भूजल सूचना पुस्तिका

गिरिडीह जिला, झारखंड

Ground Water Information Booklet

Giridih District, Jharkhand State

Giridih open cast mines

केन्द्रीय भूमिजल बोर्ड

जल संसाधन मंत्रालय

(भारत सरकार)
राज्य एकक कार्यालय, राँची
मध्य-पूर्वी क्षेत्र
पटना

Central Ground water Board

Ministry of Water Resources

(Govt. of India)
State Unit Office,Ranchi
Mid-Eastern Region
Patna

सितंबर 2013

September 2013

भूजल सूचना पुस्तिका

गिरिडीह जिला, झारखंड

Ground Water Information Booklet

Giridih District, Jharkhand State

Prepared By

सुनिल टोप्पो

(वैज्ञानिक ख)

Sunil Toppo

(Scientist B)

राज्य एकक कार्यालय, राँची

मध्य-पूर्वी क्षेत्र,पटना

State Unit Office, Ranchi

Mid Eastern Region, Patna

GROUND WATER INFORMATION OF GIRIDIH DISTRICT, JHARKHAND STATE

Contents

Sr. No.	Chapter	Pages
1.0	Introduction	7
	1.1 Introduction	7
	1.2 Demography	7
	1.3 Physiography and Drainage	8
	1.4 Irrigation	9
	1.5 Previous Studies	9
2.0	2.0 Climate and rainfall	10
3.0	3.0 Soil	10
4.0	4.0 Geology	11
5.0	Ground Water Scenario	13
	5.1 Hydrogeology	13
	5.1.1 Exploratory wells	14
	5.1.2 Depth to water level	14
	5.1.3 Seasonal fluctuation	14
	5.1.4 Long term water level trend	15
	5.2 Ground water resource	15
	5.3 Ground Water Quality	15
	5.4 Status of ground water development	16
6.0	Ground water management strategy	16
	6.1 Ground water development	16
	6.2 Water conservation and artificial recharge	17
7.0	Ground water related issue and problems	17
8.0	Awareness and training activity	18
	8.1 The mass awareness programme (MAP)	18
	8.2 Participation in exhibition, mela, fair etc.	18
	8.3 Presentation and lecture deliver in public forum/ radio/ T. V./ institution of repute / grassroots association/ NGO/ academic institution etc.	18
9.0	Area notified by CGWA / CGWB	18
10.0	Recommendation	18

List of Tables:

Table 1: Administrative division and population of Giridih district.

Table 2: Details of exploratory wells drilled in Giridih district.

Table 3: Depth to water level (m bgl) of NHS located in Giridih district (2012 – 13).

Table 4 : Long term water level trend for existing HNS of Giridih district (2003 - 2012)

Table 5: Results of chemical analysis of water samples collected from NHS (2011) in Giridih district.

Table 6: Details of groundwater development and stage of ground water Development of Giridih district as on 31st March 2009 (in hectare meter).

List of Figures:

Fig. 1 : Administrative division map of Giridih district, Jharkhand

Fig. 2: Drainage map of Giridih district, Jharkhand

Fig. 3: Hydrogeological map of Giridih district, Jharkhand

Fig. 4 : Pre monsoon (May 2012) depth to water level map of Giridih district, Jharkhand.

Fig. 5 : Post monsoon (Nov. 2012) depth to water level map of Giridih district, Jharkhand

Fig. 6 : Block wise representing stage of ground water development (%) of Giridih district, Jharkhand (March 2009).

DISTRICT AT A GALANCE
(GIRIDIH DISTRICT)

Sl No.	ITEMS	Statistics
1.	GENERAL INFORMATION	
	i) Geographical Area (Sq km.)	4854.33 Sq. km.
	(16) Administrative Divisions (As on -------) Number of Block Number of Panchyat / Villages	 12 256/2763
	(ii) Population (As on 2011 Census)- in lakhs	24, 53, 141
	(iii) Average Annual Rainfall (mm)	1198 mm
2.	GEOMORPHOLOGY	
	Major Physiographic units	Chotanagpur plateau
	Major Drainages	Sakri, Usri, Chalki, Kunda and Barakar
3.	LAND USE (Sq Km.)	
	a) Forest area:	1584.2
	b) Net area sown:	775.9
	c) Cultivable area:	935.90
4.	MAJOR SOIL TYPES	Alfisols (Red sandy soils) ultisols (red and yellow soils) Light textured Slightly Acidic Poor in N & P Fairly rich in K
5.	AREA UNDER PRINCIPAL CROPS	Pulses – 39.25 Oilseed – 3.43 Paddy – 663.62
6.	IRRIGATION BY DIFFERENT SOURCES (Area and Number of Structures as per minor irrigation census 2006 – 07, GOJ)	
	Dugwell	6220
	Tube wells /Bore wells shallow + deep)	35 + 08 = 43
	Tanks / Ponds	--
	Canals	--
	Other Sources (surface water)	3620
	Net irrigated area	6025 ha.
	Gross irrigated area	17548 ha.
7.	NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (As on 31-03-07) No of Dugwell No. of Piezometers	
10.	PREDOMINANT GEOLOGICAL FORMATIONS	Granite Gneiss, Mica Schists & Gondwana
11		

	➢ Major Water bearing formation ➢ (Pre-monsoon Depth to water level during 2012) ➢ Post-monsoon Depth to water level during 2012) ➢ Long term water level trend in 10 yrs (2003-2012) in m / yr. Pre monsoon Post monsoon All Season	Weathered & fractured granite gneiss and sandstone 4.74 – 15.40 mbgl 2.15 – 7.60 mbgl Rise: 0.002 – 0.197 Fall: 0.016 – 0.431 Rise: 0.050 – 0.210 Fall: 0.038 – 0.533 Rise: 0.013 – 0.196 Fall: 0.099 – 0.385
12.	GROUND WATER EXPLORATION BY CGWB (As on 31-03-2012)	
	No. of wells drilled (EW, OW, PZ, SH, Total	EW – 22, OW – 12
	Depth Range (m)	66 – 199.07 mbgl
	Discharge (m^3/hr)	2.16 – 37.7
	Storativity (S)	1.40 $x10^{-2}$ to 1.58 $x10^{-4}$
	Transmissivity (m^2/day)	4.34 – 66.17 m^2/day
13.	GROUND WATWER QUALITY	Good
	Presence of Chemical constituents more than permissible limit (e.g. EC, F, As, Fe	EC 238 to 1798 micro mhos/cm at 25^0 C.
	Type of Water	
14.	DYNAMIC GROUND WATER RESOURCES (2009)	
	Net annual ground water availability (ham)	33263.73
	Gross Ground Water Draft for all uses (ham)	11968
	Projected Demand for Domestic and Industrial uses up to next 25 years (ham)	5099.06
	Stage of Ground Water Development	35.97 %
15.	AWARENESSS AND TRAINING ACTIVITY	
	Mass Awareness Programmes Organized Date Place No. of Participants	Nil
	Water Management Training Programmes Organized Date Place No. of Participants	Nil
16.	EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING	Nil
	Projects completed by CGWB (No & Amount spent)	Nil
	Projects under technical guidance of CGWB (Numbers)	Nil
17	GROUND WATER CONTROL AND REGULATION	Nil

	Number Of OE Blocks	Nil
	No. of Critical Block	Nil
	No. of Blocks notified	Nil
18.	MAJOR GROUND WATER PROBLEMS AND ISSUES	81.82% of HNS showing declining trend for post monsoon (2003 – 2012)

"Ground Water Information Booklet"
Giridih district, Jharkhand state

1.0 Introduction

1.1 Introduction

Giridih district almost lies in the central part of the North Chotanagpur Divison in the state of Jharkhand and the district is bounded on the north by Jamui and some part of Nawada district of Bihar, on the east by the districts of Dhanbad, Jamtara and Deoghar ,on the south by Bokaro and some part of Dhanbad district and on the west by Hazaribag and Kodarma district. It covers an area of about 4854.33 Sq. Km and is situated between 24^0 02' and 24^0 45' N latitude and 85^0 40' and 86^0 34'E longitude. The district falls in Survey of India toposheet nos. 72 H /13,14,15, 16, 72 L/ 01, 02, 03, 04,07,08, 12, 72 E/13, 72 I/1 and 5. The district which acquired the status of an independent district on 6th December, 1972, has a close linkage with the parent district Hazaribagh. In 1999, part of it became Bokaro district.

