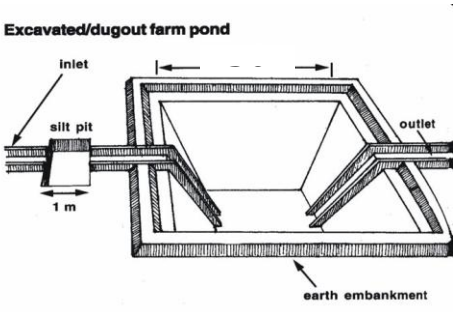
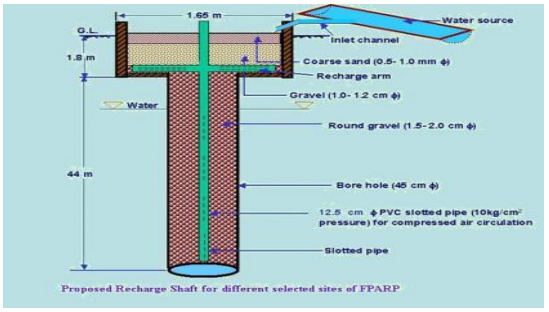
CENTRAL GROUND WATER BOARD

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





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

Western Region, Jaipur
January 2017

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

Plan at a Glance

1.	**Area of the Ahore Block**	**1613.77 sq. km.**
2.	**Area identified for Artificial Recharge**	**535.24 sq km**
3.	**Dynamic Ground Water Resources (as on 31.03.2011)**	
	Net Ground Water Availability	**23.78 MCM**
	Annual Ground Water Draft	**29.79 MCM**
	Stage of Ground Water Development	**125.27%**
4.	**Volume of water to be harnessed** **Volume of water available for recharge through RS** **Volume of water available for recharge through PT**	**1.845 MCM** **1.816 MCM** **-**
5.	**Volume of unsaturated aquifer zone available for recharge**	**1090.284 MCM**
6.	**Total number of structures to be proposed**	
	Recharge structures Existing village pond with recharge shaft/ well Percolation Tanks Sprinkler Irrigation	**52 shafts in 52 Nos. of existing village ponds** **--** **300 ha**
	Expected Annual GW recharge	**1.453 MCM**
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	**0.24**
	Total recharge/ saving of ground water	**1.693 MCM**
7.	**Estimated Cost** Artificial Recharge Plan Sprinkler Irrigation Piezometer construction Operation and maintenance	**4.494 crore** 2.60 crore 1.50 crore 0.18 crore 0.214 crore

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

Introduction

The **Ahore 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 **125.27%.** 535.24 sq. km. area is potential zone area and thus feasible for artificial recharge.

Location of the block

The Ahore Block of Jalore District covering an area of 1613.77 Sq. Km. falls in eastern most tip of Jalore District and is located between North latitudes 25°15' & 25°49' and East longitudes 72°33' & 73°06'.

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 1.845 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	**AHORE**	1613.77	535.24	SR	535.24	0.070	32.1	29.1	1090.284

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_Jawai_014_RJ1901_AL	Jawai	SR	219.391	0.696	Y	20	0
Luni_Luni_066_RJ1901_AL	Luni	SR	138.568	0.391	Y	11	0
Luni_Luni_067_RJ1901_AL	Luni	SR	268.531	0.077	Y	2	0
Luni_Mithari_085_RJ1901_AL	Mithari	SR	664.965	0.679	Y	19	0
Luni_Sukri_089_RJ1901_AL	Sukri	SR	59.725	0.001	Y	0	0
Luni_Sukri_091_RJ1901_AL	Sukri	SR	250.075	0.000	Y	0	0
Luni_Sukri_092_RJ1901_AL	Sukri	SR	25.187	0.000	Y	0	0
				1.845		**52**	**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.

