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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 KOTHACHERUVU MANDAL, ANANTAPUR DISTRICT, ANDHRA PRADESH

SOUTHERN REGION
HYDERABAD
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PLAN ON
ARTIFICIAL RECHARGE TO GROUNDWATER AND WATER CONSERVATION IN KOTHACHERUVU MANDAL, ANANTAPUR DISTRICT, ANDHRA PRADESH

CONTENTS

AT A GLANCE

Name of the Mandal	KOTHA CHERUVU
District	ANANTAPUR
State	TELANGANA
Total Area (Sq.kms)	205
Area suitable for Artificial Recharge (Sq.kms)	165
Latitude and Longitude	14.090030 to 14.274660 and 77.647580 to 77.852770
Average Annual Rainfall (mm)	622
Geology	Granites, Gneisses
Average Depth To Water Level (Decadal) (Pre Monsoon)	14.00
Average Depth To Water Level (Decadal) (Post Monsoon)	5.3
Ground Water Resources (2011)	
Annual Replenishable Ground Water Resources (MCM/yr)	19.40
Net Annual Ground Water Availability(MCM)/yr	17.46
Net Annual Ground Water Draft(MCM)/yr	18.58
Projected Demand for Domestic and Industrial Use(MCM)/yr	1.69
Stage of Ground Water Development (%)	106
Surface runoff available (MCM)/yr	14.93
Total Storage Created in the Mandal by Various Agencies (MCM)/yr	1.07
Artificial Recharge/Conservation Measures	
Recharge Structures Proposed (No.s)	Percolation Tanks: 12, Check Dams: 43 Farm ponds: 460, Recharge Shafts: 76
Improving Water use Efficiency	Micro Irrigation System: 2300ha
Tentative Total Cost in Lakhs (Rs.)	2041.515
Expected Recharge/Savings (MCM)/yr	9.599

1. INTRODUCTION

Kotha Cheruvu 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 21 inhabited villages and 2 un inhabited villages with 23 gram panchayats.

2. LOCATION

The mandal lies between north latitudes 14.090030 to 14.274660 and between east longitudes 77.647580 to 77.852770. The mandal occupies the southeast part of the Anantapur district and is bounded on the north by Bukkapatnam mandal, on the east by Nallamada mandal, on the south by OD Cheruvu mandal and west by Penugonda mandal. (Fig.1)The geographical area of the mandal is 205 sq.km.

3. PHYSIOGRAPHY AND DRAINAGE:

The area is drained by streams which are tributaries of Lower Thungabadra 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 622 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 205 sq.km, the area covered by forest is 24.16 sq.km and the net area sown is 122.96 sq.km. Barren and uncultivable land is 15.61 sq.km. The land for non agricultural use accounts for 20.65 sq.km. . (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 extending up to 12 m. The weathered zone has been extensively tapped by dug and dug cum bore wells upto20 m depth. Ground water occurs in fractured granites down to a depth of 200mbgl. 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 bglThe depth to water levels maps for pre and post monsoon period (2014) are shown in (Fig. 5 & 6. respectively.). The average depth to water level (decadal) during pre-monsoon is 14 m bgl and 5.3 m bgl during post-monsoon 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 Kothacheruvu Mandal Ananthapur District is given in Table-1.

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

Annual Replenishable Ground water resources (MCM)	19.40
Net Annual Ground water Availability. (MCM)	17.46
Net Annual Ground Water Draft(MCM)/yr	18.58
Projected Demand for Domestic and Industrial use up to 2025. (MCM)	1.69
Stage of Ground water development (%).	106
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 up to 20 m 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

Kotha Cheruvu Mandal falls under high stage of ground water development i.e., 106 % 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)	205
Hilly Area (Sq.kms)	40
Area suitable for Artificial Recharge (sq.km.)	165
Runoff Yield in MCM/yr	14.93
Existing No. of Check Dams	141
Storage created MCM/yr	1.00
Existing No. of Percolation Tanks	10
Storage created MCM/yr	0.07
Total Existing Storage Created	1.07

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 run off available in the mandal has been assessed as 13.86 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 622 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 rate.

Thus, a total of 43 **Check dams and 12 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 71 and 5 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 rain water 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 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 460 farm ponds in 23 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 2300 ha @ 100 ha per village.

13. TENTATIVE COST ESTIMATES (KOTHACHERUVU 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)	43	1.204	5	215	0.903
2	Recharge shaft in Check dam (50% of the existing Check dams)	71	0.781	0.5	35.5	0.781
3	Proposed Percolation Tanks (100*100*2.5)* 4 fillings)	12	1.2	15	180	0.9
4	Renovation Desilting, Repairs and installation of Recharge Shafts in existing PTS (50% of the existing PTS)	5	0.055	1	5	0.055
5	Proposed Farm Pond (6 filling) 5*5*1.5 dimension @ 20 farm ponds per each village	460	0.06624	0.25	115	0.059616
6	Proposed Sprinkler/drip/HDPE pipes for 100 ha in each village	2300	13.8	0.6	1380	6.9
7	Proposed Piezometers up to 50 mbgl @ one PZ per Village	23	0	0.6	13.8	0
8 (i)	Total (No. of AR Structures)	614	3.31		564.3	2.699
8 (ii)	Total (ha)	2300			1380	6.9
	Total (8(i) + 8 (ii))				**1944.3**	**9.599**
9	Impact Assessment & O & M 5 % of Total cost of the Scheme				**97.215**	
	Grand Total				**2041.515**	

*(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	2nd	3rd	4th	5th	6th	7th	8th
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 9.599 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 106% to 69% (37%)
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 has been taken from the EMUSTER, Department of Rural Development, Government of Andhra Pradesh.

