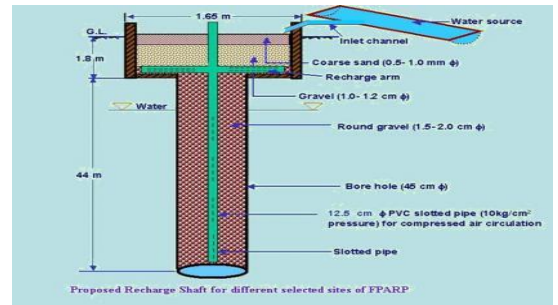
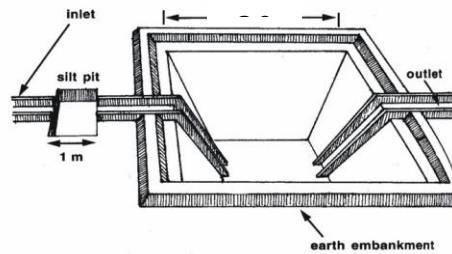




CENTRAL GROUND WATER BOARD
MINISTRY OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION
GOVERNMENT OF INDIA



Excavated/dugout farm pond



**ARTIFICIAL RECHARGE TO GROUND WATER AND
WATER CONSERVATION PLAN OF RAMGARH
BLOCK, DISTRICT ALWAR, RAJASTHAN**

Western Region, Jaipur
October 2016

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF RAMGARH BLOCK, DISTRICT ALWAR

Plan at a Glance

1.	Area of the Ramgarh Bas Block	616.97 Sq.Km.
2.	Area identified for Artificial Recharge	568.46 sq km
3.	Dynamic Ground Water Resources (as on 31.03.2011)	
	Net Ground Water Availability	60.9129 MCM
	Annual Ground Water Draft	104.4278 MCM
	Stage of Ground Water Development	171.44 %
4.	Volume of water to be harnessed	27.563 MCM
	Volume of water available for recharge through RS	0.595 MCM
	Volume of water available for recharge through PT	4.80 MCM
5.	Volume of unsaturated aquifer zone available for recharge	950.24 MCM
6.	Total number of structures to be proposed	
	Recharge structures	17 shafts in 15
	Existing village pond with recharge shaft/ well	Nos. of existing
		village ponds
	Percolation Tanks	24 nos.
	Sprinkler Irrigation	300 ha
	Expected Annual GW recharge	5.40 MCM
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	0.24
	Total recharge/ saving of ground water	5.64 MCM
7.	Estimated Cost	12.642 crore
	Artificial Recharge Plan	10.45 crore
	Sprinkler Irrigation	1.50 crore
	Piezometer construction	0.09 crore
	Operation and maintenance	0.602 crore

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF RAMGARH BLOCK, DISTRICT ALWAR

Introduction

The **Ramgarh Block, district Alwar** is one of the over exploited blocks of Rajasthan and is under severe stress, as evident from the stage of ground water development, which has attained an alarming level of **171.44%**.

Location of the block

The Ramgarh Block covers an area of 616.97 sq.km. and falls in central-eastern part of Alwar district. It is located between North latitudes 27°25' & 27°46' and East longitudes 76°37' & 76°59'.

Surface Water Availability

As per the studies carried out by Water Resources Department (WRD), Government of Rajasthan there is very little surplus water available for further development at 75% dependability. Based on the data made available from GWD, the surplus runoff available at 75% dependability level has been worked out for the zones as part of watershed within the block. The nature of aquifer (Alluvium/ Hard rock) is also considered while computing the number of Artificial Recharge structures feasible.

Accordingly about 27.563 MCM has been considered for recharge plan in the block. Optimum utilization of rainwater runoff depends on availability of land, feasible conditions, etc. Volume of Aquifer available for Artificial Recharge is given in **Table.1**

Supply Side Management

Feasible Artificial Recharge and Water Conservation Structures

About 0.035 MCM/year surplus has been considered for each recharge shaft and 0.2 MCM/year for percolation tank wherever feasible. The areas with shallow water level (<5m) have not been considered for construction of Artificial Recharge Structures

The number of Recharge Shaft is decided based on the number of suitable ponds available within the zone. If still some surplus remained unallocated, than few Percolation tanks are proposed at suitable locations. However, in some of the blocks entire available surplus cannot be utilized due to non availability of ponds for Recharge shaft or suitable location for Percolation tanks. Zone wise number of Recharge Structures proposed to be constructed is given in **Table 2**.

