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GOVERNMENT OF INDIA
MINISTRY OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION
CENTRAL GROUND WATER BOARD

PLAN ON
ARTIFICIAL RECHARGE TO GROUNDWATER AND
WATER CONSERVATION IN
KAMBADUR MANDAL, ANANTAPUR DISTRICT,
ANDHRA PRADESH STATE

SOUTHERN REGION
HYDERABAD
AUGUST-2016

PLAN ON
ARTIFICIAL RECHARGE TO GROUNDWATER AND
WATER CONSERVATION IN
KAMBADUR MANDAL, ANANTAPUR DISTRICT,
ANDHRA PRADESH STATE

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AT A GLANCE

Name of the Mandal	KAMBADUR
District	ANANTAPUR
State	ANDHRA PRADESH
Total Area (Sq.kms.s)	420
Area suitable for Artificial Recharge (Sq.kms.s)	391
Latitude and Longitude	14.276090 to 14.517370 and 77.118340 to 77.386000
Average Annual Rainfall (mm)	458
Geology	Granites, Gneisses
Average Depth To Water Level (Decadal) (Pre Monsoon)	7.1
Average Depth To Water Level (Decadal) (Post Monsoon)	2.3
Ground Water Resources (2011)	
Annual Replenishable Ground Water Resources (MCM/yr)	30.83
Net Annual Ground Water Availability(MCM)/yr	27.43
Net Annual Ground Water Draft(MCM)/yr	31.07
Projected Demand for Domestic and Industrial Use(MCM)/yr	1.90
Stage of Ground Water Development (%)	113
Surface runoff available (MCM)/yr	17.42
Total Storage Created in the Mandal by Various Agencies (MCM)/yr	1.50
Artificial Recharge/Conservation Measures	
Recharge Structures Proposed (No.s)	Percolation Tanks: 14, Check Dams: 30 Farm ponds: 240, Recharge Shafts: 106
Improving Water use Efficiency	Micro Irrigation System: 1200 ha
Tentative Total Cost in Lakhs (Rs.)	1282.26
Expected Recharge/Savings (MCM)/yr	6.477

1. INTRODUCTION

Kambadur Mandal is one of the over-exploited mandal in Anantapur district, Andhra Pradesh State, which is economically backward and chronically drought affected. The mandal has 12 inhabited villages and with 12 gram panchayats.

2. LOCATION

The mandal lies between north latitudes 14.276090 to 14.517370 and between east longitudes 77.118340 to 77.386000. The mandal occupies the Western part of the Anantapur district and is bounded on the north by Kalyandurg mandal, on the east by Kanaganapalle mandal, on the south by Karnataka State and west by Kundurpi mandal. (Fig.1)The geographical area of the mandal is 420 Sq.kms.

3. PHYSIOGRAPHY AND DRAINAGE:

The area is drained by streams which are tributaries of Lower Thungabhadra River. The streams are mostly ephemeral in nature. The drainage pattern is dendritic, rectangular to sub rectangular due to the influence of geological structures. (Fig.2)

4. RAINFALL

The average rainfall in the mandal is 458 mm. The rainfall during the South-west monsoon season i.e., June-September accounts for about 85% of the total rainfall.

5. LAND USE PATTERN

Out of the total geographical area of 420 Sq.kms., the area covered by forest is 10.60 Sq.kms. and the net area sown is 294.41 Sq.kms. Barren and uncultivable land is 37.54 Sq.kms. The land for non agricultural use accounts for 30.47 Sq.kms.. (Fig.3)

6. HYDROGEOLOGY

The Mandal is underlain by granites and granitic gneisses of Archaean age (Fig-4). The ground water in these formations occurs in the weathered and fractured zones under the water table and Semi- Confined conditions. The weathered zone thickness as per the GEC report is 10 m. The weathered zone has been extensively tapped by dug and dug cum bore wells upto 20 m depth. Ground water occurs in fractured granites down to a depth of 200 m bgl. However, the potential fractures are encountered between 50-100 m bgl. The cumulative yield varies from 2-5 lps.

7. GROUND WATER LEVEL SCENARIO

The depth to water level during pre and post-monsoon varies from 5 to 20 m bgl. The depth to water levels maps for pre and post monsoon period (2014) are shown in (Fig. 5 & 6. respectively.). The decadal mean water level trend during post monsoon is depicted in the Fig.7.

8. DYNAMIC GROUND WATER RESOURCES

The Ground water availability, Utilization and stage of Development in Kambadur Mandal, Anantapur District is given in Table-1.

Table-1: Ground water resources of Kambadur Mandal, Anantapur District.

Annual Replenishable Ground water resources (MCM)	30.83
Net Annual Ground water Availability. (MCM)	27.43
Net Annual Ground Water Draft(MCM)/yr	31.07
Projected Demand for Domestic and Industrial use up to 2025. (MCM)	1.90
Stage of Ground water development (%).	113
Whether notified or not with year of notification.	No

9. NEED FOR ARTIFICIAL RECHARGE AND CONSERVATION METHODS

The ground water withdrawal is more than the recharge with a stage of development above hundred percent. The long term water level trend mostly shows a declining trend and the water levels are very deep ranging upto 15m bgl. The sustainability of bore wells has become questionable as many bore wells are either drying up or have recorded reduced yields. There is no surface water irrigation facility in the area. All these factors indicate that there is an urgent need for artificial recharge and water conservation.

10. JUSTIFICATION OF THE ARTIFICIAL RECHARGE PROJECT

Kambadur Mandal falls under high stage of ground water development i.e., 113 % and with sufficient amount of uncommitted surface runoff. The area is completely dependent on ground water for domestic industrial and irrigation purposes. During the monsoon runoff quickly flows out of the area without natural recharge to ground water. It is necessary to apply artificial recharge techniques to allow more and more recharge through check dams, PTs, MPTs, farm ponds, recharge shafts to cope up with the withdrawal pattern and also to improve ground water situation through various interventions including on farm activities and micro irrigation systems (Sprinkler-Drip-HDPE).

11. AVAILABILITY OF SURPLUS, SURFACE WATER FOR ARTIFICIAL RECAHRGE OR CONSERVATION

The runoff was calculated by taking into account of normal rainfall of the mandal and corresponding runoff yield from Strangers table. The existing storage created by various artificial recharge structures constructed by the State Government, if any, was deducted for calculating the runoff yield to recommend new AR structures.

Total Geographical area (Sq.kms.s)	420
Hilly Area (Sq.kms.s)	29
Area suitable for Artificial Recharge (Sq.kms.)	391
Runoff Yield in MCM/yr.	17.42
Existing No. of Check Dams	128
Storage created MCM/yr.	0.91
Existing No. of Percolation Tanks	84
Storage created MCM/yr.	0.59
Total Existing Storage Created	1.50

12. FEASIBLE ARTIFICIAL RECHARGE STRUCTURES

Since the mandal is categorized as over exploited, there is an immediate need for improving ground water scenario and to ensure sustainability of ground water sources. It is also suggested to create additional storage capacity of surface water bodies which would result in supplementing irrigation thereby reducing the ground water draft. The runoff available in the mandal has been assessed as 15.92 MCM/yr, which could be considered for further planning of artificial recharge. However, the number of artificial recharge structures feasible has been recommended in areas, by considering the utilizable yield, number of existing structures, land use, drainage pattern and also where the post monsoon water levels (decadal mean) are more than 5 m bgl., and or decadal trends are either falling or showing insignificant raising trend.

