बिहार राज्य के गतिशील भूजल संसाधन, 2024
DYNAMIC GROUND WATER RESOURCES OF BIHAR, 2024

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

Minor Water Resources Department
Government of Bihar

Central Ground Water Board
Mid-Eastern Region, Patna
Ministry of Jal Shakti
Government of India

Patna
January, 2025

FOREWORD

Bihar, with a geographical area of 94,163.00 sq km with its unique location in the Gangetic plain with prolific aquifer system has an agrarian economy and the contribution of agriculture and allied activities in Gross Domestic Products of the State is 25%. Apart from rainfall, assured irrigation is one of the important inputs for sustainable agriculture production. Ground water is one of the mainstays of irrigation in the state and the demand is rising due to increased agricultural and allied activities. In addition to this the demand for drinking water due to population growth and industrial activities has also put pressure on this invisible resource. Ground water has become preferred source due to its ubiquitous nature and easy accessibility to cater the demand of all the sectors. Estimation of the dynamic ground water resource, which is annually replenishable at regular interval, is essentially required for its sustainable development and management.

Bihar, blessed with fertile soil and over all water availability, is dependent largely on agriculture. Majority of its population is dependent on agriculture and allied activities for their sustenance. Ground water based irrigation can make agriculture sustainable through assured irrigation. The state is blessed with a substantial replenishable groundwater resource in the unconsolidated aquifers in Gangetic Alluvial Plains covering about 89% of its geographical area. The untapped ground water resource should be utilized for irrigation and agro based industries. The ground water based irrigation schemes launched by the government of Bihar is a major step in this direction. One of the major concerns is that the resource is not uniformly distributed in space and time. The stress on resources is felt in the districts bordering Jharkhand state particularly during summer months.

Assessment has been carried out for 534 blocks and Patna urban area based on the recommendations/ methodology of the "Ground Water Estimation Committee 2015" for assessment year 2024. The assessment has been carried out separately for canal command areas and non-command areas for all the assessment units for the state of Bihar. Annual ground water recharge has been assessed as 34.14 bcm and net extractable ground water resource of 30.95 bcm. 4 blocks have been assessed as overexploited, 9 as critical, 49 as semi- critical and 473 blocks under the safe category with overall stage of ground water extraction of 45.54%. Refinement of various input parameters for resource assessment will give a better and realistic picture of the ground water condition.

I would like to appreciate the scientists of Central Ground Water Board, Mid-Eastern Region Patna and officers of Minor Water Resource Department, Government of Bihar for the work done by them. I hope this report will be of great use to the planners and user Agencies dealing with groundwater.

(Dr. Sandeep Kumar R. Pudakalkatti, IAS)
Secretary, Minor Water Resources Department
Government of Bihar
&
Chairman, Permanent State Level Committee (SLC)

PREFACE

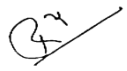
Water is indispensable natural resource for sustenance of life and livelihood on this planet. Ground water has emerged as the main source for agriculture, domestic and industry. Though ground water is replenished every year; its availability in space and time is not uniform. The dynamics of ground water reserve is influenced by several parameters like precipitation, geology, land use, land cover, irrigation practices etc. It has to be estimated at reasonable interval for its optimum development for livelihood.

The state of Bihar is endowed with fertile soil and abundant water resources aided by a good monsoon rainfall. The state is underlain by prolific water bearing formations down to the depth of hundreds of meter, particularly in the northern parts and the parts adjoining the central drainage of Ganga River. Hydrogeologically, more than 89 % of the area is underlain by unconsolidated alluvial sediments of Quaternary period. Agriculture is the main occupation of the rural population, which constitutes about 76 % of the total state population. Apart from demand for irrigation, spiraling growth of population and industrial activities has also resulted in increased demand for groundwater

Previous assessments have been made in 2004, 2009, 2011, 2013, 2017 and 2020. The estimation of dynamic ground water resource of Bihar 2024 is on the basis of recommendation of Ground Water Estimation Committee 2015 (GEC 2015). Dynamic ground water resources have been estimated considering canal command and non-command area of the assessment units. The estimation of annual extractable ground water resource is exhaustive as it requires estimation of various other parameters related to recharge and draft of ground water. The outcome of the exercise has been compiled in this **"Report on Dynamic Ground Water Resource of Bihar 2024".**

The assessment work is a joint exercise of Central Ground Water Board, MER, Patna and Minor Water Resource Department, Govt. of Bihar. A lot of efforts have been put forward by Sh. Satyendra Kumar, Scientist-C, Sh. Imam Hasan, Scientist-B and Sh. Santosh Kumar Sen, AHG of Central Ground Water Board. I also appreciate the efforts of Er. Sunil Kumar, Chief Engineer (PMG) and Er. Ranjeet Kumar Mandal, Executive Engineer (Monitoring) from Minor Water Resources Department for support during the exercise. The efforts taken by Sh. Alok Kumar Sinha, Scientist-D for computation, evaluation and validation of results of this assessment and preparation of the report on "Dynamic Ground Water Resource of Bihar, 2024" is highly appreciable and praiseworthy.

I hope the report will help the policy makers in evolving policy directives for ground water development and management of the state.



Rajeev Ranjan Shukla
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Central Ground Water Board
Mid-Eastern Region, Patna
&
Member Secretary, Permanent State Level Committee (SLC)

Ground Water Resources of Bihar, 2024

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Under Supervision and Guidance
of
Shri Rajeev Ranjan Shukla
Regional Director
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DYNAMIC GROUND WATER RESOURCES OF BIHAR, 2024
AT A GLANCE

1. Total Annual Ground Water Recharge	**: 34.14**	**BCM**
2. Total Annual Natural Discharge	**: 3.19**	**BCM**
3. Annual Extractable Ground Water Resource	**: 30.95**	**BCM**
4. Current Annual Ground Water Extraction for Irrigation Use	**: 10.21**	**BCM**
5. Current Annual Ground Water Extraction for Industrial Use	**: 0.40**	**BCM**
6. Current Annual Ground Water Extraction for Domestic Use	**: 3.48**	**BCM**
7. Current Total Annual Ground Water Extraction for All Uses	**: 14.09**	**BCM**
8. Stage of Ground Water Extraction	**: 45.54**	**%**
9. Annual GW Allocation for Domestic Use as on 2025	**: 3.75**	**BCM**
10. Net Ground Water Availability for Future Use	**: 16.70**	**BCM**
11. Total Number of Blocks (Assessment Units)	**: 535**	
12. Number of Safe Blocks	**: 473**	
13. Number of Semi-critical Blocks	**: 49**	
14. Number of Critical Blocks	**: 09**	
15. Number of Over Exploited Blocks	**:04**	

Dynamic Ground Water Resource of Bihar, 2024
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DYNAMIC GROUND WATER RESOURCES OF Bihar,2024

AT A GLANCE

1.	Total Annual Ground Water Recharge	34.14 BCM
2.	Annual Extractable Ground Water Resources	30.95 BCM
3.	Annual Ground Water Extraction	14.09 BCM
4.	Stage of Ground Water Extraction	45.54 %

CATEGORIZATION OF ASSESSMENT UNITS

(Blocks/ Mandals/ Taluks)

Sl.No	**Category**	**Number of Assessment Units**		**Recharge worthy Area**		**Annual Extractable Ground Water Resource**	
		Number	**%**	**in lakh sq. km**	%	**(in bcm)**	%
1	Safe	473	88.41	82188.75	90.64	28.02	91.24
2	Semi Critical	49	9.15	6818.28	7.54	2.16	7.06
3	Critical	9	1.68	900.68	0.99	0.23	0.77
4	Over-Exploited	4	0.7	440.99	0.48	0.28	0.92
5	Saline	-	-	-	-	-	-
	TOTAL	**535**	**100**	**90648.7**	**100**	**30.95**	**100**

EXECUTIVE SUMMARY

Ground Water Resource Assessment is carried out jointly by Minor Water Resources Department, Government of Bihar and Central Ground Water Board under the guidance of the State Level Committee on Ground Water Assessment at State Levels and under the overall supervision of the Central Level Expert Group (CLEG). Such joint exercises have been taken up earlier in 1980, 1995, 2004, 2009, 2011, 2013, 2017, 2020 and 2022. From 2022, the exercise is being carried out annually.

The assessment involves computation of dynamic ground water resources or Annual Extractable Ground Water Resource, Total Current Annual Ground Water Extraction (utilization) and the percentage of utilization with respect to annual extractable resources (stage of Ground Water Extraction). The assessment units (blocks) are categorized based on Stage of Ground Water Extraction, which are then validated with long-term water level trends. The assessment prior to that of year 2017 were carried out following Ground Water Estimation Committee (GEC) 97 Methodology, whereas from 2017 onwards assessment is based on norms and guidelines of the GEC 2015 Methodology.

The main source of replenishable ground water resources is recharge from rainfall, which contributes to nearly 60 % of the total annual ground water recharge. Bihar receives about 119.8 cm. of rain annually on average, with high spatial variation. Over 74% of the annual rainfall is received in the four rainy months for June to September only thereby leading to large variations on temporal scale. Districts like Kishanganj, Saharsa, Purnea and Araria in the north eastern part have 209 to 160 cm rainfall whereas districts in the south and south western part like Gaya, Banka, Nalanda, Aurangabad etc. have average rainfall of 100 to 97.5 cm.

Type of rock formations, their storage & transmission characteristics have a significant influence on ground water recharge. Porous formations such as the alluvial formations in the Indo-Ganga basin generally have high specific yields and are good repositories of ground water. Ground water occurrence in the fissured formations occupying nearly 10 percent of the geographical area of Bihar, on the other hand, is mostly limited to the weathered, jointed and fractured portions of the rocks.

In the present assessment, the total annual groundwater recharge in Bihar has been assessed as 34.14 bcm. Keeping an allocation for natural discharge, the annual extractable ground water resource has been assessed as 30.95 bcm. The annual groundwater extraction (as in 2024) is 14.09 bcm. The average stage of groundwater extraction for the state as a whole works out to be about 45.54 %. Out of the total 535 assessment units (534 Blocks and Patna Urban area) in the state, 4 units (0.7%) have been categorized as ‘Over-exploited’ indicating ground water extraction exceeding the annually replenishable ground water recharge. In 9 (1.68 %) assessment units, the stage of groundwater extraction is between 90-100% and have been categorized as ‘Critical’. There are 49 (9.15 %) “Semi-critical’’ assessment units, where the stage of ground water extraction is between 70 % and 90 % and 473 (88.41 %) ‘Safe’ assessment units, where the stage of Ground water extraction is less than 70 %.

Similarly, out of 90348.70 sq km recharge worthy area of the state, 440.99 sq km (0.48 %) are under 'Over-Exploited', 900.68 sq km (0.99 %) are under 'Critical', 6818.28 sq km (7.54 %) are under 'Semi-Critical' and 82188.75 sq km (90.64 %) are under 'Safe' category assessment units. Out of 30718.81 mcm of Total Annual Extractable Resources of the state, 283.46 mcm (0.92 %) are under 'Over-Exploited', 237.40 mcm (0.77 %) are under 'Critical', 2168.92 mcm (7.06 %) are under 'Semi-Critical' and 28029.03 mcm (91.24 %) are under 'Safe' category assessment units.

In comparison to 2023 assessment, the total number of assessment units in the state is same i.e. 535. The total annual ground water recharge has increased from 33.96 bcm to 34.14 bcm. The changes are attributed mainly to changes in recharge from 'Other Sources'. Accordingly, the annual extractable resource of GW Resource Assessment, 2024 on comparison with GW Resource Assessment, 2023 also shows an increase from 30.72 bcm to 30.95 bcm. The ground water extraction has marginally increased from 13.75 bcm to 14.09 bcm. The overall stage of groundwater extraction has marginally increased from 44.76 % to 45.54 %.

The over-exploited assessment units are mostly concentrated in the central part of the state and in south of river Ganga. In some parts of the state, good continuous rainfall and management practices like ground water augmentation and conservation measures through government various initiatives have resulted in improvement in ground water situation. Ground water resources assessment, like other fields of science, requires continuous refinements.

CHAPTER 1

1. INTRODUCTION

Water is a fundamental resource for life. Ground water has become an increasingly important natural resource catering to the fresh water requirements of various sectors in India. Sustainable development and efficient management of this scarce resource has become a challenge. Ground water has steadily emerged as the backbone of India's agriculture and drinking water security. Contribution of ground water is nearly 62% in irrigation, 85% in rural water supply and 50% in urban water supply. Ground water is an annually replenishable resource but its availability is non- uniform in space and time. Ground water available in the zone of water level fluctuation is replenished annually with rainfall being the dominant contributor. Hence, the sustainable utilization of ground water resources demands a realistic quantitative assessment of ground water availability in this zone based on reasonably valid scientific principles. National Water Policy, 2012 has laid emphasis on periodic assessment of ground water resources on scientific basis. The trends in water availability due to various factors including climate change must also be assessed and accounted for during water resources planning. To meet the increasing demands of water, it advocates direct use of rainfall, desalination and avoidance of inadvertent evapotranspiration for augmenting utilizable water resources. The National Water Policy 2012 also states that safe water for drinking and sanitation should be considered as pre-emptive needs followed by high priority allocation for other domestic needs (including needs of animals), achieving food security, supporting sustenance agriculture and minimum eco- system needs. Available water, after meeting the above needs should be allocated in a manner to promote its conservation and efficientuse.

1.1 PREVIOUS ASSESSMENTS

Assessmentof water resources of the country dates back to 1901 when the First Irrigation Commission assessed the Surface Water Resources as 144 million hectare meters (m ham) (NABARD, 2006). In 1949, Dr. A. N. Khosla, based on empirical formulae, estimated the total average annual runoff of all the river systems of India including both surface and ground water resources as 167 M.ham (CGWB, 1995). Since then attempts have been made from time to time by various Working Groups/ Committees/Task Forces constituted by Govt. of India to estimate the ground water resources of the country based on available data and in response to developmental needs. In 1976, National Commission of Agriculture assessed the total ground water resources of the country as 67 M.ham and the utilizable ground water as 35 M.ham, out of which 26 M.ham was considered available for irrigation (CGWB, 1995).

The first systematic methodology to assess the ground water resources of the country was evolved by Ground Water Over-Exploitation Committee in 1979. The committee was constituted by Agriculture Refinance and Development Corporation (ARDC) and was headed by Chairman, CGWB with Members from State Ground Water Organizations and Financial

Institutions. Based on the norms suggested by the committee, the country's Gross Ground Water Recharge was assessed as 47 M.ham and the Net Recharge as 32 M.ham (CGWB, 1995).

In 1982, Government of India constituted 'Ground Water Estimation Committee' (GEC) drawing Members from various States / Central organizations engaged in hydrogeological studies and groundwater development. The Committee submitted its recommendations in the year 1984 and suggested a methodology for assessment of dynamic groundwater resources, which is commonly referred to as GEC 1984. As per the recommendations of the GEC 1984, State Governments constituted Working Groups for assessment of ground water potential. The Working Groups were headed by Secretaries in-charge of Ground Water Developments and included Heads of Ground Water Departments, State Agriculture Departments, representatives from Agriculture Universities and NABARD as members. Director, CGWB was the convener of the group. The base year for the computation of the resource varied between 1991 and 1993 and a National report on Ground Water Resources of India was brought out in 1995 by compiling the data of all the States and Union Territories. As per the report, the Total Replenish able Ground Water in India was assessed as 432 billion cubic meter (bcm). The ground water resource available for irrigation purpose was about 361 bcm. The Net Ground Water Draft for Irrigation uses was about 115 bcm, thereby arriving at the level of ground water developmentas 32 %. Utilizable Irrigation Potential from ground water of the country was worked out to be 64 million hectare (CGWB, 1995).

Increasing thrust on ground water and improved techniques for data acquisition led the Government of India to form another Committee in 1995 to review the existing methodology for ground water resource assessment and to suggest revisions, if necessary. The Committee submitted its report in 1997 wherein a revised and elaborate methodology for resource assessment was suggested, which was referred as GEC 1997. In view of the limitations of ground water assessment in hard rock terrain, another Committee on Ground Water Estimation Methodology in Hard Rock Terrain was formed in 2001 to review the existing methodology for resource estimation in such formations. The Committee made certain suggestions on the criteria for categorization of blocks to be adopted for the entire country irrespective of the terrain conditions. Based on GEC 1997, the dynamic ground water resources of India have been estimated for the entire country considering 2004, 2009, 2011 and 2013 as base years. The methodology underwent comprehensive revisions again in 2015 and a revised methodology, namely GEC 2015 methodology has been prescribed for ground water assessment. This methodology is being followed for assessment carried out from 2017 onwards.

In the present assessment, the total annual groundwater recharge in the Bihar has been assessed as 34.14 bcm. Keeping an allocation for natural discharge, the annual extractable ground water resource has been assessed as 30.95 bcm. The annual groundwater extraction (as in 2024) is 14.09 bcm. The average stage of groundwater extraction for the state of Bihar as a whole works out to be about 45.54 %. Out of the total 535 assessment units (Blocks) in the state, 4 units (0.75%) have been categorized as 'Over-exploited' indicating ground water extraction exceeding the annually replenishable ground water recharge. In, 9(1.68 %) assessment units the stage of groundwater extraction is between 90-100 % and have been

categorized as ‘Critical’. There are 49 (9.15 %) “Semi-critical’’ units, where the stage of ground water extraction is between 70 % and 90 % and 473 (88.41 %) ‘Safe ‘units, where the stage of Ground water extraction is less than 70 %. Salient details of status of ground water resources and categorization of assessment units in 2004, 2009, 2011, 2013, 2017, 2020, 2022, 2023 and 2024 are shown in ***Table-1, Table-2 and Figure-1*** respectively.

Table 1: Ground water Resources assessment 2004 to 2024

S. No.	Ground Water Resources Assessment	2004	2009	2011	2013	2017	2020	2022	2023	2024
1	Annual Ground Water Recharge (bcm)	29.19	28.63	29.33	31.31	31.41	28.05	33.14	33.96	34.15
2	Annual Extractable Ground Water Resource (bcm)	27.42	26.21	26.87	28.49	28.99	25.46	30.04	30.72	30.96
3	Annual Ground Water Extraction for Irrigation, Domestic & Industrial uses(bcm)	10.77	11.35	11.89	12.73	13.26	13.02	13.50	13.75	14.10
4	Stage of Ground Water Extraction (%)	39.26	43.33	44.26	44.69	45.76	51.14	44.94	44.76	51.14

Table 2: Categorization of assessment units from 2004 to 2024

		2004		2009		2011		2013		2017		2020		2022		2023		2024	
S. No.	Categorization of Assessment Units	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	Total Assessed units	515		533		533		533		534		534		535		535		535	
2	Safe	515	100	529	99.25	522	97.94	519	97.37	432	80.90	471	88.2	469	87.66	467	87.29	473	88.41
3	Semi-critical	0	0	4	0.75	11	2.06	14	2.63	72	13.48	51	9.55	46	8.60	53	9.90	49	9.16
4	Critical	0	0	0	0	0	0	0	0	18	3.37	5	0.94	12	2.24	7	1.31	9	1.68
5	Over-Exploited	0	0	0	0	0	0	0	0	12	2.25	7	1.31	8	1.50	8	1.50	4	0.75

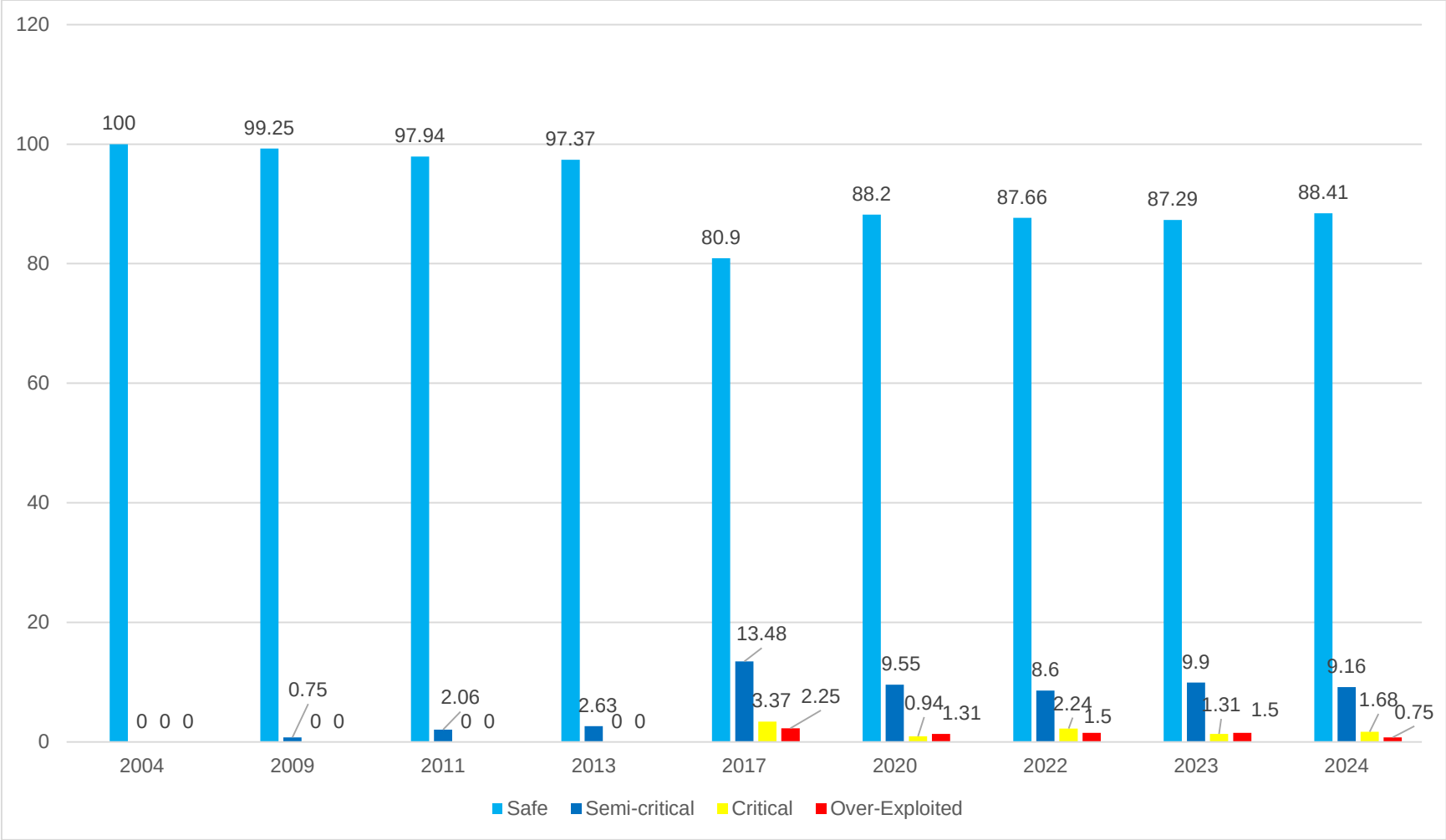

Figure 1: Illustration depicting % of Total Assessment units under different categories from 2004-2024

1.2 GROUND WATER ASSESSMENT AND MANAGEMENT INITIATIVES

The inferences drawn from the ground water resources assessment is utilized as an input to the planners and stakeholders for taking appropriate management measures for optimal utilization and sustainable development of the ground water resources. Several measures, primarily based on the findings of the resource assessment, have been taken up by the Government of India to replenish/augment ground water resources.

Initiatives by the Government of India in this regard includes constitution of Central Ground Water Authority for regulation of ground water development in the country and compilation of a conceptual document titled "Master Plan for Artificial Recharge to Ground water in India" by CGWB, whichenvisages implementation of nearly 11 million Rain Water Harvesting and Artificial Recharge structures to augment the ground water resources of the country. Ministry of Jal Shakti has also circulated a Model Bill to all States/UTs to enable them to enact suitable legislation for regulation of ground water development, which includes provision of rainwater harvesting. CGWB has taken up National Aquifer Mapping & Management Programme (NAQUIM), for mapping of major aquifers, their characterization and formulation of Aquifer Management Plans to ensure sustainability of the resources, prioritising Over-exploited, Critical and Semi-critical assessment units. Several State Governments are implementing watershed development programmes, in which, ground water conservation forms an integral part. Water conservation measures are also taken up as a part of the MGNREGA. Ministry of Jal Shakti has launched 'Jal Shakti Abhiyan', aimed at consolidating water conservation and management initiatives in the country through a holistic and integrated approach involving all stakeholders. Atal Bhujal Yojana implemented from April 2020, envisages improving ground water management in identified water-stressed areas in parts of seven states in the country with emphasis on demand management and community participation. In addition, schemes of the Government of India such as Pradhan Mantri Krishi Sinchai Yojana (PMKSY) - Har Khet Ko Pani (HKKP) - Ground Water Irrigation (GWI) envisages creation of irrigation potential from groundwater in assessment units where there is sufficient scope for further future ground water development. In furtherance of the imperative for water conservation and the astute stewardship of water resources, the Ministry of Jal Shakti, Government of India, embarked on the Jal Shakti Abhiyan in 2019. This initiative is characterized by the expeditious execution of five discerning interventions: water conservation and the harnessing of rainwater, revitalization of traditional and contemporary aquatic ecosystems, the recycling and replenishment of water, watershed development, and the deliberate augmentation of afforestation efforts. This ambitious undertaking was initially launched across 1,592 blocks, in 256 water-stressed districts across the nation. Subsequently, this pivotal campaign has been extended and reinforced during the years 2022, 2023 and 2024 accentuating the government's unwavering commitment to addressing the critical issues surrounding water conservation and resource management.

Bihar Government has its own flagship programme called **Jal Jeewan Hariyali Mission (JJHM)** which is an ambitious multi stakeholder programme with the objective of climate sustenance, conservation, and rejuvenation of water bodies and to keep water pollution free, maintaining level of Ground water, ensuring adequate water availability, climate resilient agriculture, energy conservation etc. and promoting climate awareness among the masses. The

Jal Jeewan Hariyali Mission is being implemented in coordination with various departments and the Rural Development Department has been designated as the Nodal Department.

Jal Jeewan Hariyali Mission has been established to kick off time bound and mission mode accelerated implementation of 11 target interventions that involves identification and rejuvenation of all public conventional water storage structures, construction of check dams and other water harvesting structures in small rivers / drains and water storage in the hilly area, Creation of new water sources and taking/delivering of water from the surplus river area to water deficit areas, Construction of Rain Water Harvesting Structures in the buildings, Creation of nurseries and dense plantation of trees, Promoting the usage of Alternative Cropping, Drip Irrigation, Organic Farming and other new techniques along with the Promotion of the usage of solar energy and encouraging conservation of energy.

1.3 ASSESSMENT OF GROUND WATER RESOURCES, 2024

Ministry of Jal Shakti, Departmentof Water Resources, River Development & Ganga Rejuvenation, constituted a permanent Central Level Expert Group (CLEG) for over-all supervision of the re-assessment of ground water resources in the entire country as in 2024. The terms of reference of the committee include supervision of assessment of annual replenishable ground water resources and the status of utilization for reference year 2024 onwards.

On the same line Permanent State Level Committee for Assessment of dynamic ground water resources of Bihar was constituted vide MWR-(Mon.)-988 dated 12-09-2022 under the chairmanship of The Additional Chief Secretary, Minor Water Resources Department, Government of Bihar and The Regional Director, Central Ground Water Board, Mid-Eastern Region, Patna as Member Secretary along with other line departments. A copy of the order is in **Appendix A**.

The assessment carried out was approved by the State Level Committee (**Appendix B**). Based on the assessments approved by the State Level Committees and joint assessment made in the State, the Report titled “Dynamic Ground Water Resources of Bihar-2024” has been compiled. The report provides summary and analysis of ground water resources in Bihar. The report was reviewed and deliberated upon during the meeting of Permanent SLC held on 18.09.2024 and was approved as mentioned in **Appendix C.**

Appendix A

GOVERNMENT OF BIHAR
MINOR WATER RESOURECES DEPARTMENT

ORDER

No:- MWR-(Mon.)- Patna, dated: -

Sub:- **Constitution of Permanent State Level Committee (SLC) for yearly re-estimation of ground water resources of Bihar.**

Presently the assessment of annual replenishable ground water resources of Bihar has been done periodically as per methodology suggested by Ground Water Resources Estimation Committee (GEC)-2015. This exercise comprising of assessment of annual ground water recharge, extractable ground water resources, ground water extraction for irrigation, domestic and Industrial uses etc. was last carried out in March-22.

It has now been suggested by Central Ground Water Board to constitute a State level committee on permanent basis for all future periodic reassessment of ground water.

In view of the above following State Level Committee is constituted to coordinate and guide all future assessment of Ground Water Resources of Bihar.

1. **Composition:-**

1) Additional Chief Secretary, Minor Water Resources Department, Govt. of Bihar. - Chairman
2) Secretary, Public Health Engineering Department, Govt. of Bihar. - Member
3) Secretary, Agriculture Department, Govt. of Bihar. - Member
4) Director, Panchayati Raj Department, Govt. of Bihar. - Member
5) Director, Industry, Govt. of Bihar - Member
6) Engineer-in-Chief, Water Resources Department, Govt. of Bihar - Member
7) Chief Engineer, (PMG), Minor Water Resources Department, Bihar - Member
8) General Manager, NABARD, Patna - Member
9) Regional Director, Central Ground Water Board, Patna. - Member Secretary
10) Representative of V.C, Rajendra Agriculture University Pusa. - Member

The Committee may Co-opt any other members, if necessary.

2. **Terms of Reference:-**

i) To re-assess annual ground water recharge of Bihar in accordance with the Ground Water Resources Estimation Methodology-2015

ii) To estimate the status of utilization of the annual extractable ground water resource.

3. **Time Frame:-**

The committee will submit its report on defined time.

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4. Expenditure:-

Expenditure on account of TA/DA to official members of the Committee will be met from the source from which they draw their salaries and that of non official members will be borne by the Minor Water Resources Department, Bihar.

The order will be implemented from the date of issue.

Sd.\-
Additional Chief Secretary,
Minor Water Resources Department,
Bihar, Patna.

Memo No:- 988 (MO) /Patna, dated:- 12.9.2022

Copy to all members of the State Level Estimation Committee for information & necessary action.

Superintending Engineer (HQ),
Monitoring,
Minor Water Resources Department,
Bihar, Patna.

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Appendix B

Draft

Minutes of meeting: 1st State Level Committee (SLC) held on 12.06.2024 in the Chamber of Principal Secretary, Minor Water Resources Department, Govt. of Bihar

1st Meeting of State Level Committee (SLC) was held on 12.06.2024 at 16:00 hrs. under the Chairmanship of Permanent SLC and Principal Secretary, Shri Santosh Kumar Mall, IAS, Minor Water Resources Department, Government of Bihar for Ground Water Resources Assessment of Bihar (as on 31st March 2024). The list of participants is given in Annexure I.

The meeting started with welcome address by Shri Rajeev Ranjan Shukla, Regional Director, CGWB, MER, Patna and Member Secretary of the Permanent SLC. After the permission of the Chairman of Committee, a brief presentation on background, methodology, data requirement, time line and software used for Ground Water Resource Assessment 2024 was made by Shri Alok Kumar Sinha, Scientist-D, CGWB, MER, Patna.

Following points were discussed and decided during the presentation.

1. Ground Water Resource Assessment 2024 will be assessed for 535 assessment units (534 blocks + Patna Urban Area).
2. 6th Minor Irrigation Census data (2016-17) will be projected to current year and will be used for computation of irrigation draft.
3. Rural and Urban projected population with 2% increment of 2011 Census data and will be used to ascertain Domestic draft with 70 lpcd for rural population and 135 lpcd for urban population.
4. Recharge from streams/rivers will be computed subject to data availability from Water Resources Department, Government of Bihar.
5. Principal Secretary, MWRD and chairman of permanent SLC has agreed for nomination of two officers from MWRD side for Ground Water Resource Assessment 2024.
6. Chairman of the Permanent SLC has advised CGWB that a letter may be written from MWRD side to different departments for submission of required data at the earliest.
7. During the meeting, discussion was also made on the start of NOCs for ground water withdrawal related work by Bihar State Ground Water Authority.

The meeting ended with a vote of thanks to the Chair.

Annexure-I

List of Participants

In the Chairmanship of Shri Santosh Kumar Mall, IAS, Minor Water Resources Department, Government of Bihar

S. No.	Name (Shri)	Designation	Department
1	Rajeev Ranjan Shukla	Regional Director	Central Ground Water Board, MER, Patna
2	David Kr. Chaturvedi	Superintending Engineer	Public Health Engineering Department
3	Sudama Mahto	Director	Directorate of Soil Conservation, Department of Agriculture
4	Dr. Ravish Chandra	Associate Professor	RPCAU, Pusa
5	Abhishek Kumar	Assistant Director	Department of Industries
6	Abhisek Ranjan	Executive Engineer	Panchayati Raj Department
7	Pooja Yadav	Manager	NABARD
8	Shashi Shekar Mandal	D.D (A.E)	Directorate of Soil Conservation, Department of Agriculture
9	Alok Kumar Sinha	Scientist-D	Central Ground Water Board, MER, Patna
10	Pankaj Kumar	Scientist-D	Central Ground Water Board, MER, Patna
11	Vishal Srivastava	Scientist-B	Central Ground Water Board, MER, Patna
12	Imam Hasan	Scientist-B	Central Ground Water Board, MER, Patna
13	Rajesh Kumar	Superintending Engineer	Minor Water Resource Department
14	R. K. Mandal	Executive Engineer	Minor Water Resource Department

Appendix C

बिहार सरकार,
लघु जल संसाधन विभाग,
(मुख्यालय अनुश्रवण)

सचिका सं०–लo सि० मो०–SGWCC-10/2017 – 1331 (मो) /पटना, दिनांक–07.10.2024

प्रेषक,

ई० माधव कुमार पंडित,
अधीक्षण अभियंता,
मुख्यालय अनुश्रवण,
लघु जल संसाधन विभाग, पटना।

सेवा में,

क्षेत्रीय निदेशक,
केन्द्रीय भूगर्भ जल पर्षद, पटना।

विषय:– **Dynamic Ground Water Resources of Bihar 2024** का अनुमोदित प्रारूप के संबंध में।

महाशय,

निदेशानुसार उपर्युक्त विषयक के संबंध में Dynamic Ground Water Resources of Bihar 2024 का अनुमोदित प्रारूप आवश्यक कार्रवाई हेतु उपलब्ध कराया जाता है।

अनु०:–यथावत्।

विश्वासभाजन,
7.10.24

अधीक्षण अभियंता,
मुख्यालय अनुश्रवण,
लघु जल संसाधन विभाग, पटना।

ज्ञापांक:– 1331 (मो) /पटना, दिनांक:–07.10.2024

प्रतिलिपि:– सचिव, लघु जल संसाधन विभाग, बिहार, पटना के आप्त सचिव को सूचनार्थ प्रेषित।

7.10.24

अधीक्षण अभियंता,
मुख्यालय अनुश्रवण,
लघु जल संसाधन विभाग, पटना।

CHAPTER 2

2. GROUND WATER RESOURCE ESTIMATION METHODOLOGY

Ground water resource as in 2024 have been estimated following the guidelines mentioned in the GEC 2015 methodology using appropriate assumptions depending on data availability. The principal attributes of GEC 2015 methodology are given below:

It is also important to add that as it is advisable to restrict the groundwater development as far as possible to annual replenishable resources, the categorization also considers the relation between the annual replenishment and groundwater development. An area devoid of ground water potential may not be considered for development and may remain safe whereas an area with good groundwater potential may be developed and may become over exploited over a period. Thus, water augmentation efforts can be successful in such areas, where the groundwater potential is high and there is scope for augmentation.

2.1 GROUND WATER ASSESSMENT OF UNCONFINED AQUIFER

Though the assessment of ground water resources includes assessment of dynamic and in-storage resources, the development planning should mainly focus on dynamic resource as it gets replenished on an annual basis. Changes in static or in-storage resources normally reflect long-term impacts of ground water mining. Such resources may not be replenishable annually and may be allowed to be extracted only during exigencies with proper planning for augmentation in the succeeding excess rainfall years.

2.1.1 Assessment of Annually Replenishable or Dynamic Ground Water Resources

The methodology for ground water resources estimation is based on the principle of water balance as given below –

$$\boldsymbol{Inflow - Outflow = Change\ in\ Storage(of\ an\ aquifer)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{1})$$

Equation (1) can be further elaborated as –

$$\boldsymbol{\Delta S = R_{RF} + R_{STR} + R_C + R_{SWI} + R_{GWI} + R_{TP} + R_{WCS} \pm VF \pm LF - GE - T - E - B} \ldots\ldots\ldots (\mathbf{2})$$

Where,

- ΔS - Change is storage
- R_{RF} - Rainfall recharge
- R_{STR} - Recharge from stream channels
- R_C - Recharge from canals
- R_{SWI} - Recharge from surface water irrigation
- R_{GWI} - Recharge from ground water irrigation
- R_{TP} - Recharge from Tanks & Ponds
- R_{WCS} - Recharge from water conservation structures
- VF - Vertical flow across the aquifer system
- LF - Lateral flow along the aquifer system (through flow)
- GE - Ground Water Extraction

T - Transpiration
E - Evaporation
B - Base flow

Due to lack of data for all the components in most of the assessment units, at present the water budget has been assessed based on major components only, taking into consideration certain reasonable assumptions. The estimation has been carried out using lumped parameter estimation approach keeping in mind that data from many more sources if available may be used for refining the assessment.

2.1.1.1 Rainfall Recharge

Ground water recharge has been estimated on ground water level fluctuation and specific yield approach since this method considers the response of ground water levels to ground water input and output components. In units or subareas where adequate data on ground water level fluctuations are not available, ground water recharge is estimated using rainfall infiltration factor method only. The rainfall recharge during non-monsoon season has been estimated using rainfall infiltration factor method only.

2.1.1.1.1. Ground Water Level Fluctuation Method

The ground water level fluctuation method is used for assessment of rainfall recharge in the monsoon season. The ground water balance equation in non-command areas is given by

$$\Delta \boldsymbol{S} = \boldsymbol{R_{RF}} + \boldsymbol{R_{STR}} + \boldsymbol{R_{SWI}} + \boldsymbol{R_{GWI}} + \boldsymbol{R_{TP}} + \boldsymbol{R_{WCS}} \pm \boldsymbol{VF} \pm \boldsymbol{LF} - \boldsymbol{GE} - \boldsymbol{T} - \boldsymbol{E} - \boldsymbol{B} \dots\dots\dots\dots\dots\dots\dots..(\boldsymbol{3})$$

Where,

ΔS - Change is storage
R_{RF} - Rainfall recharge
R_{STR} - Recharge from stream channels
R_{SWI} - Recharge from surface water irrigation
R_{GWI} - Recharge from ground water irrigation
R_{TP} - Recharge from Tanks& Ponds
R_{WCS} - Recharge from water conservation structures
VF - Vertical flow across the aquifer system
LF - Lateral flow along the aquifer system (through flow)
GE - Ground water extraction
T - Transpiration
E - Evaporation
B - Base flow

Whereas the water balance equation in command area have another term i.e., Recharge due to canals (R_C) and the equation is as follows:

$$\Delta \boldsymbol{S} = \boldsymbol{R_{RF}} + \boldsymbol{R_{STR}} + \boldsymbol{R_C} + \boldsymbol{R_{SWI}} + \boldsymbol{R_{GWI}} + \boldsymbol{R_{TP}} + \boldsymbol{R_{WCS}} \pm \boldsymbol{VF} \pm \boldsymbol{LF} - \boldsymbol{GE} - \boldsymbol{T} - \boldsymbol{E} - \boldsymbol{B} \dots\dots\dots\dots...(\boldsymbol{4})$$

The change in storage has been estimated using the following equation:

$$\Delta \boldsymbol{S} = \Delta \boldsymbol{h} \times \boldsymbol{A} \times \boldsymbol{S_Y} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.\dots\dots\dots\dots\dots\dots\dots..(\boldsymbol{5})$$

Where,

ΔS - Change is storage
Δh - rise in water level in the monsoon season
A - Area for computation of recharge
S_Y - Specific Yield

Substituting the expression in equation (5) for storage increase ΔS in terms of water level fluctuation and specific yield, the equations (3) & (4) becomes (6) & (7) for non-command and command sub-units,

$$\boldsymbol{R_{RF} = \Delta h \times A \times S_Y - R_{STR} - R_{SWI} - R_{GWI} - R_{TP} - R_{WCS} \pm VF \pm LF + GE + T + E + B} \ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{6})$$

$$\boldsymbol{R_{RF} = \Delta h \times A \times S_Y - R_{STR} - R_C - R_{SWI} - R_{GWI} - R_{TP} - R_{WCS} \pm VF \pm LF + GE + T + E + B} \ldots\ldots\ldots\ldots (\mathbf{7})$$

Where base flow/ recharge to/from streams have not been estimated, the same is assumed to be zero. The rainfall recharge obtained by using equation (6) and (7) provides the recharge in any particular monsoon season for the associated monsoon season rainfall. This estimate has been normalized for the normal monsoon season rainfall as per the procedure indicated below.

Normalization of Rainfall Recharge

Let R_i be the rainfall recharge and r_i be the associated rainfall. The subscript "i" takes values 1 to N where N is the number of years for which data is available. This should be at least 5. The rainfall recharge, R_i is obtained as per equation (6) & equation (7) depending on the sub-unit for which the normalization is being done.

