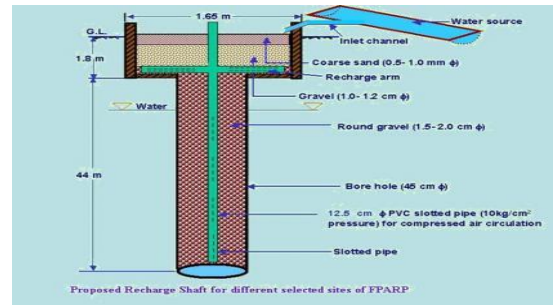




CENTRAL GROUND WATER BOARD
MINISTRY OF WATER RESOURCES,
RIVER DEVELOPMENT & GANGA REJUVENATION
GOVERNMENT OF INDIA



Excavated/dugout farm pond



**ARTIFICIAL RECHARGE TO GROUND WATER AND
WATER CONSERVATION PLAN OF RAJAKHERA
BLOCK, DISTRICT DHAULPUR, RAJASTHAN**

Western Region, Jaipur
November 2016

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF RAJAKHERA BLOCK, DISTRICT DHAULPUR

Plan at a Glance

1.	Area of the Rajakhera Block	582.07 Sq. km.
2.	Area identified for Artificial Recharge	488.72 sq km
3.	Dynamic Ground Water Resources (as on 31.03.2011)	
	Net Ground Water Availability	58.57 MCM
	Annual Ground Water Draft	76.15 MCM
	Stage of Ground Water Development	130.01 %
4.	Volume of water to be harnessed	49.657 MCM
	Volume of water available for recharge through RS	1.435 MCM
	Volume of water available for recharge through PT	9.0 MCM
5.	Volume of unsaturated aquifer zone available for recharge	838.64 MCM
6.	Total number of structures to be proposed	
	Recharge structures	41 shafts in 31 Nos. of existing village ponds
	Existing village pond with recharge shaft/ well	
	Percolation Tanks	45 nos.
	Sprinkler Irrigation	300 ha
	Expected Annual GW recharge	8.35 MCM
	Provision for supplemental irrigation, thus reducing GW withdrawal for irrigation	0.24 MCM
	Total recharge/ saving of ground water	8.59 MCM
7.	Estimated Cost	22.785 crore
	Artificial Recharge Plan	20.05 crore
	Sprinkler Irrigation	1.50 crore
	Piezometer construction	0.15 crore
	Operation and maintenance	1.085 crore

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION PLAN OF RAJAKHERA BLOCK, DISTRICT DHAULPUR

Introduction

The **Rajakhera Block, district Dhaulpur** 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 **130.01%**.

Location of the block

The Rajakhera Block covers an area of 582.07 Sq. km. and falls in north-eastern part of Dhaulpur district. It is located between North latitudes 26°39' & 26°57' and East longitudes 77°53' & 78°16'.

Surface Water Availability

As per the studies carried out by Water Resources Department (WRD), Government of Rajasthan there is very little surplus water available for further development at 75% dependability. Based on the data made available from GWD, the surplus runoff available at 75% dependability level has been worked out for the zones as part of watershed within the block. The nature of aquifer (Alluvium/ Hard rock) is also considered while computing the number of Artificial Recharge structures feasible.

Accordingly about 49.657 MCM has been considered for recharge plan in the block. Optimum utilization of rainwater runoff depends on availability of land, feasible conditions, etc. Volume of Aquifer available for Artificial Recharge is given in **Table.1**

Supply Side Management

Feasible Artificial Recharge and Water Conservation Structures

About 0.035 MCM/year surplus has been considered for each recharge shaft and 0.2 MCM/year for percolation tank wherever feasible. The areas with shallow water level (<5m) have not been considered for construction of Artificial Recharge Structures

The number of Recharge Shaft is decided based on the number of suitable ponds available within the zone. If still some surplus remained unallocated, than few Percolation tanks are proposed at suitable locations. However, in some of the blocks entire available surplus cannot be utilized due to non availability of ponds for Recharge shaft or suitable location for Percolation tanks. Zone wise number of Recharge Structures proposed to be constructed is given in **Table 2**.

