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

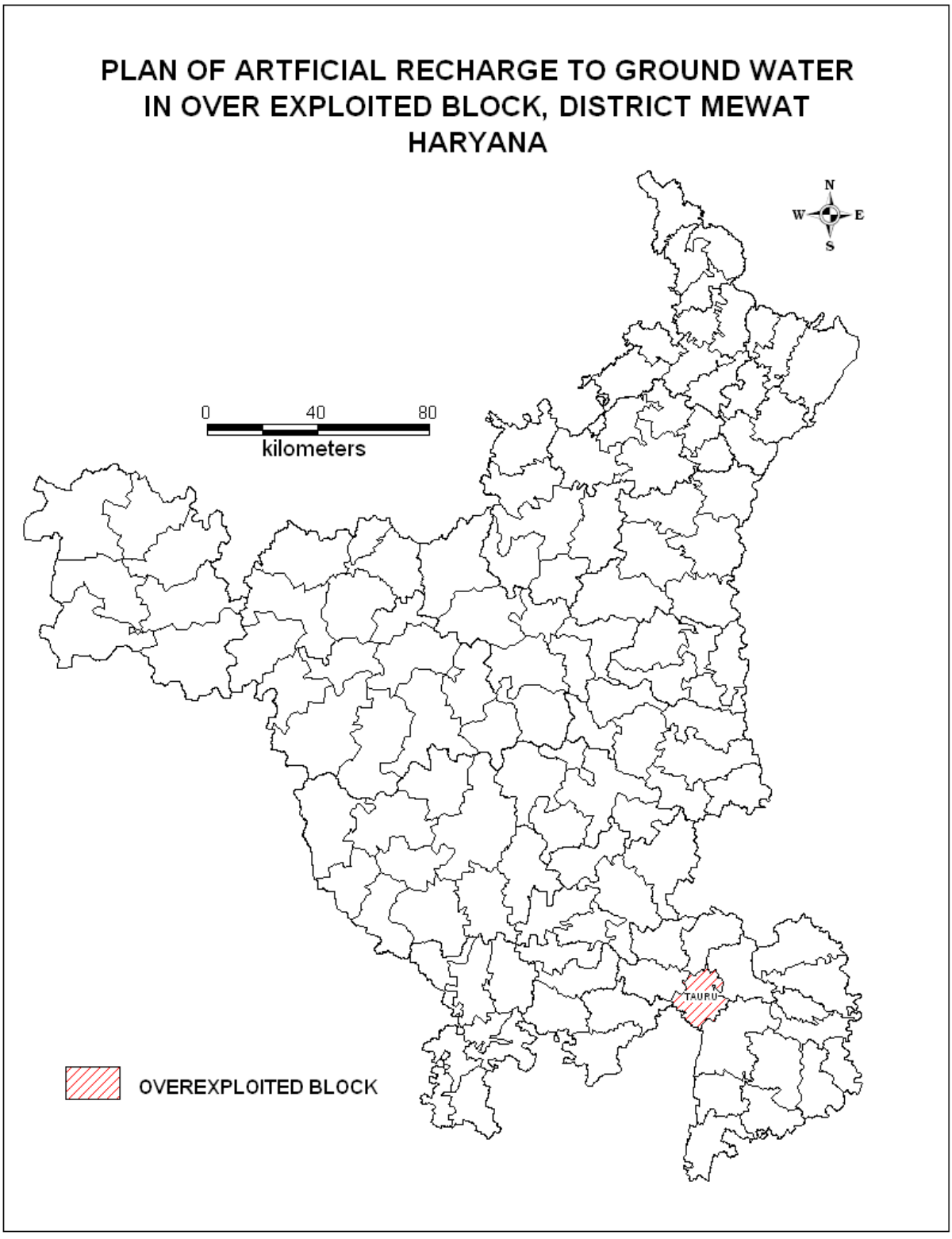
PLAN ON

ARTIFICIAL RECHARGE TO GROUND WATER AND WATER CONSERVATION IN

OVEREXPLOITED BLOCKS OF

MEWAT DISTRICT, HARYANA

Central Ground Water Board
North Western Region
Chandigarh


PLAN OF ARTFICIAL RECHARGE TO GROUND WATER
IN OVER EXPLOITED BLOCK, DISTRICT MEWAT
HARYANA
N
W
E
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0
40
80
kilometers
TAURU
OVEREXPLOITED BLOCK

PLAN OF ARTFICIAL RECHARGE TO GROUND WATER IN OVER EXPLOITED BLOCK, DISTRICT MEWAT HARYANA

INTRODUCTION

Mewat district is one of the 21 districts of Haryana state in northern India. The district was carved as the 20th district of Haryana from erstwhile Gurgaon and Hathin Block of Faridabad districts on 4 April 2005. Though Hathin Sub Division was shifted to New district Palwal in 2008.It is bounded by Gurgaon district on the north, Rewari district on the west and Faridabad and Palwal districts on the east. Nuh town is the headquarters of this district. The district occupies an area of 1859.61 km². The district has a population of 10,89,263 (2011 census). Mewat is populated by the Meos, who are agriculturalists.