A) Check dams and Percolation Tanks

The area is covered by seasonal nalas – drains, which carry discharge during monsoon period debauched into the water bodies within a short duration. It is proposed to identify such nalas for construction of check dams/Percolation tank with recharge shafts, so as to harness ground water and to increase soil moisture content.

- The site selected for check dam/Percolation Tank should have sufficient thickness of permeable soils or weathered material to facilitate recharge of stored water within a short span of time. The water stored in these structures is mostly confined to the stream course and height is normally less than 2m.
- These are designed based on stream width and excess water is allowed to flow over the crest wall. In order to avoid scouring from excess runoff water cushions are provided on the downstream side. To harness maximum runoff in the stream, a series of such check dams can be constructed to have recharge on a regional scale.
- Considering the annual monsoon rainfall of 458 mm sufficient rain water can be harnessed. This will improve ground water regime as well as delaying the instant flow into the main river.
- The flow in these seasonal rivers can be sustained up to about 2 to 3 months after monsoon.

- Recharge trenches can also be constructed along upstream side of the check dam/Percolation Tank in the impoundment area for enhancing the ground water recharge rates.

Thus, a total of 30 **Check dams and 14 Percolation tanks** are recommended.

B). Recharge Shafts

The existing check dams and percolation tanks lose their storage capacity as well as recharge capacity due to siltation. Hence, Recharge shafts are recommended in the existing Check dams and Percolation tanks to enhance the ground water recharge. During the heavy downpours, there will be sufficient accumulation of runoff, which can also effectively be utilized for recharge by constructing recharge shafts. Hence, it is proposed to construct 64 and 42 recharge shafts of 165 mm dia with 30 m depth in the existing check dams and percolation tanks respectively.

C). Farm Ponds

A farm pond is a large dug out in the earth, usually square or rectangular in shape, which harvests rainwater and stores it for future use. It has an inlet to regulate inflow and an outlet to discharge excess water. The pond is surrounded by a small bund, which prevents erosion on the banks of the pond. The size and depth depend on the amount of land available, the type of soil, the farmer's water from the farm pond is conveyed to the fields manually, by pumping, or by both methods.

Advantages of Farm Ponds

- They provide water to start growing crops, without waiting for rain to fall.
- They provide irrigation water during dry spells between rainfalls. This increases the yield, the number of crops in one year, and the diversity of crops that can be grown.
- Bunds can be used to raise vegetables and fruit trees, thus supplying the farm household with an additional source of income and of nutritious food.
- Farmers are able to apply adequate farm inputs and perform farming operations at the appropriate time, thus increasing their productivity and their confidence in farming.
- They check soil erosion and minimize siltation of waterways and reservoirs.
- They supplies water for domestic purposes and livestock
- They promote fish rearing.
- They recharge the ground water.
- They improve drainage.

- The excavated earth has a very high value and can be used to enrich soil in the fields, levelling land, and constructing farm roads.

As per the Land use classification, majority of the area is covered by the agricultural field. Hence, it is proposed to construct 240 farm ponds in 12 villages of the Mandal @ 20 farm ponds in each village.

D). Micro Irrigation System (Sprinkler /drip/HDPE pipes)

Micro irrigation is defined as the frequent application of small quantities of water directly above and below the soil surface; usually as discrete drops, continuous drops or tiny streams through emitters placed along a water delivery line. In flood/furrow irrigation method more than 50% of applied water is wasted through seepage to deeper level, localized inundation causes loss through evaporation and it leaches out the nutrients from the plant. While through drip & sprinkler irrigation wastages of irrigational water could be minimized. The studies on different crops, has revealed that irrigation water is saved drastically. The conveyance losses (mainly seepage & evaporation) can be saved up to 25 to 40% through utilization of HDPE pipes. Initially the scheme is proposed to be implemented in worst affected areas showing deepest water levels and significant declining trends. It is proposed to take up micro irrigation system in 1200 ha @ 100 ha per village.

13. TENTATIVE COST ESTIMATES (KAMBADUR MANDAL)

S.No.	Feasible Artificial Recharge & Water Conservation structures/	No. of Structures/ Quantity	Total Volume (MCM)	Tentative unit cost (in Rs lakh)	Total tentative cost (in Rs Lakh)	Expected Annual GW recharge/Savings (MCM)
1	Proposed Masonry Check dams Crest Length -10-15 m, Height-1-2 m) (0.007 MCM*4 fillings)	30	0.84	5	150	0.63
2	Recharge shaft in Check dam (50% of the existing Check dams)	64	0.704	0.5	32	0.704
3	Proposed Percolation Tanks (100*100*2.5)* 4 fillings)	14	1.4	15	210	1.05
4	Renovation Desilting, Repairs and installation of Recharge Shafts in existing PTS (50% of the existing PTS)	42	0.462	1	42	0.462
5	Proposed Farm Pond (6 filling) 5*5*1.5 dimension @ 20 farm ponds per each village	240	0.03456	0.25	60	0.031104
6	Proposed Sprinkler/drip/HDPE pipes for 100 ha in each village	1200	7.2	0.6	720	3.6
7	Proposed Piezometers up to 50 mbgl @ one PZ per Village	12	0	0.6	7.2	0
8 (i)	Total (No. of AR Structures)	402	3.44		501.2	2.877
8 (ii)	Total (ha)	1200			720	3.6
	Total (8(i) + 8 (ii))				1221.2	6.477
9	Impact Assessment & O & M -5 % of Total cost of the Scheme				61.06	
	Grand Total				1282.26	

*(Expected annual GW Recharge/Savings MCM - CDS& PTS: 75%, Farm ponds - 90%, Sprinklers-50%, Recharge shafts in existing CDS and PTS-100%)

Note: The type, number and cost of structure may vary according to site, after the ground truth verification.

14. TIME SCHEDULE

Steps	Quarters							
	1st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
Identification of line department/implementing agency and preparation of DPR								
Approval of Scheme and releases of sanction of funds								
Implementation of ARS								

Phase = one quarter or 3 months or equivalent to financial quarter

A). Operation and Maintenance

In all projects impact assessment has to be carried out to ensure that project is economically viable, socially equitable and environmentally sustainable by inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse. Accordingly it is proposed to have impact assessment as well as operation & Maintenance at the rate of 5% of the total cost of the project for 5 years from the completion of artificial recharge project.

B). Expected Benefits

The benefits of the project are:

1. The implementation of the project would result in additional recharge/Ground water savings to the tune of 6.477 MCM.
2. Ground water recharge will help in arresting the rapid decline in ground water resources and will also ensure improvement in quality of ground water by dilution.
3. Proposed structures and measures will also enhance the ground water potential and would ensure sustainability of ground water resources. It is estimated that the stage of ground water development may likely to be reduced from the present 113% to 92% (21%)
4. It will also help in controlling soil erosion.

Acknowledgements

The data received from the Director Ground Water Department Andhra Pradesh in respect of the basic inputs is duly acknowledged. The information on existing Artificial Recharge Structures have been taken from the EMUSTER, Department of Rural Development, Government of AP.

