JIND DISTRICT HARYANA

CENTRAL GROUND WATER BOARD
Ministry of Water Resources
Government of India
North Western Region
CHANDIGARH
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Contributors

Tejdeep Singh

Scientist –'C'

Prepared under supervision of

A.K.Bhatia

Regional Director

Our Vision

"Water Security through Ground water Management"

GROUND WATER INFORMATION BOOKLET
JIND DISTRICT, HARYANA

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JIND DISTRICT AT A GLANCE

Sl. No	ITEMS	Statistics
1	GENERAL INFORMATION	
	i) Geographical area (sq.km)	2702 Sq. km
	ii) Administrative Divisions	
	Number of Blocks	07
	iii) Population (as on 2011 Census)	1332042
	iv) Normal Annual Rainfall (mm)	434.00 mm
2.	GEOMORPHOLOGY	
	Major Physiographic units	Alluvial Plain
	Major Drainages	
3.	LANDUSE (Sq.Km)	
	a) Forest area	68
	b)Net area shown	2570
	c) cultivable area	2580
4.	MAJOR SOIL TYPES	Sandy, Kallar or Rehi and Sierozem soil
5.	AREA UNDER PRINCIPAL CROPS	Paddy 909 Sq. km Wheat 2069 Sq. km
6.	IRRIGATION BY DIFFERENT SOURCES	
	(Areas and Numbers of Structures)	
	Dugwells	
	Tube Wells/Boreholes	930 Sq. km/ (39169 hrs.)
	Tanks/Ponds	922 Nos.(14.84 Sq.km)
	Canals	1300 Sq. km
	Other Sources	Nil
	Net Irrigated area	2230 Sq. km

	Gross irrigated area		4310 Sq. km
7.	NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB		
	No. of Dug Wells		20
	No. of Piezometers		03
8	PREDOMINANT GEOLOGICAL FORMATIONS		Quaternary Alluvium
9	HYDROGEOLOGY		
	Major Water bearing formations		Sand layers
	Pre-monsoon depth to Water Level		2.47 mbgl to 27.06 mbgl
	Post-monsoon depth to water level		0.35 mbgl to 26.55 mbgl
	Long term water level trend in 10 yrs		
		Post Monsoon	0.05 m/yr to 0.71m/yr
		Pre-Monsoon	0.003 m/yr to 0.89 m/yr
10	GROUND WATER EXPLORATION BY CGWB		
	No of wells drilled		
		EW	09
		PZ	15
		SH	14
	Depth Range (m)		595.00 m
	Discharge (litres per min.)		2210
	Storativity (S)		1.32×10^{-3}
	Transmissivity (m^2/day)		1176
.11	GROUND WATER QUALITY		
	Presence of chemical constituents more than permissible limit		
		EC	3020 to 8590
		F	1.61 mg/l to 4.22 mg/l
		Fe	1.29 mg/l to 11.88 mg/l
		As	0.013 mg/l to 0.023 mg/l

	Type of Water	Calcium Chloride
12	DYNAMIC GROUND WATER RESOURCES (2011) in MCM	
	Annual Replenishable Ground Water Resources	817.14
	Net Annual Ground water Draft	808.73
	Projected Allocation for Domestic and Industrial Uses upto 2025	42.78
	Stage of ground Water Development	99%
13	AWARENESS AND TRAINING ACTIVITY	NIL
14	EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING	NIL
15	GROUND WATER CONTROL AND REGULATION	
	Number of OE Blocks	03
	Number of Critical Blocks	01
	Number of Semi-Critical Blocks	03
	No. of Blocks notified	NIL
16	MAJOR GROUND WATER PROBLEMS AND ISSUES.	Declining Water Table

GROUND WATER INFORMATION BOOKLET, JIND DISTRICT, HARYANA

1.0 INTRODUCTION

The district lies in the North of Haryana between 29°03′ 00″ to 29^0 51′ 00″ North latitude and 75° 53′ 00″ to 76°45′ 30″ East longitude falling in the Survey of India toposheet No. 53C and 44O. It is bounded by Patiala in the North and Sangrur district of Punjab in the northeast. It is surrounded by district Kaithal and Karnal of Haryana in east and west respectively. In southwest it has a common boundary with district Hissar, whereas in south and southeast it shares its boundary with Rohtak and Sonipat respectively. Jind district encompasses a geographical area of 2702 Sq.km

For the administrative convenience, the Jind district, a segment of the Hissar division has been divided into four (04) tehsils i.e. Narwana, Jind , Safidon and Julana. In order to streamline the rural development , these tehsils have been further subdivided into seven blocks namely Narwana, Uchana, Alewa, Jind, Julana, Pilukhera and Safidon.

