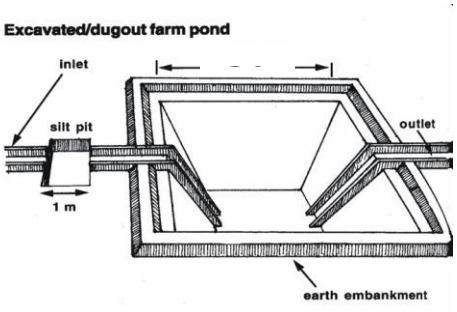
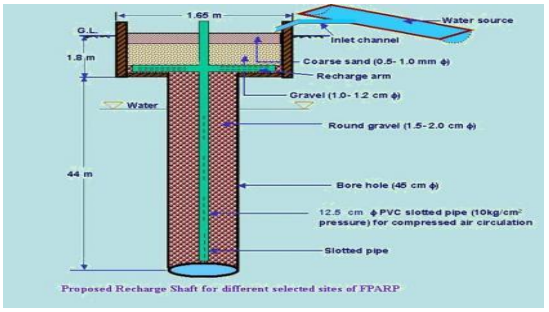
CENTRAL GROUND WATER BOARD

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





ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF KISHANGARH BAS BLOCK, DISTRICT ALWAR, RAJASTHAN

Western Region, Jaipur
October 2016

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF KISHANGARH BAS BLOCK, DISTRICT ALWAR

Plan at a Glance

1.	**Area of the Kishangarh Bas Block**	**526.46 Sq. km.**
2.	**Area identified for Artificial Recharge**	**413.22 sq km**
3.	**Dynamic Ground Water Resources (as on 31.03.2011)**	
	Net Ground Water Availability	**37.63 MCM**
	Annual Ground Water Draft	**76.55 MCM**
	Stage of Ground Water Development	**203.42 %**
4.	**Volume of water to be harnessed** **Volume of water available for recharge through RS** **Volume of water available for recharge through PT**	**15.06 MCM** **0.525 MCM** **3.40 MCM**
5.	**Volume of unsaturated aquifer zone available for recharge**	**1156.60 MCM**
6.	**Total number of structures to be proposed**	
	Recharge structures Existing village pond with recharge shaft/ well Percolation Tanks Sprinkler Irrigation	**15 shafts in 14 Nos. of existing village ponds** **17 nos.** **300 ha**
	Expected Annual GW recharge	**3.14 MCM**
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	**0.24**
	Total recharge/ saving of ground water	**3.38 MCM**
7.	**Estimated Cost** Artificial Recharge Plan Sprinkler Irrigation Piezometer construction Operation and maintenance	**9.566 crore** 7.55 crore 1.50 crore 0.06 crore 0.456 crore

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF KISHANGARH BAS BLOCK, DISTRICT ALWAR

Introduction

The **Kishangarh Bas 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 **203.42%.**

Location of the block

The Kishangarh Bas Block covers an area of 526.46 Sq. km. and falls in northern-central part of Alwar district. It is located between North latitudes 27°35' &27°56' and East longitudes 76°37' & 76°55'.

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 15.06 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	Kishangarh Bas	526.46	413.22	SR	329.89	0.12	31.08	28.08	1111.60
				HR	83.33	0.02	30.00	27.00	45.00

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
Ruparail_Ruparail_001_RJ0204_AL	Ruparail	SR	147.213	3.453	Y	11	11
Ruparail_Ruparail_002_RJ0204_AL	Ruparail	SR	133.850	8.596	Y	3	6
Ruparail_Ruparail_003_RJ0204_AL	Ruparail	SR	45.147	2.988	Y	0	0
Sabi_Sabi_007_RJ0204_AL	Sabi	SR	0.637	0.001	Y	0	0
Sabi_Sabi_010_RJ0204_AL	Sabi	SR	149.348	0.023	Y	1	0
Sabi_Sabi_011_RJ0204_AL	Sabi	SR	50.976	0.000	Y	0	0
				15.060		**15**	**17**

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	Jaistika	76.775	27.818	Ruparail_Ruparail_001_RJ0204_AL	1	5.00	5.00
2	Nangal Mohammadpur	76.798	27.782	Ruparail_Ruparail_001_RJ0204_AL	1	5.00	5.00
3	Manothadi	76.829	27.791	Ruparail_Ruparail_001_RJ0204_AL	1	5.00	5.00
4	Sarpur	76.863	27.797	Ruparail_Ruparail_001_RJ0204_AL	1	5.00	5.00
5	Sarpur	76.867	27.798	Ruparail_Ruparail_001_RJ0204_AL	1	5.00	5.00
6	Sarpur	76.871	27.800	Ruparail_Ruparail_001_RJ0204_AL	1	5.00	5.00
7	Khanpur Mewan	76.757	27.768	Ruparail_Ruparail_001_RJ0204_AL	1	5.00	5.00
8	Khanpur Mewan	76.770	27.767	Ruparail_Ruparail_001_RJ0204_AL	1	5.00	5.00
9	Khanpur Mewan	76.778	27.750	Ruparail_Ruparail_001_RJ0204_AL	2	5.00	10.00
10	Khoha	76.732	27.731	Ruparail_Ruparail_001_RJ0204_AL	1	5.00	5.00
11	Karoli	76.666	27.672	Ruparail_Ruparail_002_RJ0204_AL	1	5.00	5.00
12	Mundiya Khera	76.699	27.647	Ruparail_Ruparail_002_RJ0204_AL	1	5.00	5.00
13	Bhajera	76.725	27.634	Ruparail_Ruparail_002_RJ0204_AL	1	5.00	5.00
14	Khera	76.734	27.915	Sabi_Sabi_010_RJ0204_AL	1	5.00	5.00
				Total	**15**		**75**

