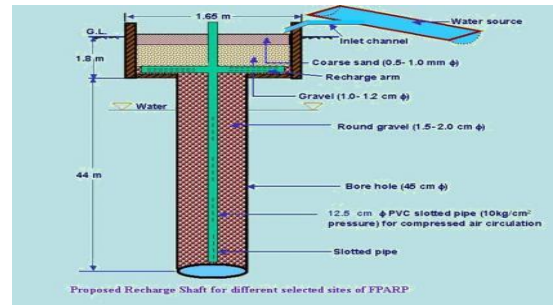
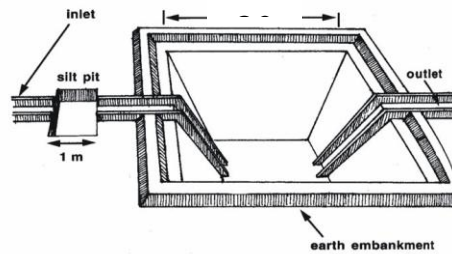




CENTRAL GROUND WATER BOARD
MINISTRY OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION
GOVERNMENT OF INDIA



Excavated/dugout farm pond



**ARTIFICIAL RECHARGE TO GROUND WATER AND
WATER CONSERVATION PLAN OF KUMHER
BLOCK, DISTRICT BHARATPUR, RAJASTHAN**

Western Region, Jaipur
January 2017

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF KUMHER BLOCK, DISTRICT BHARATPUR

Plan at a Glance

1.	Area of the Kumher Block	454.51 sq. km.
2.	Area identified for Artificial Recharge	119.08 sq km
3.	Dynamic Ground Water Resources (as on 31.03.2011)	
	Net Ground Water Availability	16.41 MCM
	Annual Ground Water Draft	18.05 MCM
	Stage of Ground Water Development	109.94%
4.	Volume of water to be harnessed	1.087 MCM
	Volume of water available for recharge through RS	0.805 MCM
	Volume of water available for recharge through PT	--
5.	Volume of unsaturated aquifer zone available for recharge	27.34 MCM
6.	Total number of structures to be proposed	
	Recharge structures	23 shafts in 21
	Existing village pond with recharge shaft/ well	Nos. of existing
		village ponds
	Percolation Tanks	--
	Sprinkler Irrigation	300 ha
	Expected Annual GW recharge	0.644 MCM
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	0.24
	Total recharge/ saving of ground water	0.884 MCM
7.	Estimated Cost	2.877 crore
	Artificial Recharge Plan	1.15 crore
	Sprinkler Irrigation	1.50 crore
	Piezometer construction	0.09 crore
	Operation and maintenance	0.137 crore

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF KUMHER BLOCK, DISTRICT BHARATPUR

Introduction

The **Kumher Block, district Bharatpur** 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 **109.94%**.

Location of the block

The Kumher Block of Bharatpur District covering an area of 454.51 Sq. Km. falls in central part of Bharatpur District and is located between North latitudes 27°12' & 27°24' and East longitudes 77°12' & 77°37'.

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 1.087 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)
Bharatpur	Kumher	454.51	119.08	SR	119.08	0.08	5.87	2.87	27.34

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_003_RJ0604_AL	Banganga	SR	0.002	0.000	N	0	0
Banganga_Banganga_007_RJ0604_AL	Banganga	SR	25.737	0.000	Y	0	0
Banganga_Banganga_008_RJ0604_AL	Banganga	SR	133.819	0.582	Y	9	0
Banganga_Banganga_013_RJ0604_AL	Banganga	SR	99.392	0.036	Y	1	0
Banganga_Banganga_025_RJ0604_AL	Banganga	SR	69.693	0.391	Y	11	0
Banganga_Banganga_026_RJ0604_AL	Banganga	SR	112.719	0.077	Y	2	0
				1.087		23	0

