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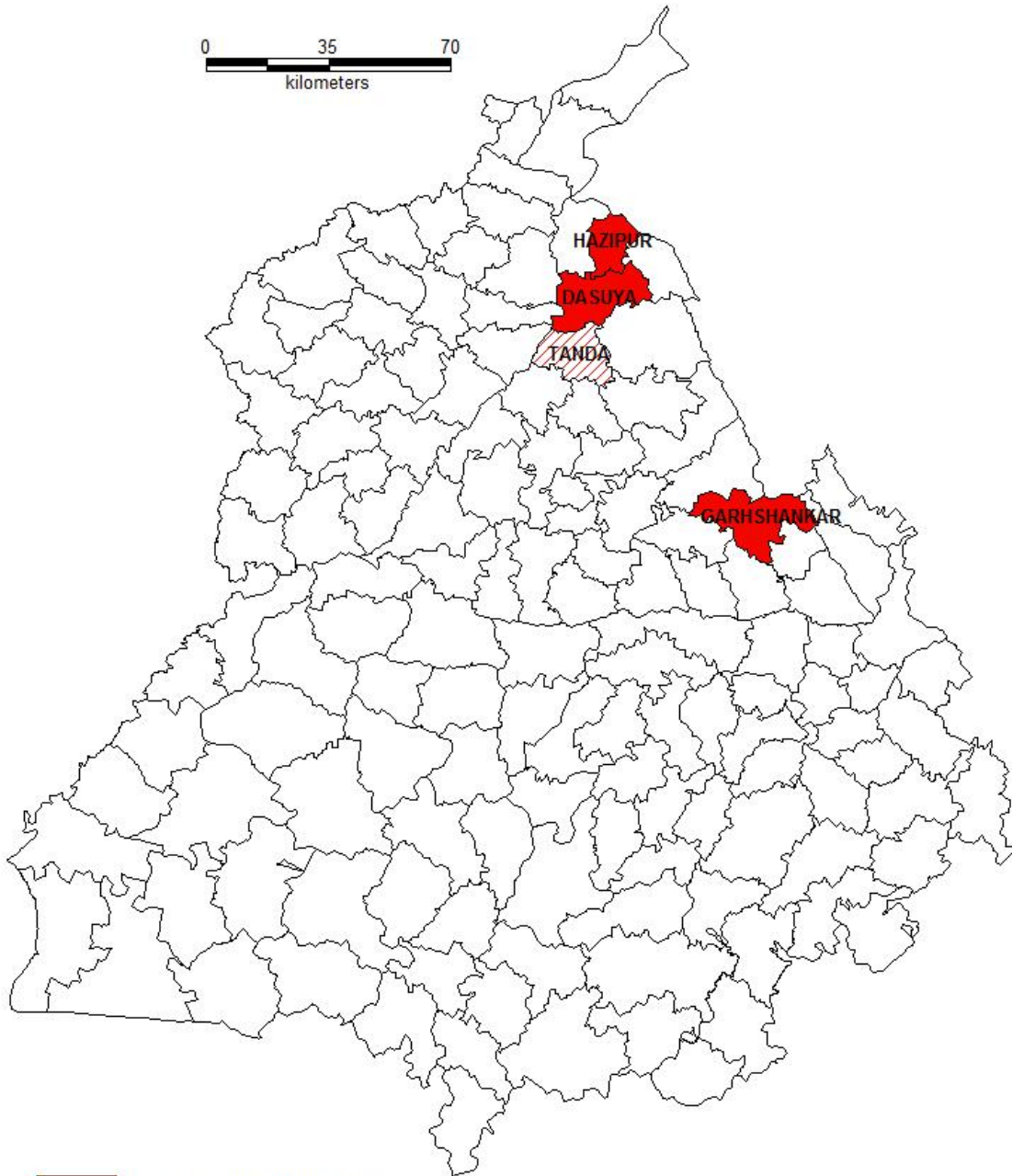
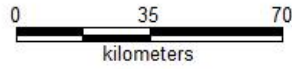
**Government of India
Ministry of Water Resources,
River Development & Ganga Rejuvenation
Central Ground Water Board**



PLAN ON

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

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

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



-  OVER EXPLOITED BLOCKS
-  NOTIFIED BLOCK

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

INTRODUCTION

Hoshiarpur district falls in the eastern part of the Punjab State and is bounded by North latitudes 30°58'30'' and 32°08'00'' and East longitudes 75°28'00'' and 76°30'00''. It falls in parts of Survey of India Toposheets nos. 43P, 44M and 53A. The district is drained by the river Beas in the north and northwest and Satluj in the south. Administratively the district has four tehsils, five sub-tehsils and ten blocks. The tehsils are Hoshiarpur, Dasuya, Garh Shankar and Mukerian. The blocks are Hoshiarpur-I, Hoshiarpur-II, Bhunga, Tanda, Dasuya, Garh Shankar, Mahipur, Mukerian, Talwara, Hazipur. At present, it has an area of 3386 Sq. Kms. and a population, as per 2011 Census is 15, 82,793 persons.

RAINFALL & CLIMATE

The climate of Hoshiarpur district is classified as tropical steppee, hot and semi-arid which is mainly dry with very hot summer and cold winter except during monsoon season when moist air of oceanic origin penetrates into the district.

The normal annual rainfall of the district is 938 mm which is unevenly distributed over the area in 38 days. The south west monsoon sets in from first week of July and withdraws in end of September, contributes about 77% of annual rainfall. July and August are the wettest months. Rest 23% rainfall is received during non-monsoon period in the wake of western disturbances and thunder storms.

GEOMORPHOLOGY

Total area of Hoshiarpur district is 339000 hectares, out of which forest area is 109000 hectares (32.15 per cent). Nearly 60 percent is the net sown area out of which 81 percent is irrigated and the cropping intensity is 170 percent, 18 percent points less than the state average. For 90 percent of irrigated area, source of irrigation is tubewells (electric operated) and wells. Based on topography, soil-crop-climate complex, the district can be divided into three broad regions.

First region is constituted by flood plains comprising Dasuya, Tanda and Mukerian blocks. This is the most fertile area of the district covering one-fourth of the geographical area.

