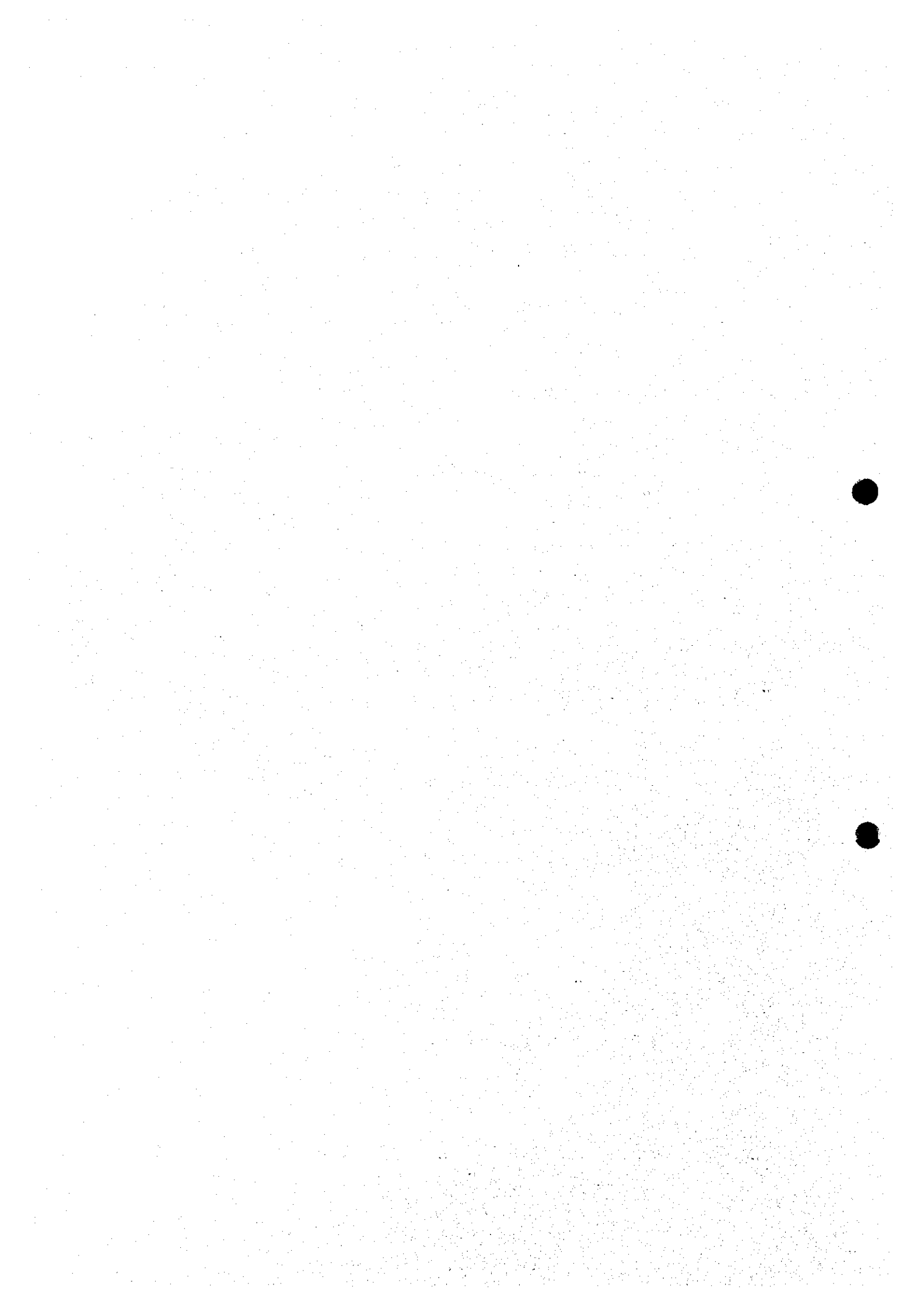
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## **E ENVIRONMENTAL ASPECTS**

### **E.1 Regulatory Procedures and Legislation**

#### **E.1.1 General**

In India, all the major legislation related to environment are enacted by the Ministry of Environment and Forests (MEF). But beside these some States and Union Territories may also enact their own legislation.

The State Pollution Control Boards (SPCB) established in every state of the country are responsible for implementing these legislation as well as issuing the rules, regulations and notifications. In the case of Union Territories, the Pollution Control Committee (PCC) is responsible for this. The Central Pollution Control Board (CPCB) at New Delhi coordinates the activities of the state pollution control boards and the pollution control committees. The CPCB also advises the Central Government on environmental related matter, and facilitate circulation of Rules and Notifications in the country. The Tamil Nadu Pollution Control Board (TNPCB) is at Chennai city. Organization charts of MEF, Environment and Forestry Department (EFD) and TNPCB are presented in Fig. E.1.1, E.1.2 and E.1.3

According to project categorization for environmental clearance, this project for Rehabilitation of Minor Irrigation Tanks falls into the River Valley Projects category. But it does not requires environmental clearance from the Central Government, because its investment is below Rs.500 million ceiling. So it only needs to obtain permit from the State authorities. Moreover this is a water related project, and water is a state subject, hence its storage, exploitation and uses are the responsibility of the state authorities.

