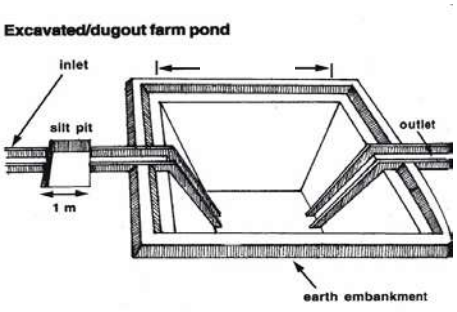
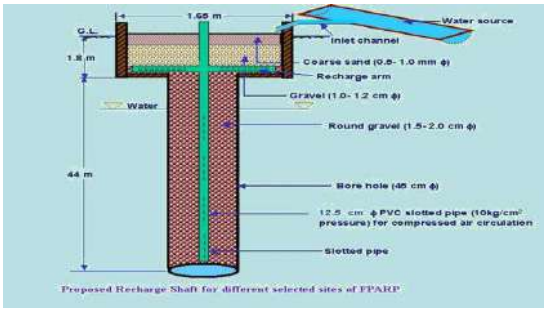
CENTRAL GROUND WATER BOARD

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





ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF RAIPUR BLOCK, DISTRICT BHILWARA, RAJASTHAN

Western Region, Jaipur
April 2016

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

Plan at a Glance

1.	**Area of the Raipur Block**	**524.20 sq.km.**
2.	**Area identified for Artificial Recharge**	**486.36 sq km**
3.	**Dynamic Ground Water Resources (as on 31.03.2011)**	
	Net Ground Water Availability	**19.2955 MCM**
	Annual Ground Water Draft	**30.8380 MCM**
	Stage of Ground Water Development	**159.82%**
4.	**Volume of water to be harnessed** **Volume of water available for recharge** **Volume of water available for conservation by other interventions**	**0.0553 MCM** **0.0253 MCM** **0.02**
5.	**Volume of unsaturated aquifer zone available for recharge**	**56.32 MCM**
6.	**Total number of structures to be proposed**	
	Recharge structures Existing village pond with recharge shaft/ well **Water Conservation** Farm pond	 **1 shaft in 1 existing village pond** **1 No.**
	Expected Annual GW recharge	**0.021 MCM**
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	**0.018 MCM**
	Total recharge/ saving of ground water	**0.039 MCM**
7.	**Estimated Cost** Artificial Recharge Plan Water conservation measures Piezometer construction Operation and maintenance	**0.1386 crore** 0.026 crore 0.10 crore 0.006 crore 0.0066 crore

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

INTRODUCTION

The demand of fresh water for agriculture, drinking and industrial uses etc. has significantly increased due to population growth and socio-economic development. As surface water resources in the State of Rajasthan are meagre, the dependability on ground water resources in the State has increased substantially. This has resulted in over exploitation of ground water resources vis a vis depletion of ground water levels in various parts of the State.

The **Raipur Block, district Bhilwara** 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 **159.82%.** In view of over exploitation of ground water resources in the block, ground water resources in the area are under continuous depletion. Thus there is urgent need for taking up suitable water management interventions based on integrated approach, which on one hand includes augmentation of ground water resources through appropriate techniques, and on the other hand requires the adoption of suitable water conservation measures, such as ensuring water use efficiency through creation of additional water storage facility, maintenance/ renovation of existing water bodies etc. Water awareness and capacity building of the stakeholders are also the important attributes of water management interventions as envisaged in the National Water Policy.

Artificial recharge to ground water is one of the most efficient, scientifically proven and cost effective technology to mitigate the problems of over exploitation of ground water resources. The technology serves as a means for restoring the depleted ground water storage, ameliorate the ground water quality problems and also enhance the sustainability of wells in the affected areas. A detailed knowledge of geology, hydrogeology, land use pattern, geomorphology and hydro-meteorological features are however, essential for selection of appropriate artificial recharge techniques as well as design and sites of ground water recharge structures.

As per directions of Ministry of Water Resources, River Development and Ganga Rejuvenation, Government of India and in pursuance to letter no 16-24/M(SML)/CGWB/ARP- OE Blocks/2015-6957, dated 13.7.2015 & 3.8.2015 & letter no 39(43)/TC/CHN/CGWB/2015-7929,dated 4.9.2015 from Central Headquarters, Central Ground Water Board, **the preparation of Artificial Recharge and Rainwater harvesting Plan for the Over exploited blocks in the State of Rajasthan has been taken up** on priority by the Western Region, Central Ground Water Board, Jaipur. Each Plan discusses the broad framework of ground water situation in the block, status of water availability (both surface and ground water), identification of feasible areas for interventions, feasibility of artificial recharge and other water conservation structures,

their design considerations, numbers and cost estimates. The expected outcomes of the proposed interventions have also been elucidated in the report

The GIS layers used in the Plan include administrative (upto village level), Hydrogeology, Depth to Water level (pre and post monsoon), geomorphic, drainage, water bodies and the map of tentative locations of proposed interventions.

Methodology:

As per Ground Water Department, Government of Rajasthan direction the basin wise availability of surplus run off is calculated after taking into account 75 % dependability on the rain water for all uses. In furtherance, the sub basins with surplus run off available for recharge were taken into consideration. The block area falling in particular sub basin was taken into account and a proportionate area of the sub-basin draining the block was calculated. Based on this area of sub-basin draining the block, proportionate surplus run off, in the block by the sub basin, for recharge was calculated. Thus was calculated the final amount of surplus run off available for recharge in particular block by one particular sub-basin. The available run off was considered for Recharge through Recharge Shaft (@ 0.03 MCM) and Percolation tank (@ 0.2 MCM). If after allocating water for Recharge through Recharge Shaft, large amount of surface run off was left then the Water conservation through Farm Ponds, along with recharge through Percolation Tanks, was also taken into account. Besides the available run off the Average Water Level for the time span of ten years (Nov., 2005 to Nov. 2014) and the Decadal Water Level trend (Nov., 2005 to Nov. 2014) were also taken into account. The blocks showing average water level more than 5 m bgl and declining water level trend were considered suitable for Artificial Recharge Plan.

