
SUCCESS STORIES OF ARTIFICIAL RECHARGE PROJECTS PUNJAB AND HARYANA STATES

Punjab state has enormous water resources. Its fertile land is irrigated by both surface and ground water. The state is a granary of India. The intensive use of ground water for irrigation and other human needs, has resulted in the declining of water levels.

During the past two decades, significant water table decline has been observed in most parts of Punjab. The main cause of ground water depletion is its over exploitation to meet the increasing demand of various sector including agriculture, industry and domestic. Extensive paddy cultivations, specially during summer months has effected the available ground water resources adversely due to declining water table, the tubewells have to be deepened and farmers are shifting to the use of submersible pumps in place of centrifugal pumps being used by them till now, resulting in additional expenditure and extra power consumption. This has adversely affected the socio- economic conditions of the small farmers. This declining water table trends, if not checked, would assume an alarming situation in near future affecting agriculture production and thus economy of the state and the country.

The impact on the ground water regime in terms of quality and quantity by implementing the artificial recharge and rain water harvesting scheme in the State of Punjab and Haryana have been found very encouraging. Followings are the success stories highlighting efficacy of recharge on ground water.

- Artificial recharge to ground water utilising canal and surplus pond water at village Channian Nakodar block, district Jalandhar, punjab
- Artificial recharge to ground water in golden temple complex, Amritsar city, Punjab
- Artificial recharge to ground water utilizing runoff generated in patiala nadi, block patiala, district patiala, punjab
- Artificial recharge to ground water by utilizing surplus water of khanna distributary, at Bhattian canal colony, block Khanna, district Ludhiana, Punjab
- Rainwater harvesting at Kheti Bhawan, Amritsar, Punjab
- Roof top rain water harvesting at basic medical sciences block, Punjab University, Chandigarh.
- Artificial recharge to ground water utilizing run off generated in Miranpur choe , block Patiala , district Patiala , Punjab
- Artificial recharge to ground water utilizing surface runoff of dhuri drain, dhuri block, district Sangrur, Punjab
- Artificial recharge to ground water utilizing surface runoff of Dhuri link drain, Dhuri block, district Sangrur, Punjab.
- Artificial recharge to ground water utilising runoff generated in bassian drain, block Nihalsingh wala district Moga
- Artificial recharge to ground water utilizing waste water from Brahm Sarovar

DISTRICT: JALANDHAR

Name of the Scheme: Artificial Recharge to Ground Water Utilising Canal and Surplus Pond Water at Village Channian Nakodar Block, District Jalandhar

Location: Village Channian Nakodar Block, District Jalandhar

Year of construction: 1999-2000

Implementing Agency: Ground Water Cell, Department of Agriculture, Punjab



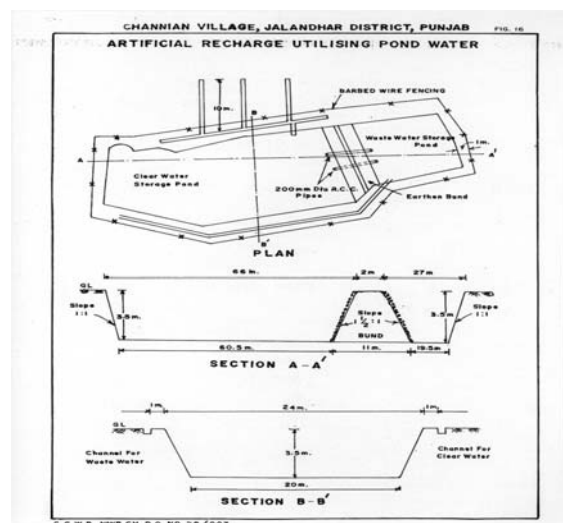
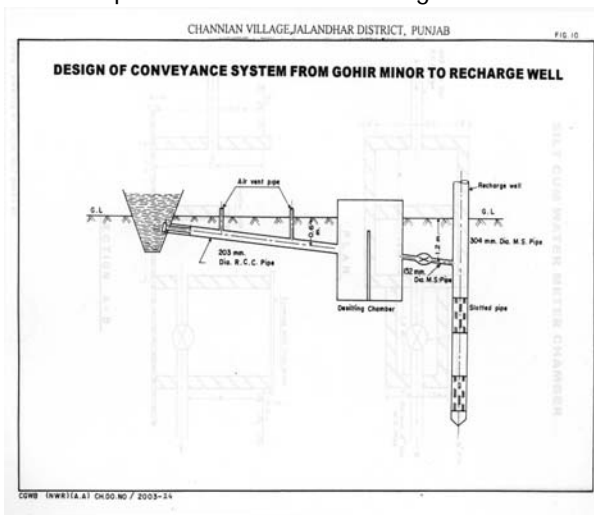
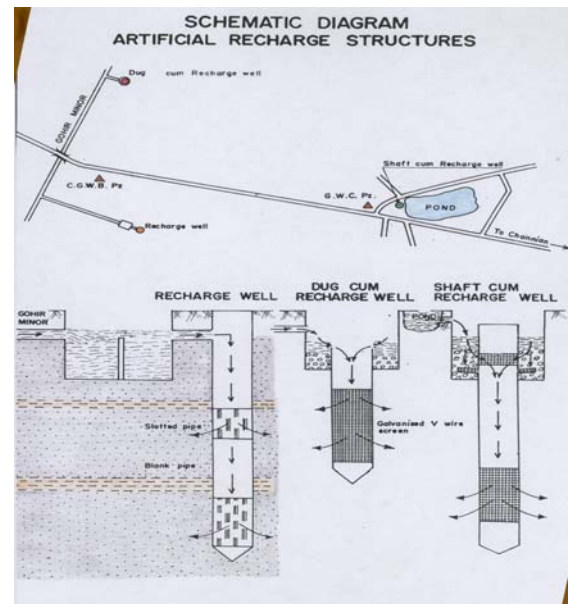
Type of Structures:

- (i) A recharge well with observation wells
- (ii) Modification of abandoned dug well to recharge well.
- (iii) Utilization of the water of existing village pond for artificial recharge.

Impact: The results of the studies indicate that the recharged water is effective in arresting the rate of decline of water levels in the area.

Due to artificial recharge from surplus pond water and natural recharge from rainfall, the falling water level trend was arrested from 1.31 m/month to 0.41m/month to 0.29m/month by October 2002.

The results have also indicated that it is feasible to recharge unconfined aquifer by utilizing canal and pond water. For two years since the inception of the scheme, the back flow of waste water has stopped entering the streets. The abandoned dry dug wells can be put to best use again by converting them into dug cum recharge wells and these can be proved as effective recharge structures.



DISTRICT: AMRITSAR

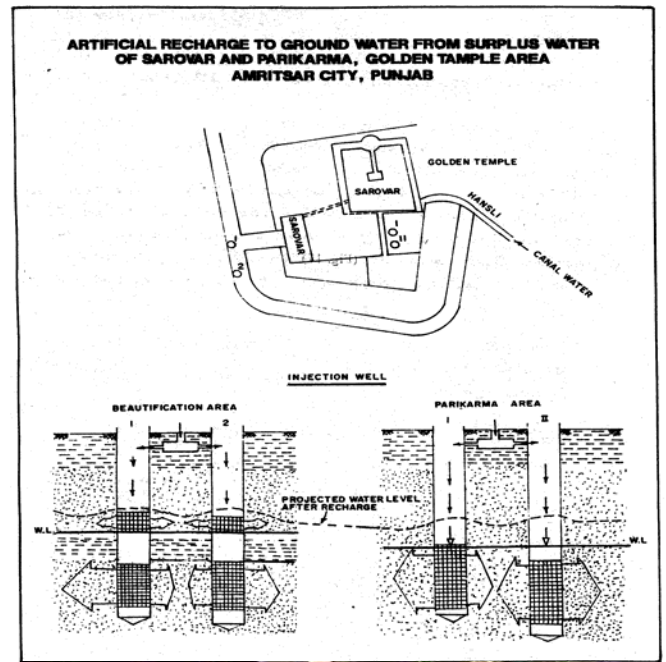
Name of the scheme: Artificial Recharge to Ground Water in Golden Temple Complex, Amritsar City, Punjab

Location: Golden Temple Complex, Amritsar City

Type of Structure:

Two recharge wells have been constructed in the Galliara Area and 4,41,504 m³/year surplus water from Sarovar is recharged to the ground water. Similarly two recharge wells have been constructed in the open space opposite Dewan Hall and 51,100 m³/year water of washing of Parikrama area 23,652m³/year from Charan Ganga and 7,145 m³/year of rooftop rain water is being used for recharging groundwater.

