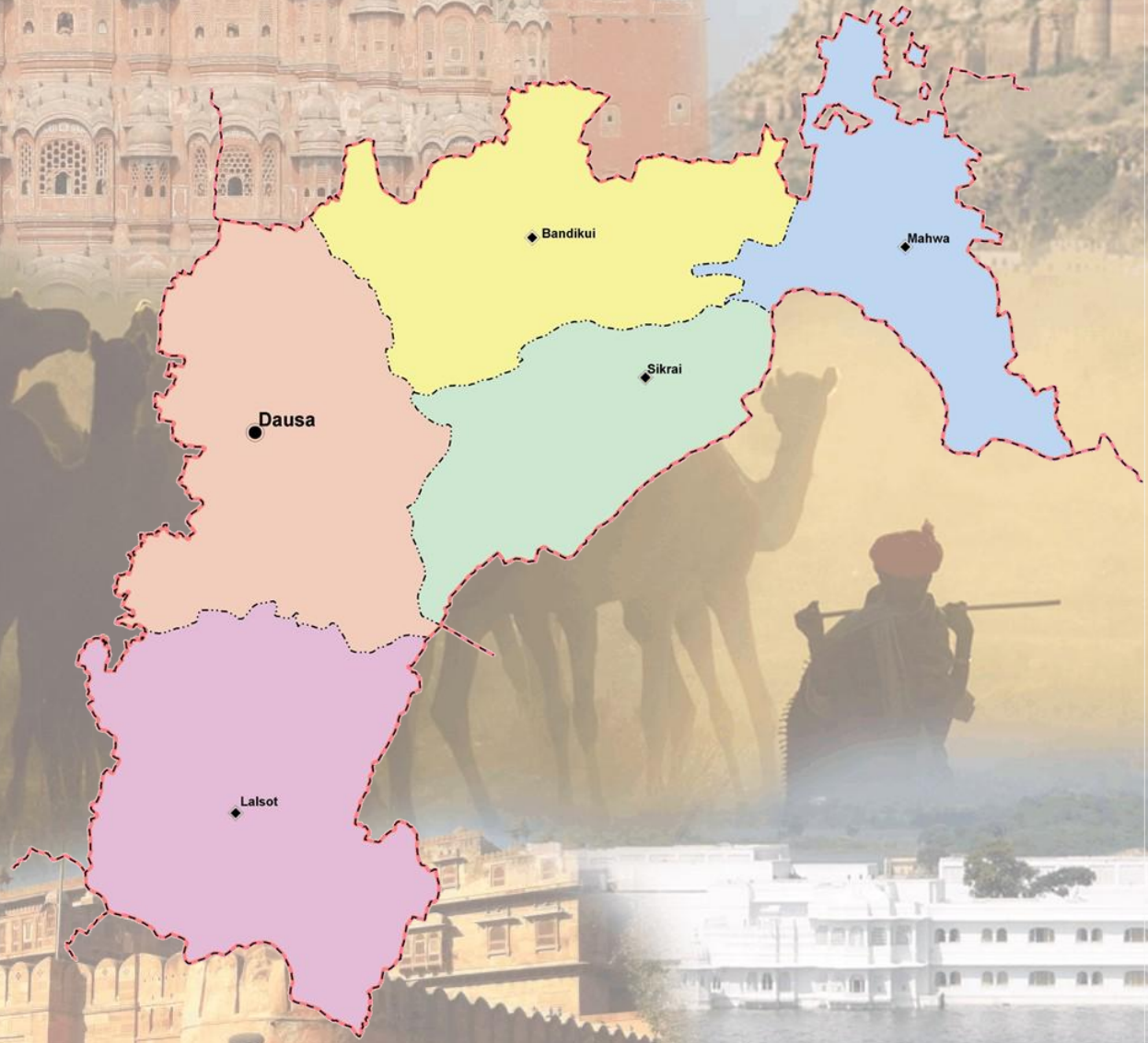
Ground Water Department,
Rajasthan

Hydrogeological Atlas of Rajasthan
Dausa District

European Union
State Partnership Programme



2013

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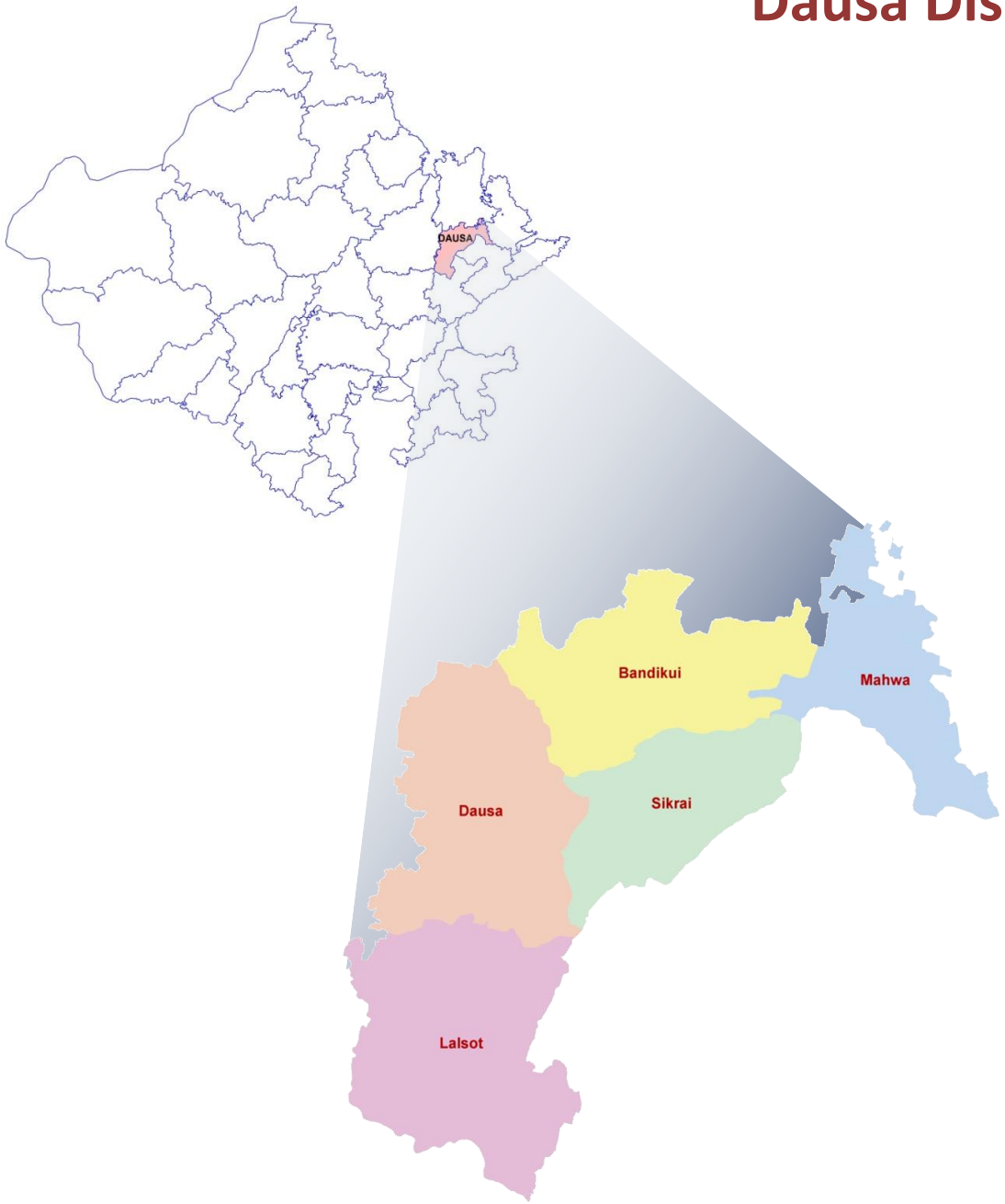
Hydrogeological Atlas of Rajasthan

Dausa District



Contents:

2013

ADMINISTRATIVE SETUP

DISTRICT – DAUSA

Location:

Dausa district is located in the eastern part of Rajasthan. It is bounded in the north by Alwar district, in the east Bharatpur district, south by SawaiMadhopur and Karauli districts and Jaipur district in the west. It stretches between 26^{o} 22' 13.32" to 27^{o} 14' 33.58" north latitude and 76^{o} 08' 32.62'' to 77^{o} 05' 00.41'' east longitude covering area of 3,417.7 sq km. The district is drained by three important rivers and the district falls within the three corresponding river basins namely 'Banganga River Basin' in northern part, 'Banas River Basin' in southern part, and 'Gambhir River Basin' is in lower eastern part.

Administrative Set-up:

Dausa district is administratively divided into five Blocks. The following table summarizes the basic statistics of the district at block level.

S. No.	Block Name	Population (Based on 2001 census)	Area (sq km)	% of District Area	Total Number of Towns and Villages
1	Bandikui	2,83,311	697.4	20.0	214
2	Dausa	3,33,508	811.8	24.0	234
3	Lalsot	2,79,619	879.6	26.0	322
4	Mahwa	2,08,846	505.7	15.0	154
5	Sikrai	2,11,779	523.2	15.0	139
Total		**13,17,063**	**3,417.7**	**100.0**	**1,063**

Dausa district has 1,063 towns and villages, of which five are block headquarters as well.

Climate:

The climate of Dausa is generally dry and is subject to extremeness of cold and heat at various places. The minimum and maximum temperatures in the district are 3.33 ^{o}C and 44 ^{o}C respectively. Annual average rainfall in the district is 570.3mm.

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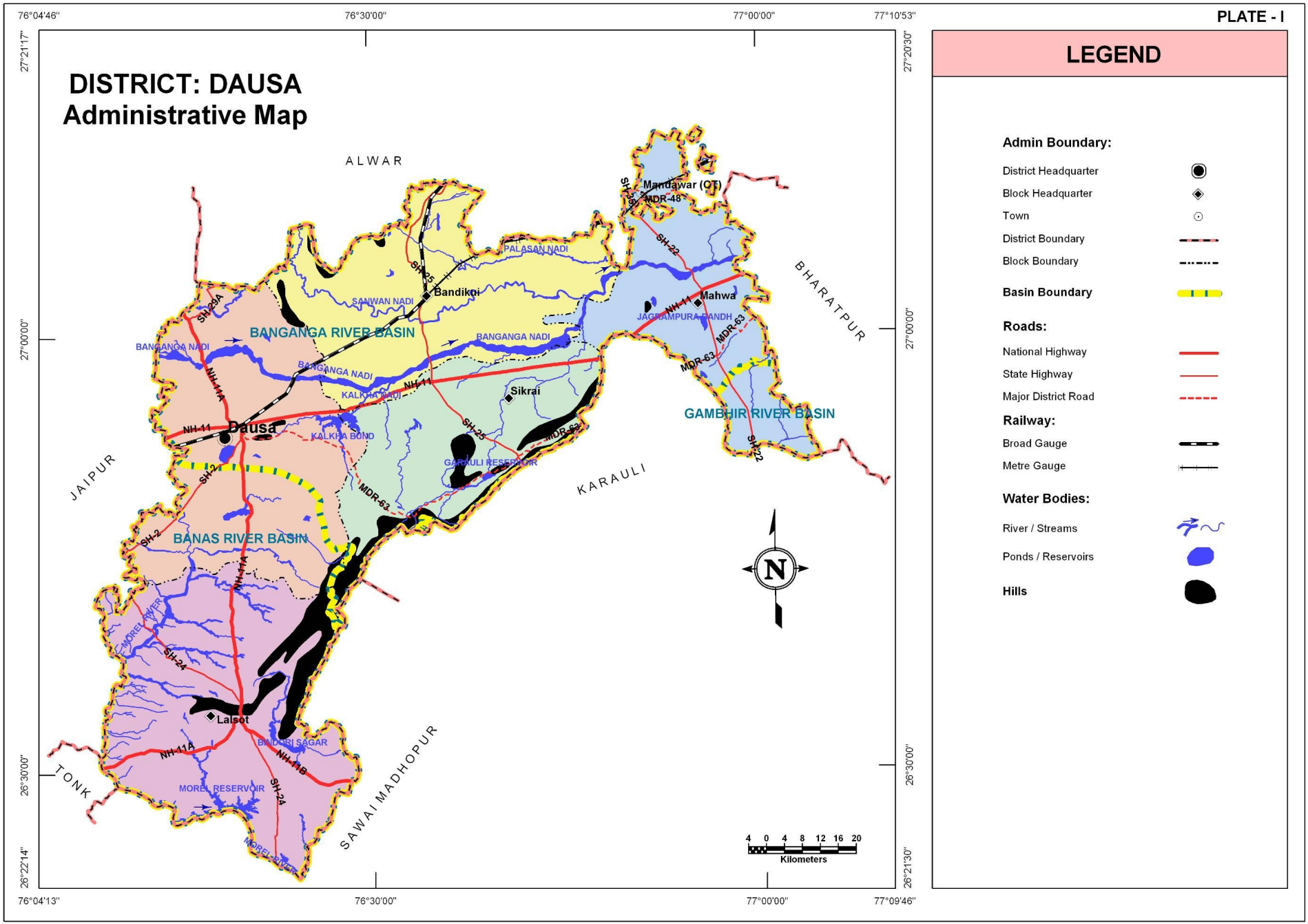
PLATE - I