After the pairs of data on R_i and r_i have been obtained as described above, a normalisation procedure is carried out for obtaining the rainfall recharge corresponding to the normal monsoon season rainfall. Let r(normal) be the normal monsoon season rainfall obtained as the average of recent 30 to 50 years of monsoon season rainfall. Two methods are possible for the normalisation procedure. The first method is based on a linear relationship between recharge and rainfall of the form

$$\boldsymbol{R = ar} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{8})$$

Where,

R = Rainfall recharge during monsoon season
r = Monsoon season rainfall
a = a constant

The computational procedure is followed in the first method is as given below:

$$\boldsymbol{R_{RF}(normal) = \frac{\sum_{i=1}^{N}\left[R_i \frac{r(normal)}{r_i}\right]}{N}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{9})$$

Where,

R_{RF}(normal) - Normalized Rainfall Recharge in the monsoon season
R_i- Rainfall Recharge in the monsoon season for the i^{th}year
r(normal) - Normal monsoon season rainfall
r_i- Rainfall in the monsoon season for the i^{th} year
N - No. of years for which data is available

The second method is also based on a linear relation between recharge and rainfall. However, this linear relationship is of the form,

$$\boldsymbol{R_{RF}(normal) = a \times r(normal) + b} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{10})$$

Where,

R_{RF}(normal) - Normalized Rainfall Recharge in the monsoon season
r(normal) - Normal monsoon season rainfall

a and b - Constants.

The two constants 'a' and 'b' in the above equation are obtained through a linear regression analysis. The computational procedure has been followed in the second method is as given below:

$$\boldsymbol{a} = \frac{\boldsymbol{NS_4 - S_1S_2}}{\boldsymbol{NS_3 - S_1^2}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{11})$$

$$\boldsymbol{b} = \frac{\boldsymbol{S_2 - aS_1}}{\boldsymbol{N}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (\mathbf{12})$$

Where,

$$\boldsymbol{S_1} = \sum_{i=1}^{N} \boldsymbol{r_i} \;,\quad \boldsymbol{S_2} = \sum_{i=1}^{N} \boldsymbol{R_i} \;,\quad \boldsymbol{S_3} = \sum_{i=1}^{N} \boldsymbol{r_i^2} \;,\quad \boldsymbol{S_4} = \sum_{i=1}^{N} \boldsymbol{R_i r_i}$$

2.1.1.1.2.Rainfall Infiltration Factor Method

The rainfall recharge estimation based on Water level fluctuation method reflects actual field conditions since it takes into account the response of ground water level. However the ground water extraction estimation included in the computation of rainfall recharge using water level fluctuation approach is often subject to uncertainties. Therefore, the rainfall recharge obtained from water level fluctuation approach has been compared with that estimated using rainfall infiltration factor method. Recharge from rainfall is estimated by using the following relationship –

$$\boldsymbol{R_{RF}} = \boldsymbol{RFIF} \times \boldsymbol{A} \times \frac{\boldsymbol{(R - a)}}{\mathbf{1000}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. (\mathbf{13})$$

Where,

R_{RF} - Rainfall recharge in ham

A - Area in hectares

RFIF - Rainfall Infiltration Factor

R- Rainfall in mm

a - Minimum threshold value above which rainfall induces ground water recharge in mm

The threshold limit of minimum and maximum rainfall event which can induce recharge to the aquifer is considered while estimating ground water recharge using rainfall infiltration factor method. The minimum threshold limit is in accordance with the relation shown in equation (13) and the maximum threshold limit is based on the premise that after a certain limit, the rate of storm rain is too high to contribute to infiltration and they will only contribute to surface runoff. Thus, 10% of Normal annual rainfall has been taken as minimum rainfall threshold and 3000 mm as maximum rainfall limit. While computing the rainfall recharge, 10% of the normal annual rainfall has been deducted from the monsoon rainfall and balance rainfall is considered for computation of rainfall recharge. The same recharge factor is used for both monsoon and non-monsoon rainfall, with the condition that the recharge due to non-monsoon rainfall is taken as zero, if the normal rainfall during the non-monsoon season is less than 10% of normal annual rainfall. In using the method based on the specified norms, recharge due to both monsoon and non-monsoon rainfall has been estimated for normal rainfall, based on recent 30 to 50 years of data.

2.1.1.1.3.Percent Deviation

After computing the rainfall recharge for normal monsoon season rainfall using the ground water level fluctuation method and rainfall infiltration factor method these two estimates is compared

with each other. A term, Percent Deviation (PD) which is the difference between the two expressed as a percentage of the later is computed as

$$\boldsymbol{PD = \frac{R_{RF}(normal, wtfm) - R_{RF}(normal, rifm)}{R_{RF}(normal, rifm)} \times 100} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{14})$$

Where,

R_{RF} (normal, wlfm) = Rainfall recharge for normal monsoon season rainfall estimated by the ground water level fluctuation method

R_{RF} (normal, rifm) = Rainfall recharge for normal monsoon season rainfall estimated by the rainfall infiltration factor method

The rainfall recharge for normal monsoon season rainfall is finally adopted as per the criteria given below:

- If PD is greater than or equal to -20%, and less than or equal to +20%, R_{RF} (normal) is taken as the value estimated by the ground water level fluctuation method.
- If PD is less than -20%, R_{RF} (normal) is taken as equal to 0.8 times the value estimated by the rainfall infiltration factor method.
- If PD is greater than +20%, R_{RF} (normal) is taken as equal to 1.2 times the value estimated by the rainfall infiltration factor method.

2.1.1.2 Recharge from Other Sources

Recharge from other sources constitutes recharges from canals, surface water irrigation, ground water irrigation, tanks & ponds and water conservation structures in command areas where as in non-command areas it constitutes the recharge due to surface water irrigation, ground water irrigation, tanks & ponds and water conservation structures. The methods of estimation of recharge from different sources are used in the assessment as follows.

Sl. No.	Source	Estimation Formula	Parameters
1	Recharge from Canals	$R_C = WA \times SF \times Days$	R_C = Recharge from Canals WA = Wetted Area SF = Seepage Factor Days = Number of Canal Running Days
2	Recharge from Surface Water Irrigation	$R_{SWI} = AD \times Days \times RFF$	R_{SWI} = Recharge due to applied surface water irrigation AD = Average Discharge Days = Number of days water is discharged to the Fields RFF = Return Flow Factor
3	Recharge from Ground Water Irrigation	$R_{GWI} = GE_{IRR} \times RFF$	R_{GWI} = Recharge due to applied ground water irrigation GE_{IRR} = Ground Water Extraction for Irrigation RFF = Return Flow Factor

Sl. No.	Source	Estimation Formula	Parameters
4	Recharge due to Tanks & Ponds	$R_{TP} = AWSA \times N \times RF$	R_{TP} = Recharge due to Tanks & Ponds AWSA = Average Water Spread Area N = Number of days Water is available in the Tank/Pond RF = Recharge Factor
5	Recharge due to Water Conservation Structures	$R_{WCS} = GS \times RF$	RWCS = Recharge due to Water Conservation Structures GS = Gross Storage = Storage Capacity multiplied by number of fillings. RF = Recharge Factor

2.1.1.3 Evaporation and Transpiration

Evaporation is estimated for the aquifer in the assessment unit if water levels in the aquifer are within the capillary zone. For areas with water levels within 1.0mbgl, evaporation is estimated using the evaporation rates available for other adjoining areas. If depth to water level is more than 1.0mbgl, the evaporation losses from the aquifer is taken as zero.

Transpiration through vegetation has been estimated if water levels in the aquifer are within the maximum root zone of the local vegetation. If water levels are within 3.5mbgl, transpiration is estimated using the transpiration rates available for other areas. If it is greater than3.5m bgl, the transpiration has been taken as zero.

2.1.1.2. Recharge During Monsoon Season

The sum of normalized monsoon rainfall recharge and the recharge from other sources and lateral and vertical flows into & out of the sub unit and stream inflows & outflows during monsoon season is the total recharge/ accumulation during monsoon season for the sub unit. Similarly, this is to be computed for all the sub units available in the assessment unit.

2.1.1.3. Recharge During Non-Monsoon Season

The rainfall recharge during non-monsoon season is estimated using rainfall infiltration factor Method only when the non-monsoon season rainfall is more than 10% of normal annual rainfall. The sum of non-monsoon rainfall recharge and the recharge from other sources and lateral and vertical flows into & out of the sub unit and stream inflows & outflows during non-monsoon season is the total recharge/ accumulation during non-monsoon season for the sub unit. Similarly, this is to be computed for all the sub units available in the assessment unit.

2.1.1.4 Total Annual Ground Water Recharge

The sum of the recharge/ accumulations during monsoon and non-monsoon seasons is the total annual ground water recharge/ accumulations for the sub unit. Similarly, this is computed for all the sub units available in the assessment unit.

2.1.1.5 Annual Extractable Ground Water Resource (EGR)

The Annual Extractable Ground Water Resource (EGR) is computed by deducting the Total Annual Natural Discharge from Total Annual Ground Water Recharge.

In the water level fluctuation method, a significant portion of base flow is already accounted for by taking the post monsoon water level one month after the end of rainfall. The base flow in the remaining non-monsoon period is likely to be small, especially in hard rock areas. In the assessment units, where river stage data are not available and neither the detailed data for

quantitative assessment of the natural discharge are available, allocation of unaccountable natural discharges to 5% or 10% of annual recharge is considered. If the rainfall recharge is assessed using water level fluctuation method this has been taken 5% of the annual recharge and if it is assessed using rainfall infiltration factor method, 10% of the annual recharge is considered. The balance is account for Annual Extractable Ground Water Resources (EGR).

2.1.1.6 Estimation of Ground Water Extraction

Ground water draft or extraction is assessed as follows.

$$GE_{ALL} = GE_{IRR} + GE_{DOM} + GE_{IND} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (15)$$

Where,

GE_{ALL} = Ground water extraction for all uses
GE_{IRR} = Ground water extraction for irrigation
GE_{DOM} = Ground water extraction for domestic uses
GE_{IND} = Ground water extraction for industrial uses

2.1.1.7.1Ground Water Extraction for Irrigation (GE_{IRR})

The methods for estimation of ground water extraction are as follows.

***Unit Draft Method:* –** In this method, season-wise unit draft of each type of well in an assessment unit is estimated. The unit draft of different types (eg. Dug well, Dug cum bore well, shallow tube well, deep tube well, bore well etc.) is multiplied with the number of wells of that particular type to obtain season-wise ground water extraction by that particular structure.

***Crop Water Requirement Method:* –** For each crop, the season-wise net irrigation water requirement is determined. This is then multiplied with the area irrigated by ground water abstraction structures. The database on crop area is obtained from Revenue records in Tehsil office, Agriculture Census and also by using Remote Sensing techniques.

***Power Consumption Method:* –**Ground water extraction for unit power consumption (electric) is determined. Extraction per unit power consumption is then multiplied with number of units of power consumed for agricultural pump sets to obtain total ground water extraction for irrigation.

2.1.1.7.2 Ground Water Extraction for Domestic Use (GE_{DOM})

There are several methods for estimation of extraction for domestic use(GEDOM). Some of the commonly adopted methods are described here.

***Unit Draft Method:* –** In this method, unit draft of each type of well is multiplied by the number of wells used for domestic purpose to obtain the domestic ground water extraction.

***Consumptive Use Method:* –** In this method, population is multiplied with per capita consumption usually expressed in litre per capita per day (lpcd). It can be expressed using following equation.

$$GE_{DOM} = Population \times Consumptive\ Requirement \times L_g \dots\dots\dots\dots\dots\dots\dots\dots\dots (16)$$

Where,

L_g = Fractional Load on Ground Water for Domestic Water Supply.

The Load on Ground water can be obtained from the Information based on Civic water supply agencies in urban areas.

2.1.1.7.3 Ground Water Extraction for Industrial Use (GE_{IND})

The commonly adopted methods for estimating the extraction for industrial use are as below:

Unit Draft Method: - In this method, unit draft of each type of well is multiplied by the number of wells used for industrial purpose to obtain the industrial ground water extraction.

***Consumptive Use Pattern Method:* –** In this method, water consumption of different industrial units is determined. Numbers of Industrial units which are dependent on ground water are multiplied with unit water consumption to obtain ground water extraction for industrial use.

$$GE_{IND} = Number\ of\ Industrial\ Units \times Unit\ Water\ Consumption \times L_g \ldots\ldots\ldots\ldots\ldots\ldots\ldots (17)$$

Where,

L_g = Fractional load on ground water for industrial water supply.

The load on ground water for industrial water supply can be obtained from water supply agencies in the Industrial belt.

Ground water extraction obtained from different methods need to be compared and based on field checks, the seemingly best value may be adopted. At times, ground water extraction obtained by different methods may vary widely. In such cases, the value matching the field situation should be considered. The storage depletion during a season, where other recharges are negligible can be taken as ground water extraction during that particular period.

2.1.1.7 Stage of Ground Water Extraction

The stage of ground water extraction is defined by,

$$Stage\ of\ GW\ Extraction = \frac{Existing\ Gross\ GW\ Extraction\ for\ all\ Uses}{Annual\ Extractable\ GW\ Resources} \times 100 \ldots\ldots\ldots\ldots\ldots (18)$$

The existing gross ground water extraction for all uses refers to the total of existing gross ground water extraction for irrigation and all other purposes. The stage of ground water extraction should be obtained separately for command areas, non-command areas and poor ground water quality areas.

2.1.1.8 Validation of Stage of Ground Water Extraction

The assessment based on the stage of ground water extraction has inherent uncertainties. In view of this, it is desirable to validate the 'Stage of Ground Water Extraction' with long term trend of ground water levels.

Long term Water Level trends are prepared for a minimum period of 10 years for both pre-monsoon and post-monsoon period. If the ground water resource assessment and the trend of long term water levels contradict each other, this anomalous situation requires a review of the ground water resource computation, as well as the reliability of water level data. The mismatch conditions are enumerated below.

SOGWE	Ground Water Level Trend	Remarks
≤ 70%	Significant decline in trend in both pre-monsoon and post-monsoon	Not acceptable and needs reassessment
> 100%	No significant decline in both pre-monsoon and post-monsoon long term trend	Not acceptable and needs reassessment

2.1.1.9 Categorisation of Assessment Unit

2.1.1.9.1 Categorisation of Assessment Unit Based on Quantity

The categorisation based on status of ground water quantity is defined by Stage of Ground Water Extraction as given below:

Stage of Ground Water Extraction	Category
≤ 70%	Safe
> 70% and ≤90%	Semi-critical
> 90% and ≤100%	Critical
> 100%	Over Exploited

2.1.1.9.2 Categorisation of Assessment Unit Based on Quality

As it is not possible to categorize the assessment units in terms of the extent of quality hazard, based on the available water quality monitoring mechanism and database on ground water quality, the Committee recommends that each assessment unit, in addition to the Quantity based categorization (safe, semi-critical, critical and over-exploited) should bear a quality hazard identifier. If any of the three quality hazards in terms of Arsenic, Fluoride and Salinity are encountered in the assessment sub unit in mappable units, the assessment sub unit has been tagged with the particular Quality hazard.

2.1.1.10 Allocation of Ground Water Resource for Utilisation

The Annual Extractable Ground Water Resources are to be apportioned between domestic, industrial and irrigation uses. Among these, as per the National Water Policy, requirement for domestic water supply is to be accorded priority. This requirement based on population has been projected to the year 2025, per capita requirement of water for domestic use, and relative load on ground water for urban and rural water supply. In situations where adequate data is not available to make this estimate, the following empirical relation has been utilized.

$$\boldsymbol{Alloc = 22 \times N \times L_g mm\ per\ year} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{19})$$

Where,

Alloc = Allocation for domestic water requirement

N = population density in the unit in thousands per sq. km.

L_g= fractional load on ground water for domestic water supply (≤ 1.0)

2.1.1.11 Net Annual Ground Water Availability for Future Use

The water available for future use is obtained by deducting the allocation for domestic use and current extraction for Irrigation and Industrial uses from the Annual Extractable Ground Water Recharge. The resulting ground water potential is termed as the net annual ground water availability for future use. The Net annual ground water availability for future use is calculated separately for non-command areas and command areas. As per the recommendations of the R&D Advisory committee, the ground water available for future use can never be negative. If it becomes negative, the future allocation of Domestic needs can be reduced to current extraction for domestic use. Even then if it is still negative, then the ground water available for future uses has been projected as zero.

2.1.1.12Additional Potential Resources under Specific Conditions

2.1.1.12.1 Potential Resource Due to Spring Discharge

Spring discharge occurs at the places where ground water level cuts the surface topography. The spring discharge is equal to the ground water recharge minus the outflow through evaporation and evapotranspiration and vertical and lateral sub-surface flow. Thus, Spring Discharge is a form of 'Annual Extractable Ground Water Recharge'. It is a renewable resource, though has not been used for Categorisation. Spring discharge measurement has been carried out by volumetric measurement of discharge of the springs. Spring discharges multiplied with time in days of each season will give the quantum of spring resources available during that season.

$$\boldsymbol{Potential\ ground\ water\ resource\ due\ to\ springs = Q \times No.of days} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{20})$$

Where,

Q = Spring Discharge

No of days = No of days spring yields.

2.1.1.12.2 Potential Resource in Waterlogged and Shallow Water Table Areas

In the area where the ground water level is less than 5m below ground level or in waterlogged areas, the resources up to 5m below ground level are potential and would be available for development in addition to the annual recharge in the area. The computation of potential resource to ground water reservoir in shallow water table areas has been done by adopting the following equation:

$$\textbf{\textit{Potential groundwater resource in shallow water table areas}} = (\mathbf{5} - \boldsymbol{D}) \times \boldsymbol{A} \times \boldsymbol{S_Y} \ldots\ldots\ldots\ldots (\mathbf{21})$$

Where,

D = Depth to water table below ground surface in pre-monsoon period in shallow aquifers.

A = Area of shallow water table zone.

S_Y = Specific Yield

2.1.1.12.3 Potential Resource in Flood Prone Areas

Ground water recharge from a flood plain is mainly the function of the following parameters-

- Areal extent of flood plain
- Retention period of flood
- Type of sub-soil strata and silt charge in the river water which gets deposited and controls seepage

Since collection of data on all these factors is time taking and difficult, in the meantime, the potential resource from flood plain may be estimated on the same norms as for ponds, tanks and lakes. This has been calculated over the water spread area and only for the retention period using the following formula.

$$\textbf{\textit{Potential groundwater resource in Flood Prone Areas}} = \mathbf{1.4} \times \boldsymbol{N} \times \frac{\boldsymbol{A}}{\mathbf{1000}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{22})$$

Where,

N = No. of Days Water is Retained in the Area

A = Flood Prone Area

2.1.1.13 Apportioning of Ground Water Assessment from Watershed to Development Unit

Where the assessment unit is a watershed, there is a need to convert the ground water assessment in terms of an administrative unit such as block/ taluka/ mandal. This has been done as follows.

A block may comprise of one or more watersheds, in part or full. First, the ground water assessment in the subareas, command, non-command and poor ground water quality areas of the watershed has been converted into depth unit (mm), by dividing the annual recharge by the respective area. The contribution of this subarea of the watershed to the block, is now calculated by multiplying this depth with the area in the block occupied by this sub-area.

The total ground water resource of the block has been presented separately for each type of sub-area, namely for command areas, non-command areas and poor ground water quality areas, as in the case of the individual watersheds.

2.2 GROUND WATER ASSESSMENT IN URBAN AREAS

The Assessment of Ground Water Resources in urban areas is similar to that of rural areas. Because of the availability of draft data and slightly different infiltration process and recharge due to other sources, the following few points are to be considered.

- Even though the data on existing ground water abstraction structures are available, accuracy is somewhat doubtful and individuals cannot even enumerate the well census in urban areas. Hence the difference of the actual demand and the supply by surface water sources as the withdrawal from the ground water resources has been considered for the assessment.
- The urban areas are sometimes concrete jungles and rainfall infiltration is not equal to that of rural areas unless and until special measures are taken in the construction of roads and pavements. Hence, 30% of the rainfall infiltration factor has been taken into consideration for urban areas as an adhoc arrangement till field studies in these areas are done and documented field studies are available.
- Because of the water supply schemes, there are many pipelines available in the urban areas and the seepages from these channels or pipes are huge in some areas. Hence this component has been included in the other resources and the recharge has also been considered. The percent losses have been collected from the individual water supply agencies, 50% of which has been considered as recharge to the ground water system.
- In the urban areas in India, normally, there is no separate channels either open or sub surface for the drainage and flash floods. These channels also recharge to some extent the ground water reservoir. As on today, there is no documented field study to assess the recharge. The seepages from the sewerages, which normally contaminate the ground water resources with nitrate also contribute to the quantity of resources and hence same percent as in the case of water supply pipes has been taken as norm for the recharge on the quantity of sewerage when there is sub surface drainage system. If estimated flash flood data is available, the same percent has been used on the quantum of flash floods to estimate the recharge from the flash floods.
- Urban areas with population more than 10 lakhs, has been considered as urban assessment unit while assessing the dynamic ground water resources.

2.3 GROUND WATER ASSESSMENT IN WATER LEVEL DEPLETION ZONES

There are areas where ground water level shows a decline even in the monsoon season. The reasons for this may be any one of the following: (a) There is a genuine depletion in the ground water regime, with ground water extraction and natural ground water discharge in the monsoon season (outflow from the region and base flow) exceeding the recharge. (b) There may be an error in water level data due to inadequacy of observation wells.

If it is concluded that the water level data is erroneous, recharge assessment has been made based on rainfall infiltration factor method. If, on the other hand, water level data is assessed as reliable, the ground water level fluctuation method has been applied for recharge estimation. As ΔS in equation 3& 4 is negative, the estimated recharge will be less than the gross ground water

extraction in the monsoon season. It must be noted that this recharge is the gross recharge minus the natural discharges in the monsoon season. The immediate conclusion from such an assessment in water depletion zones is that the area falls under the over-exploited category which requires micro level study.

2.4 NORMS HAS BEEN USED IN THE ASSESSMENT

2.4.1 Specific Yield

Recently under Aquifer Mapping Project, Central Ground Water Board has classified all the aquifers into 14 Principal Aquifers which in turn were divided into 42 Major Aquifers. Hence, it is required to assign Specific Yield values to all these aquifer units. The values recommended in the ***Table-2.1*** has been followed in the present assessments, unless sufficient data based on field studies are available to justify the minimum, maximum or other intermediate values

Table 3: Norms Recommended for Specific Yield

Sl. No.	Principal Aquifer	Major Aquifers		Age	Recommended (%)	Minimum (%)	Maximum (%)
		Code	Name				
1	Alluvium	AL01	Younger Alluvium (Clay/Silt/Sand/ Calcareous concretions)	Quaternary	10	8	12
2	Alluvium	AL02	Pebble / Gravel/ Bazada/ Kandi	Quaternary	16	12	20
3	Alluvium	AL03	Older Alluvium (Silt/Sand/Gravel/Lithomargic clay)	Quaternary	6	4	8
4	Alluvium	AL04	Aeolian Alluvium (Silt/ Sand)	Quaternary	16	12	20
5	Alluvium	AL05	Coastal Alluvium (Sand/Silt/Clay)	Quaternary	10	8	12
6	Alluvium	AL06	Valley Fills	Quaternary	16	12	20
7	Alluvium	AL07	Glacial Deposits	Quaternary	16	12	20
8	Laterite	LT01	Laterite / Ferruginous concretions	Quaternary	2.5	2	3
9	Basalt	BS01	Basic Rocks (Basalt) - Weathered, Vesicular or Jointed	Mesozoic to Cenozoic	2	1	3
10	Basalt	BS01	Basic Rocks (Basalt) - Massive Poorly Jointed	Mesozoic to Cenozoic	0.35	0.2	0.5
11	Basalt	BS02	Ultra Basic - Weathered, Vesicular or Jointed	Mesozoic to Cenozoic	2	1	3
12	Basalt	BS02	Ultra Basic - Massive Poorly Jointed	Mesozoic to Cenozoic	0.35	0.2	0.5
13	Sandstone	ST01	Sandstone/Conglomerate	Upper Palaeozoic to Cenozoic	3	1	5
14	Sandstone	ST02	Sandstone with Shale	Upper Palaeozoic to Cenozoic	3	1	5
15	Sandstone	ST03	Sandstone with shale/ coal beds	Upper Palaeozoic to Cenozoic	3	1	5
16	Sandstone	ST04	Sandstone with Clay	Upper Palaeozoic	3	1	5

Sl. No.	Principal Aquifer	Major Aquifers		Age	Recommended (%)	Minimum (%)	Maximum (%)
		Code	Name				
				to Cenozoic			
17	Sandstone	ST05	Sandstone/Conglomerate	Proterozoic to Cenozoic	3	1	5
18	Sandstone	ST06	Sandstone with Shale	Proterozoic to Cenozoic	3	1	5
19	Shale	SH01	Shale with limestone	Upper Palaeozoic to Cenozoic	1.5	1	2
20	Shale	SH02	Shale with Sandstone	Upper Palaeozoic to Cenozoic	1.5	1	2
21	Shale	SH03	Shale, limestone and sandstone	Upper Palaeozoic to Cenozoic	1.5	1	2
22	Shale	SH04	Shale	Upper Palaeozoic to Cenozoic	1.5	1	2
23	Shale	SH05	Shale/Shale with Sandstone	Proterozoic to Cenozoic	1.5	1	2
24	Shale	SH06	Shale with Limestone	Proterozoic to Cenozoic	1.5	1	2
25	Limestone	LS01	Miliolitic Limestone	Quarternary	2	1	3
26	Limestone	LS01	KarstifiedMiliolitic Limestone	Quarternary	10	5	15
27	Limestone	LS02	Limestone / Dolomite	Upper Palaeozoic to Cenozoic	2	1	3
28	Limestone	LS02	Karstified Limestone / Dolomite	Upper Palaeozoic to Cenozoic	10	5	15
29	Limestone	LS03	Limestone/Dolomite	Proterozoic	2	1	3
30	Limestone	LS03	Karstified Limestone/Dolomite	Proterozoic	10	5	15
31	Limestone	LS04	Limestone with Shale	Proterozoic	2	1	3
32	Limestone	LS04	Karstified Limestone with Shale	Proterozoic	10	5	15
33	Limestone	LS05	Marble	Azoic to Proterozoic	2	1	3
34	Limestone	LS05	Karstified Marble	Azoic to Proterozoic	10	5	15
35	Granite	GR01	Acidic Rocks (Granite,Syenite, Rhyolite etc.) - Weathered , Jointed	Mesozoic to Cenozoic	1.5	1	2
36	Granite	GR01	Acidic Rocks (Granite,Syenite, Rhyolite etc.)-Massive or Poorly Fractured	Mesozoic to Cenozoic	0.35	0.2	0.5
37	Granite	GR02	Acidic Rocks (Pegmatite, Granite, Syenite, Rhyolite etc.) - Weathered, Jointed	Proterozoic to Cenozoic	3	2	4
38	Granite	GR02	Acidic Rocks (Pegmatite, Granite, Syenite, Rhyolite etc.) - Massive, Poorly Fractured	Proterozoic to Cenozoic	0.35	0.2	0.5
39	Schist	SC01	Schist - Weathered, Jointed	Azoic to	1.5	1	2

Sl. No.	Principal Aquifer	Major Aquifers		Age	Recommended (%)	Minimum (%)	Maximum (%)
		Code	Name				
				Proterozoic			
40	Schist	SC01	Schist - Massive, Poorly Fractured	Azoic to Proterozoic	0.35	0.2	0.5
41	Schist	SC02	Phyllite	Azoic to Proterozoic	1.5	1	2
42	Schist	SC03	Slate	Azoic to Proterozoic	1.5	1	2
43	Quartzite	QZ01	Quartzite - Weathered, Jointed	Proterozoic to Cenozoic	1.5	1	2
44	Quartzite	QZ01	Quartzite - Massive, Poorly Fractured	Proterozoic to Cenozoic	0.3	0.2	0.4
45	Quartzite	QZ02	Quartzite - Weathered, Jointed	Azoic to Proterozoic	1.5	1	2
46	Quartzite	QZ02	Quartzite- Massive, Poorly Fractured	Azoic to Proterozoic	0.3	0.2	0.4
47	Charnockite	CK01	Charnockite - Weathered, Jointed	Azoic	3	2	4
48	Charnockite	CK01	Charnockite - Massive, Poorly Fractured	Azoic	0.3	0.2	0.4
49	Khondalite	KH01	Khondalites, Granulites - Weathered, Jointed	Azoic	1.5	1	2
50	Khondalite	KH01	Khondalites, Granulites - Mssive, Poorly Fractured	Azoic	0.3	0.2	0.4
51	Banded Gneissic Complex	BG01	Banded Gneissic Complex - Weathered, Jointed	Azoic	1.5	1	2
52	Banded Gneissic Complex	BG01	Banded Gneissic Complex - Massive, Poorly Fractured	Azoic	0.3	0.2	0.4
53	Gneiss	GN01	Undifferentiated metasedimentaries/ Undifferentiated metamorphic - Weathered, Jointed	Azoic to Proterozoic	1.5	1	2
54	Gneiss	GN01	Undifferentiated metasedimentaries/ Undifferentiated metamorphic - Massive, Poorly Fractured	Azoic to Proterozoic	0.3	0.2	0.4
55	Gneiss	GN02	Gneiss -Weathered, Jointed	Azoic to Proterozoic	3	2	4
56	Gneiss	GN02	Gneiss-Massive, Poorly Fractured	Azoic to Proterozoic	0.3	0.2	0.4
57	Gneiss	GN03	Migmatitic Gneiss - Weathered, Jointed	Azoic	1.5	1	2
58	Gneiss	GN03	Migmatitic Gneiss - Massive, Poorly Fractured	Azoic	0.3	0.2	0.4
59	Intrusive	IN01	Basic Rocks (Dolerite, Anorthosite etc.) - Weathered, Jointed	Proterozoic to Cenozoic	2	1	3
60	Intrusive	IN01	Basic Rocks (Dolerite, Anorthosite etc.) - Massive, Poorly Fractured	Proterozoic to Cenozoic	0.35	0.2	0.5

Sl. No.	Principal Aquifer	Major Aquifers		Age	Recommended (%)	Minimum (%)	Maximum (%)
		Code	Name				
61	Intrusive	IN02	Ultrabasics (Epidiorite, Granophyre etc.) - Weathered, Jointed	Proterozoic to Cenozoic	2	1	3
62	Intrusive	IN02	Ultrabasics (Epidiorite, Granophyre etc.) - Massive, Poorly Fractured	Proterozoic to Cenozoic	0.35	0.2	0.5

2.4.2 Rainfall Infiltration Factor

The values mentioned in ***Table-2.2*** has been used in the present assessment. The recommended Rainfall Infiltration Factor values has been used for assessment, unless sufficient data based on field studies are available to justify the minimum, maximum or other intermediate values.

Table 4: Norms Recommended for Rainfall Infiltration Factor

Sl. No.	Principal Aquifer	Major Aquifers		Age	Recommended (%)	Minimum (%)	Maximum (%)
		Code	Name				
1	Alluvium	AL01	Younger Alluvium (Clay/Silt/Sand/ Calcareous concretions)	Quaternary	22	20	24
2	Alluvium	AL02	Pebble / Gravel/ Bazada/ Kandi	Quaternary	22	20	24
3	Alluvium	AL03	Older Alluvium (Silt/Sand/Gravel/Lithomargic clay)	Quaternary	22	20	24
4	Alluvium	AL04	Aeolian Alluvium (Silt/ Sand)	Quaternary	22	20	24
5	Alluvium	AL05	Coastal Alluvium (Sand/Silt/Clay) -East Coast	Quaternary	16	14	18
5	Alluvium	AL05	Coastal Alluvium (Sand/Silt/Clay) - West Coast	Quaternary	10	8	12
6	Alluvium	AL06	Valley Fills	Quaternary	22	20	24
7	Alluvium	AL07	Glacial Deposits	Quaternary	22	20	24
8	Laterite	LT01	Laterite / Ferruginous concretions	Quaternary	7	6	8
9	Basalt	BS01	Basic Rocks (Basalt) - Vesicular or Jointed	Mesozoic to Cenozoic	13	12	14
9	Basalt	BS01	Basic Rocks (Basalt) - Weathered	Mesozoic to Cenozoic	7	6	8
10	Basalt	BS01	Basic Rocks (Basalt) - Massive Poorly Jointed	Mesozoic to Cenozoic	2	1	3
11	Basalt	BS02	Ultra Basic - Vesicular or Jointed	Mesozoic to Cenozoic	13	12	14
11	Basalt	BS02	Ultra Basic - Weathered	Mesozoic	7	6	8

Sl. No.	Principal Aquifer	Major Aquifers		Age	Recommended (%)	Minimum (%)	Maximum (%)
		Code	Name				
				to Cenozoic			
12	Basalt	BS02	Ultra Basic - Massive Poorly Jointed	Mesozoic to Cenozoic	2	1	3
13	Sandstone	ST01	Sandstone/Conglomerate	Upper Palaeozoic to Cenozoic	12	10	14
14	Sandstone	ST02	Sandstone with Shale	Upper Palaeozoic to Cenozoic	12	10	14
15	Sandstone	ST03	Sandstone with shale/ coal beds	Upper Palaeozoic to Cenozoic	12	10	14
16	Sandstone	ST04	Sandstone with Clay	Upper Palaeozoic to Cenozoic	12	10	14
17	Sandstone	ST05	Sandstone/Conglomerate	Proterozoic to Cenozoic	6	5	7
18	Sandstone	ST06	Sandstone with Shale	Proterozoic to Cenozoic	6	5	7
19	Shale	SH01	Shale with limestone	Upper Palaeozoic to Cenozoic	4	3	5
20	Shale	SH02	Shale with Sandstone	Upper Palaeozoic to Cenozoic	4	3	5
21	Shale	SH03	Shale, limestone and sandstone	Upper Palaeozoic to Cenozoic	4	3	5
22	Shale	SH04	Shale	Upper Palaeozoic to Cenozoic	4	3	5
23	Shale	SH05	Shale/Shale with Sandstone	Proterozoic to Cenozoic	4	3	5
24	Shale	SH06	Shale with Limestone	Proterozoic to Cenozoic	4	3	5

Sl. No.	Principal Aquifer	Major Aquifers		Age	Recommended (%)	Minimum (%)	Maximum (%)
		Code	Name				
25	Limestone	LS01	Miliolitic Limestone	Quarternary	6	5	7
27	Limestone	LS02	Limestone / Dolomite	Upper Palaeozoic to Cenozoic	6	5	7
29	Limestone	LS03	Limestone/Dolomite	Proterozoic	6	5	7
31	Limestone	LS04	Limestone with Shale	Proterozoic	6	5	7
33	Limestone	LS05	Marble	Azoic to Proterozoic	6	5	7
35	Granite	GR01	Acidic Rocks (Granite,Syenite, Rhyolite etc.) - Weathered , Jointed	Mesozoic to Cenozoic	7	5	9
36	Granite	GR01	Acidic Rocks (Granite,Syenite, Rhyolite etc.)-Massive or Poorly Fractured	Mesozoic to Cenozoic	2	1	3
37	Granite	GR02	Acidic Rocks (Pegmatite, Granite, Syenite, Rhyolite etc.) - Weathered, Jointed	Proterozoic to Cenozoic	11	10	12
38	Granite	GR02	Acidic Rocks (Pegmatite, Granite, Syenite, Rhyolite etc.) - Massive, Poorly Fractured	Proterozoic to Cenozoic	2	1	3
39	Schist	SC01	Schist - Weathered, Jointed	Azoic to Proterozoic	7	5	9
40	Schist	SC01	Schist - Massive, Poorly Fractured	Azoic to Proterozoic	2	1	3
41	Schist	SC02	Phyllite	Azoic to Proterozoic	4	3	5
42	Schist	SC03	Slate	Azoic to Proterozoic	4	3	5
43	Quartzite	QZ01	Quartzite - Weathered, Jointed	Proterozoic to Cenozoic	6	5	7
44	Quartzite	QZ01	Quartzite - Massive, Poorly Fractured	Proterozoic to Cenozoic	2	1	3
45	Quartzite	QZ02	Quartzite - Weathered, Jointed	Azoic to Proterozoic	6	5	7
46	Quartzite	QZ02	Quartzite- Massive, Poorly Fractured	Azoic to Proterozoic	2	1	3
47	Charnockite	CK01	Charnockite - Weathered, Jointed	Azoic	5	4	6
48	Charnockite	CK01	Charnockite - Massive, Poorly Fractured	Azoic	2	1	3
49	Khondalite	KH01	Khondalites, Granulites - Weathered, Jointed	Azoic	7	5	9

Sl. No.	Principal Aquifer	Major Aquifers		Age	Recommended (%)	Minimum (%)	Maximum (%)
		Code	Name				
50	Khondalite	KH01	Khondalites, Granulites - Mssive, Poorly Fractured	Azoic	2	1	3
51	Banded Gneissic Complex	BG01	Banded Gneissic Complex - Weathered, Jointed	Azoic	7	5	9
52	Banded Gneissic Complex	BG01	Banded Gneissic Complex - Massive, Poorly Fractured	Azoic	2	1	3
53	Gneiss	GN01	Undifferentiated metasedimentaries/ Undifferentiated metamorphic - Weathered, Jointed	Azoic to Proterozoic	7	5	9
54	Gneiss	GN01	Undifferentiated metasedimentaries/ Undifferentiated metamorphic - Massive, Poorly Fractured	Azoic to Proterozoic	2	1	3
55	Gneiss	GN02	Gneiss -Weathered, Jointed	Azoic to Proterozoic	11	10	12
56	Gneiss	GN02	Gneiss-Massive, Poorly Fractured	Azoic to Proterozoic	2	1	3
57	Gneiss	GN03	Migmatitic Gneiss - Weathered, Jointed	Azoic	7	5	9
58	Gneiss	GN03	Migmatitic Gneiss - Massive, Poorly Fractured	Azoic	2	1	3
59	Intrusive	IN01	Basic Rocks (Dolerite, Anorthosite etc.) - Weathered, Jointed	Proterozoic to Cenozoic	7	6	8
60	Intrusive	IN01	Basic Rocks (Dolerite, Anorthosite etc.) - Massive, Poorly Fractured	Proterozoic to Cenozoic	2	1	3
61	Intrusive	IN02	Ulrta Basics (Epidiorite, Granophyre etc.) - Weathered, Jointed	Proterozoic to Cenozoic	7	6	8
62	Intrusive	IN02	Ulrta Basics (Epidiorite, Granophyre etc.) - Massive, Poorly Fractured	Proterozoic to Cenozoic	2	1	3

2.4.3 Norms for Canal Recharge

The Norms suggested in ***Table-2.3*** has been used for estimating the recharge from Canals, where sufficient data based on field studies are not available.

Table 5: Norms Recommended for Recharge due to Canals

Formation	Canal Seepage factor ham/day/million square meters of wetted area		
	Recommended	Minimum	Maximum
Unlined canals in normal soils with	17.5	15	20

some clay content along with sand			
Unlined canals in sandy soil with some silt content	27.5	25	30
Lined canals in normal soils with some clay content along with sand	3.5	3	4
Lined canals in sandy soil with some silt content	5.5	5	6
All canals in hard rock area	3.5	3	4

2.4.4 Norms for Recharge Due to Irrigation

The Recommended Norms are presented in ***Table-2.4***.

Table 6: Norms Recommended for Recharge from Irrigation.

DTW m bgl	Ground Water		Surface Water	
	Paddy	Non-paddy	Paddy	Non-paddy
≤ 10	45.0	25.0	50.0	30.0
11	43.3	23.7	48.3	28.7
12	40.4	22.1	45.1	26.8
13	37.7	20.6	42.1	25.0
14	35.2	19.2	39.3	23.3
15	32.9	17.9	36.7	21.7
16	30.7	16.7	34.3	20.3
17	28.7	15.6	32.0	18.9
18	26.8	14.6	29.9	17.6
19	25.0	13.6	27.9	16.4
20	23.3	12.7	26.0	15.3
21	21.7	11.9	24.3	14.3
22	20.3	11.1	22.7	13.3
23	18.9	10.4	21.2	12.4
24	17.6	9.7	19.8	11.6
≥ 25	20.0	5.0	25.0	10.0

2.4.5 Norms for Recharge due to Tanks & Ponds

As the data on the field studies for computing recharge from Tanks & Ponds are very limited, for Seepage from Tanks & Ponds has been used as 1.4 mm / day in the present assessment.

2.4.6 Norms for Recharge due to Water Conservation Structures

The data on the field studies for computing recharge from Water Conservation Structures are very limited, hence, the norm recommended by GEC-2015 for the seepage from Water Conservation Structures is 40% of gross storage during a year which means 20% during monsoon season and 20% during non-monsoon Season is adopted.

