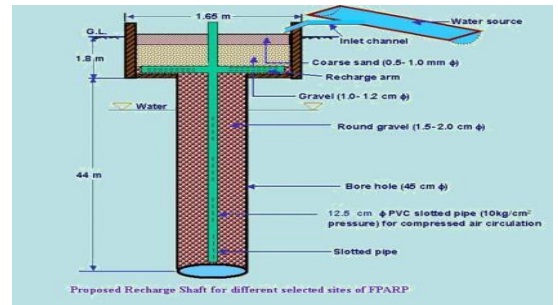
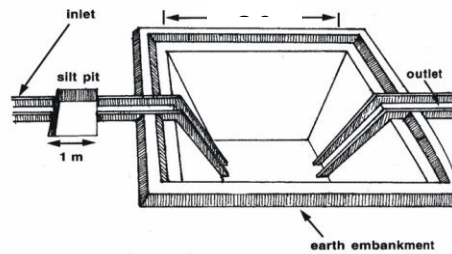




CENTRAL GROUND WATER BOARD
MINISTRY OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION
GOVERNMENT OF INDIA



Excavated/dugout farm pond



**ARTIFICIAL RECHARGE TO GROUND WATER AND
WATER CONSERVATION PLAN OF GANGAPUR
BLOCK, DISTRICT SAWAI MADHOPUR,**

Western Region, Jaipur
February 2017

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF GANGAPUR BLOCK, DISTRICT SAWAI MADHOPUR

Plan at a Glance

1.	Area of the Gangapur Block	645.50 Sq. km.
2.	Area identified for Artificial Recharge	498.92 sq km
3.	Dynamic Ground Water Resources (as on 31.03.2011)	
	Net Ground Water Availability	61.83 MCM
	Annual Ground Water Draft	105.67 MCM
	Stage of Ground Water Development	170.92 %
4.	Volume of water to be harnessed	6.02 MCM
	Volume of water available for recharge through RS	5.21 MCM
	Volume of water available for recharge through PT	0.362 MCM
5.	Volume of unsaturated aquifer zone available for recharge	586.73 MCM
6.	Total number of structures to be proposed	
	Recharge structures	149 shafts in 90
	Existing village pond with recharge shaft/ well	Nos. of existing
		village ponds
	Percolation Tanks	2 Nos
	Sprinkler Irrigation	300 ha
	Expected Annual GW recharge	4.46 MCM
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	0.24
	Total recharge/ saving of ground water	4.70 MCM
7.	Estimated Cost	10.553 crore
	Artificial Recharge Plan	8.25 crore
	Sprinkler Irrigation	1.50 crore
	Piezometer construction	0.30 crore
	Operation and maintenance	0.503 crore

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF GANGAPUR BLOCK, DISTRICT SAWAI MADHOPUR

Introduction

The **Gangapur Block, district Sawai Madhopur** 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 **170.92%**. 498.92 sq. km. area is potential zone area and thus feasible for artificial recharge.

Location of the block

The Gangapur Block covers an area of 645.50 Sq. km. and falls in **northern-central** part of Sawai Madhopur district. It is located between North latitudes 26°19' & 26°41' and East longitudes 76°33' & 76°59'.

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 6.02 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)
Sawai Madhopur	Gangapur	645.5	498.92	SR	498.92	0.080	17.7	14.7	586.730

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
Banas_Morel_064_RJ2903_AL	Morel	SR	31.664	0.705	Y	2	1
Banas_Morel_065_RJ2903_AL	Morel	SR	386.358	4.901	Y	140	0
Banas_Morel_067_RJ2903_AL	Morel	SR	0.011	0.000	N	0	0
Gambhir_Gambhir_002_RJ2903_AL	Gambhir	SR	190.356	0.243	Y	7	0
Gambhir_Gambhir_008_RJ2903_AL	Gambhir	SR	15.787	0.008	Y	0	0
Gambhir_Gambhir_010_RJ2903_AL	Gambhir	SR	22.000	0.162	Y	0	1
				6.019		149	2

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.

