

# **DISTRICT GROUND WATER BROCHURE**

## **AMBEDKAR NAGAR DISTRICT UTTAR PRADESH**

*Compiled by*

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**(AAP 2012-13)**

## CONTENTS

SECTION	TITLE	PAGE NO.
	<b>DISTRICT AT A GLANCE</b>	
1.	<b>INTRODUCTION</b>	
1.1	Location, Extent & Population .....	1
1.2	Administrative Setup .....	1
1.3	Agriculture, Irrigation and Crops .....	2
1.4	Industries .....	5
2.	<b>CLIMATE &amp; RAINFALL</b> .....	5
3.	<b>DRAINAGE, SOIL, GEOMORPHOLOGY &amp; GEOLOGY</b>	
3.1	Drainage & Soil .....	6
3.2	Geomorphology .....	7
3.3	Geology .....	7
4.	<b>GROUND WATER SCENARIO</b>	
4.1	Hydrogeology .....	8
4.2	Depth to Water Level .....	9
4.3	Long-term Water Level Trend .....	9
4.4	Ground Water Quality .....	10
4.5	Status of Ground Water Development .....	11
4.6	Dynamic Ground Water Resources .....	12
5.	<b>GROUND WATER RELATED ISSUES AND PROBLEMS</b> .....	12
6.	<b>GROUND WATER MANAGEMENT STRATEGY</b> .....	13
7.	<b>AWARENESS AND TRAINING ACTIVITY</b> .....	13
8.	<b>AREA NOTIFIED BY CGWA</b> .....	13
9.	<b>RECOMMENDATIONS</b> .....	13
	<b>BIBLIOGRAPHY/ REFERENCES</b> .....	14
	<b>APPENDICES</b>	
I	Summarized hydrogeological results of exploratory drilling by CGWB in Ambedkar Nagar district.	
II	Block-wise salient figures of Estimation of Dynamic GW Resources as on 31.3.2009.	
	<b>PLATES</b>	
I	Administrative Map of Ambedkar Nagar district, UP	
II	Hydrogeology of Ambedkar Nagar District, UP	
III	Pre-monsoon Depth to Water Levels (2011), Ambedkar Nagar District, UP	
IV	Post-monsoon Depth to Water Levels (2011), Ambedkar Nagar District, UP	
V	Dynamic GW Resources (as on 31.3.2009) of Ambedkar Nagar District, UP	

## DISTRICT AMBEDKAR NAGAR AT A GLANCE

### 1. GENERAL INFORMATION

i. Geographical Area (Sq.Km.)	:	2350
ii. Administrative Divisions		
Number of Tehsil/Block	:	5/ 9
Number of Gram Panchayat/ Villages	:	786/ 1749
iii. Population (provisional figures-2011)	:	2398709
Rural	:	2117138
Urban	:	281571
iv. Average Annual Normal Rainfall (1901-70)	:	973.23mm

### 2. GEOMORPHOLOGY

i. Major Physiographic Units	:	Central Ganga Plain Older Alluvial Plains (Varanasi Older Alluvium); Older Flood Plains (Terrace Alluvium); Younger Flood Plains (Channel Alluvium)
ii. Major Drainages	:	Ghaghra and Tons (combine waters of Biswi Nala and Marha Nala after their confluence 7-8 km west of Akbarpur); –; Ghaghra form the northern boundary; Marha/ Tons divides the district in equal halves

### 3. LAND USE

Area other than Agriculture Use	:	236203 ha
Net Sown Area (2010-11)	:	166756 ha

### 4. MAJOR SOIL TYPES

Generally deep, well drained and fine loamy, with loamy surface; coarse loamy also present along Ghaghra river; calcareous, saline and sodic in small areas in west-central part and eastern fringes; signs of slight erosion in central part around Tons river system

### 5. AREA UNDER PRINCIPAL CROPS (2010-11)

Wheat	:	118112 ha
Rice	:	115483 ha
Pulses	:	10478 ha
Sugarcane	:	11157 ha
Oil seeds	:	3601 ha

### 6. IRRIGATION BY DIFFERENT SOURCES (Number of Structures; Area in ha) (Figures for 2010-11)

Dugwells Tubewells/ Borewells	:	557; 136761 ha (Net Irrigated)
Tanks/ponds	:	--
Canals	:	721 km; 21280 ha (Net Irrigated)
Others	:	--
Net Irrigated Area	:	158041 ha
Gross Irrigated Area	:	269265 ha

### 7. NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on 31-3-2013)

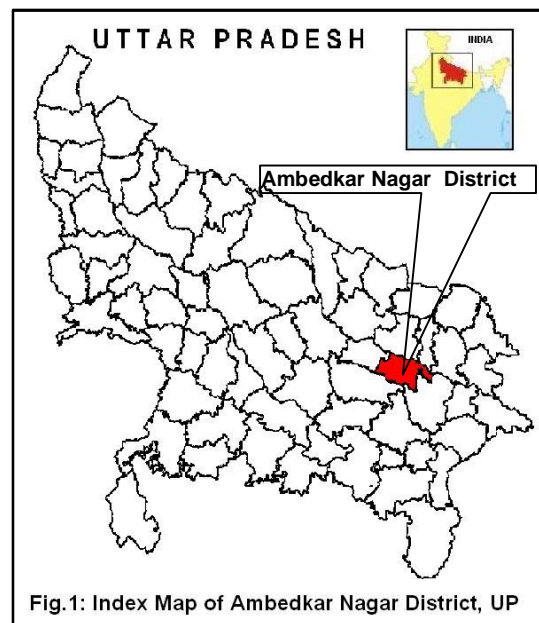
Dug wells	:	9
Piezometers (GWD, UP monitored by CGWB)	:	3

<b>8. PREDOMINANT GEOLOGICAL FORMATIONS</b>	<p>a) Major part (upland areas) covered with Older Alluvium (&gt;700m thickness) – polycyclic upward fining sequence of sand, silt and clay, deposited over Vindhyan and/ or Precambrian Granitic (?) basement (component of Faizabad Ridge)</p> <p>b) Younger (Newer) Alluvium in low land tracts along Ghaghra in small area</p>
<b>9. HYDROGEOLOGY</b>	
Major water bearing formation	: 3 Aquifer Groups up to the explored depth of 305m; ground water occurs in fine to medium and coarse sand zones and gravel in these aquifers
Pre-monsoon Depth to water level during 2011	: 1.05 – 7.21 mbgl
Post-monsoon Depth to water level during 2011	: 0.85 – 7.50 mbgl
Long term water level trend (2002-2011)	
a) Pre-monsoon (5 wells analysed)	: Fall 0.03 to 0.15 m/yr (5 wells)
b) Post-monsoon (6 wells analysed)	: Fall 0.02 to 0.15 m/yr (6 wells)
<b>10. GROUND WATER EXPLORATION BY CGWB (As on 31-3-2013)</b>	
<b>a) Normal Programme</b>	
No of wells drilled (EW/ SH/ Deposit Well)	: 2
Depth range	: ~305m
Discharge (litres per second) (m)	: 2270 & 3050 (up to 225m)
Storativity (S)	: ---
Transmissivity (m <sup>2</sup> /day)	: 355 & 3999
<b>11. GROUND WATER QUALITY</b>	
Presence of Chemical constituents more than permissible limit (e.g. EC, F, As, Fe)	: Quality fresh to brackish; Fluoride within permissible limits; Nitrate above permissible limits at Tanda (146 mg/l), Baskhari (59 mg/l) and Jahangirganj (65mg/l)
<b>12. DYNAMIC GROUND WATER RESOURCES (2009)</b>	
Annual Replenishible Ground Water Resources	: 97631.35 ham
Net Annual Ground Water Draft	: 57956.40 ham
Projected Demand for Domestic & Industrial Uses upto 2025	: 7663.62 ham
Stage of Ground Water Development	: 59.36%
<b>13. AWARENESS AND TRAINING ACTIVITY</b>	No Mass Awareness and Water Management Training Programme organized by CGWB in Ambedkar Nagar district
<b>14. EFFORTS OF ARTIFICIAL RECHARGE &amp; RAINWATER HARVESTING</b>	
Projects completed by CGWB (No & Amount spent)	: Nil
Projects under technical guidance of CGWB (Numbers)	: Nil
<b>15. GROUND WATER CONTROL AND REGULATION</b>	
Number of OE/ Critical/ Semi-critical/ Safe Blocks	: 8 blocks categorized as ‘Safe’ and 1 as Semi-critical (Bhiti)
No of blocks notified	: Nil
<b>16. MAJOR GROUND WATER PROBLEMS AND ISSUES</b>	: No major ground water problem observed. However, there is large variation in stage of GW development across different blocks.