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- District Boundary
- Block Boundary

Basin Boundary

Roads:

- National Highway
- State Highway
- Major District Road

Railway:

- Broad Gauge
- Metre Gauge

Water Bodies:

- River / Streams
- Ponds / Reservoirs

Hills

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TOPOGRAPHY

DISTRICT – DAUSA

The district is characterized by relatively flat topography along with occasional hills in the southwestern part. In general, the district has lowland topography and sheet and gully erosion of moderate to severe order. The area is drained mainly by Banganga and Morel River along with their tributaries like Sanwan, Palasan, Kalkha etc. The Banganga River flows in the northern part of the district following an E-W trend, whereas Morel river flowsin SW direction. The general topographic elevation in the district is between 250 m to 300 m above mean sea level. Elevation ranges from a minimum of 203.2 m above mean sea level in Mahwa block in the northeastern part of the district and maximum of 596.3 m above mean sea level In Bandikui block in northern part of the district.

Table: Block wise minimum and maximum elevation

S. No.	Block Name	Minimum Elevation (m amsl)	Maximum Elevation (m amsl)
1	Bandikui	234.7	596.3
2	Dausa	281.5	535.0
3	Lalsot	238.0	549.0
4	Mahwa	203.2	407.1
5	Sikrai	246.8	525.8

RAINFALL

The district received fairly good rainfall in the year 2010. The general distribution of rainfall across can be visualized from isohyets presented in the Plate – III. Rainfall is gradually increasing from northeast to south. The annual average rainfall in the district was 740.7 mm based on the data of available blocks while maximum average annual rainfall is 998.0 mm (Lalsot block). Lowest annual rainfall was observed in Mahwa block (542.5 mm). Lalsot block has received highest maximum Annual rainfall of about 1,136.3 mm.

Table: Block wise annual rainfall statistics (derived from year 2010 meteorological station data)

Block Name	Minimum Annual Rainfall (mm)	Maximum Annual Rainfall (mm)	Average Annual Rainfall (mm)
Bandikui	591.0	768.4	662.6
Dausa	684.0	939.1	783.8
Lalsot	785.8	1,136.3	998.0
Mahwa	542.5	677.8	597.4
Sikrai	617.2	769.6	661.6

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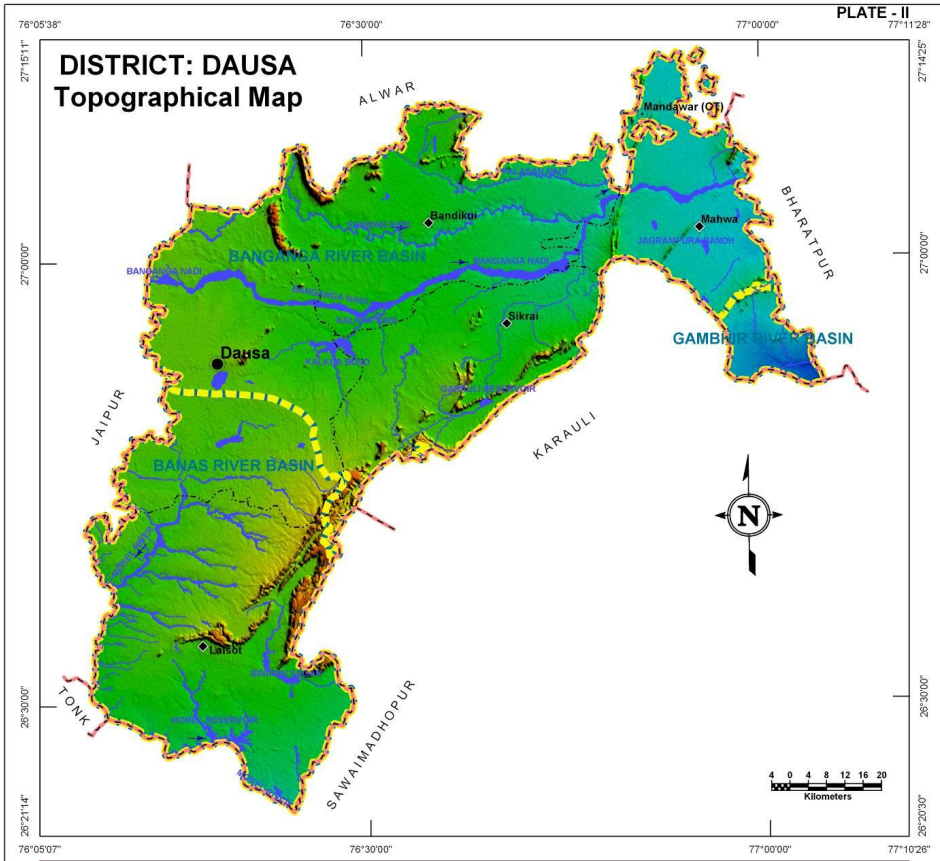
PLATE - II



LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- Town
- District Boundary
- Block Boundary

Basin Boundary

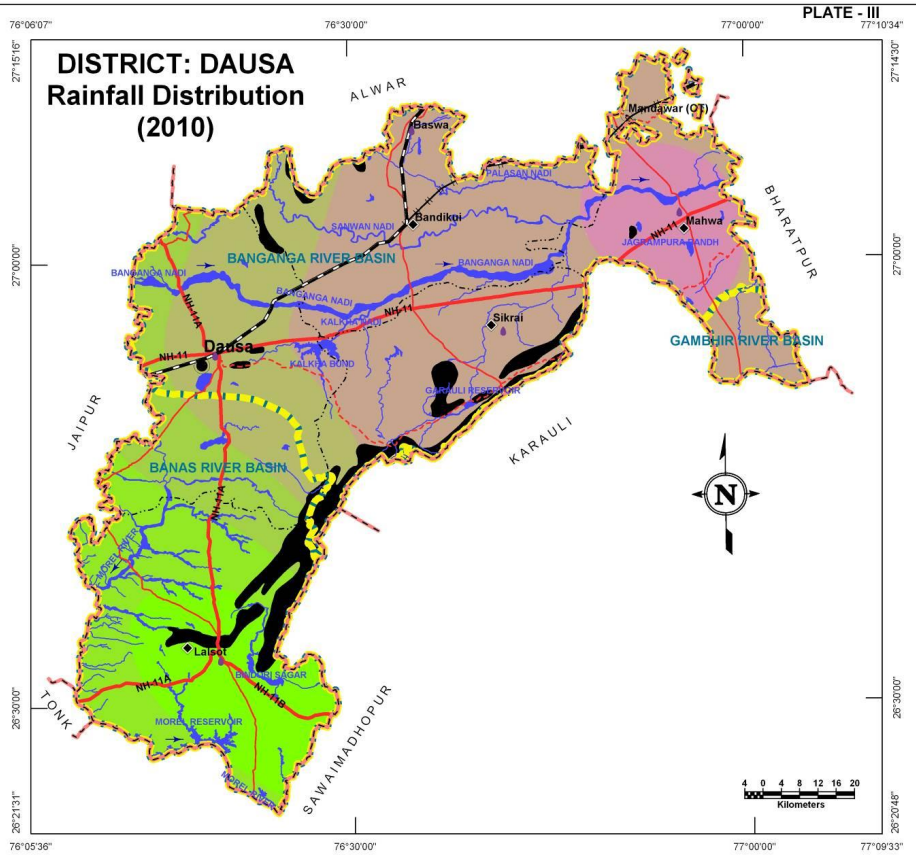
Water Bodies:
- River / Streams
- Ponds / Reservoirs

Elevation (m amsl):

596 550 500 450 400 350 300 250 203

Source : SRTM DEM

PLATE - III



LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- Town
- Raingauge Stations
- District Boundary
- Block Boundary

Basin Boundary

Roads:
- National Highway
- State Highway
- Major District Road

Railway:
- Broad Gauge
- Metre Gauge

Water Bodies:
- River / Streams
- Ponds / Reservoirs

Hills

Isohyets (mm):
- 500-600
- 600-700
- 700-800
- 800-900
- 900-1000
- > 1000

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GEOLOGY

DISTRICT – DAUSA

Geologically, most part of the district occupied by the Bhilwara Super Group rocks which consists ofgneisses, schist and migmatites. These gneisses are overlain by rocks of Delhi Super group comprising Raialo and AlwarGroups.Raialo group of rocks represented by dolomite/marble are in the NW part of Dausa block in a small part. It is overlain by AlwarGroup of rocks i.e. quartzite & schist. Alluvium and wind-blown sandoccupy parts of the district within Mahwa and Lalsot blocksin the northeast and southwest of the district.

Super Group	Group	Formation
	Recent to Sub-recent	Alluvium- Sand, silt, gravel, clay and kankar and wind-blown sand
X--------X--------X--------X--------X--------X---Unconformity---X--------X--------X-------X-------X-------X-------		
Delhi	Ajabgarh	Schists, Phyllites, Marble and Quartzites
	Alwar	Quartzites, Conglomerates &Schists.
	Raialo	Dolomite/Marble
X--------X--------X--------X--------X--------X---Unconformity---X--------X--------X-------X-------X-------X-------		
Bhilwara	Mangalwar Complex	Gneisses, Schists and Migmatites.

GEOMORPHOLOGY

Table: Geomorphologic units, their description and distribution

Origin	Landform Unit	Description
Denudational	Pediment	Broad gently sloping rock flooring, erosional surface of low relief between hill and plain, comprised of varied lithology, criss-crossed by fractures and faults.
Fluvial	Alluvial Plain	Mainly undulating landscape formed due to fluvial activity, comprising of gravels, sand, silt and clay. Terrain mainly undulating, produced by extensive deposition of alluvium.
	Valley Fill	Formed by fluvial activity, usually at lower topographic locations, comprising of boulders, cobbles, pebbles, gravels, sand, silt and clay. The unit has consolidated sediment deposits.
	Ravine	Small, narrow, deep, depression, smaller than gorges, larger than gulley, usually carved by running water.

