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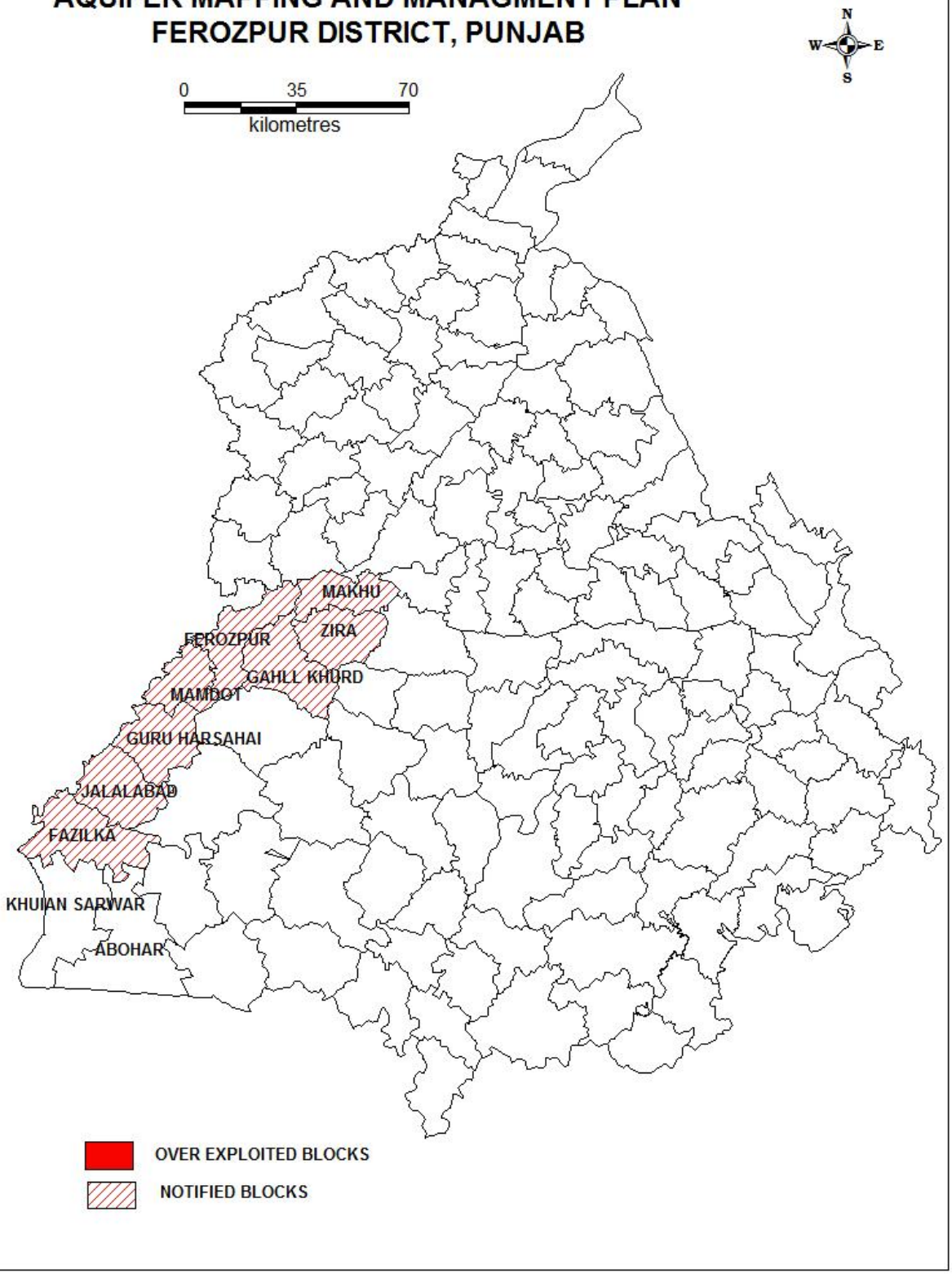
Government of India
Ministry of Water Resources,
River Development & Ganga Rejuvenation
Central Ground Water Board

PLAN ON

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

Central Ground Water Board
North Western Region
Chandigarh

AQUIFER MAPPING AND MANAGMENT PLAN
FEROZPUR DISTRICT, PUNJAB



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

INTRODUCTION

Ferozpur, the south western most district of Punjab State with a total geographical area of 5850 sq km. is located between 29o 56' 47" and 31o 0' 7" north latitudes and 72o 52' 4" and 75o 01' 11" east longitudes. The district area falls in Survey of India degree heet os. 44 J, 44F, 44I. Administratively, the district is under control of Ferozpur division and is divided into 10 development blocks namely Ferozpur, Fazilka, Abohar, Zira, Jalalabad, Ghall Khurd, Guru Har Sahai, Khuyian Servar, Makhu and Mamdot.

The Ferozpur district forms a part of Sutlej sub basin of main Indus basin and is interrupted by clusters of sand dunes. The district area is almost a flat terrain with a gentle slope towards south west direction.

Physiographically, it is characterized by four distinct features i.e. the upland plain, sand dune tracts, younger flood plain and active flood plain. The river Sutlej that is of perrineal nature mainly drains the area. River Sutlej shows both influent and effluent nature in the area. The area is traversed by a dense network of canals. In irrigation practices, contribution of tubewells are larger as compared to canal system i.e 137 % area irrigated by canal is being irrigated by tubewells.

RAINFALL & CLIMATE

The climate of the district can be classified as tropical desert, arid and hot. The area receives about 389 mm annual normal rainfalls which is unevenly distributed over the area in 23 days, out of which about 79% occurs during south west monsoon. Rain fall in the district decreases from north east to south west.

GEOMORPHOLOGY & SOIL

The district area forms a part of Indo-Gangetic plain and Sutlej Sub basin of main Indus basin. The area as a whole is almost flat with a gentle slope towards the south westerly direction. The physiographic of the district is broadly classified from north to south into four distinct features i.e. Upland plain, Sand dune tract, younger flood pain and active flood plain of Sutlej.

The soil of the district is of two types i.e. sierozem (in northern parts) and desert soils (in southern parts)

HYDROGEOLOGY

The geological formations met within the district comprised of unconsolidated alluvial deposits of Quaternary age. The alluvial deposit comprises of sand, silt, clay and often associated with kankar. Fine to medium grained sand horizon form the potential aquifer in the area.

The major source of recharge to ground water in the area is inflow of ground water from north eastern and northern parts, rainfall, seepage from canals, return seepage through irrigation and percolation from surface water bodies. The water level in the district is ranging from 0.73 to 11.35 m bgl in premonsoon and 0.49 to 9.60 m bgl after post monsoon.

The ground water in unconfined condition is abstracted through hand pumps (up to 30 m) and through shallow and medium depth tubewells up to the depth of 175 meters in northern part of district and 125 m in central part of the district. Aquifer up to the depth of 175 m is leaky aquifer. Water from aquifer below the depth of 200 m is saline to highly saline in the southern part of district. These aquifers are confined aquifer.

Ground Water Resources

The block wise ground water resource potential of the district has been assessed as per GEC-97. Net Replenishable ground water availability in the district has been assessed as 189552 ham. Gross ground water draft for all uses in the district is 278951 ham, leaving a shortfall (over draft) of 91013 ham. Ground water development in 8 blocks has exceeded available recharge; hence these blocks have been categorized as over exploited. The stage of ground water development ranges from 61 % (block Khuyian Sarwar) to 222 % (block Zira). The stage of ground water development in Ferozepur district has been assessed as 147 %.

Ground Water Quality at a Glance

Chemical quality data obtained the analysis of groundwater samples representing shallow aquifers reveals that ground water is alkaline in nature and the EC of water samples ranges from moderately to highly saline. The development of high productive agricultural practices, industries and changing life style of people have taken place which has affected the quality of ground water and which has become more prone to deterioration. The distribution of various constituents varies greatly in the district. In some cases higher limits of certain important parameters exceed the maximum permissible limit making water unpotable.

The shallow ground water is of Na-HCO3 type and in some places mixed waters are present. Among the anions bicarbonate is dominant in some water where as none of the anions dominates in rest. Among cations sodium is the dominant cation.

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	**Ferozpur**	**1990**	**7701**	**30872**	**32420**	**9489**	**82472**

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	**Ferozpur**	**299**	**1157**	**4247**	**5581**	**2338**	**13622**

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	**Ferozpur**	**1591**	**39824**	**13867**	**27349**	**0**	**82631**

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	**Ferozpur**	**26399**	**69212**	**438**

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 Lakhs	Annual Recharge (MCM)
ROOF TOP RAIN WATER HARVESTING IN RURAL AND URBEN AREAS					
1	**Artificial Recharge Plan For Urban Areas.**	8040	0.25	**20.10**	**0.555**
2	**Roof Top Rain Water Harvesting in Rural Areas**	18212	0.25	**45.53**	**1.473**
	Total	26252	**0.25**	**65.63**	**2.028**
ARTIFICIAL RECHARGE IN FARMS					
1	**Artificial Recharge Plan Through Recharge Pits.**	31890	0.35	111.61	18.219
			Total	**111.61**	**18.219**

By the implementation of the proposed recharge structures there will be a reduction of 0.91 % 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	**2789.51**	**-910.13**	**20.247**	**2769.263**	**147%**	**146.09 %**	**0.91 %**