Giridih is the administrative headquarter and the principal town of the district. The district has been given this name for abundance of mountain and hillocks in the district. It has one sub – division which has been further divided into thirteen blocks namely – Giridih, Pirtand, Bengabad, Gandey, Jamua, Dhanwar, Dewri, Bagodar, Gawan, Tisri, Dumri, Birni and Sariya (Fig. 1). The district has two Lok sabha constituencies namely Kodarma and Giridih and 6 assembly seats.

1.2 Demography

As per census of 2011, the total population of the district was 2453141 persons which is about 8 % of the total Jharkhand state population. The total urban population is 208024 persons where as the total rural population is 2245117 persons. The administrative division and population of the district is given in table – 1.

1.3 Physiography and Drainage: - The physiography of the area is controlled by rock types occurring in the area, which are hard consolidated and semi-

consolidated formations. The district represents a hilly and undulating terrain with an average elevation varying from 250 m to 600 mamsl . The district may be divided broadly into three natural divisions viz

1. The Central Plateau 2. The Lower plateau 3. The Damodar valley

The central area of the district is occupied by the central plateau, which is surrounded by lower plateaus from all sides except in the west where a ridge connects the central plateau to the Palamu district. The lower plateau with average height of 1300 ft is undulating in nature. In the north and North West the lower plateaus form tablelands until they reach ghats when they drop in height to 700 ft. The Damodar valley occurs along the southern part of the district. In the district lies the famous Parasnath hill, which has the distinction of being the highest peak of the state with an altitude of 4479 ft above mean sea level.

The majority of the area is occupied by plateau, which is moderately to shallow weathered, depending upon its area of occurrence. However major portion of the plateau area is moderately weathered. Some of the linear ridges running along E-W direction occur near Dumaria, Naukadihi Kalhamanja, Bharkatta villages and some of the residual hillocks scattered in nature, occur near Shriram nagar, Khandauli and Jonktiabad. The linear ridges and the residual hills act as run-off zone. Majority of the villages in the area occur on the inter stream divide.

The major part of the district is having dendritic drainage pattern, controlled mainly by the topography the area. The district is divided into two main watersheads viz the Barakar and the Sakri rivers. The Barakar river drains through major portion of the district, enters the district near the Birni block and also flows through Pirtand block. The Sakri river passes through the areas of Deori and Gawan blocks. A number of small rivers also flows in the district, the most important among them being Usri. Usri fall is one of the important fall on the river Usri situated about 13 km from Giridih town. All the rivers in the district area are seasonal in nature. During summer the flow of Barakar river is minimal. One of the major river is the Barakar river, which flows in NW-SE direction. The Usri Nadi, whcih flows in NW-SE direction, takes turn near Rautgadi Dhirabar nadi near Garatanr village and starts flowing almost in N-S direction. The Usri Nadi is joined by the village. Some of the prominent streams, which flow through the district are Jaria Nala, Khakho Nadi, Chilkharo Nala etc. The drainage of the

buffer zone is mainly controlled by the Barakar river and its tributaries namely Usri Nadi, Dhirabar nadi, Khakho Nadi ,Jaria Nala, Chilkharo Nala etc and the Sikri river. The Usri Nadi along with its tributaries meets the Barakar river near Hazaribad village. Drainage map of the district is prepared and shown in figure – 2.

1.4 Irrigation: - Dug wells, ponds, tanks are the main sources of irrigation. Out of total cultivable land only 12,478 ha. is irrigated. Land distribution pattern of the district is such that major chunk of irrigated land is owned by some few farmers. As per the 4thMIP census data, there are 6220 dugwells irrigating 2376 ha of area. Irrigation from wells is confined to cultivation with the bari lands adjacent to the village site The different source wise irrigation in the district is given below

Source Wise Irrigation in Giridih district (4th Minor Irrigation Census, 2006-07)

Name of Scheme	Number	Irrigation Potential Created (ha)	Irrigation Potential Utilized (ha)
Dug well	6220	10962	2376
Shallow Tube Well	115	911	812
Deep Tube Well	12	27	9
Surface flow Schemes	1598	6156	3543
Surface lift Schemes	185	337	78

Source:- Directorate of Statistics, GOJ

1.5 Previous Studies: Central Ground Water Board has established a network of observation wells (16 nos.) under National Hydrograph Network programme to study the behavior of ground water level and quality of ground water in the district. The ground water management study has been carried out during the year 2010 – 11 in part of the district and field data was collected for the study of ground water conditions in respect of quality and quantity. The board has also carried out exploratory drilling in the district under different annual action plan from 1982 to till date and drilled 22 EW and 12 OW to know the sub – surface geology, depth and thickness of water bearing formation with their yield and determine the different aquifer parameters which are presented in table - 2.

2.0 Climate and rainfall: The district belongs to one of the 13 districts of Jharkhand, which falls in the **Agro climatic sub-zone-IV**. The district receives less than 1300 mm of annual rainfall. The district experiences a subtropical

climate with three well marked seasons namely winter, summer and rainy season. The winter season begins in November and continues up to February, though the first half of March remains somewhat cool. December is the coolest month of the year and the last week of the month is the coolest period. In the second half of March the temperature rises considerably and temperature goes up to 45^{o} Celsius in the month of May, which is the hottest month of the area. The monsoon season starts from the middle of June and continues till end of September or middle of October. With the cessation of rains the temperature starts falling and the climate become rather pleasant.

3.0 Soil: Soils in Giridih district has formed as a result of insitu – weathering of crystalline basement and Gondwana sedimentaries. Climate, topography and vegetation have all contributed to the formation of soil. Soils are sandy loam to clay loam, non-calcareous and slightly to moderately acidic. The soil of the region is shallow and medium in depth generally shallow on the ridges and plateaus and deep in the valleys with low fertility status

Reliable information on location, extent quality of soil and land resources is the first requirement in planning for the sustainable management of land resources. The components of land i.e., soils, climate, water, nutrient and biota are organized into eco-system which provide a variety of services that are essential to the maintenance of the life support system and the productive capacity of the environment. Soil resource survey seems to be a viable means for land resources planning and management. Knowledge of soil fertility status and problems of soils like soil acidity/alkalinity become essential for sustainable land use plan.

Two types of soil occurs in the district namely Entisols(Older alluvial soil, Red sandy soil and red loamy soil) and Ultisols(red and yellow soil). Alfisols are the dominant soils covering more than 65 percent of Total Geographical Area. Different soils occurring the district have been shown in figure 4.1. Majority of the area is occupied by red loamy soil, which falls under Alfisol group of soil. This is followed by red and yellow which falls under Ultisol group of soil. Older alluvial

soil occurs over a small patch in the north western part in Gawan block near Charki, Paharpur and Malda villages. Red loamy soil occurs over a small patch in north eastern sector near Chauki, Panitarn villages in Deori block. Red and yellow soil occurs in central portion over a large chunk of area in Jamunia, Birni, and Dhanwar block. It also occurs in small patches south of Giridih and Gande block. In south western sector near Malpator, Bangargi, Beno, Ghettibari and Kusmarja villages and in western part near Dhargini and Ghagri villages.

4.0 Geology: The oldest geological formation which occurs in the district is the crystalline metamorphics of Archaean age, which forms the basement. The area is underlain by rocks belonging to Chotanagpur granite gneissic complex of Proterozoic age comprising of biotite and quartz biotite granite gneiss. These are overlain by lower Gondwana sedimentaries which were deposited in the slowly sinking faulted troughs or basins. The rocks of younger age include only quaternary sediments mixed with residual soil at places and are confined to small areas in and around drainage channels.

The Archaean crystallines are formed from rock types of both sedimentary and igneous origin. The sedimentaries were converted into various grades of schists by regional metamorphism. Quartz biotite granite gneiss covers a large part of the area and seems to be intruded by granites showing porphhyroblastic texture. The Chotanagpur granite gneiss contains enclaves of metasedimentaries which are aligned in almost E-W direction. The Meta sedimentaries in the area include Amphibolite, hornblende schist and Epidiorite. The amphibolites /meta basics occur as interband with quartzofelsphatic rocks and also occur in the form of isolated bodies. The metamorphosed were then intruded by magmas of basic and acid composition. Intrusive dykes and epidiorites occur usually as prominent hillocks in and around the area.

