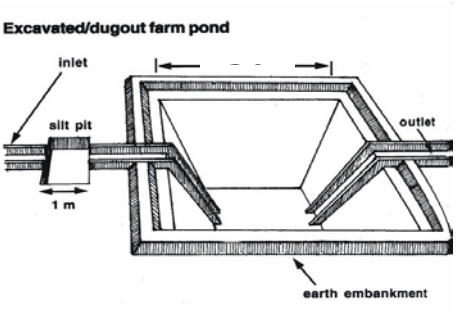
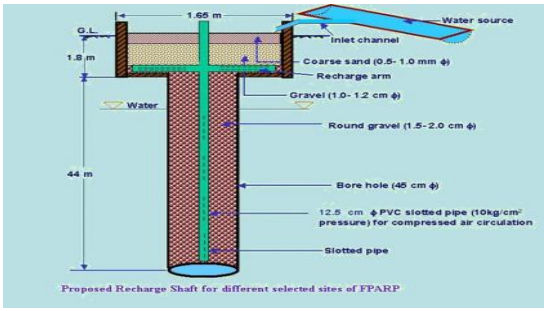
CENTRAL GROUND WATER BOARD

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





ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF NEEMRANA BLOCK, DISTRICT ALWAR, RAJASTHAN

Western Region, Jaipur
February, 2016

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLANBLOCK NEEMRANA, DISTRICT ALWAR

Plan at a Glance

1.	**Area of the Neemrana Block**	**378.82 Sq.Km.**
2.	**Area identified for Artificial Recharge**	**327.47 sq km**
3.	**Dynamic Ground Water Resources (as on 31.03.2011)**	
	Net Ground Water Availability	**37.30 MCM**
	Annual Ground Water Draft	**64.48 MCM**
	Stage of Ground Water Development	**172.88 %**
4.	**Runoff available in the block** **Volume of water recharged** **Volume of water conserved for other interventions**	**2.2997 MCM** **2.2997 MCM** **nil**
5.	**Volume of unsaturated aquifer zone available for recharge**	**1572.45 MCM**
6.	**Total number of structures to be proposed**	
	Recharge structures Existing village pond with recharge shaft/ well Percolation tank **Water Conservation** Farm pond	 **47 shafts in 40 Nos. of existing village ponds** **5 Nos.** **nil**
	Expected Annual GW recharge	**1.6098 MCM**
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	**nil**
	Total recharge/ saving of ground water	**1.6098MCM**
7.	**Estimated Cost** Artificial Recharge Plan Water conservation measures Piezometer construction Operation and maintenance	**4.851 crore** 4.35 crore nil 0.27 crore 0.231 crore

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN BLOCK NEEMRANA, DISTRICT ALWAR

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 **Neemrana 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 **172.88%.** 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

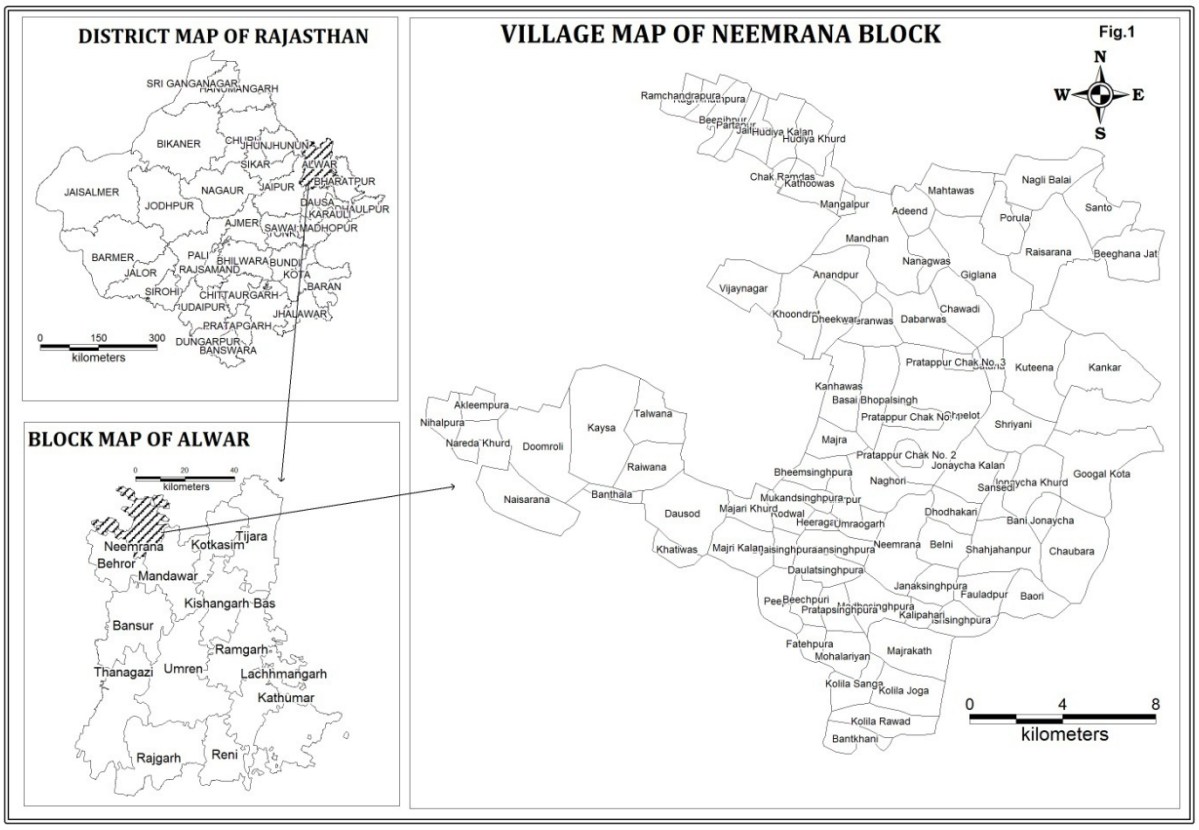
Location of the block

Neemrana Block of Alwar district falls under Over-Exploited category. It covers an area of 378.82 sq. km. and falls in northern part of Alwar district. It is located between North latitudes 27°55’ & 28°11’ and East longitudes 76°11’ & 76°30’. The total rural population of the Block is 151014 persons as per the 2011 census. It is comprised of 79192 males and 71822 females. Location map is shown in **Fig.1**.