## 1. INTRODUCTION

### 1.1 Location, Extent and Population

Situated in the eastern part of Uttar Pradesh (**Fig. 1**), Ambedkar Nagar district covers 2350 Sq.Km. geographical area, lying between latitude 26°09'N and 26°40'N, and longitude 82°13'E and 83°09'E, with its **headquarters at Akbarpur**. It was carved out as separate district from Faizabad district in 1995 and is bounded in the east and southeast by Faizabad and Sultanpur districts respectively. Azamgarh district lies to the southwest and west. Northern boundary is



flanked by Ghaghra River, across which lie Basti and Sant Kabir Nagar districts. Goarkhpur district shares the boundary with the district in the northwestern corner.

As per **provisional figures of 2011 census** (*source: Census of India web site\**), total Population of the district is 2398709, with density of population 1021 souls/per SqKm. Rural population constitutes 88.26% (2117138 nos.) of the total population. The decadal population growth from 2001 is 18.35% (55.48% in urban areas and 14.70% in rural areas).

### 1.2 Administrative Setup

The district is administratively divided into 5 tehsils and 9 development blocks (**Plate-I; Table 1**), with 111 Nyay Panchayats and 786 Gram Panchayats. The urban sector has 3 Nagar Palika Parishads (Akbarpur, Tanda, Jalalpur) and 2 town areas with Nagar Panchayats (Ashrafpur Kichhaucha and Iltefatganj Bazar). Other important small towns are Kataria and Bhulepur. Total number of villages is 1749 out of which 1645 are inhabited and 104, uninhabited.

\*[http://www.censusindia.gov.in/2011-prov results/paper2/data\\_files/UP/7-pop-12-22.pdf](http://www.censusindia.gov.in/2011-prov results/paper2/data_files/UP/7-pop-12-22.pdf)

**Table 1: Administrative Set-up, Ambedkar Nagar District, UP**

Tehsil	Block	Number of Nyay Panchayat	Number of Gram Panchayat	Number of villages
Akbarpur	Akbarpur	17	116	196
	Katehari	11	85	186
Bhiti	Bhiti	11	79	180
Tanda	Tanda	14	96	267
	Baskhari	10	65	136
Alapur	Ramnagar	12	85	212
	Jahangirganj	12	87	260
Jalalpur	Jalalpur	14	98	169
	Bhiyaon	10	75	143

Source: website updes.up.nic.in (Statistical Diary-2012, Table-55; Figures for 2011-12)

### 1.3 Agriculture, Irrigation and Crops

#### 1.3.1 Agriculture

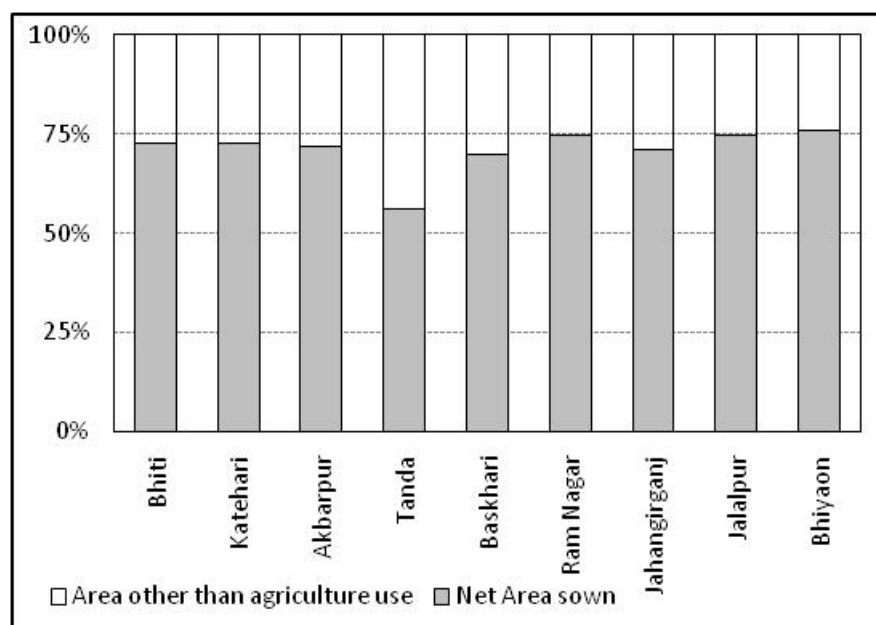
About 71% area of the district is under agricultural use. Net sown area ranges from 56.22% in Tanda to 75.84% in Bhiyaon block (**Table-2; Fig. 2**). However, except Tanda block, net sown area in rest of the blocks ranges around 70 to 75%. Net irrigated area is 158041 ha, which forms about 95% of the net sown area (166756 ha). Gross irrigated area is 269265 ha against gross sown area of 280837ha.

**Table-2: Block-wise Land Use in Ambedkar Nagar District, UP (All Areas in ha)**

Block	Total area	Area other than agriculture use*	Net Area sown	% Net Area Sown	Net Area Irrigated	% Net Irrigated to net sown
Bhiti	20974	5717	15257	72.74	14582	95.58
Katehari	25330	6928	18402	72.65	17829	96.89
Akbarpur	35801	10054	25747	71.92	24624	95.64
Tanda	31269	13690	17579	56.22	16568	94.25
Baskhari	20454	6199	14255	69.69	13395	93.97
Ram Nagar	22801	5761	17040	74.73	16602	97.43
Jahangirganj	21991	6420	15571	70.81	15215	97.71
Jalalpur	29866	7620	22246	74.49	20954	94.19
Bhiyaon	21186	5119	16067	75.84	14066	87.55
<b>Total Rural</b>	<b>229672</b>	<b>67508</b>	<b>162164</b>	<b>70.61</b>	<b>153835</b>	<b>94.86</b>
<b>Total Urban</b>	<b>6531</b>	<b>1939</b>	<b>4592</b>	<b>70.31</b>	<b>4206</b>	<b>91.59</b>
<b>Total District</b>	<b>236203</b>	<b>69447</b>	<b>166756</b>	<b>70.60</b>	<b>158041</b>	<b>94.77</b>

\*includes area of forest, barren cultivable waste, present fallow land, other fallow land, barren uncultivable land, land put to non-agriculture use, pastures and area under bush, forest & garden

**Fig. 2: Block-wise land use in Ambedkar Nagar district**



### 1.3.2 Irrigation

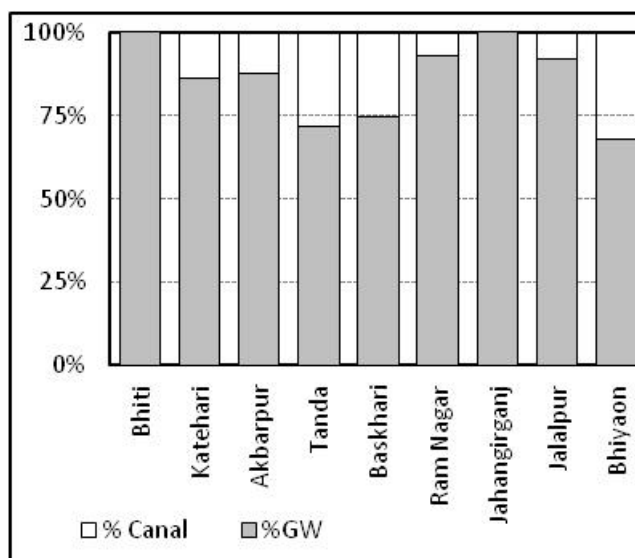
Contributing about 87% of the net irrigated area, ground water is the major source of irrigation in the district, ranging from 67.61% in Bhiyaon block to 100% in Bhiti and Jahangirganj blocks (**Table-3; Fig. 3**). The canal network runs through 721 km in the district, irrigating 21280 ha area, mainly in Bhiyaon, Tanda, Baskhari, Katehari and Akbarpur blocks.

