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

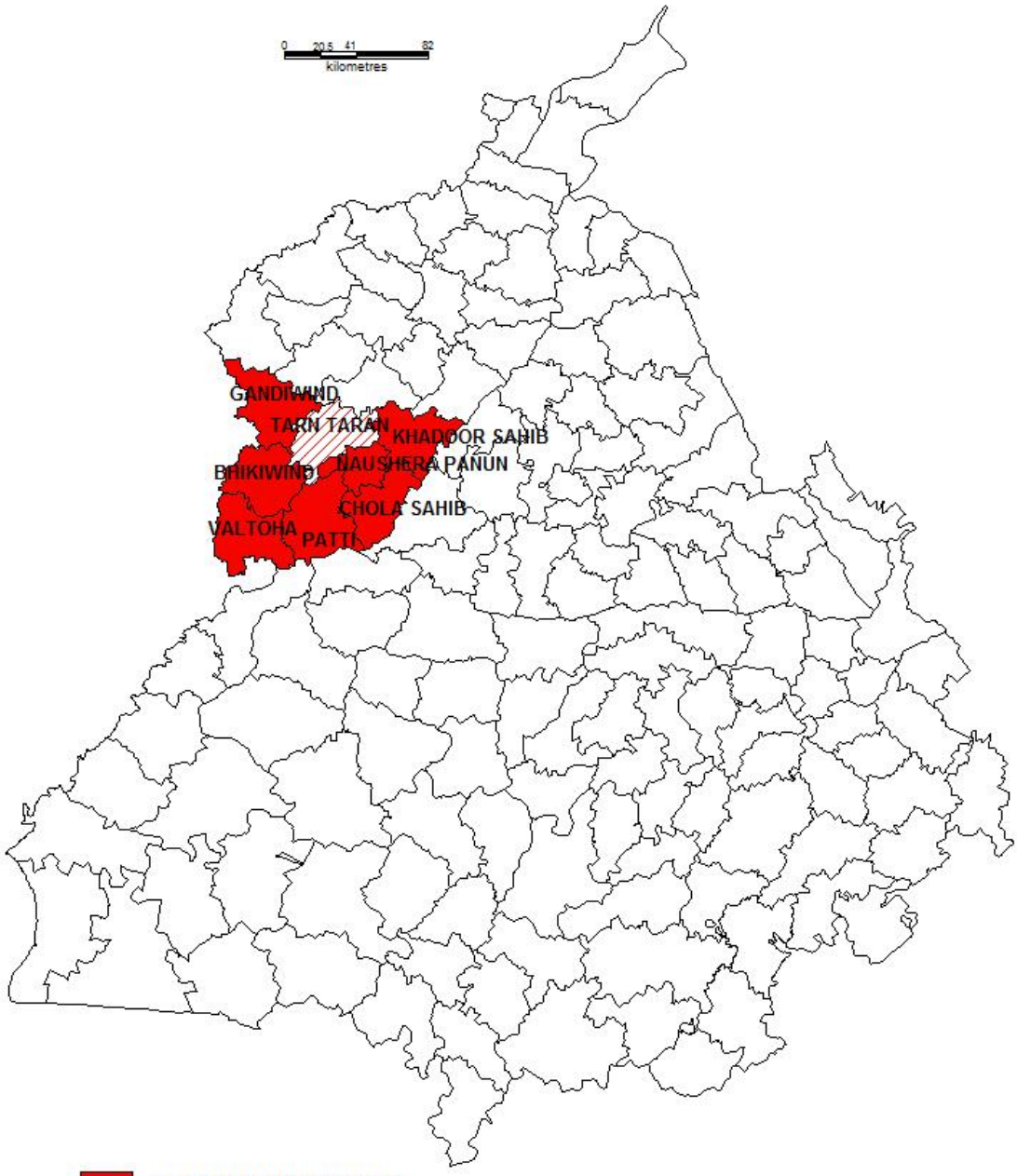
PLAN ON

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION IN

OVEREXPLOITED BLOCKS OF TARN TARAN DISTRICT, PUNJAB

Central Ground Water Board
North Western Region
Chandigarh

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



PLAN OF ARTIFICIAL RECHARGE TO GROUND WATER IN OVER EXPLOITED BLOCKS, DISTRICT TARN TARAN PUNJAB.

The purpose of this report is to serve a guide for judicious planning, development, and management of ground water resources in the district. Tarn Taran district lies between $31^0$05',and $31^0$30'05" north latitude and 74^0 30' and 75^0 15' 05" east longitudes. The area is occupied by alluvial plains. And covers an area of 2583 sq.km. It is bounded by Amritsar district in the north ,Kaputhala district in the east, Pakistan in the west , and Firozpur district in the south.

The district head quarters is located at Tarn Taran. The district is divided into 8 development blocks namely Gandiwind, Bhikiwind,Tarn Taran, Khadur Sahib, Naushera Pannuan, Chohla Sahib,Patti. and Valtoha. The total population of the district is 1120070 (census- 2011).The district has a decadal growth of 19.28%.

LAND USE, AGRICULTURE AND IRRIGATION

Tarn Taran is primarily an agricultural district. Agriculture constitutes the main source of economy, and most of the area fit for agriculture is being cultivated. The land utilization in the district is as follows:

1. Area under forests 5176 hac
2. Net area sown 217541 hac
3. Total cropped area 384541 hac

The main Rabi crops grown in the district are- wheat (185800 hect.), gram and barley,where as kharif crops grown are- rice (166000 hect.), maize, bajra,sugar cane and cotton.

The district has a net work of Upper bari Doab canal which give rise to various branches such as Sabraon branch, Lower kasur branch etc. These canals further feed their distributaries. The district has 100% irrigation facility, out of which 44.73% comes from ground water source. About 71% area of Patti block and 59% area of Tarn Taran Block is irrigated by canal water, and rest of the area of the district is irrigated with ground water.

CLIMATE and RAINFALL

The climate of the district can be classified as tropical steppe, semi-arid and hot, which is mainly characterized by general dryness except for a short period during southwest monsoon season. The normal annual rainfall of the district is 545 mm, which is unevenly distributed over the area in 30days.

The south-west monsoon which contributes 74%, sets in last week of June and withdraws in middle of September. July and August are the rainiest months.

GEOMORPHOLOGY and SOIL TYPES

Physiographically the district represents alluvial plain. The topographic gradient is about 0.4m/km in the district**.** The district falls in Ravi sub basin, Beas Sub basin and Satluj sub basin of Indus Basin. The area of the district in Ravi sub basin in the northern part of the district is 1440 sq. Km. Whereas Beas sub basin in the central part of the district covers an area of 783 sq. Km. Satluj sub basin covers an area of 361 sq km in the eastern part of the district.

Saline and alkaline soils occur in the district. Soils with salt content exceeding 0.2% are considered to be high salt soils and this concentration is injurious for plant growth. Soils whose pH values exceeds 9.0 have been classified as high alkali soils. The alkalinity render the soil impervious. The alkali soils present in the area has low fertility as compared to normal soils. The Soils of the district are categorized as tropical arid brown (weakly SOLONIZED),and arid brown soil (SOLONIZED).These soils are deficient in NPK.

Drainage

The area is drained by Patti and Nakash Nadi besides several artificial drains. The area is however broadly drained by the river Sutlej and its distributaries from the southern boundary of the district.

GEOLOGY

The geological formations in the Tarn Taran district are of Recent deposits known collectively as the Indo-Gangetic alluvium of quaternary age, which consists of sand, clay and silt, beds of gravels and very coarse sand are rarely seen. The concretionary form of calcium carbonate, known as kankar is found in beds generally at a shallow depth below the ground surface at the upper margin of the impermeable subsoil.

HYDROGEOLOGY

Water table slopes mainly from north -east to south- west indicating the flow direction in the district. Ground water in the district occurs under water table, Semi confined to confined conditions. The water table aquifer extends upto 22m bgl and composed of fine to medium grained sand. The deeper aquifer are under semi-confined condition and composed of fine sand and are silty in nature. Depth to water level maps of pre and post monsoon (2011) are given in plate V &VI. It has been observed that in major part of the district depth to water level ranges from 10 to 20 meters. The depth to water level varies between 11.30 to 19.62 m bgl during pre monsoon period and 11.94 to 18.93 m bgl during post monsoon period.

The area shows a remarkable decline in water levels which is 0.45m/year from 2002 to 2011in the district over a period of 10 years. Seasonal fluctuations (Pre & Post Monsoon), 2011 in the district ranges from -0.64 to 0.69 meters.

GROUND WATER RESOURCES

The block wise ground water resource potentials have been estimated based on methodology recommended by Ground Water Estimation Committee (1997). The block wise ground water resource and development potential of Tarn Taran district as on 31st March 2011 is as follows. The net annual ground water availability in Tarn Taran district is 104402 Ham out of this 4217 Ham has been kept reserved for domestic and industrial purposes up to 2025. The existing ground water draft for all users in the district is 190230 Ham. The average level of ground water development in the district is 182% and falls in over exploited category. Therefore care is required for further development of ground water, and no further development of ground water should be taken up.

GROUND WATER QUALITY

The shallow ground water in the district is alkaline in nature. Ground water in general is potable in the district. However at few places shallow ground water with high fluoride content has been reported. High Arsenic more than permissible limit of BIS standard has been reported at Harike.

As per USSL classification plot of USSL diagram used of irrigation waters, it indicated that ground water falls under C_2S_1 (medium salinity & low sodium) and C_3S_1 (high salinity & low sodium category). These types of ground water generally donot have any type of problem in irrigation in all types of soil.

