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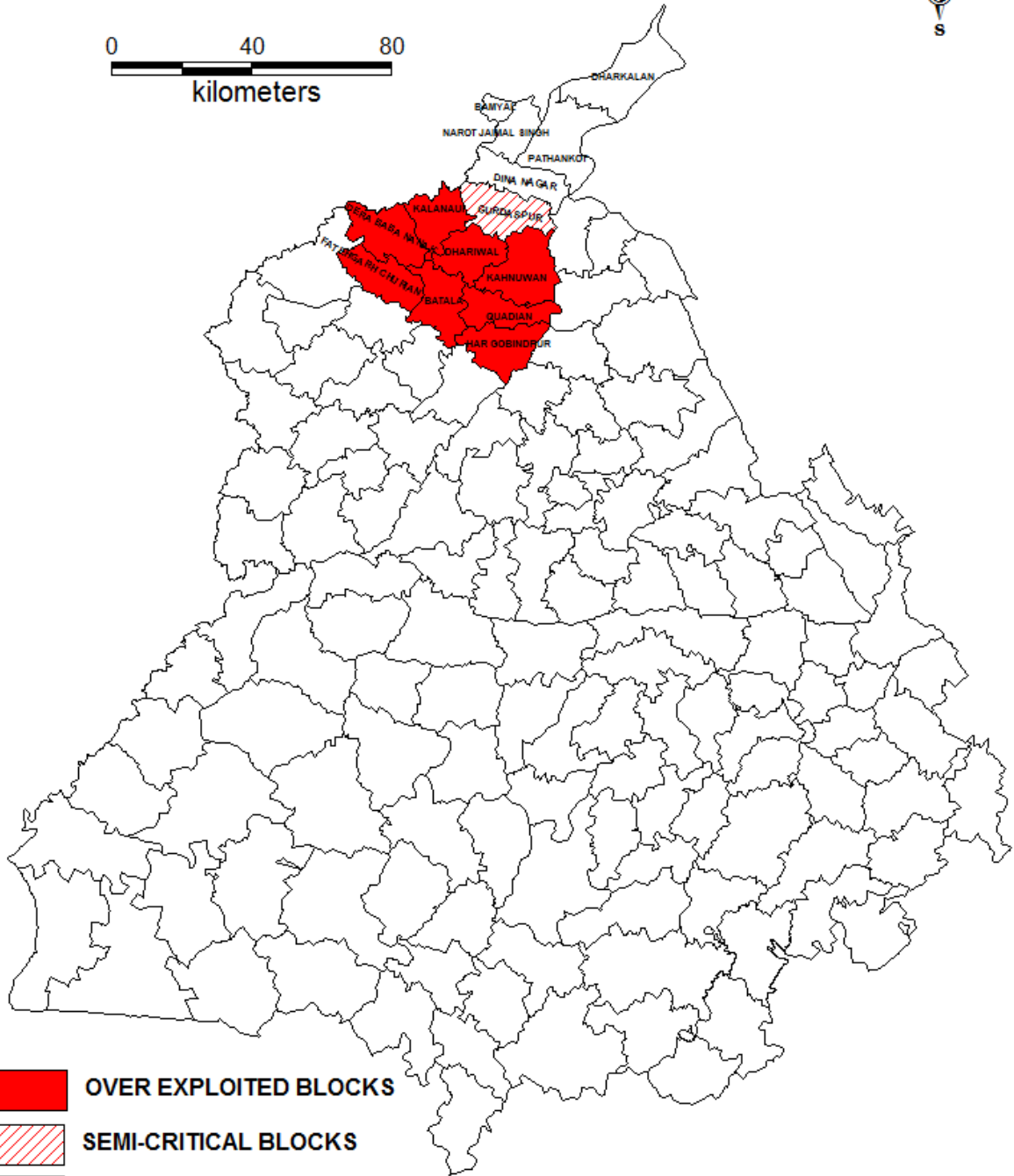
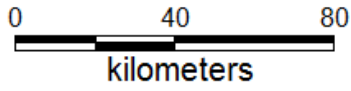
**Government of India  
Ministry of Water Resources,  
River Development & Ganga Rejuvenation  
Central Ground Water Board**


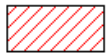

**PLAN ON**

**ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION IN  
OVEREXPLOITED BLOCKS OF GURDASPUR DISTRICT, PUNJAB**

**Central Ground Water Board  
North Western Region  
Chandigarh**

# PLAN OF ARTIFICIAL RECHARGE TO GROUND WATER IN OVER EXPLOITED BLOCKS DISTRICT GURDASPUR, PUNJAB



-  OVER EXPLOITED BLOCKS
-  SEMI-CRITICAL BLOCKS
-  SAFE BLOCKS

## **PLAN OF ARTIFICIAL RECHARGE TO GROUND WATER IN OVER EXPLOITED BLOCKS, DISTRICT GURDASPUR, PUNJAB**

Gurdaspur district is located in the northern most part of the Punjab state. It shares the boundary with Jammu & Kashmir state and Himachal Pradesh. The district is bounded by river Ravi and Beas . It has a unique characteristic of sharing the international boundary with Pakistan and river

Ravi is separating the district from Pakistan , Hoshiarpur, Kapurthala, Pathankot and Amritsar are situated on the Eastern , Southern, Northern and Western side of the district respectively . It covers an area of 3513 km<sup>2</sup> and forms a part of upper Bari Doab area. Physiographically the area is divided into three units (i) Siwalik Hills lying in NE of the district (ii) Kandi Zone lying immediately south west of foothill zone of Siwalik hills(iii) Alluvial plains lying SW of Kandi.

### **RAINFALL AND CLIMATE**

The normal annual rainfall of the area is 1113mm which is unevenly distributed over Gurdaspur district. The south western monsoon (July to Sept) contributes about 80% of the rainfall and rest 20% occur during the non monsoon period. The rain fall in the district increases from south west to north east. The climate of the district is tropical type with four well defined seasons.

### **GEOMORPHOLOGY AND SOILS**

River Ravi, Beas, Chakki Khad and Sakki nala are the main drainage features of the district. Apart from the above small local nalas and called choes are the frequent features in the northern side of the district which ultimately in the northern side of the district which ultimately meets the main khads and aluminates ultimately to the rivers Beas and Ravi. The district can be divided into three geomorphological types-Hilly area, Piedmont zone and alluvial plain. Hilly area is predominately on the NE part of the district and called Siwalik which are mainly clays and clay with boulders.

### **HYDROGEOLOGY**

The main aquifer group of the area is thick granular zones alternate with thick or thin clay lenses. The fresh aquifer is water table and extends all over the area is composed of coarser sediments . In the north eastern and northern part , there are 5-6 aquifers within 300m depth and ranges in the thickness from 20-65 m . These granular zones are laterally extensive in nature and composed of medium to coarse sands with gravel and pebbles cobbles etc. The clay beds are 5-12 m thick. In the central part 5-6 prominent granular zones have been encountered within the depth of 375m bgl . The thickness of granular zones is variable from 20-95m and the clay beds vary from

3-14m thick. Water levels of the area in pre monsoon period varies from 2.39 (Khani Khui) to 18-93 .In the same way the post monsoon water levels are variable from 1.70m (Behrampur) to 16.76(Sri Hargobindpur). It shows that there is extensive recharge by Ravi and Beas during monsoon.

### **GROUND WATER RESOURCES**

According to the data available for ground water resources on 31.3.2011,. The net ground water available in the district is 1776.21 MCM and gross draft for all uses is 2263.78MCM hence the stage of development is 127%. Amongst all the blocks 8 blocks are over exploited.

### **GROUND WATER QUALITY**

The ground water in the district is alkaline in nature with low mineralisation. The pH value ranges from 7.77 to 8.25 indicating a weak base type characteristic. Specific conductance, a measure of total dissolved solids present in water, ranges from 235 to 1640micromhos/cm at 250C. The fluoride concentration in the entire district is within the permissible limit of 1.5 mg/L for drinking water of BIS and it ranges from 0.12 to 1.16 mg/L. Nitrate values are below the permissible limit with an exception at two villages, i.e. Batala (138 mg/L) and Kalanaur (146 mg/L). Iron, essential for plant and animal growth, is below 1.0 mg/L in the entire district. Arsenic above the prescribed BIS permissible limit of 0.01 mg/L is found in well waters located at Nishayra (0.015 mg/L), Behrampur (0.0113 mg/L), Galri (0.0201 mg/L) and Sri Hargobindpur (0.010 mg/L).

### **GROUND WATER IRRIGATION SCENARIO**

As per the data available from minor irrigation census 2006-07 the detailed number of shallow, deep, tubewells, lined, unlined water distribution system, land holdings of wells are given below for reference

#### **Distribution of Shallow Tubewells According to Owner's Holding Size**

| <b>No. of shallow tube wells by size class of individual owner</b> |                  |                      |                   |                         |                    |                  |              |
|--|------------------|----------------------|-------------------|-------------------------|--------------------|------------------|--------------|
| Sr.no  | district         | Marginal<br>(0-1 ha) | Small<br>(1-2 ha) | Semi-Medium<br>(2-4 ha) | Medium<br>(4-10ha) | Big<br>(>=10 ha) | Total        |
| <b>1</b>   | <b>Gurdaspur</b> | <b>6319</b>          | <b>17639</b>      | <b>36473</b>            | <b>19183</b>       | <b>2747</b>      | <b>82361</b> |

### Distribution of Deep Tubewells According to Owner's Holding Size

| <b>No. of deep tube wells by size class of individual owner</b> |                  |            |            |             |            |            |             |
|---|------------------|------------|------------|-------------|------------|------------|-------------|
| Sr.no   | district         | Marginal   | Small      | Semi-Medium | Medium     | Big        | Total       |
|   |                  | (0-1 ha)   | (1-2 ha)   | (2-4 ha)    | (4-10ha)   | (>=10 ha)  |             |
| <b>1</b>  | <b>Gurdaspur</b> | <b>170</b> | <b>309</b> | <b>778</b>  | <b>812</b> | <b>313</b> | <b>2382</b> |

### Distribution of Shallow Tubewells According to Depth of tube well

| <b>No. by the depth of shallow Tube well</b> |                  |             |              |              |             |          |              |
|--|------------------|-------------|--------------|--------------|-------------|----------|--------------|
| Sr.no  | district         | (0-20       | (20-40       | (40-60 mts)  | (60-70      | (>70     | Total        |
|  |                  | mts)        | mts)         |              | mts)        | mts)     |              |
| <b>1</b>                                     | <b>Gurdaspur</b> | <b>2169</b> | <b>56933</b> | <b>14618</b> | <b>8830</b> | <b>0</b> | <b>82550</b> |

### Number of Ground Water Schemes and Potential Utilized by water distribution device

| <b>Ground Water Schemes according to water Distribution System</b> |                  |             |                 |                  |
|--|------------------|-------------|-----------------|------------------|
| <b>Open Water Channel</b>  |                  |             |                 |                  |
| Sr.no  | District         | Lined/pucca | Unlined/kutchha | Underground pipe |
| <b>1</b>   | <b>Gurdaspur</b> | <b>5979</b> | <b>78500</b>    | <b>490</b>       |

#### PLAN OF THIS REPORT

In this plan 2 types of the recharge structures are proposed such as Roof Top Rain water harvesting in rural & urban areas and Recharge pits in agriculture lands of 5mt x 5mt x 3mt size. The pit will be surrounded by angle irons and barbed fencing. The size and depth depend on the availability of the land. The extra water available on the field will be stored in the pit and that will also be recharged to the ground water. **A summery outline of the artificial recharge plan for the entire district of each block is given at the beginning in tabular forms. This is followed by the salient features of each block along with the detailed structure-wise recharge plan and cost estimates.**

Details of the block wise type of suitable recharge structures and volume of water assured for annual recharge for each block, schematic design of recharge structures are annexed at annexure I & II.

This plan is focusing on the technical aspects of the ground water recharge through various means so that various implementing agencies may get the appropriate technical guidelines. The existing/ongoing schemes of the central or state govt. like MANERGA, IWSP, PMKVY, NABARD funded schemes, Urban Development schemes, departmentally funded projects etc. may be benefitted from the recharge plan by incorporating the input in the operational guidelines/ design and for locating the specific sites.