ARTIFICIAL RECEHARGE PLAN THROUGH RECHARGE PITS IN OVER EXPLOITED BLOCKS OF FEROZPUR 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%)	Cost of Pit @Rs.35000/- (Crores)
FAZILKA	64835	6483	6483	3.219	22.69
FEROZPUR	40995	4099	4099	2.583	14.35
GHALL KHURD	47318	4732	4732	2.981	16.56
GURU HAR SAHAI	47478	4748	4748	2.692	16.62
JALALABAD	49142.40	4914	4914	2.440	17.20
MAKHU	29244.30	2924	2924	1.930	10.23
MAMDOT	35308	3531	3531	2.076	12.36
ZIRA	3401	458	458	0.298	1.60
			31889	18.219	111.61

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 FEROZPUR 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 (10% of total households)**	**Total No of AR Structures (one structure for each house)**	**Total recharge in MCM**	**Cost @ 25000/- Lacs/structure (crores)**
FEROZPUR	1	MAKHU	29244.30	14177	1418	1418	0.749	**3.55**
	2	ZIRA	3401	1410	141	141	0.007	**0.35**
	3	GHALL KHURD	47318	25009	2501	2501	0.126	**6.25**
	4	FEROZPUR	40995	25503	2550	2550	0.103	**6.38**
	5	MAMDOT	35308	19498	1950	1950	0.092	**4.88**
	6	GURU HAR SAHAI	47478	28249	2825	2825	0.128	**7.06**
	7	JALALBAD	49142.40	32970	3297	3297	0.131	**8.24**
	8	FAZILKA	64835	35296	3530	3530	0.137	**8.83**
		Total	**317721**	**182112**	**18212**	**18212**	**1.473**	**45.53**

ARTIFICIAL RECHARGE PLAN FOR URBAN AREAS OF DISTRICT FEROZPUR PUNJAB

District	Block	Town Name	Total Households	Total Population of Town	Households taken for Artificial Recharge (10%)	Total Roof Top Area (sqm)	Vol of water available for recharge (MCM)	Cost @25000/- per structure (crores)
FEROZPUR	MAKHU	MAKHU (NP)	2861	14658	286	57220	0.020	0.72
	MAKHU	MALLANWALA KHAS (NP)	3030	16183	303	60600	0.021	0.76
	ZIRA	ZIRA (MCL +OG)	7182	37498	718	143640	0.050	1.80
	FEROZPUR	FEROZPUR (MCL)	22263	110313	2226	445260	0.120	5.57
	FEROZPUR	FEROZPUR CANTT. (CB)	10403	53199	1040	208060	0.056	2.60
	TALWANDI BHAI	TALWANDI BHAI (MCL)	3359	17285	336	67180	0.019	0.84
	TALWANDI BHAI	MUDKI (NP)	1938	10415	194	38760	0.011	0.49
	TALWANDI BHAI	SATYEWALA (CT)	1814	8724	181	36280	0.010	0.45
	GURU HAR SAHAI	GURU HAR SAHAI (MCL)	3292	17192	329	65840	0.020	0.82
	JALALABAD	JALALABAD (MCL +OG)	8042	39525	804	160840	0.077	2.01
	FAZILKA	FAZILKA (MCL)	15266	76492	1527	305320	0.146	3.82
	FAZILKA	KORIAN WALI (CT)	963	5770	96	19260	0.005	0.24
		TOTAL	80413	407254	8040	1608260	0.555	20.10

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 82631 operated by farmers for irrigation through unlined/Katcha (71.89%) open channel system in Amritsar 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 Ferozpur district is estimated at 2755.76 MCM. It is expected that around 95.09% 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 542.89 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 Amritsar Districts. The measure if implemented will bring down the ground water overdraft from 147% to 120.83 %. 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, FEROZPUR 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)	Pecentage of unlined channel	Wastage through unlined channel, (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
1895.52	2789.51	2755.76	33.75	71.89	499.24	2256.52	2290.27	147	120.83	26.17

 # Losses from open kuchha 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.Cr. District wise
FEROZPUR	Makhu	19923.4	71.89	14323	**71.61**	**641.70**
	Zira	28170.7	71.89	20252	**101.26**	
	Ghall Khurd	20995.8	71.89	15094	**75.47**	
	Ferozpur	25464.8	71.89	18307	**91.53**	
	Mamdot	15957.5	71.89	11472	**57.36**	
	Guru Har Sahai	20580.6	71.89	14795	**73.98**	
	Jalalabad	18026.9	71.89	12960	**64.80**	
	Fazilka	12861.4	71.89	9246	**46.23**	
	Khuian Servwar	8962.9	71.89	6443	**32.22**	
	Abohar	7578.5	71.89	5448	**27.24**	

SALIENT FEATURES OF HYDROGEOLOGY OF DISTRICT FEROZPUR

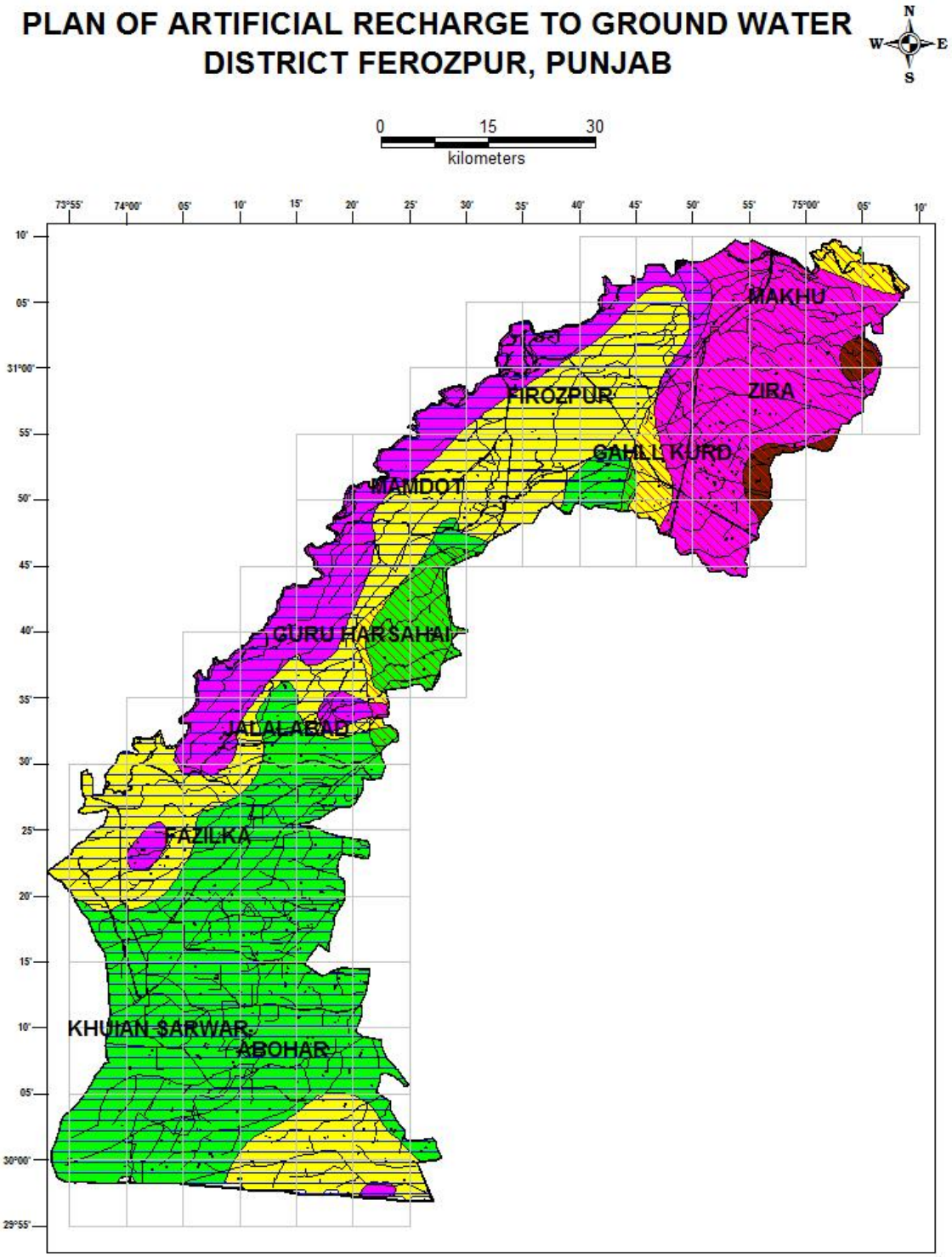
Wells Feasible	Rigs Suitable	Depth of Well (m)	Discharge (lpm)	Suitable Artificial Recharge Structures
Tube Wells	Direct and Reverse Rotary	35 - 220	600 - 1000	Recharge Trench with Injection Wells
Tube Wells	Direct and Reverse Rotary	40 - 70	400 - 600	Recharge Trench with Injection Wells
Tube Wells	Direct and Reverse Rotary	10 - 30	200 - 400	Water Level is Shallow, Recharge not Required

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	Ferozpur
Geographical Area	5850 sq.km
Major Geological Formation	Alluvium
Major Drainage System	Sutlej
Population (as on 2011)	20,26,831
Total Number of Blocks	10
Existing Major/Medium Irrigation Projects	Eastern Canal and Sirhind Feeder
Utillizable Ground Water Resources 2011	1895.52 (mcm)
Net Ground Water Draft	2789.51(mcm)
Stage of Ground Water Development	147 %
Average Annual Rainfall	389 mm
Range of Mean Daily Temperature	5° - 41° C
Over Exploted Blocks	FAZILKA, FEROZPUR GHALL KHURD GURU HAR SAHAI JALALABAD, MAKHU MAMDOT, ZIRA