EXISTING ARTIFICIAL RECHARGE STRUCTURES IN
KOTHACHERUVU MANDAL, ANANTAPUR DISTRICT, AP

S.no	Gram Panchayat	Habitation	Structure Type	Longitude	Latitude	Scheme
1	Lingareddypalle	Lingarreddipalle	Check Dam	77.7881	14.2141	NREGS
2	Lingareddypalle	Lingarreddipalle	Check Dam	77.7802	14.2071	NREGS
3	Mylasamudam	Mylasamudram	Check Dam	77.8043	14.2661	NREGS
4	Mylasamudam	Mylasamudram	Check Dam	77.8048	14.2643	NREGS
5	Mylasamudam	Mylasamudram	Check Dam	77.8006	14.2648	NREGS
6	Mylasamudam	Mylasamudram	Check Dam	77.8004	14.2540	NREGS
7	Mylasamudam	Mylasamudram	Check Dam	77.8006	14.2565	NREGS
8	Mylasamudam	Mylasamudram	Check Dam	77.8014	14.2572	NREGS
9	Kodapaganipalle	Kodapaganipalle	Check Dam	77.7502	14.2516	NREGS
10	Kodapaganipalle	Kodapaganipalle	Check Dam	77.7481	14.2409	NREGS
11	Kodapaganipalle	Vemuletipalle	Check Dam	77.7398	14.2321	NREGS
12	Kodapaganipalle	Vemuletipalle	Check Dam	77.7366	14.2310	NREGS
13	Kodapaganipalle	Vemuletipalle	Check Dam	77.7384	14.2264	NREGS
14	Kodapaganipalle	Vemuletipalle	Check Dam	77.7421	14.2376	NREGS
15	Kodapaganipalle	Vemuletipalle	Check Dam	77.7423	14.2416	NREGS
16	Kodapaganipalle	Vemuletipalle	Check Dam	77.7382	14.2444	NREGS
17	Kodapaganipalle	Vemuletipalle	Check Dam	77.7406	14.2469	NREGS
18	Kodapaganipalle	Vemuletipalle	Check Dam	77.7388	14.2308	NREGS
19	Kothacheruvu	Kothacheruvu	Check Dam	77.7628	14.1801	NREGS
20	Kothacheruvu	Kothacheruvu	Check Dam	77.7620	14.1782	NREGS
21	Kothacheruvu	Kothacheruvu	Check Dam	77.7572	14.1780	NREGS
22	Kothacheruvu	Kothacheruvu	Check Dam	77.7586	14.1780	NREGS
23	Kothacheruvu	Kothacheruvu	Check Dam	77.7629	14.1807	NREGS
24	Kesapuram	Kesapuram	Check Dam	77.7657	14.2770	NREGS
25	Kesapuram	Kesapuram	Check Dam	77.8047	14.2663	NREGS
26	Kesapuram	Kesapuram	Check Dam	77.8050	14.2643	NREGS
27	Kesapuram	Kesapuram	Check Dam	77.8007	14.2649	NREGS
28	Kesapuram	Venkatapuram	Check Dam	77.7941	14.2635	NREGS
29	Kesapuram	Venkatapuram	Check Dam	77.7907	14.2628	NREGS
30	Kesapuram	Venkatapuram	Check Dam	77.7826	14.2641	NREGS
31	Kesapuram	Venkatapuram	Check Dam	77.7728	14.2723	NREGS
32	Kesapuram	Venkatapuram	Check Dam	77.7729	14.2740	NREGS
33	Iragampalle	Iragampalle	Check Dam	77.7401	14.1956	NREGS
34	Iragampalle	ThippaBatlapalle	Check Dam	77.7404	14.1893	NREGS
35	K.locherla	K.Locherla	Check Dam	77.7314	14.1847	NREGS
36	Pothulakunta	Pothulakunta	Check Dam	77.7056	14.1659	NREGS
37	Pothulakunta	Pothulakunta	Check Dam	77.7015	14.1620	NREGS
38	Pothulakunta	Pothulakunta	Check Dam	77.6966	14.1631	NREGS
39	Pothulakunta	Pothulakunta	Check Dam	77.6876	14.1600	NREGS
40	Pothulakunta	Pothulakunta	Check Dam	77.6937	14.1616	NREGS

41	Byrapuram	Byrapuram	Check Dam	77.7061	14.1385	NREGS
42	Byrapuram	Byrapuram	Check Dam	77.7205	14.1417	NREGS
43	Byrapuram	Byrapuram	Check Dam	77.7277	14.1094	NREGS
44	Byrapuram	Gownikuntapalli	Check Dam	77.7336	14.1393	NREGS
45	Byrapuram	Obuladevarapalli	Check Dam	77.7028	14.1460	NREGS
46	Talamarla	Indlavenkatampalli	Check Dam	77.7306	14.2343	NREGS
47	Talamarla	Talamarla	Check Dam	77.7312	14.2220	NREGS
48	Narepalli	BandameedaPalli	Check Dam	77.7951	14.2456	NREGS
49	Narepalli	BandameedaPalli	Check Dam	77.8007	14.2409	NREGS
50	Narepalli	BandameedaPalli	Check Dam	77.8008	14.2401	NREGS
51	Narepalli	BandameedaPalli	Check Dam	77.7995	14.2402	NREGS
52	Narepalli	BandameedaPalli	Check Dam	77.7986	14.2413	NREGS
53	Bandlapalle	Applavandlapalle	Check Dam	77.7012	14.1371	NREGS
54	Bandlapalle	Applavandlapalle	Check Dam	77.6855	14.1267	NREGS
55	Bandlapalle	Bandlapalle	Check Dam	77.6788	14.1184	NREGS
56	Bandlapalle	Bandlapalle	Check Dam	77.6697	14.1249	NREGS
57	Bandlapalle	ChennarajuPalle	Check Dam	77.7104	14.1094	NREGS
58	Bandlapalle	ChennarajuPalle	Check Dam	77.7064	14.0959	NREGS
59	Bandlapalle	ChennarajuPalle	Check Dam	77.7181	14.1015	NREGS
60	Bandlapalle	Honnurapalli	Check Dam	77.6794	14.1220	NREGS
61	Bandlapalle	Honnurapalli	Check Dam	77.6681	14.1255	NREGS
62	Bandlapalle	KammavariPalle	Check Dam	77.6671	14.1271	NREGS
63	Bandlapalle	Yerrapalli	Check Dam	77.6832	14.1166	NREGS
64	Bandlapalle	Yerrapalli	Check Dam	77.6905	14.1142	NREGS
65	Bandlapalle	Yerrapalli	Check Dam	77.6950	14.1103	NREGS
66	Bandlapalle	Yerrapalli	Check Dam	77.7001	14.1123	NREGS
67	Bandlapalle	Yerrapalli	Check Dam	77.7034	14.1186	NREGS
68	Bandlapalle	Yerrapalli	Check Dam	77.7074	14.1077	NREGS
69	Mirzapuram	Bangaruchinnepalli	Check Dam	77.6826	14.2212	NREGS
70	Mirzapuram	Bangaruchinnepalli	Check Dam	77.6828	14.2224	NREGS
71	Mirzapuram	Bangaruchinnepalli	Check Dam	77.6819	14.2186	NREGS
72	Mirzapuram	Kothadevarapalle	Check Dam	77.7002	14.2149	NREGS
73	Mirzapuram	Kothadevarapalle	Check Dam	77.6896	14.2137	NREGS
74	Mirzapuram	Kothadevarapalle	Check Dam	77.6791	14.2110	NREGS
75	Mirzapuram	Kothadevarapalle	Check Dam	77.6811	14.2139	NREGS
76	Mirzapuram	Pathadevarapalle	Check Dam	77.7050	14.2078	NREGS
77	Mirzapuram	Pathadevarapalle	Check Dam	77.7014	14.2075	NREGS
78	Mirzapuram	Pathadevarapalle	Check Dam	77.6932	14.2015	NREGS
79	Mirzapuram	Pathadevarapalle	Check Dam	77.6893	14.2024	NREGS
80	Mirzapuram	Pathadevarapalle	Check Dam	77.6880	14.2033	NREGS
81	Mirzapuram	Pathadevarapalle	Check Dam	77.6892	14.2006	NREGS
82	Kodapaganipalle	Kodapaganipalle	Check Dam	77.7481	14.2409	IWMP
83	Kodapaganipalle	Kodapaganipalle	Check Dam	77.7502	14.2516	IWMP