ARTIFICIAL RECHARGE STRUCTURES
KAMBADUR MANDAL, ANANTAPUR DISTRICT, AP

S.no	Gram Panchayat	Habitation	Structure Type	Longitude	Latitude	Scheme
1	Chennampalle	Achampalle	Check Dam	77.2867	14.3489	NREGS
2	Chennampalle	Chennampalle	Check Dam	77.2324	14.3428	NREGS
3	Chennampalle	Chennampalle	Check Dam	77.3165	14.3727	NREGS
4	Chennampalle	Chennampalle	Check Dam	77.3046	14.3692	NREGS
5	Chennampalle	Chennampalle	Check Dam	77.2954	14.3447	NREGS
6	Chennampalle	Chennampalle	Check Dam	77.2881	14.3305	NREGS
7	Marrimakulapalle	MarrimakulaPalle	Check Dam	77.1292	14.4390	NREGS
8	Marrimakulapalle	MarrimakulaPalle	Check Dam	77.1360	14.4135	NREGS
9	Mulakanur	Kadiridevalapalli	Check Dam	77.2006	14.4032	NREGS
10	Mulakanur	Kadiridevalapalli	Check Dam	77.2020	14.4034	NREGS
11	Mulakanur	Kadiridevalapalli	Check Dam	77.2153	14.4169	NREGS
12	Mulakanur	Kadiridevalapalli	Check Dam	77.2070	14.4137	NREGS
13	Mulakanur	Kadiridevalapalli	Check Dam	77.2112	14.4094	NREGS
14	Mulakanur	Kadiridevalapalli	Check Dam	77.2113	14.4103	NREGS
15	Mulakanur	Kadiridevalapalli	Check Dam	77.2146	14.4167	NREGS
16	Mulakanur	Kadiridevalapalli	Check Dam	77.2219	14.4128	NREGS
17	Mulakanur	Kadiridevalapalli	Check Dam	77.2143	14.4132	NREGS
18	Mulakanur	Kadiridevalapalli	Check Dam	77.1898	14.4117	NREGS
19	Mulakanur	Kadiridevalapalli	Check Dam	77.1969	14.4130	NREGS
20	Mulakanur	Kadiridevalapalli	Check Dam	77.2205	14.4081	NREGS
21	Mulakanur	Mulakanur	Check Dam	77.1855	14.4179	NREGS
22	Mulakanur	Mulakanur	Check Dam	77.1922	14.4241	NREGS
23	Mulakanur	Mulakanur	Check Dam	77.1922	14.4259	NREGS
24	Mulakanur	Mulakanur	Check Dam	77.1967	14.4252	NREGS
25	Mulakanur	Mulakanur	Check Dam	77.1958	14.4272	NREGS
26	Mulakanur	Mulakanur	Check Dam	77.1776	14.4353	NREGS
27	Mulakanur	Mulakanur	Check Dam	77.1778	14.4248	NREGS
28	Mulakanur	Mulakanur	Check Dam	77.1780	14.4183	NREGS
29	Nuthimadugu	Nuthimadugu	Check Dam	77.3466	14.5210	NREGS
30	Nuthimadugu	Nuthimadugu	Check Dam	77.3376	14.4681	NREGS
31	Nuthimadugu	Tippepalle	Check Dam	77.3515	14.4746	NREGS
32	Nuthimadugu	Tippepalle	Check Dam	77.3612	14.4920	NREGS
33	Gollapalle	CherloPalle	Check Dam	77.1979	14.4305	NREGS
34	Gollapalle	CherloPalle	Check Dam	77.1953	14.4334	NREGS
35	Gollapalle	CherloPalle	Check Dam	77.2139	14.4312	NREGS
36	Gollapalle	CherloPalle	Check Dam	77.2098	14.4240	NREGS
37	Gollapalle	CherloPalle	Check Dam	77.2003	14.4388	NREGS
38	Gollapalle	CherloPalle	Check Dam	77.1977	14.4377	NREGS
39	Gollapalle	CherloPalle	Check Dam	77.2009	14.4401	NREGS
40	Gollapalle	CherloPalle	Check Dam	77.2050	14.4325	NREGS

41	Gollapalle	Gollapalle	Check Dam	77.2211	14.4175	NREGS
42	Gollapalle	IparsuPalle	Check Dam	77.2582	14.4148	NREGS
43	Gollapalle	IparsuPalle	Check Dam	77.2493	14.4105	NREGS
44	Gollapalle	IparsuPalle	Check Dam	77.2584	14.4233	NREGS
45	Gollapalle	IparsuPalle	Check Dam	77.2647	14.4225	NREGS
46	Gollapalle	IparsuPalle	Check Dam	77.2693	14.4191	NREGS
47	Gollapalle	IparsuPalle	Check Dam	77.2647	14.4133	NREGS
48	Kurakulapalle	Ayyampalle	Check Dam	77.3092	14.3260	NREGS
49	Kurakulapalle	Ayyampalle	Check Dam	77.3104	14.3208	NREGS
50	Kurakulapalle	Narsipuram	Check Dam	77.3089	14.3151	NREGS
51	Kurakulapalle	Narsipuram	Check Dam	77.3067	14.3150	NREGS
52	Rallaanantapuram	Melakunta	Check Dam	77.2709	14.3912	NREGS
53	Rallaanantapuram	Melakunta	Check Dam	77.2557	14.3927	NREGS
54	Rallaanantapuram	Melakunta	Check Dam	77.2703	14.4071	NREGS
55	Rallaanantapuram	RallaAnantapuram	Check Dam	77.2761	14.4122	NREGS
56	Rallaanantapuram	RallaAnantapuram	Check Dam	77.2856	14.4227	NREGS
57	Rallaanantapuram	RallaAnantapuram	Check Dam	77.2854	14.4232	NREGS
58	Rallaanantapuram	RallaAnantapuram	Check Dam	77.2912	14.4271	NREGS
59	Rallaanantapuram	RallaAnantapuram	Check Dam	77.3181	14.4054	NREGS
60	Rallaanantapuram	RallaAnantapuram	Check Dam	77.3147	14.4060	NREGS
61	Rallaanantapuram	Rallapalle	Check Dam	77.2794	14.3850	NREGS
62	Rallaanantapuram	Rallapalle	Check Dam	77.2859	14.3942	NREGS
63	Rallaanantapuram	Rallapalle	Check Dam	77.2839	14.3844	NREGS
64	Rampuram	Rampuram	Check Dam	77.2803	14.4686	NREGS
65	Rampuram	Y.C.Palli	Check Dam	77.2508	14.4902	NREGS
66	Rampuram	Y.C.Palli	Check Dam	77.2546	14.4923	NREGS
67	Rampuram	Y.C.Palli	Check Dam	77.2568	14.4863	NREGS
68	Rampuram	Y.C.Palli	Check Dam	77.2581	14.4870	NREGS
69	Rampuram	Y.C.Palli	Check Dam	77.2638	14.4954	NREGS
70	Timmapuram	Timmapuram	Check Dam	77.1758	14.3825	NREGS
71	Timmapuram	Timmapuram	Check Dam	77.1657	14.3810	NREGS
72	Timmapuram	Timmapuram	Check Dam	77.1734	14.3627	NREGS
73	Karthanaparathi	D.Chennepalli	Check Dam	77.3125	14.4384	NREGS
74	Karthanaparathi	Gulyam	Check Dam	77.2830	14.4344	NREGS
75	Karthanaparathi	Gulyam	Check Dam	77.2844	14.4400	NREGS
76	Karthanaparathi	Gulyam	Check Dam	77.2837	14.4426	NREGS
77	Karthanaparathi	Gulyam	Check Dam	77.2656	14.4452	NREGS
78	Karthanaparathi	Gulyam	Check Dam	77.2920	14.4410	NREGS
79	Karthanaparathi	Gulyam	Check Dam	77.2710	14.4595	NREGS
80	Karthanaparathi	Gulyam	Check Dam	77.2572	14.4605	NREGS
81	Karthanaparathi	Gulyam	Check Dam	77.2556	14.4507	NREGS
82	Karthanaparathi	Gulyam	Check Dam	77.2567	14.4519	NREGS
83	Karthanaparathi	Karthanaparathi	Check Dam	77.3158	14.4741	NREGS