PLAN OF ARTIFICIAL RECHARGE TO GROUND WATER
DISTRICT FEROZPUR, PUNJAB



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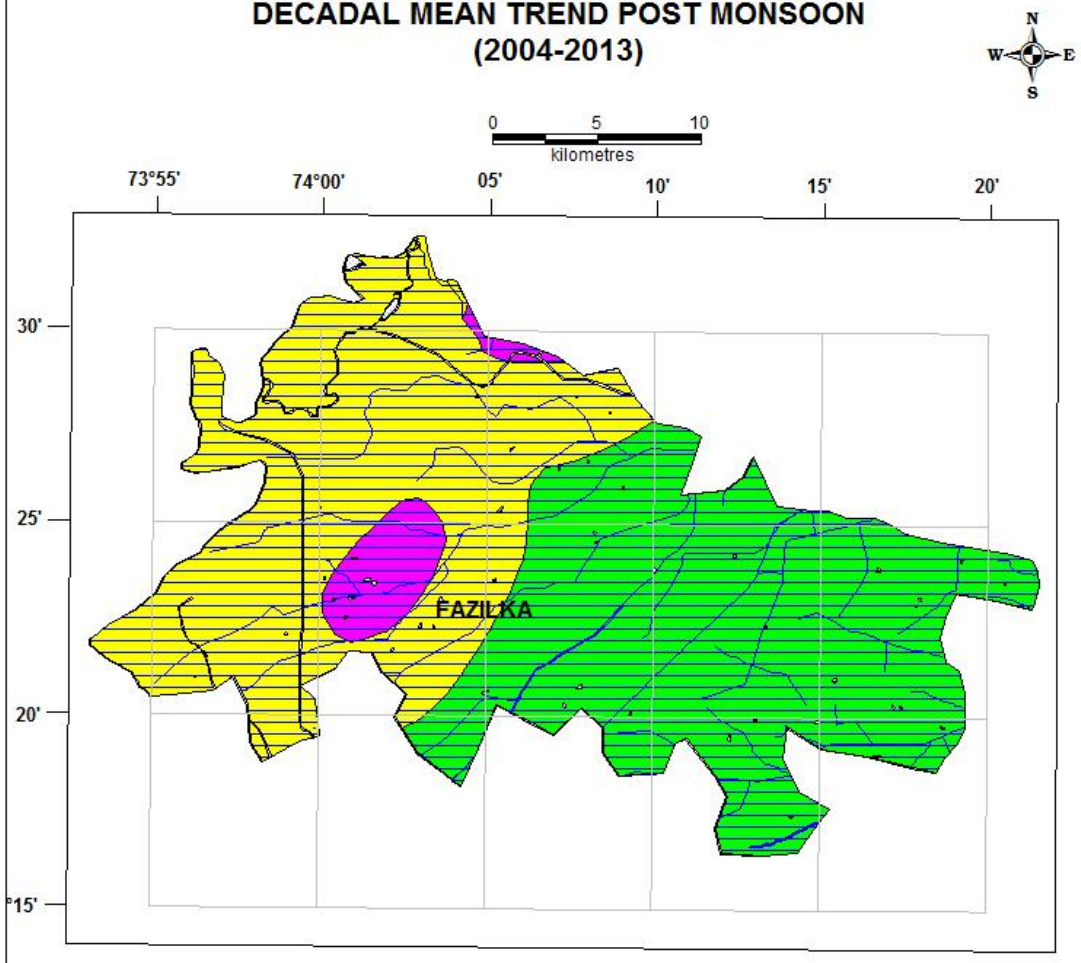
Refer Salient Features of Hydrogeology

BLOCK WISE PLAN OF DISTRICT FEROZPUR PUNJAB

(8 OE BLOCKS)

BLOCK FAZILKA DISTRICT FEROZPUR, 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)

- 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

3530	No. of Recharge Structures in Rural Villages
1623	No. of Recharge Structures in Urban Towns
6483	Recharge Pits in Agricultural Land
15.50	Thickness of Sand
	Canal Network
	Water Bodies

Ground Water Scenario of Block

Block Name:- Fazilka **District:- Ferozpur**		**State:- PUNJAB**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*859.2*
	• Number of Villages inhabited • Un-inhabited	*78* *9*
	ii) Average Annual Rainfall (mm)	*326*
	iii) Area feasible for Artificial Recharge	*430*
	iv) Village identified under scarcity of Water?	*56*
	v) Village covered under water supply	*58*
	vi) Water Tank exists in the village	*16*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	 *Satluj 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	356.66
	• Net Area Sown (Sq.Km)	287.91
	• Area Sown More than Once (Sq.Km)	0
	• Total Cropped Area (Sq.Km)	287.91
	• Cropping Intensity	100
	• Area under Thur and Sem (Sq.Km)	0
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 (mbgl) May 2015

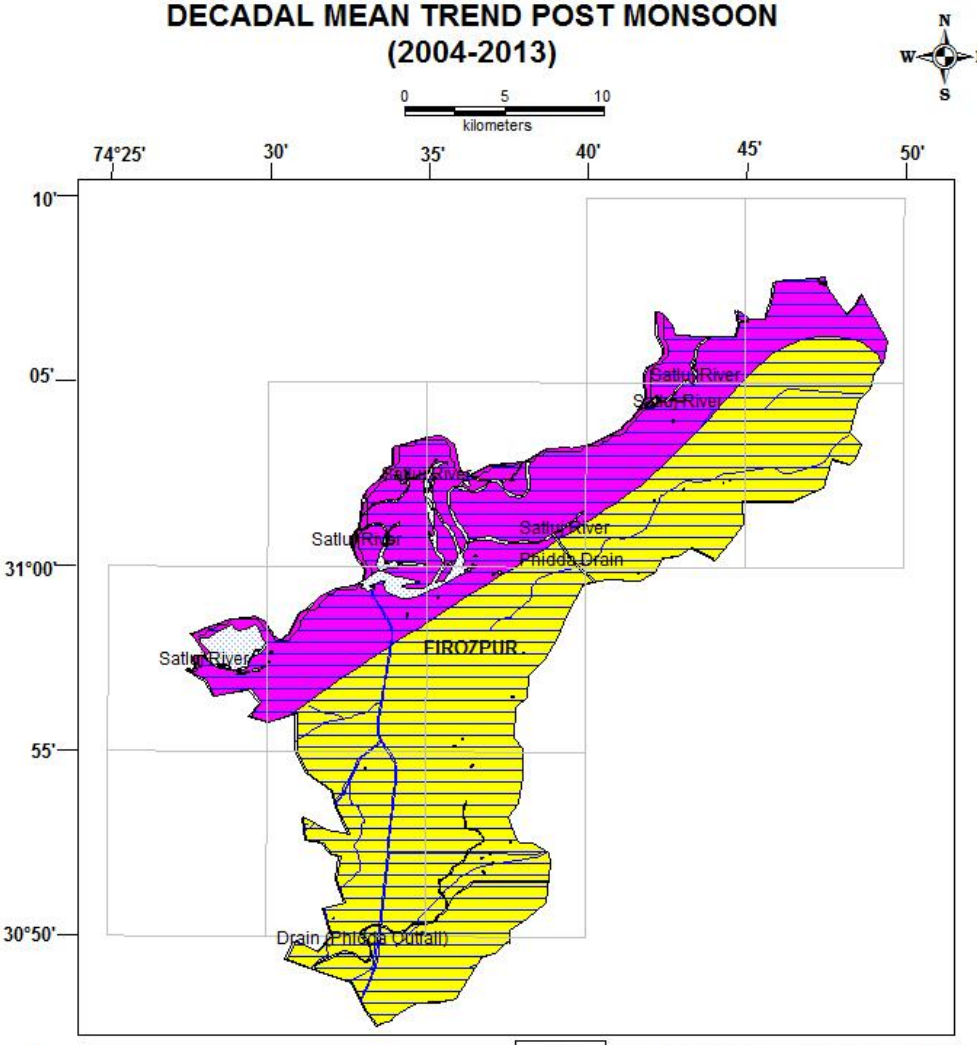
	• Pre- monsoon: (May 2015) *1.88-10.50(mbgl)*	2.00-10.00 (mbgl)	
	• Post –monsoon: (Nov2014) 1.37-11.34 (mbgl)		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*6*	
	• Depth Range (m)	*292.0-453.70*	
	• Discharge (Ipm)	*30.10-48.40*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*977-2790*	
	• Stortivity	*$1.38*10^{-3}$ to $6.4*10^{-4}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	*1238*	*1238*
	• NO3 (mg/l)	*55*	*55*
	• F (mg/l)	*0.51*	*0.51*
	• As (mg/l)	*0.0086*	*0.0086*
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (MCM)	248.91	
	• Existing Gross Ground Water Draft for Irrigation (MCM)	382.72	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)	4.92	
	• Existing Gross Ground Water Draft for all Uses (MCM)	387.63	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)	7.03	
	• Net Ground Water Availability for Future Irrigation Development (MCM)	-140.85	
	• Stage of Ground Water Development / Over Draft (%)	156	
	• 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)* *15.5*	Percentage % 31
10	Volume of unsaturated zone available for recharge (MCM)	429.41	
11.	Volume of water required for recharge (MCM)	571.09	
12.	Volume of surplus water available for recharge(MCM)	14.27	

13	Total Number of Recharge Structures	Farm Recharge	RWH Rural	RWH Urban
		6483	3530	1623
14	Total Cost (in Rs)	Farm Recharge	RWH Rural	RWH Urban
		3241.50	1765	811.50
15	Total Recharge in mcm	Farm Recharge	RWH Rural	RWH Urban
		3.219	0.137	0.151