Agriculture university, engineering Collages, Academic and Research Institution, NGO may also take up the pilot or demonstrative projects in the blocks suitable to them to plan at local level as per local conditions.

| Sr.no.   | Type of Structure                                      | No. of structures | Unit cost in Lakhs | Total cost of structure in Crores | Annual Recharge (MCM) |
|--|--|-------------------|--------------------|-----------------------------------|-----------------------|
| <b>ROOF TOP RAIN WATER HARVESTING IN RURAL AND URBEN AREAS</b> |  |                   |                    |                                   |                       |
| 1  | <b>Artificial Recharge Plan For Urban Areas.</b>       | 6663              | 0.25               | <b>16.66</b>                      | <b>0.868</b>          |
| 2  | <b>Roof Top Rain Water Harvesting in Rural Areas</b>   | 17646             | 0.25               | <b>44.12</b>                      | <b>1.697</b>          |
|  | <b>Total</b>   | 24309             | <b>0.25</b>        | <b>60.78</b>                      | <b>2.565</b>          |
| <b>ARTIFICIAL RECHARGE IN FARMS</b>                            |  |                   |                    |                                   |                       |
| 1  | <b>Artificial Recharge Plan Through Recharge Pits.</b> | 19331             | 0.35               | <b>67.65</b>                      | 22.965                |
|  |  |                   | <b>Total</b>       | <b>67.65</b>                      | <b>22.965</b>         |

By the implementation of the proposed recharge structures there will be a reduction of 0.99% in stage of ground water development as tabulated below

| Sr. no.  | Total Draft (present) (MCM) | Recharge through different proposed structures (MCM) | Draft Reduced due to Recharge (MCM) | Stage of development (present) | Stage of development after recharge | Reduction in stage of development after recharge |
|----------|-----------------------------|--|-------------------------------------|--------------------------------|-------------------------------------|--|
| <b>1</b> | <b>2263.78</b>              | <b>25.53</b>   | <b>2238.25</b>                      | <b>127%</b>                    | <b>126.01%</b>                      | <b>0.99%</b>                                     |

**ARTIFICIAL RECHARGE PLAN THROUGH RECHARGE PITS IN OVER EXPLOITED  
BLOCKS OF GURDASPUR DISTRICT**

| <b>Block Name</b>        | <b>Total area of the village (in hectares )</b> | <b>10%of village area taken for farm recharge (in hectares)</b> | <b>Total number of recharge pits</b> | <b>Annual recharge (MCM)= (Area*Runoff 15%*Rainfall )</b> | <b>Cost of Pit @ Rs.0.35 lakh (Crores)</b> |
|--------------------------|---|---|--------------------------------------|---|--|
| <b>Kahnuwan</b>          | <b>32669</b>                                    | <b>3267</b>   | <b>3267</b>                          | <b>4.322</b>  | <b>11.43</b>                               |
| <b>Dhariwal</b>          | <b>22898</b>                                    | <b>2290</b>   | <b>2290</b>                          | <b>2.782</b>  | <b>8.02</b>                                |
| <b>Kalanour</b>          | <b>19665</b>                                    | <b>1967</b>   | <b>1967</b>                          | <b>2.321</b>  | <b>6.88</b>                                |
| <b>Dera Baba Nanak</b>   | <b>27951</b>                                    | <b>2795</b>   | <b>2795</b>                          | <b>2.914</b>  | <b>9.78</b>                                |
| <b>Fatehgarh Churian</b> | <b>22564</b>                                    | <b>2256</b>   | <b>2256</b>                          | <b>2.335</b>  | <b>7.90</b>                                |
| <b>Batala</b>            | <b>21824</b>                                    | <b>2182</b>   | <b>2182</b>                          | <b>2.521</b>  | <b>7.64</b>                                |
| <b>Qadian</b>            | <b>19998</b>                                    | <b>2000</b>   | <b>2000</b>                          | <b>2.658</b>  | <b>7.00</b>                                |
| <b>Sri Hargobindpur</b>  | <b>25673</b>                                    | <b>2574</b>   | <b>2574</b>                          | <b>3.112</b>  | <b>9.01</b>                                |
|                          |   |   | <b>19331</b>                         | <b>22.965</b>   | <b>67.66</b>                               |

***Number of Recharge pits are based on following factors:***

Availability of Irrigation wells In the farmer land

Area of sandy strata at shallow depth identified

Type of structure will be recharge pit/ Recharge well( where top three meters is clay)

**ROOF TOP RAINWATER HARVESTING IN RURAL AREAS OF GURDASPUR  
DISTRICT OF PUNJAB**

| <b>Name of District</b> | <b>Sr.no</b> | <b>Name of CD Block</b> | <b>Total area of the village ( in hectares )</b> | <b>Number of households (2011 census)</b> | <b>Recharge ( 10% of total households)</b> | <b>Total No of AR Structures ( one structure for each house )</b> | <b>Total recharge in MCM</b> | <b>Cost @ 0.25 Lacs/structure (Crores)</b> |
|-------------------------|--------------|-------------------------|--|---|--|---|------------------------------|--|
| <b>GURDASPUR</b>        | 1            | Kahnuwan                | <b>32669</b>                                     | <b>24921</b>                              | <b>2492</b>                                | <b>2492</b>   | <b>0.264</b>                 | <b>6.23</b>                                |
|                         | 2            | Dhariwal                | <b>22898</b>                                     | <b>26340</b>                              | <b>2634</b>                                | <b>2634</b>   | <b>0.279</b>                 | <b>6.59</b>                                |
|                         | 3            | Kalanaur                | <b>19665</b>                                     | <b>14942</b>                              | <b>1494</b>                                | <b>1494</b>   | <b>0.141</b>                 | <b>3.74</b>                                |
|                         | 4            | Dera Baba Nanak         | <b>27951</b>                                     | <b>21241</b>                              | <b>2124</b>                                | <b>2124</b>   | <b>0.177</b>                 | <b>5.31</b>                                |
|                         | 5            | Fatehgarh-Churian       | <b>22564</b>                                     | <b>22129</b>                              | <b>2213</b>                                | <b>2213</b>   | <b>0.183</b>                 | <b>5.53</b>                                |
|                         | 6            | Batala                  | <b>21824</b>                                     | <b>26866</b>                              | <b>2687</b>                                | <b>2687</b>   | <b>0.248</b>                 | <b>6.72</b>                                |
|                         | 7            | Qadian                  | <b>19998</b>                                     | <b>17981</b>                              | <b>1798</b>                                | <b>1798</b>   | <b>0.191</b>                 | <b>4.50</b>                                |
|                         | 8            | Sri Harigovindpur       | <b>25673</b>                                     | <b>22039</b>                              | <b>2204</b>                                | <b>2204</b>   | <b>0.214</b>                 | <b>5.51</b>                                |
|                         |              | <b>Total</b>            | <b>193242</b>                                    | <b>176459</b>                             | <b>17646</b>                               | <b>17646</b>  | <b>1.697</b>                 | <b>44.12</b>                               |





**ARTIFICIAL RECHARGE PLAN FOR URBAN AREAS OF DISTRICT GURDASPUR PUNJAB**

| <b>District</b>  | <b>Block</b>           | <b>Town Name</b>               | <b>Total Households</b> | <b>Total Population of Town</b> | <b>Households taken for Artificial Recharge (10%)</b> | <b>Total Roof Top Area (sqm)</b> | <b>Vol of water available for recharge (MCM)</b> | <b>Cost @Rs.0.25 lakh/Structure (Crores)</b> |
|------------------|------------------------|--------------------------------|-------------------------|---------------------------------|---|----------------------------------|--|--|
| <b>Gurdaspur</b> | <b>Gurdaspur</b>       | <b>Gurdaspur(MCI+OG)</b>       | 15443                   | 81448                           | 1544  | 308860                           | 0.225  | <b>3.86</b>                                  |
|                  | <b>GURDASPUR</b>       | <b>Dhariwal (M CI)</b>         | 3482                    | 16772                           | 348   | 69640                            | 0.051  | <b>0.87</b>                                  |
|                  | <b>GURDASPUR</b>       | <b>Behrampur (CT)</b>          | 1057                    | 5432                            | 106   | 21140                            | 0.015  | <b>0.27</b>                                  |
|                  | <b>GURDASPUR</b>       | <b>Baryar (CT)</b>             | 706                     | 3520                            | 71  | 14120                            | 0.010  | <b>0.18</b>                                  |
|                  | <b>GURDASPUR</b>       | <b>Tibri (CT)</b>              | 2094                    | 11845                           | 209   | 41880                            | 0.030  | <b>0.52</b>                                  |
|                  | <b>GURDASPUR</b>       | <b>Fateh nangal</b>            | 1499                    | 7721                            | 150   | 29980                            | 0.018  | <b>0.38</b>                                  |
|                  | <b>BATALA</b>          | <b>Fatehgarh Churian (MCI)</b> | 2550                    | 13070                           | 255   | 51000                            | 0.031  | <b>0.64</b>                                  |
|                  | <b>BATALA</b>          | <b>Batala(MCI+ OG)</b>         | 31396                   | 158621                          | 3140  | 627920                           | 0.387  | <b>7.85</b>                                  |
|                  | <b>BATALA</b>          | <b>Qadian (MCI+ OG)</b>        | 4823                    | 2362                            | 482   | 96460                            | 0.059  | <b>1.21</b>                                  |
|                  | <b>BATALA</b>          | <b>Sri Hargobindpur (M CI)</b> | 1587                    | 8241                            | 159   | 31740                            | 0.020  | <b>0.40</b>                                  |
|                  | <b>DERA BABA NANAK</b> | <b>Dera Baba Nanak (M CI)</b>  | 1298                    | 6394                            | 130   | 25960                            | 0.014  | <b>0.33</b>                                  |
|                  | <b>DERA BABA NANAK</b> | <b>Shikar (CT)</b>             | 692                     | 4001                            | 69  | 13840                            | 0.007  | <b>0.17</b>                                  |
|                  |                        | <b>TOTAL</b>                   | <b>66627</b>            | <b>319427</b>                   | 6663  | <b>1332540</b>                   | <b>0.868</b>                                     | <b>16.658</b>                                |

## **B. POTENTIAL FOR REDUCTION IN OVERDRAFT BY ENHANCING THE GROUND WATER USE EFFICIENCY OF IRRIGATION TUBE WELLS**

The micro level transformation in the ground water management have vast impact potential to counter extensive ground water depletion faced by the state of Punjab, particularly in overexploited blocks. There are around 84932 operated by farmers for irrigation through unlined/Kutchha (92.32%) open channel system in Gurdaspur district where water from the tubewell is discharge to the agricultural field. In this process huge quantity of ground water is wasted in soil moisture and evaporation losses.

Dynamic ground water resources (2011) indicate that Gross ground water draft for irrigation in Gurdaspur district is estimated at 2197.41MCM. It is expected that around 26.52 % of over draft can be brought down by switching over to underground/surface pipeline based distribution from the prevailing unlined open channels. Thereby gross draft will be reduced to the tune of 1784.77 MCM assuming there is no crop diversification by the farmers.

The benefit will lead to saving of precious ground water resources in overexploited blocks of Gurdaspur Districts. The measure if implemented will bring down the ground water overdraft from 127% to 100.48 %. The category of the blocks will also improve drastically resulting in boosting of agriculture and industrial development otherwise not sustainable in majority of the blocks in the state.

The tubewells also consume enormous electricity which is subsidized and government incurs significant revenue on this account. The measures therefore will result in saving of energy and money. Pollution impact will be reduced whenever diesel engines are used by the farmers. The environmental and ecological condition in the irrigated land will improve. Unwanted weed growth will also be controlled inside the farm land. This will also be useful in the waterlogged/ shallow water table areas as the seepage losses in these areas also aggravate the water logging. **Government should make/launch a mission mode program for installing the underground pipe lines instead of having *katcha* channel in the entire Punjab.** Heavy ground water overdraft can be reduced by these efforts. This will ensure **more crop per drop.**















**POTENTIAL FOR REDUCTION IN OVERDRAFT BY ENHANCING THE GROUND WATER USE EFFICIENCY IN IRRIGATION TUBEWELLS, GURDASPUR DISTRICT**

| Net Annual Ground Water Availability (mcm) | Total Draft (present) (mcm) | Gross Irrigation Draft (present) (mcm) | Gross Ground Water Draft for Domestic and industrial supply (mcm) | Percentage of unlined channel | Wastage through unlined channel, (mcm) (Col 3 X Col5 X 0.30 <sup>#</sup> ) | Wastage through unlined channel in irrigated area by ground water scheme in OE blocks only | Potential of Reduced irrigation overdraft (Col3-col7) (mcm) | Gross draft after saving of water (mcm) (Col 8+Col4) | Present Stage of Development (%) | Stage of development afterwards(( Col 9/Col 1)X100) (%) | Reduction in stage of development after constructing pucca canal (Col 11-Col 10) (%) |
|--|-----------------------------|--|---|-------------------------------|--|--|---|--|----------------------------------|---|--|
| 1  | 2                           | 3                                      | 4   | 5                             | 6  | 7  | 8   | 9  | 10                               | 11  | 12   |
| 1776.21                                    | 2263.78                     | 2197.41                                | 66.37   | 92.32                         | 608.59   | 478.61   | 1718.80   | 1784.77  | 127                              | 100.48  | 26.52  |

*# Losses from open kutchha channel are around 30%.*

**COST ESTIMATE OF UNDERGROUND PIPE LINE**

| District         | Block             | Irrigated area by ground water scheme (ha) | Percentage of Unlined Channel (%) | Area under unlined Channels | Total cost @Rs.0.50 lack per hector(in cr) Area *0.50/100 = Crores | Total Cost in Rs.Cr. District wise |
|------------------|-------------------|--|-----------------------------------|-----------------------------|--|------------------------------------|
| <b>GURDASPUR</b> | Kahnuwan          | 19780                                      | 92.32                             | 18261                       | 91.30  | <b>526.46</b>                      |
|                  | Dhariwal          | 13148                                      | 92.32                             | 12138                       | 60.69  |                                    |
|                  | Kalanaur          | 12942                                      | 92.32                             | 11948                       | 59.74  |                                    |
|                  | Dera Baba Nanak   | 18018                                      | 92.32                             | 16634                       | 83.17  |                                    |
|                  | Fatehgarh-Churian | 12704                                      | 92.32                             | 11728                       | 58.64  |                                    |
|                  | Batala            | 13846                                      | 92.32                             | 12783                       | 63.91  |                                    |
|                  | Qadian            | 10608                                      | 92.32                             | 9793                        | 48.97  |                                    |
|                  | Sri Harigobindpur | 13006                                      | 92.32                             | 12007                       | 60.04  |                                    |

| Wells Feasible  | Rigs Suitable             | Depth of Well (m)  | Discharge (lpm)  | Suitable Artificial Recharge Structures |
|---|---------------------------|--|--|---|
| Tube Wells  | Direct and Reverse Rotary | 65 - 330   | 2000 - 3000  | Recharge Shaft And Recharge Trench      |
| Tube Wells  | Direct and Reverse Rotary | 40 - 95  | 1000 - 2000  | Recharge Shaft And Recharge Trench      |
| Tube Wells  | Direct and Reverse Rotary | 30 - 80  | 800 - 1000   | Recharge Shaft And Recharge Trench      |
| DEPTH TO WATER LEVEL<br>NOVEMBER 2014   |                           |  |  |   |
|  | 2.00 - 5.00 mbgl          |  National Highway |  International Boundary |   |
|  | 5.00 - 10.00 mbgl         |  Canals           |  State Boundary         |   |
|  | 10.00 - 20.00 mbgl        |  Water Bodies     |  Block Boundary         |   |
|  | 20.00 - 40.00 mbgl        |  Major Drainage   |  Block Headquarters     |   |