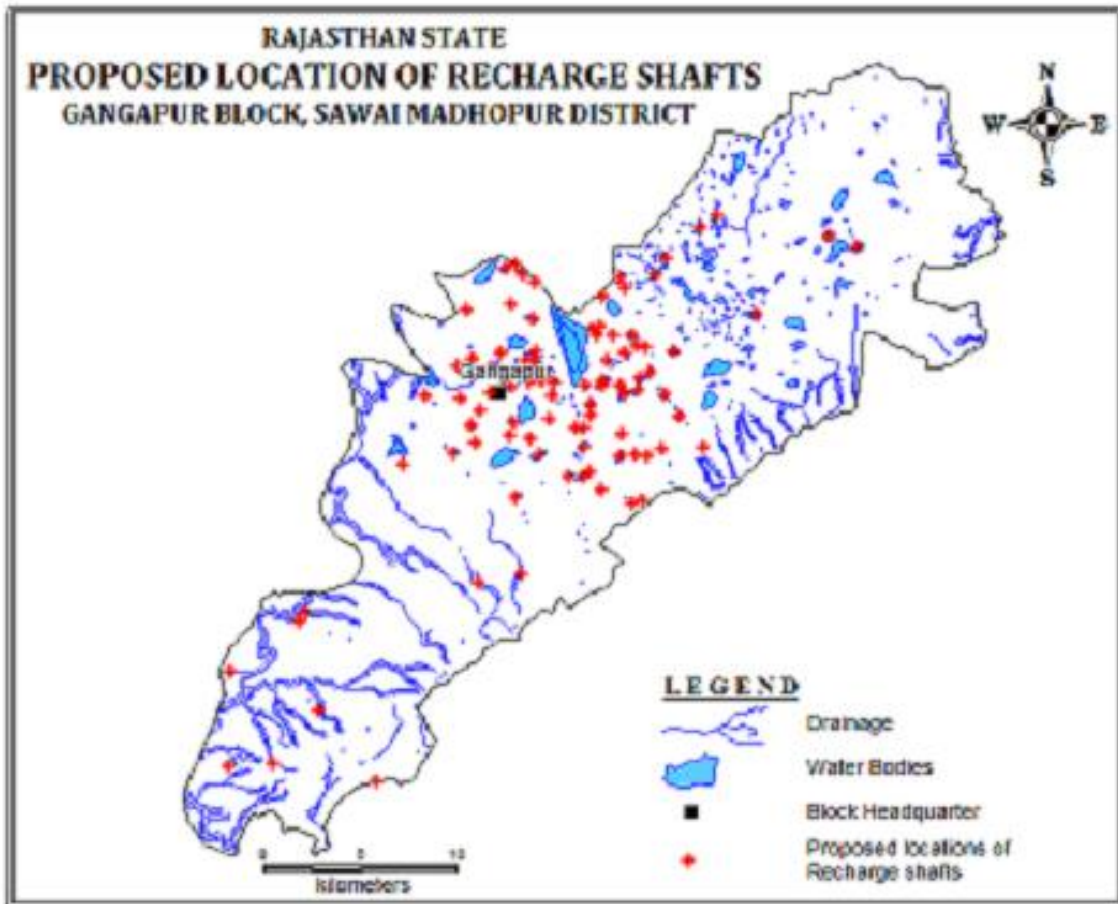
Table 3: Tentative locations of village for village pond with recharge shaft