Nuh town is Mewat district's headquarter. The district comprises Nuh, Tauru, Nagina, Firozpur Jhirka and Punhana blocks,431 villages and 8 towns.

HYDROMETEOROLOGY

The climate of the district can be classified as tropical steppe, semi-arid and hot which is mainly characterized by the extreme dryness of the Air except during monsoon months, intensely hot summers and cold winters. The normal annual rainfall is about 594 mm which is spread over 31 rainy days. 75% of rainfall occurs during south-west monsoon.

GEOMORPHOLOGY

The district area has undulating topography and is more or less bowl shaped. The sporadic ridges and hillocks make a semi- circle to the west, south and east of Punhana (27^0 51’45”:77^0 12’30”).The area does not have a general slope and rather shows distinct altitude differences in certain domains. The general slope in the area is NW-SE in the western part, NE-SW in north-eastern part. The central part is more or less flat. Seasonal streams from the hills west of Nuh drain flow towards southeast and fill up the natural depressions in central part of the district. Some topographic depressions in the area give rise to natural lakes.

Soils of the Mewat district are mostly salt affected. The soils are medium textured loamy sand and falls in low to medium category with 0.2 %to 0.75 % organic content. The average

conductivity of the soil is not more than (0.80 u mhos/cm) and the average pH of the soil is between 6.5 to 8.7. Soils of the district are suitable for cultivation of variety of crops.

HYDROGEOLOGY

The district area is mainly underlain by alluvium of Quaternary age which forms the principal ground water reservoir. Some amount of ground water also occurs in fractures, joints and crevices of hard rocks found as strike ridge in the district. The ground water in the upper zone exist down to 70 m depth, and hold water under phreatic condition. The aquifers that occur at deeper parts are confined to semi-confined. Central Ground Water Board has carried out exploratory drilling in Mewat district with the depth ranging between 39and 291 m. The data of the exploratory boreholes reveal that in the deeper zones, alluvial formation comprises sand, clay and kankar in varying proportions. These sediments rests upon the basement rocks of Delhi Super Group. Alluvium thickness varies from almost insignificant near to hill ranges to above 291meters in the area. The exploratory drilling in the area has revealed that at Alduka (28°07':77°07') in the central part the bed rock was encountered below a depth of 291 m bgl. At Gharrot in the east the depth of bed rock was 222m while at Bahin in southeast, the bed rock was reported at a depth of 147.5m. In Thekraka, at a place around central part, the depth to bed rock was mere 45m indicating highly undulating bed rock in entire Mewat area. In the northwest at Didhara (28°12'30":76°50') , the bed rock was encountered below 182m. In the southeast, at Hathangaon (27°43'40":77°15'50"), the bed rock was encountered at 84m depth. At Raoli (27°48':76°56') in the south, the bed rock was encountered below a depth of 88m in the form of alternate bands of slates and quartzites. Hence, it is concluded that thickness of alluvium is within 300 m in the central and eastern parts while in the remaining parts of Mewat it varies at few places around Santhabari, Raoli, Pingawan being within 90m bgl in general.

The ground water exploration data shows that the alluvial sediments consists of fine to medium sand, clay and kankar. Clay and sand beds are mostly mixed up with kankar. In Nuh block sand layers are few and the whole lithology is made up of clay and kankar. In Punhana

block, sand ratio predominates at 30 m depth zone. Otherwise clay ratio predominates at all other depth ranges throughout the district.

Aquifer Characteristics

In alluvium thin granular zones exist down to the entire thickness, which is negligible near quartzite outcrops. The quality of ground water is not fresh in shallow as well as deeper horizons in most parts of the district. Larger parts of Nuh, Nagina and Firozpur Jhirka blocks are underlain by brackish/saline ground water even at shallow levels. Significantly the density of tube wells is more in Tauru block, and it is less in Nuh, Nagina, Firozpur-Jhirka, and Punhana blocks.