Table 1: Volume of Aquifer available for artificial recharge

District	Block	Area of Block (Sq.km.)	Potential area suitable for recharge (Sq.km.)	Type of Aquifer	Area feasible for artificial recharge (Sq km)	Sp Yield	Average DTW (mbgl) NOV 2013	Thickness of unsaturated zone 3 m below ground level (m)	Volume of sub surface storage space available for artificial recharge (MCM)
Alwar	Ramgarh	616.97	568.46	SR	568.46	0.12	16.93	13.93	950.24

Table 2: Number of recharge structure

ZoneCode	Sub_Basin	Type of Aquifer	Zone-Area (sq. km.)	Total Surplus (MCM)	Water Level >5m	Feasible RS_Prop	Feasible PT_Prop
Banganga_Banganga_004_RJ0213_AL	Banganga	SR	9.938	0.022	N	0	0
Ruparail_Ruparail_001_RJ0213_AL	Ruparail	SR	188.128	4.412	Y	4	9
Ruparail_Ruparail_002_RJ0213_AL	Ruparail	SR	201.060	12.912	Y	4	7
Ruparail_Ruparail_003_RJ0213_AL	Ruparail	SR	154.190	10.204	Y	9	8
Ruparail_Ruparail_005_RJ0213_AL	Ruparail	SR	45.279	0.000	Y	0	0
Ruparail_Ruparail_007_RJ0213_AL	Ruparail	SR	11.826	0.000	N	0	0
Ruparail_Ruparail_012_RJ0213_HR	Ruparail	HR	2.385	0.013	N	0	0
Ruparail_Ruparail_014_RJ0213_AL	Ruparail	SR	0.774	0.000	N	0	0
				27.563		17	24

Recharge Shaft

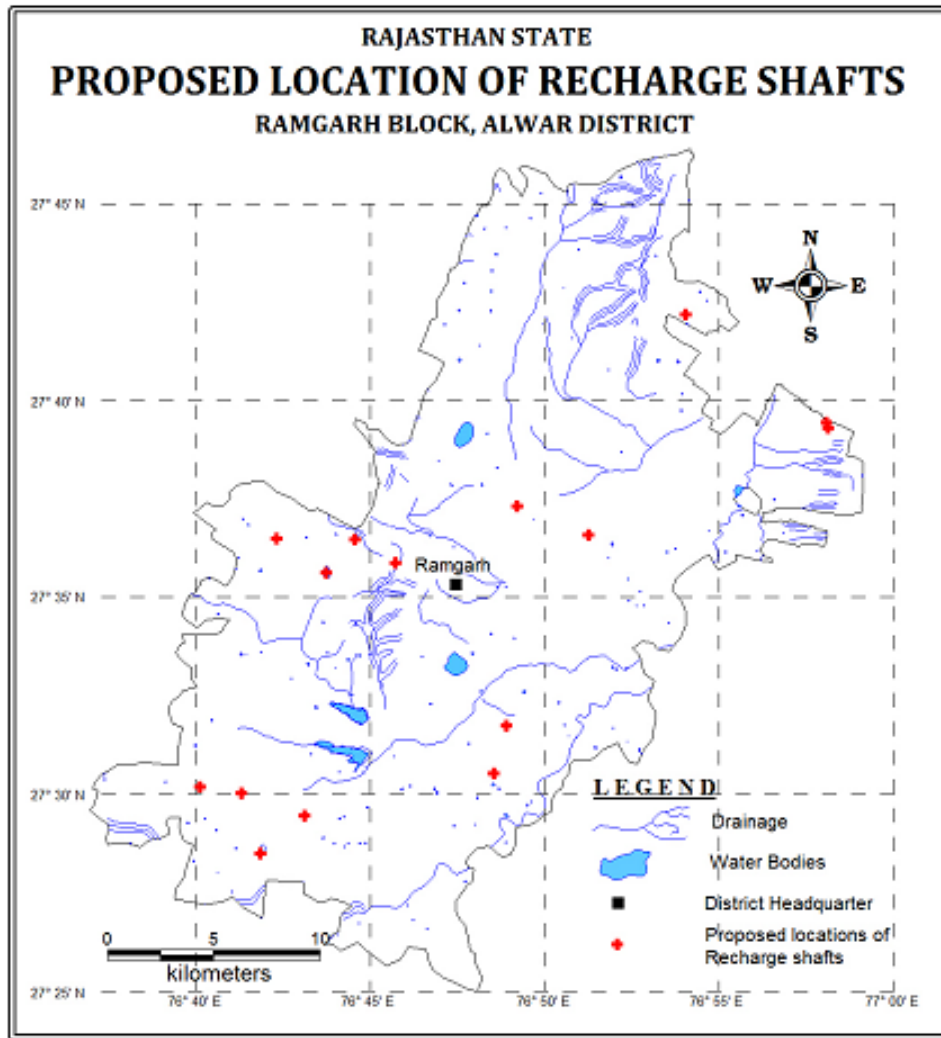
It is proposed to construct Recharge Shaft in existing ponds. The selected ponds should be atleast 3m deep and shallow ponds will be deepened accordingly. It is proposed that the inlet for the Recharge Shaft should be atleast 1m above bed of pond so that the pond retains adequate water for use by villagers.