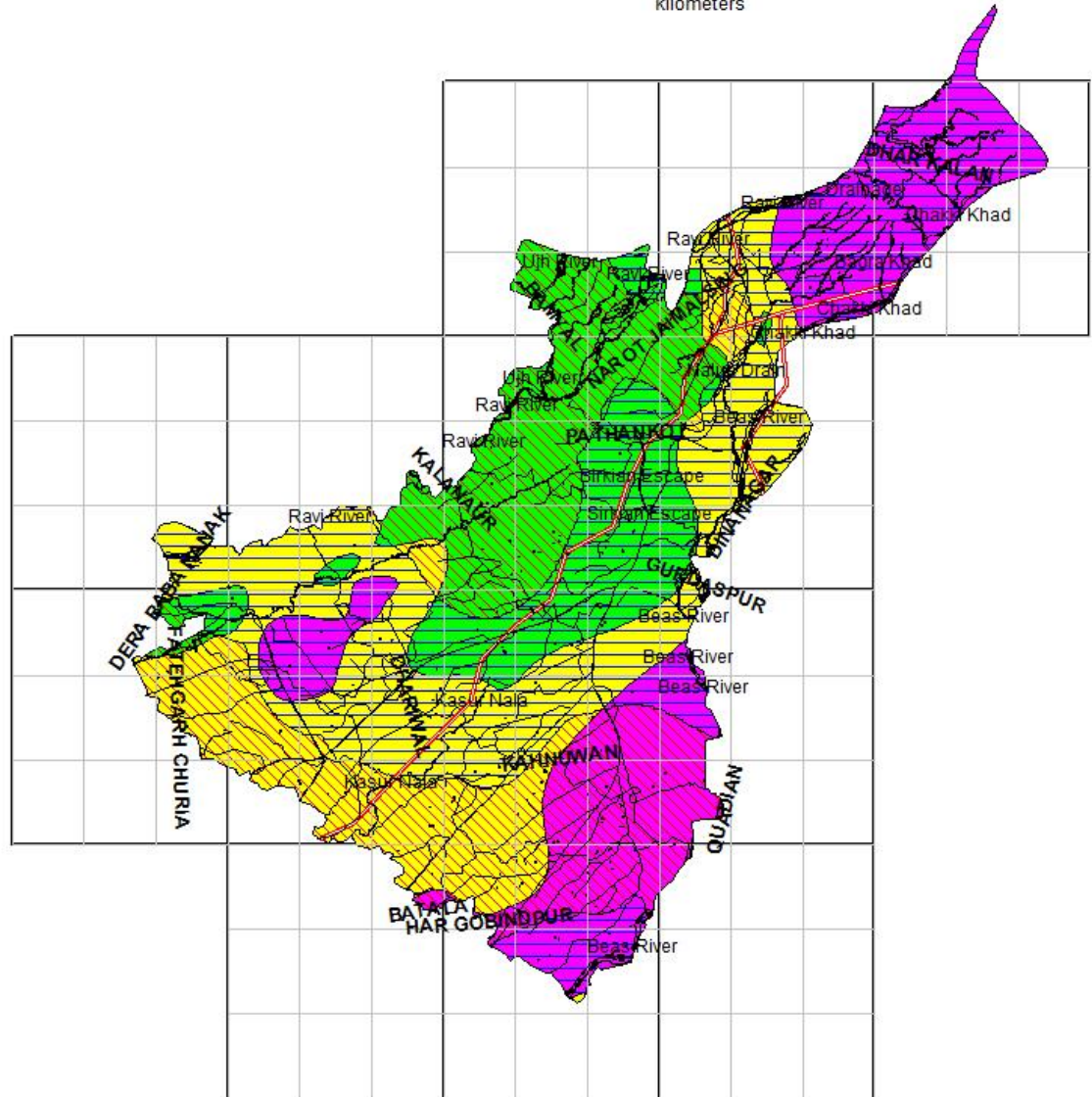
#### OTHER INFORMATION

|   |  |
|---|--|
| Name of State                             | Punjab   |
| Name of District                          | Gurdaspur  |
| Geographical Area                         | 3513 sq.km.  |
| Major Geological Formation                | Shivaliks and Alluviam   |
| Major Drainage System                     | Ravi and Beas  |
| Population (as on 2011)                   | 22,98,323  |
| Total Number of Blocks                    | 8  |
| Existing Major/Medium Irrigation Projects | Upper Bari Doab Canal<br>Shah Nehar Canal  |
| Uttillizable Ground Water Resources 2011  | 177621 (Ham)   |
| Net Ground Water Draft                    | 226378(Ham)  |
| Stage of Ground Water Development         | 127 %  |
| Average Annual Rainfall                   | 1113 mm  |
| Range of Mean Daily Temperature           | 6 - 40°C   |
| Over Exploited Blocks                     | BATALA<br>FATEHGARH CHURIAN<br>KAHNUWAN<br>KALANAUR<br>QADIAN<br>SRI HARGOBINDPUR<br>DERA BABA NANAK<br>DHARIWAL |

# PLAN OF ARTIFICIAL RECHARGE TO GROUND WATER DISTRICT GURDASPUR, PUNJAB

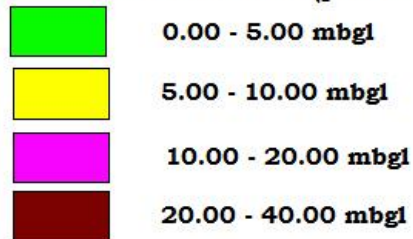


0 17 34 68  
kilometers



### Legend

#### Decadal mean water level (post monsoon)



#### Decadal mean water level trend (m)

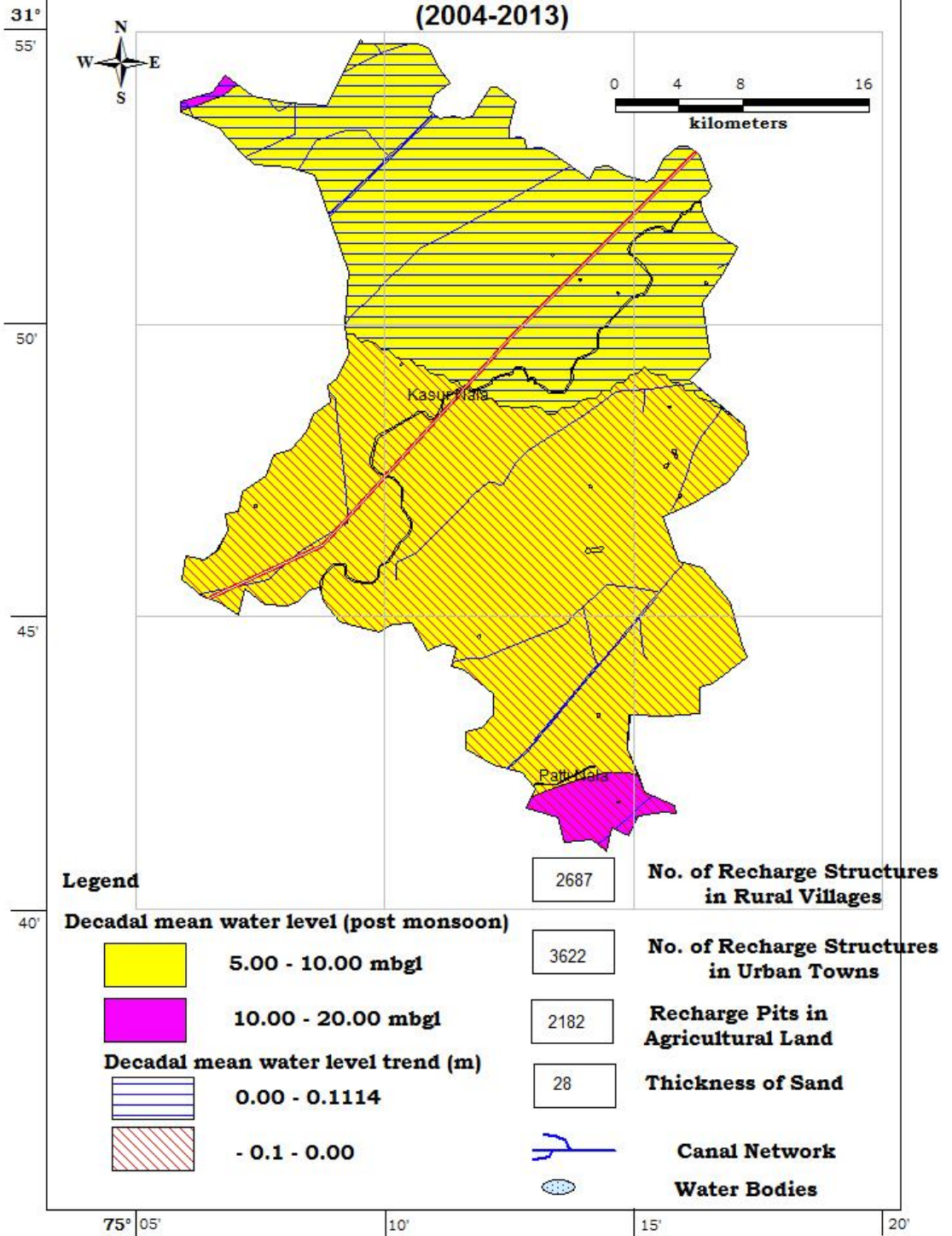


***BLOCK  
WISE PLAN OF  
DISTRICT  
GURDASPUR  
PUNJAB***

***(8 OE BLOCKS)***



**BLOCK BATALA DISTRICT GURDASPUR, PUNJAB**  
**DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON**  
**VS**  
**DECADAL MEAN TREND POST MONSOON**  
**(2004-2013)**

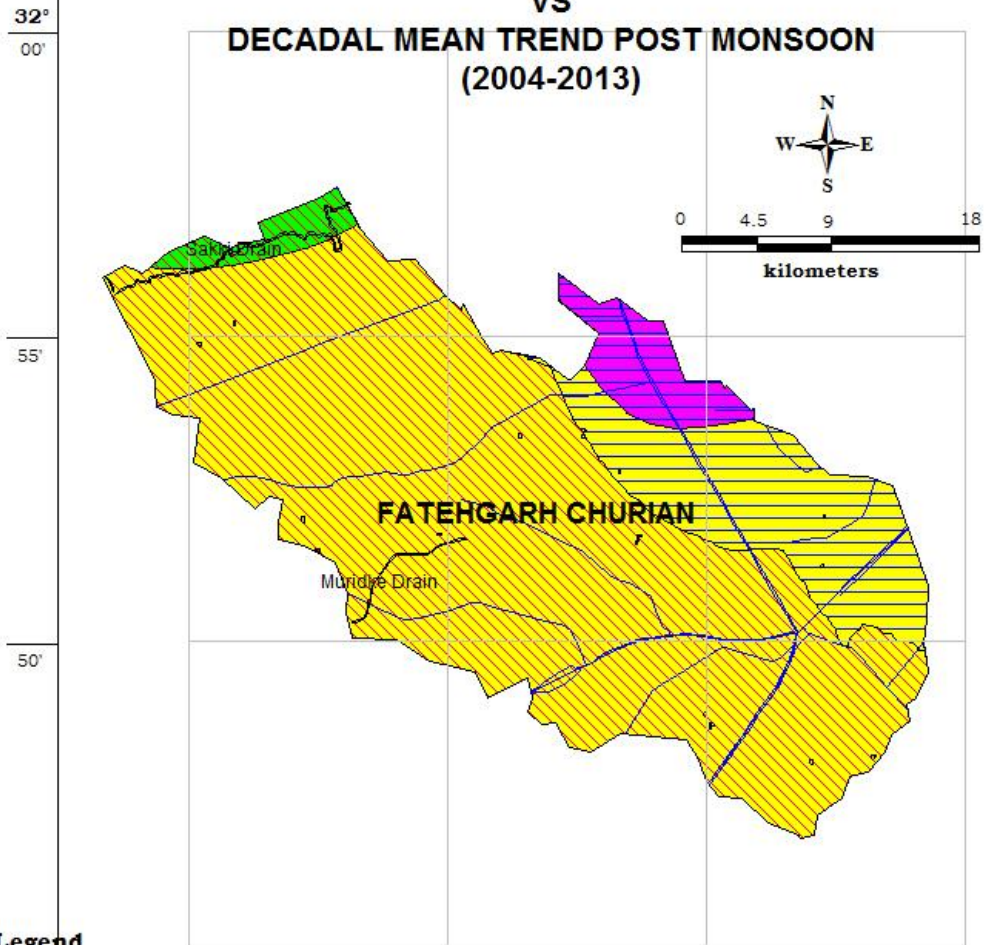


| <b>Block Name:- Batala</b><br><b>District:- Gurdaspur</b> |  |  | <b>State:- PUNJAB</b> |
|---|--|--|-----------------------|
| 1.  | GENERAL INFORMATION                              |  |                       |
|   | i) Geographical area (sq km)                     |  | 278.3                 |
|   | • Number of Villages inhabited<br>• Un-inhabited |  | 130<br>0              |
|   | ii) Average Annual Rainfall (mm)                 |  | 779                   |
|   | iii) Area feasible for Artificial Recharge       |  | 278.3                 |
|   | iv) Village identified under scarcity of Water   |  | 51                    |
|   | v) Village covered under water supply            |  | 26                    |
|   | vi) Water Tank exists in the village             |  | 16                    |
| 2.  | GEOMORPHOLOGY                                    |  |                       |
|   | Major Physiographic                              |  | Alluvium Plain        |
|   | Major drainages<br>Basin<br>Sub-Basin            |  | Ravi 40%<br>Beas 60%  |
| 3.  | LAND USE   |  |                       |
|   | • Area According to Village Papers (Sq.Km)       |  | 237.92                |
|   | • Net Area Sown (Sq.Km)                          |  | 197.59                |
|   | • Area Sown More than Once (Sq.Km)               |  | 184.00                |
|   | • Total Cropped Area (Sq.Km)                     |  | 381.59                |
|   | • Cropping Intensity                             |  | 193                   |
|   | • Area under Thur and Sem (Sq.Km)                |  | --                    |
| 4.  | PREDOMINANT GEOLOGICAL FORMATIONS                |  | Recent alluvium       |
| 5.  | HYDROGEOLOGY                                     |  |                       |

