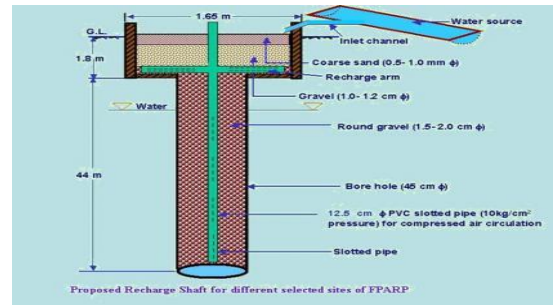




CENTRAL GROUND WATER BOARD
MINISTRY OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION
GOVERNMENT OF INDIA



Excavated/dugout farm pond



**ARTIFICIAL RECHARGE TO GROUND WATER AND
WATER CONSERVATION PLAN OF DHORIMANNA
BLOCK, DISTRICT BARMER, RAJASTHAN**

Western Region, Jaipur
December 2016

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF DHORIMANNA BLOCK, DISTRICT BARMER

Plan at a Glance

1.	Area of the Dhorimanna Block	2688.80 sq.km.
2.	Area identified for Artificial Recharge	2125.06 sq km
3.	Dynamic Ground Water Resources (as on 31.03.2011)	
	Net Ground Water Availability	42.68 MCM
	Annual Ground Water Draft	63.67 MCM
	Stage of Ground Water Development	149.17%
4.	Volume of water to be harnessed	1.383 MCM
	Volume of water available for recharge through RS	0.70 MCM
	Volume of water available for recharge through PT	--
5.	Volume of unsaturated aquifer zone available for recharge	3246.94 MCM
6.	Total number of structures to be proposed	
	Recharge structures	20 shafts in 20
	Existing village pond with recharge shaft/ well	Nos. of existing
		village ponds
	Percolation Tanks	--
	Sprinkler Irrigation	300 ha
	Expected Annual GW recharge	0.56 MCM
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	0.24 MCM
	Total recharge/ saving of ground water	0.80 MCM
7.	Estimated Cost	2.732 crore
	Artificial Recharge Plan	1.00 crore
	Sprinkler Irrigation	1.50 crore
	Piezometer construction	0.102 crore
	Operation and maintenance	0.130 crore

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF DHORIMANNA BLOCK, DISTRICT BARMER

Introduction

The **Dhorimanna Block, district Barmer** 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 **149.17%**.

Location of the block

The Dhorimanna Block of Barmer District covering an area of 2688.80 Sq. Km. falls in southern part of Barmer District and is located between North latitudes 24°55' & 25°23' and East longitudes 71°07' & 71°54'.

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 1.383 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)
Barmer	Dhorimanna	2688.8	2125.06	AI	899.69	0.1	22.86	19.86	1786.78
				Old AI	1225.37	0.06	22.86	19.86	1460.15

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_Luni_072_RJ0503_AL	Luni	SR	101.770	0.040	Y	0	0
Luni_Luni_073_RJ0503_AL	Luni	SR	80.508	0.028	Y	1	0
Luni_Luni_074_RJ0503_AL	Luni	SR	250.247	0.179	Y	0	0
Luni_Luni_075_RJ0503_AL	Luni	SR	208.195	0.057	Y	2	0
Luni_Luni_076_RJ0503_AL	Luni	SR	299.984	0.090	Y	3	0
Luni_Luni_077_RJ0503_AL	Luni	SR	723.938	0.431	Y	12	0
Luni_Luni_078_RJ0503_AL	Luni	SR	177.525	0.061	Y	2	0
Luni_Luni_079_RJ0503_AL	Luni	SR	266.115	0.182	Y	0	0
Luni_Luni_080_RJ0503_AL	Luni	SR	13.237	0.009	N	0	0
Luni_Luni_081_RJ0503_AL	Luni	SR	452.149	0.282	Y	0	0
Luni_Luni_082_RJ0503_AL	Luni	SR	57.594	0.018	Y	0	0
Luni_Luni_084_RJ0503_AL	Luni	SR	60.865	0.005	Y	0	0
Luni_Sukri (Sayala)_094_RJ0503_AL	Sukri (Sayala)	SR	4.738	0.000	N	0	0
				1.383		20	0