Recharge Shaft

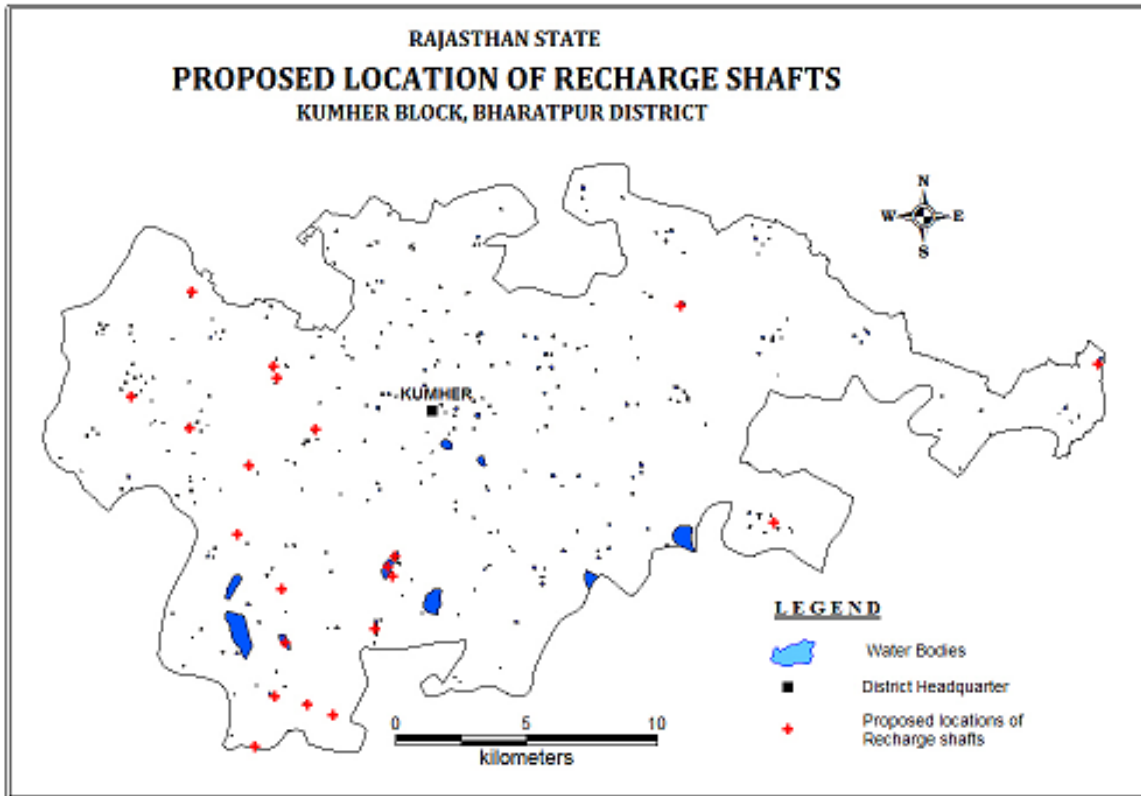
It is proposed to construct Recharge Shaft in existing ponds. The selected ponds should be atleast 3m deep and shallow ponds will be deepened accordingly. It is proposed that the inlet for the Recharge Shaft should be atleast 1m above bed of pond so that the pond retains adequate water for use by villagers.

. 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	Usrani	77.271	27.357	Banganga_Banganga_008_RJ0604_AL	1	5	5
2	Sabora	77.248	27.321	Banganga_Banganga_008_RJ0604_AL	1	5	5
3	Jahangeerpur	77.303	27.331	Banganga_Banganga_008_RJ0604_AL	1	5	5
4	Pichoomar	77.304	27.327	Banganga_Banganga_008_RJ0604_AL	1	5	5
5	Maharawar	77.271	27.310	Banganga_Banganga_008_RJ0604_AL	1	5	5
6	Astavan Jadid	77.293	27.297	Banganga_Banganga_008_RJ0604_AL	1	5	5
7	Peedhi	77.319	27.310	Banganga_Banganga_008_RJ0604_AL	1	5	5
8	Gudawali	77.289	27.274	Banganga_Banganga_008_RJ0604_AL	1	5	5
9	Chimni	77.306	27.255	Banganga_Banganga_008_RJ0604_AL	1	5	5
10	Ubar	77.496	27.278	Banganga_Banganga_013_RJ0604_AL	1	5	5
11	Chak Paprera	77.308	27.236	Banganga_Banganga_025_RJ0604_AL	2	5	10
12	Ajau	77.342	27.241	Banganga_Banganga_025_RJ0604_AL	1	5	5
13	Pahua	77.349	27.259	Banganga_Banganga_025_RJ0604_AL	1	5	5
14	Pahua	77.347	27.262	Banganga_Banganga_025_RJ0604_AL	2	5	10
15	Pahua	77.350	27.266	Banganga_Banganga_025_RJ0604_AL	1	5	5
16	Moroda	77.296	27.201	Banganga_Banganga_025_RJ0604_AL	1	5	5
17	Paprera	77.304	27.218	Banganga_Banganga_025_RJ0604_AL	1	5	5
18	Khanswara	77.316	27.215	Banganga_Banganga_025_RJ0604_AL	1	5	5
19	Sonera	77.326	27.212	Banganga_Banganga_025_RJ0604_AL	1	5	5
20	Abhaurra	77.460	27.352	Banganga_Banganga_026_RJ0604_AL	1	5	5
21	Santrook	77.622	27.332	Banganga_Banganga_026_RJ0604_AL	1	5	5
				Total	23		115

Fig: 1: Tentative location of Recharge Shaft and 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. 2.877 cr. The tentative cost estimates of the various activities of the Plan are shown in Table 4 & 5. The unit rates are as followed by the Govt. of Rajasthan (BSR).

Table 4: 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 – 1.15	-	1.50

Table 5: 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	23	0.805	5	115	0.644
	Hard rock: Depth –60m, Dia 10-12”with filter pit	-	-	-	-	-
Percolation tanks (3 fillings)	200m*200m*1.5 m	-	-	-	-	-
Water Conservation Measures	Sprinkler Irrigation	300 ha	25	0.5/ha	150	0.24
		Total			265	0.884
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					13.70	
TOTAL					287.70	0.884

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