#### **E.1.2 Legislation and Acts**

Several Acts adopted by the central government and the state government of Tamil Nadu relate to the water sector, to which this project belongs. These Acts are of three groups:

- i) Acts related to environmental protection
- ii) Acts relevant to the regulation of domestic and industrial discharge into water bodies.
- iii) Acts relevant to the distribution and utilization of water for irrigation.

Each group is briefly explained below:

**(1) Environmental Protection Acts**

The Environmental (Protection) Act of 1986 covers all activities and environment related affairs such as :

- Prevention of environmental damage
- Punishment for episodic events
- Regulation of industrial locations
- Clearance for developmental projects
- Setting of standards for air, water and solid waste releases.

The MEF establishes new rules and regulations on the basis of this Act. According to current procedures, the delineation between the central government, state governments and local agencies is as follows :

All the development projects which have large investments and may have a direct or indirect impact on air, water, land and coastal resources need a detail Environmental Impact Assessment (EIA) prepared by the proponents and submitted to the Government of India for scrutiny and clearance. The EIA is to be prepared using baseline environmental data, and quantifying impacts for each one of the natural resources, cultural/historical assets and social environment issues. An effective plan for environmental management and follow up action with periodic inspections during the construction and operation stages of the project should also be submitted.

The documents required for environmental clearance are as listed below:

- Feasibility/Project Report
- Site clearance (only for site-specified projects mentioned in the EIA Notification)
- No Objection Certificate from the SPCBs and other local authorities
- Environment Appraisal Questionnaire
- Environmental Impact Assessment Report/Environmental Management Plan
- Risk Analysis/Emergency Preparedness Plan
- Rehabilitation plans where large scale displacement of people is anticipated

The 29 projects listed in Schedule-I of the EIA Notification (1994) can be broadly categorized under the following sectors:

- Industries
- Mining
- Thermal Power Plants
- River Valley
- Ports, Harbors and Airports

- Communication
- Atomic Energy
- Transport (Rail, Road, Highway)
- Tourism (including hotels, beach resorts)

For river valley projects, according to Clause 1.4 of the Handbook of Environmental Procedures and Guidelines published by the MEF, the Government of India in 1994, all river valley projects including hydropower, major irrigation and their combination including flood control, where the investment is Rs. 500 million or above only need to obtain environmental clearance from the Central Government. All other projects need to approach the concerned State Government departments/agencies only for the necessary clearances and permits.

## (2) Water Quality Acts and Regulations

These are to maintain and safe-guard the quality of surface, ground and coastal waters against pollution that may cause by domestic and industrial discharges.

The Water (Prevention and Control of Pollution) Act of 1974 and its amendments provide for the creation of Pollution Control Boards at the Central and State levels. These Boards are to regulate the discharge of industrial effluents into natural water bodies, insist on effluent control and monitor systems, set standards for effluent discharge and punish violators. A Pollution Control Board with specific rules and regulations is functioning in Tamil Nadu state.

## (3) Acts and Regulations Related to Irrigation and Water Resources

As irrigation has been in existence historically and in an organized manner, some of irrigation related Acts are more than 100 years old. For example, the Tamil Nadu Irrigation Cess Act of 1865 provides for the costing of irrigation water supply. Acts, Rules and Regulation established in recent years also call for suitable distribution and costing of water for irrigation.

Operation for the release of water for irrigation is controlled by specific regulatory Government Orders which have been brought together in the compendium of Rules and Regulations, part 1: Rules for Water Regulation, PWD, 1984. In this context the reservoirs have been classified into three categories:

Category 1 : This includes the major (large) reservoirs for which specific Orders of Government are required to start and end releases.

Category 2 : Reservoirs in this category are somewhat smaller than those in category 1, and are regulated by the Commissioner for Land Administration on the basis of specific recommendation of the Chief Irrigation Engineer of PWD.



Category 3 : All the other reservoirs(those not in category 1 and category 2) fall in the category 3. For this category the pattern of water release is decided by the Executive Engineer of PWD and the District Collector.

### **E.1.3 Regulation for Non-Irrigation Reservoirs**

The operation of reservoirs for power generation is done by the Tamil Nadu Electricity Board (TNEB) in accordance with regulations adopted in 1985. Rules for flood control are on the basis of part 2 of Compendium of Rules and Regulations, PWD, 1984. A Government Order in the early 1980s set out that all new projects requiring institutional finance must make application through PWD for confirmation that the required water resources are available.