Exploratory drilling at 24 sites was carried out by CGWB in alluvial as well as in hard rock formation in the district. Boreholes located at Hathangaon in Punhana block and at Palri proved successful. The boreholes at most of the sites had to be abandoned due to poor quality of formation water and/or inadequate aquifer zones. At Hathangaon, the tubewell tapped aquifer zones of 21 to 33 meter deep and yield 910 lpm for 5.64 metres of drawdown . The aquifer parameters determined at this site were :

Transmissivity = 593 m^2/day

Specific yield = 2.63×10^{-2} (2.63%)

Drilling has been carried out to a depth of 175m and 130m at Ghagas in Nagina block and Sidhravat in Firozpur Jhirka block in the hard rock formation in the district. The discharge of the tube well at Ghagas was 103 lpm at a drawdown of 54m and Transmissivity obtained was 0.5811 m^2 /day. Similarly the discharge of the tube well at Sidhravat was 144 lpm at a draw down of 28m and transmissivity value obtained was 1.9202 m^2/day.

The perusal of the data of exploratory boreholes also reveals that formation water in alluvial areas at deeper level is brackish to saline. The shallow ground water is fresh up to 20m depth.

Depth to Water Level

The depth to water table is between 2-32 mbgl. In central part it is between 2 to 10 m bgl. In Tauru block the depth to water varies from 12 to 32 mbgl. The shallowest water table is recorded to be 0.53 m bgl at Nuh Block. Water logging and shallow water conditions occur in a large area in the central and south eastern parts of the district covering blocks like Nuh, Nagina and Punhana with water level ranging between 3 – 5 mbgl.

Water Level Fluctuations

The area shows a seasonal rise in water levels between 1 to 4 metres, except small patches in parts of Punhana, Nuh, Nagina and Firozpur–Jhirka where the rise in water levels less than 1 metre is recorded. Maximum rise was recorded (3-5 m) in isolated patches of the southern parts of the district area.

On a long term basis most parts of the district show rising trend of water levels from 0.20 to 4 m over the period of 10 years. Quality of ground water is a major factor in the district for rising or stagnant water level trends. The area is having saline ground water even at shallow depth. Therefore the withdrawal of ground water is negligible in the area causing water logging at places. However, the Southern part of the district shows declining trend from 0.50 to 3.45 m bgl covering Ferozepur Jhirka block. Tauru block registers maximum declining trend in last 10 year ranging from 1.25 to 11.60 m bgl.

Ground Water Flow

Water table slopes north to south and south to north indicating natural trough in Nuh block. The ridge trending NNE-SSW direction, act as a ground water divide between the western and eastern part of area as indicated by the configuration of the water table on either side of the ridge.

GROUND WATER QUALITY

(Irrigation and drinking point of view)

Chemical quality data of shallow aquifers reveals that ground water is alkaline in nature & is moderate to highly saline with EC values generally ranging from 1890µS/cm to 9370µS/cm. A significant number of samples have conductivity values more than 3000 µS/cm. Concentration of vital chemical constituents such fluoride and nitrate in about 65% of the water samples are within permissible limits assigned by BIS 1991. Among trace metals, lead and iron are found to be present in high concentrations.

On comparing the observed concentrations with the concentration limits set by BIS, it is found that groundwater, in general, is not suitable for drinking use due to high levels of salinity, nitrate, iron and lead.

Plot of USSL diagram used for the classification of irrigation waters indicates that ground water fall under C_3S_1, C_3S_2, C_4S_1, C_4S_2 and C_4S_4 classes. More than 75% ground water, when used for

customary irrigation, is likely to cause salinity hazards and thus should be used on well-drained soils for semi-salt to salt tolerant crops such as wheat, gram and rice etc.

Presence of chemical constituents more than the permissible limits in the District is given below:

Constituent	No. of wells	Location with conc.
EC > 3000 µS/cm (n=11)	6	Max. 9370µS/cm at Sikarwa
Fluoride >1.5 mg/l (n=11)	1	Luhinge Kalan, 3.99mg/l
Arsenic > 0.01mg/l (n=8)	nil	--
Iron>1.0mg/l (n=12)	3	Max 1.95 mg/l at Akaira

Type of water: Mostly Na-Cl, Mixed cation-Cl type

SUITABILITY OF WATER

Domestic

Ground water occurring in the shallow aquifer is by and large saline, however potable water at places along canals and surface water bodies like ponds, where salinity has decreased, and in the areas falling near foot hills is collected for drinking purposes.

Irrigation

The shallow ground water upto a depth of 20m is by and large fresh and fit for irrigation. The deep ground water is saline, salinity increases with depth and that water is not fit for irrigation. However in a proximity of the hills fresh water occurs and is fit for irrigation.

Potability of Water (Based On Geophysical Survey)

Geophysical surveys in the district have brought out the following picture regarding ground water quality:

(i) Ground water is saline at all levels in almost 55% of area (1050 sq.km.) which includes mainly the Central,

Southern and Southeastern parts of Mewat around Nuh, Malab, Punhana.