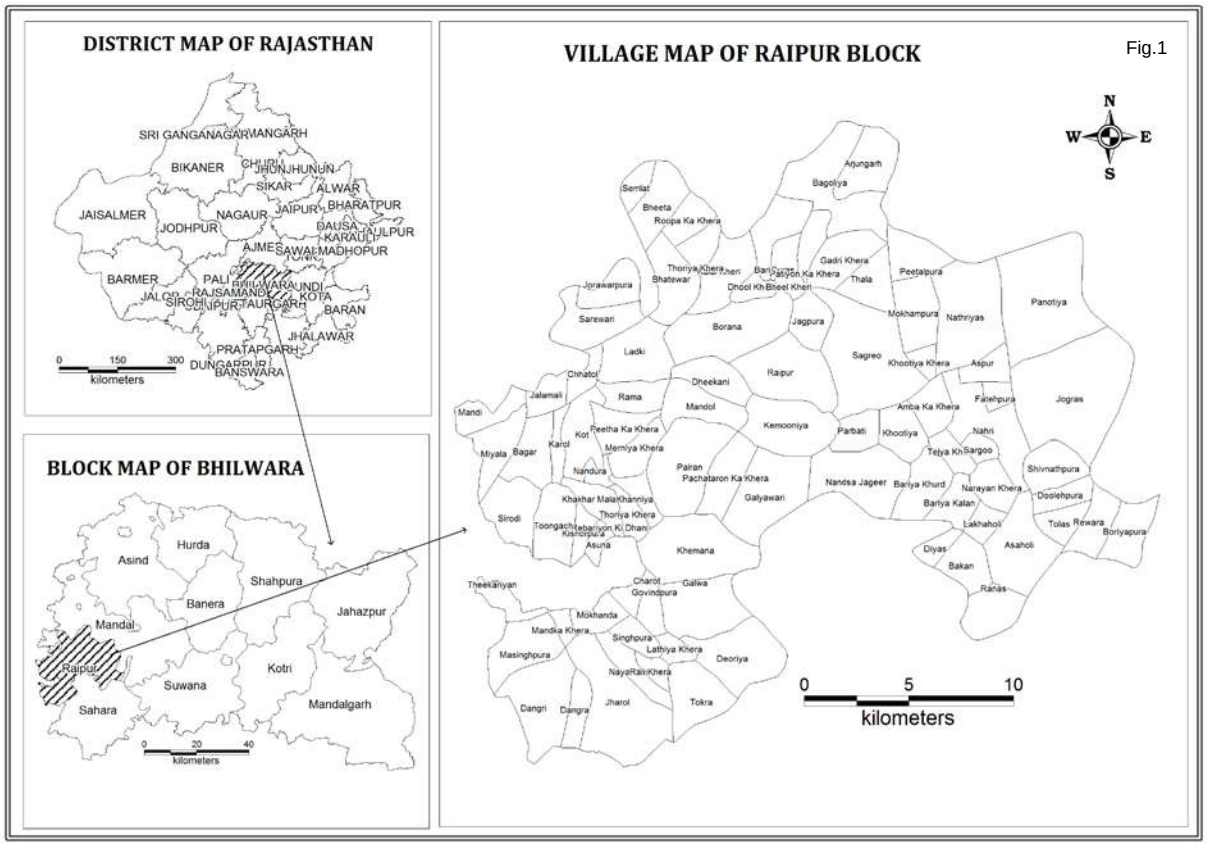
Location of the block

Raipur Block of Bhilwara district falls under Over-Exploited category. It covers an area of 524.20 Sq.Km. and falls in southwestern part of Bhilwara district. It is located between North latitudes 25°14’ & 25°31’ and East longitudes 74°01’ & 75°21’. The total rural population of the Block is 97869 persons as per the 2011 census. It is comprised of 48256 males and 49613 females. Location map is shown in **fig 1**.

Source wise Irrigated Area

Out of total area of 524.20 Sq.Km., an area of 19.47 (3.71%) falls under irrigation. The dug wells/ Tubewells are the main source of irrigation in Raipur Block. There is very little area of 0.28 Sq.Km. that falls under pond irrigation and an area of 0.47 Sq.Km. is irrigated through other sources. The wells irrigate total 18.72 Sq.Km. area in this Block.

Fig: 1



Physiography & Drainage

Physiographically, the block is characterized by presence of buried pediments of denudational origin. The minimum and maximum elevation of Block is 465.9 m and 610.3 m, respectively. The map showing various geomorphic units is presented in **fig 2**.

There is no perennial river flowing in this Block. It is drained by ephemeral Kothari river. The entire block falls under Banas river basin. The map showing drainage and water bodies in the Raipur block are shown in **fig 3**.

Fig: 2

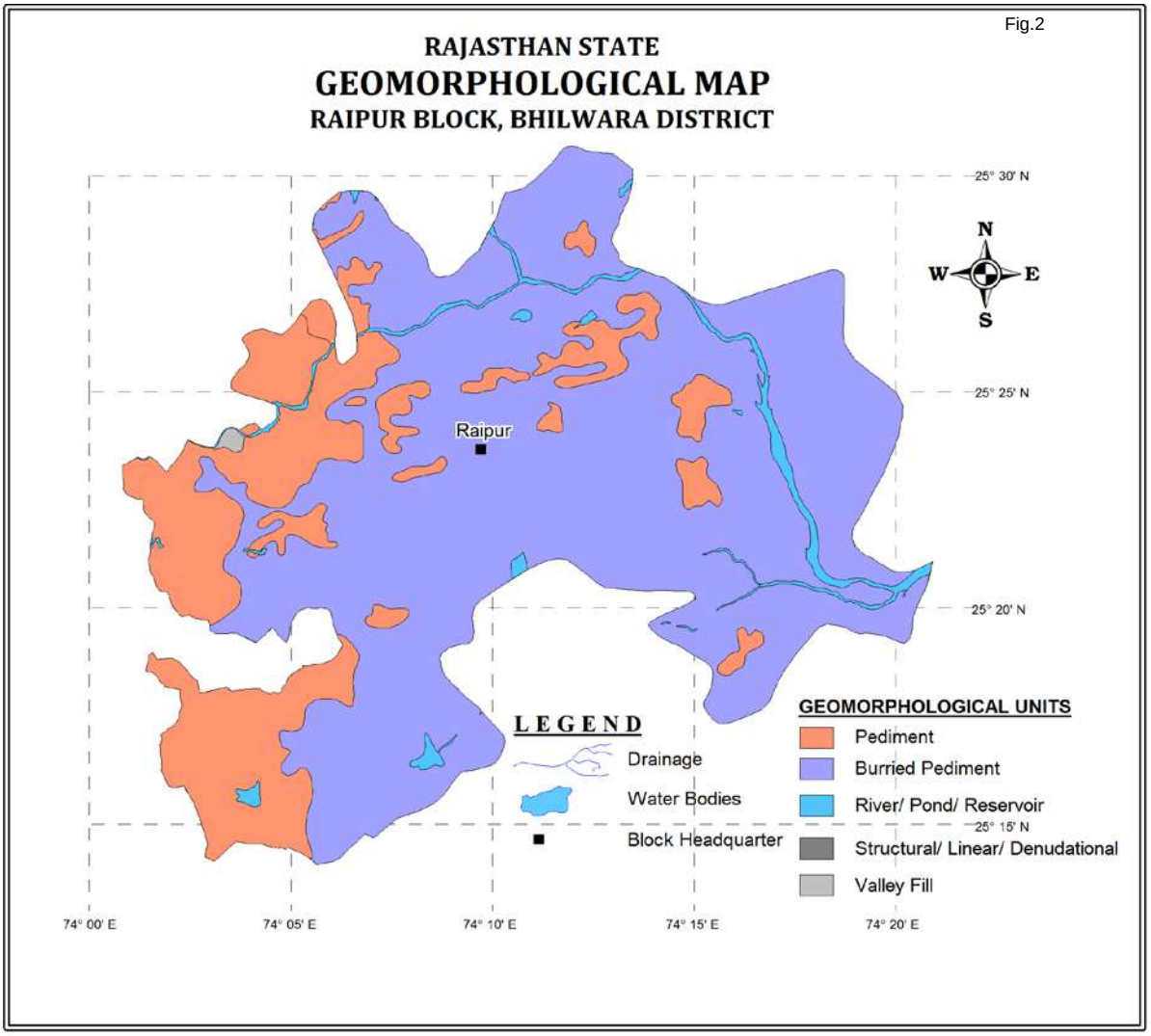


Fig.2
RAJASTHAN STATE
GEOMORPHOLOGICAL MAP
RAIPUR BLOCK, BHILWARA DISTRICT
25° 30' N
25° 25' N
25° 20' N
25° 15' N
74° 00' E
74° 05' E
74° 10' E
74° 15' E
74° 20' E
N
W
E
S
Raipur
LEGEND
Drainage
Water Bodies
Block Headquarter
GEOMORPHOLOGICAL UNITS
Pediment
Burried Pediment
River/ Pond/ Reservoir
Structural/ Linear/ Denudational
Valley Fill