2.5 Unit Draft

The methodology recommends to use well census method for computing the ground water draft. The norm used for computing ground water draft is the unit draft. The unit draft can be computed by field studies. This method involves selecting representative abstraction structure and

calculating the discharge from that particular type of structure and collecting the information on how many hours of pumping is being done in various seasons and number of such days during each season. The Unit Draft during a particular season is computed using the following equation:

$$\boldsymbol{Unit\ Draft = Discharge\ in\ m^3/hr \times No.of\ pumping\ hours\ in\ a\ day \times No.of\ days} \ldots\ldots\ldots (\mathbf{29})$$

But the procedure that is being followed for computing unit draft does not have any normalization procedure. Normally, if the year in which one collects the draft data in the field is an excess rainfall year, the abstraction from ground water will be less. Similarly, if the year of the computation of unit draft is a drought year the unit draft will be high. Hence, there is a requirement to devise a methodology that can be used for the normalization of unit draft figures. The following are the two simple techniques, which are followed for normalization of Unit Draft. Areas where, unit draft values for one rainfall cycle are available for at least 10 years second method shown in equation 31 is followed or else the first method shown in equation 30 has been used.

$$\boldsymbol{Normalised\ Unit\ Draft} = \frac{\boldsymbol{Unit\ Draft \times Rainfall\ for\ the\ year}}{\boldsymbol{Normal\ Rainfall}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{30})$$

$$\boldsymbol{Normalised\ Unit\ Draft} = \frac{\sum_{i=1}^{n} \boldsymbol{Unit\ Draft_i}}{\boldsymbol{Number\ of\ Years}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{31})$$

2.6 INDIA -GROUNDWATER RESOURCE ESTIMATION SYSTEM (IN-GRES)

"INDIA-GROUNDWATER RESOURCE ESTIMATION SYSTEM (IN-GRES) is a Software/Web-based Application developed by CGWB in collaboration with IIT-Hyderabad. It provides common and standardized platform for Ground Water Resource Estimation for the entire country and its pan-India operationalization (Central and State Governments). The system takes 'Data Input' through Excel as well as Forms, compute various ground water components (recharge, extraction etc.) and classify assessment units into appropriate categories (safe, semi-critical, critical and over-exploited). The Software uses GEC 2015 Methodology for estimation and calculation of Groundwater resources. It allows for unique and homogeneous representation of groundwater fluxes as well as categories for all the assessment units (AU) of the country.

URL of IN-GRES →http://ingres.iith.ac.in

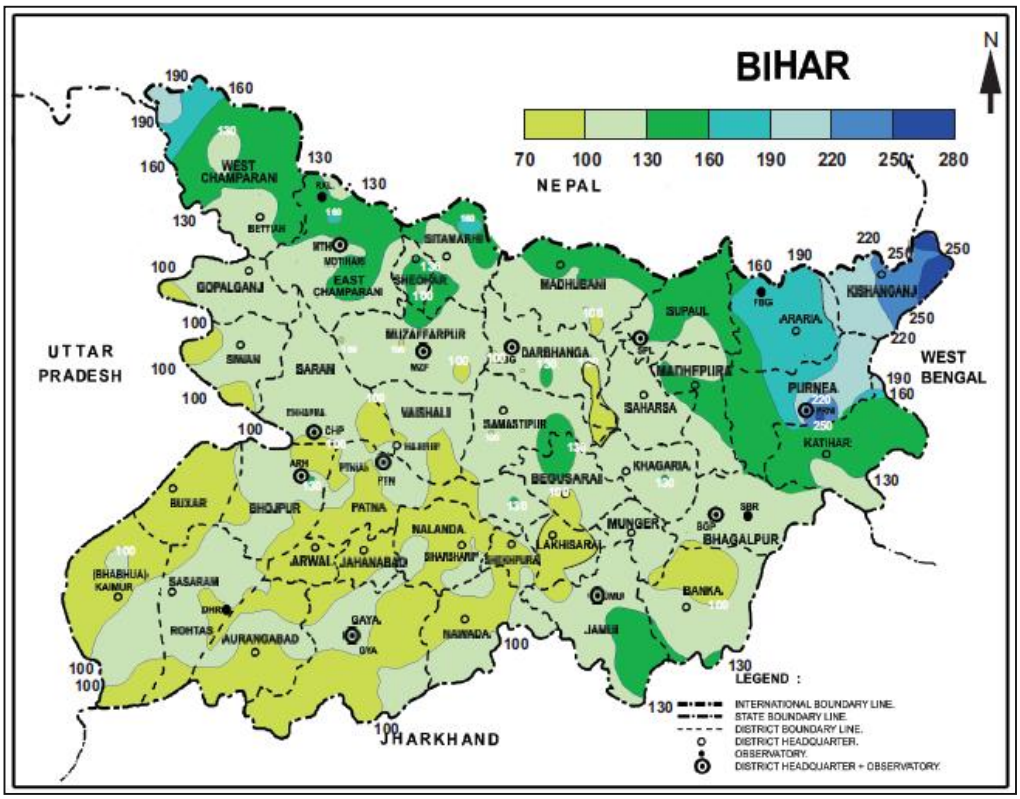
CHAPTER 3

3. RAINFALL

3.1 Normal Rainfall of Bihar

Rainfall is the main source of ground water recharge in the state. However, distribution of rainfall has a wide variation both in space and time.The total annual normal rainfall for the state is about 116.4 cms and the state receives on an average rainfall exceeding 2.5 mm for about 50 days. Kishanganj district in northeast sector receives a maximum amount of rainfall of about 221cm in a year, whereas Arwal and Jahanabad districts in southwest sector receive a minimum amount of rainfall of about 86 cm in a year.

The southwest monsoon season is the main rainy season over the state and the total amount of rainfall of about 86% is received in the southwest monsoon season (June to September), about 2% in the winter season (December, January and February) and about 6% in the pre-monsoon (March-May) and about 6% in post monsoon season (October and November).The percentage of the seasonal number of rainy days to that of the annual number of rainy days shows that 81% rainy days were during the southwest monsoon season, 9% during the pre-monsoon season, 6% during the post monsoon season and the remaining 4% during the winter season. The state receives rainfall mainly due to low pressure areas and monsoon depressions originating in the Bay of Bengal during the southwest monsoon.



3.2 District Wise Normal Rainfall of Bihar

S. No.	District	Normal Rainfall (mm)		
		Monosoon	Non-Monsoon	Total
1	ARARIA	1347	285.2	1632.2
2	ARWAL	789.7	84.7	874.4
3	AURANGABAD	859.6	115.3	974.9
4	BANKA	859.6	115.3	974.9
5	BEGUSARAI	921.6	169.1	1090.7
6	BHAGALPUR	977.3	230.6	1207.9
7	BHOJPUR	924.4	127.1	1051.5
8	BUXAR	861.2	114.2	975.4
9	DARBHANGA	924.6	199	1123.6
10	EAST CHAMPARAN	1021.6	176.1	1197.7
11	GAYA	878.7	125.2	1003.9
12	GOPALGANJ	989.9	145.6	1135.5
13	JAMUI	951.8	155.5	1107.3
14	JEHANABAD	820.4	116.2	936.6
15	KAIMUR	995.1	131.2	1126.3
16	KATIHAR	1109.9	232.8	1342.7
17	KHAGARIA	1057.7	176.2	1233.9
18	KISHANGANJ	1755.5	335.1	2090.6
19	LAKHISARAI	974	172.8	1146.8
20	MADHEPURA	1153.5	239.2	1392.7
21	MADHUBANI	1059.5	233.8	1293.3
22	MUNGER	974	172.8	1146.8
23	MUZAFFARPUR	981.1	173.4	1154.5
24	NALANDA	876.8	125.4	1002.2
25	NAWADA	896.6	145.2	1041.8
26	PATNA	941.3	133.5	1074.8
27	PURNEA	1313.3	284.9	1598.2
28	ROHTAS	834.5	114.6	949.1
29	SAHARSA	1408.1	284.8	1692.9
30	SAMASTIPUR	1025.2	167.1	1192.3
31	SARAN	973.5	150.3	1123.8
32	SHEIKHPURA	865.7	142.7	1008.4
33	SHEOHAR	1084.4	208.7	1293.1
34	SITAMARHI	1084.4	208.7	1293.1
35	SIWAN	1004.2	131.2	1135.4
36	SUPAUL	1055.6	218.2	1273.8
37	VAISHALI	1021.6	154.9	1176.5
38	WEST CHAMPARAN	1275	197	1472

3.3 Rainfall during the Calendar Year 2023 in Bihar State

DISTRICT	Actual Rainfall (mm)		
	Monsoon	Non-Monsoon	Total
ARARIA	1021.98	299.64	1321.62
ARWAL	503.76	69.92	573.68
AURANGABAD	484.04	112.66	596.70
BANKA	551.96	226.25	778.21
BEGUSARAI	558.08	233.83	791.91
BHAGALPUR	434.65	243.33	677.98
BHOJPUR	550.91	120.95	671.86
BUXAR	443.18	82.67	525.85
DARBHANGA	434.74	225.52	660.26
EAST CHAMPARAN	636.89	205.25	842.14
GAYA	579.94	118.60	698.53
GOPALGANJ	610.60	125.77	736.38
JAMUI	608.50	198.26	806.76
JEHANABAD	428.36	103.70	532.06
KAIMUR	514.29	81.10	595.39
KATIHAR	513.71	340.66	854.37
KHAGARIA	435.37	261.56	696.93
KISHANGANJ	1532.87	499.90	2032.77
LAKHISARAI	432.24	195.33	627.57
MADHEPURA	539.14	278.97	818.11
MADHUBANI	561.49	267.62	829.11
MUNGER	412.17	217.04	629.22
MUZAFFARPUR	722.02	179.26	901.27
NALANDA	523.93	136.86	660.79
NAWADA	556.58	175.41	731.99
PATNA	491.32	123.19	614.51
PURNEA	699.85	335.64	1035.48
ROHTAS	486.12	88.10	574.22
SAHARSA	531.49	275.07	806.56
SAMASTIPUR	550.51	171.09	721.61
SARAN	518.39	86.66	605.04
SHEIKHPURA	463.99	178.43	642.43
SHEOHAR	554.48	110.66	665.14
SITAMARHI	545.84	212.50	758.34
SIWAN	560.61	118.22	678.83
SUPAUL	684.15	272.95	957.10
VAISHALI	612.24	149.95	762.19
WEST CHAMPARAN	749.19	260.44	1009.64

3.4 Rainfall during Ground Water Assessment Year 2023-24 for Bihar State

DISTRICT	Actual Rainfall (mm)		
	Monsoon	Non-Monsoon	Total
ARARIA	1021.98	299.64	1321.62
ARWAL	503.76	69.92	573.68
AURANGABAD	484.04	112.66	596.70
BANKA	551.96	226.25	778.21
BEGUSARAI	558.08	233.83	791.91
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SHEOHAR	554.48	110.66	665.14
SITAMARHI	545.84	212.50	758.34
SIWAN	560.61	118.22	678.83
SUPAUL	684.15	272.95	957.10
VAISHALI	612.24	149.95	762.19
WEST CHAMPARAN	749.19	260.44	1009.64

CHAPTER 4

4. HYDROGEOLOGICAL SETUP OF BIHAR

Based upon geological diversities, geomorphological set up and relative groundwater potentialities, the state of Bihar can be divided into three broad hydrogeological groups. Hydrogeological map of Bihar is presented in **Figure 3**.

1. Consolidated (Fissured) formation
2. Semi-consolidated formation
3. Unconsolidated porous formation

1. Consolidated (Fissured) Formation

The geological formation of Archean and Precambrian age as well as upper Gondwana comes under this group. The thickness and nature of weathered mantle and saprolite zone (a transition zone between weathered residuum and fresh basement) and presence of fractures below the weathered residuum control the occurrence and movement of groundwater in this formation. In general, the thickness of the weathered zone ranges from 5 m to 20 m. Thickness of weathered mantle is comparatively more in schist and other meta-sedimentaries than granite and granite-gneiss. Ground water occurs under unconfined condition within the weathered mantle.

Regional groundwater flow system cannot be established in this unit owing to rolling topography in the area. Joints, cracks, fractures and other types of secondary porosity control the occurrence and movement of groundwater. The discharge and yield of the wells varies from place to place due to in-homogeneity of the fractures. The results of the exploratory drilling carried out by the Central Ground Water Board in the hard rock areas indicate presence of 3 to 4 sets of productive fractures down to a depth of 120 m. The yield from the wells drilled in granite gneiss, in Gaya district, varies between 5 m^3/hr to 50 m^3/hr, whereas the transmissivity varies between 125 m^2/day to 170 m^2/day. In Nawada district, the exploratory wells drilled in granite gneiss down to a depth of 190 m have discharge of 3-38 m^3/hr. In Jamui district, exploratory drilling data down to a depth of 190 m in the granite gneiss reveals presence of 1 to 4 sets of fracture zones. The yield of well varies from 10 to 50 m^3/hr. The transmissivity of fractured zone varies from 10 to 30 m^2/day. In Banka district, the yield of the exploratory wells drilled in granite gneiss down to a depth of 190 m, varies from 10 to50 m^3/hr. An exploratory well drilled in quartzite to a depth of 60 m at Rajgir, Nalanda district, has a very poor discharge. However, exploratory data indicated artesian condition at northern parts of Madhubani district bordering Nepal with piezometric head of 1 m above the ground level.

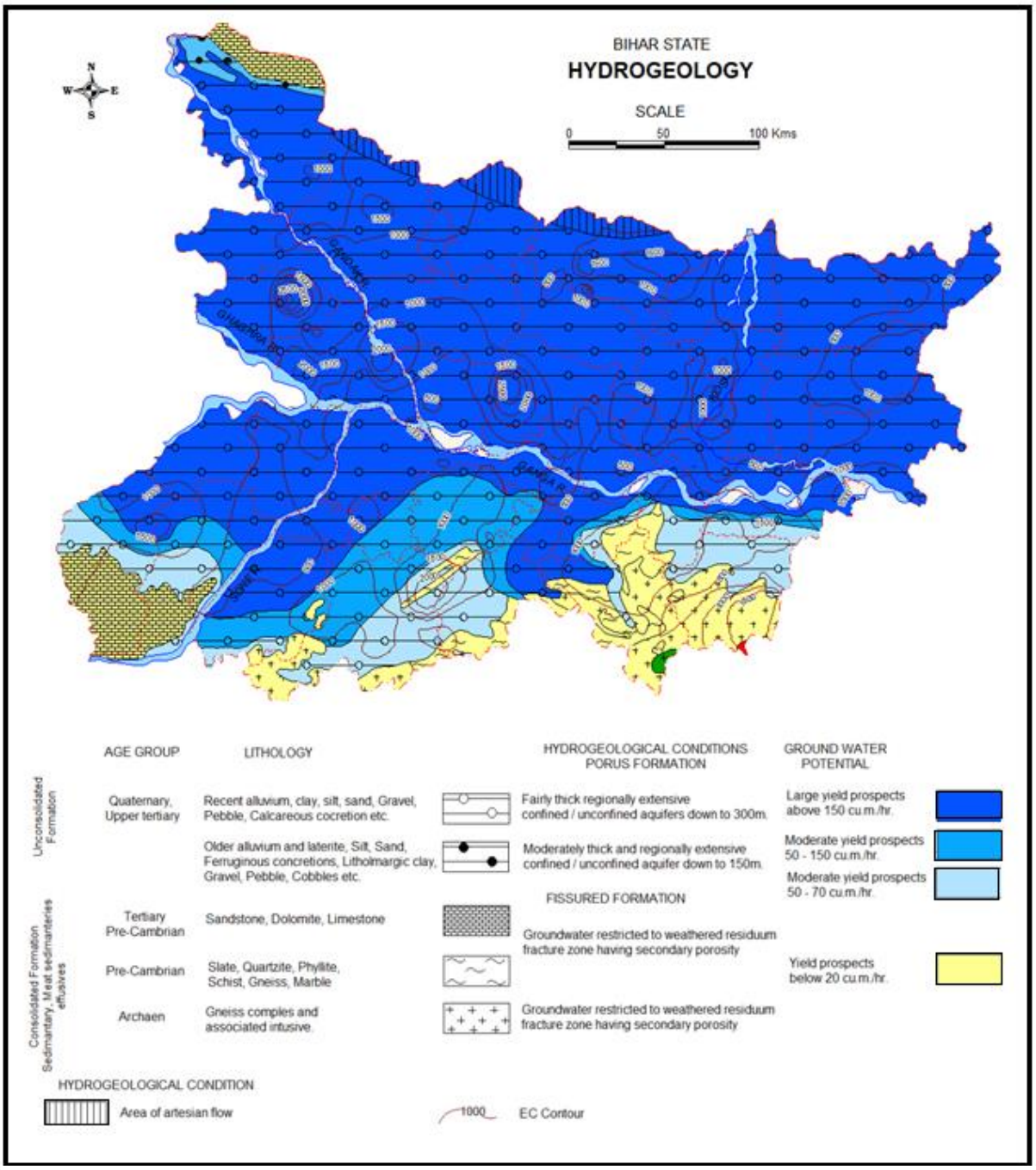


Figure 2: Hydrogeological map of Bihar state

2. Semi-consolidated formation

The sandstone belonging to the Vindhyan formation is compact and has low primary porosity. Ground water occurs within the weathered residuum and within the secondary porosity underneath. The groundwater is observed to occur under unconfined condition in the weathered mantle. The thickness of the weathered residuum is comparatively less than that of granite gneisses area. In general, the thickness varies from 5 to 10 m. Yield potential is limited due to compact nature of the formation. The limestones are also having low groundwater potential. The

yield of dug wells is observed to vary from 0.5 to 0.75 m^3/day. The yield of bored wells drilled in the Lower Vindhayan in Palamu district has been observed to be 15 m^3/hr tapping fractures between 50- 75 m bgl.

3. Unconsolidated Porous Formations

The vast quaternary Gangetic alluvial deposits covering the North and South Bihar plains hold porous aquifer system. The drilling data of CGWB indicates presence of potential aquifer down to a depth of 300 m bgl in the northern part of South Ganga alluvial plain and in major part of North Ganga alluvial plain. The groundwater occurs under unconfined conditions in the shallow aquifer whereas in the deeper aquifers it occurs under confined conditions. Regional variation in hydraulic properties and yield potential of the aquifers in alluvial formations has been observed.

Exploratory drilling indicates that the transmissivity ranges between 1127 m^2/day and 3820 m^2/day and the storage co-efficient between 1.1 x 10^{-2} and 2.8 x 10^{-4} in Ghaghra-Gandak interfluves area covering Gopalganj, Siwan& Saran districts. High transmissivity (5931 m^2/day) has been observed at Khudawanpur, Begusarai district. The transmissivity of the shallow aquifers in Kosi area is around 2000 m^2/day. The yield of wells tapping deep aquifers varies from 135 to 200 m^3/hr and from 125 to 150 m^3/hr in the western sector of North Bihar and in the eastern sector of North Bihar respectively. The shallow tube wells tapping 20-25 m thick aquifer generally yield 30 m^3/hr.

There is a wide variation in the transmissivity, storage co-efficient and yield of wells in the south of River Ganga. The thickness of alluvial sediment decreases along the areas bordering Jharkhand. To the south of River Ganga, transmissivity varies from 5000 m^2/day to more than 10,000 m^2/day. The yield of the well is observed to be more than 250 m^3/hr. The thickness of the alluvial deposit is more than 400 m in Bhojpur, Patna and parts of Nalanda districts. Towards south of Patna the maximum thickness of alluvial deposit encountered is 160 m in Nalanda district. In southwestern part of the state, thickness of alluvial deposit varies from 99 m in Banka district to 132 m in Bhagalpur district. Three to four aquifers of variable thickness have been encountered. The transmissivity of the aquifer varies from 31 m^2/day to 1515 m^2/day and storativity value varies from 2.75 x10^{-3} to 3.9 x 10^{-5}. The storativity value indicates semi-confined nature of aquifer. The exploratory drilling in Nalanda, Munger and Bhagalpur districts reveal that yield of deep tube varies from 50 m^3/hr to 100 m^3/hr. The yield of shallow tube wells in central Bihar varies from 10-20 m^3/hr.

CHAPTER-5

5. GROUND WATER LEVEL SCENARIO IN BIHAR

Groundwater level is one of the basic data elements, which reflects the groundwater regime in an area. Central Ground Water Board (CGWB) monitors groundwater levels four times a year during January, May, August and November through a network of fixed observation wells spreading throughout the state. The periodicity of groundwater level monitoring by the state varies for different state government agencies

The primary objective of monitoring the groundwater level is to record the response of groundwater regime to the natural and anthropogenic stresses on recharge and discharge components which are governed by geology, climate, physiography, land use pattern and hydrologic characteristics. Natural conditions affecting the regime include climatic parameters like rainfall, evapotranspiration etc. Anthropogenic influences include pumpage from the aquifer, recharge due to irrigation systems and other practices like waste disposal etc. Water level data generated and archived by CGWB along with data from State Government departments have been used for assessment of groundwater resources. An outline of groundwater scenario during the period of assessment is given below.

5.1 GROUNDWATER LEVEL SCENARIO (2023)

Groundwater level data of **Pre-monsoon 2023** for the state (**Figure-4**) reveals that the general depth to water level of the state ranges from 0.85 to 15.9 m bgl (metres below ground level). Very shallow water levels of less than 2 m bgl are observed in northern part of the states, such as East Champaran, Madhubani and Sitamarhi in very small patches. Groundwater level in the range of 2 to 5 m bgl is seen in West Champaran, Supaul, Araria, Sheohar, Saharsa and Kishanganj. Major part of the state shows water level in the range 5 to 10 m bgl, especially in district of Samastipur, Begusarai, Khagaria, Bhagalpur, Lakhisarai, Jamui, Banka, Nawada, Nalanda, Gaya, Aurangabad, Patna, Kaimur and Rohtas. In southern part of state, especially in the district of Kaimur, Rohtas, Jamui, Bhagalpur depth to water level is generally deeper in some patches and ranges from 10m to 15 m bgl.

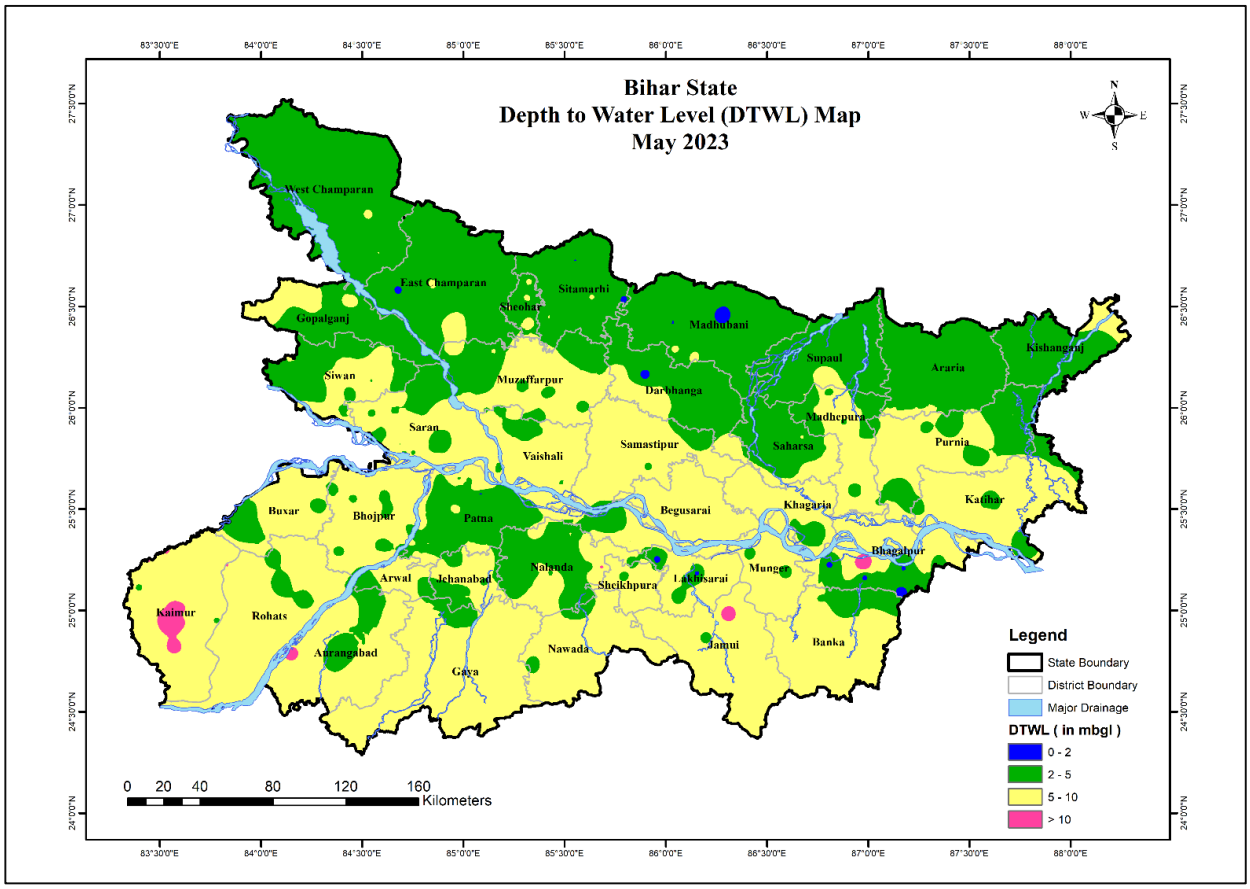


Figure 3: Pre-monsoon Depth to Water Level Map (2023)

Total 790 NHS dug wells were analysed during **Post-monsoon period** (November 2023). The minimum and the maximum depth to water levels have been recorded to be 0.25 m bgl (Darbhanga district) and 15.8 m bgl (Jamui district) respectively. The findings indicate that 15% of the wells have water levels of less than 2 mbgl, 64% have levels between 2 and 5 mbgl, 21% fall within the 5 to 10 mbgl range, and 0.7% have water levels deeper than 10 mbgl.

Shallow water levels of less than 2 mbgl are primarily found in the few patches upper part of northern Bihar. Water levels between 2 and 5 mbgl are observed across Bihar, while levels between 5 and 10 mbgl are present in some patches in the south of State. Water levels deeper than 10 mbgl are seen in a few small areas in the south of Bihar.

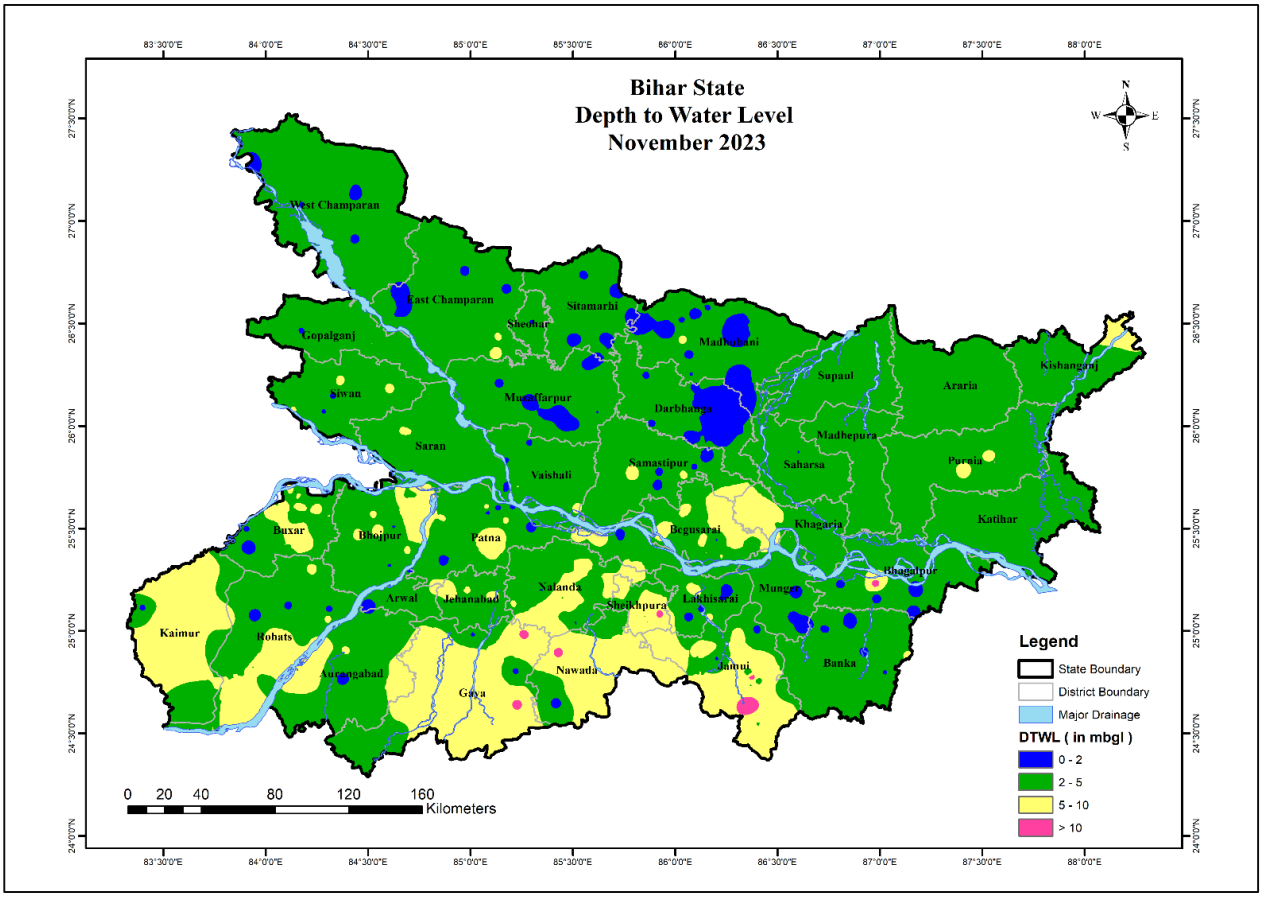


Figure 4: Post-monsoon Depth to Water Level Map (2023)

5.2 Fluctuation of Ground water Level:

5.2.1 Comparison of Pre-monsoon 2023 to Pre-monsoon 2022.

Water level fluctuation between May 2022 and May 2023 has been done for 466 HNS locations. The covered area for annual fluctuation has been shown in Fig. 11. Fall in water level has been observed in 80 % of the well analysed which covered the major portion of the monitored area. Out of which fall of 0 – 2 m has been recorded in 62 % (295), fall between 2-4 m has been recorded in 11 % (16) of the HNS monitored. About 3% of the well monitored has shown fall in water level more than 4m.

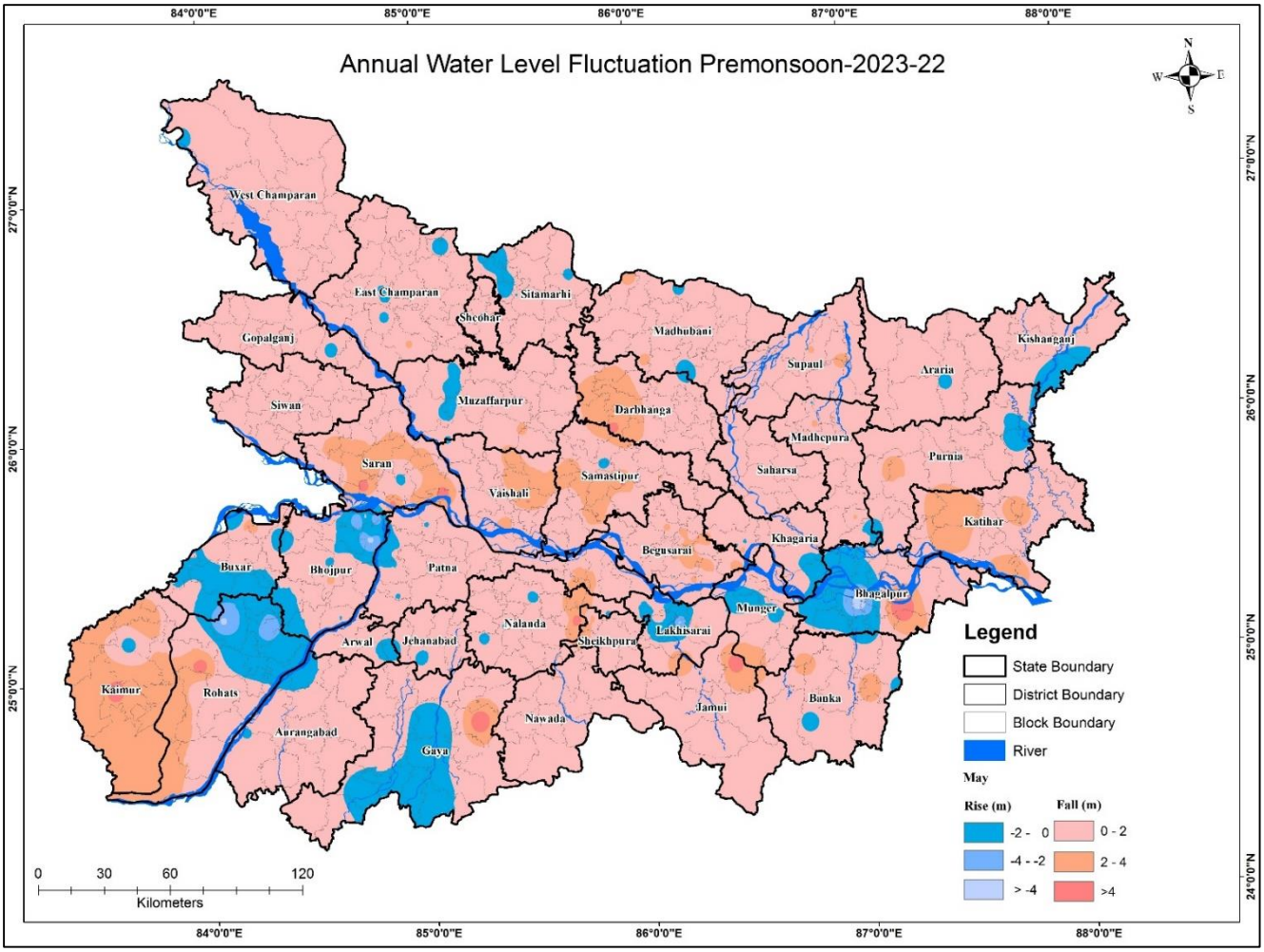


Figure 5: Water Level Fluctuation: Pre Monsoon 2022 Compared to Pre Monsoon 2023

5.2.2 Comparison of Post Monsoon 2023 to Post Monsoon 2022.

Water level fluctuation between November 2022 and November 2023 has been analysed for 616 HNS after carrying out monitoring in entire State. The analysis indicates that there is fall of water level in about 57.9% of the HNS. Out of which fall of 0 – 2m has been recorded in 48.3% (314), fall between 2-4m has been recorded in 5.1% (35) of the HNS monitored. About 1.3% of the well monitored has shown fall in water level more than 4m.

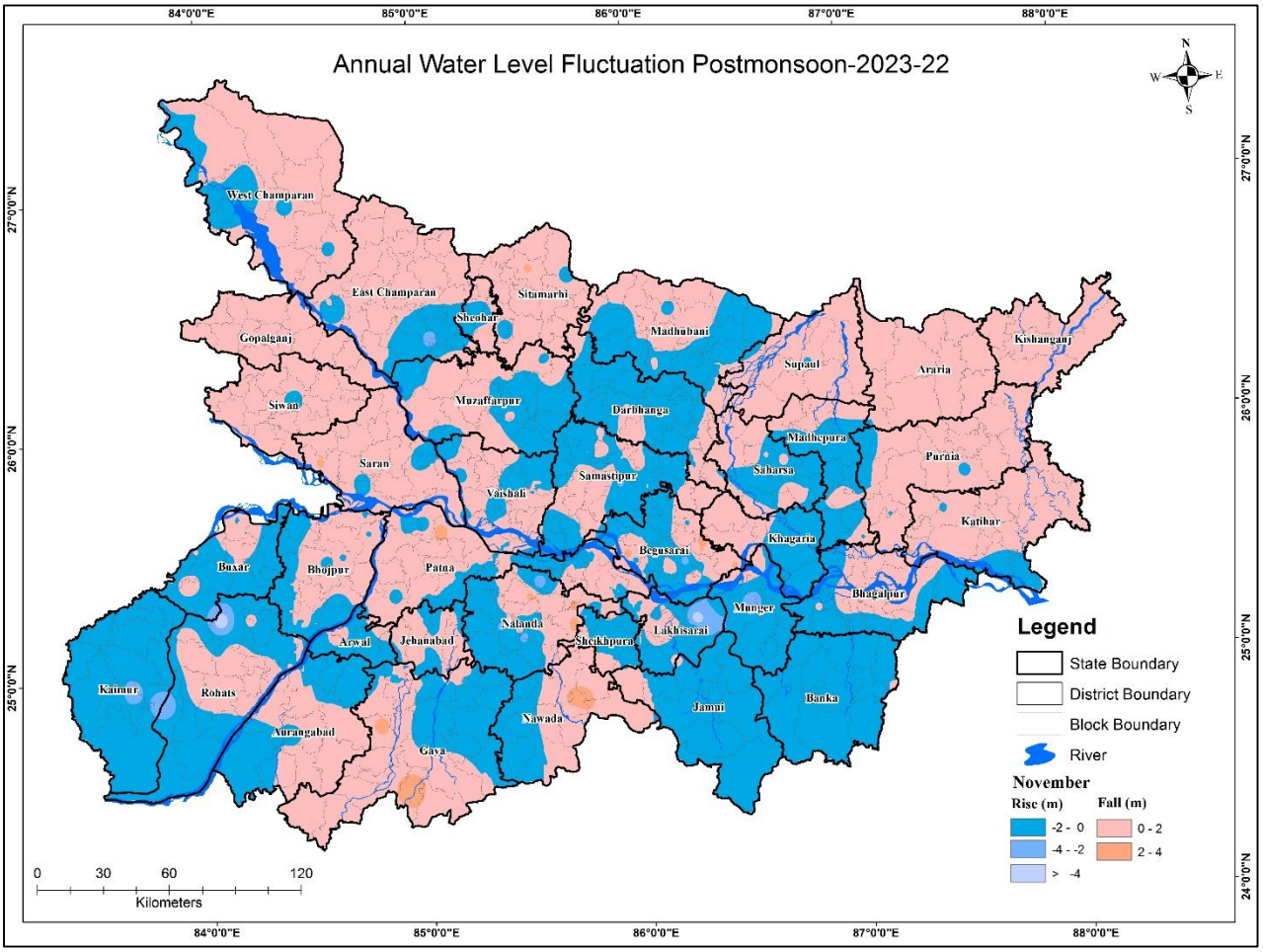


Figure 6: Water Level Fluctuation: Post Monsoon 2022 Compared to Post Monsoon 2023

5.2.3 Comparison of Pre-Monsoon 2023 with decadal mean of Pre-Monsoon (2013 to 2022)

Fluctuation in water level of May 2023 with respect to decadal mean of May has been analyzed for 589 HNS, which indicates rise in 57.62% and fall in remaining 42.37% HNS. The rise of water level is in the range of 0 – 2 m is observed in 52% of the HNS monitored. Fall is observed in 219 wells and mostly ranges up to 2 m (178 wells).