(ii) Only 26 to 30 %(500 to 575 sq,Km.) area bears fresh water within 30m depth in entire Mewat. This area lies over northwest and southwest and includes the localities around Tauru block, Mohun, Ghata-shamsabad.

(iii) Only 13 % area (250 sq.km.) bears fresh water vertically beyond 40 m depth.(over Northwest and Southwest) in entire Mewat as evident from the qualitative analysis of apparent resistivity data for half current electrode separation of 50m,80m.,100m and 150m.These areas lie around Touru block in Northwest, Patkhori, Patan-udaipuri in Southwest of Mewat.

GROUND WATER RESOURCES:

The blockwise ground water potentials have been estimated based on methodology recommended by Ground Water Estimation Committee (1997) as on 31st March 2011. The net annual ground water availability in Mewat district is 22364 Ham out of this1755 Ham has been kept reserved for domestic and industrial purposes upto next 25 years. The present net ground water draft in the district is 18776 Ham. The average level of ground water development in the district is 84 % and falls in critical category. Therefore care is required for further development of ground water. In Tauru block (151 %) which fall in overexploited category, no further development of ground water should be taken up. Since a large area has shallow ground water levels within 5.0m, there is substantial potential recharge in the district.

GROUND WATER RESOURCE AND DEVELOPMENT POTENTIAL

Assessment Unit/Block	Net Ground Water Availability (Ham)	Existing Gross Ground Water Draft for irrigation (Ham)	Existing Gross Ground Water Draft for all uses (Ham)	Allocation for domestic and industrial requirement supply upto next 25 years (Ham)	Net Ground Water Availability for future irrigation development (Ham)	Stage of ground water Develop-ment in %	Category of Block
Ferozpur Jhirka	4533	3140	3410	438	955	75	Critical
Nagina	4479	18800	2092	344	2255	47	safe
Nuh	4787	3178	3496	494	1115	73	Critical
Punhana	5999	5716	5910	283	0	99	Semi-Critical
Tauru	2566	3672	3868	196	-1302	151	Over Exploited
Total	**22364**	**17586**	**18776**	**1755**	**3023**	**84**	

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)	Others	Total
1	**Mewat**	**0**	**213**	**1506**	**1718**	**6715**	**10152**

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	**Mewat**	**0**	**66**	**392**	**40**	**2874**	**3372**

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	**Mewat**	**0**	**0**	**9110**	**1042**	**0**	**10152**

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**	**Total**
1	**Mewat**	**9934**	**4132**	**14066**

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 and 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.

A-POTENTIAL FOR REDUCTION IN OVER DRAFT AFTER RAINWATER HARVESTING AND ARTIFICIAL RECHARGE

Sr.no.	Type of Structure	No. of structures	Unit cost in Lakhs	Total cost of structure in Crores	Annual Recharge (MCM)
ROOF TOP RAIN WATER HARVESTING IN RURAL AND URBEN AREAS					
1	**Artificial Recharge Plan For Urban Areas.**	532	0.25	1.33	0.054
2	**Roof Top Rain Water Harvesting in Rural Areas**	2012	0.25	5.03	0.154
	Total	**2544**	**0.25**	**6.36**	**0.208**
ARTIFICIAL RECHARGE IN FARMS					
1	**Artificial Recharge Plan Through Recharge Pits.**	3368	0.35	11.79	3.223
			Grand Total	**18.15**	**3.431**

A1. ARTIFICIAL RECHARGE PLAN FOR URBAN AREAS OF MEWAT DISTRICT							
Block	**Town Name**	**Total Households**	**Total Population of Town**	**Households taken for AR 10%**	**Total Roof Top Area (200 sqm) in cluster of 4-6 houses**	**Cost of recharge st @0.25lacs (Crores)**	**Volume of water available for recharge (MCM)**
1	3	2	3	4	5	6	7
TAURU	Tauru (MC)	4161	22599	416	83220	1.04	0.042
TAURU	Khori Kalan (37) (CT)	1164	6007	116	23280	0.29	0.012
		5327	**28609**	**532**	**106505**	**1.33**	**0.054**

A2.ROOFROP RAINWATER HARVESTING IN RURAL AREAS OF MEWAT DISTRICT								
Name of District	**Sr. No**	**Name of CD Block**	**Total area of the village (in hectares rounded up to one decimal place)**	**Number of households (2011 census)**	**No of Houses taken for Artificial Recharge (10% of total households)**	**Total No of AR Structures (one structure for each house)**	**Total recharge in MCM**	**Cost @rs.0.25 lakhs (Crores)**
MEWAT	**1**	**Tauru**	**21048**	**20117**	**2012**	**2012**	**0.154**	**5.03**
		TOTAL	**21048**	**20117**	**2012**	**2012**	**0.154**	**5.03**