**Table 3: Block-wise Net Area Irrigated by different sources in Ambedkar Nagar District, UP**

Block	Net irrigated area (Ha)	Different Irrigation Source (Net Irrigated Area in Ha)					% Area irrigated by GW	% Area irrigated by Canal
		Canal	Tubewell		Wells	Total GW		
			Public TW	Private TW				
Bhiti	14582	0	1376	13206	0	14582	100.00	0.00
Katehari	17829	2484	1565	13780	0	15345	86.07	13.93
Akbarpur	24624	3074	2571	18979	0	21550	87.52	12.48
Tanda	16568	4681	142	11745	0	11887	71.75	28.25
Baskhari	13395	3418	81	9896	0	9977	74.48	25.52
Ram Nagar	16602	1199	20	15383	0	15403	92.78	7.22
Jahangirganj	15215	0	356	14859	0	15215	100.00	0.00
Jalalpur	20954	1762	1838	17354	0	19192	91.59	8.41
Bhiyaon	14066	4556	323	9187	0	9510	67.61	32.39
<b>Total Rural</b>	<b>153835</b>	<b>21174</b>	<b>8272</b>	<b>124389</b>	<b>0</b>	<b>132661</b>	<b>86.24</b>	<b>13.76</b>
<b>Total Urban</b>	<b>4206</b>	<b>106</b>	<b>610</b>	<b>3490</b>	<b>0</b>	<b>4100</b>	<b>97.48</b>	<b>2.52</b>
<b>Total District</b>	<b>158041</b>	<b>21280</b>	<b>8882</b>	<b>127879</b>	<b>0</b>	<b>136761</b>	<b>86.54</b>	<b>13.46</b>

Source: website updes.up.nic.in (Statistical Diary-2012, Table-18; Figures for 2010-11)

Fig. 3: Block-wise Net Area Irrigated by Different Sources, Ambedkar Nagar District, UP



Total length of canals in the district is 721 Km. There are four main canal network systems in the district – Tanda Pump Canal, Tanda Main Canal, Tanda Parallel Canal and Faizabad Branch and their distributaries – Pausara, Jahangirganj, Hanswar and Kathargarh. Salient features about these are given in **Table-4**.

**Table 4: Salient Features of Canal Network System in Ambedkar Nagar District, UP**

Canal	Length	CCA (ha)	Area covered
Chaudhary Charan SinghTanda Pump Canal	41.92 km (including minors)	5287	Starts from right bank of Ghaghra river in Tanda block, covers parts of Akbarpur and Tanda blocks through associated minors
Tanda Main Canal	103.37 km (including minors)	9346	Originates from Tanda Pump Canal near Nasirpur in Tanda block; irrigates parts of Tanda, Akbarpur, Baskhari and Bhiyaon blocks through associated network of minors and passes into Azamgarh district
Tanda Parallel Canal	116.05 km (including minors)	11702	Runs parallel to Tanda Main Canal to the left side; irrigates parts of Jalalpur and Bhiyaon blocks through associated network of minors and passes into Azamgarh district
Jahangirganj, Hanswar and Kathargarh distributaries	249.59 km (including minors)	33701	Jahangirganj Distributary takes off from Tanda Main Canal very near the latter's origin; irrigates parts of Akbarpur, Tanda, Baskhari, Ramnagar and Jahangirganj blocks through Hanswar and Kathargarh distributaries and associated minors.
Faizabad Branch Canal	29.80 km	4694	Originates in Faizabad distric; covers parts of Tanda, Katehari and Akbarpur blocks
Pausara Distributary	18.50 km	1675	parts of Tanda blocks
45 Minors associated with Faizabad Br and Pausara Dy Sysytem	162.40 km	17156	parts of Tanda, Katehari and Akbarpur blocks

Source: Executive Engineer, Irrigation,, Tanda Division & Faizabad Division



### 1.3.3 Crops

Wheat is grown in the maximum area of the district (~42% of gross sown area), followed by rice (~41% of gross sown area). Principal crop during Kharif is paddy and that during Rabi, wheat. Millet, maize and jwar are also sown in small areas during Kharif, and pulses and oil seeds during Rabi. Other crops of minor importance are sugarcane, potato etc. Cropping pattern is given in Table-5.

**Table 5: Cropping Pattern in District Ambedkar Nagar, UP (2010-11)**

Crop	Area (Ha)	% of Gross Sown Area	Irrigated (% of sown Area)
Wheat	118112	~42%	100%
Rice	115483	~41%	~100%
Pulses	10478	3.7%	~66%
Sugarcane	11157	~4%	100%
Potato	4263	~1.5%	100%
Oil Seeds	3601	~1.3%	~100%
Other Vegetables	6764	2.4%	~97%

Source: website updes.up.nic.in (Statistical Diary-2012, Table-19; Figures for 2010-11)

### 1.4 Industries

There is as such no major industrial area in the district. A few large-scale industries/ Public Sector Undertakings, as well as micro & small Scale Enterprise exist in the district (Table-6). Tanda City is famous for Tanda terri-cotton cloths. Here, the main business depends on hand loom and power loom cloths.

**Table-6: Main Industries in Ambedkar Nagar District**

Scale of Industry	Industry
Large Scale Industries/ Public Sector Undertakings	<ul style="list-style-type: none"><li>• National Therma Power Corporation, Tanda.</li><li>• J.P. Cemnet, Tanda</li><li>• Akbarpur Sugar Mill at Mijhaura (10km from Akbarpur).</li></ul>
Micro & small Enterprises	Mainly agro based. Some other such units are cotton textile, woolen, silk and artificial threads, ready-made garments and embroidery; wood/ wooden based furnitures; paper & paper products; leather based; chemical/chemical based etc.

Source: District Industrial Profile of Ambedkar Nagar District, UP by MSME Development Institute, Allahabad, Ministry of Micro, Small & Medium Enterprise, Government of India

## 2. CLIMATE AND RAINFALL

With hot and dry summers, humid monsoon season and dry winters, and normal annual rainfall (1901-70) averaged over 3 rain gauge stations existing in the district as 973.23mm, the district comes under sub-tropical sub-humid climate zone. The nearest Observatory is located in Faizabad. The temperature varies from 8.1°C

to 24.8°C in winters and 24.0°C to 39.6°C in summers. During cold-waves the temperature may plunge considerably. May is the hottest month of the year and January, the coldest, with mean daily maximum temperature during the former being 39.6°C and that in latter, 23.4°C. The mean daily minimum temperatures during these months are 24.0°C and 8.1°C respectively. The southwest monsoon is active from mid-June to September/ early-October, with maximum rainfall (~93%) taking place during this period, August being the wettest month. There is average 50 rainy days (days with rainfall of 2.5 mm or more) in a year. Average humidity remains considerably high from July to September (76% - 87%) and is highest during the month of August.

### **3. DRAINAGE, SOIL, GEOMORPHOLOGY & GEOLOGY**

#### **3.1 Drainage & Soil**

Ghaghra river, flowing in southeasterly direction drains the northern part of the district, forming its northern boundary. It is one of the largest and perennial rivers of Uttar Pradesh having width more than 5 kms at places. The banks on either side are fairly steep along its entire course. Another main drainage system is that of the Tons river, the name given to the combined water of Marha and Biswi Nalas after their confluence about 7-8 km west of Akbarpur. The river runs almost parallel to Ghaghra and flows into Azamgarh district. Together, the Marha Nala and Tons river (after junction) divide the district into almost equal halves.