84	Kodapaganipalle	Vemuletipalle	Check Dam	77.7398	14.2321	IWMP
85	Kodapaganipalle	Vemuletipalle	Check Dam	77.7366	14.2310	IWMP
86	Kodapaganipalle	Vemuletipalle	Check Dam	77.7384	14.2264	IWMP
87	Kodapaganipalle	Vemuletipalle	Check Dam	77.7421	14.2376	IWMP
88	Kodapaganipalle	Vemuletipalle	Check Dam	77.7423	14.2416	IWMP
89	Kodapaganipalle	Vemuletipalle	Check Dam	77.7382	14.2444	IWMP
90	Kodapaganipalle	Vemuletipalle	Check Dam	77.7406	14.2469	IWMP
91	Kodapaganipalle	Vemuletipalle	Check Dam	77.7388	14.2308	IWMP
92	Iragampalle	Iragampalle	Check Dam	77.7401	14.1956	IWMP
93	K.locherla	K.Locherla	Check Dam	77.7314	14.1847	IWMP
94	Pothulakunta	Pothulakunta	Check Dam	77.7056	14.1659	IWMP
95	Pothulakunta	Pothulakunta	Check Dam	77.7015	14.1620	IWMP
96	Pothulakunta	Pothulakunta	Check Dam	77.6966	14.1631	IWMP
97	Pothulakunta	Pothulakunta	Check Dam	77.6876	14.1600	IWMP
98	Pothulakunta	Pothulakunta	Check Dam	77.6937	14.1616	IWMP
99	Byrapuram	Byrapuram	Check Dam	77.7061	14.1385	IWMP
100	Byrapuram	Byrapuram	Check Dam	77.7205	14.1417	IWMP
101	Byrapuram	Byrapuram	Check Dam	77.7277	14.1094	IWMP
102	Byrapuram	Gownikuntapalli	Check Dam	77.7336	14.1393	IWMP
103	Byrapuram	Obuladevarapalli	Check Dam	77.7028	14.1460	IWMP
104	Talamarla	Indlavenkatampalli	Check Dam	77.7306	14.2343	IWMP
105	Talamarla	Talamarla	Check Dam	77.7312	14.2220	IWMP
106	Bandlapalle	Applavandlapalle	Check Dam	77.6855	14.1267	IWMP
107	Bandlapalle	Applavandlapalle	Check Dam	77.7012	14.1371	IWMP
108	Bandlapalle	Bandlapalle	Check Dam	77.6788	14.1184	IWMP
109	Bandlapalle	Bandlapalle	Check Dam	77.6697	14.1249	IWMP
110	Bandlapalle	ChennarajuPalle	Check Dam	77.7064	14.0959	IWMP
111	Bandlapalle	ChennarajuPalle	Check Dam	77.7181	14.1015	IWMP
112	Bandlapalle	ChennarajuPalle	Check Dam	77.7104	14.1094	IWMP
113	Bandlapalle	Honnurapalli	Check Dam	77.6794	14.1220	IWMP
114	Bandlapalle	Honnurapalli	Check Dam	77.6681	14.1255	IWMP
115	Bandlapalle	KammavariPalle	Check Dam	77.6671	14.1271	IWMP
116	Bandlapalle	Yerrapalli	Check Dam	77.6905	14.1142	IWMP
117	Bandlapalle	Yerrapalli	Check Dam	77.6950	14.1103	IWMP
118	Bandlapalle	Yerrapalli	Check Dam	77.7001	14.1123	IWMP
119	Bandlapalle	Yerrapalli	Check Dam	77.7034	14.1186	IWMP
120	Bandlapalle	Yerrapalli	Check Dam	77.7074	14.1077	IWMP
121	Bandlapalle	Yerrapalli	Check Dam	77.6832	14.1166	IWMP
122	Mirzapuram	Bangaruchinnepalli	Check Dam	77.6826	14.2212	IWMP
123	Mirzapuram	Bangaruchinnepalli	Check Dam	77.6828	14.2224	IWMP
124	Mirzapuram	Bangaruchinnepalli	Check Dam	77.6819	14.2186	IWMP
125	Mirzapuram	Kothadevarapalle	Check Dam	77.7002	14.2149	IWMP
126	Mirzapuram	Kothadevarapalle	Check Dam	77.6896	14.2137	IWMP

127	Mirzapuram	Kothadevarapalle	Check Dam	77.6791	14.2110	IWMP
128	Mirzapuram	Kothadevarapalle	Check Dam	77.6811	14.2139	IWMP
129	Mirzapuram	Pathadevarapalle	Check Dam	77.7050	14.2078	IWMP
130	Mirzapuram	Pathadevarapalle	Check Dam	77.7014	14.2075	IWMP
131	Mirzapuram	Pathadevarapalle	Check Dam	77.6932	14.2015	IWMP
132	Mirzapuram	Pathadevarapalle	Check Dam	77.6893	14.2024	IWMP
133	Mirzapuram	Pathadevarapalle	Check Dam	77.6880	14.2033	IWMP
134	Mirzapuram	Pathadevarapalle	Check Dam	77.6892	14.2006	IWMP
135	Lingareddypalle	Lingarreddipalle	Check Wall	77.7830	14.2137	NREGS
136	Kodapaganipalle	Vemuletipalle	Check Wall	77.7382	14.2253	NREGS
137	Kothacheruvu	GorantlaPalle	Check Wall	77.7881	14.2140	NREGS
138	Kothacheruvu	GorantlaPalle	Check Wall	77.7803	14.2072	NREGS
139	Kothacheruvu	Kothacheruvu	Check Wall	77.7621	14.1791	NREGS
140	Thirumaladevarapalle	Kanisettipalle	Check Wall	77.7901	14.2233	NREGS
141	Kodapaganipalle	Vemuletipalle	Check Wall	77.7382	14.2253	IWMP
142	K.locherla	K.Locherla	PT	77.7349	14.1439	NREGS
143	Pothulakunta	Pothulakunta	PT	77.7040	14.1657	NREGS
144	Pothulakunta	Pothulakunta	PT	77.6875	14.1572	NREGS
145	Byrapuram	Sainagar	PT	77.7097	14.1454	NREGS
146	Bandlapalle	ChennarajuPalle	PT	77.7112	14.1011	NREGS
147	K.locherla	K.Locherla	PT	77.7349	14.1439	IWMP
148	Pothulakunta	Pothulakunta	PT	77.7040	14.1657	IWMP
149	Pothulakunta	Pothulakunta	PT	77.6875	14.1572	IWMP
150	Byrapuram	Sainagar	PT	77.7097	14.1454	IWMP
151	Bandlapalle	ChennarajuPalle	PT	77.7112	14.1011	IWMP