RECHARGE/ CONSERVATION STRUCTURES		Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge in mcm
13	Farm Recharge@rS. 35000/-	6483	22.69	3.219
14	RWH Rural @ Rs. 25000/-	3530	8.82	0.137
15	RWH Urban@ Rs. 25000/-	1623	4.05	0.151
16	Underground pipe line (area in hectares) @ Rs. 50000/-	9246	46.23	69.33
	TOTAL		**81.79**	**72.84**

BLOCK FEROZPUR DISTRICT FEROZPUR, 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)

- 5.00 - 10.00 mbgl
- 10.00 - 20.00 mbgl

Decadal mean water level trend (m)

- 0.00 - 0.1114

2550	No. of Recharge Structures in Rural Villages
3266	No. of Recharge Structures in Urban Towns
4099	Recharge Pits in Agricultural Land
26	Thickness of Sand
	Canal Network
	Water Bodies

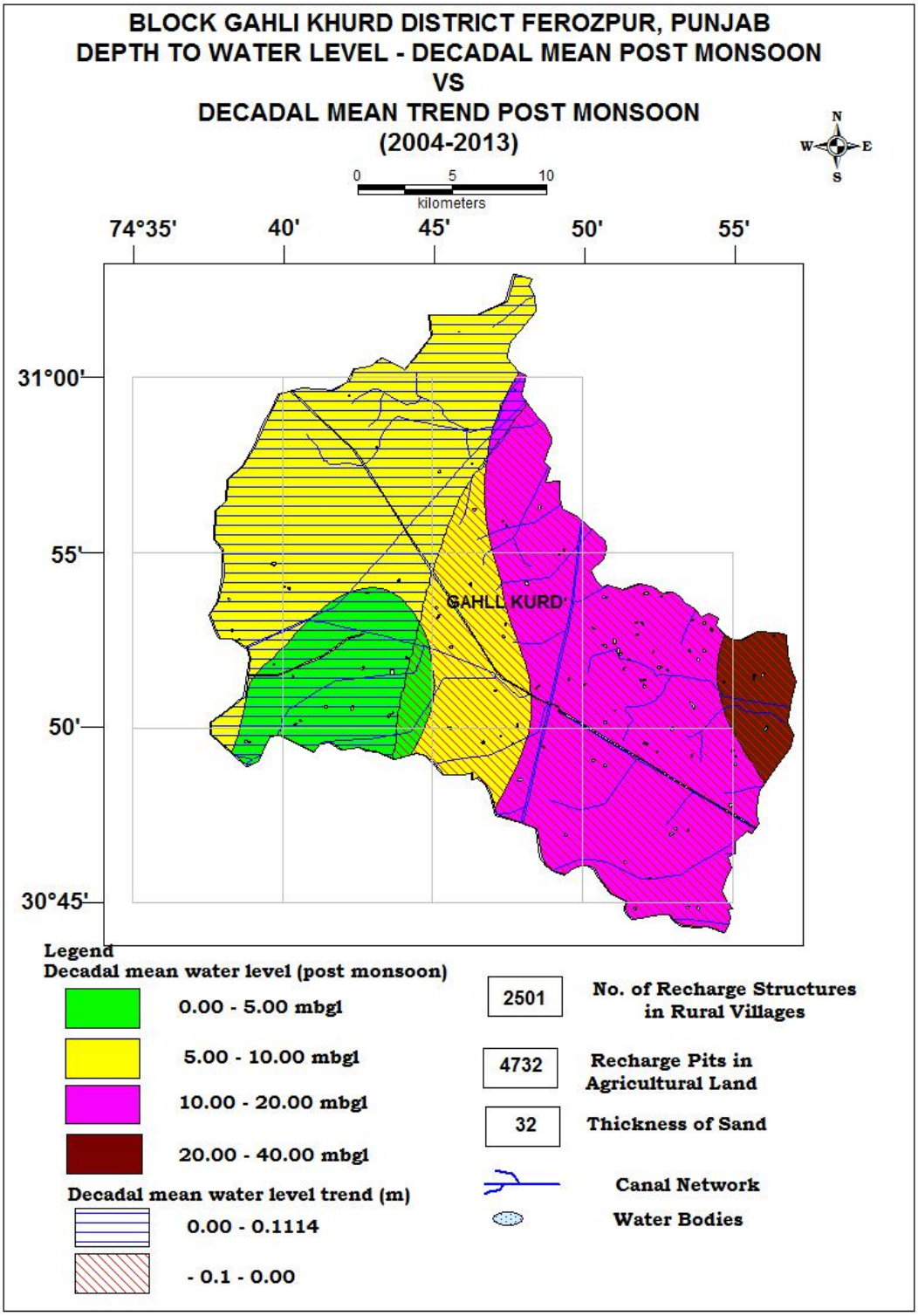
Ground Water Scenario of Block

Block Name:- Ferozpur **District:- Ferozpur**		**State:- PUNJAB**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*469.5*
	• Number of Villages inhabited • Un-inhabited	*139* *8*
	ii) Average Annual Rainfall (mm)	*339*
	iii) Area feasible for Artificial Recharge	*469.5*
	iv) Village identified under scarcity of Water?	*121*
	v) Village covered under water supply	*116*
	vi) Water Tank exists in the village	*40*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Satluj 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	426.60
	• Net Area Sown (Sq.Km)	358.84
	• Area Sown More than Once (Sq.Km)	349.60
	• Total Cropped Area (Sq.Km)	705.76
	• Cropping Intensity	198
	• Area under Thur and Sem (Sq.Km)	0
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(mbgl) May 2015	
	• Pre- monsoon: (May 2015) 6.70-9.80 (mbgl)	5.00 – 20.00 (mbgl)	
	• Post –monsoon: (Nov2014) 7.13 – 10.40 (mbgl)		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*2*	
	• Depth Range (m)	*292.0-453.70*	
	• Discharge (Ipm)	*30.10-48.40*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*977-2790*	
	• Stortivity	*$1.38*10^{-3}$ to $6.4*10^{-4}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	*1261*	*1261*
	• NO3 (mg/l)	*77*	*77*
	• F (mg/l)	*0.71*	*0.71*
	• As (mg/l)	--	--
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (MCM)	240.54	
	• Existing Gross Ground Water Draft for Irrigation (MCM)	321.26	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)	4.84	
	• Existing Gross Ground Water Draft for all Uses (MCM)	326.10	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)	7.33	
	• Net Ground Water Availability for Future Irrigation Development (MCM)	-88.04	
	• Stage of Ground Water Development / Over draft (%)	136	

	• 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)* *26*	Percentage % 52
10	Volume of unsaturated zone available for recharge (MCM)	234.65	
11.	Volume of water required for recharge (MCM)	312.07	
12.	Volume of surplus water available for recharge(MCM)	7.80	

RECHARGE/ CONSERVATION STRUCTURES		Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge in mcm
13	Farm Recharge@rS. 35000/-	4099	14.34	2.583
14	RWH Rural @ Rs. 25000/-	2550	6.37	0.103
15	RWH Urban@ Rs. 25000/-	3266	8.16	0.056
16	Underground pipe line (area in hectares) @ Rs. 50000/-	18307	91.53	58.20
	TOTAL		**120.40**	**72.84**


BLOCK GAHLI KHURD DISTRICT FEROZPUR, PUNJAB
DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON
VS
DECADAL MEAN TREND POST MONSOON
(2004-2013)
N
W
E
S
0
5
10
kilometers
74°35'
40'
45'
50'
55'
31°00'
55'
50'
30°45'
GAHLI KURD
Legend
Decadal mean water level (post monsoon)
0.00 - 5.00 mbgl
5.00 - 10.00 mbgl
10.00 - 20.00 mbgl
20.00 - 40.00 mbgl
Decadal mean water level trend (m)
0.00 - 0.1114
- 0.1 - 0.00
2501
No. of Recharge Structures in Rural Villages
4732
Recharge Pits in Agricultural Land
32
Thickness of Sand
Canal Network
Water Bodies