84	Karthanaparathi	Kothuru	Check Dam	77.2989	14.4764	NREGS
85	Pallur	Palluru	Check Dam	77.2314	14.4446	NREGS
86	Pallur	Yarramallepalli	Check Dam	77.2436	14.4565	NREGS
87	Pallur	Yarramallepalli	Check Dam	77.2410	14.4574	NREGS
88	Pallur	Yarramallepalli	Check Dam	77.2565	14.4520	NREGS
89	Kambadur	Andeplle	Check Dam	77.2099	14.3872	NREGS
90	Kambadur	Andeplle	Check Dam	77.1979	14.3890	NREGS
91	Kambadur	Andeplle	Check Dam	77.2175	14.3824	NREGS
92	Kambadur	Jallipalle	Check Dam	77.2574	14.3683	NREGS
93	Kambadur	Jallipalle	Check Dam	77.2566	14.3683	NREGS
94	Kambadur	Kotaguddam	Check Dam	77.2647	14.3350	NREGS
95	Kambadur	Kothapalle	Check Dam	77.2068	14.3333	NREGS
96	Kambadur	Kothapalle	Check Dam	77.2054	14.3288	NREGS
97	Kambadur	Kothapalle	Check Dam	77.1967	14.3212	NREGS
98	Kambadur	Kothapalle	Check Dam	77.1968	14.3391	NREGS
99	Kambadur	Kothapalle	Check Dam	77.1877	14.3377	NREGS
100	Kambadur	Kurlapalli	Check Dam	77.2368	14.3926	NREGS
101	Kambadur	OntnareddyPalle	Check Dam	77.2510	14.3495	NREGS
102	Kambadur	OntnareddyPalle	Check Dam	77.2627	14.3474	NREGS
103	Kambadur	OntnareddyPalle	Check Dam	77.2453	14.3580	NREGS
104	Kambadur	OntnareddyPalle	Check Dam	77.2634	14.3471	NREGS
105	Marrimakulapalle	MarrimakulaPalle	Check Dam	77.1292	14.4390	IWMP
106	Marrimakulapalle	MarrimakulaPalle	Check Dam	77.1360	14.4135	IWMP
107	Mulakanur	Mulakanur	Check Dam	77.1922	14.4241	IWMP
108	Mulakanur	Mulakanur	Check Dam	77.1922	14.4259	IWMP
109	Mulakanur	Mulakanur	Check Dam	77.1967	14.4252	IWMP
110	Mulakanur	Mulakanur	Check Dam	77.1958	14.4272	IWMP
111	Mulakanur	Mulakanur	Check Dam	77.1778	14.4248	IWMP
112	Mulakanur	Mulakanur	Check Dam	77.1780	14.4183	IWMP
113	Mulakanur	Mulakanur	Check Dam	77.1855	14.4179	IWMP
114	Mulakanur	Mulakanur	Check Dam	77.1776	14.4353	IWMP
115	Gollapalle	CherloPalle	Check Dam	77.1979	14.4305	IWMP
116	Gollapalle	CherloPalle	Check Dam	77.1953	14.4334	IWMP
117	Gollapalle	CherloPalle	Check Dam	77.2139	14.4312	IWMP
118	Gollapalle	CherloPalle	Check Dam	77.2098	14.4240	IWMP
119	Gollapalle	CherloPalle	Check Dam	77.2003	14.4388	IWMP
120	Gollapalle	CherloPalle	Check Dam	77.1977	14.4377	IWMP
121	Gollapalle	CherloPalle	Check Dam	77.2009	14.4401	IWMP
122	Gollapalle	CherloPalle	Check Dam	77.2050	14.4325	IWMP
123	Pallur	Palluru	Check Dam	77.2314	14.4446	IWMP
124	Rallaanantapuram	Melakunta	Check Wall	77.2697	14.3936	NREGS
125	Rallaanantapuram	RallaAnantapuram	Check Wall	77.2737	14.4134	NREGS
126	Rallaanantapuram	RallaAnantapuram	Check Wall	77.2922	14.3935	NREGS

127	Rallaanantapuram	Rallapalle	Check Wall	77.2798	14.3804	NREGS
128	Kambadur	Kothapalle	Check Wall	77.2027	14.3366	NREGS
129	Marrimakulapalle	MarrimakulaPalle	MPT	77.1247	14.4388	NREGS
130	Nuthimadugu	Nuthimadugu	MPT	77.3348	14.5061	NREGS
131	Nuthimadugu	Nuthimadugu	MPT	77.3412	14.4623	NREGS
132	Nuthimadugu	Tippepalle	MPT	77.3628	14.4967	NREGS
133	Kambadur	Kambadur	MPT	77.2302	14.3383	NREGS
134	Marrimakulapalle	MarrimakulaPalle	MPT	77.1247	14.4388	IWMP
135	Chennampalle	Chennampalle	PT	77.2985	14.3676	NREGS
136	Marrimakulapalle	MarrimakulaPalle	PT	77.1273	14.4247	NREGS
137	Marrimakulapalle	MarrimakulaPalle	PT	77.1345	14.4263	NREGS
138	Marrimakulapalle	MarrimakulaPalle	PT	77.1377	14.4161	NREGS
139	Marrimakulapalle	MarrimakulaPalle	PT	77.1294	14.4209	NREGS
140	Mulakanur	Kadiridevalapalli	PT	77.2062	14.4106	NREGS
141	Mulakanur	Kadiridevalapalli	PT	77.1914	14.4047	NREGS
142	Mulakanur	Kadiridevalapalli	PT	77.2104	14.4102	NREGS
143	Mulakanur	Kadiridevalapalli	PT	77.2019	14.4113	NREGS
144	Mulakanur	Kadiridevalapalli	PT	77.2015	14.4106	NREGS
145	Mulakanur	Kadiridevalapalli	PT	77.2013	14.4115	NREGS
146	Mulakanur	Kadiridevalapalli	PT	77.1943	14.4115	NREGS
147	Mulakanur	Kadiridevalapalli	PT	77.2170	14.4081	NREGS
148	Mulakanur	Kadiridevalapalli	PT	77.2187	14.4014	NREGS
149	Mulakanur	Mulakanur	PT	77.1750	14.4226	NREGS
150	Mulakanur	Mulakanur	PT	77.1757	14.4167	NREGS
151	Mulakanur	Mulakanur	PT	77.1819	14.4446	NREGS
152	Mulakanur	Mulakanur	PT	77.1883	14.4327	NREGS
153	Mulakanur	Mulakanur	PT	77.1797	14.4513	NREGS
154	Mulakanur	Mulakanur	PT	77.1717	14.4469	NREGS
155	Mulakanur	Mulakanur	PT	77.1793	14.4523	NREGS
156	Mulakanur	Mulakanur	PT	77.1871	14.4477	NREGS
157	Nuthimadugu	Chevitivankathanda	PT	77.3225	14.5183	NREGS
158	Nuthimadugu	Tippepalle	PT	77.3569	14.4651	NREGS
159	Gollapalle	CherloPalle	PT	77.1942	14.4301	NREGS
160	Gollapalle	CherloPalle	PT	77.2149	14.4317	NREGS
161	Gollapalle	CherloPalle	PT	77.1958	14.4441	NREGS
162	Gollapalle	IparsuPalle	PT	77.2548	14.4141	NREGS
163	Gollapalle	IparsuPalle	PT	77.2519	14.4202	NREGS
164	Kurakulapalle	Kurakulapalle	PT	77.3283	14.2892	NREGS
165	Kurakulapalle	Kurakulapalle	PT	77.3388	14.2907	NREGS
166	Rampuram	Y.C.Palli	PT	77.2711	14.4937	NREGS
167	Timmapuram	JakkireddyPalle	PT	77.1870	14.3616	NREGS
168	Timmapuram	Timmapuram	PT	77.1889	14.3748	NREGS
169	Timmapuram	Timmapuram	PT	77.1815	14.3796	NREGS