Second region the Kandi area located at the foot of Shivalik Hills and covers the sub-mountainous undulating plain with a slope of 16 metres per kilometer which progressively decreases towards the west side of the district. This belt Comprise of Hazipur, Talwara, Bhunga Hoshiarpur-II Blocks and parts of some other blocks.

Third region comprises Hoshiarpur-I, Mahilpur and Garhshankar blocks located on the beds of lower Shivalik, these are undulating plains with relatively low slope decreasing up to 4 meters per kilometer. There is acute scarcity of water supply in the belt.

HYDROGEOLOGY

Unconsolidated alluvial sediments lying south of Siwalik foothills mainly occupy the district. The alluvial sediments are classified as piedmont and fluvial deposits. The piedmont deposits lie along Siwalik Hills, which comprises boulders, pebbles, gravel, sand and clay. It is further divided into Kandi and Sirowal, which are contemporaneous, and merge imperceptibly with each other. The fluvial comprise of silt, sand, gravel and clay in association with Kankar. The drilling depth range from 126 to 460m bgl and constructed in the depth range of 103 to 374m. The yield of these wells ranges from 708 lpm to 2900 lpm with draw down of 5 to 12m. The wells constructed in the northwestern part of the district were high yielding wells than those constructed along the Siwalik foothills zone. Transmissivity of aquifers ranges from 634 to 4120 m²/day. The hydraulic conductivity value in the district varies from 2 to 29m/day. The value of storage coefficient worked out to be 58×10^{-2} to 1.8×10^{-3} .

During the pre-monsoon period depth to water in the district varies from 3.63 m bgl at Dumriwal (Kandi belt) to 27.22m bgl at Phuglana (Alluvial plains). Depth to water level less than 10m is of Hazipur, Mukerian, Tanda and Dasuya in northern, Hoshiarpur-I&II in central parts of district. Depth to water level in range of 10 to 20m in parts of Hazipur, Talwara Dasuya, Bhunga, Hoshiarpur-I&II Mahilpur and Garhshankar blocks of the district. water levels still become deeper (>20m) in the south eastern parts of the district falling in garhshankar block.

During the post-monsoon period depth to water in the district varies from 3.03 m bgl at Chohal (Kandi belt) to 28.88m bgl at Phuglana (Alluvial plains). Depth to water level less than 10m is of Hazipur, Mukerian, Dasuya, Tanda and Bhunga in northern, Hoshiarpur-I&II in central parts of district. Depth to water level in range of 10 to 20m in parts of Hazipur, Talwara, Hoshiarpur-II, Mahilpur and Garhshankar blocks of the district. Deeper water levels (>20m) is found in isolated patches in falling in garhshankar block.

Water level rise up to 2m has been recorded in all blocks in the district, whereas decline has been recorded parts of Hazipur, Hoshiarpur-II and Mahilpur blocks.

The elevation of the water table in the district varies from 221.34 to 229.34 m above mean sea level. The water table elevation map shows the general slope of the water table towards South SE from North. The average gradient of the water table is of the order of 1.5 m/km. The overall flow of ground water is from north to southeast direction.

Ground Water Resources

Ground Water Resources estimation of the district was done in 2011 for each individual block. Perusal of the Estimates reveals overall stage of ground water development in the district is of the order of 102%. The ground water development in five blocks viz Dasuya (113%), Garh Shankar (121%), Hazipur (104%) Tanda (173%) and Mukerian (109%) of the district have exceeded the available recharge and thus the blocks have been categorized as over exploited. Bhunga block has least development of ground water among all blocks i.e. 54% . Net annual ground water availability of the district is 89774 ham and existing gross ground water draft for all users is 91963 ham.

Ground Water Quality

Data of chemical analysis of water samples from shallow aquifers indicates that ground water is slightly alkaline in nature (pH varies between 7.45 to 8.20). Salinity is low to medium (E.C. value ranges between 280 to 1050). All chemical parameters are well within the permissible limits for safe drinking waters set by Bureau of Indian Standards (BIS 1991, revised in 2007) except Iron which is high at two locations with a value of greater than 1.0 mg/l which is permissible limit and As greater than the permissible value of 0.01 mg/l also at two locations. Among anions, bicarbonate is the dominant ion and among cations Ca ion is dominant one. Hence ground water is calcium bicarbonate type. By and large, quality of ground water is suitable for drinking purposes.

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

No. of shallow tube wells by size class of individual owner							
Sr.no	district	Marginal (0-1 ha)	Small (1-2 ha)	Semi-Medium (2-4 ha)	Medium (4-10ha)	Big (>=10 ha)	Total
1	HOSHIARPUR	4090	7485	13818	10702	1675	37770

Distribution of Deep Tubewells According to Owner's Holding Size

No. of deep tube wells by size class of individual owner							
Sr.no	district	Marginal (0-1 ha)	Small (1-2 ha)	Semi-Medium (2-4 ha)	Medium (4-10ha)	Big (>=10 ha)	Total
1	HOSHIARPUR	747	2746	9262	7000	917	20672

Distribution of Shallow Tubewells According to Depth of tube well

No. by the depth of shallow Tube well							
Sr.no	district	(0-20 mts)	(20-40 mts)	(40-60 mts)	(60-70 mts)	(>70 mts)	Total
1	HOSHIARPUR	7033	20239	2783	7715	0	37770

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

Ground Water Schemes according to water Distribution System				
Open Water Channel				
Sr.no	District	Lined/pucca	Unlined/kutcha	Under ground pipe
1	HOSHIARPUR	15106	37156	2961

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 x5mt x3mt 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)
ROOF TOP RAIN WATER HARVESTING IN RURAL AND URBEN AREAS					
1	Artificial Recharge Plan For Urban Areas.	1554	0.25	3.89	0.218
2	Roof Top Rain Water Harvesting in Rural Areas	10912	0.25	27.28	1.145
	Total	20358	0.25	50.90	1.363
ARTIFICIAL RECHARGE IN FARMS					
1	Artificial Recharge Plan Through Recharge Pits.	11416	0.35	39.96	14.939
			Total	39.96	14.939

By the implementation of the proposed recharge structures there will be a reduction of 1.38 % in stage of ground water development as tabulated below

Sr. no.	Total Draft (present) (mcm)	Overdraft (mcm)	Additional Recharge through 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
1	919.63	-35.22	16.302	903.328	102%	100.62%	1.38 %