Fig: 3

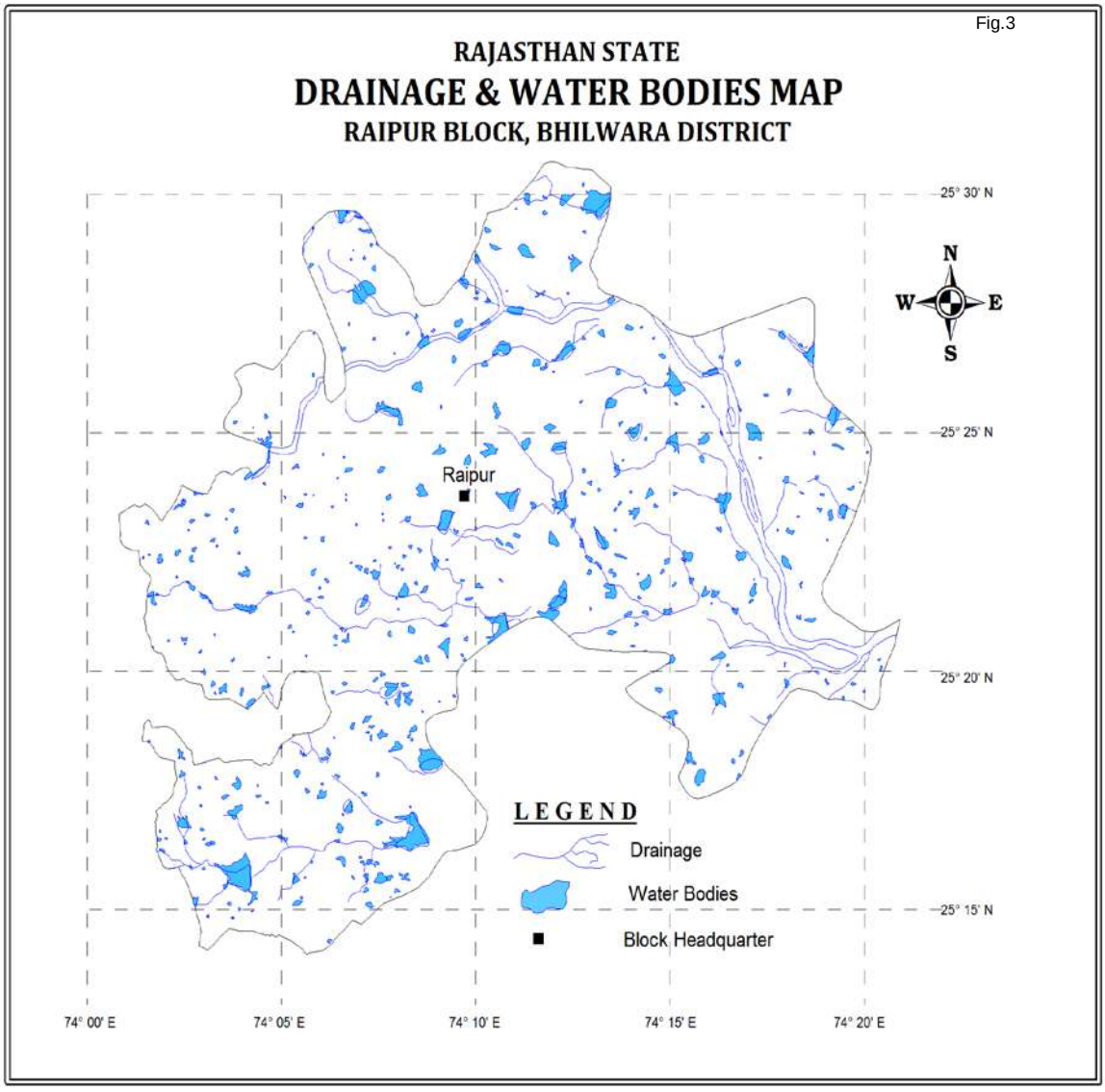


Fig.3
RAJASTHAN STATE
DRAINAGE & WATER BODIES MAP
RAIPUR BLOCK, BHILWARA DISTRICT
25° 30' N
25° 25' N
25° 20' N
25° 15' N
N
W
E
S
Raipur
LEGEND
Drainage
Water Bodies
Block Headquarter
74° 00' E
74° 05' E
74° 10' E
74° 15' E
74° 20' E

Rainfall

The climate of the block is semi arid. The Normal annual rainfall of block is 511 mm (IMD, 1901-70). The available data of rainfall indicates that larger part of annual rainfall is received through SW monsoon during July to September.

Hydrogeology of the Area

The major water bearing formations in the Block are gneiss and schist of Bhilwara Supergroup overlain by thin cover of alluvium. Out of total geographical area of 1136.10 Sq. Km, an area of 990.46 Sq. Km. (87.18%) forms aquifer system (potential zone) in the block and remaining 145.64 Sq. Km.(12.82%) area is represented by hills. Ground water occurs under unconfined to semi-confined condition. Extent, size, opening and inter-connection of joints, fissures and other plains of structural weakness control occurrence & movement of ground water. Muscovite schist often grades into gneiss. These have well-developed foliation and irregular joints and are intruded by granite, pegmatite and quartz veins. The contact between these intrusives and schists provides good channel for ground water circulation. In general yield of wells tapping Gneiss & Schist ranges from 0.29 to 0.58 lps.

Ground Water Level

As per Average decadal depth to water level (from November, 2005 to November, 2014), the block majorly falls in water level range 5-10 and 10-20 m bgl range from east to west. **(Fig 4)**

The average decadal depth to water level is 16.18 m bgl for Pre monsoon & 12.70 m bgl for Post monsoon. In general, the depth to water level is between 10 & 20 m bgl in major part of Block. Depth to water level maps for May 2014 & November 2014 is shown in **fig 5 & 6**.