|    |  |   |        |
|----|--|---|--------|
|    | Major Water bearing Formation (Aquifer)  | Fine to coarse Sand                           |        |
|    | Avg. Depth to water level (decadal)  | Depth to water level<br>May 2015 (mbgl)       |        |
|    | <ul style="list-style-type: none"> <li>•Pre- monsoon: (May 2015)</li> <li>•6.30-9.10 (mbgl)</li> </ul>                                 | 5.00 – 20.00(mbgl)                            |        |
|    | <ul style="list-style-type: none"> <li>•Post –monsoon: (Nov2014)</li> <li>•4.32-9.40(mbgl)</li> </ul>                                  |   |        |
| 6. | GROUND WATER EXPLORATION BY<br>CGWB (As on 31.03.2015)   |   |        |
|    | <ul style="list-style-type: none"> <li>•No of wells drilled</li> </ul>   | 1   |        |
|    | <ul style="list-style-type: none"> <li>•Depth Range (m)</li> </ul>   | 83.80-375.30                                  |        |
|    | <ul style="list-style-type: none"> <li>•Discharge (Ipm)</li> </ul>   | 973-4300                                      |        |
|    | Aquifer Parameters   |   |        |
|    | <ul style="list-style-type: none"> <li>•Transmissivity (m<sup>2</sup>/day)</li> </ul>  | 142-4300                                      |        |
|    | <ul style="list-style-type: none"> <li>•Storativity</li> </ul>   | 1.0*10 <sup>-3</sup> to 4.03*10 <sup>-3</sup> |        |
|    | <ul style="list-style-type: none"> <li>•Specified yield</li> </ul>   | 0.072   |        |
| 7. | GROUND WATER QUALITY   | Min   | Max    |
|    | <ul style="list-style-type: none"> <li>•EC in µS/cm at 25<sup>0</sup>c</li> </ul>  | 790   | 790    |
|    | <ul style="list-style-type: none"> <li>•NO3 (mg/l)</li> </ul>  | 90  | 90     |
|    | <ul style="list-style-type: none"> <li>•F (mg/l)</li> </ul>  | 0.31  | 0.31   |
|    | <ul style="list-style-type: none"> <li>•As (mg/l)</li> </ul>   | 0.0028  | 0.0028 |
| 8. | DYANMIC GROUND WATER<br>RESOURCES in MCM   | <b>2011</b>                                   |        |
|    | <ul style="list-style-type: none"> <li>•Net Ground Water Availability (MCM)</li> </ul>   | 171.40  |        |
|    | <ul style="list-style-type: none"> <li>•Existing Gross Ground Water Draft for Irrigation (MCM)</li> </ul>                              | 256.79  |        |
|    | <ul style="list-style-type: none"> <li>•Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)</li> </ul>    | 10.09   |        |
|    | <ul style="list-style-type: none"> <li>•Existing Gross Ground Water Draft for all Uses (MCM)</li> </ul>                                | 267.06  |        |
|    | <ul style="list-style-type: none"> <li>•Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)</li> </ul> | 13.62   |        |
|    | <ul style="list-style-type: none"> <li>•Net Ground Water Availability for Future Irrigation Development (MCM)</li> </ul>               | -99.19  |        |
|    | <ul style="list-style-type: none"> <li>•Stage of Ground Water Development / Over Draft (%)</li> </ul>                                  | 156   |        |
|    | <ul style="list-style-type: none"> <li>•Category of Block</li> </ul>   | OE  |        |

|                                   | Any specific reasons for high stress on ground water leading to Overexploitation and decline in ground water level | <i>Extensive Irrigation</i>         | Extensive Irrigation       |                       |
|-----------------------------------|--|-------------------------------------|----------------------------|-----------------------|
| 9.                                | Percentage of sand thickness up to 50 m depth (Average)  | <i>Thickness(m)</i><br>28           | Percentage<br>% 56         |                       |
| 10                                | Volume of unsaturated zone available for recharge (MCM)  | 167.49                              |                            |                       |
| 11.                               | Volume of water required for recharge (MCM)  | 222.72                              |                            |                       |
| 12.                               | Volume of surplus water available for recharge (MCM)   | 27.97                               |                            |                       |
| RECHARGE/ CONSERVATION STRUCTURES |  | Total Number of Recharge Structures | Total Cost (Rs. in crores) | Total Recharge in mcm |
| 13                                | Farm Recharge @Rs. 35000/-   | 2182                                | 7.637                      | 2.521                 |
| 14                                | RWH Rural @ Rs. 25000/-  | 2687                                | 6.717                      | 0.248                 |
| 15                                | RWH Urban @ Rs. 25000/-  | 3622                                | 9.055                      | 0.446                 |
| 16                                | Underground pipe line (area in hectares)<br><br>@ Rs. 50000/-  | 12783                               | 63.91                      | 70.43                 |
|                                   | <b>TOTAL</b>   |                                     | <b>87.319</b>              | <b>73.645</b>         |

**BLOCK FATEHGARH CHURIAN DISTRICT GURDASPUR, PUNJAB  
 DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON  
 VS  
 DECADAL MEAN TREND POST MONSOON  
 (2004-2013)**



**Legend**

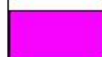
**Decadal mean water level (post monsoon)**



0.00 - 5.00 mbgl



5.00 - 10.00 mbgl



10.00 - 20.00 mbgl

**Decadal mean water level trend (m)**



0.00 - 0.1114



- 0.1 - 0.00

2213

**No. of Recharge Structures  
 in Rural Villages**

2256

**Recharge Pits in  
 Agricultural Land**

255

**No. of Recharge Structures  
 in Urban Towns**

30

**Thickness of Sand**



**Canal Network**



**Water Bodies**

55°

75° 00'

05'

10°

### Ground Water Scenario of Block

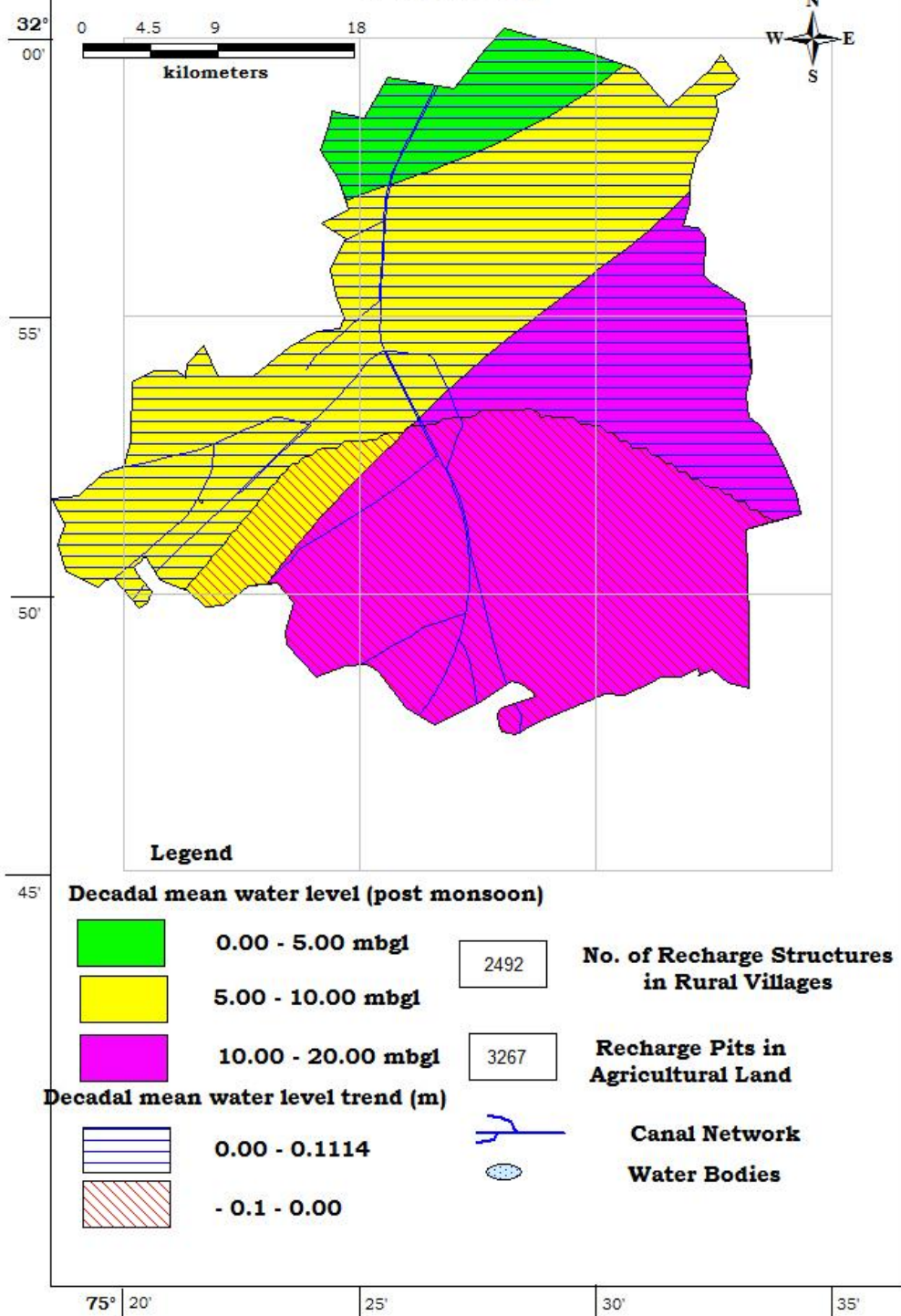
| Block Name:- Fatehgarh Churian |  |  |
|--------------------------------|--|--|
| District:- Gurdaspur           |  | State:- PUNJAB                         |
| 1.                             | GENERAL INFORMATION                            |  |
|                                | i) Geographical area (sq km)                   | 213.3                                  |
|                                | •Number of Villages inhabited<br>•Un-inhabited | 108<br>0                               |
|                                | ii) Average Annual Rainfall (mm)               | 700                                    |
|                                | iii)Area feasible for Artificial Recharge      | 213.3                                  |
|                                | iv)Village identified under scarcity of Water  | 6                                      |
|                                | v)Village covered under water supply           | 26                                     |
|                                | vi)Water Tank exists in the village            | 17                                     |
| 2.                             | GEOMORPHOLOGY                                  |  |
|                                | Major Physiographic                            | Alluvium Plain                         |
|                                | Major drainages<br>Basin<br>Sub-Basin          | Ravi 100%                              |
| 3.                             | LAND USE                                       |  |
|                                | •Area According to Village Papers (Sq.Km)      | 207.31                                 |
|                                | •Net Area Sown (Sq.Km)                         | 175.54                                 |
|                                | •Area Sown More than Once (Sq.Km)              | 160.00                                 |
|                                | •Total Cropped Area (Sq.Km)                    | 335.54                                 |
|                                | •Cropping Intensity                            | 191                                    |
|                                | •Area under Thur and Sem (Sq.Km)               | --                                     |
| 4.                             | PREDOMINANT GEOLOGICAL FORMATIONS              | Recent alluvium                        |
| 5.                             | HYDROGEOLOGY                                   |  |
|                                | Major Water bearing Formation (Aquifer)        | Fine to coarse Sand                    |
|                                | Avg. Depth to water level (decadal)            | Depth to water level<br>May 2015(mbgl) |

|    |  |   |                      |
|----|--|---|----------------------|
|    | <ul style="list-style-type: none"> <li>•Pre- monsoon: (May 2015)</li> <li>•6.10-9.56 (mbgl)</li> </ul>             | 5.00 – 10.00(mbgl)                            |                      |
|    | <ul style="list-style-type: none"> <li>•Post –monsoon: (Nov2014)</li> <li>• 6.30-9.66(mbgl)</li> </ul>             |   |                      |
| 6. | GROUND WATER EXPLORATION BY CGWB<br>(As on 31.03.2015)   |   |                      |
|    | •No of wells drilled   | --  |                      |
|    | •Depth Range (m)   | 83.80-375.30                                  |                      |
|    | •Discharge (Ipm)   | 973-4300                                      |                      |
|    | Aquifer Parameters   |   |                      |
|    | •Transmissivity (m <sup>2</sup> /day)  | 142-4300                                      |                      |
|    | •Storativity   | 1.0*10 <sup>-3</sup> to 4.03*10 <sup>-3</sup> |                      |
|    | •Specified yield   | 0.072   |                      |
| 7. | GROUND WATER QUALITY   | Min   | Max                  |
|    | •EC in µS/cm at 25 <sup>0</sup> c  | 522   | 704                  |
|    | •NO <sub>3</sub> (mg/l)  | 18  | 42                   |
|    | •F (mg/l)  | 0.31  | 0.18                 |
|    | •As (mg/l)   | 0.0006  | 0.0006               |
| 8. | DYANMIC GROUND WATER RESOURCES in MCM  | <b>2011</b>                                   |                      |
|    | •Net Ground Water Availability (MCM)   | 129.37  |                      |
|    | •Existing Gross Ground Water Draft for Irrigation (MCM)  | 247.74  |                      |
|    | •Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)                                  | 3.96  |                      |
|    | •Existing Gross Ground Water Draft for all Uses (MCM)  | 251.69  |                      |
|    | •Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)                               | 5.51  |                      |
|    | •Net Ground Water Availability for Future Irrigation Development (MCM)   | -123.87                                       |                      |
|    | •Stage of Ground Water Development / Over Draft(%)   | 195   |                      |
|    | •Category of Block   | OE  |                      |
|    | Any specific reasons for high stress on ground water leading to Overexploitation and decline in ground water level | Extensive Irrigation                          | Extensive Irrigation |

|                                   |   |                                     |                            |                       |
|-----------------------------------|---|-------------------------------------|----------------------------|-----------------------|
| 9.                                | Percentage of sand thickness up to 50 m depth (Average) | <i>Thickness(m)</i><br>30           | Percentage<br>% 60         |                       |
| 10                                | Volume of unsaturated zone available for recharge (MCM) | ---                                 |                            |                       |
| 11.                               | Volume of water required for recharge (MCM)             | ---                                 |                            |                       |
| 12.                               | Volume of surplus water available for recharge(MCM)     | ---                                 |                            |                       |
| RECHARGE/ CONSERVATION STRUCTURES |   | Total Number of Recharge Structures | Total Cost (Rs. in crores) | Total Recharge in mcm |
| 13                                | Farm Recharge @Rs. 35000/-                              | 2256                                | 7.896                      | 2.335                 |
| 14                                | RWH Rural @ Rs. 25000/-                                 | 2213                                | 5.532                      | 0.183                 |
| 15                                | RWH Urban@ Rs. 25000/-                                  | 255                                 | 0.637                      | 0.031                 |
| 16                                | Underground pipe line (area in hectares) @ Rs. 50000/-  | 11728                               | 58.64                      | 67.90                 |
| <b>TOTAL</b>                      |   |                                     | <b>72.705</b>              | <b>70.449</b>         |