Source wise Irrigated Area

The dug wells/ Tubewells are the only major source of irrigation in Neemrana Block. There is no area that falls under canal & pond irrigation. The wells irrigate total 368.56 sq.km. area in this Block.

Fig: 1



Physiography & Drainage

Physiographically **(Fig.2),** the block is characterized by presence of alluvial plains, sandy plains and hills. The minimum and maximum elevation of Block is 264.9 m and 503.8 m, respectively.

There is no perennial & seasonal river flowing in this Block. However, the entire block falls under Sabi river basin. The drainage and water bodies map is given as **Fig: 3**.

Fig: 2

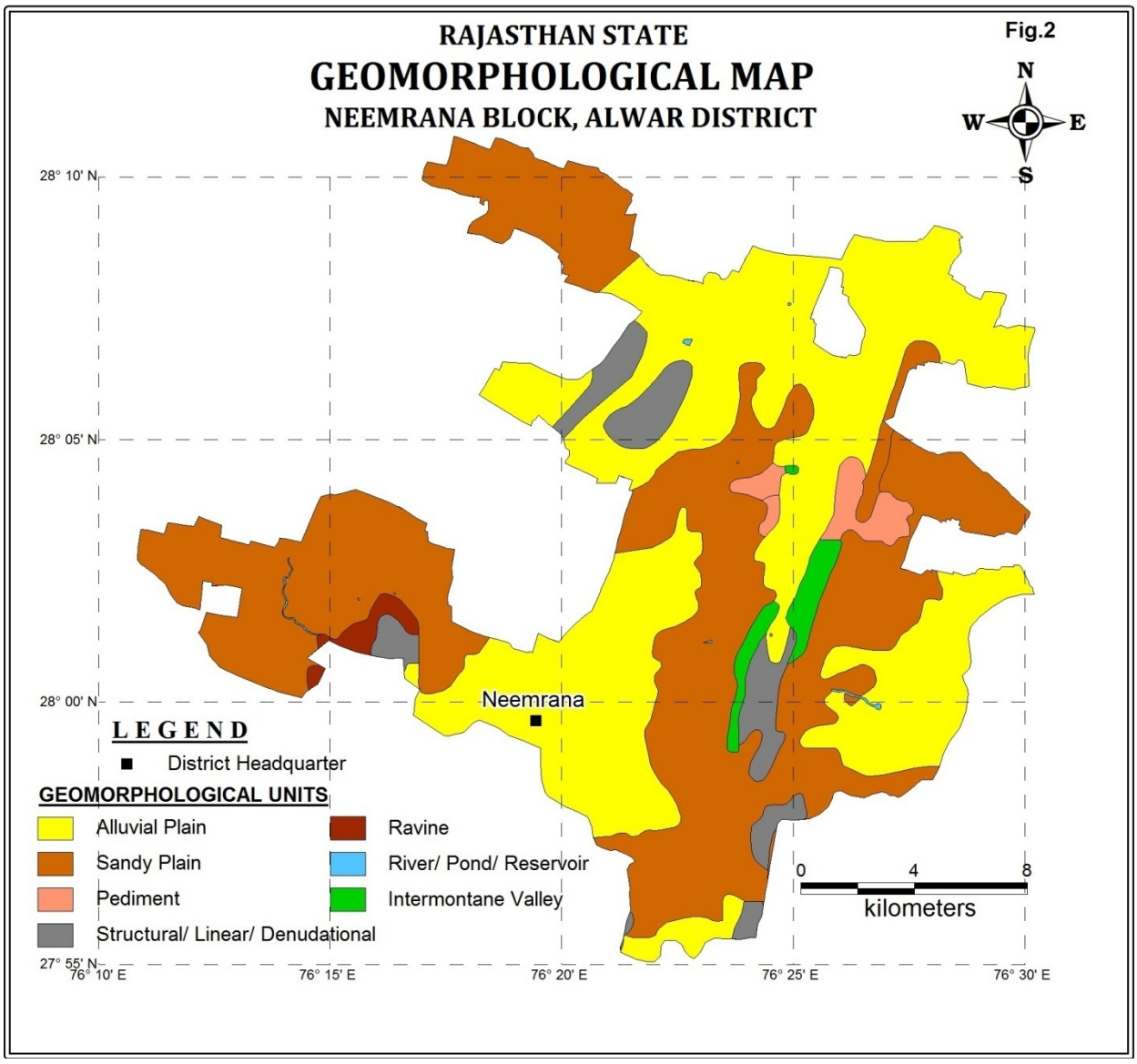
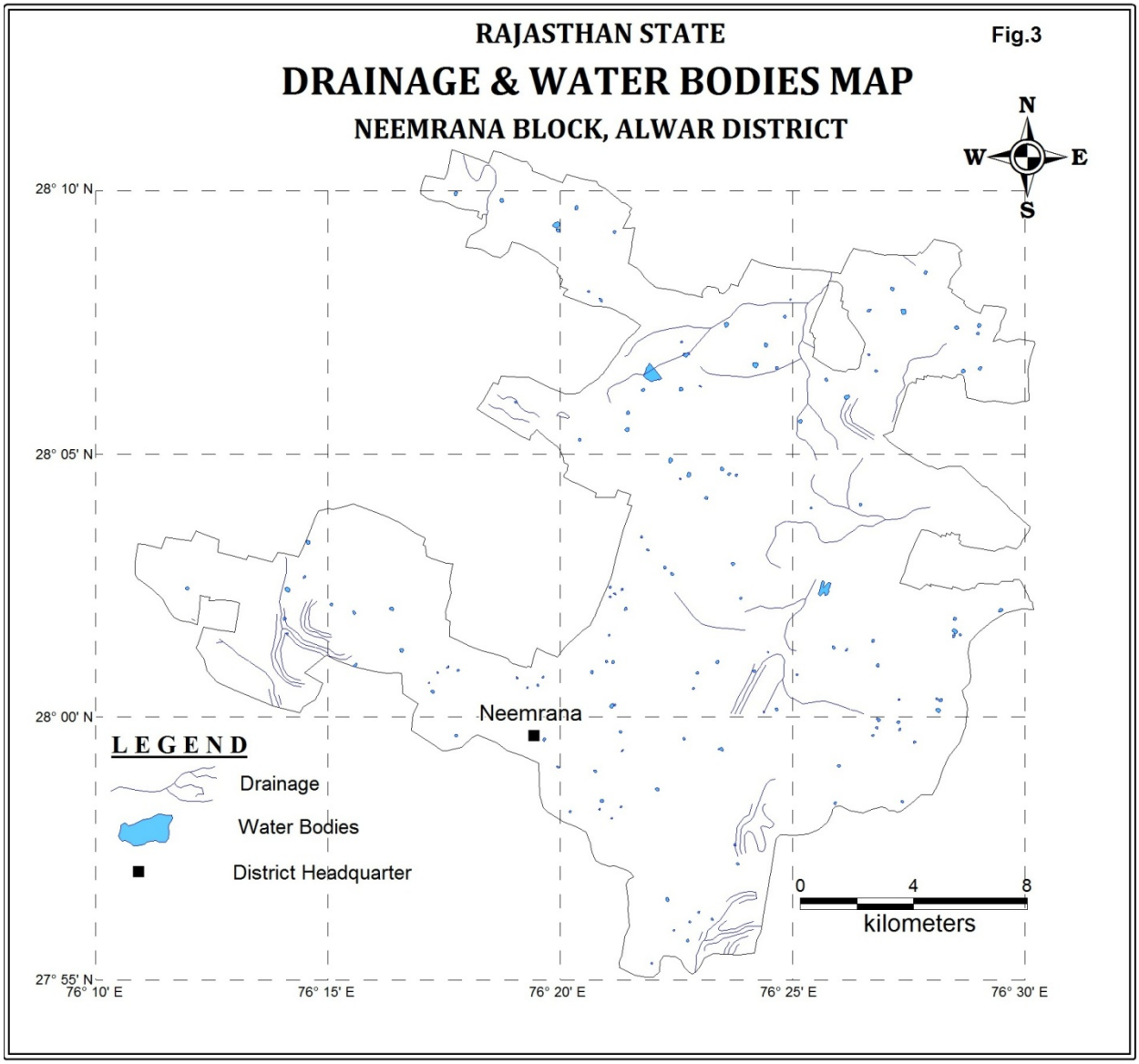

