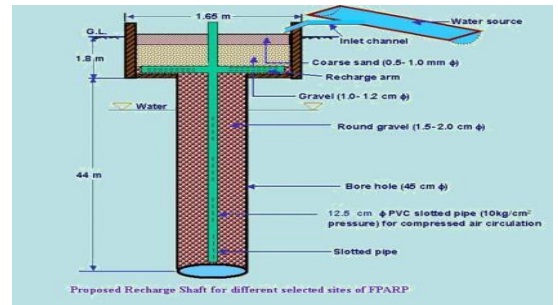
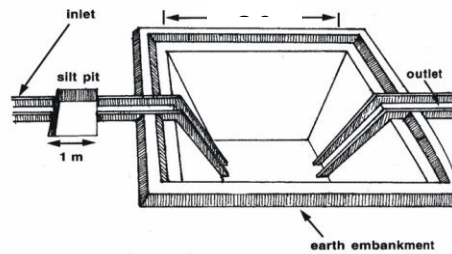




CENTRAL GROUND WATER BOARD
MINISTRY OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION
GOVERNMENT OF INDIA



Excavated/dugout farm pond



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

Western Region, Jaipur
October 2016

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

Plan at a Glance

1.	Area of the Karauli Block	1262.09 sq.km.
2.	Area identified for Artificial Recharge	1084.46 sq km
3.	Dynamic Ground Water Resources (as on 31.03.2011)	
	Net Ground Water Availability	96.3987 MCM
	Annual Ground Water Draft	92.727 MCM
	Stage of Ground Water Development	96.19 %
4.	Volume of water to be harnessed	2.578 MCM
	Volume of water available for recharge through RS	1.295 MCM
	Volume of water available for recharge through PT	1.0 MCM
5.	Volume of unsaturated aquifer zone available for recharge	1479.35 MCM
6.	Total number of structures to be proposed	
	Recharge structures	37 shafts in 31 Nos. of existing village ponds
	Existing village pond with recharge shaft/ well	
	Percolation Tanks	5 No.
	Sprinkler Irrigation	300 ha
	Expected Annual GW recharge	1.836 MCM
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	0.24 MCM
	Total recharge/ saving of ground water	2.076 MCM
7.	Estimated Cost	5.744 crore
	Artificial Recharge Plan	3.85 crore
	Sprinkler Irrigation	1.50 crore
	Piezometer construction	0.12 crore
	Operation and maintenance	0.274 crore

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

Introduction

The **Karauli Block, district Karauli** 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 **96.19%**.

Location of the block

The Karauli Block of Karauli District covering an area of 1262.09 Sq. Km. falls in northern - central part of Karauli District and is located between North latitudes 26°16' & 26°49' and East longitudes 76°48' & 77°24'.

Surface Water Availability

As per the studies carried out by Water Resources Department (WRD), Government 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 2.578 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 were 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	Karauli	1262.1	1084.46	SR	448.37	0.12	26.35	23.35	1256.33
		1262.1	1084.46	HR	636.09	0.02	20.53	17.53	223.01