As per 2011 census the total population of the district is 1332042. During 1991 census, the district registered a growth of 21.36% in a last decade. The rural and urban population is 9,48,250 and 2,41,577 with an average density of 440-person/sq km. Out of total population 6,42,282 are males and 5,47,545 are females. The male and female ratio of the district as a whole was 1000:852. In Jind district 79% of the population is settled in 307 villages and the rest 21% of population is concentrated in five towns. There is no scheduled tribe population in the district, as no part of the district is under tribal area. The population of schedule caste is 2,35,765 out of which 1,98,790 belong to rural and 36,975 to urban area. The percentage of schedule caste population of the district is 19.81%. The literacy rate in the district is 52.33% out of which the male literacy is 33.44% while female literacy is 18.88 %

The area of Jind district is irrigated by two canal systems i.e. The Western Yamuna canal and the Bhakra canal. The Narwana and Barwala link canals of Bhakra canal system interlink these two systems. Western Yamuna Canal takes off from the Yamuna at Tajewala head works (Ambala district). The Sirsa branch bifurcates from the main Western Yamuna canal at Indri (Karnal district) and joint by Narwana branch of Bhakra canal near Budhera. About 49.0 km further down the Hansi Branch takes off from main branch of Western Yamuna canal at village Munak. Sirsa Branch irrigates area in the Northern part of Jind district by Narwana branch of the Bhakra canal and its distributaries i.e. Habri sub branch , Jakhali, Rajaund, Sudkain Dhanauri etc. The area of the district irrigated by the Sirsa branch is approx. 143744ha. Hansi branch enters in the district near Anta village in Safidon Tehsil with the augmentation of water supply from Bhakra

canal. It irrigates the southern part of the Jind district through Buthra Branch and Sunder sub branch. The area irrigated by Hansi branch system is approx. 63326ha. Narwana Branch link canal irrigates some area of Jind district in its tail reaches. The district is also irrigated through Khanauri and Haripur minors. The area irrigated by these distributaries is approx. 5000 ha. (Source irrigation Deptt. Canal)

2.0 RAINFALL AND CLIMATE

The climate of Jind district can be classified as tropical steppe,semi-arid and hot which is mainly dry with very hot summer and cold winter except during monsoon season when moist air of oceanic origin penetrate into the district. There are four seasons in a year. The hot weather season starts from mid March to last week of the June followed by the south west monsoon which lasts upto September. The transition period from September to October forms the post-monsoon season . The winter season starts late in November and remains upto first week of March.

Rainfall : The normal annual rainfall of the district is 515 mm which is unevenly distributed over the area 26 days. The south west monsoon , sets in from last week of June and withdraws in end of September, contributed about 84% of annual rainfall. July and August are the wettest months. Rest 16% rainfall is received during non-monsoon period in the wake of western disturbances and thunder storms. Generally rainfall in the district increases from southwest to northeast .

Normal Annual Rainfall	:	515 mm
Normal monsoon Rainfall	:	433 mm
Temperature		
Mean Maximum	:	41°C(May&June)
Mean Minimum	:	6°C(January)
Normal Rainy days	:	26

3.0 GEOMORPHOLOGY AND SOILS

Physiography : Physiographically, it constitutes a part of the Punjab -Haryana plain which is largely flat, featureless and monotonous alluvial upland plain and is formed of Pleistocene and sub Recent alluvial deposits of the Indo-Gangetic system. It is dotted only sporadically with sand dunes and depression, yielding a local relief of not more than 6m. The district does not offer much physiographic diversity.

There is no perennial river in the district. Only a small river Chautang nadi enters the district near the village Mundh and debouches near village Bosini into Karnal district after covering about a distance of ten kilometers in Jind district

Soils: The soils of the Jind district are sandy loam to loam in texture. According to physical characteristics , these soils may be divided into Sandy, Kallar or Rehi and Sierozem soil. Sandy soils locally called *retil dharti* are found in parts of all the blocks of the district . Bajra, Jowar and gram crops are generally grown in these soils. Kallar or Rehi soils are found in Safidon block of district. This type of soil is formed due to alkaline reaction. The reclamation of Kallar soils calls for the lowering down of excessive salts by flooding or by gypsum treatment. Sierozem soil, these soils are light yellowish brown to pale brown in colour . Soils are calcareous and normally have a kankar layer at a depth of 0.75m to 1.25m. Almost all the soils are deficient in nitrogen, phosphorous and potash Salinity and alkalinity are the serious problems particularly in the irrigated area, wind erosion is also a common feature in this area. Gram , wheat , bajra Jowar, cotton and mustard are the main crops of the area.

