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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 NAWANSHAHAR DISTRICT, PUNJAB

Central Ground Water Board
North Western Region
Chandigarh

PLAN OF ARTIFICIAL RECHARGE TO GROUND WATER IN OVER EXPLOITED BLOCKS DISTRICT NAWAN SHAHR PUNJAB

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

INTRODUCTION

Nawanshahr district, located in the eastern part of the Punjab State, forms a part of the Bist-Doab region. Geographically, it lies between North latitudes of 30°48′45″ and 31°16′15″ and East longitudes of 75°46′00″ and 76°26′30″ covering a geographical ambience of 1190 sq.km.

The area is bounded by Nawanshahar district in the north, Siwalik Hills in the northeast, Sutlej River in the south, Kapurthala district in the northwest and Jalandhar in the west.

Administratively, Nawanshahr district is divided into 2 tehsils namely Nawanshahr and Balachaur comprising five-development block Aur, Banga, Shahr, Saroya and Balachaur.

Physiographically, the area is bounded by NNW- SSE trending Siwalik Hills in the northeast and antecedent Sutlej River in the south, which forms the main drainage basin.

RAINFALL AND CLIMATE

The average annual rainfall in the district is 924 mm. The rainfall in the district in general increases from the south-west towards the north-east. About 70 % of the annual normal rainfall in the district is received during the period July to September, July being the rainiest month. Some rainfall is received mostly as thunder showers in June and in association with passing western disturbances in the cold season. After February, temperature begin to rise rapidly. June is generally the hottest month with the mean daily temperature at about 41˚C and the mean daily minimum at about 27˚C.

GEOMORPHOLOGY AND SOIL TYPES

The district forms a part of Indo-Gangetic alluvial plain. Geomorphologically, the area can be grouped into 2 units-alluvial fan and alluvial plains. Alluvial fans are mainly found in the foothills deposited by hill torrents. These alluvial fans coalesced to form Kandi formation and Sirowal formation, which runs parallel to Siwaliks.

The soils in the district can be grouped under Reddish Chestnut Soils and Tropical Arid Brown Soils (Weakly Solonized). These soils have formed from the alluvium deposited by rivers of Indus

system. The soils are generally loamy sand at the surface and calcareous sandy loam in the sub-surface layers.

Hydrogeology

The Nawanshahr district is covered by Quaternary alluvial deposit except in the north-eastern part, where the Siwalik hills of Tertiary age are exposed. The aquifer in the alluvial tracts of Banga, Aur and Nawanshahr block comprises sand and silt with intercalation of little clay and kankar. In Kandi formation, covering large parts of Balachaur and Saroya blocks, boulders, gravel, pebbles and coarse sand with several layers of lenticular and fringing clay forms the main water bearing formation.

Groundwater occurs under both unconfined as wells as confined conditions. In Kandi area and top aquifer of alluvial tract that extends to a depth range of 50 to 60m bgl groundwater occurs under unconfined condition. But towards south, groundwater occurs under semi-confined to confined condition particularly below 50 m depth that is in hydraulic continuity with the kandi area. Precipitation is the principal source of replenishment of groundwater in kandi area.

In unconfined aquifer, the depth to water level varies from 8.8 to 29.7m during pre monsoon and 8.3 to 23.7m during post monsoon season. Deeper water levels are observed in the north eastern part of the district where Tertiary Siwalik hills are exposed. Since the depth to water level is more than 5 m bgl, the whole district is not prone to water logging condition.

In major part of the district, the water level ranges between 10 and 30 m while the water level in the western and southern part is within the depth range of 5 to 10 m bgl. Seasonal fluctuation shows that in general there is an overall rise in the water level except in the eastern part and few isolated patches. However, the long term trend of water level of 10 years shows that there is a decline in water level in major part of the area ranging from 0.25 to 0.86 m /year except a few isolated patches where the rise is at the rate of 0.06 m/year which is insignificant.

The subsurface geology shows a marked difference between the north eastern Kandi belt and alluvial plain in the western part of the district. Hence the performance of aquifer and various aquifer parameters will also show variation. The shallow tubewells tapping 40 m of alluvial aquifer in Banga, Aur and Nawanshahr block shows more yield in the range of 1500-5700 lpm for drawdown of 4.6 and 5.6 m respectively while those in Kandi belt the yield is in the range of 708-1500 lpm for drawdown of 4.69-5.9 m respectively. Similarly the aquifer parameter also show vide variation from eastern to western part of the district. In the eastern part the hydraulic conductivity is 7 m/day and transmissivity is 645 m^2/day. While in the western part the value of K & T are 53 m/day and 2940 m^2/day respectively. Similarly the storage coefficient of the aquifer in southeastern part is $1.8*10^{-3}$ while it is of the order of $1.18*10^{-3}$ in the western part. The values of various aquifer parameters clearly indicates that the aquifer in the

western part of the district bear promising potential aquifer while the aquifer in the eastern part are intercalated by more clay layers.

Ground Water Resources

Ground Water Resource potential of the district has been assessed as per Ground Water Resource Estimation Methodology-1997 (GEC-97) by considering administrative block as the assessment unit by excluding hilly terrain. The gross groundwater draft of the district is 722.56 MCM whereas net groundwater resource is 627.46 MCM. The stage of groundwater development in three block viz. Aur, Banga and Nawanshahr exceeded 100%, thus categorised as over-exploited while in the remaining two blocks viz. Saroya and Balachaur are categorised under safe category. The stage of ground water development in the district as a whole is 115%.

GROUND WATER QUALITY

The ground water in the district is alkaline in nature with low to medium salinity. The chemical quality data from the shallow and deep aquifers indicate that all major cations (Ca, Mg, Na, K) and anions (CO_3, HCO_3, Cl, SO_4) are within the permissible limits set by BIS, 1991. In the western part of the district, electrical conductivity is slightly higher than 700 microsiemens/cm. While, the maximum value of 940 microsiemens/cm is reported at village Rahon..