A3.ARTIFICIAL RCEHARGE PLAN THROUGH RECHARGE PITS IN OVER EXPLOITED BLOCKS OF MEWAT DISTRICT

Block Name	Total area of the village (in hectares rounded up to one decimal place)	16%of village area taken for farm recharge (sq m)	Total number of recharge pits (1 recharge pit / hector) for 16% area	Annual recharge (MCM)= (Area*Runoff 15%*Rainfall in m/1000000)	Cost of Pit (Crores) @Rs.0.35 lakh
Tauru	**21048**	**33676800**	**3368**	**3.223**	**11.78**
Total	**21048**	**33676800**	**3368**	**3.223**	**11.78**

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/ Cavity well (where top three meters is clay)

16%of village area taken for farm recharge

QUANT ATIVE IMPACT

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	**38.68**	**-13.02**	**3.431**	**35.25**	**151%**	**137.37%**	**13.63%**

BY THE IMPLEMENTATION OF THE PROPOSED RECHARGE STRUCTURES THERE WILL BE A REDUCTION OF 13.63% IN STAGE OF GROUND WATER DEVELOPMENT AS TABULATED BELOW

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 Haryana, particularly in overexploited blocks.

There are around 4132 (out of 14066) tubewells (29.38%) operated by farmers for irrigation through unlined/Katcha open channel system in Mewat district where water from the tubewell is discharge to the agricultural field. In this process huge (upto 30 %) quantity of ground water is wasted in soil moisture and evaporation losses.

Around 90% of the tube wells are of shallow depth (< 60m) and remaining are deeper (60-110 m) depth. Thus majority of wells are tapping Aquifer group-1 which is under stress due to overexploitation.

Dynamic ground water resources (2011) indicate that Gross ground water draft for irrigation in Tauru Block of Mewat district is estimated at 36.72 MCM. It is expected that around 30% 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 3.24 MCM assuming there is no crop diversification by the farmers.

The benefit will lead to saving of precious ground water resources in the Tauru block which is categorized as overexploited. The measure if implemented will bring down the ground water overdraft from 151 % to 138.11%. 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 Haryana**. 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

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 Col 5 X 0.25#)/100	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((Col8/Col1)X100) (%)	Reduction in stage of development after constructing pucca canal (Col9-Col10) (%)
1	2	3	4	5	6	7	8	9	10	11
25.66	38.68	36.72	1.96	29.38	2.70	34.02	35.44	151	138.11	12.89

#losses from open kuchha channel are around 25%.