4.0 GROUND WATER SCENARIO

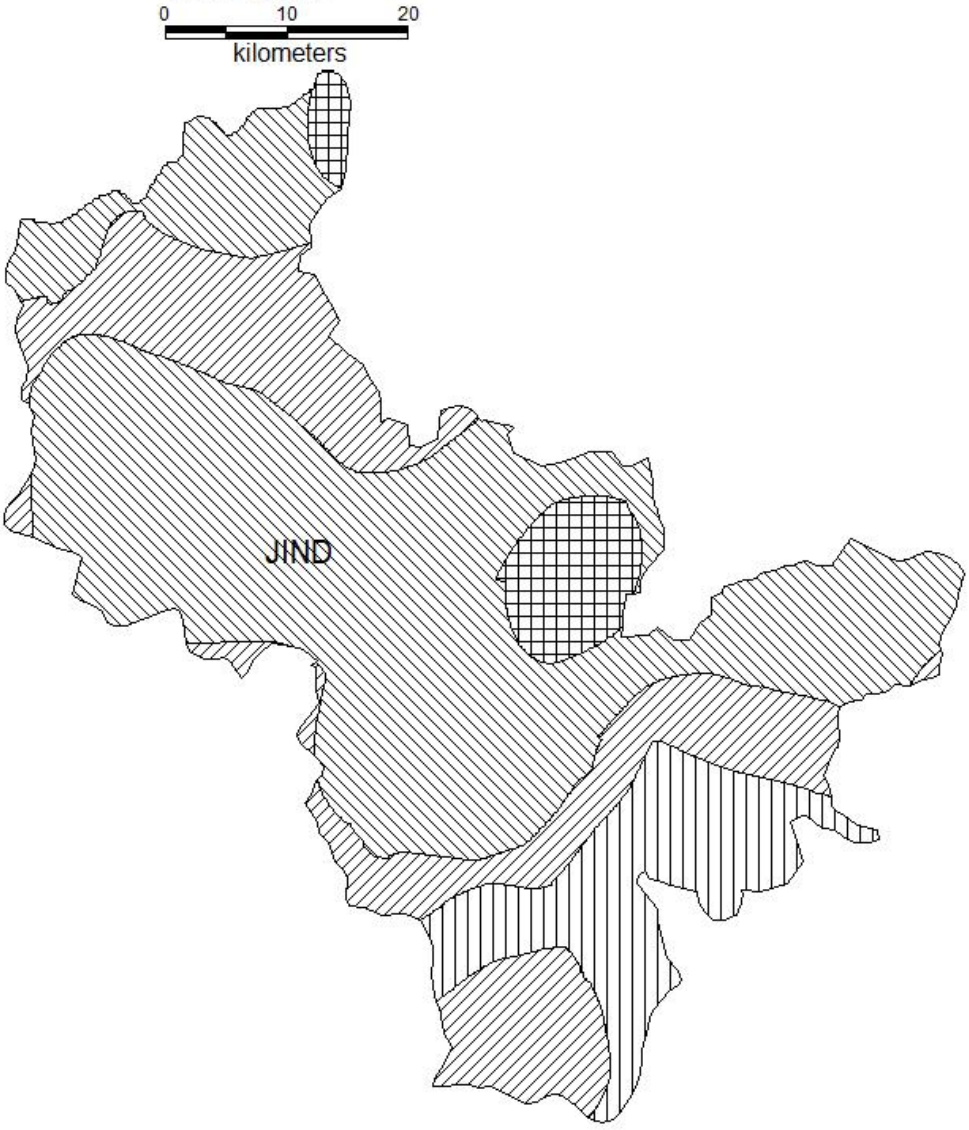
4.1 HYDROGEOLOGY

The district is occupied by geological formations of Quaternary age comprising of Recent alluvial deposits belonging to the vast Indus alluvial plains.