S.No.	Village	Long	Lat	Watershed	No of Shafts	Unit cost (Rs in lac)	Total cost (Rs in lac)
1.	Hirapur	76.658	26.349	Banas_Morel_064_RJ2903_AL	1	5	5
2.	Mahanandpur Dyodha	76.784	26.584	Banas_Morel_064_RJ2903_AL	2	5	10
3.	Khidarpur	76.775	26.575	Banas_Morel_065_RJ2903_AL	1	5	5
4.	Khidarpur	76.786	26.578	Banas_Morel_065_RJ2903_AL	1	5	5
5.	Ramsinghpura	76.704	26.568	Banas_Morel_065_RJ2903_AL	1	5	5
6.	Ramsinghpura	76.727	26.571	Banas_Morel_065_RJ2903_AL	1	5	5
7.	Kamalpur	76.738	26.564	Banas_Morel_065_RJ2903_AL	3	5	15
8.	Ramsinghpura	76.739	26.581	Banas_Morel_065_RJ2903_AL	1	5	5
9.	Ramsinghpura	76.733	26.585	Banas_Morel_065_RJ2903_AL	3	5	15
10.	Ramsinghpura	76.730	26.590	Banas_Morel_065_RJ2903_AL	1	5	5
11.	Ramsinghpura	76.724	26.588	Banas_Morel_065_RJ2903_AL	3	5	15
12.	Kashipur	76.769	26.559	Banas_Morel_065_RJ2903_AL	2	5	10
13.	Kashipur	76.771	26.557	Banas_Morel_065_RJ2903_AL	2	5	10
14.	Kashipur	76.773	26.561	Banas_Morel_065_RJ2903_AL	2	5	10
15.	Udai Khurd	76.780	26.556	Banas_Morel_065_RJ2903_AL	1	5	5
16.	Udai Khurd	76.790	26.557	Banas_Morel_065_RJ2903_AL	4	5	20
17.	Udai Khurd	76.792	26.552	Banas_Morel_065_RJ2903_AL	1	5	5
18.	Udai Khurd	76.796	26.551	Banas_Morel_065_RJ2903_AL	2	5	10
19.	Udai Khurd	76.811	26.549	Banas_Morel_065_RJ2903_AL	3	5	15
20.	Udai Khurd	76.786	26.548	Banas_Morel_065_RJ2903_AL	2	5	10
21.	Udai Khurd	76.777	26.545	Banas_Morel_065_RJ2903_AL	1	5	5
22.	Udai Khurd	76.774	26.536	Banas_Morel_065_RJ2903_AL	4	5	20
23.	Udai Khurd	76.774	26.533	Banas_Morel_065_RJ2903_AL	1	5	5
24.	Udai Khurd	76.766	26.533	Banas_Morel_065_RJ2903_AL	2	5	10
25.	Udai Khurd	76.783	26.533	Banas_Morel_065_RJ2903_AL	1	5	5
26.	Udai Khurd	76.786	26.529	Banas_Morel_065_RJ2903_AL	4	5	20
27.	Udai Khurd	76.793	26.531	Banas_Morel_065_RJ2903_AL	3	5	15
28.	Udai Khurd	76.794	26.537	Banas_Morel_065_RJ2903_AL	3	5	15
29.	Udai Khurd	76.799	26.539	Banas_Morel_065_RJ2903_AL	3	5	15
30.	Udai Khurd	76.807	26.529	Banas_Morel_065_RJ2903_AL	2	5	10
31.	Udai Kalan (Rural)	76.740	26.549	Banas_Morel_065_RJ2903_AL	1	5	5
32.	Udai Kalan (Rural)	76.739	26.545	Banas_Morel_065_RJ2903_AL	2	5	10
33.	Udai Kalan (Rural)	76.735	26.545	Banas_Morel_065_RJ2903_AL	1	5	5
34.	Udai Kalan (Rural)	76.740	26.541	Banas_Morel_065_RJ2903_AL	1	5	5
35.	Udai Kalan (Rural)	76.743	26.535	Banas_Morel_065_RJ2903_AL	1	5	5
36.	Udai Kalan (Rural)	76.750	26.535	Banas_Morel_065_RJ2903_AL	2	5	10