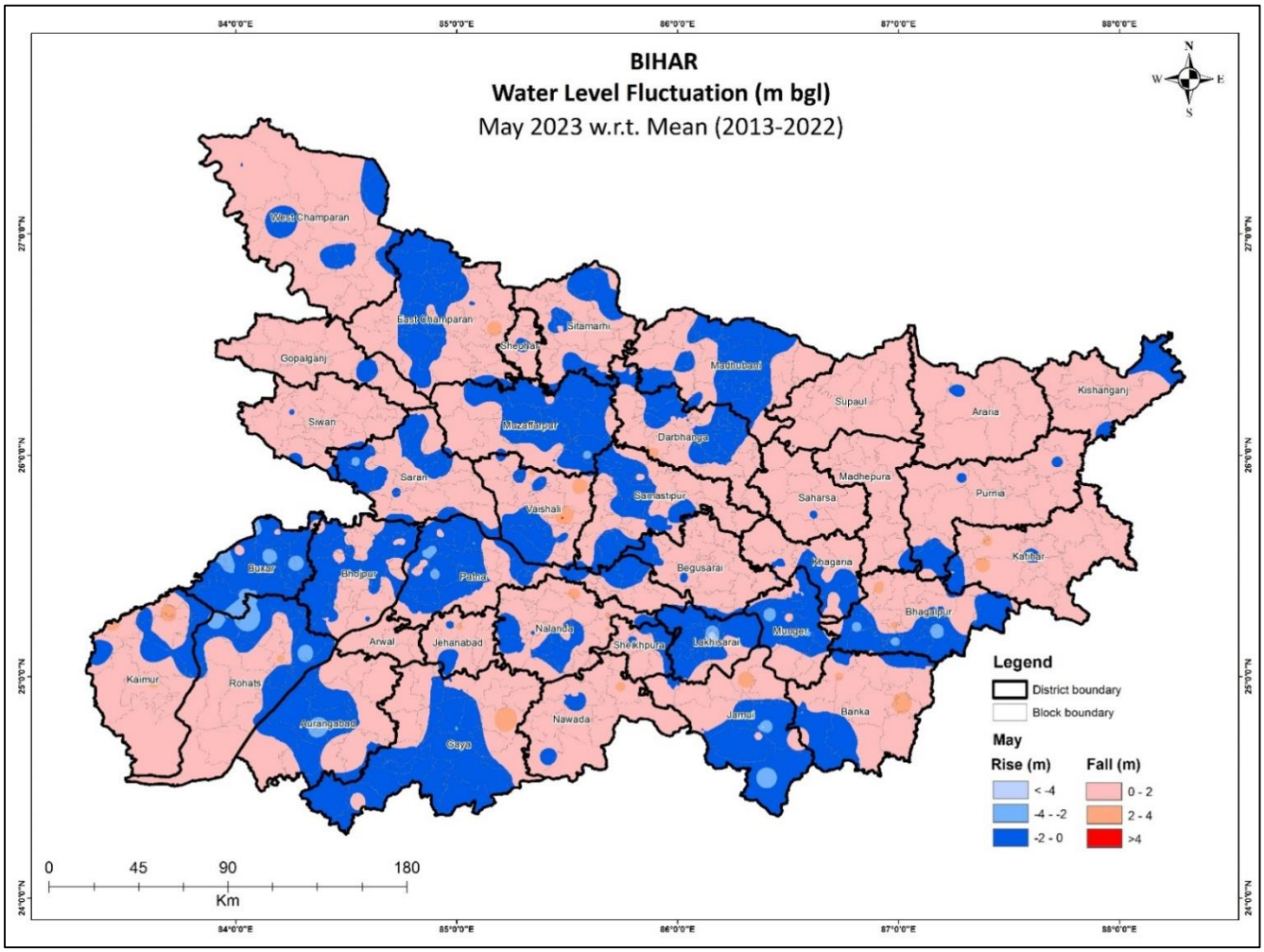


Figure 7: Ground water Level Fluctuation: Pre Monsoon 2023 w.r.t Decadal Mean

5.2.4 FLUCTUATION OF GROUNDWATER LEVEL IN ASSESSMENT YEAR (2023)

Water level of 603 HNS were analysed as to compare with the water level during May 2023. As per the comparison between Nov. 2023 and May 2023, rise of water level observed in 569 (94%) whereas, 34 (5 %) HNS have shown fall in water. The majority of HNS (322 well, 53%) have shown rise in the range of 0 to 2 m, whereas the 209 (34%) and 38 (6%) NHS have shown rise in water level rise 2 to 4 and > 4 mm respectively. The water level fluctuation has been depicted in **Figure 8.**

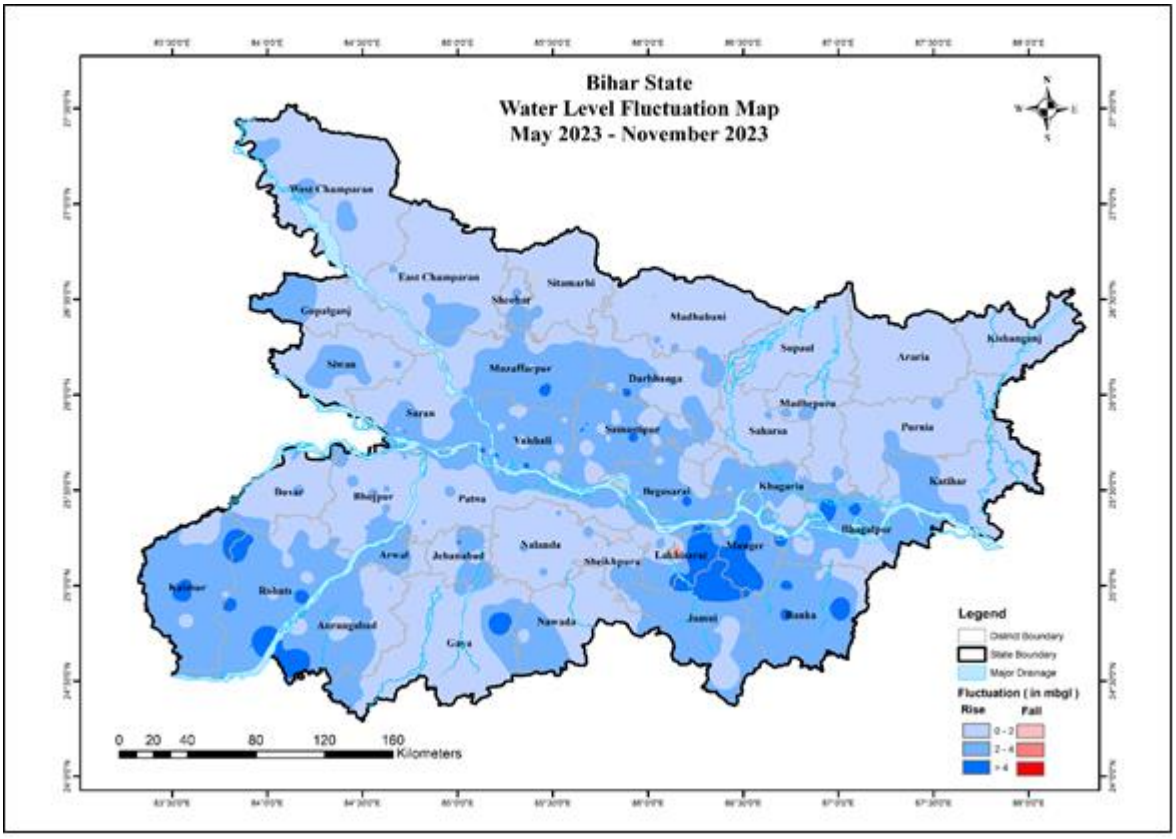


Figure 8: Ground water Level Fluctuation: Pre-monsoon 2023 compared to Post-monsoon 2023

CHAPTER 6

6. GROUND WATER RESOURCES OF BIHAR

6.1 ANNUAL GROUND WATER RECHARGE

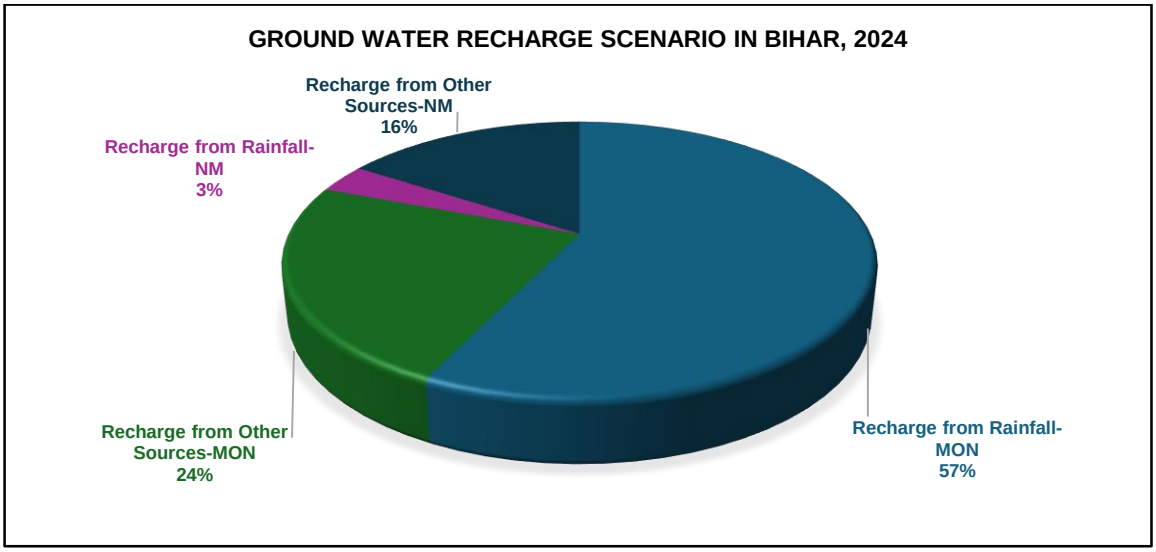
As per the 2024 assessment of Dynamic Ground Water Resources, the Total Annual Ground Water Recharge for the state of Bihar has been assessed as 34.14 bcm (billion cubic meter) and Total natural discharges works out to be 3.19 bcm. Hence, Annual Extractable Ground Water Resources for Bihar is 30.95 bcm.

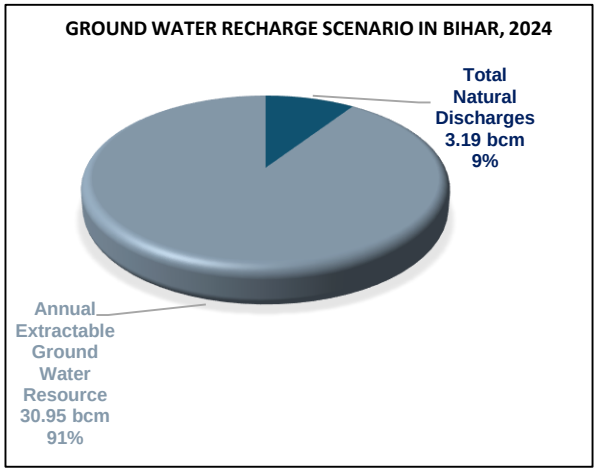
Rainfall recharge during monsoon and non-monsoon period is the major contributor of total annual groundwater recharge of the state of Bihar, which is 20.67 bcm or 60.54% of the total recharge (Monsoon season: 94.5%, Non-monsoon season: 5.5%) and the remaining 39.46%(Monsoon season: 59.7%, Non-monsoon season: 40.3%) or 13.47 bcm is from 'Other sources' viz. canal seepage, return flow from irrigation, recharge from tanks, ponds and water conservation structures taken together. (Fig-6.1). The contribution in Annual Ground Water Recharge from rainfall during monsoon season is more than 70% in the districts of Begusarai, Darbhanga, Khagaria, Nalanda, Samastipur, Sheikhpura and Sitamarhi**(Figure 7)**.

District-wise Ground Water Resources of Bihar (as in 2024) are given in Annexure-II and the district-wise figures are given in Annexure-II. The over-all scenario of ground water resource and extraction in the state is given in Figure 7. Annual Extractable Ground Water Resource of Bihar for GWRA 2024 is given in **Table 8**.

Volumetric estimates are dependent on the areal extent of the assessment units. To compare the ground water resource of different assessment units, the volumetric estimates of annual ground water recharge have been converted to depth units (m) by dividing the annual ground water recharge by the area of the respective assessment units (km^2). Spatial variation in annual ground water recharge (m) is shown in Fig-6.3. Annual Ground Water Recharge is significantly high in the Northern most parts of Bihar covering the districts of East Champaran, West Champaran, Purnea, Araria and Madhubani, where rainfall is plenty and thick piles of unconsolidated alluvial formations are conducive for recharge. Annual Ground Water Recharge in these regions varies from 0.25 to more than 0.5 m. The parts of north Bihar and alluvial belt adjoining river Ganga particularly the eastern extremity of the state also has relatively high annual ground water recharge, in the range 0.25 to more than 0.5 m. In Southern Bihar, particularly Munger, Sheikhpura, parts of Arwal and Nalanda that have varied aquifer disposition ranging from alluvium to marginal alluvium, the annual ground water recharge is scanty, mostly between 0.10 to 0.15 m. Similarly, in major parts of the Southern Bihar, covered with hard rock terrains, annual ground water recharge mostly ranges from 0.10 to 0.025 m. This is primarily because of comparatively low infiltration and storage capacity of the rock formations prevailing in the region. The remaining part of Central Bihar is mostly characterized by moderate recharge in the range of 0.10 to 0.25 m.

The overall estimate of Annual Ground Water Recharge for the state shows an increase of 0.19 bcm in the present assessment as compared to the last assessment i.e. 2023. The Annual Extractable Ground Water Resources shows increase of 0.24 bcm. The Annual Ground Water Extraction for irrigation, domestic and Industrial uses have increased by 0.35 bcm.





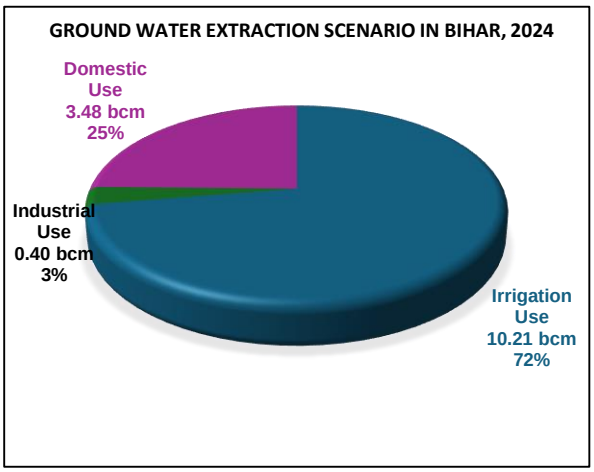


Figure 9: Ground Water Resource and Extraction Scenario in Bihar

Table 7: Annual Extractable Ground Water Recharge of Bihar 2024

S.No.	Name of District	Ground Water Recharge					Total Natural Discharges	Annual Extractable Ground Water Resource
		Monsoon Season		Non-Monsoon Season		Total Annual Ground Water Recharge		
		Recharge from rainfall	Recharge from other Sources	Recharge from Rainfall	Recharge from other Sources			
1	**ARARIA**	76581.72	44932.96	7485.44	31169.77	160169.89	14866.21	145303.68
2	**ARWAL**	10594.86	6582.82	0	3973.38	21151.06	2031.14	19119.92
3	**AURANGABAD**	49117.48	51355.76	1116.5	30936.05	132525.79	12799.57	119726.23
4	**BANKA**	43835.04	16524.95	915.09	8954.02	70229.10	6596.4	63632.68
5	**BEGUSARAI**	44245.15	3579.32	2724.84	5757.06	56306.37	5630.68	50675.69
6	**BHAGALPUR**	58336.95	8802.45	6287.29	5317.43	78744.12	7428.73	71315.39
7	**BHOJPUR**	47999.42	23694.10	1103.52	14948.80	87745.84	8774.58	78971.26
8	**BUXAR**	30622.56	18544.19	626.77	12012.53	61806.05	5667.75	56138.30
9	**DARBHANGA**	55273.13	9703.57	4990.37	7306.17	77273.24	7292.58	69980.65
10	**EAST CHAMPARAN**	90477.76	59410.82	5352.08	37885.32	193125.98	17367.36	175758.62
11	**GAYA**	92464.88	23670.48	2497.4	13752.93	132385.69	12905.13	119480.56
12	**GOPALGANJ**	46155.43	35273.25	1553.12	23429.26	106411.06	10518.46	95892.60
13	**JAMUI**	34130.14	8889.05	1686.34	5053.15	49758.68	4271.04	45487.64
14	**JEHANABAD**	17557.33	8232.53	462.46	6598.22	32850.54	3145.74	29704.79
15	**KAIMUR**	49702.42	20753.34	900.77	11632.96	82989.49	8094.88	74894.61
16	**KATIHAR**	82627.76	19264.18	7209.24	14268.59	123369.77	12134.18	111235.59
17	**KHAGARIA**	39660.12	2210.63	1883.05	5238.35	48992.15	4538.08	44454.07
18	**KISHANGANJ**	53513.00	2825.82	5300.16	2807.64	64446.62	5205.23	59241.40
19	**LAKHISARAI**	21472.95	11620.24	1279.31	7134.35	41506.85	4003.67	37503.18
20	**MADHEPURA**	38605.05	41279.07	3931.72	25022.32	108838.16	10447.84	98390.31
21	**MADHUBANI**	77162.85	33422.25	8011.77	23575.9	142172.77	11607.74	130565.01
22	**MUNGER**	26111.97	9830.39	1545.83	4118.05	41606.24	4026.19	37580.04
23	**MUZAFFARPUR**	74411.61	25605.83	4231.91	20002.28	124251.63	12251.72	111999.92
24	**NALANDA**	45991.18	9003.48	1283.24	7728.63	64006.53	6003.73	58002.80
25	**NAWADA**	46357.36	12733.14	2056.28	8184.00	69330.78	6761.13	62569.64
26	**PATNA**	75614.12	17499.10	1990.62	13281.99	108385.83	10248.12	98219.1
27	**PURNEA**	74894.54	49309.87	8812.19	33751.91	166768.51	15282.78	151485.74
28	**ROHTAS**	68382.86	32365.48	1554.07	16035.93	118338.34	11833.83	106504.5
29	**SAHARSA**	42335.83	13402.96	4221.66	9459.72	69420.17	5767.98	63652.19
30	**SAMASTIPUR**	67879.57	10363.42	3001.88	7756.75	89001.62	8567.37	80434.25
31	**SARAN**	55933.99	32419.73	2193.7	20610.92	111158.34	10892.26	100266.08
32	**SHEIKHPURA**	12609.23	2696.66	610.19	2090.8	18006.88	1675.62	16331.26
33	**SHEOHAR**	11894.64	3952.45	844.06	1728.44	18419.59	1708.31	16711.28
34	**SITAMARHI**	54419.65	5200.90	4163.59	3439.53	67223.67	5425.82	61797.85
35	**SIWAN**	50257.00	32048.82	887.50	25045.59	108238.91	10492.06	97746.85
36	**SUPAUL**	45038.71	30919.77	4815.78	26282.44	107056.7	9577.23	97479.47
37	**VAISHALI**	50503.40	17213.15	1783.69	11137.32	80637.56	7553.06	73084.5
38	**WEST CHAMPARAN**	91148.59	50081.11	4241.96	34746.37	180218.03	16104.7	164113.33
	Total (ham)	1953920	805218	113555.3	542174.8	3414868.6	319498.9	3095451
	Total (bcm)	19.54	8.05	1.14	5.42	34.15	3.19	30.95

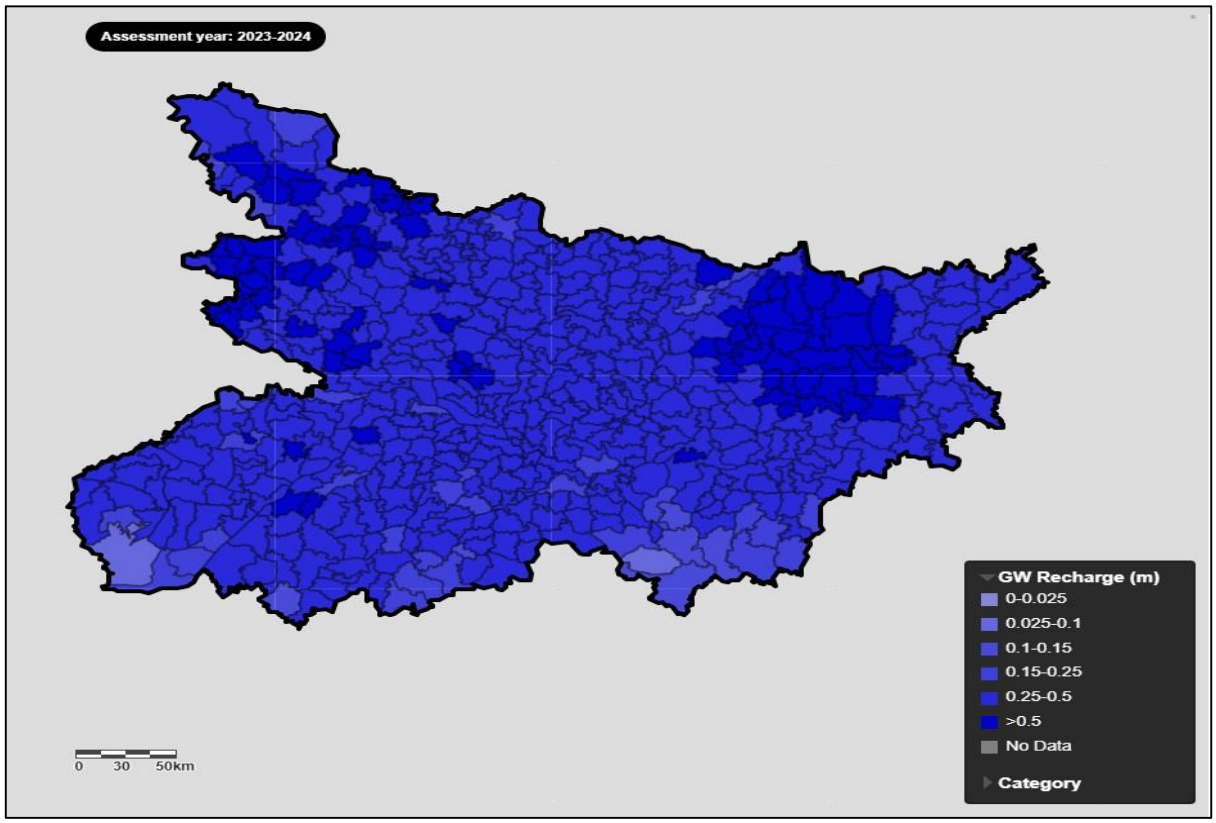


Figure 10: Spatial variation in annual ground water recharge (in m), 2024

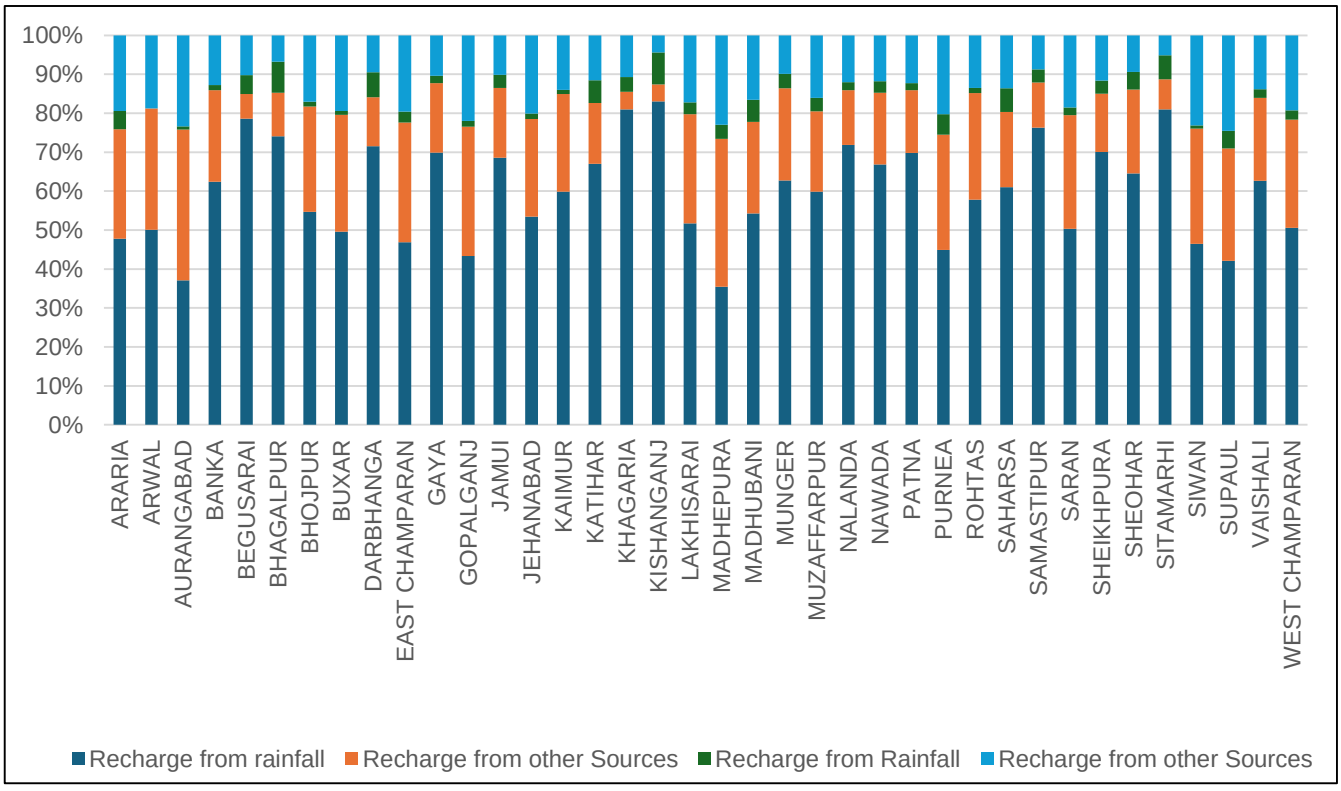


Figure 11: District wise contribution of recharge in Total Annual Ground Water Recharge of Bihar, 2024

6.2 ANNUAL EXTRACTABLE GROUND WATER RESOURCES

The assessment of ground water extraction is carried out considering the Minor Irrigation Census data and sample surveys carried out by the State Ground Water Departments. The Total Annual Ground Water Extraction of the state of Bihar for the year 2024 has been estimated as 14.1 bcm. The agriculture sector is the largest consumer of groundwater resources, accounting for 72.41% of the total annual groundwater extraction, which amounts to 10.21 bcm. The domestic use accounts for 24.68% (3.48 bcm), while industrial use represents 2.83% (0.4 bcm) of total annual groundwater extraction of the Country. In districts such as Banka, Darbhanga, Jamui and Munger the ground water extraction for domestic use is more than 30 % (Fig-6.5). Annual Ground Water Extraction of Bihar for GWRA 2024 is given in Table 9.

Table 8: Annual Ground Water Extraction of Bihar 2024

S.No.	Name of District	Annual Extractable Ground Water Resource	Current Annual Ground Water Extraction				Annual GW Allocation for Domestic use as on 2025	Net Ground Water Availability for future use	Stage of Ground Water Extraction (%)
			Irrigation	Industrial	Domestic	Total			
1	2	9	10	11	12	13	14	15	16
1	ARARIA	145303.68	21401.4	114.93	10437.64	31953.96	11422.16	113065.01	21.99
2	ARWAL	19119.92	6539.65	130.83	2541.86	9212.33	2663.27	9786.17	48.18
3	AURANGABAD	119726.23	23972.95	2630.1	9270.83	35873.86	9974.13	83149.07	29.96
4	BANKA	63632.68	17148.52	102.91	7163.41	24414.83	7718.42	38662.85	38.37
5	BEGUSARAI	50675.69	24338.4	76.89	9811.2	34226.51	10568	15692.38	67.54
6	BHAGALPUR	71315.39	19980.1	1197.15	7145.49	28322.76	7665.13	42472.99	39.71
7	BHOJPUR	78971.26	30755.01	727.29	8813.23	40295.52	9323.17	38165.82	51.03
8	BUXAR	56138.3	19695	494.28	5322.47	25511.78	5630.44	30318.55	45.44
9	DARBHANGA	69980.65	26175.9	793.6	12973.61	39943.13	13620.45	29390.66	57.08
10	EAST	175758.62	50372.55	7188.84	18566.48	76127.87	20740.41	98051.19	43.31
11	GAYA	119480.56	48117.14	2009.51	15289.81	65416.38	16469.22	53418.36	54.75
12	GOPALGANJ	95892.6	44955.9	513.05	8533.3	54002.25	8946.79	41518.89	56.32
13	JAMUI	45487.64	11867.69	14.75	6360.6	18243.03	6835.06	28428.49	40.11
14	JEHANABAD	29704.79	20381.99	5.13	3593.27	23980.4	3801.2	6557.15	80.73
15	KAIMUR	74894.61	26800.86	61.11	5725.62	32587.58	6159.97	41879.54	43.51
16	KATIHAR	111235.59	36735.84	157.03	10362.84	47255.67	11248.13	63298.72	42.48
17	KHAGARIA	44454.07	22362.98	17.79	5935.95	28316.72	6491.72	15581.59	63.7
18	KISHANGANJ	59241.4	14119.35	298.5	5983.59	20401.43	6552.17	38271.38	34.44
19	LAKHISARAI	37503.18	7281.24	86.3	3432.89	10800.42	3673.32	26462.36	28.8
20	MADHEPURA	98390.31	31160.7	145.76	7409.01	38715.46	8137.46	58946.4	39.35
21	MADHUBANI	130565.01	36016.89	8715	15658.41	60390.32	16806.78	69510.09	46.25
22	MUNGER	37580.04	8283.5	749.28	4462.5	13495.25	4697.7	23849.59	35.91
23	MUZAFFARPUR	111999.92	56792.95	1389.68	16102.79	74285.42	18201.96	37956.39	66.33
24	NALANDA	58002.8	34276.49	2000.79	9291.53	45568.79	9818.74	12632.27	78.56
25	NAWADA	62569.64	25166.4	83.6	5982.33	31232.3	6351.29	31110.76	49.92
26	PATNA	98219.1	42257.58	1433.96	16758.19	60449.74	17864.16	37595.63	61.55
27	PURNEA	151485.74	41442	1031.3	11082.33	53555.65	12029.1	96983.31	35.35
28	ROHTAS	106504.5	24046.83	247.28	9480.89	33775	9997.81	72212.62	31.71
29	SAHARSA	63652.19	17538.9	66	6237.65	23842.55	6708.21	39339.09	37.46
30	SAMASTIPUR	80434.25	40389	264.3	14531.02	55184.4	15596.7	24310.5	68.61
31	SARAN	100266.08	29125.2	173.9	12918.61	42217.61	13666.1	57300.97	42.11
32	SHEIKHPURA	16331.26	7438.2	2.4	2077.34	9517.95	2192.9	6697.75	58.28
33	SHEOHAR	16711.28	7145.7	181	2336.8	9663.54	2524.1	6860.43	57.83
34	SITAMARHI	61797.85	17228.7	88	11891.92	29208.59	12870.98	31610.2	47.26
35	SIWAN	97746.85	43973.72	218.81	10916.45	55108.97	11593.96	41960.39	56.38
36	SUPAUL	97479.47	24035.4	71.3	7801.84	31908.53	8478.84	64893.93	32.73
37	VAISHALI	73084.5	33371.84	2263.29	11712.33	47347.44	13253.87	26793.45	64.78
38	WEST	164113.33	28437.72	4396	14384.02	47217.75	15671.2	115608.39	28.77
	Total (ham)	3095451	1021130.2	40141.63	348300.04	1409571.7	375965.02	1670343.3	45.54
	Total (bcm)	30.95	10.21	0.4	3.48	14.1	3.76	16.7	45.54

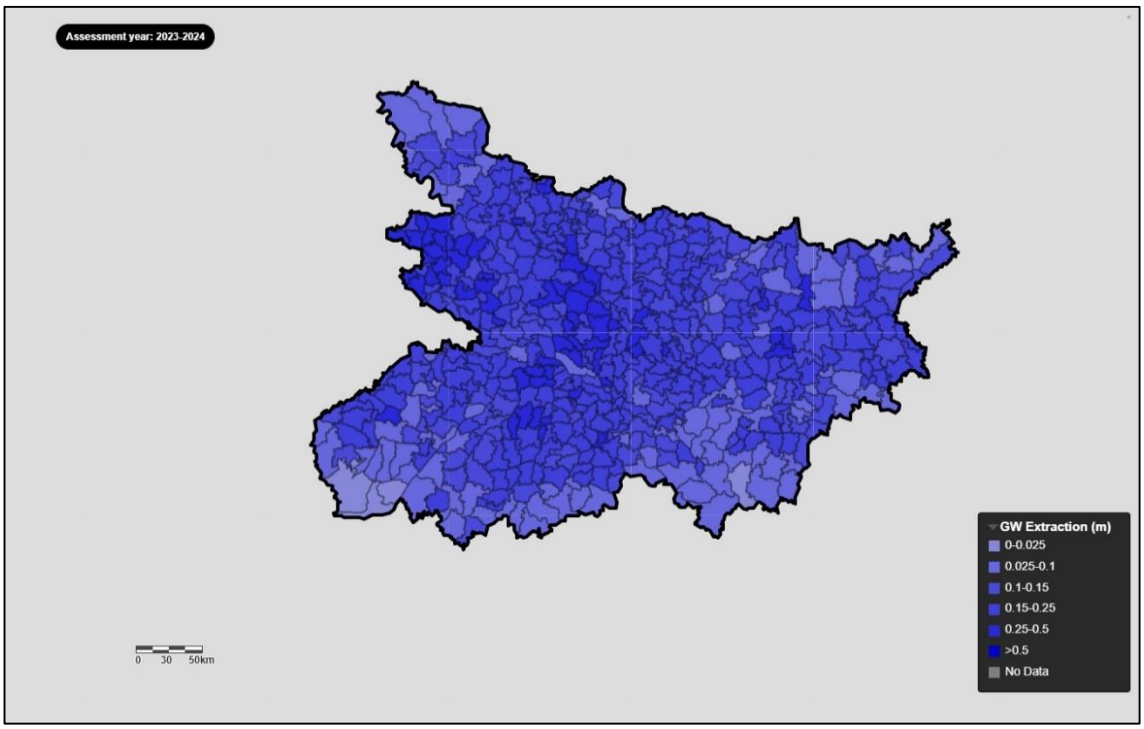


Figure 12: Spatial variation in annual ground water extraction (in m), 2024

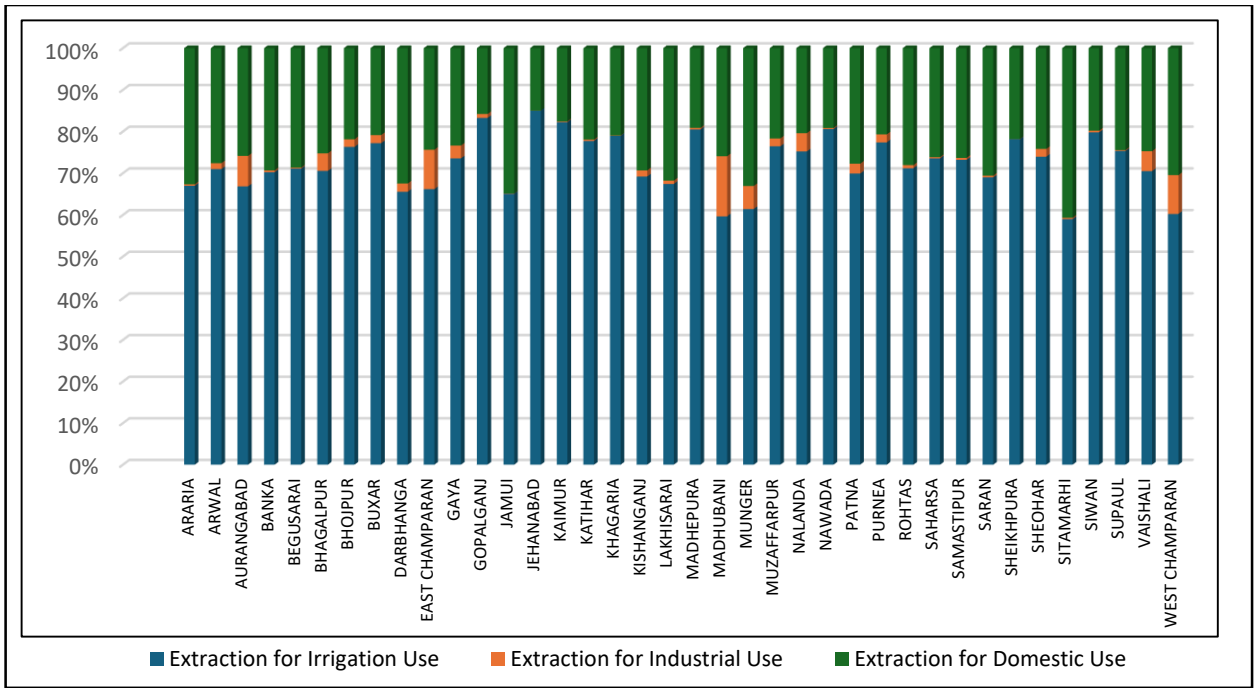


Figure 13: District wise extraction for Irrigation, Industrial and Domestic Use in Bihar (GWRA 2024)

6.3 STAGE OF GROUND WATER EXTRACTION

The overall stage of groundwater extraction (SOGE) in the state of Bihar is 45.54%. The stage of ground water extraction is highest in the districts of Jehanabad, Nalanda where the stage of groundwater extraction is between 75-85%. In the districts of Vaishali, Samastipur, Muzaffarpur, Begusarai, Patna and Khagaria the stage of ground water extraction is between 70-60%. In rest of the districts, the stage of ground water extraction is below 60 %. Categorization of Assessment units on the basis of SOGE, as per GWRA 2024 is given in Fig 6.6.

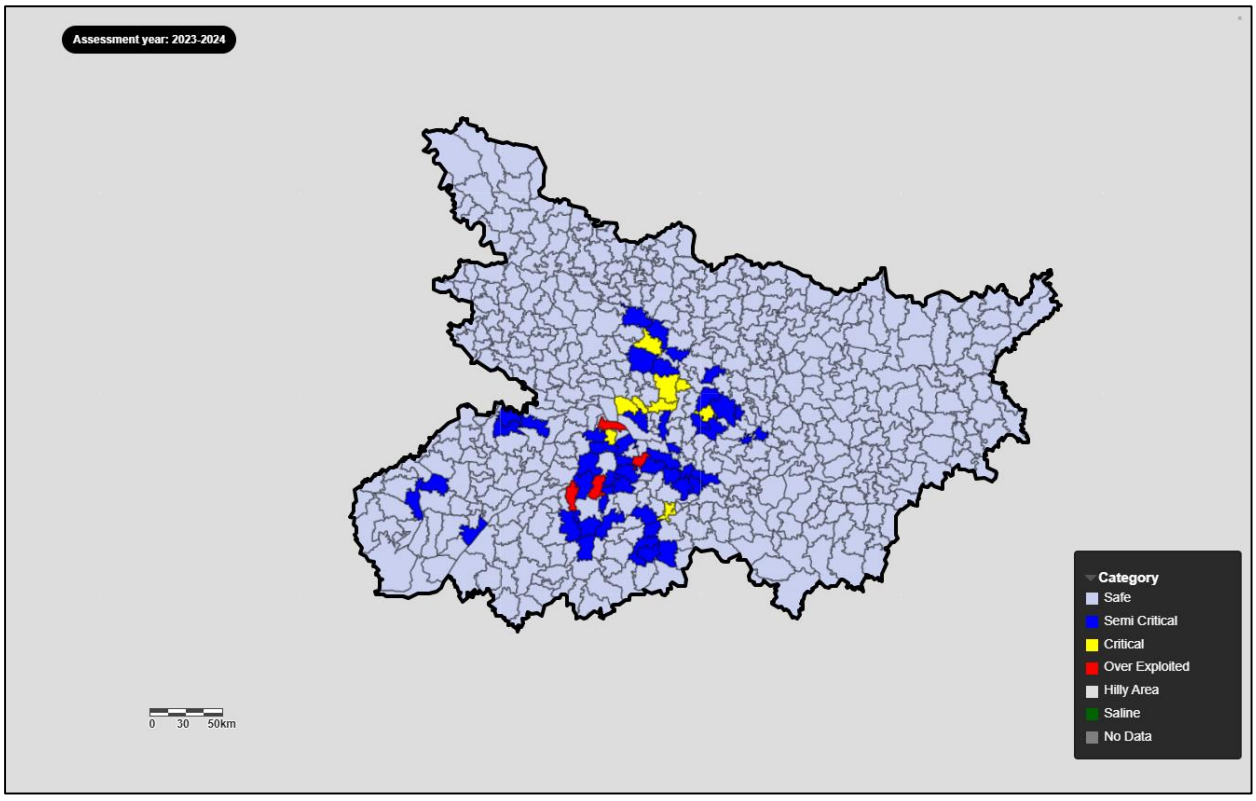


Figure 14: Spatial variation in categorization of Assessment Units (AU)

6.4 CATEGORIZATION OF ASSESSMENT UNITS

Out of the total 535 assessment units (Blocks/ Urban areas), 4 (0.75%) has been categorized as 'Over-exploited', 9 (1.68%) as 'Critical', 49 (9.15%) as 'Semi-critical', and 473 (88.41%) units as 'Safe', as illustrated in Fig. 6.7. The State-wise and District-wise numbers of assessment units under different categories are given in **Annexure III (A) and Annexure III (B)** respectively. The percentage of Over-exploited and Critical administrative units are approximately 10 % of the total units are in Jehanabad, Vaishali, Sheikhpura, Muzaffarpur, Nalanda and Samastipur. The District-wise name of the assessment units under Over-exploited, Critical and Semi-critical categories and Quality problems in assessment units are given in **Annexure IV (A) and Annexure IV (B)** respectively. Similarly out of 90.35 thousand sq km recharge worthy area of the country, 0.87 thousand sq km (0.96 %) are under 'Over-Exploited', 0.84 thousand sq km (0.89 %) are under 'Critical', 7.42 thousand sq km (8.21 %) are under 'Semi-Critical', 81.26 thousand sq km (89.94 %) are under 'Safe'. State-wise and District-wise details are given in **Annexure III (E) and Annexure III (F)** respectively. Out of 30.72 bcm of Total Annual Extractable Resources of the country, 0.28 bcm (0.92%) are under 'Over-Exploited', 0.24 bcm (0.77%) are under 'Critical', 2.17 bcm (7.06%) are under 'Semi-Critical', 28.03 bcm (91.24 %) are under 'Safe' category assessment units. State/UT-wise and District-wise details are given in **Annexure III (C) and Annexure III (D)** respectively.

