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

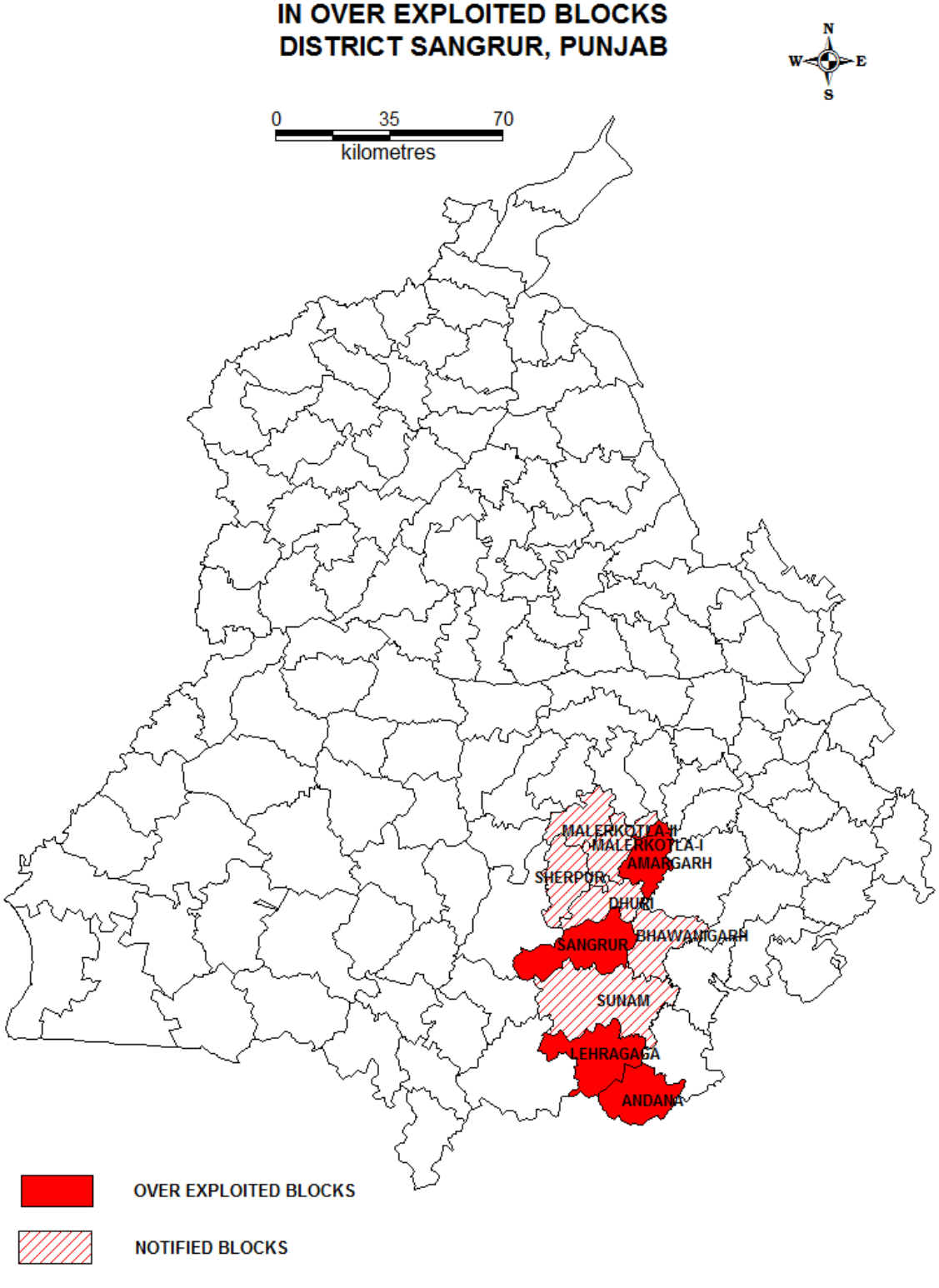
PLAN ON

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION IN

OVEREXPLOITED BLOCKS OF SANGRUR DISTRICT, PUNJAB

Central Ground Water Board
North Western Region
Chandigarh

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



PLAN OF ARTFICIAL RECHARGE TO GROUND WATER IN OVER EXPLOITED BLOCKS, DISTRICT SANGRUR PUNJAB

INTRODUCTION

Sangrur District falls in the southern part of the Punjab State and is bounded by latitudes 29^0 44/ 45//(N) and longitude 75^0 14/ 45//(E) . The area falls in the Survey of India Toposheet Nos. 44N 44O 53B and little area in 53C. The district has 12 community development blocks Sangrur, Bhawanigarh, Malerkotla-I, Malerkotla-II , Dhuri, Sherpur, Barnala, Sehna Mehalkalan, Sunam Lehargage Andona and 4 sub divisions namely Malerkotla, Barnala, Sunam Dhuri and Moonak. The district is very densily populated. The population as per censes 2001 is 2000173 and population density is 400 person per sq;km.

RAINFALL AND CLIMATE

The precipitation in the area occurs mainly due to south west and north east monsoon. However most of the precipitation is received through south westerly monsoon. The normal annual rainfall of the district is 558 mm about 75% of the rainfall occurs during last week of June to mid Sept. By going through the data of last 30 years indicates that highest rainfall was 1012 mm in 1983 and lowest rainfall 121mm was experienced in 2002. The climate of the district is characterized by the dryness of the air an intensely hot summer and cold winter.

GEOMORPHOLOGY AND SOILS

The area forms a part of Indo gangetic plain. The country is more or less flat except towards its north western part which is profusely dotted with sand dunes. The elevation of the land in the area varies from 251m in the south western to 236m above mean sea level in NE. There is no well defined material drainage system in the area but for the southern part of the district, which is drained by the Ghaggar River. Three main canals pass through the area Ghaggar branch in south western part, Kotla branch in the central part and the Bathinda branch in the northern part. Soils of the district is loamy sand and sandy loam kaller land is also spotted at a few places. The soil is sandy/brown blown sand clay the boarder of Faridkot, Moga district.

HYDROGEOLOGY

The district is occupied by Indo-gengetic alluvial plain of Quaternary age and falls in

Ghaggar sub-basin . The ground water occurs in alluvial formations comprising fine to coarse sand which forms the potential aquifers. In the shallow aquifers upto 50m ground water occurs under unconfined /water table conditions where as in deeper aquifers semi confined /confined conditions exists. The deepest borehole was drilled upto the depth of 537.20m at Akbarpur ($30^{O}10'00''$ $75^{O}00'$ $05''$) The permeable granular zone comprising of fine to medium grained sand and occasionally coarse grained sand and gravel. The borehole data reveals that clay group of formations dominate over the sand group in the district area. Ground water occurs in the district under water table and semi confined /confined conditions.

The discharge of deep tubewells in the area varies between 1067 to 3330 lpm. The transmisity values ranges from 1020 -1670m^2/day and storavity ranges from $3.24x10^{-4}$ to $7.5x10^{-2}$ The depth to water level ranges from 12.25 to 29.60 m during the pre monsoon period and 13.80 m to 30.15m bgl during post monsoon period, The seasonal fluctuation varies from 1.05 m to 5.32m in the area. The long term fluctuation trend indicates have a fall of 065m/year

GROUND WATER RESOURCES

The block wise ground water resources potential in the distict has been assessed as per GEC -97 as on March 2011.The stage of ground water development ranges between 207% (Lehragaga) to 358% (Sunam) . The net ground water resources of the district have been estimated to be 1305.51MCM and gross ground water draft of the district is 3663.96 MCM. Leaving behind a short fall of 2402.90 MCM. The stage of ground water development in the district is 283%.

Ground Water Quality

The shallow ground water of the district is alkaline in nature (pH 7.68 to 9.04) and is moderate to highly saline (EC 894-6990µS/cm. at 25^{0}C). Among anions, either bicarbonate is the dominant anion or none of the anion dominates, whereas among cations, sodium is generally the dominant cation. Comparing the concentration values of major ions with the desirable and permissible concentration limits for drinking water, as recommended by Bureau of Indian standards, more than half (56 %) of the ground waters are not suitable for drinking purposes either due to salinity or fluoride or nitrate concentration beyond the permissible limit of safe drinking waters.

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	**Sangrur**	**263**	**1114**	**1830**	**759**	**92**	**4058**

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	**Sangrur**	**734**	**8867**	**37961**	**42043**	**9767**	**99372**

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	**Sangrur**	**3**	**47**	**376**	**3742**	**0**	**4168**

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	**Sangrur**	**1107**	**104026**	**377**

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 Lakhs	Annual Recharge (MCM)
ROOF TOP RAIN WATER HARVESTING IN RURAL AND URBEN AREAS					
1	**Artificial Recharge Plan For Urban Areas.**	10103	0.25	**25.2575**	**0.855**
2	**Roof Top Rain Water Harvesting in Rural Areas**	21788	0.25	**54.47**	**1.368**
	Total	31891	**0.25**	**79.72**	**2.223**
ARTIFICIAL RECHARGE IN FARMS					
1	**Artificial Recharge Plan Through Recharge Pits.**	32155	0.35	112.54	25.127
			Total	**112.54**	**25.127**

By the implementation of the proposed recharge structures there will be a reduction of 2.12% 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	**3694.27**	**- 2402.90**	**27.35**	**3666.92**	**283 %**	**280.88 %**	**2.12 %**

ARTIFICIAL RCEHARGE PLAN THROUGH RECHARGE PITS IN OVER EXPLOITED BLOCKS OF SANGRUR DISTRICT

Block Name	**Total area of the village (in hectares)**	**10%of village area taken for farm recharge (in hectares)**	**Total number of recharge pits**	**Annual recharge (MCM)= (Area*Runoff 15%*Rainfall**	**Cost of Pit @Rs.0.35 lakh (Crores)**
Malerkotla -I	**38340.10**	**3834**	**3834**	**3.405**	**13.41**
Ahemadgarh	**34813**	**3481**	**3481**	**3.091**	**12.18**
Sherpur	**27264.40**	**2726**	**2726**	**2.012**	**9.54**
Dhuri	**26094**	**2609**	**2609**	**1.977**	**9.13**
Bhawanigarh	**32311**	**3231**	**3231**	**2.627**	**11.30**
Sangrur	**34857**	**3486**	**3486**	**2.635**	**12.20**
Sunam	**58056.90**	**5806**	**5806**	**4.346**	**20.32**
Lehragaga	**40294.40**	**4029**	**4029**	**2.913**	**14.10**
Andana	**29526**	**2953**	**2953**	**2.121**	**10.33**
			32155	**25.127**	**112.51**