Impact: The first major benefit of the scheme is conservation of water and arresting fall in water levels, in turn resulting in saving of energy for lifting of water. Another advantage is the sustainability of the existing structures preventing them from going defunct due to fast decline in water levels. Artificial recharge by utilizing Sarovar water and swimming pools is feasible and is suitable for urban areas like Amritsar city.



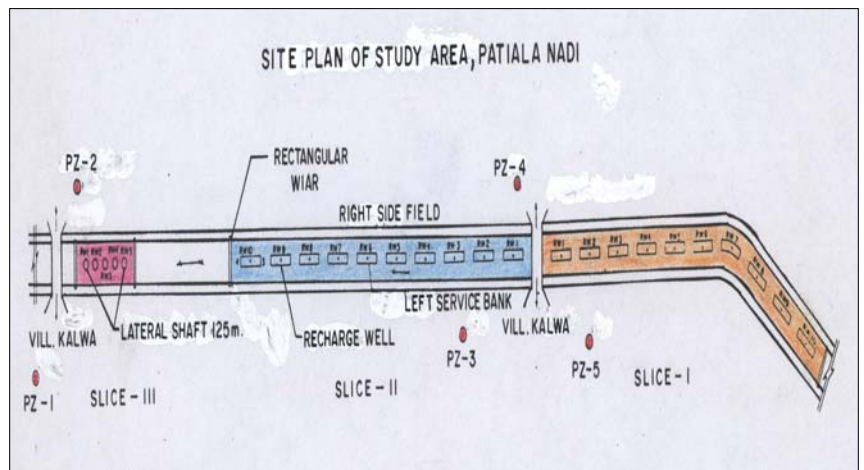
DISTRICT: PATIALA

Name of the Scheme: Artificial Recharge to Ground Water utilizing runoff generated in Patiala Nadi, Block Patiala, District Patiala, Punjab

Location: Patiala Nadi, Block Patiala

Type of Structure:

Punjab has a dense network of drains which were constructed during early 70's to tackle the problems of water logging both surface as well as sub-surface. These drains were very effective in getting rid of water logging problem. Due to declining water levels, these drains are not serving the purpose for which these were constructed. This resulted into the reduction of natural recharge to a greater extent. In case the bed of these drains is modified in a way to allow the surface runoff to percolate to recharge the ground water regime it can help to check the declining trend of water levels.



Along Patiala Nadi in Patiala block, Patiala district, the bed of the drain was modified by constructing one long trench and 20 small trenches and within long trench 10 recharge wells and one recharge well in each small trench were constructed, to enhance the rate of recharge to ground water.

Maintenance of the recharge structures, involving clearing of weeds and grass from the bed of the modified drains and removal of accumulated silt is very important for overall efficiency during its lifetime.

Impact: Experiment has created awareness amongst the farmers of the area for augmenting the ground water recharge along the Nadi beds in depleting water level areas. By doing so, apart from the additional recharge to ground water, there will be marked reduction in runoff losses and flooding of land.

Observed rate of recharge in slice I & II with 20 recharge wells was 10.5 lps/well where as it is 8.96 lps/running meter length of trench in slice III with 5 recharge wells.



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RAIN WATER FLOWING /RECHARGING IN

DISTRICT: LUDHIANA

Name of the scheme: Artificial Recharge to Ground Water by Utilizing Surplus Water Of Khanna Distributary, at Bhattian Canal Colony, Block Khanna, District Ludhiana, Punjab

