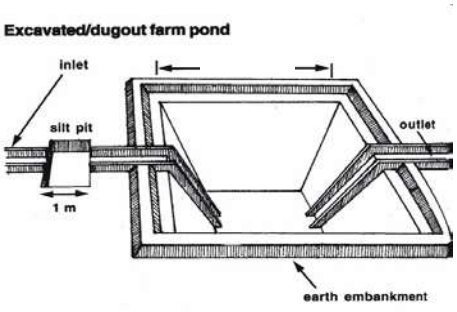
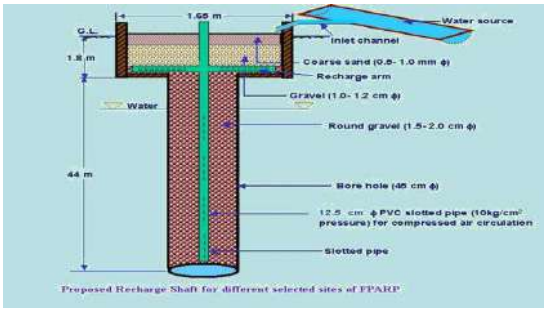
CENTRAL GROUND WATER BOARD

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





ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF LALSOT BLOCK, DISTRICT DAUSA, RAJASTHAN

Western Region, Jaipur
December 2015

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF LALSOT BLOCK, DISTRICT DAUSA

Plan at a Glance

1.	**Area of the Lalsot Block**	**871.24 sq.km.**
2.	**Area identified for Artificial Recharge**	**780.36 sq km**
3.	**Dynamic Ground Water Resources (as on 31.03.2011)**	
	Net Ground Water Availability	**61.6025 MCM**
	Annual Ground Water Draft	**121.0493 MCM**
	Stage of Ground Water Development	**196.50%**
4.	**Volume of water to be harnessed** **Volume of water available for recharge** **Volume of water available for conservation by other interventions**	**4.865 MCM** **4.865 MCM** **0 MCM**
5.	**Volume of unsaturated aquifer zone available for recharge**	**2575.188 MCM**
6.	**Total number of structures to be proposed**	
	Recharge structures Existing village pond with recharge shaft/ well Percolation tank	**Numbers** **144 shafts in 111 Nos. of existing village ponds** **3 Nos.**
	Expected Annual GW recharge	**3.402 MCM**
	Total recharge/ saving of ground water	**3.402 MCM**
7.	**Estimated Cost** **Artificial Recharge Plan** **Piezometer construction** **Operation and maintenance**	**9.982crore** **8.40 crore** **0.38 crore** **1.20 crore**

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF LALSOT BLOCK, DISTRICT DAUSA

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 **Lalsot Block, district Dausa** 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 **196.50%.** 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 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:

The methodology as adopted for the assessment of source water availability is as follows:

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.

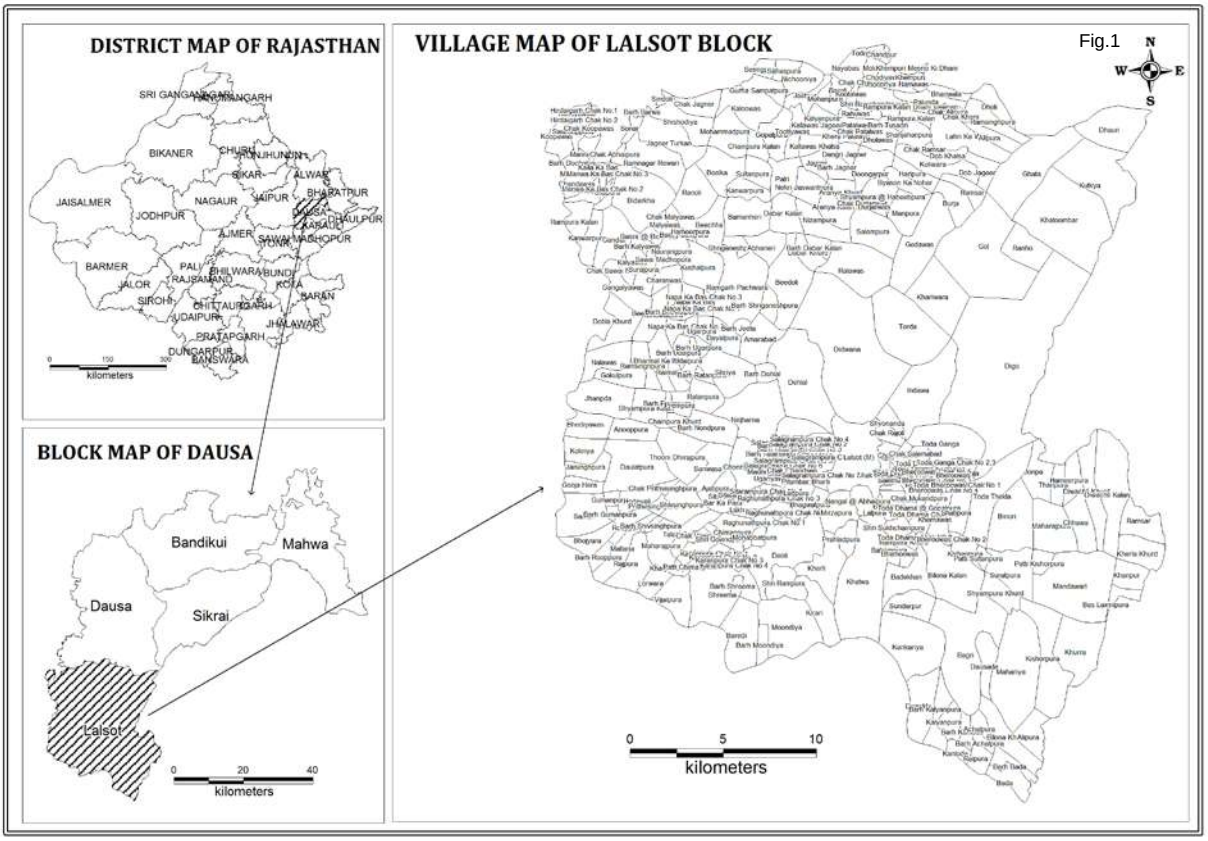
The block area falling in particular sub basin was taken into account and a proportionate area of the sub-basin draining the block was calculated. Based on this area of sub-basin draining the block, proportionate surplus run off, in the block by the sub basin, for recharge was calculated.

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 block showing average water level more than 10 m bgl and declining water level trend were considered as suitable for Artificial Recharge Plan.

Location of the block

The Lalsot Block covering an area of 871.24 Sq. Km. falls in southern part of Dausa District and is located between North latitudes 26°23' & 26°45' and East longitudes 76°09' & 76°29'. As per 2011 census, the total rural population of the Block is 315080 persons consisting of 164654 males & 150426 females. Location map is shown in fig 1.



