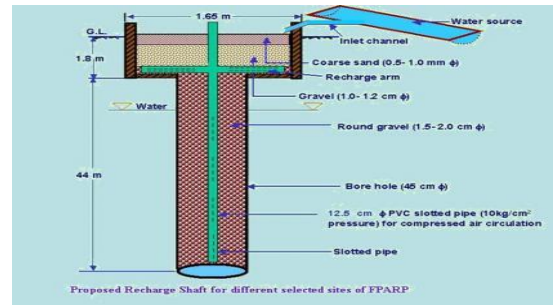




**CENTRAL GROUND WATER BOARD**  
MINISTRY OF WATER RESOURCES,  
RIVER DEVELOPMENT & GANGA REJUVENATION  
GOVERNMENT OF INDIA



Excavated/dugout farm pond



**ARTIFICIAL RECHARGE TO GROUND WATER AND  
WATER CONSERVATION PLAN OF HINDAUN  
BLOCK, DISTRICT KARAU LI, RAJASTHAN**

Western Region, Jaipur  
October 2016

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

## Plan at a Glance

1.	<b>Area of the Hindaun Block</b>	<b>637.7 sq.km.</b>
2.	<b>Area identified for Artificial Recharge</b>	<b>575.2 sq km</b>
3.	<b>Dynamic Ground Water Resources (as on 31.03.2011)</b>	
	Net Ground Water Availability	<b>57.4807 MCM</b>
	Annual Ground Water Draft	<b>126.3683 MCM</b>
	Stage of Ground Water Development	<b>219.84%</b>
4.	<b>Volume of water to be harnessed</b>	<b>2.32 MCM</b>
	<b>Volume of water available for recharge through RS</b>	<b>1.155 MCM</b>
	<b>Volume of water available for recharge through PT</b>	<b>1.168 MCM</b>
5.	<b>Volume of unsaturated aquifer zone available for recharge</b>	<b>1064.34 MCM</b>
6.	<b>Total number of structures to be proposed</b>	
	<b>Recharge structures</b>	<b>33 shafts in 25</b>
	Existing village pond with recharge shaft/ well	<b>Nos. of existing</b>
		<b>village ponds</b>
	Percolation Tanks	<b>6 No.</b>
	Sprinkler Irrigation	<b>300 ha</b>
	<b>Expected Annual GW recharge</b>	<b>1.86 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>2.096 MCM</b>
7.	<b>Estimated Cost</b>	<b>5.985 crore</b>
	Artificial Recharge Plan	4.05 crore
	Sprinkler Irrigation	1.50 crore
	Piezometer construction	0.15 crore
	Operation and maintenance	0.285 crore

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

## Introduction

The **Hindaun Block, district Karali** 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 **219.84%**.

## Location of the block

The Hindaun Block of Karali District covering an area of 637.7 Sq. Km. falls in northern - central part of Karali District and is located between North latitudes 26°34' & 26°52' and East longitudes 76°52' & 77°13'.

## 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 2.32 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 was 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)
Karauli	Hindaun	637.7	575.2	SR	493.9	0.12	20.80	17.80	1054.97
				HR	81.3	0.02	8.76	5.76	9.37

**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
Gambhir_Gambhir_001_RJ2301_AL	Gambhir	SR	0.058	0.00	Y	0	0
Gambhir_Gambhir_002_RJ2301_AL	Gambhir	SR	6.745	0.01	Y	0	0
Gambhir_Gambhir_006_RJ2301_AL	Gambhir	SR	27.564	0.12	Y	4	0
Gambhir_Gambhir_007_RJ2301_AL	Gambhir	SR	42.970	0.25	Y	0	1
Gambhir_Gambhir_008_RJ2301_AL	Gambhir	SR	203.930	<b>0.10</b>	Y	3	0
Gambhir_Gambhir_010_RJ2301_AL	Gambhir	SR	53.129	0.39	Y	6	1
Gambhir_Gambhir_014_RJ2301_SR	Gambhir	SR	2.744	0.00	Y	0	0
Gambhir_Gambhir_015_RJ2301_AL	Gambhir	SR	164.273	1.45	Y	20	4
Gambhir_Gambhir_016_RJ2301_AL	Gambhir	SR	86.598	0.00	Y	0	0
Gambhir_Gambhir_016_RJ2301_SR	Gambhir	SR	52.321	0.00	Y	0	0
				<b>2.32</b>		<b>33</b>	<b>6</b>