Ground Water Scenario of Block

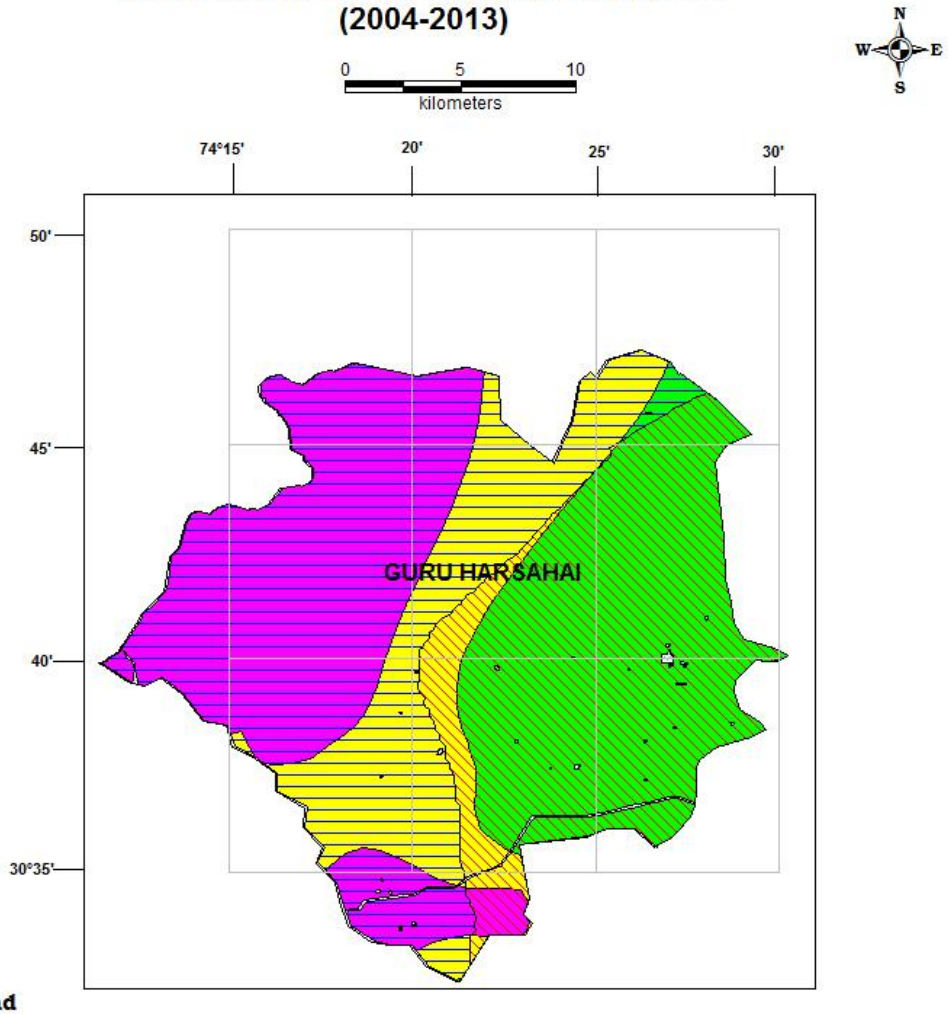
Block Name:- Ghal Khurd **District:- Ferozpur**		**State:- PUNJAB**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*532.1*
	• Number of Villages inhabited • Un-inhabited	*123* *0*
	ii) Average Annual Rainfall (mm)	*422*
	iii) Area feasible for Artificial Recharge (sq km)	*425*
	iv) Village identified under scarcity of Water?	*98*
	v) Village covered under water supply	*97*
	vi) Water Tank exists in the village	*65*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	 *Satluj 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	491.42
	• Net Area Sown (Sq.Km)	356.16
	• Area Sown More than Once (Sq.Km)	349.60
	• Total Cropped Area (Sq.Km)	80481
	• Cropping Intensity	190
	• Area under Thur and Sem (Sq.Km)	0
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 (mbgl) May 2015

	• Pre- monsoon: (May 2015) *4.30-12.65(mbgl)*	2.00-20.00 (mbgl)	
	• Post –monsoon: (Nov2014) *3.55-14.70(mbgl)*		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*2*	
	• Depth Range (m)	*292.0-453.70*	
	• Discharge (Ipm)	*30.10-48.40*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*977-2790*	
	• Stortivity	*$1.38*10^{-3}$ to $6.4*10^{-4}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c		*6091*
	• NO3 (mg/l)		*53*
	• F (mg/l)		*0.45*
	• As (mg/l)	*0.0026*	*0.0056*
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (MCM)	220.10	
	• Existing Gross Ground Water Draft for Irrigation (MCM)	509.04	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)	2.83	
	• Existing Gross Ground Water Draft for all Uses (MCM)	511.87	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)	4.08	
	• Net Ground Water Availability for Future Irrigation Development (MCM)	-293.02	
	• Stage of Ground Water Development/ Over Draft (%)	233	
	• 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)	265.93	
11.	Volume of water required for recharge (MCM)	353.68	
12.	Volume of surplus water available for recharge(MCM)	8.84	

RECHARGE/ CONSERVATION STRUCTURES		Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge in mcm
13	Farm Recharge@rS. 35000/-	4732	16.56	2.981
14	RWH Rural @ Rs. 25000/-	2501	6.25	0.126
15	RWH Urban@ Rs. 25000/-	-	-	-
16	Underground pipe line (area in hectares) @ Rs. 50000/-	15094	75.47	92.22
	TOTAL		**98.28**	**95.327**

BLOCK GURU HARSAHAI DISTRICT FEROZPUR, 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

2825	No. of Recharge Structures in Rural Villages
329	No. of Recharge Structures in Urban Towns
4748	Recharge Pits in Agricultural Land
26.50	Thickness of Sand
	Canal Network
	Water Bodies

Ground Water Scenario of Block

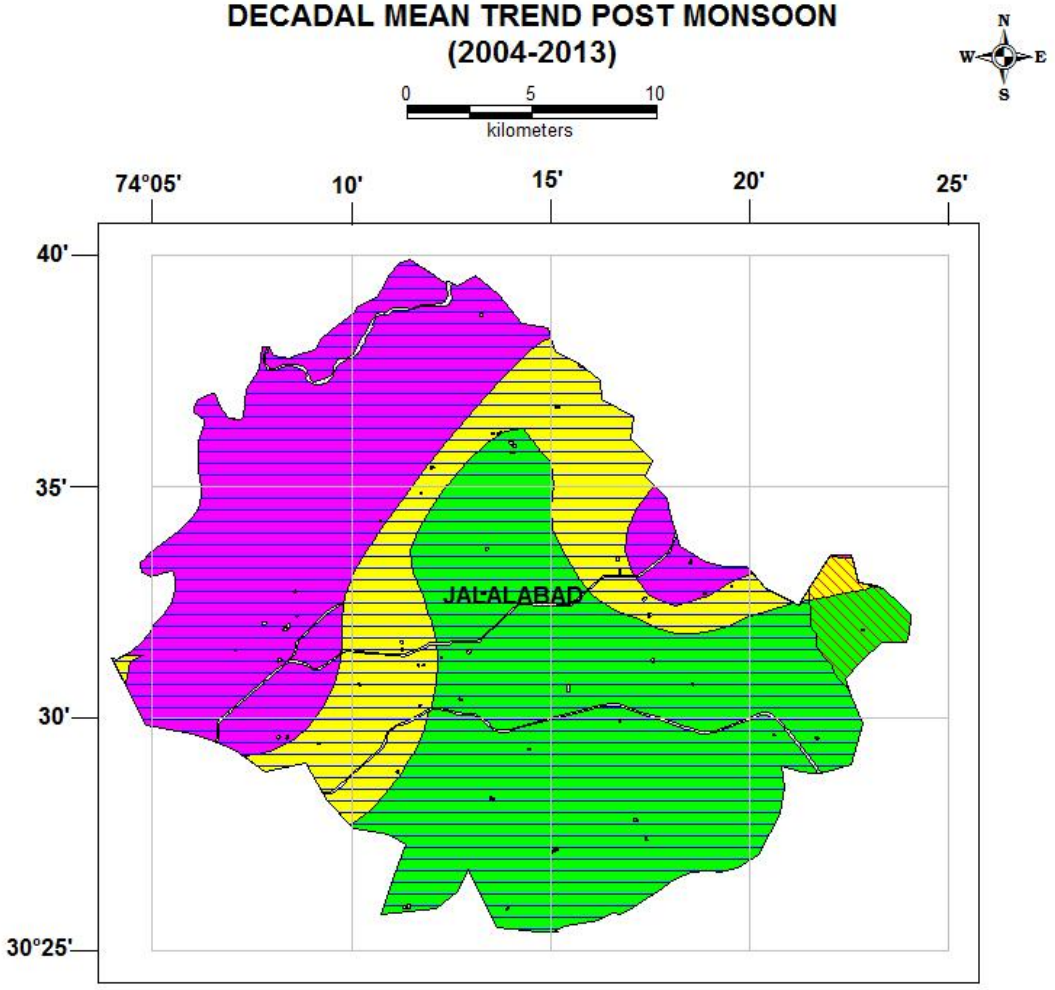
Block Name:- Gur Har Sahai **District:- Ferozpur**		**State:- PUNJAB**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*490.6*
	• Number of Villages inhabited • Un-inhabited	*130* *3*
	ii) Average Annual Rainfall (mm)	*384*
	iii) Area feasible for Artificial Recharge	*392*
	iv) Village identified under scarcity of Water?	*53*
	v) Village covered under water supply	*49*
	vi) Water Tank exists in the village	*20*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Satluj 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	337.89
	• Net Area Sown (Sq.Km)	305.95
	• Area Sown More than Once (Sq.Km)	294.84
	• Total Cropped Area (Sq.Km)	600.79
	• Cropping Intensity	196
	• Area under Thur and Sem (Sq.Km)	0
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)

	• Pre- monsoon: (May 2015) *1.63-15.94(mbgl)*	2.00- 20.00 (mbgl)	
	• Post –monsoon: (Nov2014) *1.27-18.10(mbgl)*		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*3*	
	• Depth Range (m)	*292.0-453.70*	
	• Discharge (Ipm)	*30.10-48.40*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*977-2790*	
	• Stortivity	*1.38*10^{-3} to 6.4*10^{-4}*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^{0}c	*842*	*6091*
	• NO3 (mg/l)	*3.9*	*28*
	• F (mg/l)	*0.31*	*2.97*
	• As (mg/l)	*0.0043*	*0.0012*
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (MCM)	216.34	
	• Existing Gross Ground Water Draft for Irrigation (MCM)	254.01	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)	2.79	
	• Existing Gross Ground Water Draft for all Uses (MCM)	256.80	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)	4.13	
	• Net Ground Water Availability for Future Irrigation Development (MCM)	-41.80	
	• Stage of Ground Water Development / Over Draft (%)	119	
	• 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)* *26.5*	Percentage % 53
10	Volume of unsaturated zone available for recharge (MCM)	245.19	
11.	Volume of water required for recharge (MCM)	326.09	
12.	Volume of surplus water available for recharge(MCM)	8.15	

RECHARGE/ CONSERVATION STRUCTURES		Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge in mcm
13	Farm Recharge@rS. 35000/-	4748	16.61	2.692
14	RWH Rural @ Rs. 25000/-	2825	7.06	0.128
15	RWH Urban@ Rs. 25000/-	329	0.82	0.020
16	Underground pipe line (area in hectares) @ Rs. 50000/-	14795	73.98	46.02
	TOTAL		**98.47**	**48.86**