The Soil Map of UP published by National Bureau of Soil Sciences and Land Use Planning (NBSS & LUP, 2004) shows that in almost entire district, the soil is mainly deep, well or moderately well drained and fine loamy, with loamy surface. In the narrow belt along Ghaghra, the coarse loamy soil (Balua) is also present along with soil of the above nature. In west-central parts, however, the soil is moderately well or poorly drained, exhibiting calcareous nature and is slightly saline and sodic. In a small portion in eastern fringes the soil is poorly drained, fine loamy and calcareous and is associated with slightly saline and sodic soils. At places, poorly drained, calcareous and/ or fine silty soils are also present in minor proportion along with main type of soil. Soil in the central parts, i.e around Tons river system shows signs of slight erosion. In broader terms, Varanasi Plain has Older Alluvial Soil (Alfisols), while Terrace Alluvium has Newer Alluvial Soil (Entisols) (GSI, 2001).

### **3.2 Geomorphology**

Ambedkar Nagar district forms part of Central Ganga Plains, having monotonous topography, with elevations ranging between 83-92 mamsl and gentle southeasterly slope. Geomorphologically, the terrain can be differentiated into upland and lowland (GSI, 2001). The upland known as Varanasi Plain, lying in Ganga-Ghaghra interfluves is the oldest geomorphic unit and occupies major part of the district. The ground of Varanasi Plain is silty to clayey, slopes gently towards southeast, and has scars of relict fluvial features in the form of *tals* and palaeochannels. The lowland lies along Ghaghra river and is divisible into Older Flood Plain (Terrace Plain) and Active Flood Plain (Channel Plain). The Terrace Plain is of depositional type and preserves the sediments deposited by the river during its process of incision. Active Flood Plain is restricted to the present day banklines of the river in the form of point/ channel/ lateral bars and is wide and sandy.

### **3.3 Geology**

The district exposes Quaternary sediments (GSI, *op. cit.*), which can be differentiated into Older Alluvium (OA) and Newer Alluvium (NA). The OA consists of oxidized, brown, yellow and khaki coloured sediments whereas the NA comprises unoxidised, grey and khaki coloured sediments. The OA, designated as Varanasi Alluvium (Middle to Late Pliestocene age), contains polycyclic sequence of silt and clay with kankar layers and subordinate beds/ lenses of micaceous sand, deposited over inferred basement of Bundelkhand Granite/ Vindhyan as components of 'Faizabad Ridge' (Khan *et al.*, 1992). It is dominantly argillaceous in the upper part and arenaceous in the lower levels (Khanna *et al.*, 1990). Central Ground Water Board has drilled exploratory wells only down to 305m in the southern part of the district. However, the boreholes drilled by CGWB down to 752m at Ranipur Gharwal in adjoining Faizabad district to the west and down to 755m at Paendapur in Azamgarh district to the south did not encounter basement, indicating that OA is more than 700m thick in this part. Thin interbeds of calcareous sandstones and compacted kankar beds, punctuating the stratigraphic column at various levels, represent minor breaks in sedimentation and suggest locally pulsating palaeoclimatic conditions from warm humid to warm arid at times (Khan *et al.*, *op.cit.*). The NA (Holocene age) occupies lowland and is divisible into Terrace

Alluvium and Channel Alluvium. The Terrace Alluvium consists of interbedded sequence of grey to khaki, micaceous, fine to coarse grained, immature sand, silt and clay and is well developed along Ghaghra river. The Channel Alluvium includes loose sand (grey, micaceous, fine to medium grained) of point/ channel bars and mud flats of flood plain of Ghaghra river. Thin layers of mud occupying tals/ palaeochannels are considered as homotaxial to Newer Alluvium. Generalized stratigraphic sequence is given in Table-7.

