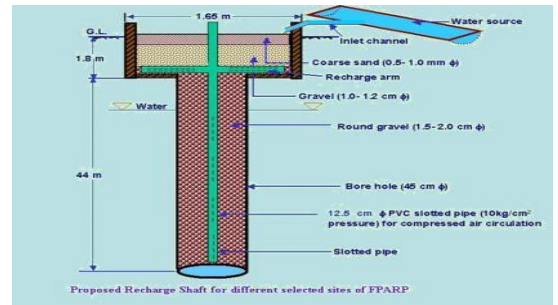
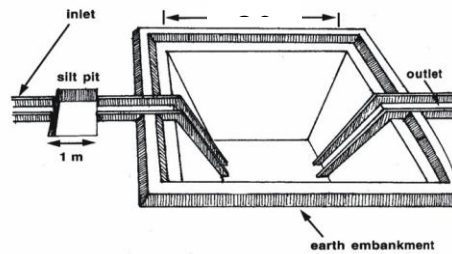




CENTRAL GROUND WATER BOARD
MINISTRY OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION
GOVERNMENT OF INDIA



Excavated/dugout farm pond



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

Western Region, Jaipur
February 2017

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

Plan at a Glance

1.	Area of the Sumerpur Block	959.73 sq. km.
2.	Area identified for Artificial Recharge	660.4 sq km
3.	Dynamic Ground Water Resources (as on 31.03.2011)	
	Net Ground Water Availability	45.58 MCM
	Annual Ground Water Draft	43.30 MCM
	Stage of Ground Water Development	95.0%
4.	Volume of water to be harnessed	1.29 MCM
	Volume of water available for recharge through RS	1.275 MCM
	Volume of water available for recharge through PT	-
5.	Volume of unsaturated aquifer zone available for recharge	209.511 MCM
6.	Total number of structures to be proposed	
	Recharge structures	37 shafts in 37 Nos. of existing village ponds
	Existing village pond with recharge shaft/ well	
	Percolation Tanks	--
	Sprinkler Irrigation	300 ha
	Expected Annual GW recharge	1.02 MCM
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	0.24 MCM
	Total recharge/ saving of ground water	1.26 MCM
7.	Estimated Cost	3.644 crore
	Artificial Recharge Plan	1.85 crore
	Sprinkler Irrigation	1.50 crore
	Piezometer construction	0.12 crore
	Operation and maintenance	0.174 crore

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

Introduction

The **Sumerpur Block, district Pali** 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 **95%**. 660.40 sq. km. area is potential zone area and thus feasible for artificial recharge.

Location of the block

The Sumerpur Block of Pali District covering an area of 959.73 Sq. Km. falls in Pali District and is located between North latitudes 25°04' & 25°35' and East longitudes 72°56' & 73°16'.

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 1.29 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)
PALI	SUMERPUR	959.73	660.4	SR	379.07	0.060	10.71	7.71	175.3578
				HR	281.33	0.020	9.07	6.07	34.15346

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
Luni_Jawai_014_RJ2610_AL	Jawai	SR	232.534	0.738	Y	21	0
Luni_Jawai_015_RJ2610_AL	Jawai	SR	40.131	0.094	Y	3	0
Luni_Jawai_016_RJ2610_HR	Jawai	HR	6.402	0.000	Y	0	0
Luni_Mithari_085_RJ2610_AL	Mithari	SR	423.019	0.432	Y	12	0
Luni_Mithari_086_RJ2610_AL	Mithari	SR	34.314	0.026	Y	1	0
Luni_Sukri_091_RJ2610_AL	Sukri	SR	90.164	0.000	Y	0	0
Luni_Sukri_092_RJ2610_AL	Sukri	SR	160.813	0.000	Y	0	0
				1.290		37	0