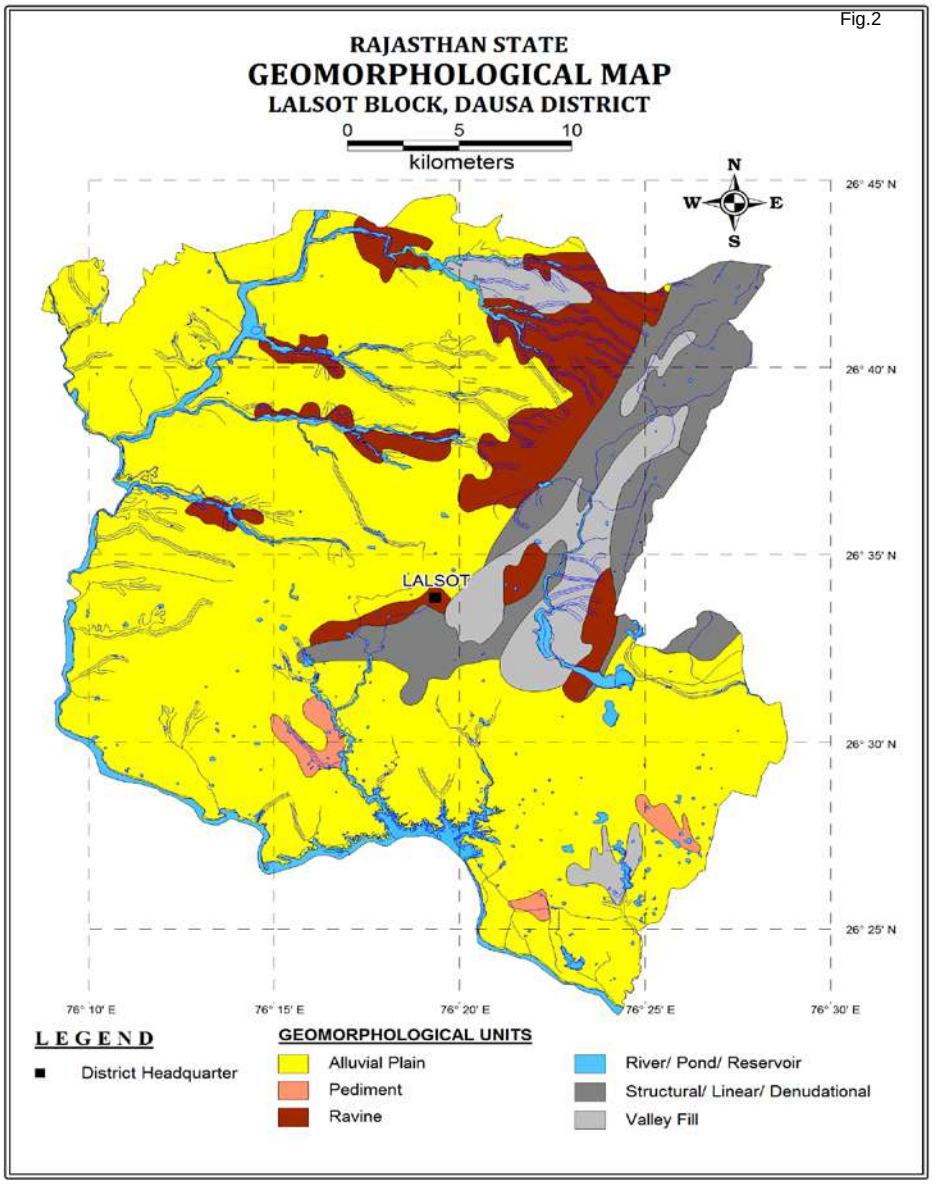
Source wise Irrigated Area

Out of total area of 632.94 Sq.Km., an area of 271.50 (42.90%) falls under irrigation. The dug wells/ Tubewells are the only major source of irrigation in Lalsot Block. There is no canal & pond irrigation.

Physiography & Drainage

Physiographically, the block is characterized by presence of alluvial plains, valley fills, ravines, pediments and hills. The minimum and maximum elevation of Block is 238.0 m. amsl and 549.0 m. amsl, respectively. The map showing various geomorphic units is presented in fig 2.

Fig.2



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

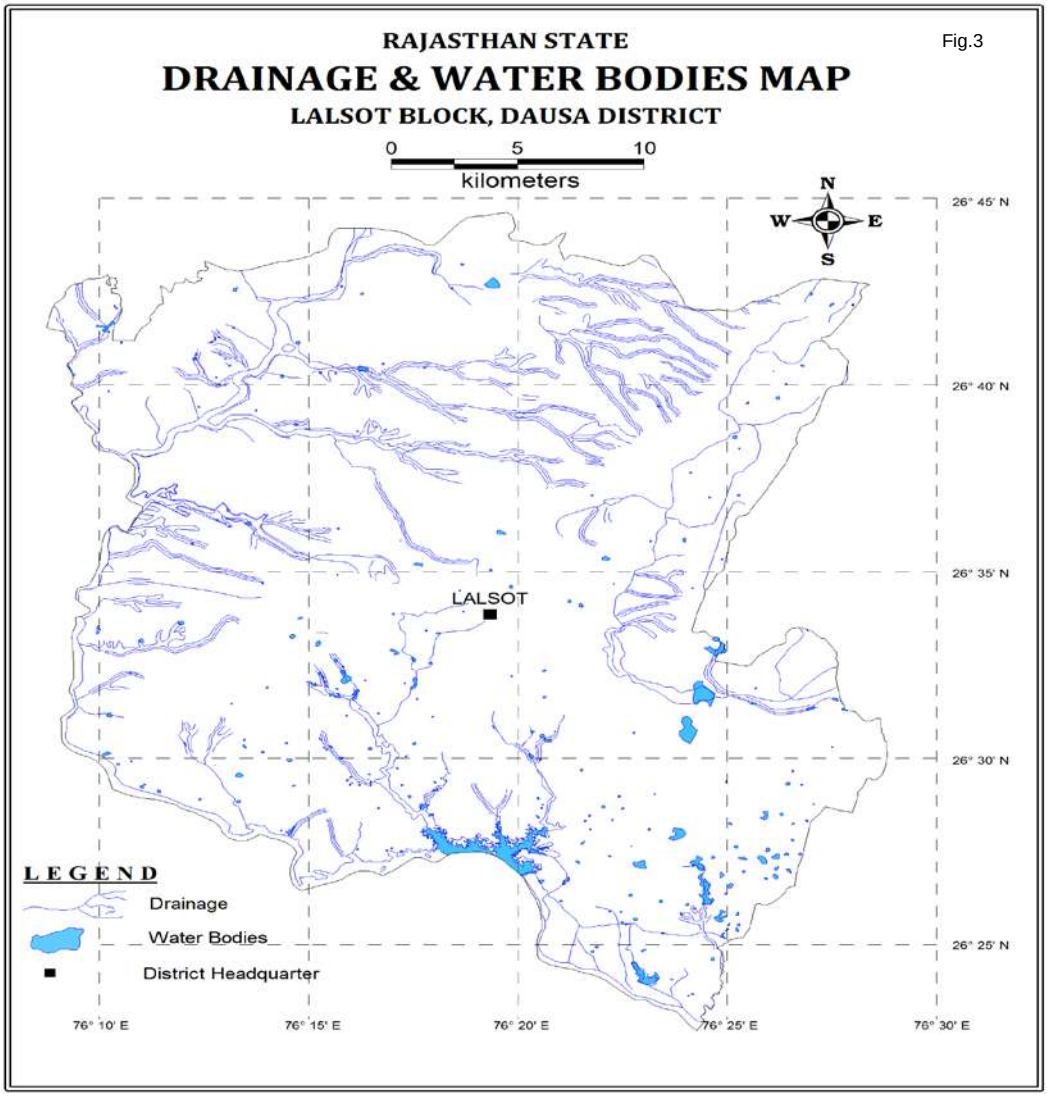


Fig.3

Rainfall

The climate of the block is semi arid. The Normal annual rainfall of block is 653.35 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