**BLOCK KAHNUWAN DISTRICT GURDASPUR, PUNJAB**  
**DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON**  
**VS**  
**DECADAL MEAN TREND POST MONSOON**  
**(2004-2013)**



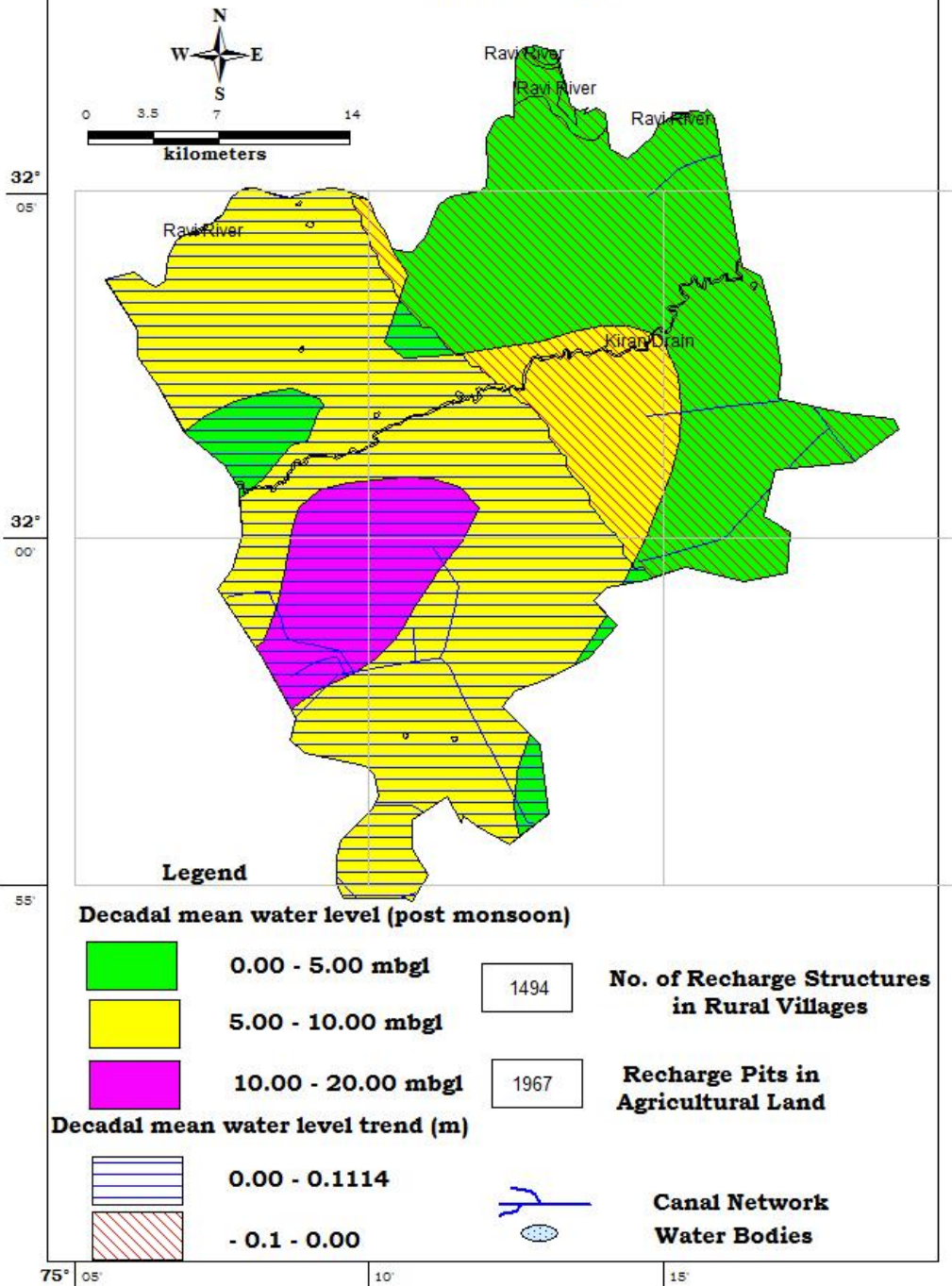
## Ground Water Scenario of Block

| <b>Block Name:- Kahnuwan</b> |  | <b>State:- PUNJAB</b> |
|------------------------------|--|-----------------------|
| <b>District:- Gurdaspur</b>  |  |                       |
| 1.                           | GENERAL INFORMATION                            |                       |
|                              | i) Geographical area (sq km)                   | 323.7                 |
|                              | •Number of Villages inhabited<br>•Un-inhabited | 137<br>6              |
|                              | ii) Average Annual Rainfall (mm)               | 889                   |
|                              | iii)Area feasible for Artificial Recharge      | 259                   |
|                              | iv) Village identified under scarcity of Water | 43                    |
|                              | v)Village covered under water supply           | 80                    |
|                              | vi)Water Tank exists in the village            | 43                    |
| 2.                           | GEOMORPHOLOGY                                  |                       |
|                              | Major Physiographic                            | Alluvium Plain        |
|                              | Major drainages<br>Basin<br>Sub-Basin          | Satluj 100%           |
| 3.                           | LAND USE                                       |                       |
|                              | •Area According to Village Papers (Sq.Km)      | 320.93                |
|                              | •Net Area Sown (Sq.Km)                         | 239.19                |
|                              | •Area Sown More than Once (Sq.Km)              | 207.00                |
|                              | •Total Cropped Area (Sq.Km)                    | 446.19                |
|                              | •Cropping Intensity                            | 187                   |
|                              | •Area under Thur and Sem (Sq.Km)               | --                    |
| 4.                           | PREDOMINAT GEOLOGICAL FORMATIONS               | Recent alluvium       |
| 5.                           | HYDROGEOLOGY                                   |                       |
|                              | Major Water bearing Formation (Aquifer)        | Fine to coarse Sand   |
|                              | Avg. Depth to water level (decadal)            | Depth to water level  |

|    |  |                                 |     |
|----|--|---------------------------------|-----|
|    |  | May 2015 (mbgl)                 |     |
|    | <ul style="list-style-type: none"> <li>•Pre- monsoon: (May 2015)</li> <li>•3.04-7.60 (mbgl)</li> </ul> | 2.00 – 20.00(mbgl)              |     |
|    | <ul style="list-style-type: none"> <li>•Post –monsoon: (Nov2014)</li> <li>•3.70-8.00(mbgl)</li> </ul>  |                                 |     |
| 6. | GROUND WATER EXPLORATION BY CGWB<br>(As on 31.03.2015)   |                                 |     |
|    | •No of wells drilled   | 2                               |     |
|    | •Depth Range (m)   | 83.80-375.30                    |     |
|    | •Discharge (Ipm)   | 973-4300                        |     |
|    | Aquifer Parameters   |                                 |     |
|    | •Transmissivity (m2/day)   | 142-4300                        |     |
|    | •Storativity   | $1.0*10^{-3}$ to $4.03*10^{-3}$ |     |
|    | •Specified yield   | 0.072                           |     |
| 7. | GROUND WATER QUALITY   | Min                             | Max |
|    | •EC in $\mu\text{S}/\text{cm}$ at $25^{\circ}\text{c}$   | --                              | --  |
|    | •NO3 (mg/l)  | --                              | --  |
|    | •F (mg/l)  | --                              | --  |
|    | •As (mg/l)   | --                              | --  |
| 8. | DYANMIC GROUND WATER RESOURCES in MCM  | <b>2011</b>                     |     |
|    | •Net Ground Water Availability (MCM)   | 175.53                          |     |
|    | •Existing Gross Ground Water Draft for Irrigation (MCM)  | 254.72                          |     |
|    | •Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)                      | 3.24                            |     |
|    | •Existing Gross Ground Water Draft for all Uses (MCM)  | 257.95                          |     |
|    | •Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)                   | 4.78                            |     |
|    | •Net Ground Water Availability for Future Irrigation Development (MCM)                                 | -83.97                          |     |
|    | •Stage of Ground Water Development / Over Draft(%)   | 147                             |     |
|    | •Category of Block   | OE                              |     |

|  |  |  |                                   |                              |
|--|--|--|-----------------------------------|------------------------------|
|  | Any specific reasons for high stress on ground water leading to Overexploitation and decline in ground water level | <i>Extensive Irrigation</i>                | <i>Extensive Irrigation</i>       |                              |
| 9.                                       | Percentage of sand thickness up to 50 m depth (Average)  | <i>Thickness(m)</i><br>--                  | Percentage %<br>--                |                              |
| 10                                       | Volume of unsaturated zone available for recharge (MCM)  | 194.81                                     |                                   |                              |
| 11.                                      | Volume of water required for recharge (MCM)  | 259.06                                     |                                   |                              |
| 12.                                      | Volume of surplus water available for recharge(MCM)  | 32.53                                      |                                   |                              |
| <b>RECHARGE/ CONSERVATION STRUCTURES</b> |  | <b>Total Number of Recharge Structures</b> | <b>Total Cost (Rs. in crores)</b> | <b>Total Recharge in mcm</b> |
| 13                                       | Farm Recharge @Rs. 35000/-   | 3267                                       | 7.637                             | 4.322                        |
| 14                                       | RWH Rural @ Rs. 25000/-  | 2492                                       | 6.717                             | 0.264                        |
| 15                                       | RWH Urban@ Rs. 25000/-   | -  | -                                 | -                            |
| 16                                       | Underground pipe line (area in hectares) @ Rs. 50000/-   | 18261                                      | 63.91                             | 69.79                        |
|  | <b>TOTAL</b>   |  | <b>78.264</b>                     | <b>74.376</b>                |

**BLOCK KALANOUR DISTRICT GURDASPUR, PUNJAB  
 DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON  
 VS  
 DECADAL MEAN TREND POST MONSOON  
 (2004-2013)**



### Ground Water Scenario of Block

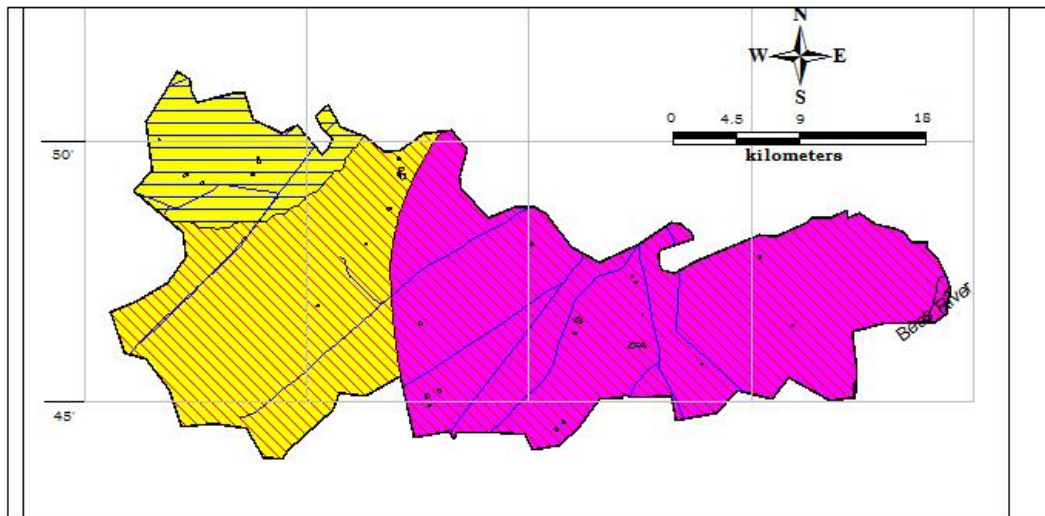
| <b>Block Name:- Kalanaur</b> |  |                       |
|------------------------------|--|-----------------------|
| <b>District:- Gurdaspur</b>  |  | <b>State:- PUNJAB</b> |
| 1.                           | GENERAL INFORMATION                            |                       |
|                              | i) Geographical area (sq km)                   | 226.4                 |
|                              | •Number of Villages inhabited<br>•Un-inhabited | 101<br>8              |
|                              | ii) Average Annual Rainfall (mm)               | 795                   |
|                              | iii)Area feasible for Artificial Recharge      | 50                    |
|                              | iv)Village identified under scarcity of Water  | 12                    |
|                              | v)Village covered under water supply           | 58                    |
|                              | vi)Water Tank exists in the village            | 23                    |
| 2.                           | GEOMORPHOLOGY                                  |                       |
|                              | Major Physiographic                            | Alluvium Plain        |
|                              | Major drainages<br>Basin<br>Sub-Basin          | Ravi 100%             |
| 3.                           | LAND USE                                       |                       |
|                              | •Area According to Village Papers (Sq.Km)      | 187.71                |
|                              | •Net Area Sown (Sq.Km)                         | 160.08                |
|                              | •Area Sown More than Once (Sq.Km)              | 152.00                |
|                              | •Total Cropped Area (Sq.Km)                    | 312.08                |
|                              | •Cropping Intensity                            | 195                   |
|                              | •Area under Thur and Sem (Sq.Km)               | --                    |
| 4.                           | PREDOMINAT GEOLOGICAL FORMATIONS               | Recent alluvium       |
| 5.                           | HYDROGEOLOGY                                   |                       |
|                              | Major Water bearing Formation (Aquifer)        | Fine to coarse Sand   |