**ARTIFICIAL RECHARGE PLAN THROUGH RECHARGE PITS IN OVER EXPLOITED BLOCKS
HOSHIARPUR DISTRICT**

Block Name	Total area of the village (hectares)	10%of village area taken for farm recharge (hectares)	Total number of recharge pits	Annual recharge (MCM)= (Area*Runoff 15%*Rainfall)	Cost of Pit @ Rs.0.35 lakh (Crores)
HAZIPUR	17019	1702	1702	2.555	5.96
TANDA	26047	2605	2605	3.364	9.12
DASUYA	38244	3824	3824	4.566	13.38
GARHSHANKAR	31708	3285	3285	4.454	11.50
			11416	14.939	39.96

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 HOSHIARPUR DISTRICT OF PUNJAB

Name of District	Sr.no	Name of CD Block	Total area of the village (in hectares)	Number of households (2011 census)	No of Houses taken for Artificial Recharge	Total No of AR Structures	Total recharge in MCM	Cost @ 0.25 Lacs/structure (Crores)
HOSHIARPUR	1	HAZIPUR	17019	16326	1633	1633	0.196	4.08
	2	TANDA	26047	24864	2486	2486	0.257	6.22
	3	GARHSHANKAR	38244	35684	3568	3568	0.341	8.92
	4	DASUYA	31708	32254	3225	3225	0.351	8.06
		Total	113018	109128	10912	10912	1.145	27.28

ARTIFICIAL RECHARGE PLAN FOR URBAN AREAS OF DISTRICT S.A.S NAGAR PUNJAB

District	Block	Town Name	Total Households	Total Population of Town	Households taken for Artificial Recharge (10%)	Total Roof Top Area (sqm)	Volume of water available for recharge (MCM)	Cost @Rs.0.25 lakh (Crores)
HOSHIARPUR	GARHSHANKAR	Garhshankar (MCL)	3678	16955	368	73560	0.047	0.9
	DASUYA	Urmar Tanda (MCL)	4965	23419	497	99300	0.072	1.2
	DASUYA	Dasuya (MCL)	5281	25192	528	105620	0.076	1.3
	DASUYA	Gardiwala (MCL)	1612	7593	161	32240	0.023	0.4
	TOTAL		15536	73159	1554	310720	0.218	3.9

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 58442 tubewells operated by farmers for irrigation through unlined/Kutchha (63.57%) open channel system in Hoshiarpur district where water from the tube-well 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 Hoshiarpur district is estimated at 902.40 MCM. It is expected that around 10.34 % 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 807.79 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 Hoshiarpur Districts. The measure if implemented will bring down the ground water overdraft from 99% to 88.66 %. 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 tube wells 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 *kutchha* 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, HOSHIARPUR 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, in irrigated area by ground water scheme only (mcm)(Col 3 X Col5 X 0.30 [#])	Wastage through unlined channel in irrigated area by ground water scheme in OE blocks only	Potential of Reduced irrigation overdraft (Col 3-col 7) (mcm)	Gross draft after saving of water (mcm) (Col 8+Col4)	Present Stage of Development (%)	Stage of development afterwards((Col 9/Col1)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
911.10	902.40	858.40	44.00	63.57	163.70	94.61	763.79	807.79	99	88.66	10.34

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 hecter(in cr) =Total irrigated area (by ground water scheme) of the block *0.5 *Col4	Total Cost in Rs. Crores. District wise
1	2	3	4	5	6	7
HOSHIARPUR	Bhunga	579	63.57	368	1.84	
	Dasuya	19669	63.357	12504	62.52	
	Garhshankar	19757	63.357	12560	62.80	
	Hazipur	6525	63.357	4148	20.74	
	Hoshiarpur-I	21688	63.357	13787	68.94	
	Hoshiarpur-II	19717	63.357	12534	62.67	
	Mahilpur	17727	63.357	11269	56.35	
	Mukerian	12699	63.357	8073	40.36	
	Talwara	5046	63.357	3208	16.04	
	Tanda	21315	63.357	13550	67.75	

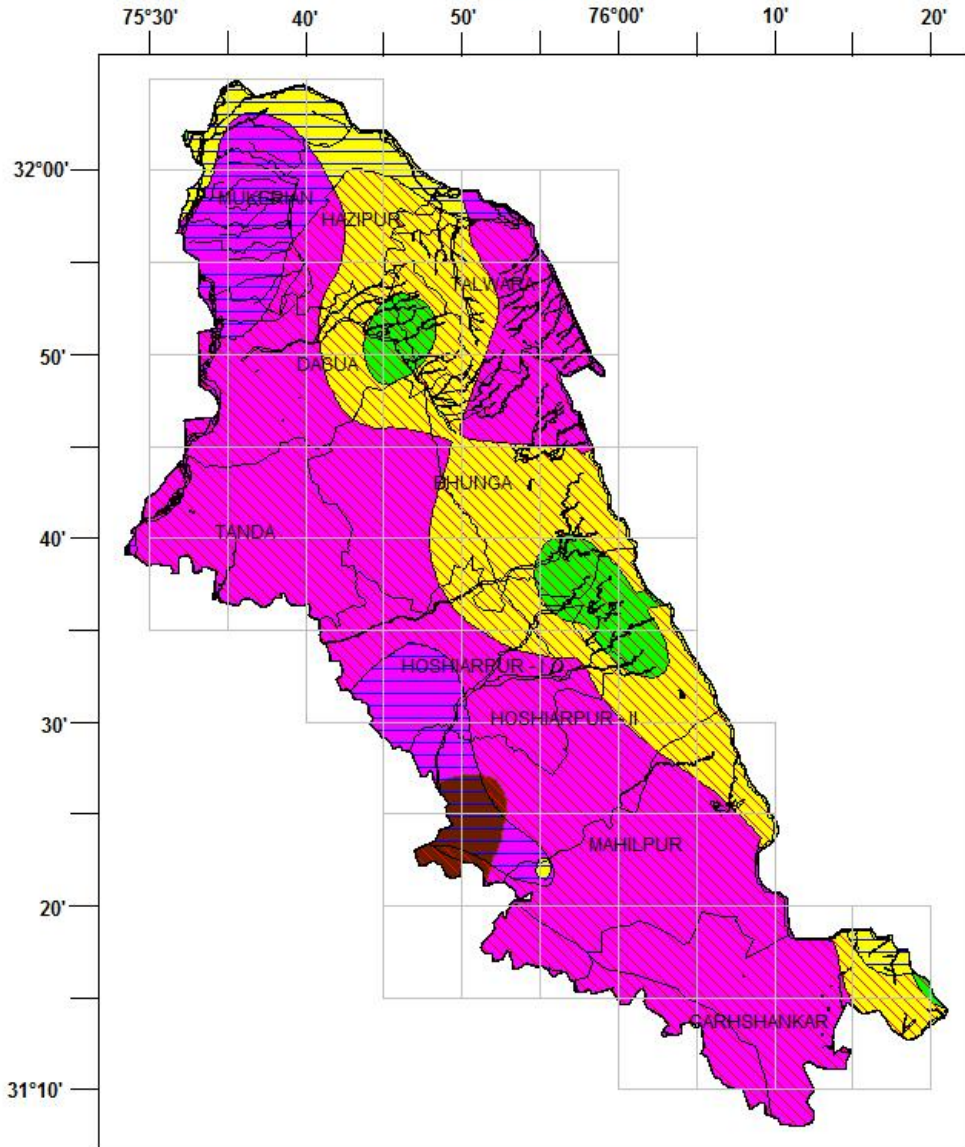
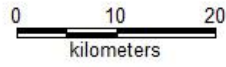
SALIENT FEATURES OF HYDROGEOLOGY OF DISTRICT HOSHIARPUR