BLOCK JALALABAD DISTRICT FEROZPUR, 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

3297	No. of Recharge Structures in Rural Villages
804	No. of Recharge Structures in Urban Towns
4914	Recharge Pits in Agricultural Land
18	Thickness of Sand
	Canal Network
	Water Bodies

Ground Water Scenario of Block

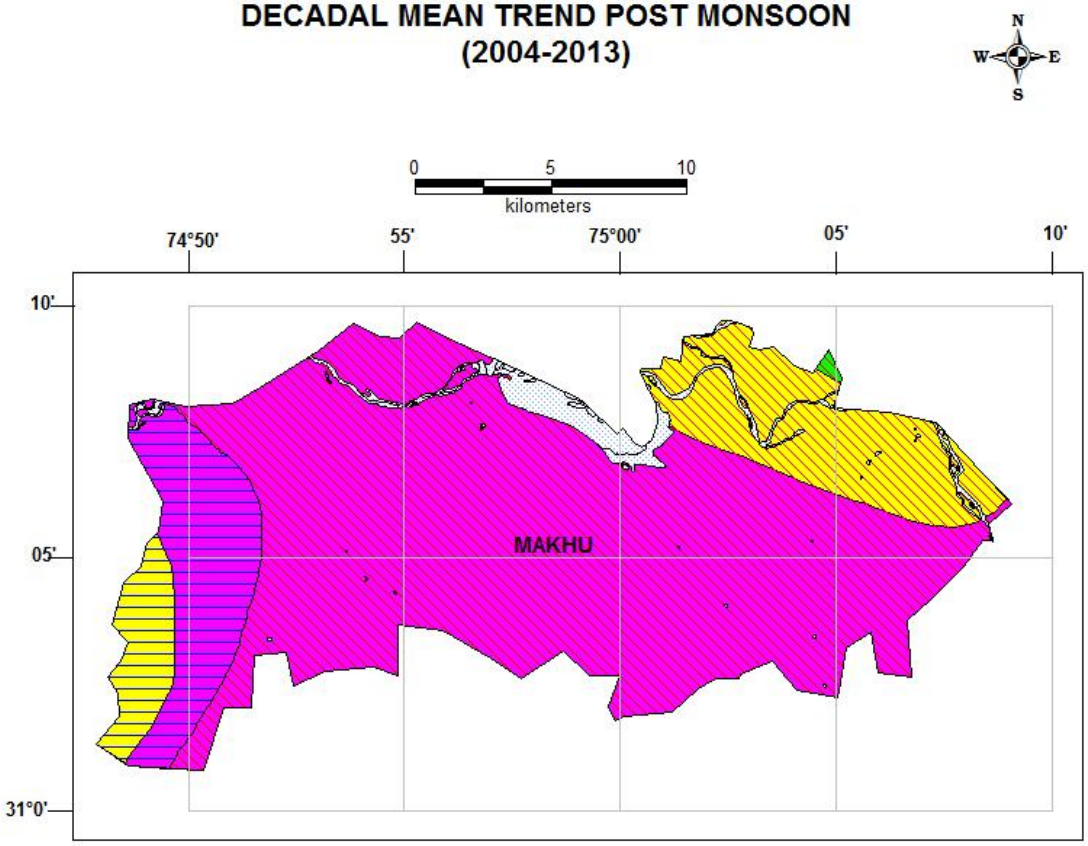
Block Name:- Jalalabad **District:- Ferozpur**		**State:- PUNJAB**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*524.4*
	• Number of Villages inhabited • Un-inhabited	*134* *6*
	ii) Average Annual Rainfall (mm)	*333*
	iii) Area feasible for Artificial Recharge (sq km)	*420*
	iv) Village identified under scarcity of Water	*98*
	v) Village covered under water supply	*98*
	vi) Water Tank exists in the village	*25*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Satluj 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	490.73
	• Net Area Sown (Sq.Km)	419.71
	• Area Sown More than Once (Sq.Km)	0
	• Total Cropped Area (Sq.Km)	419.17
	• Cropping Intensity	100
	• Area under Thur and Sem (Sq.Km)	0
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)

	• Pre- monsoon: (May 2015) • *2.12-19.20(mbgl)*	*2.00 – 20.00 (mbgl)*	
	• Post –monsoon: (Nov2014) • *0.89-21.80(mbgl)*		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*3*	
	• Depth Range (m)	*292.0-453.70*	
	• Discharge (Ipm)	*30.10-48.40*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*977-2790*	
	• Stortivity	*1.38*10^{-3} to 6.4*10^{-4}*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^{0}c	*1751*	*1751*
	• NO3 (mg/l)	*46*	*46*
	• F (mg/l)	*0.56*	*0.56*
	• As (mg/l)	*0.0014*	*0.0014*
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (MCM)	210.27	
	• Existing Gross Ground Water Draft for Irrigation (MCM)	307.36	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)	3.56	
	• Existing Gross Ground Water Draft for all Uses (MCM)	310.92	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)	5.24	
	• Net Ground Water Availability for Future Irrigation Development (MCM)	-102.32	
	• Stage of Ground Water Development / Over Draft (%)	148	
	• 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)* *18*	Percentage % 36
10	Volume of unsaturated zone available for recharge (MCM)	262.09	
11.	Volume of water required for recharge (MCM)	348.56	
12.	Volume of surplus water available for recharge(MCM)	8.71	

RECHARGE/ CONSERVATION STRUCTURES		Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge in mcm
13	Farm Recharge@rS. 35000/-	4914	16.61	2.692
14	RWH Rural @ Rs. 25000/-	3297	7.06	0.128
15	RWH Urban@ Rs. 25000/-	804	0.82	0.020
16	Underground pipe line (area in hectares) @ Rs. 50000/-	12960	64.80	55.68
	TOTAL		**89.29**	**58.52**

BLOCK MAKHU DISTRICT FEROZPUR, 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

1418	No. of Recharge Structures in Rural Villages
589	No. of Recharge Structures in Urban Towns
2924	Recharge Pits in Agricultural Land
	Canal Network
	Water Bodies

Ground Water Scenario of Block

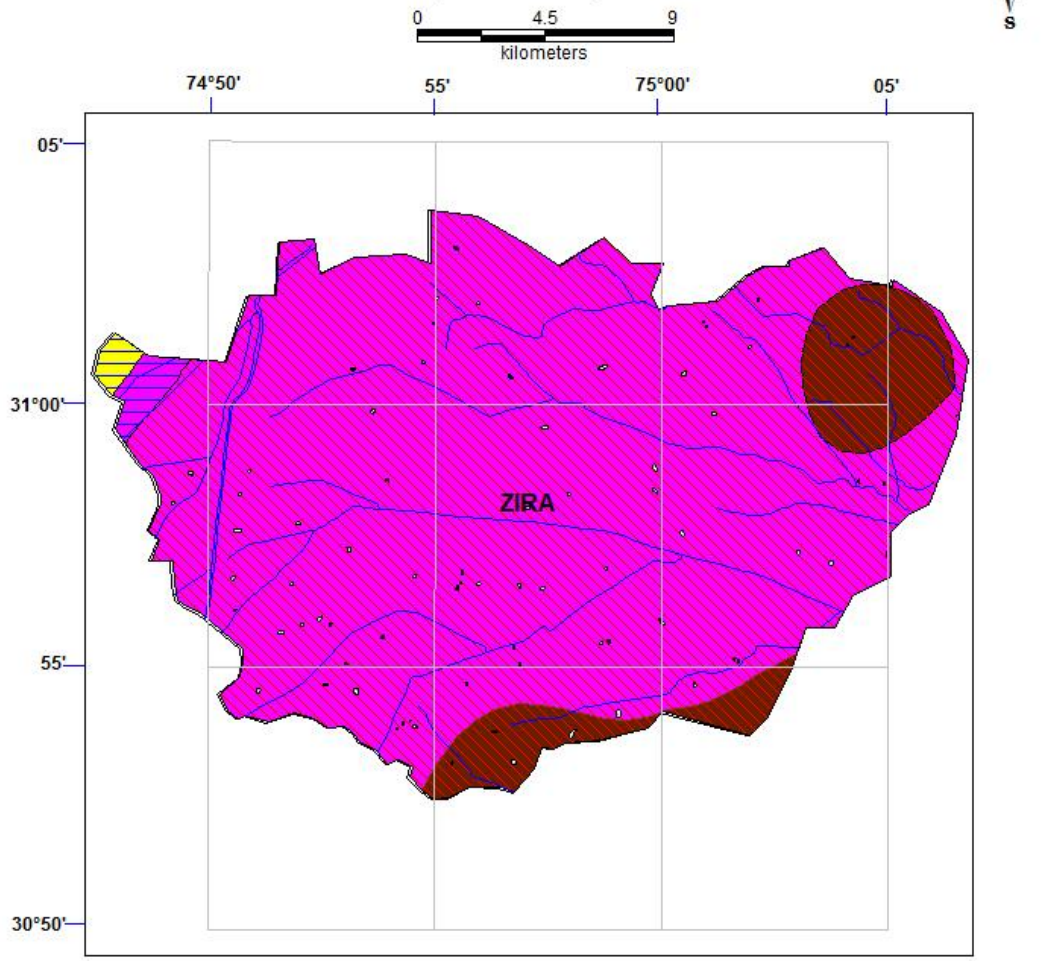
Block Name:- Makhu **District:- Ferozpur**		**State:- PUNJAB**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*288.6*
	• Number of Villages inhabited • Un-inhabited	*124* *10*
	ii) Average Annual Rainfall (mm)	*442*
	iii) Area feasible for Artificial Recharge (sq km)	*260*
	iv) Village identified under scarcity of Water	*99*
	v) Village covered under water supply	*42*
	vi) Water Tank exists in the village	*13*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Satluj 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	293.65
	• Net Area Sown (Sq.Km)	264.90
	• Area Sown More than Once (Sq.Km)	239.01
	• Total Cropped Area (Sq.Km)	503.91
	• Cropping Intensity	190
	• Area under Thur and Sem (Sq.Km)	0
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 (mbgl)	
	• Pre- monsoon: (May 2015) 3.89-17.62(mbgl)	*2.00- 20.00 (mbgl)*	
	• Post –monsoon: (Nov2014) 4.05-19.45(mbgl)		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*1*	
	• Depth Range (m)	*292.0-453.70*	
	• Discharge (Ipm)	*30.10-48.40*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*977-2790*	
	• Stortivity	*1.38*10^{-3} to 6.4*10^{-4}*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^{0}c	--	--
	• NO3 (mg/l)	--	--
	• F (mg/l)	--	--
	• As (mg/l)	--	--
8	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (MCM)	112.60	
	• Existing Gross Ground Water Draft for Irrigation (MCM)	215.80	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)	1.64	
	• Existing Gross Ground Water Draft for all Uses (MCM)	217.45	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)	2.49	
	• Net Ground Water Availability for Future Irrigation Development (MCM)	-105.69	
	• Stage of Ground Water Development / Over Draft (%)	193	
	• 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)	144.24	
11.	Volume of water required for recharge (MCM)	191.83	
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 in mcm
13	Farm Recharge@rS. 35000/-	2924	10.23	1.930
14	RWH Rural @ Rs. 25000/-	1418	3.54	0.749
15	RWH Urban@ Rs. 25000/-	589	1.47	0.041
16	Underground pipe line (area in hectares) @ Rs. 50000/-	14323	71.61	39.09
	TOTAL		**86.85**	**41.81**