170	Timmapuram	Timmapuram	PT	77.1820	14.3855	NREGS
171	Timmapuram	Timmapuram	PT	77.1701	14.3929	NREGS
172	Timmapuram	Timmapuram	PT	77.1674	14.3876	NREGS
173	Timmapuram	Timmapuram	PT	77.1813	14.4065	NREGS
174	Timmapuram	Timmapuram	PT	77.1912	14.4050	NREGS
175	Timmapuram	Timmapuram	PT	77.1775	14.3790	NREGS
176	Timmapuram	Timmapuram	PT	77.1770	14.3555	NREGS
177	Karthanaparthi	D.Chennepalli	PT	77.3262	14.4405	NREGS
178	Karthanaparthi	D.Chennepalli	PT	77.3197	14.4317	NREGS
179	Karthanaparthi	Karthanaparthi	PT	77.3106	14.4665	NREGS
180	Karthanaparthi	Kothuru	PT	77.2885	14.4494	NREGS
181	Pallur	Devendrapuram	PT	77.2307	14.4843	NREGS
182	Pallur	Devendrapuram	PT	77.2461	14.4861	NREGS
183	Pallur	Venkatampalli	PT	77.2359	14.4705	NREGS
184	Pallur	Venkatampalli	PT	77.2332	14.4685	NREGS
185	Pallur	Yarramallepalli	PT	77.2357	14.4662	NREGS
186	Kambadur	Andeplle	PT	77.2097	14.3868	NREGS
187	Kambadur	Jallipalle	PT	77.2703	14.3663	NREGS
188	Kambadur	Kambadur	PT	77.2324	14.3938	NREGS
189	Kambadur	Kambadur	PT	77.2180	14.3263	NREGS
190	Kambadur	Kurlapalli	PT	77.2428	14.3731	NREGS
191	Kambadur	Kurlapalli	PT	77.2379	14.3874	NREGS
192	Kambadur	Kurlapalli	PT	77.2371	14.3872	NREGS
193	Kambadur	M.Manda	PT	77.2317	14.3754	NREGS
194	Kambadur	OntnareddyPalle	PT	77.2508	14.3438	NREGS
195	Kambadur	OntnareddyPalle	PT	77.2503	14.3441	NREGS
196	Marrimakulapalle	MarrimakulaPalle	PT	77.1273	14.4247	IWMP
197	Marrimakulapalle	MarrimakulaPalle	PT	77.1345	14.4263	IWMP
198	Marrimakulapalle	MarrimakulaPalle	PT	77.1377	14.4161	IWMP
199	Marrimakulapalle	MarrimakulaPalle	PT	77.1294	14.4209	IWMP
200	Mulakanur	Mulakanur	PT	77.1750	14.4226	IWMP
201	Mulakanur	Mulakanur	PT	77.1819	14.4446	IWMP
202	Mulakanur	Mulakanur	PT	77.1757	14.4167	IWMP
203	Mulakanur	Mulakanur	PT	77.1883	14.4327	IWMP
204	Mulakanur	Mulakanur	PT	77.1797	14.4513	IWMP
205	Mulakanur	Mulakanur	PT	77.1717	14.4469	IWMP
206	Mulakanur	Mulakanur	PT	77.1793	14.4523	IWMP
207	Mulakanur	Mulakanur	PT	77.1871	14.4477	IWMP
208	Gollapalle	CherloPalle	PT	77.1942	14.4301	IWMP
209	Gollapalle	CherloPalle	PT	77.2149	14.4317	IWMP
210	Gollapalle	CherloPalle	PT	77.1958	14.4441	IWMP
211	Pallur	Venkatampalli	PT	77.2359	14.4705	IWMP
212	Pallur	Venkatampalli	PT	77.2332	14.4685	IWMP

PROPOSED RECHARGE STRUCTURES
KAMBADUR MANDAL, ANANTAPUR DISTRICT, AP.

S.No.	Mandal	Lattitude	Longitude	Structure_Type
1	Kambadur	14.4259	77.1539	CheckDam
2	Kambadur	14.4349	77.1422	CheckDam
3	Kambadur	14.4383	77.1930	CheckDam
4	Kambadur	14.4317	77.1661	CheckDam
5	Kambadur	14.3949	77.1876	CheckDam
6	Kambadur	14.3478	77.1756	CheckDam
7	Kambadur	14.3610	77.2547	CheckDam
8	Kambadur	14.3731	77.2696	CheckDam
9	Kambadur	14.4612	77.3101	CheckDam
10	Kambadur	14.4102	77.3046	CheckDam
11	Kambadur	14.3720	77.3199	CheckDam
12	Kambadur	14.3554	77.3280	CheckDam
13	Kambadur	14.4265	77.2968	CheckDam
14	Kambadur	14.4543	77.2870	CheckDam
15	Kambadur	14.4743	77.2911	CheckDam
16	Kambadur	14.4962	77.3207	CheckDam
17	Kambadur	14.4717	77.3245	CheckDam
18	Kambadur	14.4664	77.2625	CheckDam
19	Kambadur	14.4507	77.2378	CheckDam
20	Kambadur	14.4346	77.2384	CheckDam
21	Kambadur	14.4817	77.2845	CheckDam
22	Kambadur	14.4375	77.2655	CheckDam
23	Kambadur	14.3881	77.2454	CheckDam
24	Kambadur	14.3544	77.2343	CheckDam
25	Kambadur	14.3510	77.2544	CheckDam
26	Kambadur	14.3428	77.2680	CheckDam
27	Kambadur	14.3591	77.3098	CheckDam
28	Kambadur	14.2900	77.3065	CheckDam
29	Kambadur	14.4446	77.2099	CheckDam
30	Kambadur	14.3683	77.1672	CheckDam
31	Kambadur	14.3686	77.2864	Percolation Tank
32	Kambadur	14.3491	77.3174	Percolation Tank
33	Kambadur	14.3578	77.2731	Percolation Tank
34	Kambadur	14.5038	77.3557	Percolation Tank
35	Kambadur	14.4767	77.3649	Percolation Tank
36	Kambadur	14.4654	77.2275	Percolation Tank
37	Kambadur	14.4159	77.2373	Percolation Tank
38	Kambadur	14.3483	77.3046	Percolation Tank

39	Kambadur	14.3112	77.3367	Percolation Tank
40	Kambadur	14.3073	77.3147	Percolation Tank
41	Kambadur	14.3375	77.2156	Percolation Tank
42	Kambadur	14.4507	77.3416	Percolation Tank
43	Kambadur	14.4849	77.3641	Percolation Tank
44	Kambadur	14.4517	77.2014	Percolation Tank