RAJASTHAN STATE
GEOMORPHOLOGICAL MAP
NEEMRANA BLOCK, ALWAR DISTRICT
Fig.2
N
W
E
S
28° 10' N
28° 05' N
28° 00' N
27° 55' N
76° 10' E
76° 15' E
76° 20' E
76° 25' E
76° 30' E
Neemrana
LEGEND
District Headquarter
GEOMORPHOLOGICAL UNITS
Alluvial Plain
Sandy Plain
Pediment
Structural/ Linear/ Denudational
Ravine
River/ Pond/ Reservoir
Intermontane Valley
0
4
8
kilometers

Fig: 3


RAJASTHAN STATE
Fig.3
DRAINAGE & WATER BODIES MAP
NEEMRANA BLOCK, ALWAR DISTRICT
N
W
E
S
28° 10' N
28° 05' N
28° 00' N
27° 55' N
76° 10' E
76° 15' E
76° 20' E
76° 25' E
76° 30' E
Neemrana
LEGEND
Drainage
Water Bodies
District Headquarter
0
4
8
kilometers

Rainfall

The climate of the block is semi arid. The Normal annual rainfall of block is 585.26mm. Failure of rains has observed several times. The available data of rainfall indicates that larger part of annual rainfall is received through SW monsoon during July to September. In March, there is transition to summers. The summer months of April to June are the hottest months and temperature upto 48°C is reached. From end of June to September, south western monsoon is received. The months of July and August are the wettest months, receiving about 70% of total annual rainfall. Winter season starts from November and lasts upto February. Average temperature during these months remains between 15° to 18°C, however from end of December to mid January, temperature remains in the range of 5° to 10°C.

1.5 Hydrogeology of the Area

Neemrana Block is mostly covered by older Quaternary alluviums. Older alluviums form major aquifers in this Block. Out of total geographical area of 378.82Sq. Km, an area of 327.43 Sq. Km. (86.43%) forms aquifer system (potential zone) in the block and remaining 51.39 Sq. Km.(13.57%) area is represented by hills. Ground water occurs under phreatic conditions in the shallow aquifers and under semi-confined conditions in the deeper aquifer, which is the principal water bearing zone. In general yield of wells tapping alluvial aquifers varies from 0.46 to 3.47 lps depending on the thickness of saturated granular zones.

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 20-50 m bgl range. **(Fig 4)**

The average decadal depth to water level is 46.69mbgl for Pre monsoon & 44.64 m bgl for Post monsoon. In general, the depth to water level is more than 40 m bgl in major part of Block The Map showing Depth to water level for May, 2014 and November, 2014 is shown in **Fig 5 & 6.**

