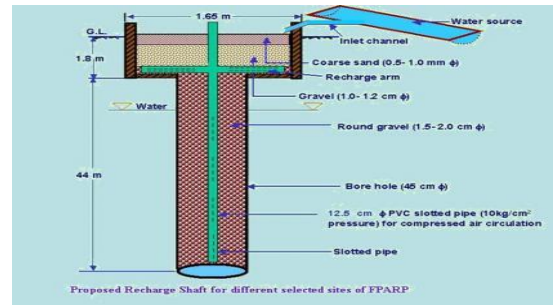




**CENTRAL GROUND WATER BOARD**  
MINISTRY OF WATER RESOURCES,  
RIVER DEVELOPMENT & GANGA REJUVENATION  
GOVERNMENT OF INDIA



Excavated/dugout farm pond



**ARTIFICIAL RECHARGE TO GROUND WATER AND  
WATER CONSERVATION PLAN OF  
LACHMANGARH BLOCK, DISTRICT ALWAR,**

Western Region, Jaipur  
October 2016

# ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF LACHMANGARH BLOCK, DISTRICT ALWAR

## Plan at a Glance

1.	<b>Area of the Lachmangarh Bas Block</b>	<b>623.95 Sq.Km.</b>
2.	<b>Area identified for Artificial Recharge</b>	<b>415.01 sq km</b>
3.	<b>Dynamic Ground Water Resources (as on 31.03.2011)</b>	
	Net Ground Water Availability	<b>35.081 MCM</b>
	Annual Ground Water Draft	<b>69.2794 MCM</b>
	Stage of Ground Water Development	<b>197.48 %</b>
4.	<b>Volume of water to be harnessed</b>	<b>3.363 MCM</b>
	<b>Volume of water available for recharge through RS</b>	<b>1.015 MCM</b>
	<b>Volume of water available for recharge through PT</b>	<b>0.20 MCM</b>
5.	<b>Volume of unsaturated aquifer zone available for recharge</b>	<b>874.84 MCM</b>
6.	<b>Total number of structures to be proposed</b>	
	<b>Recharge structures</b>	<b>29 shafts in 19 Nos. of existing village ponds</b>
	Existing village pond with recharge shaft/ well	
	Percolation Tanks	<b>1 nos.</b>
	Sprinkler Irrigation	<b>300 ha</b>
	<b>Expected Annual GW recharge</b>	<b>0.972 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>1.212 MCM</b>
7.	<b>Estimated Cost</b>	<b>3.612 crore</b>
	Artificial Recharge Plan	1.85 crore
	Sprinkler Irrigation	1.50 crore
	Piezometer construction	0.09 crore
	Operation and maintenance	0.172 crore

# ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF LACHMANGARH BLOCK, DISTRICT ALWAR

## Introduction

The **Lachmangarh 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 **197.48%**.

## Location of the block

The Lachmangarh Block covers an area of 623.95 Sq.Km. and falls in southern part of Alwar district. It is located between North latitudes 27°8' & 27°36' and East longitudes 76°44' & 77°4'.

## 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 3.363 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	Lachhmangarh	623.95	415.01	SR	415.01	0.12	0.1	24.08	21.08