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 Tube wells 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	**Tarn Taran**	**1870**	**7475**	**19184**	**16395**	**3361**	**48285**

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	**Tarn Taran**	**22**	**922**	**3906**	**4905**	**1483**	**11238**

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	**Tarn Taran**	**0**	**5244**	**948**	**42140**	**0**	**48332**

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	**Tarn Taran**	**2621**	**56648**	**308**

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 Rs. in Lakhs	Total cost of structure Rs. in Lakhs	Annual Recharge (MCM)
ROOF TOP RAIN WATER HARVESTING IN RURAL AND URBEN AREAS					
1	**Artificial Recharge Plan For Urban Areas.**	**2676**	0..25	**6.69**	**0.216**
2	**Roof Top Rain Water Harvesting in Rural Areas**	**17360**	0..25	**43.40**	**1.093**
	Total	20037	**0..25**	**50.09**	**1.309**
ARTIFICIAL RECHARGE IN FARMS					
1	**Artificial Recharge Plan Through Recharge Pits.**	**23186**	0.35	**81.15**	**17.781**
			Total	**81.15**	**17.781**

By the implementation of the proposed recharge structures there will be a reduction of 1.62% in stage of ground water development as tabulated below

Sr. no.	Total Draft (present) **(MCM)**	Recharge through different proposed structures **(MCM)**	Draft Reduced due to Recharge **(MCM)**	Stage of development (present)	Stage of development after recharge	Reduction in stage of development after recharge
1	**1902.30**	**19.09**	**1883.21**	**182%**	**180.38%**	**1.62 %**

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

Block Name	**Total area of the village (in hectares)**	**10%of village area taken for farm recharge(hac)**	**Total number of recharge pits**	**Annual recharge (MCM)= (Area*Runoff 15%)**	**Cost of Pit @Rs.35000/- (crores)**
Khadur Sahib	**28624.7**	**2862**	**2862**	2.705	**10.02**
Tarn Taran	**35759.2**	**3576**	**3576**	2.972	**12.52**
Gandiwind	**15821.4**	**1582**	**1582**	1.315	**5.54**
Bhikiwind	**31594.5**	**3159**	**3159**	2.384	**11.06**
Valtoha	**34943.8**	**3494**	**3494**	2.112	**12.23**
Patti	**37841.6**	**3784**	**3784**	2.526	**13.24**
Naushera pannuan	**18186.4**	**1819**	**1819**	1.468	**6.37**
Chohla Sahib	**29099**	**2910**	**2910**	2.300	**10.19**
• **New block**			**23186**	**17.781**	**81.15**

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 TARN TARAN DISTRICT OF PUNJAB

Block Name	**Total area of the village (in hectares)**	**Number of Households (2011 Census)**	**Households taken for Artificial Recharge (10% of total Households)**	**Annual recharge (MCM) = (Area*Runoff available)**	**Cost of Pit @Rs25000/- (Crores)**
Khadur Sahib	**28624.7**	**25154**	**2515**	**0.190**	**6.29**
Tarn Taran	**35759.2**	**35178**	**3518**	**0.234**	**8.80**
Gandiwind	**15821.4**	**9892**	**989**	**0.074**	**2.47**
Bhikiwind	**31594.5**	**22133**	**2213**	**0.134**	**5.53**
Valtoha	**34943.8**	**17332**	**1733**	**0.084**	**4.33**
Patti	**37841.6**	**25723**	**2572**	**0.137**	**6.43**
Naushera pannuan	**18186.4**	**17051**	**1705**	**0.106**	**4.26**
Chohla Sahib	**29099**	**21152**	**2115**	**0.134**	**5.29**
• **New block**			**17360**	**1.093**	**43.40**

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)

ARTIFICIAL RECHARGE PLAN FOR URBAN AREAS OF DISTRICT TARN TARAN PUNJAB

District	Block	Town Name	Total Households	Total Population of Town	Households taken for Artificial Recharge (10%)	Total Roof Top Area (sqm)	Volume of water available for recharge (MCM)	Cost @Rs 25000/- per structure (crores)
TARN TARAN	**TARN TARAN**	**Tarn Taran (M Cl)**	12874	66847	**1287**	257480	0.114	**3.22**
	PATTI	**Patti (M Cl)**	7607	40976	**761**	152140	0.054	**1.90**
	PATTI	**Khem Karan (NP)**	2436	13446	**244**	48720	0.017	**0.61**
	Bhikhiwind	**Bhikhiwind (CT)**	3835	20526	**384**	76700	0.031	**0.96**
		TOTAL	**26752**	**141795**	**2676**	**535040**	**0.216**	**6.69**

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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 59570tubewells operated by farmers for irrigation through unlined/Kutcha (95.07%) open channel system in Tarntaran 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 Tarntaran district is estimated at 1875.66 MCM. It is expected that around 42.83 % 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 1452.94 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 Tarntaran Districts. The measure if implemented will bring down the ground water overdraft from 182% to 139.17 %. 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, TARNTARAN 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 (mcm) in OE blocks only (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
1044.02	1902.30	1875.66	26.64	95.07	449.36	1426.30	1452.94	182	139.17	42.83

 # 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) Area *0.50/100 = Crores	Total Cost in Rs. Cr. District wise
TARNTARAN	Khadur Sahib	14790	95.07	14061	**70.30**	**440.98**
	Tarn Taran	14319	95.07	13613	**68.07**	
	Gandiwind	2534	95.07	2409	**12.05**	
	Bhikiwind	5894	95.07	5603	**28.02**	
	Valtoha	17702	95.07	16829	**84.15**	
	Patti	17067	95.07	16226	**81.13**	
	Naushera Pannuan	6160	95.07	5856	**29.28**	
	Chohla Sahib	14301	95.07	13596	**67.98**	

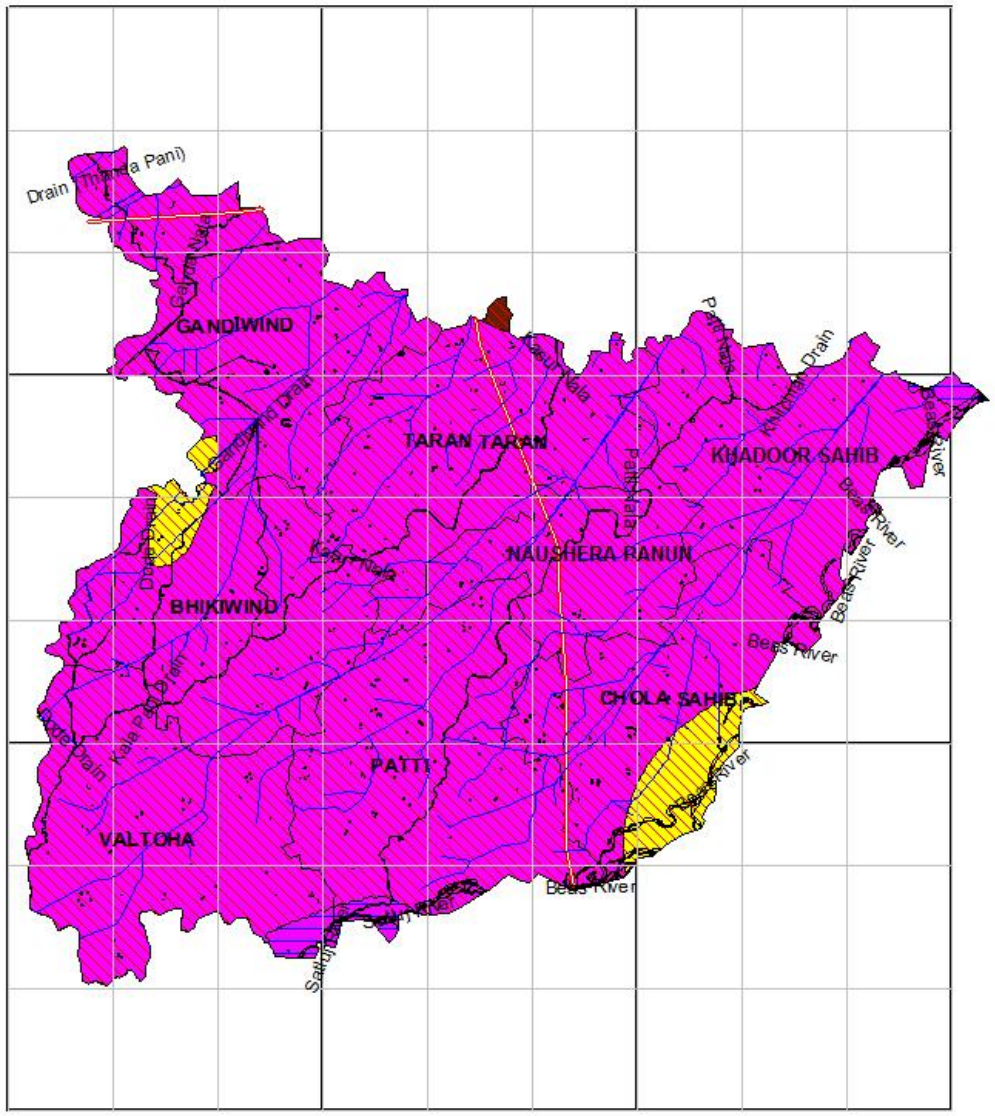
Wells Feasible	Rigs Suitable	Depth of Well (m)	Discharge (lpm)	Suitable Artificial Recharge Structures
Tube Wells	Direct and Reverse Rotary	80 - 210	2000 - 4000	Recharge Shaft And Recharge Trench
Tube Wells	Direct and Reverse Rotary	30 - 105	1000 - 2000	Recharge Shaft And Recharge Trench
Tube Wells	Direct and Reverse Rotary	30 - 90	800 - 1000	Recharge Shaft And Recharge Trench

DEPTH TO WATER LEVEL NOVEMBER 2014			
5.00 - 10.00 mbgl	National Highway	International Boundary	
10.00 - 20.00 mbgl	Canals	State Boundary	
20.00 - 40.00 mbgl	Water Bodies	Block Boundary	
	Major Drainage	Block Headquarters	