Water Level Trend:

All the hydrographs are showing declining water level trends over last 10 years. Water level trend shows average decline of 0.14 m/year during pre monsoon and 0.12 m/year during post monsoon.
As per the Decadal Water level trend (from November, 2005 to November, 2014), the declining trend is visible in the block. The fall in the range of -1 to 0 and 0 to 1 m/ year in ground water level is prevalent in the block. The map of Decadal Water Level Trend is shown in **fig. 7**

Fig: 4

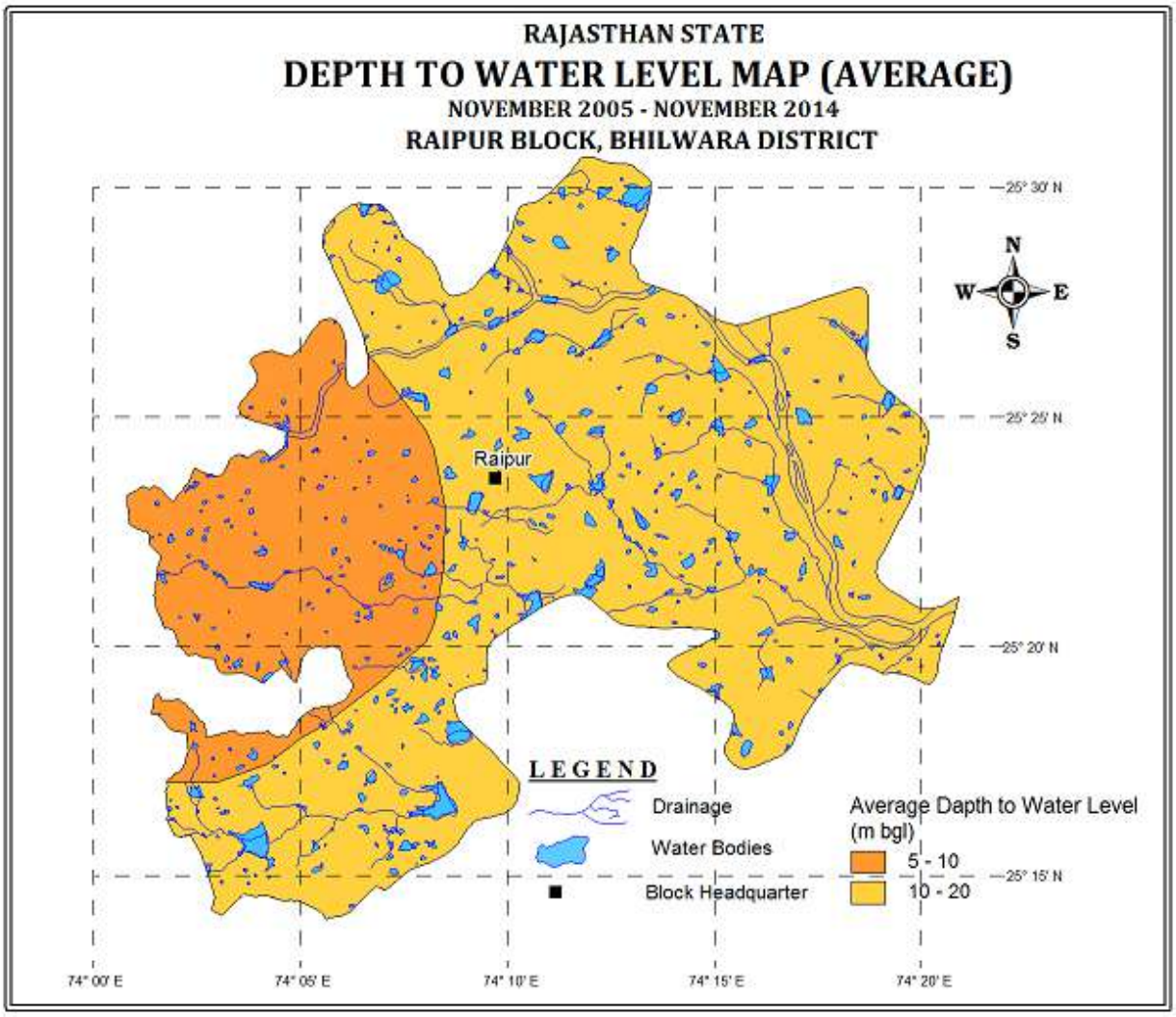

RAJASTHAN STATE
DEPTH TO WATER LEVEL MAP (AVERAGE)
NOVEMBER 2005 - NOVEMBER 2014
RAIPUR BLOCK, BHILWARA DISTRICT
25° 30' N
25° 25' N
25° 20' N
25° 15' N
74° 00' E
74° 05' E
74° 10' E
74° 15' E
74° 20' E
N
W
E
S
Raipur
LEGEND
Drainage
Water Bodies
Block Headquarter
Average Dapth to Water Level (m bgl)
5 - 10
10 - 20