Recharge Shaft

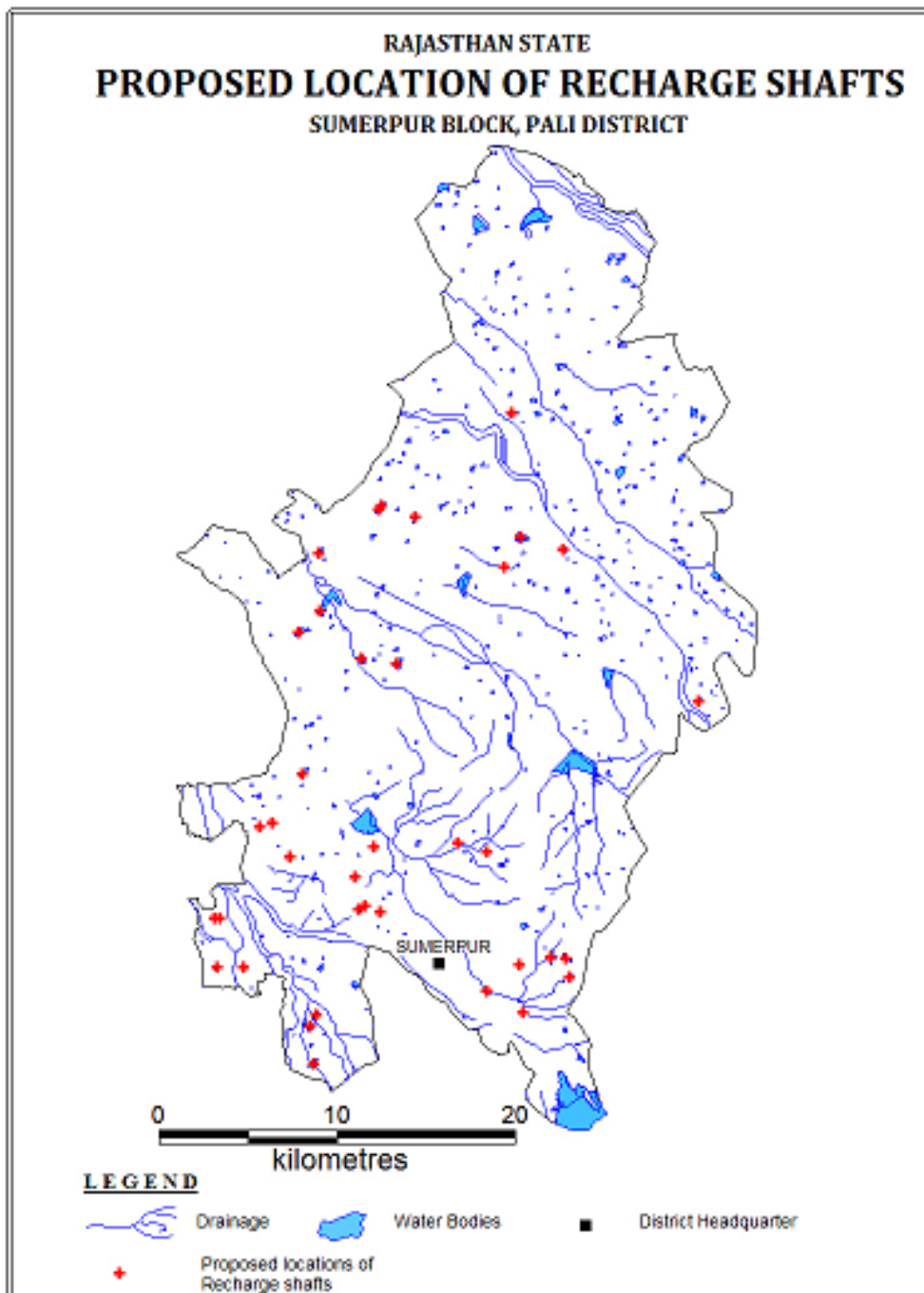
It is proposed to construct Recharge Shaft in existing ponds. The selected ponds should be atleast 3m deep and shallow ponds will be deepened accordingly. It is proposed that the inlet for the Recharge Shaft should be atleast 1m above bed of pond so that the pond retains adequate water for use by villagers.