### Recharge Shaft

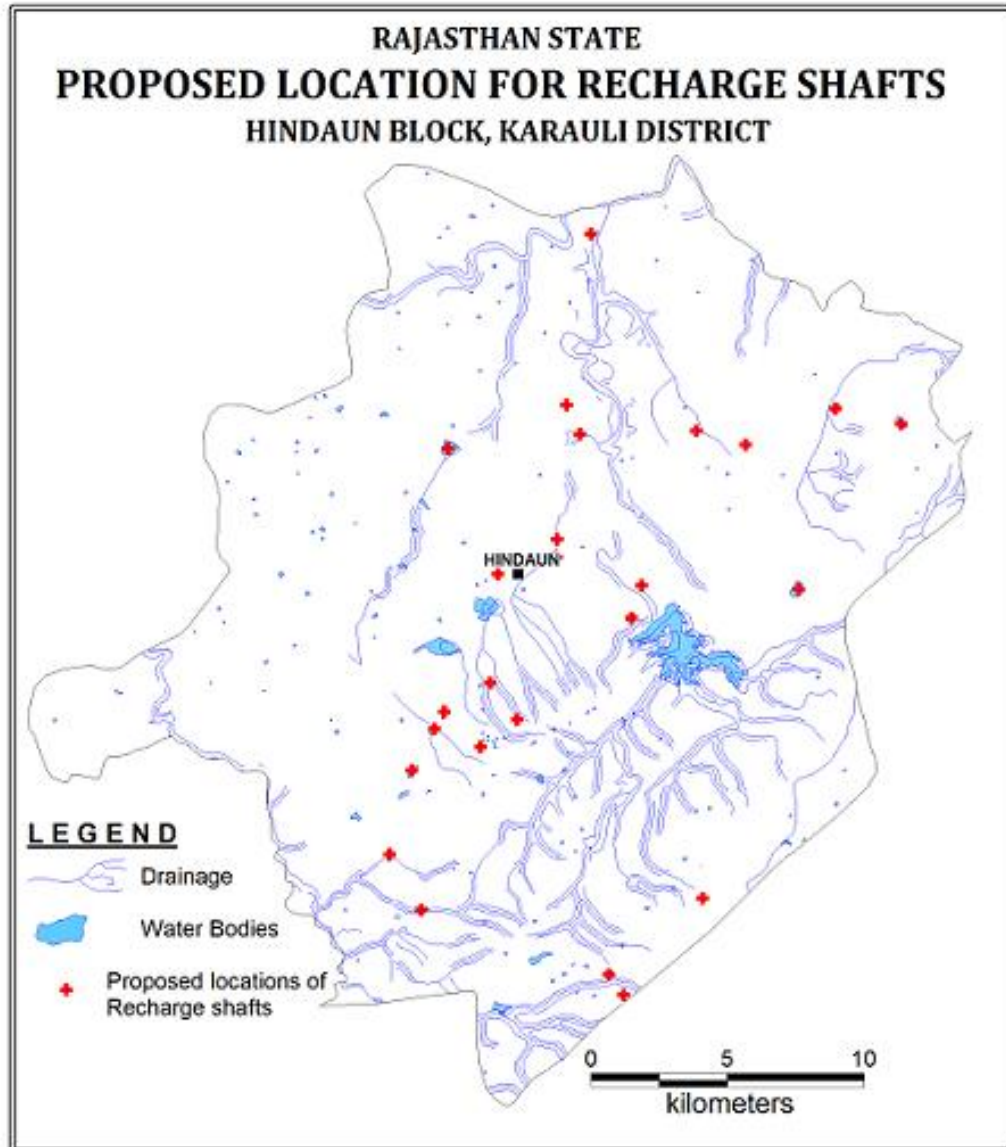
It is proposed to construct Recharge Shaft in existing ponds. The selected ponds should be atleast 3m deep and shallow ponds will be deepened accordingly. It is proposed that the inlet for the Recharge Shaft should be atleast 1m above bed of pond so that the pond retains adequate water for use by villagers.