|    |  |   |       |
|----|--|---|-------|
|    | Avg. Depth to water level (decadal)  | Depth to water level<br>May 2015(mbgl)        |       |
|    | <ul style="list-style-type: none"> <li>•Pre- monsoon: (May 2015)</li> <li>•3.04- 11.79 (mbgl)</li> </ul>   | 2.00 – 10.00 (mbgl)                           |       |
|    | <ul style="list-style-type: none"> <li>•Post – monsoon: (Nov2014)</li> <li>•3.80 – 11.09 (mbgl)</li> </ul> |   |       |
| 6. | GROUND WATER EXPLORATION BY<br>CGWB<br>(As on 31.03.2015)  |   |       |
|    | •No of wells drilled   | 2   |       |
|    | •Depth Range (m)   | 83.80-375.30                                  |       |
|    | •Discharge (Ipm)   | 973-4300                                      |       |
|    | Aquifer Parameters   |   |       |
|    | •Transmissivity (m <sup>2</sup> /day)  | 142-4300                                      |       |
|    | •Storativity   | 1.0*10 <sup>-3</sup> to 4.03*10 <sup>-3</sup> |       |
|    | •Specified yield   | 0.072   |       |
| 7. | GROUND WATER QUALITY   | Min   | Max   |
|    | •EC in µS/cm at 25 <sup>0</sup> c  | 269   | 568   |
|    | •NO3 (mg/l)  | 0.5   | 1.7   |
|    | •F (mg/l)  | 0.2   | 0.25  |
|    | •As (mg/l)   | 0.003   | 0.003 |
| 8. | DYANMIC GROUND WATER<br>RESOURCES in MCM   | <b>2011</b>                                   |       |
|    | •Net Ground Water Availability<br>(MCM)  | 112.97  |       |
|    | •Existing Gross Ground Water Draft<br>for Irrigation (MCM)   | 175.42  |       |
|    | •Existing Gross Ground Water Draft<br>for Domestic and Industrial Water<br>Supply (MCM)                    | 2.23  |       |
|    | •Existing Gross Ground Water Draft<br>for all Uses (MCM)   | 177.64  |       |
|    | •Allocation for Domestic and Industrial<br>Requirement Supply up to next 25<br>years (MCM)                 | 3.27  |       |
|    | •Net Ground Water Availability for<br>Future Irrigation Development<br>(MCM)                               | -65.72  |       |
|    | •Stage of Ground Water Development /<br>Over Draft (%)   | 157   |       |
|    | •Category of Block   | OE  |       |

|  |  |  |                                   |                              |
|--|--|--|-----------------------------------|------------------------------|
|  | Any specific reasons for high stress on ground water leading to Overexploitation and decline in ground water level | <i>Extensive Irrigation</i>                | Extensive Irrigation              |                              |
| 9.                                       | Percentage of sand thickness up to 50 m depth (Average)  | <i>Thickness(m)</i><br>--                  | Percentage %<br>--                |                              |
| 10                                       | Volume of unsaturated zone available for recharge (MCM)  | --   |                                   |                              |
| 11.                                      | Volume of water required for recharge (MCM)  | --   |                                   |                              |
| 12.                                      | Volume of surplus water available for recharge(MCM)  | --   |                                   |                              |
| <b>RECHARGE/ CONSERVATION STRUCTURES</b> |  | <b>Total Number of Recharge Structures</b> | <b>Total Cost (Rs. in crores)</b> | <b>Total Recharge in mcm</b> |
| 13                                       | Farm Recharge @Rs. 35000/-   | 1967                                       | 6.884                             | 2.321                        |
| 14                                       | RWH Rural @ Rs. 25000/-  | 1494                                       | 3.735                             | 0.141                        |
| 15                                       | RWH Urban@ Rs. 25000/-   | -  | -                                 | -                            |
| 16                                       | Underground pipe line (area in hectares)<br><br>@ Rs. 50000/-  | 12783                                      | 63.915                            | 48.06                        |
|  | <b>TOTAL</b>   |  | <b>74.534</b>                     | <b>50.522</b>                |

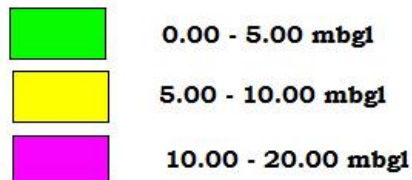


**BLOCK QUADIAN DISTRICT GURDASPUR, PUNJAB**  
**DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON**  
**VS**  
**DECADAL MEAN TREND POST MONSOON**  
**(2004-2013)**

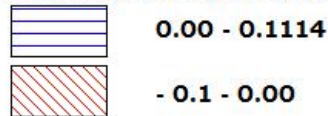


**Legend**

**Decadal mean water level (post monsoon)**



**Decadal mean water level trend (m)**



**No. of Recharge Structures in Rural Villages**



**Recharge Pits in Agricultural Land**



**Canal Network**



**Water Bodies**

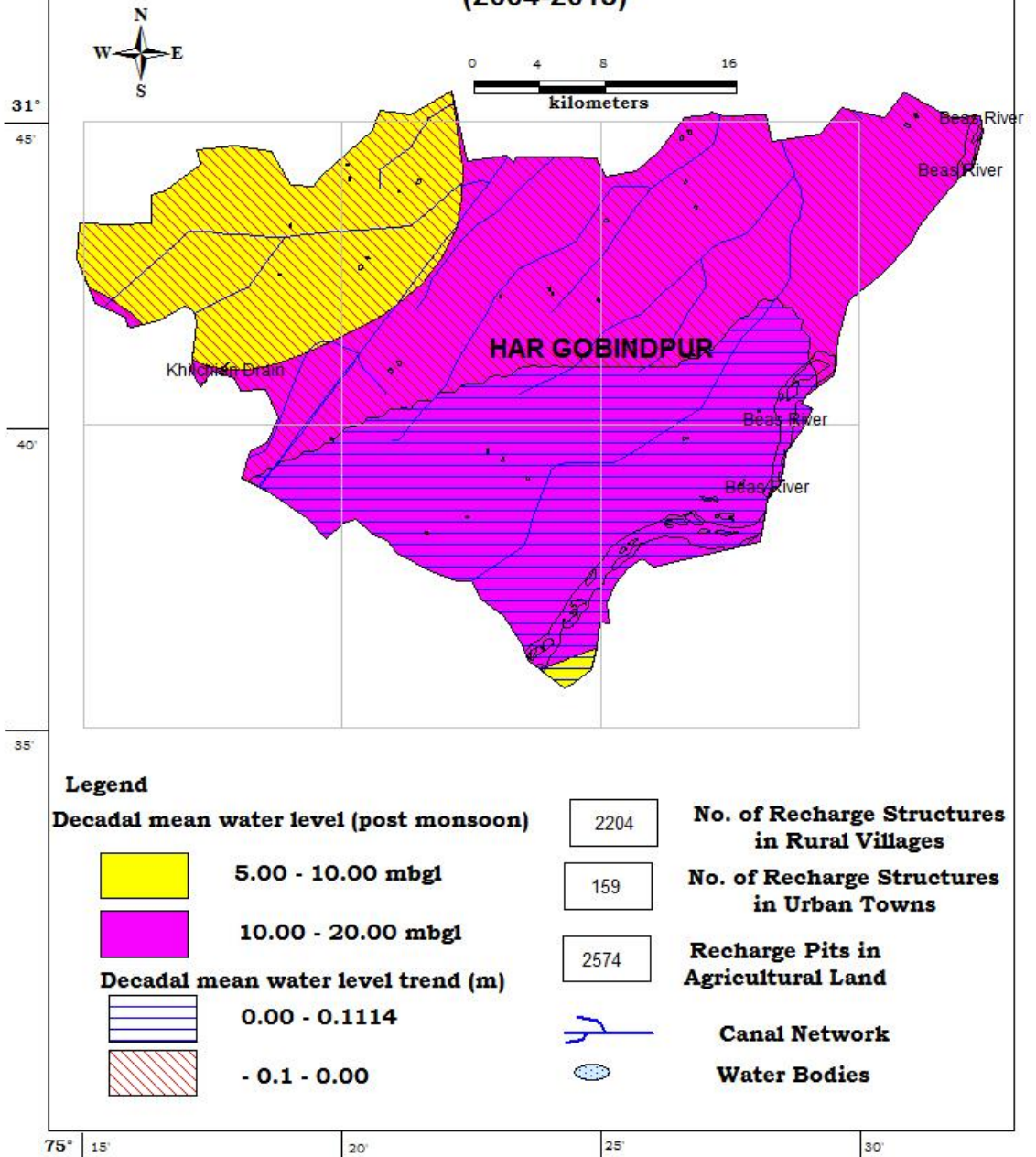
### Ground Water Scenario of the Block

| Block Name:- Qadian  |  |                     |
|----------------------|--|---------------------|
| District:- Gurdaspur |  | State:- PUNJAB      |
| 1.                   | GENERAL INFORMATION                            |                     |
|                      | i) Geographical area (sq km)                   | 180.6               |
|                      | •Number of Villages inhabited<br>•Un-inhabited | 69<br>0             |
|                      | ii) Average Annual Rainfall (mm)               | 894                 |
|                      | iii)Area feasible for Artificial Recharge      | 180.6               |
|                      | iv)Village identified under scarcity of Water  | 28                  |
|                      | v)Village covered under water supply           | 23                  |
|                      | vi)Water Tank exists in the village            | 14                  |
| 2.                   | GEOMORPHOLOGY                                  |                     |
|                      | Major Physiographic                            | Alluvium Plain      |
|                      | Major drainages<br>Basin<br>Sub-Basin          | Beas 100%           |
| 3.                   | LAND USE                                       |                     |
|                      | •Area According to Village Papers (Sq.Km)      | 199.26              |
|                      | •Net Area Sown (Sq.Km)                         | 159.62              |
|                      | •Area Sown More than Once (Sq.Km)              | 161.00              |
|                      | •Total Cropped Area (Sq.Km)                    | 320.62              |
|                      | •Cropping Intensity                            | 201                 |
|                      | •Area under Thur and Sem (Sq.Km)               | --                  |
| 4.                   | PREDOMINAT GEOLOGICAL FORMATIONS               | Recent alluvium     |
| 5.                   | HYDROGEOLOGY                                   |                     |
|                      | Major Water bearing Formation (Aquifer)        | Fine to coarse Sand |

|    |   |   |       |
|----|---|---|-------|
|    | Avg. Depth to water level (decadal)   | Depth to water level<br>May 2015 (mbgl)       |       |
|    | <ul style="list-style-type: none"> <li>•Pre- monsoon: (May 2015)</li> <li>•9.00-19.51 (mbgl)</li> </ul> | 5.00 – 20.00 (mbgl)                           |       |
|    | <ul style="list-style-type: none"> <li>•Post –monsoon: (Nov2014)</li> <li>•9.50-19.44(mbgl)</li> </ul>  |   |       |
| 6. | GROUND WATER EXPLORATION BY<br>CGWB(As on 31.03.2015)   |   |       |
|    | •No of wells drilled  | 0   |       |
|    | •Depth Range (m)  | 83.80-375.30                                  |       |
|    | •Discharge (Ipm)  | 973-4300                                      |       |
|    | Aquifer Parameters  |   |       |
|    | •Transmissivity (m <sup>2</sup> /day)   | 142-4300                                      |       |
|    | •Storativity  | 1.0*10 <sup>-3</sup> to 4.03*10 <sup>-3</sup> |       |
|    | •Specified yield  | 0.072   |       |
| 7. | GROUND WATER QUALITY  | Min   | Max   |
|    | •EC in µS/cm at 25 <sup>0</sup> c   | 522   | 704   |
|    | •NO3 (mg/l)   | 18  | 42    |
|    | •F (mg/l)   | 0.31  | 0.18  |
|    | •As (mg/l)  | 0.0006  | 0.006 |
| 8. | DYANMIC GROUND WATER<br>RESOURCES in MCM  | <b>2011</b>                                   |       |
|    | •Net Ground Water Availability<br>(MCM)   | 118.46  |       |
|    | •Existing Gross Ground Water Draft<br>for Irrigation (MCM)  | 153.21  |       |
|    | •Existing Gross Ground Water Draft<br>for Domestic and Industrial Water<br>Supply (MCM)                 | 3.02  |       |
|    | •Existing Gross Ground Water Draft<br>for all Uses (MCM)  | 156.23  |       |
|    | •Allocation for Domestic and Industrial<br>Requirement Supply up to next 25<br>years (MCM)              | 4.39  |       |
|    | •Net Ground Water Availability for<br>Future Irrigation Development<br>(MCM)                            | -39.14  |       |
|    | •Stage of Ground Water Development /<br>Over Draft(%)   | 132   |       |
|    | •Category of Block  | OE  |       |

|                                   | Any specific reasons for high stress on ground water leading to Overexploitation and decline in ground water level | <i>Extensive Irrigation</i>         | <i>Extensive Irrigation</i> |                       |
|-----------------------------------|--|-------------------------------------|-----------------------------|-----------------------|
| 9.                                | Percentage of sand thickness up to 50 m depth (Average)  | <i>Thickness(m)</i><br>--           | Percentage<br>% --          |                       |
| 10                                | Volume of unsaturated zone available for recharge (MCM)  | 108.69                              |                             |                       |
| 11.                               | Volume of water required for recharge (MCM)  | 144.53                              |                             |                       |
| 12.                               | Volume of surplus water available for recharge(MCM)  | 18.15                               |                             |                       |
| RECHARGE/ CONSERVATION STRUCTURES |  | Total Number of Recharge Structures | Total Cost (Rs. in crores)  | Total Recharge in mcm |
| 13                                | Farm Recharge @Rs. 35000/-   | 2000                                | 7.637                       | 2.658                 |
| 14                                | RWH Rural @ Rs. 25000/-  | 1798                                | 6.717                       | 0.191                 |
| 15                                | RWH Urban@ Rs. 25000/-   | -                                   | -                           | -                     |
| 16                                | Underground pipe line (area in hectares)<br><br>@ Rs. 50000/-  | 9793                                | 63.91                       | 41.98                 |
|                                   | <b>TOTAL</b>   |                                     | <b>78.264</b>               | <b>44.829</b>         |

**BLOCK HAR GOBINDPUR DISTRICT GURDASPUR, PUNJAB  
 DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON  
 VS  
 DECADAL MEAN TREND POST MONSOON  
 (2004-2013)**