**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
Banganga_Banganga_003_RJ0210_AL	Banganga	SR	32.659	0.018	Y	0	0
Banganga_Banganga_004_RJ0210_AL	Banganga	SR	98.960	0.220	Y	6	0
Banganga_Banganga_005_RJ0210_AL	Banganga	SR	171.277	0.486	Y	14	0
Banganga_Banganga_006_RJ0210_AL	Banganga	SR	104.052	0.343	Y	8	0
Banganga_Banganga_009_RJ0210_AL	Banganga	SR	9.045	0.057	Y	0	0
Banganga_Banganga_010_RJ0210_AL	Banganga	SR	18.907	0.037	Y	0	0
Ruparail_Ruparail_002_RJ0210_AL	Ruparail	SR	18.141	1.165	Y	0	1
Ruparail_Ruparail_005_RJ0210_AL	Ruparail	SR	73.288	0.000	Y	0	0
Ruparail_Ruparail_006_RJ0210_AL	Ruparail	SR	76.650	1.024	Y	1	0
Ruparail_Ruparail_012_RJ0210_AL	Ruparail	SR	2.511	0.014	Y	0	0
				<b>3.363</b>		<b>29</b>	<b>1</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	Sorai	76.850	27.403	Banganga_Banganga_004_RJ0210_AL	1	5	5
2	Soorajgarh	76.857	27.381	Banganga_Banganga_004_RJ0210_AL	3	5	15
3	Roneejajat	76.830	27.394	Banganga_Banganga_004_RJ0210_AL	1	5	5
4	Lachhmangarh	76.853	27.374	Banganga_Banganga_004_RJ0210_AL	1	5	5
5	Khohra	76.786	27.332	Banganga_Banganga_005_RJ0210_AL	1	5	5
6	Mojpur	76.801	27.362	Banganga_Banganga_005_RJ0210_AL	1	5	5
7	Jona Khera Bhai	76.820	27.333	Banganga_Banganga_005_RJ0210_AL	1	5	5
8	Jona Khera Bhai	76.829	27.336	Banganga_Banganga_005_RJ0210_AL	1	5	5
9	Gor Pahari	76.836	27.376	Banganga_Banganga_005_RJ0210_AL	2	5	10
10	Lachhmangarh	76.857	27.366	Banganga_Banganga_005_RJ0210_AL	1	5	5
11	Lachhmangarh	76.864	27.357	Banganga_Banganga_005_RJ0210_AL	2	5	10
12	Rasoolpur	76.786	27.299	Banganga_Banganga_005_RJ0210_AL	1	5	5
13	Sunari	76.784	27.255	Banganga_Banganga_005_RJ0210_AL	2	5	10
14	Mukundpura	76.815	27.263	Banganga_Banganga_005_RJ0210_AL	1	5	5
15	Sehra	76.803	27.277	Banganga_Banganga_005_RJ0210_AL	1	5	5
16	Irniya	76.953	27.406	Banganga_Banganga_006_RJ0210_AL	1	5	5
17	Lilee	76.883	27.360	Banganga_Banganga_006_RJ0210_AL	3	5	15
18	Lilee	76.889	27.359	Banganga_Banganga_006_RJ0210_AL	4	5	20
19	Baroda Meo	76.872	27.481	Ruparail_Ruparail_006_RJ0210_AL	1	5	5
				<b>Total</b>	<b>29</b>		<b>145</b>