Recharge Shaft

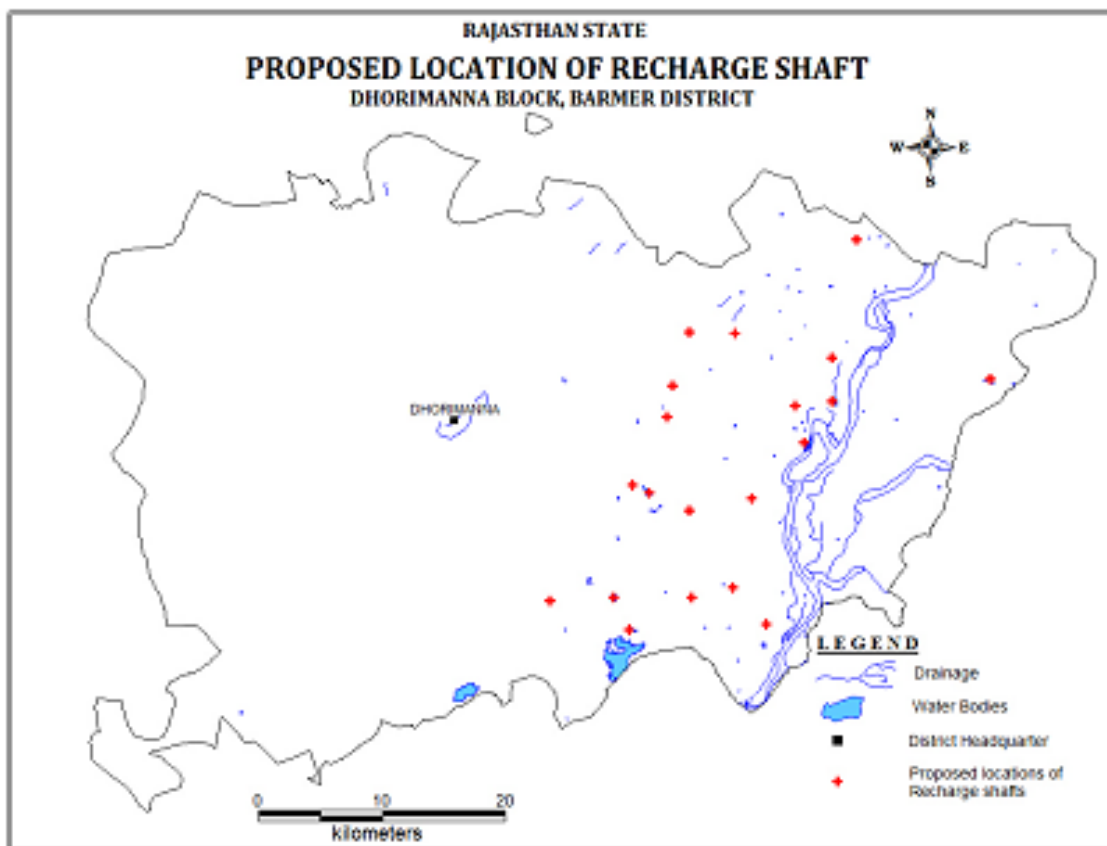
It is proposed to construct Recharge Shaft in existing ponds. The selected ponds should be atleast 3m deep and shallow ponds will be deepened accordingly. It is proposed that the inlet for the Recharge Shaft should be atleast 1m above bed of pond so that the pond retains adequate water for use by villagers.

. 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	Nai Undari	71.759	25.334	Luni_Luni_073_RJ0503_AL	1	5	5
2	Machron Ki Dhani	71.583	25.151	Luni_Luni_075_RJ0503_AL	1	5	5
3	Machron Ki Dhani	71.597	25.145	Luni_Luni_075_RJ0503_AL	1	5	5
4	Manki	71.520	25.065	Luni_Luni_076_RJ0503_AL	1	5	5
5	Beri Gaon	71.666	25.078	Luni_Luni_076_RJ0503_AL	1	5	5
6	Beri Gaon	71.633	25.070	Luni_Luni_076_RJ0503_AL	1	5	5
7	Paliyali	71.694	25.052	Luni_Luni_077_RJ0503_AL	1	5	5
8	Ramji Ka Golphanta	71.630	25.133	Luni_Luni_077_RJ0503_AL	1	5	5
9	Pujan Beri	71.610	25.201	Luni_Luni_077_RJ0503_AL	1	5	5
10	Dheemri	71.680	25.143	Luni_Luni_077_RJ0503_AL	1	5	5
11	Dabhad	71.663	25.264	Luni_Luni_077_RJ0503_AL	1	5	5
12	Mokhawa	71.627	25.264	Luni_Luni_077_RJ0503_AL	1	5	5
13	Lalaniyon Ki Dhani	71.614	25.224	Luni_Luni_077_RJ0503_AL	1	5	5
14	Seeloo	71.743	25.216	Luni_Luni_077_RJ0503_AL	1	5	5
15	Seeloo	71.713	25.212	Luni_Luni_077_RJ0503_AL	1	5	5
16	Aalpura	71.720	25.185	Luni_Luni_077_RJ0503_AL	1	5	5
17	Gudhamalani	71.742	25.248	Luni_Luni_077_RJ0503_AL	1	5	5
18	Loonwa Jageer	71.869	25.235	Luni_Luni_077_RJ0503_AL	1	5	5
19	Daboi	71.571	25.069	Luni_Luni_078_RJ0503_AL	1	5	5
20	Jhakarra	71.584	25.046	Luni_Luni_078_RJ0503_AL	1	5	5
				Total	20		100

Fig: 1: Tentative location of Recharge Shaft and Percolation Tanks



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 17 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. 2.732 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 – 1.00	-	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	20	0.70	5	100	0.56
	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			250	0.80
Impact assessment & Monitoring						
Piezometer	50 – 80 m	17		0.6	10.20	
<i>Impact assessment will be carried out by implementing agency</i>						
O & M - 5% of total cost of the scheme					13.01	
TOTAL					273.21	0.80

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