Percolation Tank

The tentative location of villages for construction of percolation tank and their cost estimates are shown in Fig 2 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	Nangli Pathan	76.794	27.856	Ruparail_Ruparail_001_RJ0204_AL	40
2	Mandwapur	76.808	27.846	Ruparail_Ruparail_001_RJ0204_AL	40
3	Chachaka	76.821	27.813	Ruparail_Ruparail_001_RJ0204_AL	40
4	Chor Basai	76.787	27.755	Ruparail_Ruparail_001_RJ0204_AL	40
5	Nyana	76.795	27.765	Ruparail_Ruparail_001_RJ0204_AL	40
6	Raoka	76.805	27.767	Ruparail_Ruparail_001_RJ0204_AL	40
7	Vrisangpur	76.839	27.769	Ruparail_Ruparail_001_RJ0204_AL	40
8	Vrisangpur	76.864	27.775	Ruparail_Ruparail_001_RJ0204_AL	40
9	Sarpur	76.861	27.797	Ruparail_Ruparail_001_RJ0204_AL	40
10	Padasala	76.879	27.769	Ruparail_Ruparail_001_RJ0204_AL	40

S. No.	Village	Longitude	Latitude	Micro Watershed	Unit Cost (Rs. In lacs)
11	Sarpur	76.879	27.799	Ruparail_Ruparail_001_RJ0204_AL	40
12	Khoha	76.718	27.729	Ruparail_Ruparail_002_RJ0204_AL	40
13	Rundh Jajor	76.695	27.707	Ruparail_Ruparail_002_RJ0204_AL	40
14	Rundh Jajor	76.677	27.693	Ruparail_Ruparail_002_RJ0204_AL	40
15	Karoli	76.668	27.683	Ruparail_Ruparail_002_RJ0204_AL	40
16	Bahadurpur Patti Katla	76.749	27.665	Ruparail_Ruparail_002_RJ0204_AL	40
17	Shekhpur	76.768	27.686	Ruparail_Ruparail_002_RJ0204_AL	40
				Total	680