Fig.1

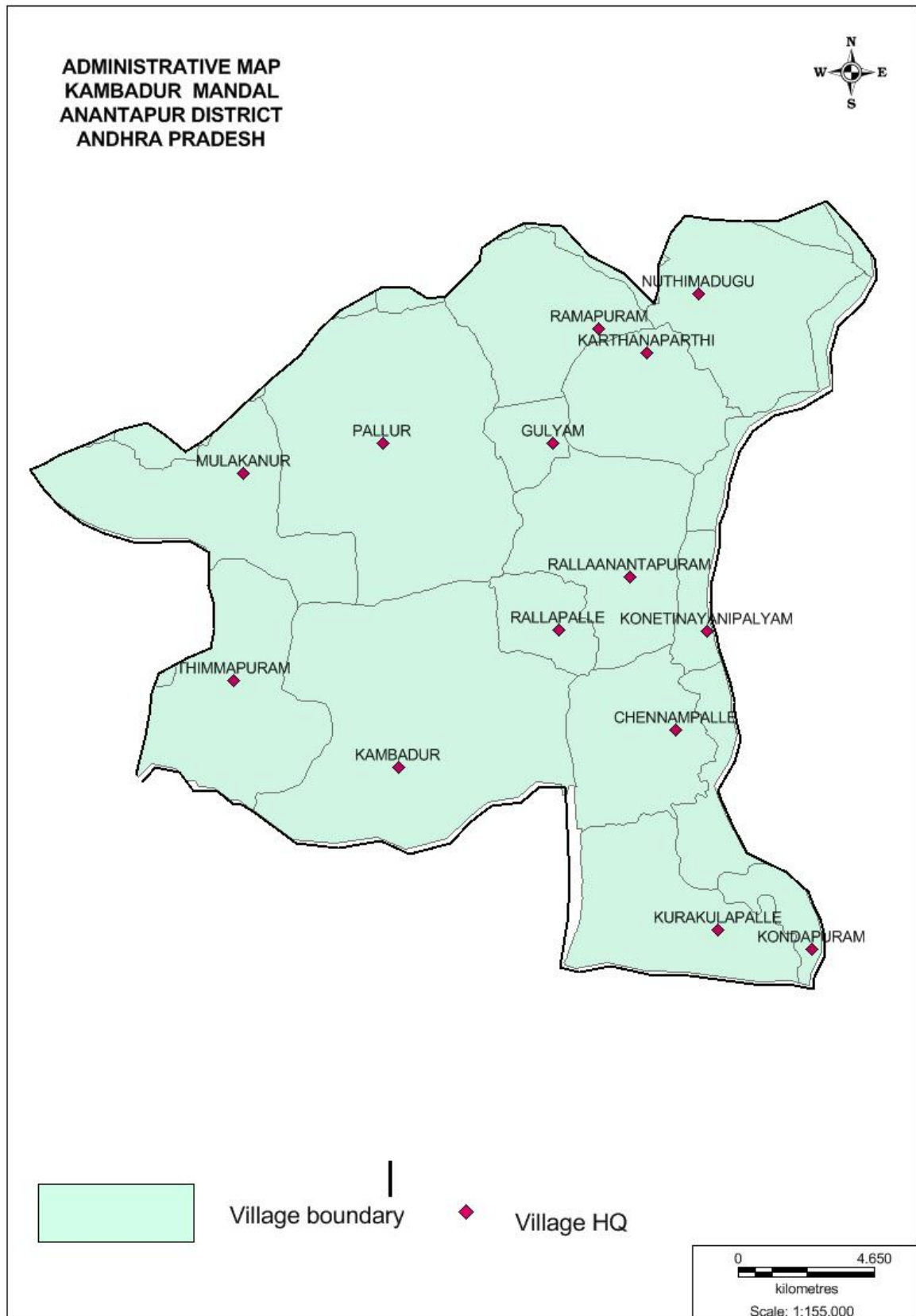


Fig.2

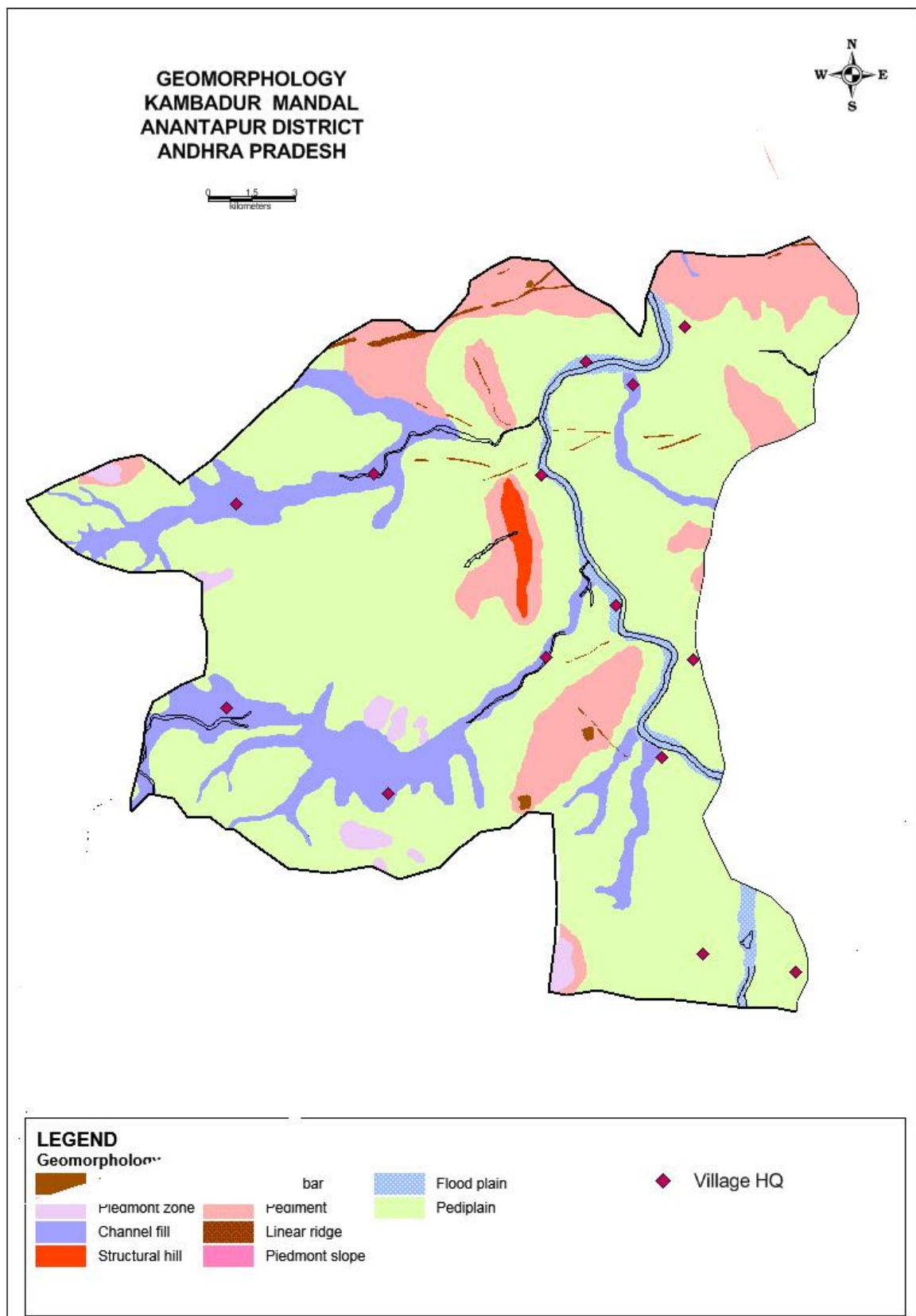