Fig: 4

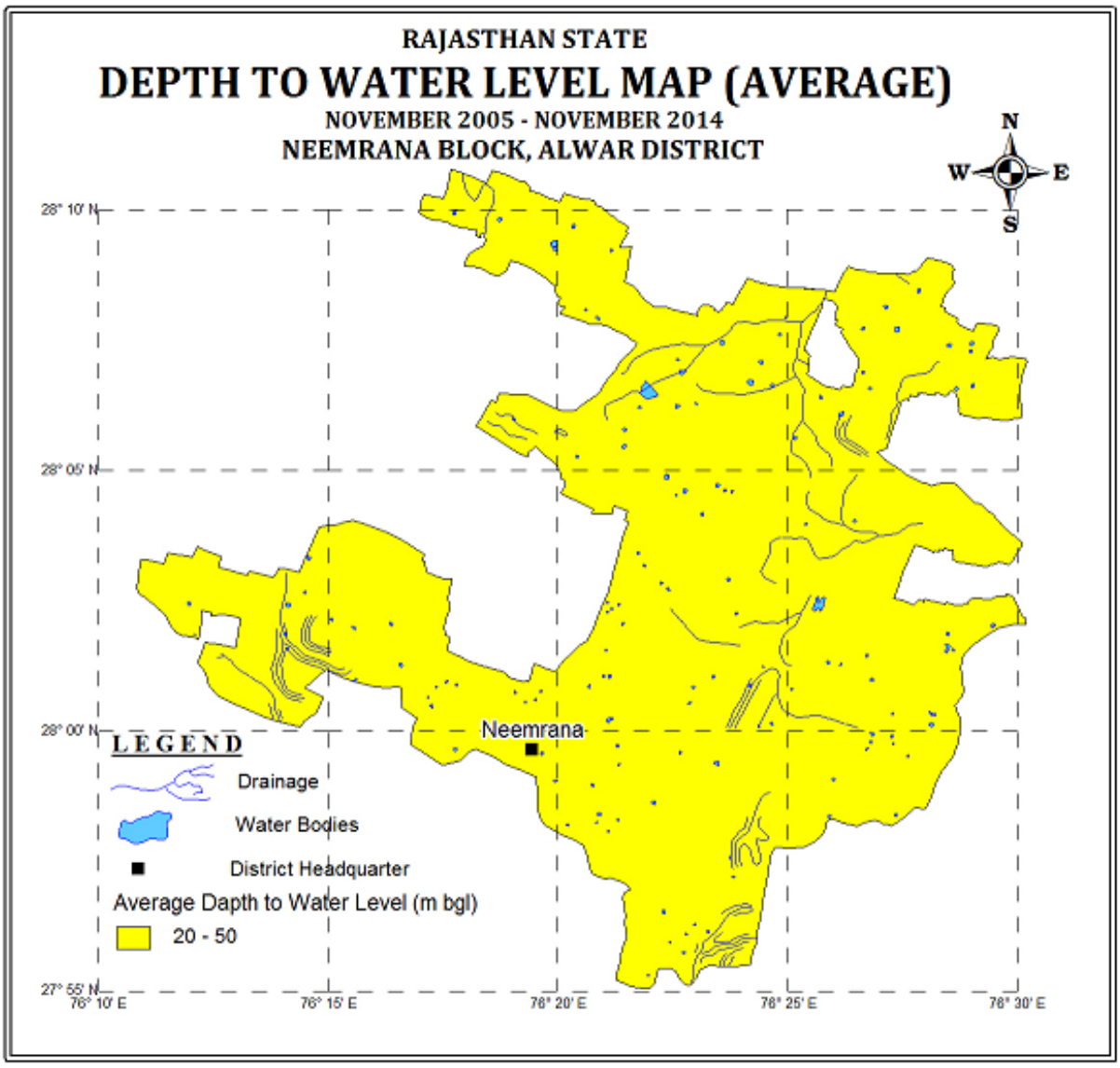

RAJASTHAN STATE
DEPTH TO WATER LEVEL MAP (AVERAGE)
NOVEMBER 2005 - NOVEMBER 2014
NEEMRANA BLOCK, ALWAR DISTRICT
N
W
E
S
28° 10' N
28° 05' N
28° 00' N
27° 55' N
76° 10' E
76° 15' E
76° 20' E
76° 25' E
76° 30' E
Neemrana
LEGEND
Drainage
Water Bodies
District Headquarter
Average Dapth to Water Level (m bgl)
20 - 50

