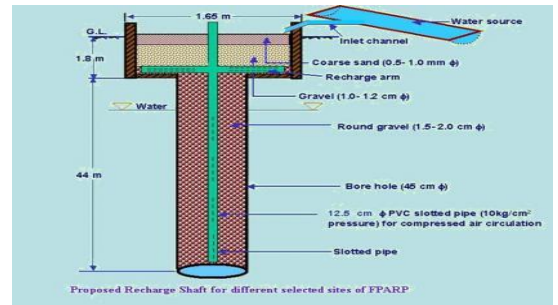
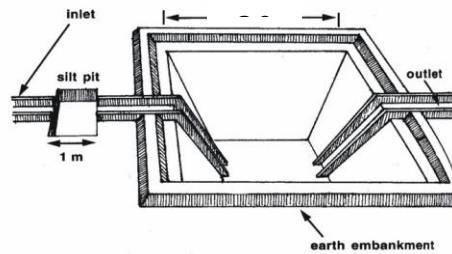




**CENTRAL GROUND WATER BOARD**  
MINISTRY OF WATER RESOURCES,  
RIVER DEVELOPMENT & GANGA REJUVENATION  
GOVERNMENT OF INDIA



Excavated/dugout farm pond



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

Western Region, Jaipur  
December 2016

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

## Plan at a Glance

1.	<b>Area of the Barmer Block</b>	<b>3841.58 sq.km.</b>
2.	<b>Area identified for Artificial Recharge</b>	<b>1986.88 sq km</b>
3.	<b>Dynamic Ground Water Resources (as on 31.03.2011)</b>	
	Net Ground Water Availability	<b>26.92 MCM</b>
	Annual Ground Water Draft	<b>12.01 MCM</b>
	Stage of Ground Water Development	<b>44.60%</b>
4.	<b>Volume of water to be harnessed</b>	<b>1.015 MCM</b>
	<b>Volume of water available for recharge through RS</b>	<b>0.175 MCM</b>
	<b>Volume of water available for recharge through PT</b>	<b>0.80 MCM</b>
5.	<b>Volume of unsaturated aquifer zone available for recharge</b>	<b>2554.82 MCM</b>
6.	<b>Total number of structures to be proposed</b>	
	<b>Recharge structures</b> Existing village pond with recharge shaft/ well	<b>5 shafts in 5 Nos. of existing village ponds</b>
	Percolation Tanks	<b>4 Nos.</b>
	Sprinkler Irrigation	<b>300 ha</b>
	<b>Expected Annual GW recharge</b>	<b>0.78 MCM</b>
	<b>Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation</b>	<b>0.24</b>
	<b>Total recharge/ saving of ground water</b>	<b>1.02 MCM</b>
7.	<b>Estimated Cost</b> Artificial Recharge Plan Sprinkler Irrigation Piezometer construction Operation and maintenance	<b>3.549 crore</b> 1.85 crore 1.50 crore 0.03 crore 0.169 crore

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

## Introduction

The **Barmer Block, district Barmer** is one of the safe blocks of Rajasthan and provides favourable conditions for artificial recharge, with stage of ground water development of 44.60 %. 1986.88 sq. km. area is potential zone area and thus feasible for artificial recharge.

## Location of the block

The Barmer Block of Barmer District covering an area of 3841.58 Sq. Km. falls in central- western part of Barmer District and is located between North latitudes 25°20' & 26°00' and East longitudes 70°39' & 71°31'.