OTHER INFORMATION

Name of State	Punjab
Name of District	Tarn Taran
Geographical Area	2583 sq.km.
Major Geological Formation	Alluviam
Major Drainage System	Ravi and Beas
Population (as on 2011)	11,200,70
Total Number of Blocks	8
Existing Major/Medium Irrigation Projects	Upper Bari Doab Canal
Utillizable Ground Water Resources 2011	1044.02 (mcm)
Net Ground Water Draft	1092.30 (mcm)
Stage of Ground Water Development	182 %
Average Annual Rainfall	545 mm
Range of Mean Daily Temperature	5- 40°C
Over Exploted Blocks	GANDIWIND BHIKIWIND TARN TARAN KHADUR SAHIB NAUSHERA PANNUAN CHOHLA SAHIB PATTI VALTOHA

PLAN OF ARTIFICIAL RECHARGE TO GROUND WATER
DISTRICT TARN TARAN, PUNJAB



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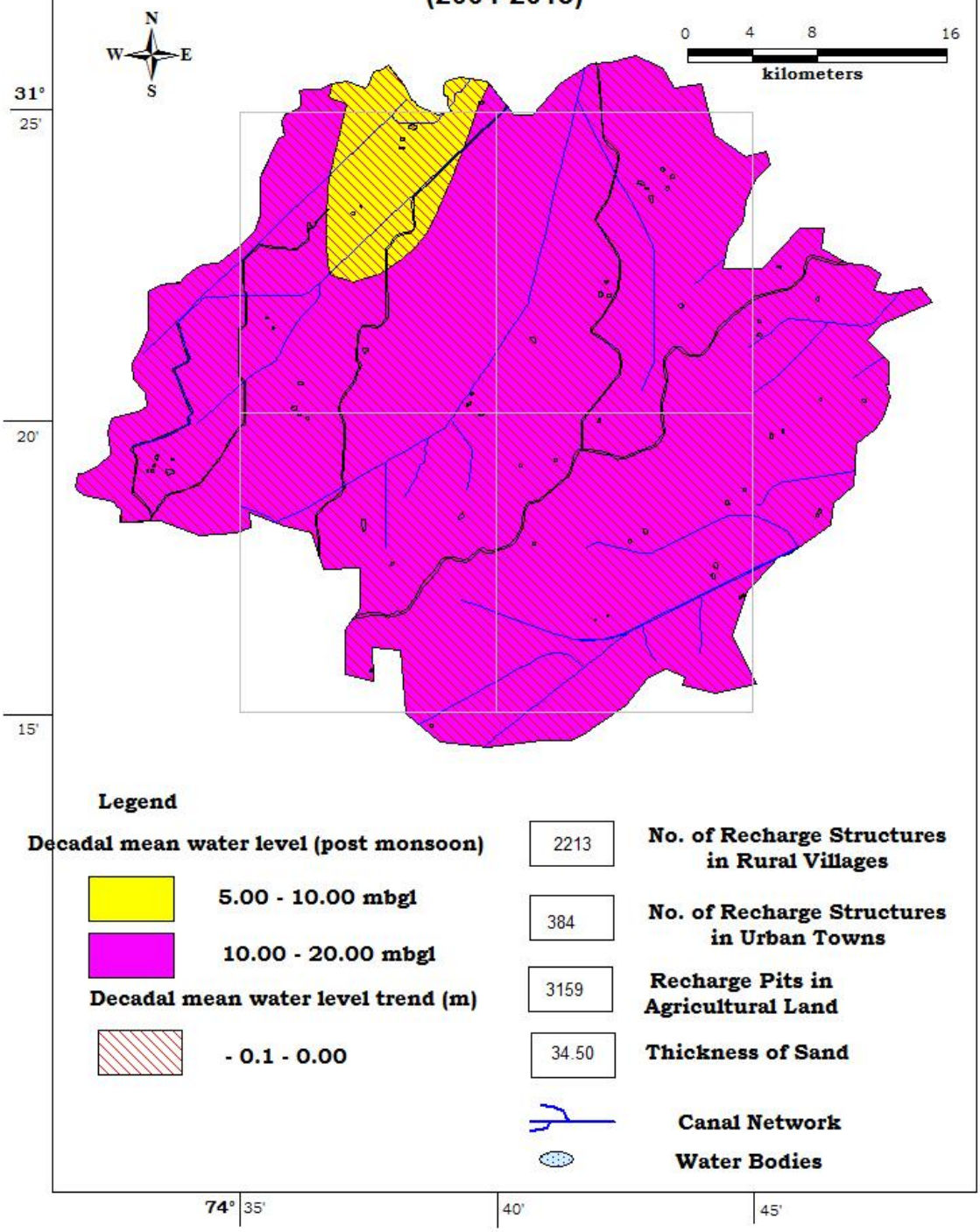
Decadal mean water level (post monsoon)

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

Decadal mean water level trend (m)

- -0.10 -- -0.00

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



Ground Water Scenario of Block

Block Name:- Bhikhiwind **District:- Taran Tarn** **State:- PUNJAB**		
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*333*
	• Number of Villages inhabited • Un-inhabited	*165* *0*
	ii) Average Annual Rainfall (mm)	*512*
	iii) Area feasible for Artificial Recharge	*300*
	iv) Village identified under scarcity of Water	*68*
	v) Village covered under water supply	*68*
	vi) Water Tank exists in the village	*47*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Ravi 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	350.90
	• Net Area Sown (Sq.Km)	299.97
	• Area Sown More than Once (Sq.Km)	2.98

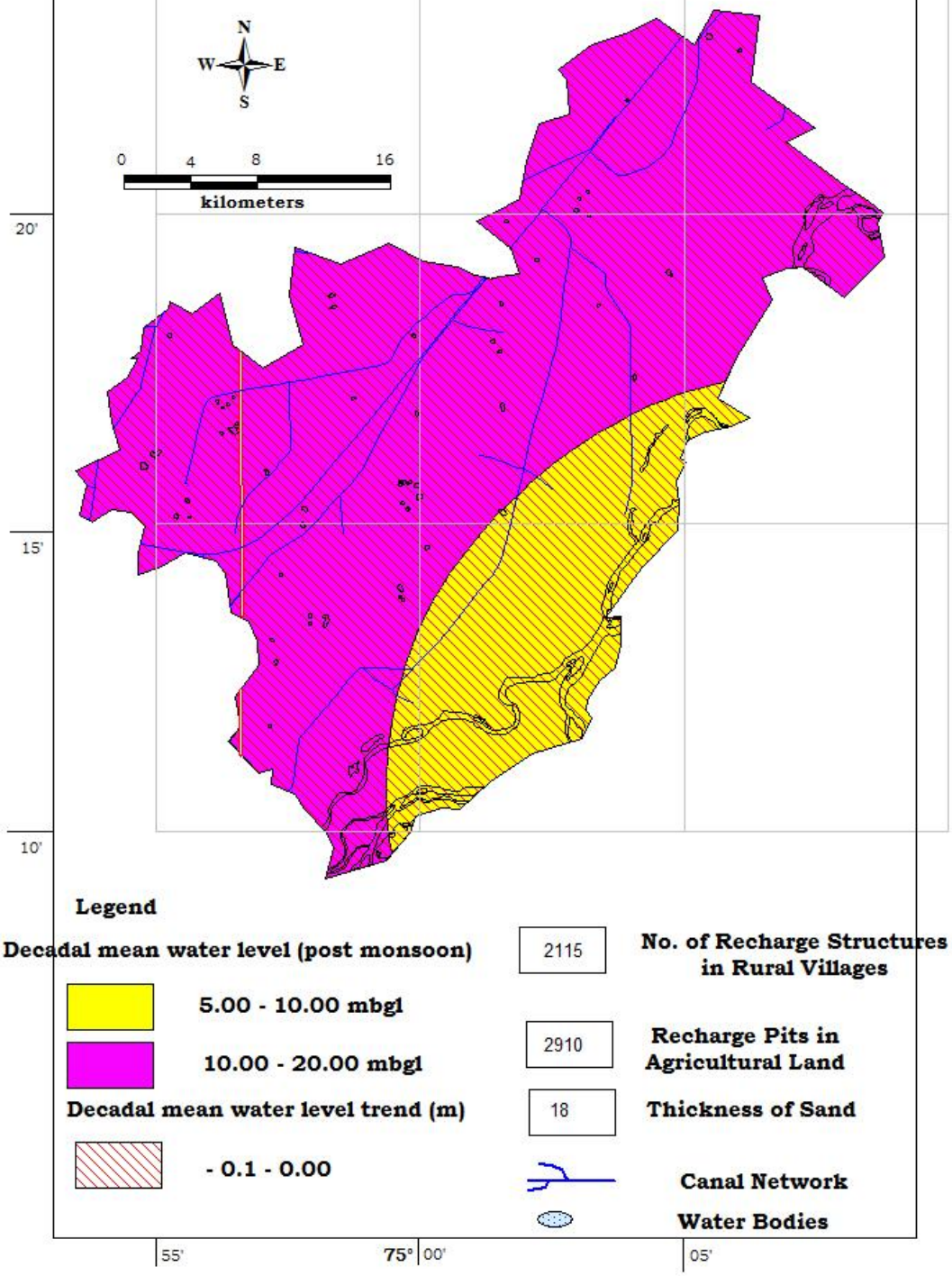
	• Total Cropped Area (Sq.Km)	302.95	
	• Cropping Intensity	101	
	• Area under Thur and Sem (Sq.Km)	--	
4.	PREDOMINAT GEOLOGICAL FORMATIONS	*Recent alluvium*	
5.	HYDROGEOLOGY		
	Major Water bearing Formation (Aquifer)	Fine to coarse Sand	
	Avg. Depth to water level (decadal)	Depth to water level may 2015 (mbgl)	
	• Pre- monsoon: (May 2015) 13.08- 16.20 (mbgl)	*5.00 – 20.00 (mbgl)*	
	• Post –monsoon: (Nov2014) 6.67 – 15.70 (mbgl)		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*3*	
	• Depth Range (m)	*308.76-500.0*	
	• Discharge (Ipm)	*484.5-4504*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*1450-4140*	
	• Storativity	*$1.8*10^{-3}$ to $8.04*10^{-3}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	*475*	*1588*
	• NO3 (mg/l)	*7.7*	*43*