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 SANGRUR DISTRICT OF PUNJAB								
Name of District	Sr.no	Name of CD Block	Total area of the village (in hectares rounded up to one decimal place)	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
	1	**Malerkotla -I**	**38340.10**	**26974**	**2697**	**2697**	**0.192**	**6.74**
	2	**Ahemadgarh**	**34813**	**27006**	**2701**	**2701**	**0.192**	**6.75**
	3	**Sherpur**	**27264.40**	**19306**	**1931**	**1931**	**0.114**	**4.82**
	4	**Dhuri**	**26094**	**16517**	**1652**	**1652**	**0.100**	**4.13**
	5	**Bhawanigarh**	**32311**	**19852**	**1985**	**1985**	**0.129**	**4.96**
	6	**Sangrur**	**34857**	**24215**	**2422**	**2422**	**0.146**	**6.05**
	7	**Sunam**	**58056.90**	**45394**	**4539**	**4539**	**0.272**	**11.34**
	8	**Lehragaga**	**40294.40**	**23725**	**2373**	**2373**	**0.137**	**5.93**
	9	**Andana**	**29526**	**14875**	**1488**	**1488**	**0.086**	**3.72**
SANGRUR		Total	**321556.80**	**217864**	**21788**	**21788**	**1.368**	**54.44**

ARTIFICIAL RECHARGE PLAN FOR URBAN AREAS OF DISTRICT SANGRUR PUNJAB

District	Block	Town Name	Total Households	Total Population of Town	HousholdS taken for Atificial Recharge (10%)	Total Roof Top Area (sqm)	Vol of water available for recharge (MCM)	Cost @Rs.0.25 lakh
SANGRUR	AHMEDGARH (ANDANA)	AHMEDGARH (MCL)	6425	31302	643	128500	0.057	1.60
	MALERKOTLA	MALERKOTLA (MCL)	25218	135424	2522	504360	0.239	6.30
	MALERKOTLA	AMARGARH (CT)	1473	7339	147	29460	0.014	0.36
	DHURI	DHURI (MCL)	11077	55225	1108	221540	0.090	2.77
	BHAWANIGARH	BHAWANIGARH (MCL)	4498	22320	450	89960	0.039	1.12
	SANGRUR	SANGRUR (MCL)	18199	88043	1820	363980	0.147	4.55
	SANGRUR	LONGOWAL (MCL)	4572	23851	457	91440	0.037	1.14
	SUNAM	CHEEMA (NP)	2265	11615	227	45300	0.018	0.56
	SUNAM	SUNAM UDHAM SINGH WALA (MCL + OG)	13662	69069	1366	273240	0.109	3.41
	SUNAM	DIRBA (NP)	3227	16952	323	64540	0.026	0.80
	LEHRAGAGA	LEHRAGAGA (MCL)	4466	22588	447	89320	0.034	1.11
	LEHRAGAGA	MOONAK (NP)	3296	18141	330	65920	0.025	0.82
	LEHRAGAGA	KHANAURI (NP)	2628	14096	263	52560	0.020	0.65
		TOTAL	**101006**	**515965**	**10103**	**2020120**	**0.855**	**25.19**

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 103540 tube wells operated by farmers for irrigation through unlined/Kutcha (98.57%) open channel system in Sangrur 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 Sangrur district is estimated at 3627.60 MCM. It is expected that around 61.78 % 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 2589.31 MCM assuming there is no crop diversification by the farmers.

The benefit will lead to saving of precious ground water resources in overexploited blocks Sangrur Districts. The measure if implemented will bring down the ground water overdraft from 211% to 149.22 %. 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 *kutcha* channel in the entire Punjab. Heavy ground water overdraft can be reduced by these efforts. This will ensure **more crops per drop.**

POTENTIAL FOR REDUCTION IN OVERDRAFT BY ENHANCING THE GROUND WATER USE EFFICIENCY IN IRRIGATION TUBEWELLS, SANGRUR 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#)	Potential of Reduced irrigation overdraft (Col3-col6) (mcm)	Gross draft after saving of water (mcm) (Col 7+Col4)	Present Stage of Development (%)	Stage of development afterwards((Col 8/Col1) X100) (%)	Reduction in stage of development after constructing pucca canal (Col9-Col10) (%)
1	2	3	4	5	6	7	8	9	10	11
1735.20	3664.3	3627.6	36.7	98.57	1074.99	2552.61	2589.31	211	149.22	61.78

 # Losses from open kutcha 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) =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**
SANGRUR	Malerkotla-I	29945.2	98.57	29517	147.58	952.81
	Malerkotla-II	27110	98.57	26722	133.61	
	Sherpur	19579.8	98.57	19300	96.50	
	Dhuri	18713.5	98.57	18446	92.23	
	Bhawnigarh	26156	98.57	25782	128.91	
	Sangrur	18830	98.57	18561	92.80	
	Sunam	24051.4	98.57	23707	118.54	
	Lehragaga	11587	98.57	11421	57.11	
	Andana	17353.2	98.57	17105	85.53	

SALIENT FEATURES OF HYDROGEOLOGY OF DISTRICT SANGRUR

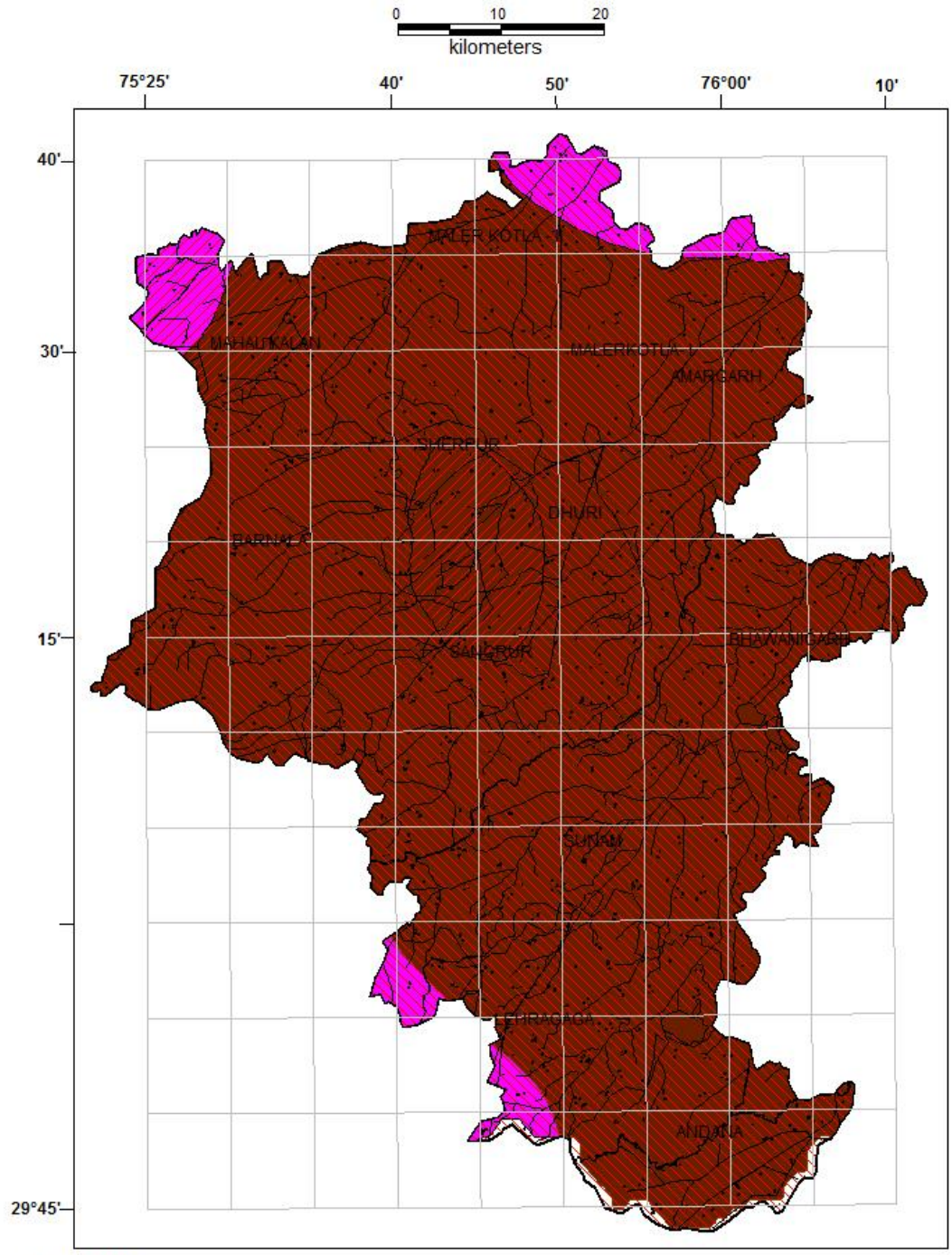
Wells Feasible	Rigs Suitable	Depth of Well (m)	Discharge (lpm)	Suitable Artificial Recharge Structures
Tube Wells	Direct and Reverse Rotary	50 - 100	1300 - 2500	Recharge Shaft And Recharge Trench
Tube Wells	Direct and Reverse Rotary	40 - 150	1000 - 1300	Recharge Shaft And Recharge Trench
Tube Wells	Direct and Reverse Rotary	50 - 100	600 - 1000	Recharge Shaft And Recharge Trench