Table 2: Number of recharge structure

ZoneCode	Sub_Basin	Type of Aquifer	Zone-Area (sq. km.)	Total Surplus (mcm)	Water Level >5m	Feasible_RS_Pr op	Feasible_PT_Pr op
Banas_Kalisil_042_RJ2302_SR	Kalisil	SR	149.6147	0.000	Y	0	0
Banas_Morel_064_RJ2302_AL	Morel	SR	51.2891	1.142	Y	13	3
Banas_Morel_065_RJ2302_SR	Morel	SR	0.0471	0.001	Y	0	0
Chambal_Chambal Downstream_005_RJ2302_SR	Chambal Downstream	SR	0.4715	0.040	Y	0	0
Gambhir_Gambhir_001_RJ2302_AL	Gambhir	SR	76.0718	0.000	Y	0	0
Gambhir_Gambhir_001_RJ2302_SR	Gambhir	SR	119.6776	0.000	Y	0	0
Gambhir_Gambhir_002_RJ2302_AL	Gambhir	SR	11.8457	0.015	Y	0	0
Gambhir_Gambhir_006_RJ2302_SR	Gambhir	SR	2.7053	0.012	Y	0	0
Gambhir_Gambhir_007_RJ2302_AL	Gambhir	SR	0.0417	0.000	Y	0	0
Gambhir_Gambhir_010_RJ2302_AL	Gambhir	SR	172.4643	1.270	Y	22	2
Gambhir_Gambhir_011_RJ2302_SR	Gambhir	SR	9.2551	0.097	Y	2	0
Gambhir_Gambhir_013_RJ2302_SR	Gambhir	SR	87.2506	0.000	Y	0	0
Gambhir_Gambhir_014_RJ2302_SR	Gambhir	HR	64.6341	0.000	Y	0	0
Gambhir_Gambhir_014_RJ2302_SR	Gambhir	HR	138.5930	0.000	Y	0	0
Gambhir_Gambhir_014_RJ2302_SR	Gambhir	HR	25.7521	0.000	Y	0	0
Gambhir_Gambhir_015_RJ2302_AL	Gambhir	SR	0.0813	0.001	Y	0	0
Gambhir_Gambhir_016_RJ2302_AL	Gambhir	SR	27.0701	0.000	Y	0	0
Gambhir_Gambhir_016_RJ2302_SR	Gambhir	SR	54.3344	0.000	Y	0	0
Parbati_Parbati_004_RJ2302_SR	Parbati	SR	158.8917	0.000	Y	0	0
Parbati_Parbati_005_RJ2302_SR	Parbati	SR	46.8368	0.000	Y	0	0
Parbati_Parbati_009_RJ2302_SR	Parbati	SR	3.7351	0.000	Y	0	0
Parbati_Parbati_011_RJ2302_SR	Parbati	SR	29.9972	0.000	Y	0	0
Parbati_Parbati_013_RJ2302_SR	Parbati	SR	3.6782	0.000	Y	0	0
				2.578		37	5

Recharge Shaft

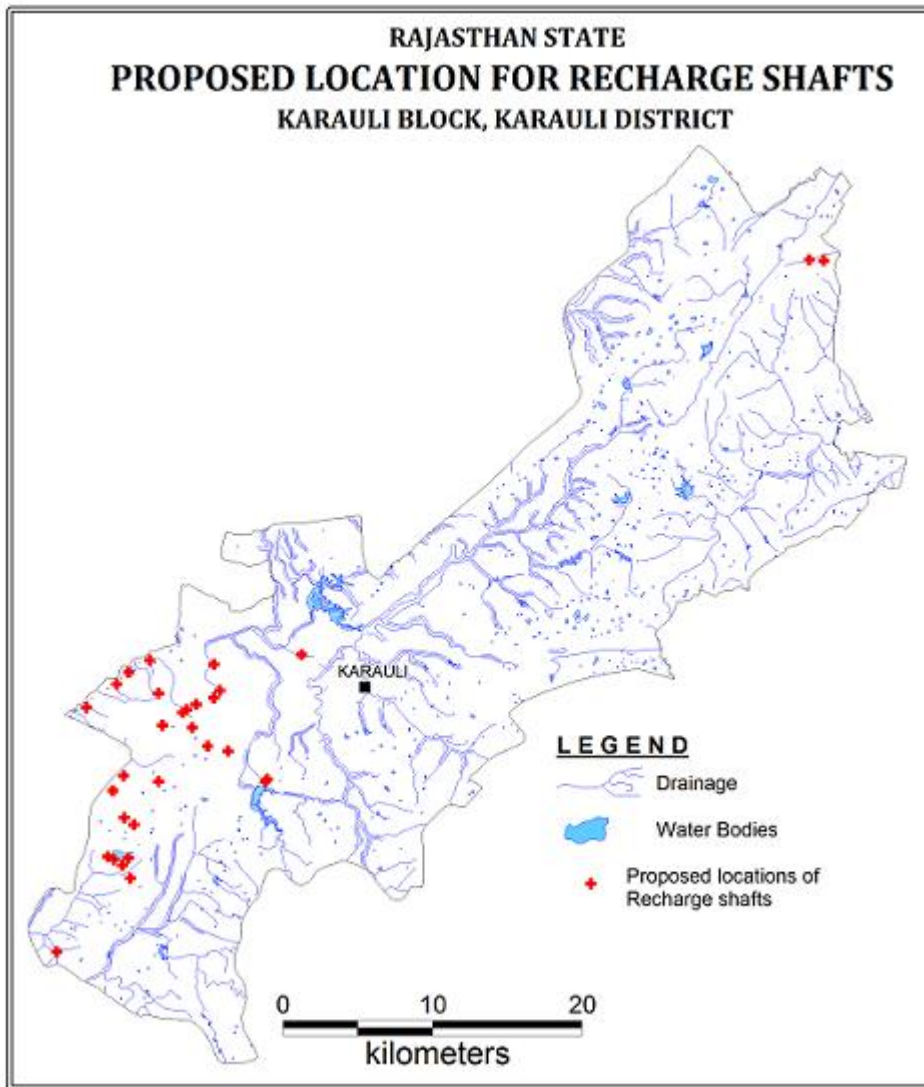
It is proposed to construct Recharge Shaft in existing ponds. The selected ponds should be atleast 3m deep and shallow ponds will be deepened accordingly. It is proposed that the inlet for the Recharge Shaft should be atleast 1m above bed of pond so that the pond retains adequate water for use by villagers.