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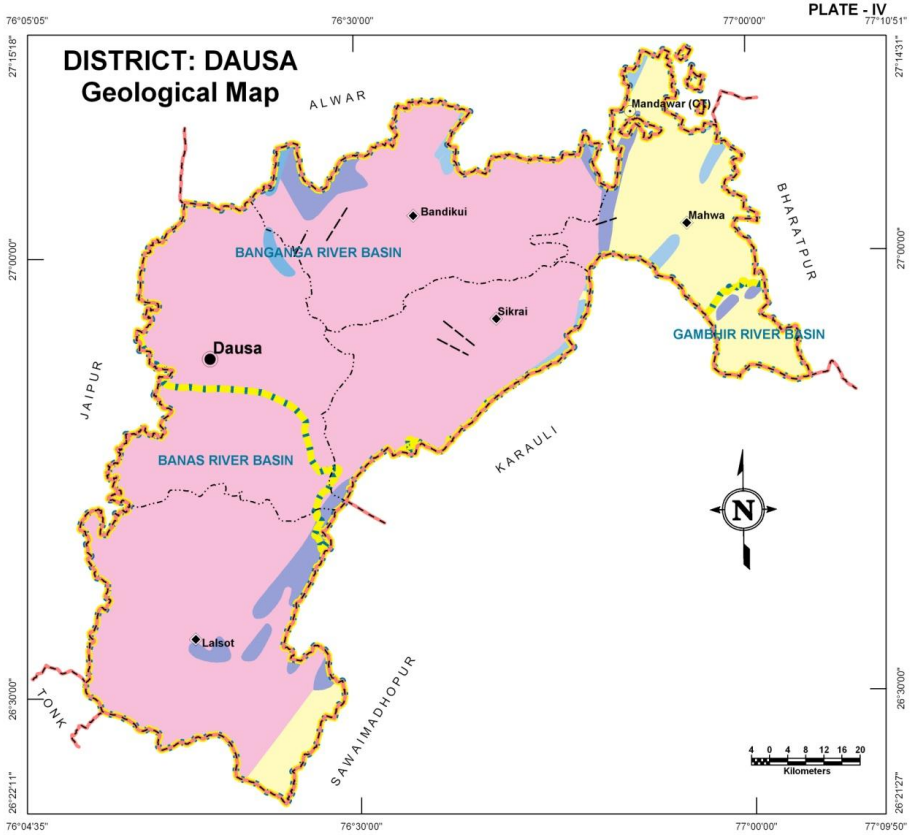
PLATE - IV



LEGEND

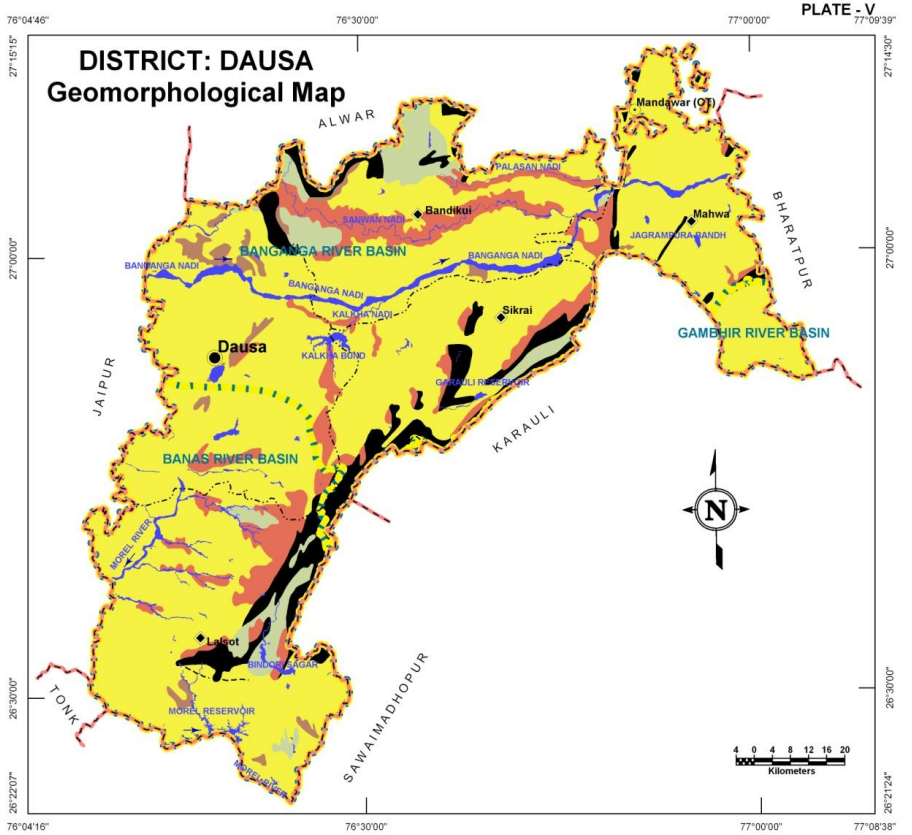
Admin Boundary:
- District Headquarter
- Block Headquarter
- Town
- District Boundary
- Block Boundary
- **Basin Boundary**

Structural Features:
- Fault

Geology:
- Alluvium and Wind blown sand
- Ajabgarh Group
- Alwar Group
- Raialo Group
- Mangalwar Complex

Source: District Resource Map of Rajasthan - GSI

PLATE - V



LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- Town
- District Boundary
- Block Boundary
- **Basin Boundary**

Water Bodies:
- River/Ponds/Reservoirs

Structural Features:
- Fault/Fractures/Lineament

Hills:
- Structural/Denudational/Linear Ridge

Landform Units:

Fluvial Origin:
- Alluvial plain
- Ravine
- Valley Fill

Denudational Origin:
- Pediment

Source: Ground Water Atlas of Rajasthan - SRSAC & GWD, Rajasthan

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AQUIFERS

DISTRICT – DAUSA

Alluvium constitutes the most prominent aquifer in the district occupying more than (Younger alluvium – 21.6% and Older alluvium 58.4%) of the district area. Silt, sand, gravel and occasional pebbles constitute aquifer material within the aeolian and fluvial origin alluvium. The weathered, fractured and jointed hardrock forms aquifers in hardrock areas. Quartzite contributes to about 9% of aquifers in the district and rest of 5.3% is occupied by gneisses and phyllite aquifers.

Table: aquifer potential zones their area and their description

Aquifer in Potential Zone	Area (sq km)	% age of district	Description of the unit/Occurrence
Younger Alluvium	739.4	21.6	It is largely constituted of Aeolian and Fluvial sand, silt, clay, gravel and pebbles in varying proportions.
Older Alluvium	1,997.8	58.4	This litho unit comprises of mixture of heterogeneous fine to medium grained sand, silt and kankar.
Phyllite	73.7	2.2	These include meta sediments and represented by carbonaceous phyllite.
Quartzite	311.0	9.1	Medium to coarse grained and varies from feldspathic grit to sericitic quartzite.
Gneiss	105.1	3.1	Comprises of porphyritic and non-porphyritic gneissic complex.
Hills	190.7	5.6	-
Total	**3,417.7**	**100.0**	

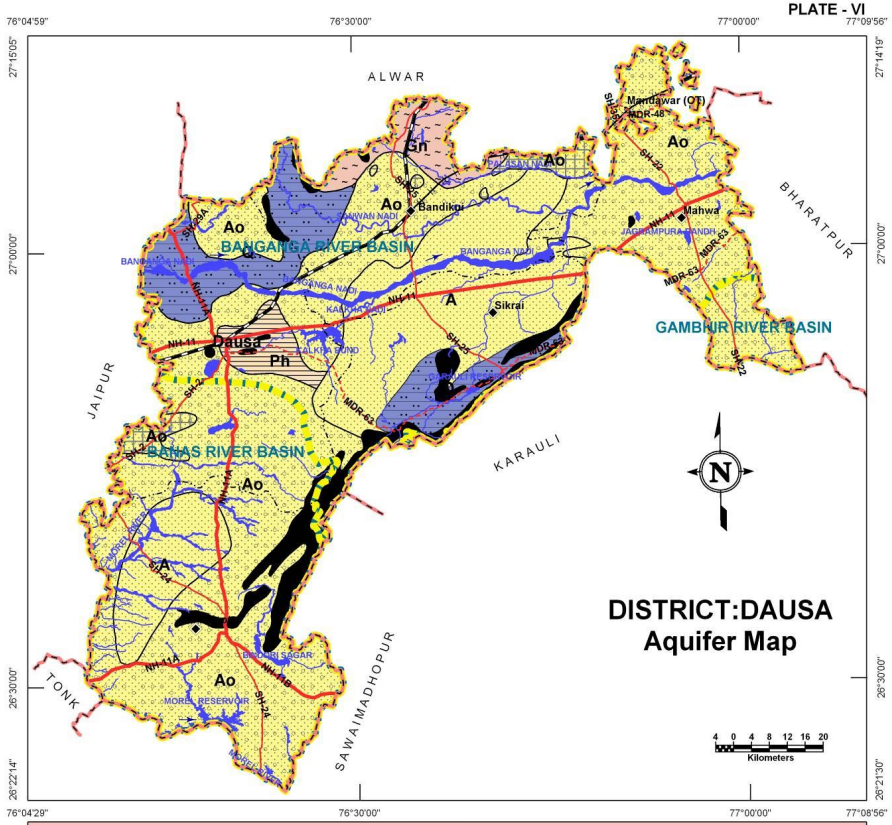
STAGE OF GROUND WATER DEVELOPMENT

Ground water in the district appears to be under severe stress as indicated by assessment results wherein all the blocks fall within 'Over Exploited' category. This situation needs immediate attention for conservation measures since recharge in monsoon is exceeded by withdrawal as a result the static reserves of ground water are becoming the source of ground water rather than the usable water being extracted from dynamic reserves.

Categorization on the basis of stage of development of ground water	Block Name
Over Exploited	Sikrai, Dausa, Lalsot, Bandikui, Mahwa

Basis for categorization: Ground water development >100% - Over-Exploited.

PLATE - VI



LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- Town
- District Boundary
- Block Boundary
- **Basin Boundary**

Roads:
- National Highway
- State Highway
- Major District Road

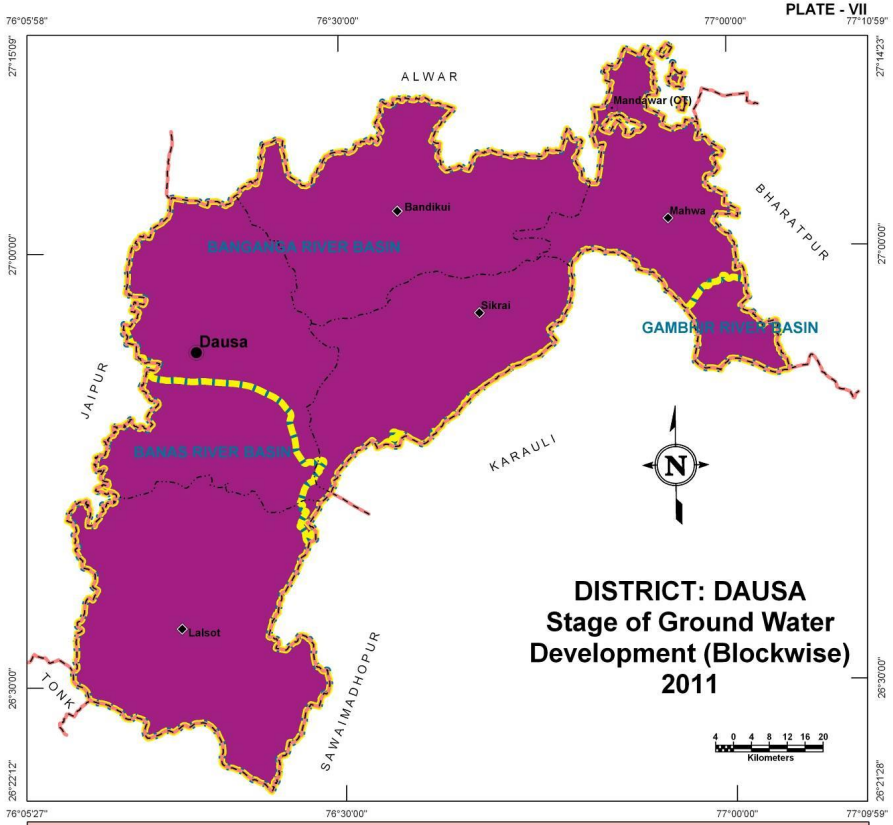
Railway:
- Broad Gauge
- Metre Gauge

Water Bodies:
- River / Streams
- Ponds / Reservoirs
- **Hills**
- **Non Potential Zone**

Aquifer:
- Younger Alluvium
- Older Alluvium
- Phyllite
- Quartzite
- Gneiss

Source: Ground Water Potential Zone Map - GWD, Rajasthan

PLATE - VII



LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- Town
- District Boundary
- Block Boundary
- **Basin Boundary**

Stage of Ground Water Development:
- Over-Exploited

Source: Ground Water Department, Rajasthan

LOCATION OF EXPLORATORY AND GROUND WATER MONITORING WELLS DISTRICT – DAUSA

Dausa district has well distributed network of large number of exploratory wells (56) and ground water monitoring stations (127) in the district owned by RGWD (34 and 91 respectively) and CGWB (22 and 36 respectively). The exploratory wells have formed the basis for delineation of subsurface aquifer distribution scenario in three dimensions. Benchmarking and optimization studies suggest that ground water level monitoring network requires strengthening by addition of 11 wells in Dausa and Bandikui blocks whereas, 101 additional wells must be added to the existing network for optimal water quality monitoring.