General Stratigraphic Sequence of Giridih district

Age	**Formation**	**Lithology**
Quaternary	Alluvium	Sand, silt , clay

Lr. Gondwana (Upper Carboniferous to Permian)	Barakar Formation Karharbari Talcher	Sandstone, grit, shale, carbonaceous shale, coal Shale, Sandstone Sandstone, Shale, Boulders, conglomerates
----------UNCONFORMITY----------		
Archaean (Lower to Upper Proterozoic.	Chotanagpur Granite Gneiss Complex Unclassified Meta Sedimentatries	Quartz vein, breciatted quartz, pegmatites Biotite and quartz biotite granite gneiss Amphibolite,Hornblende schist. Epidiorite

The Gondwana rocks which are exposed in trough like basins in the area is the Barakar formations only. This formation is extensively jointed, fractured and faulted, intruded by dykes and sills. The Gondwanas, unconformably overly the metamorphics and over a greater part of the area dipping southerly, thereby exposing the younger unit towards the south adjoining the southern faulted boundary. Sandstone, shale, carbonaceous shale, coal and clays are the major litho units of the Gondwanas.

Alluvium and residual soils occur only as superficial deposit in general. Deposits of alluvium occur along the flood plains of Barakar, Sikri and the local streams namely Usri, Dhirabar , Khakho Nadi , as thin veneer.

5.0 Ground Water Scenario

5.1 Hydrogeology: - The district is underlain by compact and hard rocks belonging to crystalline metamorphics of Archaean age and lower Gondwana sedimentaries, which are devoid of any primary porosity . The ground water in such formation occurs within the secondary porosity such as joints, fractures and bedding plains.

The ground water occurrence and movement is basically controlled by the prevailing morphology and intensity of structural discontinuities. The intensity of joints, fractures, foliation planes are more along structurally disturbed zones. Therefore structure is another controlling factor for occurrence and movement of ground water over the area.

Hydrogeologically the area can be grouped under two major formations.

I) Fissured formation:- Represented by consolidated metamorphics and semi-consolidated Gondwanas

ii) Porous formation: - Represented by the alluvium.

The consolidated formations are represented by the Archaean metasedimentaries consisting of phyllites, schist's and gneisses with associated bands of quartzites and amphibolites. Ground water occur under unconfined condition in the weathered mantle and semi-confined to confined condition in the deeper fractures. Through Pumping tests in dug wells in the weathered mantle of quartzofelspathic rocks , the specific capacity values of the phreatic aquifers have been found in the range of 15-35 lpm/m**.**

The Gondwana rocks occur in a series of basins associated with coal measures. Gondwana sandstone in general is known to constitute good aquifers at many places. Ground water occurs under unconfined condition in the weathered mantles varying in depth from 8 –17 m as observed in the dugwells and in confined condition in deeper fractures. Hydrogeological map is shown in figure 3.

5.1.1 Exploratory wells: To understand the sub – surface geology, identify the various water bearing horizons including their depth location and thickness and compute the hydraulic characteristics such as Transmissivity and Storativity of the aquifers, 22 exploratory and 12 observation wells have been drilled in the district under different exploratory drilling programme from annual action plan 1982 to 2012. The depth of exploratory wells ranges between 66.00 to 199.07 mbgl. The static water level of these exploratory wells varies from 1.60 to 35.22 mbgl. The exploratory wells are shown in hydrogeological map of the district (figure – 3)

5.1.2 Depth to Water Level: -

There are 16 National Hydrograph Stations (NHS) have been established by Central Ground Water Board for the study of behavior of the water level and their fluctuation.

Pre monsoon depth to water level: - On the basis of the depth to water level of the year 2012 - 13 (table – 2), the pre monsoon depth to water level was monitored between 4.74 to 15.40 mbgl. Majority of the wells (45.45%) fall in the water level range of 9 - 12 mbgl. Pre monsoon depth to water level map (May 2012) is prepared and shown in fig.-4.

Post monsoon depth to water level: - On the basis of the depth to water level of the year 2012 – 13, the post monsoon depth to water level ranges between 2.15 to 7.60 mbgl. About 75% of the wells fall in the water level ranges between 3 – 6 mbgl. Post monsoon depth to water level map (Nov. 2012) is prepared and shown in figure 5.

5.1.3 Seasonal Fluctuation:- From the pre monsoon and post monsoon depth to water level data collected during May 2012 and November 2013 respectively, water level fluctuation were computed for all NHS of the district. The water level fluctuation between pre monsoon and post monsoon period of the district varies from 2.59 to 9.53 m.

5.1.4 Long term water level trend: - Water level depends upon the storage of ground water development and variation in rainfall over a long period. Central Ground Water Board has established eleven numbers of National Hyrdograph Stations (NHS) for the study of water level behavior in the district. The water level data of each station has been analyzed. The pre monsoon and post monsoon long term water level trend has been calculated for the period of 2003 – 2012 (Table 4). The long term water level trend is showing rising trend between 0.002 – 0.197, 0.050 – 0.210 and 0.013 – 0.196 m/ year for pre monsoon, post monsoon and all period respectively. Similarly, the long term water level trend is showing declining trend between 0.016 – 0.431, 0.038 – 0.533 and 0.099 – 0.385 m/ year for pre monsoon, post monsoon and all period respectively. About

72.73% of the wells showing declining trend for pre monsoon period, 81.82% wells showing declining trend for post monsoon period and 73.33% wells showing declining trend for all the period.

5.2 Ground Water Resources: Based on the recommendation of the Ground Water Estimation Committee – 1997 (GEC – 1997), Block wise the ground water resource assessment has been evaluated (March 2009). The net annual ground water availability of the district is 33263.73 ham. The gross ground water draft for all uses of the district is 11968 ham. The net ground water availability for future irrigation development for the district is 19305.36 ham. All blocks of the district falling under “Safe” category. The stage of ground water development varies from 19.44% to 62.68% (table – 6). Block wise (except new blocks) stage of ground water development is shown in figure- 6.

5.3 Ground Water Quality: To evaluate the quality of ground water, samples have been collected from representative NHS (dug wells) during the month of May 2011. These samples have been considered to assess the chemical quality of ground water and its suitability for drinking and irrigation purposes. The samples represent the quality of phreatic zone or the shallow zone. The ground water samples were analysed for major chemical constituents by using standard procedure at chemical laboratory in CGWB, MER, Patna. Analysed results are given in table 5.

The results of ground water samples were evaluated in accordance with the standard (ISI – 1993) for drinking purpose. In general the quality of ground water in the phreatic aquifer is acceptable except one sample chloride and four samples nitrate concentration more than permissible limit. The EC value ranges from 238 – 1798 micro Siemens/cm at 25^0c.

5.4 Status of Ground Water Development: The over all ground water development of the district is only 35.97%. Thus, there is sufficient scope for shallow as wells deep bore wells. State Govt. Agency has been constructed a large number of bore wells to minimize the drinking water problem in the district. Central Ground Water Board has been drilled 22 exploratory bore wells and 12

observation bore wells in the district. The depth of bore wells ranges between 66.00 – 199.07 mbgl. The yield of bore wells ranges from 1.60 to 35.22 m^3/hr. The detail of exploratory bore wells drilled by Central Ground Water Board is given in table -2.

6.0. Ground Water Management Strategy

6.1. Ground Water Development: Dug wells and shallow to medium depth (upto 50 m) bore wells are the main ground water extraction structures in the area to meet the increasing demand of domestic water supply. The overall ground water development stage of the district is 35.97% only. Thus, there is sufficient scope for development of ground water through dug wells, shallow and medium depth bore wells.

Construction of dug cum bore well structure is also suitable for enhance the yield of dug wells in respect of cost beneficial and economical. The ground water development varies in different places depending on the availability of favorable locations. For the construction of ground water structures, knowledge of the local as well as regional hydrogeological condition of the area is necessary.