All industries requiring water, including those which are privately financed, must apply to the TNPCB for a certificate of approval for their effluent disposal procedures. Water Utilisation Committee makes all decisions related to water resources. The committee is comprised of representatives from the Departments of Industry and Commerce, Finance, Planning and Development, Municipal Administration and Water Supply, and chaired by the Secretary of PWD.

It should be noted that the projects demanding water more than 4,500 m<sup>3</sup>/day go before the full Committee, others are dealt with by the Technical Sub-Committee. The Sub-Committee is chaired by Chief Irrigation Engineer of PWD and has representative from the Department of Industry and Commerce, Agriculture, the Tamil Nadu Water Supply and Drainage Board, and include the Chief Groundwater Engineer. Irrigation Projects are not actually discussed in Committee but details have to be circulated to all the relevant departments.

### **E.1.4 Short-Comings**

Though there are acts, procedures and committees to address water resources and environmental concerns, in practice there is often confusion and poor coordination especially with regards to water resource allocation decisions. The present procedures provide no mechanism for undertaking long-term resources planning. Establishing some new institutions and authorities, and adopting new water acts are some of the approaches to overcome these problems.

The current Acts of Government of Tamil Nadu and Acts of MEF related to water and environment are listed below.

#### **(1) Acts of Government of Tamil Nadu**

- Madras City Land Revenue Act, 1851
- The Madras Compulsory Labour Act, 1858

- Tamilnadu Revenue Recover Act, 1864
- Tamilnadu Irrigation Cess Act, 1865
- Tamilnadu Land Revenue Assessment Act, 1875
- Nilgiris Game and Fish Preservation Act, 1879
- Tamilnadu River Conservancy Act, 1884
- Tamilnadu Canals and Public Ferries Act, 1890
- The Land Acquisition Act, 1894
- Tamilnadu Irrigation Cess (Amendment) Act 1900
- Tamilnadu Land Encroachment Act, 1905
- Madras Estate Land Act, 1908
- Tamilnadu Land Revenue Assessment(Amendment) Act, 1914
- The Madras Town Planning Act, 1920
- Madras Survey and Boundaries Act, 1923
- Land Acquisition Amendment Act, 1923
- Bhavani Reservoir Irrigation Cess Act, 1933
- The Periar Irrigation Tanks (Preservation) Act, 1934
- Madras Irrigation Cess (Amendment), 1940
- Tamilnadu Irrigation (Voluntary Cess) Act, 1942
- Tamilnadu Irrigation Works (Repairs Improvement and Construction) Act, 1943
- The (Tamilnadu) Irrigation Cess (Amendment) Act, 1945
- The Land Acquisition (Tamilnadu) Amendment Act, 1948
- The Tamilnadu Irrigation Tanks Improvements Act, 1949
- The Land Acquisition (Tamilnadu) (amendment) Act, 1953
- Mattur Canals Irrigation Cess Act, 1953
- Tamilnadu Irrigation (Levy of Betterment Contribution) Act, 1955
- Tamilnadu Panchayats Act, 1958
- Madras Irrigation Works (Construction of field bothies) Act, 1959
- Tamilnadu Land Improvements Schemes Act, 1959 as amended
- Land Acquisition (Tamilnadu) (Amendment) Act, 1961
- Madras Additional Assessment and Additional Water Cess, 1963
- Tamilnadu Water Supply and Drainage Board Act, 1971 as amended
- Madras Metropolitan Water Supply and Sewerage Act, 1978 as modified
- Madras Metropolitan Area Ground Water (Regulation) Act, 1987

**(2) Acts of Ministry of Environment and Forests**

- Water (Prevention and Control of Pollution) Acts, 1974
- Water (Prevention and Control of Pollution) Cess, 1977
- The Environment (Protection) Act, 1986
- Forest (Conservation) Act, 1980
- Wildlife (Protection) Act, 1972
- Air (Prevention and Control of Pollution) Act, 1981.

## **E.2 Environmental Assessment**

### **E.2.1 Fauna and Flora**

The State has abundant ecologically valuable resources. The entire coast of about 6,000 km are considered ecologically sensitive, especially the coast from Rameswaram to Tuticorin including 21 coral-origin islands and mangrove forests is reserved as the Marine National Park and rare and unique species of fishes, dolphins, etc. as well as endangered mammal of Dugong.

On the other hand, the Western Ghats in Tamil Nadu are considered ecologically as one of the most sensitive and rich areas in the world, which are of highly rich floral values. In the western end of the Western Ghats around Mahendragalor hills, there are many national parks and sanctuaries to be protected. This area has rare herbal plants as well as wild lives such as tigers and birds, etc.

There are 15 wild sanctuaries and five (5) national parks in Tamil Nadu. Out of these areas only seven (7) national parks are located in the Study Area.