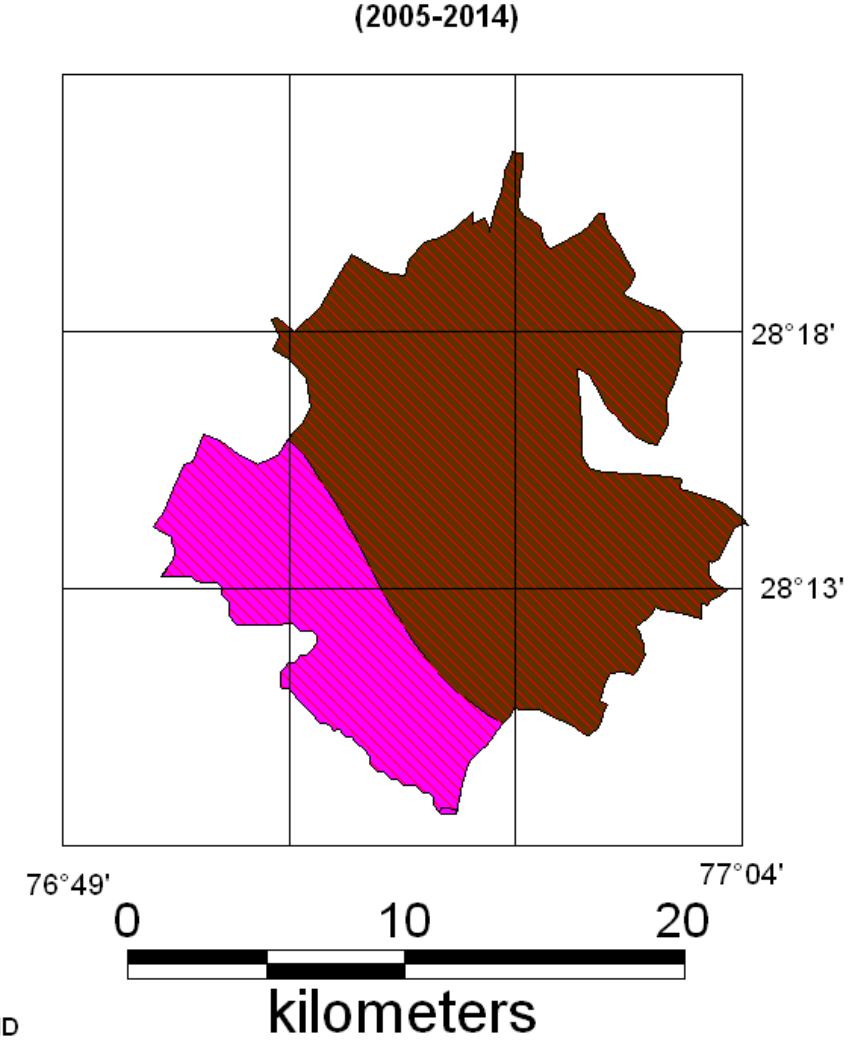
COST ESTIMATE OF UNDERGROUND PIPE LINE

District	Block	Irrigated area by ground water scheme (ha)	Percentage of Unlined Channel (%)	Area under unlined Channels (ha)	Total cost @Rs.0.50 lack per hector(in cr) =Total irrigated area (by ground water scheme) of the block (Col5*0.5)	Total Cost in Rs. Cr. District wise
1	2	3	4	5	6	7
Mewat	Taoru	13973	29.37	4104	20.52	20.52

BLOCK WISE PLAN OF DISTRICT MEWAT HARYANA

(1 OE BLOCK)

BLOCK-TAURU DISTRICT- MEWAT STATE-HARYANA
DEPTH TO WATER LEVEL TAURU, DECADAL MEAN POST MONSOON
Vs
DECADAL MEAN TREND POST MONSOON
(2005-2014)



LEGEND

Decadal Mean Water Level (m.bgl)

- 10.00 to 20.00
- 20.00 to 40.00

Decadal Mean Trend (m)

- -0.10 to 0.00
- 0.00 to 0.1114

2012	No. of Recharge Structures in Rural Villages
532	No. of Recharge Structures in Urban Towns
3368	No. of Recharge Pits in Agriculture land
9	Thickness of Sand

