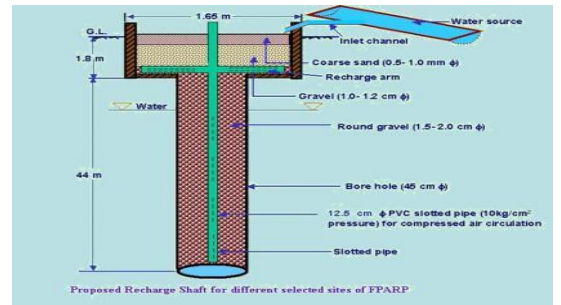
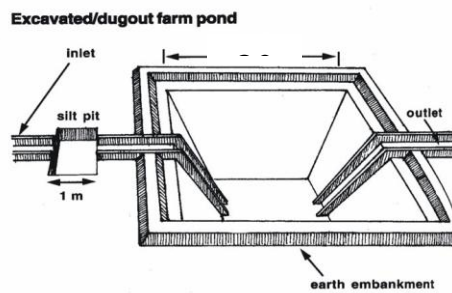




CENTRAL GROUND WATER BOARD
MINISTRY OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION
GOVERNMENT OF INDIA



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

Western Region, Jaipur
December 2016

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

Plan at a Glance

| | | |
|----|--|-------------------------|
| 1. | Area of the Chohtan Block | 3306.26 sq.km. |
| 2. | Area identified for Artificial Recharge | 2135.94 sq km |
| 3. | Dynamic Ground Water Resources (as on 31.03.2011) | |
| | Net Ground Water Availability | 46.70 MCM |
| | Annual Ground Water Draft | 46.07 MCM |
| | Stage of Ground Water Development | 98.66% |
| 4. | Volume of water to be harnessed | 1.28 MCM |
| | Volume of water available for recharge through RS | 11 MCM |
| | Volume of water available for recharge through PT | 1 MCM |
| 5. | Volume of unsaturated aquifer zone available for recharge | 7973.04 MCM |
| 6. | Total number of structures to be proposed | |
| | Recharge structures | 11 shafts in 11 |
| | Existing village pond with recharge shaft/ well | Nos. of existing |
| | | village ponds |
| | Percolation Tanks | 01 No. |
| | Sprinkler Irrigation | 300 ha |
| | Expected Annual GW recharge | 0.47 MCM |
| | Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation | 0.24 |
| | Total recharge/ saving of ground water | 0.71 MCM |
| 7. | Estimated Cost | 2.604 crore |
| | Artificial Recharge Plan | 0.95 crore |
| | Sprinkler Irrigation | 1.50 crore |
| | Piezometer construction | 0.03 crore |
| | Operation and maintenance | 0.124 crore |

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

Introduction

The **Chohtan Block, district Barmer** is one of the critical blocks of Rajasthan and provides favourable conditions for artificial recharge, with stage of ground water development of 98.66 %. 2135.94 sq. km. area is potential zone area and thus feasible for artificial recharge.

Location of the block

The Chohtan Block of Barmer District covering an area of 3306.26 Sq. Km. falls in western part of Barmer District and is located between North latitudes 24°39' & 25°35' and East longitudes 70°40' & 71°21'.

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 1.28 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) |
|----------|---------|------------------------|---|-----------------|---|----------|-----------------------------|--|---|
| Barmer | Chohtan | 3306.3 | 2135.94 | SR | 2135.94 | 0.08 | 49.66 | 46.66 | 7973.04 |

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_Luni_074_RJ0508_AL | Luni | SR | 1.048 | 0.001 | N | 0 | 0 |
| Luni_Luni_079_RJ0508_AL | Luni | SR | 359.546 | 0.246 | Y | 0 | 0 |
| Luni_Luni_080_RJ0508_AL | Luni | SR | 0.000 | 0.341 | Y | 0 | 0 |
| Luni_Luni_080_RJ0508_AL | Luni | SR | 503.542 | 0.000 | N | 0 | 0 |
| Luni_Luni_081_RJ0508_AL | Luni | SR | 444.350 | 0.277 | Y | 0 | 1 |
| Luni_Luni_082_RJ0508_AL | Luni | SR | 512.955 | 0.165 | Y | 5 | 0 |
| Luni_Luni_083_RJ0508_AL | Luni | SR | 0.001 | 0.000 | N | 0 | 0 |
| Luni_Luni_083_RJ0508_AL | Luni | SR | 737.966 | 0.240 | Y | 6 | 0 |
| Luni_Luni_084_RJ0508_AL | Luni | SR | 124.134 | 0.010 | Y | 0 | 0 |
| Outside Basin_Sub 6_071_RJ0508_AL | Sub 6 | SR | 616.242 | 0.000 | Y | 0 | 0 |
| | | | | 1.280 | | 11 | 1 |