Locations of the tanks and their catchment and command areas are examined and it is judged that no such sanctuaries and protected areas are included in the areas relating to the rainfed tanks to be improved. Most of these tanks are constructed near the village away from such areas to be protected in older times. Therefore, no negative effects to these areas is expected by the project implementation.

### **E.2.2 Agriculture**

Adoption of modern agricultural technology comprising high yielding varieties, chemical fertilizers, assured irrigation and improved agronomic practices is considered apt to induce sometimes adverse effects to the human lives; environmental pollution such as pesticide residue into food chain and drinking water and pesticide associated health hazards. To overcome these adverse effect induced by introducing modernized farming practice, the Integrated Pest Management (IPM) is being promoted by the Union government.

The IPM is considered ecologically sound, economically viable and socially acceptable system to prevent the plants from pest damages applying effects of naturally occurring beneficial fauna and built-in compensatory mechanism of the plants instead of indiscriminate use of pesticide. It is recommended to promote and introduce these ecologically sound farming practices as much as possible to reduce such harmful effects.

### **E.2.3 Irrigation**

The groundwater development is considered in some parts of the Southern Study Area

near Ramanathapuram district to supplement the shortage of surface water by exploring the groundwater in the shallow aquifers. In spite of the development of the shallow aquifers, such groundwater exploitation may cause serious troubles in water quality as well as its rechargeable volume. Brackish water with electric conductivity value of about 1.4 dS/m is observed in some areas near the Ramanathapuram district in the Southern Study Area. Villagers take mainly groundwater for their domestic use including drinking in the rural areas.

Therefore, it is necessary to evaluate the volume exploitable for supplemental irrigation to the extent that the regional water balance is not given any adverse effect in view of both water quality and quantity prior to taking up the groundwater development for tank modernization.

### **E.3 Present Environmental Conditions in the Study Area**

#### **E.3.1 Health and Sanitary Conditions**

In the State a PHC normally covers 30,000 rural population and a HSC covers 5,000 population. A health nurse is only stationed at a HSC and doctors are available at a PHC. There is only one village health nurse in a HSC and doctors are available in a PHC.

In relation to irrigation and drainage, two waterborne diseases, i.e. schistosomiasis and Guinea worm which are found in other places of India, do not occur in the State. Three mosquito-related diseases, malaria, filariasis and Japanese encephalitis which are found in some places in the State, also do not occur in this area. Only rare malaria case found in this area is a case infected in Chennai or other sea shore areas.

#### **E.3.2 Natural Environment**

In agriculture, natural manure is mainly applied to irrigated paddy cultivation, hence use of chemical fertilizer is small. However, chemical pesticides, insecticides and herbicides are commonly used. In India, manufacture, distribution and use of fertilizers and insecticides are regulated under the Fertilizer Control Order Act of 1985 and the Insecticide Act of 1968 by the government of India.

#### **E.3.3 Surface Water and Groundwater**

Groundwater is utilized widely for irrigation for around three months after the tank water becomes unavailable in the dry season. There are about 70 private open dug wells in the ayacut. In the State, the block-wise monitoring and estimation of ground water resources have been carried out by the Groundwater Wing of PWD. For utilization of groundwater resources, PWD has classified all blocks into three categories, i.e. Dark, Grey and White areas. These categories indicate the level of groundwater utilization as over 85 % in Dark area, between 65 % and 85 % in Grey area, and below 65 % in White

area.

The main quality problems of groundwater in the State are generally stated as follows:

- i) Groundwater being brackish or saline due to geological formation.
- ii) Pollution due to industrial and municipal discharges.
- iii) Pollution due to sea-water intrusion in coastal region.
- iv) Contamination due to application of agro-chemicals and pesticides.

The result of the water quality measurement conducted by JICA Study Team in pilot Tank Areas are shown in Table E.3.1. And the FAO and PWD Standards of Water Quality for Irrigation is shown in Table E.3.2.

#### **E.4 Environmental Impact of the Project in Pilot Tank Areas**

##### **E.4.1 Categories of Environmental Impact**

Initial screening of the environmental impact was conducted based on the present environmental conditions of the Study Area and formulation of the Master Plan. (Refer to Table E.4.1). In the feasibility study of the Pilot tank Areas, the environmental impact by the Project was examined on the follows:

- 1) Social Environment
  - a) Social Institutions and Customs
  - b) Health and Sanitary Issues
  
- 2) Natural Environment
  - a) Biological and Ecological Issues
  - b) Soil and Land Resources
  - c) Hydrology and Quality of Water

Based on the JICA Environmental Guidelines, the environmental impact of the rehabilitation works in each Pilot Tank Areas, through the field survey and in consideration of the components of the Project.

##### **G.4.2 Environmental Impact**

From the results of the environmental impact examination for the Pilot Tank Areas, it can be judged that basically the Project will not induce any significant direct negative environmental impacts excepting groundwater component at some areas. Summary of likely environmental impact in 10 Pilot Tank Areas is presented in Table G.4.24.