PROPOSED ARTIFICIAL RECHARGE STRUCTURES IN
KOTHACHERUVU MANDAL, ANANTAPUR DISTRICT, AP

S.No.	Mandal	Lattitude	Longitude	Structure_Type
1	Kothacheruvu	14.2326	77.6991	CheckDam
2	Kothacheruvu	14.2288	77.6736	CheckDam
3	Kothacheruvu	14.2236	77.6618	CheckDam
4	Kothacheruvu	14.2147	77.6631	CheckDam
5	Kothacheruvu	14.2355	77.6662	CheckDam
6	Kothacheruvu	14.2347	77.7151	CheckDam
7	Kothacheruvu	14.2399	77.7331	CheckDam
8	Kothacheruvu	14.2465	77.7466	CheckDam
9	Kothacheruvu	14.2543	77.7496	CheckDam
10	Kothacheruvu	14.2584	77.7541	CheckDam
11	Kothacheruvu	14.2615	77.7618	CheckDam
12	Kothacheruvu	14.2031	77.7281	CheckDam
13	Kothacheruvu	14.2097	77.7504	CheckDam
14	Kothacheruvu	14.2197	77.7520	CheckDam
15	Kothacheruvu	14.2461	77.7531	CheckDam
16	Kothacheruvu	14.2521	77.7663	CheckDam
17	Kothacheruvu	14.2405	77.7208	CheckDam
18	Kothacheruvu	14.1977	77.7107	CheckDam
19	Kothacheruvu	14.2339	77.7078	CheckDam
20	Kothacheruvu	14.1895	77.7009	CheckDam
21	Kothacheruvu	14.1707	77.7201	CheckDam
22	Kothacheruvu	14.1350	77.6949	CheckDam
23	Kothacheruvu	14.1317	77.6769	CheckDam
24	Kothacheruvu	14.1263	77.7001	CheckDam
25	Kothacheruvu	14.1138	77.7165	CheckDam
26	Kothacheruvu	14.1475	77.6776	CheckDam
27	Kothacheruvu	14.1530	77.6693	CheckDam
28	Kothacheruvu	14.1501	77.6643	CheckDam
29	Kothacheruvu	14.1396	77.6519	CheckDam
30	Kothacheruvu	14.1986	77.6735	CheckDam
31	Kothacheruvu	14.1955	77.7231	CheckDam
32	Kothacheruvu	14.2298	77.6835	CheckDam
33	Kothacheruvu	14.2075	77.6724	CheckDam
34	Kothacheruvu	14.2462	77.7294	CheckDam
35	Kothacheruvu	14.2386	77.7745	CheckDam
36	Kothacheruvu	14.1928	77.7756	CheckDam
37	Kothacheruvu	14.1576	77.7280	CheckDam
38	Kothacheruvu	14.1254	77.7050	CheckDam
39	Kothacheruvu	14.1393	77.6980	CheckDam
40	Kothacheruvu	14.1681	77.6865	CheckDam
41	Kothacheruvu	14.1645	77.7098	CheckDam

42	Kothacheruvu	14.2139	77.7084	CheckDam
43	Kothacheruvu	14.2249	77.7401	CheckDam
44	Kothacheruvu	14.1740	77.7053	Percolation Tank
45	Kothacheruvu	14.1533	77.7087	Percolation Tank
46	Kothacheruvu	14.2714	77.7754	Percolation Tank
47	Kothacheruvu	14.2371	77.8066	Percolation Tank
48	Kothacheruvu	14.2307	77.8232	Percolation Tank
49	Kothacheruvu	14.2348	77.8323	Percolation Tank
50	Kothacheruvu	14.2349	77.8405	Percolation Tank
51	Kothacheruvu	14.2428	77.8302	Percolation Tank
52	Kothacheruvu	14.2584	77.8112	Percolation Tank
53	Kothacheruvu	14.1138	77.7165	Percolation Tank
54	Kothacheruvu	14.2384	77.8177	Percolation Tank
55	Kothacheruvu	14.1645	77.7098	Percolation Tank