GROUND WATER IRRIGATION SCENARIO

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

Distribution of Shallow Tubewells According to Owner's Holding Size

No. of shallow tube wells by size class of individual owner							
Sr.no	district	Marginal (0-1 ha)	Small (1-2 ha)	Semi-Medium (2-4 ha)	Medium (4-10ha)	Big (>=10 ha)	Total
1	**Nawan shahr**	**1452**	**3596**	**6098**	**4677**	**1212**	**17035**

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	**Nawan shahr**	**58**	**637**	**3580**	**4092**	**798**	**9165**

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	**Nawan shahr**	**719**	**4406**	**9410**	**2503**	**0**	**17038**

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	**Nawan shahr**	**628**	**25663**	**0**

PLAN OF THIS REPORT

In this plan 2 types of the recharge structures are proposed such as Roof Top Rain water harvesting in rural & urban areas and Recharge pits in agriculture lands of 5mt x5mt x3mt size. The pit will be surrounded by angle irons and barbed fencing. The size and depth depend on the availability of the land. The extra water available on the field will be stored in the pit and that will also be recharged to the ground water.

A summery outline of the artificial recharge plan for the entire district of each block is given at the beginning in tabular forms. This is followed by the salient features of each block along with the detailed structure-wise recharge plan and cost estimates.

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

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

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

S N	Type of Structure	No. of structures	Unit cost in Lakhs	Total cost of structure in Crores	Annual Recharge (MCM)
ROOF TOP RAIN WATER HARVESTING IN RURAL AND URBEN AREAS					
1	**Artificial Recharge Plan For Urban Areas.**	2062	0.25	**5.155**	**0.1402**
2	**Roof Top Rain Water Harvesting in Rural Areas**	6898	0.25	**17.245**	**0.607**
	Total	**8960**	**0.25**	**22.40**	**0.7472**
ARTIFICIAL RECHARGE IN FARMS					
1	**Artificial Recharge Plan Through Recharge Pits.**	7390	0.35	25.865	8.16
			Total	**25.865**	**8.168**

By the implementation of the proposed recharge structures there will be a reduction of 1.27 % 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	**722.56**	**-98.83**	**8.915**	**713.645**	**115%**	**113.73%**	**1.27%**

ARTIFICIAL RCEHARGE PLAN THROUGH RECHARGE PITS IN OVER EXPLOITED BLOCKS NAWAN SHAHR DISTRICT

Block Name	Total area of the village (in hectares)	10% of village area taken for farm recharge (hectares)	Total number of recharge pits	Annual recharge (MCM)= (Area*Runoff 15%*)	Cost of Pit @Rs.0.35lakh (Crores)
Banga	**26230**	**2623**	**2623**	**2.739**	**13.12**
Aur	**22030**	**2203**	**2203**	**2.290**	**11.02**
Nawan Shahr	**25640**	**2564**	**2564**	**3.139**	**12.82**
			7390	**8.168**	**36.95**

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 NAWAN SHAHR DISTRICT OF PUNJAB								
Name of District	Sr.no	Name of CD Block	Total area of the village (in hectares)	Number of households (2011 census)	No of Houses taken for Artificial Recharge	Total No of AR Structures	Total recharge in MCM	Cost @ 0.25 Lacs/structure (Crores)
NAWAN SHAHR	1	Banga	**26234**	**28201**	**2820**	**2820**	**0.236**	**7.1**
	2	Aur	**22027**	**19099**	**1910**	**1910**	**0.159**	**4.8**
	3	Nawan Shahr	**25644**	**21682**	**2168**	**2168**	**0.212**	**5.4**
		Total	**73905**	**68982**	**6898**	**6898**	**0.607**	**17.2**

ARTIFICIAL RECHARGE PLAN FOR URBAN AREAS OF DISTRICT NAWAN SHAHR 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 @Rs.0.25 lakh (Crores)
NAWAN SHAHR	BANGA	BANGA (M CL)	4401	20906	440	88020	0.049	1.1
	AUR	AUR (CT)	864	4063	86	17280	0.010	0.22
	AUR	SALOH (CT)	971	4481	97	19420	0.011	0.24
	NAWAN SHAHR	NAWAN SHAHR (M CL)	10073	46024	1007	201460	0.0132	2.52
	NAWAN SHAHR	RAHON (MCL)	3260	15676	326	65200	0.043	0.82
	NAWAN SHAHR	KHOTHRAN (CT)	1055	5046	106	21100	0.014	0.27
		TOTAL	20624	96196	2062	412480	0.1402	5.16

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 26203tubewells operated by farmers for irrigation through unlined/Katcha (97.61%) open channel system in Nawanshahar 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 Nawanshahar district is estimated at 699.90 MCM. It is expected that around 30.58% 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 509.53 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 Nawanshahar Districts. The measure if implemented will bring down the ground water overdraft from 107% to 76 %. 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, NAWANSHAHAR 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
670.30	714.15	699.90	14.60	97.61	204.95	494.95	509.53	107	76	30.58

 # 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. Crores. District wise
1	**2**	**3**	**4**	**5**	**6**	**7**
NAWANSHAHAR	Banga	**19762**	**97.61**	**19290**	**96.45**	**405.27**
	Aur	**18348**	**97.61**	**17909**	**89.55**	
	Nawanshahr	**19964**	**97.61**	**19487**	**97.43**	
	Saroya	**10604**	**97.61**	**10351**	**51.75**	
	Balachour	**14361**	**97.61**	**14018**	**70.09**	

SALIENT FEATURES OF HYDROGEOLOGY OF DISTRICT NAWAN SHAHR

Wells Feasible	Rigs Suitable	Depth of Well (m)	Discharge (lpm)	Suitable Artificial Recharge Structures
Tube Wells	Direct and Reverse Rotary	40 - 145	1300 - 3000	Recharge Shaft And Recharge Trench
Tube Wells	Direct and Reverse Rotary	45 - 80	1000 - 1300	Recharge Shaft And Recharge Trench
Tube Wells	Direct and Reverse Rotary	40 - 50	600 - 1000	Recharge Shaft And Recharge Trench