	• F (mg/l)	*0.55*	*0.71*
	• As (mg/l)	---	---
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (MCM)	132.04	
	• Existing Gross Ground Water Draft for Irrigation (MCM)	221.01	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)	3.56	
	• Existing Gross Ground Water Draft for all Uses (MCM)	224.57	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)	5.66	
	• Net Ground Water Availability for Future Irrigation Development (MCM)	-94.62	
	• Stage of Ground Water Development / Over Draft (%)	170	
	• 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)* *34.5*	Percentage % 69
10	Volume of unsaturated zone available for recharge (MCM)	376.06	

11.	Volume of water required for recharge (MCM)			500.21
12.	Volume of surplus water available for recharge(MCM)			16.34
RECHARGE/ CONSERVATION STRUCTURES		Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge in mcm
13	Farm Recharge@ Rs. 35000/-	3159	11.05	2.384
14	RWH Rural @ Rs. 25000/-	2213	5.53	0.031
15	RWH Urban@ Rs. 25000/-	384	0.96	0.120
16	Underground pipe line (area in hectares) @ Rs. 50000/-	5603	28.02	52.95
	TOTAL		**45.56**	**55.49**

BLOCK CHOLA SAHIB DISTRICT TARNTARAN, 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

Decadal mean water level trend (m)

- - 0.1 - 0.00

- 2115 — No. of Recharge Structures in Rural Villages
- 2910 — Recharge Pits in Agricultural Land
- 18 — Thickness of Sand
- Canal Network
- Water Bodies

Ground Water Scenario of Block

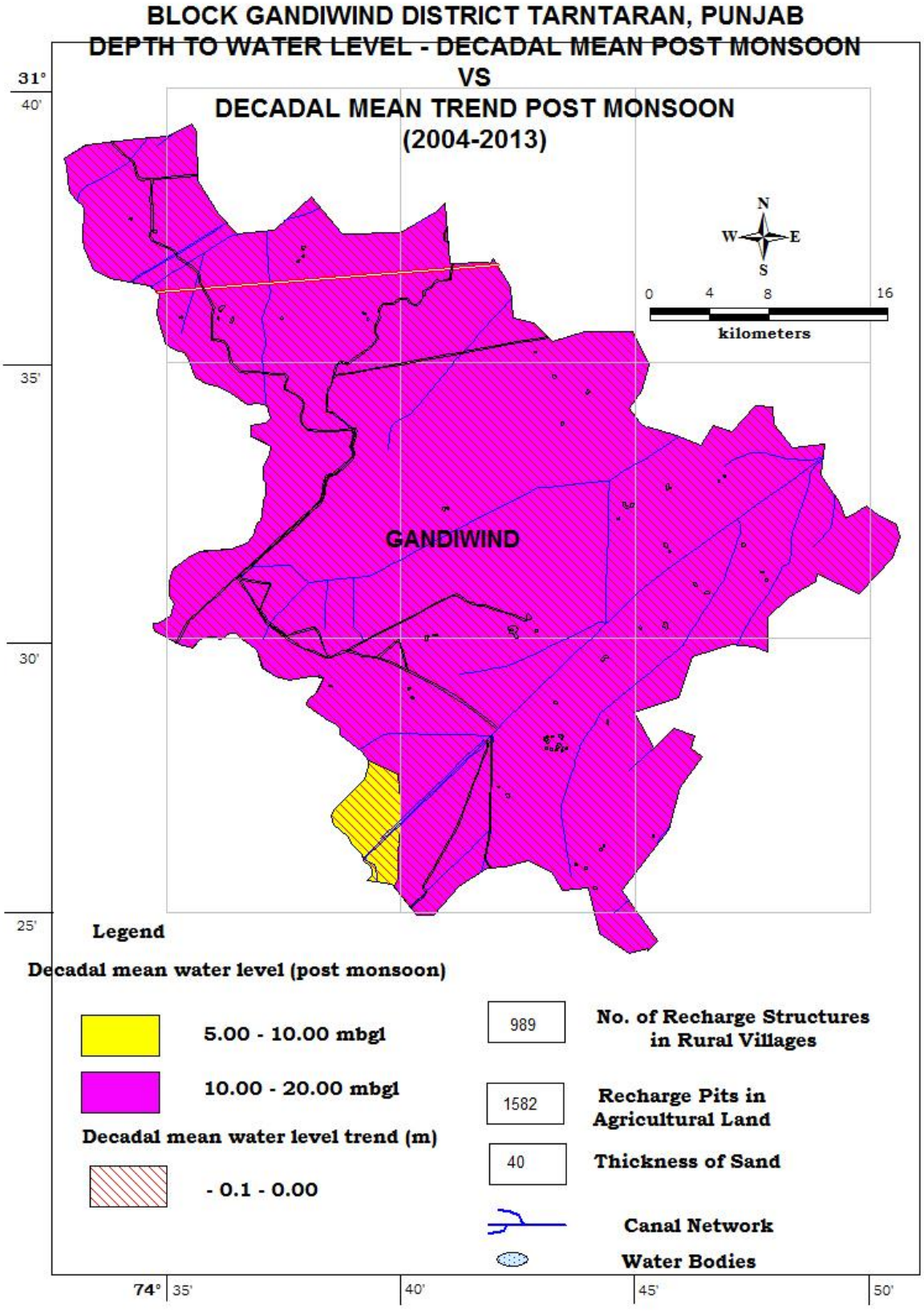
Block Name:- Chola Sahib **District:- Tarn Taran**		**State:- PUNJAB**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*349.8*
	• Number of Villages inhabited • Un-inhabited	*50* *1*
	ii) Average Annual Rainfall (mm)	*536*
	iii) Area feasible for Artificial Recharge	*330*
	iv) Village identified under scarcity of Water	*48*
	v) Village covered under water supply	*43*
	vi) Water Tank exists in the village	*30*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Beas 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	289.54
	• Net Area Sown (Sq.Km)	224.85

	• Area Sown More than Once (Sq.Km)	2.23	
	• Total Cropped Area (Sq.Km)	227.08	
	• Cropping Intensity	101	
	• Area under Thur and Sem (Sq.Km)	--	
4.	PREDOMINAT GEOLOGICAL FORMATIONS	*Recent alluvium*	
5.	HYDROGEOLOGY		
	Major Water bearing Formation (Aquifer)	Fine to coarse Sand	
	Avg. Depth to water level (decadal)	Depth to water level May 2015 (mbgl)	
	• Pre- monsoon: (May 2015) *17.69-19.17(mbgl)*	5.00- 20.00 (mbgl)	
	• Post –monsoon: (Nov2014) *16.55-18.00 (mbgl)*		
6.	GROUND WATERN EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*1*	
	• Depth Range (m)	*308.76-500.0*	
	• Discharge (Ipm)	*484.5-4504*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*1450-4140*	
	• Storativity	*$1.8*10^{-3}$ to $8.04*10^{-3}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max

	• EC in µS/cm	*947*	*947*
	• NO3 (mg/l)	--	--
	• F (mg/l)	*0.71*	*0.71*
	• As (mg/l)	0.0024	0.0069
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (MCM)	111.02	
	• Existing Gross Ground Water Draft for Irrigation (MCM)	187.87	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)	2.55	
	• Existing Gross Ground Water Draft for all Uses (MCM)	190.42	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)	4.06	
	• Net Ground Water Availability for Future Irrigation Development (MCM)	-80.90	
	• Stage of Ground Water Development / Over Draft (%)	172	
	• 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)	395.03	
11.	Volume of water required for recharge (MCM)	525.44	
12.	Volume of surplus water available for recharge(MCM)	17.16	

RECHARGE/ CONSERVATION STRUCTURES		Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge in mcm
13	Farm Recharge@ Rs. 35000/-	2910	10.18	2.30
14	RWH Rural @ Rs. 25000/-	2115	5.28	0.134
15	RWH Urban@ Rs. 25000/-	-	-	-
16	Underground pipe line (area in hectares) @ Rs. 50000/-	13596	67.98	45.01
	TOTAL		**83.84**	**47.44**


BLOCK GANDIWIND DISTRICT TARNTARAN, PUNJAB
DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON
VS
DECADAL MEAN TREND POST MONSOON
(2004-2013)
31°
40'
35'
30'
25'
74°
35'
40'
45'
50'
N
W
E
S
0
4
8
16
kilometers
GANDIWIND
Legend
Decadal mean water level (post monsoon)
5.00 - 10.00 mbgl
10.00 - 20.00 mbgl
Decadal mean water level trend (m)
- 0.1 - 0.00
989
No. of Recharge Structures in Rural Villages
1582
Recharge Pits in Agricultural Land
40
Thickness of Sand
Canal Network
Water Bodies

Ground Water Scenario of Block

Block Name:- Gandiwind **District:- Taran Tarn** **State:- PUNJAB**		
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*336.9*
	• Number of Villages inhabited • Un-inhabited	*79* *0*
	ii) Average Annual Rainfall (mm)	*633*
	iii) Area feasible for Artificial Recharge	*336.9*
	iv) Village identified under scarcity of Water	*36*
	v) Village covered under water supply	*36*
	vi) Water Tank exists in the village	*20*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Ravi 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	195.21
	• Net Area Sown (Sq.Km)	151.35
	• Area Sown More than Once	--