Table: Block wise count of wells (existing and recommended)

Block Name	Exploratory Wells			Ground Water Monitoring Stations			Recommended additional wells for optimization of monitoring network	
	CGWB	RGWD	Total	CGWB	RGWD	Total	Water Level	Water Quality
Bandikui	5	7	12	7	17	24	3	19
Dausa	7	8	15	9	20	29	8	24
Lalsot	5	8	13	9	20	29	-	25
Mahwa	1	7	8	6	21	27	-	18
Sikrai	4	4	8	5	13	18	-	15
Total	**22**	**34**	**56**	**36**	**91**	**127**	**11**	**101**

DEPTH TO WATER LEVEL (PRE MONSOON – 2010)

Depth to water level shows variation ranging from less than 20m below ground level to more than 50m below ground level. Most of the alluvial part of Banas and Gambhir River Basin and adjoining parts the ground water occurs at shallow depths up to a maximum depth of 30mbgl. There is also a shallow water occurrence area in the southeast of Bandikui and Dausa blocks where the depth to water level is less than 20m bgl. Otherwise, in general, in the central, southern and northern parts the ground water occurs at moderate levels i.e., in between 30m bgl to 50m bgl. In the southernmost part of the district within Lalsot block, deepest water level more than 50m bgl reported.

Depth to water level (m bgl)	Block wise area coverage (sq km) *					Total Area (sq km)
	Bandikui	Dausa	Lalsot	Mahwa	Sikrai	
<20	2.1	263.1	74.1	106.1	3.0	**448.4**
20-30	286.0	463.8	365.0	319.9	245.8	**1,680.5**
30-40	384.0	69.5	273.4	79.0	187.0	**992.9**
40-50	14.8	-	82.2	-	7.7	**104.7**
>50	-	-	0.5	-	-	**0.5**
Total	**686.9**	**796.4**	**795.2**	**505.0**	**443.5**	**3,227.0**

* The area covered in the derived maps is less than the total district area since the hills have been excluded from interpolation/contouring.

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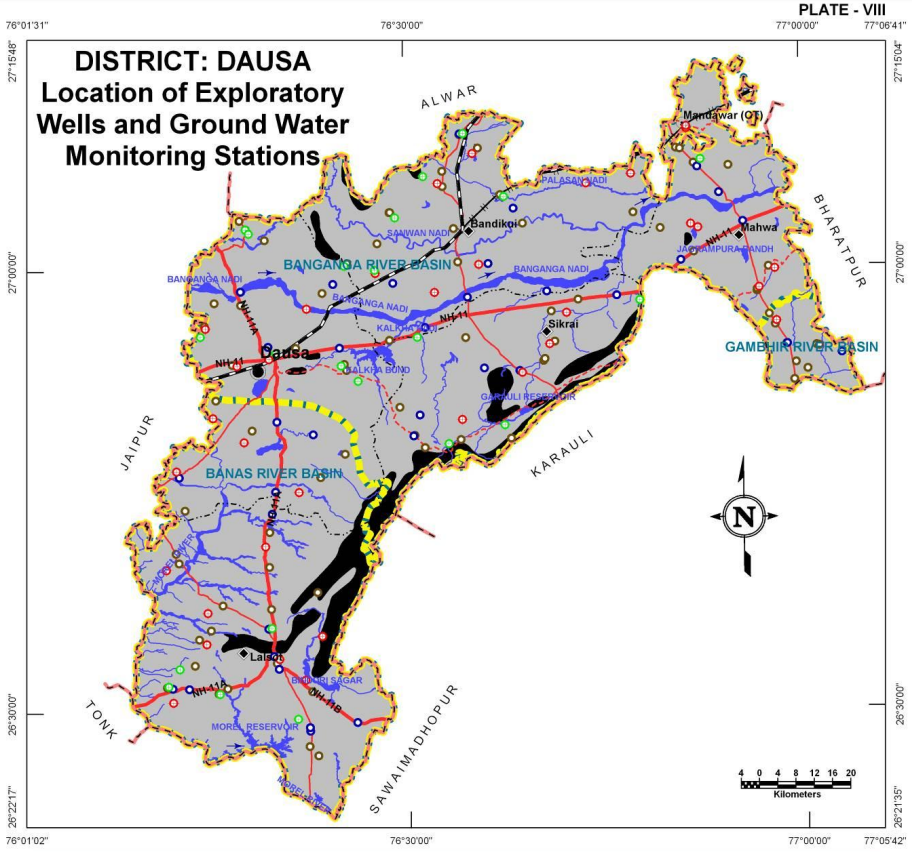
PLATE - VIII



LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- Town
- District Boundary
- Block Boundary
- **Basin Boundary**

Roads:
- National Highway
- State Highway
- Major District Road

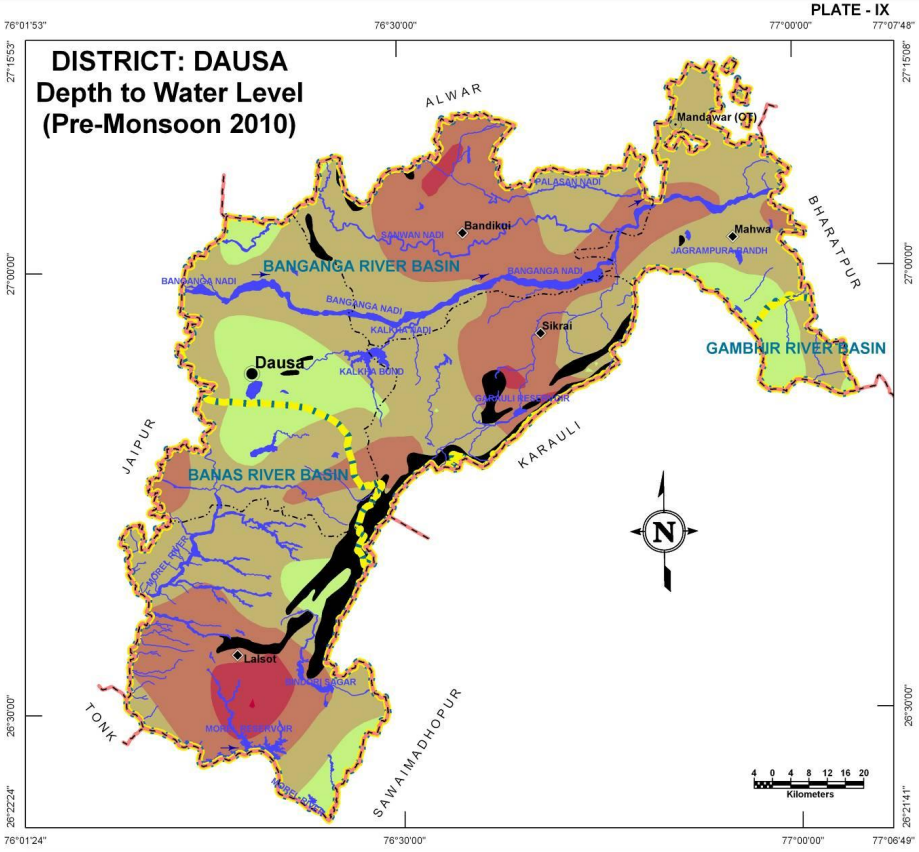
Railway:
- Broad Gauge
- Metre Gauge

Water Bodies:
- River / Streams
- Ponds / Reservoirs
- **Hills**

Exploratory Wells:
- CGWB
- RGWD

Ground Water Monitoring Stations:
- CGWB
- RGWD

PLATE - IX



LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- Town
- District Boundary
- Block Boundary
- **Basin Boundary**

Water Bodies:
- River / Streams
- Ponds / Reservoirs
- **Hills**

Depth to Water Level(m bgl):
- <20
- 20 - 30
- 30 - 40
- 40 - 50
- > 50

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WATER TABLE ELEVATION (PRE MONSOON – 2010) DISTRICT – DAUSA

The water table elevation map is presented in Plate – X. The central parts of the district, aligning with the drainage divide between Banganga and Banas River Basin, the water table is highest reaching elevations of more than 320m amsl (Dausa and Lalsot block). Then it gradually lowers towards both northeast and south. Minimum water table elevation (<200m amsl) is seen in Mahwa block.

Table: Block wise area covered in each water table elevation range

Water table elevation Range (amsl)	Block wise area coverage (sq km)					Total Area (sq km)
	Bandikui	Dausa	Lalsot	Mahwa	Sikrai	
< 200	-	-	-	20.7	-	**20.7**
200 - 220	-	-	-	338.6	7.2	**345.8**
220 - 240	34.9	-	-	132.4	124.8	**292.1**
240 - 260	430.0	-	230.1	13.3	121.8	**795.2**
260 - 280	162.6	19.7	209.3	-	88.8	**480.4**
280 - 300	59.2	241.0	174.6	-	67.3	**542.1**
300 - 320	0.2	535.7	181.2	-	33.6	**750.7**
> 320	-	-	-	-	-	**-**
Total	**686.9**	**796.4**	**795.2**	**505.0**	**443.5**	**3,227.0**

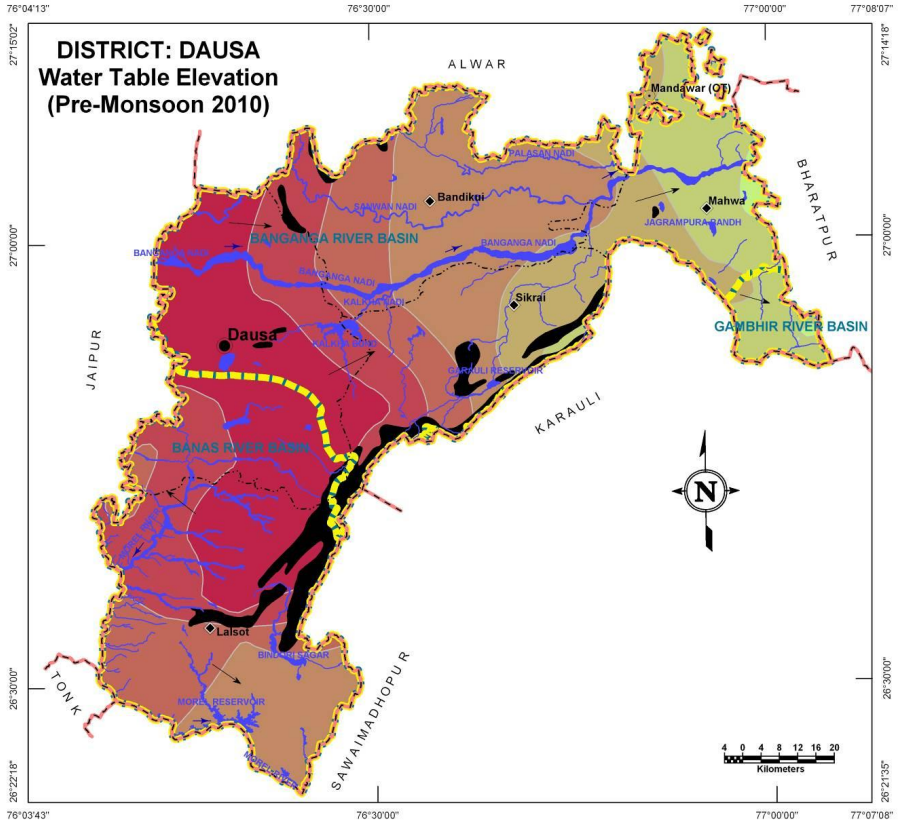
WATER LEVEL FLUCTUATION (PRE TO POST MONSOON 2010)

A 2m contour interval adopted to visualize the ground water level fluctuation reveals a fall of 2 m in one area to rise in other areas reaching upto 14m, as seen in Plate – XI. The negative fluctuation areas (indicated by pink and red regions) are the areas where overexploitation is taking place and even after monsoon recharge water level has not risen and has actually gone down with respect to pre-monsoon levels. Such large ground water depletion areas are located around Lalsot and Bandikui. Rest of the district has shown a general to significant rise in ground water level in the post monsoon season with respect to pre monsoon season. Maximum rise of more than 14m is noticed in northwestern part of Dausa block.