DEPTH TO WATER LEVEL NOVEMBER 2014

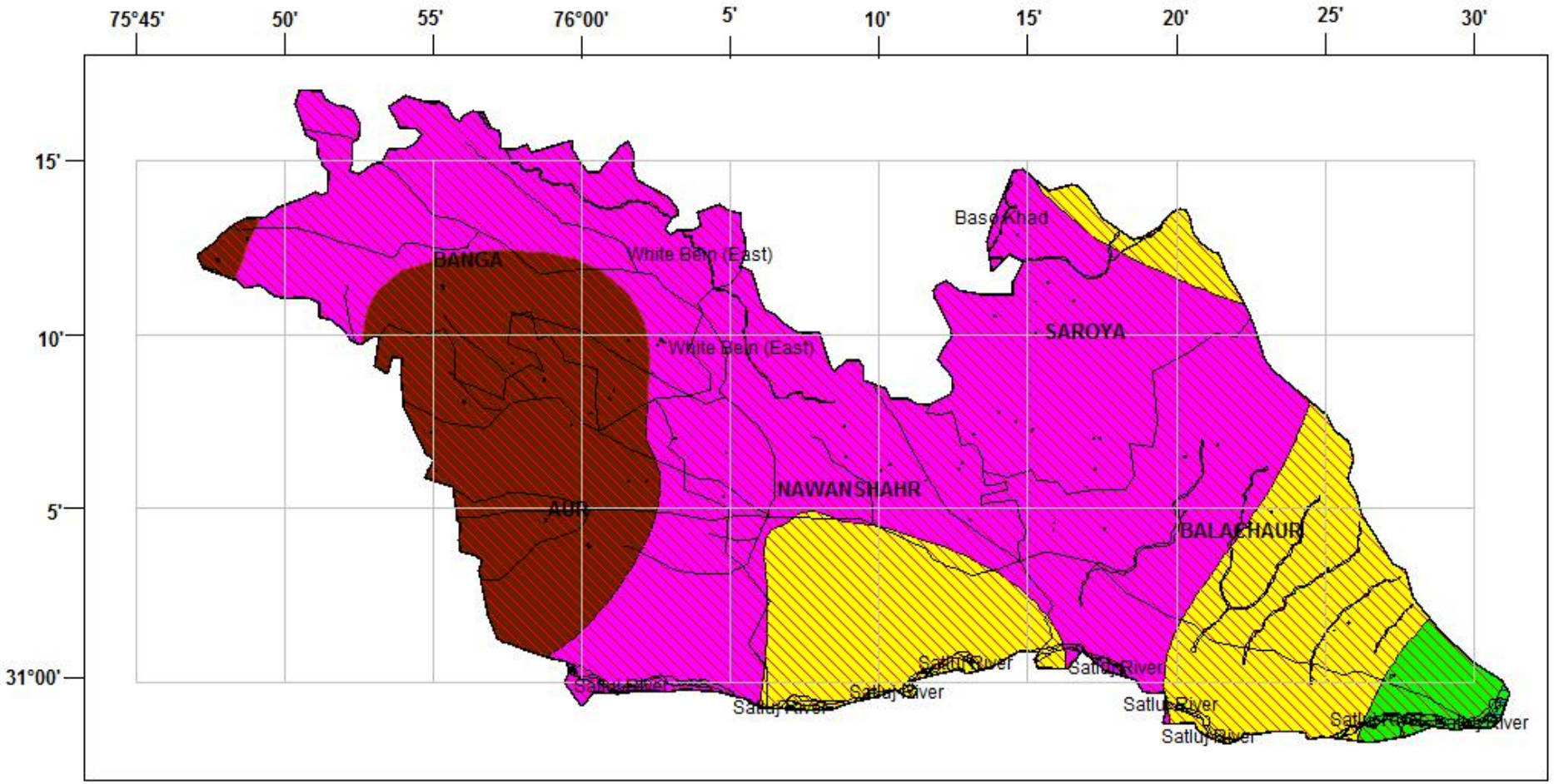
- 2.00 - 5.00 mbgl
- 5.00 - 10.00 mbgl
- 10.00 - 20.00 mbgl
- 20.00 - 40.00 mbgl

- National Highway
- Canals
- Water Bodies
- Major Drainage
- International Boundary
- State Boundary
- Block Boundary
- Block Headquarters

OTHER INFORMATION

Name of State	Punjab
Name of District	Nawan Shahr
Geographical Area	1190 sq.km.
Major Geological Formation	Alluviam and Shiwaliks
Major Drainage System	Satluj
Population (as on 2011)	6,14,362
Total Number of Blocks	5
Existing Major/Medium Irrigation Projects	Bist Doab Canal
Utillizable Ground Water Resources 2011	627.46 (mcm)
Net Ground Water Draft	722.56 (mcm)
Stage of Ground Water Development	115 %
Average Annual Rainfall	924 mm
Range of Mean Daily Temperature	6- 41°C
Over Exploted Blocks	AUR BANGA NAWAN SHAHR

