



TN – IAMWARM PROJECT

MARKANDEYA NATHI SUB BASIN

WATER RESOURCE DEPARTMENT

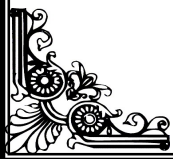




1. WATER RESOURCES ORGANISATION



1.1 INTRODUCTION



1.1 INTRODUCTION

1.1.1 General

Agriculture is the dominant sector in the Indian economy. Tamil Nadu depends largely on the surface water irrigation as well as ground water irrigation. The state has used the surface and ground water potentials to the maximum limit and hence the future development and expansion depends only on the efficient and economical use of water potential and resources.

To achieve higher water use efficiency, it is necessary to improve and upgrade the existing conveyance system and also to introduce modern irrigation methods.

With the above objective, a comprehensive programme has been proposed with a Multi Disciplinary Approach.

1.1.2 Description of the Pennaiyar Basin

The main Pennaiyar Basin gets its name after the name of the river Pennaiyar. The Pennaiyar River has its origin in the South Eastern slopes of Chennakesava hills in Nandhidurg in Karnataka state and after traversing about 112km in Karnataka state it enters in Tamil Nadu in Hosur Taluk and flows through Hosur, Krishnagiri and Uthangarai Taluks of Krishnagiri District and Harur Taluk of Dharmapuri District for a length of 190.50km. After traversing in Dharmapuri District, the Pennaiyar river enters into Thiruvannamalai, Vilupuram, Cuddalore District and travels a distance of 139.50km. The Pennaiyar River finally empties into the Bay of Bengal near Cuddalore. The total drainage area of Pennaiyar including the area in Karnataka state is 15101 sq.km. The catchment area in Karnataka state itself is (931.06 sq.miles) 2384. sq.km. The total length of river is 432km. (i.e) 320km in Tamil Nadu and 112km in Karnataka state. The Markandeya Nathi sub basin is located between latitude of 12⁰ 32' 30" to 12⁰ 48' 10" and longitude of 78⁰ 35' 10" E to 78⁰ 47' 40".

This basin has been divided into 18 sub basins namely as follows.

1. 1A Chinnar, 1B Chinnar
2. Markandanadhi
3. Kambainallur
4. Pambar
5. Vaniar
6. Kottapatti kallar/ Kovilar
7. Mattur River
8. Valayar Odai
9. Ramakal Odai
10. Pambanar & Varattar
11. Musukundanadhi
12. Aliyar
13. Thuringalar
14. Gadilam
15. Upto Krishnagiri Reservoir
16. Krishnagiri to Pambar
17. Pambar to Thirukovilur
18. Lower Pennaiyar

1.1.3 Description of the Markandeya Nathi Sub-Basin

The Markandeya Nathi sub basin is one of the major tributary to the Pennaiyar.

There are 9 anicuts and 5 Tanks involved in the Markandeya Nathi Sub basin. Markandeyan Nathi starts from Karnataka state and runs for a distance of 30km Tamil Nadu and Join Pennaiyar river near Gooliam Village in Krishnagiri Taluk and District.

There is a seasonal flow in the river during monsoon seasons. The maximum discharge of this river, so far measured near confluence point to Pennaiyar is 115000 C/S.

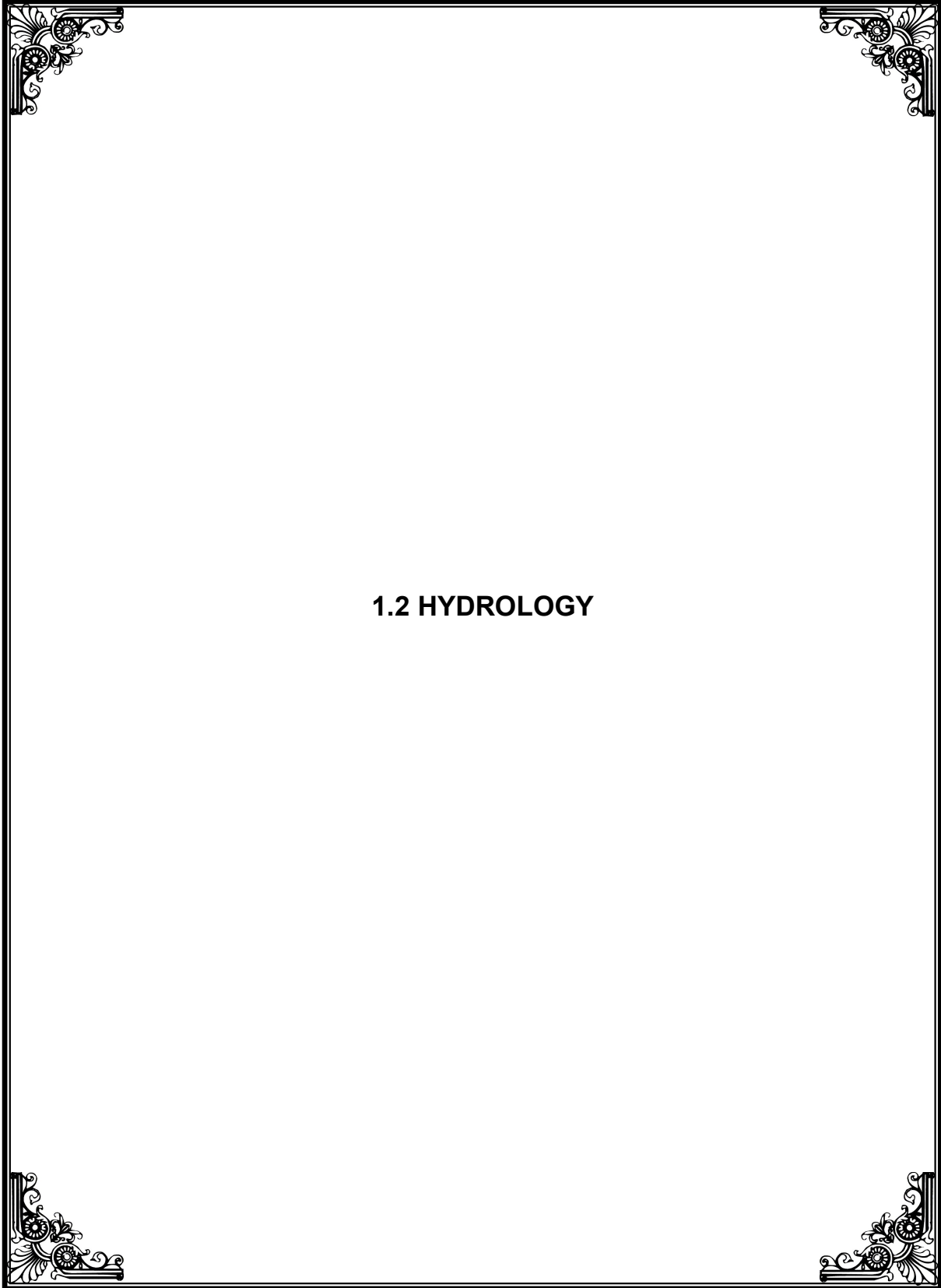
The Markandeya Nathi Sub basin area is 450.54km. The taluk covered in the Sub basin covered only Krishnagiri Taluk of Krishnagiri District.

1.1.4. Convergence Table in Annexure – I & II & III

CUSTER WISE / INFRASTRUCTURE WISE / VILLAGE WISE CONVERGENT TABLE

I- Sigaralapalli

Sl No.	Infrastructure/ Tank/ Anicut	Total Ayacut (Ha)			Total Area (Ha)			WRD Activities		Agriculture		TNAU		Horticulture		Agri marketing		AED		Fisheries		Animal Husbandry	
		FI	PI	Gap	Wop	WP	Gap	Act	No	Act	No./ Ha	Act	No./ Ha	Act	No./ Ha	Act	No./ Ha	Act	No./ Ha	Act	No./ Ha	Act	No./ Ha
1	2	3	4	5	6	7	8	9		10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	Sigaralapalli	50.8	24.24	40.68	74.92	115.60	-	culvert Inlet supply channel retaining wall	3 Nos 2 Nos 500M 50 M	Pa Ra Ma Gr	20 40 20 10			AEP	5	Rag	1	D DD S FP	3 1 2 1			-	-
2	Naickan Anicut	6.61	1.17	8.41	7.78	16.19	-	reconstruction of Anicut	1No	Ra	10			AEP	1	-	-	D FP	1 1			-	-
3	Ettipalli Tank	15.10	8.55	20.42	23.65	44.07		Sluice repair retaining wall Supply channel improvement	2 No 1 No 250 M	Pa Ra Gr	10 20 10			AEPMa AEPBa AEP Br	5 4 1	Gro Dry	1 1	D DD S FP	2 1 1 1	FP	2	-	-
4	Varagachendiram Anicut	5.44	0.96	6.51	6.40	12.91		Desilting of supply channel	1250m	Ra	10			AEPBa	1	Mai	1	-	-			FD IC MM DW	4 2 20 1500
5	Beemandapalli Tank	24.82	16.15	33.52	40.97	74.49		Supply channel improvement Sluice repair Weir repairs	200m 1 No 1No	-	-			AEPBa AEP To Aaep BR AEP J	3 2 2 2	Dryi	1	D DD S FP	2 2 2 1	FP	1	-	-
6	Beemandapalli Anicut	19.72	9.36	18.17	29.08	47.25		Supply channel improvements Desilting supply channel	200m 3000m	Pa Ra Ma Gr	110 40 20 10			AEP To AEPBr AEP J	1 1 1	Pa To	1 1	D DD FP	2 1 1			FD IC MM DW	2 1 10 1500
7	Kollapatti Anicut	31.82	17.38	23.15	49.20	72.35		Supply channel improvements	500m	Pa Ra Ma Gr	10 20 10 10			AEP Ba AEP Ma	2 2		--	D DD S	2 2 1			FD IC MM DW	2 1 10 1250



1.2 HYDROLOGY

GENERAL

1.2.1. Markandeya Nathi sub basin are worth mentioning tributaries of Pennaiyar River.

During 1957 (Year) one reservoir namely Krishnagiri Reservoir was constructed across the Pennaiyar River.