Alluvium (composed of sand, clay, kankar and gravel) forms the principal and potential aquifer in the area. Ground water occurs under unconfined to confined conditions in the primary porosity i.e. pore spaces. Talus and scree deposits form minor aquifer occuring on the flanks of almost all the hills. Lithologically, these are composed of rock fragments. Topographically, these are situated in such a position that they receive all the run-off from the hills/hill ranges located nearby. Width of talus and scree deposits along the foothills varies from a few metres to over 500 m. It is more where hill ranges are tectonically affected and disrupted by faulting. Ground water occurs under unconfined to semi-confined conditions. Thickness of talus and scree deposits goes up to 50 m of which the aquifer comprises 28 to 50 m. Phyllite & Quartzites of Delhi Supergroup and Quartzite, phyllite/shale, gneisses of Bhilwara Super Group form the minor aquifers. Ground water occurs under unconfined condition to semi-confined conditions in the weathered mantle (ranging in thickness from 2 to 25 m) and deep-seated secondary porosity i.e. fractures, joints, contacts etc. of hard formation. Out of total geographical area of 871.24 Sq. Km, an area of 780.36 Sq. Km. (89.57%) forms aquifer system (potential zone) in the block and remaining 90.88 Sq. Km.(10.43%) area is represented by hills. In general yield of wells tapping alluvial aquifers varies from 0.35 to 4.63 lps depending on the thickness of saturated granular zones and yield of the wells tapping hard rock aquifers in ranges from 0.06 to 1.16 lps.

Ground Water Level:

The average decadal depth to water level is 44.86 mbgl for Pre monsoon & 37.83 mbgl for Post monsoon. As per Average depth to water level (from November, 2005 to November, 2014), the block falls in water level range of 20-50 m bgl with some parts even showing water level range of 50-60 m bgl. (Fig 4)

According to depth to water level maps of May 2014 & November 2014, water level ranges between 20 to 40 mbgl & more than 40 mbgl in major part except some isolated patches where water level is comparatively shallower. Depth to water level maps for May 2014 & November 2014 is shown in fig 5 & 6.

Water Level Trend:

The hydrographs of wells monitored by CGWB & GWD from 1997 to 2010 shows declining water level trends. A water level fall of 0.82 m/year during pre monsoon and 1.04 m/year during post monsoon has been observed for this period.

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 0-1 and 1-2 m in ground water level is prevalent in the block. The map of Decadal Water Level Trend is shown in fig. 7.

Fig: 4

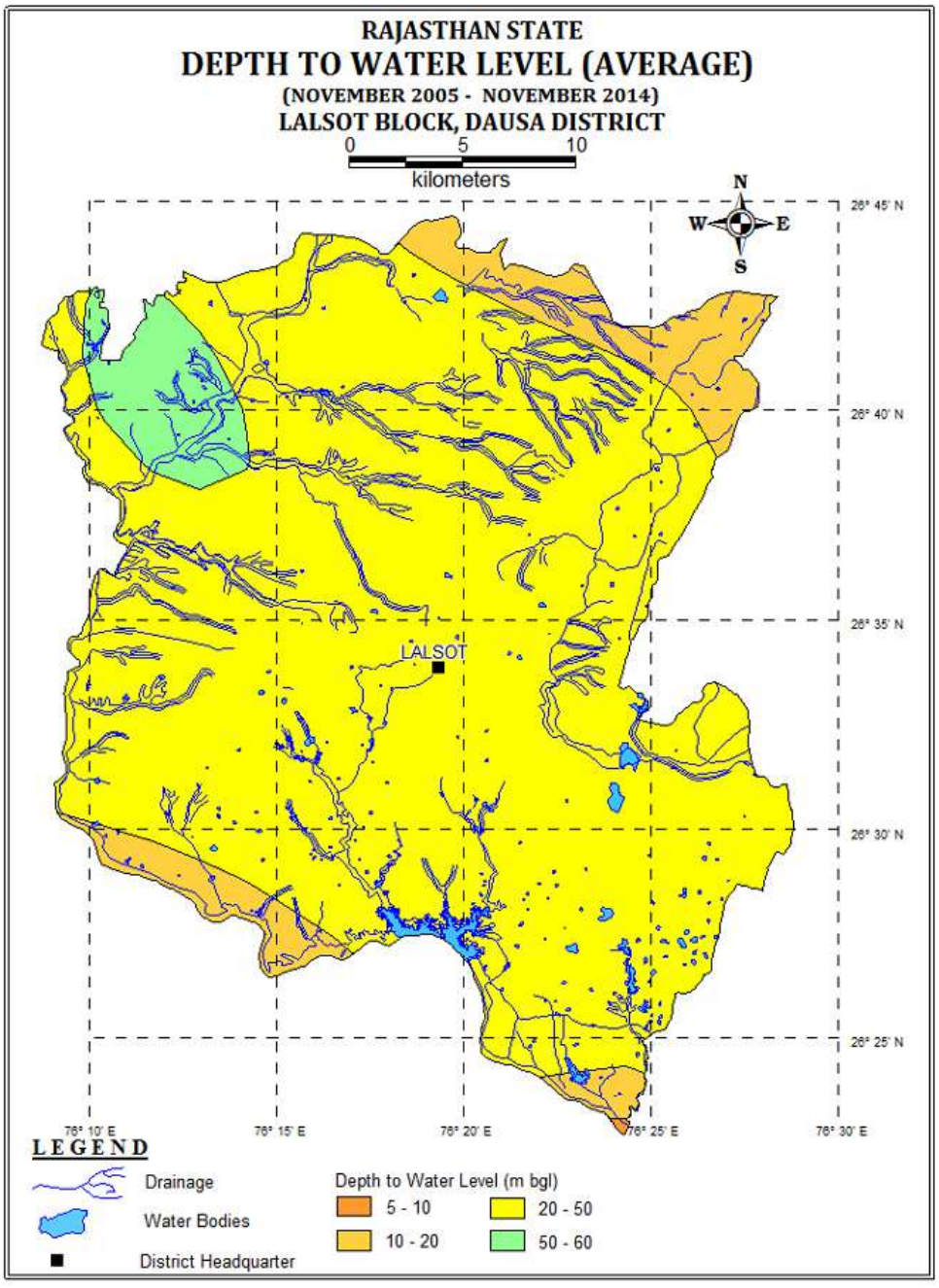

RAJASTHAN STATE
DEPTH TO WATER LEVEL (AVERAGE)
(NOVEMBER 2005 - NOVEMBER 2014)
LALSOT BLOCK, DAUSA DISTRICT
0 5 10
kilometers
N
W
E
S
26° 45' N
26° 40' N
26° 35' N
26° 30' N
26° 25' N
LALSOT
76° 10' E
76° 15' E
76° 20' E
76° 25' E
76° 30' E
LEGEND
Drainage
Water Bodies
District Headquarter
Depth to Water Level (m bgl)
5 - 10
10 - 20
20 - 50
50 - 60