PLAN OF ARTIFICIAL RECHARGE TO GROUND WATER
DISTRICT NAWAN SHAHR, PUNJAB



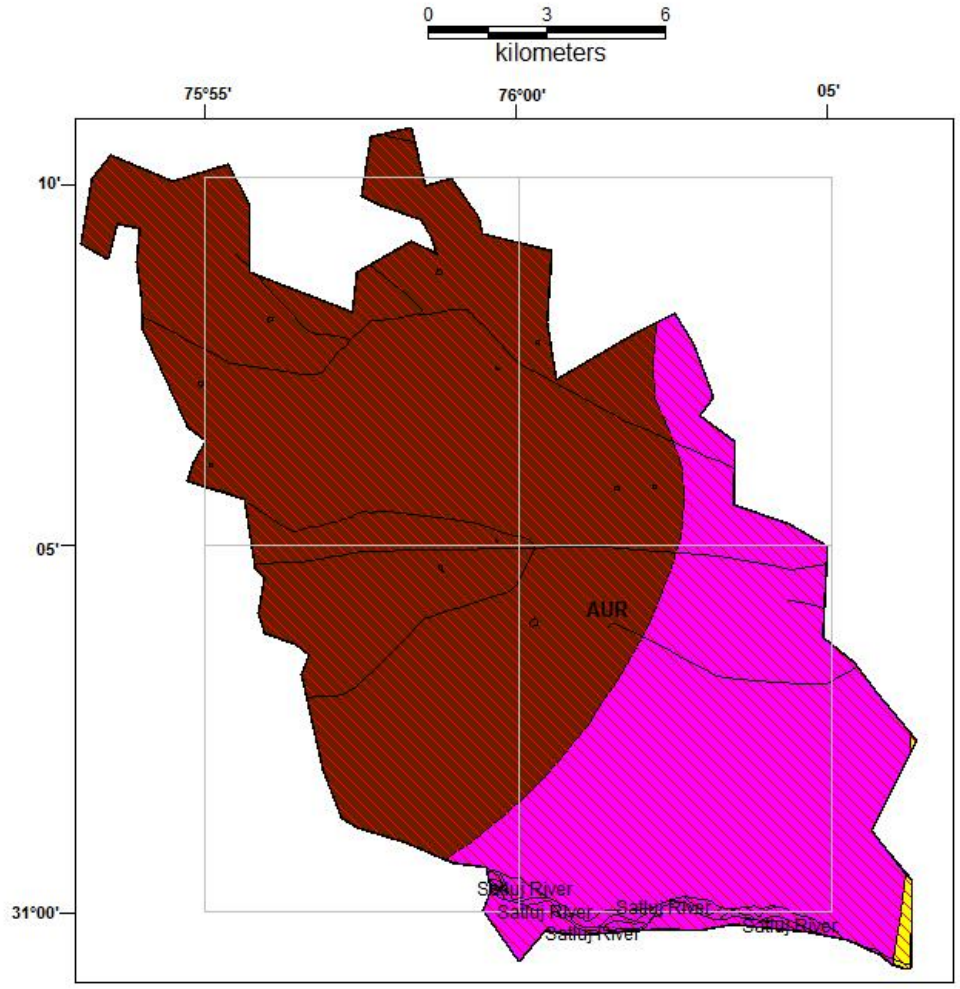
Legend

Refer Silent features of Hydrogeology Moga

BLOCK WISE PLAN OF DISTRICT NAWANSHAR PUNJAB

(3OE BLOCKS)

BLOCK AUR DISTRICT NAWAN SHAHR, 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
- 20.00 - 40.00 mbgl

Decadal mean water level trend (m)

- - 0.1 - 0.00

1910	No. of Recharge Structures in Rural Villages
183	No. of Recharge Structures in Urban Towns
2203	Recharge Pits in Agricultural Land
28	Thickness of Sand
	Canal Network
	Water Bodies