Fig.3

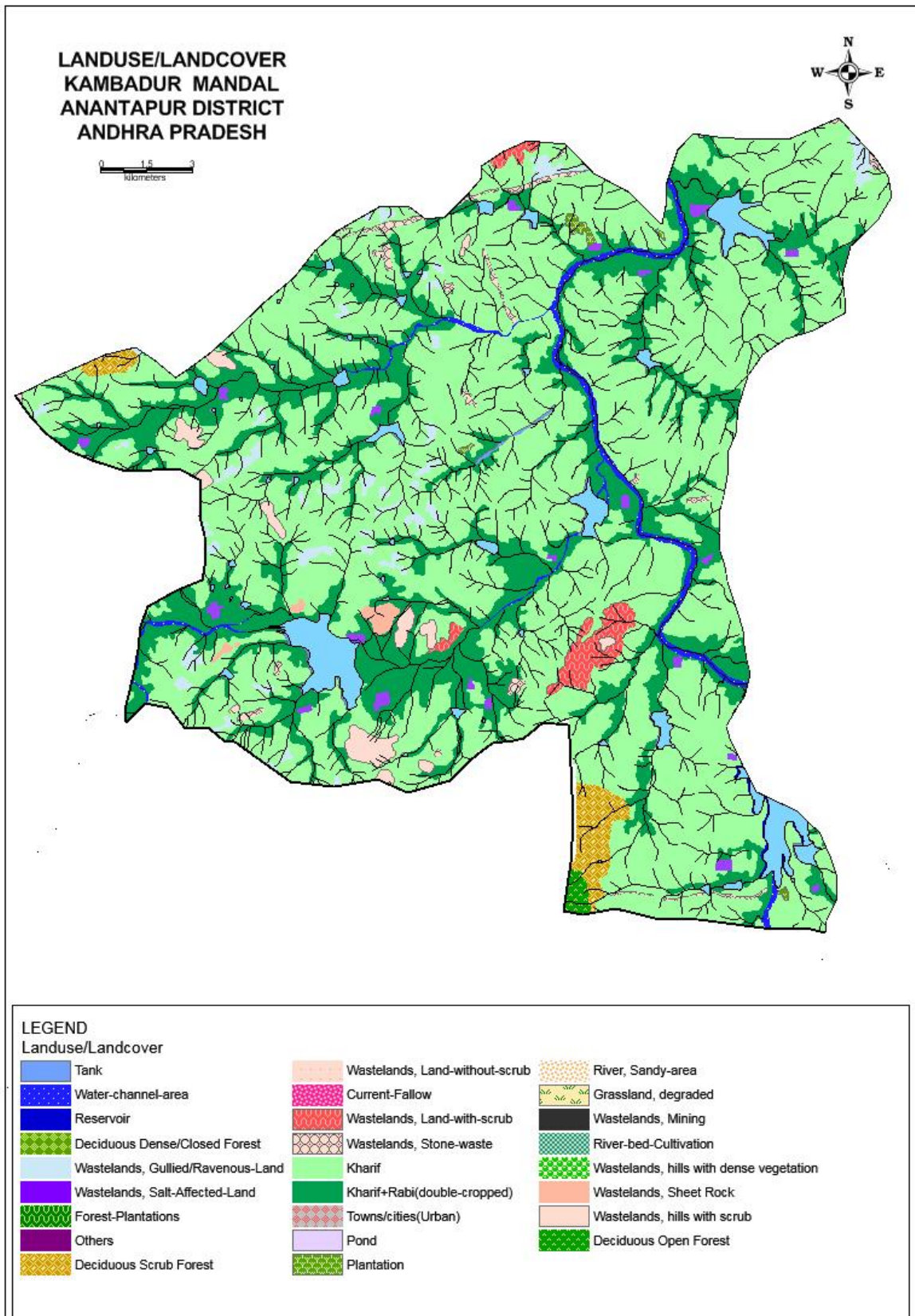


Fig.4

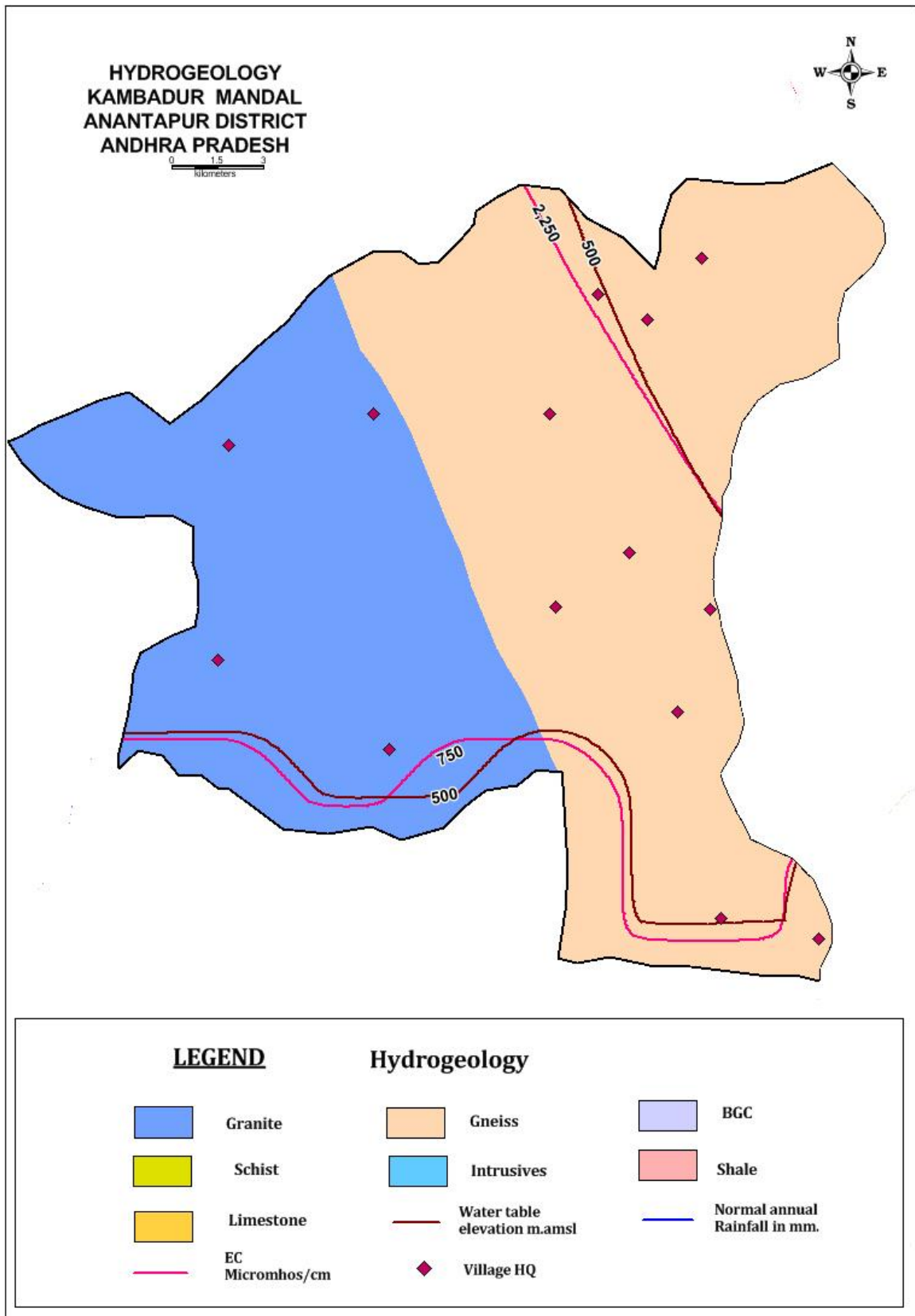


Fig.5