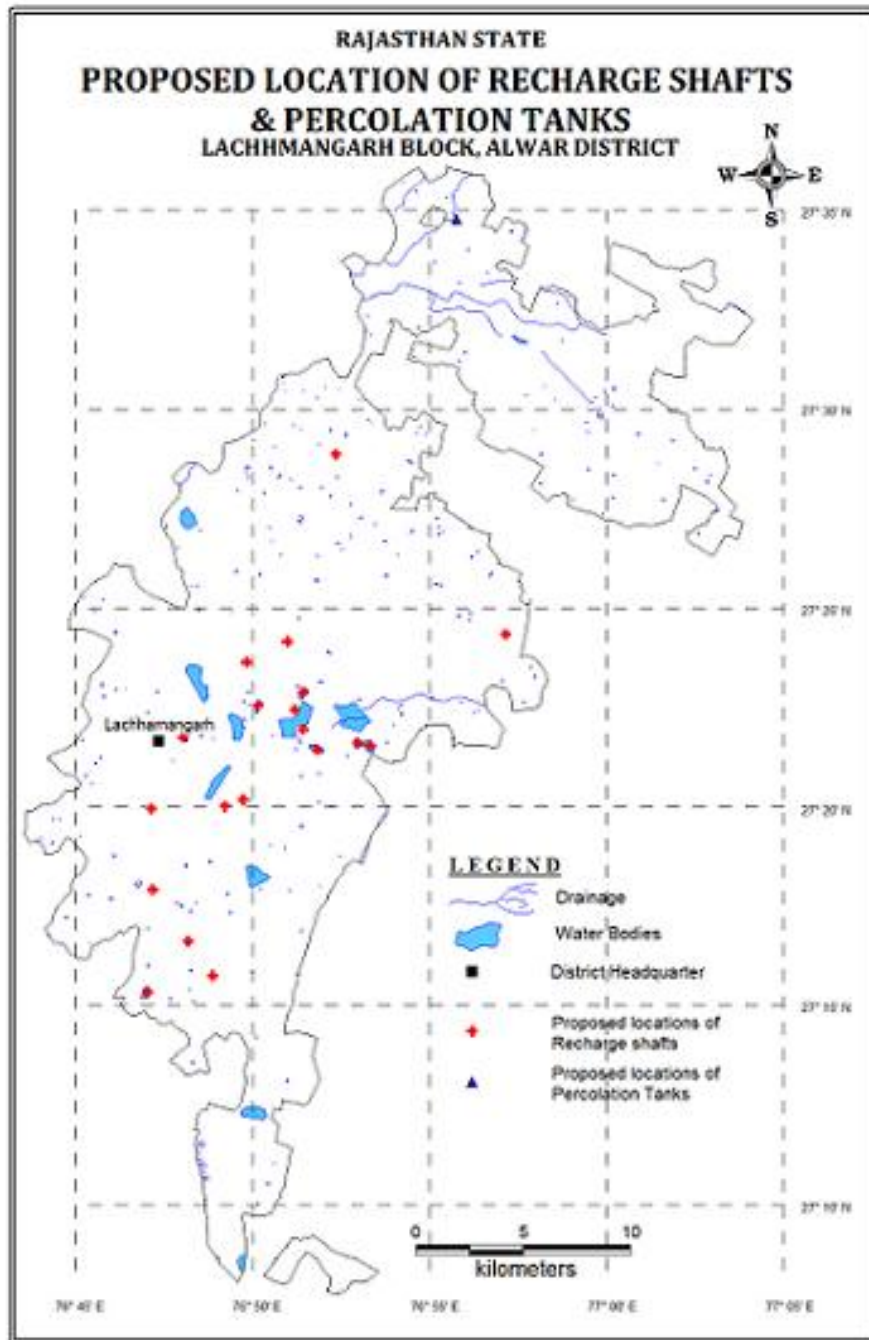
**Percolation Tank**

The tentative location of villages for construction of percolation tank and their cost estimates are shown in Fig 1 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	Indpur	76.929	27.580	Ruparail_Ruparail_002_RJ0210_AL	40
				Total	40

Figure 1: Showing Tentative location of the Recharge Shaft and 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 15 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. 3.612 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 – 1.45	0.40	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
<b>Recharge Structures/ Activities</b>						
Recharge shaft within the pond /tanks	Alluvium – Depth 80m, Dia: 10-12” with filter pit	29	1.015	5	145	0.812
	Hard rock: Depth –60m, Dia 10-12”with filter pit	-	-	-	-	-
Percolation tanks (3 fillings)	200m*200m*1.5 m	1	0.20	40	40	0.16
Water Conservation Measures	Sprinkler Irrigation	300 ha	25	0.5/ha	150	0.24
		<b>Total</b>			<b>335</b>	<b>1.212</b>
<b>Impact assessment &amp; Monitoring</b>						
Piezometer	50 – 80 m	15		0.6	9	
<i>Impact assessment will be carried out by implementing agency</i>						
O & M - 5% of total cost of the scheme					17.20	
<b>TOTAL</b>					<b>361.20</b>	<b>1.212</b>

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