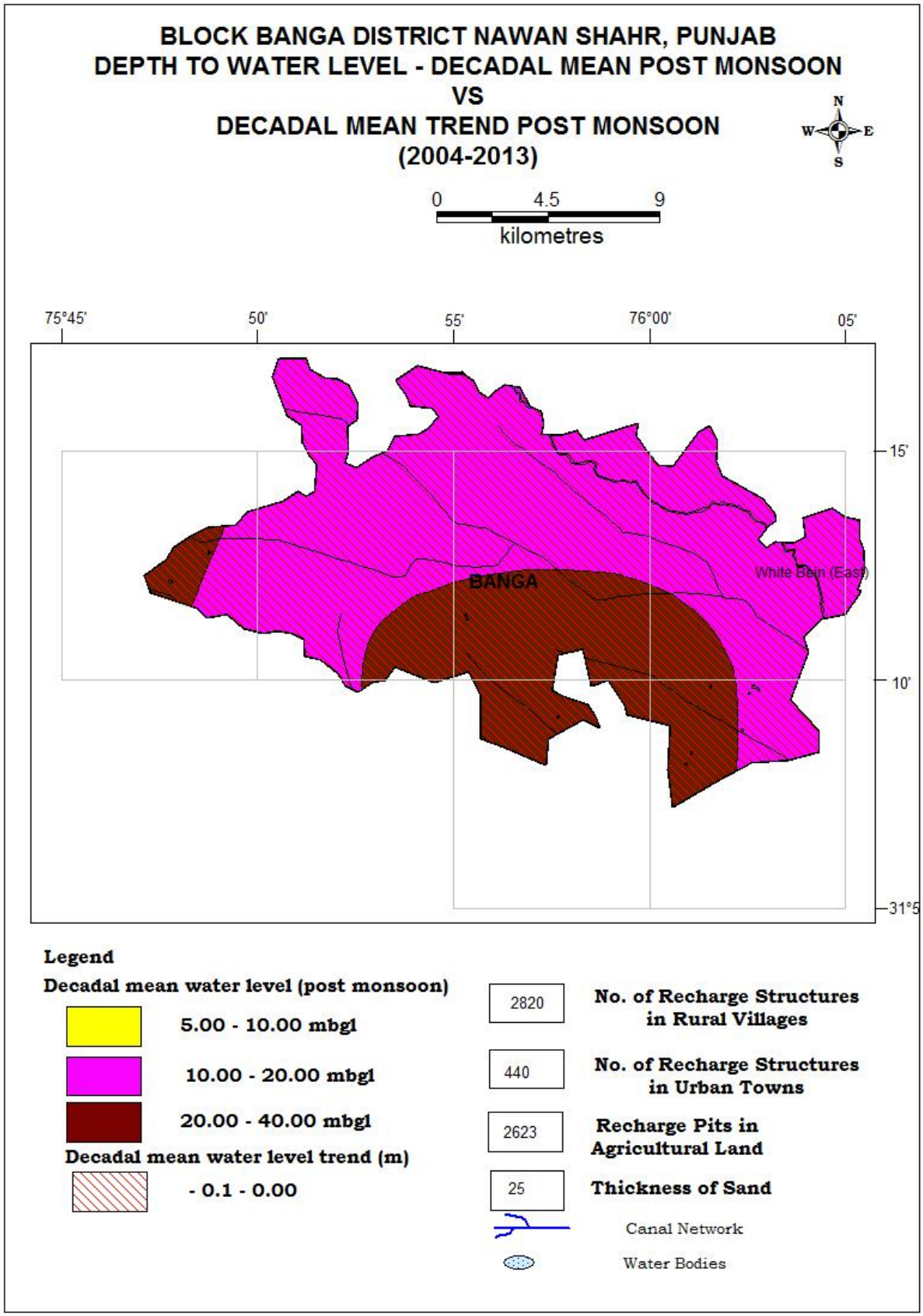
Ground Water Scenario of Block

Block Name:- Aur **District:- Nawanshahr**		**State:- PUNJAB**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*218.50*
	• Number of Villages inhabited • Un-inhabited	*75* *3*
	ii) Average Annual Rainfall (mm)	*698*
	iii) Area feasible for Artificial Recharge	*218.50*
	iv) Village identified under scarcity of Water	*59*
	v) Village covered under water supply	*80*
	vi) Water Tank exists in the village	*38*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Satluj 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	229.33
	• Net Area Sown (Sq.Km)	199.95
	• Area Sown More than Once (Sq.Km)	199.95
	• Total Cropped Area (Sq.Km)	399.90
	• Cropping Intensity	200
	• Area under Thur and Sem (Sq.Km)	--
4.	PREDOMINAT GEOLOGICAL FORMATIONS	*Recent alluvium*
	HYDROGEOLOGY	

5.	Major Water bearing Formation (Aquifer)	Fine to coarse Sand	
	Avg. Depth to water level (decadal)	Depth to water level May 2015(mbgll)	
	• Pre- monsoon: (May 2015) • *14.23-14.23 (mbgl)*	*10.00-40.00 (mbgl)*	
	• Post –monsoon: (Nov2014) • *14.35-14.35(mbgl)*		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*1*	
	• Depth Range (m)	*101.0-451.8*	
	• Discharge (Ipm)	*5670*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*5750*	
	• Storativity	*$6.0*10^{-3}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	*449*	*449*
	• NO3 (mg/l)	*9.5*	*9.5*
	• F (mg/l)	*0.54*	*0.54*
	• As (mg/l)	--	--
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (Mcm)	134.72	
	• Existing Gross Ground Water Draft for Irrigation (Mcm)	240.42	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (Mcm)	2.30	
	• Existing Gross Ground Water Draft for all Uses (Mcm)	242.72	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (Mcm)	2.91	
	• Net Ground Water Availability for Future Irrigation Development (Mcm)	-108.61	

	• Stage of Ground Water Development / Over Draft (%)	180	
	• 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*	Percentage % 56
10	Volume of unsaturated zone available for recharge (MCM)	331.46	
11.	Volume of water required for recharge (MCM)	440.7	
12.	Volume of surplus water available for recharge(MCM)	1.80	

	RECHARGE/ CONSERVATION STRUCTURES	**Total Number of Recharge Structures**	**Total Cost (Rs. in crores)**	**Total Recharge/ Water saving in MCM**
13	Farm Recharge @Rs. 35000/-	2203	**7.71**	**2.290**
14	RWH Rural @ Rs. 25000/-	1910	**4.78**	**0.159**
15	RWH Urban@ Rs. 25000/-	183	**0.46**	**0.021**
16	Underground pipe line (area in hectares) @ Rs. 50000/-	17909	**89.55**	**27.08**
TOTAL			**102.49**	**29.55**


BLOCK BANGA DISTRICT NAWAN SHAHR, PUNJAB
DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON
VS
DECADAL MEAN TREND POST MONSOON
(2004-2013)
N
W
E
S
0
4.5
9
kilometres
75°45'
50'
55'
76°00'
05'
15'
10'
31°5
BANGA
White Bein (East)
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)
- 0.1 - 0.00
2820
No. of Recharge Structures in Rural Villages
440
No. of Recharge Structures in Urban Towns
2623
Recharge Pits in Agricultural Land
25
Thickness of Sand
Canal Network
Water Bodies