37.	Udai Kalan (Rural)	76.736	26.535	Banas_Morel_065_RJ2903_AL	1	5	5
38.	Udai Kalan (Rural)	76.727	26.532	Banas_Morel_065_RJ2903_AL	2	5	10
39.	Udai Kalan (Rural)	76.716	26.530	Banas_Morel_065_RJ2903_AL	1	5	5
40.	Udai Kalan (Rural)	76.717	26.542	Banas_Morel_065_RJ2903_AL	2	5	10
41.	Udai Kalan (Rural)	76.722	26.549	Banas_Morel_065_RJ2903_AL	1	5	5
42.	Udai Kalan (Rural)	76.708	26.546	Banas_Morel_065_RJ2903_AL	1	5	5
43.	Udai Kalan (Rural)	76.700	26.542	Banas_Morel_065_RJ2903_AL	1	5	5
44.	Gaonri Kalan	76.682	26.529	Banas_Morel_065_RJ2903_AL	1	5	5
45.	Jiyapur	76.701	26.527	Banas_Morel_065_RJ2903_AL	1	5	5
46.	Daulatpur	76.711	26.522	Banas_Morel_065_RJ2903_AL	1	5	5
47.	Udai Kalan (Rural)	76.729	26.517	Banas_Morel_065_RJ2903_AL	3	5	15
48.	Udai Kalan (Rural)	76.726	26.510	Banas_Morel_065_RJ2903_AL	1	5	5
49.	Daulatpur	76.707	26.515	Banas_Morel_065_RJ2903_AL	1	5	5
50.	Astroli	76.708	26.506	Banas_Morel_065_RJ2903_AL	1	5	5
51.	Astroli	76.697	26.502	Banas_Morel_065_RJ2903_AL	3	5	15
52.	Udai Kalan (Rural)	76.737	26.509	Banas_Morel_065_RJ2903_AL	2	5	10
53.	Udai Kalan (Rural)	76.747	26.518	Banas_Morel_065_RJ2903_AL	2	5	10
54.	Udai Kalan (Rural)	76.749	26.529	Banas_Morel_065_RJ2903_AL	2	5	10
55.	Udai Kalan (Rural)	76.741	26.501	Banas_Morel_065_RJ2903_AL	4	5	20
56.	Dibsya	76.761	26.514	Banas_Morel_065_RJ2903_AL	1	5	5
57.	Dibsya	76.768	26.525	Banas_Morel_065_RJ2903_AL	4	5	20
58.	Dibsya	76.768	26.519	Banas_Morel_065_RJ2903_AL	1	5	5
59.	Dibsya	76.764	26.513	Banas_Morel_065_RJ2903_AL	1	5	5
60.	Dibsya	76.764	26.505	Banas_Morel_065_RJ2903_AL	3	5	15
61.	Toksi	76.784	26.500	Banas_Morel_065_RJ2903_AL	4	5	20
62.	Vinega	76.785	26.511	Banas_Morel_065_RJ2903_AL	1	5	5
63.	Khanpur Baroda	76.757	26.491	Banas_Morel_065_RJ2903_AL	2	5	10
64.	Khanpur Baroda	76.765	26.491	Banas_Morel_065_RJ2903_AL	3	5	15
65.	Jat Baroda	76.768	26.493	Banas_Morel_065_RJ2903_AL	1	5	5
66.	Jat Baroda	76.774	26.484	Banas_Morel_065_RJ2903_AL	1	5	5
67.	Toksi	76.790	26.478	Banas_Morel_065_RJ2903_AL	1	5	5
68.	Toksi	76.795	26.480	Banas_Morel_065_RJ2903_AL	1	5	5
69.	Benipur	76.797	26.501	Banas_Morel_065_RJ2903_AL	1	5	5
70.	Toksi	76.792	26.501	Banas_Morel_065_RJ2903_AL	1	5	5
71.	Jeewli	76.806	26.504	Banas_Morel_065_RJ2903_AL	1	5	5
72.	Jeewli	76.827	26.505	Banas_Morel_065_RJ2903_AL	1	5	5
73.	Khera Barh Ramgarh	76.581	26.356	Banas_Morel_065_RJ2903_AL	1	5	5
74.	Kotri	76.604	26.358	Banas_Morel_065_RJ2903_AL	1	5	5
75.	Kari Gaonri	76.582	26.400	Banas_Morel_065_RJ2903_AL	2	5	10
76.	Talawara	76.627	26.383	Banas_Morel_065_RJ2903_AL	1	5	5
77.	Bhawta	76.621	26.428	Banas_Morel_065_RJ2903_AL	2	5	10
78.	Bhawta	76.617	26.424	Banas_Morel_065_RJ2903_AL	1	5	5
79.	Barh Bichla	76.671	26.497	Banas_Morel_065_RJ2903_AL	1	5	5

80.	Mirzapur (Rural)	76.729	26.481	Banas_Morel_065_RJ2903_AL	1	5	5
81.	Salempur	76.710	26.441	Banas_Morel_065_RJ2903_AL	1	5	5
82.	Chooli (Rural)	76.732	26.446	Banas_Morel_065_RJ2903_AL	1	5	5
83.	Chhan	76.814	26.519	Banas_Morel_065_RJ2903_AL	2	5	10
84.	Piloda	76.833	26.612	Gambhir_Gambhir_002_RJ2903_AL	1	5	5
85.	Piloda	76.825	26.607	Gambhir_Gambhir_002_RJ2903_AL	1	5	5
86.	Shekhpur	76.854	26.566	Gambhir_Gambhir_002_RJ2903_AL	1	5	5
87.	Kishorpur	76.892	26.603	Gambhir_Gambhir_002_RJ2903_AL	1	5	5
88.	Paota	76.907	26.598	Gambhir_Gambhir_002_RJ2903_AL	1	5	5
89.	Mahanandpur Dyodha	76.807	26.592	Gambhir_Gambhir_002_RJ2903_AL	1	5	5
90.	Mahanandpur Dyodha	76.802	26.585	Gambhir_Gambhir_002_RJ2903_AL	1	5	5
					149		745