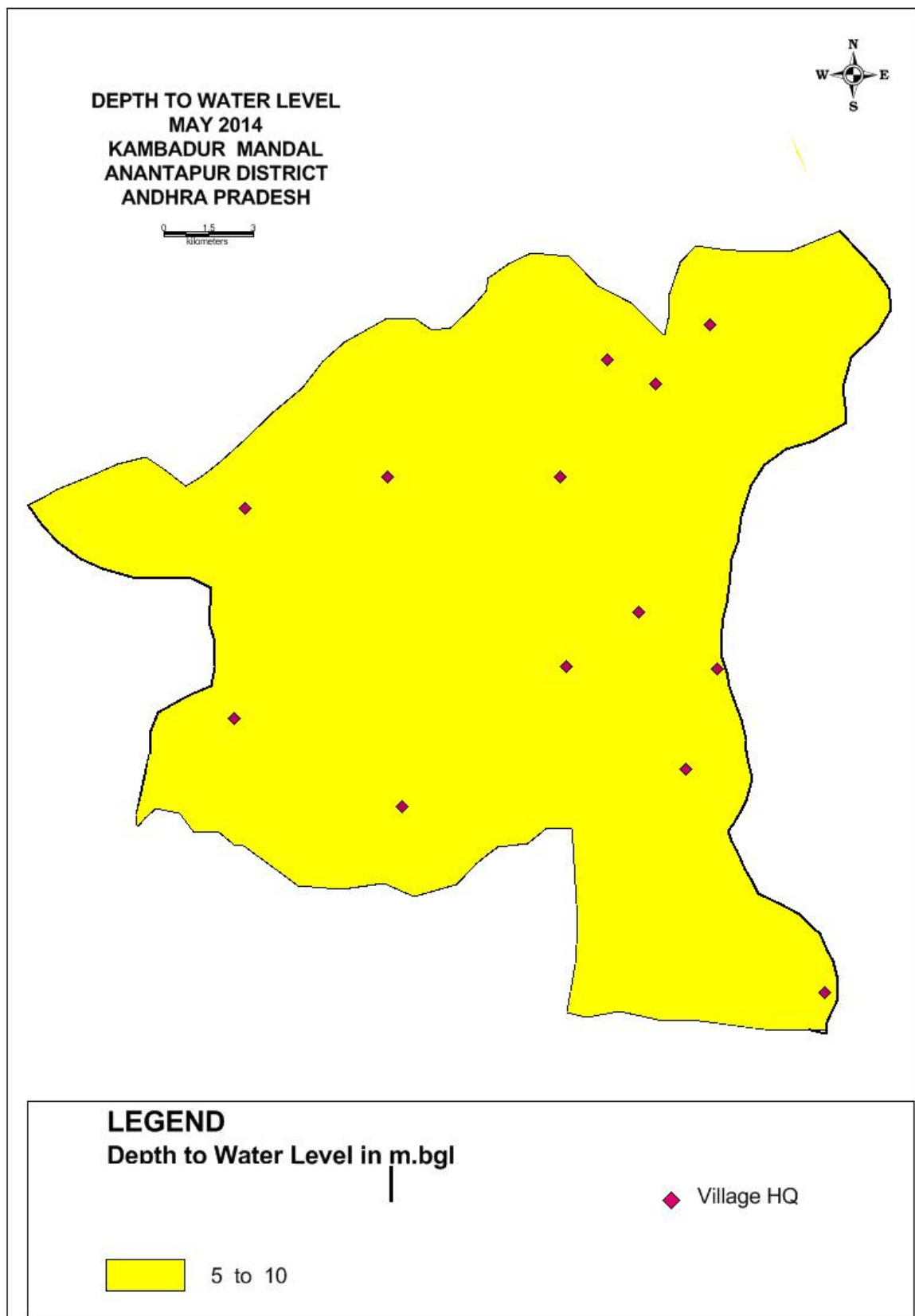


Fig.6

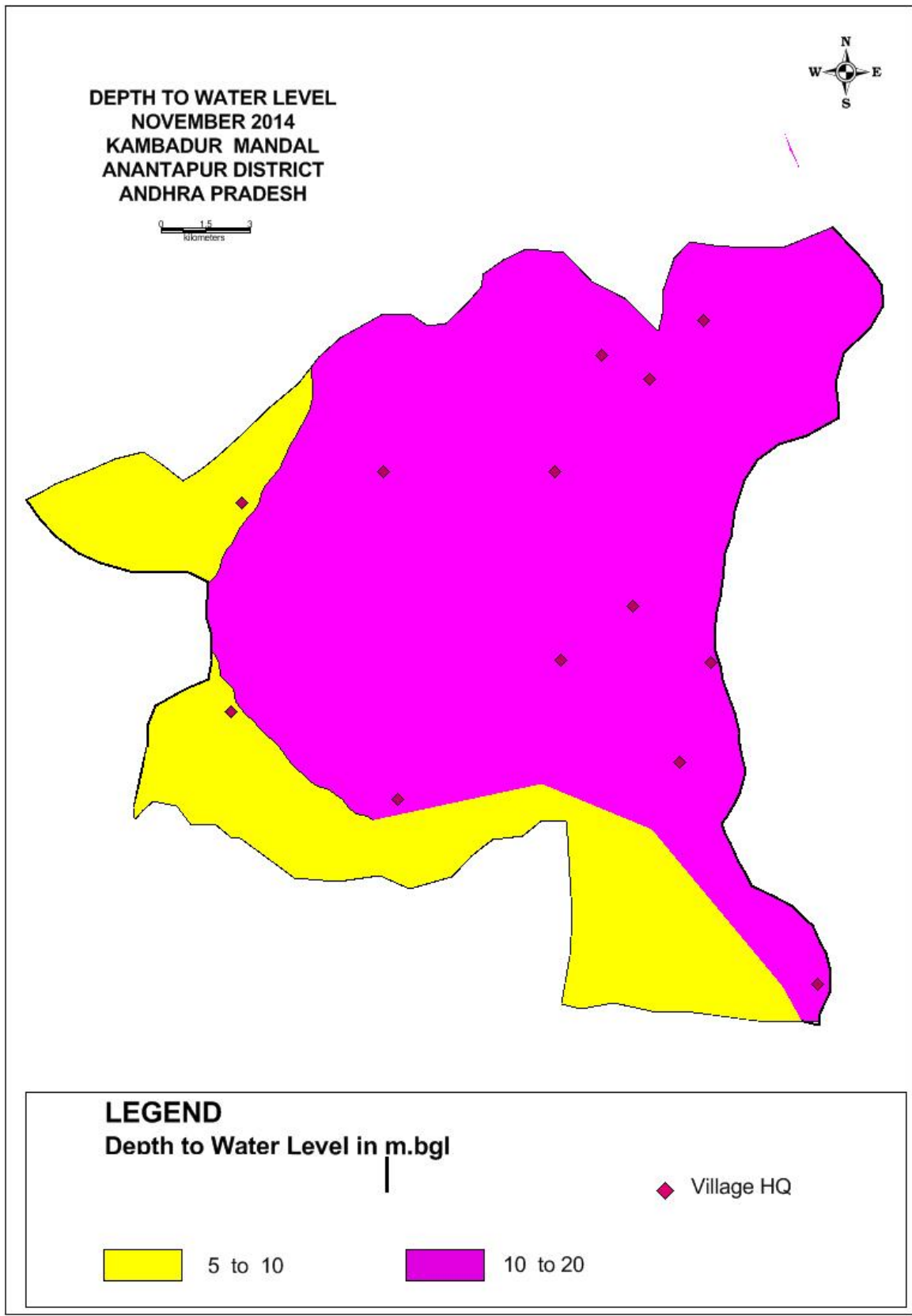


Fig.7