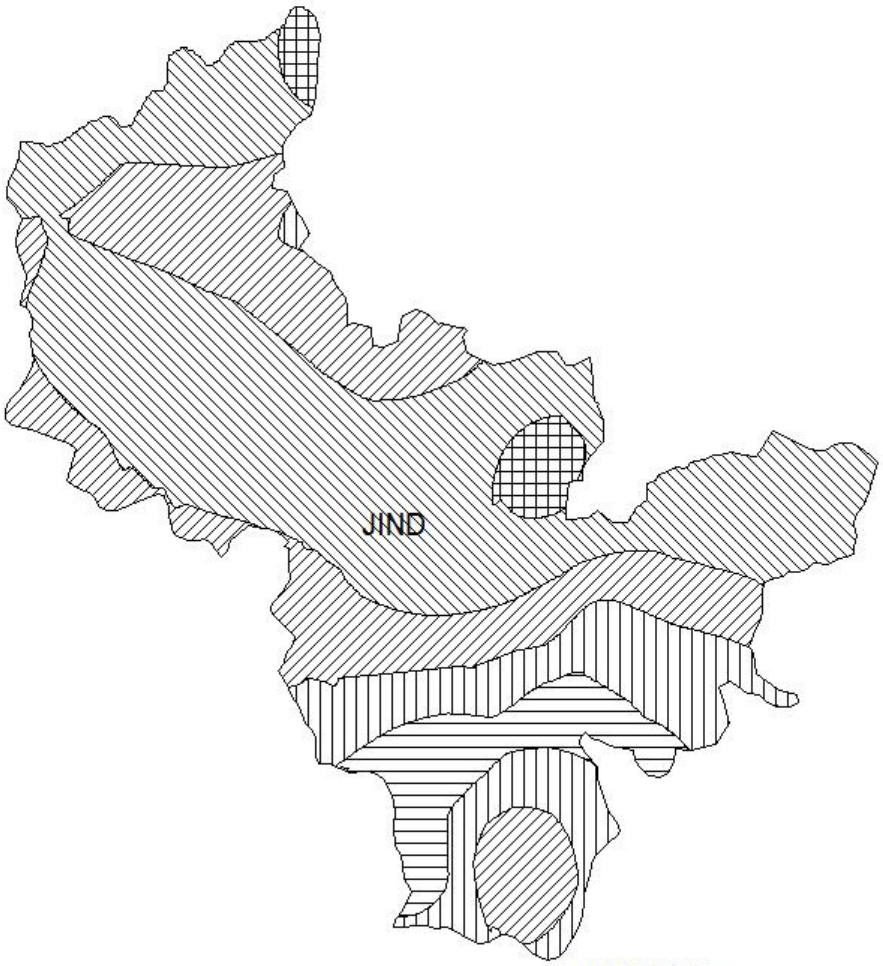
The ground water occurs in a thick zone of saturation in the alluvium both under confined and unconfined conditions. The shallow aquifers, which are unconfined in nature are being tapped chiefly by open dug well and shallow tubewell. The deeper aquifers, which are underlain by extensive confining clays, occur under confined conditions.

A buried river channel of Ghaggar running in East-North - East to West - South-West direction has been located in the eastern part of the area. In Safidon -Jind tract tubewells have been constructed within a depth of 80 to 100 m bgl encountering fresh water zones with 25m to 35m of granular material comprising coarse sand, gravel and pebble.

DEPTH TO WATER LEVEL MAP
JIND
MAY 2011



DEPTH TO WATER LEVEL MAP
JIND
NOVEMBER 2011



LEGEND
RANGE (MBGL)

- 0.0 - 2.0
- 2.0 - 5.0
- 5.0 - 10.0
- 10.0 - 20.0
- 20.0 - 30.0

4.2 WATER LEVEL BEHAVIOR

The depth to water level ranges from 2.47 to 27.06 mbgl in pre monsoon period. The long term trend in the water level reflected by water level hydrographs are indicative of the change in groundwater storage in phreatic zone with time. Few hydrographs stations like Khatkaran , Uchana stations indicate a rising trend and this may be due to local hydrological conditions prevailing in the area. The hydrographs of Pillukhera , Alewa, Kalwan, Pipartha, Ramrae and Jhamala indicate a declining trend which may be due to over exploitation of ground water and these area require careful management of surface water and conjunctive use of surface water and ground water. For the rest of the stations, hydrograph neither indicate any substantial rise or decline thus indicating that the storage (Dynamic) is being maintained at the normal level which is not disturbed by the present level of ground water development. In general rate of decline from 0.05m/yr to 0.71m/yr has been observed during post-monsoon period and 0.003m/yr to 0.89 m/yr during pre-monsoon period.

Ground water flow

In general the ground water elevation varies from 205 to 230 m .a.m.s.l. and the regional ground water flow direction is south southwest except in the central part of the district while it shows westwards and may be due to water divide or local hydrogeological conditions.