Table: Block wise area covered in each water fluctuation zone

Water level fluctuation range (m)	Block wise area coverage (sq km)					Total Area (sq km)
	Bandikui	Dausa	Lalsot	Mahwa	Sikrai	
<-2	11.5	-	20.1	-	3.2	**34.8**
-2 – 0	326.7	7.2	131.3	18.0	77.5	**560.7**
0 – 2	240.0	201.7	399.3	283.3	224.4	**1,348.7**
2 – 4	77.2	299.2	148.4	165.7	127.2	**817.7**
4 – 6	31.5	144.7	65.2	33.5	11.2	**286.1**
6 – 8	-	38.6	25.1	4.5	-	**68.2**
8 – 10	-	35.9	5.8	-	-	**41.7**
10 – 12	-	44.6	-	-	-	**44.6**
12 – 14	-	18.4	-	-	-	**18.4**
>14	-	6.1	-	-	-	**6.1**
Total	**686.9**	**796.4**	**795.2**	**505.0**	**443.5**	**3,227.0**

PLATE - X



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- District Boundary
- Block Boundary
- **Basin Boundary**

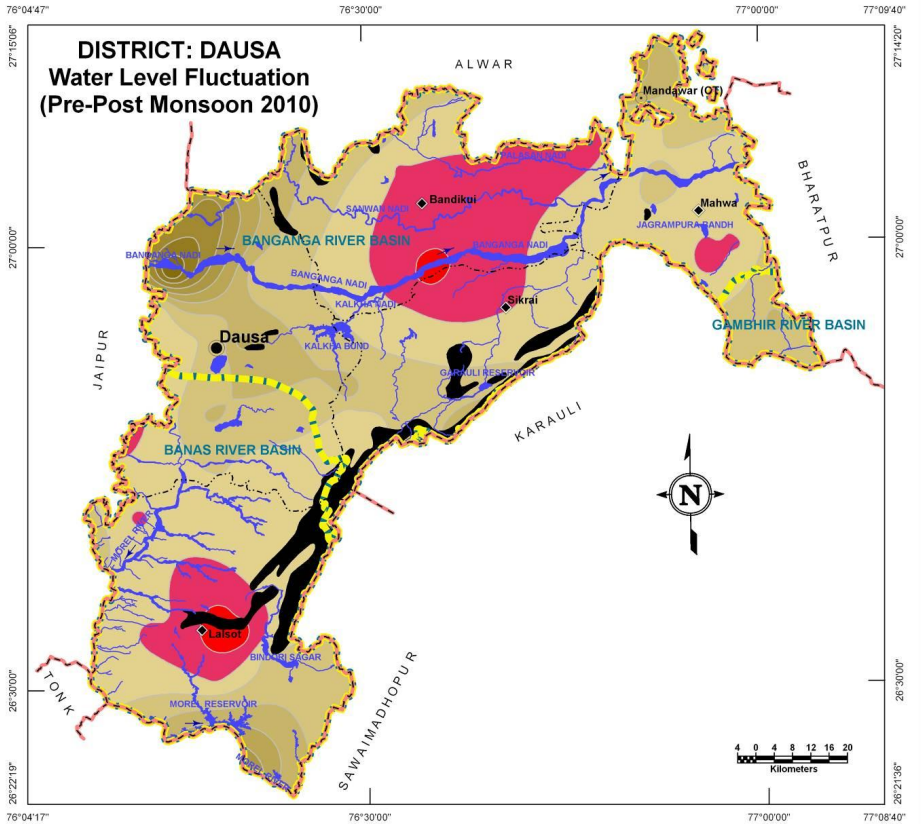
Water Bodies:

- River / Streams
- Ponds / Reservoirs
- **Hills**
- **Water Table Elevation**

Water Table Elevation(m amsl):

- <200
- 200 - 220
- 220 - 240
- 240 - 260
- 260 - 280
- 280 - 300
- 300 - 320
- >320

PLATE - XI



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- District Boundary
- Block Boundary
- **Basin Boundary**

Water Bodies:

- River / Streams
- Ponds / Reservoirs
- **Hills**

Water Level Fluctuation(m):

- <-2
- -2 to 0
- 0 to 2
- 2 to 4
- 4 to 6
- 6 to 8
- 8 to 10
- 10 to 12
- 12 to 14
- >14

GROUND WATER ELECTRICAL CONDUCTIVITY DISTRIBUTION — DISTRICT – DAUSA

The Electrical conductivity (at 25°C) distribution map is presented in Plate – XII. The areas with low EC values in ground water (<2000 µS/cm) are shown in yellow color and occupies almost 69% of the district area. The ground water in this region is suitable for domestic purposes. The areas with moderately high EC values in ground water (2000-4000 µS/cm) are shown in green color occupy 27% of the district area. Remaining part of the district approximately 4% has low EC values in ground water (>4000 µS/cm) which is shown in red color, largely western part of the district. The ground water in this region is not suitable for domestic purpose.

Table: Block wise area of Electrical conductivity distribution

Electrical Conductivity Ranges (µS/cm at 25°C) (Ave. of years 2005-09)	Block wise area coverage (sq km)										Total Area (sq km)
	Bandikui		Dausa		Lalsot		Mahwa		Sikrai		
	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	
< 2000	591.1	86.1	323.0	40.6	728.9	91.7	202.5	40.1	382.7	86.3	**2,228.2**
2000-4000	95.8	13.9	369.1	46.3	66.3	8.3	282.2	55.9	60.8	13.7	**874.2**
>4000	-	-	104.3	13.1	-	-	20.3	4.0	-	-	**124.6**
Total	**686.9**	**100.0**	**796.4**	**100.0**	**795.2**	**100.0**	**505.0**	**100.0**	**443.5**	**100.0**	**3,227.0**

GROUND WATER CHLORIDE DISTRIBUTION

The yellow colored regions in Plate – XIII are such areas where chloride concentration is low (<250 mg/l) and the region occupies approximately 56% of the district area. This demarcates the area where ground water is suitable for domestic purpose. The areas with moderately high chloride concentration (250-1000 mg/l) are shown in green color and occupy approximately 40% of the district area. Remaining part of the district (approximately 3%) falls under high chloride concentration (>1000 mg/l) area which is shown in red color, largely occupying areas in the western part of the district where ground water is not suitable for domestic purpose.

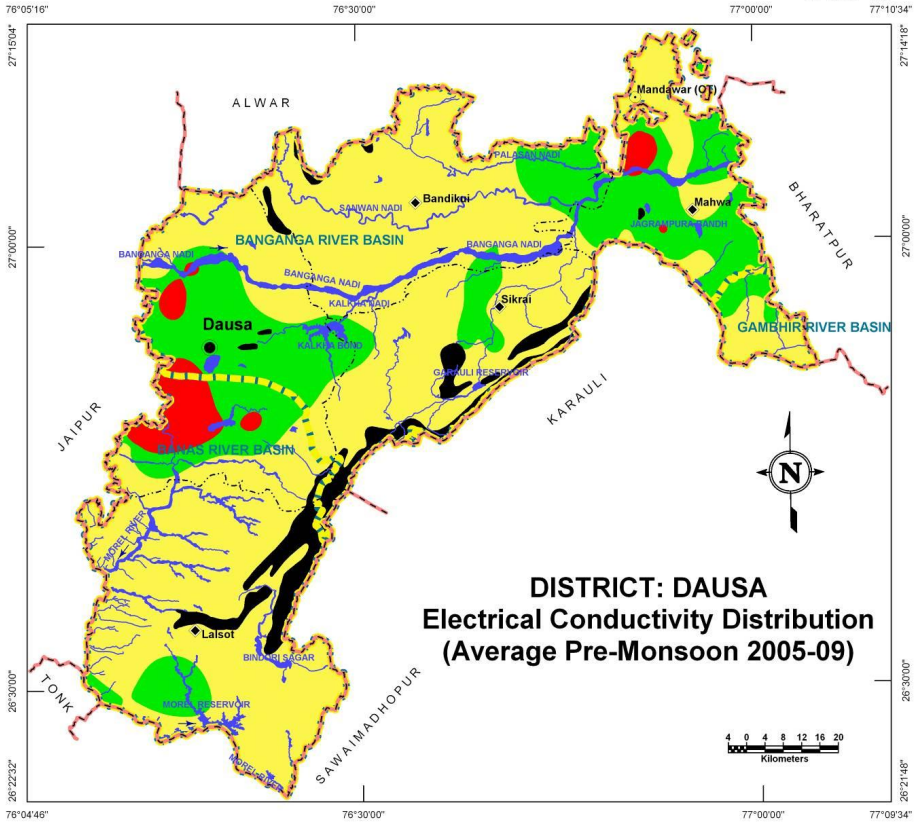
Table: Block wise area of Chloride distribution

Chloride Concentration Range (mg/l) (Ave. of years 2005-09)	Block wise area coverage (sq km)										Total Area (sq km)
	Bandikui		Dausa		Lalsot		Mahwa		Sikrai		
	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	
<250	527.2	77.0	247.9	31.1	621.2	78.0	103.6	21.0	322.4	73.0	**1,822.3**
250-1000	159.7	23.0	457.0	57.4	174.0	22.0	390.3	77.0	121.0	27.0	**1,302.0**
>1000	-	-	91.5	11.5	-	-	11.1	2.0	0.1	-	**102.7**
Total	**686.9**	**100.0**	**796.4**	**100.0**	**795.2**	**100.0**	**505.0**	**100.0**	**443.5**	**100.0**	**3,227.0**

Ground Water Department,
Rajasthan

European Union
State Partnership Programme

PLATE - XII



DISTRICT: DAUSA
Electrical Conductivity Distribution
(Average Pre-Monsoon 2005-09)

LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- District Boundary
- Block Boundary

Basin Boundary

Water Bodies:

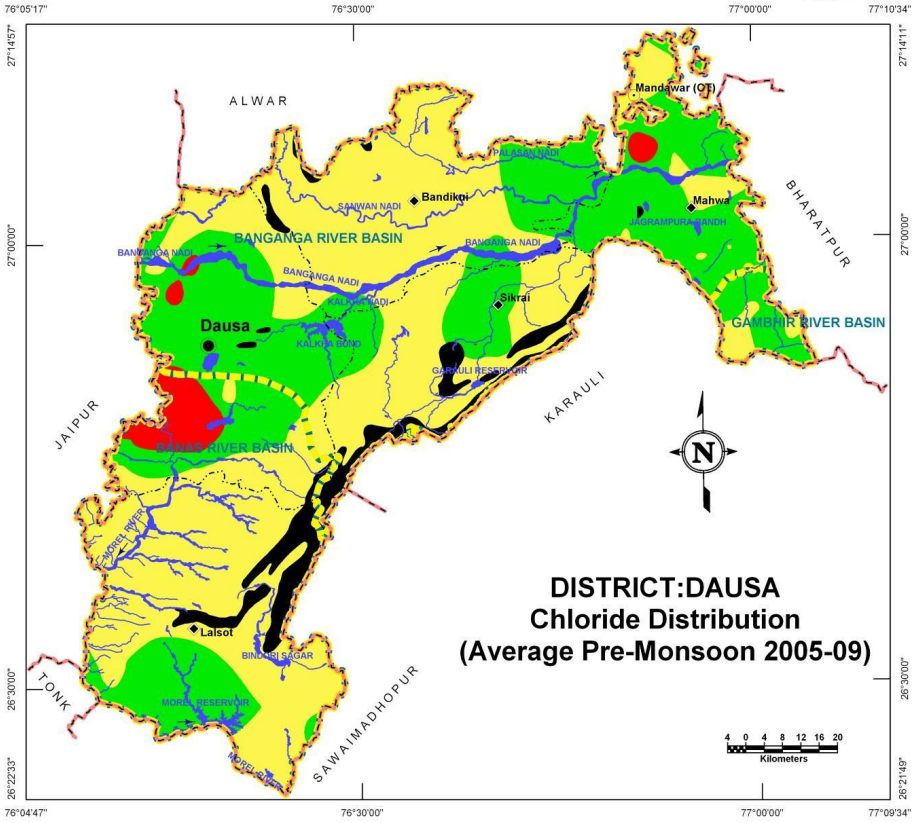
- River / Streams
- Ponds / Reservoirs

Hills

Electrical Conductivity (µS/cm at 25°C):

- < 2000
- 2000-4000
- >4000

PLATE - XIII



DISTRICT:DAUSA
Chloride Distribution
(Average Pre-Monsoon 2005-09)

LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- District Boundary
- Block Boundary

Basin Boundary

Water Bodies:

- River / Streams
- Ponds / Reservoirs

Hills

Chloride Concentration (mg/l):

- < 250
- 250 - 1000
- > 1000

ROLTA
Rolta India Limited

GROUND WATER FLUORIDE DISTRIBUTION

DISTRICT – DAUSA

The Fluoride concentration map is presented in Plate XIV.The areas with low concentration (i.e.,>1.5 mg/l) are shown in yellow color and occupies almost 69% of the district area which is suitable for domestic purpose. The areas with moderately high concentration (1.5-3.0 mg/l) are shown in green color and occupy approximately 25% of the district area, largely northeastern part of the district and around Dausa. Remaining small part of the district approximately 5% has high Fluoride concentration (>3.0 mg/l) which is shown in red color, largely eastern and the central part of the district, which is not suitable for domestic purpose.

Table: Block wise area of Fluoride distribution

Fluoride Concentration Range (mg/l) (Ave. of years 2005-09)	Block wise area coverage (sq km)										Total Area (sq km)
	Bandikui		Dausa		Lalsot		Mahwa		Sikrai		
	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	
<1.5	605.3	88.1	412.3	51.8	690.5	86.8	199.6	39.5	331.6	74.8	**2,239.3**
1.5-3.0	70.6	10.3	308.8	38.8	102.8	12.9	249.6	49.4	81.1	18.3	**812.9**
>3.0	11.0	1.6	75.3	9.5	1.9	0.2	55.8	11.1	30.8	6.9	**174.8**
Total	**686.9**	**100.0**	**796.4**	**100.0**	**795.2**	**100.0**	**505.0**	**100.0**	**443.5**	**100.0**	**3,227.0**

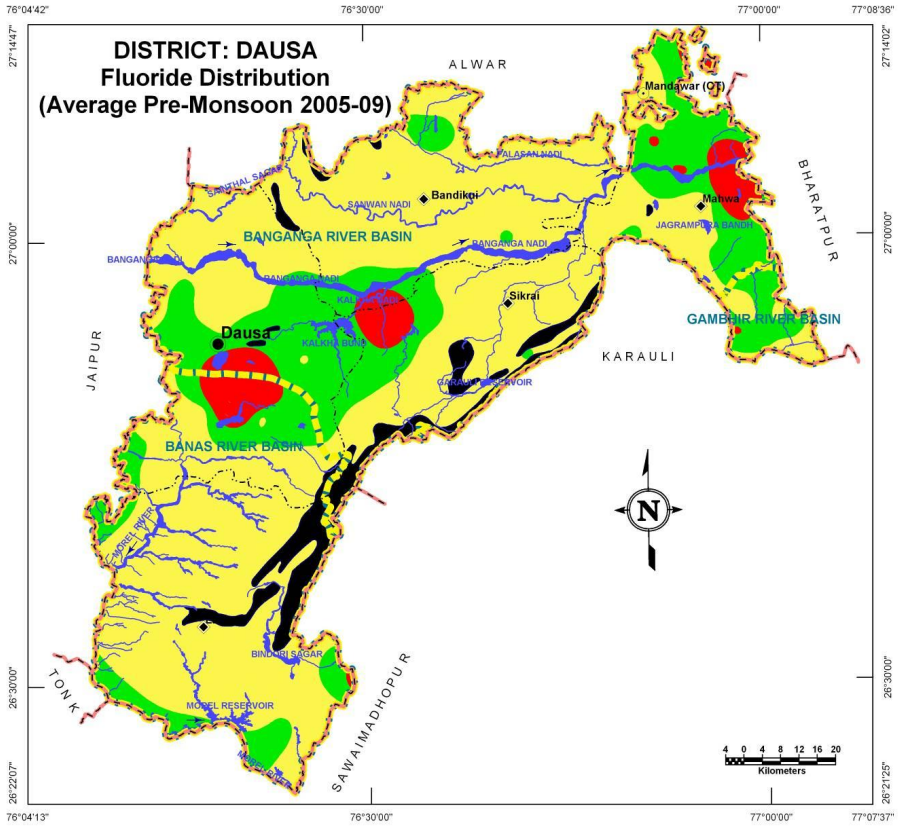
GROUND WATER NITRATE DISTRIBUTION

High nitrate concentration in ground water renders it unsuitable for agriculture purposes. Plate XV shows distribution of Nitrate in ground water. Low nitrate concentration (<50 mg/l) is shown in yellow color occupy approximately 64% of the district area which is suitable for agriculture purpose. The areas with moderately high nitrate concentration (50-100 mg/l) are shown in green color and occupy approximately 25% of the district area. Remaining part of the district area approximately 11% is covered with high concentration nitrate (>100 mg/l) in ground water which is seenas red colored patches, largely in the eastern and western part of Dausa district where the ground water is suitable for agriculture.

Table: Block wise area of Nitrate distribution

Nitrate Concentration Range (mg/l) (Ave. of years 2005-09)	Block wise area coverage (sq km)										Total Area (sq km)
	Bandikui		Dausa		Lalsot		Mahwa		Sikrai		
	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	
<50	483.5	70.4	332.1	41.7	612.8	77.1	319.3	63.2	326.9	73.7	**2,074.6**
50-100	192.5	28.0	212.4	26.7	158.5	19.9	121.2	24.0	110.8	25.0	**795.4**
>100	10.9	1.6	251.9	31.6	23.9	3.0	64.5	12.8	5.8	1.3	**357.0**
Total	**686.9**	**100.0**	**796.4**	**100.0**	**795.2**	**100.0**	**505.0**	**100.0**	**443.5**	**100.0**	**3,227.0**

PLATE - XIV



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- District Boundary
- Block Boundary

Basin Boundary

Water Bodies:

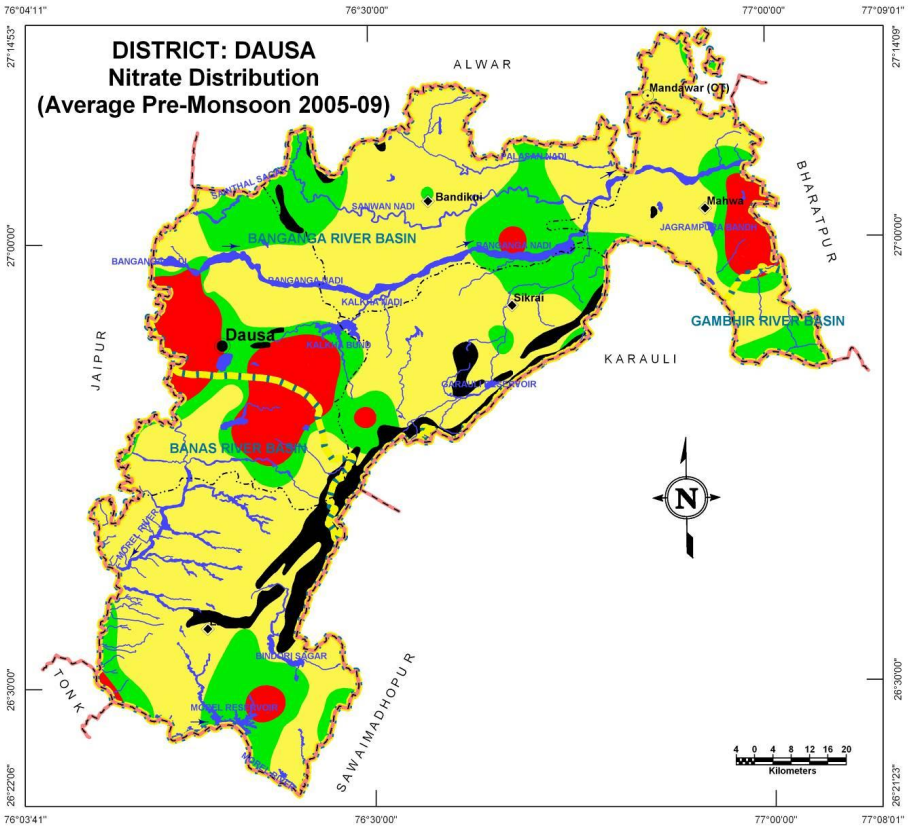
- River / Streams
- Ponds / Reservoirs

Hills

Fluoride Concentration (mg/l):

- < 1.5
- 1.5-3.0
- > 3.0

PLATE - XV



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- District Boundary
- Block Boundary

Basin Boundary

Water Bodies:

- River / Streams
- Ponds / Reservoirs

Hills

Nitrate Concentration (mg/l):

- < 1.5
- 1.5-3.0
- > 3.0

DEPTH TO BEDROCK

DISTRICT – DAUSA

Plate – XVI depicts the bedrock depth from ground level in Dausa district. The beginning of massive bedrock has been considered for defining top of bedrock surface. It varies from less than 40m below ground level to more than 80m bgl. The major rocks types constituting the bedrock are phyllites, quartzites and granites. These rocks are overlain by alluvial deposits of sand, clay, silt and admixture of these in different proportions and thicknesses. The map reveals that the bedrock surface is quite undulating and varies from very shallow near hardrock exposures to more than 80m bgl. Shallow depth to bedrock of less than 40 meter bglhas been encountered inthe western part of Dausa city, southeastern part of Sikrai block and southern fringe of Lalsot block. In most part of the district however, the general depth bedrock ranges from 40m bgl to 60m bgl. Bedrock found at moderate depth in between 60m bgl to 80m bgl in the northeastern parts Bandikui, Mahwa and Sikrai blocks. Deepest bedrock more than 80m bgl has been encountered in Mandawar town and Mahwa block.