## 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 1.015 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	Barmer	3841.6	1986.88	SR	740.63	0.06	55.20	52.20	2319.65
				HR	1246.25	0.015	15.58	12.58	235.17

**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_062_RJ0502_AL	Luni	SR	62.190	0.006	Y	0	0
Luni_Luni_062_RJ0502_AL	Luni	SR	79.949	0.005	Y	0	0
Luni_Luni_062_RJ0502_HR	Luni	HR	118.409	0.009	Y	0	0
Luni_Luni_062_RJ0502_SR	Luni	HR	65.043	0.005	Y	0	0
Luni_Luni_070_RJ0502_AL	Luni	SR	32.479	0.027	Y	0	0
Luni_Luni_070_RJ0502_AL	Luni	SR	512.896	0.420	Y	5	1
Luni_Luni_070_RJ0502_HR	Luni	HR	159.663	0.131	Y	0	1
Luni_Luni_070_RJ0502_SR	Luni	SR	24.217	0.020	Y	0	0
Luni_Luni_072_RJ0502_AL	Luni	SR	322.525	0.127	Y	0	1
Luni_Luni_073_RJ0502_AL	Luni	SR	7.050	0.002	Y	0	0
Luni_Luni_074_RJ0502_AL	Luni	SR	167.228	0.120	Y	0	0
Luni_Luni_075_RJ0502_AL	Luni	SR	107.754	0.030	Y	0	0
Luni_Luni_077_RJ0502_AL	Luni	SR	2.064	0.001	Y	0	0
Luni_Luni_079_RJ0502_AL	Luni	SR	0.224	0.000	Y	0	0
Luni_Luni_081_RJ0502_AL	Luni	SR	182.099	0.113	Y	0	1
Outside Basin_Sub 6_062_RJ0502_AL	Sub 6	SR	515.796	0.000	Y	0	0
Outside Basin_Sub 6_068_RJ0502_AL	Sub 6	SR	59.423	0.000	Y	0	0
Outside Basin_Sub 6_069_RJ0502_SR	Sub 6	SR	12.746	0.000	Y	0	0
Outside Basin_Sub 6_070_RJ0502_AL	Sub 6	SR	879.134	0.000	Y	0	0
Outside Basin_Sub 6_070_RJ0502_HR	Sub 6	HR	0.000	0.000	Y	0	0
Outside Basin_Sub 6_070_RJ0502_HR	Sub 6	HR	0.000	0.000	Y	0	0
Outside Basin_Sub 6_071_RJ0502_AL	Sub 6	SR	574.331	0.000	Y	0	0
				<b>1.015</b>		<b>5</b>	<b>4</b>

## 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	Pumdro Ki Basti	71.320	25.617	Luni_Luni_070_RJ0502_AL	1	5	5
2	Ati	71.263	25.664	Luni_Luni_070_RJ0502_AL	1	5	5
3	Purohition Ki Basti	71.401	25.822	Luni_Luni_070_RJ0502_AL	1	5	5
4	Bandra	71.427	25.773	Luni_Luni_070_RJ0502_AL	1	5	5
5	Bandra	71.426	25.774	Luni_Luni_070_RJ0502_AL	1	5	5
				<b>Total</b>	<b>5</b>		<b>25</b>