Fig.1

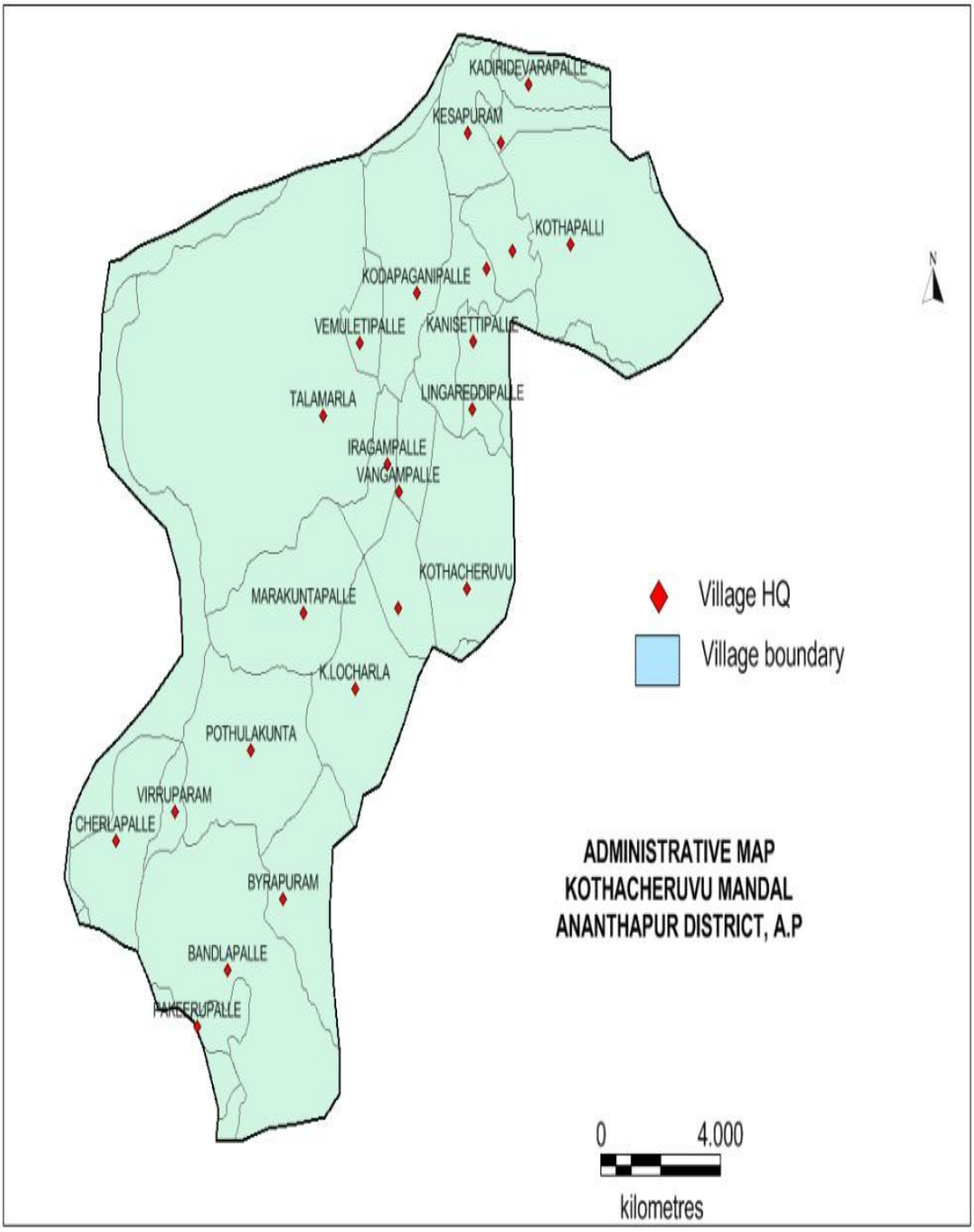

KADIRIDEVARAPALLE
KESAPURAM
KOTHAPALLI
KODAPAGANIPALLE
VEMULETIPALLE
KANISETTIPALLE
TALAMARLA
LINGAREDDIPALLE
IRAGAMPALLE
VANGAMPALLE
KOTHACHERUVU
MARAKUNTAPALLE
K.LOCHARLA
POTHULAKUNTA
VIRRUPARAM
CHERLAPALLE
BYRAPURAM
BANDLAPALLE
PAMIDIPALLE
N
Village HQ
Village boundary
ADMINISTRATIVE MAP
KOTHACHERUVU MANDAL
ANANTHAPUR DISTRICT, A.P
0
4.000
kilometres

Fig.2

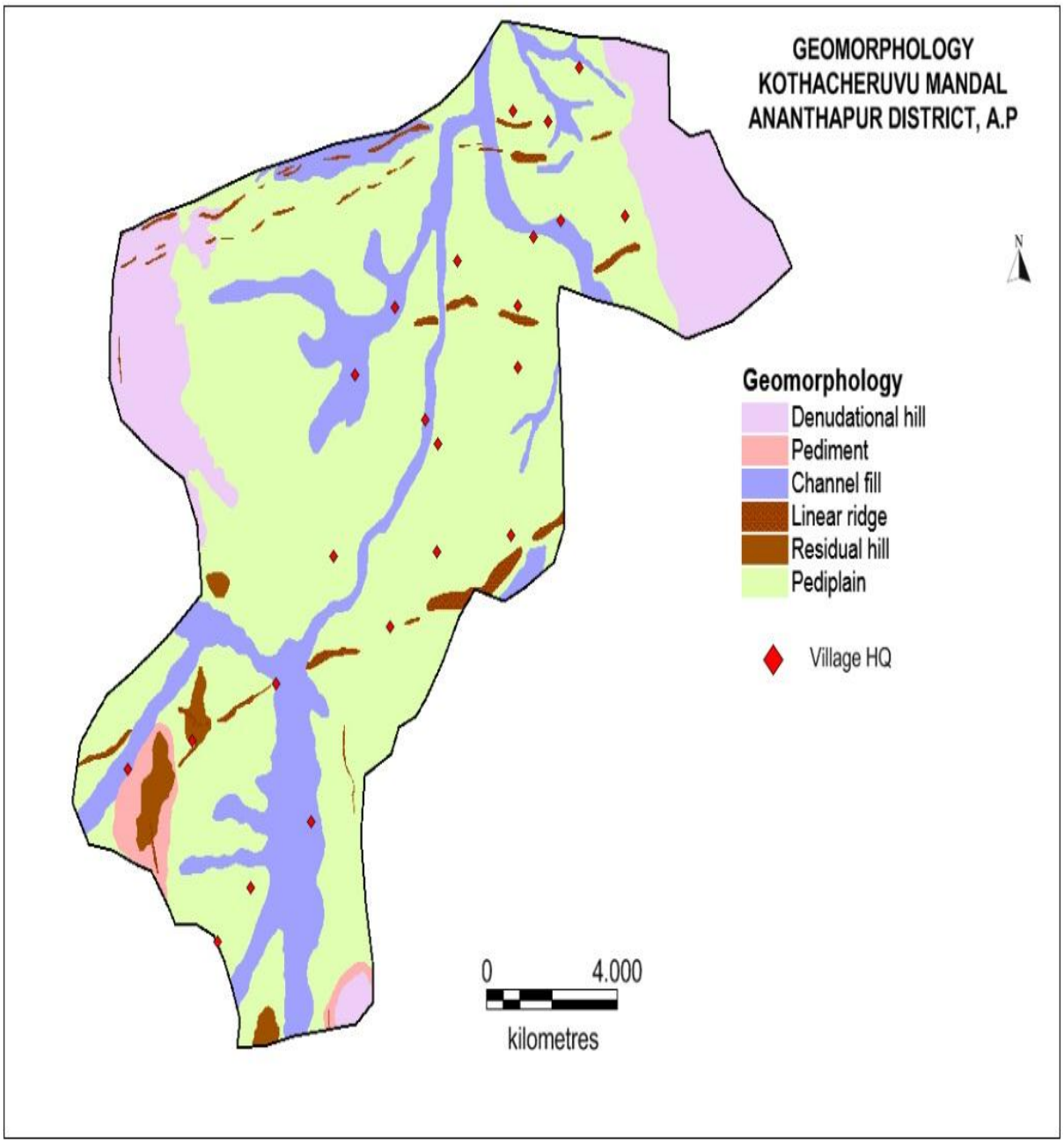

GEOMORPHOLOGY
KOTHACHERUVU MANDAL
ANANTHAPUR DISTRICT, A.P
N
Geomorphology
Denudational hill
Pediment
Channel fill
Linear ridge
Residual hill
Pediplain
Village HQ
0
4.000
kilometres