DEPTH TO WATER LEVEL NOVEMBER 2014	National Highway	International Boundary
	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	Sangrur
Geographical Area	5020 sq.km
Major Geological Formation	Alluviam
Major Drainage System	Ghaggar
Population (as on 2011)	16,54,408
Total Number of Blocks	9
Existing Major/Medium Irrigation Projects	Sirhind Canal and Bhakra Canal
Utillizable Ground Water Resources 2011	1305.51 (mcm)
Net Ground Water Draft	3694.27 (mcm)
Stage of Ground Water Development	283 %
Average Annual Rainfall	552 mm
Range of Mean Daily Temperature	7° - 40° C
Over Exploted Blocks	MALERKOTLA -I MALERKOTLA -II SHERPUR, DHURI, SUNAM BHAWANIGARH, SANGRUR, SUNAM, LEHRAGAGA

PLAN OF ARTIFICIAL RECHARGE TO GROUND WATER
DISTRICT SANGRUR, PUNJAB



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Refer Salient Features of Hydrogeology

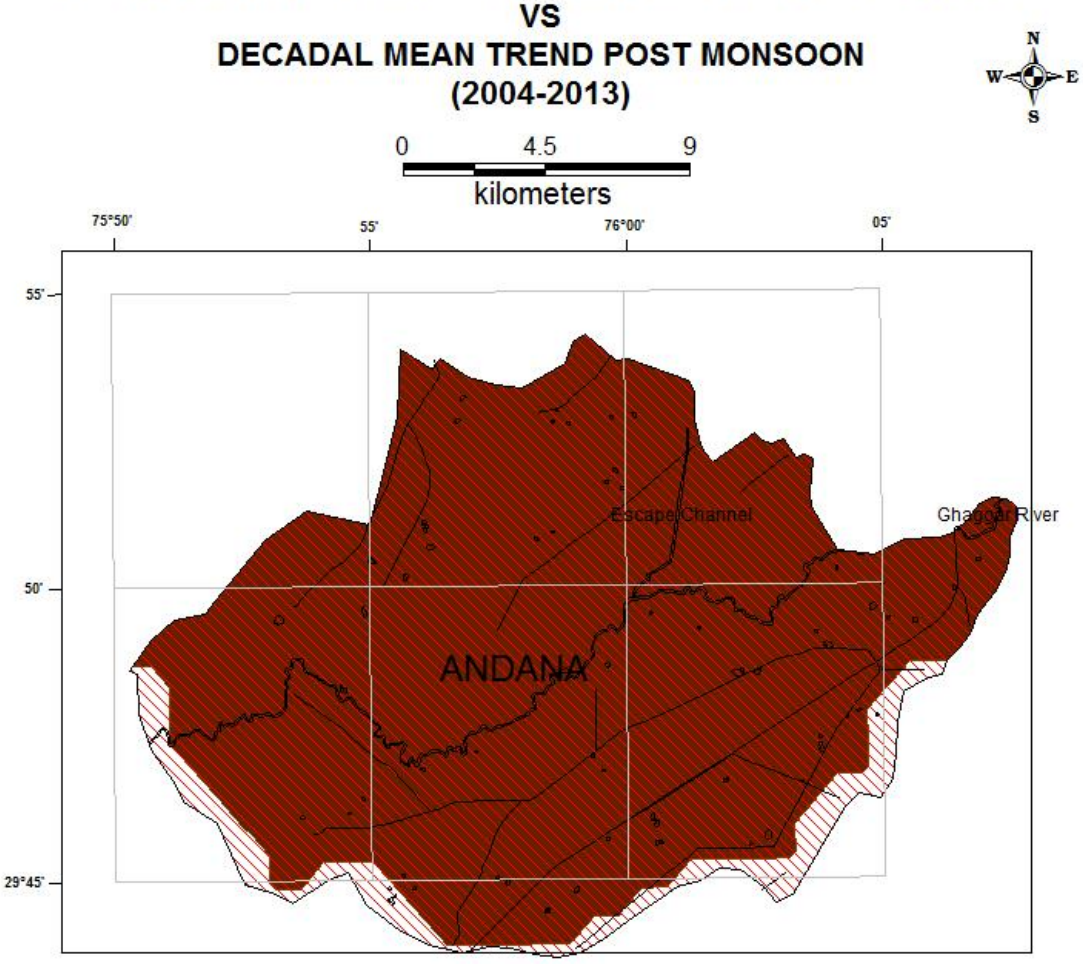
Decadal mean water level trend (m)

	-0.20 -- -0.10
	-0.10 -- -0.00

BLOCK WISE PLAN OF DISTRICT SANGRUR PUNJAB

(9 OE BLOCKS)

BLOCK ANDANA DISTRICT SANGRUR, PUNJAB
DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON
VS
DECADAL MEAN TREND POST MONSOON
(2004-2013)



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Decadal mean water level (post monsoon)

20.00 - 40.00 mbgl

Decadal mean water level trend (m)

- 0.1 - 0.00

Canal Network

Water Bodies

1488	**No. of Recharge Structures in Rural Villages**
643	**No. of Recharge Structures in Urban Towns**
2953	**Recharge Pits in Agricultural Land**
16.62	**Thickness of Sand**

Ground Water Scenario of Block

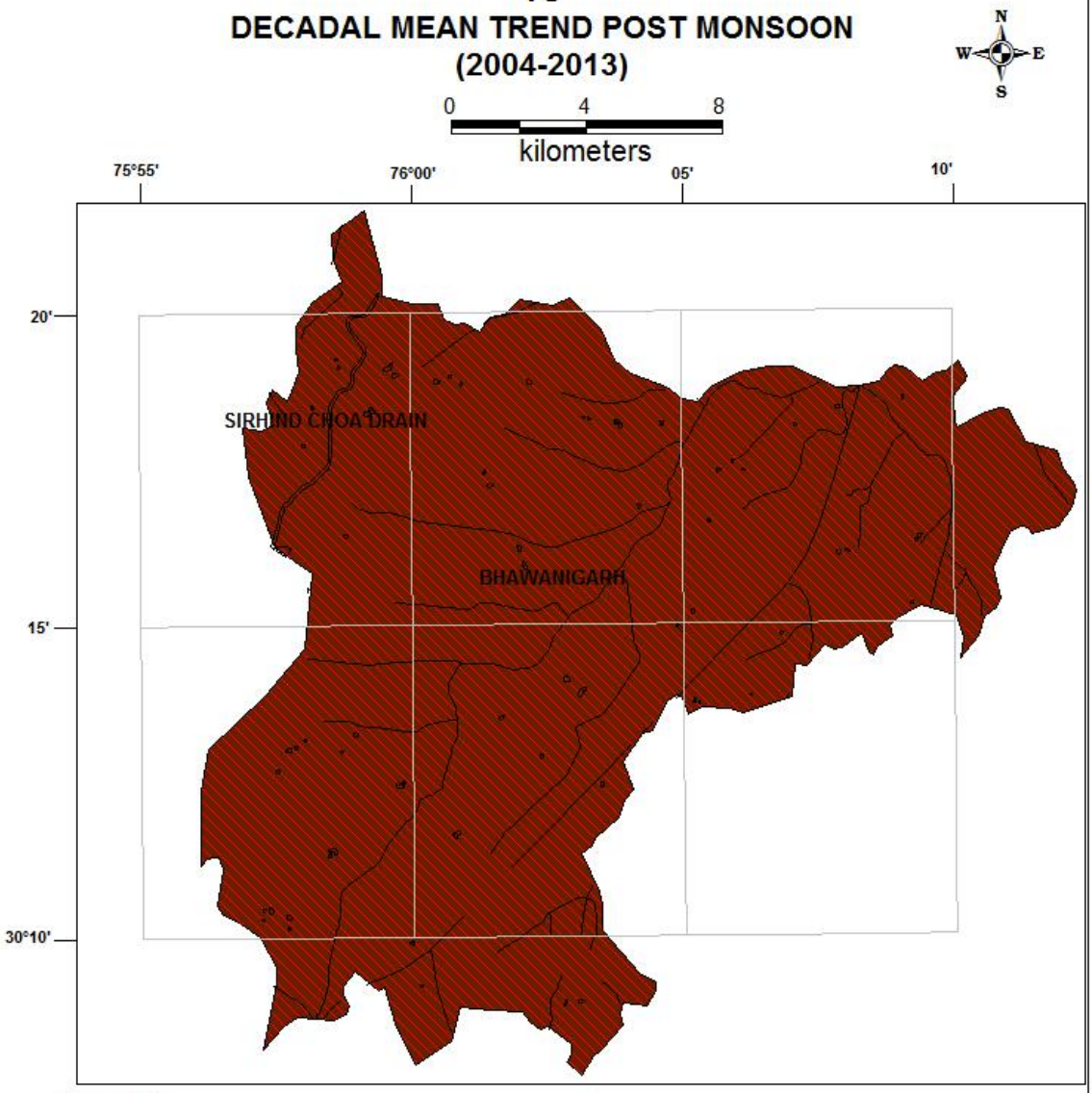
Block Name:- Andana **District:- Sangrur**		**State:- PUNJAB**
1. `	GENERAL INFORMATION	
	i) Geographical area (sq km)	*411.5*
	• Number of Villages inhabited • Un-inhabited	*39* -
	ii) Average Annual Rainfall (mm)	*484*
	iii) Area feasible for Artificial Recharge	*411.5*
	iv) Village identified under scarcity of Water	*40*
	v) Village covered under water supply	*39*
	vi) Water Tank exists in the village	*26*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Ghaggar 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	283.55
	• Net Area Sown (Sq.Km)	245.52
	• Area Sown More than Once (Sq.Km)	2.44
	• Total Cropped Area (Sq.Km)	247.96
	• 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 (mbgll)	
	• Pre- monsoon: (May 2015) • 25.40-26.30 (mbgl)	*20.00 – 40.00(mbgl)*	
	• Post –monsoon: (Nov2014) • 24.51-25.62(mbgl)		
6. *1 a*	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*7*	
	• Depth Range (m)	*299.50-550.47*	
	• Discharge (Ipm)	*25.00*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*1790*	
	• Storativity	*$1.26*10^{-3}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	--	---
	• NO3 (mg/l)	--	---
	• F (mg/l)	--	--
	• As (mg/l)	0.0015	0.0071
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (Mcm)	116.83	
	• Existing Gross Ground Water Draft for Irrigation (Mcm)	252.61	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (Mcm)	1.62	
	• Existing Gross Ground Water Draft for all Uses (Mcm)	254.23	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (Mcm)	2.37	
	• Net Ground Water Availability for Future Irrigation Development (Mcm)	-138.15	
	• Stage of Ground Water Development / Over Draft(%)	2.18	