Table 1: Volume of Aquifer available for artificial recharge

District	Block	Area of Block (Sq. km.)	Potential area suitable for recharge (Sq. km.)	Type of Aquifer	Area feasible for artificial recharge (Sq km)	Sp Yield	Average DTW (mbgl) NOV 2013	Thickness of unsaturated zone 3 m below ground level (m)	Volume of sub surface storage space available for artificial recharge (MCM)
Dhaulpur	RAJAKHERA	582.07	488.72	SR	488.72	0.12	17.30	14.30	838.64

Table 2: Number of recharge structure

ZoneCode	Sub_Basin	Type of Aquifer	Zone-Area (sq. km.)	Total Surplus (MCM)	Water Level >5m	Feasible RS_Prop	Feasible PT_Prop
Chambal_Chambal Downstream_009_RJ1304_AL	Chambal Downstream	SR	303.200	27.393	Y	29	29
Gambhir_Gambhir_005_RJ1304_AL	Gambhir	SR	164.329	18.970	Y	4	11
Gambhir_Gambhir_009_RJ1304_AL	Gambhir	SR	136.807	3.230	Y	7	5
Parbati_Parbati_016_RJ1304_AL	Parbati	SR	2.446	0.065	N	1	0
				49.657		41	45

Recharge Shaft

It is proposed to construct Recharge Shaft in existing ponds. The selected ponds should be atleast 3m deep and shallow ponds will be deepened accordingly. It is proposed that the inlet for the Recharge Shaft should be atleast 1m above bed of pond so that the pond retains adequate water for use by villagers.

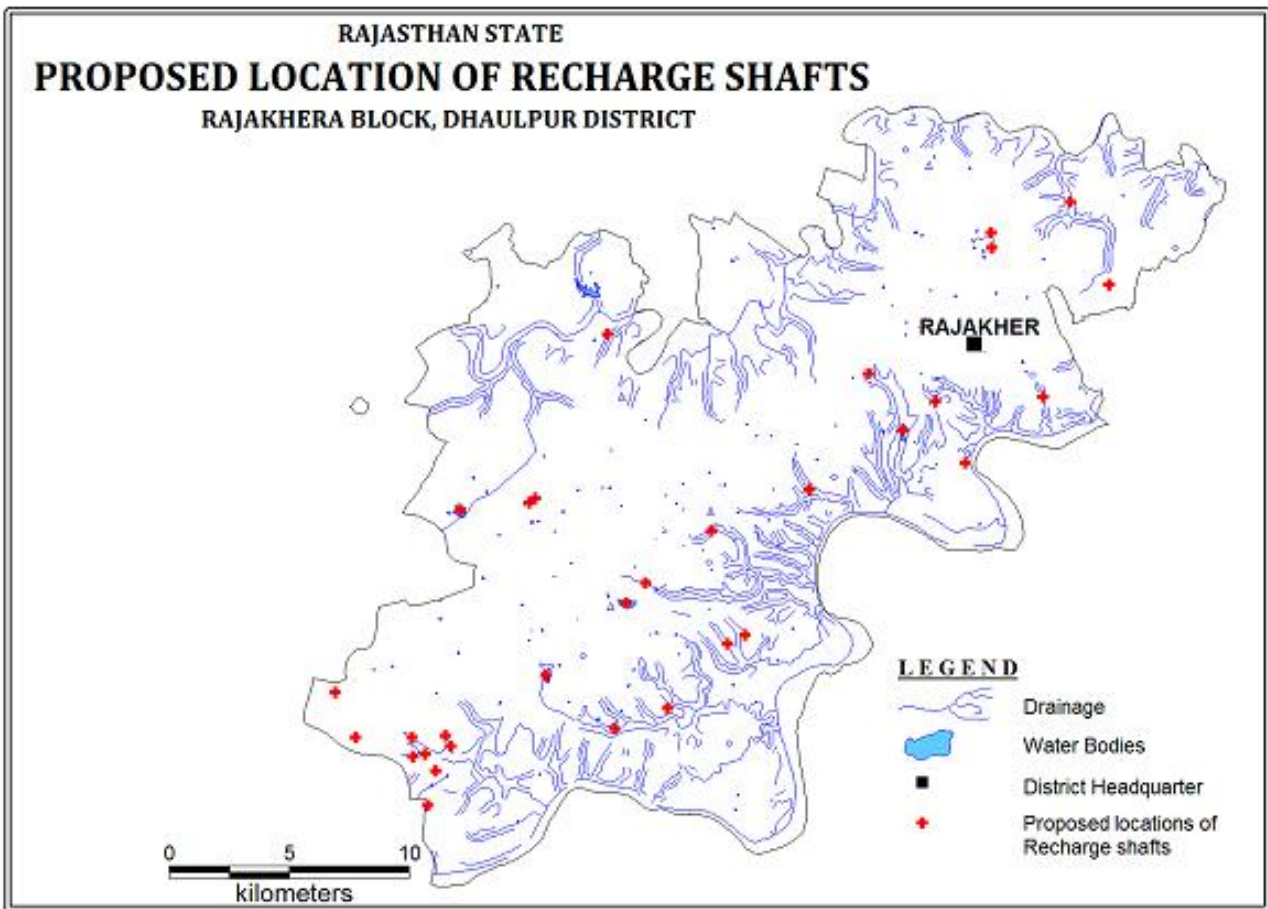
. The tentative location of villages for construction of recharge shaft/well in existing village pond and their cost estimates are shown in Fig 1 and Table 3.