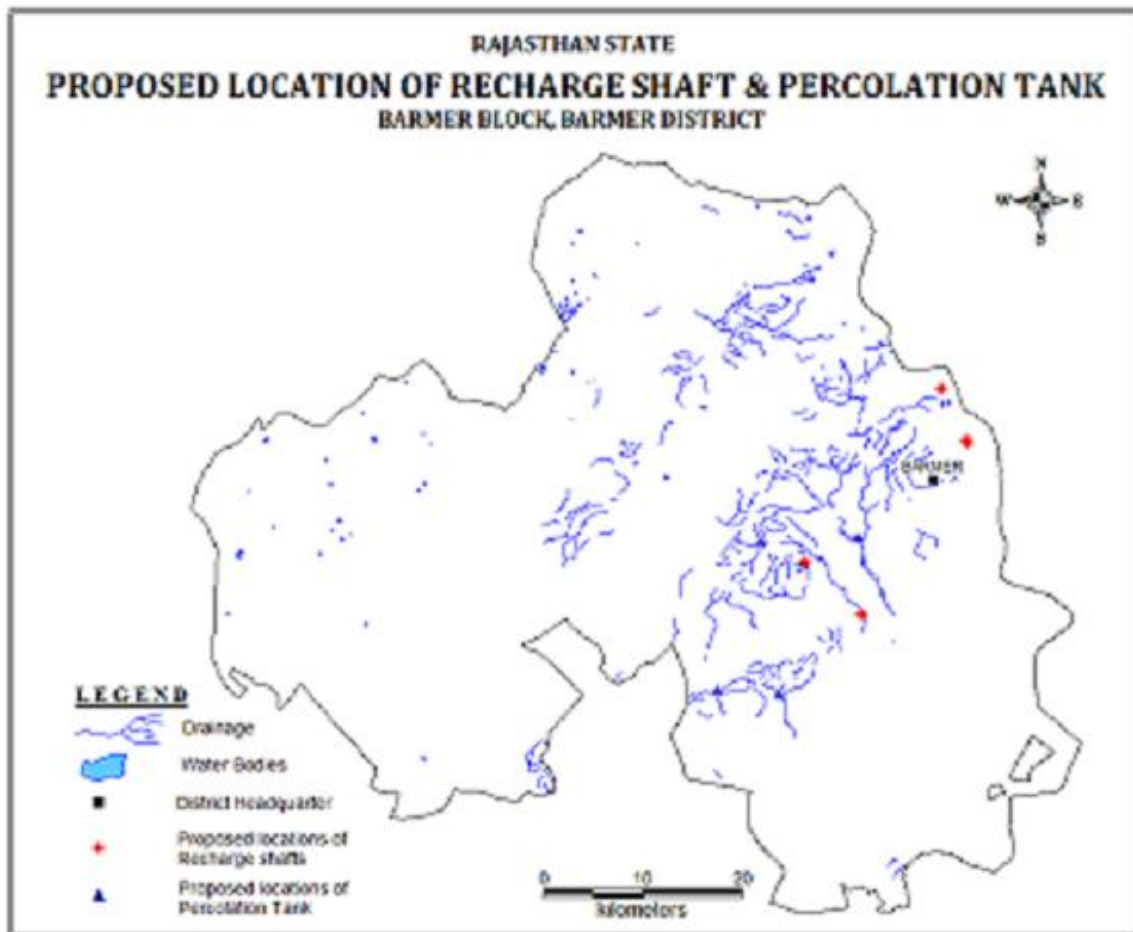
## Percolation Tank

The tentative location of villages for construction of percolation tank and their cost estimates are shown in Fig 1 and Table 4

**Table 4: Tentative locations of village for Percolation Tanks**

S. No.	Village	Longitude	Latitude	Micro Watershed	Unit Cost (Rs. In lacs)
1	Para	71.220	25.681	Luni_Luni_070_RJ0502_AL	40
2	Ati	71.319	25.684	Luni_Luni_070_RJ0502_HR	40
3	Surte Ka Tala	71.239	25.543	Luni_Luni_072_RJ0502_AL	40
4	Mahendrapura	71.177	25.547	Luni_Luni_081_RJ0502_AL	40
				<b>Total</b>	<b>160</b>

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 5 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. 3.549 cr. The tentative cost estimates of the various activities of the Plan are shown in Table 5 & 6. The unit rates are as followed by the Govt. of Rajasthan (BSR).

**Table 5: 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 – 0.25	1.60	1.50

**Table 6: 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
<b>Recharge Structures/ Activities</b>						
Recharge shaft within the pond /tanks	Alluvium – Depth 80m, Dia: 10-12” with filter pit	5	0.175	5	25	0.14
	Hard rock: Depth –60m, Dia 10-12”with filter pit	-	-	-	-	-
Percolation tanks (3 fillings)	200m*200m*1.5 m	4	0.80	40	160	0.64
Water Conservation Measures	Sprinkler Irrigation	300 ha	25	0.5/ha	150	0.24
		<b>Total</b>			<b>335</b>	<b>1.02</b>
<b>Impact assessment &amp; Monitoring</b>						
Piezometer	50 – 80 m	5		0.6	3	
<i>Impact assessment will be carried out by implementing agency</i>						
O & M - 5% of total cost of the scheme					16.90	
<b>TOTAL</b>					<b>354.90</b>	<b>1.02</b>

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