	• 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)	*Thickness(m) 16.62*	Percentage % 33.42
10	Volume of unsaturated zone available for recharge (MCM)	1474.68	
11.	Volume of water required for recharge (MCM)	1961.38	
12.	Volume of surplus water available for recharge(MCM)	9.08	

RECHARGE/ CONSERVATION STRUCTURES		**Total Number of Recharge Structures**	**Total Cost (Rs. in crores)**	**Total Recharge/ Water saving in MCM**
13	Farm Recharge @Rs. 35000/-	2953	**10.34**	**2.12**
14	RWH Rural @ Rs. 25000/-	1488	**3.72**	**0.09**
15	RWH Urban@ Rs. 25000/-	643	**1.61**	**0.06**
16	Underground pipe line (area in hectares) @ Rs. 50000/-	17105	**85.53**	**73.90**
	TOTAL		**101.19**	**76.16**

BLOCK BHAWANIGARH DISTRICT SANGRUR, PUNJAB
DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON
VS
DECADAL MEAN TREND POST MONSOON
(2004-2013)



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Decadal mean water level (post monsoon)

20.00 - 40.00 mbgl

Decadal mean water level trend (m)

- 0.1 - 0.00

Canal Network

Water Bodies

1985 — No. of Recharge Structures in Rural Villages

450 — No. of Recharge Structures in Urban Towns

3231 — Recharge Pits in Agricultural Land

Ground Water Scenario of Block

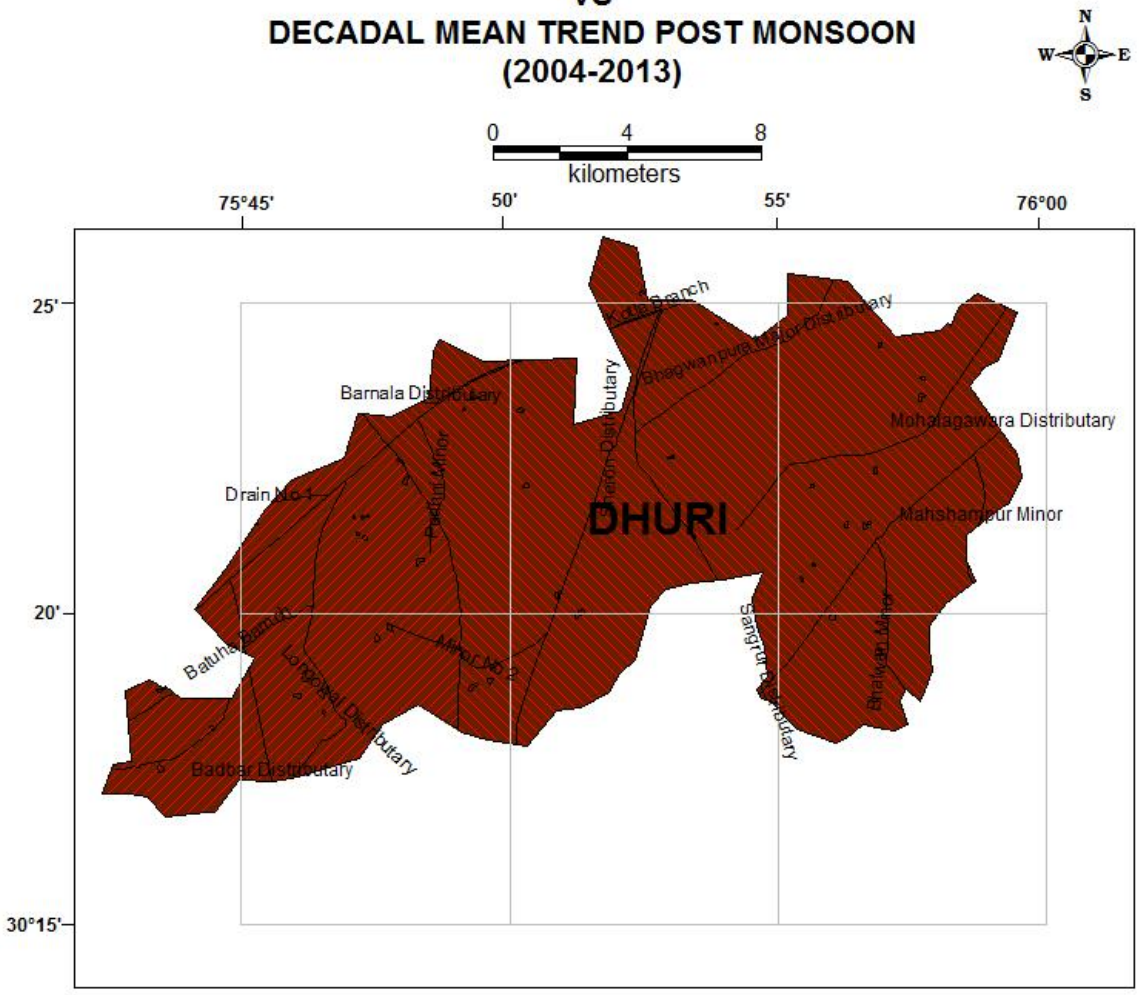
Block Name:- Bhawanigarh District:- Sangrur PUNJAB		**State:-**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*351.7*
	• Number of Villages inhabited • Un-inhabited	*66* *1*
	ii) Average Annual Rainfall (mm)	*544*
	iii) Area feasible for Artificial Recharge	*351.7*
	iv) Village identified under scarcity of Water	*37*
	v) Village covered under water supply	*67*
	vi) Water Tank exists in the village	*45*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Ghaggar 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	323.14
	• Net Area Sown (Sq.Km)	304.23
	• Area Sown More than Once (Sq.Km)	2.70
	• Total Cropped Area (Sq.Km)	306.93
	• 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 (mbgll)	
	• Pre- monsoon: (May 2015) • *30.46-31.86(mbgl)*	*20.00 – 40.00(mbgl)*	
	• Post –monsoon: (Nov2014) • *29.00-31.80(mbgl)*		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*1*	
	• Depth Range (m)	*299.50-550.47*	
	• Discharge (Ipm)	*25.00*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*1790*	
	• Storativity	$1.26*10^{-3}$	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	445	445
	• NO3 (mg/l)	---	----
	• F (mg/l)	0.42	0.42
	• As (mg/l)	-------	----
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (Mcm)	130.54	
	• Existing Gross Ground Water Draft for Irrigation (Mcm)	390.10	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (Mcm)	2.69	
	• Existing Gross Ground Water Draft for all Uses (Mcm)	392.79	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (Mcm)	3.95	
	• Net Ground Water Availability for Future Irrigation Development (Mcm)	-263.51	
	• Stage of Ground Water Development / Over Draft(%)	301	
	• 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)	*Thickness(m)* --	Percentage % ---
10	Volume of unsaturated zone available for recharge (MCM)	781.33	
11.	Volume of water required for recharge (MCM)	1039.10	
12.	Volume of surplus water available for recharge(MCM)	4.81	

RECHARGE/ CONSERVATION STRUCTURES		**Total Number of Recharge Structures**	**Total Cost (Rs. in crores)**	**Total Recharge/ Water saving in MCM**
13	Farm Recharge @Rs. 35000/-	3231	**11.31**	**2.63**
14	RWH Rural @ Rs. 25000/-	1985	**4.96**	**0.13**
15	RWH Urban@ Rs. 25000/-	450	**1.13**	**0.04**
16	Underground pipe line (area in hectares) @ Rs. 50000/-	25782	**128.91**	**114.11**
	TOTAL		**146.31**	**116.91**

BLOCK DHURI DISTRICT SANGRUR, PUNJAB
DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON
VS
DECADAL MEAN TREND POST MONSOON
(2004-2013)



Legend

Decadal mean water level (post monsoon)

20.00 - 40.00 mbgl

Decadal mean water level trend (m)

- 0.20 - 0.10

- 0.01 - 0.00

Canal Network

Water Bodies

1652	**No. of Recharge Structures in Rural Villages**
1108	**No. of Recharge Structures in Urban Towns**
2609	**Recharge Pits in Agricultural Land**
9	**Thickness of Sand**

