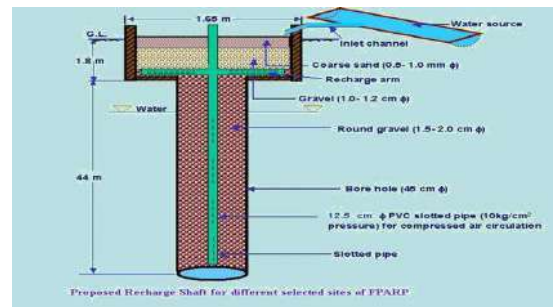
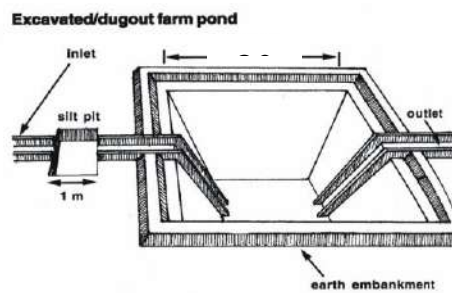




CENTRAL GROUND WATER BOARD
MINISTRY OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION
GOVERNMENT OF INDIA



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

Western Region, Jaipur
January 2017

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

Plan at a Glance

1.	Area of the Weir Block	606.53 sq. km.
2.	Area identified for Artificial Recharge	430.39 sq km
3.	Dynamic Ground Water Resources (as on 31.03.2011)	
	Net Ground Water Availability	54.53 MCM
	Annual Ground Water Draft	75.84 MCM
	Stage of Ground Water Development	139.08%
4.	Volume of water to be harnessed	1.224 MCM
	Volume of water available for recharge through RS	0.07 MCM
	Volume of water available for recharge through PT	--
5.	Volume of unsaturated aquifer zone available for recharge	584.27 MCM
6.	Total number of structures to be proposed	
	Recharge structures	2 shafts in 2 Nos.
	Existing village pond with recharge shaft/ well	of existing village ponds
	Percolation Tanks	--
	Sprinkler Irrigation	300 ha
	Expected Annual GW recharge	0.056 MCM
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	0.24 MCM
	Total recharge/ saving of ground water	0.296 MCM
7.	Estimated Cost	1.693 crore
	Artificial Recharge Plan	0.10 crore
	Sprinkler Irrigation	1.50 crore
	Piezometer construction	0.012 crore
	Operation and maintenance	0.081 crore

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

Introduction

The **Weir 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 **139.08%**. 430.39 sq. km. area is potential zone area and thus feasible for artificial recharge.

Location of the block

The Weir Block of Bharatpur District covering an area of 606.53 Sq. Km. falls in Bharatpur District and is located between North latitudes 26°52' & 27°11' and East longitudes 76°57' & 77°16'.

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 1.224 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	Weir	606.53	430.39	SR	344.07	0.12	16.67	13.67	564.41
				HR	86.32	0.02	14.50	11.50	19.85

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_010_RJ0609	Banganga	SR	1.840	0.004	N	0	0
Banganga_Banganga_012_RJ0609	Banganga	SR	0.896	0.000	N	0	0
Banganga_Banganga_014_RJ0609	Banganga	SR	1.225	0.000	N	0	0
Banganga_Banganga_015_RJ0609	Banganga	SR	43.986	0.000	Y	0	0
Banganga_Banganga_016_RJ0609	Banganga	SR	119.918	0.000	Y	0	0
Banganga_Banganga_017_RJ0609	Banganga	SR	231.220	0.000	Y	0	0
Banganga_Banganga_025_RJ0609	Banganga	SR	113.819	0.639	Y	0	0
Gambhir_Gambhir_004_RJ0609	Gambhir	SR	21.254	0.149	Y	1	0
Gambhir_Gambhir_006_RJ0609	Gambhir	HR	7.151	0.032	N	0	0
Gambhir_Gambhir_007_RJ0609	Gambhir	SR	69.496	0.400	Y	1	0
				1.224		2	0