Fig: 5

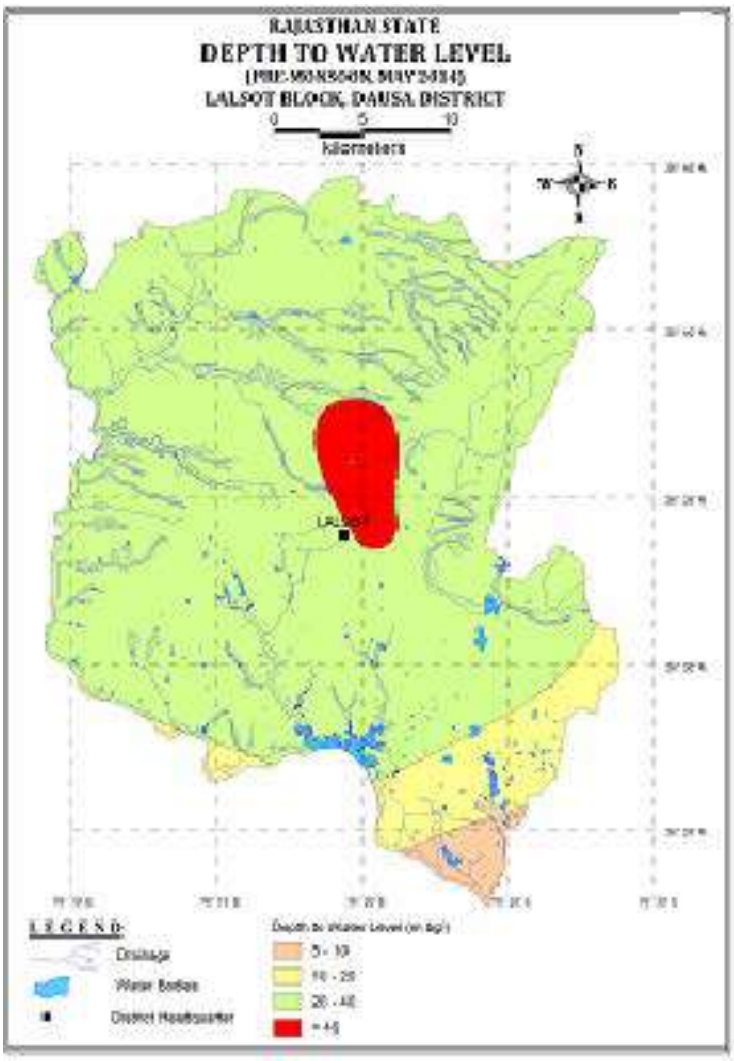

RAJASTHAN STATE
DEPTH TO WATER LEVEL
LALSOT BLOCK, DAUSA DISTRICT
0 5 10
Kilometers
N
W
E
S
LEGEND
Drainage
Water Bodies
District Headquarter
5 - 10
10 - 20
20 - 40
> 40

Fig: 6

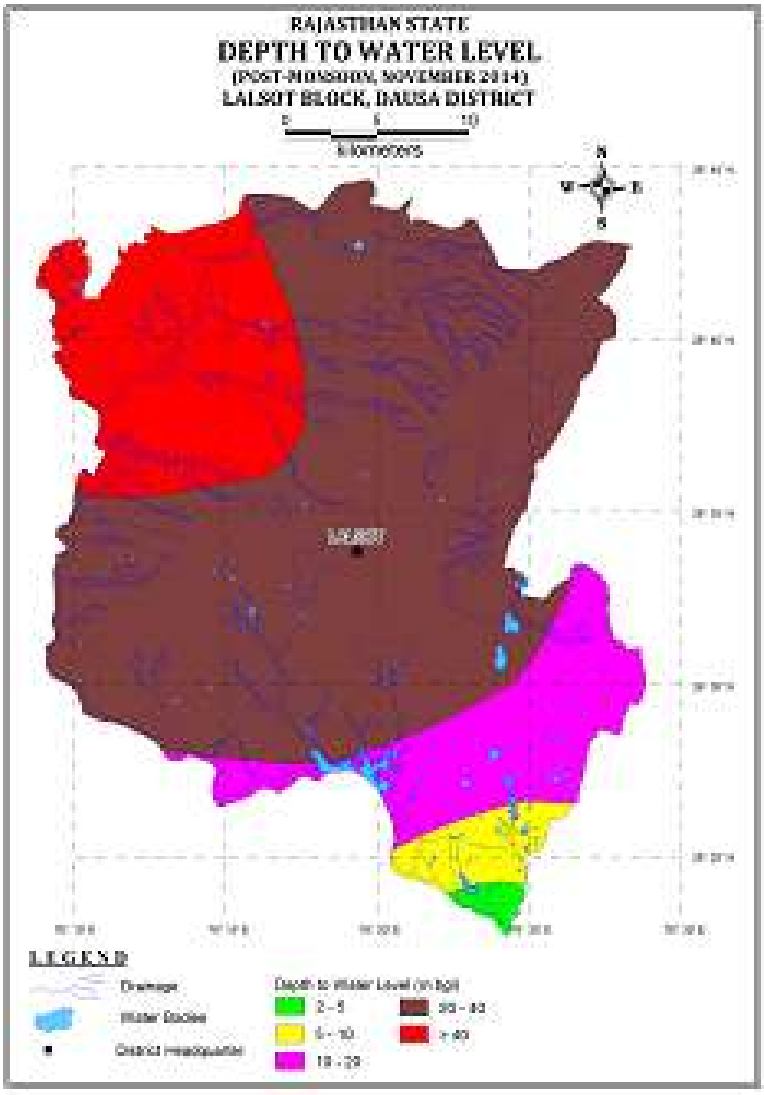
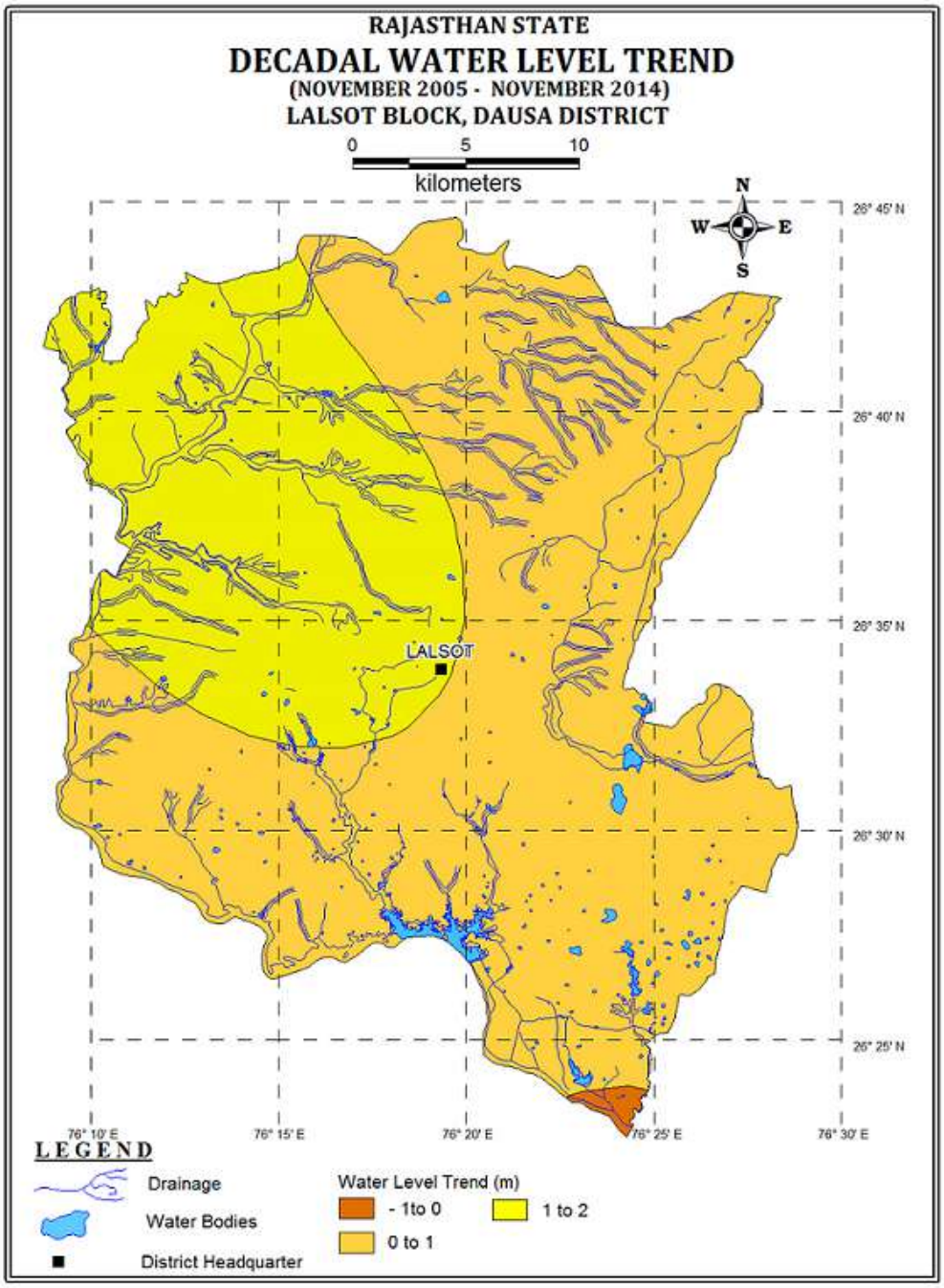