. The tentative location of villages for construction of recharge shaft/well in existing village pond and their cost estimates are shown in Fig 1 and Table 3.

Table 3: Tentative locations of village for village pond with recharge shaft

S.No.	Village	Long	Lat	Watershed	No of Shafts	Unit cost (Rs in lac)	Total cost (Rs in lac)
1	Khohar	76.900	27.703	Ruparail_Ruparail_001_RJ0213_AL	1	5	5
2	Munpur Karmala	76.968	27.657	Ruparail_Ruparail_001_RJ0213_AL	1	5	5
3	Munpur Karmala	76.969	27.655	Ruparail_Ruparail_001_RJ0213_AL	1	5	5
4	Niwali	76.820	27.622	Ruparail_Ruparail_001_RJ0213_AL	1	5	5
5	Kareeriya	76.743	27.608	Ruparail_Ruparail_002_RJ0213_AL	1	5	5
6	Manki	76.854	27.610	Ruparail_Ruparail_002_RJ0213_AL	1	5	5
7	Meo Khera	76.815	27.529	Ruparail_Ruparail_002_RJ0213_AL	1	5	5
8	Jugrawar	76.809	27.509	Ruparail_Ruparail_002_RJ0213_AL	1	5	5
9	Badi Pokhar	76.705	27.608	Ruparail_Ruparail_003_RJ0213_AL	1	5	5
10	Mandu Ka Bas	76.729	27.594	Ruparail_Ruparail_003_RJ0213_AL	3	5	15
11	Bere	76.762	27.598	Ruparail_Ruparail_003_RJ0213_AL	1	5	5
12	Goondpur	76.669	27.503	Ruparail_Ruparail_003_RJ0213_AL	1	5	5
13	Jhareda	76.689	27.500	Ruparail_Ruparail_003_RJ0213_AL	1	5	5
14	Kherli Saiyad	76.698	27.475	Ruparail_Ruparail_003_RJ0213_AL	1	5	5
15	Doomera	76.719	27.491	Ruparail_Ruparail_003_RJ0213_AL	1	5	5
				Total	17		85