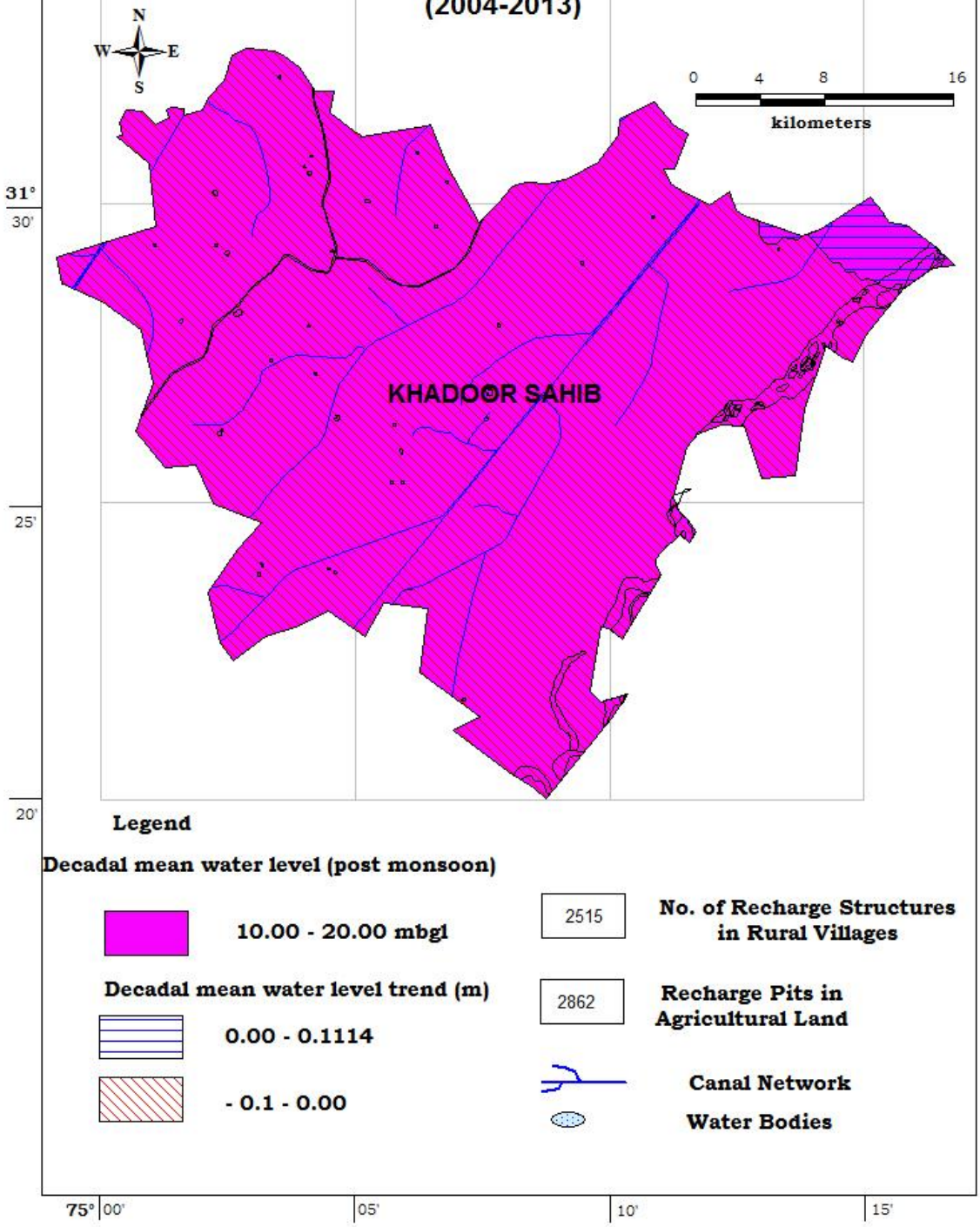
	(Sq.Km)		
	• Total Cropped Area (Sq.Km)	151.35	
	• Cropping Intensity	100	
	• Area under Thur and Sem (Sq.Km)	--	
4.	PREDOMINAT GEOLOGICAL FORMATIONS	*Recent alluvium*	
5.	HYDROGEOLOGY		
	Major Water bearing Formation (Aquifer)	Fine to coarse Sand	
	Avg. Depth to water level (decadal)	Depth to water level May 2015 (mbgl)	
	• Pre- monsoon: (May 2015) 10.75 – 19.68 (mbgl)	*10.00-20.00 (mbgl)*	
	• Post –monsoon: (Nov2014) 10.44 – 18.90 (mbgl)		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*1*	
	• Depth Range (m)	*308.76-500.0*	
	• Discharge (Ipm)	*484.5-4504*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*1450-4140*	
	• Storativity	*$1.8*10^{-3}$ to $8.04*10^{-3}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	*421*	*1155*

	• NO3 (mg/l)	*0.1*	*3.3*
	• F (mg/l)	*0.17*	*1.4*
	• As (mg/l)	*0.0004*	0.0004
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (MCM)	160.89	
	• Existing Gross Ground Water Draft for Irrigation (MCM)	288.16	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)	3.07	
	• Existing Gross Ground Water Draft for all Uses (MCM)	291.23	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)	4.89	
	• Net Ground Water Availability for Future Irrigation Development (MCM)	-132.15	
	• Stage of Ground Water Development/ over draft (%)	181	
	• 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)* *40*	Percentage % 80

10	Volume of unsaturated zone available for recharge (MCM)	380.46
11.	Volume of water required for recharge (MCM)	506.07
12.	Volume of surplus water available for recharge(MCM)	16.53

RECHARGE/ CONSERVATION STRUCTURES		Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge in mcm
13	Farm Recharge@ Rs 35000/-	1582	5.53	1.315
14	RWH Rural @ Rs. 25000/-	989	2.47	0.134
15	RWH Urban@ Rs. 25000/-	-	-	-
16	Underground pipe line (area in hectares) @ Rs. 50000/-	2409	12.05	69.04
	TOTAL		**20.05**	**70.49**

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



Legend

Decadal mean water level (post monsoon)

10.00 - 20.00 mbgl

Decadal mean water level trend (m)

0.00 - 0.1114

- 0.1 - 0.00

2515 — No. of Recharge Structures in Rural Villages

2862 — Recharge Pits in Agricultural Land

Canal Network

Water Bodies

Ground Water Scenario of Block

Block Name:- Khadoor Sahib **District:- Tarn Taran**		**State:- PUNJAB**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*341.5*
	• Number of Villages inhabited • Un-inhabited	*79* *2*
	ii) Average Annual Rainfall (mm)	*637*
	iii) Area feasible for Artificial Recharge	*68.3*
	iv) Village identified under scarcity of Water	*69*
	v) Village covered under water supply	*68*
	vi) Water Tank exists in the village	*37*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	 *Beas 90%* *Ravi 10%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	286.35
	• Net Area Sown (Sq.Km)	250.24

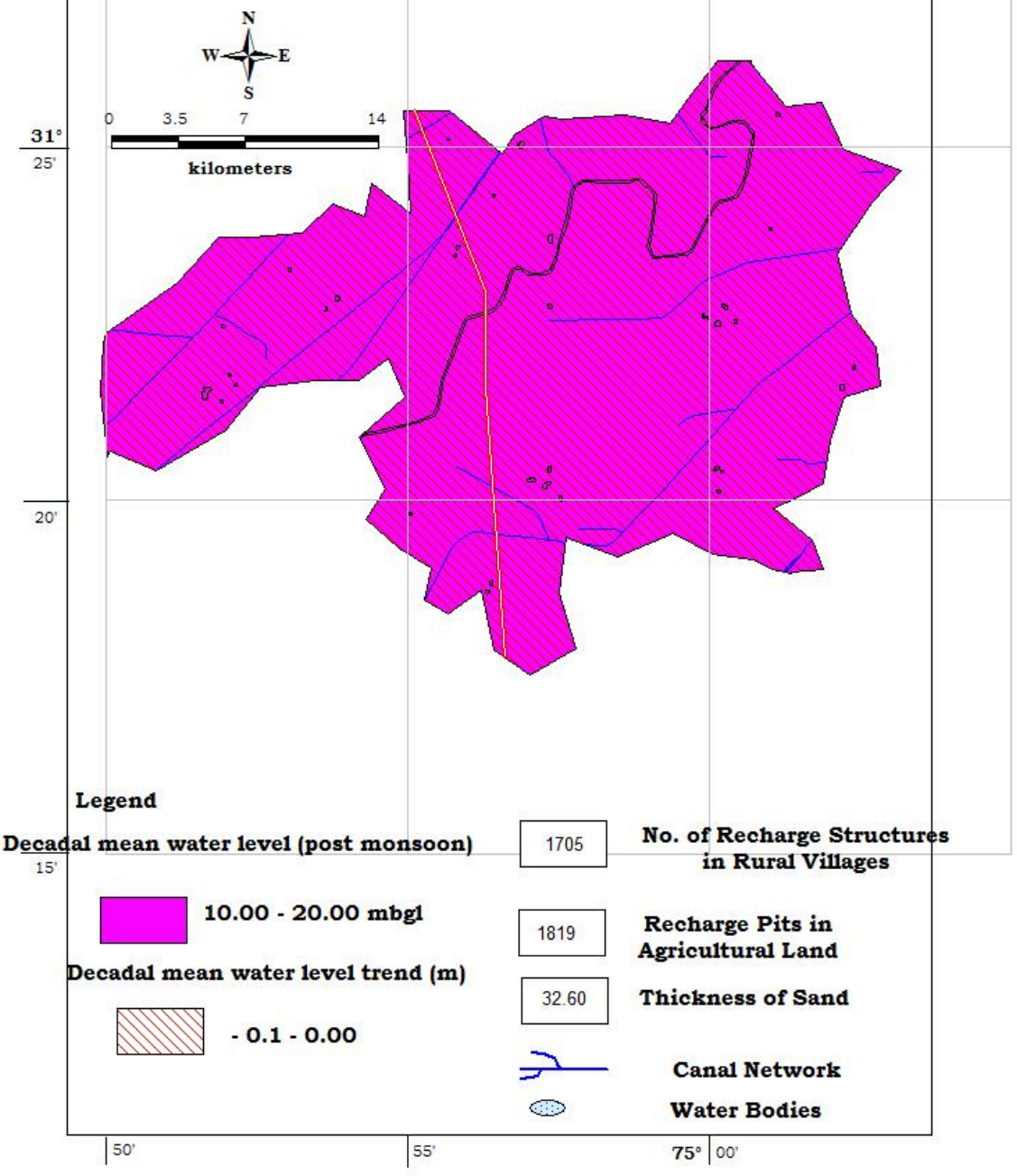
	• Area Sown More than Once (Sq.Km)	2.37	
	• Total Cropped Area (Sq.Km)	252.61	
	• Cropping Intensity	101	
	• Area under Thur and Sem (Sq.Km)	--	
4.	PREDOMINAT GEOLOGICAL FORMATIONS	*Recent alluvium*	
5.	HYDROGEOLOGY		
	Major Water bearing Formation (Aquifer)	Fine to coarse Sand	
	Avg. Depth to water level (decadal)	Depth to water level May 2015 (mbgl)	
	• Pre- monsoon: (May 2015) *18.15-21.30(mbgl)*	*10.00-40.00 (mbgl)*	
	• Post –monsoon: (Nov2014) *16.60-20.19 (mbgl)*		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*1*	
	• Depth Range (m)	*308.76-500.0*	
	• Discharge (Ipm)	*484.5-4504*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*1450-4140*	
	• Storativity	*$1.8*10^{-3}$ to $8.04*10^{-3}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max