Wells Feasible	Rigs Suitable	Depth of Well (m)	Discharge (lpm)	Suitable Artificial Recharge Structures
Tube Wells	Direct and Reverse Rotary	50 - 120	1300 - 2000	Recharge Shaft with Injection Wells
Tube Wells	Direct and Reverse Rotary	50 - 130	1000 - 1300	Check Dams and Recharge Trench
Tube Wells	Direct and Reverse Rotary	30 - 110	800 - 1000	Check Dams
DEPTH TO WATER LEVEL NOVEMBER 2014				
	0.00 - 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	Hoshiarpur
Geographical Area	3365 sq.km
Major Geological Formation	Alluvium and Shivaliks
Major Drainage System	Sutlej and Beas
Population (as on 2011)	14,80,736
Total Number of Blocks	14
Existing Major/Medium Irrigation Projects	Shah Nehar and Kandi Canal
Utilizable Ground Water Resources 2011	897.74 (mcm)
Net Ground Water Draft	919.63 (mcm)
Stage of Ground Water Development	102 %
Average Annual Rainfall	938 mm
Range of Mean Daily Temperature	5° - 40° C
Over Exploited Blocks	HAZIPUR TANDA DASUYA GARSHANKAR

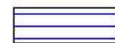
PLAN OF ARTIFICIAL RECHARGE TO GROUND WATER DISTRICT HOSHIARPUR, PUNJAB



Legend

Refer Salient Features of Hydrogeology

Decadal mean water level trend (m)



0.00 -- 0.1114

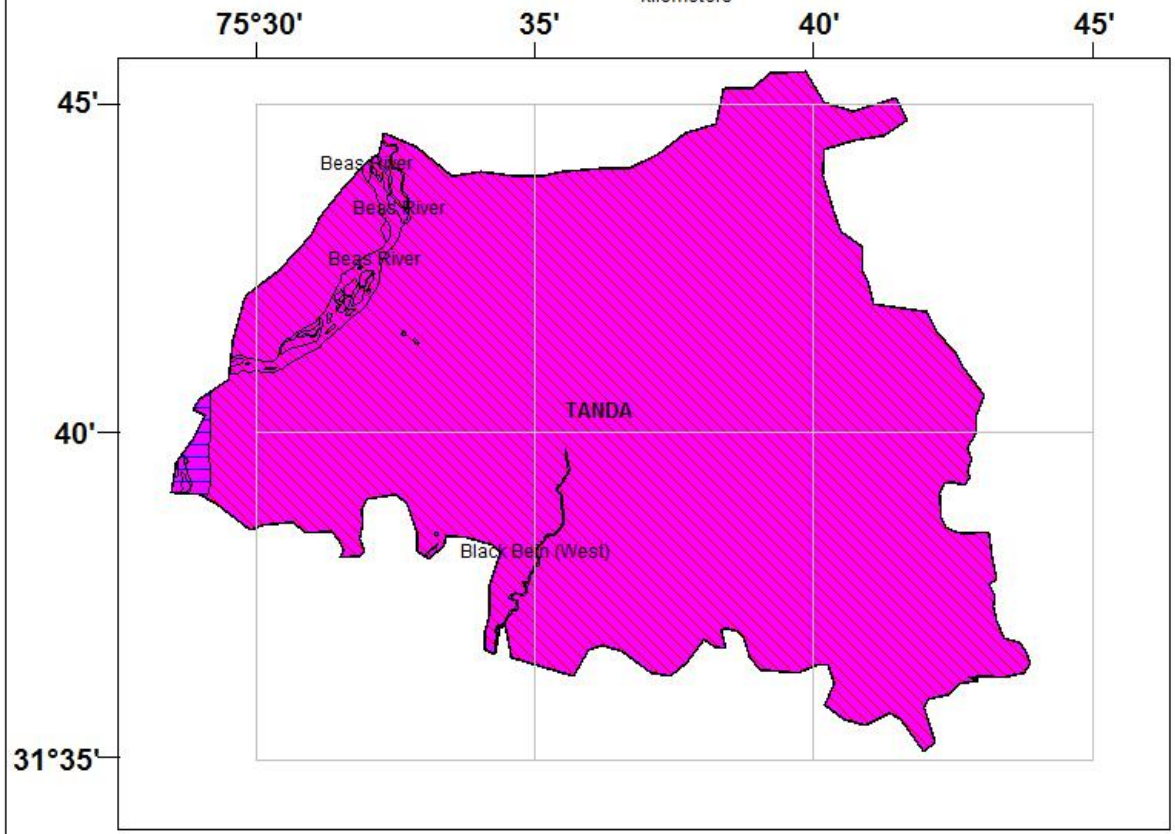
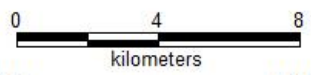