Fig: 1: Tentative location of Recharge Shaft



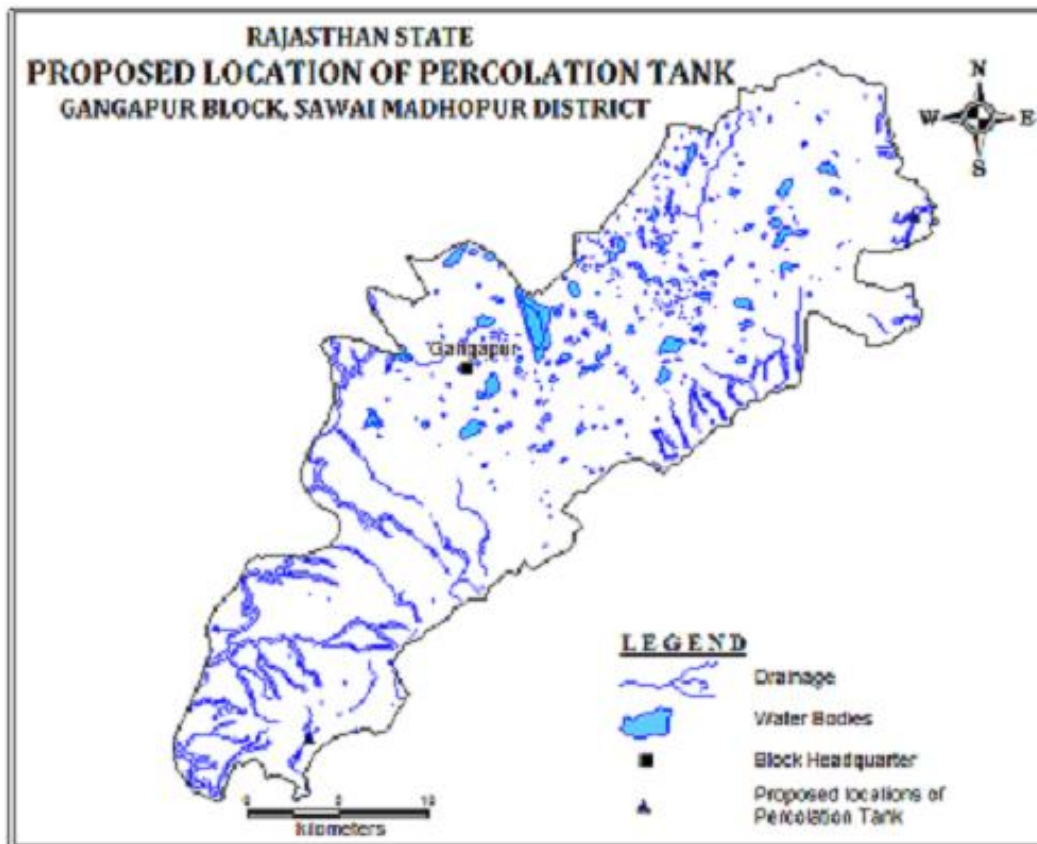
Percolation Tank

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	Barh Tatwara	76.633	26.346	Banas_Morel_064_RJ2903_AL	40
2	Meri	76.970	26.606	Gambhir_Gambhir_010_RJ2903_AL	40
				Total	80

Fig: 2: Tentative location of 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 50 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. 10.553 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 – 7.45	0.80	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	149	5.21	5	745	4.17
	Hard rock: Depth –60m, Dia 10-12”with filter pit	-	-	-	-	-
Percolation tanks (3 fillings)	200m*200m*1.5 m	2	0.362	40	80	0.29
Water Conservation Measures	Sprinkler Irrigation	300 ha	25	0.5/ha	150	0.24
		Total			975	4.70
Impact assessment & Monitoring						
Piezometer	50 – 80 m	50		0.6	30	
<i>Impact assessment will be carried out by implementing agency</i>						
O & M - 5% of total cost of the scheme					50.25	
TOTAL					1055.25	4.70

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