Fig: 5

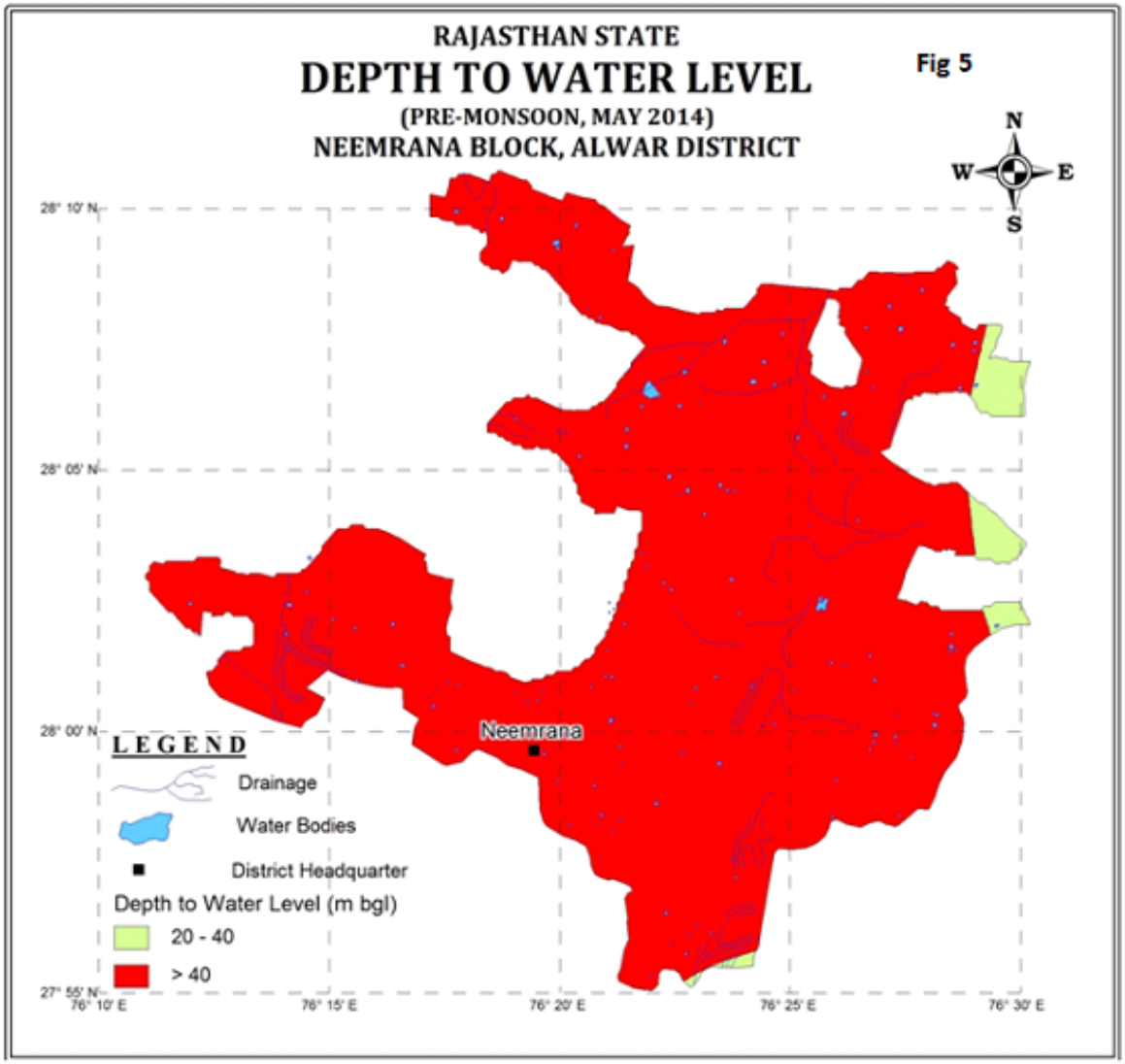
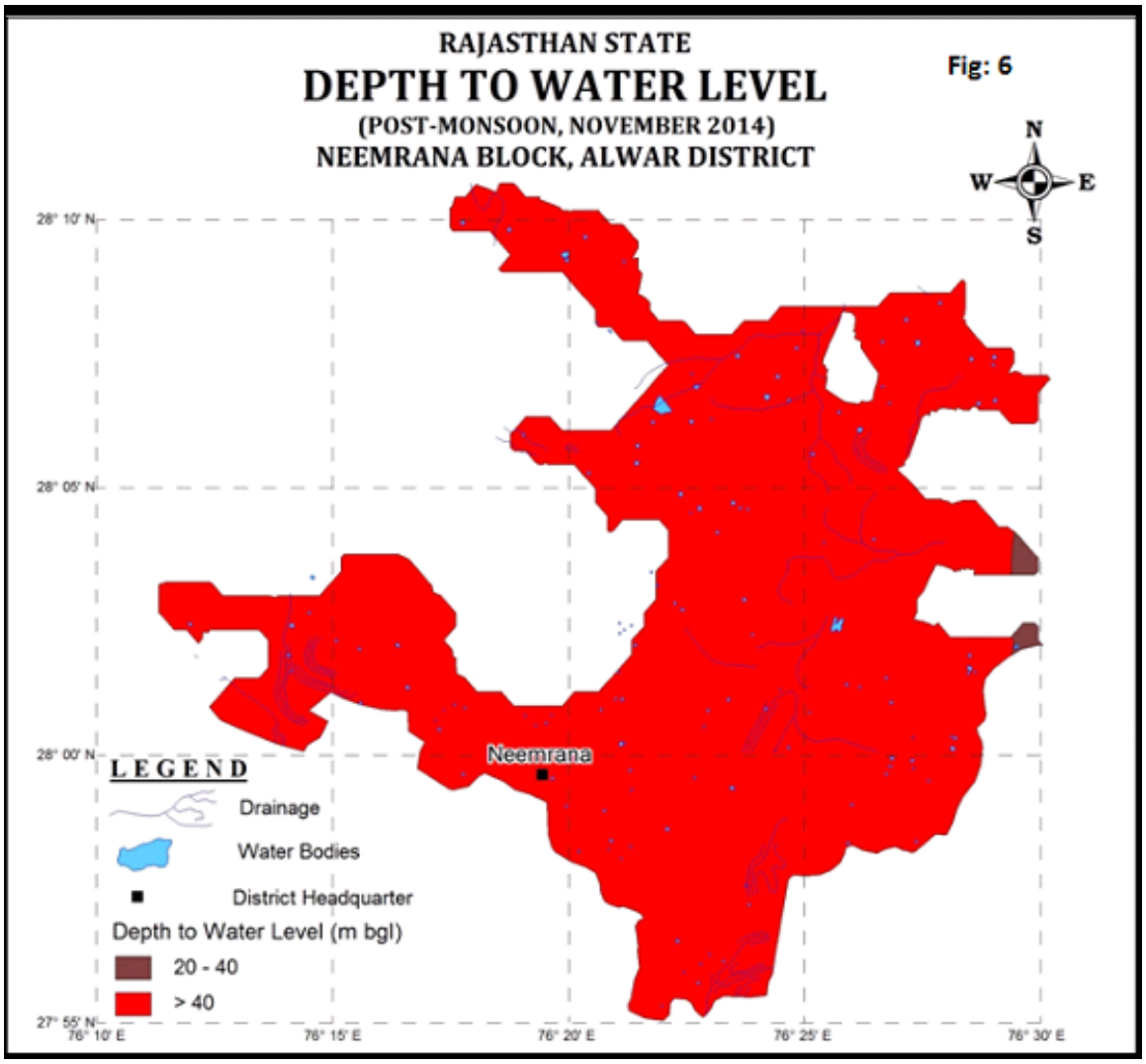

RAJASTHAN STATE
DEPTH TO WATER LEVEL
(PRE-MONSOON, MAY 2014)
NEEMRANA BLOCK, ALWAR DISTRICT
Fig 5
N
W
E
S
28° 10' N
28° 05' N
28° 00' N
27° 55' N
76° 10' E
76° 15' E
76° 20' E
76° 25' E
76° 30' E
Neemrana
LEGEND
Drainage
Water Bodies
District Headquarter
Depth to Water Level (m bgl)
20 - 40
> 40