. 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	Chainpur	76.871	26.443	Banas_Morel_064_RJ2302_AL	3	5.00	15
2	Khirkhira	76.864	26.434	Banas_Morel_064_RJ2302_AL	2	5.00	10
3	Pator Shastri	76.872	26.418	Banas_Morel_064_RJ2302_AL	1	5.00	5
4	Pator Shastri	76.878	26.414	Banas_Morel_064_RJ2302_AL	1	5.00	5
5	Manoharpura	76.874	26.394	Banas_Morel_064_RJ2302_AL	1	5.00	5
6	Manoharpura	76.870	26.389	Banas_Morel_064_RJ2302_AL	1	5.00	5
7	Manoharpura	76.865	26.393	Banas_Morel_064_RJ2302_AL	1	5.00	5
8	Manoharpura	76.861	26.395	Banas_Morel_064_RJ2302_AL	1	5.00	5
9	Ghurakar	76.876	26.382	Banas_Morel_064_RJ2302_AL	1	5.00	5
10	Gerai	76.826	26.338	Banas_Morel_064_RJ2302_AL	1	5.00	5
11	Jagatpura	76.888	26.512	Gambhir_Gambhir_010_RJ2302_AL	1	5.00	5
12	Jahangeerpur	76.875	26.505	Gambhir_Gambhir_010_RJ2302_AL	1	5.00	5
13	Deeppura	76.866	26.498	Gambhir_Gambhir_010_RJ2302_AL	1	5.00	5
14	Dafalpur	76.846	26.484	Gambhir_Gambhir_010_RJ2302_AL	1	5.00	5
15	Beejalpur	76.897	26.473	Gambhir_Gambhir_010_RJ2302_AL	1	5.00	5
16	Makanpur	76.895	26.492	Gambhir_Gambhir_010_RJ2302_AL	1	5.00	5
17	Daleelpur	76.911	26.481	Gambhir_Gambhir_010_RJ2302_AL	1	5.00	5
18	Daleelpur	76.914	26.483	Gambhir_Gambhir_010_RJ2302_AL	2	5.00	10
19	Paitoli	76.920	26.486	Gambhir_Gambhir_010_RJ2302_AL	1	5.00	5
20	Pator	76.917	26.472	Gambhir_Gambhir_010_RJ2302_AL	3	5.00	15
21	Kota	76.928	26.461	Gambhir_Gambhir_010_RJ2302_AL	1	5.00	5
22	Gunesra	76.932	26.490	Gambhir_Gambhir_010_RJ2302_AL	1	5.00	5
23	Gunesra	76.935	26.494	Gambhir_Gambhir_010_RJ2302_AL	1	5.00	5
24	Keeratpur	76.932	26.510	Gambhir_Gambhir_010_RJ2302_AL	1	5.00	5
25	Mamchari	76.941	26.458	Gambhir_Gambhir_010_RJ2302_AL	1	5.00	5
26	Gopalgarh	76.895	26.440	Gambhir_Gambhir_010_RJ2302_AL	1	5.00	5
27	Mamchari	76.966	26.439	Gambhir_Gambhir_010_RJ2302_AL	1	5.00	5
28	Mamchari	76.967	26.441	Gambhir_Gambhir_010_RJ2302_AL	1	5.00	5
29	Tharkapura	76.990	26.516	Gambhir_Gambhir_010_RJ2302_AL	1	5.00	5
30	Jamoor	77.331	26.752	Gambhir_Gambhir_011_RJ2302_SR	1	5.00	5
31	Jamoor	77.340	26.752	Gambhir_Gambhir_011_RJ2302_SR	1	5.00	5
				Total	37		185