The groundwater development in the areas where high saline groundwater and/or likely seawater intrusion are observed may induce significant impacts on soils. In such areas groundwater development is not recommended. Therefore, the groundwater

development needs careful planning regarding water quality, water table, and scale of development and selection of crops.

In addition to the above, some minor impacts may be induced such as increase of conflict/friction on water sharing, increase of agrochemical use, outbreak of mosquito-related diseases and destroying peacocks nests in the southern area. However, these minor impacts can be avoided through appropriate development procedures and countermeasures.

Post-project monitoring and supporting services are required for groundwater development, agrochemical use, water users association (WUA) and outbreak of mosquito-related diseases. Such monitoring and support services shall be conducted by relevant government agencies utilizing existing organizational structures and staff.

#### **E.4.3 Environmental Clearance**

As to the environmental rule in India, the Government of India enacted the Environment (Protection) Act of 1986 under the Constitution and the Environment (Protection) Rules of 1986. According to the Notification on Environmental Impact Assessment of Development Projects of 1994, all the projects listed under schedule -I are required to obtain environmental clearance from the Central Government.

In the irrigation sector concerned, among the project under scheduled-I, all river valley projects including hydropower, major irrigation and their combination including flood control, where the investment is Rs. 500 million or above, only need to obtain environmental clearance from the Central Government.

According to the Environment and Forests Department (EFD) and the Tamil Nadu Pollution Control Board (TNPCB), the Project does not need to obtain the environmental clearance from the Central Government, as far as the Project is to be implemented in the existing minor irrigation tanks.

Table E.3.1 Result of Water Quality Measurement at Pilot Tank Areas

Surface Water/ Groundwater	pH	EC		Water Temp. (°C)	Assumed TDS (ppm)	Remarks
		ms/m	µmhos/cm			
7. A. A. Kamalingapuram Tank Area	8.7	38.2	382	33.0	244	Little water (Well depth)
1) Tank water	8.2	161.7	1,617	30.0	1,035	6m, Irrigation
2) Groundwater	8.4	692.0	6,920	31.9	4,429	5m, Emergency use
- Upper reach	8.1	48.7	487	31.5	312	6m, For drinking
- Middle reach	-	-	-	-	-	-
- Village	-	-	-	-	-	-
8. Pandikannai Tank Area	-	-	-	-	-	No water (Well depth)
1) Tank water	7.0	460.0	4,600	32.0	2,944	30m - 40m
2) Groundwater	7.3	531.0	5,310	32.3	3,398	30m. For drinking
- Upper reach	7.6	105.1	1,051	31.3	673	13m - 14m, For drinking
- Village	8.6	118.0	1,180	30.0	755	- do -
- do -	-	-	-	-	-	- do -
9. Sengugulam Tank Area	-	-	-	-	-	No water (Well depth)
1) Tank water	7.2	195.1	1,951	30.8	1,249	70m - 80m
2) Groundwater	7.5	187.8	1,878	30.4	1,202	- do -
- Upper reach	7.2	146.7	1,467	32.6	939	- do -
- Middle reach	7.4	208.0	2,080	31.4	1,311	- do -
- do -	-	-	-	-	-	- do -
10. Kurumbi Tank Area	7.1	11.1	111	35.5	71	Little water (Well depth)
1) Tank water	7.0	59.3	593	32.1	380	45m
2) Groundwater	6.4	64.0	640	31.2	410	- do -
- Upper reach	6.7	73.6	736	30.7	471	- do -
- Middle reach	6.4	68.2	682	31.5	436	- do -
- do -	-	-	-	-	-	- do -

Source: JICA Study Team  
 Note: 1) Groundwater samples were taken from tanks and borehole/open wells being used for irrigation or potable water within Ayacut & village.  
 2) Assumed TDS (ppm) = EC (µmhos/cm) × 0.64 (FAO SOIL BULLETIN, 1979)

Table E.3.2 Standards of Water Quality for Irrigation

Parameter	Unit	No Problem	Increasing Problem	Severe Problem
1. FAO Guidelines for Evaluating Irrigation Water				
- Electric Conductivity (EC)	µmhos/cm	< 700	700 - 3,000	> 3,000
- pH		Normal range 6.5 - 8.4		
2. PWD Classification of Water for Irrigation				
- Electric Conductivity (EC)	µmhos/cm	< 1,500	1,500 - 3,000	> 3,000

Source: 1) FAO SOIL BULLETIN, 1979  
 2) Groundwater Resources of Tamil Nadu, PWD, 1994