Finally, Pennaiyar River confluences with Bay of Bengal near Cuddalore.

1.2.2 LOCATION

Markandeya nathi Sub Basin area is 450.54 km. The Taluk covered in this sub basin is Veppanapalli and Krishnagiri of Krishnagiri district.

1.2.3 CATCHMENT AREA OF MARKANDEYA NATHI SUB-BASIN

The Markandeya Nathi Sub Basin has a typical climate, owing to the marginal catchments area in the Karnadaga State. This Sub Basin enjoys the benefits of mostly North East monsoon and South West Monsoon.

1.2.4 HYDRO METEOROLOGY

The Hydro Meteorology parameters include rainfall, temperature, humidity, wind velocity, evaporation and duration of sun shine which determine the climate of the basin.

1.2.5 RAIN FALL

Average annual rainfall of gauging stations influencing this sub basin is as follows

Sl No	Name of Rain gauge Station	North East Monsoon	Summer	Winter	South west monsoon	Annual
1.	Hosur	240	161	11	339	751
2.	Melumalai	259	151	13	386	810
3.	Krishnagiri	305	164	10	445	925

a. CLIMATE

The Markandaya Nadhi Sub Basin lies in a medium rainfall belt having an annual average weighted rainfall of 811 mm. Southwest monsoon contribute 400 mm, while NE monsoon contributes 411 mm . This basin receives a major share of its rainfall during NE monsoon. This monsoon helps to build up storage in the anicuts and Non system tank. This basin has Western Ghats on Western sides. North East monsoon rainfall, though lesser than the South West monsoon rainfall , still contribute some runoff Markandaya Nadhi Sub Basin For the measurement of Hydro meteorological parameters in the basin area, there is one weather station at Melumalai near Krishnagiri its data is taken for the study.

b. SOIL CLASSIFICATION

In this sub basin, due to different stages, Weathering & parent material, the soil types are met with in combination of Inceptisol, Alfisol and Vertisol. More prominent type is Inceptisol.

Inceptisol	Red or brown or grey soil with surface horizon more developed than sub surface. They are developing soils, moderately deep, coarse loamy to loam moderately drained to well drained	Suited for commonly grown crops with exceptions
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Alfisol	The red or brown soils having accumulation of alleviated clay in sub surface horizon it well drained, poor water and nutrient holding capacity.	Annual crops with shallow roots systems cum up wells
Vertisols	Black soil	Suitable for cotton, Pulses etc

b.1 LAND HOLDINGS

The details of farm holdings and size classes prevalent in Kovilar Sub basin are given below:

Category	Size of holdings	Numbers	Percentage
Marginal	Below 1.00 Ha	710	78.45%
Small	1.00 – 2.00 Ha	105	11.60%
Medium	2.00 – 5.00 Ha	70	7.73%
Big	5.0 ha & above	20	2.21%
Total		905	

Above table revealed that the marginal farmers alone accounted for 78.45 percent in the sub basin followed by small farmers. Developmental initiatives will need to take the fact into account

1.2.6 DEMOGRAPHY

Name of Sub Basin	Total No. of Blocks	Total No. of Villages	Population in, Million		
			2004	2010	2025
Markandaya Nadhi Sub Basin	2	50	0.076	0.082	0.093

CROPPING PATTERN

	:		
Name of the sub Basin	Markandanadhi	Fully Irrigated	: 217.00 Ha
District	: Krishnagiri	Partially Irrigated	: 97.89 Ha
Registered Ayacut Area	527.44	Gap	: 212.55 Ha
		Total Ayacut Area	: 527.44 Ha

S.No.	Crop	Without Project				With Project				Increasing
		FI	PI	RF/G	TOTAL	FI	PI	RF/G	TOTAL	
I	Perennial crop									
1	Coconut	10.00	-	-	10.00	10.00	-	-	10.00	0.00
2	Mango	45.00	-	-	45.00	60.00	-	-	60.00	15.00
3	Fodder	7.00	-	-	7.00	20.00	-	-	20.00	13.00
4	Mulbery	6.00	-	-	6.00	10.00	-	-	10.00	4.00
5	Jasmine	5.00	-	-	5.00	10.00	-	-	10.00	5.00
	Total	73.00	0.00	0.00	73.00	110.00	0.00	0.00	110.00	37.00
II	Annual Crop									
1	Sugarcane	10.00	-	-	10.00	10.00	-	-	10.00	0.00
2	Banana	15.00	-	-	15.00	25.00	-	-	25.00	10.00
	Total	25.00	0.00	0.00	25.00	35.00	0.00	0.00	35.00	10.00
III	1st crop (Sep- Jan)									
1. a	Paddy	105.00	-	-	105.00	-	-	-	0.00	-105.00
b	Paddy - SRI	-	-	-	0.00	105.00	-	-	105.00	105.00
3	Vegetables									
	Brinjal	6.00	-	-	6.00	10.00	-	-	10.00	4.00
	Tomato	8.00	-	-	8.00	20.00	-	-	20.00	12.00
4	Ragi	-	77.89	-	77.89	147.44	-	-	147.44	69.55
5	Maize	-	0.00	-	0.00	50.00	-	-	50.00	50.00
6	Pulses	-	10.00	-	10.00	20.00	-	-	20.00	10.00
7	Groundnut	-	10.00	-	10.00	30.00	-	-	30.00	20.00
8	Fallow	-		212.55	212.55	0.00	-	-	0.00	-212.55
	Total	119.00	97.89	212.55	429.44	382.44	0.00	0.00	382.44	-47.00
	Grand Total (I+II+III)	217.00	97.89	212.55	527.44	527.44	0.00	0.00	527.44	0.00
IV	2nd crop									
1. a	Paddy	30.00	-	-	30.00	-	-	-	0.00	-30.00
b	Paddy - SRI	-	-	-	0.00	30.00	-	-	30.00	30.00
2	Ragi	-	22.20	-	22.20	72.20	-	-	72.20	50.00
3	Maize	-	-	-	0.00	50.00	-	-	50.00	50.00
4	Groundnut	-	5.00	-	5.00	10.00	-	-	10.00	5.00
5	Pulses	-	5.00	-	5.00	10.00	-	-	10.00	5.00
6	Tomato	-	5.00	-	5.00	10.00	-	-	10.00	5.00
	Total	30.00	37.20	0.00	67.20	182.20	0.00	0.00	182.20	115.00
	Great Grand Total	247.00	135.09	212.55	594.64	709.64	0.00	0.00	709.64	115.00
	Cropping Intensity				72.44%				134.54%	

MARKANDEYANADHI SUB BASIN - PENNAIYAR BASIN

Crop water requirement without Project

Sl.No.	Name of Crop	Area in Ha	Crop water requirement in mm	Total Crop water requirement in Mcm	Irrigation water requirement at source Eff=53%	Total Irrigation requirement in Mcm
I	Perennial Crops					
1	Coconut	10.00	979	0.098	0.18	0.18
2	Mango	45.00	506	0.228	0.43	0.43
3	Fodder	7.00	386	0.027	0.05	0.05
4	Mulberry	6.00	510	0.031	0.06	0.06
5	Jasmine	5.00	509	0.025	0.05	0.05
	Sub Total	73.00		0.41	0.77	0.77
II	Annual Crops					
1	Sugarcane	10.00	832	0.083	0.16	0.16
2	Banana	15.00	811	0.122	0.23	0.23
	Sub Total	25.00		0.20	0.39	0.39
III	1st crop (Sep- Jan)					
1.a	Paddy	105.00	757	0.795	1.50	1.50
1.b	Paddy - SRI	0.00	385	0.000	0.00	0.00
2	Vegetables					
	Brinjal	6.00	464	0.028	0.05	0.05
	Tomato	8.00	382	0.031	0.06	0.06
3	Ragi	77.89	303	0.236	0.45	0.45
4	Maize	0.00	329	0.000	0.00	0.00
5	Pulses	10.00	300	0.030	0.06	0.06
6	Groundnut	10.00	605	0.061	0.11	0.11
7	Fallow	0.00	0	0.000	0.00	0.00
	Sub Total	216.89		1.18	2.23	2.23
	Grand Total (I+II+III)	314.89		1.79	3.38	3.38
IV	2nd Crop					
1. a	Paddy	30.00	471	0.141	0.27	0.27
1. b	Paddy - SRI	0.00	330	0.000	0.00	0.00
2	Ragi	22.20	303	0.067	0.13	0.13
3	Maize	0.00	382	0.000	0.00	0.00