-0.10 -- -0.00

***BLOCK
WISE PLAN OF
DISTRICT
HOSHIARPUR
PUNJAB***

(4 OE BLOCKS)

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



Legend

Decadal mean water level (post monsoon)

 10.00 - 20.00 mbgl

Decadal mean water level trend (m)

 0.00 - 0.1114

 - 0.1 - 0.00

2486

2605



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

**Recharge Pits in
 Agricultural Land**

Canal Network

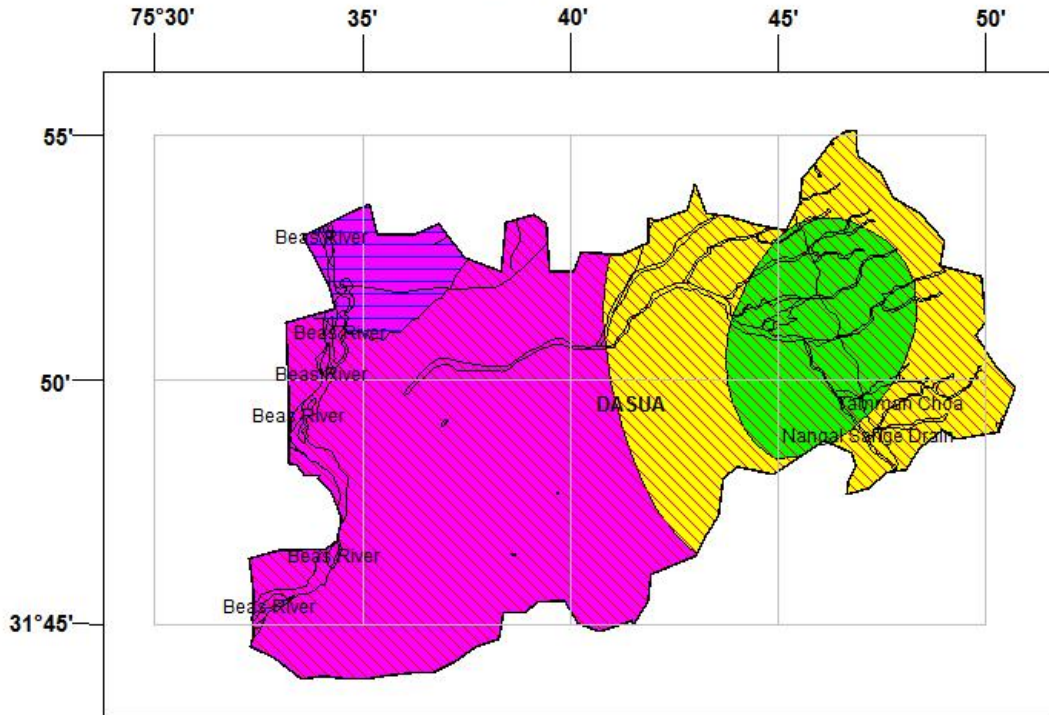
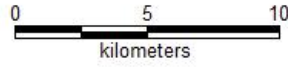
Ground Water Scenario of Block

Block Name:- Tanda District:- Hoshiarpur State:- PUNJAB		
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	233.7
	<ul style="list-style-type: none"> • Number of Villages inhabited • Un-inhabited 	117 5
	ii) Average Annual Rainfall (mm)	866
	iii) Area feasible for Artificial Recharge	198.64
	iv) Village identified under scarcity of Water	113
	v) Village covered under water supply	93
	vi) Water Tank exists in the village	22
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	<i>Beas 100%</i>
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	259.67
	• Net Area Sown (Sq.Km)	199.14
	• Area Sown More than Once (Sq.Km)	1.63
	• Total Cropped Area (Sq.Km)	200.77
	• Cropping Intensity	101
	• Area under Thur and Sem (Sq.Km)	--
4.	PREDOMINANT GEOLOGICAL FORMATIONS	<i>Recent alluvium</i>
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"> •Pre- monsoon: (May 2015) •4.20-20.15 (mbgl) 	2.00 – 20.00 (mbgl)	
	<ul style="list-style-type: none"> •Post –monsoon: (Nov2014) •5.20 – 19.70 (mbgl) 		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	•No of wells drilled	1	
	•Depth Range (m)	20.0-459.33	
	•Discharge (Ipm)	600-3478	
	Aquifer Parameters		
	•Transmissivity (m ² /day)	130-2248	
	•Storativity	1.57*10 ⁻³ to 6.8*10 ⁻⁴	
	•Specified yield	0.072	
7.	GROUND WATER QUALITY	Min	Max
	•EC in µS/cm at 25 ^o c	---	---
	•NO3 (mg/l)	---	---
	•F (mg/l)	---	---
	•As (mg/l)	0.0121	0.0121
8.	DYANMIC GROUND WATER RESOURCES in MCM	2011	
	•Net Ground Water Availability (Mcm)	95.07	
	•Existing Gross Ground Water Draft for Irrigation (Mcm)	161.07	
	•Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (Mcm)	3.37	
	•Existing Gross Ground Water Draft for all Uses (Mcm)	164.44	
	•Allocation for Domestic and Industrial Requirement Supply up to next 25 years (Mcm)	4.55	
	•Net Ground Water Availability for Future Irrigation Development (Mcm)	-70.55	

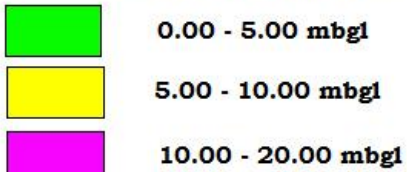
	•Stage of Ground Water Development / Over Draft (%)	173		
	•Category of Block	OE		
	Any specific reasons for high stress on ground water leading to Overexploitation and decline in ground water level	<i>Extensive Irrigation</i>	Extensive Irrigation	
9.	Percentage of sand thickness up to 50 m depth (Average)	<i>Thickness(m)</i>	Percentage %	
10	Volume of unsaturated zone available for recharge (MCM)	222.22		
11.	Volume of water required for recharge (MCM)	295.56		
12.	Volume of surplus water available for recharge(MCM)	9.50		
	RECHARGE/ CONSERVATION STRUCTURES	Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge/ Water saving in MCM
13	Farm Recharge @Rs. 35000/-	2605	9.12	3.364
14	RWH Rural @ Rs. 25000/-	2486	6.22	0.257
15	RWH Urban@ Rs. 25000/-	0	0.00	0
16	Underground pipe line (area in hectares) @ Rs. 50000/-	13550	67.75	30.39
TOTAL			83.08	34.01

