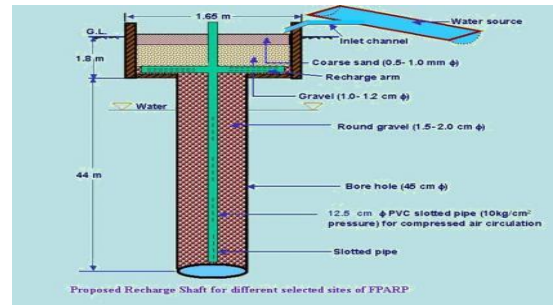
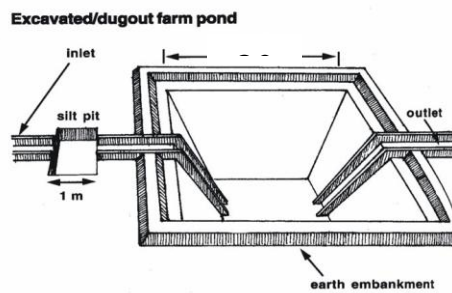




CENTRAL GROUND WATER BOARD
MINISTRY OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION
GOVERNMENT OF INDIA



**ARTIFICIAL RECHARGE TO GROUND WATER AND
WATER CONSERVATION PLAN OF BHINMAL
BLOCK, DISTRICT JALORE, RAJASTHAN**

Western Region, Jaipur
January 2017

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF BHINMAL BLOCK, DISTRICT JALORE

Plan at a Glance

1.	Area of the Bhinmal Block	1365.61 sq. km.
2.	Area identified for Artificial Recharge	1322.75 sq km
3.	Dynamic Ground Water Resources (as on 31.03.2011)	
	Net Ground Water Availability	71.88 MCM
	Annual Ground Water Draft	155.17 MCM
	Stage of Ground Water Development	215.87%
4.	Volume of water to be harnessed	1.054 MCM
	Volume of water available for recharge through RS	1.015 MCM
	Volume of water available for recharge through PT	-
5.	Volume of unsaturated aquifer zone available for recharge	5324.069 MCM
6.	Total number of structures to be proposed	
	Recharge structures	29 shafts in 29
	Existing village pond with recharge shaft/ well	Nos. of existing
		village ponds
	Percolation Tanks	--
	Sprinkler Irrigation	300 ha
	Expected Annual GW recharge	0.812 MCM
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	0.24 MCM
	Total recharge/ saving of ground water	1.052 MCM
7.	Estimated Cost	3.224 crore
	Artificial Recharge Plan	1.45 crore
	Sprinkler Irrigation	1.50 crore
	Piezometer construction	0.12 crore
	Operation and maintenance	0.154 crore

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF BHINMAL BLOCK, DISTRICT JALORE

Introduction

The **Bhinmal Block, district Jalore** 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 **215.87%**. 1322.75 sq. km. area is potential zone area and thus feasible for artificial recharge.

Location of the block

The Bhinmal Block of Jalore District covering an area of 1365.61 Sq. Km. falls in central part of Jalore District and is located between North latitudes 24°57' & 25°25' and East longitudes 71°48' & 72°26'.

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 1.054 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)
JALORE	BHINMAL	1365.61	1322.75	SR	1322.75	0.070	60.5	57.5	5324.069

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
Luni_Bandi_001_RJ1902_AL	Bandi	SR	224.378	0.047	Y	1	0
Luni_Khari_030_RJ1902_AL	Khari	SR	40.345	0.040	Y	1	0
Luni_Luni_077_RJ1902_AL	Luni	SR	307.677	0.183	Y	5	0
Luni_Sagi_087_RJ1902_AL	Sagi	SR	393.871	0.785	Y	22	0
Luni_Sukri (Sayala)_094_RJ1902_AL	Sukri (Sayala)	SR	319.459	0.000	Y	0	0
				1.054		29	0