4	Groundnut	5.00	304	0.015	0.03	0.03
5	Pulses	5.00	300	0.015	0.03	0.03
6	Tomato	5.00	400	0.020	0.04	0.04
	Total	67.20		0.26	0.49	0.49
	Great Grand Total	382.09		2.05	3.87	3.87

MARKANDEYANADHI SUB BASIN - PENNAIYAR BASIN

Water Potential without Project

Surface Water Potential	=	45.23	Mcm
Ground Water Potential	=	29.03	Mcm
Total Potential	=	74.26	Mcm

Water Demand without Project

Domestic	=	2.1	Mcm
Livestock	=	3.93	Mcm
Industrial	=	0.08	Mcm
Irrigation WRO	=	3.87	Mcm
PU & GW	=	6.67	Mcm
Total Water Demand	=	16.65	Mcm

<u>Water Balance</u>	=	57.61	Mcm
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Balance water flowing in Pennaiyar river

MARKANDEYANADHI SUB BASIN - PENNAIYAR BASIN

Crop water requirement with Project

Sl.No.	Name of Crop	Area in Ha	Crop water requirement in mm	Total Crop water requirement in Mcm	Irrigation water requirement at source Eff=56%	Total Irrigation requirement in Mcm
I	Perennial Crops					
1	Coconut	10.00	979	0.098	0.17	0.17
2	Mango	60.00	506	0.304	0.54	0.54
3	Fodder	20.00	386	0.077	0.14	0.14
4	Mulbery	10.00	510	0.051	0.09	0.09
5	Jasmine	10.00	509	0.051	0.09	0.09
	Sub Total	110.00		0.58	1.04	1.04
II	Annual Crops					
1	Sugarcane	10.00	832	0.083	0.15	0.15
2	Banana	25.00	811	0.203	0.36	0.36
	Sub Total	35.00		0.29	0.51	0.51
III	1st Crop					
1.a	Paddy	0.00	757	0.000	0.00	0.00
1.b	Paddy - SRI	105.00	385	0.404	0.72	0.72
2	Vegetables					
	Brinjal	10.00	464	0.046	0.08	0.08
	Tomato	20.00	382	0.076	0.14	0.14
3	Ragi	147.44	303	0.447	0.80	0.80
4	Maize	50.00	329	0.165	0.29	0.29
5	Pulses	20.00	300	0.060	0.11	0.11
6	Groundnut	30.00	605	0.182	0.32	0.32
7	Fallow	0.00	0	0.000	0.00	0.00
	Sub Total	382.44		1.38	2.46	2.46
	Grand Total (I+II+III)	527.44		2.25	4.01	4.01
IV	2nd Crop					
1. a	Paddy	0.00	471	0.000	0.00	0.00
1. b	Paddy - SRI	30.00	330	0.099	0.18	0.18
2	Ragi	72.20	303	0.219	0.39	0.39
3	Maize	50.00	382	0.191	0.34	0.34

4	Groundnut	10.00	304	0.030	0.05	0.05
5	Pulses	10.00	300	0.030	0.05	0.05
6	Tomato	10.00	400	0.040	0.07	0.07
	Total	182.20		0.61	1.09	1.09
	Great Grand Total	709.64		2.86	5.10	5.10

MARKANDEYANADHI SUB BASIN - PENNAIYAR BASIN

Water Potential with Project

Surface Water Potential	=	45.23	Mcm
Ground Water Potential	=	29.03	Mcm
Total Potential	=	74.26	Mcm

Water Demand with Project

Domestic	=	2.1	Mcm
Livestock	=	3.93	Mcm
Industrial	=	0.08	Mcm
Irrigation WRO	=	5.10	Mcm
PU & GW	=	6.67	Mcm
Total Water Demand	=	17.88	Mcm

<u>Water Balance</u>	=	56.38	Mcm
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Balance water flowing in Pennaiyar river



1.3 HYDRAULICS OF THE COMPONENTS

HYDRAULIC PARTICULARS

a) ANICUT

Sl.No	Name of Anicut	Village	Ayacut	Length of Anicut(M)	Crest level of Anicut (M)	Front (M)	Free Sq.km	Combined Sq.km	Maximum flood discharge Cumecs/ Cusecs	Head sluice Location	Vent(M)	Sill Level sluice (M)	Discharge Cumecs	Supply Channel					Remarks
														Length (m)	Bed width (M)	FSD (M)	Bed slope	Sluice	
1	Naickan Anicut	Badimadugu	16.19 ha	40m	100.00	100.900			12.73 c/s	l/s		99.55		1500m	0.60	0.45	1.2500	1	Feed to Naickan Eri
2	Sigarala palli anicut		115. 60 ha	70m	590.75	593.25			12.73 c/s	L/s		590 00		6138	1.00	0.50	1.2500	1	Feed to Ettipalli tank
3	Beemanda palli Anicut	Beemandapalli	47. 25 ha	147m	100.00	103.600	0.10 sqmile	431.60 sqmile	543.50	Right		99.500		4.5km	1.20m	0.50	-	1	
4	Singiripalli anicut	Singiripalli	4.67 ha	27.80m	100.00	100.600				Right		99.55		1225m	-	-	-	-	
5	Nachikuppam Anicut	Nachikuppam	14.57 ha	56.20m	100.00	101.20				Right		99.50		600m	-	-	-	-	
6	Thadathada Anicut	Thadathada	28.78 ha	22.30m	100.00	100.750				Left		99.250		2300m	1.20m	0.75	2.5ft / mile	-	Feed to Dasiripalli tank
7	Dasiripalli Anicut	Dasiripalli	19.80	51.40m	100.00	100.750				Right		99.10		3000m	0.90	0.90	-	-	Feed to koral natham tank
8	Kollapatti Anicut	Beemandapalli	72.35 ha	101.71 m	100.00	103.66	2.54	40.65	54500	Left		99.500	6.00	3600m	1.2m	0.5m	-	1	Feed to Ganga sandiram tank
9	Varaga sandiram Anicut	Varaga sandiram	12.91.ha	47 m	100.00	100.75	2.00	10.00	12.00	L/s		99.500		1150m	1.0m	0.45m	-	-	Feeding to Varagasandiram tank

b) TANKS (Non System Tanks)

Sl. No	District	Taluk	Name of Work	Ayacut in Ha	Capacity in Mcft	Number of Fillings	Free catchment in SqKm	Combined Catchment in Sq.Km	Water spread area(Sq.Km)	FTL in M	MWL in M	No.of Sluices	Nos and Length of weir (m)		Discharge in Cusecs	Length of bund (M)	Length of Supply Channel (M)	Upper Tank	Lower Tank
													Nos	Length in m					
1	Krishnagiri	Krishnagiri	Beemanda Palli	74.49 ha	10.32 mcff	2	1.46 sqmile	1.46 sqmile	6.85 m.sq feet	100	100.600	1	1	34m		560m	-	-	-
2			Thimmamma cherru Tank	76.76	9.45 mcff	2	4.80	-	-	93	94	1	1	85m	139.36 cumees	260	-	-	-
3			Badathala tank	332.21 ha	85.35 mcff	2	4.60 sqmile	7.11 msqfeet	-	504.1	505.10	2	2	88.70 14.30	1755c/s	1433m	18.2km		-
4			Byanapalli	55.11ha	11.52 mcff	2	-	4.85 sq.mile	4.35 msq feet	100	100.6	2	1	64.60	-	570m		Pungammal tank	
5			Eittipalli	44.07	14.59	2	2.92 sqmile	3.64 sqile	4.68 msqft	100	100.75	2	1	41.75	1324c/s	1335m	6km		Jagana thapuram tank

C) SUPPLY CHANNELS HAVING DIRECT AYACUT

Sl. No.	Name of supply channel	Start Point		End Point		Length in metres	Bed width	Bed slope	Side slope	MFD	Depth of flow	Remarks
		Location	Sill level	Location	Sill level							
1	Sigaralapalli	Sigaralapalli	590.00	Eittipalli	587.550	6138m	1.00m	1:2500	1:1	12.79 c/s	0.50m	
2	Beemandapalli Anicut Supply	Kuppachiparai	99.50	Beemandapalli	97.450	4500m	1:20m	1:2500	1:1	54350 c/s	0.50	
3	Kollapatti Anicut	Kollapatti	99.50	Gangasandiram	98.060	3600m	1.20m	1:2500	1:1	54500 c/s	0.50	
4	Dasiripalli anicut supply channel	Dasiripalli	99.100	Koralnatham	97.900	3000m	0.90	1:2500	1:1		0.30	
5	Thadathada Anicut supply	Thadathada	99.250	Dasiripalli	98.330	2300m	1.20	1:2500	1:1		0.75	
6	Singiripalli Anicut supply		99.550		1225m	0.50		1:2500	1:1		0.45	
7	Nachikuppam Anicut supply	Thimmasandiram	99.50	Gangamadugu	99.260	600m	0.50	1:2500	1:1		0.30	
8	Varagasandiram Anicut supply	Varagasandiram	99.550	Varagasandiram	99.090	1150m	0.50	1:2500	1:1		0.45	
9	Naickan Anicut Supply channel	Badimadugu	99.55	Badimadugu		1500m	0.60	1:2500	1:1		0.45	
10	Badathalav tank supply channel	Marasandiram		Kallukurrikee		18200m	4.50m	1:2500	1:1	53300 c/s	0.9m	



1.4 PARTICIPATORY IRRIGATION MANAGEMENT (PIM)

SALIENT FEATURES OF IMPLEMENTATION OF PIM IN Markandeya Nadhi SUB-BASIN

1. **The Sub-Basin:** This is one of the Eighteen sub-basins of the Pennaiyar River Basin. Totally five (3) irrigation tank, 9 Anicuts are under the control of Water Resources Organization (WRO) of Public Works Department (PWD) in this sub-basin. The list of Infrastructures covered with more details are furnished in the **Annexure -1**. These Infrastructures are located within the Sub-Basin's hydraulic boundary spread over 11 villages of Krishnagiri Taluk in Krishnagiri Districts. The Total Command area under these Infrastructures works out to 527.44 Ha. (**Annexure5**).