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

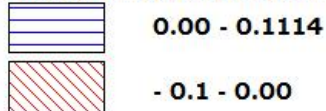


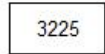
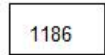

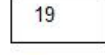


Legend

Decadal mean water level (post monsoon)



Decadal mean water level trend (m)



	No. of Recharge Structures in Rural Villages
	No. of Recharge Structures in Urban Towns
	Recharge Pits in Agricultural Land
	Thickness of Sand
	Canal Network
	Water Bodies

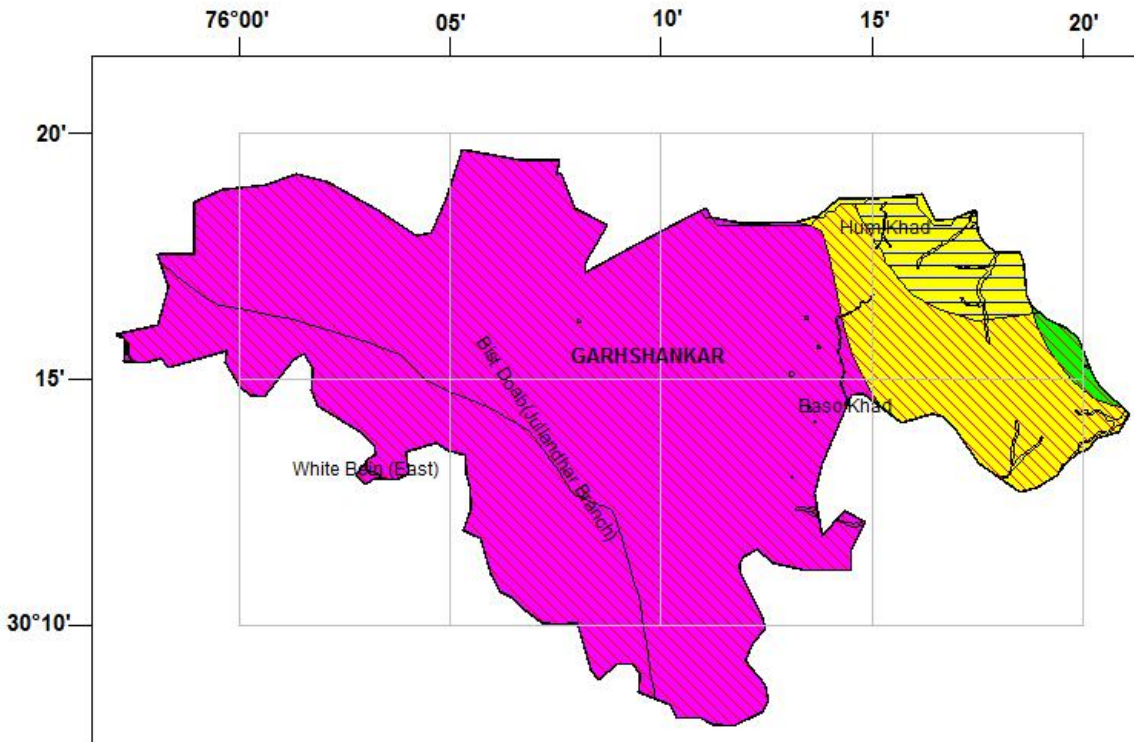
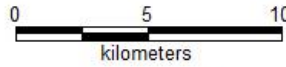
Ground Water Scenario of Block

Block Name:- Dasuya		State:- PUNJAB
District:- Hoshiarpur		
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	374.5
	•Number of Villages inhabited •Un-inhabited	142 17
	ii) Average Annual Rainfall (mm)	908
	iii)Area feasible for Artificial Recharge	337
	iv) Village identified under scarcity of Water	167
	v)Village covered under water supply	149
	vi) Water Tank exists in the village	28
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	<i>Beas 100%</i>
3.	LAND USE	
	•Area According to Village Papers (Sq.Km)	306.47
	•Net Area Sown (Sq.Km)	22.172
	•Area Sown More than Once (Sq.Km)	190
	•Total Cropped Area (Sq.Km)	223.62
	•Cropping Intensity	101
	•Area under Thur and Sem (Sq.Km)	--
4.	PREDOMINAT GEOLOGICAL FORMATIONS	<i>Recent alluvium</i>
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"> •Pre- monsoon: (May 2015) •2.64-8.39 (mbgl) •Post –monsoon: (Nov2014) 	2.00- 10.00 (mbgl)	
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	•No of wells drilled	6	
	•Depth Range (m)	20.0-459.33	
	•Discharge (Ipm)	600-3478	
	Aquifer Parameters		
	•Transmissivity (m ² /day)	130-2248	
	•Storativity	1.57*10 ⁻³ to 6.8*10 ⁻⁴	
	•Specified yield	0.072	
7.	GROUND WATER QUALITY	Min	Max
	•EC in µS/cm at 25 ⁰ c	470	470
	•NO ₃ (mg/l)	30	30
	•F (mg/l)	0.54	0.054
	•As (mg/l)	0.0028	0.0033
8.	DYANMIC GROUND WATER RESOURCES in MCM	2011	
	•Net Ground Water Availability (Mcm)	128.94	
	•Existing Gross Ground Water Draft for Irrigation (Mcm)	142.05	
	•Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (Mcm)	3.31	
	•Existing Gross Ground Water Draft for all Uses (Mcm)	145.36	
	•Allocation for Domestic and Industrial Requirement Supply up to next 25 years (Mcm)	4.45	




	•Net Ground Water Availability for Future Irrigation Development (Mcm)	-17.57		
	•Stage of Ground Water Development / Over Draft (%)	113		
	•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> 19	Percentage % 38	
10	Volume of unsaturated zone available for recharge (MCM)	356.11		
11.	Volume of water required for recharge (MCM)	473.64		
12.	Volume of surplus water available for recharge(MCM)	15.23		
	RECHARGE/ CONSERVATION STRUCTURES	Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge/ Water saving in MCM
13	Farm Recharge @Rs. 35000/-	3824	13.38	4.566
14	RWH Rural @ Rs. 25000/-	3225	8.06	0.351
15	RWH Urban@ Rs. 25000/-	1186	2.97	0.171
16	Underground pipe line (area in hectares) @ Rs. 50000/-	12504	62.52	26.72
TOTAL			86.93	31.808