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 | Madawao | 71.303 | 24.845 | Luni_Luni_082_RJ0508_AL | 1 | 5 | 5 |
| 2 | Gira | 71.260 | 24.823 | Luni_Luni_082_RJ0508_AL | 1 | 5 | 5 |
| 3 | Gira | 71.257 | 24.818 | Luni_Luni_082_RJ0508_AL | 1 | 5 | 5 |
| 4 | Gira | 71.257 | 24.807 | Luni_Luni_082_RJ0508_AL | 1 | 5 | 5 |
| 5 | Gira | 71.258 | 24.812 | Luni_Luni_082_RJ0508_AL | 1 | 5 | 5 |
| 6 | Bakhasar | 71.113 | 24.699 | Luni_Luni_083_RJ0508_AL | 1 | 5 | 5 |
| 7 | Bakhasar | 71.116 | 24.703 | Luni_Luni_083_RJ0508_AL | 1 | 5 | 5 |
| 8 | Bakhasar | 71.122 | 24.718 | Luni_Luni_083_RJ0508_AL | 1 | 5 | 5 |
| 9 | Bakhasar | 71.146 | 24.719 | Luni_Luni_083_RJ0508_AL | 1 | 5 | 5 |
| 10 | Bakhasar | 71.148 | 24.723 | Luni_Luni_083_RJ0508_AL | 1 | 5 | 5 |
| 11 | Tareesara | 71.153 | 24.713 | Luni_Luni_083_RJ0508_AL | 1 | 5 | 5 |
| | | | | Total | 11 | | 55 |

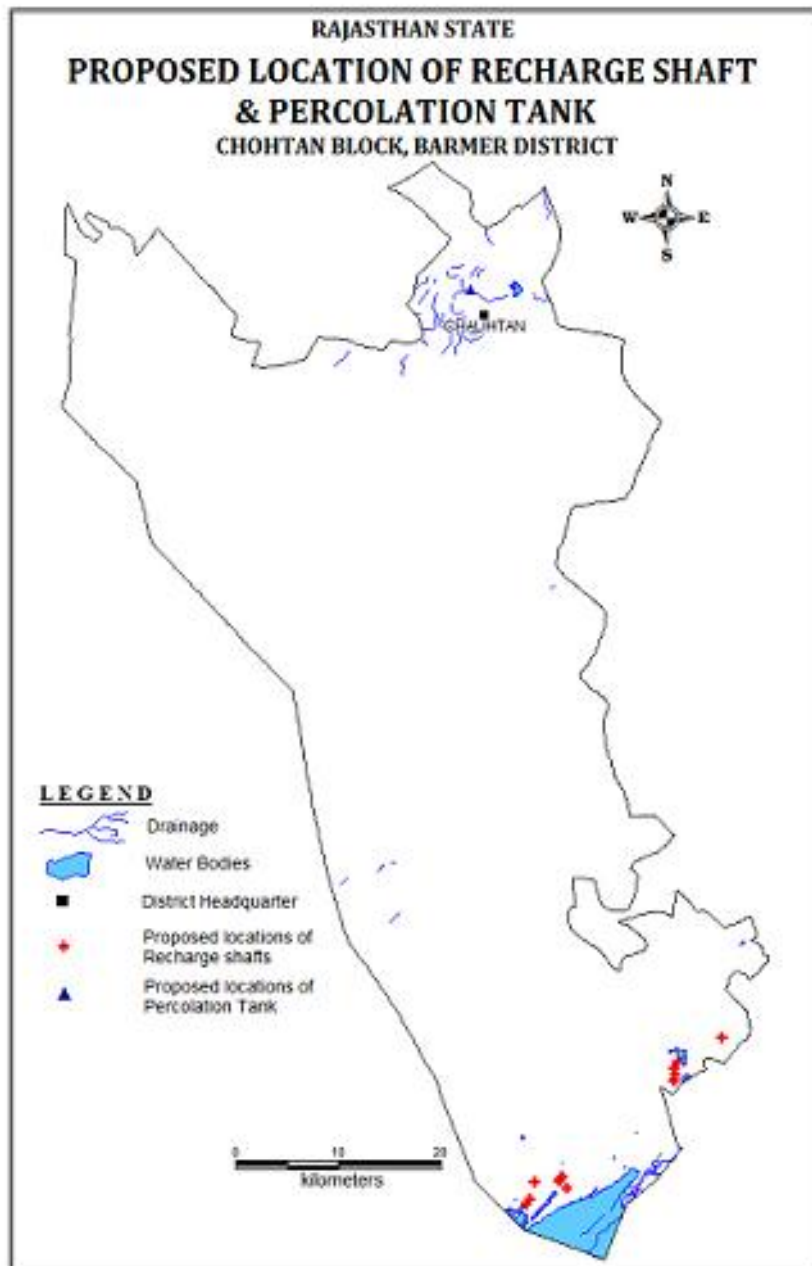
Percolation Tank

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 | Chuli Doongri | 71.060 | 25.498 | Luni_Luni_081_RJ0508_AL | 40 |
| | | | Total | | 40 |

Fig: 1: Tentative location of Recharge Shaft and 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 5 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. 2.604 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 – 0.55 | 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 |
|--|---|----------------------------------|---|----------------------------------|-----------------------------------|---|
| Recharge Structures/ Activities | | | | | | |
| Recharge shaft within the pond /tanks | Alluvium – Depth 80m, Dia: 10-12” with filter pit | 11 | 0.385 | 5 | 55 | 0.31 |
| | 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 |
| | | Total | | | 245 | 0.71 |
| Impact assessment & Monitoring | | | | | | |
| Piezometer | 50 – 80 m | 5 | | 0.6 | 3 | |
| <i>Impact assessment will be carried out by implementing agency</i> | | | | | | |
| O & M - 5% of total cost of the scheme | | | | | 12.40 | |
| TOTAL | | | | | 260.40 | 0.71 |

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