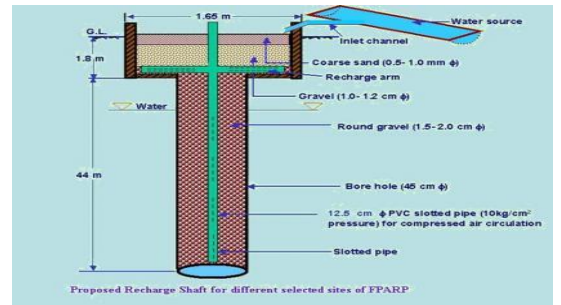




CENTRAL GROUND WATER BOARD
MINISTRY OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION
GOVERNMENT OF INDIA



Excavated/dugout farm pond



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

Western Region, Jaipur
January 2017

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

Plan at a Glance

1.	Area of the Rupwas Block	539.01 sq. km.
2.	Area identified for Artificial Recharge	501.10 sq km
3.	Dynamic Ground Water Resources (as on 31.03.2011)	
	Net Ground Water Availability	66.39 MCM
	Annual Ground Water Draft	72.42 MCM
	Stage of Ground Water Development	109.08%
4.	Volume of water to be harnessed	1.575 MCM
	Volume of water available for recharge through RS	0.875 MCM
	Volume of water available for recharge through PT	--
5.	Volume of unsaturated aquifer zone available for recharge	235.88 MCM
6.	Total number of structures to be proposed	
	Recharge structures	25 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	0.70 MCM
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	0.24 MCM
	Total recharge/ saving of ground water	0.94 MCM
7.	Estimated Cost	3.014 crore
	Artificial Recharge Plan	1.25 crore
	Sprinkler Irrigation	1.50 crore
	Piezometer construction	0.12 crore
	Operation and maintenance	0.144 crore

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

Introduction

The **Rupwas 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 **109.08%**. 501.10 sq. km. area is potential zone area and thus feasible for artificial recharge.

Location of the block

The Rupwas Block of Bharatpur District covering an area of 539.01 Sq. Km. falls in Bharatpur District and is located between North latitudes 26°53' & 27°09' and East longitudes 77°19' & 77°46'.

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 0.875 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	Rupwas	539.01	501.1	SR	338.6	0.1	9.78	6.78	229.57
				HR	162.5	0.02	4.94	1.94	6.31

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_012_RJ0607_AL	Banganga	SR	13.197	0.000	N	0	0
Banganga_Banganga_013_RJ0607_AL	Banganga	SR	0.720	0.000	N	0	0
Banganga_Banganga_014_RJ0607_AL	Banganga	SR	149.967	0.000	Y	0	0
Banganga_Banganga_014_RJ0607_SR	Banganga	SR	0.000	0.000	N	0	0
Banganga_Banganga_017_RJ0607_AL	Banganga	SR	2.825	0.000	N	0	0
Gambhir_Gambhir_003_RJ0607_SR	Gambhir	SR	240.707	0.481	Y	14	0
Gambhir_Gambhir_004_RJ0607_AL	Gambhir	SR	92.104	0.647	Y	6	0
Gambhir_Gambhir_004_RJ0607_SR	Gambhir	SR	63.552	0.446	Y	5	0
Gambhir_Gambhir_013_RJ0607_SR	Gambhir	SR	0.672	0.000	N	0	0
				1.575		25	0