Fig: 5

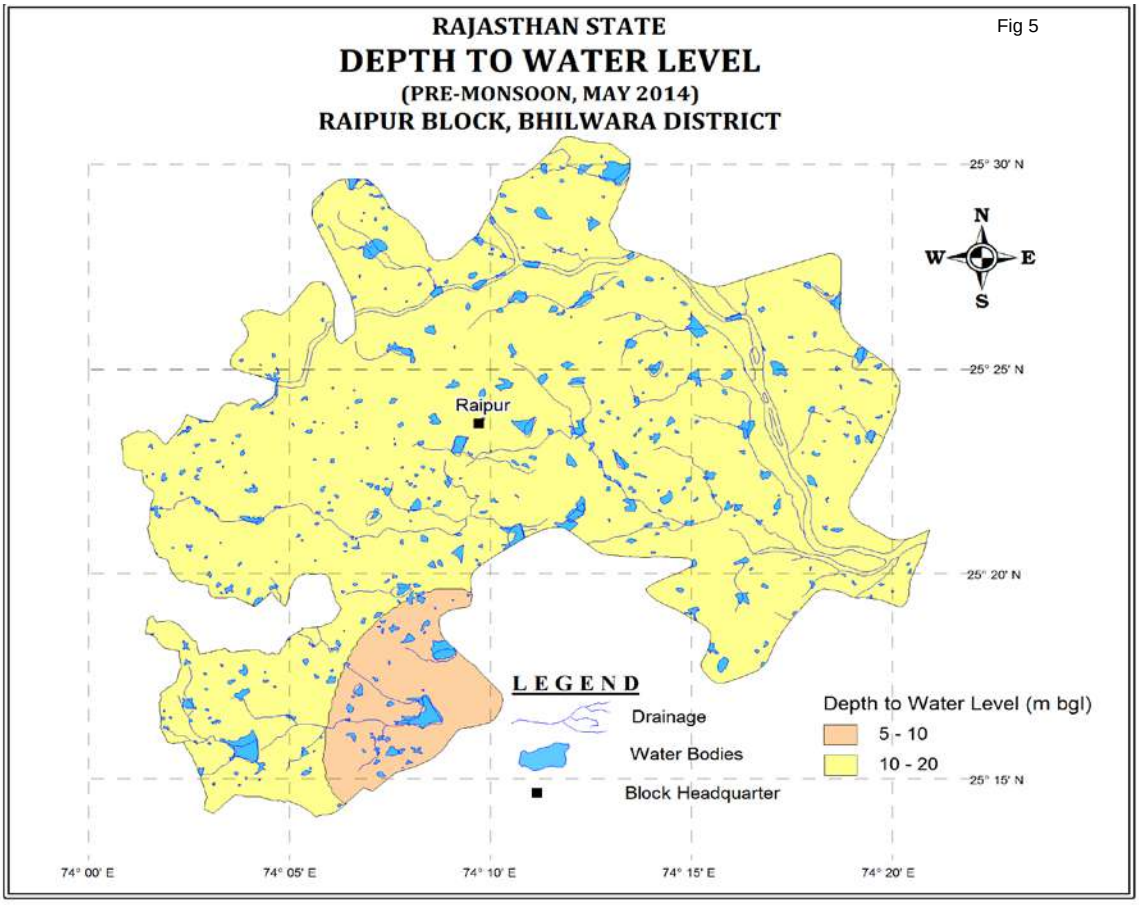
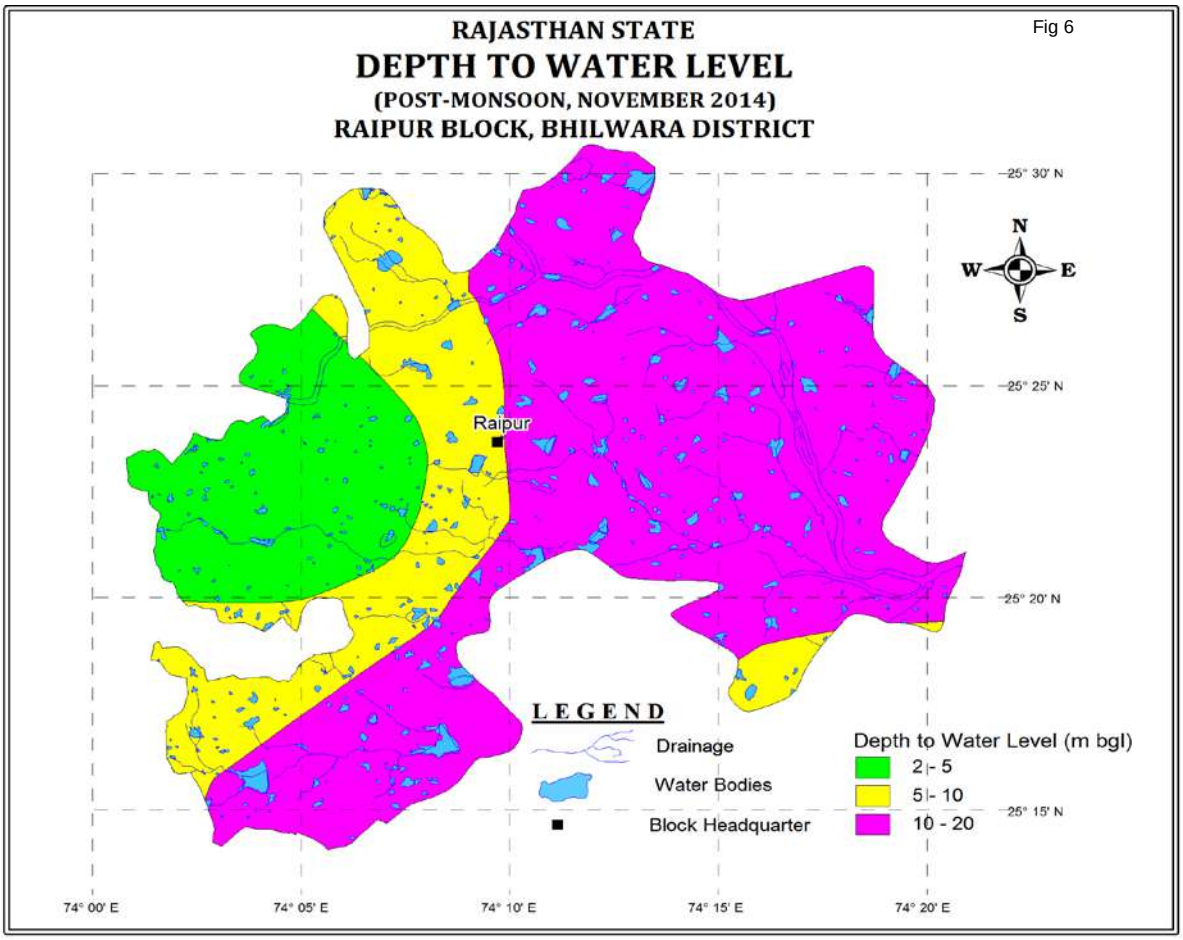

RAJASTHAN STATE
DEPTH TO WATER LEVEL
(PRE-MONSOON, MAY 2014)
RAIPUR BLOCK, BHILWARA DISTRICT
Fig 5
25° 30' N
25° 25' N
25° 20' N
25° 15' N
N
W
E
S
Raipur
74° 00' E
74° 05' E
74° 10' E
74° 15' E
74° 20' E
LEGEND
Drainage
Water Bodies
Block Headquarter
Depth to Water Level (m bgl)
5 - 10
10 - 20

Fig: 6


RAJASTHAN STATE
DEPTH TO WATER LEVEL
(POST-MONSOON, NOVEMBER 2014)
RAIPUR BLOCK, BHILWARA DISTRICT
Fig 6
25° 30' N
25° 25' N
25° 20' N
25° 15' N
74° 00' E
74° 05' E
74° 10' E
74° 15' E
74° 20' E
N
W
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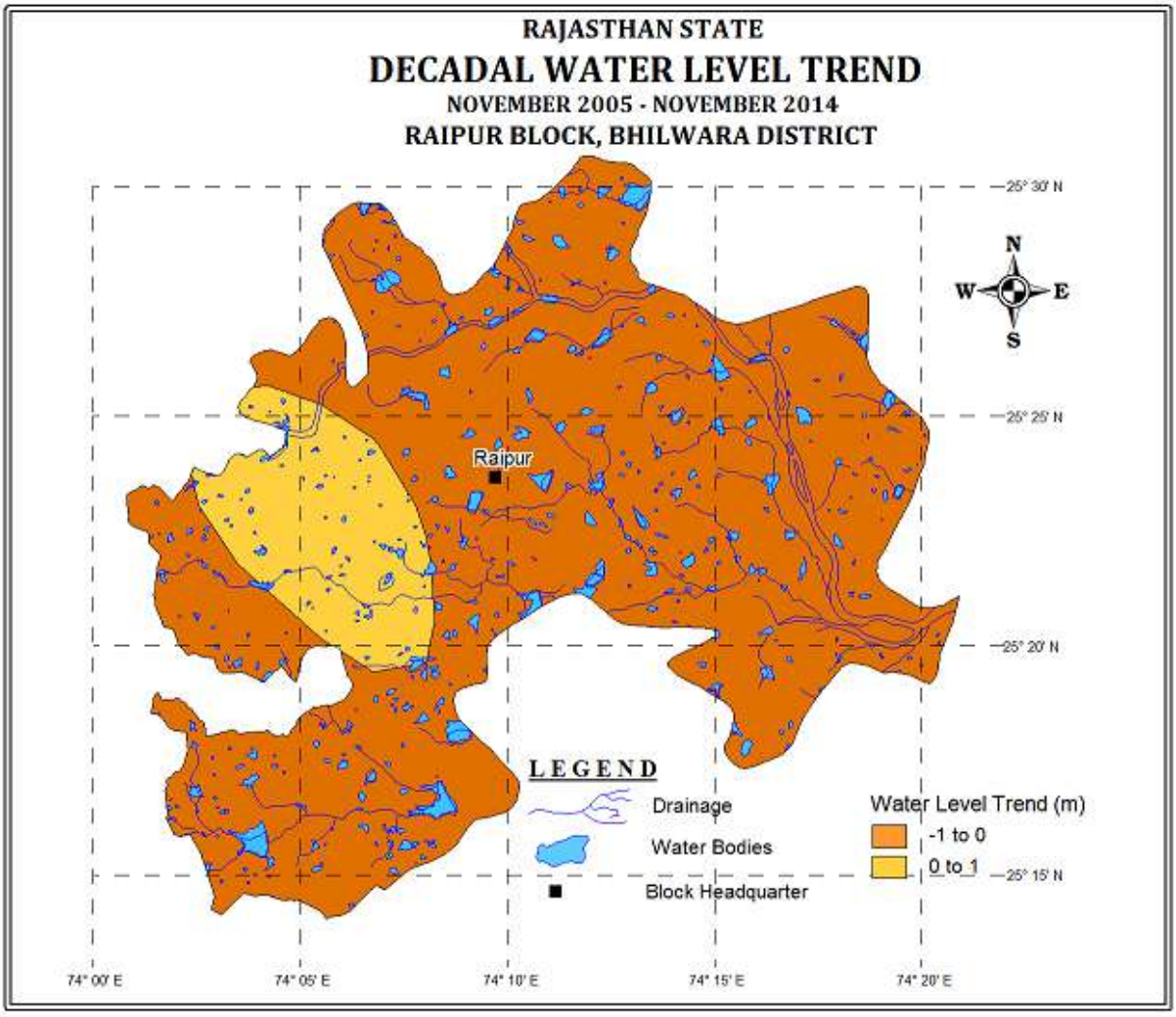
S
Raipur
LEGEND
Drainage
Water Bodies
Block Headquarter
Depth to Water Level (m bgl)
2 - 5
5 - 10
10 - 20