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



Legend

Decadal mean water level (post monsoon)

- 5.00 - 10.00 mbgl
- 10.00 - 20.00 mbgl
- 20.00 - 40.00 mbgl

Decadal mean water level trend (m)

- 0.00 - 0.1114
- - 0.1 - 0.00

141	No. of Recharge Structures in Rural Villages
718	No. of Recharge Structures in Urban Towns
458	Recharge Pits in Agricultural Land
	Canal Network
	Water Bodies

Ground Water Scenario of Block

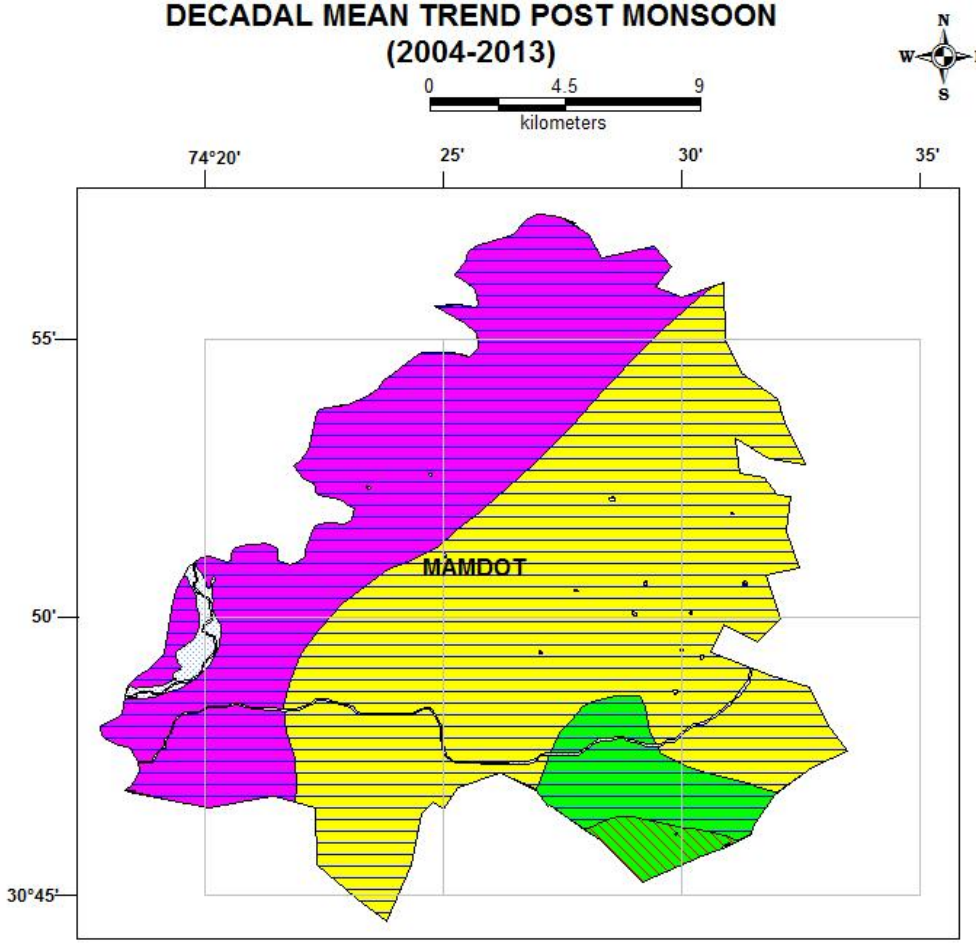
Block Name:- Zira **District:- Ferozpur**		**State:- PUNJAB**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*383.4*
	• Number of Villages inhabited • Un-inhabited	*102* *1*
	ii) Average Annual Rainfall (mm)	*436*
	iii) Area feasible for Artificial Recharge	*383.4*
	iv) Village identified under scarcity of Water	*91*
	v) Village covered under water supply	*81*
	vi) Water Tank exists in the village	*32*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Satluj 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	393.72
	• Net Area Sown (Sq.Km)	365.79
	• Area Sown More than Once (Sq.Km)	300.80
	• Total Cropped Area (Sq.Km)	666.59
	• Cropping Intensity	182
	• Area under Thur and Sem (Sq.Km)	0
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 (mbgl)	
	• Pre- monsoon: (May 2015) 17.32-26.25(mbgl)	*10.00- 40.00(mbgl)*	
	• Post –monsoon: (Nov2014) 19.03-28.17(mbgl)		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*1*	
	• Depth Range (m)	*292.0-453.70*	
	• Discharge (Ipm)	*30.10-48.40*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*977-2790*	
	• Stortivity	*1.38*10^{-3} to 6.4*10^{-}*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^{0}c	--	*2452*
	• NO3 (mg/l)	--	*86*
	• F (mg/l)	--	*2.79*
	• As (mg/l)	--	--
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (Ham)	169.37	
	• Existing Gross Ground Water Draft for Irrigation (Ham)	373.33	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (Ham)	2.78	
	• Existing Gross Ground Water Draft for all Uses (Ham)	376.11	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (Ham)	4.01	
	• Net Ground Water Availability for Future Irrigation Development (Ham)	-207.98	
	• Stage of Ground Water Development /Over Draft (%)	22	

	• 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)	191.62	
11.	Volume of water required for recharge (MCM)	254.84	
12.	Volume of surplus water available for recharge(MCM)	6.37	

RECHARGE/ CONSERVATION STRUCTURES		Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge in mcm
13	Farm Recharge@Rs. 35000/-	458	1.60	0.298
14	RWH Rural @ Rs. 25000/-	141	0.35	0.007
15	RWH Urban@ Rs. 25000/-	718	1.79	0.050
16	Underground pipe line (area in hectares) @ Rs. 50000/-	20252	101.26	39.09
	TOTAL		**105**	**39.45**

BLOCK MAMDOT DISTRICT FEROZPUR, 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

- 1950 — No. of Recharge Structures in Rural Villages
- 711 — No. of Recharge Structures in Urban Towns
- 3531 — Recharge Pits in Agricultural Land
- Canal Network
- Water Bodies

Ground Water Scenario of Block

Block Name:- Mamdot **District:- Ferozpur**		**State:- PUNJAB**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*375.8*
	• Number of Villages inhabited • Un-inhabited	*104* *7*
	ii) Average Annual Rainfall (mm)	*398*
	iii) Area feasible for Artificial Recharge (sq km)	*357*
	iv) Village identified under scarcity of Water	*103*
	v) Village covered under water supply	*55*
	vi) Water Tank exists in the village	*25*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	 *Satluj 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	324.54
	• Net Area Sown (Sq.Km)	291.63
	• Area Sown More than Once (Sq.Km)	271.42
	• Total Cropped Area (Sq.Km)	563.05
	• Cropping Intensity	193
	• Area under Thur and Sem (Sq.Km)	0
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 (mbgl) May 2015

	• Pre- monsoon: (May 2015) 6.91-12.25(mbgl)	*5.00-20.00(mbgl)*	
	• Post –monsoon: (Nov2014) 6.45-12.30(mbgl)		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*2*	
	• Depth Range (m)	*292.0-453.70*	
	• Discharge (Ipm)	*30.10-48.40*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*977-2790*	
	• Stortivity	*$1.38*10^{-3}$ to $6.4*10^{-4}$*	
	• 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)	--	--
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (MCM)	191.28	
	• Existing Gross Ground Water Draft for Irrigation (MCM)	215.80	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)	1.64	
	• Existing Gross Ground Water Draft for all Uses (MCM)	217.45	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)	2.49	
	• Net Ground Water Availability for Future Irrigation Development (MCM)	-27.01	
	• Stage of Ground Water Development (%)	114	
	• 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)	184.82	
11.	Volume of water required for recharge (MCM)	249.79	
12.	Volume of surplus water available for recharge(MCM)	6.24	