Ground Water Scenario of Block

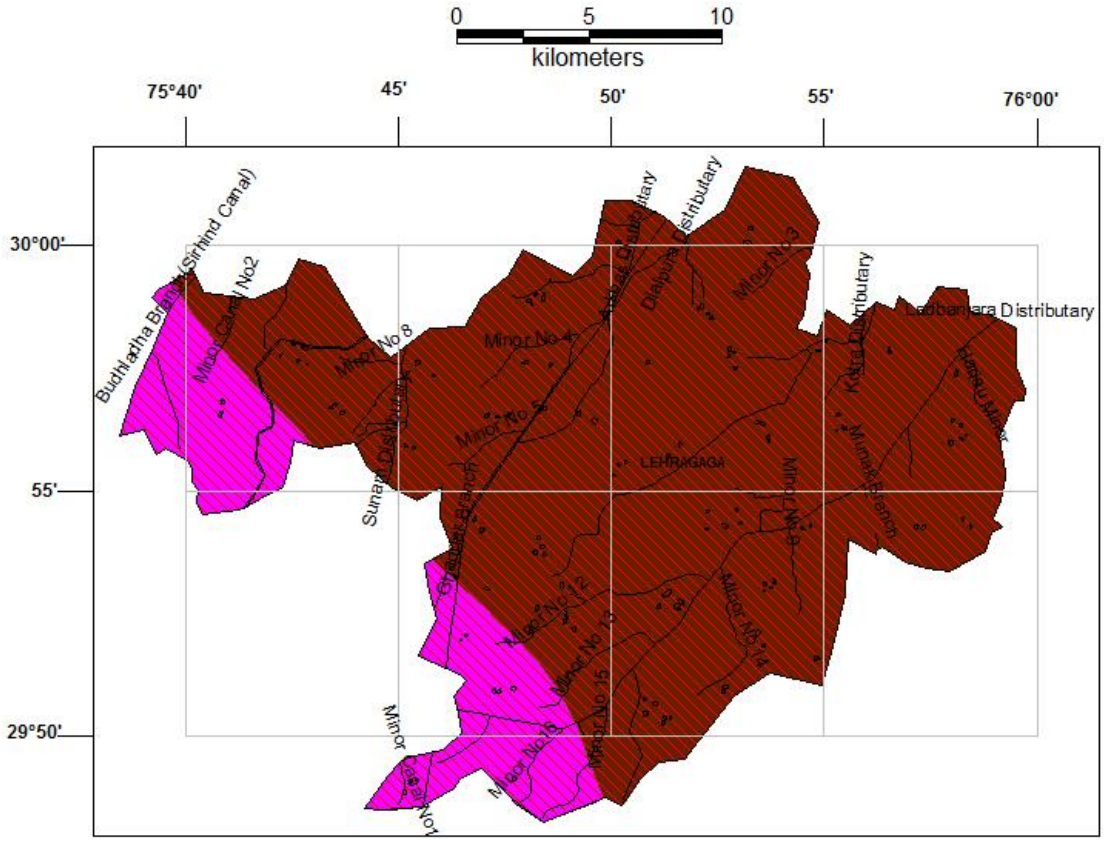
Block Name:- Dhuri **District:- Sangrur** **State:- PUNJAB**		
1. `	GENERAL INFORMATION	
	i) Geographical area (sq km)	*248.1*
	• Number of Villages inhabited • Un-inhabited	*43* -
	ii) Average Annual Rainfall (mm)	*508*
	iii) Area feasible for Artificial Recharge	*248.1*
	iv) Village identified under scarcity of Water	*42*
	v) Village covered under water supply	*42*
	vi) Water Tank exists in the village	*35*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Ghaggar 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	261.79
	• Net Area Sown (Sq.Km)	220.89
	• Area Sown More than Once (Sq.Km)	2.00
	• Total Cropped Area (Sq.Km)	222.89
	• 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 (mbgll)	
	• Pre- monsoon: (May 2015) • *26.22-37.01(mbgl)*	*20.00 – 40.00(mbgl)*	
	• Post –monsoon: (Nov2014) • *26.25-37.90(mbgl)*		
6. *1 a*	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*6*	
	• Depth Range (m)	*299.50-550.47*	
	• Discharge (Ipm)	*25.00*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*1790*	
	• Storativity	*$1.26*10^{-3}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	445	445
	• NO3 (mg/l)	---	----
	• F (mg/l)	0.42	0.42
	• As (mg/l)	-------	----
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (Mcm)	119.34	
	• Existing Gross Ground Water Draft for Irrigation (Mcm)	319.73	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (Mcm)	2.76	
	• Existing Gross Ground Water Draft for all Uses (Mcm)	322.49	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (Mcm)	4.05	
	• Net Ground Water Availability for Future Irrigation Development (Mcm)	-204.44	
	• Stage of Ground Water Development / Over Draft(%)	270	
	• 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)	*Thickness(m) 9*	Percentage % 18
10	Volume of unsaturated zone available for recharge (MCM)	551.17	
11.	Volume of water required for recharge (MCM)	733.08	
12.	Volume of surplus water available for recharge(MCM)	3.39	

RECHARGE/ CONSERVATION STRUCTURES		**Total Number of Recharge Structures**	**Total Cost (Rs. in crores)**	**Total Recharge/ Water saving in MCM**
13	Farm Recharge @Rs. 35000/-	2609	**9.13**	**1.977**
14	RWH Rural @ Rs. 25000/-	1652	**4.13**	**0.100**
15	RWH Urban@ Rs. 25000/-	1108	**2.77**	**0.090**
16	Underground pipe line (area in hectares) @ Rs. 50000/-	18446	**92.23**	**93.54**
	TOTAL		**108.26**	**95.71**

BLOCK LEHRAGAGA DISTRICT SANGRUR, PUNJAB
DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON
VS
DECADAL MEAN TREND POST MONSOON
(2004-2013)



Legend

Decadal mean water level (post monsoon)

20.00 - 40.00 mbgl

Decadal mean water level trend (m)

- 0.01 - 0.00

Canal Network

Water Bodies

2373	**No. of Recharge Structures in Rural Villages**
1040	**No. of Recharge Structures in Urban Towns**
4029	**Recharge Pits in Agricultural Land**

Ground Water Scenario of Block

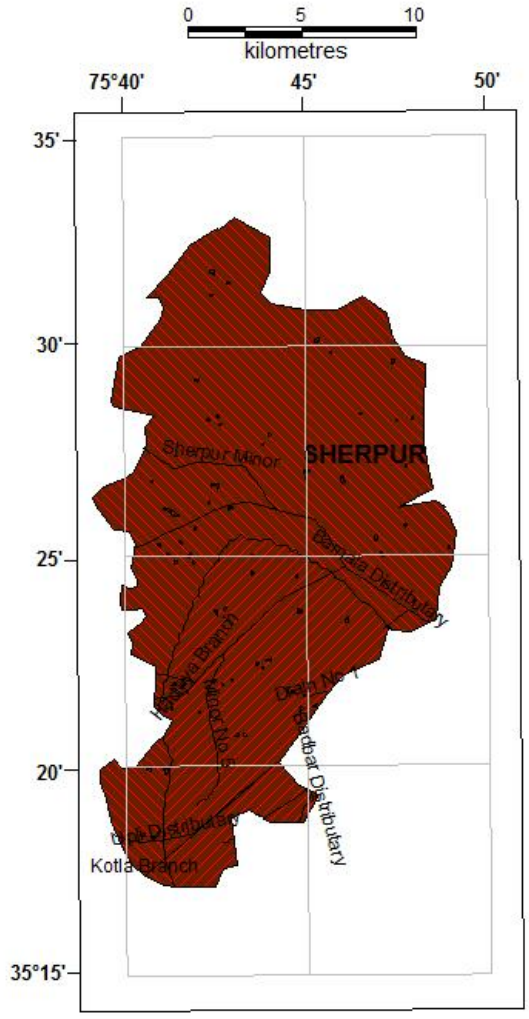
Block Name:- Lehargaga District:- Sangrur PUNJAB		**State:-**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*469.2*
	• Number of Villages inhabited • Un-inhabited	*48* -
	ii) Average Annual Rainfall (mm)	*489*
	iii) Area feasible for Artificial Recharge	*469.2*
	iv) Village identified under scarcity of Water	*42*
	v) Village covered under water supply	*42*
	vi) Water Tank exists in the village	*31*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	 *Ghaggar 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	381.03
	• Net Area Sown (Sq.Km)	344.99
	• Area Sown More than Once (Sq.Km)	3.40
	• Total Cropped Area (Sq.Km)	348.39
	• 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 (mbgll)	
	• Pre- monsoon: (May 2015) • *24.85-25.61(mbgl)*	*20.00 – 40.00(mbgl)*	
	• Post –monsoon: (Nov2014) • *24.92-25.51(mbgl)*		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*6*	
	• Depth Range (m)	*299.50-550.47*	
	• Discharge (Ipm)	*25.00*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*1790*	
	• Storativity	*$1.26*10^{-3}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	445	445
	• NO3 (mg/l)	---	----
	• F (mg/l)	0.42	0.42
	• As (mg/l)	-------	----
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (Mcm)	143.26	
	• Existing Gross Ground Water Draft for Irrigation (Mcm)	293.79	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (Mcm)	2.90	
	• Existing Gross Ground Water Draft for all Uses (Mcm)	296.69	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (Mcm)	4.25	
	• Net Ground Water Availability for Future Irrigation Development (Mcm)	-154.78	
	• Stage of Ground Water Development (%)	207	
	• 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)	*Thickness(m)* --	Percentage % ---
10	Volume of unsaturated zone available for recharge (MCM)	1042.36	
11.	Volume of water required for recharge (MCM)	1386.38	
12.	Volume of surplus water available for recharge(MCM)	6.42	

RECHARGE/ CONSERVATION STRUCTURES		**Total Number of Recharge Structures**	**Total Cost (Rs. in crores)**	**Total Recharge/ Water saving in MCM**
13	Farm Recharge @Rs. 35000/-	4029	**14.10**	**2.913**
14	RWH Rural @ Rs. 25000/-	2373	**5.93**	**0.137**
15	RWH Urban@ Rs. 25000/-	1040	**2.60**	**0.259**
16	Underground pipe line (area in hectares) @ Rs. 50000/-	11421	**57.11**	**85.94**
	TOTAL		**79.74**	**89.25**

BLOCK SHERPUR DISTRICT SANGRUR, PUNJAB
DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON
VS
DECADAL MEAN TREND POST MONSOON
(2004-2013)



Legend

Decadal mean water level (post monsoon)

20.00 - 40.00 mbgl

Decadal mean water level trend (m)