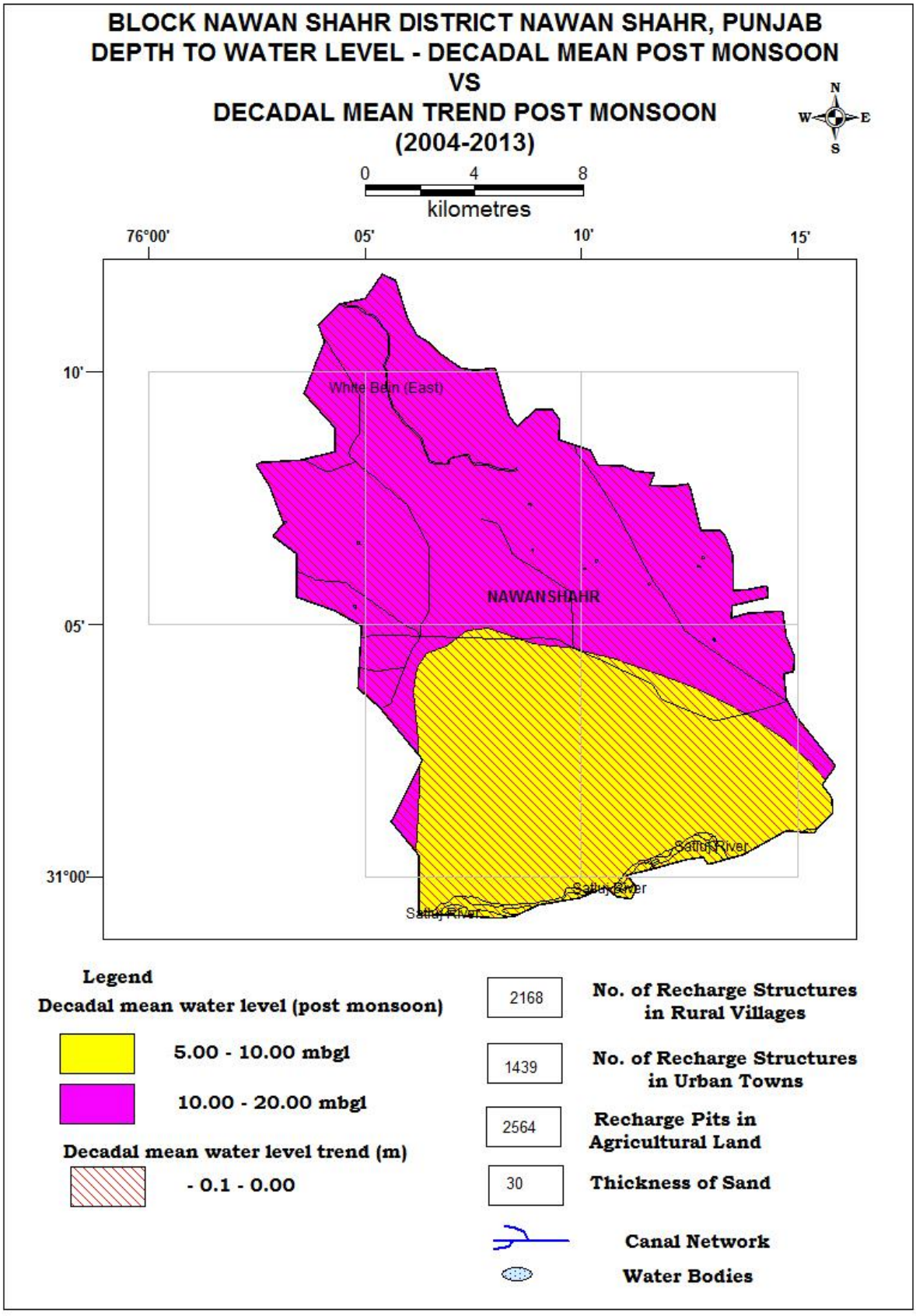
Ground Water Scenario of Block

Block Name:- Banga **District:- Nawanshahr**		**State:- PUNJAB**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*232.4*
	• Number of Villages inhabited • Un-inhabited	*92* *2*
	ii) Average Annual Rainfall (mm)	*701*
	iii) Area feasible for Artificial Recharge	*232.4*
	iv) Village identified under scarcity of Water	*71*
	v) Village covered under water supply	*95*
	vi) Water Tank exists in the village	*66*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Satluj 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	265.96
	• Net Area Sown (Sq.Km)	230.10
	• Area Sown More than Once (Sq.Km)	230.10
	• Total Cropped Area (Sq.Km)	460.20
	• Cropping Intensity	200
	• Area under Thur and Sem (Sq.Km)	--
4.	PREDOMINAT GEOLOGICAL FORMATIONS	*Recent alluvium*
	HYDROGEOLOGY	

5.	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) • 15.60-20.20 (mbgl)	*10.00 – 40.00 (mbgl)*	
	• Post –monsoon: (Nov2014) • 16.00-21.40(mbgl)		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*2*	
	• Depth Range (m)	*101.0-451.8*	
	• Discharge (Ipm)	*5670*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*5750*	
	• Storativity	*$6.0*10^{-3}$*	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	--	--
	• NO3 (mg/l)	--	--
	• F (mg/l)	--	--
	• As (mg/l)	0.0018	0.0018
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (Mcm)	97.65	
	• Existing Gross Ground Water Draft for Irrigation (Mcm)	139.23	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (Mcm)	3.79	
	• Existing Gross Ground Water Draft for all Uses (Mcm)	143.02	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (Mcm)	4.79	
	• Net Ground Water Availability for Future Irrigation Development	-46.37	

	(Mcm)		
	• Stage of Ground Water Development /Over Draft (%)	146	
	• 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)	352.55	
11.	Volume of water required for recharge (MCM)	468.83	
12.	Volume of surplus water available for recharge(MCM)	1.92	

	RECHARGE/ CONSERVATION STRUCTURES	**Total Number of Recharge Structures**	**Total Cost (Rs. in crores)**	**Total Recharge/ Water saving in MCM**
13	Farm Recharge @Rs. 35000/-	2623	**9.18**	**2.739**
14	RWH Rural @ Rs. 25000/-	2820	**7.05**	**0.236**
15	RWH Urban@ Rs. 25000/-	440	**1.10**	**0.049**
16	Underground pipe line (area in hectares) @ Rs. 50000/-	19290	**96.45**	**40.33**
TOTAL			**113.78**	**43.354**


BLOCK NAWAN SHAHR DISTRICT NAWAN SHAHR, PUNJAB
DEPTH TO WATER LEVEL - DECADAL MEAN POST MONSOON
VS
DECADAL MEAN TREND POST MONSOON
(2004-2013)
N
W
E
S
0
4
8
kilometres
76°00'
05'
10'
15'
10'
05'
31°00'
White Bein (East)
NAWANSHAHR
Satluj River
Satluj River
Satluj River
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
2168
No. of Recharge Structures in Rural Villages
1439
No. of Recharge Structures in Urban Towns
2564
Recharge Pits in Agricultural Land
30
Thickness of Sand
Canal Network
Water Bodies