**Table –7: Generalized Stratigraphic Sequence\* in and around Ambedkar Nagar District, UP**

Age	Geological Units	Lithology	Geomorphological Units	Landforms
Holocene	Newer Alluvium	Ghaghra Recent Alluvium sands are greyish in colour fine to medium in size and micaceous in nature	Ghaghara Recent Flood Plain Deposits (Younger Flood Plains) restricted to narrow areas limited to its channel width	Point bars/channel bar sands, over bank silt
		Ghaghra Terrace Alluvium - sandy beds	Ghaghara Older Flood Plain	point bar sands with wavy bedding, ripple, cross laminations etc. and characterized by almost absence of top soil.
Middle to Upper Pliocene	Varanasi Older Alluvium (VOA) >700m	Brownish silt, clay, sand, sandstone and kankar, oxidized mature, sediments (fining upward sequence)	Varanasi Older Alluvial Plain – the oldest unit covering the highest level	Silty/ clayey surface with - Palaeochannels, Tals, meander cut-offs etc.
~~~~~ Unconformity ~~~~~				
Basement: Bundelkhand Granite (Precambrian) and/ or Vindhyan Supergroup (?) as component of Faizabad Ridge			Not exposed in the area	

\* Synthesized after District Resource Map of Faizabad District (GSI, 2001); Khan et al, 1992. and Khanna et al, 1990.

#### 4. GROUND WATER SCENARIO

##### 4.1 Hydrogeology

Exploratory drilling has been carried out by Central Ground Water Board down to about 305m at two places in Jalalpur block in the southern part of the district (**Plate-II; Appendix-I**). The sediments are predominantly arenaceous, made up of sequence of different grades of sand, silt and clay. Kankar, indicative of sedimentation gaps, occur as thin beds and lenses and is generally associated with clay. The sands vary from fine to very coarse, occasionally becoming gravelly in nature. Litholog of these wells in the panel diagram illustrated in Pandey, 2012

depicts three aquifer systems separated by thick clay beds. Deep exploratory drilling (~750m) in adjoining Faizabad and Azamgarh districts also suggests that multiple aquifer system exists in the area. Exploratory well drilled down to 582m at Balaipur (**Appendix-I**) near the southern boundary in Azamgarh district encounters thick clay beds in the depth range of 72-519m, with thin intercalations of sand beds (Singh, 2005). Sand mixed with gravel form the principal aquifers.

The 2 wells drilled in the district have been constructed up to 229m, collectively tapping Aquifer Group I & II. These wells have yielded 2270 to 3050 lpm water. Summary of the EWs drilled in the district is given in **Table-8**

**Table-8: Exploratory Drilling by CGWB in Ambedkar Nagar district, UP (Summarized results in Appendix-I)**

Number of EW	Depth Range (mbgl)	Yields (lpm)	Draw-downs (m)	Transmissivity (m <sup>2</sup> /day)
2	304.80-305.41	2270 - 3050	3.05 – 8.62	355 – 3999

**Hydrogeological map** of the district is presented in **Plate-II**.

#### **4.2 Depth to Water Level**

As per data of Ground Water Monitoring Stations of CGWB and GWD, UP for 2012, water levels in the district range from 1.05 to 7.48 mbgl during pre-monsoon, with majority of wells falling in the range of 3-7 mbgl. During post-monsoon, water levels range from 0.85 to 7.22 mbgl, with large number of wells having water levels between 2-6 mbgl. Depth to water level contours for pre- and post-monsoon 2012 are presented in **Plate-III & IV** respectively.

#### **4.3 Long-term Water Level Trend**

Analysis of water levels for the period 2003-12 in respect of CGWB monitoring wells existing in the district shows slightly declining trends, with range of decline as 0.03-0.15 m/yr during pre-monsoon and 0.02-0.15 m/yr during post-monsoon. Maximum decline has been observed at Bhati, both during pre-monsoon (0.15 m/yr) and post-monsoon (0.15 m/yr).