Table E.3.1

Surface Water/ Groundwater	pH	EC		Water Temp. (°C)	Assumed TDS (ppm)	Remarks
		ms/m	µmhos/cm			
1. Echur Tank Area	8.8	30.0	300	34.4	192	Little water (Well depth)
1) Tank water	7.9	33.5	335	32.5	214	9m
2) Groundwater	9.4	61.5	615	31.1	394	9m
- Upper reach	8.1	69.4	694	30.7	444	9m
- do -	7.5	68.2	682	30.4	436	9m
- Lower reach	8.4	93.0	930	31.7	595	5m - 6m
3) Village tube well	7.1	89.6	896	32.4	573	30m. For drinking
2. Cherukkanur Tank Area	9.7	90.4	904	34.9	579	
1) Tank water	9.7	86.7	867	33.0	555	
2) Outlet water	7.2	217.0	2,170	31.1	1,389	7m - 9m
3) Groundwater	7.8	127.0	1,270	35.0	813	12m
- Upper reach	8.4	152.5	1,525	34.8	976	15m
- do -	8.6	75.1	751	31.0	480	Little water
4) Vignity tank	8.8	121.4	1,214	31.9	777	Little water
- Tank water	8.5	175.8	1,758	33.8	1,125	Little water
3. Polambakkam Tank Area	8.6	33.3	333	35.2	213	Little water (Well depth)
1) Tank water	8.1	70.1	701	32.7	449	9m
2) Groundwater	7.8	57.6	576	31.2	369	9m
- Upper reach	7.6	63.4	634	34.0	405	9m
- do -	7.7	69.6	696	33.1	445	9m
- Lower reach	9.2	84.0	840	35.0	538	Little water
4. Enadur Big Tank Area	7.8	107.1	1,071	34.0	685	
1) Tank water	7.8	118.4	1,184	31.4	758	(Well depth)
2) Drain pond	7.6	119.7	1,197	32.0	766	18m
3) Groundwater	7.7	174.0	1,740	31.0	1,114	9m
- Upper reach	8.5	14.7	147	32.8	94	Little water
- Lower reach	7.6	23.9	239	34.8	153	
5. Vadakkupattu Tank Area	7.5	23.3	233	53.9	149	
1) Tank water	7.7	42.2	422	31.7	270	(Well depth)
2) Outlet water	7.8	68.2	682	31.8	436	9m
3) Groundwater	-	-	-	-	-	-
- Upper reach	8.0	248.0	2,480	30.8	1,587	15m
- Lower reach	-	-	-	-	-	-
6. Siruvahai Tank Area	-	-	-	-	-	No water (Well depth)
1) Tank water	-	-	-	-	-	-
2) Groundwater	-	-	-	-	-	-
- Upper reach	-	-	-	-	-	-