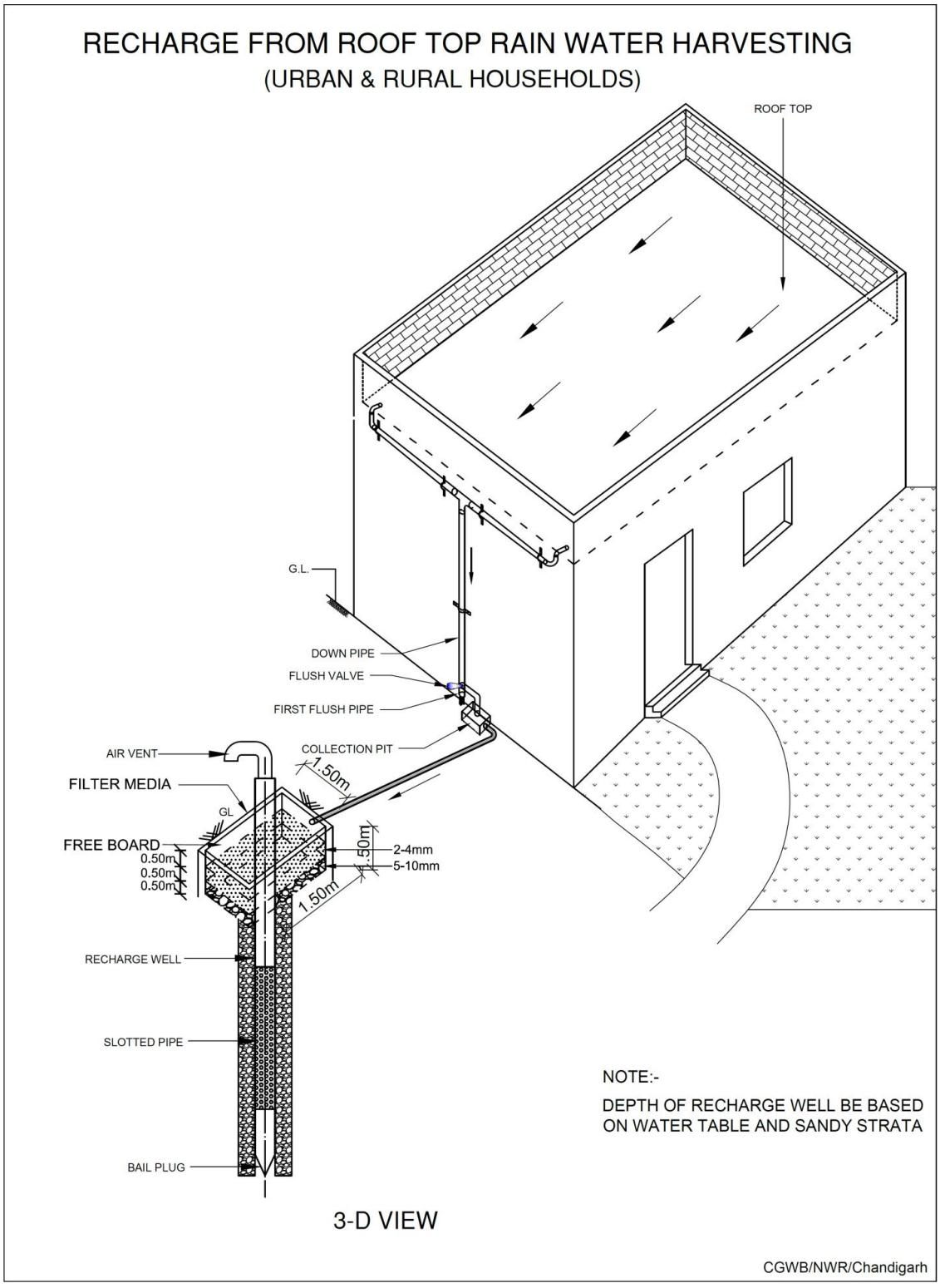
Ground Water Scenario of Block

Block Name :- Tauru **District :- MEWAT** **State :- Haryana**		
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	*224.87*
	• Number of Villages inhabited • Un-inhabited	*2* *0*
	ii) Average Annual Rainfall (mm)	*596*
2.	GEOMORPHOLOGY	
	Major Physiographic	Alluvium Plain
	Major drainages Basin Sub-Basin	 *Ganga* *Yamuna*
3.	LAND USE	
	• Current fallows (Sq.Km	--
	• Net Area Sown (Sq.Km)	116.09
	• Area Sown More than Once (Sq.Km)	----
	• Total Irrigated Area (Sq.Km)	103.28
	• Total UnIrrigated Area (Sq.Km)	12.81
4.	PREDOMINAT GEOLOGICAL FORMATIONS	*Younger alluvium*
5.	HYDROGEOLOGY	
	Major Water bearing Formation (Aquifer)	Fine to coarse Sand
	Avg. Depth to water level (decadal)	
	• Pre- monsoon: (May 2015)	*39.89-39.89(mbgl)*
	• Post –monsoon: (Nov2014)	*37.37-38.12(mbgl)*
6.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.2015)	
	• No of wells drilled	*19*
	• Depth Range (m)	*39.50-250.00*

	• Discharge (Ipm)	*48-910-1-40*		
	Aquifer Parameters			
	• Transmissivity (m2/day)	*204-593*		
	• Storativity	------		
	• Soil infiltration rate mm/ hour	--		
		Min	*Max*	*Avg.*
		--	--	--
7.	GROUND WATER QUALITY	VALUE		
	• EC in µS/cm at 25^0c	*840*		
	• NO3 (mg/l)	*28*		
	• F (mg/l)	*0.3*		
	• Fe (mg/l)	*1.03*		
	• As (mg/l)	*0.0036*		
8.	DYANMIC GROUND WATER RESOURCES	**YEAR 2011**		
	• Net Ground Water Availability (MCM)	25.66		
	• Existing Gross Ground Water Draft for Irrigation (MCM)	36.72		
	• Existing Gross Ground Water Draft for Domestic and Industrial Water Supply (MCM)	1.96		
	• Existing Gross Ground Water Draft for all Uses (MCM)	38.68		
	• Allocation for Domestic and Industrial Requirement Supply up to next 25 years (MCM)	1.96		
	• Net Ground Water Availability for Future Irrigation Development (MCM)	-13.02		
	• Stage of Ground Water Development / Over Draft (%)	151		
	• Category of Block	OE		