Fig: 7



Subsurface Hydrogeology

As inferred from borehole data of the Raipur Block; Schist, Phyllite & Gneiss form the aquifers. However, the ground water in these only occurs in shallow weathered parts or fractures due to absence of primary porosity. The depth of drilling is 172.30 mbgl and the average discharge value is 3.33 lps. The quality of ground water in the block is affected by high salinity & fluoride contamination.

Dynamic Ground Water Resource

The status of ground water resources of the block is presented in table 1. The annual Net Ground water Availability in the block is 1929.55ham and Annual Ground water draft is 3083.80ham. Stage of Ground water development has reached 159.82%.

Table 1: Ground Water Availability, Utilization and Stage of Development Raipur Block, Bhilwara District (As on 31.3.2011)

Natural Discharge During Non Monsoon Period	214.39 ham
Net Annual Ground Water Availability	1929.55 ham
Annual Ground Water Draft	3083.80 ham
Net Ground water Availability for Future Irrigation Use	Nil
Stage of Ground Water Development	159.82%
Source: Ground Water Resource Assessment 31.03.2011	

Need for artificial recharge and water conservation plan

The present artificial recharge and water conservation Plan aims to mitigate the problems of continuous decline in water levels over the area through techniques of artificial recharge utilizing surplus rainwater based on scientific manner for optimal results. The broad scope of the recharge plan is as follows:

- Establishing efficacy of integrated approach through various artificial recharge and water conservation techniques. Intervention is proposed in cluster mode basis wherever feasible to have a better impact.
- Enhancing water use efficiency for controlling excessive ground water draft, especially for irrigation purposes.
- Ensuring sustainability of ground water abstraction structures and improvement in quality of ground water.

Surface water availability

As per the studies carried out by Water Resources Department, Govt of Rajasthan there is hardly any surplus water available for further development at 75% dependability. However, after taking into account the availability of source water in the basins of Rivers flowing in the State proportionate amount of surplus runoff available in particular block by particular sub basin was calculated.
Accordingly about 0.0553 MCM has been considered for recharge plan in the block. Optimum utilization of rainwater runoff depends on availability of land, feasible conditions, etc. Surface water availability, allocation and number of structures are presented in table 2.

Table 2: Source water for artificial recharge and number of recharge structure

District	District code	Block	Block code	Area of Block (Sq.km.)	Potential area suitable for recharge (Sq.km.)	Type of Aquifer	Area feasible for artificial recharge (Sq km)	Sp Yield
BHILWARA	RJ07	**RAIPUR**	RJ0707	524.200	486.360	hard rock	486.360	0.015

Table 2 (contd): Source water for artificial recharge and number of recharge structure

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)	Sub Basin	Surplus available in the block (in Mm3)	Surplus water used in Recharge Shaft (RS)	No. of RS (0.03 MCM/RS)	Remaining Surplus water for Farm Pond (FP)	No. of FP (0.05 MCM/ FP)
10.720	7.720	56.320	Banas	0.0553	0.03	1	0.0253	1

Feasible Artificial Recharge and water conservation structures

A wide spectrum of techniques is in vougue, which are being implemented to recharge the ground water reservoir, conserve the utilizable rainfall and enhance the water use efficiency. Based on prevailing field conditions, out of total block area of 524.20 sq km practically 486.36 sq km area is feasible for implementing recharge measures. Based on available information about the area such as ground water scenario, hydrogeology, hydrology, topography, rainfall pattern, drainage, soil cover, utilizable rainfall etc. scope for various interventions has been studied and assessment of suitable areas, tentative design and costs of structures has been worked out in the present plan.

Identification of feasible areas

Raipur block is having ground water level between 10 & 20m below ground level and as per dynamic ground water resource estimation, the block is over exploited with stage of ground water development at 159.82%. The Raipur block is feasible for recharge due to presence of permeable zone above water table, favorable land slope and availability of water from rainfall.

Generally the Artificial recharge structures suitable in this type of area are Check dams/ Anicuts/ Percolation tanks and Recharge Shafts/ Recharge wells. Since the ground water levels are quite deep in the block, the structures like ani-cuts and Check dams are

not suitable and also their construction is regulated. Considering this aspect the proposal for Recharge Shaft/ Recharge wells and have been firmed up in the present Plan are the most suitable structures in Raipur block. In view of the availability of number of ponds in the block, percolation tanks are also not found feasible.

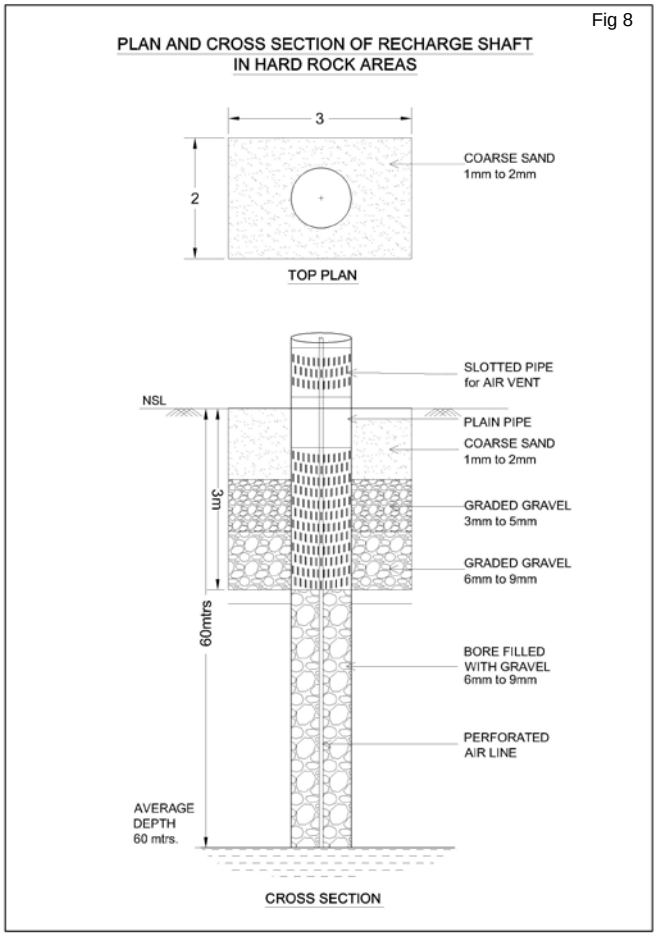
Details of Ground Water Recharge Measures

Existing Village Pond with recharge shaft/wells

Almost all the villages in the State of Rajasthan have one or two village ponds & other ponds. With time, these ponds get silted & hardly any water percolates downward. Also, any excess water coming into the pond goes away as a run off due to limited storage capacity. This surplus runoff can very well be utilized for recharging the ground water and also for enhancing conservation of water that can be further used for irrigation, thereby saving ground water withdrawal. Since natural recharge from these ponds is limited due to siltation and ground water levels are deep, the most effective ground water structure considered under the Plan is Recharge Shaft/ Recharge well constructed within the pond itself.