### Ground Water Scenario of Block

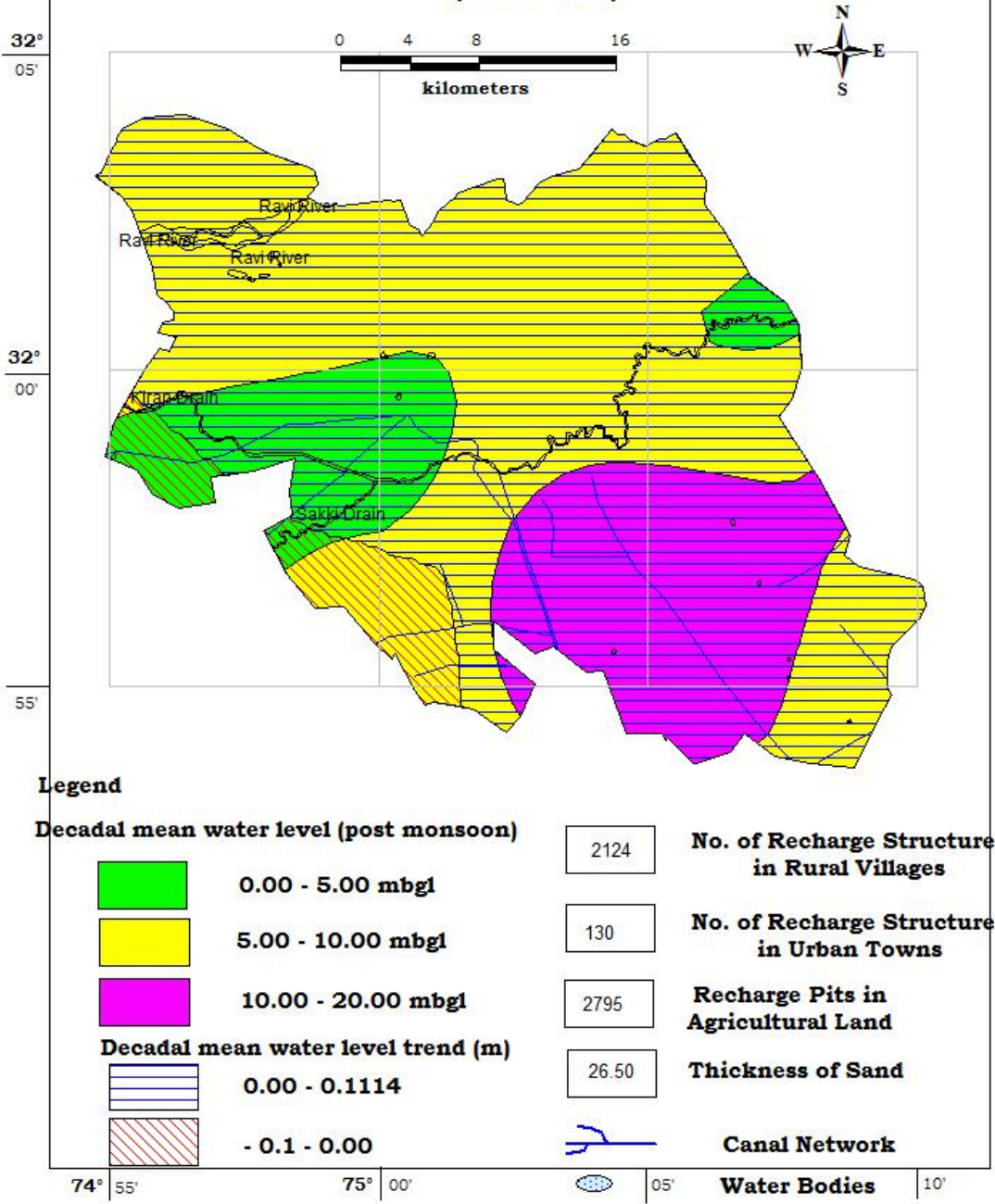
| <b>Block Name:- Sri Hargobindpur</b> |  | <b>State:- PUNJAB</b>                   |
|--------------------------------------|--|---|
| <b>District:- Gurdaspur</b>          |  |   |
| 1.                                   | <b>GENERAL INFORMATION</b>                     |   |
|                                      | i) Geographical area (sq km)                   | 283.3                                   |
|                                      | •Number of Villages inhabited<br>•Un-inhabited | 98<br>1                                 |
|                                      | ii) Average Annual Rainfall (mm)               | 816                                     |
|                                      | iii)Area feasible for Artificial Recharge      | 283.3                                   |
|                                      | iv)Village identified under scarcity of Water  | 25                                      |
|                                      | v)Village covered under water supply           | 52                                      |
|                                      | vi)Water Tank exists in the village            | 19                                      |
| 2.                                   | <b>GEOMORPHOLOGY</b>                           |   |
|                                      | Major Physiographic                            | Alluvium Plain                          |
|                                      | Major drainages<br>Basin<br>Sub-Basin          | <i>Beas100%</i>                         |
| 3.                                   | <b>LAND USE</b>                                |   |
|                                      | •Area According to Village Papers (Sq.Km)      | 257.97                                  |
|                                      | •Net Area Sown (Sq.Km)                         | 195.85                                  |
|                                      | •Area Sown More than Once (Sq.Km)              | 198.00                                  |
|                                      | •Total Cropped Area (Sq.Km)                    | 393.85                                  |
|                                      | •Cropping Intensity                            | 201                                     |
|                                      | •Area under Thur and Sem (Sq.Km)               | --                                      |
| 4.                                   | <b>PREDOMINAT GEOLOGICAL FORMATIONS</b>        | <i>Recent alluvium</i>                  |
| 5.                                   | <b>HYDROGEOLOGY</b>                            |   |
|                                      | Major Water bearing Formation (Aquifer)        | Fine to coarse Sand                     |
|                                      | Avg. Depth to water level (decadal)            | Depth to water level<br>May 2015 (mbgl) |

|    |  |   |                      |
|----|--|---|----------------------|
|    | <ul style="list-style-type: none"> <li>•Pre- monsoon: (May 2015)</li> <li>• 4.50-15.65 (mbgl)</li> </ul>           | 5.00 – 20.00 (mbgl)                           |                      |
|    | <ul style="list-style-type: none"> <li>•Post –monsoon: (Nov2014)</li> <li>• 4.50-15.65 (mbgl)</li> </ul>           |   |                      |
| 6. | GROUND WATER EXPLORATION BY CGWB<br>(As on 31.03.2015)   |   |                      |
|    | •No of wells drilled   | 2   |                      |
|    | •Depth Range (m)   | 83.80-375.30                                  |                      |
|    | •Discharge (Ipm)   | 973-4300                                      |                      |
|    | Aquifer Parameters   |   |                      |
|    | •Transmissivity (m <sup>2</sup> /day)  | 142-4300                                      |                      |
|    | •Storativity   | 1.0*10 <sup>-3</sup> to 4.03*10 <sup>-3</sup> |                      |
|    | •Specified yield   | 0.072   |                      |
| 7. | GROUND WATER QUALITY   | Min   | Max                  |
|    | •EC in µS/cm at 25 <sup>o</sup> c  | 327   | 420                  |
|    | •NO <sub>3</sub> (mg/l)  | 7.6   | 13                   |
|    | •F (mg/l)  | 0.07  | 0.46                 |
|    | •As (mg/l)   | 0.001   | 0.01                 |
| 8. | DYANMIC GROUND WATER RESOURCES in MCM  | <b>2011</b>                                   |                      |
|    | •Net Ground Water Availability (MCM)   | 130.78  |                      |
|    | •Existing Gross Ground Water Draft for Irrigation (MCM)  | 176.62  |                      |
|    | •Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)                                  | 3.63  |                      |
|    | •Existing Gross Ground Water Draft for all Uses (MCM)  | 180.25  |                      |
|    | •Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)                               | 5.05  |                      |
|    | •Net Ground Water Availability for Future Irrigation Development (MCM)   | -50.89  |                      |
|    | •Stage of Ground Water Development / Over Draft(%)   | 138   |                      |
|    | •Category of Block   | OE  |                      |
|    | Any specific reasons for high stress on ground water leading to Overexploitation and decline in ground water level | Extensive Irrigation                          | Extensive Irrigation |

|  |   |  |                                   |
|--|---|--|-----------------------------------|
| 9.                                       | Percentage of sand thickness up to 50 m depth (Average) | <i>Thickness(m)</i><br>--                  | Percentage<br>%<br>--             |
| 10                                       | Volume of unsaturated zone available for recharge (MCM) | 170.50                                     |                                   |
| 11.                                      | Volume of water required for recharge (MCM)             | 226.72                                     |                                   |
| 12.                                      | Volume of surplus water available for recharge(MCM)     | 28.47                                      |                                   |
| <b>RECHARGE/ CONSERVATION STRUCTURES</b> |   | <b>Total Number of Recharge Structures</b> | <b>Total Cost (Rs. in crores)</b> |
| 13                                       | Farm Recharge @Rs. 35000/-                              | 2574                                       | 9.009                             |
| 14                                       | RWH Rural @ Rs. 25000/-                                 | 2204                                       | 5.51                              |
| 15                                       | RWH Urban@ Rs. 25000/-                                  | 159  | 0.3975                            |
| 16                                       | Underground pipe line (area in hectares) @ Rs. 50000/-  | 12007                                      | 60.035                            |
|  | <b>TOTAL</b>  |  | <b>74.951</b>                     |
|  |   |  | <b>51.736</b>                     |



**BLOCK DERA BABA NANAK DISTRICT GURDASPUR, PUNJAB  
DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON  
VS  
DECADAL MEAN TREND POST MONSOON  
(2004-2013)**



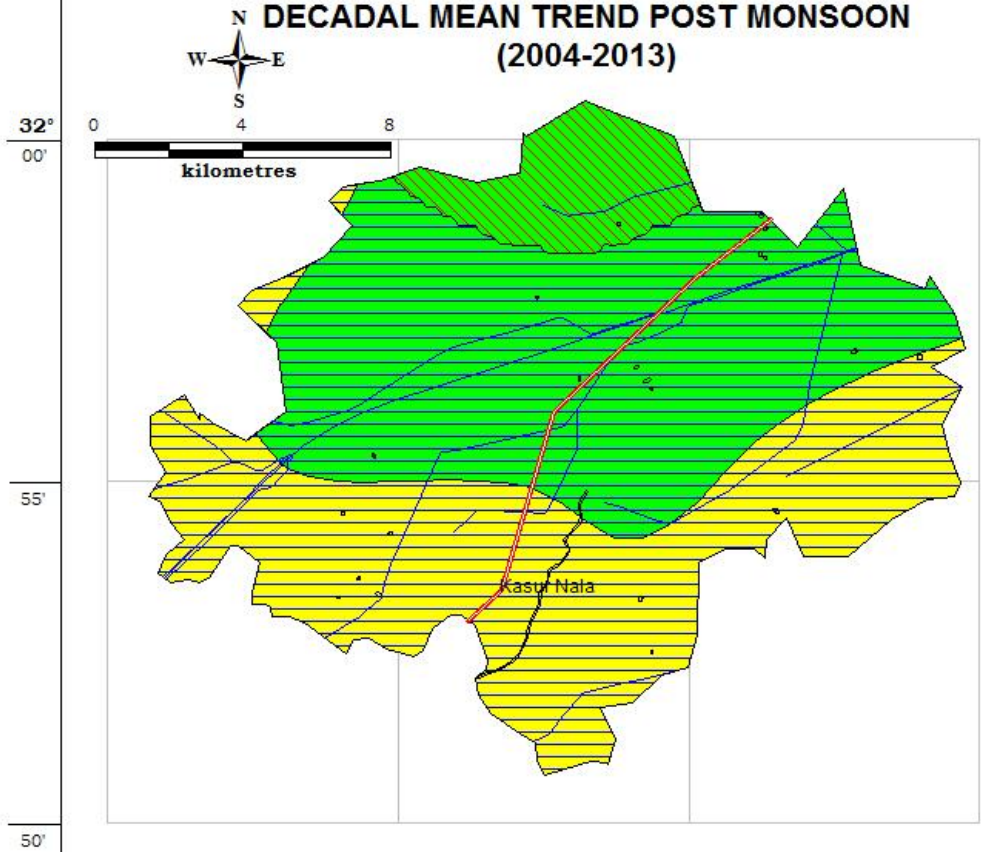
### Ground Water Scenario of Block







| <b>Block Name:- Dera Baba Nanak</b> |  |                       |
|-------------------------------------|--|-----------------------|
| <b>District:- Gurdaspur</b>         |  | <b>State:- PUNJAB</b> |
| 1.                                  | GENERAL INFORMATION                            |                       |
|                                     | i) Geographical area (sq km)                   | 294.5                 |
|                                     | •Number of Villages inhabited<br>•Un-inhabited | 139<br>6              |
|                                     | ii) Average Annual Rainfall (mm)               | 706                   |
|                                     | iii)Area feasible for Artificial Recharge      | 265                   |
|                                     | iv)Village identified under scarcity of Water  | 61                    |
|                                     | v)Village covered under water supply           | 38                    |
|                                     | vi)Water Tank exists in the village            | 21                    |
| 2.                                  | GEOMORPHOLOGY                                  |                       |
|                                     | Major Physiographic                            | Alluvium Plain        |
|                                     | Major drainages<br>Basin<br>Sub-Basin          | Ravi100%              |
| 3.                                  | LAND USE                                       |                       |
|                                     | •Area According to Village Papers (Sq.Km)      | 297.58                |
|                                     | •Net Area Sown (Sq.Km)                         | 252.71                |
|                                     | •Area Sown More than Once (Sq.Km)              | 236.00                |
|                                     | •Total Cropped Area (Sq.Km)                    | 488.71                |
|                                     | •Cropping Intensity                            | 193                   |
|                                     | •Area under Thur and Sem (Sq.Km)               | --                    |
| 4.                                  | PREDOMINAT GEOLOGICAL FORMATIONS               | Recent alluvium       |
| 5.                                  | HYDROGEOLOGY                                   |                       |
|                                     | Major Water bearing Formation (Aquifer)        | Fine to coarse Sand   |