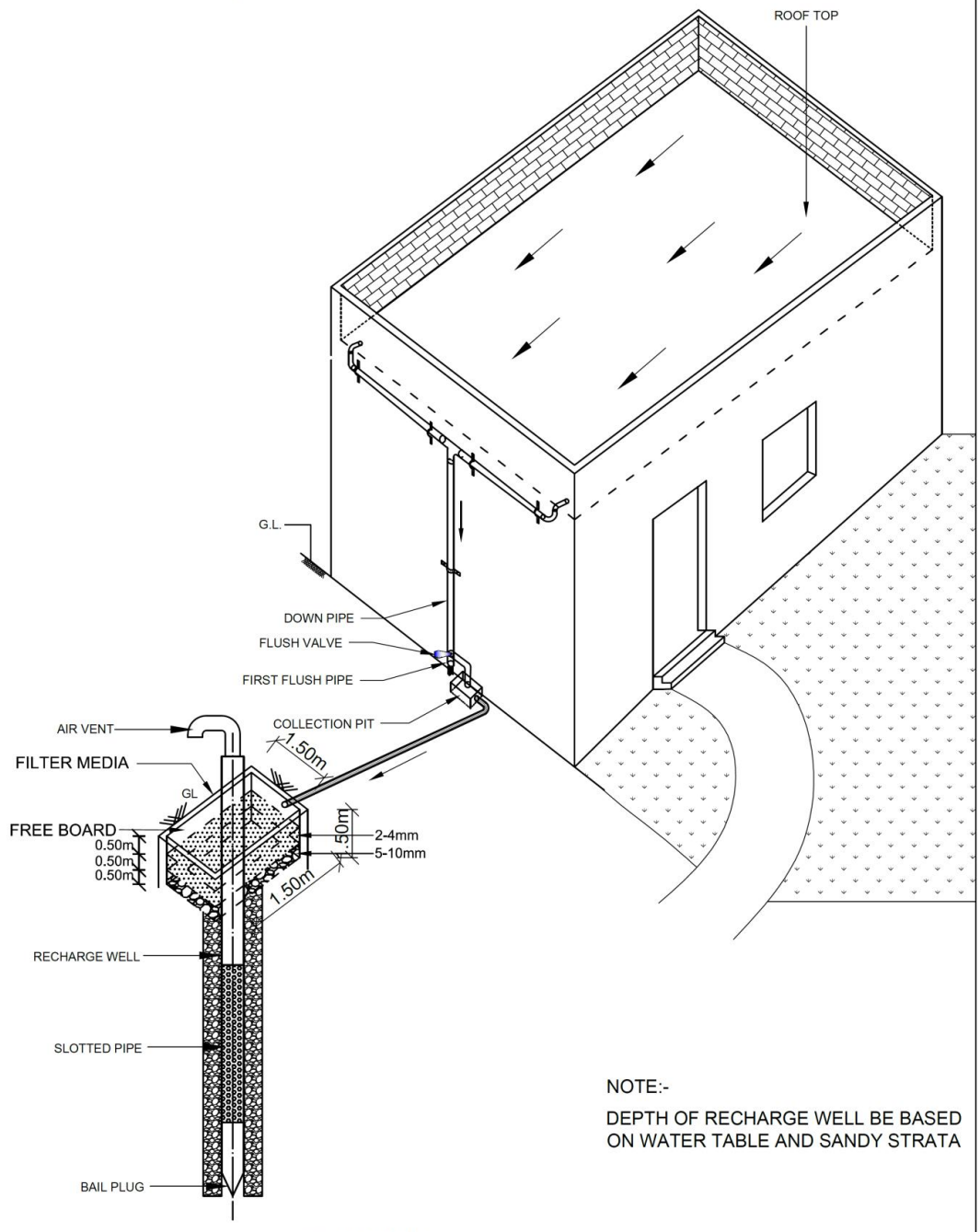
13	Total Number of Recharge Structures	Farm Recharge	RWH Rural	RWH Urban
		3531	1950	711
14	Total Cost (in Rs)	Farm Recharge	RWH Rural	RWH Urban
		1765.50	975	355.50
15	Total Recharge in mcm	Farm Recharge	RWH Rural	RWH Urban
		2.076	0.092	0.04

RECHARGE/ CONSERVATION STRUCTURES		Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge in mcm
13	Farm Recharge@rS. 35000/-	3531	12.35	2.076
14	RWH Rural @ Rs. 25000/-	1950	4.87	0.092
15	RWH Urban@ Rs. 25000/-	711	1.77	0.04
16	Underground pipe line (area in hectares) @ Rs. 50000/-	11472	57.36	39.09
	TOTAL		**76.35**	**41.30**

Annexure-I

RECHARGE FROM ROOF TOP RAIN WATER HARVESTING

(URBAN & RURAL HOUSEHOLDS)



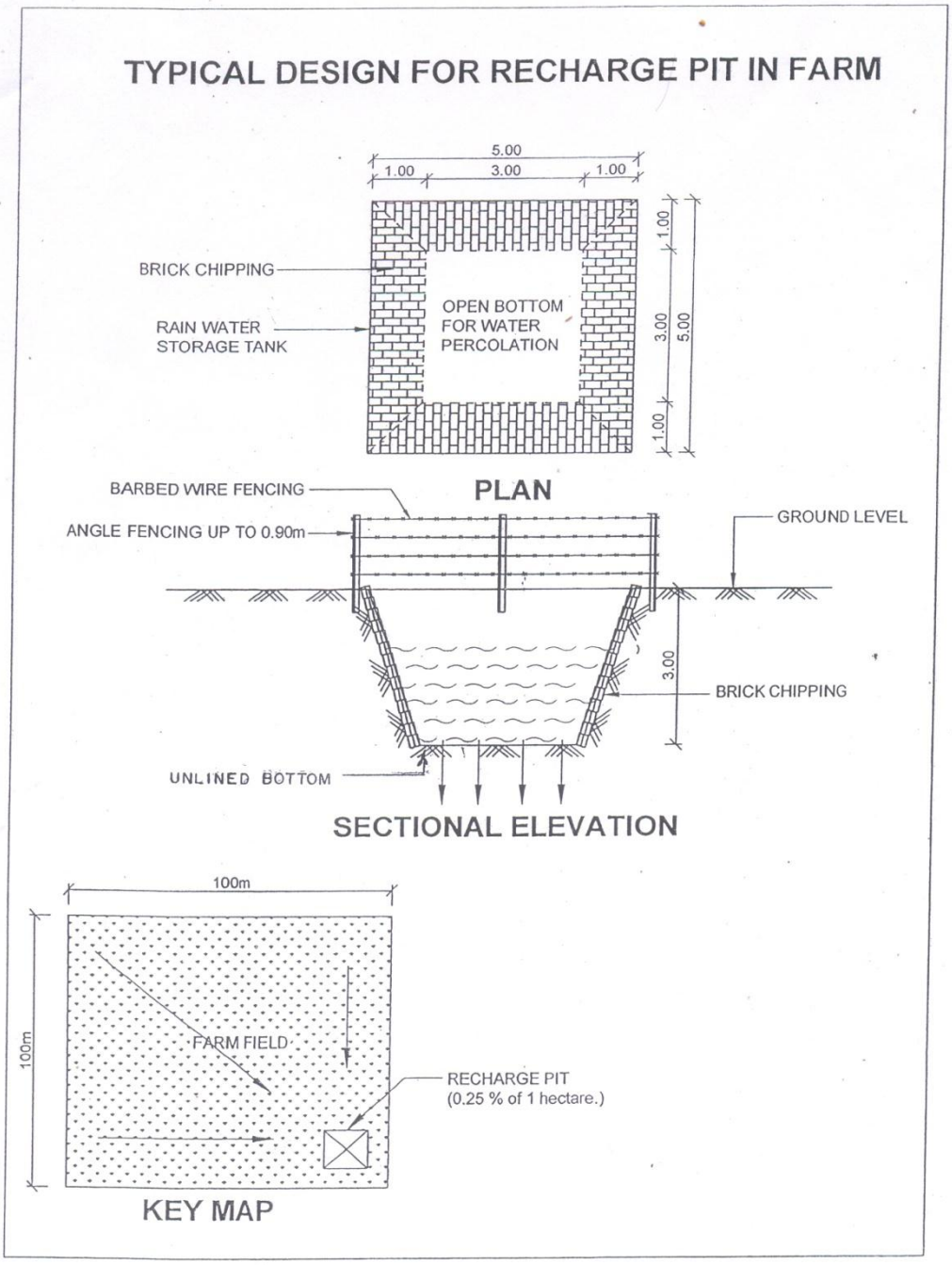
NOTE:-

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

3-D VIEW

CGWB/NWR/Chandigarh

Annexure-II


TYPICAL DESIGN FOR RECHARGE PIT IN FARM
5.00
1.00
3.00
1.00
BRICK CHIPPING
RAIN WATER
STORAGE TANK
OPEN BOTTOM
FOR WATER
PERCOLATION
1.00
3.00
5.00
1.00
PLAN
BARBED WIRE FENCING
ANGLE FENCING UP TO 0.90m
GROUND LEVEL
3.00
BRICK CHIPPING
UNLINED BOTTOM
SECTIONAL ELEVATION
100m
100m
FARM FIELD
RECHARGE PIT
(0.25 % of 1 hectare.)
KEY MAP