. 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	Jatwara	77.163	26.791	Gambhir_Gambhir_006_RJ2301_AL	2	5.00	10
2	Jatwara	77.187	26.786	Gambhir_Gambhir_006_RJ2301_AL	2	5.00	10
3	Patti Narayanpur	77.020	26.778	Gambhir_Gambhir_008_RJ2301_AL	1	5.00	5
4	Khera	77.007	26.672	Gambhir_Gambhir_008_RJ2301_AL	1	5.00	5
5	Manema	76.998	26.644	Gambhir_Gambhir_008_RJ2301_AL	1	5.00	5
6	Todopura	77.010	26.626	Gambhir_Gambhir_010_RJ2301_AL	2	5.00	10
7	Kotri	77.079	26.604	Gambhir_Gambhir_010_RJ2301_AL	2	5.00	10
8	Kotri	77.085	26.598	Gambhir_Gambhir_010_RJ2301_AL	1	5.00	5
9	Mothiyapur	77.114	26.629	Gambhir_Gambhir_010_RJ2301_AL	1	5.00	5
10	Ver Khera	77.072	26.848	Gambhir_Gambhir_015_RJ2301_AL	1	5.00	5
11	Vajna Kalan	77.064	26.792	Gambhir_Gambhir_015_RJ2301_AL	1	5.00	5
12	Vajna Kalan	77.069	26.782	Gambhir_Gambhir_015_RJ2301_AL	1	5.00	5
13	Dhindhora	77.111	26.783	Gambhir_Gambhir_015_RJ2301_AL	1	5.00	5
14	Khijoori	77.130	26.779	Gambhir_Gambhir_015_RJ2301_AL	1	5.00	5
15	Hindaun (M)	77.060	26.748	Gambhir_Gambhir_015_RJ2301_AL	1	5.00	5
16	Hindaun (M)	77.060	26.742	Gambhir_Gambhir_015_RJ2301_AL	1	5.00	5
17	Hindaun (M)	77.038	26.736	Gambhir_Gambhir_015_RJ2301_AL	1	5.00	5
18	Kalwari Jatt	77.091	26.732	Gambhir_Gambhir_015_RJ2301_AL	1	5.00	5
19	Kalyanpur Sayta	77.088	26.722	Gambhir_Gambhir_015_RJ2301_AL	1	5.00	5
20	Jagar	77.149	26.731	Gambhir_Gambhir_015_RJ2301_AL	4	5.00	20
21	Kachroli	77.015	26.685	Gambhir_Gambhir_015_RJ2301_AL	1	5.00	5
22	Phulwara	77.019	26.691	Gambhir_Gambhir_015_RJ2301_AL	2	5.00	10
23	Hindaun (M)	77.035	26.700	Gambhir_Gambhir_015_RJ2301_AL	1	5.00	5
24	Kachroli	77.032	26.679	Gambhir_Gambhir_015_RJ2301_AL	1	5.00	5
25	Dughati	77.045	26.688	Gambhir_Gambhir_015_RJ2301_AL	1	5.00	5
				<b>Total</b>	<b>33</b>		<b>165</b>