Depth to bedrock (m bgl)	Block wise area coverage (sq km)										Total Area (sq km)
	Bandikui		Dausa		Lalsot		Mahwa		Sikrai		
	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	
<40	-	-	21.0	2.6	59.0	7.4	-	-	111.0	25.0	**191.0**
40-60	420.6	61.2	775.4	97.4	736.2	92.6	0.7	0.1	327.5	73.8	**2,260.4**
60-80	266.3	38.8	-	-	-	-	406.0	80.4	5.0	1.1	**677.3**
>80	-	-	-	-	-	-	98.3	19.5	-	-	**98.3**
Total	**686.9**	**100.0**	**796.4**	**100.0**	**795.2**	**100.0**	**505.0**	**100.0**	**443.5**	**100.0**	**3,227.0**

UNCONFINED AQUIFER

In most part of the district bedrock is covered by a thick pile of alluvium. In unconfined conditions the alluvial aquifer attains a thickness of more than 30m. Perusal of Plate – XVII reveals a moderate thickness of upto 30m in the area with pockets of more thick (>30m) unconfined alluvial aquifer material along Banas River in Dausa district.Weathered, fractured and jointed rock formations occurring at shallower depths constitute good unconfined aquifers. Such aquifers under unconfined conditions are located in the southwestern part of the district (Bandikui and Dausa region) andSikrai region in the east. This productive zone attains very high thickness of more than 30m near district headquarter.

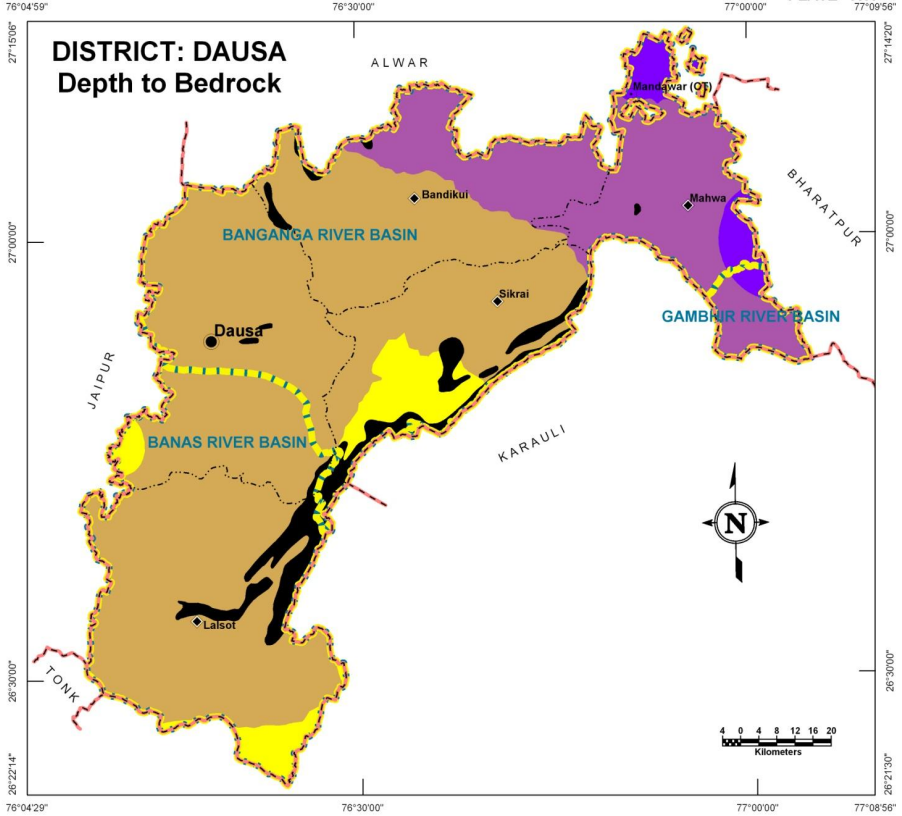
Alluvial areas

Unconfined aquifer Thickness (m)	Block wise area coverage (sq km)					Total Area (sq km)
	Bandikui	Dausa	Lalsot	Mahwa	Sikrai	
< 10	473.3	427.3	520.9	466.1	269.1	**2,156.7**
10-20	24.2	85.7	243	38.9	79.6	**471.4**
20-30	-	53.8	31.1	0	5.4	**90.3**
> 30	-	17.4	-	-	-	**17.4**
Total	**497.5**	**584.2**	**795.0**	**505.0**	**354.1**	**2,735.8**

Hard rock areas

Unconfined aquifer Thickness (m)	Block wise area coverage (sq km)					Total Area (sq km)
	Bandikui	Dausa	Lalsot	Mahwa	Sikrai	
< 10	189.4	50.2	0.2	0	89.4	**329.2**
10-20	-	114.9	-	-	-	**114.9**
20-30	-	39.0	-	-	-	**39.0**
> 30	-	8.1	-	-	-	**8.1**
Total	**189.4**	**212.2**	**0.2**	**-**	**89.4**	**491.2**

PLATE - XVI



LEGEND

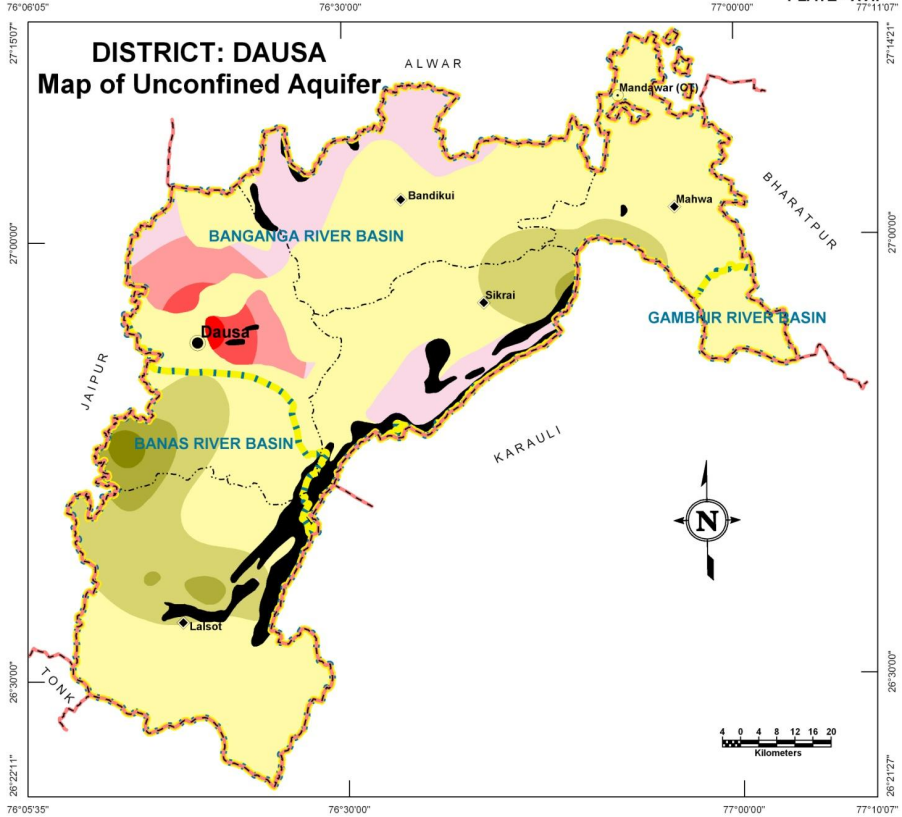
Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- District Boundary
- Block Boundary
- **Basin Boundary**
- **Hills**

Elevation (m amsl):

- <40
- 40-60
- 60-80
- >80

PLATE - XVII



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- Town
- District Boundary
- Block Boundary
- **Basin Boundary**
- **Hills**

Aquifer Thickness (m):

Alluvial Area	Weathered & Fractured Zone in Hardrock Area
<10	<10
10-20	10-20
20-30	20-30
>30	>30

Glossary of terms

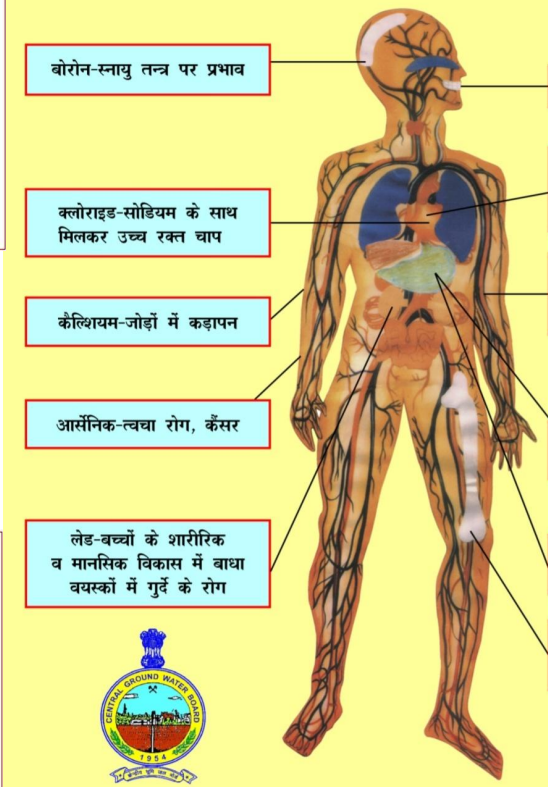
S. No.	Technical Terms	Definition
1	AQUIFER	A saturated geological formation which has good permeability to supply sufficient quantity of water to a Tube well, well or spring.
2	ARID CLIMATE	Climate characterized by high evaporation and low precipitation.
3	ARTIFICIAL RECHARGE	Addition of water to a ground water reservoir by man-made activity
4	CLIMATE	The sum total of all atmospheric or meteorological influences principally temperature, moisture, wind, pressure and evaporation of a region.
5	CONFINED AQUIFER	A water bearing strata having confined impermeable overburden. In this aquifer, water level represent the piezometric head.
6	CONTAMINATION	Introduction of undesirable substance, normally not found in water, which renders the water unfit for its intended use.
7	DRAWDOWN	The drawdown is the depth by which water level is lowered.
8	FRESH WATER	Water suitable for drinking purpose.
9	GROUND WATER	Water found below the land surface.
10	GROUND WATER BASIN	A hydro-geologic unit containing one large aquifer or several connected and interrelated aquifers.
11	GROUND WATER RECHARGE	The natural infiltration of surface water into the ground.
12	HARD WATER	The water which does not produce sufficient foam with soap.
13	HYDRAULIC CONDUCTIVITY	A constant that serves as a measure of permeability of porous medium.
14	HYDROGEOLOGY	The science related with the ground water.
15	HUMID CLIMATE	The area having high moisture content.
16	ISOHYET	A line of equal amount of rainfall.
17	METEOROLOGY	Science of the atmosphere.
18	PERCOLATION	It is flow through a porous substance.
19	PERMEABILITY	The property or capacity of a soil or rock for transmitting water.
20	pH	Value of hydrogen-ion concentration in water. Used as an indicator of acidity (pH < 7) or alkalinity (pH > 7).
21	PIEZOMETRIC HEAD	Elevation to which water will rise in a piezometers.
22	RECHARGE	It is a natural or artificial process by which water is added from outside to the aquifer.
23	SAFE YIELD	Amount of water which can be extracted from ground water without producing undesirable effect.
24	SALINITY	Concentration of dissolved salts.
25	SEMI-ARID	An area is considered semiarid having annual rainfall between 10-20 inches.
26	SEMI-CONFINED AQUIFER	Aquifer overlain and/or underlain by a relatively thin semi-pervious layer.
27	SPECIFIC YIELD	Quantity of water which is released by a formation after its complete saturation.
28	TOTAL DISSOLVED SOLIDS	Total weight of dissolved mineral constituents in water per unit volume (or weight) of water in the sample.
29	TRANSMISSIBILITY	It is defined as the rate of flow through an aquifer of unit width and total saturation depth under unit hydraulic gradient. It is equal to product of full saturation depth of aquifer and its coefficient of permeability.
30	UNCONFINED AQUIFER	A water bearing formation having permeable overburden. The water table forms the upper boundary of the aquifer.
31	UNSATURATED ZONE	The zone below the land surface in which pore space contains both water and air.
32	WATER CONSERVATION	Optimal use and proper storage of water.
33	WATER RESOURCES	Availability of surface and ground water.
34	WATER RESOURCES MANAGEMENT	Planned development, distribution and use of water resources.
35	WATER TABLE	Water table is the upper surface of the zone of saturation at atmospheric pressure.
36	ZONE OF SATURATION	The ground in which all pores are completely filled with water.
37	ELECTRICAL CONDUCTIVITY	Flow of free ions in the water at 25C mu/cm.
38	CROSS SECTION	A Vertical Projection showing sub-surface formations encountered in a specific plane.
39	3-D PICTURE	A structure showing all three dimensions i.e. length, width and depth.
40	GWD	Ground Water Department
41	CGWB	Central Ground Water Board
42	CGWA	Central Ground Water Authority
43	SWRPD	State Water Resources Planning Department
44	EU-SPP	European Union State Partnership Programme
45	TOPOGRAPHY	Details of drainage lines and physical features of land surface on a map.
46	GEOLOGY	The science related with the Earth.
47	GEOMORPHOLOGY	The description and interpretation of land forms.
48	PRE MONSOON SURVEY	Monitoring of Ground Water level from the selected DKW/Piezometer before Monsoon (carried out between 15th May to 15th June)
49	POST-MONSOON SURVEY	Monitoring of Ground Water level from the selected DKW/Piezometer after Monsoon (carried out between 15th October to 15th November)
50	PIEZOMETER	A non-pumping small diameter bore hole used for monitoring of static water level.
51	GROUND WATER FLUCTUATION	Change in static water level below ground level.
52	WATER TABLE	The static water leval found in unconfined aquifer.
53	DEPTH OF BED ROCK	Hard & compact rock encountered below land Surface.
54	G.W. MONITORING STATION	Dug wells selected on grid basis for monitoring of state water level.
55	EOLIAN DEPOSITS	Wind blown sand deposits