2. Command area

Non system tank-3Nos : 195.32 Ha

Anicuts-9Nos: 332.12 Ha

Total : 527.44 Hectare

3. An Assessment of number of WUAs.

i)	WUA's are not formed already in this sub basin.	
ii)	Associates proposed to be formed under IAMWARM Project covering 3 tank and 9 Anicuts in 11 Villages only.	6 Nos. (527.44)Hectare.
iii)	The Total command area covered by the above (8) WUAs works out to	527.44 Hectare.
iv)	More details about formation of WUA's in the Sub-Basin are made available in the Annexure-1	

4. An account of “Awareness creation” among the farming community:

Activities undertaken and “Walkthrough Survey” carried out :

- i) There are five Tank and 9 Anicuts in the Sub-Basin spread over 11 villages as detailed out in Annexure – 01. All these Villages were visited by the WRO officials and awareness about various activities, contemplated under IAMWARM project has been created.
- ii) Details of villages covered, walkthrough surveys conducted, farmers attended, list of works suggested by the farmers, list of works analyzed and finalized by WRO officials, are all furnished in the Annexure -02 and Annexure -03:

5. Schedule for completion of delineation and preparation for WUA documents, comprising of :

- i) Form – I : Details to be notified by Districted Collectors (Middle of Feb -09)
- ii) Form – II :WUA document to be notified by District Collectors (End of March – 09)
- iii) Completion of preparatory works for the conduct of Elections for WUAs (End of June - 09)

6. Schedule for conduct of Elections in the Sub-Basin for forming Management Committees (I st week of July – 2009)

7. Support Organization (SOs).

- i) Initiating and completing the process of publishing EOI to hire Support Organisation at Sub-Basin level (I st week of Feb’2009)
- ii) Short listing and Providing Request for Proposals (RFPs) p all the short listed agencies, and obtaining Technical and Cost Proposals (Middle of April’2009)
- iii) Selection and deployment of Support Organization to the Sub-Basin (End of May’2009)

8. Appointment and the Role of Competent Authorities:

- i) Section 26 of the Tamil Nadu Farmer’s Management of Irrigation Systems (TNFMIS) Act provides for the appointment of “Competent Authorities” to assist the respective Organization (WUA, Distributory Committee and Project Committee), in the Implementation and execution of all decisions taken by such farmers organization. Similarly, every farmer’s organization shall extend such co-operation or assistance, as may be required by the competent Authority, for carrying out all the tasks related to implementation of TNFMIS Act.
- ii) Appointment of Competent Authorities for the WUAs proposed to be formed under IAMWARM project is indicated below.

Name of the WRO Sub Divisional Officer and section officer working in the Markandeya Nathi Sub-Basin:

- a. Upper Pennaiyar Basin Sub Division KRP Dam- WUAs 1 to 6
- b. Section Officer, WRO, Irrigation Section, Krishnagiri -WUAs1 to 6

9. Involvement of farmers in the preparation “Scheme Modernization Plans”.

- i) Based on the outcome of the “Awareness Creation Programme” and walkthrough survey carried out with the involvement of farmers, a list of tasks proposed to be taken up for “Modernization” under IAMWARM Project was discussed with 155 No. of farmers from 11 Villages. The final list of tasks was also prepared and exhibited in the Notice Board of the Village Administrative Officers Office and Panchayat Office. These details were also discussed with the farmers and the tasks to be taken up under scheme modernization finalized .
- ii) During the meeting, the farmers present were also informed that soon after finalization of contract for carrying out “Modernization of Irrigation Systems” a “Notice Board” with the details about the nature of works, its cost, period of contract and Name of the contractor will all be fixed at the site of work, as well as the Executive Engineer of WRO, who has been designated as the Nodal Officer for the Sub-Basin concerned.
- iii) The field Officers of WRO are all aware of the problems in handing over the operation and maintenance responsibilities to the farmers concerned, if the tasks as desired by the farmers in the command area are not included in the modernization of the system and also in case, some of the tasks already included and planned are not implemented due to some reasons or other.
- iv) The WRO officers were also informed that they are personally responsible for handing over the irrigation systems, under IAMWARM Project.

10. Current status of Recovery of water charges :

- i) An enquiry conducted with the “Village Administrative Officers” (VAOs) of randomly selected villages (6 numbers out of 11 Villages) located within the Sub-Basin the normal water charges recovery as informed by the VAO, works out to 40% only, about the expected percentage of 80-90%.
- ii) With the proposal to form new WUAs under IAMWARM in “ Markandeya Nathi Sub-Basin” the Managing Committee will be trained to take up the responsibility of improving the water charges recovery percentage. These will be followed up, after completing the modernization tasks and handing over of the O & M responsibilities to WUAs.

11. “Capacity Building” of the WUA farmers:

- i) The “Support Organization Group” will prepare “Training Modules” required for building the capacity of the WUA farmers, based on a “Training Needs” Analysis. They will also organize various “Capacity Building” programs at suitable locations within the Sub-Basin command area, to benefit the farmers of the WUAs in the Sub-Basin.
 - ii) The “Support Organization” will also arrange for organization the “Study Tours” both within and outside the state to enhance their knowledge and experiences which will help them to improve the crop productivity and there by the farmer’s income.
 - iii) The support Organization will also conduct necessary “Awareness programme” and impart training to educate the farmers of the WUAs in all aspects of the TNFMIS Act, TNFMS Rules and Election procedures for constituting the “Managing Committee” of the WUAs.
12. The “Component Authorities” appointed for the Sub-Basin will also be trained to effectively to interact with WUA farmers and maintain good report and relationship with the farming community in the Sub-Basin.

Annexure: 1

AN ASSESSMENT OF COMMAND AREA AND WUAS UNDER THE CONTROL OF WRO OF PWD IN MARKENDEYANATHI SUB - BASIN

WUA No	Name of Irrigation Systems and Tanks	Command Area in (Ha)	Location of the Command Area			Coverage of Command area under different projects (Ha)		Status of formation of WUAs in the Sub-Basin	
			Villages	Taluk	District	WRCP and Others	IAMWARM	Formed under WRCP	To be formed under IAMWARM
WUA - 1	Naickan anicut, sigaralapalli anicut , ettipalli tank, varagasamdiram, anicut,	188.77	Iddipalli Sigaralapalli, Ettipalli, Varagasandiram.	Krishnagiri	Krishnagiri	-	188.77	-	Yes
WUA - 2	Beemandapalli tank	74.49	Beemandapalli	Krishnagiri	Krishnagiri	-	74.49	-	Yes
WUA-3	Kollapatti anicut	72.35	Kollapatti	Krishnagiri	Krishnagiri	-	72.35	-	Yes
WUA – 4	Beemandapalli anicut	47.25	Beemandapalli	Krishnagiri	Krishnagiri	-	47.25	-	Yes

WUA-5	Timmammacherru Tank	76.76	Sigaramaganapalli	Krishnagiri	Krishnagiri	-	76.76	-	Yes
WUA-6	Singiripalli anicut, Nachikuppam anicut, Thadathada anicut, Thasiripalli anicut	67.82	Singiripalli, Nachikuppam, Thadathada, Thasiripalli	Krishnagiri	Krishnagiri	-	67.82	-	Yes
	Total	527.44					527.44		

ABSTRACT

1.	Command Area already covered under WRCP and other Project / Schemes	Nil
2.	Command Area proposed to be covered under IAMWARM Project	527.44 Hectares
3.	Total command area controlled by WRO of PWD in the Sub Basin	527.44 Hectares
4.	Total No. of WUAs already formed under WRCP	Nil
5.	Total No. of WUAs proposed to be formed under IAMWARM	6 Nos.
6.	Total No. of WUAs that will cover the entire Sub-Basin	6 Nos

Annexure: 2

Details of "Awareness Creation Activities and Walk - Through Surveys"

Sl. No	Date of Visit	Names if the Villages Visited	Awareness Programme (No.of farmers attended) (Prepare the list of farmers with acknowledgement seperately and attach)	Walk - Through Survey (No.of farmers Participated) (Prepare the list of farmers with acknowledgement seperately and attach)	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
1	11.12.2008	Sigaralapalli Ettipalli Varagasandiram Beemandapalli	60	70	
2	13.12.2008	Singiripalli Sigaramaganapalli Thasiripalli	50	60	
			110	130	

ANNEXURE – 3

Details of Modernisation works as suggested by the Farmers and as finalized by the officials of WRO