## 4.4 Ground Water Quality

### 4.4.1 Quality of Ground Water in Phreatic Aquifer

Central Ground water Board monitors ground water quality of phreatic aquifer through analysis of samples collected once a year (one sample from each block). Ground Water samples collected from 9 blocks of the district during 2012 show **Electrical Conductivity (EC)** in the range of 260-1250  $\mu$ -Siemens/cm, with EC values more than 1000 $\mu$ -S/cm at 4 places (Tanda, Baskahri, Jahangirganj and Bhiyaon), indicating that ground water is fresh to brackish in the district. Variation in EC over the area is illustrated through EC contours on Hydrogeological Map of the district (i.e **Plate-II**). Ground water is of slightly alkaline nature as suggested by pH values ranging from 7.81 to 8.70, with only one sample having pH value less than 8. Total hardness (as CaCO<sub>3</sub>) ranges from 180-380 mg/l. **Fluoride** is within permissible limits (1.5 mg/l) in all the samples, whereas **Nitrate** above permissible limit (45 mg/l) has been found at 3 places (Tanda – 146 mg/L; Baskhari – 59 mg/L & Jahangirganj – 65 mg/L).

During a survey carried out by UP Jal Nigam for **arsenic** in ground water in 4 blocks of the district, namely – Tanda, Baskhari, Ramnagar and Jahangirganj, arsenic has been detected in some of the GW samples from 3 blocks except Jahangirganj, with arsenic concentrations above 10 ppb also encountered in rare instances (**Table-9**). Arsenic above **50ppb was not found** in any sample (Total 2330 samples).

**Table-9: Summary of Survey Carried out by UP Jal Nigam for Arsenic in GW**

Block	No. of HPs (GW samples)	As Concentration up to 10 ppb (No. of HPs)	As Concentration >10 ppb (No. of HPs)	% of samples above 10 ppb
Tanda	706	2	3	~0.004%
Baskhari	360	4	1	~0.002%
Ramnagar	695	9	8	~0.011%

*Source: Report on 'Arsenic Toxicity in GW of UP' by State Water Resource Agency, Government of UP compiling results of UP Jal Nigam survey*

### 4.4.2 Quality of Ground Water in Deeper Aquifers

The two exploratory wells constructed up to around 225m in the district (in Jalalpur block), collectively tapping first and second aquifer systems have formation water with EC around 580-600  $\mu$ -Siemens/cm (**Appendix-I**).

#### 4.5 Status of Ground Water Development

About 71% area of the district is under agricultural use, with paddy and wheat grown on large scale. Net irrigated area is about 95% of the net sown area, of which 87% contribution comes from ground water. Although there is fairly strong canal network in the district, irrigation is mainly ground water dependent throughout the district (**Table-3 & 10**). This is due to easy access to ground water as water levels are not deep and ground water is directly under control of individual farmer/ user.

**Table 10: Block-wise status of sources of irrigation in Ambedkar Nagar district**

Block	Canal length (km)	Govt. tube-well (No.)	Perma-nent wells (No.)	Rahat (No.)	Pumpsets				Ground pumpset (No.)
Bhiti	0	112	16	0	1285	4507	13	5805	0
Katehari	102	69	14	0	641	5680	500	6821	0
Akbarpur	40	79	16	0	1371	9343	353	11067	0
Tanda	181	17	11	0	607	7041	116	7764	0
Baskhari	91	10	13	0	368	4872	28	5268	0
Ram Nagar	112	18	12	0	325	6819	61	7205	0
Jahangirganj	33	33	11	0	380	5459	73	5912	0
Jalalpur	59	59	15	0	951	8250	109	9310	0
Bhiyaon	103	29	13	0	443	4506	41	4990	0
<b>Total Rural</b>	<b>721</b>	<b>426</b>	<b>121</b>	<b>0</b>	<b>6371</b>	<b>56477</b>	<b>1294</b>	<b>64142</b>	<b>0</b>
<b>Total Urban</b>	<b>-</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total District</b>	<b>721</b>	<b>436</b>	<b>121</b>	<b>0</b>	<b>6371</b>	<b>56477</b>	<b>1294</b>	<b>64142</b>	<b>0</b>

Source: website updes.up.nic.in (Statistical Diary-2012, Table-23; Figures for 2010-11)