RAJASTHAN STATE
DEPTH TO WATER LEVEL
(POST-MONSOON, NOVEMBER 2014)
LALSOT BLOCK, DAUSA DISTRICT
KILOMETERS
N
W
E
S
LEGEND
Drainage
Water Bodies
District Headquarter
Depth to Water Level (in bgl)
2 - 5
5 - 10
10 - 20
20 - 40
> 40

Fig: 7


RAJASTHAN STATE
DECADAL WATER LEVEL TREND
(NOVEMBER 2005 - NOVEMBER 2014)
LALSOT BLOCK, DAUSA DISTRICT
0 5 10
kilometers
N
W E
S
26° 45' N
26° 40' N
26° 35' N
26° 30' N
26° 25' N
LALSOT
76° 10' E
76° 15' E
76° 20' E
76° 25' E
76° 30' E
LEGEND
Drainage
Water Bodies
District Headquarter
Water Level Trend (m)
- 1to 0
1 to 2
0 to 1

Subsurface Hydrogeology

As inferred from borehole data of the Lalsot Block; Alluvium forms the principal aquifer in the area. The depth of drilling ranges from 31.8 to 92 mbgl and the average discharge ranges from 1.17 to 12.17 lps. Transmissivity value varies between 66.2 to 556 m^2/day. The quality of ground water in Lalsot 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 6160.25ham and Annual Ground water draft is 12104.93ham. Stage of Ground water development has reached 196.50%.

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

Natural Discharge During Non Monsoon Period	684.47 ham
Net Annual Ground Water Availability	6160.25 ham
Annual Ground Water Draft	12104.93 ham
Net Ground water Availability for Future Irrigation Use	Nil
Stage of Ground Water Development	196.50%
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 4.8654 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
DAUSA	RJ12	**LALSOT**	RJ1203	871.240	780.360	alluvium	780.360	0.100

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)
36.000	33.000	2575.188	Morel	4.8654	4.32	144	0.5454	3

Feasible Artificial Recharge and water conservation structures

A wide spectrum of techniques are in vogue, 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 871.24 sq km practically 780.36 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

Lalsot block is having ground water level between 20 & 40m below ground level and as per dynamic ground water resource estimation, the block is over exploited with stage of ground water development at 196.50%. The Lalsot 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 Plan are the most suitable structures in Lalsot 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.

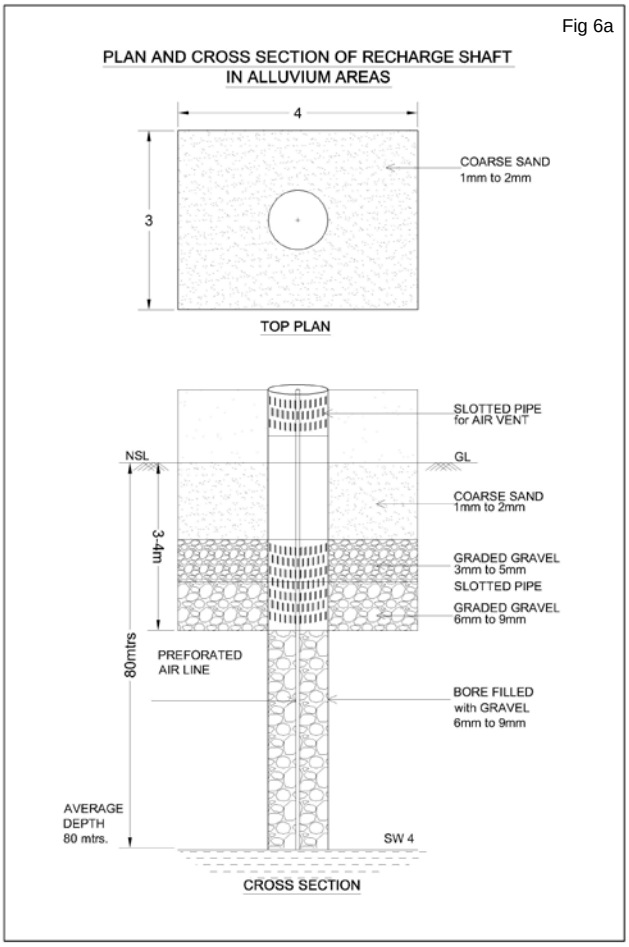
The model design of recharge well has been worked out in consultation with Ground Water Department, Government of Rajasthan and presented in Fig 6a & 6b. The major features required are:

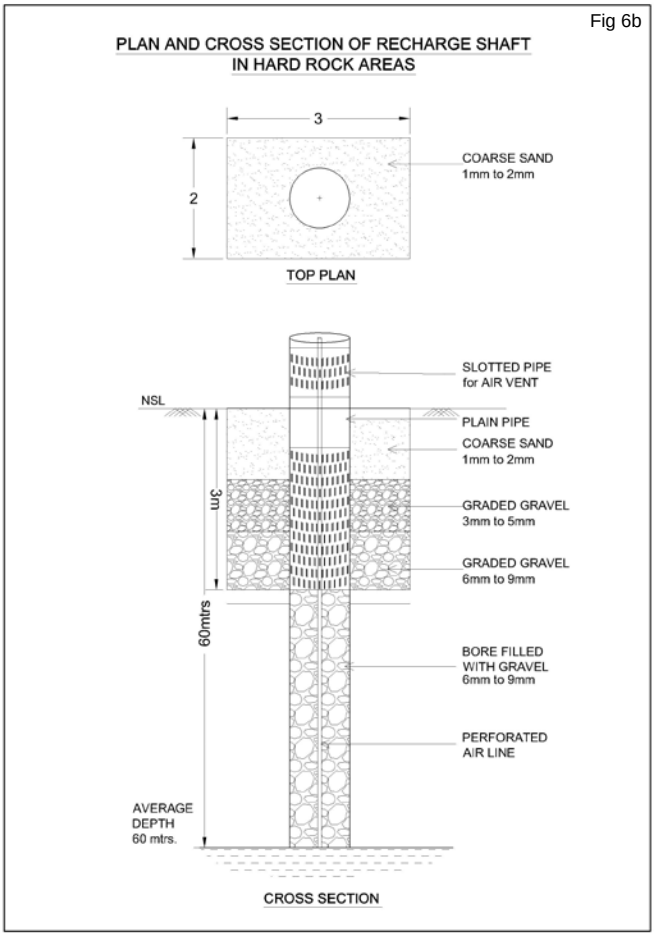
1. The well should have sufficient diameter for recharge- 10 to 12 inch diameter well with bottom screen/ opening just above the highest ground water level.
2. The well should have screen/ opening at the top, which should be at least 1.5m above the bed level of the pond.
3. The upper opening should be 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.

Criteria for number of shafts

Village ponds having area <1 ha and > 25 ha has not been considered for construction of recharge shafts, one recharge shaft is proposed for pond area between 1 to 5 ha; 2 for 5 to 7.5ha and 4 shafts for >7.5 ha.





The tentative location of villages for construction of recharge shaft/well in existing village pond and their cost estimates are shown in Fig 8 and Table 3. The plan proposes construction of 144 recharges shafts/ wells in 111 identified existing village ponds.

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	Achalpura	76.3833	26.4142	1.5747	Soft_rock	1	5	5
2	Alipura	76.4149	26.4199	2.3055	Soft_rock	1	5	5
3	Alipura	76.4109	26.4103	1.928	Soft_rock	1	5	5
4	Anooppura	76.199	26.5604	4.1304	Soft_rock	1	5	5
5	Bagri	76.3854	26.4681	1.266	Soft_rock	1	5	5
6	Bagri	76.378	26.4387	1.477	Soft_rock	1	5	5
7	Bagri	76.3801	26.428	1.6484	Soft_rock	1	5	5
8	Bagri	76.3758	26.4261	1.9747	Soft_rock	1	5	5
9	Barh Nondpura	76.2435	26.5543	3.2767	Soft_rock	1	5	5
10	Beechha	76.2394	26.6705	1.5836	Soft_rock	1	5	5

11	Beelka	76.2456	26.6856	2.0557	Soft_rock	1	5	5
12	Bhamoowas	76.3385	26.5008	3.0253	Soft_rock	1	5	5
13	Bhediyawas	76.1664	26.558	1.4804	Soft_rock	1	5	5
14	Bhediyawas	76.1659	26.5562	1.4039	Soft_rock	1	5	5
15	Bhojyara	76.1695	26.5018	4.2716	Soft_rock	1	5	5
16	Bidarkha	76.2044	26.6784	1.5281	Soft_rock	1	5	5
17	Bilona Kalan	76.3671	26.4782	1.2271	Soft_rock	1	5	5
18	Chak Koopawas	76.1731	26.7015	1.0276	Soft_rock	1	5	5
19	Chak Vijaipura	76.2244	26.5053	1.589	Soft_rock	1	5	5
20	Chandsen	76.2915	26.544	2.3285	Soft_rock	1	5	5
21	Chonriyawas	76.2535	26.5511	3.7561	Soft_rock	1	5	5
22	Chonriyawas	76.2606	26.5436	1.5083	Soft_rock	1	5	5
23	Chonriyawas	76.2548	26.5371	1.9291	Soft_rock	1	5	5
24	Chonriyawas	76.2504	26.5337	1.7775	Soft_rock	1	5	5
25	Chonriyawas	76.2562	26.5349	2.1501	Soft_rock	1	5	5
26	Chonriyawas	76.2523	26.5323	1.4597	Soft_rock	1	5	5
27	Daulatpura	76.1832	26.5525	2.9031	Soft_rock	1	5	5
28	Dausada	76.3817	26.4524	14.2031	Soft_rock	4	5	20
29	Dehlal	76.2936	26.5864	3.9256	Soft_rock	1	5	5
30	Deoli	76.2919	26.5065	1.1127	Soft_rock	1	5	5
31	Deoli	76.2743	26.5042	1.4979	Soft_rock	1	5	5
32	Deoli	76.2628	26.5	1.5833	Soft_rock	1	5	5
33	Dhaun	76.4499	26.7074	1.1066	Soft_rock	1	5	5
34	Dhaun	76.4583	26.7025	1.7051	Soft_rock	1	5	5
35	Didwana	76.3305	26.5764	1.7284	Soft_rock	1	5	5
36	Digo	76.3994	26.5973	2.2761	Soft_rock	1	5	5
37	Digo	76.4195	26.6433	1.7535	Soft_rock	1	5	5
38	Digo	76.3683	26.5892	4.6729	Soft_rock	1	5	5
39	Diwachli Kalan	76.4594	26.526	1.9802	Soft_rock	1	5	5
40	Diwachli Kalan	76.4497	26.5223	3.1137	Soft_rock	1	5	5
41	Goodariya	76.2316	26.5027	1.0341	Soft_rock	1	5	5
42	Hameerpura	76.427	26.5242	1.8682	Soft_rock	1	5	5
43	Indawa	76.3538	26.57	1.3092	Soft_rock	1	5	5
44	Indawa	76.3582	26.5683	1.9804	Soft_rock	1	5	5
45	Jaisinghpura	76.1791	26.5381	1.0286	Soft_rock	1	5	5
46	Kalyanpura	76.3645	26.4157	1.4899	Soft_rock	1	5	5
47	Kankariya	76.359	26.4622	1.5069	Soft_rock	1	5	5
48	Kankariya	76.357	26.4534	1.4582	Soft_rock	1	5	5
49	Kankariya	76.3426	26.4447	2.4719	Soft_rock	1	5	5
50	Kankariya	76.3525	26.4451	3.5362	Soft_rock	1	5	5
51	Kanwarpura	76.2546	26.6721	1.0043	Soft_rock	1	5	5
52	Karanpura Chak No 1	76.2423	26.499	2.6815	Soft_rock	1	5	5
53	Khatoombar	76.4368	26.6608	2.0156	Soft_rock	1	5	5
54	Kherli	76.3001	26.4892	1.1741	Soft_rock	1	5	5
55	Kherli	76.3003	26.4858	1.1532	Soft_rock	1	5	5
56	Khurra	76.4327	26.459	2.6078	Soft_rock	1	5	5
57	Khurra	76.4456	26.457	1.2593	Soft_rock	1	5	5