Figure 1: Showing Tentative location of the Recharge Shaft



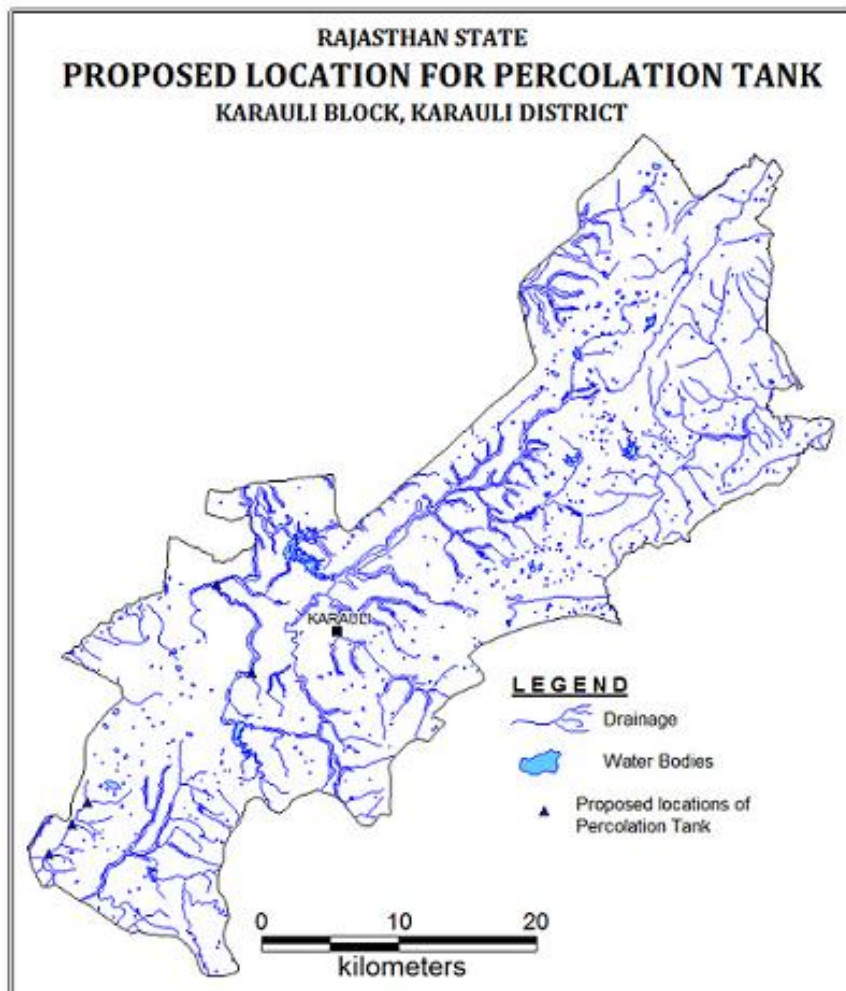
Percolation Tank

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	Gerai	76.822	26.351	Banas_Morel_064_RJ2302_AL	40
2	Gangurda	76.851	26.385	Banas_Morel_064_RJ2302_AL	40
3	Gangurda	76.839	26.370	Banas_Morel_064_RJ2302_AL	40
4	Sahajpur	76.945	26.527	Gambhir_Gambhir_010_RJ2302_AL	40
5	Rampur	76.971	26.469	Gambhir_Gambhir_010_RJ2302_AL	40
			Total		200

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 20 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. 5.744 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)
1.85	2.00	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	37	1.295	5	185	1.04
	Hard rock: Depth –60m, Dia 10-12”with filter pit	-	-	-	-	-
Percolation tanks (3 fillings)	200m*200m*1.5 m	5	1.0	40	200	0.80
Water Conservation Measures	Sprinkler Irrigation	300 ha	25	0.5/ha	150	0.24
		Total			535	2.08
Impact assessment & Monitoring						
Piezometer	50 – 80 m	20		0.6	12	
<i>Impact assessment will be carried out by implementing agency</i>						
O & M - 5% of total cost of the scheme					27.35	
TOTAL					574.35	2.08

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