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

S.No.	Village	Long	Lat	Watershed	No of Shafts	Unit cost (Rs in lac)	Total cost (Rs in lac)
1	Khurila	78.124	26.850	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
2	Dharapura	78.138	26.829	Chambal_Chambal Downstream_009_RJ1304_AL	3	5	15
3	Basai Gheeyaram	78.152	26.839	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
4	Garhi Jafar	78.164	26.816	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
5	Samauna	78.197	26.841	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
6	Dani	78.058	26.791	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
7	Shekhpur Goojar	78.030	26.771	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
8	Rahsena	78.022	26.764	Chambal_Chambal Downstream_009_RJ1304_AL	4	5	20
9	Bakspura	78.064	26.749	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
10	Bakspura	78.072	26.752	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
11	Khurd	77.988	26.737	Chambal_Chambal Downstream_009_RJ1304_AL	3	5	15
12	Samor	78.039	26.724	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
13	Changora	78.017	26.717	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
14	Bhaisakh	77.908	26.713	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
15	Samola	77.932	26.713	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
16	Samola	77.932	26.706	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
17	Gher	77.939	26.688	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
18	Bamroli	77.938	26.707	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
19	Bamroli	77.942	26.701	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
20	Bamroli	77.948	26.710	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
21	Bhaisena	77.946	26.714	Chambal_Chambal	1	5	5

				Downstream_009_RJ1304_AL			
22	Siholi	78.099	26.806	Chambal_Chambal Downstream_009_RJ1304_AL	1	5	5
23	Rajakhera (M)	78.175	26.902	Gambhir_Gambhir_005_RJ1304_AL	1	5	5
24	Rajakhera (M)	78.175	26.897	Gambhir_Gambhir_005_RJ1304_AL	1	5	5
25	Didwar	78.208	26.914	Gambhir_Gambhir_005_RJ1304_AL	1	5	5
26	Babarpur	78.225	26.883	Gambhir_Gambhir_005_RJ1304_AL	1	5	5
27	Dulhara	77.952	26.799	Gambhir_Gambhir_009_RJ1304_AL	4	5	20
28	Tetooka	77.981	26.801	Gambhir_Gambhir_009_RJ1304_AL	1	5	5
29	Tetooka	77.984	26.803	Gambhir_Gambhir_009_RJ1304_AL	1	5	5
30	Kailashpura	78.014	26.864	Gambhir_Gambhir_009_RJ1304_AL	1	5	5
31	Masoodpur	77.900	26.730	Parbati_Parbati_016_RJ1304_AL	1	5	5
				Total	41		205