Fig.3

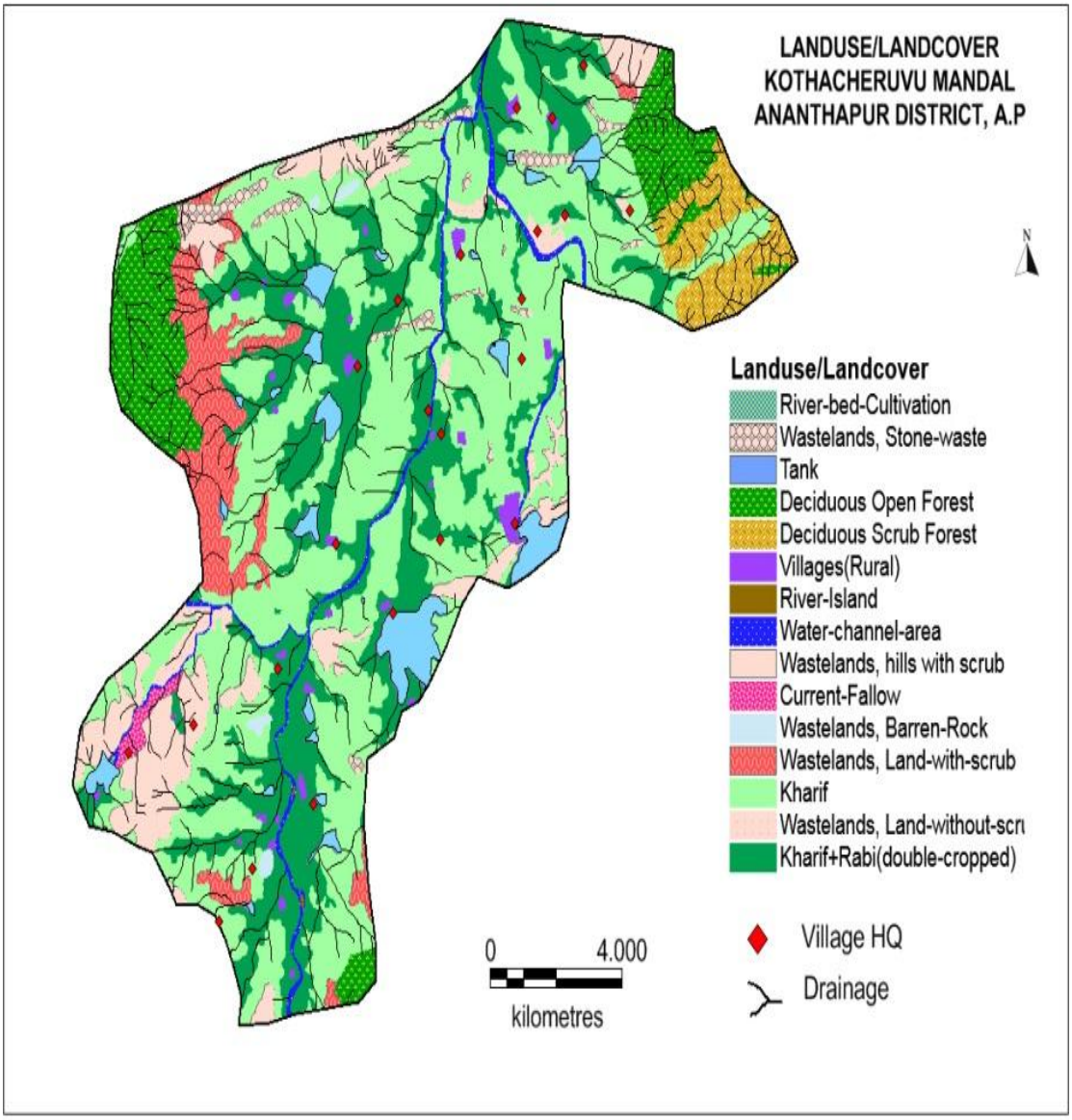

LANDUSE/LANDCOVER
KOTHACHERUVU MANDAL
ANANTHAPUR DISTRICT, A.P
N
Landuse/Landcover
River-bed-Cultivation
Wastelands, Stone-waste
Tank
Deciduous Open Forest
Deciduous Scrub Forest
Villages(Rural)
River-Island
Water-channel-area
Wastelands, hills with scrub
Current-Fallow
Wastelands, Barren-Rock
Wastelands, Land-with-scrub
Kharif
Wastelands, Land-without-scr
Kharif+Rabi(double-cropped)
Village HQ
Drainage
0
4.000
kilometres

Fig.4

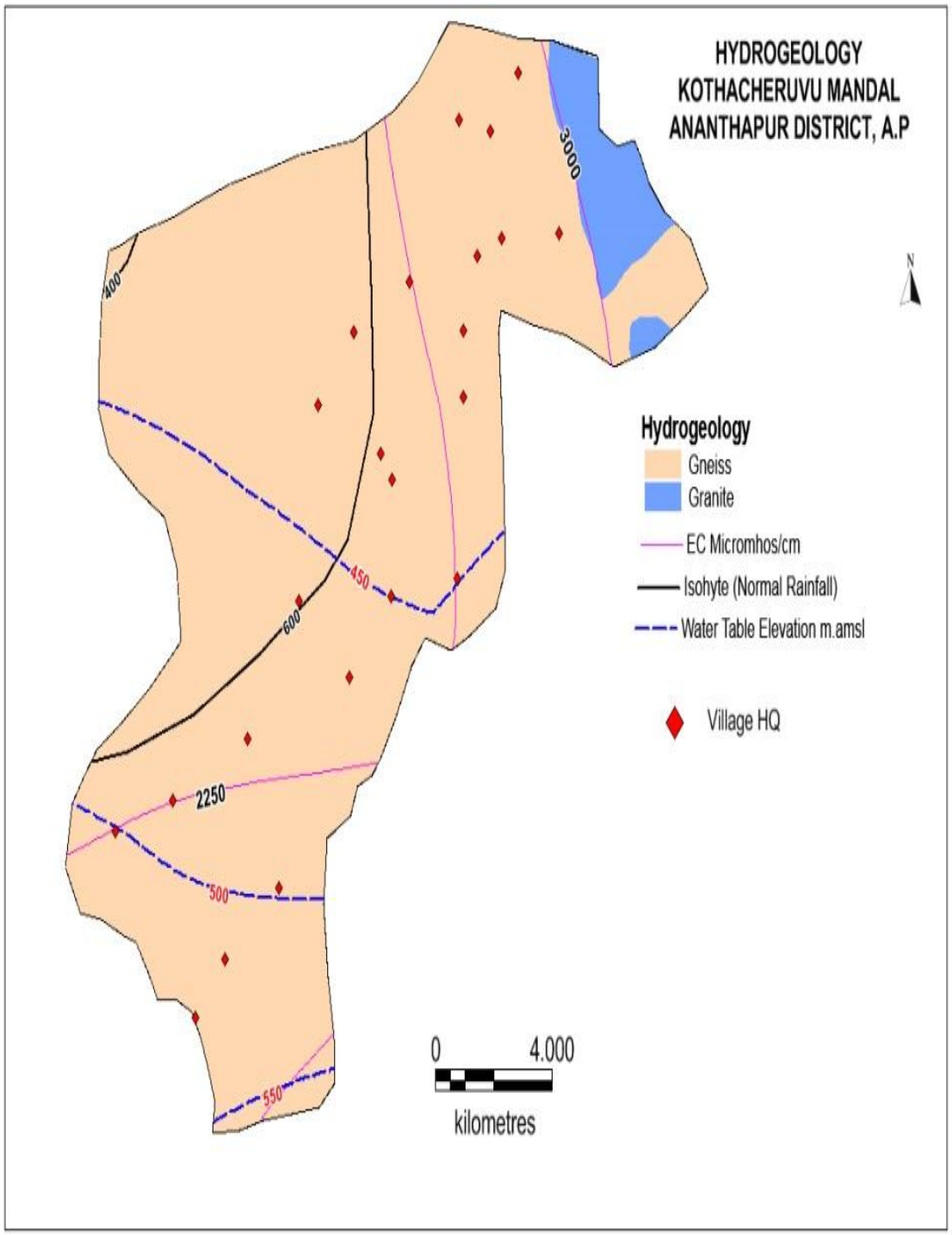

HYDROGEOLOGY
KOTHACHERUVU MANDAL
ANANTHAPUR DISTRICT, A.P
N
Hydrogeology
Gneiss
Granite
EC Micromhos/cm
Isohyte (Normal Rainfall)
Water Table Elevation m.amsl
Village HQ
3000
400
450
600
2250
500
550
0
4.000
kilometres