Figure 1: Showing Tentative location of the Recharge Shaft



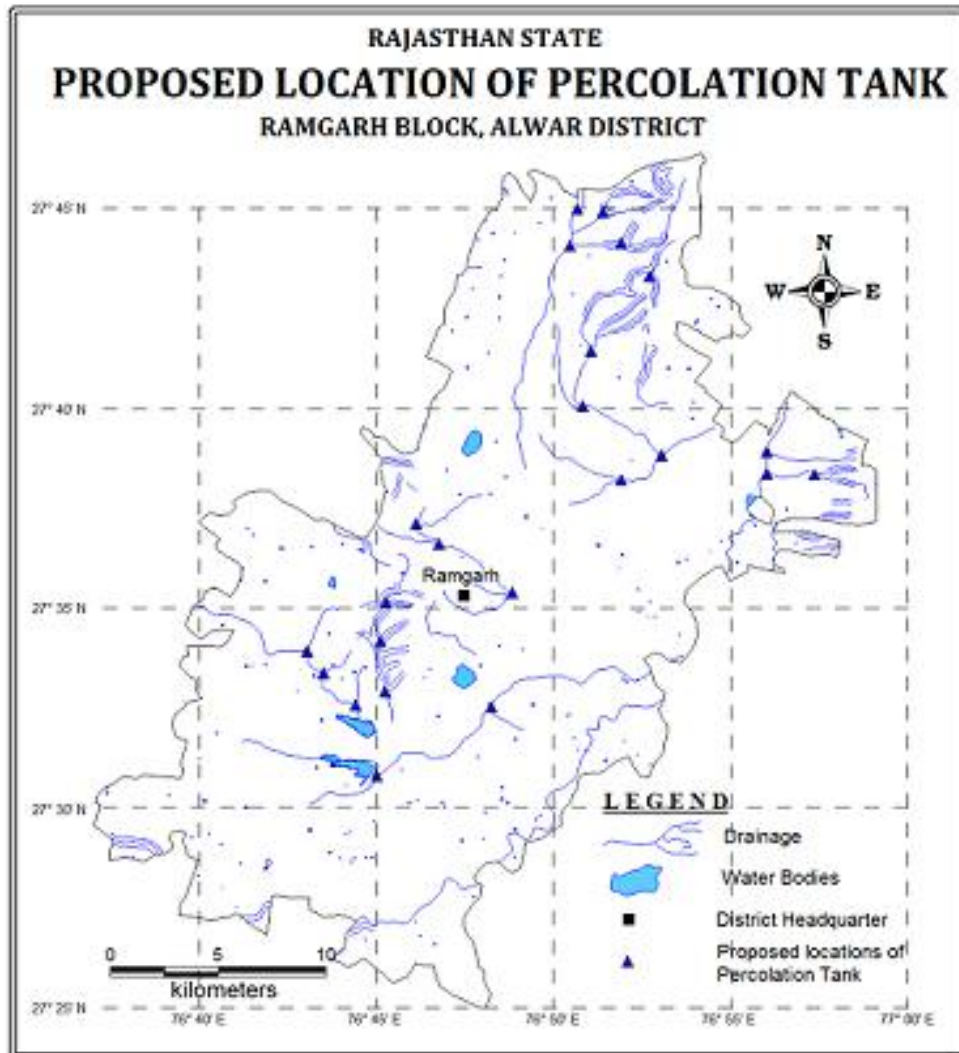
Percolation Tank

The tentative location of villages for construction of percolation tank and their cost estimates are shown in Fig 2 and Table 4

Table 4: Tentative locations of village for Percolation Tanks

S. No.	Village	Longitude	Latitude	Micro Watershed	Unit Cost (Rs. In lacs)
1	Naugawan	76.865	27.637	Ruparail_Ruparail_001_RJ0213_AL	40
2	Meghawas	76.847	27.668	Ruparail_Ruparail_001_RJ0213_AL	40
3	Mubarikpur	76.851	27.691	Ruparail_Ruparail_001_RJ0213_AL	40
4	Nangla Chirawanda	76.878	27.722	Ruparail_Ruparail_001_RJ0213_AL	40
5	Kalsawara	76.841	27.735	Ruparail_Ruparail_001_RJ0213_AL	40
6	Patan Bhan	76.844	27.750	Ruparail_Ruparail_001_RJ0213_AL	40
7	Kala Ghata	76.856	27.749	Ruparail_Ruparail_001_RJ0213_AL	40
8	Pata	76.865	27.736	Ruparail_Ruparail_001_RJ0213_AL	40
9	Naugawan	76.884	27.647	Ruparail_Ruparail_001_RJ0213_AL	40
10	Masta Bad	76.804	27.542	Ruparail_Ruparail_002_RJ0213_AL	40
11	Sherpur	76.933	27.640	Ruparail_Ruparail_002_RJ0213_AL	40
12	Golki	76.933	27.648	Ruparail_Ruparail_002_RJ0213_AL	40
13	Rasgan	76.956	27.639	Ruparail_Ruparail_002_RJ0213_AL	40
14	Ramgarh	76.814	27.590	Ruparail_Ruparail_002_RJ0213_AL	40
15	Dohli	76.779	27.610	Ruparail_Ruparail_002_RJ0213_AL	40
16	Kota Khurd	76.769	27.618	Ruparail_Ruparail_002_RJ0213_AL	40
17	Balwandka	76.717	27.565	Ruparail_Ruparail_003_RJ0213_AL	40
18	Chaprada	76.725	27.556	Ruparail_Ruparail_003_RJ0213_AL	40
19	Nangla Banjeerka	76.740	27.543	Ruparail_Ruparail_003_RJ0213_AL	40
20	Agyara	76.731	27.520	Ruparail_Ruparail_003_RJ0213_AL	40
21	Nangla Banjeerka	76.754	27.549	Ruparail_Ruparail_003_RJ0213_AL	40
22	Nangla Banjeerka	76.752	27.569	Ruparail_Ruparail_003_RJ0213_AL	40
23	Bere	76.754	27.586	Ruparail_Ruparail_003_RJ0213_AL	40
24	Agyara	76.750	27.513	Ruparail_Ruparail_003_RJ0213_AL	40
					960