Drinking water requirement of the district is met by UP Jal Nigam through tubewells (Piped Water Supply Scheme) and India Mark II hand pumps, with per capita demand considered as 70 lpcd (rate of water supply 70 lpcd + 15%). As per Statistical Diary, 2012, 1645 villages have India Mark II hand pumps, benefiting a population of 2528870. Rural Piped Water Supply Schemes have 4 tubewells catering to 29123 population in 3 villages of Jalalpur block (Suhurpur, Nagpur & Manguradila villages ) and 1 village of Bhiyaon block (Bhiyaon) (*source: office of Executive Engineer, UPJN, Ambedkar Nagar*). In urban areas, water supply is through 743 HPs and 25 TWs in 5 towns (Akbarpur, Tanda, Jalalpur, Ashrafpur Kichaucha and Iltefatganj), catering to population of 173795 (*Source as above*). Out of the 25 tube wells, 19 are located in Tanda and Akbarpur town alone (10 and 9 respectively).

#### 4.6 Dynamic Ground Water Resources (as on 31.3.2009)

As per estimation of dynamic (replenishable) ground water resource of Ambedkar Nagar district (as on 31.3.2009), all the blocks barring one have been categorized as 'Safe' (**Plate-V; Appendix-II**). Only Bhati block has been categorized as Semi-critical. Keeping provision for future domestic and industrial requirements, availability of ground water for future irrigation development comes to 36836.01ham. Summary of Dynamic GW Resources of the district is presented in **Table-11**.

**Table-11: Dynamic GW Resource, Ambedkar Nagar district, UP (as on 31.3.2009)**

Net annual GW Availability (ham)	Gross GW Draft for all uses (ham)	Net GW Availability for future development for irrigation (ham)	Over-all Stage of GW Development	Block-wise range of GW Development	Categorisation of blocks
97631.35	57956.40	36836.01	59.36%	39.03% (Tanda) to 85.53 % (Jahangirganj)	8 blocks 'Safe' & 1 block 'Semi-critical' (Bhati)

When compared to the earlier Dynamic Ground Water Resources as on 31.3.2004, it is seen that Bhati block has come under 'Semi-critical' category from earlier 'Safe' category, whereas 'Katehari block, which was categorized as 'Semi-critical' in 2004 has become 'Safe' in 2009.

#### 5. GROUND WATER RELATED ISSUES AND PROBLEMS

The foregoing description of ground water scenario does not indicate any major ground water problem in the district. However, a comparison of dynamic GW resources as on 31.3.2004 and 31.3.2009 reveals that Bhati block has now come under 'Semi-critical' category, from 'Safe' Category earlier. There is very high variability in the stage of GW development in the district; from 39.03% in Tanda block to 85.53% in Karanda block. Ground water development is low in blocks having substantial canal irrigation. In some small areas, in the immediate vicinity of canals, marshy/ water logged land is observed, particularly in Baskhari, Ramnagar, Bhiyaon, Tanda and Katehari blocks (SWaRA, 2010). However, total area covered by such land is miniscule 4.34% of the district. As can be seen from Table 3, 4 & 10 (also Plate-I), although canal network exists in Ram Nagar and Jahangirganj blocks through Jahangirganj Distributary, irrigation from canal is very low or absent,



indicating that sufficient water does not reach tail-ends of the canal. As a result stage of GW development in these blocks is relatively high (77.5% % 85.53% respectively). However, water levels in these blocks are between 2-5mbgl during post-monsoon (Plate-IV) and there is no significant decline, suggesting that situation is not alarming. Canal network is absent in the 'Semi-critical' Bhiti block.

## **6. GROUND WATER MANAGEMENT STRATEGY**

The present level of ground water development is 59.36% in the district, leaving net ground water availability for future irrigation development as 36836.01ham. Out of the 9 blocks, 8 have been categorized as 'Safe'. Only Bhiti block falls under 'Semi-critical' category. Thus, additional irrigation potential can be judiciously exploited in all the 'Safe' blocks.

