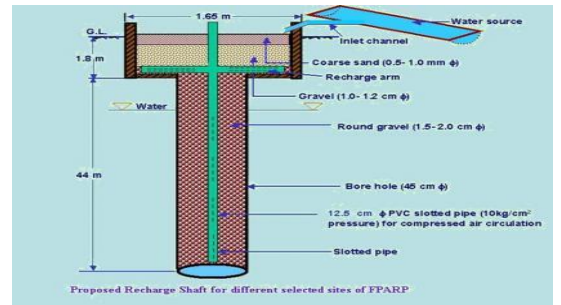




**CENTRAL GROUND WATER BOARD**  
MINISTRY OF WATER RESOURCES,  
RIVER DEVELOPMENT & GANGA REJUVENATION  
GOVERNMENT OF INDIA



Excavated/dugout farm pond



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

Western Region, Jaipur  
October 2016

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

## Plan at a Glance

<b>1.</b>	<b>Area of the Kotkasim Bas Block</b>	<b>344.43 Sq. km.</b>
<b>2.</b>	<b>Area identified for Artificial Recharge</b>	<b>306.59 sq km</b>
<b>3.</b>	<b>Dynamic Ground Water Resources (as on 31.03.2011)</b>	
	Net Ground Water Availability	<b>54.6934 MCM</b>
	Annual Ground Water Draft	<b>92.2551 MCM</b>
	Stage of Ground Water Development	<b>168.68 %</b>
<b>4.</b>	<b>Volume of water to be harnessed</b>	<b>7.764 MCM</b>
	Volume of water available for recharge through RS	<b>0.56 MCM</b>
	Volume of water available for recharge through PT	<b>2.20 MCM</b>
<b>5.</b>	<b>Volume of unsaturated aquifer zone available for recharge</b>	<b>700.86 MCM</b>
<b>6.</b>	<b>Total number of structures to be proposed</b>	
	<b>Recharge structures</b>	<b>16 shafts in 16</b>
	Existing village pond with recharge shaft/ well	<b>Nos. of existing</b>
		<b>village ponds</b>
	Percolation Tanks	<b>11 nos.</b>
	Sprinkler Irrigation	<b>300 ha</b>
	<b>Expected Annual GW recharge</b>	<b>2.21 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>2.45 MCM</b>
<b>7.</b>	<b>Estimated Cost</b>	<b>7.098 crore</b>
	Artificial Recharge Plan	5.20 crore
	Sprinkler Irrigation	1.50 crore
	Piezometer construction	0.06 crore
	Operation and maintenance	0.338 crore

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

## Introduction

The **Kotkasim Block, district Alwar** 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 **168.68 %**.

## Location of the block

The Kotkasim Block covers an area of 344.43 Sq. km. and falls in north-eastern part of Alwar district. It is located between North latitudes 27°50' & 28°8' and East longitudes 76°35' & 76°50'.

## 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 7.764 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)
Alwar	Kotkasim	344.43	306.59	SR	306.59	0.15	18.24	15.24	700.86

**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
Sabi_Sabi_005_RJ0205_AL	Sabi	SR	1.977	0.001	Y	0	0
Sabi_Sabi_006_RJ0205_AL	Sabi	SR	32.485	0.055	Y	2	0
Sabi_Sabi_007_RJ0205_AL	Sabi	SR	113.927	0.260	Y	5	0
Sabi_Sabi_008_RJ0205_AL	Sabi	SR	2.658	0.000	Y	0	0
Sabi_Sabi_009_RJ0205_AL	Sabi	SR	3.135	0.000	Y	0	0
Sabi_Sabi_010_RJ0205_AL	Sabi	SR	19.382	0.003	Y	0	0
Sabi_Sabi_011_RJ0205_AL	Sabi	SR	49.251	0.000	Y	0	0
Sabi_Sabi_018_RJ0205_AL	Sabi	SR	130.583	7.445	Y	9	11
<b>Total</b>				<b>7.764</b>		<b>16</b>	<b>11</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	Teuwas	76.807	28.049	Sabi_Sabi_006_RJ0205_AL	1	5	5
2	Berawas Khurd	76.784	28.010	Sabi_Sabi_006_RJ0205_AL	1	5	5
3	Roneeja	76.759	27.993	Sabi_Sabi_007_RJ0205_AL	1	5	5
4	Pur	76.714	27.968	Sabi_Sabi_007_RJ0205_AL	1	5	5
5	Pur	76.721	27.970	Sabi_Sabi_007_RJ0205_AL	1	5	5
6	Ikrotiya	76.718	27.939	Sabi_Sabi_007_RJ0205_AL	1	5	5
7	Deengli	76.755	27.960	Sabi_Sabi_007_RJ0205_AL	1	5	5
8	Burhi Bawal	76.772	28.100	Sabi_Sabi_018_RJ0205_AL	1	5	5
9	Burhi Bawal	76.781	28.094	Sabi_Sabi_018_RJ0205_AL	1	5	5
10	Nasopur	76.797	28.081	Sabi_Sabi_018_RJ0205_AL	1	5	5
11	Akoli	76.725	28.122	Sabi_Sabi_018_RJ0205_AL	1	5	5
12	Jokhawas	76.722	28.096	Sabi_Sabi_018_RJ0205_AL	1	5	5
13	Jatoowas	76.703	28.086	Sabi_Sabi_018_RJ0205_AL	1	5	5
14	Jakopur	76.683	28.046	Sabi_Sabi_018_RJ0205_AL	1	5	5
15	Baghana	76.667	27.992	Sabi_Sabi_018_RJ0205_AL	1	5	5
16	Magha Ka Majra	76.607	27.965	Sabi_Sabi_018_RJ0205_AL	1	5	5
				<b>Total</b>	<b>16</b>		<b>80</b>