Recharge Shaft

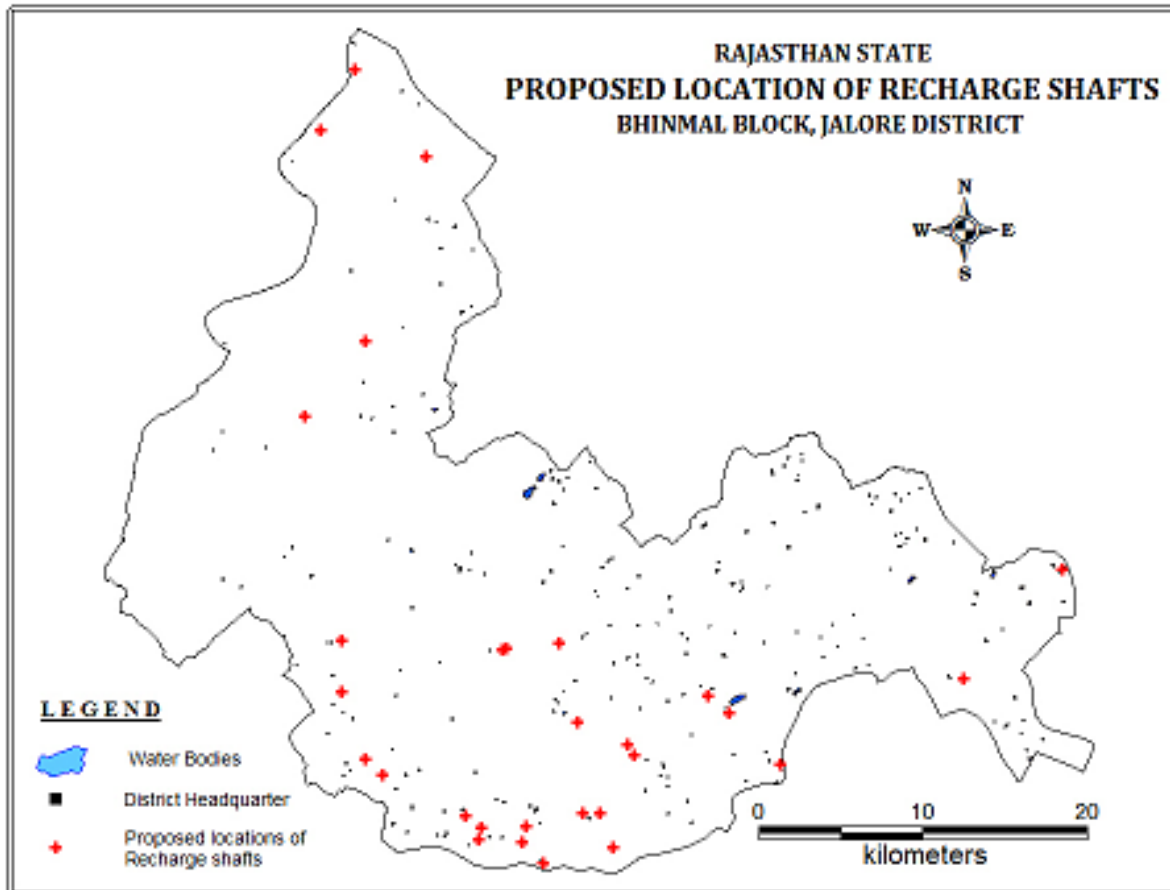
It is proposed to construct Recharge Shaft in existing ponds. The selected ponds should be atleast 3m deep and shallow ponds will be deepened accordingly. It is proposed that the inlet for the Recharge Shaft should be atleast 1m above bed of pond so that the pond retains adequate water for use by villagers.

. 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	Ledarmer	72.343	25.064	Luni_Bandi_001_RJ1902_AL	1	5	5
2	Bheempura	72.403	25.124	Luni_Khari_030_RJ1902_AL	1	5	5
3	Bijaliya	71.954	25.364	Luni_Luni_077_RJ1902_AL	1	5	5
4	Khokha	72.018	25.349	Luni_Luni_077_RJ1902_AL	1	5	5
5	Rangala	71.975	25.397	Luni_Luni_077_RJ1902_AL	1	5	5
6	Bagoti	71.981	25.249	Luni_Luni_077_RJ1902_AL	1	5	5
7	Rauta	71.945	25.208	Luni_Luni_077_RJ1902_AL	1	5	5
8	Dantiwas	72.042	24.989	Luni_Sagi_087_RJ1902_AL	1	5	5
9	Dantiwas	72.051	24.983	Luni_Sagi_087_RJ1902_AL	1	5	5
10	Dantiwas	72.050	24.976	Luni_Sagi_087_RJ1902_AL	1	5	5
11	Thobau	71.981	25.020	Luni_Sagi_087_RJ1902_AL	1	5	5
12	Jogau	71.991	25.011	Luni_Sagi_087_RJ1902_AL	1	5	5
13	Kooka	71.967	25.086	Luni_Sagi_087_RJ1902_AL	1	5	5
14	Thobau	71.967	25.057	Luni_Sagi_087_RJ1902_AL	1	5	5
15	Dantiwas	72.078	24.984	Luni_Sagi_087_RJ1902_AL	1	5	5
16	Dantiwas	72.076	24.975	Luni_Sagi_087_RJ1902_AL	1	5	5
17	Dantiwas	72.088	24.964	Luni_Sagi_087_RJ1902_AL	1	5	5
18	Nohra	72.112	24.990	Luni_Sagi_087_RJ1902_AL	1	5	5
19	Nimbawas	72.123	24.991	Luni_Sagi_087_RJ1902_AL	1	5	5
20	Kerwala	72.131	24.972	Luni_Sagi_087_RJ1902_AL	1	5	5
21	Sewari	72.064	25.080	Luni_Sagi_087_RJ1902_AL	1	5	5
22	Sewari	72.067	25.081	Luni_Sagi_087_RJ1902_AL	1	5	5
23	Jeran	72.098	25.083	Luni_Sagi_087_RJ1902_AL	1	5	5
24	Viyonka Goliya	72.110	25.041	Luni_Sagi_087_RJ1902_AL	1	5	5
25	Nimbawas	72.140	25.029	Luni_Sagi_087_RJ1902_AL	1	5	5
26	Nimbawas	72.144	25.022	Luni_Sagi_087_RJ1902_AL	1	5	5
27	Joojani	72.189	25.055	Luni_Sagi_087_RJ1902_AL	1	5	5
28	Bhinmal (Rural)	72.201	25.046	Luni_Sagi_087_RJ1902_AL	1	5	5
29	Bhagal Bhim	72.232	25.018	Luni_Sagi_087_RJ1902_AL	1	5	5
				Total	29		145

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. 3.224 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 – 1.45	-	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	29	1.015	5	145	0.812
	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			295	1.052
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					15.35	
TOTAL					322.35	1.052

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