Figure 1: Showing Tentative location of the Recharge Shaft



Percolation Tank

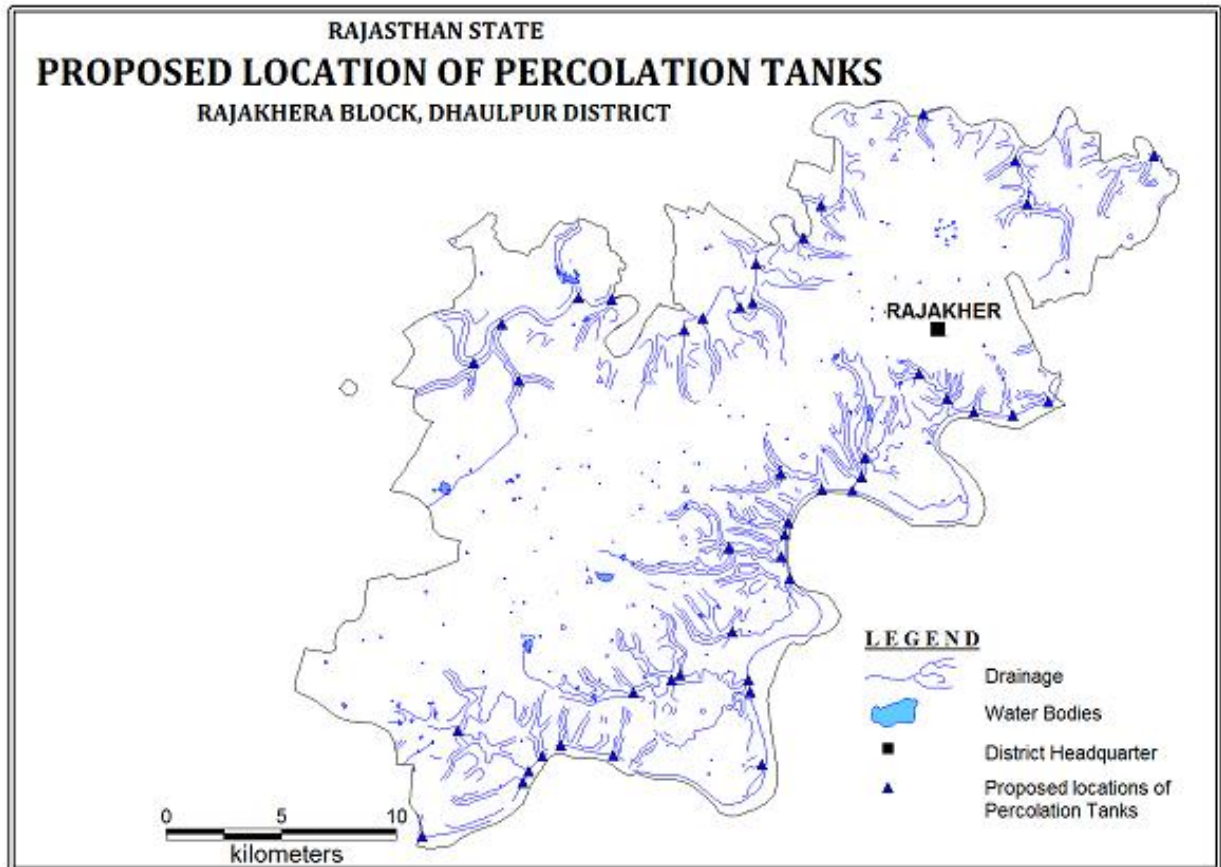
The tentative location of villages for construction of percolation tank and their cost estimates are shown in Fig 2 and Table 4