It also follows from the discussions in the preceding section (Section-5) that establishing canal network in Bhiti block and ensuring availability of water at the tail end, combined with practice of conjunctive use of surface and ground water is the need of the hour in order to maintain the right balance between surface and ground water and also to bring about parity in ground water development across the district.

## **7. AWARENESS AND TRAINING ACTIVITY**

No Mass Awareness Programme or Water Management Training Programme has been organized by CGWB in Ambedkar Nagar district.

## **8. AREA NOTIFIED BY CGWA**

No area/ block of Ambedkar Nagar district has been notified by CGWA.

## **9. RECOMMENDATIONS**

- Canal network should be established in Bhiti block, which has now come under 'Semi-critical' category.
- Availability of water at the tail end should be ensured, particularly in Ramnagar and Jahangirganj blocks.
- Practice of conjunctive use of surface and ground water is the need of the hour in order to maintain the right balance between surface and ground

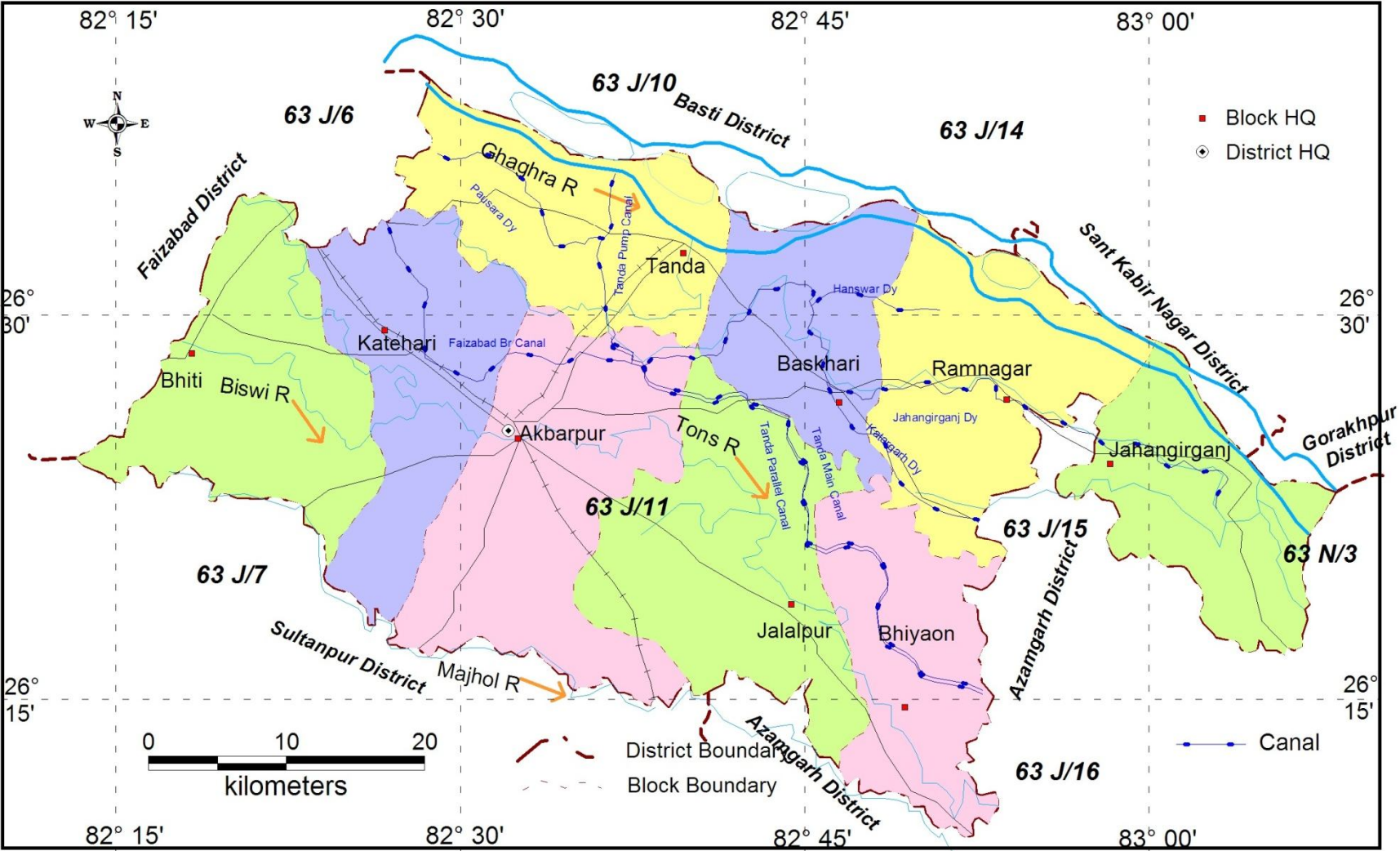
water and also to bring about parity in ground water development across the district.

- Deep exploratory drilling should be undertaken in the district to ascertain characteristics of deeper aquifers.

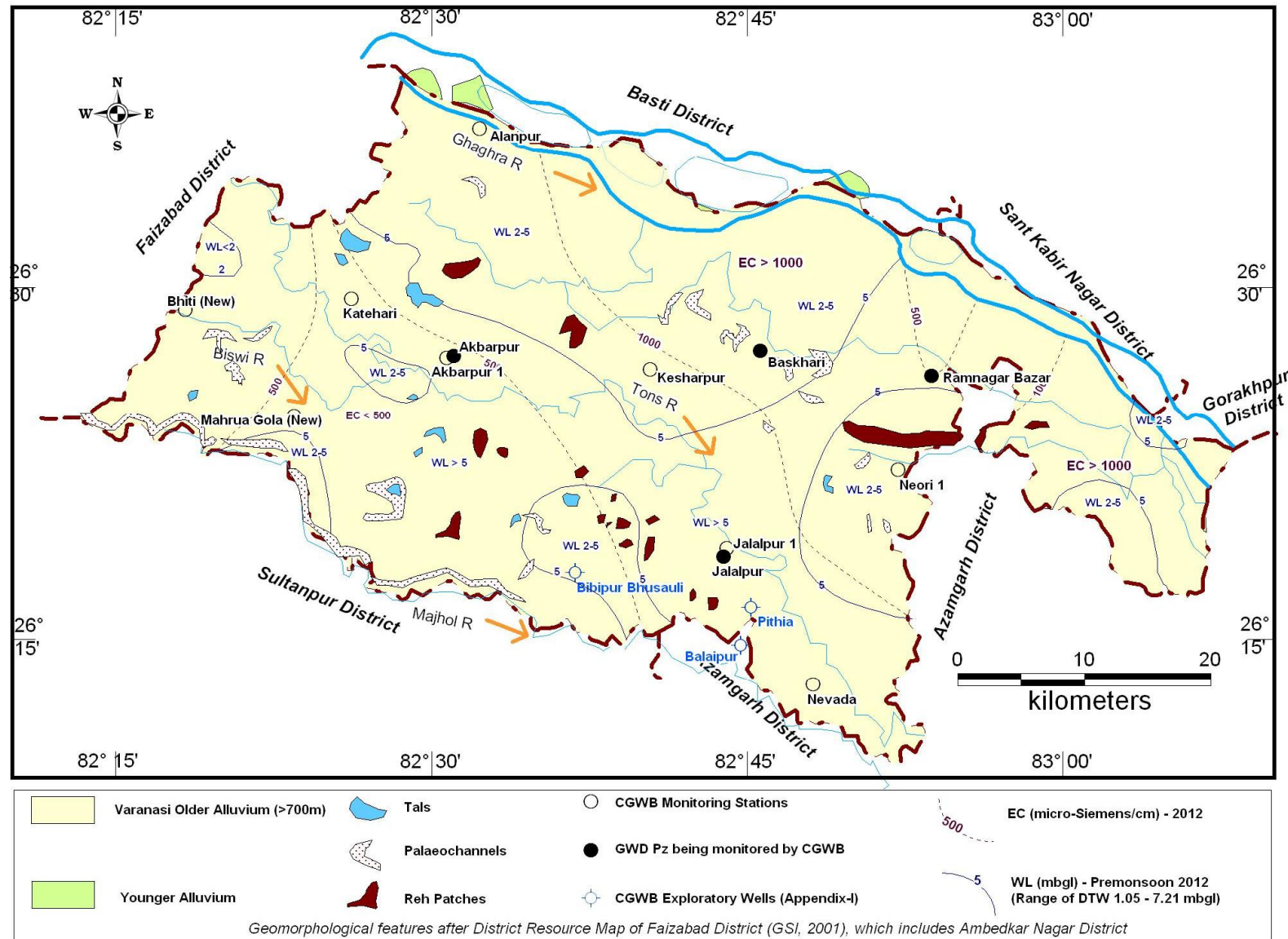
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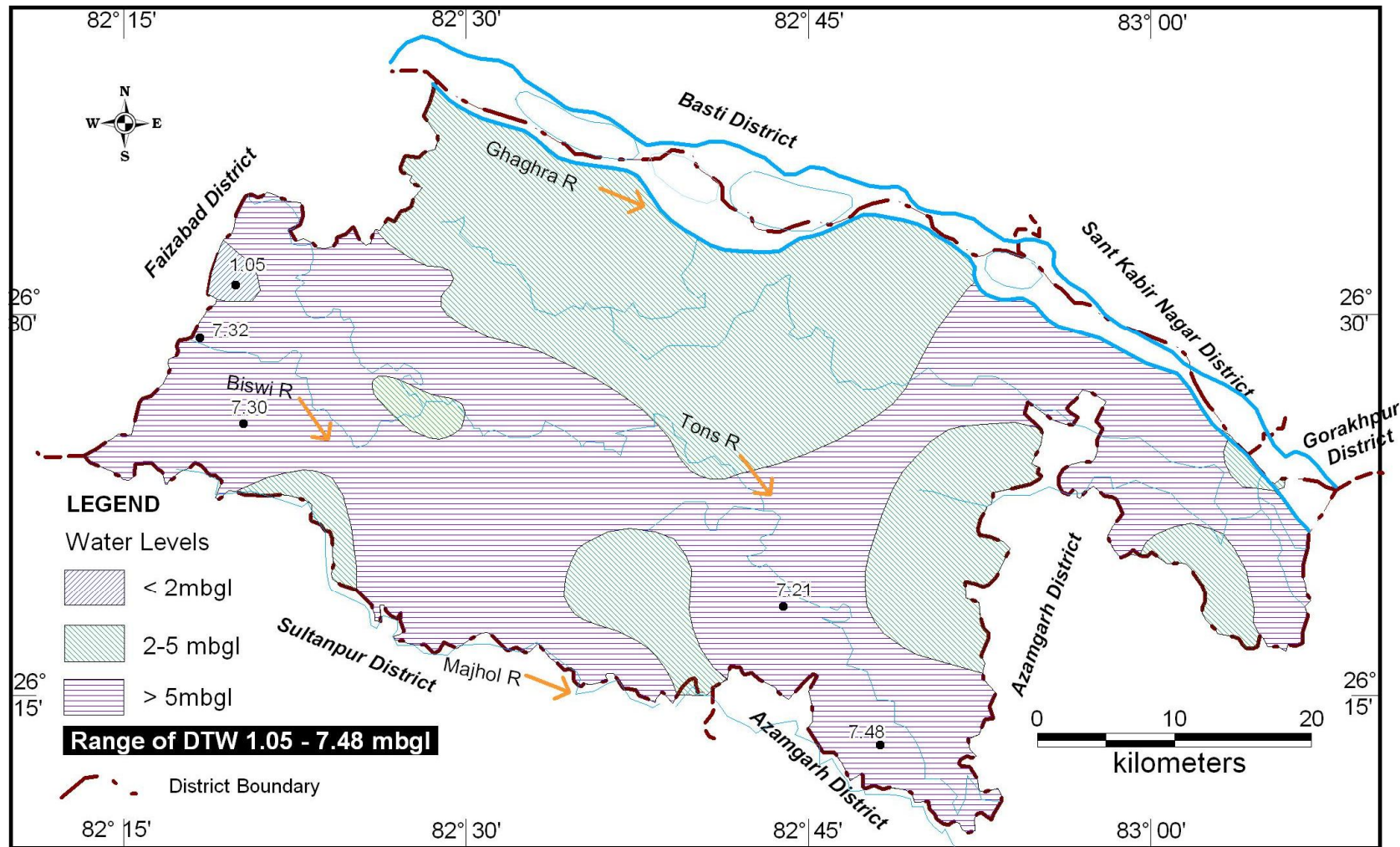
Administrative Map of Ambedkar Nagar District, UP



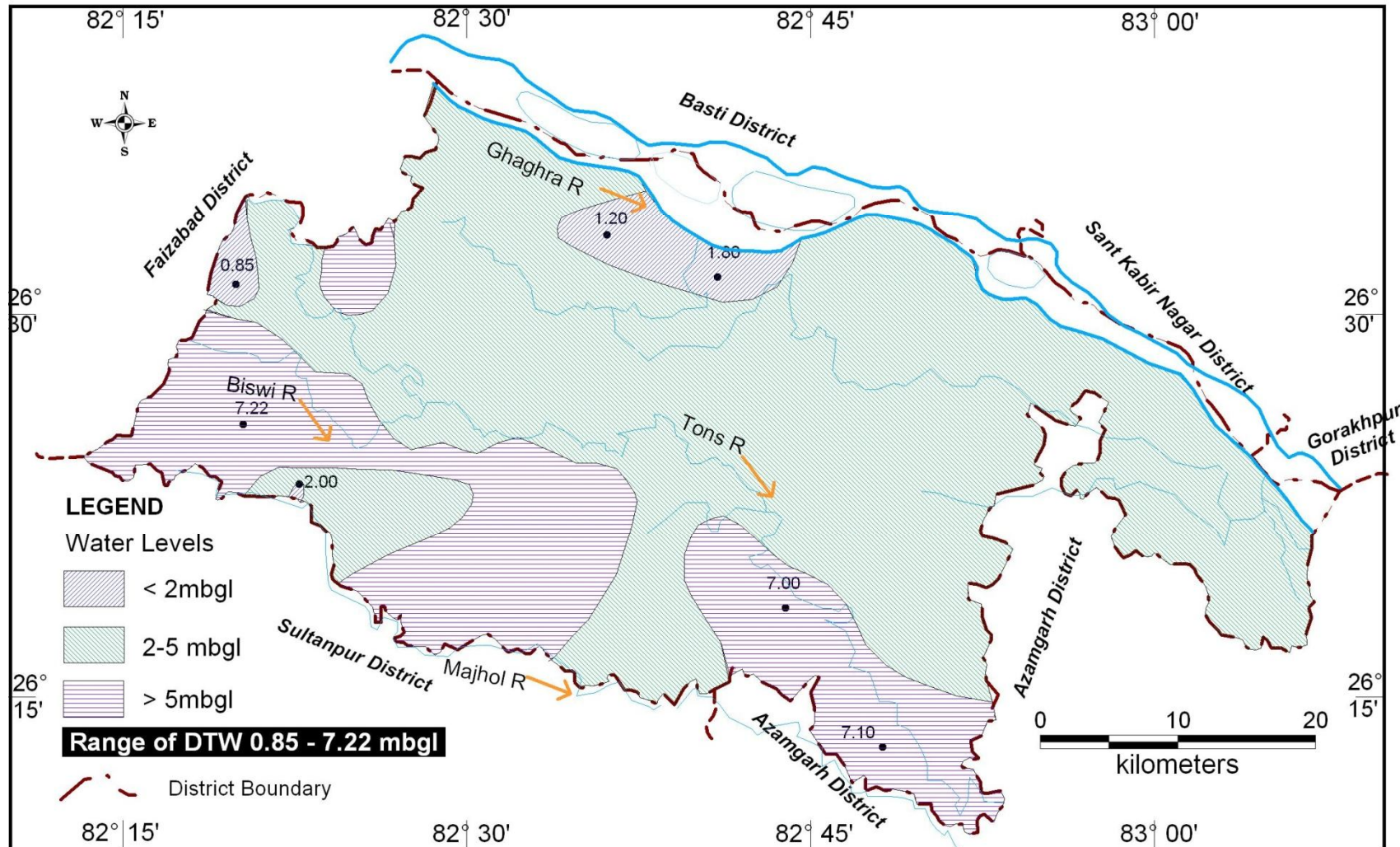
### Hydrogeological Map of Ambedkar Nagar District, UP



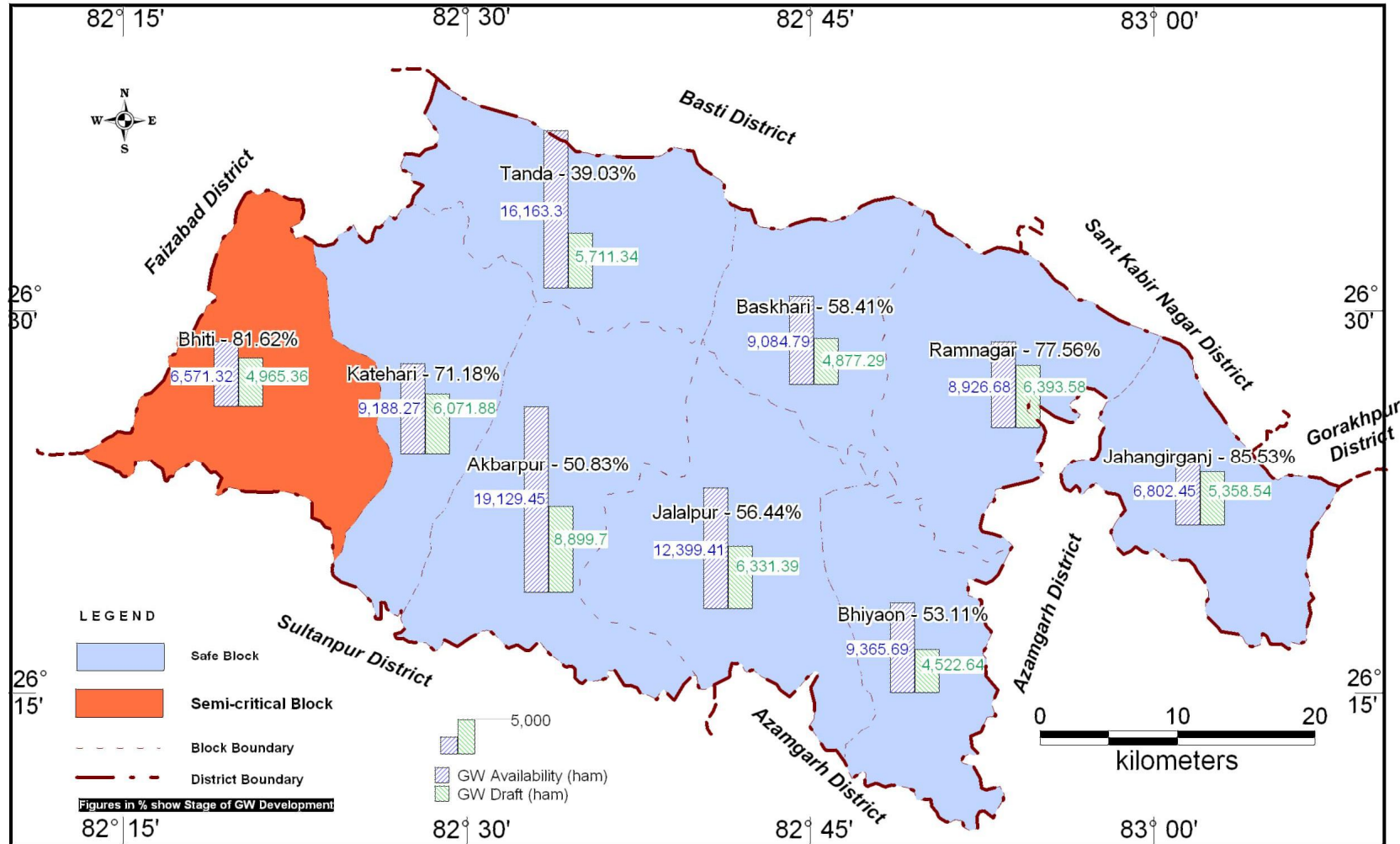
### Depth to Water Level in Ambedkar Nagar District, UP Pre-monsoon 2012



Depth to Water Level in Ambedkarnagar District, UP  
Post-monsoon 2012



### Dynamic Ground Water Resources in Ambedkar Nagar District, UP (as on 31.3.2009)



APPENDIX-I

Summarized Hydrogeological Results of Exploratory Drilling by CGWB in (and near) Ambedkar Nagar District, UP

Sl. No.	LOCATION	Block	TYPE OF WELL	DEPTH DRILLED (mbgl)	DEPTH CONSTRUCTED (mbgl)	AQUIFER ZONES TAPPED (mbgl)	STATIC WATER LEVEL (mbgl)	DISCHARGE (lpm)	DRAW DOWN (m)	SPECIFIC CAPACITY (lpm/m) of DD	TRANSMISSIVITY, T (m <sup>2</sup> /day)	STORATIVITY, S	REMARKS
1	BIBIPUR BHUSAULI	Jalalpur	EW	305.41	229.00	38-50; 55-61; 118-148; 201-224;	4.29	2270	8.62	263	355	---	EC 580
2	PITHIA	Jalalpur	EW	304.80	220.00	36-54; 59-66; 94-100; 111-122; 134-168; 191-197; 203-215;	4.35	3050	3.05	1000		---	EC 603
3	BALAIPUR	***	EW	582.00	440.00	35-64; 212-220; 269-289; 324-334; 420-435	4.84	2150	14.15	152	473		EC 660

\*\*\* Azamgarh District



APPENDIX-II

Dynamic Ground Water Resources, Ambedkar Nagar District, UP  
(as on 31.03.2009)

Block	Net Annual GW availability (in ham)	Existing gross GW draft for Irrigation (in ham)	Existing gross GW draft for Domestic & Industrial Water Supply (in ham)	Existing gross GW draft for all uses (in ham)	Provision for domestic & industrial supply for 2025 (ham)	Net GW Availability for future development for irrigation (ham)	Stage of GW development (in %)	Category
Akbarpur	19129.45	8899.7	823.81	9723.51	1335.56	8894.19	50.83	Safe
Baskhari	9084.79	4877.29	429.58	5306.87	631.65	3575.85	58.41	Safe
Bhiti	6571.32	4965.36	398.19	5363.55	657.59	948.37	81.62	Semi-critical
Bhiyaon	9365.69	4522.64	451.29	4973.93	699.97	4143.08	53.11	Safe
Jahangirganj	6802.45	5358.54	459.71	5818.25	679.49	764.42	85.53	Safe
Jalalpur	12399.41	6331.39	667.28	6998.67	1051.07	5016.95	56.44	Safe
Katehari	9188.27	6071.88	468.11	6539.99	734.88	2381.51	71.18	Safe
Ram Nagar	8926.68	6393.58	530.06	6923.64	900.65	1632.45	77.56	Safe
Tanda	16163.30	5711.34	596.65	6307.99	972.76	9479.20	39.03	Safe
<b>Total District</b>	<b>97631.35</b>	<b>53131.72</b>	<b>4824.68</b>	<b>57956.40</b>	<b>7663.62</b>	<b>36836.01</b>	<b>59.36</b>	