Ground Water Scenario of Block

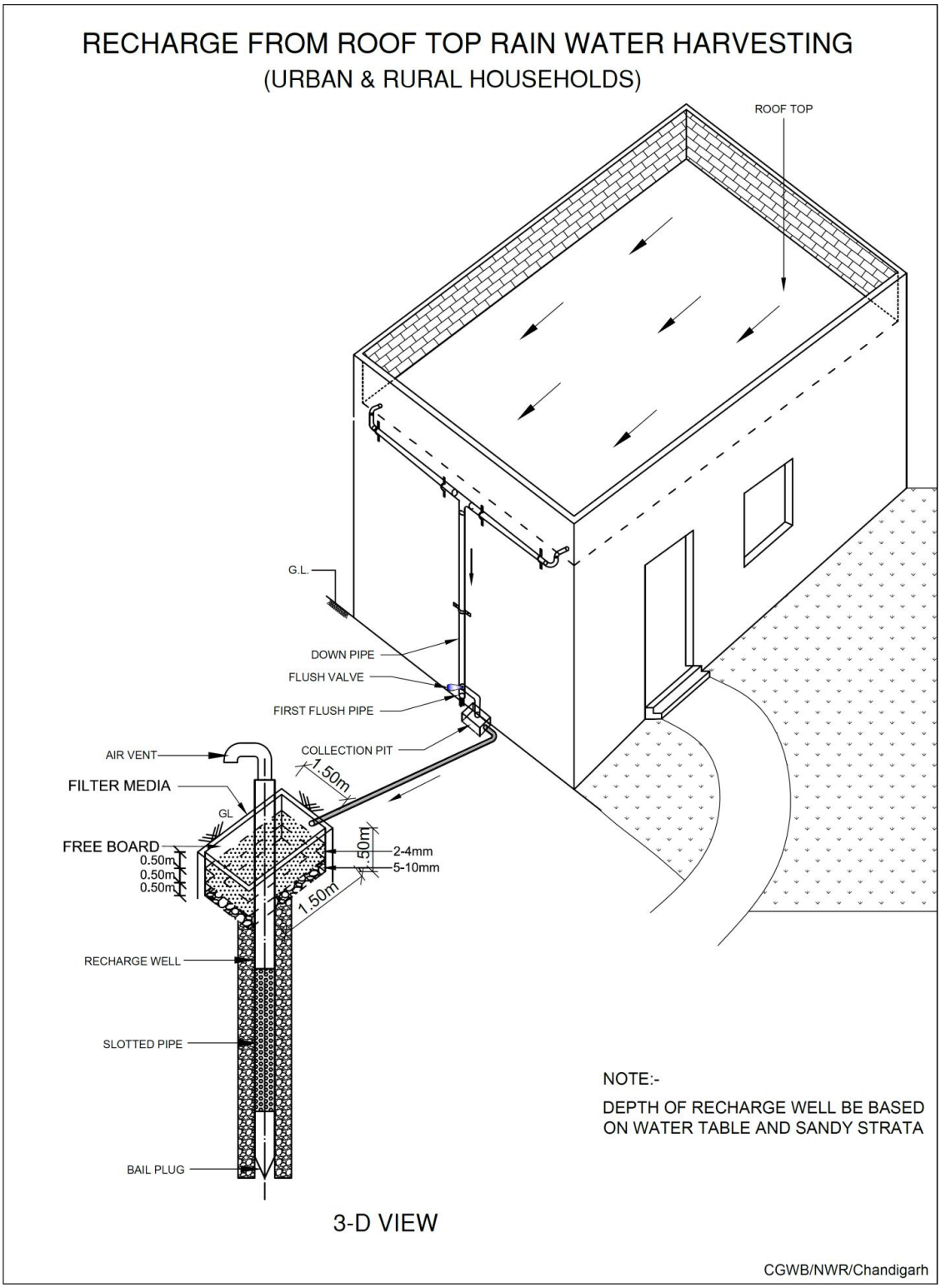
Block Name:- Nawan shahr **District:- Nawan shahr**		**State:- PUNJAB**
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*330.2*
	• Number of Villages inhabited • Un-inhabited	*98* *4*
	ii) Average Annual Rainfall (mm)	*828*
	iii) Area feasible for Artificial Recharge	*330.2*
	iv) Village identified under scarcity of Water	*94*
	v) Village covered under water supply	*100*
	vi) Water Tank exists in the village	*56*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	*Satluj 100%*
3.	LAND USE	
	• Area According to Village Papers (Sq.Km)	264.82
	• Net Area Sown (Sq.Km)	232.06
	• Area Sown More than Once (Sq.Km)	232.06
	• Total Cropped Area (Sq.Km)	464.12
	• Cropping Intensity	200
	• Area under Thur and Sem (Sq.Km)	--
4.	PREDOMINAT GEOLOGICAL FORMATIONS	*Recent alluvium*
	HYDROGEOLOGY	

5.	Major Water bearing Formation (Aquifer)	Fine to coarse Sand	
	Avg. Depth to water level (decadal)	Depth to water level May 2015 (mbgll)	
	• Pre- monsoon: (May 2015) • 5.01-16.30 (mbgl)	*10.00 – 20.00 (mbgl)*	
	• Post –monsoon: (Nov2014) • 4.99-15.70(mbgl)		
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)		
	• No of wells drilled	*2*	
	• Depth Range (m)	*101.0-451.8*	
	• Discharge (Ipm)	*5670*	
	Aquifer Parameters		
	• Transmissivity (m2/day)	*5750*	
	• Storativity	$6.0*10^{-3}$	
	• Specified yield	*0.072*	
7.	GROUND WATER QUALITY	Min	Max
	• EC in µS/cm at 25^0c	*923*	*1280*
	• NO3 (mg/l)	*2*	*180*
	• F (mg/l)	*0.02*	*0.35*
	• As (mg/l)	0.004	0.004
8.	DYANMIC GROUND WATER RESOURCES in MCM	**2011**	
	• Net Ground Water Availability (Mcm)	220.72	
	• Existing Gross Ground Water Draft for Irrigation (Mcm)	218.22	
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (Mcm)	3.74	
	• Existing Gross Ground Water Draft for all Uses (Mcm)	221.96	
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (Mcm)	4.73	
	• Net Ground Water Availability for Future Irrigation Development (Mcm)	-2.23	