	• EC in µS/cm at 25^0c	*428*	*688*
	• NO3 (mg/l)	--	*1.6*
	• F (mg/l)	*0.15*	*0.64*
	• As (mg/l)	*0.0002*	0.0002
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (MCM)	156.03	
	• Existing Gross Ground Water Draft for Irrigation (MCM)	258.81	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)	3.33	
	• Existing Gross Ground Water Draft for all Uses (MCM)	262.14	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)	5.29	
	• Net Ground Water Availability for Future Irrigation Development (MCM)	-108.07	
	• Stage of Ground Water Development / over Draft(%)	168	
	• 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)	385.66	
11.	Volume of water required for recharge (MCM)	512.98	
12.	Volume of surplus water available for recharge(MCM)	16.75	

RECHARGE/ CONSERVATION STRUCTURES		Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge in mcm
13	Farm Recharge@ Rs. 35000/-	2862	10.01	2.705
14	RWH Rural @ Rs. 25000/-	2515	6.28	0.190
15	RWH Urban@ Rs. 25000/-	-	-	-
16	Underground pipe line (area in hectares) @ Rs. 50000/-	14061	70.30	62.00
	TOTAL		**86.59**	**64.895**

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



Ground Water Scenario of Block

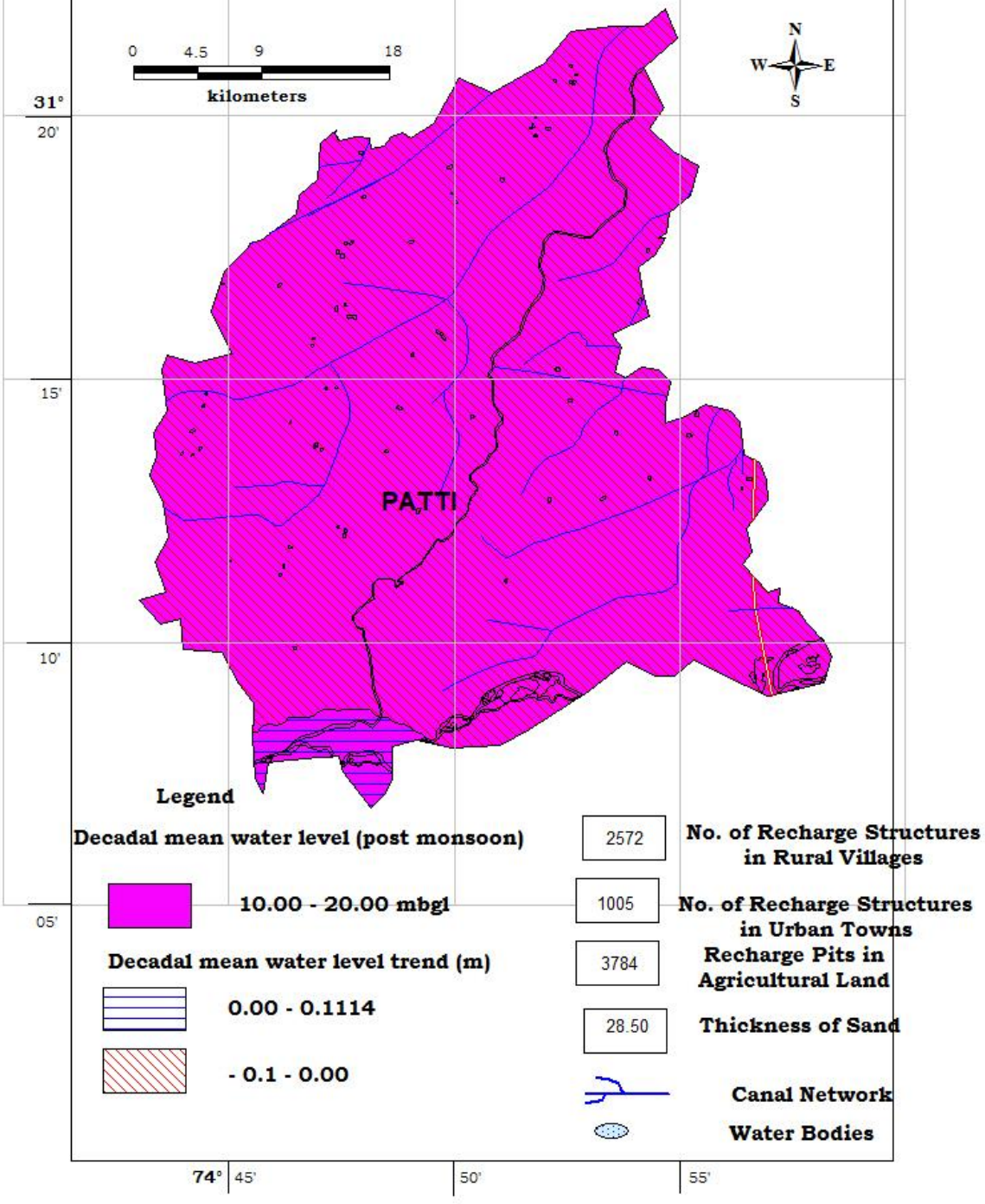
Block Name:- Naushera Pannu **District:- Taran Tarn** **State:- PUNJAB**		
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*199.2*
	• Number of Villages inhabited • Un-inhabited	*45* *3*
	ii) Average Annual Rainfall (mm)	*547*
	iii) Area feasible for Artificial Recharge	*199.2*
	iv) Village identified under scarcity of Water	*47*
	v) Village covered under water supply	*47*
	vi) Water Tank exists in the village	*20*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	 *Beas 50%* *Ravi 50%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	180.04
	• Net Area Sown (Sq.Km)	153.03
	• Area Sown More than Once (Sq.Km)	1.53

	• Total Cropped Area (Sq.Km)	154.56	
	• 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 (mbgl) *May 2015*	
	• Pre- monsoon: (May 2015) 17.50- 19.37 (mbgl)	*10.00-20.00 (mbgl)*	
	• Post –monsoon: (Nov2014) 16.00 – 18.16 (mbgl)		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*2*	
	• Depth Range (m)	*308.76-500.0*	
	• Discharge (Ipm)	*484.5-4504*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*1450-4140*	
	• Storativity	*$1.8*10^{-3}$ to $8.04*10^{-3}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	*485*	*485*

	• NO3 (mg/l)	*6.8*	*6.6*
	• F (mg/l)	*0.56*	*0.56*
	• As (mg/l)	*0.0022*	0.0022
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (MCM)	78.57	
	• Existing Gross Ground Water Draft for Irrigation (MCM)	162.78	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)	2.16	
	• Existing Gross Ground Water Draft for all Uses (MCM)	164.93	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)	3.43	
	• Net Ground Water Availability for Future Irrigation Development (MCM)	-87.63	
	• Stage of Ground Water Development/ Over draft (%)	210	
	• 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)* *32.6*	Percentage % 65.2

10	Volume of unsaturated zone available for recharge (MCM)			224.96
11.	Volume of water required for recharge (MCM)			299.22
12.	Volume of surplus water available for recharge(MCM)			9.77
RECHARGE/ CONSERVATION STRUCTURES		Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge in mcm
13	Farm Recharge@ Rs 35000/-	1819	6.36	1.468
14	RWH Rural @ Rs. 25000/-	1705	4.26	0.106
15	RWH Urban@ Rs. 25000/-	-	-	-
16	Underground pipe line (area in hectares) @ Rs. 50000/-	5856	29.28	39.00
	TOTAL		**39.90**	**40.57**