Recharge Shaft

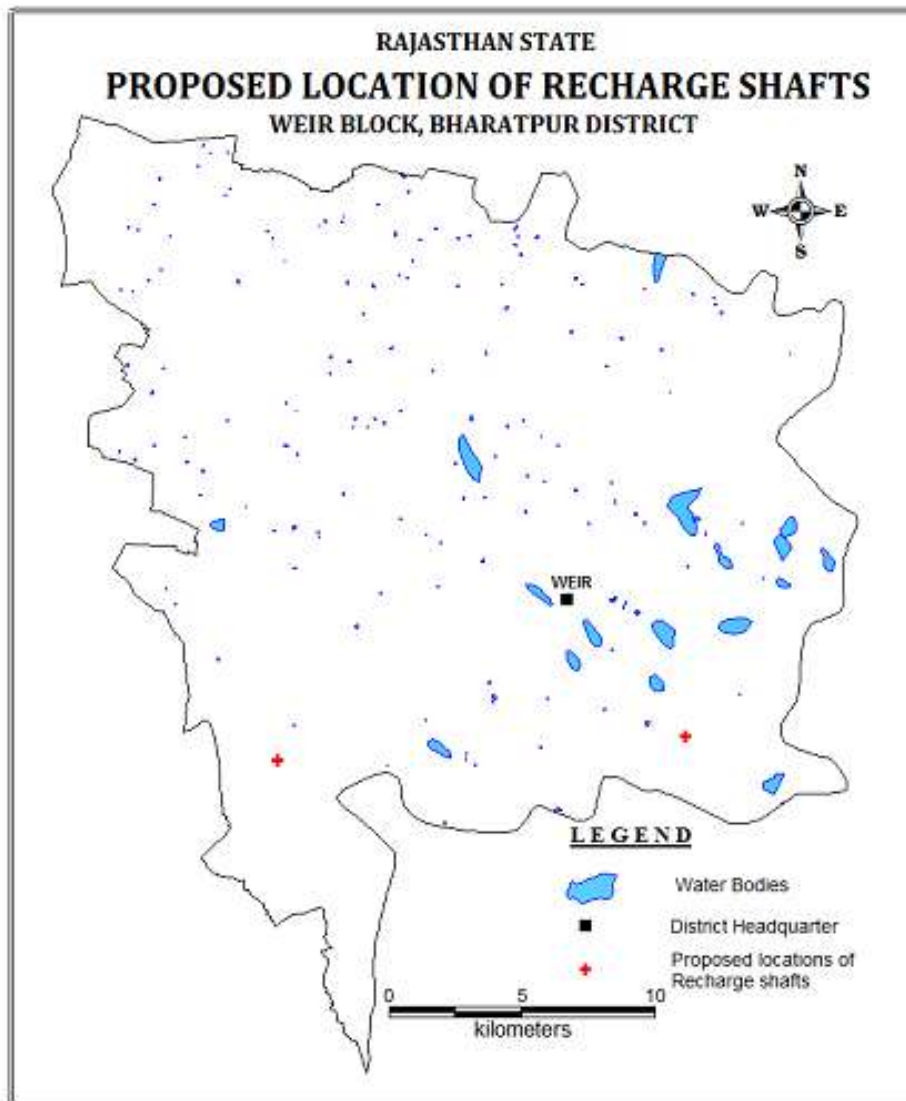
It is proposed to construct Recharge Shaft in existing ponds. The selected ponds should be atleast 3m deep and shallow ponds will be deepened accordingly. It is proposed that the inlet for the Recharge Shaft should be atleast 1m above bed of pond so that the pond retains adequate water for use by villagers.

. 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	Bhagora	77.197	26.973	Gambhir_Gambhir_004_RJ0609_AL	1	5	5
2	Nithar	77.043	26.965	Gambhir_Gambhir_007_RJ0609_AL	1	5	5
				Total	2		10

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 2 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. 1.693 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 – 0.10	-	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	2	0.07	5	10	0.056
	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			160	0.296
Impact assessment & Monitoring						
Piezometer	50 – 80 m	2		0.6	1.2	
<i>Impact assessment will be carried out by implementing agency</i>						
O & M - 5% of total cost of the scheme					8.06	
TOTAL					169.26	0.296

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