Fig.5

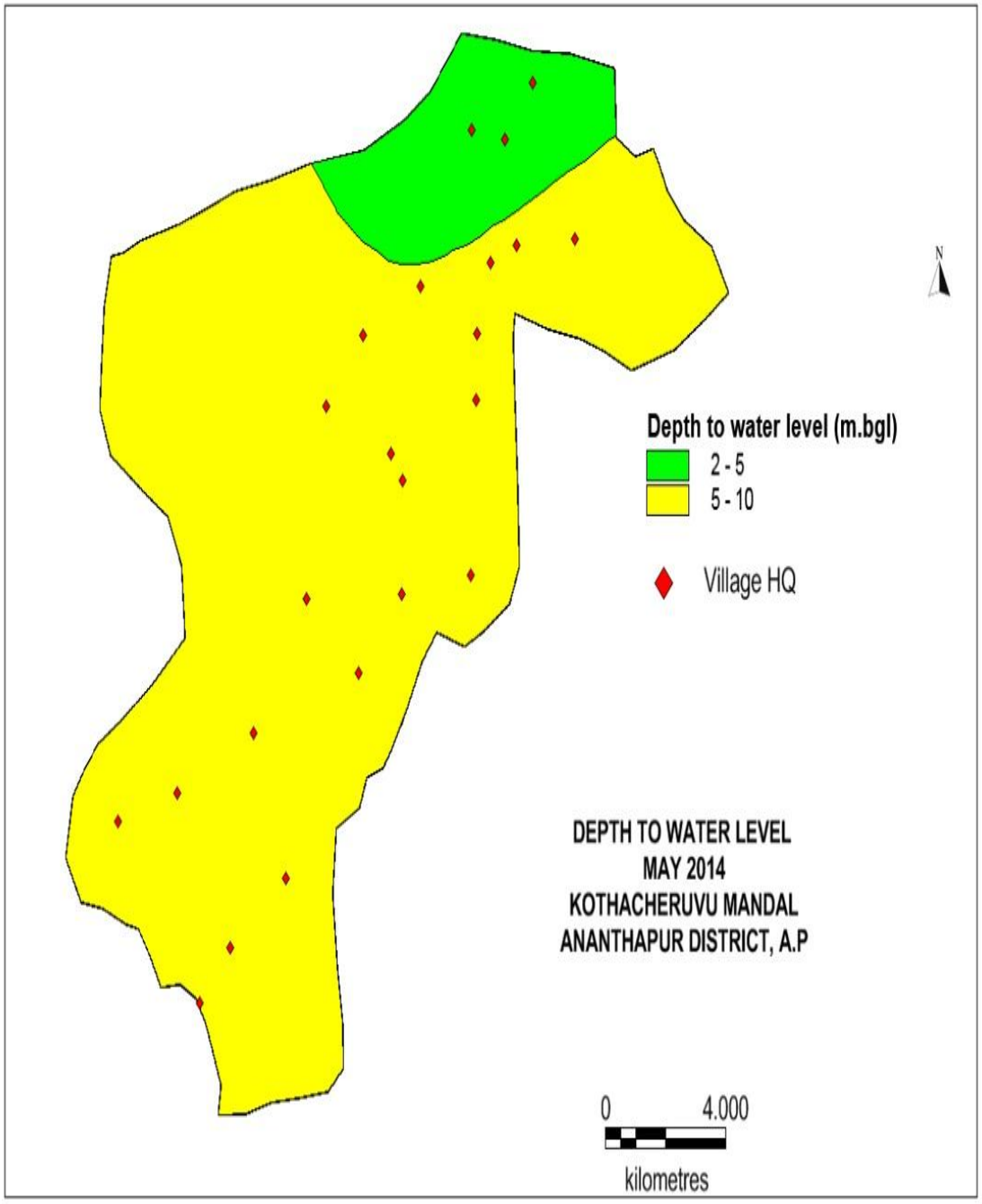

Depth to water level (m.bgl)
2 - 5
5 - 10
Village HQ
N
DEPTH TO WATER LEVEL
MAY 2014
KOTHACHERUVU MANDAL
ANANTHAPUR DISTRICT, A.P
0
4.000
kilometres