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

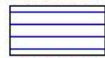



Legend

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

3568

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

368

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

3285

**Recharge Pits in
Agricultural Land**

45

Thickness of Sand



Canal Network



Water Bodies

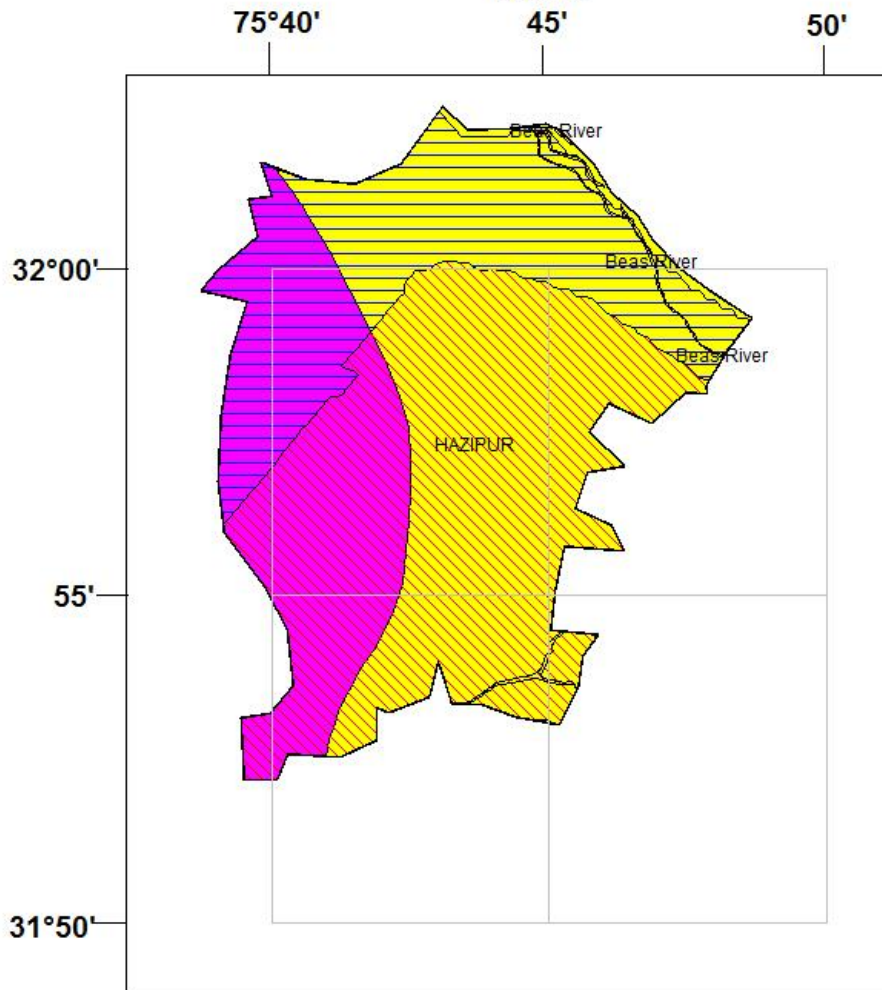
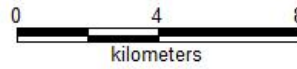
Ground Water Scenario of Block








Block Name:- Garhshankar		State:- PUNJAB
District:- Hoshiarpur		
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	412.1
	•Number of Villages inhabited •Un-inhabited	144 0
	ii)Average Annual Rainfall (mm)	806
	iii)Area feasible for Artificial Recharge	412.1
	iv) Village identified under scarcity of Water	132
	v) Village covered under water supply	131
	vi) Water Tank exists in the village	50
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	Satluj 100%
3.	LAND USE	
	•Area According to Village Papers (Sq.Km)	365.50
	•Net Area Sown (Sq.Km)	225.77
	•Area Sown More than Once (Sq.Km)	1.92
	•Total Cropped Area (Sq.Km)	227.69
	•Cropping Intensity	101
	•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"> •Pre- monsoon: (May 2015) •23.50 – 24..00 (mbgl) 	20.00 – 40.00 (mbgl)	
	<ul style="list-style-type: none"> •Post –monsoon: (Nov2014) •23.00-23.00 (mbgl) 		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	•No of wells drilled	11	
	•Depth Range (m)	20.0-459.33	
	•Discharge (Ipm)	600-3478	
	Aquifer Parameters		
	•Transmissivity (m ² /day)	130-2248	
	•Storativity	1.57*10 ⁻³ to 6.8*10 ⁻⁴	
	•Specified yield	0.072	
7.	GROUND WATER QUALITY	Min	Max
	•EC in µS/cm at 25 ⁰ c	470	470
	•NO ₃ (mg/l)	30	30
	•F (mg/l)	0.54	0.054
	•As (mg/l)	0.0028	0.0033
8.	DYANMIC GROUND WATER RESOURCES in MCM	2011	
	•Net Ground Water Availability (Mcm)	125.07	
	•Existing Gross Ground Water Draft for Irrigation (Mcm)	141.65	
	•Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (Mcm)	9.75	
	•Existing Gross Ground Water Draft for all Uses (Mcm)	151.39	
	•Allocation for Domestic and Industrial Requirement Supply up to next 25 years (Mcm)	11.29	

	•Net Ground Water Availability for Future Irrigation Development (Mcm)	-27.86		
	•Stage of Ground Water Development / Over Draft(%)	121		
	•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> 45	Percentage % 90	
10	Volume of unsaturated zone available for recharge (MCM)	391.86		
11.	Volume of water required for recharge (MCM)	521.19		
12.	Volume of surplus water available for recharge(MCM)	16.76		
	RECHARGE/ CONSERVATION STRUCTURES	Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge/ Water saving in MCM
13	Farm Recharge @Rs. 35000/-	3285	11.50	4.454
14	RWH Rural @ Rs. 25000/-	3568	8.92	0.341
15	RWH Urban@ Rs. 25000/-	368	0.92	0.047
16	Underground pipe line (area in hectares) @ Rs. 50000/-	12560	62.80	26.72
TOTAL			84.14	31.562