Location: Bhattian Canal Colony, Block Khanna

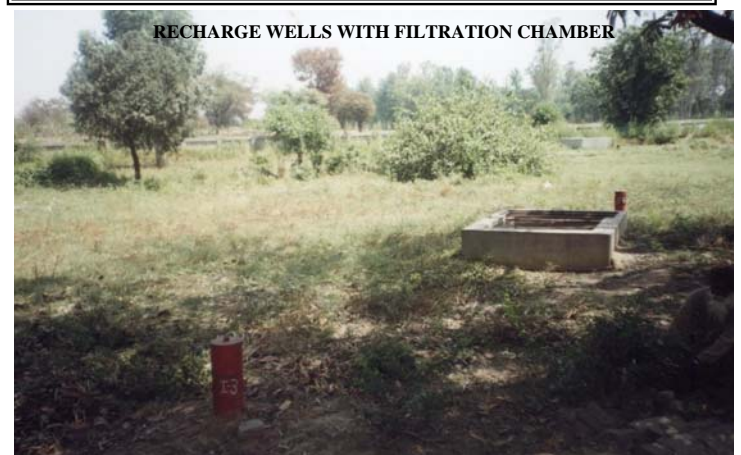
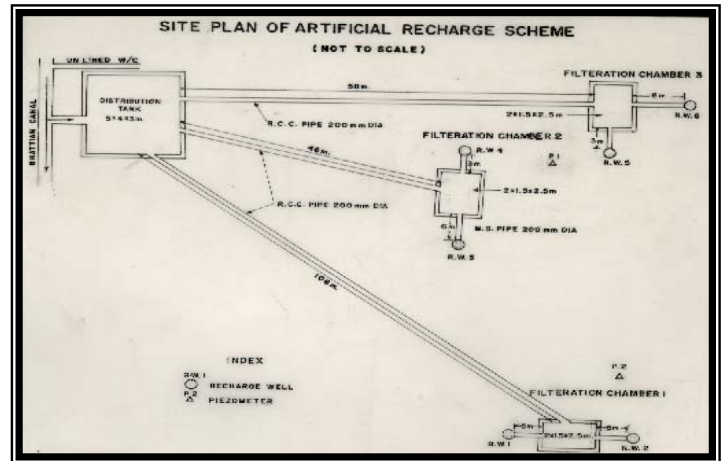
Year of Construction: 2002

Implementing agency: Investigation division of Directorate Water Resources, Punjab

Cost of the scheme: Rs. 9.48 lakhs

Type of Structure:

The scheme utilized surplus canal water of Khanna distributary of Bhakra main line canal for ground water recharge. It was taken up to study the feasibility of augmenting ground water resources in the area. Six recharge tubewells were constructed for recharging canal water under gravity. A water distribution tank and three filtration chambers were also constructed.



RECHARGE WELLS WITH FILTRATION CHAMBER

Impact:

The artificial recharge to ground water has helped in arresting the rate of decline from 16 cms/months to 4 cm/month rise. As per the information collected from local people, the discharge of the tubewells is not reduced at the time of pumping of ground water during sowing season of paddy although ground water draft is at its peak. The scheme has been found very effective in recharging surplus canal water and is cost effective. The recharge wells have to be cleared with compressed air once in 3 years so as to maintain their original recharge capacity.

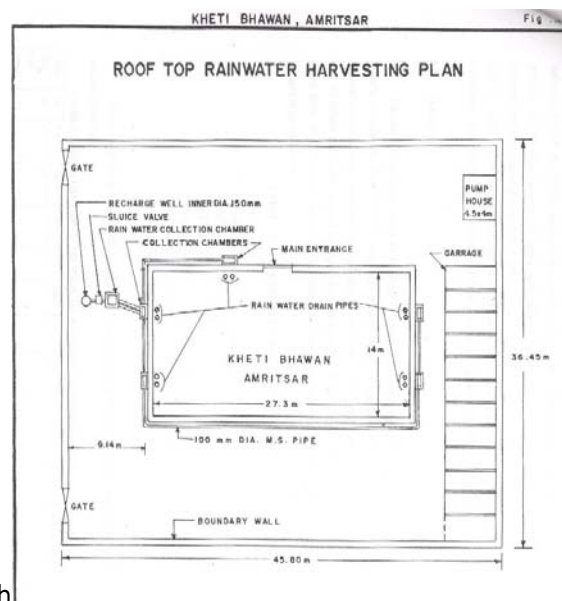
DISTRICT: AMRITSAR

Name of the scheme: Rainwater Harvesting at Kheti Bhawan, Amritsar, Punjab

Location: Kheti Bhawan, Amritsar

Year of Construction:

Implementing agency: Department of Agriculture, Punjab and funded by Central Ground Water Board under central sector scheme.



Cost of the Scheme: Rs.1.00 Lakh

Type of Structure:

Rain water from the roof top of Khetri Bhawan is being recharged to ground water through a recharge well.

Impact:

The annual draft of ground water has exceeded the annual recharge, resulting in mining of static ground water reservoir in the area. This has resulted in decline in water level at an alarming rate. The scheme is a demonstrative scheme for popularizing the roof top rain water harvesting. The rate of recharge of the structures constructed works out to be 14 liters per second. The studies reveal that it is feasible to harvest the roof top rain water and can be used for recharging ground water. The scheme can be replicated in other buildings of the city.