Table 4: Tentative locations of village for Percolation Tanks

S. No.	Village	Longitude	Latitude	Micro Watershed	Unit Cost (Rs. In lacs)
1	Bamroli	77.958	26.704	Chambal_Chambal Downstream_009_RJ1304_AL	40
2	Shahanpur	77.989	26.688	Chambal_Chambal Downstream_009_RJ1304_AL	40
3	Shahanpur	77.987	26.683	Chambal_Chambal Downstream_009_RJ1304_AL	40
4	Gher	77.942	26.662	Chambal_Chambal Downstream_009_RJ1304_AL	40
5	Tighara	77.995	26.694	Chambal_Chambal Downstream_009_RJ1304_AL	40
6	Tighara	78.003	26.698	Chambal_Chambal Downstream_009_RJ1304_AL	40
7	Samor	78.035	26.718	Chambal_Chambal Downstream_009_RJ1304_AL	40
8	Ghuraiya Khera	78.026	26.694	Chambal_Chambal Downstream_009_RJ1304_AL	40
9	Teeketpura	78.052	26.723	Chambal_Chambal Downstream_009_RJ1304_AL	40
10	Teeketpura	78.055	26.725	Chambal_Chambal Downstream_009_RJ1304_AL	40
11	Kathoomra	78.091	26.690	Chambal_Chambal Downstream_009_RJ1304_AL	40
12	Mahadpura	78.086	26.719	Chambal_Chambal Downstream_009_RJ1304_AL	40
13	Mahadpura	78.085	26.723	Chambal_Chambal Downstream_009_RJ1304_AL	40
14	Garhi Tadabali	78.217	26.832	Chambal_Chambal Downstream_009_RJ1304_AL	40
15	Samauna	78.201	26.827	Chambal_Chambal Downstream_009_RJ1304_AL	40
16	Samauna	78.184	26.828	Chambal_Chambal Downstream_009_RJ1304_AL	40
17	Sikandarpur	78.172	26.833	Chambal_Chambal Downstream_009_RJ1304_AL	40
18	Basai Gheeyaram	78.160	26.843	Chambal_Chambal Downstream_009_RJ1304_AL	40
19	Dalel Ka Pura	78.135	26.803	Chambal_Chambal Downstream_009_RJ1304_AL	40
20	Dalel Ka Pura	78.131	26.797	Chambal_Chambal Downstream_009_RJ1304_AL	40

S. No.	Village	Longitude	Latitude	Micro Watershed	Unit Cost (Rs. In lacs)
21	Barsala	78.136	26.810	Chambal_Chambal Downstream_009_RJ1304_AL	40
22	Siholi	78.099	26.804	Chambal_Chambal Downstream_009_RJ1304_AL	40
23	Jaitpur	78.117	26.798	Chambal_Chambal Downstream_009_RJ1304_AL	40
24	Dhodi Ka Pura	78.103	26.785	Chambal_Chambal Downstream_009_RJ1304_AL	40
25	Dhodi Ka Pura	78.101	26.780	Chambal_Chambal Downstream_009_RJ1304_AL	40
26	Jugaipura	78.077	26.775	Chambal_Chambal Downstream_009_RJ1304_AL	40
27	Dhodi Ka Pura	78.100	26.771	Chambal_Chambal Downstream_009_RJ1304_AL	40
28	Dhodi Ka Pura	78.103	26.763	Chambal_Chambal Downstream_009_RJ1304_AL	40
29	Cheelpura	78.078	26.742	Chambal_Chambal Downstream_009_RJ1304_AL	40
30	Hathwari	78.057	26.860	Gambhir_Gambhir_005_RJ1304_AL	40
31	Ganhaidi	78.065	26.865	Gambhir_Gambhir_005_RJ1304_AL	40
32	Nadauli	78.082	26.869	Gambhir_Gambhir_005_RJ1304_AL	40
33	Nadauli	78.087	26.871	Gambhir_Gambhir_005_RJ1304_AL	40
34	Nagar	78.089	26.886	Gambhir_Gambhir_005_RJ1304_AL	40
35	Teerajpur	78.109	26.896	Gambhir_Gambhir_005_RJ1304_AL	40
36	Kachhiyara Bidar	78.117	26.909	Gambhir_Gambhir_005_RJ1304_AL	40
37	Didwar	78.202	26.926	Gambhir_Gambhir_005_RJ1304_AL	40
38	Didwar	78.208	26.909	Gambhir_Gambhir_005_RJ1304_AL	40
39	Silawat	78.263	26.928	Gambhir_Gambhir_005_RJ1304_AL	40
40	Singhawali Khurd	78.162	26.944	Gambhir_Gambhir_005_RJ1304_AL	40
41	Chaproli	77.965	26.847	Gambhir_Gambhir_009_RJ1304_AL	40
42	Dhondhi Ka Pura	77.984	26.840	Gambhir_Gambhir_009_RJ1304_AL	40
43	Kotpura	77.977	26.862	Gambhir_Gambhir_009_RJ1304_AL	40
44	Piluya	78.011	26.873	Gambhir_Gambhir_009_RJ1304_AL	40
45	Khoobipura	78.025	26.872	Gambhir_Gambhir_009_RJ1304_AL	40
				Total	1800