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



Legend			
Decadal mean water level (post monsoon)		1633	No. of Recharge Structures in Rural Villages
	5.00 - 10.00 mbgl		1702 Recharge Pits in Agricultural Land
	10.00 - 20.00 mbgl		17 Thickness of Sand
Decadal mean water level trend (m)			Canal Network
	0.00 - 0.1114		
	- 0.1 - 0.00		

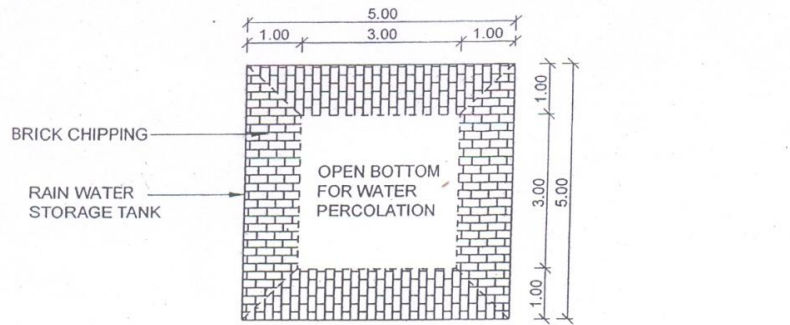
Ground Water Scenario of Block

Block Name:- Hazipur		
District:- Hoshiarpur		State:- PUNJAB
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	125.9
	•Number of Villages inhabited •Un-inhabited	93 2
	ii)Average Annual Rainfall (mm)	1005
	iii) Area feasible for Artificial Recharge	125.9
	iv) Village identified under scarcity of Water	93
	v) Village covered under water supply	82
	vi) Water Tank exists in the village	24
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	Beas 100%
3.	LAND USE	
	•Area According to Village Papers (Sq.Km)	170.45
	•Net Area Sown (Sq.Km)	105.79
	•Area Sown More than Once (Sq.Km)	1.06
	•Total Cropped Area (Sq.Km)	106.85
	•Cropping Intensity	101
	•Area under Thur and Sem (Sq.Km)	--
4.	PREDOMINAT GEOLOGICAL FORMATIONS	Recent alluvium
5.	HYDROGEOLOGY	

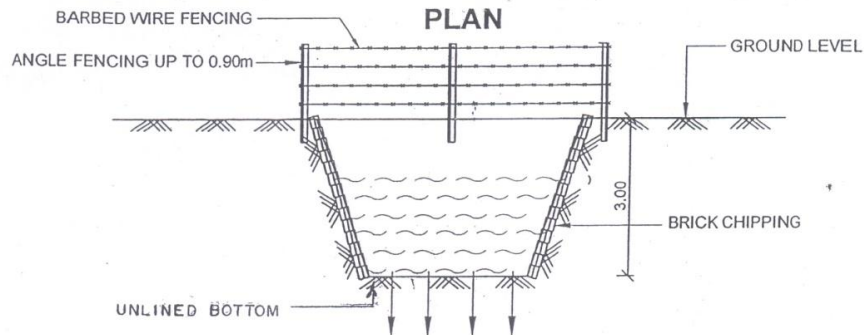
	Major Water bearing Formation (Aquifer)	Fine to coarse Sand	
	Avg. Depth to water level (decadal)	Depth to water level May 2015(mbgl)	
	<ul style="list-style-type: none"> •Pre- monsoon: (May 2015) •8.35-13.38 (mbgl) 	5.00-20.00 (mbgl)	
	<ul style="list-style-type: none"> •Post –monsoon: (Nov2014) •8.02-11.80(mbgl) 		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	•No of wells drilled	1	
	•Depth Range (m)	20.0-459.33	
	•Discharge (Ipm)	600-3478	
	Aquifer Parameters		
	•Transmissivity (m ² /day)	130-2248	
	•Storativity	1.57*10 ⁻³ to 6.8*10 ⁻⁴	
	•Specified yield	0.072	
7.	GROUND WATER QUALITY	Min	Max
	•EC in µS/cm at 25 ⁰ c	385	727
	•NO ₃ (mg/l)	15	83
	•F (mg/l)	0.11	0.13
	•As (mg/l)	0.0016	0.0019
8.	DYANMIC GROUND WATER RESOURCES in MCM	2011	
	•Net Ground Water Availability (Mcm)	58.05	
	•Existing Gross Ground Water Draft for Irrigation (Mcm)	57.14	
	•Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (Mcm)	3.40	
	•Existing Gross Ground Water Draft for all Uses (Mcm)	60.54	
	•Allocation for Domestic and Industrial Requirement Supply up to next 25 years (Mcm)	4.59	

	•Net Ground Water Availability for Future Irrigation Development (Mcm)	-3.68		
	•Stage of Ground Water Development / Over Draft (%)	104		
	•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> 17	Percentage % 34	
10	Volume of unsaturated zone available for recharge (MCM)	119.72		
11.	Volume of water required for recharge (MCM)	159.23		
12.	Volume of surplus water available for recharge(MCM)	5.12		
	RECHARGE/ CONSERVATION STRUCTURES	Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge/ Water saving in MCM
13	Farm Recharge @Rs. 35000/-	1702	5.96	2.555
14	RWH Rural @ Rs. 25000/-	1633	4.08	0.196
15	RWH Urban@ Rs. 25000/-	0	0.00	0
16	Underground pipe line (area in hectares) @ Rs. 50000/-	4148	20.74	10.78
TOTAL			30.78	13.531

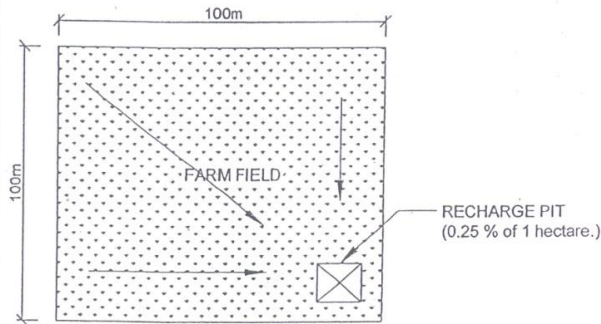
TYPICAL DESIGN FOR RECHARGE PIT IN FARM



PLAN



SECTIONAL ELEVATION



KEY MAP