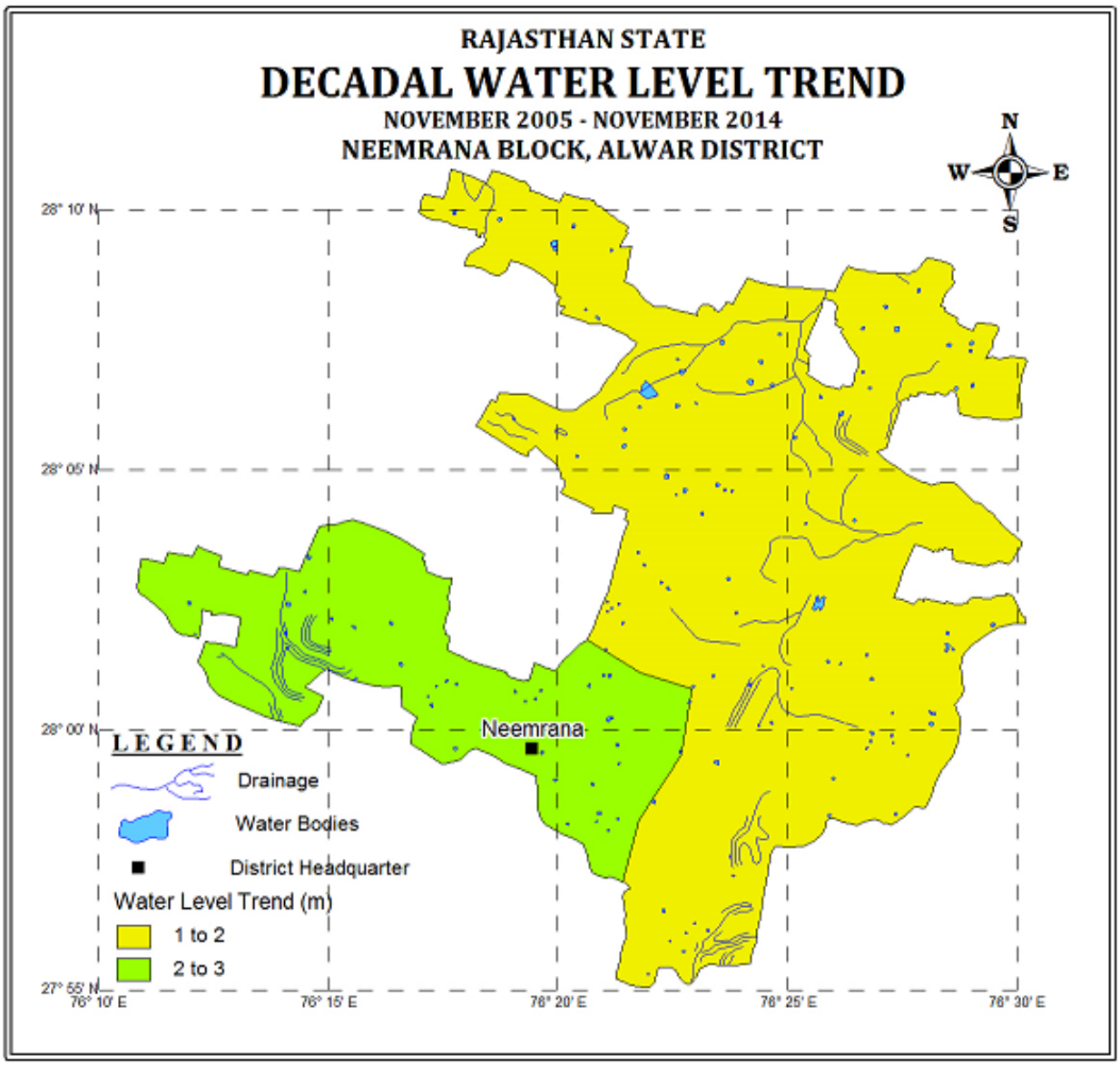
Fig: 6



Water Level Trend: All the hydrographs are showing declining water level trends over last 10 years. At these monitoring stations water level fall varying from 1.59 to 2.40 m/year during pre monsoon and 1.49 to 1.60 m/year during post monsoon has been observed.

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 1-2 m and as high as 2-3 m/ year in ground water level is prevalent in the block. The map of Decadal Water Level Trend is shown in fig. 7.

Fig: 7



Subsurface Hydrogeology

As inferred from borehole data of the Neemrana Block; Older Alluvium forms the major aquifer in the block. The depth of drilling ranges from 71.5 to 145.34 mbgl and the average discharge ranges from 1.67 to 11.22 lps. The quality of water has 2 major problems, i.e., Salinity & Fluoride. Transmissivity value varies between 105 to 430 m^2/day.

Dynamic Ground Water Resource

The Ground water Resources for the block are given in Table 1 as per 31.03.2011 Ground Water Resource Assessment. The Net Ground water Availability of Block is 3729.55 ham and Annual Ground water draft is 6447.61 ham. Due to this excessive draft over recharge, stage of Ground water development has reached 172.88%.

Table 1 Ground Water Availability, Utilization and Stage of Development Neemrana Block, Alwar District

Natural Discharge During Non Monsoon Period	414.40 ham
Net Ground Water Availability	3729.55 ham
Annual Ground Water Draft	6447.61 ham
Net Ground water Availability for Future Irrigation Use	0 ham
Stage of Ground Water Development	172.88%
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 2.2997 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
ALWAR	RJ02	**NEEMRANA**	RJ0212	378.820	327.430	alluvium	327.430	0.120

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 Percolation tank (PT)	No. of PT (0.2 MCM/ PT)
43.020	40.020	1572.450	Dohan	2.2997	1.3997	47	0.9	5

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 378.82sq km practically 327.43 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

Neemrana block is having ground water level mostly more than 40m below ground level and as per dynamic ground water resource estimation, the block is over exploited with stage of ground water development at 172.88%. The Neemrana 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 these aspect the proposal for Recharge Shaft/ Recharge wells and percolation tanks have been firmed up in the present Planare the most suitable structures in Neemrana block.

Details of Ground Water Recharge Measures

1. 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.

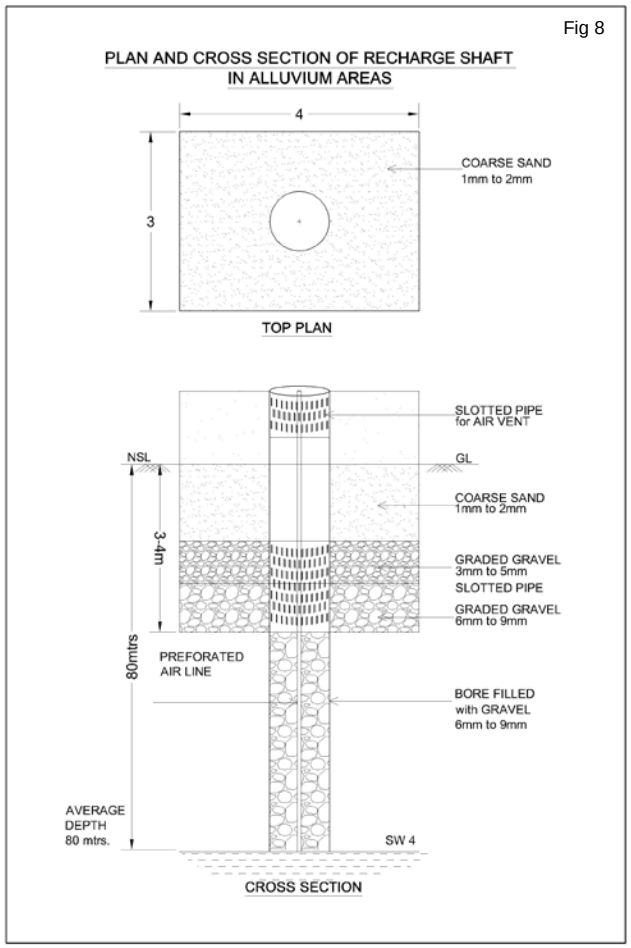
The above mentioned recharge well has been designed in a manner that maximum surplus water would likely to be utilized for recharge as well as sufficient water is retained in the pond for local use.
The model design of recharge well has been worked out in consultation with Ground Water Department, Government 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 2.5 ha. Therefore, more number of such Recharge wells are envisaged for larger ponds.