For potential available for the ground water development considering the ground water draft has been worked out as per norms of Ground Water Estimation Committee – 1997 (GEC – 1997) and the details of ground water recharge, net annual ground water availability, annual draft, net ground water balance and stage of ground water development has been assessed and presented in table -6.

6.2 Water Conservation and Artificial Recharge: In view of the increasing thrust on development of ground water resources, there is urgent need to augment the depleting ground water resources. This gets augmented through natural recharge and can be augmented in an increased scale through artificial recharge. From hydrogeological point of view, rain water conservation is needed to arrest decline in ground water levels and to improve ground water quality by dilution. The construction of water conservation structures and artificial recharge

structures depends on the topographic features, hydrological and hydrogeological conditions of the area. The artificial recharge through roof top rain water harvesting practice may be implemented in Giridih urban area to arrest decline in ground water level. About 72.73% of the wells showing declining trend for pre monsoon period, 81.82% wells showing declining trend for post monsoon period and 73.33% wells showing declining trend for all the period.Thus, all the blocks required for artificial recharge through ckeck dam, percolation tank, nala bandhara, gabion structures and contour bunding and trenching.

7.0 Ground Water Related Issue and Problems: As per the result of chemical analysis of water samples collected from NHS, the nitrate concentration is found more than permissible limits in shallow aquifer in villages Dhanwar, Jamua, Duri and Bandhutanr. Similarly, the chloride concentration is found in village Jamua. The long term water level trend of NHS is showing declining trend in 72.73% wells for pre monsoon period and 81.82% wells for post monsoon period. Similarly, the long term water level trend of NHS is showing declining trend in 73.33% well for all period.

8.0. Awareness and Training Activity

8.1 The Mass Awareness Programme (MAP) by CGWB: Nil

8.2 Participation in Exhibition, Mela, Fair etc. - Nil

8.3 Presentation and Lecture deliver in public forum / Radio / T.V / Institution of repute / Grassroots association / NGO / Academic institution etc. – Nil

9.0 Area Notified by CGWA / CGWB: As per the ground water resource assessment evaluated, all blocks of the district falling under the safe category. Thus, the authority has not been notified any blocks.

10.0 Recommendation

1. Artificial recharge practice is required in all the blocks of the district because the long term water level trend of NHS of CGWB is showing declining trend specially for all period. In order to conserve run – off water during monsoon, it is suggested to construct the water conservation structures at suitable places to facilitate the ground water recharge around the water scarcity villages through check dam, percolation tank, nala bandhara, gabion structures and contour bunding and trenching.

2. The drilling data of the district is indicating that there is good prospect for successful bore wells with the help of proper study of lineaments and geophysical survey.

TABLE 1: ADMINISTRATIVE DIVISION AND POPULATION (CENSUS 2011) OF GIRIDIH DISTRICT, JHARKHAND

Sr. No.	Block	Area (Sq. km)	Rural population			Urban population		
			Male	Female	Total	Male	Female	Total
1	Gawan	336.75	59039	56923	115962	--	--	--
2	Tisri	429.53	47423	47658	95081	--	--	--
3	Deori	423.51	94686	87841	182527	--	--	--
4	Dhanwar	352.41	133849	124726	258575	4531	4246	8777
5	Jamua	478.50	139892	131671	271563	--	--	--
6	Bengabad	402.50	79018	74180	153198	--	--	--
7	Gandey	366.09	90407	84680	175087	--	--	--
8	Giridih	380.86	107643	100617	208260	85668	78642	164310
9	Birni	319.93	85970	83481	169451	--	--	--
10	Bagodar	544.10	80722	77372	158094	--	--	--
11	Sariya	NA	66982	63153	130135	9954	8979	18933
12	Dumri	427.33	108060	109609	217669	8337	7667	16004

13	Pirtanr	392.82	55917	53598	109515	--	--	--
Total		4854.33	1149608	1095509	2245117	108490	99534	208024

TABLE 2: DETAILS OF EXPLORATORY WELLS DRILLED IN GIRIDIH DISTRICT (As on March'2012)

Sl No	Location	Block	Co-ordinate	Depth Drilled (mbgl).	Length of Casing (m)	Granular Zone / fracture Tapped (m)	Static Water level (m bgl)	Discharge (m^3/hr)	Drawdown (m)	Specific Capacity (m^3/hr/m)	T (m^2/day)	S
1	2	3	4	5	6	7	8	9	10	11	12	13
1	JAGANATHDIH EW OW	JAMUA	$24^0$24'20" $86^0$09'50"	100 100.2	7.5	-	1.6	9	11.39	0.79	13.76	$1.36X10^{-3}$
2	JHALAKDIHA EW OW	JAMUA	$24^0$12'55" $86^0$16'30"	100 95.5	7.5	021.00-024.00 057.00-059.00	3.43	7.48	9.09	0.82	28.5	$5.30X10^{-3}$
3	JORASANKH EW OW	JAMUA	$24^0$17'15" $86^0$09'10"	101 101	7.3	022.00-024.00 069.00-070.00	4.36	10.74	13.39	0.8	-	$6.30X10^{-2}$
4	TARA, EW OW	JAMUA	$24^0$19'40" $86^0$04'20"	100 95	9	-	6.81	4.5	7.62	0.59	24.8	$1.40X10^{-2}$
5	BELATANR EW OW	DEORI	$24^0$32'40" $86^0$00'30"	100 100	16.2	-	1.95	5.4	6.5	0.83	18.7	$3.90X10^{-3}$
6	NAWADIH EW OW	JAMUA	$24^0$18'30" $86^0$09'20"	100 154.6	19 142	-	6.23	2.16 (A C)	-	-	-	-
7	NAUDIHA EW OW1 OW2	JAMUA	$24^0$23'00" $86^0$17'10"	66 71.5 100	9	-	1.4 magl	36	10.5	3.42	-	-

8	**RATHDIH** EW OW	**BENGABAD**	$24^0$18'00" $86^0$21'10"	100 100	5	3	7.2	15.5	-	-	-	-
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
9	**MOHANPUR (Jail campus)** EW	**GIRIDIH**	$24^0$05'00" $86^0$21'10"				23.9	39.6	1.68		17.39	
10	**OFFICERS COLONY** EW	**GIRIDIH**	$24^0$09'10" $86^0$20'10"	199.02				Dry				
11	**GANDEY BLOCK** **EW** OW	**GANDEY**	$24^0$04'55" $86^0$23'20"	137.71 145.61			7.17	11.29	11.7		66.17	$1.58X10^{-5}$
12	**BAZAR HAT** EW OW	**GIRIDIH**	$24^0$09'40" $86^0$20'10"	93.09 95			5.25	37.7	18.26		46.1	0.0023
13	**DANDIDIH** EW	**GIRIDIH**	$24^0$10'10" $86^0$20'30"	145.48			35.22	19.8	2.92		4.34	
14	**SIHODIH** EW	**GAWAN**	$24^0$36'40" $85^0$57'50"									
15	**BHANDARIDIH** ANIMAL HUSBANDRY EW	**GIRIDIH**	$24^0$10'10" $86^0$21'10"									
16	**PACHAMBHA** EW	**GIRIDIH**	$24^0$10'10" $86^0$19'10"	199.07				Dry				
17	**RAJ DHANWAR** EW	**RAJ DHANWAR**	$24^0$23'30" $85^0$59'10"	199.07				2.7				

18	***MICA THANA TISRI EW***	***TISRI***	*24^{0}34'50" 86^{0}04'40"*	*186.93*			*6.38*	*12.45*	*7.92*		*20.08*	
19	***DUMRI BLOCK CAMPUS,EW*** *OW*	***DUMRI***	*24^{0}23'59" 86^{0}02'10"*	*198.35* *120.35*				*15.3*				
20	***BIRANGADA, MADHUBAN*** *EW*	***PIRTANR***	*23^{0}59'10" 86^{0}10'20"*	*191.53*				*27*				
21	***ATKA*** *EW* *OW*	***BAGODAR***	*24^{0}03'40" 85^{0}54'45"*	*182.54* *122.85*				*11.8*				
22	***MADHUBAN*** *EW*	***PIRTANR***	*24^{0}01'10" 86^{0}09'20"*			*Abandoned*						