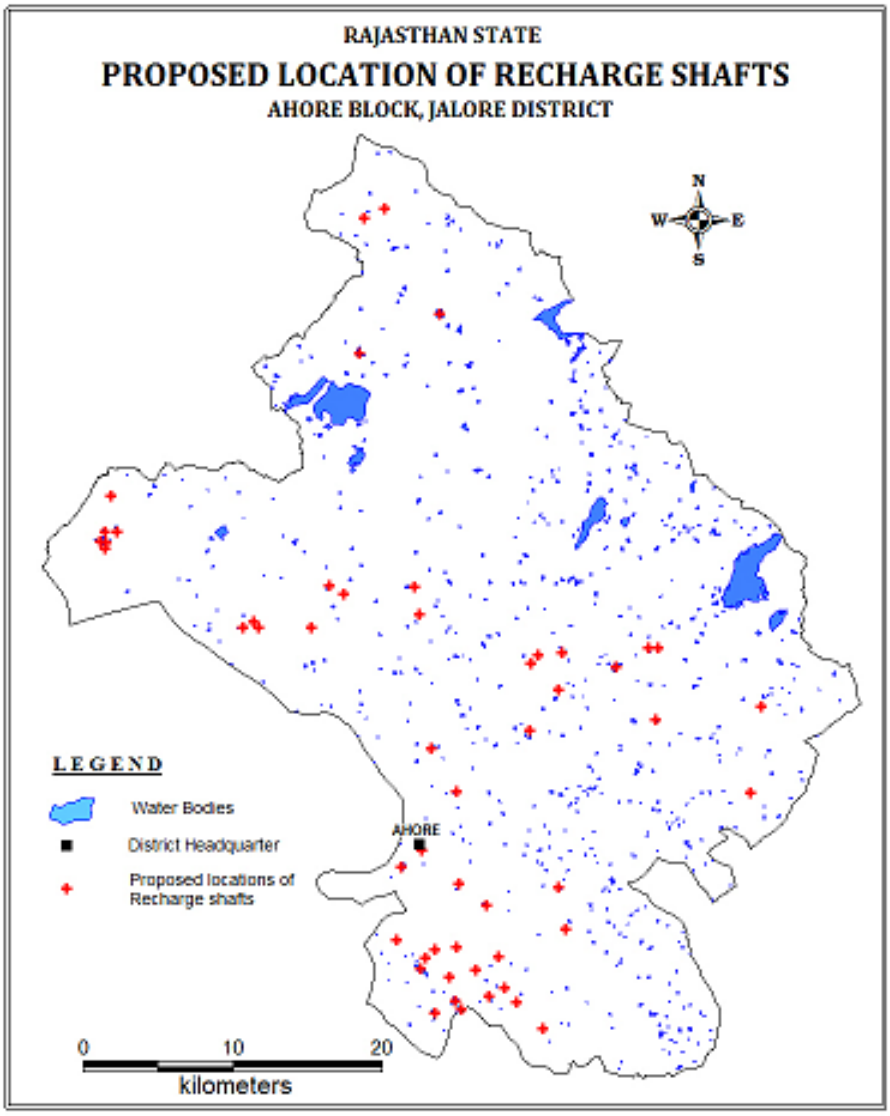
. The tentative location of villages for construction of recharge shaft/well in existing village pond and their cost estimates are shown in Fig 1 and Table 3.