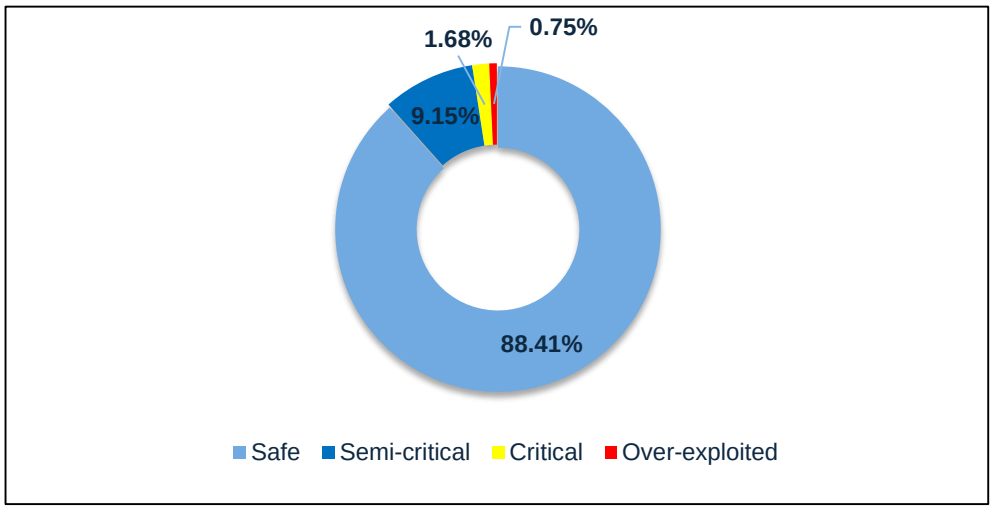


Figure 15: Assessment Units as per GWRA 2024

6.5 COMPARIOSN WITH PREVIOUS ASSESSMENT

The gross annual dynamic groundwater resource available as on 31st March 2023 for the state of Bihar was 30.72 BCM, whereas it has been worked out to be 30.95 BCM for the year 2024. There is about 0.78 % increase in the dynamic groundwater resources from previous estimation. The gross annual groundwater draft for assessment year 2023 worked out to be 13751 MCM where as it was 13502 MCM in previous estimation. There is about 1.84% increase in the groundwater draft from previous estimation. The stage of groundwater development of the state of Bihar for the assessment year 2024 is worked out as 45.54 %, whereas it was 44.76 % in assessment year 2023.

This variation of annual dynamic groundwater resources is due to demarcation of recharge area into canal command and non-command area by utilizing canal network data (given in fig. 6.8), changes in factors like normalization, depth to water level etc due to different years of estimation. Slight variations in recharge, both from canal sources and rainfall has been observed. The revival and renovation of tanks and water bodies as part of the Jal Jeevan Hariyali Mission, initiated by the Government of Bihar, resulted in a marginal increase in recharge from surface water sources and surface water irrigation. Ground Water Resource figures for the year 2004 to 2024 are given in table 5.5 and fig 5.10.The district wise summary of assessment units improved or deteriorated from 2023 to 2024 assessment and detailed comparison of categorization of assessment units from 2023 and 2024 are given in **Annexure V (A) and Annexure V(B)** respectively**.** For further evaluation, an illustration of resource comparison between 2023 and 2024 is given in fig (5.11) and table (5.6)

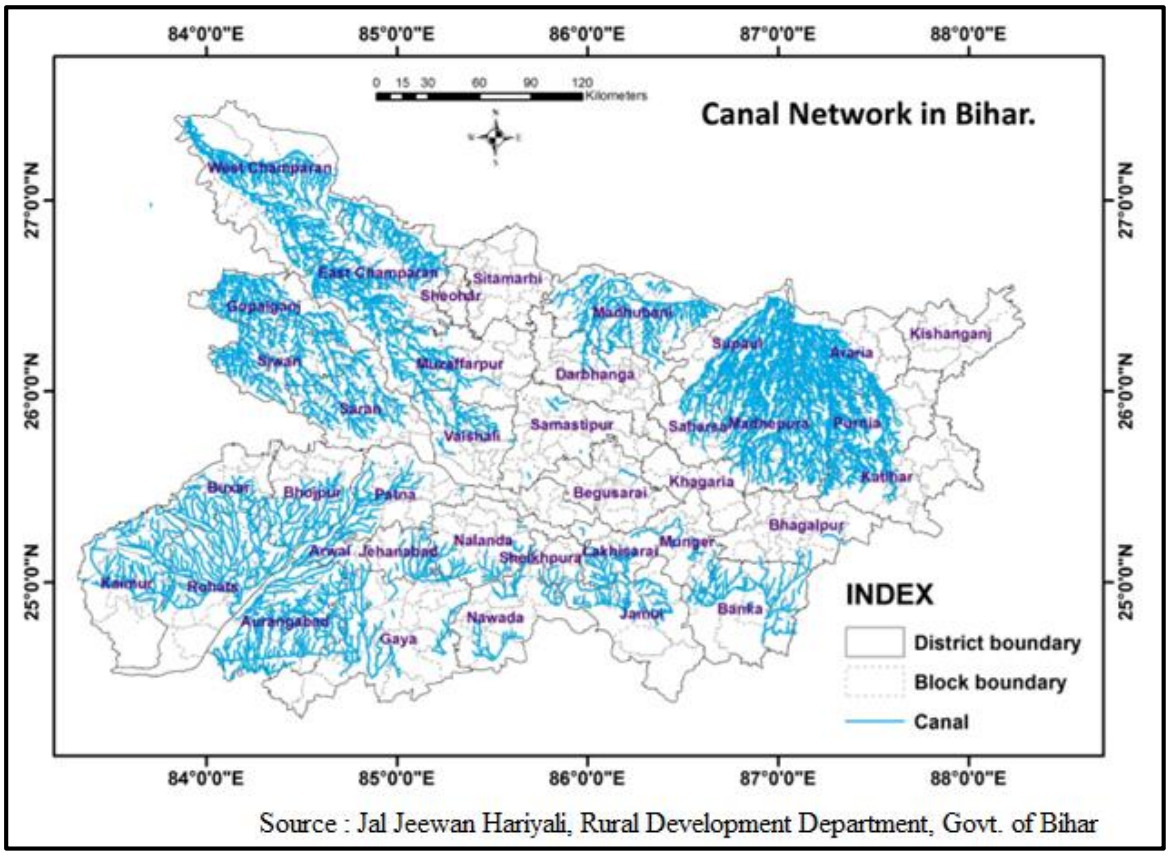


Figure 16: Map showing Canal network in Bihar state, GWRA 2023

Table 9: Ground Water Resource Figures of Previous Estimations

S. No.	Year of Assessment	Annual Extractable Ground Water Resource (MCM)	Gross Annual Ground Water Extraction for all uses (MCM)	Stage of Ground Water Extraction (%)
1	2004	27421	10766	39.26
2	2009	26206	11355	43.33
3	2011	26870	11892	44.26
4	2013	28487	12732	44.69
5	2017	28988	13264	45.76
6	2020	25456	13019	51.14
7	2022	30042	13502	44.94
8	2023	30719	13751	44.76
9	2024	30954	14095	45.54

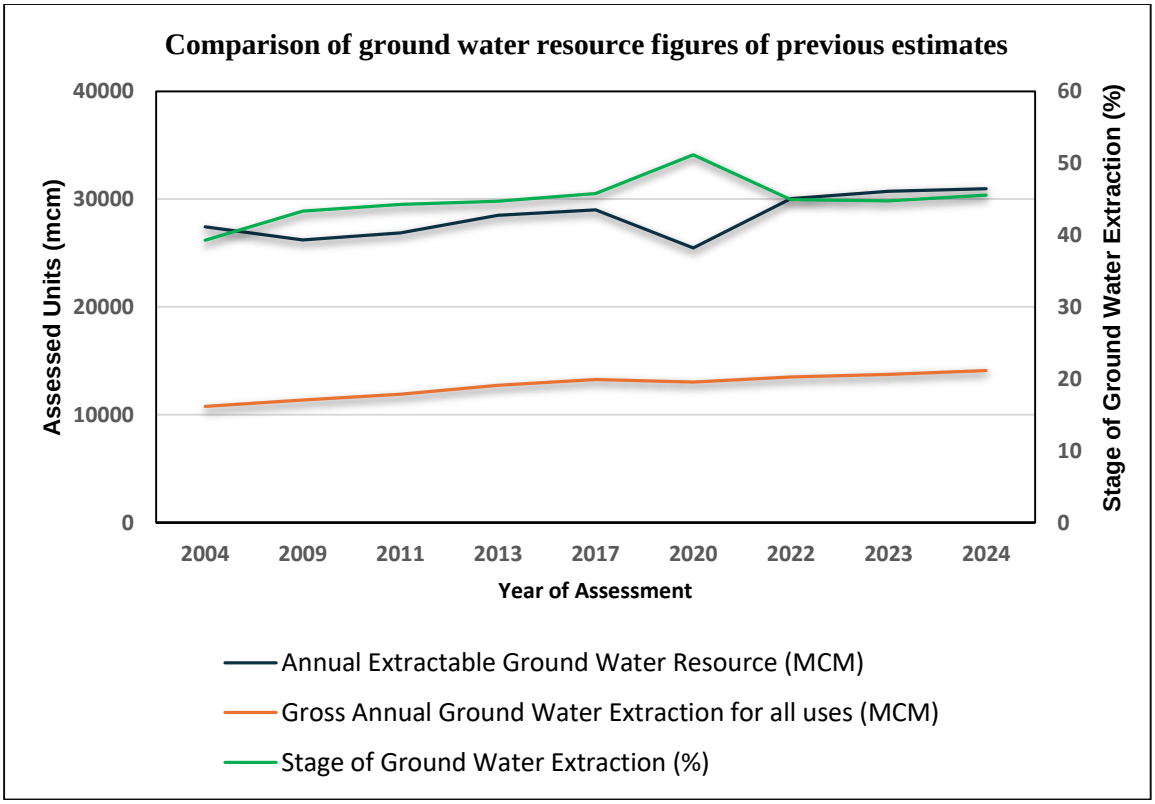


Figure 17: Comparison of ground water resource figures of previous estimates

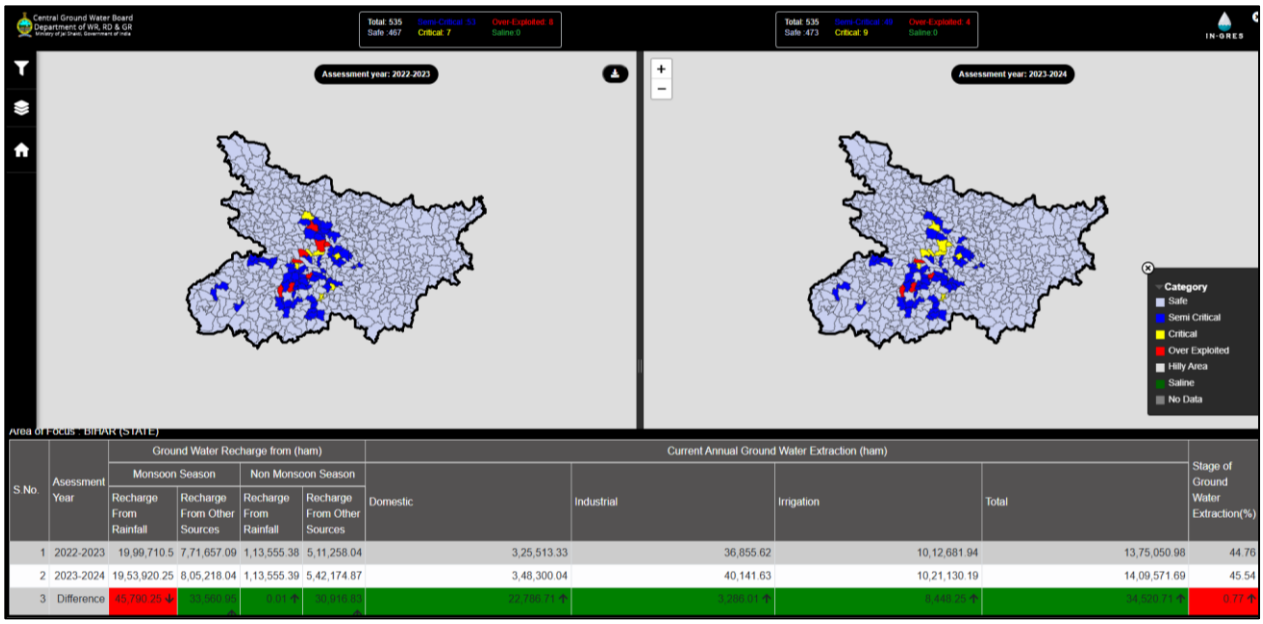


Figure 18: Illustration for Comparison of categorization of Assessment Units of 2024 w.r.t. 2023

Table 10: Comparison of Categorization of Assessment Units of 2023 w.r.t. 2024

S.No.	Name of District	Name of Assessment Unit	Stage of Ground Water Extraction (%)2023	Stage of Ground Water Extraction (%)2024	Remark
1	BHOJPUR	KOILWAR	84.08	68.25	Improved
2	MUZAFFARPUR	GAIGHAT	72.06	65.67	Improved
3	MUZAFFARPUR	MINAPUR	95.45	81.81	Improved
4	MUZAFFARPUR	MUSHAHARI	115.95	96.69	Improved
5	MUZAFFARPUR	KANTI	73.01	54.16	Improved
6	MUZAFFARPUR	MURAUL (DHOLI)	77.73	65.11	Improved
7	NALANDA	PARWALPUR	71.52	56.80	Improved
8	NALANDA	RAHUI	58.88	79.21	Deteriorated
9	PATNA	DHANARUA	86.92	69.42	Improved
10	SAMASTIPUR	SARAIRANJAN	83.35	65.43	Improved
11	SAMASTIPUR	TAJPUR	108.03	97.77	Improved
12	SAMASTIPUR	KALYANPUR	71.82	67.45	Improved
13	SAMASTIPUR	WARISNAGAR	54.29	72.48	Deteriorated
14	SHEIKHPURA	BARBIGHA	94.84	88.97	Improved
15	VAISHALI	HAJIPUR	103.63	93.38	Improved
16	VAISHALI	PATEPUR	108.14	98.50	Improved

CHAPTER 7

7. DISTRICT WISE GROUND WATER RESOURCE SCENARIO OF BIHAR

According to GWRA 2023, out of the total 535 assessment units, distributed among 38 districts in state of Bihar (blocks + Patna Urban), 8 units (1.50 %) are 'Over-exploited', 7 units (1.31 %) are 'Critical', 53 units (9.91 %) are 'Semi-Critical', 467 units (87.29 %) units are 'Safe' category. There is no 'Saline' block in the State.

Similarly, out of 90348.70 sq. km recharge worthy area of the State, 867.8 sq km (0.96 %) area is under 'Over-Exploited', 803.91 sq. km (0.89 %) under 'Critical', 7417.08 sq. km (8.21 %) under 'Semi-critical', 81259.91 sq. km (89.94 %) under 'Safe' categories of assessment units. Out of total 30718.81 mcm annual extractable ground water resources of the State, 283.46 mcm (0.92 %) are under 'Over-exploited', 237.4 mcm (0.77 %) under 'Critical', 2168.92 mcm (7.06 %) under 'Semi-critical' and 28029.03 mcm (91.24 %) are under 'Safe' categories of assessment units.

All districts of Bihar lie under 'Safe' category (S.O.G.E < 70 %) except for the districts of Jehanabad (S.O.G.E = 82.21 %) and Nalanda (S.O.G.E = 75.65 %), which lie under 'Semi-critical' category. The ground water conditions, its availability and utilization scenario and categorization of assessment units in different districts are given in **Annexure I, II, III& IV**. District wise summaries are given below.

1. Araria

Dynamic Ground water resources of Araria district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 278937 ha of geographical area, 278937 ha is ground water recharge worthy area. There are 9 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 137179.75 ham and ground water extraction for irrigation use, industrial use and domestic use is 26373.62 ham, 114.00 ham, 9289.55 ham respectively. Ground water extraction for all uses in the district is 35777.16 ham, making stage of ground water extraction 26.08 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 9930.12 ham in the district.9 block/urban area in the district are categorized as safe.

2. Arwal

Dynamic Ground water resources of Arwal district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 63683 ha of geographical area, 63683 ha is ground water recharge worthy area. There are 5 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 19005.67 ham and ground water extraction for irrigation use, industrial use and domestic use is 5561.32 ham, 129.00 ham, 2532.87 ham respectively. Ground water extraction for all uses in the district is 8223.18 ham, making stage of ground water extraction 43.27 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 2707.53 ham in the district.5 block/urban area in the district are categorized as safe.

3. Aurangabad

Dynamic Ground water resources of Aurangabad district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 330284 ha of geographical area, 309054 ha is ground water recharge worthy area. There are 11 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 122821.20 ham and ground water extraction for irrigation use, industrial use and domestic use is 19647.43 ham, 2630.10 ham, 8583.46 ham respectively. Ground water extraction for all uses in the district is 30861.03 ham, making stage of ground water extraction 25.13 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 9175.33 ham in the district.11 block/urban area in the district are categorized as safe.

4. Banka

Dynamic Ground water resources of Banka district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 301954 ha of geographical area, 267300 ha is ground water recharge worthy area. There are 11 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 59246.03 ham and ground water extraction for irrigation use, industrial use and domestic use is 11331.27 ham, 94.12 ham, 6607.92 ham respectively. Ground water extraction for all uses in the district is 18033.31 ham, making stage of ground water extraction 30.44 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 7063.57 ham in the district.11 block/urban area in the district are categorized as safe.

5. Begusarai

Dynamic Ground water resources of Begusarai district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 189131 ha of geographical area, 189131 ha is ground water recharge worthy area. There are 18 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 49382.55 ham and ground water extraction for irrigation use, industrial use and domestic use is 22021.73 ham, 73.20 ham, 9122.88 ham respectively. Ground water extraction for all uses in the district is 31217.81 ham, making stage of ground water extraction 63.22 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 9751.95 ham in the district.14 block/urban area in the district are categorized as safe.

6. Bhagalpur

Dynamic Ground water resources of Bhagalpur district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 260255 ha of geographical area, 260255 ha is ground water recharge worthy area. There are 16 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 69329.49 ham and ground water extraction for irrigation use, industrial use and domestic use is 17599.23 ham, 1104.84 ham, 6664.16 ham respectively. Ground water extraction for all uses in the district is 25368.22 ham, making stage of ground water extraction 36.59 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 7123.72 ham in the district.16 block/urban area in the district are categorized as safe.

7. Bhojpur

Dynamic Ground water resources of Bhojpur district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 227530 ha of geographical area, 227530 ha is ground

water recharge worthy area. There are 14 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 80277.16 ham and ground water extraction for irrigation use, industrial use and domestic use is 28673.57 ham, 715.45 ham, 8532.48 ham respectively. Ground water extraction for all uses in the district is 37921.51 ham, making stage of ground water extraction 47.24 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 9120.84 ham in the district.10 block/urban area in the district are categorized as safe.

8. Buxar

Dynamic Ground water resources of Buxar district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 171006 ha of geographical area, 171006 ha is ground water recharge worthy area. There are 11 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 58651.22 ham and ground water extraction for irrigation use, industrial use and domestic use is 19272.33 ham, 486.95 ham, 5152.92 ham respectively. Ground water extraction for all uses in the district is 24912.20 ham, making stage of ground water extraction 42.48 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 5508.25 ham in the district.11 block/urban area in the district are categorized as safe.

9. Darbhanga

Dynamic Ground water resources of Darbhanga district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 250429 ha of geographical area, 250429 ha is ground water recharge worthy area. There are 18 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 68104.12 ham and ground water extraction for irrigation use, industrial use and domestic use is 22006.67 ham, 793.60 ham, 12847.21 ham respectively. Ground water extraction for all uses in the district is 35647.50 ham, making stage of ground water extraction 52.34 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 13733.09 ham in the district.18 block/urban area in the district are categorized as safe.

10. East Champaran

Dynamic Ground water resources of East Champaran district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 395887 ha of geographical area, 395887 ha is ground water recharge worthy area. There are 27 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 173333.00 ham and ground water extraction for irrigation use, industrial use and domestic use is 51125.81 ham, 7176.69 ham, 16656.38 ham respectively. Ground water extraction for all uses in the district is 74958.88 ham, making stage of ground water extraction 43.25 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 18240.72 ham in the district. 27 block/urban area in the district are categorized as safe.

11. Gaya

Dynamic Ground water resources of Gaya district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 498586 ha of geographical area, 490978 ha is ground water recharge worthy area. There are 24 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 112408.56 ham and ground water extraction for

irrigation use, industrial use and domestic use is 39563.56 ham, 364.68 ham, 14115.09 ham respectively. Ground water extraction for all uses in the district is 54043.27 ham, making stage of ground water extraction 48.08 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 15088.38 ham in the district. 20 block/urban area in the district are categorized as safe.

12. Gopalganj

Dynamic Ground water resources of Gopalganj district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 201913 ha of geographical area, 201913 ha is ground water recharge worthy area. There are 14 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 91812.58 ham and ground water extraction for irrigation use, industrial use and domestic use is 36196.74 ham, 511.21 ham, 8485.39 ham respectively. Ground water extraction for all uses in the district is 45193.39 ham, making stage of ground water extraction 49.22 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 9070.51 ham in the district. 14 block/urban area in the district are categorized as safe.

13. Jamui

Dynamic Ground water resources of Jamui district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 309826 ha of geographical area, 255114 ha is ground water recharge worthy area. There are 10 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 42789.06 ham and ground water extraction for irrigation use, industrial use and domestic use is 8057.04 ham, 8.45 ham, 5906.21 ham respectively. Ground water extraction for all uses in the district is 13971.72 ham, making stage of ground water extraction 32.65 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 6313.45 ham in the district. 10 block/urban area in the district are categorized as safe.

14. Jehanabad

Dynamic Ground water resources of Jehanabad district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 93257 ha of geographical area, 93257 ha is ground water recharge worthy area. There are 7 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 28595.37 ham and ground water extraction for irrigation use, industrial use and domestic use is 20029.64 ham, 0.00 ham, 3478.81 ham respectively. Ground water extraction for all uses in the district is 23508.45 ham, making stage of ground water extraction 82.21 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 3718.69 ham in the district. 2 block/urban area in the district are categorized as safe.

15. Kaimur

Dynamic Ground water resources of Kaimur district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 336206 ha of geographical area, 298040 ha is ground water recharge worthy area. There are 11 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 72101.38 ham and ground water extraction for irrigation use, industrial use and domestic use is 21918.90 ham, 32.67 ham, 5301.10 ham respectively. Ground water extraction for all uses in the district is 27252.65 ham, making stage of

ground water extraction 37.80 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 5666.63 ham in the district. 10 block/urban area in the district are categorized as safe.

16. Katihar

Dynamic Ground water resources of Katihar district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 300991 ha of geographical area, 300991 ha is ground water recharge worthy area. There are 16 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 114409.74 ham and ground water extraction for irrigation use, industrial use and domestic use is 51373.99 ham, 120.78 ham, 9393.91 ham respectively. Ground water extraction for all uses in the district is 60888.69 ham, making stage of ground water extraction 53.22 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 10041.67 ham in the district. 16 block/urban area in the district are categorized as safe.

17. Khagaria

Dynamic Ground water resources of Khagaria district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 148572 ha of geographical area, 148572 ha is ground water recharge worthy area. There are 7 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 43777.08 ham and ground water extraction for irrigation use, industrial use and domestic use is 20747.50 ham, 17.79 ham, 5290.43 ham respectively. Ground water extraction for all uses in the district is 26055.72 ham, making stage of ground water extraction 59.52 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 5655.24 ham in the district. 7 block/urban area in the district are categorized as safe.

18. Kishanganj

Dynamic Ground water resources of Kishanganj district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 191143 ha of geographical area, 191143 ha is ground water recharge worthy area. There are 7 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 68632.20 ham and ground water extraction for irrigation use, industrial use and domestic use is 19352.99 ham, 298.50 ham, 5317.98 ham respectively. Ground water extraction for all uses in the district is 24969.48 ham, making stage of ground water extraction 36.38 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 5684.67 ham in the district. 7 block/urban area in the district are categorized as safe.

19. Lakhisarai

Dynamic Ground water resources of Lakhisarai district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 122774 ha of geographical area, 114494 ha is ground water recharge worthy area. There are 7 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 37685.55 ham and ground water extraction for irrigation use, industrial use and domestic use is 10576.92 ham, 4.20 ham, 3222.16 ham respectively. Ground water extraction for all uses in the district is 13803.27 ham, making stage of ground water extraction 36.63 % as a whole for the district. Annual Ground water allocation for

domestic use as on 2025 is calculated to be 3444.33 ham in the district. 7 block/urban area in the district are categorized as safe.

20. Madhepura

Dynamic Ground water resources of Madhepura district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 178840 ha of geographical area, 178840 ha is ground water recharge worthy area. There are 13 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 95232.53 ham and ground water extraction for irrigation use, industrial use and domestic use is 32371.52 ham, 124.20 ham, 6542.17 ham respectively. Ground water extraction for all uses in the district is 39037.84 ham, making stage of ground water extraction 40.99 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 6993.29 ham in the district. 13 block/urban area in the district are categorized as safe.

21. Madhubani

Dynamic Ground water resources of Madhubani district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 348645 ha of geographical area, 348645 ha is ground water recharge worthy area. There are 21 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 123684.06 ham and ground water extraction for irrigation use, industrial use and domestic use is 28520.58 ham, 9132.60 ham, 14582.38 ham respectively. Ground water extraction for all uses in the district is 52235.54 ham, making stage of ground water extraction 42.23 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 15587.92 ham in the district. 21 block/urban area in the district are categorized as safe.

22. Munger

Dynamic Ground water resources of Munger district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 139550 ha of geographical area, 133142 ha is ground water recharge worthy area. There are 9 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 34864.58 ham and ground water extraction for irrigation use, industrial use and domestic use is 6004.08 ham, 735.18 ham, 4382.62 ham respectively. Ground water extraction for all uses in the district is 11121.89 ham, making stage of ground water extraction 31.90 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 4684.81 ham in the district. 9 block/urban area in the district are categorized as safe.

23. Muzaffarpur

Dynamic Ground water resources of Muzaffarpur district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 304277 ha of geographical area, 304277 ha is ground water recharge worthy area. There are 16 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 106896.64 ham and ground water extraction for irrigation use, industrial use and domestic use is 55501.95 ham, 1279.35 ham, 15242.84 ham respectively. Ground water extraction for all uses in the district is 72024.15 ham, making stage of ground water extraction 67.38 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 16293.90 ham in the district. 7 block/urban area in the district are categorized as safe.

24. Nalanda

Dynamic Ground water resources of Nalanda district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 234996 ha of geographical area, 231646 ha is ground water recharge worthy area. There are 20 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 55886.05 ham and ground water extraction for irrigation use, industrial use and domestic use is 31400.15 ham, 1852.01 ham, 9023.03 ham respectively. Ground water extraction for all uses in the district is 42275.19 ham, making stage of ground water extraction 75.65 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 9645.24 ham in the district. 8 block/urban area in the district are categorized as safe.

25. Nawada

Dynamic Ground water resources of Nawada district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 248657 ha of geographical area, 245658 ha is ground water recharge worthy area. There are 14 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 61735.07 ham and ground water extraction for irrigation use, industrial use and domestic use is 24664.50 ham, 65.40 ham, 5733.56 ham respectively. Ground water extraction for all uses in the district is 30463.47 ham, making stage of ground water extraction 49.35 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 6128.91 ham in the district. 9 block/urban area in the district are categorized as safe.

26. Patna

Dynamic Ground water resources of Patna district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 320084 ha of geographical area, 320084 ha is ground water recharge worthy area. There are 24 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 97875.01 ham and ground water extraction for irrigation use, industrial use and domestic use is 41773.94 ham, 420.12 ham, 15885.77 ham respectively. Ground water extraction for all uses in the district is 58079.83 ham, making stage of ground water extraction 59.34 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 16981.15 ham in the district. 16 block/urban area in the district are categorized as safe.

27. Purnea

Dynamic Ground water resources of Purnea district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 320239 ha of geographical area, 320239 ha is ground water recharge worthy area. There are 14 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 156928.58 ham and ground water extraction for irrigation use, industrial use and domestic use is 40342.46 ham, 1031.30 ham, 10046.13 ham respectively. Ground water extraction for all uses in the district is 51419.90 ham, making stage of ground water extraction 32.77 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 10738.84 ham in the district. 14 block/urban area in the district are categorized as safe.

28. Rohtas

Dynamic Ground water resources of Rohtas district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 383926 ha of geographical area, 375143 ha is ground water recharge worthy area. There are 19 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 113261.90 ham and ground water extraction for irrigation use, industrial use and domestic use is 36123.43 ham, 194.40 ham, 9263.50 ham respectively. Ground water extraction for all uses in the district is 45581.33 ham, making stage of ground water extraction 40.24 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 9902.25 ham in the district. 17 block/urban area in the district are categorized as safe.

29. Saharsa

Dynamic Ground water resources of Saharsa district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 166128 ha of geographical area, 166128 ha is ground water recharge worthy area. There are 10 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 69934.66 ham and ground water extraction for irrigation use, industrial use and domestic use is 18586.21 ham, 63.00 ham, 5780.78 ham respectively. Ground water extraction for all uses in the district is 24430.02 ham, making stage of ground water extraction 34.93 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 6179.39 ham in the district. 10 block/urban area in the district are categorized as safe.

30. Samastipur

Dynamic Ground water resources of Samastipur district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 261287 ha of geographical area, 261287 ha is ground water recharge worthy area. There are 20 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 79730.79 ham and ground water extraction for irrigation use, industrial use and domestic use is 41098.05 ham, 264.30 ham, 13532.46 ham respectively. Ground water extraction for all uses in the district is 54894.82 ham, making stage of ground water extraction 68.85 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 14465.58 ham in the district.13 block/urban area in the district are categorized as safe.

31. Saran

Dynamic Ground water resources of Saran district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 262957 ha of geographical area, 262957 ha is ground water recharge worthy area. There are 20 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 96876.16 ham and ground water extraction for irrigation use, industrial use and domestic use is 38139.93 ham, 170.35 ham, 12507.08 ham respectively. Ground water extraction for all uses in the district is 50817.35 ham, making stage of ground water extraction 52.46 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 13369.51 ham in the district. 20 block/urban area in the district are categorized as safe.

32. Sheikhpura

Dynamic Ground water resources of Sheikhpura district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 68809 ha of geographical area, 66259 ha is ground

water recharge worthy area. There are 6 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 16061.77 ham and ground water extraction for irrigation use, industrial use and domestic use is 6732.45 ham, 2.40 ham, 2023.49 ham respectively. Ground water extraction for all uses in the district is 8758.33 ham, making stage of ground water extraction 54.53 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 2163.02 ham in the district. 5 block/urban area in the district are categorized as safe.

33. Sheohar

Dynamic Ground water resources of Sheohar district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 44299 ha of geographical area, 44299 ha is ground water recharge worthy area. There are 5 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 16438.72 ham and ground water extraction for irrigation use, industrial use and domestic use is 7958.25 ham, 7.00 ham, 2142.75 ham respectively. Ground water extraction for all uses in the district is 10108.00 ham, making stage of ground water extraction 61.49 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 2290.50 ham in the district. 5 block/urban area in the district are categorized as safe.

34. Sitamarhi

Dynamic Ground water resources of Sitamarhi district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 218520 ha of geographical area, 218520 ha is ground water recharge worthy area. There are 17 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 63051.89 ham and ground water extraction for irrigation use, industrial use and domestic use is 20928.82 ham, 88.00 ham, 10852.21 ham respectively. Ground water extraction for all uses in the district is 31869.05 ham, making stage of ground water extraction 50.54 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 11600.50 ham in the district. 17 block/urban area in the district are categorized as safe.

35. Siwan

Dynamic Ground water resources of Siwan district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 222307 ha of geographical area, 222307 ha is ground water recharge worthy area. There are 19 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 94532.32 ham and ground water extraction for irrigation use, industrial use and domestic use is 40819.44 ham, 19.20 ham, 10452.01 ham respectively. Ground water extraction for all uses in the district is 51290.64 ham, making stage of ground water extraction 54.26 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 11172.74 ham in the district. 19 block/urban area in the district are categorized as safe.

36. Supaul

Dynamic Ground water resources of Supaul district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 241026 ha of geographical area, 241026 ha is ground water recharge worthy area. There are 11 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 102035.95 ham and ground water extraction for

irrigation use, industrial use and domestic use is 26411.81 ham, 71.30 ham, 7052.25 ham respectively. Ground water extraction for all uses in the district is 33535.38 ham, making stage of ground water extraction 32.87 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 7538.55 ham in the district. 11 block/urban area in the district are categorized as safe.

37. Vaishali

Dynamic Ground water resources of Vaishali district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 199518 ha of geographical area, 199518 ha is ground water recharge worthy area. There are 16 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 71226.21 ham and ground water extraction for irrigation use, industrial use and domestic use is 36169.25 ham, 2263.29 ham, 11038.90 ham respectively. Ground water extraction for all uses in the district is 49471.41 ham, making stage of ground water extraction 69.46 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 11800.07 ham in the district. 10 block/urban area in the district are categorized as safe.

38. West Champaran

Dynamic Ground water resources of West Champaran district have been estimated for base year-2022-23, on block/urban area wise basis. Out of 434438 ha of geographical area, 387181 ha is ground water recharge worthy area. There are 18 assessment units in the district. The Annual Extractable Ground Water Resources in the district is 166086.88 ham and ground water extraction for irrigation use, industrial use and domestic use is 27704.90 ham, 4396.00 ham,12928.52 ham respectively. Ground water extraction for all uses in the district is 45029.40 ham, making stage of ground water extraction 27.11 % as a whole for the district. Annual Ground water allocation for domestic use as on 2025 is calculated to be 13820.00 ham in the district. 18 block/urban area in the district are categorized as safe.

7.1 OVERALL GROUND WATER RESOURCE SCENARIO OF BIHAR

The State is covered with Gangetic alluvium in more than 89% of its geographical area. The consolidated formations occupy fringes in the southern parts of the state. Dug wells and shallow tube wells tapping the phreatic zone are the common ground water abstraction structures. The assessment of dynamic ground water resources has been carried out in 535 Assessment Units (534 blocks + Patna Urban) of the State. The Total Annual Ground Water Recharge has been worked out as 33.96 bcm with the Annual Extractable Ground Water Resources as 30.72 bcm. The Current Annual Ground Water Extraction for all uses has been estimated as 13.75 bcm and the Stage of Ground Water Extraction of the State is 44.76 %.

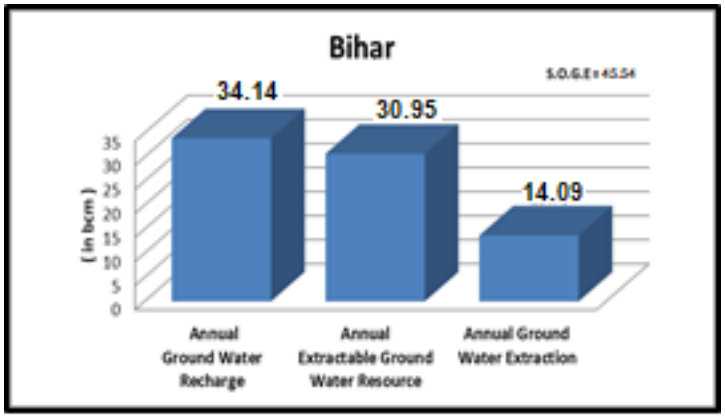


Figure 19: Overall Ground water Resource Scenario of Bihar (GWRA 2024)

CHAPTER 8

8. CONCLUSIONS

Dynamic Ground Water Resource Assessment (GWRA) of the state of Bihar, for the year 2024, has been carried out jointly by MWRD, Govt. of Bihar and CGWB, MER, Patna, for 534 blocks and 1 urban area (Patna Urban), covering all the 38 districts, using "INDIA-GROUNDWATER RESOURCE ESTIMATION SYSTEM (IN-GRES). The resource has been estimated by following GEC – 2015 methodology.

Total annual ground water recharge in the state of Bihar (2024) has been assessed as 33.94 billion cubic meter (bcm). Ground water resources are replenished through rainfall and other sources like return flow from irrigation, canal seepage, recharge from water bodies, water conservation structures etc. The main source of annual ground water recharge is rainfall, which contributes nearly 58.89% of the total annual ground water recharge. The total annual extractable ground water resource of Bihar has been assessed as 30.95 bcm, after keeping a provision for natural discharge. The annual ground water extraction of Bihar (2024) is 14.09 bcm, the largest user being irrigation sector, which accounts for 72.46 % of the total annual groundwater extraction. The stage of ground water extraction for the entire state of Bihar, which is the percentage of ground water extraction with respect to annual extractable ground water recharge, has been computed as 45.54%.

It has been assessed that out of the total 535 assessment units (blocks + Patna Urban), 4 units (0.7 %) are 'Over-exploited', 9 units (1.68 %) are 'Critical', 49 units (9.15 %) are 'Semi-Critical', 473 units (88.41 %) units are 'Safe' category.

The total annual ground water recharge for the state of Bihar, as in 2024 has increased by 0.18 bcm as compared to the last assessment (2023). The total annual extractable ground water resource has increased by 0.24 bcm. The Annual Ground Water Extraction for irrigation, domestic and Industrial uses has also increased by 0.34 bcm during this period. These variations are attributed mainly to refinement of parameters, refinement in well census data and changing ground water regime. Stage of Ground Water Extraction increased from 44.76% to 45.54 %.