The above mentioned recharge well has been designed in a manner that maximum surplus water would likely to be utilized for recharge as well as sufficient water is retained in the pond for local use.

Fig 8



The model design of recharge well has been worked out in consultation with Ground Water Department, Government of Rajasthan and presented in Fig 8. The major features required are:

1. The well should have sufficient diameter for recharge- 10 to 12 inch diameter well with bottom screen/ opening just above the highest ground water level.
2. The well should have screen/ opening at the top, which should be at least 1.5m above the bed level of the pond.
3. The upper opening should be surrounded with filter pack comprising graded filter media of medium, coarse sand & gravel, so that the Recharge well does not get silted.

The opening for inflow to the well has been proposed at 1.5m above Bed level

of pond. This is necessary to ensure that the pond retains sufficient water for use by local consumers. However, this may necessitate further deepening of pond itself so that the pond is 3-4 m deep. A Single well as discussed above would be suitable for a pond upto area of about 5ha. Therefore, more number of such Recharge wells is envisaged for larger ponds.

The tentative location of villages for construction of recharge shaft/well in existing village pond and their cost estimates are shown in Fig 9 and Table 3. The plan proposes construction of 1 recharges shafts/ wells at 1 identified existing village pond at an estimated cost of 2.6 lacs.

Fig: 9

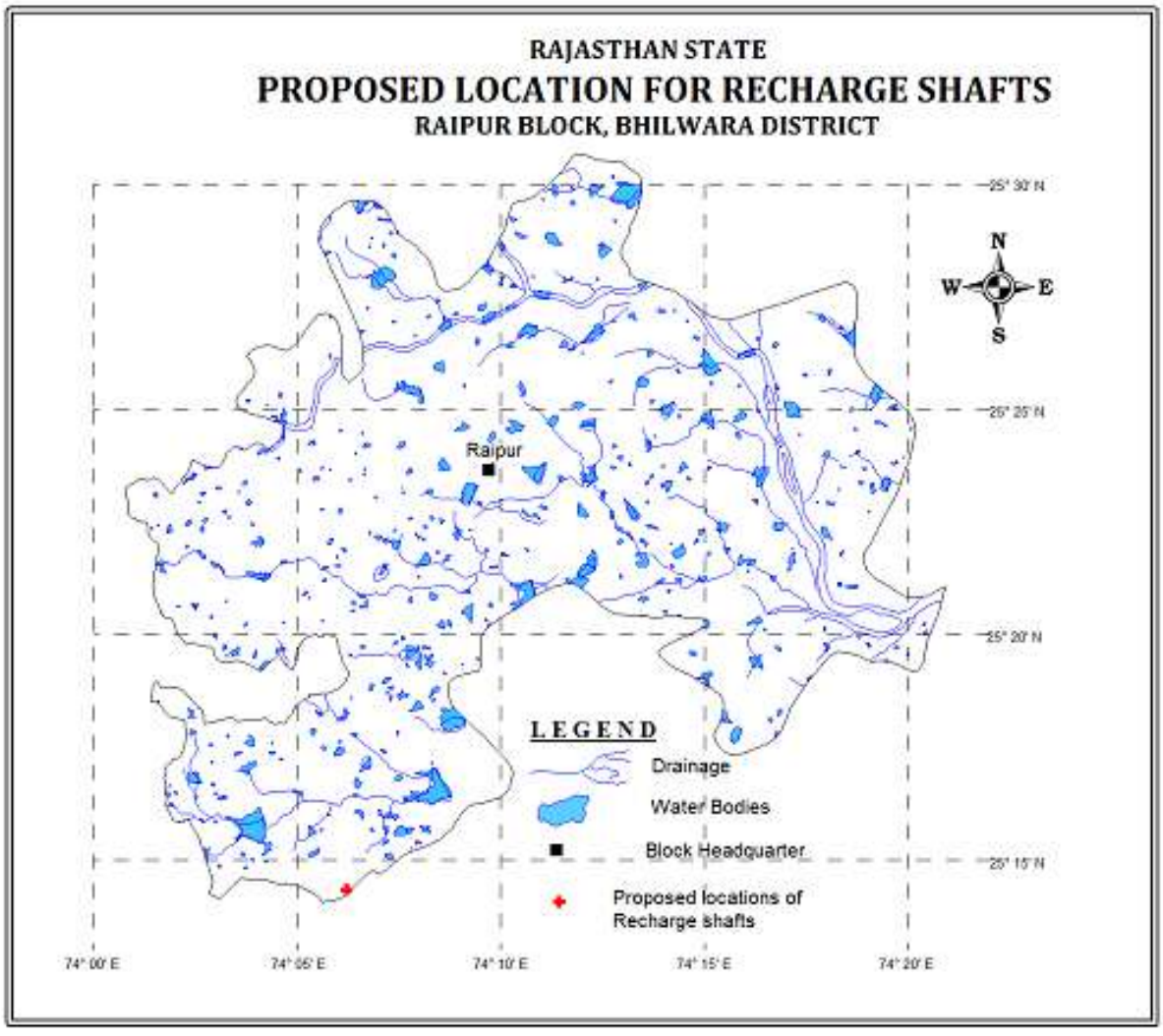


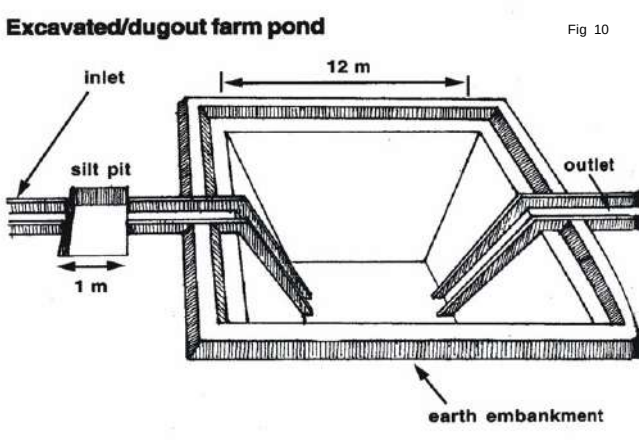
Table 3: Tentative locations of village for village pond with recharge shaft

S No.	Village	Long	Lat	Pond area (ha)	Formation	No of Shafts	Unit cost (Rs in lac)	Total cost (Rs in lac)
1	Jharol	74.104	25.239	2.003	Hard Rock	1	2.6	2.6
				Total		1		2.6

Conservation Measures

As mentioned earlier the present Plan occurs on integrated approach of interventions, which includes both recharge measures as well as conservation of water while the recharge interventions have been discussed. The proposed conservation measures discussed below includes conservation of farm ponds, revival, repair of existing water bodies, etc.