Figure 1: Showing Tentative location of the Recharge Shaft

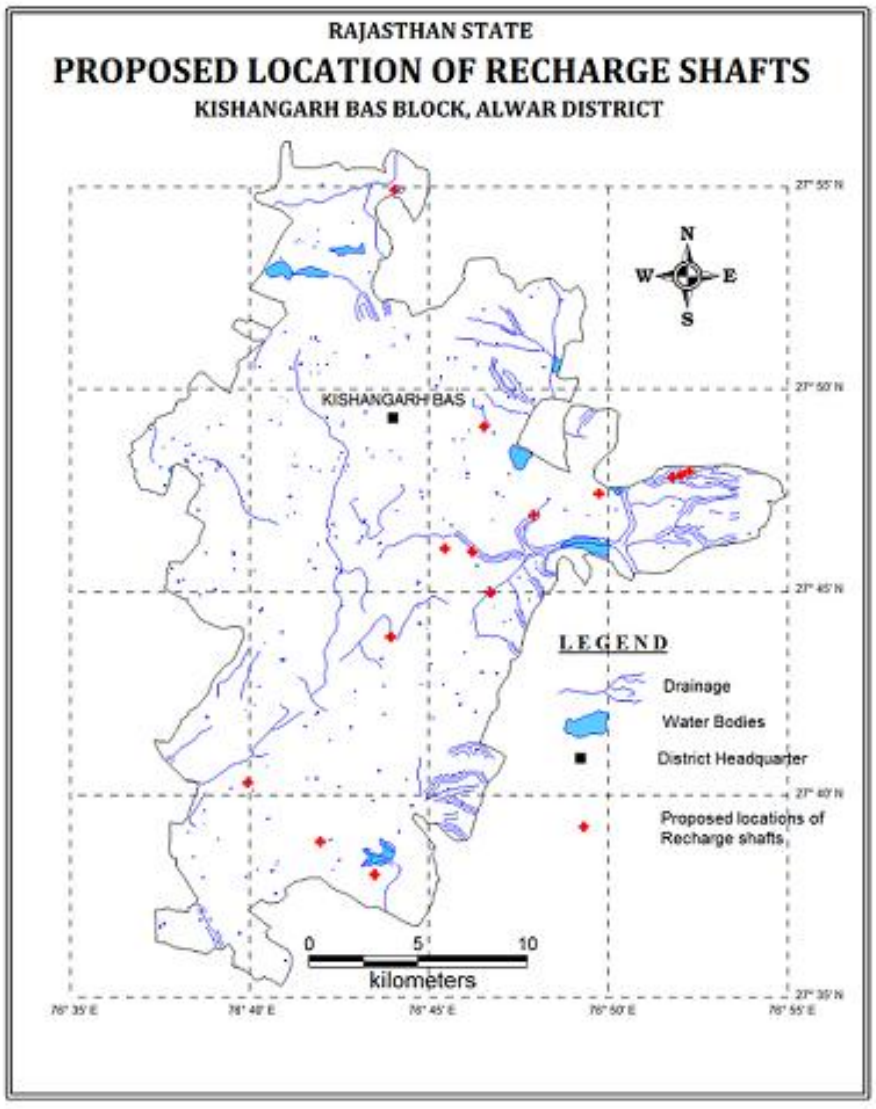
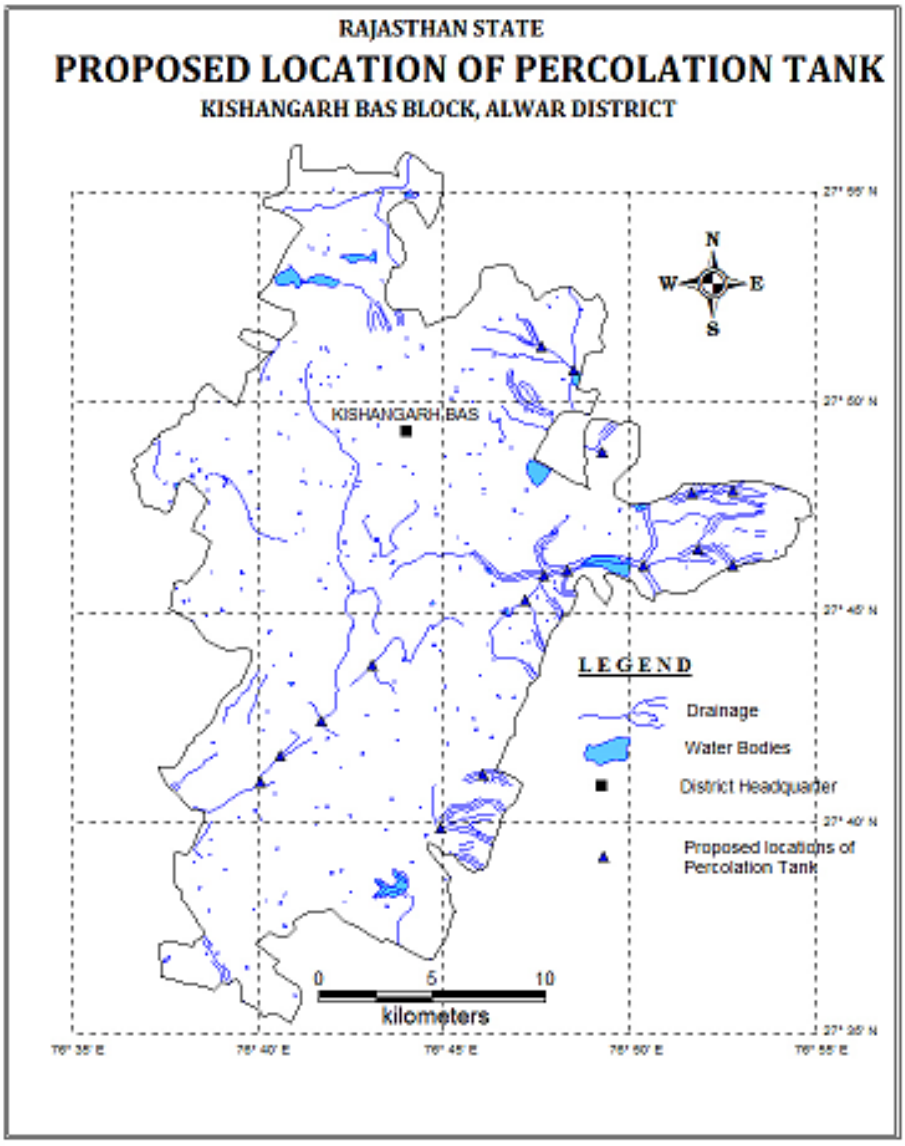


Figure 2: Showing Tentative location of the Percolation Tank



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 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 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. 9.566 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 – 0.75	6.80	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
Recharge Structures/ Activities						
Recharge shaft within the pond /tanks	Alluvium – Depth 80m, Dia: 10-12" with filter pit	15	0.525	5	75	0.42
	Hard rock: Depth –60m, Dia 10-12"with filter pit	-	-	-	-	-
Percolation tanks (3 fillings)	200m*200m*1.5 m	17	3.40	40	680	2.72
Water Conservation Measures	Sprinkler Irrigation	300 ha	25	0.5/ha	150	0.24
		Total			**905**	**3.38**
Impact assessment & Monitoring						
Piezometer	50 – 80 m	10		0.6	6	
Impact assessment will be carried out by implementing agency						
O & M - 5% of total cost of the scheme					45.55	
TOTAL					**956.55**	**3.38**

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