4.3 GROUND WATER RESOURCES

The ground water development potential and water balance as on March 2009 has been computed. The blockwise details of ground water potential , draft and balance are given in table. Out of eight blocks, three blocks are over exploited. The stage of ground water development ranges between 124% (block-Narwana) to 81% (Pilukhera Block). The total replenishable ground water resource in the district is 817.14 MCM, of which the net utilisable ground water resources for irrigation is 773.63 MCM. District shows an overall 99% ground water development.

GROUND WATER RESOURCE AND DEVELOPMENT POTENTIAL OF JIND DISTRICT, HARYANAAS ON 31ST MARCH, 2011 in ha m

Block	Net annual ground water availability (ham)	Existing gross ground water draft for irrigation (ham)	Existing gross ground water draft for all uses (ham)	Provision for domestic & industrial requirement supply to 2025 (ham)	Net annual ground water availability for future irrigation development (ham)	Stage of ground water development (%)	catagory
Alewa	6288	7017	7175	158	-887	114	OVER EXPLOITED
Jind	18735	15544	17067	1983	1208	91	CRITICAL
Julana	8297	7117	7131	174	1006	86	SEMI CRITICAL
Narwana	14507	17428	17971	543	-3464	124	OVER EXPLOITED
Pilukhera	9854	7872	7987	142	1840	81	SEMI CRITICAL
Safidon	13854	13957	15072	1115	-1218	109	Over Exploited
Uchana	10179	8428	8470	164	1587	83	SEMI CRITICAL
Total	**81714**	**77363**	**80873**	**4278**	**73**	**99**	

4.4 GROUND WATER QUALITY

The results of chemical analysis of ground water samples in the phreatic aquifer (dug well zone) indicate that Ground water is alkaline in nature (pH values ranges between 8.07 to 9.08). Ground water is moderately to highly saline. The electrical conductivity ranges from 270 µs/cm at 25^0C (Ramarae) to 8590 µs/cm at 25^0C (Lawan). On the perusal of Iso conductivity map, it is seen that in a major part of the district conductivity ranges from 250 to 2000 µs/cm at 25^0C indicating fresh ground water. In the blocks of Narwana and parts of Uchana area , the conductivity values greater than 2000µs/cm at 25^0C have been recorded. Whereas formation water from deeper aquifer shows that the electrical conductivity ranges from 17000 at Uchana to 24000µs/cm at Paoli at 25^0C.

The chemical parameters in many samples are beyond the permissible limits for safe drinking water criterion. Sulphate and Nitrate values were found more than permissible limit at location Chabari and Kanchana Khurd. Fluoride values were found to be more than permissible limits at seven locations. Highest value of 19.36 was observed at Korawal. Arsenic values were found more than permissible limit at 3 locations. Samples of Safidon, Shabuddinpur and Kalwan have been reported to have values 0.013 mg/l, 0.015 mg/l and 0.023 mg/l respectively.

Generally Calcium has been found to be dominant cation and Cl as dominant anion. Hence the ground water is of Ca-Cl type. Ground water is fit for drinking in large part of the district but have been found unfit in isolated patches.

The suitability of ground water for irrigation is generally ascertained by the values of salinity, SAR and RSC. SAR and RSC values ranges between 0.71 to 22.11 and (-) 5.70 to 16.30 respectively.

4.5 STATUS OF THE GROUND WATER DEVELOPMENT

Net area sown in the district is 2,57,000 ha. Area sown more than once is 2,09,000 ha bringing the total cropped area (Gross sown area) to 4,66,000 ha. 86.8% of the total area is sown annually. The entire net area sown is irrigated through tubewells and canals. There are 39,169 tubewells in the district which irrigates an area of 390 sq.km, whereas 1300 sq. km area is being irrigated by canals. 41% Irrigation in the district is being supported by tubewells. Paddy constitutes the main kharif crop whereas wheat is the main Rabi crop. The

average yield of paddy cultivation is 2213 kg/ha where as wheat crop average yield is 206.90 kg/ha.

Entire drinking water supply to all rural as well as urban parts of the district is based on ground water or by canal (where water quality of ground water is saline or poor) The tubewell for water supply constructed by Public Health Department, Haryana for drinking water supply are generally between 40 to 100 m deep or on the basis of local hydrogeological conditions and available fresh water bearing zone. The area where drinking water supply is not present through PHD Haryana , the supply is dependent on hand pumps /dug wells shallow jet pumps which are constructed by Panchayat or by user. The depth of hand pumps varies from 10 to 25 m (in phreatic zone) on the basis of prevailing local conditions.