Sl.No	Date of Visit	Names of the Villages Visited	Out Come of walk through survey and discussions with farmers	
			Works Suggested by Farmers	Works finalized by WRO Officials
1	11.12.2008	Sigaralapalli Ettipalli Varagasandiram Beemandapalli	Singaralapalli anicut supply channel across culverts supply channel desilting . Retaining walls in supply channels . sluices repair	All the request were fulfilled and culverts, inlets of the important locations are proposed.
2	13.12.2008	Singiripalli Sigaramaganapalli Thasiripalli	Singiripalli anicut supply channel should be de-silted and request to clearing jungle clearance , silt clearance , sluice repairs and retaining wall in supply channel	All the request were fulfilled

WALK THROUGH SURVEY

Sl. No	Walk Through Survey		Farmers request	Technical Solution								Proposals in Plan							Remarks	
	Date	Location		WRO	Agri	Horti	AED	TNAU	AGMT	AHD	Fisheries	WRO	Agri	Horti	AED	TNAU	AGMT	AHD		Fisheries
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	11.12.08	Sigaralapalli Ettipalli Varagasandiram Beemandapalli	Requested to Singaralapalli anicut supply channel across culverts supply channel desilting . Periodical water regulation to be done, Want of common place for selling produces A few farmers asking Mango Grafts, T.C.Banana Vegetable seeds, Flower seeds Layer Milch animals sheep loan Farmers enquired fisheries activities	All the requested were fulfilled and culvert, inlets are proposed		Accepted to supply the planting Material			Collection centre ABC Demand for net connection Drying yard	Milch arrange the animal loans by the department through bank	Fish culture in farm ponds	construction of culverts. inlets and desilting supply channel, retaining wall in supply channel in weaker section .		Under Area Expansion programme to supply the fruits plants & Vegetable			ABC/CC Provision of Drying yard	Milch arrange the animal loans by the department through bank	Creation of farm ponds through AED and supply of fish seeds, inputs also Training	

2	13.12.08	Singiripalli Sigaramaganapalli Thasiripalli	<p>Singiripalli anicut supply channel should be de-silted and request to clearing jungle clearance , silt clearance , sluice repairs.</p> <p>Inadequate infrastructure for post harvest operations</p> <p>A very few farmers asking only Mango Grafts & T.C.Banana</p> <p>Milch animals sheep loan</p> <p>Farmers enquired fisheries activities</p>	accept the formers request		Accepted to supply the Planting Material			Drying yard Threshing yard	Milch arrange the animal loans by the department through bank	Fish culture in farm ponds	Jungle clearance in supply channel. silt clearance in supply channel, sluice repair and retaining wall in channel weaker section		Under Area Expansion programme to supply the fruits plants & Vegetable			Provisionof drying yard	Milch arrange the animal loans by the department through bank	Creation of farm ponds through AED and supply of fish seeds, inputs also Training	
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DETAILS OF PROPOSED WATER USERS ASSOCIATIONS

Sl. No	WUA No	Villages	Name of WUA	Ayacut in Ha
1	1	Iddipalli Sigaralapalli Ettipalli Varagasandiram	Naickan anicut, sigaralapalli anicut. Ettipalli tank . Varagasamdoram anicut water users Assocation	188.77
2	2	Beemandapalli	Beemandapalli tank Water Users Assocation	74.49
3	3	Kollapatti	Kollapatti anicut Water Users Assocation	72.35
4	4	Beemandapalli	Beemandapalli anicut Water Users Assocation	47.25
5	5	Sigaramaganapalli	Thimmammacherru Tank Water Users Assocation	76.76
6	6	Singiripalli Nachikuppam Thadathada Thasiripalli	Singiripalli anicut Nachikuppam anicut Thadathada anicut Thasiripalli anicut Water Users Assocation	67.82
			Total	527.44Ha



1.5 IRRIGATION INFRASTRUCTURE

ABSTRACT ON THE DETAILS OF THE IRRIGATION INFRASTRUCTURES AVAILABLE/ WORKS TAKEN UP UNDER IAMWARM PROJECT

Name of Sub Basin: Markendeyanadhi

Sl. No	Details	Anicuts			System Tanks			Non- System Tank			Any other supply channel		Remarks
		Nos	Supply Channel in Km	Direct Ayacut	Nos	Supply Channel in Km	Ayacut	Nos	Supply Channel in Km	Ayacut	Length	Direct Ayacut	
1	Available Infrastructure in Sub Basin	9	41.49 Km	332.12	-	-	-	3	6.1 km	195.32	-	-	
2	Infrastructures excluded in IAMWARM Projects since works carried out under various schemes from 2000.	4	16.50 Km	263.98	-	-	-	3	6.1 Km	195.32	-	-	
3	Infrastructures that doesn't require any Rehabilitation works	-	-	-	-	-	-	-	-	-	-	-	
4	Works taken up in IAMWARM Project a) Works takenup under Part _ II Nabard, NADP and MLA consitiency But taken up in IAMWARM Project	4	16.50Km	263.98	-	-	-	3	6.1 Km	195.32	-	-	Component of works partially taken up in Part- II, Nabard, NADP and MLA Consitiency and balance item of works takenup in IAMWARM Project
	b) Works proposed in IAMWARM Project alone	5	24.99Km	68.14	-	-	-	-	-	-			.

- 1) Certified that the Panchayat Union Tanks are not considered in this project.
- 2) Certified that the tanks executed under various schemes (Viz, WRCPI, NABARD, PART II Schemes etc.,) since 2000 were not proposed inthis project.

List of tanks/Anicuts executed under various schemes (Viz, Part II Scheme, NABARD, WRCP I etc.,) since 2000.

Sl.No.	Name of Anicut / Tank	Ayacut	Scheme in which executed	Amount In Lakhs	Details of components executed	Remarks
1	Ettipalli Tank	44.07 Ha	Nabard	11.02	Bund, Supply channel	
2	Sigaralapalli Anicut	115.60 Ha	Nabard		Anicut Supply channel	Newly constructed
3	Thimmammacheru Tank	76.76ha	Part – II	18.90	Catchment treatment Bund ,Sluice ,Weir ,Supply channel WUA Building Thrushing floor	
4	Kollapatti Anicut	72.35 Ha	NADP	14.03	Anicut skin wall Apron cut of wall	
5	Beemandapalli anicut		NADP		Skin wall	
6	Thadathada Anicut		NADP		Head sluice repair works and anicut Apron	
7	Beemandapalli Tank		MLA Constituency	10.00	Bund , Weir supply Channel Sluice and Encroachment	

MARKANDYA NATHI SUB BASIN

THE FOLLOWING TANKS AND ANICUTS ARE TAKEN AND EXECUTED
(UNDER Part-II, Nabard, NADP ,MLA Consitiuecy)

Sl. No	Name of tank/ Anicut	Work Executed under				
		Part –II	Nabard	NADP	MLA consitiuecy	IAMWARrM Project
1	Sigaralapalli anicut	-	Construction of anicut and excavation of new supply channel	-	-	Providing retaining wall in supply channel, construction of new culvert 3 Nos and inlet 2 Nos
2	Beemandapalli anicut	-	Construction of anicut skin wall	Construction of anicut sluice wall	-	Providing retaining wall in supply channel
3	Kollapatti anicut	-	-	Construction of anicut skin wall , apron cut of wall	-	providing retaining wall in Supply channel , Construction of Bed bars in supply channel
4	Thadathada anicut	-	-	Skin wall, construction of cross masonry wall in Supply channel	-	providing retaining wall in Supply channel and Construction of Bed bars in supply channel

1	<u>Non System</u> Beemandapalli tank	-	-	-	Bund, Strengthening, weir improvements, supply channel partial lining and encroachment eviction bund	Improvements to the Left over portion supply channel retaining walls
2	Thimmamacherruvu tank	Bund strengthening renewal Of sluice shutters Supply channel partially improvements ,WUA building construction, Thurshing floor	-	-	-	Supply channel Left over portion supply channel retaining walls
3	Ettipalli tank	-	Supply channel Partially improved, and Bund improvements	-	-	Supply channel Left over portion retaining walls and sluice repair works

1. List of Anicuts with details of Villages, Block, Taluk, District, Direct Ayacut Area, Capacity etc :

LIST OF ANICUTS

Sl. No	Anicuts	Village	Block	Taluk	District	Direct Ayacut Area in Ha	Capacity
1	Sigaralapalli anicut	Sigaralapalli	Veepanapalli	Krishnagiri	Krishnagiri	115.60	
2	Naickan anicut	Iddipalli	Veepanapalli	Krishnagiri	Krishnagiri	16.19	
3	Varagasandiram anicut	Appinaican kottai	Veepanapalli	Krishnagiri	Krishnagiri	12.91	
4	Beemandaplli Anicut	Beemandapalli	Veepanapalli	Krishnagiri	Krishnagiri	47.25	
5	Kollapatti Anicut	Kollapatti	Veepanapalli	Krishnagiri	Krishnagiri	72.35	
6	Sigiripalli Anicut	Singiripalli	Veepanapalli	Krishnagiri	Krishnagiri	4.67	
7	Naclikuppam Anicut	Naclikuppam	Veepanapalli	Krishnagiri	Krishnagiri	14.57	
8	Thathada Anicut	Thadathada	Veepanapalli	Krishnagiri	Krishnagiri	28.78	
9	Thasiripalli anicut	Thasiripalli	Veepanapalli	Krishnagiri	Krishnagiri	19.80	
						332.12	