- 0.02 - -0.01

- 0.01 - 0.00

Canal Network

Water Bodies

1931 **No. of Recharge Structures in Rural Villages**

2726 **Recharge Pits in Agricultural Land**

Ground Water Scenario of Block

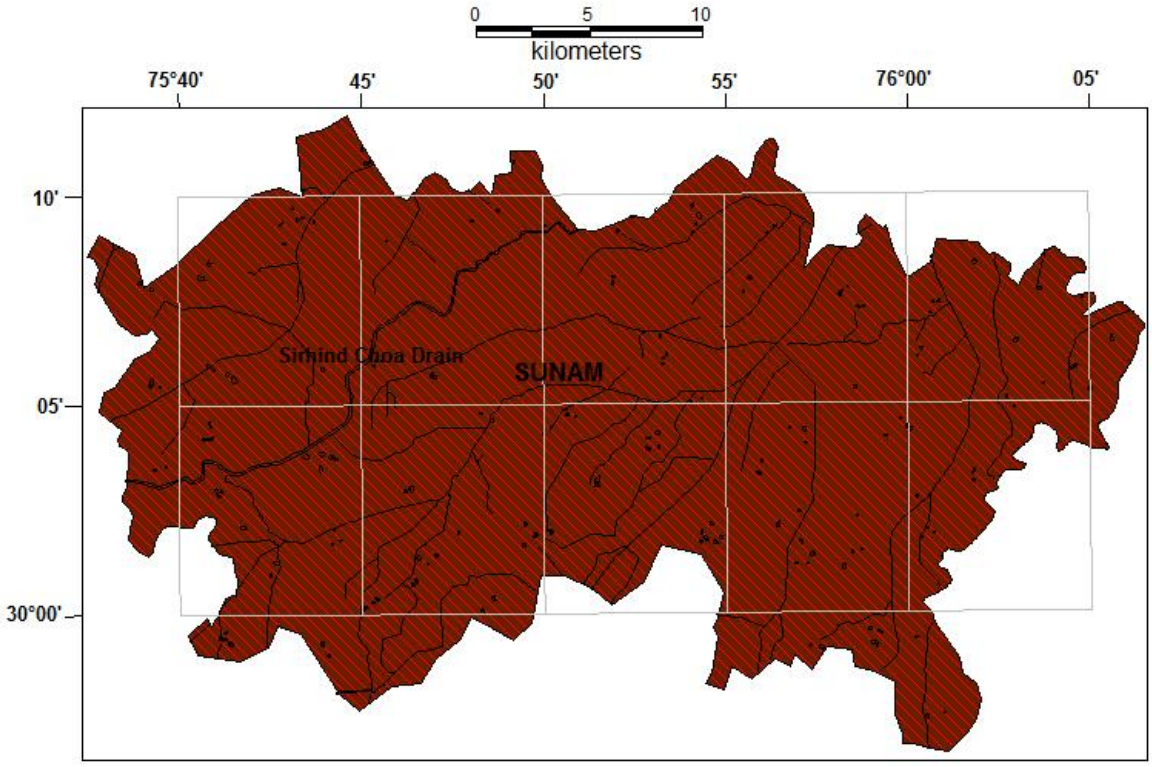
Block Name:- Sherpur **District:- Sangrur** **State:- PUNJAB**		
1. `	GENERAL INFORMATION	
	i) Geographical area (sq km)	*350.5*
	• Number of Villages inhabited • Un-inhabited	-- -
	ii) Average Annual Rainfall (mm)	*564*
	iii) Area feasible for Artificial Recharge	*350.5*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Ghaggar 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	---
	• Net Area Sown (Sq.Km)	---
	• Area Sown More than Once (Sq.Km)	---
	• Total Cropped Area (Sq.Km)	---
	• Cropping Intensity	---
	• 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 (mbgll)
	• Pre- monsoon: (May 2015) • *21.43-34.63(mbgl)*	*20.00 – 40.00(mbgl)*
	• Post –monsoon: (Nov2014) • *20.55-26.00(mbgl)*	

6. *1 a*	GROUND WATERN EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	--	
	• Depth Range (m)	*299.50-550.47*	
	• Discharge (Ipm)	*25.00*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*1790*	
	• Storativity	*1.26*10^{-3}*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm	--	---
	• NO3 (mg/l)	--	---
	• F (mg/l)	--	--
	• As (mg/l)	0.0016	0.0016
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (Mcm)	98.37	
	• Existing Gross Ground Water Draft for Irrigation (Mcm)	406.66	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (Mcm)	2.06	
	• Existing Gross Ground Water Draft for all Uses (Mcm)	409.24	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (Mcm)	3.79	
	• Net Ground Water Availability for Future Irrigation Development (Mcm)	-312.08	
	• Stage of Ground Water Development (%)	4.16	
	• Category of Block	OE	
	Any specific reasons for high stress on ground water leading to Overexploitation and decline in ground water level		
9.	Percentage of sand thickness up to 50 m depth (Average)	*Thickness(m)* --	Percentage % --

10	Volume of unsaturated zone available for recharge (MCM)	778.66
11.	Volume of water required for recharge (MCM)	1035.65
12.	Volume of surplus water available for recharge(MCM)	4.79

RECHARGE/ CONSERVATION STRUCTURES		**Total Number of Recharge Structures**	**Total Cost (Rs. in crores)**	**Total Recharge/ Water saving in MCM**
13	Farm Recharge @Rs. 35000/-	2726	**9.54**	**2.012**
14	RWH Rural @ Rs. 25000/-	1931	**4.83**	**0.114**
15	RWH Urban@ Rs. 25000/-	0	**0.00**	**0**
16	Underground pipe line (area in hectares) @ Rs. 50000/-	19300	**96.50**	**92.06**
	TOTAL		**110.87**	**94.19**

BLOCK SUNAM DISTRICT SANGRUR, PUNJAB
DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON
VS
DECADAL MEAN TREND POST MONSOON
(2004-2013)



Legend

Decadal mean water level (post monsoon)

20.00 - 40.00 mbgl

Decadal mean water level trend (m)

- 0.01 - 0.00

Canal Network

Water Bodies

4539	No. of Recharge Structures in Rural Villages
1916	No. of Recharge Structures in Urban Towns
5806	Recharge Pits in Agricultural Land
21	Thickness of Sand

Ground Water Scenario of Block

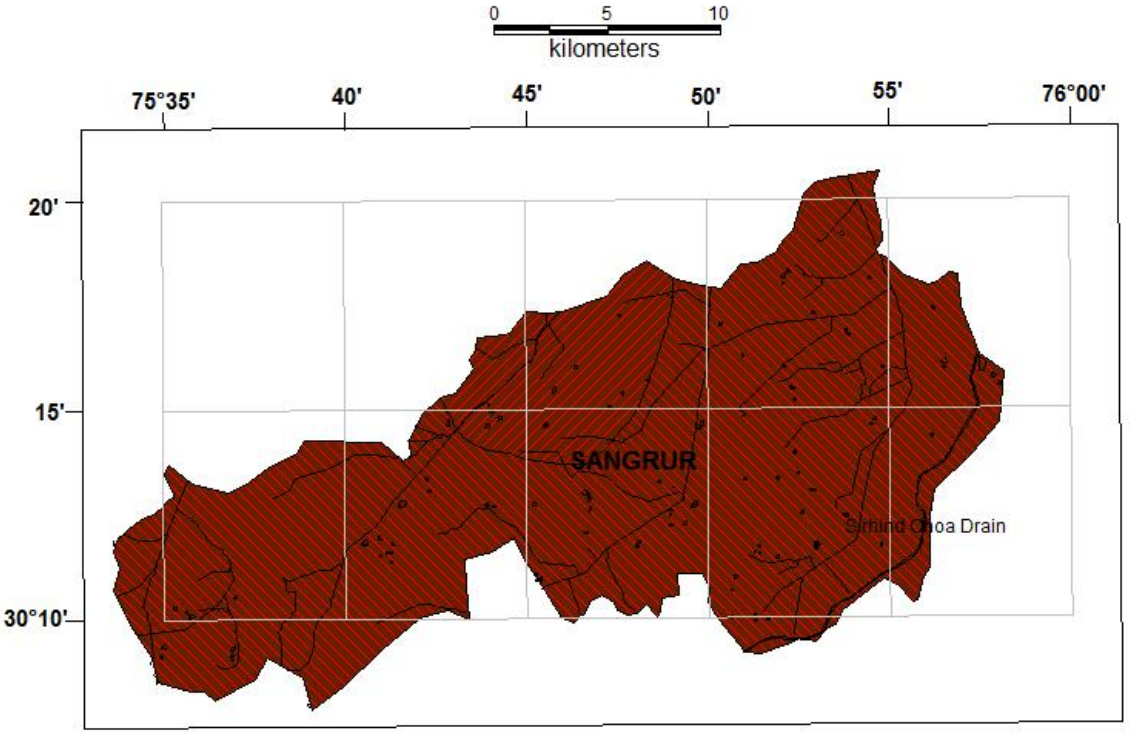
Block Name:- Sunam District:- Sangrur PUNJAB		**State:-**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*663.8*
	• Number of Villages inhabited • Un-inhabited	*93* -
	ii) Average Annual Rainfall (mm)	*503*
	iii) Area feasible for Artificial Recharge	*663.8*
	iv) Village identified under scarcity of Water	*41*
	v) Village covered under water supply	*40*
	vi) Water Tank exists in the village	*33*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Ghaggar 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	411.20
	• Net Area Sown (Sq.Km)	365.50
	• Area Sown More than Once (Sq.Km)	3.54
	• Total Cropped Area (Sq.Km)	369.04
	• 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 (mbgll)	
	• Pre- monsoon: (May 2015) • *25.58-32.31(mbgl)*	*20.00 – 40.00 (mbgl)*	
	• Post –monsoon: (Nov2014) • *25.28-32.35(mbgl)*		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*5*	
	• Depth Range (m)	*299.50-550.47*	
	• Discharge (Ipm)	*25.00*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*1790*	
	• Storativity	$1.26*10^{-3}$	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	1638	1638
	• NO3 (mg/l)	7.4	7.4
	• F (mg/l)	0.3	0.49
	• As (mg/l)	-------	----
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (Mcm)	204.21	
	• Existing Gross Ground Water Draft for Irrigation (Mcm)	724.84	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (Mcm)	6.58	
	• Existing Gross Ground Water Draft for all Uses (Mcm)	731.42	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (Mcm)	9.65	
	• Net Ground Water Availability for Future Irrigation Development (Mcm)	-530.28	
	• Stage of Ground Water Development / Over Draft (%)	358	
	• 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)	*Thickness(m) 42*	Percentage % 42
10	Volume of unsaturated zone available for recharge (MCM)	1474.68	
11.	Volume of water required for recharge (MCM)	1961.38	
12.	Volume of surplus water available for recharge(MCM)	9.08	

RECHARGE/ CONSERVATION STRUCTURES		**Total Number of Recharge Structures**	**Total Cost (Rs. in crores)**	**Total Recharge/ Water saving in MCM**
13	Farm Recharge @Rs. 35000/-	5806	**20.32**	**4.35**
14	RWH Rural @ Rs. 25000/-	4539	**11.35**	**0.27**
15	RWH Urban@ Rs. 25000/-	1916	**4.79**	**0.15**
16	Underground pipe line (area in hectares) @ Rs. 50000/-	23707	**118.54**	**212.04**
	TOTAL		**154.99**	**216.81**