Figure 2: Showing Tentative location of the Percolation Tank



Demand Side Management

Efficient Irrigation:

In Flood/ furrow irrigation method more than 50% of applied water is wasted through seepage to deeper levels, local inundation causes loss through evaporation and it leaches out the nutrients from the plants. While through drip and sprinkler irrigation method, wastage through irrigation losses could be minimized. Ground water usage can be minimized drastically by using HDPE pipes. Initially the scheme can be proposed to be started in 300 ha area, which is worst affected showing deepest water level and declining trends. The area is to be finalized based on land holdings, willingness of farmers and No Objection certificate from the land owner.

Impact Assessment and Monitoring

Assessment of impact of the artificial recharge schemes implemented is essential to assess the efficacy of structures constructed. It helps in identification of cost-effective recharge mechanisms for optimal recharge into the ground water system. It also helps to make necessary modifications in site selection, design and construction of structures in future.

It is proposed to construct 15 piezometers, at suitable locations for monitoring of water levels, in the vicinity of proposed recharge structure.

Revival, Repair of Water Bodies

The existing ponds and tanks with time loose their storage capacity as well as the natural ground water recharge through these water bodies has also become negligible due to siltation and encroachment by farmers for agriculture purposes. There are several such villages where ponds/ tanks are in dilapidated condition. These existing village tanks, which are normally silted and damaged, can be modified to serve as recharge structure in case these are suitably located to serve as percolation tanks. Through desilting, coupled with providing proper waste weir, the village tanks can be converted into recharge structure.

Financial Outlay of the Plan

The total estimated cost of the Plan is Rs. 12.642 cr. The tentative cost estimates of the various activities of the Plan are shown in Table 5 & 6. The unit rates are as followed by the Govt. of Rajasthan (BSR).

Table 5: Cost of the recharge structures

Cost Recharge Shaft Rs in crs (Unit cost Rs 0.05 cr for alluvium and Rs 0.026 cr for hard rock)	Cost of Percolation Tank in Rs in crs (Unit cost Rs 0.4 cr)	Cost of Sprinkler irrigation in Rs (Unit cost 0.005 cr/ha)
Soft rock – 0.85	9.60	1.50

Table 6: Tentative cost of different activities

Feasible Artificial Recharge & Water Conservation structures/ activities	Tentative Design	Quantity (in nos. or area in ha)	Rainwater harvested (MCM) or No. of sprinklers (/ha)	Tentative unit cost (in Rs lakh)	Total tentative cost (in Rs lakh)	Expected Annual GW recharge/ conservation (MCM) @ 0.8 MCM/structure
Recharge Structures/ Activities						
Recharge shaft within the pond /tanks	Alluvium – Depth 80m, Dia: 10-12” with filter pit	17	0.595	5	85	0.48
	Hard rock: Depth –60m, Dia 10-12”with filter pit	-	-	-	-	-
Percolation tanks (3 fillings)	200m*200m*1.5 m	24	4.80	40	960	3.84
Water Conservation Measures	Sprinkler Irrigation	300 ha	25	0.5/ha	150	0.24
		Total			1195	4.56
Impact assessment & Monitoring						
Piezometer	50 – 80 m	15		0.6	9	
<i>Impact assessment will be carried out by implementing agency</i>						
O & M - 5% of total cost of the scheme					60.20	
TOTAL					1264.20	4.56

Note: Type, number and cost of structure may vary according to site after ground verification