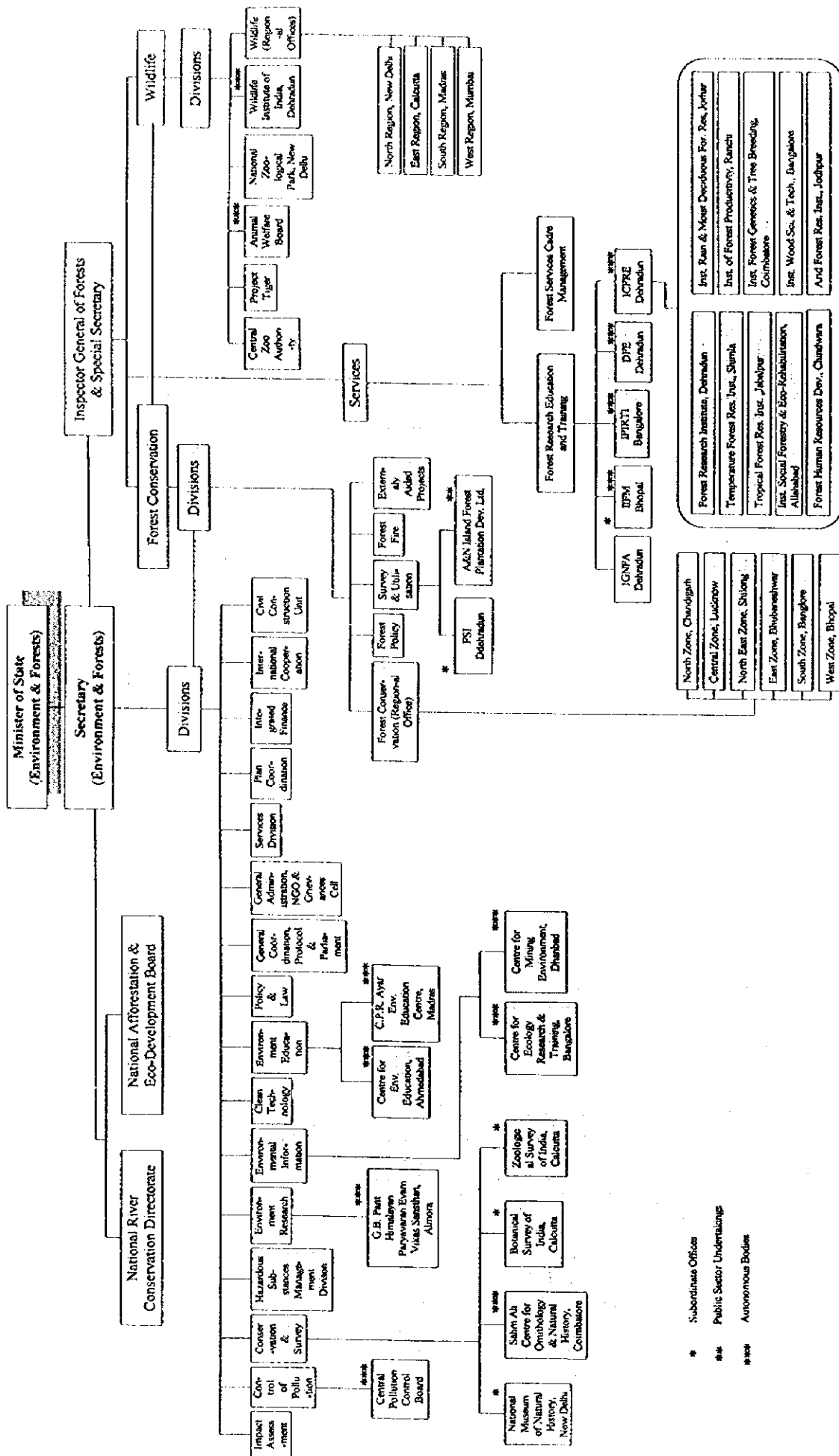


Fig. E.1.1 Organization Chart of Ministry of Environment and Forests

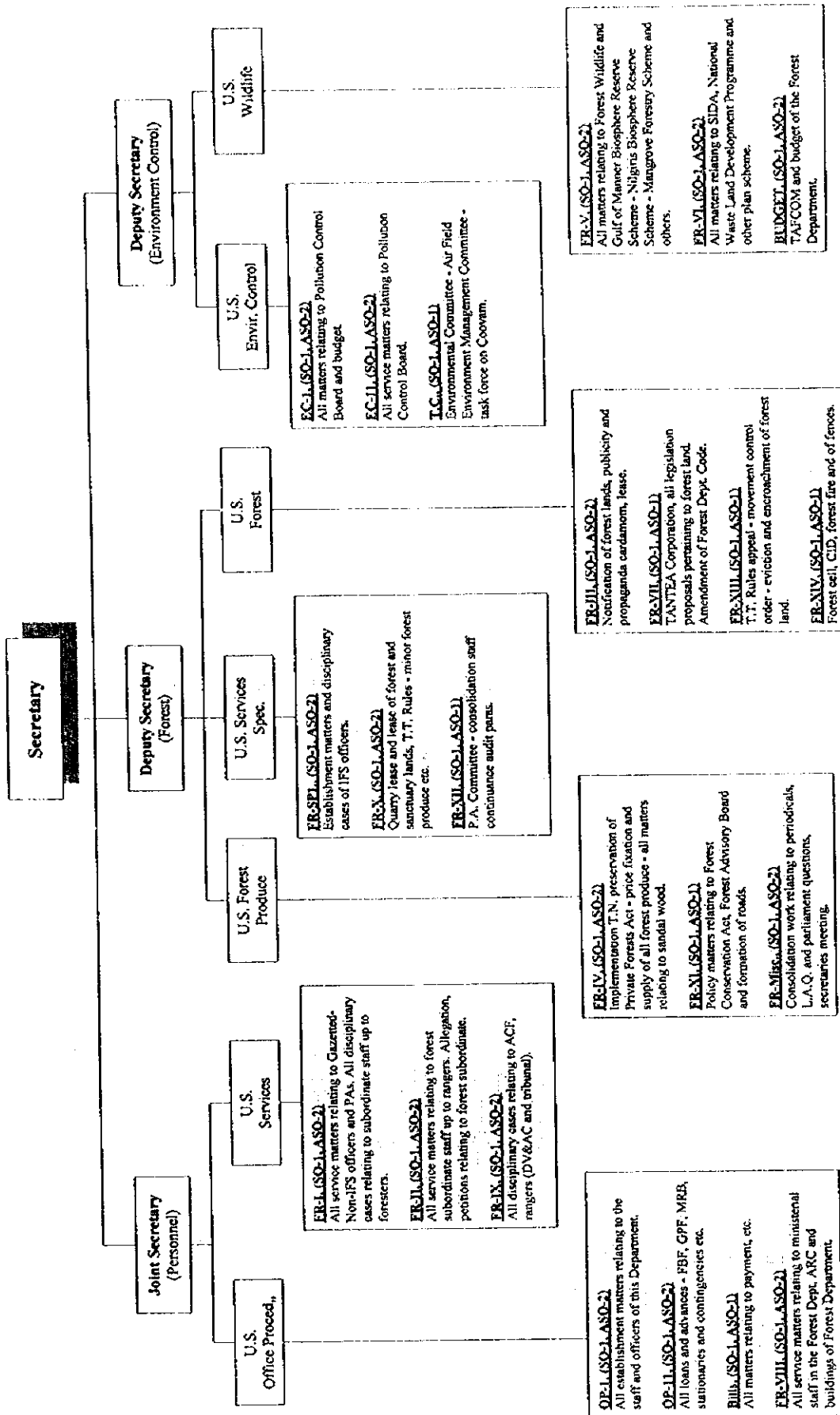