. 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	Korta	72.957	25.176	Luni_Jawai_014_RJ2610_AL	1	5	5
2	Korta	72.960	25.176	Luni_Jawai_014_RJ2610_AL	1	5	5
3	Bamnera	72.959	25.151	Luni_Jawai_014_RJ2610_AL	1	5	5
4	Poyana	72.974	25.152	Luni_Jawai_014_RJ2610_AL	1	5	5
5	Jana	72.990	25.224	Luni_Jawai_014_RJ2610_AL	1	5	5
6	Jana	72.982	25.222	Luni_Jawai_014_RJ2610_AL	1	5	5
7	Bharoonda	73.000	25.207	Luni_Jawai_014_RJ2610_AL	1	5	5
8	Bithiya	73.006	25.248	Luni_Jawai_014_RJ2610_AL	1	5	5
9	Bankali	73.046	25.212	Luni_Jawai_014_RJ2610_AL	1	5	5
10	Pomawa	73.036	25.197	Luni_Jawai_014_RJ2610_AL	1	5	5
11	Purara	73.038	25.180	Luni_Jawai_014_RJ2610_AL	1	5	5
12	Pomawa	73.041	25.182	Luni_Jawai_014_RJ2610_AL	1	5	5
13	Pomawa	73.049	25.179	Luni_Jawai_014_RJ2610_AL	1	5	5
14	Rojra	73.093	25.214	Luni_Jawai_014_RJ2610_AL	1	5	5
15	Rojra	73.109	25.209	Luni_Jawai_014_RJ2610_AL	1	5	5
16	Koliwara	73.145	25.156	Luni_Jawai_014_RJ2610_AL	1	5	5
17	Koliwara	73.153	25.156	Luni_Jawai_014_RJ2610_AL	1	5	5
18	Koliwara	73.127	25.153	Luni_Jawai_014_RJ2610_AL	1	5	5
19	Angor	73.109	25.139	Luni_Jawai_014_RJ2610_AL	1	5	5
20	Galthani	73.129	25.129	Luni_Jawai_014_RJ2610_AL	1	5	5
21	Koliwara	73.155	25.146	Luni_Jawai_014_RJ2610_AL	1	5	5
22	Palri	73.014	25.128	Luni_Jawai_015_RJ2610_AL	1	5	5
23	Palri	73.011	25.122	Luni_Jawai_015_RJ2610_AL	1	5	5
24	Palri	73.013	25.103	Luni_Jawai_015_RJ2610_AL	1	5	5
25	Pawa	73.049	25.382	Luni_Mithari_085_RJ2610_AL	1	5	5
26	Pawa	73.051	25.384	Luni_Mithari_085_RJ2610_AL	1	5	5
27	Heengola	73.069	25.378	Luni_Mithari_085_RJ2610_AL	1	5	5
28	Gogra	73.015	25.360	Luni_Mithari_085_RJ2610_AL	1	5	5
29	Takhatgarh (M)	73.016	25.331	Luni_Mithari_085_RJ2610_AL	1	5	5
30	Takhatgarh (M)	73.004	25.320	Luni_Mithari_085_RJ2610_AL	1	5	5
31	Takhatgarh (M)	73.039	25.307	Luni_Mithari_085_RJ2610_AL	1	5	5
32	Balana	73.059	25.304	Luni_Mithari_085_RJ2610_AL	1	5	5
33	Koselao	73.127	25.368	Luni_Mithari_085_RJ2610_AL	1	5	5
34	Koselao	73.119	25.353	Luni_Mithari_085_RJ2610_AL	1	5	5
35	Kheemara	73.151	25.362	Luni_Mithari_085_RJ2610_AL	1	5	5
36	Pechawa	73.123	25.430	Luni_Mithari_085_RJ2610_AL	1	5	5
37	Deotara	73.227	25.285	Luni_Mithari_086_RJ2610_AL	1	5	5
				Total	37		185

Fig: 1: Tentative location of Recharge Shaft



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. 3.644 cr. The tentative cost estimates of the various activities of the Plan are shown in Table 4 & 5. The unit rates are as followed by the Govt. of Rajasthan (BSR).

Table 4: 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 – 1.85	-	1.50

Table 5: 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	1.275	5	185	1.02
	Hard rock: Depth –60m, Dia 10-12”with filter pit	-	-	-	-	-
Percolation tanks (3 fillings)	200m*200m*1.5 m	-	-	-	-	-
Water Conservation Measures	Sprinkler Irrigation	300 ha	25	0.5/ha	150	0.24
		Total			335	1.26
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					17.35	
TOTAL					364.35	1.26

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