A. Farm Ponds



A farm pond is a large hole dug out in the earth, usually square or rectangular in shape, which harvests rainwater and stores it for future use. It has an inlet to regulate inflow and an outlet to discharge excess water. The pond is surrounded by a small bund, which prevents erosion on the banks of the pond. The size and depth depend on the amount of land available, the type of soil, the farmer's water requirements, the cost of excavation, and the possible uses of the excavated earth. Water from the farm pond is conveyed to the fields manually, by pumping, or by both methods. Pictorial diagram of farm pond is shown in fig 10.

Advantages of Farm Ponds

- They provide water to start growing crops, without waiting for rain to fall.
- They provide irrigation water during dry spells between rainfalls. This increases the yield, the number of crops in one year, and the diversity of crops that can be grown.
- Bunds can be used to raise vegetables and fruit trees, thus supplying the farm household with an additional source of income and of nutritious food.
- Farmers are able to apply adequate farm inputs and perform farming operations at the appropriate time, thus increasing their productivity and their confidence in farming.
- They check soil erosion and minimize siltation of waterways and reservoirs.
- They supplies water for domestic purposes and livestock

- They promote fish rearing.
- They recharge the ground water.
- They improve drainage.
- The excavated earth has a very high value and can be used to enrich soil in the fields, leveling land, and constructing farm roads

It is proposed to construct 1 farm ponds as per the specification of Govt. of Rajasthan (30 x 30 x 1.5 m). This can accommodate about 0.03 MCM of runoff rainfall considering 3 fillings. Farm ponds can be constructed in the village at feasible location. Dimension of the farm pond depends on land holdings.

B. Revival, repair of water bodies

The existing ponds and tanks in 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.

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. The monitoring system should be designed judiciously to monitor impact of these structures individually as well as collectively. Demarcation of the zone of influence of the artificial recharge structure is one of the main objectives of monitoring.

It is proposed to utilize the existing data available with the Government of Rajasthan and CGWB baseline data. For assessment of the impact of proposed measures additional data will be generated by construction of the piezometer at suitable and strategic sites.

It is proposed to construct 1 piezometer, at suitable location for monitoring of water levels, in the vicinity of proposed recharge structure. The depth of the piezometer may vary from 60 to 80 mbgl. This will help in assessing the impact of the project implementation.

Since the implantation of the Plan involves institutional framework, it is proposed to constitute State Level Technical Coordination Committee (SLTCC) and District Level Technical Coordination Committee (DLTCC) for proper monitoring and review of the implementation of the Plan.

Financial Outlay of the Plan

The total estimated cost of the Plan is 0.1386 cr, which includes Rs 0.026 cr for ground water recharge activities, Rs 0.1 cr (Farm ponds), 0.006 cr for ground water monitoring (Piezometer construction) and Rs 0.0066 cr towards operation and maintenance charges. 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). The total estimated cost of the project is **Rs 0.1386 Crores**.

Table 4: Cost of the recharge structures

Cost of Percolation Tank in Rs in crs (Unit cost Rs 0.4 cr)	Cost of Farm Pond in Rs (Unit cost Rs 0.1 cr)	Cost Recharge Shaft Rs in crs (Unit cost Rs 0.05 cr for alluvium and Rs 0.026 cr for hard rock)
0	0.10	Hard rock – 0.026

Table 5: Tentative cost of different activities

Feasible Artificial Recharge & Water Conservation structures/ activities	**Tentative Design**	**Quantity (in nos. or area in sq. m)**	**Rainwater harvested (mcm)**	**Tentative unit cost (in Rs lakh)**	**Total tentative cost (in Rs lakh)**	**Expected Annual GW recharge/ conservation (mcm)**
Recharge Structures/ Activities						
Recharge shaft within the pond /tanks	Hard rock: Depth –60m, Dia 10-12”with filter pit	1	0.03	2.6	2.6	0.021
Water Conservation Activities						
Farm Pond (3 fillings)	(30 m x 30m x 1.5 m)	1	0.0253	10	10	0.018
Impact assessment & Monitoring						
Piezometer	Up to 80 m bgl	1		0.6	0.6	
Impact assessment will be carried out by implementing agency						
O & M - 5% of total cost of the scheme					0.66	
TOTAL					**13.86**	
Note: Type, number and cost of structure may vary according to site after ground verification						

Time Schedule

The project is to be implemented in two years, however impact assessment will be carried out for five years**.** A time schedule for different activities is given in table 6.

Table 6: Time Schedule

Steps	1st phase	2th Phase	3rd Phase	4th Phase	5th Phase	6th Phase	7th Phase	8th Phase
Constitution of State Level Technical Coordination Committee (SLTCC) and District Level Technical Coordination Committee (DLTCC)	■							
Arranging meeting of SLTCC for provision available under the scheme, request to implementing agencies for submission of DPR		■	■					
Scrutiny, recommendations & approval of AR Projects / Schemes in DLTCC & SLTCC		■	■					
Forwarding the DPR to Central Ground Water Board (CHQ), New Delhi for approval and issuing of sanction from the Ministry		■	■					
Meeting of TCC(CHQ) and release of sanction of funds		■	■					
Construction of artificial recharge structures & Monitoring of water levels in the area locally				■	■			
Completion and Utilisation certificate						■	■	
Impact Assessment and submission of report								■

Expected Benefits or outcome of the Plan

Ground water recharge and water conservation Plan of Raipur block, Bhilwara envisages gainful utilization of 0.03 MCM of surplus monsoon runoff for recharging of depleted aquifer system. Besides this, the proposed intervention would also lead to reduction of pre-existing ground water draft by 0.025MCM annually through construction of farm ponds.

With the additional recharge and water conservation interventions as proposed in the Plan, it is anticipated that with enhanced recharge and reduction in ground water draft, the stage of ground water development will reduce to 159.44 % from the existing 159.82%. The projected status of ground water resources and utilization scenario is presented in table 7.

Table 7: Projected Status of Groundwater Resource & Utilization							
Net G.W. Availability (mcm)	**Additional Recharge from RWH & conservation (mcm)**	**Total Net G.W. Availability after intervention (Ham)**	**Existing G.W Draft for all purpose (ham)**	**Saving of Ground water through projects (ham)**	**Net GW draft after interventions (ham)**	**Present stage of G.W. development (%)**	**Projected stage of G.W. Dev. (in %)**
19.2955	0.03	19.3255	30.838	0.0253	30.8127	159.82	159.44

- The implementation of the project would result in additional recharge. The other tangible/ non-tangible benefits of the project are:

- Recharging the ground water will help in arresting the rapid decline in ground water resources and will also ensure improvement in quality of ground water by way of dilution.
- Proposed structures and measures will also enhance the ground water potential and would ensure sustainability of ground water resources.
- Surface runoff water stored or harnessed can be used as supplemental irrigational resources and will reduce the stress on the ground water.
- Besides, it will also help in reducing the amount and spate of storm water being drained by river and controlling soil erosion.