Fig.6

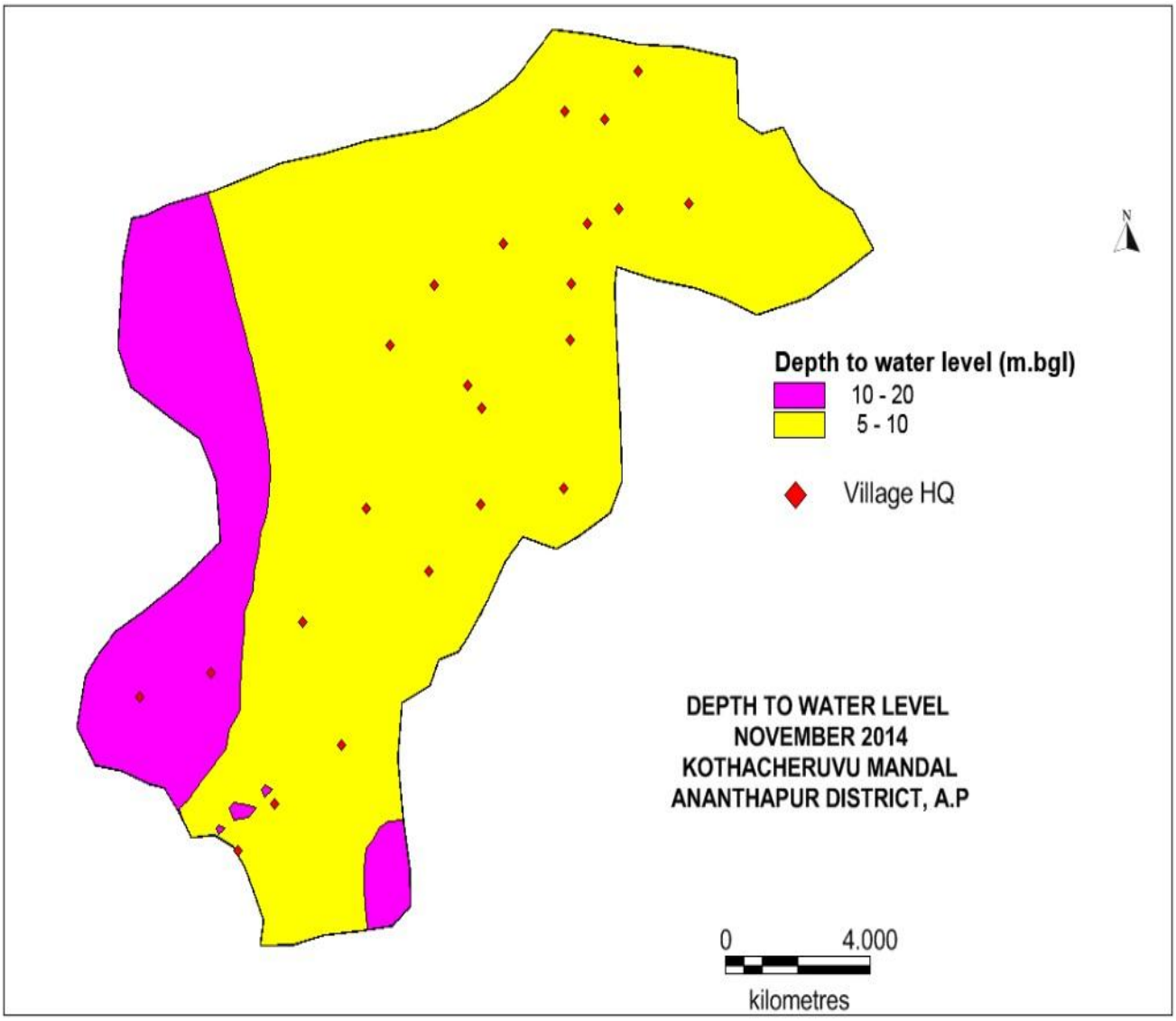
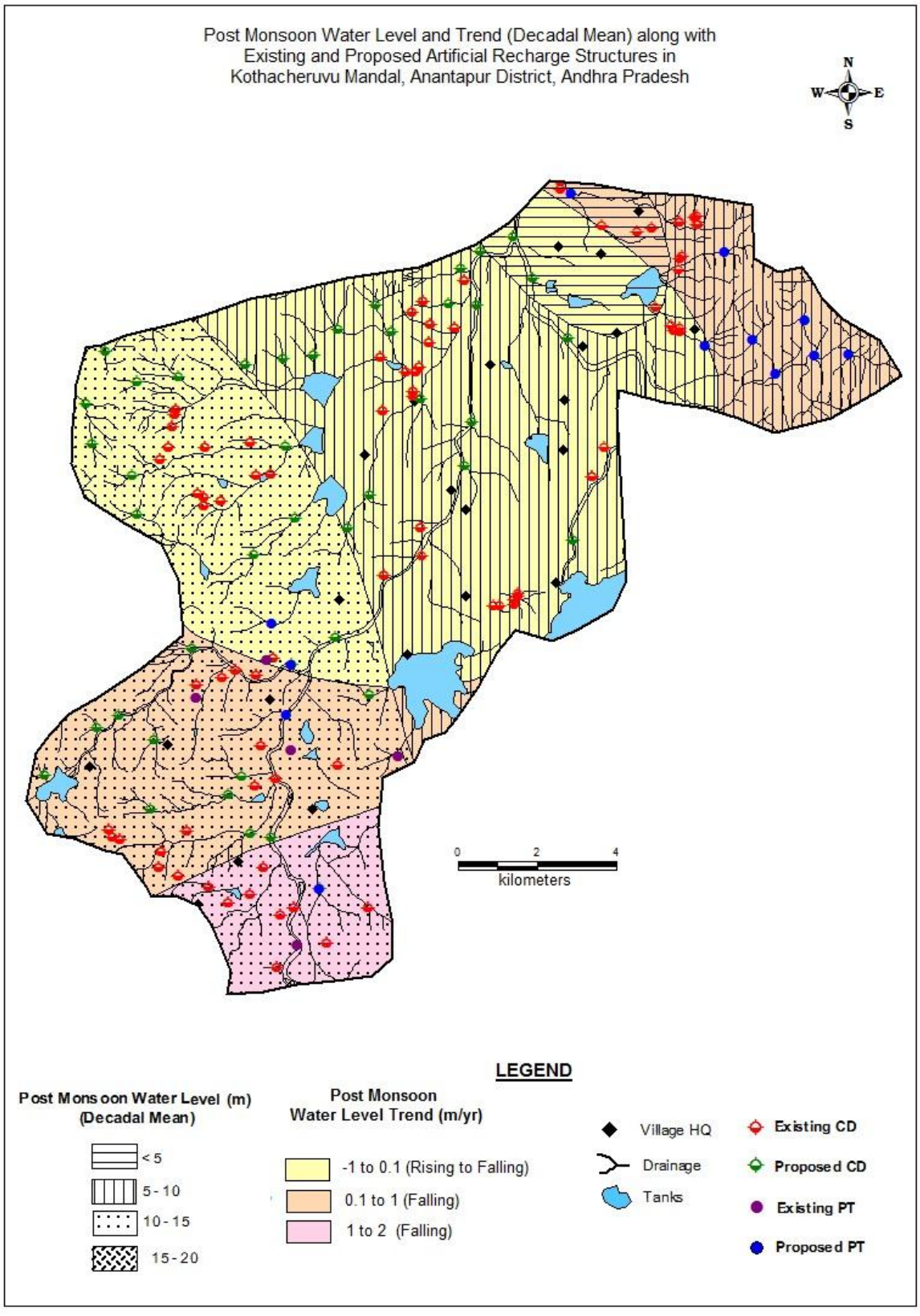

N
Depth to water level (m.bgl)
10 - 20
5 - 10
Village HQ
DEPTH TO WATER LEVEL
NOVEMBER 2014
KOTHACHERUVU MANDAL
ANANTHAPUR DISTRICT, A.P
0
4.000
kilometres

Fig.7


Post Monsoon Water Level and Trend (Decadal Mean) along with
Existing and Proposed Artificial Recharge Structures in
Kothacheruvu Mandal, Anantapur District, Andhra Pradesh
N
W
E
S
0
2
4
kilometers
LEGEND
Post Monsoon Water Level (m)
(Decadal Mean)
< 5
5 - 10
10 - 15
15 - 20
Post Monsoon
Water Level Trend (m/yr)
-1 to 0.1 (Rising to Falling)
0.1 to 1 (Falling)
1 to 2 (Falling)
Village HQ
Drainage
Tanks
Existing CD
Proposed CD
Existing PT
Proposed PT