Dynamic Ground Water Resource of Bihar, 2024
ANNEXURES

Annexure–I
Ground Water Resources Availability, Utilization and Stage of Extraction
(As in 2024)

DYNAMIC GROUND WATER RESOURCES OF BIHAR, 2024															
BIHAR															
S. No	State/ Union Territories	Ground Water Recharge					Total Natural Discharges	Annual Extractable Ground Water Resource	Current Annual Ground Water Extraction				Annual GW Allocation for Domestic use as on 2025	Net Ground Water Availability for future use	Stage of Ground Water Extraction (%)
		Monsoon Season		Non-Monsoon Season		Total Annual Ground Water Recharge			Irrigation	Industrial	Domestic	Total			
		Recharge from rainfall	Recharge from other Sources	Recharge from Rainfall	Recharge from other Sources										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	**BIHAR**	19.54	8.05	1.14	5.42	34.15	3.19	30.95	10.21	0.4	3.48	14.1	3.76	16.7	45.54
	Total (bcm)	19.54	8.05	1.14	5.42	34.15	3.19	30.95	10.21	0.4	3.48	14.1	3.76	16.7	45.54

Annexure –II
District-wise Ground Water Resources Availability, Utilization and Stage of extraction (as in 2024)

DYNAMIC GROUND WATER RESOURCES OF BIHAR, 2024															
BIHAR															
S.No.	Name of District	Ground Water Recharge					Total Natural Discharges	Annual Extractable Ground Water Resource	Current Annual Ground Water Extraction				Annual GW Allocation for Domestic use as on 2025	Net Ground Water Availability for future use	Stage of Ground Water Extraction (%)
		Monsoon Season		Non-Monsoon Season		Total Annual Ground Water Recharge			Irrigation	Industrial	Domestic	Total			
		Recharge from rainfall	Recharge from other Sources	Recharge from Rainfall	Recharge from other Sources										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	ARARIA	76581.72	44932.96	7485.44	31169.77	160169.89	14866.21	145303.68	21401.4	114.93	10437.64	31953.96	11422.16	113065.01	21.99
2	ARWAL	10594.86	6582.82	0	3973.38	21151.06	2031.14	19119.92	6539.65	130.83	2541.86	9212.33	2663.27	9786.17	48.18
3	AURANGABAD	49117.48	51355.76	1116.5	30936.05	132525.79	12799.57	119726.23	23972.95	2630.1	9270.83	35873.86	9974.13	83149.07	29.96
4	BANKA	43835.04	16524.95	915.09	8954.02	70229.1	6596.4	63632.68	17148.52	102.91	7163.41	24414.83	7718.42	38662.85	38.37
5	BEGUSARAI	44245.15	3579.32	2724.84	5757.06	56306.37	5630.68	50675.69	24338.4	76.89	9811.2	34226.51	10568	15692.38	67.54
6	BHAGALPUR	58336.95	8802.45	6287.29	5317.43	78744.12	7428.73	71315.39	19980.1	1197.15	7145.49	28322.76	7665.13	42472.99	39.71
7	BHOJPUR	47999.42	23694.1	1103.52	14948.8	87745.84	8774.58	78971.26	30755.01	727.29	8813.23	40295.52	9323.17	38165.82	51.03
8	BUXAR	30622.56	18544.19	626.77	12012.53	61806.05	5667.75	56138.3	19695	494.28	5322.47	25511.78	5630.44	30318.55	45.44
9	DARBHANGA	55273.13	9703.57	4990.37	7306.17	77273.24	7292.58	69980.65	26175.9	793.6	12973.61	39943.13	13620.45	29390.66	57.08
10	EAST CHAMPARAN	90477.76	59410.82	5352.08	37885.32	193125.98	17367.36	175758.62	50372.55	7188.84	18566.48	76127.87	20740.41	98051.19	43.31
11	GAYA	92464.88	23670.48	2497.4	13752.93	132385.69	12905.13	119480.56	48117.14	2009.51	15289.81	65416.38	16469.22	53418.36	54.75
12	GOPALGANJ	46155.43	35273.25	1553.12	23429.26	106411.06	10518.46	95892.6	44955.9	513.05	8533.3	54002.25	8946.79	41518.89	56.32
13	JAMUI	34130.14	8889.05	1686.34	5053.15	49758.68	4271.04	45487.64	11867.69	14.75	6360.6	18243.03	6835.06	28428.49	40.11
14	JEHANABAD	17557.33	8232.53	462.46	6598.22	32850.54	3145.74	29704.79	20381.99	5.13	3593.27	23980.4	3801.2	6557.15	80.73
15	KAIMUR	49702.42	20753.34	900.77	11632.96	82989.49	8094.88	74894.61	26800.86	61.11	5725.62	32587.58	6159.97	41879.54	43.51

DYNAMIC GROUND WATER RESOURCES OF BIHAR, 2024															
BIHAR															
S.No.	Name of District	Ground Water Recharge					Total Natural Discharges	Annual Extractable Ground Water Resource	Current Annual Ground Water Extraction				Annual GW Allocation for Domestic use as on 2025	Net Ground Water Availability for future use	Stage of Ground Water Extraction (%)
		Monsoon Season		Non-Monsoon Season		Total Annual Ground Water Recharge			Irrigation	Industrial	Domestic	Total			
		Recharge from rainfall	Recharge from other Sources	Recharge from Rainfall	Recharge from other Sources										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
16	KATIHAR	82627.76	19264.18	7209.24	14268.59	123369.77	12134.18	111235.59	36735.84	157.03	10362.84	47255.67	11248.13	63298.72	42.48
17	KHAGARIA	39660.12	2210.63	1883.05	5238.35	48992.15	4538.08	44454.07	22362.98	17.79	5935.95	28316.72	6491.72	15581.59	63.7
18	KISHANGANJ	53513	2825.82	5300.16	2807.64	64446.62	5205.23	59241.4	14119.35	298.5	5983.59	20401.43	6552.17	38271.38	34.44
19	LAKHISARAI	21472.95	11620.24	1279.31	7134.35	41506.85	4003.67	37503.18	7281.24	86.3	3432.89	10800.42	3673.32	26462.36	28.8
20	MADHEPURA	38605.05	41279.07	3931.72	25022.32	108838.16	10447.84	98390.31	31160.7	145.76	7409.01	38715.46	8137.46	58946.4	39.35
21	MADHUBANI	77162.85	33422.25	8011.77	23575.9	142172.77	11607.74	130565.01	36016.89	8715	15658.41	60390.32	16806.78	69510.09	46.25
22	MUNGER	26111.97	9830.39	1545.83	4118.05	41606.24	4026.19	37580.04	8283.5	749.28	4462.5	13495.25	4697.7	23849.59	35.91
23	MUZAFFARPUR	74411.61	25605.83	4231.91	20002.28	124251.63	12251.72	111999.92	56792.95	1389.68	16102.79	74285.42	18201.96	37956.39	66.33
24	NALANDA	45991.18	9003.48	1283.24	7728.63	64006.53	6003.73	58002.8	34276.49	2000.79	9291.53	45568.79	9818.74	12632.27	78.56
25	NAWADA	46357.36	12733.14	2056.28	8184	69330.78	6761.13	62569.64	25166.4	83.6	5982.33	31232.3	6351.29	31110.76	49.92
26	PATNA	75614.12	17499.1	1990.62	13281.99	108385.83	10248.12	98219.1	42257.58	1433.96	16758.19	60449.74	17864.16	37595.63	61.55
27	PURNEA	74894.54	49309.87	8812.19	33751.91	166768.51	15282.78	151485.74	41442	1031.3	11082.33	53555.65	12029.1	96983.31	35.35
28	ROHTAS	68382.86	32365.48	1554.07	16035.93	118338.34	11833.83	106504.5	24046.83	247.28	9480.89	33775	9997.81	72212.62	31.71
29	SAHARSA	42335.83	13402.96	4221.66	9459.72	69420.17	5767.98	63652.19	17538.9	66	6237.65	23842.55	6708.21	39339.09	37.46
30	SAMASTIPUR	67879.57	10363.42	3001.88	7756.75	89001.62	8567.37	80434.25	40389	264.3	14531.02	55184.4	15596.7	24310.5	68.61
31	SARAN	55933.99	32419.73	2193.7	20610.92	111158.34	10892.26	100266.08	29125.2	173.9	12918.61	42217.61	13666.1	57300.97	42.11
32	SHEIKHPURA	12609.23	2696.66	610.19	2090.8	18006.88	1675.62	16331.26	7438.2	2.4	2077.34	9517.95	2192.9	6697.75	58.28
33	SHEOHAR	11894.64	3952.45	844.06	1728.44	18419.59	1708.31	16711.28	7145.7	181	2336.8	9663.54	2524.1	6860.43	57.83
34	SITAMARHI	54419.65	5200.9	4163.59	3439.53	67223.67	5425.82	61797.85	17228.7	88	11891.92	29208.59	12870.98	31610.2	47.26
35	SIWAN	50257	32048.82	887.5	25045.59	108238.91	10492.06	97746.85	43973.72	218.81	10916.45	55108.97	11593.96	41960.39	56.38
36	SUPAUL	45038.71	30919.77	4815.78	26282.44	107056.7	9577.23	97479.47	24035.4	71.3	7801.84	31908.53	8478.84	64893.93	32.73

DYNAMIC GROUND WATER RESOURCES OF BIHAR, 2024															
BIHAR															
S.No.	Name of District	Ground Water Recharge					Total Natural Discharges	Annual Extractable Ground Water Resource	Current Annual Ground Water Extraction				Annual GW Allocation for Domestic use as on 2025	Net Ground Water Availability for future use	Stage of Ground Water Extraction (%)
		Monsoon Season		Non-Monsoon Season		Total Annual Ground Water Recharge			Irrigation	Industrial	Domestic	Total			
		Recharge from rainfall	Recharge from other Sources	Recharge from Rainfall	Recharge from other Sources										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
37	VAISHALI	50503.4	17213.15	1783.69	11137.32	80637.56	7553.06	73084.5	33371.84	2263.29	11712.33	47347.44	13253.87	26793.45	64.78
38	WEST CHAMPARAN	91148.59	50081.11	4241.96	34746.37	180218.03	16104.7	164113.33	28437.72	4396	14384.02	47217.75	15671.2	115608.39	28.77
	Total (ham)	1953920	805218	113555.3	542174.8	3414868.55	319498.9	3095450.98	1021130.19	40141.63	348300.04	1409571.69	375965.02	1670343.33	45.54
	Total (bcm)	19.54	8.05	1.14	5.42	34.15	3.19	30.95	10.21	0.4	3.48	14.1	3.76	16.7	45.54

Annexure – III (A)
Categorization of Blocks in Bihar
(As in 2024)

CATEGORIZATION OF BLOCKS IN BIHAR (2024)												
S.No.	States / Union Territories	Total No. of Assessed Units	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			Nos.	%	Nos.	%	Nos.	%	Nos.	%	Nos.	%
1	**BIHAR**	535	473	88.41	49	9.16	9	1.68	4	0.75	-	-
	Grand Total	535	473	88.41	49	9.16	9	1.68	4	0.75	-	-

Annexure – III (B)
District Wise Categorization of Blocks in Bihar
(As in 2024)

DYNAMIC GROUND WATER RESOURCES OF INDIA, 2024												
BIHAR												
S.No	Name of District	Total No. of Assessed Units	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			No	%	No.	%	No.	%	No.	%	No.	%
1	ARARIA	18	14	77.78	4	22.22	-	-	-	18	14	77.78
2	ARWAL	11	11	100.0	-	-	-	-	-	11	11	100.0
3	AURANGABAD	11	11	100.0	-	-	-	-	-	11	11	100.0
4	BANKA	14	9	64.29	5	35.71	-	-	-	14	9	64.29
5	BEGUSARAI	11	11	100.0	-	-	-	-	-	11	11	100.0
6	BHAGALPUR	16	16	100.0	-	-	-	-	-	16	16	100.0
7	BHOJPUR	11	10	90.91	1	9.09	-	-	-	11	10	90.91
8	BUXAR	10	10	100.0	-	-	-	-	-	10	10	100.0
9	DARBHANGA	14	11	78.57	3	21.43	-	-	-	14	11	78.57
10	EAST CHAMPARAN	17	17	100.0	-	-	-	-	-	17	17	100.0
11	GAYA	19	19	100.0	-	-	-	-	-	19	19	100.0
12	GOPALGANJ	18	18	100.0	-	-	-	-	-	18	18	100.0
13	JAMUI	9	9	100.0	-	-	-	-	-	9	9	100.0
14	JEHANABAD	5	5	100.0	-	-	-	-	-	5	5	100.0
15	KAIMUR	18	18	100.0	-	-	-	-	-	18	18	100.0
16	KATIHAR	27	27	100.0	-	-	-	-	-	27	27	100.0
17	KHAGARIA	24	20	83.33	4	16.67	-	-	-	24	20	83.33
18	KISHANGANJ	10	10	100.0	-	-	-	-	-	10	10	100.0
19	LAKHISARAI	7	2	28.57	3	42.86	-	-	2	7	2	28.57
20	MADHEPURA	16	16	100.0	-	-	-	-	-	16	16	100.0
21	MADHUBANI	7	7	100.0	-	-	-	-	-	7	7	100.0
22	MUNGER	7	7	100.0	-	-	-	-	-	7	7	100.0
23	MUZAFFARPUR	7	7	100.0	-	-	-	-	-	7	7	100.0
24	NALANDA	13	13	100.0	-	-	-	-	-	13	13	100.0
25	NAWADA	21	21	100.0	-	-	-	-	-	21	21	100.0
26	PATNA	9	9	100.0	-	-	-	-	-	9	9	100.0
27	PURNEA	16	10	62.5	5	31.25	1	6.25	-	16	10	62.5
28	ROHTAS	20	8	40.0	10	50.0	1	5.0	1	20	8	40.0
29	SAHARSA	24	17	70.83	5	20.83	1	4.17	1	24	17	70.83
30	SAMASTIPUR	14	14	100.0	-	-	-	-	-	14	14	100.0
31	SARAN	19	17	89.47	2	10.53	-	-	-	19	17	89.47
32	SHEIKHPURA	20	14	70.0	4	20.0	2	10.0	-	20	14	70.0
33	SHEOHAR	20	20	100.0	-	-	-	-	-	20	20	100.0
34	SITAMARHI	6	5	83.33	1	16.67	-	-	-	6	5	83.33
35	SIWAN	5	5	100.0	-	-	-	-	-	5	5	100.0
36	SUPAUL	16	10	62.5	2	12.5	4	25.0	-	16	10	62.5
37	VAISHALI	11	11	100.0	-	-	-	-	-	11	11	100.0
38	WEST CHAMPARAN	14	14	100.0	-	-	-	-	-	14	14	100.0
	Total	535	473	88.41	49	9.16	9	1.68	4	535	473	88.41

Annexure - III(C)
Annual Extractable Ground Water Resource
Of Assessment Units under Different Category in Bihar
(As in 2024)

ANNUAL EXTRACTABLE RESOURCE OF ASSESSMENT UNITS UNDER DIFFERENT CATEGORIES, 2024												
BIHAR												
S.No.	State/Union Territories	Total Annual Extractable Resource of Assessed Units (mcm)	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			Total Annual Extractable Resource (mcm)	%	Total Annual Extractable Resource (mcm)	%	Total Annual Extractable Resource (mcm)	%	Total Annual Extractable Resource (mcm)	%	Total Annual Extractable Resource (mcm)	%
1	**BIHAR**	30954.51	28524.13	92.15	1995.4	6.45	314.09	1.01	120.9	0.39	-	-
	Total	30954.51	28524.13	92.15	1995.4	6.45	314.09	1.01	120.9	0.39	-	-
	Grand Total	30954.51	28524.13	92.15	1995.4	6.45	314.09	1.01	120.9	0.39	-	-

Annexure – III (D)
District-Wise Annual Extractable Ground Water Resource Of Assessment Units under Different Category in Bihar
(As in 2024)

DYNAMIC GROUND WATER RESOURCES OF INDIA, 2024												
BIHAR												
S.No	Name of District	Total Annual Extractable Resource of Assessed Units (mcm)	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			Total Annual Extractable Resource (mcm)	%	Total Annual Extractable Resource (mcm)	%	Total Annual Extractable Resource (mcm)	%	Total Annual Extractable Resource (mcm)	%	Total Annual Extractable Resource (mcm)	%
1	ARARIA	506.76	424.34	83.74	82.41	16.26	-	-	-	-	-	-
2	ARWAL	974.79	974.79	100	-	-	-	-	-	-	-	-
3	AURANGABAD	636.33	636.33	100	-	-	-	-	-	-	-	-
4	BANKA	625.7	479.02	76.56	146.68	23.44	-	-	-	-	-	-
5	BEGUSARAI	1197.26	1197.26	100	-	-	-	-	-	-	-	-
6	BHAGALPUR	713.15	713.15	100	-	-	-	-	-	-	-	-
7	BHOJPUR	748.95	684.13	91.35	64.82	8.65	-	-	-	-	-	-
8	BUXAR	636.52	636.52	100	-	-	-	-	-	-	-	-
9	DARBHANGA	789.71	664.04	84.09	125.67	15.91	-	-	-	-	-	-
10	EAST CHAMPARAN	617.98	617.98	100	-	-	-	-	-	-	-	-
11	GAYA	977.47	977.47	100	-	-	-	-	-	-	-	-
12	GOPALGANJ	1641.13	1641.13	100	-	-	-	-	-	-	-	-
13	JAMUI	1453.04	1453.04	100	-	-	-	-	-	-	-	-
14	JEHANABAD	191.2	191.2	100	-	-	-	-	-	-	-	-
15	KAIMUR	699.81	699.81	100	-	-	-	-	-	-	-	-
16	KATIHAR	1757.59	1757.59	100	-	-	-	-	-	-	-	-
17	KHAGARIA	1194.81	974.67	81.58	220.14	18.42	-	-	-	-	-	-
18	KISHANGANJ	454.88	454.88	100	-	-	-	-	-	-	-	-
19	LAKHISARAI	297.05	107.32	36.13	114.09	38.41	-	-	75.64	25.46	-	-
20	MADHEPURA	1112.36	1112.36	100	-	-	-	-	-	-	-	-
21	MADHUBANI	444.54	444.54	100	-	-	-	-	-	-	-	-
22	MUNGER	592.41	592.41	100	-	-	-	-	-	-	-	-
23	MUZAFFARPUR	375.03	375.03	100	-	-	-	-	-	-	-	-
24	NALANDA	983.9	983.9	100	-	-	-	-	-	-	-	-
25	NAWADA	1305.65	1305.65	100	-	-	-	-	-	-	-	-

DYNAMIC GROUND WATER RESOURCES OF INDIA, 2024												
BIHAR												
S.No	Name of District	Total Annual Extractable Resource of Assessed Units (mcm)	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			Total Annual Extractable Resource (mcm)	%	Total Annual Extractable Resource (mcm)	%	Total Annual Extractable Resource (mcm)	%	Total Annual Extractable Resource (mcm)	%	Total Annual Extractable Resource (mcm)	%
26	**PATNA**	375.8	375.8	100	-	-	-	-	-	-	-	-
27	**PURNEA**	1120	756.5	67.54	317.32	28.33	46.18	4.12	-	-	-	-
		580.03	220.69	38.05	316.94	54.64	22.28	3.84	20.12	3.47	-	-
28	**ROHTAS**	982.19	746.83	76.04	189.9	19.33	20.32	2.07	25.14	2.56	-	-
29	**SAHARSA**	1514.86	1514.86	100	-	-	-	-	-	-	-	-
30	**SAMASTIPUR**	1065.05	936.11	87.89	128.93	12.11	-	-	-	-	-	-
31	**SARAN**	804.34	552.91	68.74	197.65	24.57	53.78	6.69	-	-	-	-
32	**SHEIKHPURA**	1002.66	1002.66	100	-	-	-	-	-	-	-	-
33	**SHEOHAR**	163.31	139.38	85.34	23.93	14.66	-	-	-	-	-	-
34	**SITAMARHI**	167.11	167.11	100	-	-	-	-	-	-	-	-
35	**SIWAN**	730.85	492.41	67.38	66.9	9.15	171.53	23.47	-	-	-	-
36	**SUPAUL**	561.38	561.38	100	-	-	-	-	-	-	-	-
37	**VAISHALI**	958.93	958.93	100	-	-	-	-	-	-	-	-
38	**WEST CHAMPARAN**	30954.51	28524.13	92.15	1995.4	6.45	314.09	1.01	120.9	0.39		
	Grand Total	30954.51	28524.13	92.15	1995.4	6.45	314.09	1.01	120.9	0.39		

Annexure - III (E)
Recharge worthy Area of
Assessment Unit under Different Category in Bihar
(As in 2024)

AREA OF ASSESSMENT UNITS UNDER DIFFERENT CATEGORIES IN BIHAR (2024)													
S.No.	States / Union Territories	Total Geographical Area of Assessed Units (sq. km)	Recharge Worthy Area (sq. km)	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
				Recharge Worthy Area (sq. km)	%	Recharge Worthy Area (sq. km)	%	Recharge Worthy Area (sq. km)	%	Recharge Worthy Area (sq. km)	%	Recharge Worthy Area (sq. km)	%
1	**BIHAR**	92708.67	90348.7	82188.75	90.97	6818.28	7.55	900.68	1	440.99	0.49	-	-

Annexure – III (F)
District Wise Recharge worthy Area of Assessment Unit
Under Different Category in Bihar
(As in 2024)

DYNAMIC GROUND WATER RESOURCES OF BIHAR, 2024												
BIHAR												
S.No.	Name of District	Total Recharge Worthy Area of Assessed Units (sq.km)	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			Recharge Worthy Area of Assessed Units (sq.km)	%	Recharge Worthy Area of Assessed Units (sq.km)	%	Recharge Worthy Area of Assessed Units (sq.km)	%	Recharge Worthy Area of Assessed Units (sq.km)	%	Recharge Worthy Area of Assessed Units (sq.km)	%
1	ARARIA	1891.31	1595.0	84.33	296.31	15.67	-	-	-	-	-	-
2	ARWAL	2410.26	2410.26	100.0	-	-	-	-	-	-	-	-
3	AURANGABAD	2673.0	2673.0	100.0	-	-	-	-	-	-	-	-
4	BANKA	2456.58	1835.76	74.73	620.82	25.27	-	-	-	-	-	-
5	BEGUSARAI	3090.54	3090.54	100.0	-	-	-	-	-	-	-	-
6	BHAGALPUR	2602.55	2602.55	100.0	-	-	-	-	-	-	-	-
7	BHOJPUR	2980.4	2769.86	92.94	210.54	7.06	-	-	-	-	-	-
8	BUXAR	1661.28	1661.28	100.0	-	-	-	-	-	-	-	-
9	DARBHANGA	2275.3	1798.89	79.06	476.41	20.94	-	-	-	-	-	-
10	EAST CHAMPARAN	2185.2	2185.2	100.0	-	-	-	-	-	-	-	-
11	GAYA	2223.07	2223.07	100.0	-	-	-	-	-	-	-	-
12	GOPALGANJ	3871.81	3871.81	100.0	-	-	-	-	-	-	-	-
13	JAMUI	2789.37	2789.37	100.0	-	-	-	-	-	-	-	-
14	JEHANABAD	636.83	636.83	100.0	-	-	-	-	-	-	-	-
15	KAIMUR	2504.29	2504.29	100.0	-	-	-	-	-	-	-	-
16	KATIHAR	3958.87	3958.87	100.0	-	-	-	-	-	-	-	-
17	KHAGARIA	4909.78	4108.82	83.69	800.96	16.31	-	-	-	-	-	-
18	KISHANGANJ	2551.14	2551.14	100.0	-	-	-	-	-	-	-	-
19	LAKHISARAI	932.57	340.83	36.55	334.92	35.91	-	-	256.82	27.54	-	-
20	MADHEPURA	3009.91	3009.91	100.0	-	-	-	-	-	-	-	-

DYNAMIC GROUND WATER RESOURCES OF BIHAR, 2024												
BIHAR												
S.No.	Name of District	Total Recharge Worthy Area of Assessed Units (sq.km)	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			Recharge Worthy Area of Assessed Units (sq.km)	%	Recharge Worthy Area of Assessed Units (sq.km)	%	Recharge Worthy Area of Assessed Units (sq.km)	%	Recharge Worthy Area of Assessed Units (sq.km)	%	Recharge Worthy Area of Assessed Units (sq.km)	%
21	MADHUBANI	1485.72	1485.72	100.0	-	-	-	-	-	-	-	-
22	MUNGER	1911.43	1911.43	100.0	-	-	-	-	-	-	-	-
23	MUZAFFARPUR	1144.94	1144.94	100.0	-	-	-	-	-	-	-	-
24	NALANDA	1788.4	1788.4	100.0	-	-	-	-	-	-	-	-
25	NAWADA	3486.45	3486.45	100.0	-	-	-	-	-	-	-	-
26	PATNA	1331.42	1331.42	100.0	-	-	-	-	-	-	-	-
27	PURNEA	3042.77	1979.2	65.05	943.6	31.01	119.97	3.94	-	-	-	-
28	ROHTAS	2316.46	915.11	39.5	1245.12	53.75	80.93	3.49	75.3	3.25	-	-
29	SAHARSA	3200.84	2424.36	75.74	602.26	18.82	65.35	2.04	108.87	3.4	-	-
30	SAMASTIPUR	3202.39	3202.39	100.0	-	-	-	-	-	-	-	-
31	SARAN	3751.43	3372.29	89.89	379.14	10.11	-	-	-	-	-	-
32	SHEIKHPURA	2612.87	1849.47	70.78	600.31	22.98	163.09	6.24	-	-	-	-
33	SHEOHAR	2629.57	2629.57	100.0	-	-	-	-	-	-	-	-
34	SITAMARHI	662.59	569.13	85.89	93.46	14.11	-	-	-	-	-	-
35	SIWAN	442.99	442.99	100.0	-	-	-	-	-	-	-	-
36	SUPAUL	1995.18	1309.41	65.63	214.43	10.75	471.34	23.62	-	-	-	-
37	VAISHALI	1710.06	1710.06	100.0	-	-	-	-	-	-	-	-
38	WEST CHAMPARAN	2019.13	2019.13	100.0	-	-	-	-	-	-	-	-
	Total	90348.7	82188.75	90.97	6818.28	7.55	900.68	1.0	440.99	0.49	-	-

Annexure - IV (A)
Categorization of Over Exploited, Critical and Semi Critical blocks
(As in 2024)

CATEGORISATION OF ASSESSMENT UNIT, 2024							
BIHAR							
S.N	Name of District	S.N	Name of Semi-Critical Assessment Units	S.N	Name of Critical Assessment Units	S.N	Name of Over-Exploited Assessment Units
1	**BEGUSARAI**	1	NAVKOTHI				
		2	BIRPUR				
		3	KHUDABANDPUR				
		4	BACHWARA				
2	**BHOJPUR**	1	BIHIYA				
		2	SHAHPUR				
		3	ARA SADAR				
3	**GAYA**	1	TEKARI				
		2	BELAGANJ				
		3	KHIZAR SARAI				
		4	GAYA SADAR				
4	**JEHANABAD**	1	GHOSHI			1	RATNI FARIDPUR
		2	MODANGANJ			2	KAKO
		3	JEHANABAD				
5	**KAIMUR**	1	KUDRA				
6	**MUZAFFARPUR**	1	MINAPUR	1	MUSHAHARI		
		2	KURHANI				
		3	BANDRA				
		4	BOCHAHAN				
		5	SAKRA				
7	**NALANDA**	1	EKANGARSARAI	1	GIRIYAK	1	NAGARNAUSA
		2	RAHUI				
		3	HILSA				
		4	ASTHAWAN				
		5	CHANDI				
		6	KARAI PARSARAI				
		7	RAJGIR				
		8	HARNAUT				
		9	SARMERA				

CATEGORISATION OF ASSESSMENT UNIT, 2024							
BIHAR							
S.N	**Name of District**	**S.N**	**Name of Semi-Critical Assessment Units**	**S.N**	**Name of Critical Assessment Units**	**S.N**	**Name of Over-Exploited Assessment Units**
		10	BIND				
8	**NAWADA**	1	HISUA				
		2	NARHAT				
		3	MESKAUR				
		4	AKBARPUR				
		5	NARDIGANJ				
9	**PATNA**	1	PHULWARI SHARIF	1	SAMPATCHAK	1	PATNA URBAN
		2	MASAURHI				
		3	ATHMALGOLA				
		4	FATUHA				
		5	PUNPUN				
10	**ROHTAS**	1	KOCHAS				
		2	DEHRI				
11	**SAMASTIPUR**	1	UJIYARPUR	1	TAJPUR		
		2	WARISNAGAR	2	DALSINGSARAI		
		3	BIBHUTIPUR				
		4	VIDYAPATINAGAR				
12	**SHEIKHPURA**	1	BARBIGHA				
13	**VAISHALI**	1	MAHNAR	1	JANDAHA		
		2	BIDUPUR	2	PATEPUR		
				3	HAJIPUR		
				4	RAJA PAKAR		

ABSTRACT			
Total No. of Assessed Units	**Number of Semi critical Assessment Units**	**Number of Critical Assessment Units**	**Number of Over Exploited Assessment Units**
535	49	9	4

Annexure - IV (B)
Quality Problems in Assessment units
(As in 2024)

QUALITY PROBLEMS IN ASSESSMENT UNITS, 2024							
BIHAR							
S.No.	Name of District	S.No.	Name of Assessment Units affected by Fluoride	S.No.	Name of Assessment Units affected by Arsenic	S.No.	Name of Assessment Units affected by Salinity
1	**AURANGABAD**	1	MADANPUR				
		2	RAFIGANJ				
		3	KUTUMBA				
		4	GOH				
		5	NABINAGAR				
		6	OBRA				
		7	HASPURA				
		8	DEO				
		9	AURANGABAD				
		10	BARUN				
2	**BANKA**	1	RAJOUN				
		2	BARAHAT				
		3	KATORIYA				
		4	BELHAR				
		5	SHAMBHUGANJ				
		6	AMARPUR				
		7	DHORAIYA				
		8	BANKA				
		9	CHANDAN				
		10	BOUNSI				
		11	FULLIDUMAR				
3	**BEGUSARAI**			1	NAVKOTHI		
				2	MATIHANI		
				3	BALIA		
				4	BARAUNI		
				5	SAHEBPUR KAMAL		
				6	BACHWARA		
				7	BEGUSARAI		
4	**BHAGALPUR**	1	SANHOULA				
		2	KHARIK				
		3	NARAYANPUR				
		4	NAUGACHHIA				
		5	GAURADIH				
5	**BHOJPUR**			1	BIHIYA		

QUALITY PROBLEMS IN ASSESSMENT UNITS, 2024							
BIHAR							
S.No.	Name of District	S.No.	Name of Assessment Units affected by Fluoride	S.No.	Name of Assessment Units affected by Arsenic	S.No.	Name of Assessment Units affected by Salinity
				2	SHAHPUR		
				3	BARHARA		
				4	UDWANTNAGAR		
				5	ARA SADAR		
				6	KOILWAR		
6	**BUXAR**			1	CHAKKI		
				2	BRAHMPUR		
				3	SIMRI		
				4	BUXAR		
7	**DARBHANGA**			1	BIRAUL		
				2	BAHERI		
8	**GAYA**	1	TANKUPPA				
		2	SHERGHATI				
		3	IMAMGANJ				
		4	MUHRA				
		5	BARACHATTY				
		6	ATRI				
		7	PARAIYA				
		8	NEEMCHAK BATHANI				
		9	GURARU				
		10	MOHANPUR				
		11	TEKARI				
		12	AMAS				
		13	GURUA				
		14	MANPUR				
		15	BODH GAYA				
		16	BELAGANJ				
		17	KHIZAR SARAI				
		18	BANKE BAZAR				
		19	KONCH				
		20	WAZIRGANJ				
		21	GAYA SADAR				
		22	DUMARIYA				
		23	DOBHI				
		24	FATEHPUR				
9	**JAMUI**	1	KHAIRA				
		2	BARHAT				
		3	SIKANDRA				
		4	LAXMIPUR				

QUALITY PROBLEMS IN ASSESSMENT UNITS, 2024							
BIHAR							
S.No.	Name of District	S.No.	Name of Assessment Units affected by Fluoride	S.No.	Name of Assessment Units affected by Arsenic	S.No.	Name of Assessment Units affected by Salinity
		5	JAMUI				
		6	SONO				
		7	ISLAMNAGAR ALIGANJ				
		8	CHAKAI				
		9	JHAJHA				
		10	GIDHAUR				
10	**JEHANABAD**	1	RATNI FARIDPUR				
		2	JEHANABAD				
		3	HULASGUNJ				
11	**KAIMUR**	1	MOHANIA				
		2	CHAND				
		3	NUAON				
		4	DURGAWATI				
		5	KUDRA				
		6	CHAINPUR				
		7	BHAGWANPUR				
		8	RAMGARH				
		9	BHABHUA				
		10	RAMPUR				
12	**KATIHAR**			1	AMDABAD		
				2	MANSAHI		
				3	KURSELA		
				4	MANIHARI		
				5	SAMELI		
				6	BALRAMPUR		
13	**KHAGARIA**			1	PARBATTA		
				2	GOGRI		
				3	MANSI		
				4	KHAGARIA		
14	**KISHANGANJ**			1	BAHADURGANJ		
				2	KISHANGANJ		
15	**LAKHISARAI**	1	RAMGARH CHOWK	1	SURAJGARHA		
				2	LAKHISARAI		
				3	PIPARIA		
				4	BARAHIA		

QUALITY PROBLEMS IN ASSESSMENT UNITS, 2024							
BIHAR							
S.No.	Name of District	S.No.	Name of Assessment Units affected by Fluoride	S.No.	Name of Assessment Units affected by Arsenic	S.No.	Name of Assessment Units affected by Salinity
16	**MUNGER**	1	TETIYABAMBAR				
		2	TARAPURA				
		3	HAVELI KHARAGPUR				
		4	ASARGANJ				
		5	SANGRAMPUR				
17	**NALANDA**	1	NOORSARAI				
		2	EKANGARSARAI				
		3	ISLAMPUR				
		4	RAHUI				
		5	HILSA				
		6	BIHARSHARIF				
		7	PARWALPUR				
		8	ASTHAWAN				
		9	CHANDI				
		10	KARAI PARSARAI				
		11	RAJGIR				
		12	HARNAUT				
		13	BEN				
		14	SARMERA				
		15	SILAO				
		16	BIND				
		17	NAGARNAUSA				
		18	GIRIYAK				
		19	THARTHARI				
		20	KATRISARAI				
18	**NAWADA**	1	WARISALIGANJ				
		2	NAWADA				
		3	HISUA				
		4	RAJAULI				
		5	KAWAKOLE				
		6	GOVINDPUR				
		7	ROH				
		8	PAKARIBARAWAN				
		9	NARHAT				
		10	KASHICHAK				
		11	MESKAUR				
		12	AKBARPUR				
		13	NARDIGANJ				
		14	SIRDALA				

QUALITY PROBLEMS IN ASSESSMENT UNITS, 2024							
BIHAR							
S.No.	Name of District	S.No.	Name of Assessment Units affected by Fluoride	S.No.	Name of Assessment Units affected by Arsenic	S.No.	Name of Assessment Units affected by Salinity
19	**PATNA**			1	DANAPUR		
				2	BARH		
				3	MANER		
				4	BAKHTIYARPUR		
20	**PURNEA**			1	PURNEA		
				2	KASBA		
21	**ROHTAS**	1	KARAKAT				
		2	BIKRAMGANJ				
		3	SANJHAULI				
		4	KARGAHAR				
		5	NASRIGANJ				
		6	CHENARI				
		7	AKORHIGOLA				
		8	DINARA				
		9	SHEOSAGAR				
		10	NOKHA				
		11	DAWATH				
		12	DEHRI				
22	**SAMASTIPUR**			1	PATORI		
				2	MOHANPUR		
				3	MOHIUDDIN NAGAR		
				4	VIDYAPATINAGAR		
23	**SARAN**			1	SONEPUR		
				2	CHAPRA SADAR		
				3	DIGHWARA		
				4	RIVILGANJ		
24	**SHEIKHPURA**	1	SHEIKHPURA				
		2	GHAT KUSUMBA				
		3	CHEWARA				
		4	SHEIKHOPUR SARAI				
		5	ARIYARI				
		6	BARBIGHA				
25	**VAISHALI**			1	SAHDAI		
				2	HAJIPUR		
				3	DESRI		
				4	RAGHOPUR		

QUALITY PROBLEMS IN ASSESSMENT UNITS, 2024							
BIHAR							
S.No.	Name of District	S.No.	Name of Assessment Units affected by Fluoride	S.No.	Name of Assessment Units affected by Arsenic	S.No.	Name of Assessment Units affected by Salinity
				5	BIDUPUR		

ABSTRACT			
Total No. of Assessed Units	Number of Assessment Units affected by Fluoride	Number of Assessment Units affected by Arsenic	Number of Assessment Units affected by Salinity
185	131	54	0

Annexure – V (A)

Summary of Assessment units improved or deteriorated from 2023 to 2024 assessment

State-Wise Summary of Assessment Units Improved or Deteriorated From 2023 to 2024 Assessment				
S.No	**Name of States / Union Territories**	**Number of Assessment Units Improved**	**Number of Assessment Units Deteriorated**	**Number of Assessment Units with No Change**
1	**BIHAR**	14	2	519

Annexure – V (B)
COMPARISON OF CATEGORIZATION OF ASSESSMENT UNITS
(2023 TO 2024)

COMPARISON OF CATEGORIZATION OF ASSESSMENT UNITS (2023 AND 2024)									
BIHAR									
S.No.	Name of District	Name of Assessment Unit	Stage of Ground Water Extraction (%)2023	Categorization in 2023	Name of District	Name of Assessment Unit	Stage of Ground Water Extraction (%)2024	Categorization in 2024	Remark
1	**BHOJPUR**	KOILWAR	84.08	Semi_Critical	**BHOJPUR**	KOILWAR	68.25	Safe	Improved
2	**MUZAFFARPUR**	GAIGHAT	72.06	Semi_Critical	**MUZAFFARPUR**	GAIGHAT	65.67	Safe	Improved
3	**MUZAFFARPUR**	MINAPUR	95.45	Critical	**MUZAFFARPUR**	MINAPUR	81.81	Semi_Critical	Improved
4	**MUZAFFARPUR**	MUSHAHARI	115.95	Over_Exploited	**MUZAFFARPUR**	MUSHAHARI	96.69	Critical	Improved
5	**MUZAFFARPUR**	KANTI	73.01	Semi_Critical	**MUZAFFARPUR**	KANTI	54.16	Safe	Improved
6	**MUZAFFARPUR**	MURAUL (DHOLI)	77.73	Semi_Critical	**MUZAFFARPUR**	MURAUL (DHOLI)	65.11	Safe	Improved
7	**NALANDA**	PARWALPUR	71.52	Semi_Critical	**NALANDA**	PARWALPUR	56.80	Safe	Improved
8	**NALANDA**	RAHUI	58.88	Safe	**NALANDA**	RAHUI	79.21	Semi_Critical	Deteriorated
9	**PATNA**	DHANARUA	86.92	Semi_Critical	**PATNA**	DHANARUA	69.42	Safe	Improved
10	**SAMASTIPUR**	SARAIRANJAN	83.35	Semi_Critical	**SAMASTIPUR**	SARAIRANJAN	65.43	Safe	Improved
11	**SAMASTIPUR**	TAJPUR	108.03	Over_Exploited	**SAMASTIPUR**	TAJPUR	97.77	Critical	Improved
12	**SAMASTIPUR**	KALYANPUR	71.82	Semi_Critical	**SAMASTIPUR**	KALYANPUR	67.45	Safe	Improved
13	**SAMASTIPUR**	WARISNAGAR	54.29	Safe	**SAMASTIPUR**	WARISNAGAR	72.48	Semi_Critical	Deteriorated
14	**SHEIKHPURA**	BARBIGHA	94.84	Critical	**SHEIKHPURA**	BARBIGHA	88.97	Semi_Critical	Improved
15	**VAISHALI**	HAJIPUR	103.63	Over_Exploited	**VAISHALI**	HAJIPUR	93.38	Critical	Improved
16	**VAISHALI**	PATEPUR	108.14	Over_Exploited	**VAISHALI**	PATEPUR	98.50	Critical	Improved

Annexure VI
Assessment Unit Wise Report
(Attribute Table)

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
ARARIA								
1	ARARIA	9527.79	6729.71	1076.03	3665.11	20998.64	2099.86	18898.78
2	BHARGAMA	6409.01	8144.68	625.97	5475.79	20655.45	2065.55	18589.9
3	FORBESGANJ	11628.12	10845.22	1144.59	6672.72	30290.65	2828.76	27461.89
4	JOKIHAT	8186.98	2789.55	730.84	1440.27	13147.64	1314.77	11832.87
5	KURSAKANTA	5106.54	583.95	438.49	294.95	6423.93	642.4	5781.53
6	NARPATGANJ	10476.48	5976.88	1024.34	4828.06	22305.76	1812.92	20492.84
7	PALASI	7746.38	842.82	665.17	467.5	9721.87	972.19	8749.68
8	RANIGANJ	11521.33	8583.06	1266.59	8073.85	29444.83	2411.64	27033.19
9	SIKTI	5979.09	437.09	513.42	251.52	7181.12	718.12	6463
DISTRICT TOTAL		**76581.72**	**44932.96**	**7485.44**	**31169.77**	**160169.89**	**14866.21**	**145303.68**
ARWAL								
1	ARWAL	2064.95	1896.59	0	1169.72	5131.26	513.12	4618.14
2	KALER	1971.87	2779.64	0	1570.16	6321.67	632.17	5689.5
3	KARPI	3466.99	853.48	0	472.84	4793.31	479.33	4313.98
4	KURTHA	1498.55	509.3	0	357.8	2365.65	152.61	2213.04
5	SONBHADRA BANSHI SURYPUR	1592.5	543.81	0	402.86	2539.17	253.91	2285.26
DISTRICT TOTAL		**10594.86**	**6582.82**	**0**	**3973.38**	**21151.06**	**2031.14**	**19119.92**

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
AURANGABAD								
1	AURANGABAD	4692.03	5147.66	102.18	3368.1	13309.97	1151.78	12158.2
2	BARUN	5097.72	5407.62	110.59	3295.34	13911.27	1237.05	12674.22
3	DAUDNAGAR	2996.92	4913.76	70.04	2223.19	10203.91	1020.39	9183.52
4	DEO	2912.13	4198.98	72.22	2151.39	9334.72	857.23	8477.49
5	GOH	5591.97	5478.19	118.66	3225.01	14413.83	1441.39	12972.44
6	HASPURA	2341.2	3251.55	53.6	1644.08	7290.43	729.04	6561.39
7	KUTUMBA	3955.9	5046.69	92.47	3127.75	12222.81	1222.28	11000.53
8	MADANPUR	3676.87	4941.16	95.83	2838.51	11552.37	1155.24	10397.13
9	NABINAGAR	9764.94	3818.97	192.02	3281.3	17057.23	1705.72	15351.51
10	OBRA	4099.77	5827.55	94.4	2850.65	12872.37	1243.75	11628.62
11	RAFIGANJ	3988.03	3323.63	114.49	2930.73	10356.88	1035.7	9321.18
DISTRICT TOTAL		**49117.48**	**51355.76**	**1116.5**	**30936.05**	**132525.79**	**12799.57**	**119726.23**
BANKA								
1	AMARPUR	2784.47	1936.56	56.41	1075.86	5853.3	585.33	5267.97
2	BANKA	5780.15	639.32	113.97	506.42	7039.86	379.08	6660.78
3	BARAHAT	1775.45	1761.55	43.35	872.18	4452.53	343.65	4108.88
4	BELHAR	2086.9	2757.26	51.23	1190.45	6085.84	608.57	5477.26
5	BOUNSI	3881.38	1566.39	77.12	855.46	6380.35	638.04	5742.31
6	CHANDAN	5995.46	462.82	117	280.45	6855.73	685.57	6170.16
7	DHORAIYA	2789.13	1525.51	79.81	986.53	5380.98	538.1	4842.88
8	FULLIDUMAR	2396.12	1015.22	47.77	592.18	4051.29	405.12	3646.16

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
9	KATORIYA	11192.39	449.13	218.03	359.25	12218.8	1221.88	10996.92
10	RAJOUN	2894.79	2023.39	58.99	1084.94	6062.11	606.22	5455.89
11	SHAMBHUGANJ	2258.8	2387.8	51.41	1150.3	5848.31	584.84	5263.47
DISTRICT TOTAL		**43835.04**	**16524.95**	**915.09**	**8954.02**	**70229.1**	**6596.4**	**63632.68**
BEGUSARAI								
1	BACHWARA	3386.57	250.77	208.5	422.46	4268.3	426.82	3841.48
2	BAKHRI	1793.19	240.06	111.21	397.5	2541.96	254.2	2287.76
3	BALIA	3483.92	258.13	214.49	420.05	4376.59	437.67	3938.92
4	BARAUNI	2847.18	196.96	175.29	301.73	3521.16	352.12	3169.04
5	BEGUSARAI	5198.27	391.29	320.04	616.06	6525.66	652.58	5873.08
6	BHAGAWANPUR	2654.36	199.48	163.42	315.9	3333.16	333.32	2999.84
7	BIRPUR	1208.42	122.15	74.4	197	1601.97	160.2	1441.77
8	CHERIA BARIYARPUR	2430.65	212.65	149.65	493.6	3286.55	328.65	2957.9
9	CHHORAHI	2410.05	212.28	148.38	333.44	3104.15	310.43	2793.72
10	DANDARI	1649.76	168.01	101.57	247.17	2166.51	216.65	1949.86
11	GARHPURA	1435.64	128.15	88.39	183.46	1835.64	183.57	1652.07
12	KHUDABANDPUR	1106.16	136.05	68.1	205.24	1515.55	151.55	1364
13	MANSOORCHAK	966.92	71.32	59.53	103.56	1201.33	120.13	1081.2
14	MATIHANI	4135.87	228.72	254.63	384.83	5004.05	500.41	4503.64
15	NAVKOTHI	1232.76	188.6	75.9	273.83	1771.09	177.1	1593.99
16	SAHEBPUR KAMAL	3379.08	294.96	208.04	460.13	4342.21	434.23	3907.98