Fig 8



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 47 recharges shafts/ wells in 40 identified existing village ponds at an estimated cost of 235 lacs.

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

S.N	Village	Long	Lat	Pond Area (Ha)	No of Shaft	Formation	Unit cost (Rs in lac)	Cost of Shaft (Rs in lac)
1	Nareda Khurd	76.200	28.041	1.040	1	Soft_rock	5	5
2	Doomroli	76.234	28.031	1.040	1	Soft_rock	5	5
3	Doomroli	76.236	28.040	1.960	1	Soft_rock	5	5
4	Raiwana	76.273	28.034	1.370	1	Soft_rock	5	5
5	Doomroli	76.243	28.055	1.370	1	Soft_rock	5	5
6	Raiwana	76.276	28.021	1.270	1	Soft_rock	5	5
7	Ramchandrapura	76.296	28.166	1.450	1	Soft_rock	5	5
8	Beenjhpur	76.312	28.164	1.430	1	Soft_rock	5	5
9	Hudiya Kalan	76.333	28.154	1.310	1	Soft_rock	5	5
10	Jaitpur	76.332	28.156	3.840	2	Soft_rock	5	10
11	Hudiya Kalan	76.339	28.161	1.230	1	Soft_rock	5	5
12	Heeragarh	76.352	28.004	1.470	1	Soft_rock	5	5
13	Dheekwar	76.357	28.091	1.530	1	Soft_rock	5	5
14	Dheekwar	76.358	28.096	1.140	1	Soft_rock	5	5
15	Madhosinghpura	76.368	27.977	1.370	1	Soft_rock	5	5
16	Beeranwas	76.373	28.081	1.750	1	Soft_rock	5	5
17	Anandpur	76.368	28.108	22.270	4	Soft_rock	5	20
18	Beeranwas	76.379	28.077	1.690	1	Soft_rock	5	5
19	Mandhan	76.377	28.104	1.480	1	Soft_rock	5	5
20	Mandhan	76.378	28.115	2.290	1	Soft_rock	5	5
21	Neemrana	76.391	27.990	1.520	1	Soft_rock	5	5
22	Dabarwas	76.391	28.079	1.350	1	Soft_rock	5	5
23	Adeend	76.393	28.124	1.790	1	Soft_rock	5	5
24	Pratappur Chak No. 1	76.395	28.049	1.140	1	Soft_rock	5	5
25	Nanagwas	76.403	28.112	2.780	1	Soft_rock	5	5
26	Giglana	76.407	28.118	1.310	1	Soft_rock	5	5
27	Chawadi	76.419	28.094	1.030	1	Soft_rock	5	5
28	Giglana	76.436	28.101	2.140	1	Soft_rock	5	5
29	Chaubara	76.469	28.002	1.150	1	Soft_rock	5	5

30	Nagli Balai	76.452	28.136	1.320	1	Soft_rock	5	5
31	Raisarana	76.457	28.128	2.530	1	Soft_rock	5	5
32	Nagli Balai	76.464	28.141	1.050	1	Soft_rock	5	5
33	Googal Kota	76.491	28.034	2.030	1	Soft_rock	5	5
34	Beeghana Jat	76.484	28.110	1.170	1	Soft_rock	5	5
35	Beeghana Jat	76.478	28.110	1.300	1	Soft_rock	5	5
36	Santo	76.484	28.124	1.280	1	Soft_rock	5	5
37	Santo	76.476	28.123	1.340	1	Soft_rock	5	5
38	Basai Bhopalsingh	76.373	28.045	1.140	1	Soft_rock	5	5
39	Googal Kota	76.475	28.027	1.150	1	Soft_rock	5	5
40	Shriyani	76.427	28.040	12.910	4	Soft_rock	5	20
	Total				47			235