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



Ground Water Scenario of Block

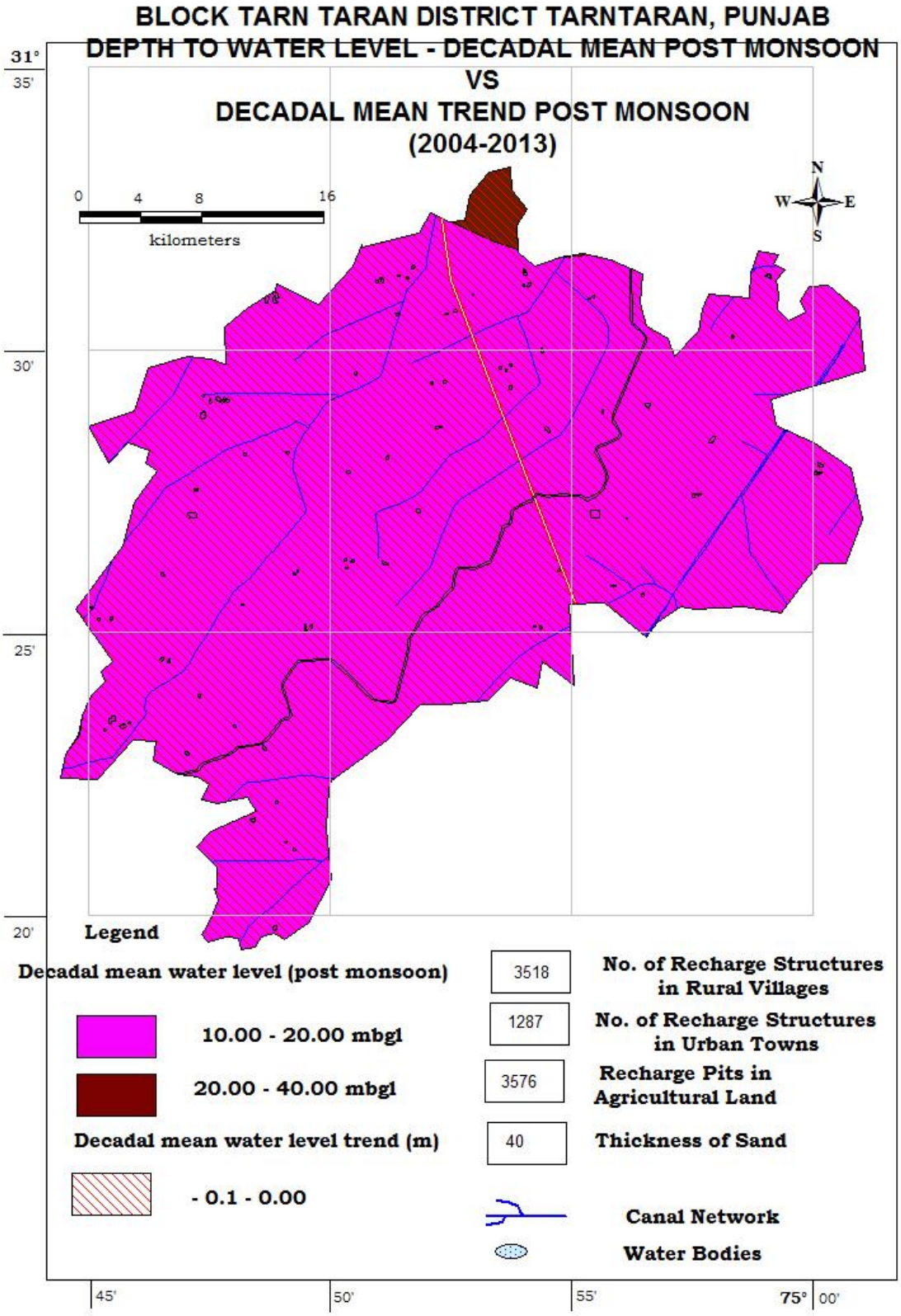
Block Name:- Patti **District:- Taran Tarn**		**State:- PUNJAB**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*375.5*
	• Number of Villages inhabited • Un-inhabited	*68* *0*
	ii) Average Annual Rainfall (mm)	*451*
	iii) Area feasible for Artificial Recharge	*263*
	iv) Village identified under scarcity of Water	*61*
	v) Village covered under water supply	*59*
	vi) Water Tank exists in the village	*36*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	 *Satluj 40%* *Ravi 30%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	320.21
	• Net Area Sown (Sq.Km)	258.62
	• Area Sown More than Once (Sq.Km)	2.52

	• Total Cropped Area (Sq.Km)	261.14	
	• Cropping Intensity	101	
	• Area under Thur and Sem (Sq.Km)	--	
4.	PREDOMINAT GEOLOGICAL FORMATIONS	*Recent alluvium*	
5.	HYDROGEOLOGY		
	Major Water bearing Formation (Aquifer)	Fine to coarse Sand	
	Avg. Depth to water level (decadal)	Depth to water level May 2015(mbgl)	
	• Pre- monsoon: (May 2015) 15.40- 19.10 (mbgl)	10.00- 20.00 (mbgl)	
	• Post –monsoon: (Nov2014) 14.70 – 18.90 (mbgl)		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*2*	
	• Depth Range (m)	*308.76-500.0*	
	• Discharge (Ipm)	*484.5-4504*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*1450-4140*	
	• Storativity	*$1.8*10^{-3}$ to $8.04*10^{-3}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	*862*	*918*

	• NO3 (mg/l)	*9*	*77*
	• F (mg/l)	*0.77*	*2.02*
	• As (mg/l)	*0.3975*	*0.3975*
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (MCM)	124.45	
	• Existing Gross Ground Water Draft for Irrigation (MCM)	256.51	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)	4.17	
	• Existing Gross Ground Water Draft for all Uses (MCM)	260.68	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)	6.57	
	• Net Ground Water Availability for Future Irrigation Development (MCM)	-138.63	
	• Stage of Ground Water Development / Over Draft (%)	209	
	• 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)* *28.5*	Percentage % 57

10	Volume of unsaturated zone available for recharge (MCM)	424.05
11.	Volume of water required for recharge (MCM)	564.05
12.	Volume of surplus water available for recharge(MCM)	18.42

RECHARGE/ CONSERVATION STRUCTURES		Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge in mcm
13	Farm Recharge@ Rs 35000/-	3784	13.24	2.526
14	RWH Rural @ Rs. 25000/-	2572	6.43	0.137
15	RWH Urban@ Rs. 25000/-	1005	2.51	0.071
16	Underground pipe line (area in hectares) @ Rs. 50000/-	16226	81.13	61.45
	TOTAL		**103.31**	**64.20**


BLOCK TARN TARAN DISTRICT TARNTARAN, PUNJAB
DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON
VS
DECADAL MEAN TREND POST MONSOON
(2004-2013)
0 4 8 16
kilometers
N
W E
S
31°
35'
30'
25'
20'
45'
50'
55'
75° 00'
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
3518
No. of Recharge Structures in Rural Villages
1287
No. of Recharge Structures in Urban Towns
3576
Recharge Pits in Agricultural Land
40
Thickness of Sand
Canal Network
Water Bodies

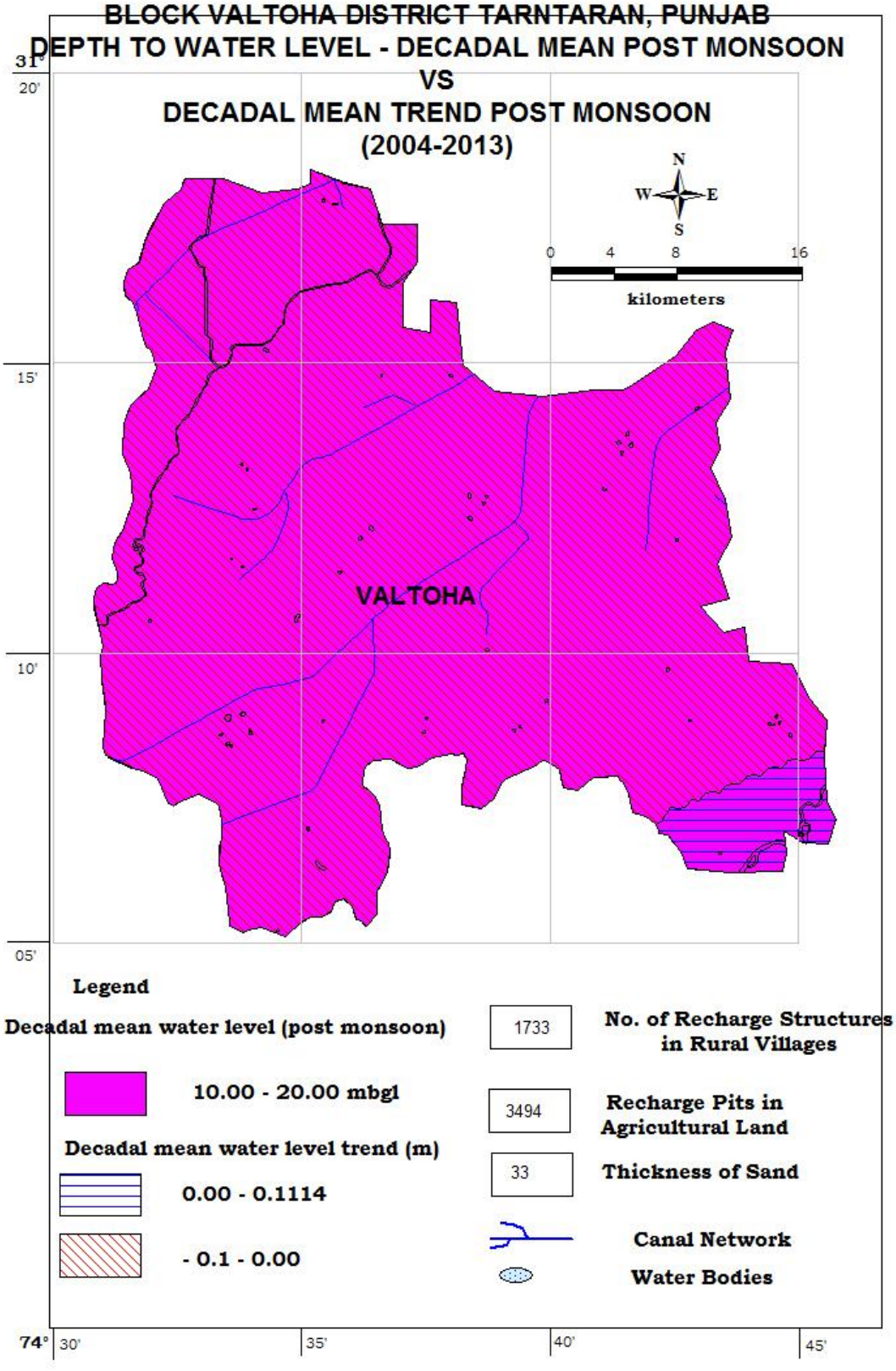
Ground Water Scenario of Block

Block Name:- Tarn Taran **District:- Tarn Tarn**		**State:- PUNJAB**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*320*
	• Number of Villages inhabited • Un-inhabited	*106* *0*
	ii) Average Annual Rainfall (mm)	*562*
	iii) Area feasible for Artificial Recharge	*320*
	iv) Village identified under scarcity of Water	*86*
	v) Village covered under water supply	*86*
	vi) Water Tank exists in the village	*50*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Ravi 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	345.96
	• Net Area Sown (Sq.Km)	295.30
	• Area Sown More than Once (Sq.Km)	2.87
	• Total Cropped Area (Sq.Km)	298.17