DISTRICT: CHANDIGARH

Name of the Scheme: Roof Top Rain Water Harvesting at Basic Medical Sciences Block, Panjab University, Chandigarh.

Location: Basic Medical Sciences Block, Panjab University, Chandigarh

Year of Construction: 2001

Implementing agency: Engineering wing of Punjab University and funded by Central Ground Water Board under central sector scheme.

Cost of the Scheme: Rs.2.56 Lakh

Type of structure:

Domestic water supply in the city is met from two sources, Bhakra canal and deep tubewells. The canal water supply is limited hence the additional burden of increased water demand is met by ground water through construction of additional tubewells. This puts more stress on ground water storage and decline in the water levels particularly of deeper aquifers, which sustain the tubewell discharge.

Impact:

Water from surface runoff and rooftop rainwater can be utilized for augmenting ground water resources. The Basic Medical Sciences Block, Panjab University with rooftop area of 2100 m² was selected to study the feasibility of recharging ground water by harvesting roof top rain water.

The total rainfall received during the study period is 1201 mm, resulting 2135m³ of roof top surface runoff. Out of this, 1985m³ of water is estimated to be recharged to the ground water reservoir, which is 93% of roof top runoff generated.

The recharge results have indicated that it is possible to recharge the confined aquifer system occurring in the city and the experimental studies have proved to be very successful. Aquifer system, comprising of sand and gravel can easily accept water recharged through recharge wells.

The scheme also helped in creating awareness amongst the students of various departments and institutions about roof top rainwater harvesting techniques. The teaching faculty members have also been trained in these artificial recharge methods.

DISTRICT: PATIALA

Name of the Scheme: Artificial Recharge to Ground Water Utilizing Run off generated in Miranpur Choe, Block Patiala, District Patiala, Punjab

Location: Miranpur Choe, Block Patiala

Type of structure:

The bed of the Miranpur drain was modified to construct 24 number recharge wells. Four number piezometers were also constructed to monitor the effect of recharge on ground water regime.

Impact:

During monitoring period the recharge capacity of the recharge / injection wells has come out to be 2.22 Lps. These results have been found to be encouraging in the experimental stage. These kind of schemes can be replicated in other areas for augmenting the ground water recharge by artificial means.

The encouraging results could be sustained only if the structures are properly maintained. It involves clearing of weeds and grass from the bed of the modified drains and removal of accumulated silt on the filter media from time to time, which can be done at nominal cost

DISTRICT: MOGA

Name of the Scheme: Artificial Recharge to Ground Water Utilising Runoff generated in Bassian Drain , Block Nihalsisnggh Wala, District Moga

Location: Bassian Drain , Block Nihalsisnggh Wala

Type of Structure:

Two trenches each having 170m length were constructed with three recharge wells in each trench and 3 piezometers on both sides of the trench. Total quantity of water anticipated to be recharged annually through two trenches of 170m length is 5.58 MCM.

Impact:

Scheme has helped to install 18 additional shallow tubewells in the area. In the area 108 shallow tubewells owned by the farmers have been benefited due to rise in water level. Total number of beneficiaries is 130 families. In an area of 11 sq km the rise in water level observed was 0.20m. The farmers of the area also reported that there is appreciable increase in discharge of their shallow tubewells due to artificial recharging of aquifer system of the area. Water level data reveals marginal increase in water levels around Bassian drain in spite of heavy pumping for paddy growth.

DISTRICT: SANGRUR

Name of the scheme: Artificial Recharge to Ground Water Utilizing Surface Runoff of Dhuri Drain , Dhuri Block, District Sangrur, Punjab

Location: Dhuri Drain , Dhuri Block

Year of Construction: 1999-2000

Cost of the Scheme: Rs. 39.10 lakhs

Implementing Agency: Executive Engineer, Investigation Division, Water Resources, Punjab and funded by CGWB

Type of Structure:

Artificial recharge to ground water through modified drain bed utilizing surface drain discharges from Dhuri Drain. The scheme envisages construction of 20 shafts of 3m dia and 10 shafts of 2m dia down to 6m in the drain bed. For direct recharge through drain bed, the bed was modified by constructing a trench of 295m length, 5m width at the top and 3m at the bottom and having 3.25m depth. Six recharge wells were constructed in the lateral trench to enhance the rate of recharge to dewatered unconfined aquifer. Twenty four piezometers were installed on both sides of the drain to study the behaviour of water level.