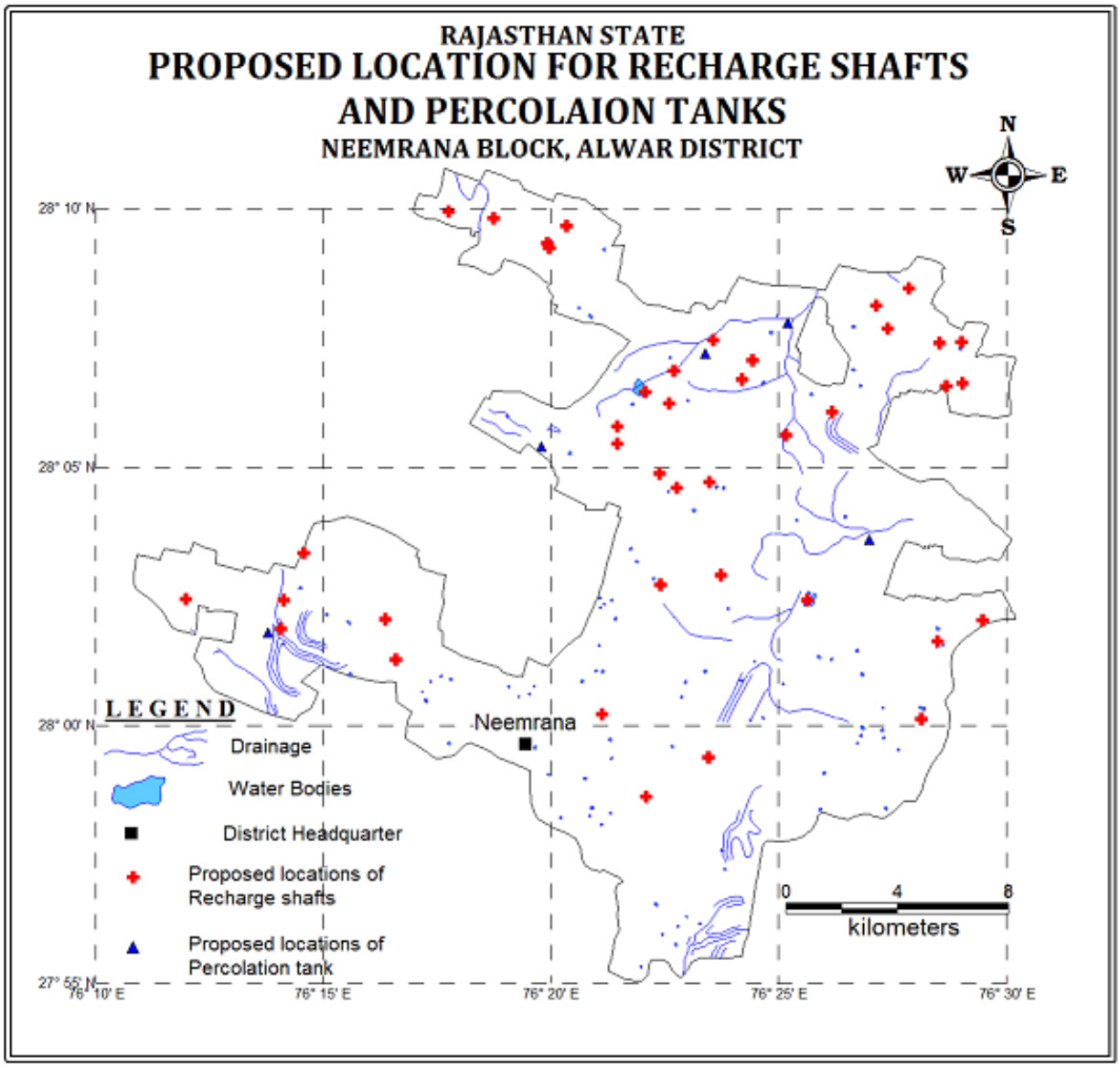
2. Percolation tanks

Percolation tanks are among the most common runoff harvesting structures in India. A percolation tank can be defined as an artificiallly created surface water body submerging a highly permeable land area so that the surface runoff is made percolate and recharge the ground water storage. These are not provide with sluices or outlests for discharging water from tank for irrigation or other purposes. They may, however, be provided with arrangements for spilling away the surplus water that may enter the tank so as to avoid over-topping of the tank bund. It is possible to have more than one percolation tank in a catchment if sufficient surplus runoff is available and the site characxterisitcs favor recahrge through such structures. Under the plan, 5 Nos. percolation tanks (200mx200mx1.5m) in the vicinity of respective villages. Location of percolation tanks is given in Fig 9 and Table 4.

Table 4: Tentative location of village proposed for percolation tank

SN	District	Block	Village	Longitude	Latitude
1	ALWAR	Neemrana	Doomroli	76.230	28.030
2	ALWAR	Neemrana	Vijaynagar	76.330	28.090
3	ALWAR	Neemrana	Adeend	76.390	28.120
4	ALWAR	Neemrana	Mahtawas	76.420	28.130
5	ALWAR	Neemrana	Kuteena	76.450	28.060

Fig: 9


RAJASTHAN STATE
PROPOSED LOCATION FOR RECHARGE SHAFTS
AND PERCOLAION TANKS
NEEMRANA BLOCK, ALWAR DISTRICT
N
W
E
S
28° 10' N
28° 05' N
28° 00' N
27° 55' N
76° 10' E
76° 15' E
76° 20' E
76° 25' E
76° 30' E
Neemrana
LEGEND
Drainage
Water Bodies
District Headquarter
Proposed locations of Recharge shafts
Proposed locations of Percolation tank
0
4
8
kilometers

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 45 piezometer, at suitable locations 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 4.851 cr, which includes Rs 4.35 cr for ground water recharge activities, 0.27 cr for ground water monitoring (Piezometer construction) and Rs 0.231 cr towards operation and maintenance charges. The tentative cost estimates of the various activities of the Plan are shown in Table 5 & 6.

The tentative cost for different activities is given in table 6. The unit rates are as followed by the Govt. of Rajasthan (BSR). The total estimated cost of the project is **Rs 4.851 Crores**.

Table 5: Cost of the recharge structures

Cost Percolation Tank in Rs in crs (Unit cost Rs 0.4 cr)	Cost Recharge Shaft Rs in crs (Unit cost Rs 0.05 cr)
Alluvium – 2	2.35

Table 6: 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	Alluvium – Depth 80m, Dia: 10-12" with filter pit	47	1.3997	5	235	0.9798
	Hard rock: Depth –60m, Dia 10-12"with filter pit	-	-	2.6	-	-
Percolation tanks (3 fillings)	200m*200m*1.5m	5	0.90	40	200	0.63
Sub total					435	1.6098
Impact assessment & Monitoring						
Piezometer	Up to 80 m bgl	45		0.6	27	
Impact assessment will be carried out by implemneting agency						
O & M - 5% of total cost of the scheme					23.1	
TOTAL					**485.1**	

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 7.

Table 7: 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 Neemrana block, Alwar envisages gainful utilization of 1.6098 MCM of surplus monsoon runoff for recharging of depleted aquifer system.

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 172.88% from the existing 165.73%. The projected status of ground water resources and utilization scenario is presented in table 8.

Table 8: Projected Status of Groundwater Resource & Utilization

Net G.W. Availability (Ham)	Additional Recharge from RWH & conservation (mcm)	Total Net G.W. Availability after intervention (mcm)	Existing G.W Draft for all purpose (mcm)	Saving of Ground water through projects (mcm)	Net GW draft after interventions (mcm)	Present stage of G.W. development (%)	Projected stage of G.W. Dev. (in %)
37.2955	1.6098	38.9053	64.4761	0	64.4761	172.88	165.73

- 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.