TABLE 3: DEPTH TO WATER LEVEL OF HYDROGRAPH NETWORK STATIONS LOCATED IN GIRIDIH DISTRICT (2012 - 13)

Sl No.	Location	May 2012	August 2012	November 2012	January 2013
1	Bagodar	8.25	4.15	3.56	5.10
2	Giridih	15.40	9.88	5.87	7.43
3	Tisri	--	1.55	--	4.07
4	Dhanwar	4.74	--	2.15	4.16
5	Jamua	11.20	8.60	7.60	9.58
6	Birni	10.12	--	--	10.82
7	Pandri	9.73	5.83	5.50	8.03
8	Dewri	--	4.80	4.34	5.80
9	Khijri	--	5.47	5.82	7.08
10	Dumri	13.50	4.01	4.66	6.60
11	Bengabad	8.76	4.15	3.91	5.82
12	Bandhutanr	10.19	7.20	6.90	8.04
13	Dhanidih	8.17	6.91	3.51	5.64
14	Gandey	10.43	--	--	--
15	Sariya	--	5.37	5.19	6.90
16	Maheshmunda	--	--	--	4.63

TABLE 4: LONG TERM WATER LEVEL TREND FOR EXISTING HYDROGRAPH NETWORK STATIONS OF GIRIDIH DISTRICT (2003 – 2012)

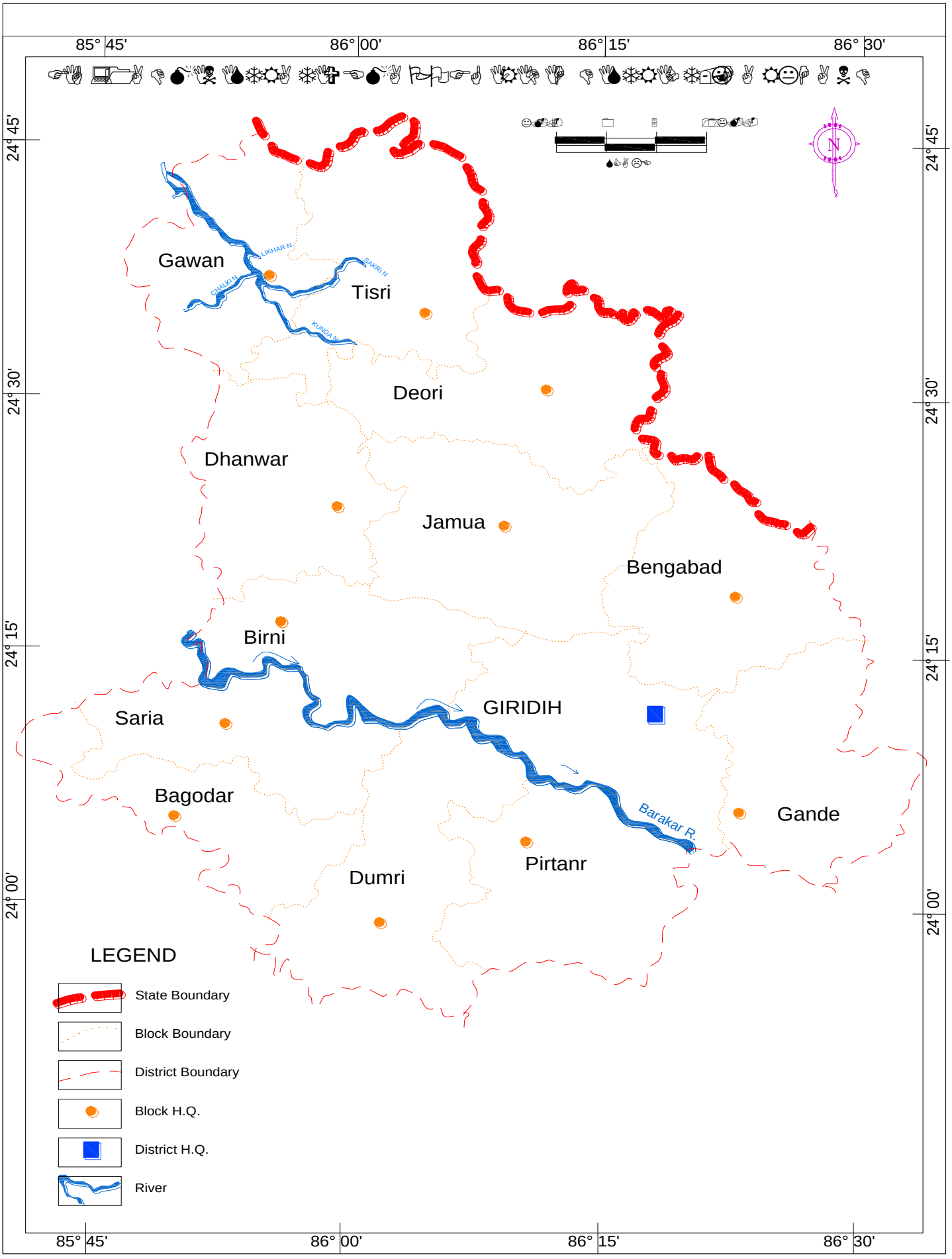
Sl No.	Location	Pre monsoon trend (m/year)		Post monsoon trend (m/year)		All period (m/year)	
		Rise	Fall	Rise	Fall	Rise	Fall
1	Bagodar	--	0.051	0.050	--	0.096	--
2	Giridih	--	0.431	--	0.335	--	0.385
3	Tisri					--	0.102
4	Dhanwar	0.197	--	0.210	--	0.197	--
5	Jamua	--	0.120	--	0.164	--	0.178
6	Birni	0.002	--	--	0.385	--	0.300
7	Pandri	--	0.105	--	0.533	--	0.099
8	Dewri					--	0.177
9	Khijri					--	0.352
10	Dumri	0.095	--	--	0.108	0.135	--
11	Bengabad	--	0.087	--	0.038	0.013	--
12	Bandhutanr	--	0.016	--	0.192	--	0.271
13	Dhanidih	--	0.168	--	0.173	--	0.222
14	Gandey					--	1.236
15	Pirtanr	--	0.065	--	0.258	--	0.153

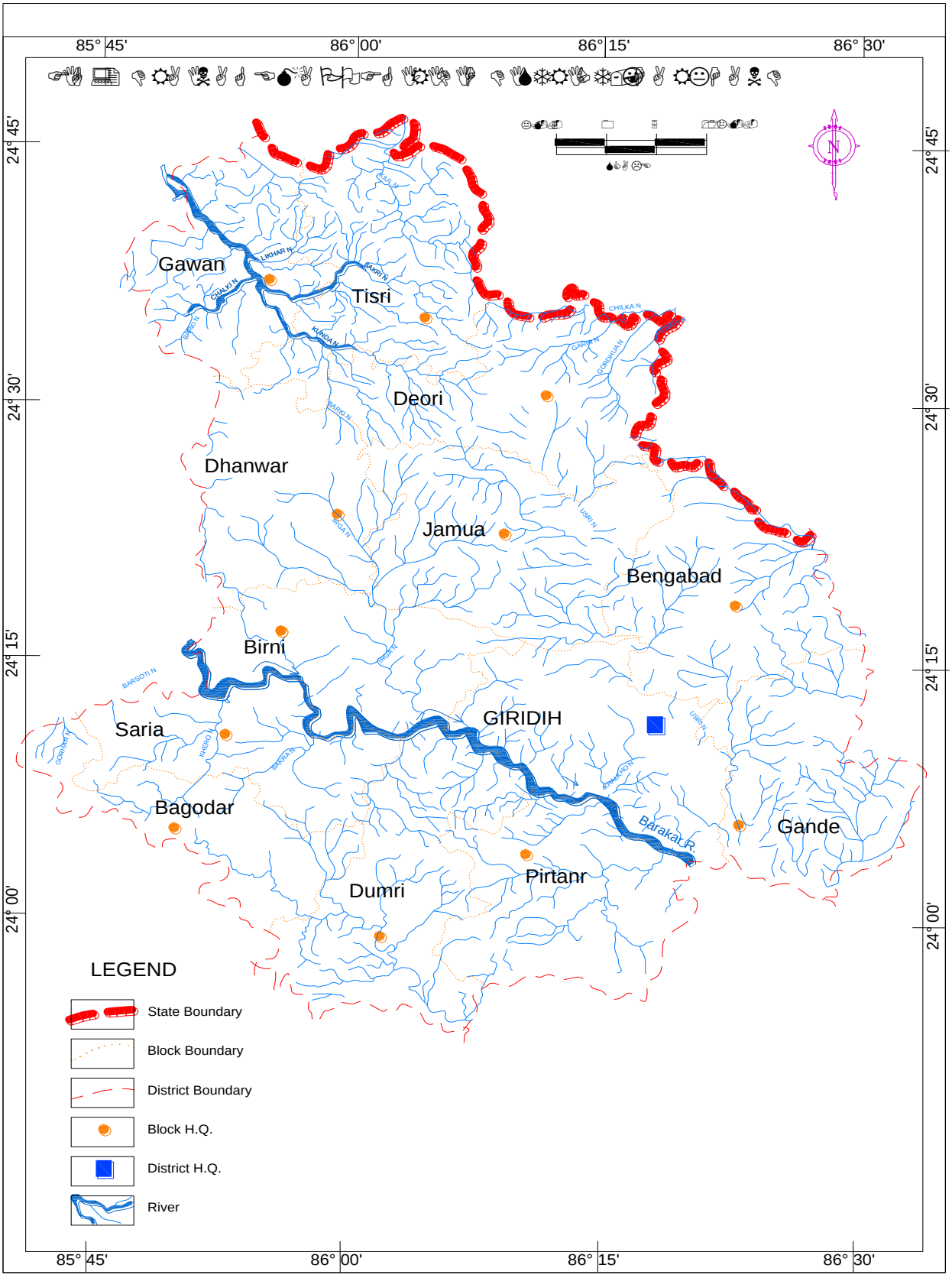
TABLE 5: ANALYSIS OF WATER QUALITY PARAMETERS OBSERVED IN HYDROGRAPH NETWORK STATIONS OF GIRIDIH DISTRICT (2011)