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	Ahore	72.786	25.369	Luni_Jawai_014_RJ1901_AL	1	5	5
2	Ahore	72.799	25.379	Luni_Jawai_014_RJ1901_AL	1	5	5
3	Charli	72.824	25.359	Luni_Jawai_014_RJ1901_AL	1	5	5
4	Dayalpura I	72.842	25.346	Luni_Jawai_014_RJ1901_AL	1	5	5
5	Agwari	72.895	25.331	Luni_Jawai_014_RJ1901_AL	1	5	5
6	Chawarcha	72.825	25.283	Luni_Jawai_014_RJ1901_AL	1	5	5
7	Chawarcha	72.822	25.288	Luni_Jawai_014_RJ1901_AL	1	5	5
8	Chawarcha	72.808	25.281	Luni_Jawai_014_RJ1901_AL	1	5	5
9	Cheeparwara	72.783	25.325	Luni_Jawai_014_RJ1901_AL	1	5	5
10	Budtara	72.801	25.314	Luni_Jawai_014_RJ1901_AL	1	5	5
11	Budtara	72.799	25.307	Luni_Jawai_014_RJ1901_AL	1	5	5
12	Budtara	72.808	25.319	Luni_Jawai_014_RJ1901_AL	1	5	5
13	Budtara	72.818	25.302	Luni_Jawai_014_RJ1901_AL	1	5	5
14	Thanwla	72.822	25.320	Luni_Jawai_014_RJ1901_AL	1	5	5
15	Thanwla	72.835	25.307	Luni_Jawai_014_RJ1901_AL	1	5	5
16	Thanwla	72.850	25.314	Luni_Jawai_014_RJ1901_AL	1	5	5
17	Harjee	72.844	25.291	Luni_Jawai_014_RJ1901_AL	1	5	5
18	Harjee	72.854	25.296	Luni_Jawai_014_RJ1901_AL	1	5	5
19	Harjee	72.862	25.287	Luni_Jawai_014_RJ1901_AL	1	5	5
20	Harjee	72.880	25.271	Luni_Jawai_014_RJ1901_AL	1	5	5
21	Barwan	72.761	25.759	Luni_Luni_066_RJ1901_AL	1	5	5
22	Barwan	72.775	25.765	Luni_Luni_066_RJ1901_AL	1	5	5
23	Raithal	72.593	25.592	Luni_Luni_066_RJ1901_AL	1	5	5
24	Raithal	72.588	25.570	Luni_Luni_066_RJ1901_AL	1	5	5
25	Raithal	72.596	25.570	Luni_Luni_066_RJ1901_AL	1	5	5
26	Raithal	72.589	25.564	Luni_Luni_066_RJ1901_AL	1	5	5
27	Raithal	72.589	25.560	Luni_Luni_066_RJ1901_AL	1	5	5
28	Raithal	72.586	25.565	Luni_Luni_066_RJ1901_AL	1	5	5
29	Sarana	72.687	25.516	Luni_Luni_066_RJ1901_AL	1	5	5
30	Sarana	72.691	25.513	Luni_Luni_066_RJ1901_AL	1	5	5
31	Sarana	72.680	25.513	Luni_Luni_066_RJ1901_AL	1	5	5
32	Bhorda	72.758	25.678	Luni_Luni_067_RJ1901_AL	1	5	5
33	Ghana	72.812	25.701	Luni_Luni_067_RJ1901_AL	1	5	5
34	Aipura	72.726	25.513	Luni_Mithari_085_RJ1901_AL	1	5	5
35	Baori	72.738	25.538	Luni_Mithari_085_RJ1901_AL	1	5	5
36	Nosra	72.747	25.533	Luni_Mithari_085_RJ1901_AL	1	5	5
37	Nosra	72.795	25.537	Luni_Mithari_085_RJ1901_AL	1	5	5
38	Nosra	72.798	25.521	Luni_Mithari_085_RJ1901_AL	1	5	5
39	Sankhwali	72.872	25.491	Luni_Mithari_085_RJ1901_AL	1	5	5
40	Choonda	72.876	25.496	Luni_Mithari_085_RJ1901_AL	1	5	5
41	Choonda	72.893	25.498	Luni_Mithari_085_RJ1901_AL	1	5	5

42	Sankhwali	72.890	25.475	Luni_Mithari_085_RJ1901_AL	1	5	5
43	Maheshpura	72.929	25.489	Luni_Mithari_085_RJ1901_AL	1	5	5
44	Moolewa	72.950	25.500	Luni_Mithari_085_RJ1901_AL	1	5	5
45	Moolewa	72.956	25.501	Luni_Mithari_085_RJ1901_AL	1	5	5
46	Kamba	72.806	25.440	Luni_Mithari_085_RJ1901_AL	1	5	5
47	Sankhwali	72.871	25.451	Luni_Mithari_085_RJ1901_AL	1	5	5
48	Khara	72.822	25.414	Luni_Mithari_085_RJ1901_AL	1	5	5
49	Panchota	72.955	25.457	Luni_Mithari_085_RJ1901_AL	1	5	5
50	Bhooti	73.025	25.465	Luni_Mithari_085_RJ1901_AL	1	5	5
51	Rodala	73.018	25.413	Luni_Mithari_085_RJ1901_AL	1	5	5
52	Jora	72.890	25.357	Luni_Mithari_085_RJ1901_AL	1	5	5
				Total	**52**		**260**

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 loses 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 30 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. 4.494 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 – 2.60	-	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	52	1.816	5	260	1.453
	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			**410**	**1.693**
Impact assessment & Monitoring						
Piezometer	50 – 80 m	30		0.6	18	
Impact assessment will be carried out by implementing agency						
O & M - 5% of total cost of the scheme					21.40	
TOTAL					**449.40**	**1.693**

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