|    |  |   |        |
|----|--|---|--------|
|    | Avg. Depth to water level (decadal)  |   |        |
|    | •Pre- monsoon: (May 2015)  | 2.00-10.00(mbgl)                              |        |
|    | •Post –monsoon: (Nov2014)  |   |        |
| 6. | GROUND WATER EXPLORATION BY CGWB(As on 31.03.2015)                                   |   |        |
|    | •No of wells drilled   | 1   |        |
|    | •Depth Range (m)   | 83.80-375.30                                  |        |
|    | •Discharge (Ipm)   | 973-4300                                      |        |
|    | Aquifer Parameters   |   |        |
|    | •Transmissivity (m <sup>2</sup> /day)  | 142-4300                                      |        |
|    | •Storativity   | 1.0*10 <sup>-3</sup> to 4.03*10 <sup>-3</sup> |        |
|    | •Specified yield   | 0.072   |        |
| 7. | GROUND WATER QUALITY   | Min   | Max    |
|    | •EC in µS/cm at 25 <sup>0</sup> c  | 481   | --     |
|    | •NO3 (mg/l)  | --  | --     |
|    | •F (mg/l)  | --  | 0.84   |
|    | •As (mg/l)   | 0.0013  | 0.0017 |
| 8. | DYANMIC GROUND WATER RESOURCES in MCM  | <b>2011</b>                                   |        |
|    | •Net Ground Water Availability (MCM)   | 119.90  |        |
|    | •Existing Gross Ground Water Draft for Irrigation (MCM)                              | 151.60  |        |
|    | •Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)    | 2.4   |        |
|    | •Existing Gross Ground Water Draft for all Uses (MCM)                                | 154.00  |        |
|    | •Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM) | 2.91  |        |
|    | •Net Ground Water Availability for Future Irrigation Development (MCM)               | - 34.58                                       |        |
|    | •Stage of Ground Water Development / Over Draft (%)                                  | 128   |        |
|    | •Category of Block   | OE  |        |

|  |  |  |                                   |                              |
|--|--|--|-----------------------------------|------------------------------|
|  | Any specific reasons for high stress on ground water leading to Overexploitation and decline in ground water level | <i>Extensive Irrigation</i>                | Extensive Irrigation              |                              |
| 9.                                       | Percentage of sand thickness up to 50 m depth (Average)  | <i>Thickness(m)</i><br>26.5                | Percentage %<br>53                |                              |
| 10                                       | Volume of unsaturated zone available for recharge (MCM)  | 177.24                                     |                                   |                              |
| 11.                                      | Volume of water required for recharge (MCM)  | 235.69                                     |                                   |                              |
| 12.                                      | Volume of surplus water available for recharge(MCM)  | 29.60                                      |                                   |                              |
| <b>RECHARGE/ CONSERVATION STRUCTURES</b> |  | <b>Total Number of Recharge Structures</b> | <b>Total Cost (Rs. in crores)</b> | <b>Total Recharge in mcm</b> |
| 13                                       | Farm Recharge @Rs. 35000/-   | 2795                                       | <b>9.783</b>                      | 2.914                        |
| 14                                       | RWH Rural @ Rs. 25000/-  | 2124                                       | <b>5.310</b>                      | 0.177                        |
| 15                                       | RWH Urban@ Rs. 25000/-   | 130  | <b>0.325</b>                      | 0.007                        |
| 16                                       | Underground pipe line (area in hectares) @ Rs. 50000/-   | 16634                                      | <b>83.170</b>                     | 67.77                        |
|  | <b>TOTAL</b>   |  | <b>98.588</b>                     | <b>70.868</b>                |

**BLOCK DHARIWAL NANAK DISTRICT GURDASPUR, PUNJAB  
 DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON  
 VS  
 DECADAL MEAN TREND POST MONSOON  
 (2004-2013)**



|   |                   |  |   |
|---|-------------------|--|---|
| <b>Legend</b>   |                   |  |   |
| <b>Decadal mean water level (post monsoon)</b>                                      |                   | 2634   | <b>No. of Recharge Structures in Rural Villages</b> |
|  | 0.00 - 5.00 mbgl  | 348  | <b>No. of Recharge Structures in Urban Towns</b>    |
|  | 5.00 - 10.00 mbgl | 2290   | <b>Recharge Pits in Agricultural Land</b>           |
| <b>Decadal mean water level trend (m)</b>   |                   | 30.50  | <b>Thickness of Sand</b>                            |
|  | 0.00 - 0.1114     |  | <b>Canal Network</b>                                |
|  | - 0.1 - 0.00      |  | <b>Water Bodies</b>                                 |
| 75° 10'   | 15'               | 20'  | 25'   |

### Ground Water Scenario of Block

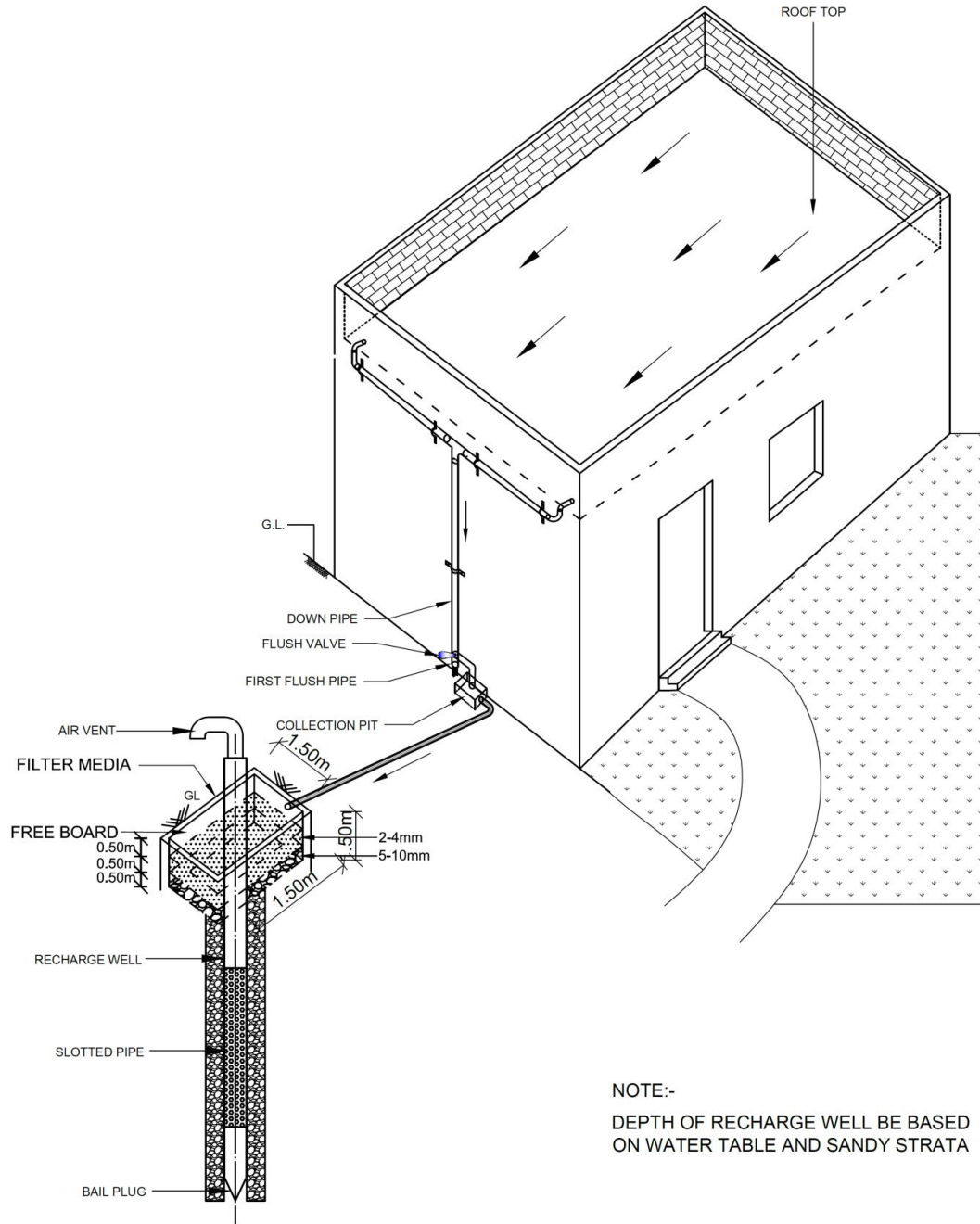
| <b>Block Name:- Dhariwal</b> |  | <b>State:- PUNJAB</b> |
|------------------------------|--|-----------------------|
| <b>District:- Gurdaspur</b>  |  |                       |
|                              | GENERAL INFORMATION                            |                       |
|                              | i) Geographical area (sq km)                   | 256.8                 |
|                              | •Number of Villages inhabited<br>•Un-inhabited | 117<br>0              |
|                              | ii) Average Annual Rainfall (mm)               | 819                   |
|                              | iii)Area feasible for Artificial Recharge      | 212.00                |
|                              | iv) Village identified under scarcity of Water | 17                    |
|                              | v)Village covered under water supply           | 30                    |
|                              | vi) Water Tank exists in the village           | 21                    |
| 2.                           | GEOMORPHOLOGY                                  |                       |
|                              | Major Physiographic                            | Alluvium Plain        |
|                              | Major drainages<br>Basin<br>Sub-Basin          | Ravi 60%<br>Beas 40%  |
| 3.                           | LAND USE                                       |                       |
|                              | •Area According to Village Papers (Sq.Km)      | 201.73                |
|                              | •Net Area Sown (Sq.Km)                         | 174.30                |
|                              | •Area Sown More than Once (Sq.Km)              | 156.00                |
|                              | •Total Cropped Area (Sq.Km)                    | 330.30                |
|                              | •Cropping Intensity                            | 190                   |
|                              | •Area under Thur and Sem (Sq.Km)               | --                    |
| 4.                           | PREDOMINAT GEOLOGICAL FORMATIONS               | Recent alluvium       |
| 5.                           | HYDROGEOLOGY                                   |                       |
|                              | Major Water bearing Formation (Aquifer)        | Fine to coarse Sand   |

|    |  |   |                             |
|----|--|---|-----------------------------|
|    | Avg. Depth to water level (decadal)  | Depth to water level<br>May 2015 (mbgl)       |                             |
|    | <ul style="list-style-type: none"> <li>•Pre- monsoon: (May 2015)</li> <li>• 4.30-11.80 (mbgl)</li> </ul>                 | 2.00 – 20.00 (mbgl)                           |                             |
|    | <ul style="list-style-type: none"> <li>•Post –monsoon: (Nov2014)</li> <li>• 2.90-26.90(mbgl)</li> </ul>                  |   |                             |
| 6. | GROUND WATER EXPLORATION BY<br>CGWB(As on 31.03.2015)  |   |                             |
|    | •No of wells drilled   | 1   |                             |
|    | •Depth Range (m)   | 83.80-375.30                                  |                             |
|    | •Discharge (Ipm)   | 973-4300                                      |                             |
|    | Aquifer Parameters   |   |                             |
|    | •Transmissivity (m <sup>2</sup> /day)  | 142-4300                                      |                             |
|    | •Storativity   | 1.0*10 <sup>-3</sup> to 4.03*10 <sup>-3</sup> |                             |
|    | •Specified yield   | 0.072   |                             |
| 7. | GROUND WATER QUALITY   | Min   | Max                         |
|    | •EC in µS/cm at 25 <sup>0</sup> c  | 345   | 403                         |
|    | •NO <sub>3</sub> (mg/l)  | 1.4   | 15                          |
|    | •F (mg/l)  | 0.17  | 0.27                        |
|    | •As (mg/l)   | 0.0014  | 0.015                       |
| 8. | DYANMIC GROUND WATER<br>RESOURCES in MCM   | <b>2011</b>                                   |                             |
|    | •Net Ground Water Availability (MCM)   | 186.77  |                             |
|    | •Existing Gross Ground Water Draft for<br>Irrigation (MCM)   | 234.65  |                             |
|    | •Existing Gross Ground Water Draft for<br>Domestic and Industrial Water Supply<br>(MCM)                                  | 4.08  |                             |
|    | •Existing Gross Ground Water Draft for<br>all Uses (MCM)   | 238.72  |                             |
|    | •Allocation for Domestic and Industrial<br>Requirement Supply up to next 25<br>years (MCM)                               | 5.97  |                             |
|    | •Net Ground Water Availability for Future<br>Irrigation Development (MCM)  | 53.85   |                             |
|    | •Stage of Ground Water Development /<br>Over Draft (%)   | 128   |                             |
|    | •Category of Block   | OE  |                             |
|    | Any specific reasons for high stress on<br>ground water leading to Overexploitation<br>and decline in ground water level | Extensive<br>Irrigation                       | Extensiv<br>e<br>Irrigation |

|  |   |                                     |                            |
|--|---|-------------------------------------|----------------------------|
| 9.                                       | Percentage of sand thickness up to 50 m depth (Average) | <i>Thickness(m)</i><br>30.5         | Percentage<br>% 61         |
| 10                                       | Volume of unsaturated zone available for recharge (MCM) | 154.55                              |                            |
| 11.                                      | Volume of water required for recharge (MCM)             | 205.52                              |                            |
| 12.                                      | Volume of surplus water available for recharge(MCM)     | 25.81                               |                            |
| <b>RECHARGE/ CONSERVATION STRUCTURES</b> |   | Total Number of Recharge Structures | Total Cost (Rs. in crores) |
| 13                                       | Farm Recharge @Rs. 35000/-                              | 2290                                | <b>8.015</b>               |
| 14                                       | RWH Rural @ Rs. 25000/-                                 | 2634                                | <b>6.585</b>               |
| 15                                       | RWH Urban@ Rs. 25000/-                                  | 348                                 | <b>0.870</b>               |
| 16                                       | Underground pipe line (area in hectares) @ Rs. 50000/-  | 12138                               | <b>60.690</b>              |
|  | <b>TOTAL</b>  |                                     | <b>76.160</b>              |
|  |   |                                     | <b>67.402</b>              |



### RECHARGE FROM ROOF TOP RAIN WATER HARVESTING (URBAN & RURAL HOUSEHOLDS)



3-D VIEW

NOTE:-  
DEPTH OF RECHARGE WELL BE BASED  
ON WATER TABLE AND SANDY STRATA

### TYPICAL DESIGN FOR RECHARGE PIT IN FARM