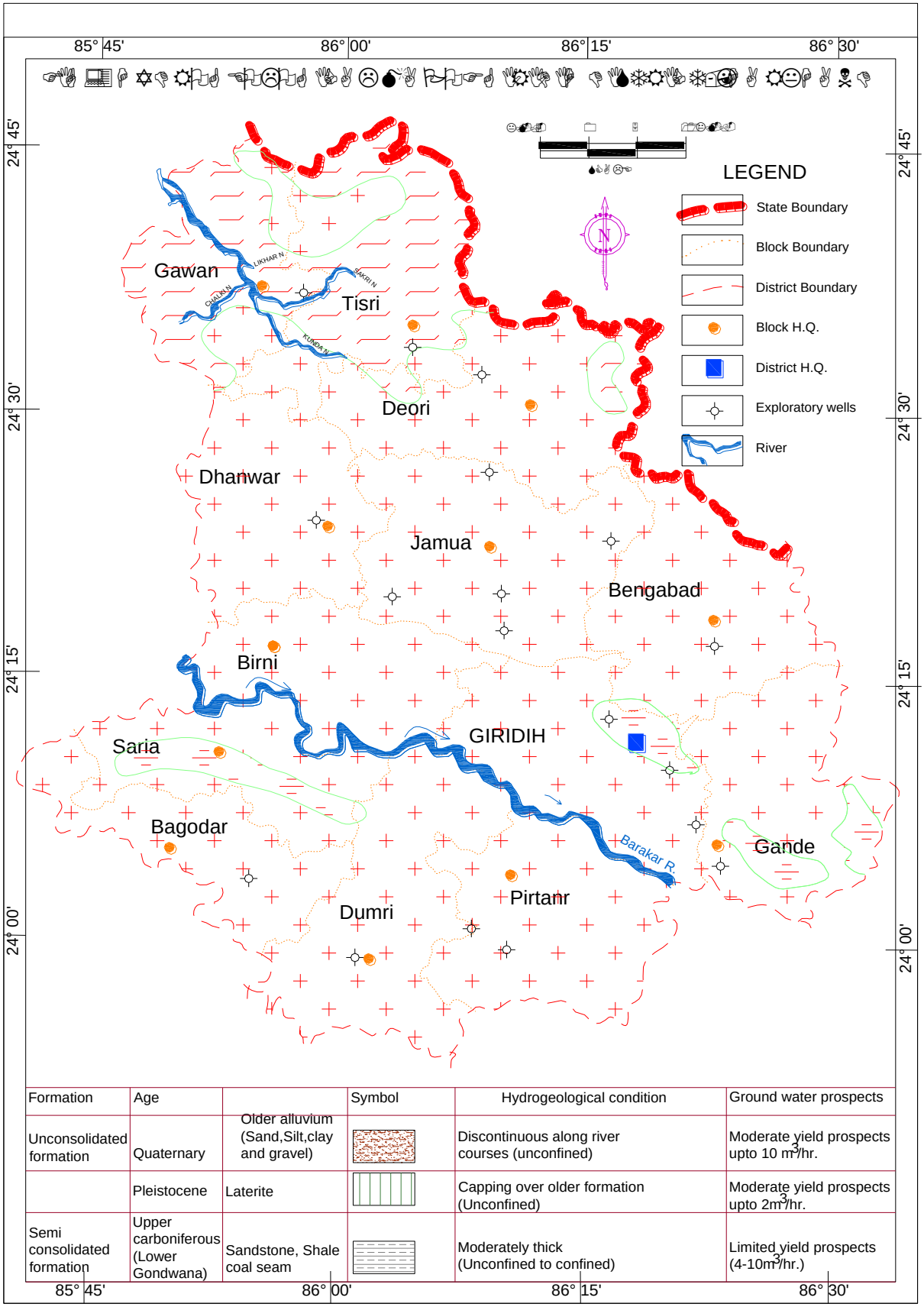
Sl No.	Location	EC in micro siemens/cm at 25^0 c	pH	TH as $CaCO_3$	Ca	Mg	Na	K	HCO_3	Cl
					← mg / l →					
1	Bagodar	708	6.75	275	40	45.52	28.57	0.96	159.9	102.8
2	Giridih	374	7.84	100	30	6.07	35.08	1.08	110.7	49.63
3	Dhanwar	664	8.17	180	50	13	55	2.8	189	75
4	Jamua	1798	7.33	600	190	30	122	3.2	244	369
5	Birni	350	7.80	120	32	9.7	23	0.5	129.15	32
6	Dumri	1183	8.19	425	50	72.9	66.78	2.15	252.15	141.8
7	Bengabad	273	7.98	85	20	8.5	25.22	1.86	61.5	35.45
8	Bandhutanr	638	7.98	135	28	15.79	78	0.8	146.4	89
9	Dhanidih	238	7.04	70	18	6.10	22	0.5	80	18
10	Gandey	503	8.41	170	54	8.5	42	3.5	197	43

TABLE 6: DETAILS OF GROUND WATER DEVELOPMENT AND STAGE OF GROUND WATER DEVELOPMENT OF GIRIDIH DISTRICTS AS ON 31ST MARCH 2009 (in hectare meters)