Impact:

The study indicated that it is feasible to recharge the unconfined aquifer in the area by utilising the flow generated in the surface drains and recharging the same through shafts, trenches and recharge wells. However uncased recharge wells filled with gravel have not been found very effective in recharging ground water. The recharge test conducted on the trench and 4 shafts revealed that average rate of recharge is about 94 litres/sec.

Apart from the additional recharge to ground water and arresting the declining trend of water level, there was marked reduction in runoff, water loses and flooding of land. The farmers of the area have reported that there was increase in discharge of their tubewells during testing of the recharge structures. On an average 0.25 m rise in water level was observed in an area of 30 sq.km. and about 200 families benefited.

DISTRICT: SANGRUR

Name of the Scheme: Artificial Recharge to Ground Water Utilizing Surface Runoff of Dhuri Link Drain , Dhuri Block, District Sangrur, Punjab.

Location: Dhuri Link Drain, Dhuri Block

Year of Construction: 1999-2000

Cost of the Scheme: Rs. 34.20 lakhs

Implementing Agency: Executive Engineer, Investigation Division, Water Resources, Punjab and funded by CGWB

Type of Structure:

Recharge to ground water through modified drain bed utilising surface drain discharges from Dhuri Link Drain. The scheme envisages construction of 28 shafts of 3m dia in the drain bed, out of which 23 were constructed down to a depth of 6m and 5 to a depth of 11m, (upto water level). For direct recharge through drain bed, the bed was modified by constructing a trench of 250m length, 5m width at the top and 3m at the bottom and having 3m depth. Sixteen piezometers were also installed on both sides of the drain to study the behavior of water level due to artificial recharge. Three recharge wells were also installed within the trench to enhance the rate of recharge to unconfined aquifer.

Impact:

The study indicates that it is feasible to recharge the unconfined aquifer in the area by utilising the flow generated in the surface drains and recharging the same through shafts, trenches and recharge wells.

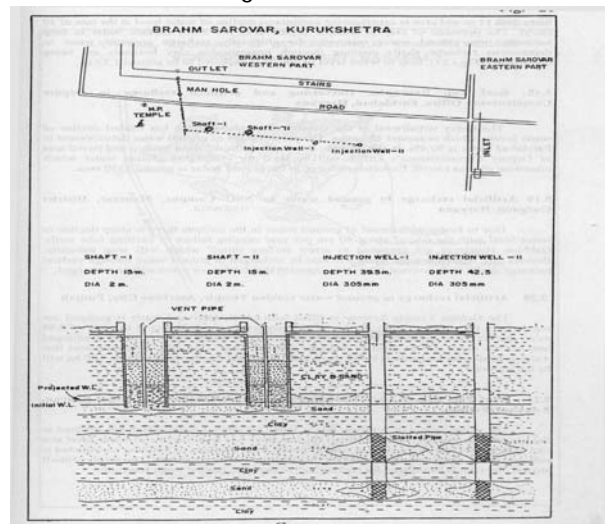
DISTRICT: KURUKSHETRA

Name of the Scheme: Artificial Recharge to Ground Water Utilizing Waste Water from Braham Sarovar, Kurukshetra city, Haryana

Location: Braham Sarovar, Kurukshetra city

Type of Structure:

The Braham Sarovar has an area of 0.418 sq.km. and storage capacity of 1.9 MCM of water. The Sarovar is filled by water from Thaneswar Distributary by pumping and after few days 1.27 m column of water of the Sarovar is drained out and the Sarovar is again filled with water to maintain desired water column. The scheme envisaged the recharge to ground water through injecting wastewater of Braham Sarovar by recharge structures such as recharge shafts and injection wells. Two recharge shafts and two injection wells were constructed in the south western part of the Braham Sarovar.



Impact:

Total annual water available from leakage was estimated to be 0.063 MCM. The surplus water discharged from Sarovar is 0.2808 MCM. Hence, the total water available for recharge during one year from Sarovar was 0.3496 MCM.

The analysis of water level data indicates that no rise of water level was observed in piezometer. However trend analysis of water level indicates that decline rate at nearest hydrograph network station at Kaulpur, tapping shallow aquifers was 1.175 m/year, where as average declining rate in the piezometers near artificial recharge structure was 0.2544 m/ year. The lesser rate of decline in piezometer might be an indication of positive impact of the structure.