Figure 1: Showing Tentative location of the Recharge Shaft



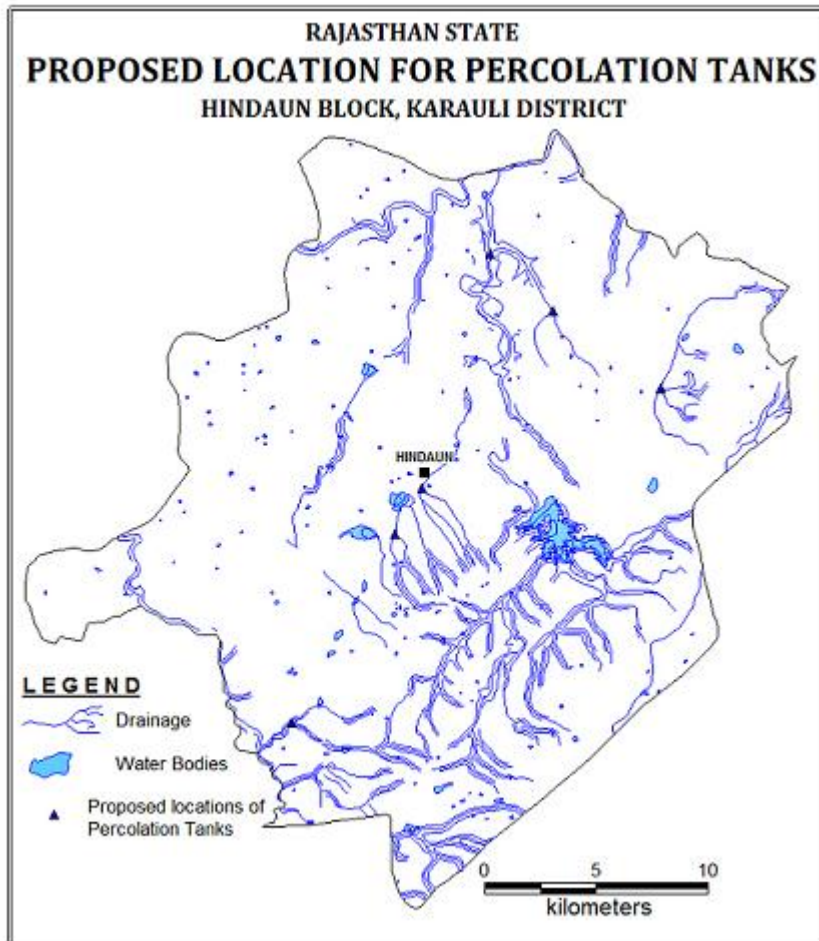
## Percolation Tank

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	Somli	77.152	26.770	Gambhir_Gambhir_007_RJ2301_AL	40
2	Katkar	76.986	26.636	Gambhir_Gambhir_010_RJ2301_AL	40
3	Ver Khera	77.075	26.824	Gambhir_Gambhir_015_RJ2301_AL	40
4	Hukmi Khera	77.103	26.801	Gambhir_Gambhir_015_RJ2301_AL	40
5	Hindaun (M)	77.033	26.712	Gambhir_Gambhir_015_RJ2301_AL	40
6	Hindaun (M)	77.044	26.730	Gambhir_Gambhir_015_RJ2301_AL	40
				Total	240

**Fig: 2: Tentative location of 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 25 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 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. 5.985 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 – 1.65	2.40	1.5



**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	33	1.155	5	165	0.924
	Hard rock: Depth –60m, Dia 10-12”with filter pit	-	-	-	-	-
Percolation tanks (3 fillings)	200m*200m*1.5 m	6	1.168	40	240	0.934
Water Conservation Measures	Sprinkler Irrigation	300 ha	25	0.5/ha	150	0.24
		Total			555	2.098
<b>Impact assessment &amp; Monitoring</b>						
Piezometer	50 – 80 m	25		0.6	15	
<i>Impact assessment will be carried out by implementing agency</i>						
O & M - 5% of total cost of the scheme					28.5	
<b>TOTAL</b>					<b>598.5</b>	<b>2.098</b>

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