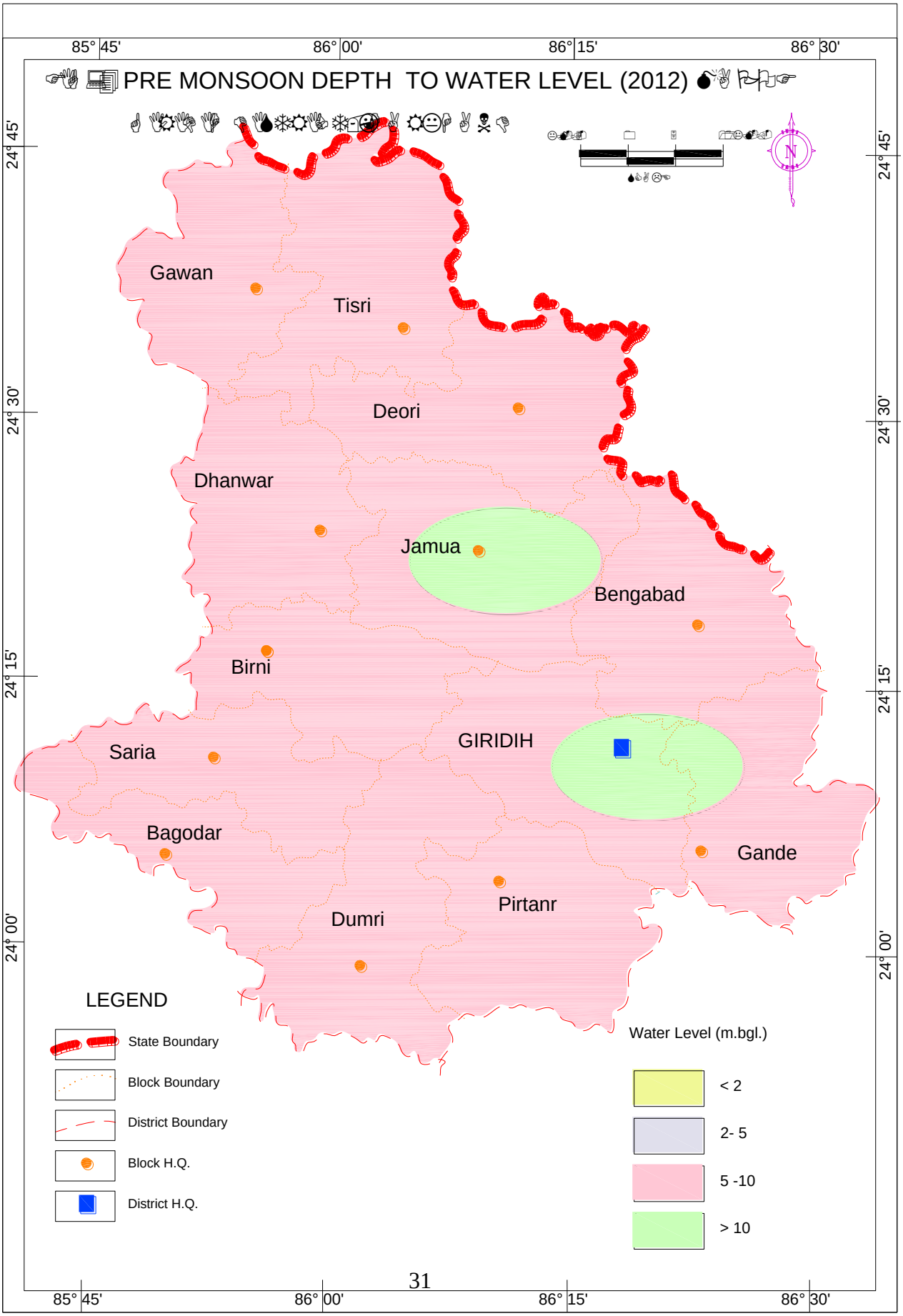
Sl. No.	Assessment Unit/ District	Net Annual Ground Water Availability	Gross Ground Water Draft for Irrigation	Gross Ground Water Draft for Domestic and Industrial water Supply	Gross Ground Water Draft for all Uses (10+11)	Allocation for Domestic and Industrial Requirement supply upto next 25 years	Net Ground Water Availability for future irrigation development (9 – 12 – 13)	Stage of Ground Water Development (12/9)*100 (%)	Categorization for future ground water development (safe/ critical/ over - exploited)
1	2	9	10	11	12	13	14	15	16
1	Bagodar	4141.75	629.88	398.80	1028.68	654.09	2857.78	24.84	Safe
2	Bengabad	2830.27	848.77	200.48	1049.26	328.82	1652.68	37.07	Safe
3	Birni	2261.74	967.66	226.71	1194.37	371.84	922.24	52.81	Safe
4	Dewri	2822.92	910.72	236.87	1147.59	388.50	1523.70	40.65	Safe
5	Dhanwar	2868.67	1470.30	327.84	1798.14	537.70	860.66	62.68	Safe
6	Dumri	2621.12	560.63	294.82	855.45	483.55	1576.94	32.64	Safe
7	Gandey	2545.85	636.36	229.79	866.15	376.88	1532.60	34.02	Safe
8	Gawan	2086.88	615.00	149.32	764.32	244.90	1226.97	36.63	Safe
9	Giridih	3197.62	407.16	415.97	1152.38	682.24	2108.22	36.04	Safe
10	Jamua	3098.95	1095.85	357.16	1453.01	585.79	1417.31	46.89	Safe
11	Pirtanr	2307.39	358.79	147.06	505.85	241.21	1707.39	21.92	Safe
12	Tisri	2480.59	358.20	124.10	482.30	203.54	1918.85	19.44	Safe
Total		**33263.73**	**8859.31**	**3108.94**	**11968**	**5099.06**	**19305.36**	**35.97 (Avg.)**	Safe

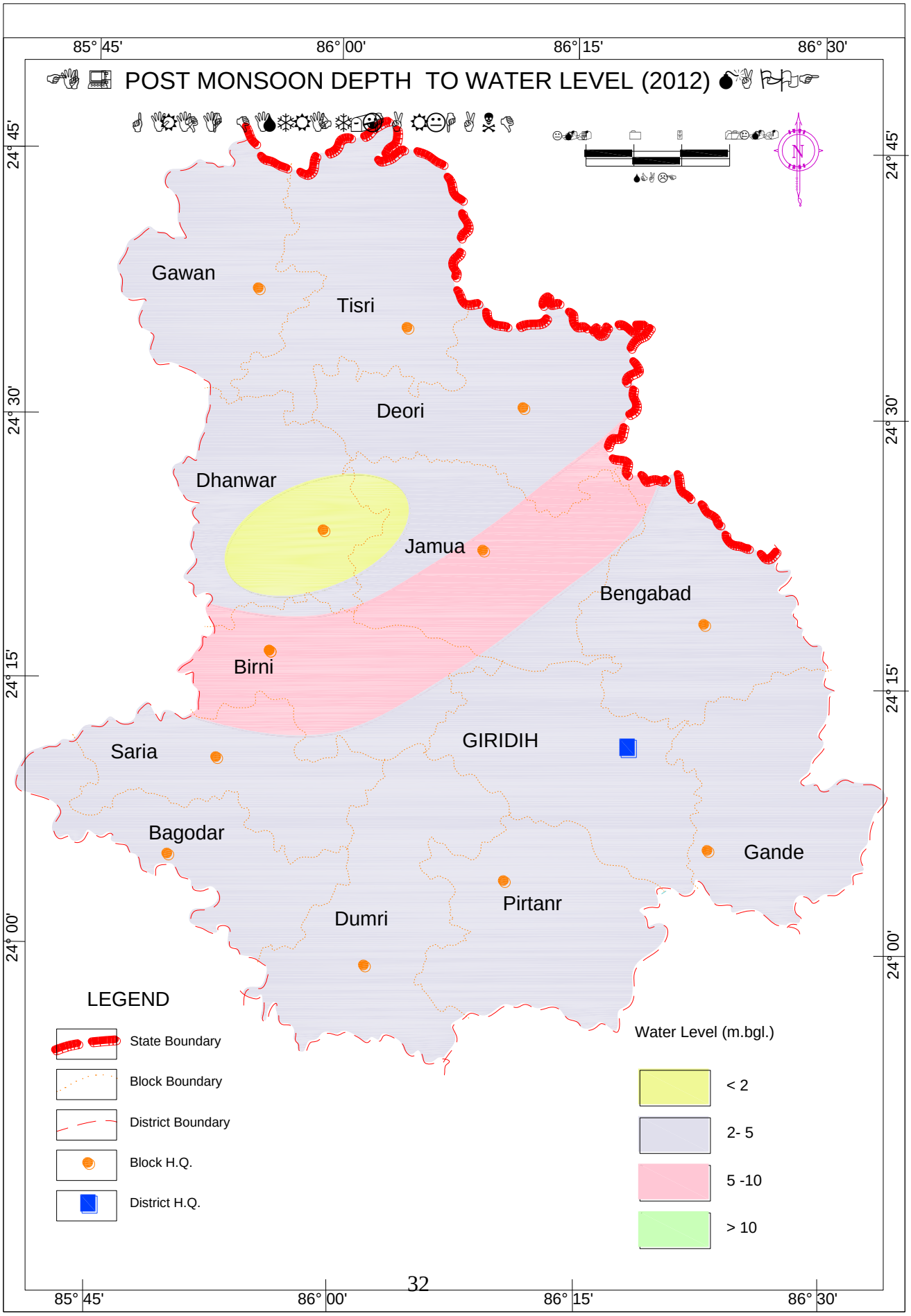

85° 45'
86° 00'
86° 15'
86° 30'
24° 45'
24° 30'
24° 15'
24° 00'
N
Gawan
Tisri
Deori
Dhanwar
Jamua
Bengabad
Birni
GIRIDIH
Saria
Bagodar
Gande
Pirtanr
Dumri
Barakar R.
LIKHAR N
SAKRI N
CHAUKI N
KUNDA N
LEGEND
State Boundary
Block Boundary
District Boundary
Block H.Q.
District H.Q.
River