58	Khurra	76.4401	26.4571	1.5196	Soft_rock	1	5	5
59	Khurra	76.4357	26.456	5.3639	Soft_rock	2	5	10
60	Khurra	76.4305	26.4546	8.6986	Soft_rock	4	5	20
61	Khurra	76.4228	26.4552	3.0649	Soft_rock	1	5	5
62	Khurra	76.4362	26.4507	1.8456	Soft_rock	1	5	5
63	Khurra	76.441	26.4495	2.1809	Soft_rock	1	5	5
64	Khurra	76.4231	26.4493	1.1926	Soft_rock	1	5	5
65	Khurra	76.4356	26.447	3.3169	Soft_rock	1	5	5
66	Kirari	76.29	26.4827	1.2204	Soft_rock	1	5	5
67	Kirari	76.2958	26.4782	6.1984	Soft_rock	2	5	10
68	Kirari	76.2986	26.4746	1.9623	Soft_rock	1	5	5
69	Kishorpura	76.4176	26.4707	1.3557	Soft_rock	1	5	5
70	Kishorpura	76.4201	26.4605	1.6461	Soft_rock	1	5	5
71	Kishorpura	76.4143	26.4477	3.1875	Soft_rock	1	5	5
72	Kishorpura	76.4179	26.4429	3.4735	Soft_rock	1	5	5
73	Kishorpura	76.4137	26.4295	12.0343	Soft_rock	4	5	20
74	Kishorpura	76.4207	26.4304	1.3217	Soft_rock	1	5	5
75	Kishorpura	76.421	26.4255	1.1352	Soft_rock	1	5	5
76	Kishorpura	76.4205	26.4233	1.7172	Soft_rock	1	5	5
77	Kutkya	76.4465	26.6753	1.0212	Soft_rock	1	5	5
78	Lalsot (M)	76.3016	26.5558	1.0354	Soft_rock	1	5	5
79	Madhopura	76.2647	26.5362	15.7678	Soft_rock	4	5	20
80	Maharajpura	76.2009	26.5061	1.1869	Soft_rock	1	5	5
81	Mahariya	76.3967	26.4661	23.7245	Soft_rock	4	5	20
82	Mahariya	76.411	26.4558	1.3703	Soft_rock	1	5	5
83	Mahariya	76.4047	26.4529	20.2463	Soft_rock	4	5	20
84	Mahariya	76.3901	26.4361	1.4618	Soft_rock	1	5	5
85	Mahariya	76.4006	26.4347	1.0732	Soft_rock	1	5	5
86	Mandawari	76.4406	26.4885	2.1753	Soft_rock	1	5	5
87	Mandawari	76.431	26.4732	6.3338	Soft_rock	2	5	10
88	Mandawari	76.4382	26.4749	1.5332	Soft_rock	1	5	5
89	Manrahera	76.1692	26.6926	12.2088	Soft_rock	4	5	20
90	Mohabbatpura	76.2586	26.505	1.1287	Soft_rock	1	5	5
91	Napa Ka Bas Chak No.2	76.2257	26.6047	3.8511	Soft_rock	1	5	5
92	Nirjharna	76.2466	26.5625	1.4299	Soft_rock	1	5	5
93	Palri	76.2715	26.6738	8.7973	Soft_rock	4	5	20
94	Patti Chimanpura	76.2223	26.4924	4.7933	Soft_rock	1	5	5
95	Pitambar Bharti	76.2919	26.532	6.2593	Soft_rock	2	5	10
96	Rahuwas	76.323	26.7123	20.9522	Soft_rock	4	5	20
97	Rajpura	76.184	26.4873	2.364	Soft_rock	1	5	5
98	Rajpura	76.1902	26.4852	1.3898	Soft_rock	1	5	5
99	Rampura Khurd	76.345	26.5079	3.5408	Soft_rock	1	5	5
100	Ramsar	76.4632	26.5216	1.6931	Soft_rock	1	5	5
101	Salagrampura Chak No 3	76.2842	26.5473	4.3201	Soft_rock	1	5	5
102	Samel	76.1705	26.5193	3.2951	Soft_rock	1	5	5
103	Shishodiya	76.2206	26.7093	2.0199	Soft_rock	1	5	5

104	Shreema	76.2426	26.4677	5.121	Soft_rock	2	5	10
105	Shri Sukhchainpura	76.3389	26.5116	1.3793	Soft_rock	1	5	5
106	Shri Sukhchainpura	76.3428	26.5098	2.6243	Soft_rock	1	5	5
107	Sitarampura Chak No 1	76.2686	26.5283	5.4763	Soft_rock	2	5	10
108	Sitarampura Chak No 2	76.2591	26.5281	4.386	Soft_rock	1	5	5
109	Sundarpur	76.3412	26.4738	1.0685	Soft_rock	1	5	5
110	Torda	76.3266	26.6009	4.8334	Soft_rock	1	5	5
111	Vijaipura	76.222	26.4805	1.9907	Soft_rock	1	5	5
Total						144		720

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 characterisitcs favor recharge through such structures. Under the plan, 3 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

S No	Village	Longitude	Latitude
1	Ramnagar Rewari	76.2168	26.6819
2	Khatwa	76.3226	26.4746
3	Thooni Dhirajpura	76.2145	26.5533