Figure 2: Showing Tentative location of the Percolation Tank



Demand Side Management

Efficient Irrigation:

In Flood/ furrow irrigation method more than 50% of applied water is wasted through seepage to deeper levels, local inundation causes loss through evaporation and it leaches out the nutrients from the plants. While through drip and sprinkler irrigation method, wastage through irrigation losses could be minimized. Ground water usage can be minimized drastically by using HDPE pipes. Initially the scheme can be proposed to be started in 300 ha area, which is worst affected showing deepest water level and declining trends. The area is to be finalized based on land holdings, willingness of farmers and No Objection certificate from the land owner.

Impact Assessment and Monitoring

Assessment of impact of the artificial recharge schemes implemented is essential to assess the efficacy of structures constructed. It helps in identification of cost-effective recharge mechanisms for optimal recharge into the ground water system. It also helps to make necessary modifications in site selection, design and construction of structures in future.

It is proposed to construct 25 piezometers, at suitable locations for monitoring of water levels, in the vicinity of proposed recharge structure.

Revival, Repair of Water Bodies

The existing ponds and tanks with time loose their storage capacity as well as the natural ground water recharge through these water bodies has also become negligible due to siltation and encroachment by farmers for agriculture purposes. There are several such villages where ponds/ tanks are in dilapidated condition. These existing village tanks, which are normally silted and damaged, can be modified to serve as recharge structure in case these are suitably located to serve as percolation tanks. Through desilting, coupled with providing proper waste weir, the village tanks can be converted into recharge structure.

Financial Outlay of the Plan

The total estimated cost of the Plan is Rs. 22.785 cr. The tentative cost estimates of the various activities of the Plan are shown in Table 5 & 6. The unit rates are as followed by the Govt. of Rajasthan (BSR).

Table 5: Cost of the recharge structures

Cost Recharge Shaft Rs in crs (Unit cost Rs 0.05 cr for alluvium and Rs 0.026 cr for hard rock)	Cost of Percolation Tank in Rs in crs (Unit cost Rs 0.4 cr)	Cost of Sprinkler irrigation in Rs (Unit cost 0.005 cr/ha)
Soft rock – 2.05	18.00	1.50

Table 6: Tentative cost of different activities

Feasible Artificial Recharge & Water Conservation structures/ activities	Tentative Design	Quantity (in nos. or area in ha)	Rainwater harvested (MCM) or No. of sprinklers (/ha)	Tentative unit cost (in Rs lakh)	Total tentative cost (in Rs lakh)	Expected Annual GW recharge/ conservation (MCM) @ 0.8 MCM/structure
Recharge Structures/ Activities						
Recharge shaft within the pond /tanks	Alluvium – Depth 80m, Dia: 10-12” with filter pit	41	1.435	5	205	1.15
	Hard rock: Depth –60m, Dia 10-12”with filter pit	-	-	-	-	-
Percolation tanks (3 fillings)	200m*200m*1.5 m	45	9.0	40	1800	7.2
Water Conservation Measures	Sprinkler Irrigation	300 ha	25	0.5/ha	150	0.24
		Total			2155	8.59
Impact assessment & Monitoring						
Piezometer	50 – 80 m	25		0.6	15	
<i>Impact assessment will be carried out by implementing agency</i>						
O & M - 5% of total cost of the scheme					108.50	
TOTAL					2278.50	8.59

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