Recharge Shaft

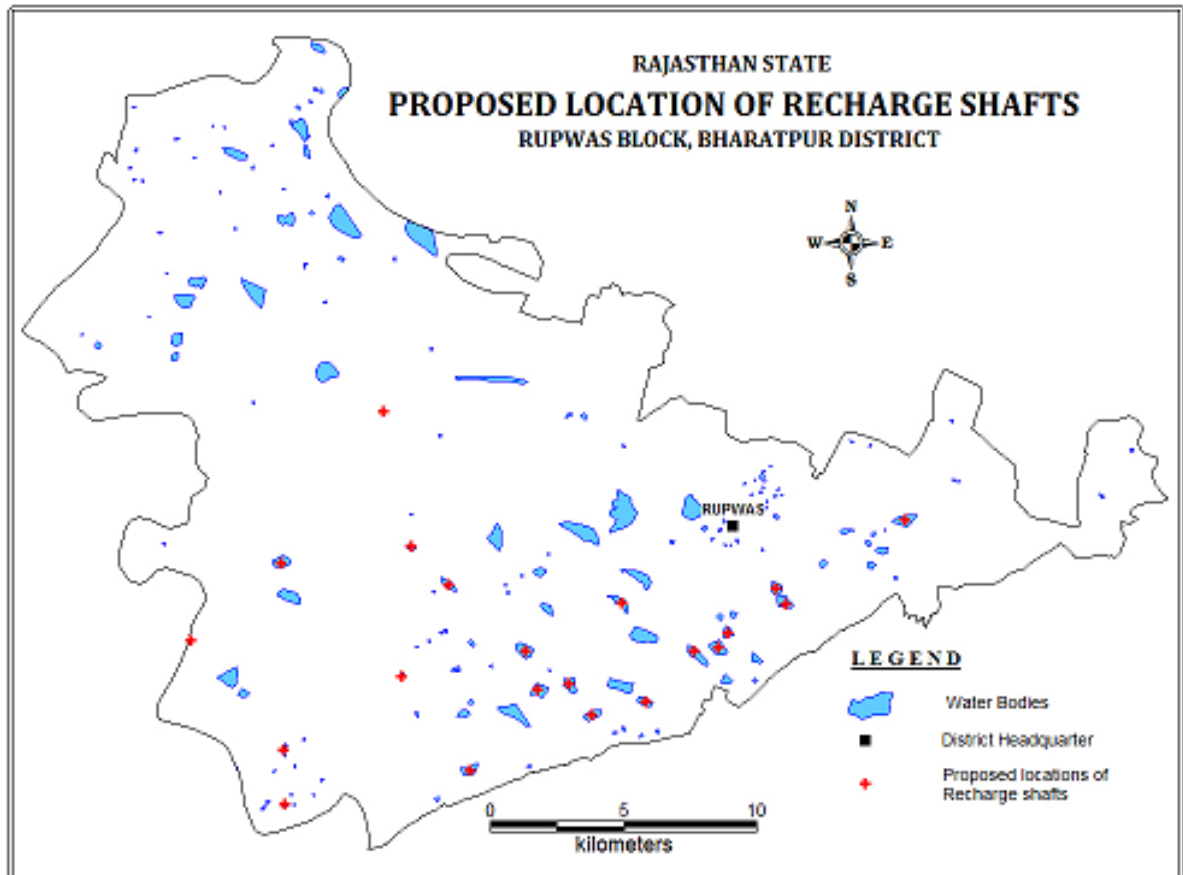
It is proposed to construct Recharge Shaft in existing ponds. The selected ponds should be atleast 3m deep and shallow ponds will be deepened accordingly. It is proposed that the inlet for the Recharge Shaft should be atleast 1m above bed of pond so that the pond retains adequate water for use by villagers.

. 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	Paharpur	77.522	26.951	Gambhir_Gambhir_003_RJ0607_SR	1	5	5
2	Dhana	77.527	26.939	Gambhir_Gambhir_003_RJ0607_SR	1	5	5
3	Basai	77.501	26.911	Gambhir_Gambhir_003_RJ0607_SR	1	5	5
4	Sajjanwas	77.539	26.941	Gambhir_Gambhir_003_RJ0607_SR	1	5	5
5	Tontpur	77.547	26.930	Gambhir_Gambhir_003_RJ0607_SR	1	5	5
6	Maloni	77.567	26.934	Gambhir_Gambhir_003_RJ0607_SR	1	5	5
7	Samahad	77.559	26.968	Gambhir_Gambhir_003_RJ0607_SR	1	5	5
8	Noharda	77.586	26.951	Gambhir_Gambhir_003_RJ0607_SR	1	5	5
9	Samri	77.595	26.953	Gambhir_Gambhir_003_RJ0607_SR	1	5	5
10	Samri	77.599	26.958	Gambhir_Gambhir_003_RJ0607_SR	1	5	5
11	Jotroli	77.493	26.974	Gambhir_Gambhir_003_RJ0607_SR	1	5	5
12	Rundh Rupbas	77.617	26.973	Gambhir_Gambhir_003_RJ0607_SR	1	5	5
13	Rundh Kheriya Jat	77.620	26.967	Gambhir_Gambhir_003_RJ0607_SR	1	5	5
14	Shakkarpur	77.665	26.996	Gambhir_Gambhir_003_RJ0607_SR	1	5	5
15	Jareela	77.395	26.955	Gambhir_Gambhir_004_RJ0607_AL	1	5	5
16	Khera Thakur	77.430	26.981	Gambhir_Gambhir_004_RJ0607_AL	4	5	20
17	Nagla Radhey	77.468	27.032	Gambhir_Gambhir_004_RJ0607_AL	1	5	5
18	Dumriya	77.431	26.918	Gambhir_Gambhir_004_RJ0607_SR	1	5	5
19	Dumriya	77.431	26.900	Gambhir_Gambhir_004_RJ0607_SR	1	5	5
20	Goojar Balai	77.479	26.987	Gambhir_Gambhir_004_RJ0607_SR	2	5	5
21	Mahalpur Chooria	77.475	26.943	Gambhir_Gambhir_004_RJ0607_SR	1	5	5
				Total	25		125

Fig: 1: Tentative location of Recharge Shaft



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 20 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. 3.014 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 – 1.25	-	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	25	0.875	5	125	0.70
	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			275	0.94
Impact assessment & Monitoring						
Piezometer	50 – 80 m	20		0.6	12	
<i>Impact assessment will be carried out by implementing agency</i>						
O & M - 5% of total cost of the scheme					14.35	
TOTAL					301.35	0.94

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