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



Legend

Decadal mean water level (post monsoon)

20.00 - 40.00 mbgl

Decadal mean water level trend (m)

- 0.2 - 0.1

- 0.1 - 0.00

Canal Network

Water Bodies

2422	No. of Recharge Structures in Rural Villages
2277	No. of Recharge Structures in Urban Towns
3486	Recharge Pits in Agricultural Land
11	Thickness of Sand

Ground Water Scenario of Block

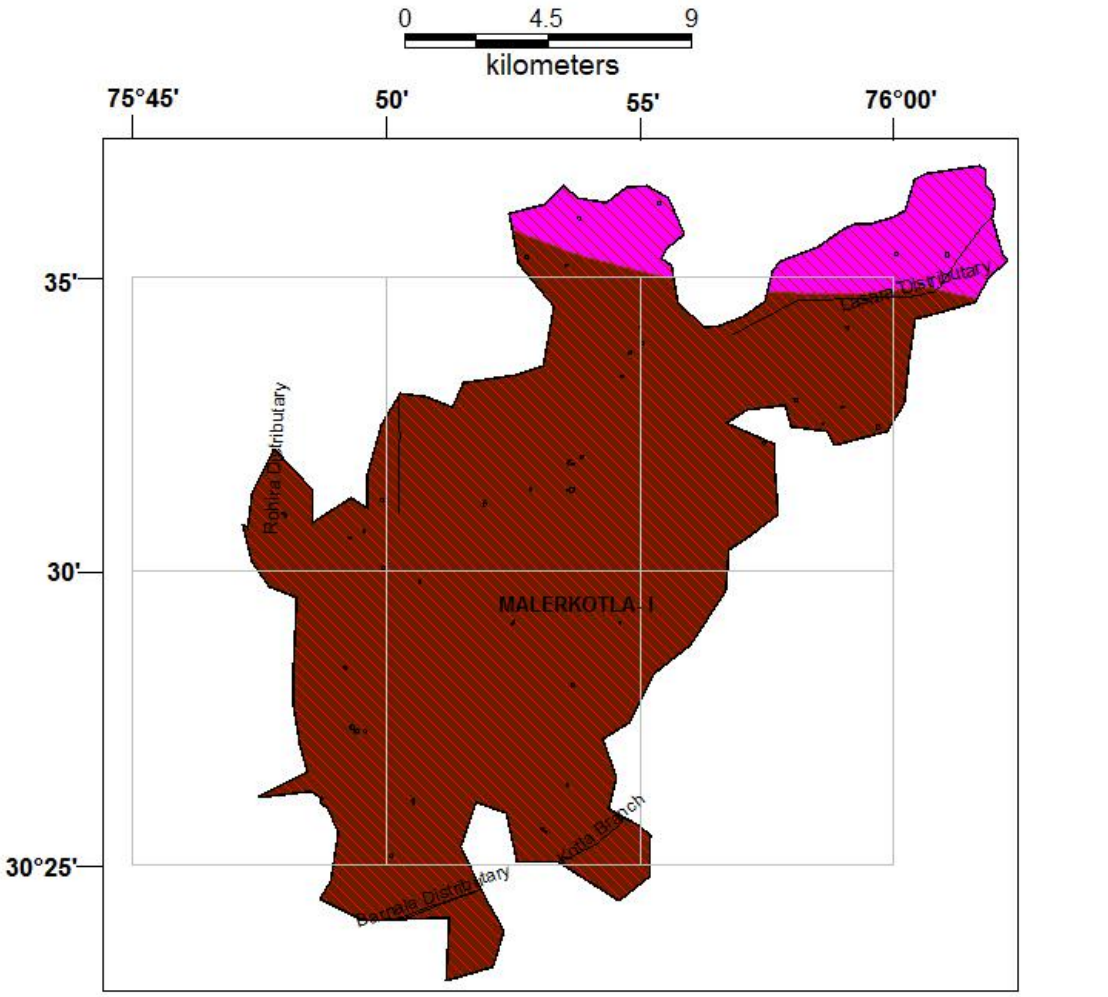
Block Name:- Sangrur **District:- Sangrur** **State:- PUNJAB**		
1. `	GENERAL INFORMATION	
	i) Geographical area (sq km)	*557.7*
	• Number of Villages inhabited • Un-inhabited	*63* *1*
	ii) Average Annual Rainfall (mm)	*506*
	iii) Area feasible for Artificial Recharge	*557.7*
	iv) Village identified under scarcity of Water	*56*
	v) Village covered under water supply	*56*
	vi) Water Tank exists in the village	*43*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Ghaggar 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	348.66
	• Net Area Sown (Sq.Km)	322.59
	• Area Sown More than Once (Sq.Km)	3.14
	• Total Cropped Area (Sq.Km)	325.73
	• 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 (mbgll)	
	• Pre- monsoon: (May 2015) • *25.99-31.72(mbgl)*	*20.00 – 40.00 (mbgl)*	
	• Post –monsoon: (Nov2014) • *25.99-30.87(mbgl)*		
6. *1 a*	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*6*	
	• Depth Range (m)	*299.50-550.47*	
	• Discharge (Ipm)	*25.00*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*1790*	
	• Storativity	*$1.26*10^{-3}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	1638	1638
	• NO3 (mg/l)	7.4	7.4
	• F (mg/l)	0.3	0.49
	• As (mg/l)	-------	----
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (Mcm)	200.74	
	• Existing Gross Ground Water Draft for Irrigation (Mcm)	466.83	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (Mcm)	4.46	
	• Existing Gross Ground Water Draft for all Uses (Mcm)	471.29	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (Mcm)	6.53	
	• Net Ground Water Availability for Future Irrigation Development (Mcm)	-272.63	
	• Stage of Ground Water Development / Over Draft(%)	235	
	• 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)	*Thickness(m) 11*	Percentage % 22
10	Volume of unsaturated zone available for recharge (MCM)	1238.97	
11.	Volume of water required for recharge (MCM)	1647.88	
12.	Volume of surplus water available for recharge(MCM)	7.63	

RECHARGE/ CONSERVATION STRUCTURES		**Total Number of Recharge Structures**	**Total Cost (Rs. in crores)**	**Total Recharge/ Water saving in MCM**
13	Farm Recharge @Rs. 35000/-	3486	**12.20**	**2.635**
14	RWH Rural @ Rs. 25000/-	2422	**6.06**	**0.146**
15	RWH Urban@ Rs. 25000/-	2277	**5.69**	**0.184**
16	Underground pipe line (area in hectares) @ Rs. 50000/-	18561	**92.81**	**137.46**
	TOTAL		**116.75**	**140.425**

BLOCK MALERKOTLA - I DISTRICT SANGRUR, 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
- 20.00 - 40.00 mbgl

Decadal mean water level trend (m)

- - 0.10 - 0.00

- Canal Network
- Water Bodies

2697	No. of Recharge Structures in Rural Villages
2522	No. of Recharge Structures in Urban Towns
3834	Recharge Pits in Agricultural Land
32	Thickness of Sand

Ground Water Scenario of Block

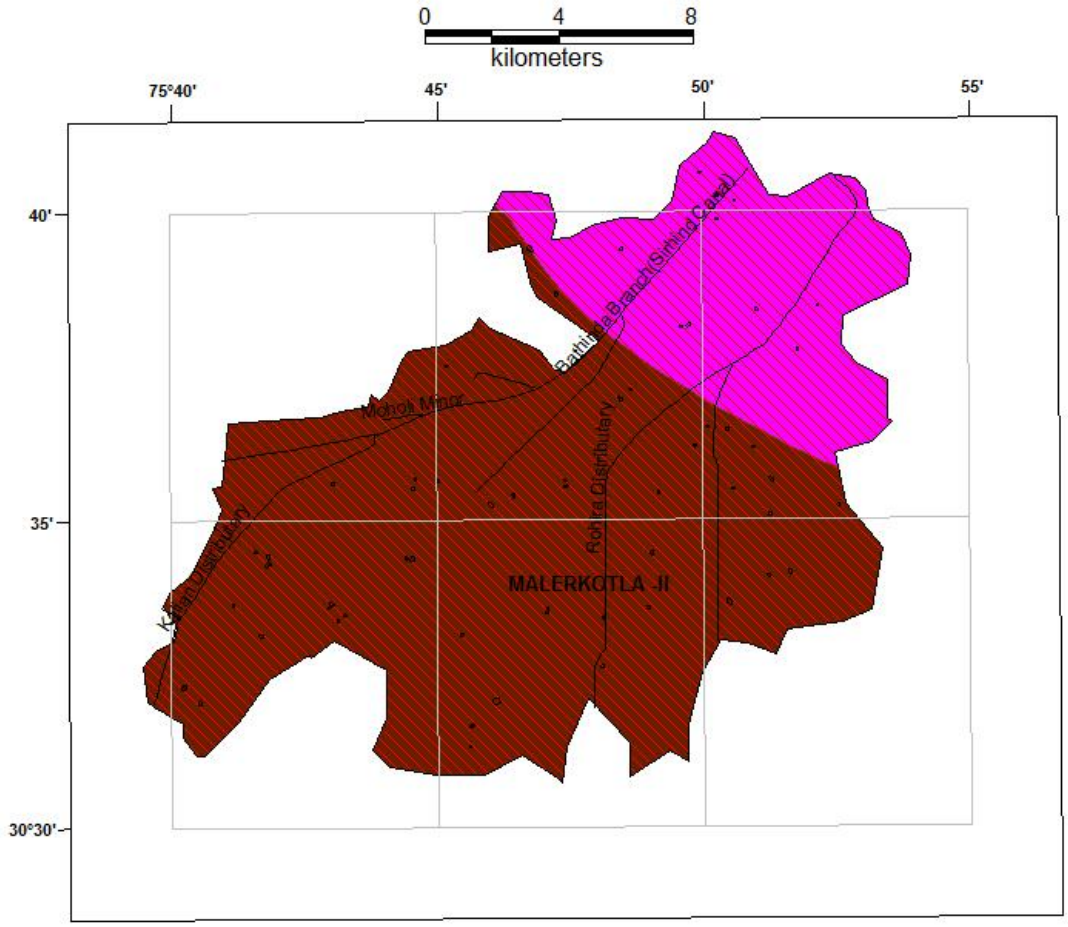
Block Name:- Maler Kotla - I **District:- Sangrur**		**State:- PUNJAB**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*464.4*
	• Number of Villages inhabited • Un-inhabited	*104* *2*
	ii) Average Annual Rainfall (mm)	*596*
	iii) Area feasible for Artificial Recharge	*464.4*
	iv) Village identified under scarcity of Water	*103*
	v) Village covered under water supply	*103*
	vi) Water Tank exists in the village	*60*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Ghaggar 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	376.45
	• Net Area Sown (Sq.Km)	335.57
	• Area Sown More than Once (Sq.Km)	2.40
	• Total Cropped Area (Sq.Km)	348.39
	• 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 (mbgll)	
	• Pre- monsoon: (May 2015) • *25.90-28.05(mbgl)*	*20.00 – 40.00(mbgl)*	
	• Post –monsoon: (Nov2014) • *25.72-28.77(mbgl)*		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*4*	
	• Depth Range (m)	*299.50-550.47*	
	• Discharge (Ipm)	*25.00*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*1790*	
	• Storativity	*$1.26*10^{-3}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	--	---
	• NO3 (mg/l)	--	---
	• F (mg/l)	--	--
	• As (mg/l)	0.0016	0.0016
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (Mcm)	191.03	
	• Existing Gross Ground Water Draft for Irrigation (Mcm)	494.72	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (Mcm)	4.67	
	• Existing Gross Ground Water Draft for all Uses (Mcm)	499.38	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (Mcm)	6.85	
	• Net Ground Water Availability for Future Irrigation Development (Mcm)	-310.53	
	• Stage of Ground Water Development / Over Draft (%)	2.61	
	• 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)	*Thickness(m) 32*	Percentage % 64
10	Volume of unsaturated zone available for recharge (MCM)	1031.70	
11.	Volume of water required for recharge (MCM)	1372.20	
12.	Volume of surplus water available for recharge(MCM)	6.35	