Fig. E.1.2 Organization Chart of Environment and Forest Department

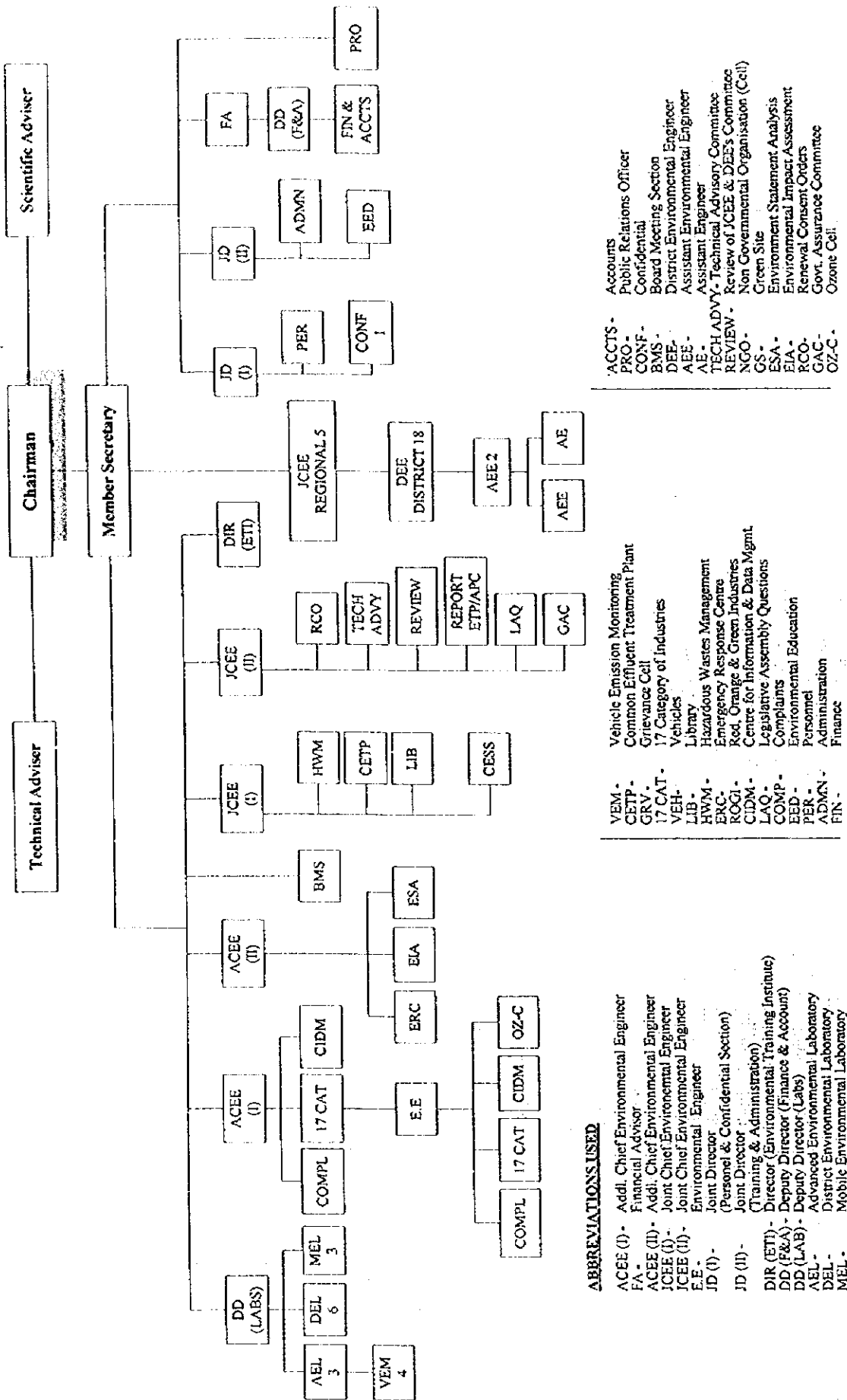


Fig. E.1.3 Organization Chart of Tamilnadu Pollution Control Board