There are 39169 shallow tubewells ranging in depth from 25 to 60m and provide irrigation to 930 sq.km area which constitutes about 88.09% of the total irrigated area. The discharge of these shallow tubewells ranged between 100 and 800 lpm with a draw down of 1.0 to 3.5m.

5.0 GROUND WATER MANAGEMENT STRATEGY

Perusal of the Ground Water Resources available in the district clearly indicate that Northeastern part of the district has high development of ground water resources, some times the extent of making the block overexploited. Blocks located in southern and central part have low ground water developed and their development is well within the 50%. Though water quality is good and fit for the purpose of drinking and irrigation these areas have low ground water development. Hence ground water draft is not having adverse impact on the ground water levels. Lower level of recorded ground water development may be the combined effect of less draft, more rainfall and suitable hydrogeological conditions and alternate facility for irrigation.

Since the whole area of the district is alluvium and at no place neither basement has been encountered or any cobble, pebble bed, hence appropriate method of drilling in the area would be rotary or reverse rotary.

The ground water at shallow depth up to 40 to 100m is fresh to marginal saline. Tubewells can be constructed upto the depth of 40-100 m for drinking as well as for irrigation purpose depending on the local hydogeological conditions. Deeper aquifer are largely saline in the district .

5.2 Water Conservation & Artificial Recharge

Parts of Jind district are showing varying water levels and different levels of ground water development. No Artificial Recharge Project has been taken up in the district. However Central part of the district has been found suitable and feasible on the basis of annual decline in Water level and annual mean water

level for last ten years. Southern part of the district covering Alewa block, Northeastern part of Jind and North Western part of Pilukhera blocks are the most suitable area for Artificial Recharge because these are the areas which have more than 15m of decadal annual mean water level with decline of 5 to 10 cm/yr. Remaining half of the southeastern area of Alewa block, northeastern part of the Jind block, North western part of the Pilukhera block is area second in priority as this area is having mean annual water level between 10-15 m and decline of 5- 10 cm/yr. Almost whole of the remaining area of Alewa, part of Uchana, Jind , part of Safidon and Pilukhera blocks are next suitable for Artificial recharge on priority index as these area with mean annual water level of 10-15 m for last ten years and are having rate of decline 0-5 cm/yr.

As per the assessment of the Central Ground Water Board, almost the whole district of Jind is suitable for Artificial Recharge and most suitable structure for Artificial recharge is recharge trench and recharge shaft of variable size to accommodate available run-off or surplus available water for recharge.

There are a large numbers of tanks and ponds in the district which act as water conservation structures and ground water recharge structures in the district, which are as follows:

6.0 GROUND WATER RELATED ISSUES AND PROBLEMS

Two different type of Ground Water Related problems can be identified in the district in respect of quality and quantity:-

Declining Water level in the area in parts of Alewa, Narwana and Safidon Block. In these block rate of decline of 43 , 16 and 14 cm/yr have been observed for Pre-monsoon period and 52,19 and 15 cm/yr have been observed for Post-monsoon period respectively. Where as southern and southwestern part of the district either water level are not showing any decline or they are rising.

Regarding ground water quality some problem areas have been identified on the basis of samples collected and analysed. For the purpose of irrigation water of the district has been categorized in a category, which is fit except in north central part and southeastern part of the district.

7.0 RECOMMENDATIONS

The following measures are recommended to minimize the declining ground water trend in parts of the Jind district as safeguard against environmental degradation.

1. It is necessary to notify the district for regulation of all ground water abstraction structures and the construction of any tubewell in Safidon blocks of the district, prior permission should be sought from the Central Ground Water Authority.
2. Artificial recharge to ground water should be taken up in the urban and rural area to avert the further lowering of ground water level since natural recharge to the aquifer system is not adequate to support such ground water withdrawal. In this context, Alewa, Narwana and Safidon blocks are recommended for artificial recharge practices.
3. Detailed geophysical study is required for the delineation of fresh water zones (Phreatic aquifers) in the district.
4. A modern agricultural management has to be taken into account for effective water management techniques involving economics distributors of water monitoring minimum hours of pumping and also by selecting most suitable cost effective crop pattern so that even high TDS water may be suitable for irrigation for salt tolerant crops. The modern methods of irrigation like sprinkler, drip irrigation etc should be used.
5. Local populace to be educated regarding consequences of mining of ground water and need for its effective/economic use.