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
17	SAMHO-AKHA-KURHA	1539.31	119.58	94.77	175.24	1928.9	192.89	1736.01
18	TEGHRA	3387.04	160.16	208.53	225.86	3981.59	398.16	3583.43
DISTRICT TOTAL		**44245.15**	**3579.32**	**2724.84**	**5757.06**	**56306.37**	**5630.68**	**50675.69**
BHAGALPUR								
1	BIHPUR	3438.81	349.94	367.4	216.98	4373.13	437.31	3935.82
2	GAURADIH	2908.34	908.19	324.32	619.71	4760.56	476.06	4284.5
3	GOPALPUR	2997.65	282.9	320.27	180.27	3781.09	378.1	3402.99
4	ISMAILPUR	1869.78	180.06	199.76	82.29	2331.89	233.19	2098.7
5	JAGDISHPUR	2270.41	635.63	265.57	300.13	3471.74	215.17	3256.57
6	KAHALGAON	7593.97	1029.74	811.33	712.14	10147.18	1014.73	9132.45
7	KHARIK	2975.04	319.89	317.85	203	3815.78	381.59	3434.19
8	NARAYANPUR	3262.21	203.93	348.53	140.41	3955.08	395.52	3559.56
9	NATHNAGAR	2850.9	441.63	304.59	274.8	3871.92	387.19	3484.73
10	NAUGACHHIA	2412.69	318.24	257.77	206.84	3195.54	319.55	2875.99
11	PIRPAINTY	7915.51	383.14	845.68	258.24	9402.57	940.26	8462.31
12	RANGRA CHOWK	2712.07	202.72	289.75	148.72	3353.26	335.33	3017.93
13	SABOUR	2599.23	128.51	277.7	88.71	3094.15	309.42	2784.73
14	SANHOULA	3938.99	1310.74	420.84	822.24	6492.81	649.29	5843.52
15	SHAHKUND	3667.47	1506.15	406.29	713.4	6293.31	629.33	5663.98
16	SULTANGANJ	4923.88	601.04	529.64	349.55	6404.11	326.69	6077.42
DISTRICT TOTAL		**58336.95**	**8802.45**	**6287.29**	**5317.43**	**78744.12**	**7428.73**	**71315.39**

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
BHOJPUR								
1	AGIAON	3196.9	1915.12	75.33	1320.33	6507.68	650.77	5856.91
2	ARA SADAR	3992.06	819.86	89.3	669.82	5571.04	557.1	5013.94
3	BARHARA	4500.18	312.22	100.48	234.58	5147.46	514.74	4632.72
4	BIHIYA	3007.83	719.59	67.64	459.73	4254.79	425.47	3829.32
5	CHARPOKHRI	2005.44	3046.28	52.79	1546.99	6651.5	665.15	5986.35
6	GARHANI	2408.15	589.34	54.09	502.88	3554.46	355.44	3199.02
7	JAGDISHPUR	5575.32	2954.68	124.48	1679.05	10333.53	1033.35	9300.18
8	KOILWAR	2547.92	535.85	57.14	325.06	3465.97	346.6	3119.37
9	PIRO	4392.66	3399.31	105.46	2025.92	9923.35	992.34	8931.01
10	SAHAR	2496.76	2066.69	61.46	1384.38	6009.29	600.93	5408.36
11	SANDESH	2774.33	1150.71	62.82	950.82	4938.68	493.87	4444.81
12	SHAHPUR	3275.16	453.76	73.13	335.98	4138.03	413.81	3724.22
13	TARARI	4346.84	3488.67	97.05	2081.22	10013.78	1001.38	9012.4
14	UDWANTNAGAR	3479.87	2242.02	82.35	1432.04	7236.28	723.63	6512.65
DISTRICT TOTAL		**47999.42**	**23694.1**	**1103.52**	**14948.8**	**87745.84**	**8774.58**	**78971.26**
BUXAR								
1	BRAHMPUR	3722.36	963.73	68.21	845.06	5599.36	559.94	5039.42
2	BUXAR	3023.46	1072.02	59.52	547.6	4702.6	388.63	4313.97
3	CHAKKI	1541.28	77.41	28.02	61.26	1707.97	170.8	1537.17
4	CHAUGAIN	954.97	666.46	19.9	507.8	2149.13	157.98	1991.15
5	CHAUSA	1923.84	1014.03	40.35	775.54	3753.76	279.07	3474.69

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
6	DUMRAON	3866.1	1773.74	73.19	1237.34	6950.37	695.05	6255.32
7	ITARHI	4229.22	4602.77	85.8	2674.45	11592.24	1013.37	10578.87
8	KESATH	522.83	1376.61	11.41	1156.15	3067	306.7	2760.3
9	NAWANAGAR	2795.34	1220.97	72.54	692.26	4781.11	478.11	4303
10	RAJPUR	4605.77	5402.99	105.34	3156.13	13270.23	1194.87	12075.36
11	SIMRI	3437.39	373.46	62.49	358.94	4232.28	423.23	3809.05
DISTRICT TOTAL		**30622.56**	**18544.19**	**626.77**	**12012.53**	**61806.05**	**5667.75**	**56138.3**
DARBHANGA								
1	ALINAGAR	2130.59	436.47	189.39	364.14	3120.59	312.05	2808.54
2	BAHADURPUR	3711.68	878.79	335.8	632.15	5558.42	555.83	5002.59
3	BAHERI	4815.8	657.27	428.08	428.19	6329.34	632.93	5696.41
4	BENIPUR	3628.87	705.57	324	569.85	5228.29	522.83	4705.46
5	BIRAUL	4134.52	584.39	367.52	482.42	5568.85	556.89	5011.96
6	DARBHANGA	4620.76	498.07	410.74	376.89	5906.46	590.65	5315.81
7	GAURA BAURAM	2604.73	367.54	231.53	303.92	3507.72	350.78	3156.94
8	GHANSHYAMPUR	2125.56	1271.95	206.15	881.95	4485.61	448.56	4037.05
9	HANUMAN NAGAR	3133.79	413.46	278.56	282.18	4107.99	410.8	3697.19
10	HAYAGHAT	1928.16	280.48	171.39	207.05	2587.08	258.7	2328.37
11	JALE	4187.43	377.08	372.22	306.2	5242.93	524.3	4718.63
12	KEOTI	3318.49	935.81	299.07	697.59	5250.96	525.09	4725.87
13	KIRATPUR	1397.98	105.05	124.27	94.35	1721.65	172.18	1549.47
14	KUSHESWAR	2260.81	310.72	232.33	225.62	3029.48	154.39	2875.09

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
	ASTHAN							
15	KUSHESWAR ASTHAN EAST	2639.8	256.7	241.6	166.08	3304.18	166.38	3137.8
16	MANIGACHHI	3024.16	724.74	271.41	561.66	4581.97	458.2	4123.77
17	SINGHWARA	3819.55	582.29	339.52	451.73	5193.09	519.31	4673.78
18	TARDIH	1790.45	317.19	166.79	274.2	2548.63	132.71	2415.92
DISTRICT TOTAL		**55273.13**	**9703.57**	**4990.37**	**7306.17**	**77273.24**	**7292.58**	**69980.65**
EAST CHAMPARAN								
1	ADAPUR	3485.02	2859.75	207.09	1757.36	8309.22	830.92	7478.3
2	ARERAJ	4773.38	1882.78	256.14	1551.1	8463.4	601.42	7861.98
3	BANJARIYA	3153.9	910.66	188.39	600.57	4853.52	313.19	4540.33
4	BANKATWA	2049.51	1819.58	119.6	912.07	4900.76	490.08	4410.68
5	CHAKIA	4372.51	1717.17	234.36	1310.57	7634.61	763.46	6871.15
6	CHAURADANO	2852.07	2969.08	182.38	1823.33	7826.86	705.06	7121.8
7	CHIRAIYA	3983.13	4292.88	277.59	2784.89	11338.49	1133.86	10204.63
8	DHAKA	4308.4	1831.62	228.55	1582.15	7950.72	795.07	7155.65
9	GHORASAHAN	2070.81	2907.08	160.89	1235.19	6373.97	637.4	5736.57
10	HARSIDDHI	4383.32	4703.69	257	2852.55	12196.56	1219.67	10976.89
11	KALYANPUR	5903.29	2621.52	321.9	2526.25	11372.96	775.21	10597.75
12	KESARIA	4029.83	2669.37	254.5	1502.88	8456.58	709.68	7746.9
13	KOTWA	3381.23	2960.49	205.54	2026.9	8574.16	741.63	7832.53
14	MADHUBAN	3155.68	439.56	164.26	268.2	4027.7	402.78	3624.92

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		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
15	MEHSI	3160.35	1843.83	164.5	999.9	6168.58	616.86	5551.72
16	MOTIHARI	5194.45	2422.35	340.11	1399.07	9355.98	703.78	8652.2
17	PAHARPUR	3444.78	4118.4	209.09	2601.72	10373.99	952.67	9421.32
18	PAKARIDAYAL	2925.83	1022.53	157.57	830.7	4936.63	493.67	4442.96
19	PATAHI	2873.62	1294.93	160.19	881.77	5210.51	521.06	4689.45
20	PHENHARA	1417.85	255.21	73.8	140.64	1887.5	188.76	1698.74
21	PIPRAKOTHI	959.52	1009.49	66	659.38	2694.39	232.25	2462.14
22	RAMGARHWA	3721.52	2355.3	226.66	1355.15	7658.63	613.77	7044.86
23	RAXAUL	2584.51	2497.05	177.6	1481.37	6740.53	674.06	6066.47
24	SANGRAMPUR	3404.21	1923.18	199.62	1189.49	6716.5	536.58	6179.92
25	SUGAULI	3681.36	3242.05	226.11	1759.26	8908.78	816.11	8092.67
26	TETARIA	2086.91	340.82	108.63	193.29	2729.65	272.96	2456.69
27	TURKAULIYA	3120.77	2500.45	184.01	1659.57	7464.8	625.4	6839.4
DISTRICT TOTAL		**90477.76**	**59410.82**	**5352.08**	**37885.32**	**193125.98**	**17367.36**	**175758.62**
GAYA								
1	AMAS	1943.28	744.65	52.26	459.21	3199.4	319.95	2879.45
2	ATRI	2671.57	405.79	70.97	290.03	3438.36	343.83	3094.53
3	BANKE BAZAR	4167.33	635.97	110.85	334.42	5248.57	524.86	4723.71
4	BARACHATTY	5315.97	623.85	141.55	311.85	6393.22	639.32	5753.9
5	BELAGANJ	4027.46	1081.06	108.05	801	6017.57	601.76	5415.81
6	BODH GAYA	5990.11	955.2	159.24	600.42	7704.97	770.5	6934.47
7	DOBHI	2871.96	1257.97	77.83	560.69	4768.45	476.85	4291.6

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
8	DUMARIYA	2268.41	1126.21	75.45	498.32	3968.39	216.78	3751.61
9	FATEHPUR	6317.57	981.62	168.68	578.17	8046.04	804.6	7241.44
10	GAYA SADAR	3770.24	379.66	100.15	204.6	4454.65	445.47	4009.18
11	GURARU	2818.75	1405.44	76.25	834.43	5134.87	513.49	4621.38
12	GURUA	3732.29	1853.27	103.39	938.22	6627.17	662.72	5964.45
13	IMAMGANJ	5428.21	875.4	144.19	505.81	6953.61	695.36	6258.25
14	KHIZAR SARAI	3691.78	1568.78	100.74	930.5	6291.8	629.18	5662.62
15	KONCH	5135.27	2122.01	139.51	1385.92	8782.71	878.28	7904.43
16	MANPUR	2552.6	438	67.81	309.58	3367.99	336.8	3031.19
17	MOHANPUR	6581.9	890.78	175.49	498.65	8146.82	814.68	7332.14
18	MUHRA	3033.62	462.75	80.58	353.2	3930.15	393.02	3537.13
19	NEEMCHAK BATHANI	2407.14	541.93	64.66	312.2	3325.93	332.59	2993.34
20	PARAIYA	2830.06	1041.08	77.46	600.11	4548.71	454.87	4093.84
21	SHERGHATI	2345.14	872.21	63.55	384.02	3664.92	366.49	3298.43
22	TANKUPPA	2951.92	439.35	78.66	271.1	3741.03	374.09	3366.94
23	TEKARI	4669.37	1721.93	128.24	1073.51	7593.05	666.68	6926.37
24	WAZIRGANJ	4942.93	1245.57	131.84	716.97	7037.31	642.96	6394.35
DISTRICT TOTAL		**92464.88**	**23670.48**	**2497.4**	**13752.93**	**132385.69**	**12905.13**	**119480.56**
GOPALGANJ								
1	BAIKUNTHPUR	5018.2	1993.39	156.98	1260.73	8429.3	842.93	7586.37
2	BARAULI	4176.98	3629.75	141.78	1939.17	9887.68	866.12	9021.56

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		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
3	BHORE	2583.11	3723.97	100.31	2570.46	8977.85	897.79	8080.06
4	GOPALGANJ	4933.7	1392.83	150.37	744.06	7220.96	722.09	6498.87
5	HATHUA	3591.41	2330.4	112.76	1891.38	7925.95	792.59	7133.36
6	KATEYA	2235.57	3707.53	97.03	2203.35	8243.48	824.35	7419.13
7	KUCHAIKOT	5628.01	4584.49	193.35	3104.13	13509.98	1351	12158.98
8	MANJHA	3405.31	2415.21	108.81	1749.81	7679.14	767.91	6911.23
9	PANCHDEVARI	2314.19	1590.3	71.36	1524.55	5500.4	550.04	4950.36
10	PHULWARIA	1774.29	2663.98	73.46	1813.96	6325.69	632.57	5693.12
11	SIDHWALIA	2374.23	2229.27	92.39	1269.15	5965.04	596.51	5368.53
12	THAWE	1621.72	1494.77	53.84	951.61	4121.94	412.2	3709.74
13	UCHKAGAON	2773.2	1648.79	87.14	1232.38	5741.51	574.15	5167.36
14	VIJAYIPUR	3725.51	1868.57	113.54	1174.52	6882.14	688.21	6193.93
DISTRICT TOTAL		**46155.43**	**35273.25**	**1553.12**	**23429.26**	**106411.06**	**10518.46**	**95892.6**
JAMUI								
1	BARHAT	4103.57	389.95	182.56	245.17	4921.25	492.12	4429.13
2	CHAKAI	5528.79	1390.97	313.98	597.79	7831.53	417.33	7414.2
3	GIDHAUR	1487.61	590.02	70.03	287.87	2435.53	243.56	2191.97
4	ISLAMNAGAR ALIGANJ	3838.89	647.98	170.29	402.16	5059.32	505.94	4553.38
5	JAMUI	2783.16	1477.18	131.88	751.17	5143.39	514.34	4629.05
6	JHAJHA	2621.16	910.23	153.05	653.57	4338.01	245.9	4092.11
7	KHAIRA	6948.28	1095.44	311.02	696.13	9050.87	861.57	8189.3

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		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
8	LAXMIPUR	1597.69	687.36	76.11	430.17	2791.33	171.53	2619.8
9	SIKANDRA	3163.87	1005.73	140.54	628.09	4938.23	493.83	4444.4
10	SONO	2057.12	694.19	136.88	361.03	3249.22	324.92	2924.3
DISTRICT TOTAL		**34130.14**	**8889.05**	**1686.34**	**5053.15**	**49758.68**	**4271.04**	**45487.64**
JEHANABAD								
1	GHOSHI	1747.04	1513.63	45.85	1001.53	4308.05	291.48	4016.56
2	HULASGUNJ	1843.29	979.89	48.17	1002.2	3873.55	387.36	3486.19
3	JEHANABAD	3118.1	1508.65	80.59	867.37	5574.71	557.47	5017.24
4	KAKO	2510.57	1163.69	65.72	1107.75	4847.73	484.77	4362.95
5	MAKHDUMPUR	4435.02	1959.92	120.85	1535.05	8050.84	805.08	7245.76
6	MODANGANJ	1518.69	548.15	39.64	532.98	2639.46	263.96	2375.51
7	RATNI FARIDPUR	2384.62	558.6	61.64	551.34	3556.2	355.62	3200.58
DISTRICT TOTAL		**17557.33**	**8232.53**	**462.46**	**6598.22**	**32850.54**	**3145.74**	**29704.79**
KAIMUR								
1	ADHAURA	3825.45	288.31	67.08	259.12	4439.96	444	3995.96
2	BHABHUA	7792.68	3703.3	136.65	2076.35	13708.98	1370.9	12338.08
3	BHAGWANPUR	1311.76	1719.67	27.65	870.05	3929.13	392.91	3536.22
4	CHAINPUR	6743.14	3057.45	121.07	1578.51	11500.17	1150.02	10350.15
5	CHAND	4012.94	1538.47	84.44	722.74	6358.59	635.86	5722.73
6	DURGAWATI	3905.54	1162.61	68.48	607.09	5743.72	574.37	5169.35
7	KUDRA	4849.9	1209.83	86.02	1056.13	7201.88	720.18	6481.7
8	MOHANIA	6651.82	1575.89	116.65	1267.69	9612.05	961.21	8650.85

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		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
9	NUAON	4403.17	2652.8	77.21	1225.25	8358.43	835.85	7522.58
10	RAMGARH	3644.98	2147.03	68.85	1090.89	6951.75	491.09	6460.65
11	RAMPUR	2561.04	1697.98	46.67	879.14	5184.83	518.49	4666.34
DISTRICT TOTAL		**49702.42**	**20753.34**	**900.77**	**11632.96**	**82989.49**	**8094.88**	**74894.61**
KATIHAR								
1	AMDABAD	5300.15	267.77	446.06	156.98	6170.96	617.09	5553.87
2	AZAMNAGAR	8850.94	1488.55	744.89	981.25	12065.63	1206.57	10859.06
3	BALRAMPUR	5305.02	723.47	446.47	453.31	6928.27	692.83	6235.44
4	BARARI	9166.88	899.17	775.15	714.2	11555.4	1155.55	10399.85
5	BARSOI	7843.32	1201.51	660.09	816.15	10521.07	1052.11	9468.96
6	DANDKHORA	2506.64	429.72	210.96	269.3	3416.62	341.66	3074.96
7	FALKA	4313.73	3238.4	400.77	2639.59	10592.49	1059.24	9533.25
8	HASANGANJ	1677.17	658	168.15	525.91	3029.23	194.81	2834.42
9	KADWA	9551.12	660.7	803.82	428.41	11444.05	1144.4	10299.65
10	KATIHAR	3050.62	1011.26	260.24	943.94	5266.06	526.61	4739.45
11	KORHA	7086.47	5888.27	705.82	4108.03	17788.59	1778.86	16009.73
12	KURSELA	1587.18	136.61	144.39	80.21	1948.39	100.14	1848.25
13	MANIHARI	7027.91	362.53	591.46	225.82	8207.72	820.77	7386.95
14	MANSAHI	1473.28	570.55	184.78	472.43	2701.04	270.1	2430.94
15	PRANPUR	4300.7	851.86	361.94	589.89	6104.39	610.45	5493.94
16	SAMELI	3586.63	875.81	304.25	863.17	5629.86	562.99	5066.87
DISTRICT TOTAL		**82627.76**	**19264.18**	**7209.24**	**14268.59**	**123369.77**	**12134.18**	**111235.59**

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
KHAGARIA								
1	ALAULI	7385.47	364.82	347.87	933.36	9031.52	903.15	8128.37
2	BELDAUR	5697.75	422.81	283.35	959.5	7363.41	375.2	6988.21
3	CHAUTHAM	4412.13	243.33	207.82	484.45	5347.73	534.77	4812.96
4	GOGRI	6735.37	413.32	317.25	959.99	8425.93	842.6	7583.33
5	KHAGARIA	7059.62	274.72	332.53	686.81	8353.68	835.36	7518.32
6	MANSI	1883.84	140.38	88.73	286.32	2399.27	239.93	2159.34
7	PARBATTA	6485.94	351.25	305.5	927.92	8070.61	807.07	7263.54
DISTRICT TOTAL		**39660.12**	**2210.63**	**1883.05**	**5238.35**	**48992.15**	**4538.08**	**44454.07**
KISHANGANJ								
1	BAHADURGANJ	7143.27	356.83	687.31	241.74	8429.15	427.46	8001.69
2	DIGHALBANK	6949.13	402.94	707.97	421.42	8481.46	848.15	7633.31
3	KISHANGANJ	5281.63	292.92	501.97	279.64	6356.16	322.55	6033.61
4	KOCHADHAMAN	8546.5	456.59	795.57	489.2	10287.86	517.87	9769.99
5	POTHIA	9647.19	639.16	982.85	711.2	11980.4	1198.04	10782.36
6	TERHAGACHH	5265.74	273.71	536.47	231.8	6307.72	630.77	5676.96
7	THAKURGANJ	10679.54	403.67	1088.02	432.64	12603.87	1260.39	11343.48
DISTRICT TOTAL		**53513**	**2825.82**	**5300.16**	**2807.64**	**64446.62**	**5205.23**	**59241.4**
LAKHISARAI								
1	BARAHIA	5267.8	1413.16	308.23	954.54	7943.73	652.78	7290.95
2	CHANNAN	942.51	883.57	63.74	489.11	2378.93	237.88	2141.05
3	HALSI	2132.69	2442	127.44	1579.36	6281.49	628.15	5653.34

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
4	LAKHISARAI	3626.06	2056.78	222	1127.91	7032.75	703.28	6329.47
5	PIPARIA	1318.55	259.45	74.66	140.11	1792.77	173.85	1618.92
6	RAMGARH CHOWK	1300.78	2436.1	92.08	1267.39	5096.35	509.64	4586.71
7	SURAJGARHA	6884.56	2129.18	391.16	1575.93	10980.83	1098.09	9882.74
DISTRICT TOTAL		**21472.95**	**11620.24**	**1279.31**	**7134.35**	**41506.85**	**4003.67**	**37503.18**
MADHEPURA								
1	ALAMNAGAR	3244.94	2079.99	376.37	1331.14	7032.44	703.24	6329.2
2	BIHARIGANJ	2365.8	3322.32	232.34	1769.26	7689.72	753.56	6936.16
3	CHAUSA	2748.95	2082.31	300.42	1122.91	6254.59	505.11	5749.48
4	GAMHARIA	1706.56	1442.21	168.29	514.76	3831.82	352.88	3478.94
5	GHELADH	1921.33	2448.02	201.76	1477.49	6048.6	604.86	5443.74
6	GWALPARA	2586.8	2824.35	256.51	997.91	6665.57	666.55	5999.02
7	KUMARKHAND	5155.75	6592.39	543.21	4253.07	16544.42	1654.45	14889.97
8	MADHEPURA	4648.75	3942.33	417.6	2625.08	11633.76	1163.37	10470.39
9	MURLIGANJ	4270.16	5247.42	434.09	3311.53	13263.2	1261.31	12001.88
10	PURAINI	1569.82	1819.5	191.22	1119.23	4699.77	410.46	4289.31
11	SHANKARPUR	2706.39	2708.06	238.7	2104.27	7757.42	775.74	6981.68
12	SIGHESHWARSTHAN	2180.97	3507.74	244.32	2173.4	8106.43	810.64	7295.79
13	UDA KISHANGANJ	3498.83	3262.43	326.89	2222.27	9310.42	785.67	8524.75
DISTRICT TOTAL		**38605.05**	**41279.07**	**3931.72**	**25022.32**	**108838.16**	**10447.84**	**98390.31**
MADHUBANI								
1	ANDHARATHARI	3516.02	1709	340.38	1191.87	6757.27	675.73	6081.54

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
2	BABUBARHI	4524.8	2286.77	434.7	1792.92	9039.19	903.93	8135.26
3	BASOPATTI	2914.63	1306.44	300.58	970.31	5491.96	362.24	5129.72
4	BENIPATTI	5833.81	1763.41	603.04	1341.79	9542.05	601.45	8940.6
5	BISFI	4450.12	827.33	416.51	659.26	6353.22	635.32	5717.9
6	GHOGHARDIHA	3510.21	1320.6	377.8	871.05	6079.66	362.95	5716.71
7	HARLAKHI	3357.1	1648.6	339.97	1002.72	6348.39	437.87	5910.51
8	JAINAGAR	2833.92	1522.99	296.99	838.05	5491.95	431.14	5060.81
9	JHANJHARPUR	3399.55	1142.43	335.42	816.37	5693.77	362.48	5331.29
10	KALUAHI	1516.37	934.49	204.44	716.41	3371.71	337.17	3034.54
11	KHAJAULI	2309.68	1824.83	262.35	1205.31	5602.17	475.68	5126.49
12	KHUTAUNA	5028.77	2619.08	494.63	1492.55	9635.03	963.51	8671.52
13	LADANIA	3543.8	1089.53	422.55	750.33	5806.21	359.6	5446.61
14	LAKHANAUR	2770.87	967.6	270.01	869.32	4877.8	312.58	4565.22
15	LAUKAHI	6124.1	4301.52	612.14	2818.8	13856.56	1385.66	12470.9
16	MADHEPUR	4594.23	1009.26	541.77	611.84	6757.1	401.44	6355.66
17	MADHWAPUR	2653.33	578.18	248.98	455.2	3935.69	393.57	3542.12
18	PANDAUL	3657.71	1260.75	375.6	1154.88	6448.94	407.24	6041.7
19	PHULPARAS	3340.51	2221.93	367.07	1495.85	7425.36	586.37	6838.99
20	RAHIKA	2926.55	1537.86	355.62	1287.9	6107.93	456.73	5651.2
21	RAJNAGAR	4356.77	1549.65	411.22	1233.17	7550.81	755.08	6795.72
DISTRICT TOTAL		**77162.85**	**33422.25**	**8011.77**	**23575.9**	**142172.77**	**11607.74**	**130565.01**
MUNGER								

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
1	ASARGANJ	1028.13	903.51	76.05	332.75	2340.44	234.05	2106.39
2	BARIYARPUR	3641.56	128.77	205.25	76.7	4052.28	405.23	3647.05
3	DHARAHARA	4694.72	1556.9	275.54	776.34	7303.5	730.35	6573.15
4	HAVELI KHARAGPUR	4623.97	2121	269.84	842.7	7857.51	785.75	7071.75
5	JAMALPUR	1615.44	2000.96	109.26	649.59	4375.25	437.52	3937.73
6	MUNGER SADAR	5491.16	256.85	309.49	156.75	6214.25	621.42	5592.83
7	SANGRAMPUR	1187.54	1210.83	79.93	487.97	2966.27	296.62	2669.65
8	TARAPURA	1529.54	1277.55	90.84	528.59	3426.52	208.23	3218.29
9	TETIYABAMBAR	2299.91	374.02	129.63	266.66	3070.22	307.02	2763.2
DISTRICT TOTAL		**26111.97**	**9830.39**	**1545.83**	**4118.05**	**41606.24**	**4026.19**	**37580.04**
MUZAFFARPUR								
1	AURAI	4855.76	965.86	270.89	722.6	6815.11	681.51	6133.6
2	BANDRA	2754.6	457.81	153.67	378.71	3744.79	374.48	3370.31
3	BOCHAHAN	4022.82	980.19	224.42	694.11	5921.54	592.15	5329.39
4	GAIGHAT	5240.44	576.36	292.35	512.17	6621.32	662.14	5959.18
5	KANTI	4027.04	1917.52	233.88	1391.92	7570.36	757.04	6813.32
6	KATRA	4715.65	509.28	263.07	460.06	5948.06	594.8	5353.26
7	KURHANI	6488.22	2668.23	361.95	2037.97	11556.37	1155.65	10400.72
8	MARWAN	2669.19	1872.39	160.14	1340.16	6041.88	430.72	5611.16
9	MINAPUR	5883.15	981.93	329.04	868.74	8062.86	806.29	7256.57
10	MOTIPUR	7817.28	3868.15	436.1	2806.58	14928.11	1492.81	13435.3
11	MURAUL (DHOLI)	1550.47	268.19	87.1	234.16	2139.92	214	1925.93

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
12	MUSHAHARI	2824.73	1040.72	166.86	1099.23	5131.54	513.15	4618.39
13	PAROO	6952.41	3726.98	405.45	2695.52	13780.36	1378.04	12402.32
14	SAHEBGANJ	4614.84	1793.88	260.4	1721.94	8391.06	839.11	7551.95
15	SAKRA	4360.88	713.9	243.28	653.75	5971.81	597.18	5374.63
16	SARAIYA	5634.13	3264.44	343.31	2384.66	11626.54	1162.65	10463.89
DISTRICT TOTAL		**74411.61**	**25605.83**	**4231.91**	**20002.28**	**124251.63**	**12251.72**	**111999.92**
NALANDA								
1	ASTHAWAN	2829.23	960.23	78.36	663.85	4531.67	453.17	4078.5
2	BEN	2051.29	328.42	55.86	292.46	2728.03	272.81	2455.22
3	BIHARSHARIF	3580.28	433.6	96.91	453.46	4564.25	456.41	4107.83
4	BIND	1473.37	324.75	40.22	263.85	2102.19	195.45	1906.74
5	CHANDI	2685.35	328.86	72.62	347.46	3434.29	343.43	3090.86
6	EKANGARSARAI	2294.62	718.41	74.47	563.19	3650.69	216.02	3434.67
7	GIRIYAK	1659.2	380.16	44.84	391.41	2475.61	247.56	2228.06
8	HARNAUT	3722.71	506.63	100.59	533.75	4863.68	486.37	4377.31
9	HILSA	2889.82	764.96	79.9	496.09	4230.77	423.08	3807.69
10	ISLAMPUR	3802.79	856.04	123.04	744.88	5526.75	319.59	5207.16
11	KARAI PARSARAI	1327.69	232.48	35.87	224.28	1820.32	182.03	1638.29
12	KATRISARAI	834.83	334.45	23.41	187.34	1380.03	138	1242.03
13	NAGARNAUSA	1543.78	323.94	41.71	325.71	2235.14	223.51	2011.63
14	NOORSARAI	2559.64	297.86	69.16	294.81	3221.47	322.14	2899.33
15	PARWALPUR	1286.07	115.4	34.91	110.64	1547.02	154.7	1392.32

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
16	RAHUI	2491.71	335.28	67.41	334.83	3229.23	322.93	2906.3
17	RAJGIR	2617.08	665.59	71.78	532.95	3887.4	388.74	3498.66
18	SARMERA	2536.47	340.84	68.54	337.35	3283.2	328.32	2954.88
19	SILAO	2518.97	583.73	68.88	478.16	3649.74	364.97	3284.77
20	THARTHARI	1286.28	171.85	34.76	152.16	1645.05	164.5	1480.55
DISTRICT TOTAL		**45991.18**	**9003.48**	**1283.24**	**7728.63**	**64006.53**	**6003.73**	**58002.8**
NAWADA								
1	AKBARPUR	3781.23	1072.13	164.31	676.83	5694.5	569.45	5125.05
2	GOVINDPUR	2839.56	863.38	123.8	537.27	4364.01	436.4	3927.61
3	HISUA	2566.87	601.7	110.73	450.3	3729.6	372.96	3356.64
4	KASHICHAK	1697.4	406.65	74.02	274.65	2452.72	215.01	2237.71
5	KAWAKOLE	5941.05	756.84	256.47	589.01	7543.37	754.33	6789.04
6	MESKAUR	950.84	292.58	49.97	225.14	1518.53	79.97	1438.56
7	NARDIGANJ	2131.53	376.57	91.95	301.27	2901.32	290.14	2611.18
8	NARHAT	1298.85	649.64	57.27	368.22	2373.98	237.4	2136.58
9	NAWADA	3706.55	1104.96	160.71	658.81	5631.03	493.3	5137.73
10	PAKARIBARAWAN	4121.63	1252.06	181.4	725.19	6280.28	628.03	5652.25
11	RAJAULI	6785.35	1790.98	295.35	1211.58	10083.26	1008.32	9074.93
12	ROH	2859.4	927.31	148.02	559.34	4494.07	449.41	4044.66
13	SIRDALA	4513.18	1341.44	197.02	818.65	6870.29	687.02	6183.27
14	WARISALIGANJ	3163.92	1296.9	145.26	787.74	5393.82	539.39	4854.43
DISTRICT TOTAL		**46357.36**	**12733.14**	**2056.28**	**8184**	**69330.78**	**6761.13**	**62569.64**

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
PATNA								
1	ATHMALGOLA	966.56	170.11	25.14	142.24	1304.05	130.41	1173.64
2	BAKHTIYARPUR	4726.68	408.97	122.92	349.8	5608.37	560.85	5047.52
3	BARH	2631.7	304.54	68.44	252.61	3257.29	325.72	2931.57
4	BELCHHIA	1649.04	225.63	42.88	173.6	2091.15	209.12	1882.03
5	BIHTA	4559.03	1797.6	121.1	1293.1	7770.83	650.09	7120.74
6	BIKRAM	3262.1	2648.72	92.52	1831.82	7835.16	535.1	7300.06
7	DANAPUR	2988.78	361.48	77.72	313.85	3741.83	374.18	3367.65
8	DANIYAWAN	1563.31	240.19	40.65	189.8	2033.95	203.4	1830.55
9	DHANARUA	4455.8	603.38	115.87	495.41	5670.46	567.05	5103.41
10	DULHIN BAZAR	2657.87	745.8	69.12	689.63	4162.42	416.24	3746.18
11	FATUHA	3034.41	411.83	78.91	337.64	3862.79	386.28	3476.51
12	GHOSWARI	3357.88	224.63	87.32	165.36	3835.19	383.53	3451.66
13	KHUSRUPUR	1474.22	262.19	38.34	205.74	1980.49	198.05	1782.44
14	MANER	4099.19	179.38	106.6	124.83	4510	451	4059
15	MASAURHI	4861.16	828.11	126.41	665.65	6481.33	648.14	5833.19
16	MOKAMA	4594.36	361.72	119.48	285.45	5361.01	536.1	4824.91
17	NAUBATPUR	3888.23	1926.75	104.75	1383.99	7303.72	730.37	6573.35
18	PALIGANJ	5308.87	2365.24	148.47	1606.89	9429.47	727.85	8701.62
19	PANDARAK	4920.23	456.35	127.95	369.91	5874.44	587.45	5286.99
20	PATNA SADAR	1147.63	342.02	29.84	339.53	1859.02	185.91	1673.11
21	PATNA URBAN	2297.2	172.31	59.74	174.06	2703.31	270.33	2514.37

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		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
22	PHULWARI SHARIF	2556.77	1407.03	66.49	976.56	5006.85	500.68	4506.17
23	PUNPUN	3043.78	706.33	79.15	615.59	4444.85	444.48	4000.37
24	SAMPATCHAK	1569.32	348.79	40.81	298.93	2257.85	225.79	2032.06
DISTRICT TOTAL		**75614.12**	**17499.1**	**1990.62**	**13281.99**	**108385.83**	**10248.12**	**98219.1**
PURNEA								
1	AMOUR	6619.52	912.4	674.32	570.4	8776.64	441.37	8335.27
2	BAISA	4208.85	601.3	570.49	368.1	5748.74	574.88	5173.86
3	BAISI	4154.24	603.23	563.09	378.16	5698.72	569.88	5128.84
4	BANMANKHI	8366.96	7911.93	1014.95	5469.86	22763.7	2276.37	20487.33
5	BARHARA KOTHI	5204.73	4615.67	632.1	3178.91	13631.41	1363.15	12268.27
6	BHAWANIPUR	3707.63	2922.59	442.04	2043.98	9116.24	778.94	8337.3
7	DAGARUA	4409.43	1929.06	577.73	1221.34	8137.56	813.76	7323.8
8	DHAMDAHA	10798.49	5072.47	997.63	4649.29	21517.88	2151.8	19366.08
9	JALALGARH	2391.97	3371.61	311.5	2080.94	8156.02	788.72	7367.3
10	KASBA	4098.55	3285.66	462.21	2014.24	9860.66	870.47	8990.19
11	KRITYANANDNAGAR	5837.25	9169.1	783.43	5195.18	20984.96	2073.33	18911.63
12	PURNEA	5612.85	3317.23	707.94	2599.06	12237.08	904.75	11332.33
13	RUPAULI	6320.98	2835.08	683.43	1989.51	11829	844.37	10984.63
14	SRINAGAR	3163.09	2762.54	391.33	1992.94	8309.9	830.99	7478.91
DISTRICT TOTAL		**74894.54**	**49309.87**	**8812.19**	**33751.91**	**166768.51**	**15282.78**	**151485.74**
ROHTAS								
1	AKORHIGOLA	1867.91	1655.99	45.36	727.3	4296.56	429.65	3866.91

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
2	BIKRAMGANJ	2104.74	2062.4	59.46	883.56	5110.16	511.02	4599.13
3	CHENARI	2979.17	2303.6	67.85	1290.87	6641.49	664.14	5977.35
4	DAWATH	1835.66	1867.2	46.08	700.24	4449.18	444.91	4004.27
5	DEHRI	3165.03	1516.32	70.22	911.18	5662.75	566.27	5096.48
6	DINARA	5639.42	3061.41	133.88	1225.82	10060.53	1006.06	9054.47
7	KARAKAT	3973.96	1749.33	88.17	854.7	6666.16	666.62	5999.54
8	KARGAHAR	6472.79	2080.27	143.61	930.98	9627.65	962.76	8664.89
9	KOCHAS	4237.75	2815.9	94.02	1515.41	8663.08	866.31	7796.77
10	NASRIGANJ	2569.31	1756.71	57	688.34	5071.36	507.13	4564.23
11	NAUHATTA	7076.51	904.92	157	672.33	8810.76	881.09	7929.67
12	NOKHA	3282.67	741.55	73.25	584.46	4681.93	468.2	4213.73
13	RAJPUR	1374.76	516.47	30.5	254.25	2175.98	217.6	1958.38
14	ROHTAS	5744.31	512.98	127.44	460.54	6845.27	684.52	6160.75
15	SANJHAULI	1331.61	997.79	29.54	444.43	2803.37	280.34	2523.03
16	SASARAM	4603.55	2309.43	103.81	1144.6	8161.39	816.14	7345.25
17	SHEOSAGAR	6468.69	4100.32	143.52	1931.16	12643.69	1264.37	11379.32
18	SURAJPURA	1010.76	839.06	24.7	332.37	2206.89	220.69	1986.2
19	TILOUTHU	2644.26	573.83	58.66	483.39	3760.14	376.01	3384.13
DISTRICT TOTAL		**68382.86**	**32365.48**	**1554.07**	**16035.93**	**118338.34**	**11833.83**	**106504.5**
SAHARSA								
1	BANMA ITAHRI	1639.59	377.68	191.1	171.5	2379.87	237.99	2141.88
2	KAHARA	3061.08	1256.95	341.66	972.01	5631.7	394.03	5237.67

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
3	MAHISHI	6981.89	1084.36	566.52	454.34	9087.11	908.72	8178.39
4	NAUHATTA	3744.02	710.91	431.7	284.12	5170.75	320.62	4850.13
5	PATARGHAT	2688.15	1290.41	301.54	1120.94	5401.04	540.11	4860.93
6	SALKHUA	4747.96	798.18	448.8	364.1	6359.04	393.05	5965.99
7	SATTAR KATAIYA	4403.71	2120.33	383.06	1805.08	8712.18	634.14	8078.04
8	SIMRI BAKHTIYARPUR	4662.59	1745.64	543.44	1199.47	8151.14	815.12	7336.02
9	SONBARSA	4737.86	1882.06	534.85	1495.17	8649.94	865	7784.94
10	SOUR BAZAR	5668.98	2136.44	478.99	1592.99	9877.4	659.2	9218.2
DISTRICT TOTAL		**42335.83**	**13402.96**	**4221.66**	**9459.72**	**69420.17**	**5767.98**	**63652.19**
SAMASTIPUR								
1	BIBHUTIPUR	5500.18	878.2	242.18	657.57	7278.13	727.82	6550.31
2	BITHAN	3067.53	423.16	137.03	312.6	3940.32	200.06	3740.26
3	DALSINGSARAI	2482.91	486.27	109.33	359.75	3438.26	343.83	3094.43
4	HASANPUR	3993.63	283.61	175.85	201.46	4654.55	465.45	4189.1
5	KALYANPUR	6072.14	986.67	270.38	783.73	8112.92	811.3	7301.62
6	KHANPUR	3680.01	435.15	162.04	325.66	4602.86	460.29	4142.57
7	MOHANPUR	2113.97	292.06	93.08	208.13	2707.24	270.72	2436.52
8	MOHIUDDIN NAGAR	3379.95	548.24	148.83	425.43	4502.45	450.25	4052.2
9	MORWA	3283.93	474.18	144.6	347.41	4250.12	425.01	3825.11
10	PATORI	2799.66	369.52	123.27	269.76	3562.21	356.22	3205.99
11	PUSA	1980.64	230.82	87.21	163.4	2462.07	246.21	2215.86