85° 45'
86° 00'
86° 15'
86° 30'
24° 45'
24° 30'
24° 15'
24° 00'
Gawan
Tisri
Deori
Dhanwar
Jamua
Bengabad
Birni
GIRIDIH
Saria
Bagodar
Gande
Pirtanr
Dumri
Barakat R.
LEGEND
State Boundary
Block Boundary
District Boundary
Block H.Q.
District H.Q.
River



Formation	Age		Symbol	Hydrogeological condition	Ground water prospects
Unconsolidated formation	Quaternary	Older alluvium (Sand,Silt,clay and gravel)		Discontinuous along river courses (unconfined)	Moderate yield prospects upto 10 m^3/hr.
	Pleistocene	Laterite		Capping over older formation (Unconfined)	Moderate yield prospects upto 2m^3/hr.
Semi consolidated formation	Upper carboniferous (Lower Gondwana)	Sandstone, Shale coal seam		Moderately thick (Unconfined to confined)	Limited yield prospects (4-10m^3/hr.)


PRE MONSOON DEPTH TO WATER LEVEL (2012)
85° 45'
86° 00'
86° 15'
86° 30'
24° 45'
24° 30'
24° 15'
24° 00'
N
Gawan
Tisri
Deori
Dhanwar
Jamua
Bengabad
Birni
GIRIDIH
Saria
Bagodar
Gande
Pirtanr
Dumri
LEGEND
State Boundary
Block Boundary
District Boundary
Block H.Q.
District H.Q.
Water Level (m.bgl.)
< 2
2- 5
5 -10
> 10


POST MONSOON DEPTH TO WATER LEVEL (2012)
85° 45'
86° 00'
86° 15'
86° 30'
24° 45'
24° 30'
24° 15'
24° 00'
N
Gawan
Tisri
Deori
Dhanwar
Jamua
Bengabad
Birni
GIRIDIH
Saria
Bagodar
Gande
Pirtanr
Dumri
LEGEND
State Boundary
Block Boundary
District Boundary
Block H.Q.
District H.Q.
Water Level (m.bgl.)
< 2
2- 5
5 -10
> 10

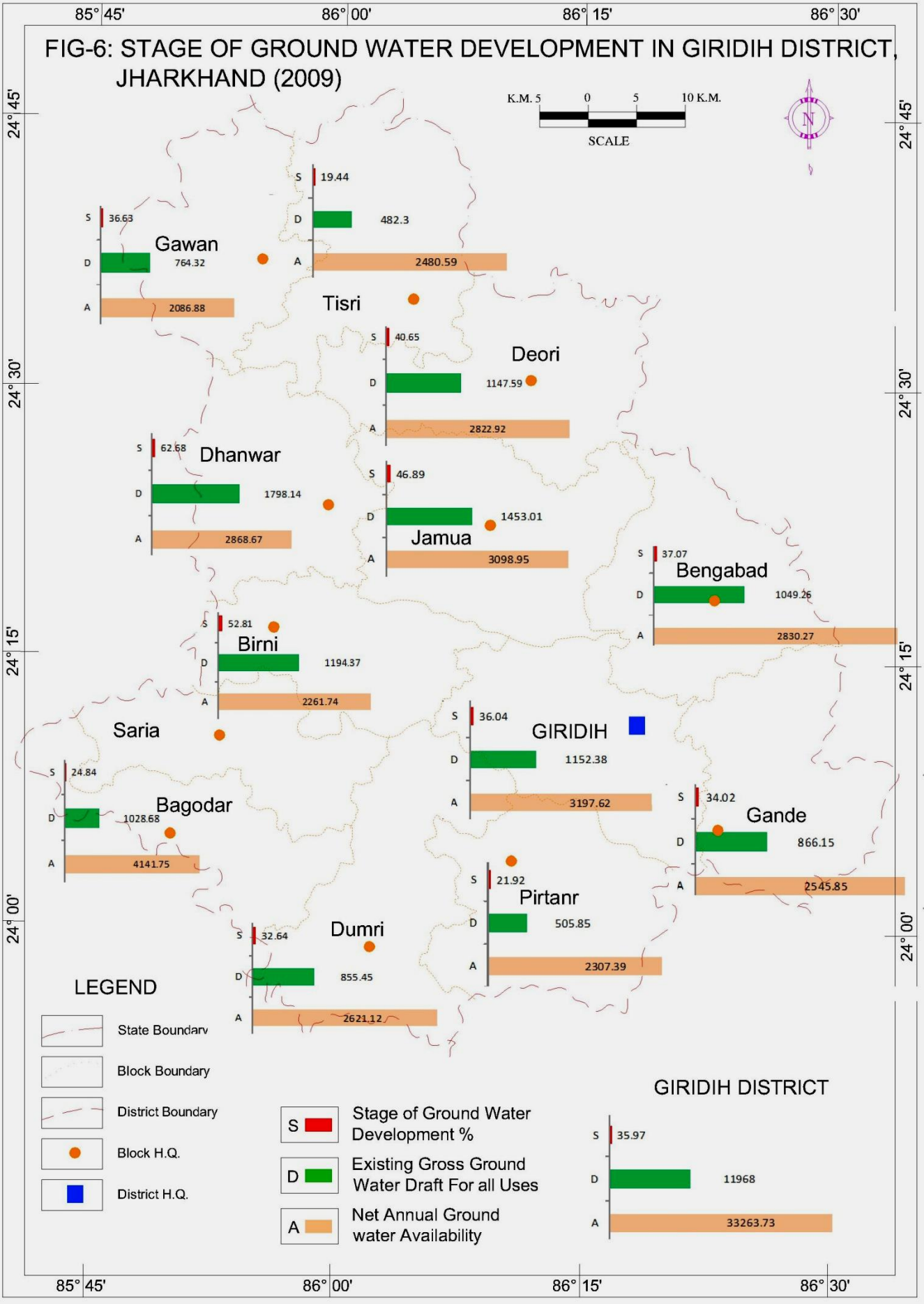


FIG-6: STAGE OF GROUND WATER DEVELOPMENT IN GIRIDIH DISTRICT, JHARKHAND (2009)
85° 45'
86° 00'
86° 15'
86° 30'
24° 45'
24° 30'
24° 15'
24° 00'
K.M. 5 0 5 10 K.M.
SCALE
N
Gawan
S 36.63
D 764.32
A 2086.88
Tisri
S 19.44
D 482.3
A 2480.59
Deori
S 40.65
D 1147.59
A 2822.92
Dhanwar
S 62.68
D 1798.14
A 2868.67
Jamua
S 46.89
D 1453.01
A 3098.95
Bengabad
S 37.07
D 1049.26
A 2830.27
Birni
S 52.81
D 1194.37
A 2261.74
Saria
GIRIDIH
S 36.04
D 1152.38
A 3197.62
Bagodar
S 24.84
D 1028.68
A 4141.75
Gande
S 34.02
D 866.15
A 2545.85
Pirtanr
S 21.92
D 505.85
A 2307.39
Dumri
S 32.64
D 855.45
A 2621.12
LEGEND
State Boundary
Block Boundary
District Boundary
Block H.Q.
District H.Q.
S Stage of Ground Water Development %
D Existing Gross Ground Water Draft For all Uses
A Net Annual Ground water Availability
GIRIDIH DISTRICT
S 35.97
D 11968
A 33263.73