(Contd…)

Ground Water Department,
Rajasthan

European Union
State Partnership Programme

भूजल में घुले मुख्य तत्वों की अधिकता का मानव शरीर पर दुष्प्रभाव



- बोरोन-स्नायु तन्त्र पर प्रभाव
- क्लोराइड-सोडियम के साथ मिलकर उच्च रक्त चाप
- कैल्शियम-जोड़ों में कड़ापन
- आर्सेनिक-त्वचा रोग, कैंसर
- लेड-बच्चों के शारीरिक व मानसिक विकास में बाधा वयस्कों में गुर्दे के रोग
- फ्लोराइड - दंत क्षरण
- सोडियम-हृदय, गुर्दा व रक्त परिसंचरण रोगों से ग्रसित लोगों को हानिकारक
- नाइट्रेट-नवजात शिशुओं में ब्लू बेबी बीमारी (मेथमोग्लोबिनिमिया)
- सल्फेट-अधिकता में मैग्नेशियम के साथ मिलकर दस्तावर
- आयरन-आयरन जीवाणु से आमाशय संबंधी रोग
- फ्लोराइड-जोड़ों में अकड़न, हड्डियों में मुड़ाव

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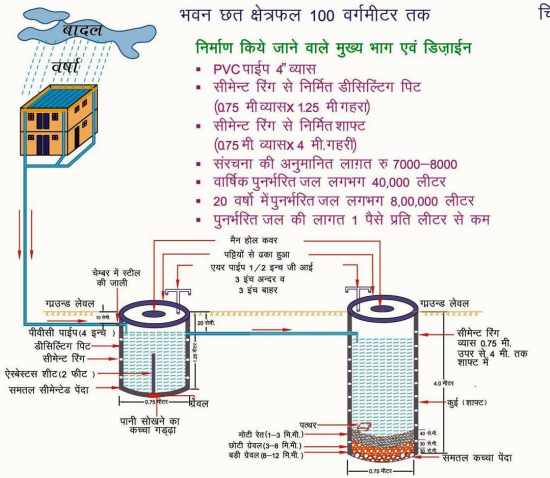
भूजल अमूल्य है इसे प्रदूषित न करें।

चित्र–1

भवन छत क्षेत्रफल 100 वर्गमीटर तक

निर्माण किये जाने वाले मुख्य भाग एवं डिज़ाईन

- PVC पाईप 4" व्यास
- सीमेन्ट रिंग से निर्मित डीसिल्टिंग पिट (0.75 मी.व्यास x 1.25 मी.गहरा)
- सीमेन्ट रिंग से निर्मित शाफ्ट (0.75 मी.व्यास x 4 मी.गहरी)
- संरचना की अनुमानित लाग़त रु 7000–8000
- वार्षिक पुनर्भरित जल लगभग 40,000 लीटर
- 20 वर्षो में पुनर्भरित जल लगभग 8,00,000 लीटर
- पुनर्भरित जल की लागत 1 पैसे प्रति लीटर से कम

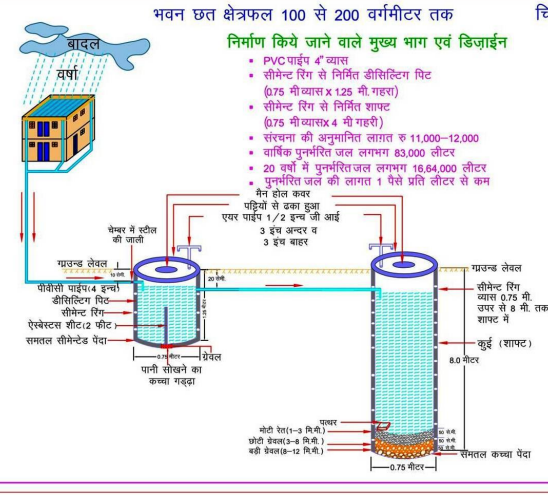


चित्र–2

भवन छत क्षेत्रफल 100 से 200 वर्गमीटर तक

निर्माण किये जाने वाले मुख्य भाग एवं डिज़ाईन

- PVC पाईप 4" व्यास
- सीमेन्ट रिंग से निर्मित डीसिल्टिंग पिट (0.75 मी.व्यास x 1.25 मी. गहरा)
- सीमेन्ट रिंग से निर्मित शाफ्ट (0.75 मी.व्यास x 4 मी गहरी)
- संरचना की अनुमानित लाग़त रु 11,000–12,000
- वार्षिक पुनर्भरित जल लगभग 83,000 लीटर
- 20 वर्षो में पुनर्भरित जल लगभग 16,64,000 लीटर
- पुनर्भरित जल की लागत 1 पैसे प्रति लीटर से कम

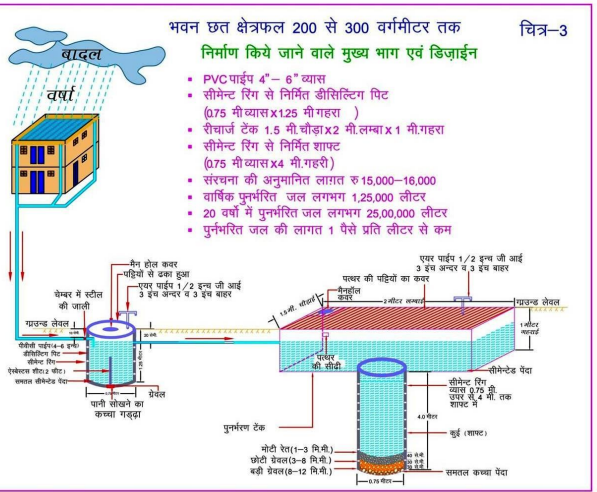


चित्र–3

भवन छत क्षेत्रफल 200 से 300 वर्गमीटर तक

निर्माण किये जाने वाले मुख्य भाग एवं डिज़ाईन

- PVC पाईप 4"– 6" व्यास
- सीमेन्ट रिंग से निर्मित डीसिल्टिंग पिट (0.75 मी.व्यास x 1.25 मी.गहरा)
- रीचार्ज टेंक 1.5 मी.चौड़ा x 2 मी.लम्बा x 1 मी.गहरा
- सीमेन्ट रिंग से निर्मित शाफ्ट (0.75 मी.व्यास x 4 मी.गहरी)
- संरचना की अनुमानित लाग़त रु 15,000–16,000
- वार्षिक पुनर्भरित जल लगभग 1,25,000 लीटर
- 20 वर्षो में पुनर्भरित जल लगभग 25,00,000 लीटर
- पुनर्भरित जल की लागत 1 पैसे प्रति लीटर से कम

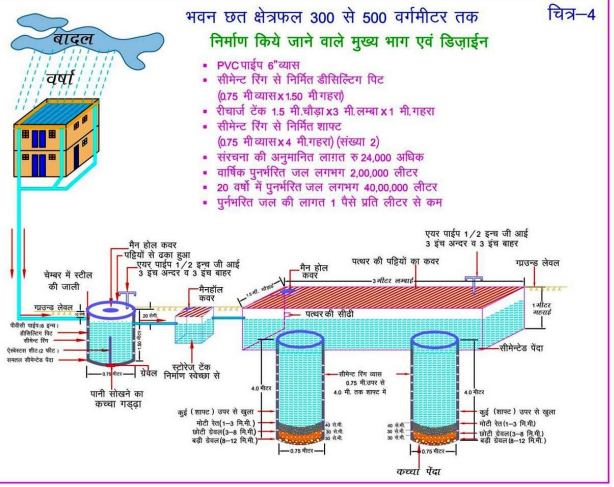


चित्र–4

भवन छत क्षेत्रफल 300 से 500 वर्गमीटर तक

निर्माण किये जाने वाले मुख्य भाग एवं डिज़ाईन

- PVC पाईप 6"व्यास
- सीमेन्ट रिंग से निर्मित डीसिल्टिंग पिट (0.75 मी.व्यास x 1.50 मी.गहरा)
- रीचार्ज टेंक 1.5 मी.चौड़ा x 3 मी.लम्बा x 1 मी.गहरा
- सीमेन्ट रिंग से निर्मित शाफ्ट (0.75 मी.व्यास x 4 मी.गहरा) (संख्या 2)
- संरचना की अनुमानित लाग़त रु 24,000 अधिक
- वार्षिक पुनर्भरित जल लगभग 2,00,000 लीटर
- 20 वर्षो में पुनर्भरित जल लगभग 40,00,000 लीटर
- पुर्नभरित जल की लागत 1 पैसे प्रति लीटर से कम



Rolta India Limited

Myths and Facts about Ground Water

S No	Myths	Facts
1	What is Ground Water • an underground lake • a net work of underground rivers • a bowl filled with water	Water which occurs below the land in geological formations/rocks is Ground water
2	Ground Water occurs everywhere beneath the Land Surface	Not really, it depends on the nature of rock formation
3	There is a relationship between ground water and surface water	Not all the places. Near streams/rivers there is relation
4	Groundwater is not renewable resource	It is renewable source and every year it is being recharged through rain/applied irrigation etc
5	Ground water is unlimited and deeper you drill more discharge	It is limited to annual recharge from rain/applied irrigation. The discharge may not increase if you go deeper
6	Ground Water moves rapidly	The movement of ground water is very slow
7	Ground water pumped from wells is thousands of years old	Generally the ground water being tapped through wells is a few years old
8	If water taste good—it is safe to drink	It may have other chemicals e.g. fluoride, nitrates etc which are harmful
9	Water from free flowing tube wells is very pure	This water can also be contaminated so test before use
10	If I recharge my TW/DW/HP it will not benefit me	It will also benefit you and also adjoing wells
11	There is no static ground water resources in Rajasthan	Rajasthan is also having Static GW resources, and being tapped in most of areas as GW annual withdrawal is more than annual recharge
12	I cannot meet annual cooking and drinking water requirement by rain water harvesting	The water requirement for drinking and cooking is only 8 lit/day. You can harvest this water for family of 5 persons from roof top or paved area of 75 Sq m to meet annual requirement
13	You can increase ground water recharge	This can be done by harvesting the rain water and storing in sub surface reservoir (GW) by constructing the recharge structures
14	You cannot use abandoned TW/HP/DW for ground water recharge	These should be used as recharge structures as harvested rain water is directly put into GW reservoir
15	Putting waste near HP/TW will not cause any problem	Such actions will pollute wells and water

ROLTA

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