List of Supply Channel

Sl. No.	Name of Supply Channel	Off take point	Length in Km	Village	Block	Taluk	District	Direct Ayacut in Ha
1	Sigaralapalli	Anicut	6138m	Sigaralapalli	Veppanapalli	Krishnagiri	Krishnagiri	115.60
2	Beemandapalli Anicut Supply	Anicut	4500m	Beemandapalli	Veppanapalli	Krishnagiri	Krishnagiri	42.25
3	Kollapathi Anicut	Anicut	3600m	Kollapathi	Veppanapalli	Krishnagiri	Krishnagiri	72.35
4	Dasiripalli anicut supply channel	Anicut	3000m	Dasiripalli	Veppanapalli	Krishnagiri	Krishnagiri	19.80
5	Thadathada Anicut supply	Anicut	2300m	Thadathada	Veppanapalli	Krishnagiri	Krishnagiri	28.78
6	Singiripalli Anicut supply	Anicut	0.50	Singiripalli	Veppanapalli	Krishnagiri	Krishnagiri	4.67
7	Nachikuppam Anicut supply	Anicut	600m	Nachikuppam	Veppanapalli	Krishnagiri	Krishnagiri	14.57
8	Varagasandiram Anicut supply	Anicut	1150m	Varagasandiram	Veppanapalli	Krishnagiri	Krishnagiri	12.91
9	Naickan Anicut Supply channel	Anicut	1500m	Badimadugu	Veppanapalli	Krishnagiri	Krishnagiri	16.19



1.6. REHABILITATION OF IRRIGATION INFRASTRUCTURE

1.6 Rehabilitation of Irrigation Infrastructure

1.6.1 Structural Status & Deficiencies in the System

1.6 Rehabilitation of Irrigation Infrastructure

1.6.1 Structural Status & Deficiencies in the System

The following are the present structural condition of the Markandeya Nathi sub-basin system.

1. This system is a old system existing for more than 20 Years as such requires Rehabilitation.
2. Heavy accumulation of silt due to hilly region and contour nature of canal system.
3. Lack of adequate control of regulating structures like Anicuts, Sand/ scour vents etc.,
4. The damaged (or) dilapidated condition of the existing anicuts, diversion head works etc. and supply channels causes to poor standard of the entire conveyance system.

Salient Features of Proposals :

In order to improve the conveyance and Operational Efficiency in Irrigation, it is now proposed to improve and modernize the Irrigation Infrastructures in Markandeya Nathi Sub basin.

1. Reconstruction of Naickan Anicut, Nachekuppam Anicut,.
2. Anicut Repairs
 - a) Apron concrete in damaged portion
 - b) Providing cut off walls in d/s of anicut in damaged porition.
3. sluice shutter repair works
4. Desilting in supply channels by earthwork excavation and Bed bar provision in the supply channel.
5. Providing revetments and Retaining walls in selective area of the supply channels
6. Providing Culverts and Cattle crossing Whenever necessary places only.
7. Construction of culverts across the supply channels and construction of inlets in supply channel
8. Providing tank bund model section and providing bed bars in supply channels, retaining walls in supply channel weaker portion
9. Weir repairs and apron concrete works.

1.6.2 Expected Outcome

1. Increase in conveyance efficiency by from 45% to 55%
2. The present Gap area of 212.55 ha. is to be converted as a fully irrigated area
3. The following irrigation infrastructure development works are proposed in the sub basin.
Rehabilitation works for 9 Anicuts, 3 tanks

B. WRO COST TABLE

Sl. No	Description of work	Quantity	Amount in Lakhs	Remarks
I. Non Tank Component		Nil	Nil	
1	Anicut repairs works	2 No	0.83	
2	Reconstruction of Anicut	2No	63.17	
3	Supply channel improvements	25775	32.91	
4	Construction of Culverts	2No	2.59	
5	Construction of Inlets	2No	2.41	
6	Sluice shutter repair	1No	0.17	
7	Measuring Device	9 Nos	1.33	
8.	Environment cell		3.00	
			106.41	

II. Tank Component				
1	Repairs to sluice shutters	3 Nos	0.51	
2	Weir repairs	1No	1.58	
3	Supply channel improvements	450 m	9.05	
4.	Measuring Device	4 nos	0.59	
	Total		11.73	

1). Non-Tank component = 106.41

2). Tank component = 11.73

Total = 118.14 lakhs

PACKAGE DETAILS

PACKAGE NO.I

Name of Tank / Anicut	Amount in Lakhs
Tank 3 Nos	11.73
Anicut 9 Nos	103.41
Sub Total	115.14

TANK DETAILS WITH FREE BOARD PROVIDED

Sl. No.	Name of the Tank	Maximum Height of Bund	Free Board		Length of Bund
			Provided previously	Provided now	
1	Ettipalli tank	4.67m	1.50	--	1300
2	Beemandapalli Tank	5.00	150	-	540m
3	Thimmammacheruvu Tank	3.00	1.25	-	260

Note:-

- 1) For height of bund up to 3.0 m – Free board is 1.25m
- 2) For height of bund more than 3.0m – Free board is 1.50 m

RECONSTRUCTION OF NACHIKUPPAM ANICUT

I. Computation of Maximum Flood Discharge:-

(i). Using Ryves Formula

Combined catchment area = 112.38 Sq.Miles

Free catchment area = 47.60 Sq.mile

Intercepted catchment area = 64.78 Sq.Miles

C = 600 as per memoir of Pennaiyar river Basin

Q = $CM^{2/3} \times 1/5 CM^{2/3}$

= $600 \times 112.38^{2/3} - 1/5 \times 600 \times 64.78^{2/3}$

= 13972.59 - 1935.57

= 12037.02 c/s (or) 340.84 Cumecs

In preliminary report this has been adopted as $1/4$ as a economic measure but the same has been now adopted as $1/5$ as a safety measure.

(ii). Design of Weir:-

Full supply depth of canal = 0.45 M

Proposed driving head = 0.300 M

Creast level of anicut = 490.00 M

Floor level = 488.00 M

Height anicut required = 2.00 M

Maximum flood discharge = 340.84 Cumecs

That is Discharge proposed through weir portion = 340.84 Cumecs

That is Discharge through weir / Rm = $\frac{340.84}{54} = 6.31$ Cumecs

54

Say = 6.5 Cumecs

Water way

As per C.B.I.P Publication No.179, Is.6966 -1963 and C.E. Circular Memo No.A2/6953/81 -12- dated 14.04.81). The water way as per Lacy's wetted perimeter equation is give by $P=4.83 Q$ Where Q = 580.30 Cumecs.

= $4.83 \times 580.30 = 115.53$ M

As per CBIP Publication a water way equal to 1.00 to 1.4 P is generally assumed in rivers, streams in plains. However under any circumstances, the "Looseness Factor" which is a ratio of the overall length of weir / Anicut provided to a theoretically computed minimum stable width of the river at the designed flood

determined by Lacy's equation, should not be less than 0.6 Adopting "Looseness Factor" of 0.6, the minimum water way required.

$$P = 4.83 \sqrt{q} = 4.83 \sqrt{340.84} = 89.17 \text{ m}$$

$$= 0.60 \times 89.17 \text{ M} = 53.50 \text{ m} \text{ Say Hence the length of weir is proposed as 54m}$$

Hence safe

RECONSTRUCTION OF NAICKAN ANICUT

DESIGN OF WEIR

I. Computation of Maximum Flood Discharge:-

(i). Using Ryves Formula

Combined catchment area = 112.38 Sq.Miles

Free catchment area = 47.60 Sq.mile

Intercepted catchment area = 196.26 Sq.Miles

C = 600 as per memoir of Pennaiyar river Basin

Q = $CM^{2/3} \times 1/5 CM^{2/3}$

= $600 \times 261.05^{2/3} - 1/5 \times 600 \times 196.26^{2/3}$

= 24507.57 – 4052.62

= 20454.95 c/s (or) 579.21 Cumecs

In preliminary report this has been adopted as $1/4$ as a economic measure but the same has been now adopted as $1/5$ as a safety measure.