Fig: 8

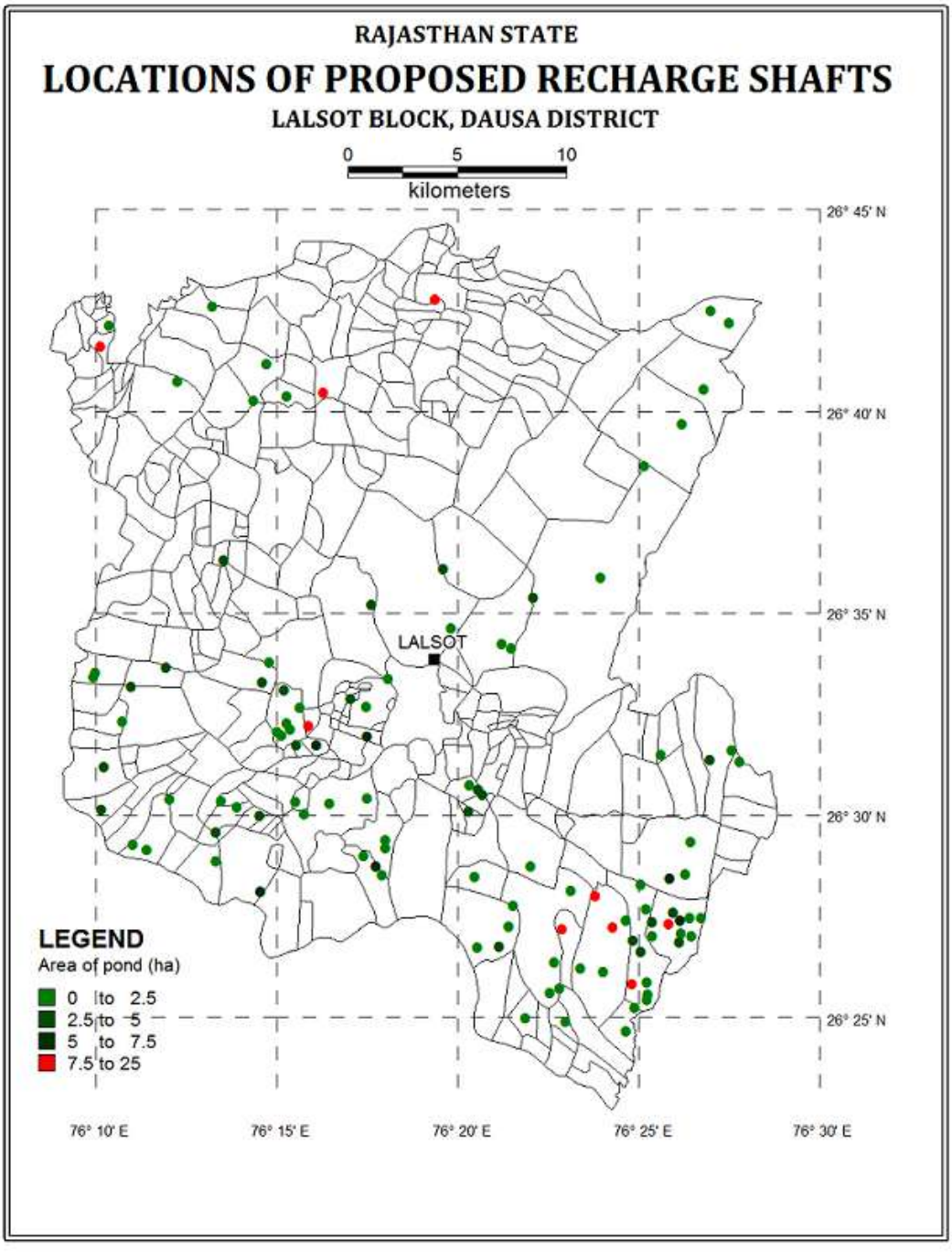
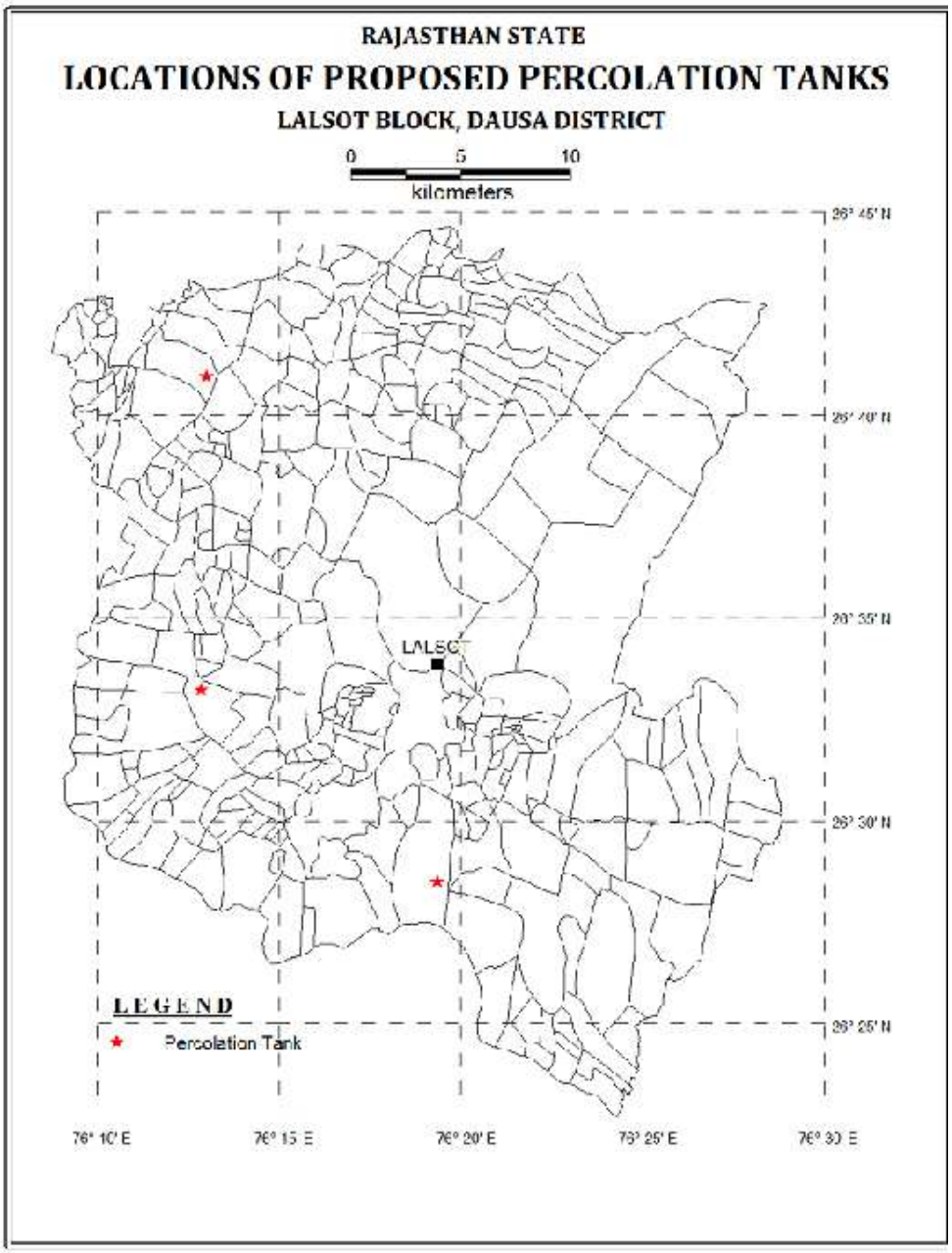

RAJASTHAN STATE
LOCATIONS OF PROPOSED RECHARGE SHAFTS
LALSOT BLOCK, DAUSA DISTRICT
0
5
10
kilometers
26° 45' N
26° 40' N
26° 35' N
26° 30' N
26° 25' N
LALSOT
LEGEND
Area of pond (ha)
0 to 2.5
2.5 to 5
5 to 7.5
7.5 to 25
76° 10' E
76° 15' E
76° 20' E
76° 25' E
76° 30' E

Fig: 9


RAJASTHAN STATE
LOCATIONS OF PROPOSED PERCOLATION TANKS
LALSOT BLOCK, DAUSA DISTRICT
0
5
10
kilometers
LALSOT
LEGEND
Percolation Tank
76° 10' E
76° 15' E
76° 20' E
76° 25' E
76° 30' E

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 63 piezometer, one in each village, 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 9.98 cr, which includes Rs 8.40 cr for ground water recharge activities, 0.39cr for ground water monitoring (Piezometer construction) and Rs 1.20 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 9.982 Crores**.

Table 5: Cost of the recharge structures

Cost of Percolation Tank in Rs in crs (Unit cost Rs 0.4 cr)	Cost Recharge Shaft Rs in crs (Unit cost Rs 0.05 cr for alluvium and Rs 0.026 cr for hard rock)
1.20	Alluvium – 7.20

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	144	4.32	5	720	3.02
Percolation tanks (3 fillings)	200m*200m*1.5 m	3	0.5454	40	120	0.382
Sub total					840	3.402
Impact assessment & Monitoring						
Piezometer	Up to 80 m bgl	63		0.6	37.8	
Impact assessment will be carried out by implementing agency						
O & M - 5% of total cost of the scheme					120.39	
TOTAL					**998.19**	

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 Lalsot block, Dausa envisages gainful utilization of 3.402 MCM of surplus monsoon runoff for recharging of depleted aquifer system.

With the additional recharge as proposed in the Plan, it is anticipated that with enhanced recharge, the stage of ground water development will reduce to 186.22% from the existing 196.50%. 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 (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 %)
61.6025	3.402	65.0045	121.0493	0	121.0493	196.5	186.22

- 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.