	• Cropping Intensity	101	
	• Area under Thur and Sem (Sq.Km)	--	
4.	PREDOMINAT GEOLOGICAL FORMATIONS	*Recent alluvium*	
5.	HYDROGEOLOGY		
	Major Water bearing Formation (Aquifer)	Fine to coarse Sand	
	Avg. Depth to water level (decadal)	Depth to water level May 2015(mbgl)	
	• Pre- monsoon: (May 2015) 15.30 – 20.40 (mbgl)	*10.00-40.00 (mbgl)*	
	• Post –monsoon: (Nov2014) 14.00- 18.94 (mbgl)		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*1*	
	• Depth Range (m)	*308.76-500.0*	
	• Discharge (Ipm)	*484.5-4504*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*1450-4140*	
	• Storativity	*$1.8*10^{-3}$ to $8.04*10^{-3}$*	
	• 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)	--	--
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (MCM)	147.34	
	• Existing Gross Ground Water Draft for Irrigation (MCM)	280.26	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)	5.76	
	• Existing Gross Ground Water Draft for all Uses (MCM)	286.02	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)	9.05	
	• Net Ground Water Availability for Future Irrigation Development (MCM)	-141.97	
	• Stage of Ground Water Development / Over Draft(%)	194	
	• 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)* *40*	Percentage % 80
10	Volume of unsaturated zone available for recharge (MCM)	361.38	

11.	Volume of water required for recharge (MCM)			480.68
12.	Volume of surplus water available for recharge(MCM)			15.70
RECHARGE/ CONSERVATION STRUCTURES		Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge in mcm
13	Farm Recharge@ Rs. 35000/-	3576	12.51	2.705
14	RWH Rural @ Rs. 25000/-	3518	8.79	0.234
15	RWH Urban@ Rs. 25000/-	1287	3.21	0.114
16	Underground pipe line (area in hectares) @ Rs. 50000/-	13613	68.07	67.14
	TOTAL		**92.58**	**95.636**


BLOCK VALTOHA DISTRICT TARNTARAN, PUNJAB
DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON
VS
DECADAL MEAN TREND POST MONSOON
(2004-2013)
N
W
E
S
0
4
8
16
kilometers
VALTOHA
31°
20'
15'
10'
05'
74°
30'
35'
40'
45'
Legend
Decadal mean water level (post monsoon)
10.00 - 20.00 mbgl
Decadal mean water level trend (m)
0.00 - 0.1114
- 0.1 - 0.00
1733
No. of Recharge Structures in Rural Villages
3494
Recharge Pits in Agricultural Land
33
Thickness of Sand
Canal Network
Water Bodies

Ground Water Scenario of Block

Block Name:- Valtoha **District:- Tarn Tarn**		**State:- PUNJAB**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*327.5*
	• Number of Villages inhabited • Un-inhabited	*65* *4*
	ii) Average Annual Rainfall (mm)	*408*
	iii) Area feasible for Artificial Recharge	*327.5*
	iv) Village identified under scarcity of Water	*59*
	v) Village covered under water supply	*59*
	vi) Water Tank exists in the village	*38*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	 *Satluj 60%* *Ravi 40%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	399.16
	• Net Area Sown (Sq.Km)	348.63
	• Area Sown More than Once (Sq.Km)	3.06
	• Total Cropped Area (Sq.Km)	351.69

	• Cropping Intensity	101	
	• Area under Thur and Sem (Sq.Km)	--	
4.	PREDOMINAT GEOLOGICAL FORMATIONS	*Recent alluvium*	
5.	HYDROGEOLOGY		
	Major Water bearing Formation (Aquifer)	Fine to coarse Sand	
	Avg. Depth to water level (decadal)	Depth to water level May 2015 (mbgl)	
	• Pre- monsoon: (May 2015) 6.12 – 17.55 (mbgl)	*5.00-20.00 (mbgl)*	
	• Post –monsoon: (Nov2014) 5.00 – 17.33 (mbgl)		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*2*	
	• Depth Range (m)	*308.76-500.0*	
	• Discharge (Ipm)	*484.5-4504*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*1450-4140*	
	• Storativity	*$1.8*10^{-3}$ to $8.04*10^{-3}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	*1001*	*1001*
	• NO3 (mg/l)	*1*	*1*

	• F (mg/l)	*0.28*	*0.28*
	• As (mg/l)	--	--
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (MCM)	133.67	
	• Existing Gross Ground Water Draft for Irrigation (MCM)	220.28	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)	2.03	
	• Existing Gross Ground Water Draft for all Uses (MCM)	222.30	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)	3.23	
	• Net Ground Water Availability for Future Irrigation Development (MCM)	-89.83	
	• Stage of Ground Water Development / Over Draft(%)	166	
	• 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)* *33*	Percentage % 66

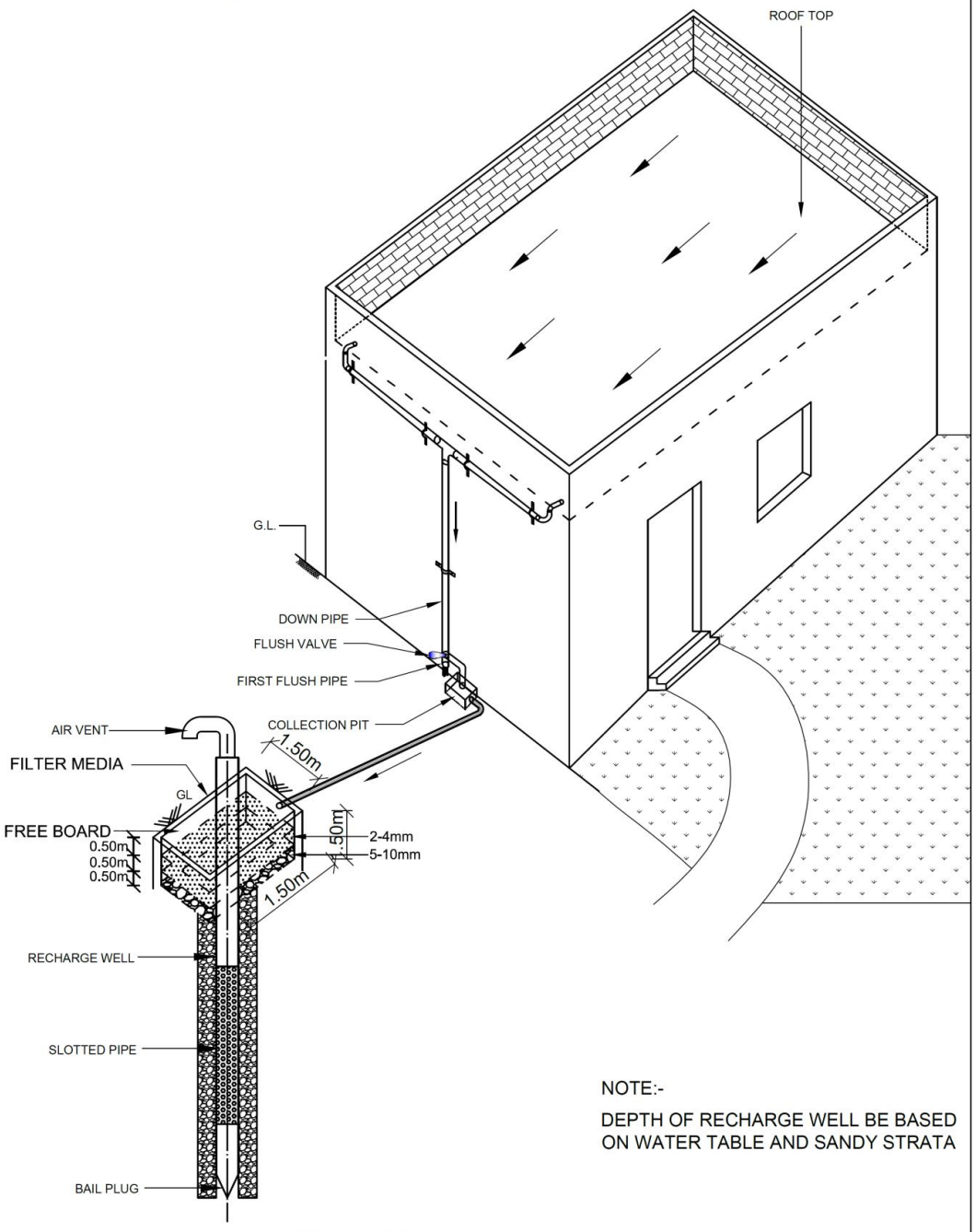
10	Volume of unsaturated zone available for recharge (MCM)	369.85
11.	Volume of water required for recharge (MCM)	491.95
12.	Volume of surplus water available for recharge(MCM)	16.07

RECHARGE/ CONSERVATION STRUCTURES		Total Number of Recharge Structures	Total Cost (Rs. in crores)	Total Recharge in mcm
13	Farm Recharge@ Rs. 35000/-	3494	12.22	2.112
14	RWH Rural @ Rs. 25000/-	1733	4.33	0.084
15	RWH Urban@ Rs. 25000/-	-	-	-
16	Underground pipe line (area in hectares) @ Rs. 50000/-	16829	84.15	52.77
	TOTAL		**100.70**	**54.966**

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