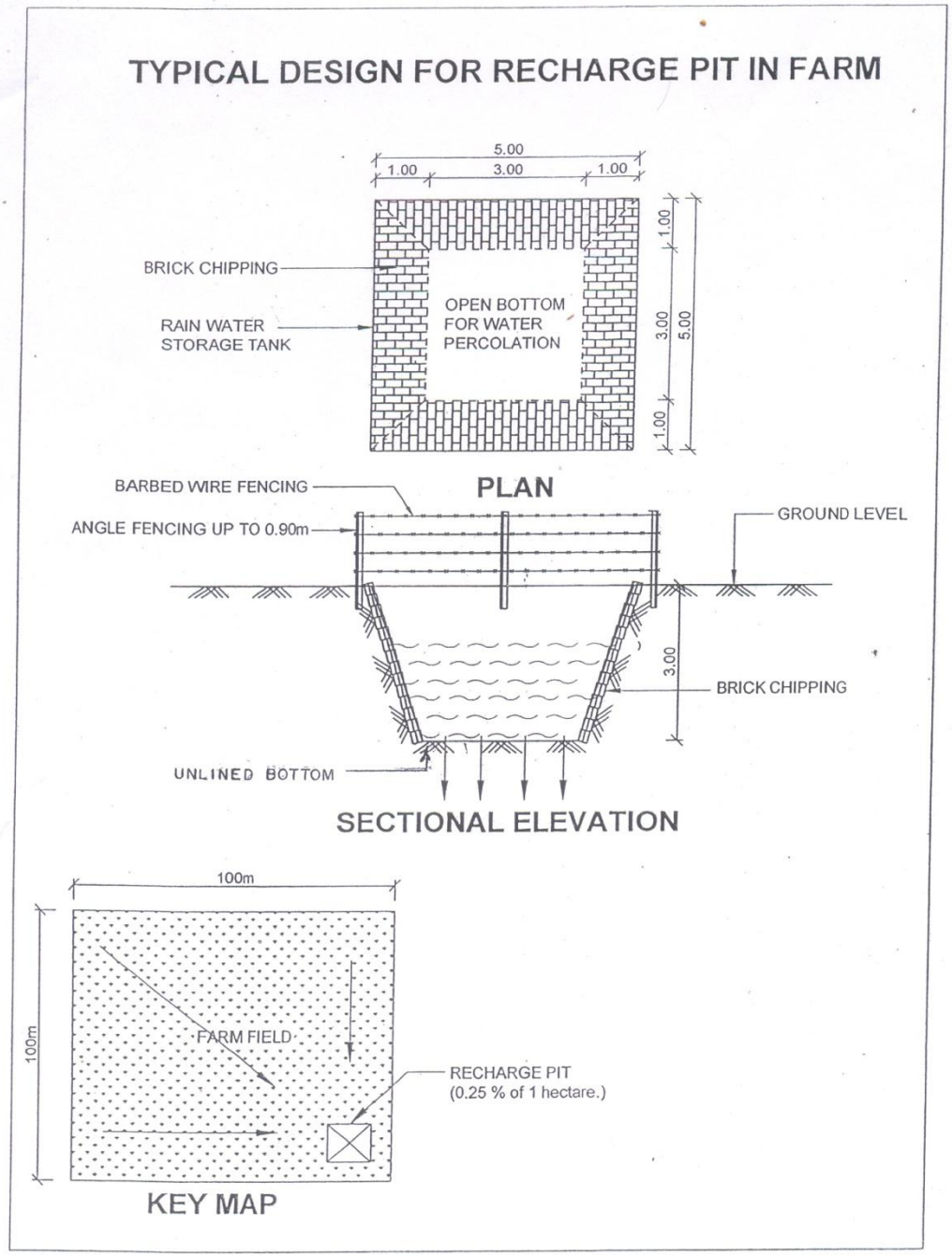
	• Stage of Ground Water Development / Over Draft (%)	101	
	• Category of Block	OE	
	Any specific reasons for high stress on ground water leading to Overexploitation and decline in ground water level	*Extensive Irrigation*	Extensive Irrigation
9.	Percentage of sand thickness up to 50 m depth (Average)	*Thickness(m) 30*	Percentage % 60
10	Volume of unsaturated zone available for recharge (MCM)	500.91	
11.	Volume of water required for recharge (MCM)	666.13	
12.	Volume of surplus water available for recharge(MCM)	2.72	

	RECHARGE/ CONSERVATION STRUCTURES	**Total Number of Recharge Structures**	**Total Cost (Rs. in crores)**	**Total Recharge/ Water saving in MCM**
13	Farm Recharge @Rs. 35000/-	2564	**8.97**	**3.139**
14	RWH Rural @ Rs. 25000/-	2168	**5.42**	**0.212**
15	RWH Urban@ Rs. 25000/-	1439	**3.60**	**0.070**
16	Underground pipe line (area in hectares) @ Rs. 50000/-	19487	**97.44**	**63.23**
TOTAL			**115.43**	**34.01**

Annexure-I


RECHARGE FROM ROOF TOP RAIN WATER HARVESTING
(URBAN & RURAL HOUSEHOLDS)
ROOF TOP
G.L.
DOWN PIPE
FLUSH VALVE
FIRST FLUSH PIPE
COLLECTION PIT
AIR VENT
FILTER MEDIA
GL
FREE BOARD
0.50m
0.50m
0.50m
1.50m
1.50m
1.50m
2-4mm
5-10mm
RECHARGE WELL
SLOTTED PIPE
BAIL PLUG
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