RECHARGE/ CONSERVATION STRUCTURES		**Total Number of Recharge Structures**	**Total Cost (Rs. in crores)**	**Total Recharge/ Water saving in MCM**
13	Farm Recharge @Rs. 35000/-	3834	**13.42**	**3.405**
14	RWH Rural @ Rs. 25000/-	2697	**6.74**	**0.192**
15	RWH Urban@ Rs. 25000/-	2522	**6.31**	**0.239**
16	Underground pipe line (area in hectares) @ Rs. 50000/-	29517	**147.59**	**144.72**
	TOTAL		**174.05**	**148.556**

BLOCK MALERKOTLA -II DISTRICT SANGRUR, 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

20.00 - 40.00 mbgl

Decadal mean water level trend (m)

- 0.1 - 0.00

Canal Network

Water Bodies

2701 **No. of Recharge Structures in Rural Villages**

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

3481 **Recharge Pits in Agricultural Land**

Ground Water Scenario of Block

Block Name:- Maler Kotla-II **District:- Sangrur** **State:- PUNJAB**		
11. `	GENERAL INFORMATION	
	i) Geographical area (sq km)	*464.4*
	• Number of Villages inhabited • Un-inhabited	*87* *1*
	ii) Average Annual Rainfall (mm)	*596*
	iii) Area feasible for Artificial Recharge	*464.4*
	iv) Village identified under scarcity of Water	*90*
	v) Village covered under water supply	*90*
	vi) Water Tank exists in the village	*67*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Ghaggar 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	324.63
	• Net Area Sown (Sq.Km)	290.96
	• Area Sown More than Once (Sq.Km)	2.81
	• Total Cropped Area (Sq.Km)	293.77
	• 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 (mbgll)	
	• Pre- monsoon: (May 2015) • *25.90-28.05(mbgl)*	*20.00 – 40.00 (mbgl)*	
	• Post –monsoon: (Nov2014) • *25.72-28.77(mbgl)*		
6. *1 a*	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*4*	
	• Depth Range (m)	*299.50-550.47*	
	• Discharge (Ipm)	*25.00*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*1790*	
	• Storativity	*$1.26*10^{-3}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	--	---
	• NO3 (mg/l)	--	---
	• F (mg/l)	--	--
	• As (mg/l)	0.0016	0.0016
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (Mcm)	98.37	
	• Existing Gross Ground Water Draft for Irrigation (Mcm)	406.66	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (Mcm)	2.58	
	• Existing Gross Ground Water Draft for all Uses (Mcm)	409.24	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (Mcm)	3.79	
	• Net Ground Water Availability for Future Irrigation Development (Mcm)	-312.08	
	• Stage of Ground Water Development / Over Draft (%)	416	
	• Category of Block	OE	

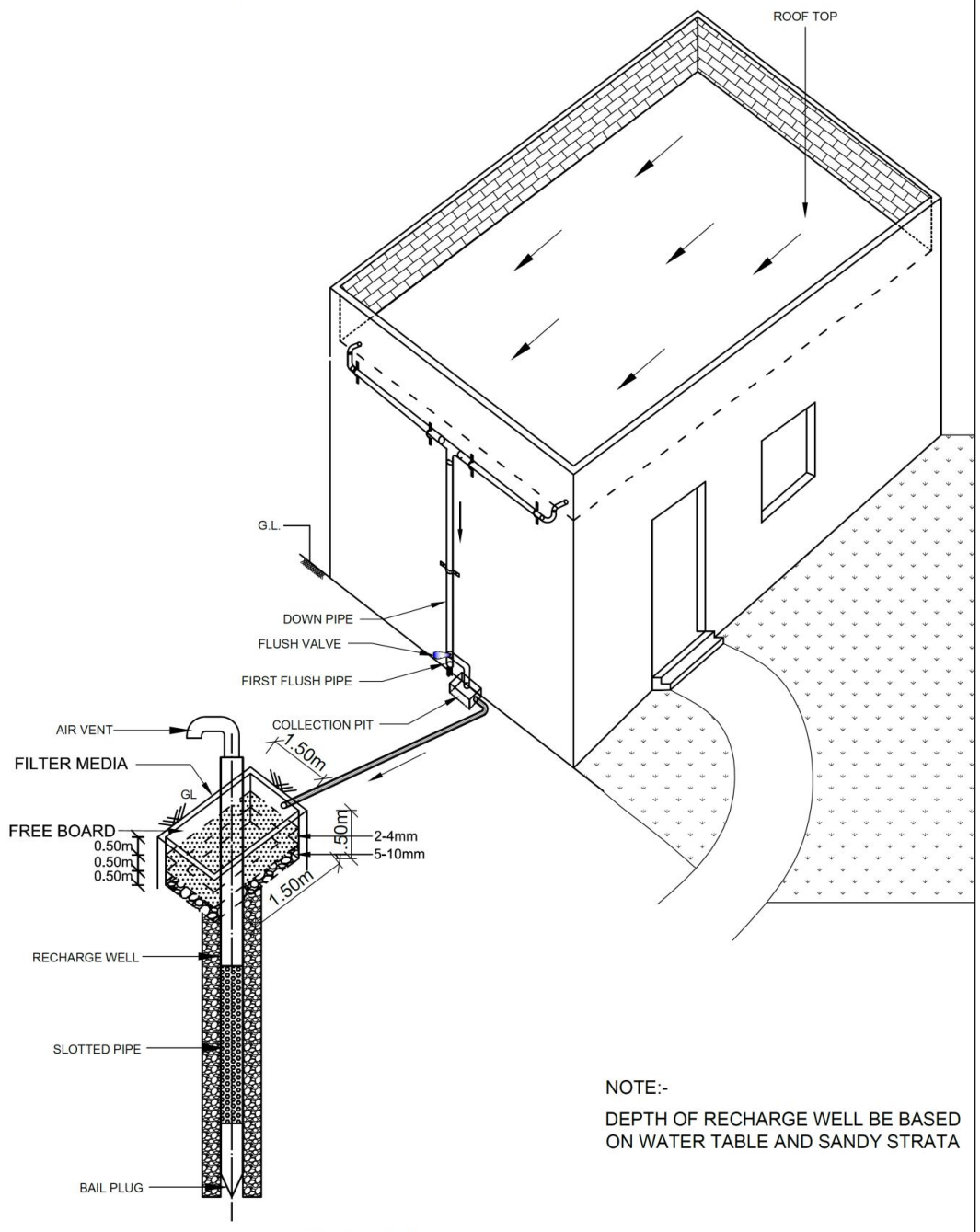
	Any specific reasons for high stress on ground water leading to Overexploitation and decline in ground water level	*Extensive Irrigation*	Extensive Irrigation
9.	Percentage of sand thickness up to 50 m depth (Average)	*Thickness(m) 32*	Percentage % 64
10	Volume of unsaturated zone available for recharge (MCM)	1031.70	
11.	Volume of water required for recharge (MCM)	1372.20	
12.	Volume of surplus water available for recharge(MCM)	6.35	

RECHARGE/ CONSERVATION STRUCTURES		**Total Number of Recharge Structures**	**Total Cost (Rs. in crores)**	**Total Recharge/ Water saving in MCM**
13	Farm Recharge @Rs. 35000/-	3481	**12.18**	**3.091**
14	RWH Rural @ Rs. 25000/-	2701	**6.75**	**0.192**
15	RWH Urban@ Rs. 25000/-	147	**0.37**	**0.014**
16	Underground pipe line (area in hectares) @ Rs. 50000/-	26722	**133.61**	**118.96**
	TOTAL		**152.91**	**122.26**

Annexure-I

RECHARGE FROM ROOF TOP RAIN WATER HARVESTING

(URBAN & RURAL HOUSEHOLDS)



3-D VIEW

CGWB/NWR/Chandigarh

Annexure-II

TYPICAL DESIGN FOR RECHARGE PIT IN FARM