(ii). Design of Weir:-

Max flood discharge = 0.45 M

Proposed head of anicut = 0.300 M

Floor level bed level = 590.75 M

Height anicut required = 2.00 M

That is Discharge through weir per running metre

Maximum flood discharge = 579.21 Cumecs

That is Discharge proposed through weir portion = 579.21 Cumecs

That is Discharge through weir / Rm = $579.21 = 8.27$ Cumecs

70

Say = 8.5 Cumecs

Hence safe

MARKANDEYA NATHI SUB BASIN
PACKAGE 1
Calculation of machineries Requirement

**Hydraulic excavator &
4 Tippers / Lorries**

	6 Hours / Day	
(4 No x 2 loads/ hour x 6 Hr x 4 m ³ / trip)		192 m ³ /Day
For 1 month (20 Working days)	20 x 192 m ³	3840 m ³ / month
Total quantity of earth work	31712	

Working period for earth work 4 months + 3 Months rainy season

Machineries required for earth work :

1. Hydraulic excavator - 4 nos
2. Tippers / Lorries - 10 nos
3. Water lorries - 2 nos

Mixer machine	2 m ³ / hour	For 6 hours / day	12 m ³ / day
Total quantity of concrete		2437 m ³	
Mixer machine required		4 Nos for 10 days / month --5 months	
Material conveyence		Tippers / Lorries	
Cement	10 mt / Trip	1 trip / day	10 mt / day
Sand	5.66 m ³ / Trip	2 trips / day	11.32m ³ /day
Metal / stone	5.60 m ³ / Trip	3 trips / day	16.80 m ³ /day
Total quantity of cement		389mt	
Lorry required for conveyence		389/10	39 Lorries
Total quantity of sand		1000 m ³	
Lorry required for conveyence		1000/11.20	90 Lorries
Total quantity of metal		572 m ³	
Lorry required for conveyence		572 /16.80	34 Lorries
Total quantity of stone		2227 m ³	
Lorry required for conveyence		2227 /16.80	557 Lorries
Tipper / Lorries for conveyance of materials		4 Nos for 20 days for 8 months	



1.7. ENVIRONMENTAL COMPONENT

Report to accompany the estimate for the work of Environmental Component in Detailed Project Report for Markandanadhi Sub Basin of Pennaiyar River Basin” under TN – IAMWARM PROJECT

Estimate Amount: Rs 3.00 Lakhs

Under TNWRCP, with World Bank assistance, special emphasis was given for the first time to assess the Environmental Status and degradation caused for all River basins in Tamil Nadu. Soil Assessment study has been conducted by **Environment Protection Training and Research Institute (EPTRI), Hyderabad**. This institute has identified the Environmental issues, mitigatory measures and given their recommendations on the following issues.

- Environmental Issues :
- Soil Erosion, Sand Mining
 - Water Pollution due to Industries
 - Encroachment of river and tank beds
 - Poor solid waste management
- ii) Social Issues:
- Dry Land Agriculture
 - Reduction in Livestock
 - Women empowerment-SHG's
 - No storing facilities.
 - Health problems due to industrial water pollution
- iii) Mitigatory Measures:
- Non-judicial and excessive sand mining have to be controlled and regulated.
 - Livestock services delivery and management
 - Common storage facilities may be established
- iv) Agency:
- The above measures can be improved By the combined working of Environmental Cell wing and Animal Husbandry Department.

The Environmental Cell of WRO assessed the Environmental impact on the quality of Surface and Ground water and Soil by collecting water & soil samples and testing them, preparation of Micro level Environmental Status Reports for all the River basins with the World Bank assistance for these works up to March 2004.

Also few Awareness programs & workshops were conducted to create Awareness on the Environmental issues & remedies among the public, farmers, Govt. officials and NGOs. Seminars were conducted to find out new techniques and methods developed recently to solve the Environmental problems.

Now under IAMWARM Project, focus is at each Sub Basin level to identify and prioritize the requirements for improvements to storage structures, rehabilitation, new schemes for water harvest, and diversification of crops. Any new schemes or rehabilitation of existing one, consideration of the Environmental issues pertaining to that area and remedial action to overcome the problems is must. Accordingly, Environmental issues prevailing in the Markandanadhi Sub basin is taken up under IAMWARM Project.

PENNAIYAR RIVER

Pennaiyar River originates on the South Eastern slope of Chinnakesava Hills in Karnataka State. The river is called Dakshina Pinakini in Karnataka. The river enters into Tamil Nadu at Sakkarasam palli near Bagalur village of Hosur taluk. The total length of river is 432 Km and out of which 112 Km length of river is in Karnataka State and 320 Km is in Tamil Nadu, it confluences in Bay of Bengal at Cuddalore.

MARKANDHANADHI SUB-BASIN

The Markandeya Nathi sub basin is one of the major tributary to the Pennaiyar. There are 9 anicuts and 5 Tanks involved in the Markandeya Nathi Sub basin. Markandeyan Nathi starts from Karnataka state and runs for a distance of 30km Tamil Nadu and Join Pennaiyar river near Gooliam Village in Krishnagiri Taluk and District. There is a seasonal flow in the river during monsoon seasons. The maximum discharge of this river, so far measured near confluence point to Pennaiyar is 115000 C/S. The Markandeya Nathi Sub basin area is 450.54km. The taluk covered by this sub basin is only Krishnagiri Taluk of Krishnagiri District. Markandeya Nathi sub basin is worth mentioning tributaries of Pennaiyar River. During 1957 (Year) one reservoir namely Krishnagiri Reservoir was constructed across the Pennaiyar River.

ENVIRONMENTAL PROBLEMS:

SOIL EROSION:

Soil erosion causes depletion of fertility through removal of valuable surface soil and lead to reduction in the effective arable soil depth and hence it is one of limiting factors for crop production.

SAND MINING:

One of the major problem in river basin related to Sand Mining as it poses major threat to River Bed. Sand quarrying for construction and other purposes is growing at an alarming rate

which causes failure of Anicuts and Diversion structures, stagnation of water in the deep mined river bed causing consequent health hazards. This needs to be prevented by all means. Now the sand mining has come under the control of WRO. Sand is being collected only at the approved site and the Regular Territorial Division is closely monitoring.

AQUATIC WEEDS :

It is observed that the Aquatic weeds growth Ipomoea locally known as Kadal Palai is found to be in almost 80% of the tanks. The plant growth varies from 40% to 80% in various tanks. In general weeds growth restricts the water storage and loss in capacity of the tanks.

INDUTRIAL POLLUTION:

The effluent from industries located in this sub basin are let into ditches and water drains which ultimately reach the River or supply channels of tanks or lands. Special attention is needed for treating the effluent to avoid water pollution in the sub basin.

SOLID WASTE DISPOSAL:

The problem of Garbage collection and its disposal has assumed importance, in the context of rapid growth of population, urbanization, industrial growth and development. There is no organized scientific method of disposal in all the Municipalities and Panchayats in this sub basin.

SEWAGE DISPOSAL LET INTO WATER BODIES:

Almost all the village has no safe disposal of sewage or proper treatment method is adopted. This affect the near by water source directly or affecting the ground water potential indirectly So, creating awareness among the Presidents of the local bodies is essential and to motivate them to adapt Solid waste management and Sewage management, wherever required, Workshop including field visits, exclusively for them is to be conducted under the IAMWARM project.

ACTIVITIES PROPOSED:

River Basin Monitoring:-

To monitor the quality of water and soil and create database regarding the environmental status for the sub basin, the following activities are proposed at the sub basin level.

Collection and testing of water and soil samples:

Water samples will be collected and tested in the sub basin at identified sampling points regularly. Continuance of collection and testing of water samples is essential, as good and long range data will enable to understand the problems more precisely.

Hence, now it is proposed to collect and test water samples for a period of **Three years** to assess the environmental impact on the quality of surface water of this sub basin more accurately.

In addition to the above identified locations, water samples will also be collected from tanks and near by wells to estimate the level of pollution in selected locations, where sewage is directly let into tanks and Channels. These samples will be tested, to assess the impact on the quality of surface and ground water.

Soil samples are to be collected from selected locations to assess the impact on the quality of soil due to various Environmental problems like use of chemical fertilizer and using the polluted water. From these locations numbers of samples at regular interval have to be collected and tested to determine precisely the impact on the degradation of the quality of the soil.

Therefore testing soil samples are essential.

Under this item following provisions have been made.

1 Testing charges for the water& soil samples.

2 Provision of Labour charges, purchase of materials, conveyance, driver salary and computer operator.

Transfer of technical know-how for solid waste management system including source segregation, recycle of dry waste and linkage with user agencies.

Now a new scheme for solid waste management plan is under implementation in all municipalities and Panchayats. Under this scheme, collection tank for disposal and non-disposable garbage have been constructed in most of the local bodies. But recycling the waste and converting the solid waste into manure and production of energy from them are yet to be come up.

Hence demonstration and action programs are planned with user agencies and necessary field visits are programmed to transfer of technical know how for solid waste management system.

Conducting Awareness Programs.

Awareness Programs are necessary to create awareness among the public about environmental aspects and the action to be taken by them to remove or reduce the impacts due to the environmental problems. So far, no awareness Programs were conducted in this sub basin.

Hence, to create and motivate the people, Awareness programmes are to be conducted in the villages where sewage is directly let into water bodies. It is also proposed to conduct awareness meetings in School/ Institutions during the study period of three years covering the following subjects in addition to placing Stickers, Tin sheets and Pamphlets containing messages about Environmental Awareness.

- Sanitation. Solid waste treatment.
- Sewage treatment and converting the same into Gas.
- Natural farming.

- Conversion of aquatic weeds into manure etc.

Mode of Execution:

All the works proposed are to be carried out by outsourcing through an Educational Institute.

Total Cost.

The total Proposal cost works out to **Rs.3.00 Lakhs.**
(Rupees Three Lakh Only).

(ENVIRONMENTAL COMPONENT)

Name of River Basin	Pennaiyar River Basin
Name of Sub Basin	Markandanadhi Sub-Basin
Number of WUA	yet to be formed: 8 Nos.
Name of Division	Upper Pennaiyar Basin Division,Dharmapuri
Name of Sub-Division	Upper Pennaiyar Basin Sub- Division,KRP Dam,Krishnagiri
District	Krishnagiri
Taluk	1) Krishnagiri
Block	1) Veppanapalli 2) Krishnagiri
Name of Tanks\ Anicuts severly affected by water weeds under this sub-basin	List enclosed
Domestic Sewage (Name of River/ Tank with specific location polluted by Domestic sewage)	Sewage generated are disposed in land & tanks
Municipal Solid Waste (Name of River/ Tank with specific location where Municipal solid waste is dumped)	Solid waste generated are disposed in land & tanks which may cause ground water pollution.
Water Quality Status:	
i) Ground Water	Ground water is Moderate to good.
ii)Surface Water	Water can be utilized for irrugation purpose,however it need treatment before using drinking purpose.