### Percolation Tank

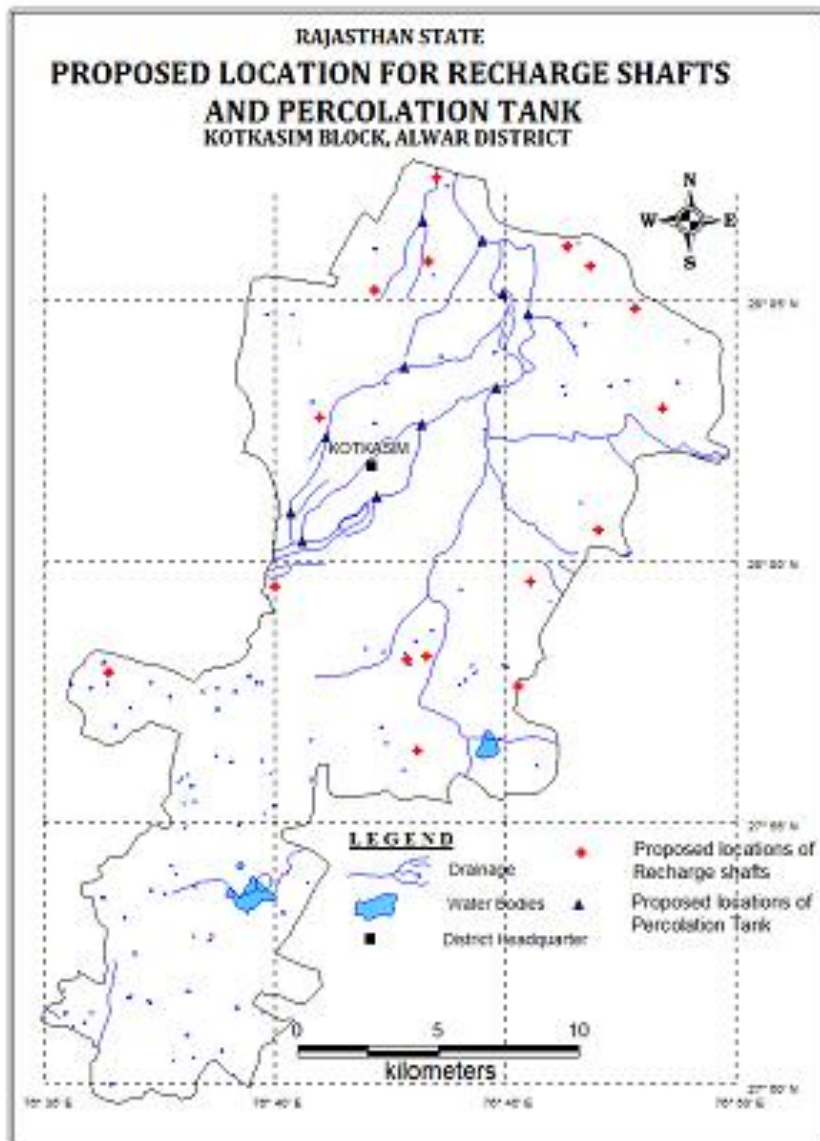
The tentative location of villages for construction of percolation tank and their cost estimates are shown in Fig 1 and Table 4

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

S. No.	Village	Longitude	Latitude	Micro Watershed	Unit Cost (Rs. In lacs)
1	Akoli	76.720	28.108	Sabi_Sabi_018_RJ0205_AL	40
2	Lalpur	76.742	28.102	Sabi_Sabi_018_RJ0205_AL	40
3	Hajnaka	76.749	28.085	Sabi_Sabi_018_RJ0205_AL	40
4	Kayampura Jokhawas	76.758	28.079	Sabi_Sabi_018_RJ0205_AL	40
5	Jakopur	76.685	28.039	Sabi_Sabi_018_RJ0205_AL	40
6	Narwas	76.713	28.062	Sabi_Sabi_018_RJ0205_AL	40
7	Kanharka	76.719	28.044	Sabi_Sabi_018_RJ0205_AL	40
8	Baghana	76.672	28.015	Sabi_Sabi_018_RJ0205_AL	40

S. No.	Village	Longitude	Latitude	Micro Watershed	Unit Cost (Rs. In lacs)
9	Baghana	76.676	28.006	Sabi_Sabi_018_RJ0205_AL	40
10	Kotkasim	76.704	28.020	Sabi_Sabi_018_RJ0205_AL	40
11	Jamalpur	76.747	28.055	Sabi_Sabi_018_RJ0205_AL	40
				<b>Total</b>	<b>440</b>

**Figure 1: Showing Tentative location of the Recharge Shaft and Percolation Tank**



## 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 10 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. 7.098 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 – 0.80	4.40	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	16	0.56	5	80	0.45
	Hard rock: Depth –60m, Dia 10-12”with filter pit	-	-	-	-	-
Percolation tanks (3 fillings)	200m*200m*1.5 m	11	2.2	40	440	1.76
Water Conservation Measures	Sprinkler Irrigation	300 ha	25	0.5/ha	150	0.24
		<b>Total</b>			<b>670</b>	<b>2.45</b>
<b>Impact assessment &amp; Monitoring</b>						
Piezometer	50 – 80 m	10		0.6	6	
<i>Impact assessment will be carried out by implementing agency</i>						
O & M - 5% of total cost of the scheme					33.80	
<b>TOTAL</b>					<b>709.80</b>	<b>2.45</b>

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