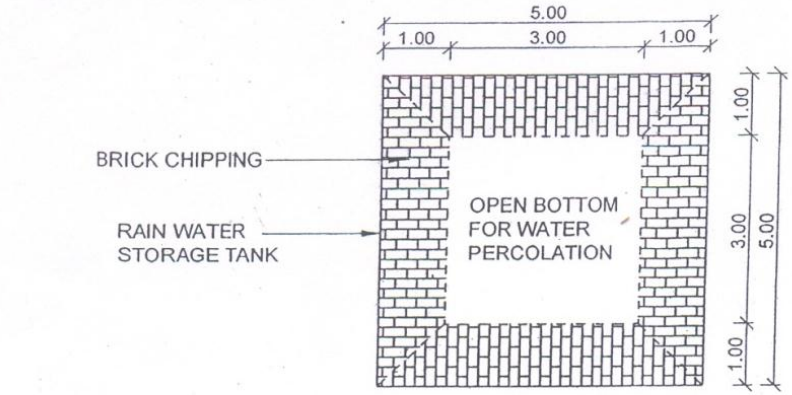
	Any specific reasons for high stress on ground water leading to Overexploitation and decline in ground water level	*Extensive Irrigation*	
9.	Percentage of sand thickness up to 50 m depth (Average)	*Thickness(m)* *16*	Percentage % 32
10	Volume of unsaturated zone available for recharge (MCM)	730	
11.	Volume of water required for recharge (MCM)	971	
12.	Volume of surplus water available for recharge(MCM)	8.68	

RECHARGE/ CONSERVATION STRUCTURES		**Total Number of Recharge Structures**	**Total Cost (Rs. in crores)**	**Total Recharge/ Water saving in MCM**
13	Farm Recharge @Rs. 35000/-	3368	11.78	3.223
14	RWH Rural @ Rs. 25000/-	2012	5.03	0.154
15	RWH Urban@ Rs. 25000/-	532	1.33	0.054
16	Underground pipe line (area in hectares) @ Rs. 50000/-	4104	20.52	2.70
TOTAL			**38.66**	**6.131**

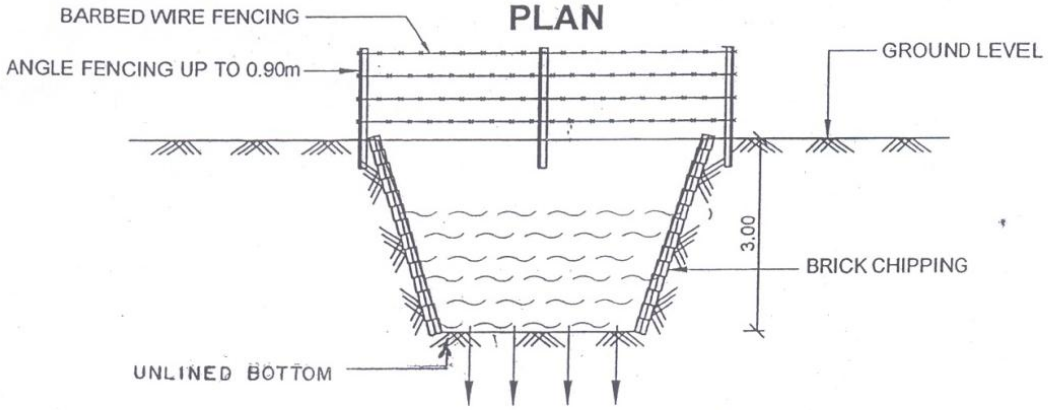

RECHARGE FROM ROOF TOP RAIN WATER HARVESTING
(URBAN & RURAL HOUSEHOLDS)
ROOF TOP
G.L.
DOWN PIPE
FLUSH VALVE
FIRST FLUSH PIPE
COLLECTION PIT
AIR VENT
FILTER MEDIA
GL
FREE BOARD
0.50m
0.50m
0.50m
1.50m
1.50m
2-4mm
5-10mm
RECHARGE WELL
SLOTTED PIPE
BAIL PLUG
NOTE:-
DEPTH OF RECHARGE WELL BE BASED ON WATER TABLE AND SANDY STRATA
3-D VIEW
CGWB/NWR/Chandigarh

Annexure-II

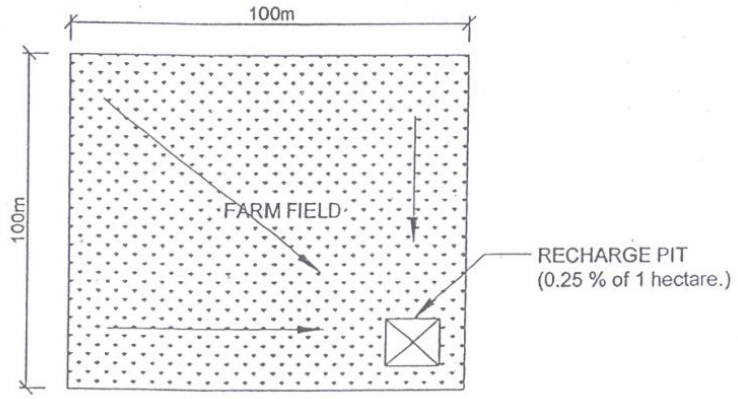
TYPICAL DESIGN FOR RECHARGE PIT IN FARM



PLAN



SECTIONAL ELEVATION



KEY MAP