Environmental Activities in Markanda Nadhi Sub-Basin of Pennaiyar River Basin under
IAMWARM PROJECT

DETAILED ESTIMATE

Sl No	Description of work	No	Measurement			Contents
			L	B	D	
I. Environmental Social Monitoring of river basin including peroidal water and soil quality testing and documentation. (By fixing nodel agency or any educational institution)						
1	Collection and testing of water samples and Soil samples					
i)	Water samples collected from river & tanks for a period of Three years					3 Nos
ii)	Soil samples collected from irrigation fields for a period of Three years					1 Nos
iii.)	Hiring jeep driver on service contract basis for the department vehicle	1 No	1 months			1
iv.)	Collection and conveyance charges including all purchases like cans, chemicals, Documentation of test results including labour charges.					LS
II Environmental Social knowledge base analysis and development (By fixing nodel agency or any educational institution)						
	Preparation of Impact Assessment report with expert analysis for 3 yrs @ every 6 months and documentation for					
a)	Impacts due to project investment.					LS
b)	Other impacts observed in the river basin.					LS
III. Transfer of technical know how for solid waste management system including source segregation, recycle of dry waste and linkage with user agencies. (By fixing nodel agency or any educational institution)						

a)	Motivating the local bodies for Solid waste management project and Sewage treatment plants to prevent pollution of water sources and using for irrigation by transferring technical know how through demonstration Documentary film and Technical visit including herbal garden.	L.S.					L.S.
b)	Promoting Entrepreneurship Policy for Eradication for weeds by setting up Bio gas Plant / Vermi compost By WUA through Awareness creation, Demonstration and consultative meeting and pilot study.	L.S.					L.S.
IV.	Conducting Environmental and social Awareness meeting, programme, demonstration and Exhibitions on various environmental and social related issues including capacity building.(By fixing nodal agency or any educational institution)						
a)	Printing Stickers, Pamphlets, Tin sheets, Providing Banners for Propagating Environmental Awareness among public	LS					LS
b)	Conducting meetings in school/Institutions	1 x 1					1 No
c)	Preparing and publishing Environmental Atlas for the Sub Basin for the use of Line departments / Institutions for better Management of Sub basin						LS
d)	Documentation of the entire activities, Videofilms,hire purchase of LCD,Preparation of sub-basin maps of all size & Upgradation of computer and accessories.	LS					LS
e)	Exposure to field visit and Eco-friendly practices and environmental monitoring.	LS					LS

Environmental Activities in Markandanadhi Sub-Basin of Pennaiyar River Basin under
IAMWARM PROJECT

Working Sheet

Water Samples

1	Testing Charges rate as per ground water division (Dept) (Partly)	650.00	/Sample
2	Testing Charges rate as per SGS Laboratory (private) (Total Coliform, Faecal Coliform, Pesticides Residual) (Partly)	5250.00	/Sample
3	Service Charges @ 10.30 %	540.75	
	TOTAL	6440.75	(or)
		6441	

Soil Samples

1	Testing Charges rate as per SM & R Division (Dept) (Partly)	6000	/Sample
2	Testing Charges rate as per SGS Laboratory (private) (Pesticides Residual) (Partly)	4500	/Sample
	Service Charges @ 10.3 %	463.50	
	TOTAL	10963.5	(or)
		10964	

Environmental Activities in Markanda Nadhi Sub-Basin of Pennaiyar River Basin under
IAMWARM PROJECT

ABSTRACT ESTIMATE

S.No	Qty	Description of Work	Rate	Per	Amount
I. Environmental Social Monitoring of river basin including peroidal water and soil quality testing and documentation. (By fixing nodel agency or any educational institution)					
a)	3 Nos	Testing charges for Water samples	6441	Each	19323
b)	1 Nos	Testing charges for soil samples from polluted site	10964	Each	10964
c)	1 month	Hiring Jeep driver for the Dept Vehicle@ RS 151.80 /day	151.80	/day	3947
d)	LS	Collection and conveyance charges including all purchases like cans, bottles,chemicals,Documentation of test results including labour charges.	LS		3446
II Environmental Social knowledge base analysis and development (By fixing nodel agency or any educational institution)					
		Preparation of Impact Assessment report with expert analysis for 3 yrs @ every 6 months and documentation for			
a)	LS	Impacts due to project investment.			60000
b)	LS	Other impacts observed in the river basin.			15000
III. Transfer of technical know how for solid waste management system including source segregation, recycle of dry waste and linkage with user agencies. (By fixing nodel agency or any educational institution)					

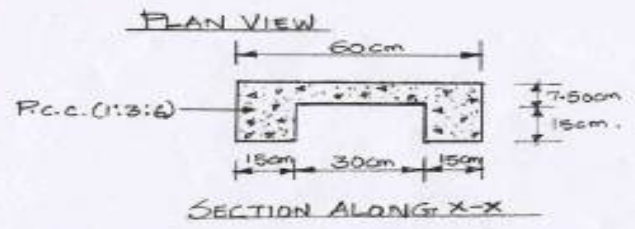
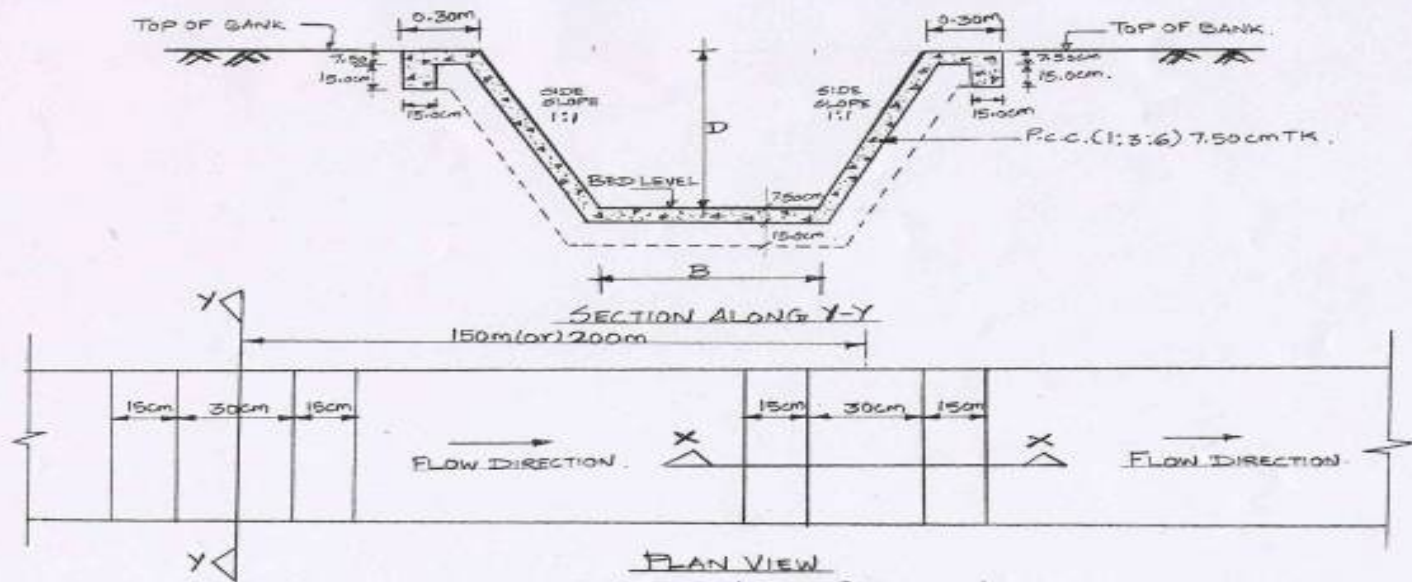
a)	L.S.	Motivating the local bodies for Solid waste management project and Sewage treatment plants to prevent pollution of water sources and using for irrigation by transferring technical know how through demonstration Documentary film and Technical visit including herbal garden.	LS		30000
b)	LS	Promoting Entrepreneurship Policy for Eradication for weeds by setting up Bio gas Plant / Vermi compost By WUA through Awareness creation, Demonstration and consultative meeting and pilot study.	LS		30000
IV.	Conducting Environmental and social Awareness meeting, programme, demonstration and Exhibitions on various environmental and social related issues including capacity building. (By fixing nodel agency)				
a)	LS	Printing Stickers, Pamphlets, Tin sheets, Providing Banners for Propagating Environmental Awareness among public	LS		1500
b)	1	No	Conducting meetings in school/Institutions	20000	20000
c)	LS	Preparing and publishing Environmental Atlas for the Sub Basin for the use of Line departments / Institutions for better Management of Sub basin	LS		50000
d)	LS	Documentation of the entire activities, Videofilms, hire purchase of LCD, Preparation of sub-basin maps of all size & Upgradation of computer and accessories.	LS		5820
e)	LS	Exposure to field visit and Eco-friendly practices and environmental monitoring.	LS		50000
		Total			300000

(Rupees Three Lakhs Only)



DESIGN AND DRAWING





DIMENSIONS TO SUIT SITE CONDITION.

DRAWING NOT TO SCALE