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
12	ROSERA	2797.32	288.45	123.17	228.43	3437.37	343.74	3093.63
13	SAMASTIPUR	3730.63	438.19	164.27	328.12	4661.21	466.12	4195.09
14	SARAIRANJAN	3862.13	518.71	170.06	389.85	4940.75	494.08	4446.67
15	SHIVAJINAGAR	3602.77	453.72	158.64	340.66	4555.79	455.59	4100.2
16	SINGHIYA	3779.16	478.33	166.4	405.47	4829.36	482.94	4346.42
17	TAJPUR	1772.43	402.43	78.04	283.98	2536.88	253.68	2283.2
18	UJIYARPUR	4467.46	933.87	196.71	710.19	6308.23	630.82	5677.41
19	VIDYAPATINAGAR	2162.44	367.74	100.46	245.72	2876.36	148.79	2727.57
20	WARISNAGAR	3350.68	1074.1	150.33	769.43	5344.54	534.45	4810.09
DISTRICT TOTAL		**67879.57**	**10363.42**	**3001.88**	**7756.75**	**89001.62**	**8567.37**	**80434.25**
SARAN								
1	AMNOUR	2446.06	2026.67	105.1	1284.01	5861.84	586.18	5275.66
2	BANIYAPUR	3219.26	4887.12	141.76	2699.22	10947.36	1094.73	9852.62
3	CHAPRA SADAR	4202.75	1560.97	154.22	857.62	6775.56	677.56	6098.01
4	DARIYAPUR	5025.28	1044.75	188.31	789.41	7047.75	614.1	6433.65
5	DIGHWARA	2021.24	224.99	74.17	204.89	2525.29	252.53	2272.76
6	EKMA	2963.02	2176.48	125.5	1545.32	6810.32	681.04	6129.28
7	GARKHA	3794.42	1368.51	143.52	996.18	6302.63	630.26	5672.37
8	ISUAPUR	2058.45	1603.36	83.48	865.38	4610.67	461.06	4149.61
9	JALALPUR	2494.4	2241.29	99.72	1477.47	6312.88	631.29	5681.59
10	LAHLADPUR	1184.72	384.19	44.52	344.29	1957.72	195.78	1761.94
11	MAKER	1645.19	529.32	61.81	428.11	2664.43	266.44	2397.99

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
12	MANJHI	4569.79	2628.52	177.2	1815.74	9191.25	919.12	8272.13
13	MARHAURA	3488.01	2771.67	128	1577.48	7965.16	796.52	7168.64
14	MASHRAKH	2733.22	2874.92	112.72	1722.53	7443.39	744.35	6699.04
15	NAGRA	1053.02	1438.69	44.91	876.29	3412.91	341.29	3071.62
16	PANAPUR	2492.69	575.99	94.03	451.08	3613.79	228.48	3385.31
17	PARSA	1902.27	1950.01	86.8	1077	5016.08	501.61	4514.47
18	RIVILGANJ	2807.82	525.36	103.04	425.26	3861.48	386.15	3475.33
19	SONEPUR	3816.97	367.96	140.07	373.9	4698.9	469.88	4229.02
20	TARAIYA	2015.41	1238.96	84.82	799.74	4138.93	413.89	3725.04
DISTRICT TOTAL		**55933.99**	**32419.73**	**2193.7**	**20610.92**	**111158.34**	**10892.26**	**100266.08**
SHEIKHPURA								
1	ARIYARI	2200.03	881.15	135.05	568.22	3784.45	253.39	3531.06
2	BARBIGHA	1878.34	364.51	86.07	330.4	2659.32	265.92	2393.4
3	CHEWARA	2323.33	383.74	105.96	335.28	3148.31	314.84	2833.47
4	GHAT KUSUMBA	1869.61	235.56	85.27	200.76	2391.2	239.12	2152.08
5	SHEIKHOPUR SARAI	1113.61	417.88	50.79	240.54	1822.82	182.28	1640.54
6	SHEIKHPURA	3224.31	413.82	147.05	415.6	4200.78	420.07	3780.71
DISTRICT TOTAL		**12609.23**	**2696.66**	**610.19**	**2090.8**	**18006.88**	**1675.62**	**16331.26**
SHEOHAR								
1	DUMRI KATSARI	1831.66	483.88	126.87	202.21	2644.62	264.46	2380.16
2	PIPRAHI	2146.41	680.53	157.54	294.85	3279.33	268.55	3010.78
3	PURNAHIYA	1680.74	581.46	122.14	245.47	2629.81	262.98	2366.83

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
4	SHEOHAR	2472.93	831.15	176.86	368	3848.94	310.63	3538.31
5	TARIYANI	3762.9	1375.43	260.65	617.91	6016.89	601.69	5415.2
DISTRICT TOTAL		**11894.64**	**3952.45**	**844.06**	**1728.44**	**18419.59**	**1708.31**	**16711.28**
SITAMARHI								
1	BAIRGANIA	1498.18	130.06	127.77	78.88	1834.89	95.12	1739.77
2	BAJPATTI	3832.22	171.15	265.45	122.56	4391.38	439.14	3952.24
3	BATHNAHA	3918.63	271.76	380.98	190.63	4762	240.97	4521.03
4	BELSAND	2114.71	218.81	146.48	133.5	2613.5	261.36	2352.14
5	BOKHRA	2365.84	261.54	163.88	190.07	2981.33	298.13	2683.2
6	CHORAUT	2026.14	173.76	140.35	120.06	2460.31	246.03	2214.28
7	DUMRA	5375.34	456.4	372.35	358.99	6563.08	656.31	5906.77
8	MAJORGANJ	1655.1	195.56	143.93	124.85	2119.44	108.84	2010.6
9	NANPUR	2463.9	179.46	204.81	151.42	2999.59	299.95	2699.64
10	PARIHAR	5031.4	657.38	404.34	424.79	6517.91	342.08	6175.83
11	PARSAUNI	1626.74	148.28	112.68	98.9	1986.6	198.66	1787.94
12	PUPRI	2560.59	350.37	177.37	197.39	3285.72	328.57	2957.15
13	RIGA	3552.2	403.47	246.06	263.95	4465.68	446.56	4019.12
14	RUNNI SAIDPUR	7238.36	559.6	501.4	314.26	8613.62	861.37	7752.25
15	SONBARSA	4207.37	465.54	335.97	353.48	5362.36	271.03	5091.33
16	SUPPI	1756.27	259.93	163.38	132.78	2312.36	124.04	2188.32
17	SURSAND	3196.66	297.83	276.39	183.02	3953.9	207.66	3746.24
DISTRICT TOTAL		**54419.65**	**5200.9**	**4163.59**	**3439.53**	**67223.67**	**5425.82**	**61797.85**

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
SIWAN								
1	ANDAR	2725.38	1265.93	46.86	1029.93	5068.1	506.81	4561.29
2	BARHARIA	4055.15	2653.4	70.78	1999.49	8778.82	877.88	7900.94
3	BASANTPUR	1320.07	934.29	24.95	781.17	3060.48	306.05	2754.43
4	BHAGWANPUR	3441.35	1821.34	59.25	1413.85	6735.79	673.58	6062.21
5	DARAULI	3892	3612.82	69.95	2714.36	10289.13	1028.91	9260.22
6	DARAUNDHA	2819.78	2312.86	50	1795.28	6977.92	697.79	6280.13
7	GORIAKOTHI	3156.54	1740.61	55.06	1222.4	6174.61	617.47	5557.14
8	GUTHANI	2076.13	1761.42	36.96	1360.09	5234.6	523.46	4711.14
9	HASANPURA	1975.47	776.2	33.52	800.86	3586.05	287.22	3298.83
10	HUSSAINGANJ	2223.93	1356.33	38.62	1049.73	4668.61	466.87	4201.74
11	LAKRI NABIGANJ	2193.01	1089.4	37.75	839.31	4159.47	415.95	3743.52
12	MAHARAJGANJ	2741.71	924.57	45.47	1008.89	4720.64	376.87	4343.77
13	MAIRWA	1653.08	1575.64	32.22	1167.24	4428.18	442.82	3985.36
14	NAUTAN	1463.96	1262.98	26.02	951.33	3704.29	370.43	3333.86
15	PACHRUKHI	2867.63	1195.38	49.26	911.61	5023.88	502.39	4521.49
16	RAGHUNATHPUR	3361.2	2239.49	62.17	1732.62	7395.48	574.28	6821.2
17	SISWAN	2672.88	1037.76	45.81	786.63	4543.08	454.3	4088.78
18	SIWAN SADAR	2732.14	2248.03	51.82	1724.15	6756.14	675.62	6080.52
19	ZIRADEI	2885.59	2240.37	51.03	1756.65	6933.64	693.36	6240.28
DISTRICT TOTAL		**50257**	**32048.82**	**887.5**	**25045.59**	**108238.91**	**10492.06**	**97746.85**
SUPAUL								

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
1	BASANTPUR	4246.18	3042.38	502.56	2523.17	10314.29	1031.44	9282.85
2	CHHATAPUR	5334.4	6210.83	624.88	5790.99	17961.1	1796.12	16164.98
3	KISHANPUR	3369.86	1712.55	392.99	1036.99	6512.39	651.24	5861.15
4	MARAUNA	2721.2	254.4	332.81	152.39	3460.8	346.08	3114.72
5	NIRMALI	2113.15	206.48	258.45	132.42	2710.5	271.05	2439.45
6	PIPRA	4492.83	3941.31	394.63	3433.78	12262.55	965.54	11297.01
7	PRATAPGANJ	2524.54	1866.97	221.38	1673.38	6286.27	499.97	5786.3
8	RAGHOPUR	4405.06	3183.54	415.77	2678.48	10682.85	842.82	9840.03
9	SARAIGARH-BHAPTIYAHI	4076.8	1607.84	412.42	1234.31	7331.37	525.42	6805.95
10	SUPAUL	6246.86	3039	618.57	2119.66	12024.09	896.5	11127.59
11	TRIVENGANJ	5507.83	5854.47	641.32	5506.87	17510.49	1751.05	15759.44
DISTRICT TOTAL		**45038.71**	**30919.77**	**4815.78**	**26282.44**	**107056.7**	**9577.23**	**97479.47**
VAISHALI								
1	BHAGWANPUR	2662.09	2984.89	105.74	1493.92	7246.64	724.66	6521.98
2	BIDUPUR	2981.91	719.77	102.4	525.81	4329.89	432.99	3896.9
3	CHEHRA KALAN	1661.76	746.13	61.07	539.35	3008.31	239.79	2768.52
4	DESRI	1930.66	335.17	66.3	202.2	2534.33	253.45	2280.88
5	GORAUL	1041.18	1514.98	44.69	1101.37	3702.22	370.22	3332
6	HAJIPUR	2574.21	1022.12	88.4	778.38	4463.11	446.32	4016.79
7	JANDAHA	4083.66	755.72	140.23	593.86	5573.47	557.35	5016.12
8	LALGANJ	3847.44	910.91	134.38	783.57	5676.3	567.64	5108.66

S.No	District / Assessment Unit	Ground Water Recharge (Ham)				Total Annual Ground Water Recharge (Ham)	Total Natural Discharge (Ham)	Annual Extractable Ground Water Resource (Ham)
		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
9	MAHNAR	2600.51	238.31	89.3	175.73	3103.85	310.39	2793.46
10	MAHUA	3780.29	3421.73	135.38	1702.91	9040.31	454.34	8585.97
11	PATEHRI BELSAR	6679.48	577.3	229.37	392.6	7878.75	787.87	7090.88
12	PATEPUR	3469.08	1573.43	125.19	1129.41	6297.11	629.71	5667.4
13	RAGHOPUR	5878.42	265.53	201.87	176.1	6521.92	652.2	5869.72
14	RAJA PAKAR	1967.37	393.62	67.56	296.54	2725.09	272.51	2452.58
15	SAHDAI	2284.2	312.97	78.44	205.29	2880.9	288.09	2592.81
16	VAISHALI	3061.14	1440.57	113.37	1040.28	5655.36	565.53	5089.83
DISTRICT TOTAL		**50503.4**	**17213.15**	**1783.69**	**11137.32**	**80637.56**	**7553.06**	**73084.5**
WEST CHAMPARAN								
1	BAGAHA 1	10792.84	7086.77	433.93	4496.15	22809.69	2280.97	20528.72
2	BAGAHA 2	6935.09	7023.09	324.22	6042.79	20325.19	1824.61	18500.58
3	BAIRIYA	6106.5	2594.15	255.81	1650.04	10606.5	821.43	9785.07
4	BETTIAH	1369.17	490.95	67.53	433.42	2361.07	167.58	2193.49
5	BHITAHA	2927.23	270.1	154.34	171.24	3522.91	183.76	3339.15
6	CHANPATIA	6786.86	3529.62	282.51	2422.26	13021.25	1302.13	11719.12
7	GAUNAHA	3964.51	1412.7	160.54	1368.75	6906.5	489.67	6416.83
8	LAURIYA	4040.12	3731.58	223	2191.78	10186.48	1018.64	9167.84
9	MADHUBANI	3597.98	221.78	153.99	160.62	4134.37	210.95	3923.42
10	MAINATAND	4716.34	4091.11	256.88	2003.1	11067.43	1017.19	10050.24
11	MAJHAULIA	6821.82	2756.43	313.51	2099.45	11991.21	889.19	11102.02
12	NARKATIAGANJ	7211.34	3929.8	377.86	3048.85	14567.85	1456.79	13111.06

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		Monsoon Season		Non-Monsoon Season				
		Recharge from Rainfall	Recharge from Other Sources	Recharge from Rainfall	Recharge from Other Sources			
1	2	3	4	5	6	7	8	9
13	NAUTAN	4370.5	3962.15	206.53	2228.72	10767.9	996.94	9770.96
14	PIPRASI	3180.25	68.88	175.54	52.17	3476.84	347.68	3129.16
15	RAMNAGAR	4600.07	2643.01	243.67	2322.74	9809.49	980.95	8828.54
16	SIKTA	5310.36	2289.09	214.51	1361.4	9175.36	759.2	8416.16
17	THAKARAHA	2857.5	112.51	157.72	82.8	3210.53	321.05	2889.48
18	YOGAPATTI	5560.11	3867.39	239.87	2610.09	12277.46	1035.97	11241.49
DISTRICT TOTAL		**91148.59**	**50081.11**	**4241.96**	**34746.37**	**180218.03**	**16104.7**	**164113.33**
STATE TOTAL (HAM)		**1953920.2**	**805218.04**	**113555.39**	**542174.87**	**3414868.55**	**319498.9**	**3095450.98**
STATE TOTAL (MCM)		**19539.202**	**8052.1804**	**1135.5539**	**5421.7487**	**34148.6855**	**3194.989**	**30954.5098**
STATE TOTAL (BCM)		**19.53**	**8.05**	**1.13**	**5.4217**	**34.1486**	**3.1949**	**30.95**

Annexure VI
Assessment Unit Wise Report (..Cont.)
(Attribute Table)

S. No	District / Assessment Unit	Annual Extractable Ground Water Resource (Ham)	ANNUAL GROUND WATER DRAFT (Ham)				Annual GW Allocation for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization (OE/Critical/ Semi-critical/Safe)
			Irrigation	Industrial	Domestic	Total Extraction				
1	2	9	10	11	12	13	14	15	16	17
ARARIA										
1	ARARIA	18898.78	645.45	0.75	1858.09	2504.29	2033.36	16219.22	13.25	safe
2	BHARGAMA	18589.9	6532.5	0.09	821.72	7354.29	899.22	11857.91	39.56	safe
3	FORBESGANJ	27461.89	970.95	114	1958.69	3043.64	2143.44	24233.5	11.08	safe
4	JOKIHAT	11832.87	3999.75	0	1146.92	5146.67	1255.11	6578.01	43.49	safe
5	KURSAKANTA	5781.53	1489.8	0	531.23	2021.03	581.33	3710.4	34.96	safe
6	NARPATGANJ	20492.84	1109.55	0.03	1252.23	2361.81	1370.34	18012.93	11.53	safe
7	PALASI	8749.68	3217.5	0	884.13	4101.63	967.53	4564.65	46.88	safe
8	RANIGANJ	27033.19	1838.85	0.06	1420.26	3259.17	1554.22	23640.06	12.06	safe
9	SIKTI	6463	1597.05	0	564.37	2161.43	617.61	4248.33	33.44	safe
DISTRICT TOTAL		**145303.68**	**21401.4**	**114.93**	**10437.64**	**31953.96**	**11422.16**	**113065.01**	**27.36**	**safe**
ARWAL										
1	ARWAL	4618.14	910.91	120	625.46	1656.37	655.34	2931.89	35.87	safe
2	KALER	5689.5	2162.55	1.59	722.13	2886.27	756.63	2768.73	50.73	safe
3	KARPI	4313.98	1683.24	9	611.13	2303.36	640.32	1981.43	53.39	safe
4	KURTHA	2213.04	1015.69	0.24	387.31	1403.25	405.81	791.29	63.41	safe
5	SONBHADRA BANSHI SURYPUR	2285.26	767.26	0	195.82	963.08	205.17	1312.83	42.14	safe
DISTRICT TOTAL		**19119.92**	**6539.65**	**130.83**	**2541.86**	**9212.33**	**2663.37**	**9786.17**	**49.11**	**safe**
AURANGABAD										
1	AURANGABAD	12158.2	2287.77	136.8	1218.97	3643.54	1311.44	8422.19	29.97	safe
2	BARUN	12674.22	1513.32	153	684.56	2350.87	736.49	10271.42	18.55	safe

S. No	District / Assessment Unit	Annual Extractable Ground Water Resource (Ham)	ANNUAL GROUND WATER DRAFT (Ham)				Annual GW Allocation for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization (OE/Critical/ Semi-critical/Safe)
			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
3	DAUDNAGAR	9183.52	882.18	51.3	835.82	1769.3	899.23	7350.81	19.27	safe
4	DEO	8477.49	816.87	6	592.73	1415.6	637.7	7016.92	16.70	safe
5	GOH	12972.44	3388.45	30	802.10	4220.54	862.94	8691.06	32.53	safe
6	HASPURA	6561.39	2119.81	3	569.72	2692.52	612.94	3825.65	41.04	safe
7	KUTUMBA	11000.53	3270.16	90	775.40	4135.57	834.23	6806.13	37.59	safe
8	MADANPUR	10397.13	2325.06	300	723.15	3348.21	778.01	6994.06	32.20	safe
9	NABINAGAR	15351.51	1654.51	1470	1103.11	4227.63	1186.79	11040.2	27.54	safe
10	OBRA	11628.62	2845.58	300	809.52	3955.09	870.93	7612.12	34.01	safe
11	RAFIGANJ	9321.18	2869.24	90	1155.75	4114.99	1243.43	5118.51	44.15	safe
DISTRICT TOTAL		**119726.23**	**23972.95**	**2630.1**	**9270.82**	**35873.86**	**9974.13**	**83149.07**	**30.32**	**safe**
	BANKA									
1	AMARPUR	5267.97	2762.69	73	840.72	3676.41	905.86	1526.42	69.79	safe
2	BANKA	6660.78	982.67	1.71	859.12	1843.5	925.68	4750.72	27.68	safe
3	BARAHAT	4108.88	692.75	2.94	512.39	1208.08	552.09	2861.1	29.40	safe
4	BELHAR	5477.26	868.79	0.36	576.04	1445.19	620.67	3987.44	26.39	safe
5	BOUNSI	5742.31	805.27	0.4497	635.39	1441.1	684.62	4251.98	25.10	safe
6	CHANDAN	6170.16	301.46	1.44	568.88	871.78	612.95	5254.31	14.13	safe
7	DHORAIYA	4842.88	2558.66	0	823.47	3382.13	887.27	1396.95	69.84	safe
8	FULLIDUMAR	3646.16	802.75	0.27	430.18	1233.2	463.51	2379.63	33.82	safe
9	KATORIYA	10996.92	1730.56	5.64	641.04	2377.24	690.71	8570.01	21.62	safe
10	RAJOUN	5455.89	2837.51	17.1	678.67	3533.27	731.25	1870.04	64.76	safe
11	SHAMBHUGANJ	5263.47	2805.41	0	597.52	3402.93	643.81	1814.25	64.65	safe
DISTRICT TOTAL		**63632.68**	**17148.52**	**102.9097**	**7163.409**	**24414.83**	**7718.42**	**38662.85**	**40.65**	**safe**
	BEGUSARAI									
1	BACHWARA	3841.48	2107.8	0	672.01	2779.82	723.85	1009.82	72.36	semi critical
2	BAKHRI	2287.76	988.65	0	578.96	1567.6	623.61	675.51	68.52	safe

S. No	District / Assessment Unit	Annual Extractable Ground Water Resource (Ham)	ANNUAL GROUND WATER DRAFT (Ham)				Annual GW Allocation for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization (OE/Critical/ Semi-critical/Safe)
			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
3	BALIA	3938.92	1930.5	0	741.77	2672.27	798.99	1209.43	67.84	safe
4	BARAUNI	3169.04	1287	66.12108	807.13	2160.25	869.39	946.53	68.17	safe
5	BEGUSARAI	5873.08	2867.1	10.7688	1130.68	4008.55	1217.89	1777.32	68.25	safe
6	BHAGAWANPUR	2999.84	1462.5	0	592.60	2055.11	638.31	899.02	68.51	safe
7	BIRPUR	1441.77	936	0	334.50	1270.49	360.3	145.48	88.12	semi critical
8	CHERIA BARIYARPUR	2957.9	1464.45	0	503.39	1967.84	542.22	951.23	66.53	safe
9	CHHORAHI	2793.72	1470.3	0	426.21	1896.5	459.08	864.35	67.88	safe
10	DANDARI	1949.86	1041.3	0	265.13	1306.44	285.59	622.96	67.00	safe
11	GARHPURA	1652.07	721.5	0	381.31	1102.81	410.72	519.85	66.75	safe
12	KHUDABANDPUR	1364	877.5	0	310.10	1187.61	334.02	152.47	87.07	semi critical
13	MANSOORCHAK	1081.2	438.75	0	289.44	728.19	311.76	330.69	67.35	safe
14	MATIHANI	4503.64	1907.1	0	524.13	2431.24	564.56	2031.97	53.98	safe
15	NAVKOTHI	1593.99	1023.75	0	283.77	1307.51	305.66	264.59	82.03	semi critical
16	SAHEBPUR KAMAL	3907.98	1957.8	0	666.37	2624.17	717.78	1232.4	67.15	safe
17	SAMHO-AKHA-KURHA	1736.01	842.4	0	105.62	948.03	113.77	779.83	54.61	safe
18	TEGHRA	3583.43	1014	0	1198.08	2212.08	1290.5	1278.93	61.73	safe
DISTRICT TOTAL		**50675.69**	**24338.4**	**76.88**	**9811.19**	**34226.51**	**10568**	**15692.38**	**69.10**	**safe**
BHAGALPUR										
1	BIHPUR	3935.82	1475.5	0	332.74	1808.24	358.4	2101.92	45.94	safe
2	GAURADIH	4284.5	982.8	1.8	382.48	1367.09	410.21	2889.68	31.91	safe
3	GOPALPUR	3402.99	1161.2	0	259.52	1420.72	278.34	1963.45	41.75	safe
4	ISMAILPUR	2098.7	497.9	0	127.76	625.66	137.03	1463.77	29.81	safe
5	JAGDISHPUR	3256.57	956.8	45	413.32	1415.13	443.29	1811.47	43.45	safe

S. No	District / Assessment Unit	Annual Extractable Ground Water Resource (Ham)	ANNUAL GROUND WATER DRAFT (Ham)				Annual GW Allocation for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization (OE/Critical/ Semi-critical/Safe)
			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
6	KAHALGAON	9132.45	2065.7	759	1074.62	3899.32	1152.54	5155.21	42.70	safe
7	KHARIK	3434.19	1333.8	0	349.29	1683.08	374.62	1725.78	49.01	safe
8	NARAYANPUR	3559.56	724.7	0	278.24	1002.94	298.41	2536.45	28.18	safe
9	NATHNAGAR	3484.73	1492.4	0	414.00	1906.4	444.02	1548.31	54.71	safe
10	NAUGACHHIA	2875.99	1305.2	0	509.64	1814.84	546.59	1024.2	63.10	safe
11	PIRPAINTY	8462.31	1405.5	0	744.49	2150	798.47	6258.33	25.41	safe
12	RANGRA CHOWK	3017.93	652.6	0	246.54	899.14	264.42	2100.91	29.79	safe
13	SABOUR	2784.73	388	300	371.96	1059.96	398.93	1697.8	38.06	safe
14	SANHOULA	5843.52	1974.8	0	511.22	2486.02	548.29	3320.43	42.54	safe
15	SHAHKUND	5663.98	2002	91.35	520.00	2613.35	557.7	3012.93	46.14	safe
16	SULTANGANJ	6077.42	1561.2	0	609.67	2170.87	653.87	3862.35	35.72	safe
DISTRICT TOTAL		**71315.39**	**19980.1**	**1197.15**	**7145.48**	**28322.76**	**7665.13**	**42472.99**	**40.51**	**safe**
BHOJPUR										
1	AGIAON	5856.91	955.18	175	485.54	1615.72	513.64	4213.09	27.59	safe
2	ARA SADAR	5013.94	3286.08	58.32	1098.36	4442.75	1161.91	507.64	88.61	semi critical
3	BARHARA	4632.72	1501.23	0	787.47	2288.7	833.03	2298.46	49.40	safe
4	BIHIYA	3829.32	2730.25	9.9	646.33	3386.47	683.72	405.46	88.44	semi critical
5	CHARPOKHRI	5986.35	2205.39	2.4	331.71	2539.49	350.9	3427.67	42.42	safe
6	GARHANI	3199.02	1263.25	262	337.92	1863.17	357.47	1316.3	58.24	safe
7	JAGDISHPUR	9300.18	4678.1	2.91	939.64	5620.64	994	3625.18	60.44	safe
8	KOILWAR	3119.37	1403.43	22.4943	703.04	2128.97	743.72	949.72	68.25	safe
9	PIRO	8931.01	2872.06	65	913.15	3850.21	965.99	5027.96	43.11	safe
10	SAHAR	5408.36	681.34	0.24	360.87	1042.45	381.75	4345.03	19.27	safe
11	SANDESH	4444.81	2016.31	0	359.03	2375.34	379.8	2048.7	53.44	safe
12	SHAHPUR	3724.22	2208.65	0	736.12	2944.77	778.71	736.86	79.07	semi critical
13	TARARI	9012.4	2810.29	120	597.65	3527.94	632.23	5449.88	39.15	safe

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			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
14	UDWANTNAGAR	6512.65	2143.45	9.03	516.42	2668.9	546.3	3813.87	40.98	safe
DISTRICT TOTAL		**78971.26**	**30755.01**	**727.2943**	**8813.23**	**40295.52**	**9323.17**	**38165.82**	**54.17**	**safe**
BUXAR										
1	BRAHMPUR	5039.42	2199.3	227.18	641.63	3068.11	678.75	1934.19	60.88	safe
2	BUXAR	4313.97	1963.2	150	776.66	2889.86	821.6	1379.17	66.99	safe
3	CHAKKI	1537.17	333	0	138.28	471.28	146.28	1057.89	30.66	safe
4	CHAUGAIN	1991.15	1125	0	159.51	1284.51	168.74	697.41	64.51	safe
5	CHAUSA	3474.69	1725	4.5	339.26	2068.76	358.88	1386.31	59.54	safe
6	DUMRAON	6255.32	1725	0.126	676.21	2401.35	715.34	3814.84	38.39	safe
7	ITARHI	10578.87	3593.4	4.44	558.37	4156.22	590.68	6390.34	39.29	safe
8	KESATH	2760.3	292.5	0	110.67	403.18	117.08	2350.71	14.61	safe
9	NAWANAGAR	4303	1123.5	108	544.97	1776.47	576.51	2494.99	41.28	safe
10	RAJPUR	12075.36	3639.9	0.03	698.78	4338.7	739.21	7696.23	35.93	safe
11	SIMRI	3809.05	1975.2	0	678.13	2653.34	717.37	1116.47	69.66	safe
DISTRICT TOTAL		**56138.3**	**19695**	**494.276**	**5322.47**	**25511.78**	**5630.44**	**30318.55**	**47.43**	**safe**
DARBHANGA										
1	ALINAGAR	2808.54	1374.75	0	460.06	1834.81	483	950.79	65.33	safe
2	BAHADURPUR	5002.59	2291.25	30	847.68	3168.93	889.94	1791.4	63.35	safe
3	BAHERI	5696.41	1953.9	165	968.27	3087.18	1016.55	2560.95	54.20	safe
4	BENIPUR	4705.46	2051.4	30	973.10	3054.51	1021.62	1602.43	64.91	safe
5	BIRAUL	5011.96	1858.35	30	915.38	2803.73	961.02	2162.59	55.94	safe
6	DARBHANGA	5315.81	1618.5	33.6	2040.42	3692.52	2142.15	1521.56	69.46	safe
7	GAURA BAURAM	3156.94	1189.5	0	486.66	1676.16	510.93	1456.51	53.09	safe
8	GHANSHYAMPUR	4037.05	1033.5	0	426.19	1459.69	447.44	2556.11	36.16	safe
9	HANUMAN NAGAR	3697.19	1665.3	0	494.72	2160.02	519.39	1512.5	58.42	safe

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			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
10	HAYAGHAT	2328.37	975	75	473.77	1523.77	497.39	780.98	65.44	safe
11	JALE	4718.63	1086.15	0	845.43	1931.58	887.58	2744.9	40.94	safe
12	KEOTI	4725.87	1956.45	0	866.14	2822.59	909.32	1860.1	59.73	safe
13	KIRATPUR	1549.47	249.6	0	260.50	510.1	273.49	1026.38	32.92	safe
14	KUSHESWAR ASTHAN	2875.09	1152.9	0	521.08	1673.98	547.06	1175.13	58.22	safe
15	KUSHESWAR ASTHAN EAST	3137.8	1131	0	412.13	1543.14	432.68	1574.11	49.18	safe
16	MANIGACHHI	4123.77	1678.95	430	731.43	2840.38	767.9	1246.92	68.88	safe
17	SINGHWARA	4673.78	2002.65	0	856.15	2858.81	898.84	1772.28	61.17	safe
18	TARDIH	2415.92	906.75	0	394.48	1301.23	414.15	1095.02	53.86	safe
DISTRICT TOTAL		**69980.65**	**26175.9**	**793.6**	**12973.61**	**39943.13**	**13620.45**	**29390.66**	**56.18**	**safe**
EAST CHAMPARAN										
1	ADAPUR	7478.3	1338.65	303	718.71	2360.36	783.68	5052.97	31.56	safe
2	ARERAJ	7861.98	1305.63	102	644.52	2052.15	702.78	5751.57	26.10	safe
3	BANJARIYA	4540.33	1220.87	624	574.52	2419.39	626.46	2069	53.29	safe
4	BANKATWA	4410.68	875.31	396	412.70	1684.01	450.01	2689.36	38.18	safe
5	CHAKIA	6871.15	2544.43	30	815.96	3390.39	889.73	3406.99	49.34	safe
6	CHAURADANO	7121.8	1996.75	396	603.04	2995.79	657.55	4071.5	42.07	safe
7	CHIRAIYA	10204.63	3238.55	549	977.56	4765.11	1065.93	5351.15	46.70	safe
8	DHAKA	7155.65	1755.16	696	1229.63	3680.79	1340.8	3363.69	51.44	safe
9	GHORASAHAN	5736.57	1722.91	939	617.54	3279.45	673.36	2995.66	57.17	safe
10	HARSIDDHI	10976.89	3874.08	30	785.94	4690.03	856.99	6215.82	42.73	safe
11	KALYANPUR	10597.75	3428.06	411	944.92	4783.98	1030.34	5728.35	45.14	safe
12	KESARIA	7746.9	1403.43	84	735.05	2222.48	801.5	5457.97	28.69	safe
13	KOTWA	7832.53	1847.13	5.1	596.08	2448.31	649.96	5330.34	31.26	safe

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			Irrigation	Industrial	Domestic	Total Extraction				
1	2	9	10	11	12	13	14	15	16	17
14	MADHUBAN	3624.92	1874.5	0	611.89	2486.39	667.21	1083.21	68.59	safe
15	MEHSI	5551.72	2407.51	2.1	222.58	2632.19	738.22	2403.89	47.41	safe
16	MOTIHARI	8652.2	2033.21	30	1603.63	3666.84	1748.59	4840.4	42.38	safe
17	PAHARPUR	9421.32	3036.69	11.7	646.33	3694.72	704.76	5668.17	39.22	safe
18	PAKARIDAYAL	4442.96	1457.22	276	590.99	2324.21	644.41	2065.33	52.31	safe
19	PATAHI	4689.45	2132.04	195	587.80	2914.84	640.94	1721.47	62.16	safe
20	PHENHARA	1698.74	863.9	15	283.68	1162.59	309.33	510.5	68.44	safe
21	PIPRAKOTHI	2462.14	776.48	303	272.24	1351.72	296.85	1085.81	54.90	safe
22	RAMGARHWA	7044.86	1843.53	150	709.83	2703.36	774	4277.33	38.37	safe
23	RAXAUL	6066.47	1206.8	360	959.50	2526.3	1046.24	3453.43	41.64	safe
24	SANGRAMPUR	6179.92	1460.48	885	508.79	2854.27	554.78	3279.66	46.19	safe
25	SUGAULI	8092.67	1331.71	390	913.01	2634.72	995.55	5375.41	32.56	safe
26	TETARIA	2456.69	1263.25	3	363.07	1629.31	395.89	794.56	66.32	safe
27	TURKAULIYA	6839.4	2134.27	2.94	636.97	2774.17	694.55	4007.65	40.56	safe
DISTRICT TOTAL		**175758.62**	**50372.55**	**7188.84**	**18566.48**	**76127.87**	**20740.41**	**98051.19**	**46.10**	**safe**
GAYA										
1	AMAS	2879.45	1305.87	0.465	360.44	1666.78	388.24	1184.87	57.89	safe
2	ATRI	3094.53	1412.4	7	282.43	1701.83	304.21	1370.92	54.99	safe
3	BANKE BAZAR	4723.71	1294.22	7	444.85	1746.07	479.17	2943.32	36.96	safe
4	BARACHATTY	5753.9	801.73	1.407	489.16	1292.29	526.89	4423.88	22.46	safe
5	BELAGANJ	5415.81	3772.91	3	761.89	4537.79	820.66	819.25	83.79	semi critical
6	BODH GAYA	6934.47	2465.7	33.93	860.53	3360.15	926.91	3507.94	48.46	safe
7	DOBHI	4291.6	1229.53	1.44	533.36	1764.32	574.5	2486.14	41.11	safe
8	DUMARIYA	3751.61	1738.7	4	441.68	2184.37	475.75	1533.17	58.22	safe
9	FATEHPUR	7241.44	2133.77	1.5	808.59	2943.86	870.96	4235.21	40.65	safe
10	GAYA SADAR	4009.18	570.5	1.9125	2326.05	2898.45	2505.48	931.3	72.30	semi critical

S. No	District / Assessment Unit	Annual Extractable Ground Water Resource (Ham)	ANNUAL GROUND WATER DRAFT (Ham)				Annual GW Allocation for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization (OE/Critical/ Semi-critical/Safe)
			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
11	GURARU	4621.38	2236.1	240	460.54	2936.63	496.06	1649.23	63.54	safe
12	GURUA	5964.45	2240.82	1.794	632.45	2875.07	681.23	3040.6	48.20	safe
13	IMAMGANJ	6258.25	2366.4	7	661.71	3035.11	712.75	3172.1	48.50	safe
14	KHIZAR SARAI	5662.62	3450.36	2	604.18	4056.53	650.78	1559.49	71.64	semi critical
15	KONCH	7904.43	4815.7	3	692.96	5511.65	746.42	2339.32	69.73	safe
16	MANPUR	3031.19	1587	18	509.35	2114.35	548.64	877.55	69.75	safe
17	MOHANPUR	7332.14	1749.29	4	686.89	2440.18	739.87	4838.98	33.28	safe
18	MUHRA	3537.13	1668.88	7	346.00	2021.88	372.69	1488.56	57.16	safe
19	NEEMCHAK BATHANI	2993.34	1051.33	30	338.39	1419.72	364.49	1547.52	47.43	safe
20	PARAIYA	4093.84	2366.5	0.03	349.95	2716.46	376.94	1350.39	66.35	safe
21	SHERGHATI	3298.43	720.46	4.98	584.21	1309.65	629.27	1943.72	39.71	safe
22	TANKUPPA	3366.94	981.86	0.225	428.78	1410.86	461.85	1923	41.90	safe
23	TEKARI	6926.37	4119.61	22.995	924.49	5067.1	995.81	1787.95	73.16	semi critical
24	WAZIRGANJ	6394.35	2037.5	1606.83	760.95	4405.28	819.65	2463.95	68.89	safe
DISTRICT TOTAL		**119480.56**	**48117.14**	**2009.5085**	**15289.81**	**65416.38**	**16469.22**	**53418.36**	**54.84**	**safe**
GOPALGANJ										
1	BAIKUNTHPUR	7586.37	4077	57.6	691.91	4826.51	725.43	2726.33	63.62	safe
2	BARAULI	9021.56	4027.35	0.24	936.04	4963.63	981.39	4012.58	55.02	safe
3	BHORE	8080.06	5065.05	0	567.76	5632.81	595.27	2461.79	69.71	safe
4	GOPALGANJ	6498.87	2441.4	3.888	852.68	3297.97	894	3159.58	50.75	safe
5	HATHUA	7133.36	3248.55	0.285	722.97	3971.8	758	3126.53	55.68	safe
6	KATEYA	7419.13	2464.8	0	462.79	2927.59	485.22	4469.11	39.46	safe
7	KUCHAIKOT	12158.98	5642.4	5	1057.91	6705.31	1109.17	5402.41	55.15	safe
8	MANJHA	6911.23	3549.6	0.72	635.47	4185.79	666.26	2694.65	60.57	safe
9	PANCHDEVARI	4950.36	2265.9	0	416.74	2682.64	436.94	2247.52	54.19	safe

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			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
10	PHULWARIA	5693.12	3357.9	1.32	318.39	3677.62	333.82	2000.07	64.60	safe
11	SIDHWALIA	5368.53	1185.6	420	451.03	2056.63	472.89	3290.04	38.31	safe
12	THAWE	3709.74	1482	9	369.92	1860.92	387.85	1830.89	50.16	safe
13	UCHKAGAON	5167.36	2635.95	15	625.81	3276.76	656.14	1860.27	63.41	safe
14	VIJAYIPUR	6193.93	3512.4	0	423.87	3936.27	444.41	2237.12	63.55	safe
DISTRICT TOTAL		**95892.6**	**44955.9**	**513.053**	**8533.29**	**54002.25**	**8946.79**	**41518.89**	**56.01**	**safe**
JAMUI										
1	BARHAT	4429.13	306.09	0	314.60	620.69	338.07	3784.97	14.01	safe
2	CHAKAI	7414.2	1327.27	7.59	802.45	2137.31	862.31	5620.22	28.83	safe
3	GIDHAUR	2191.97	984.58	0	264.62	1249.2	284.36	923.03	56.99	safe
4	ISLAMNAGAR ALIGANJ	4553.38	1241.71	0	466.65	1708.36	501.45	2874.89	37.52	safe
5	JAMUI	4629.05	2190.8	2.9115	1004.86	3198.56	1079.82	1355.53	69.10	safe
6	JHAJHA	4092.11	1459.27	0.93	1039.72	2499.93	1117.28	2129.27	61.09	safe
7	KHAIRA	8189.3	1428.76	0.39	804.40	2233.55	864.41	5961.21	27.27	safe
8	LAXMIPUR	2619.8	480.64	0	423.59	904.23	455.19	1683.97	34.52	safe
9	SIKANDRA	4444.4	1681.13	1.5	507.39	2190.02	545.24	2254.38	49.28	safe
10	SONO	2924.3	767.44	1.431	732.30	1501.18	786.93	1841.02	51.33	safe
DISTRICT TOTAL		**45487.64**	**11867.69**	**14.7525**	**6360.59**	**18243.03**	**6835.06**	**28428.49**	**42.99**	**safe**
JEHANABAD										
1	GHOSHI	4016.56	2609.2	0	353.85	2963.05	374.33	1116.4	73.77	semi critical
2	HULASGUNJ	3486.19	1594.14	0	309.20	1903.33	327.09	1564.97	54.60	safe
3	JEHANABAD	5017.24	3587.2	0.7398	669.63	4257.57	708.38	720.92	84.86	semi critical
4	KAKO	4362.95	3925.98	0.9	567.73	4494.61	600.58	262.6	103.02	over_exploited
5	MAKHDUMPUR	7245.76	3891.63	0.345	926.12	4818.1	979.71	2374.07	66.50	safe
6	MODANGANJ	2375.51	1598.6	2.85	287.05	1888.5	303.66	470.4	79.50	semi critical

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			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
7	RATNI FARIDPUR	3200.58	3175.24	0.3	479.69	3655.24	507.45	47.79	114.21	over_exploited
DISTRICT TOTAL		**29704.79**	**20381.99**	**5.1348**	**3593.26**	**23980.4**	**3801.2**	**6557.15**	**82.35**	**semi critical**
KAIMUR										
1	ADHAURA	3995.96	534.64	0	195.39	730.03	210.21	3251.11	18.27	safe
2	BHABHUA	12338.08	4662.55	1.695	859.79	5524.04	925.02	6748.81	44.77	safe
3	BHAGWANPUR	3536.22	1722.65	0.15	606.14	2328.94	652.12	1168.16	65.86	safe
4	CHAINPUR	10350.15	2601.25	2.7	642.27	3246.22	690.99	7055.21	31.36	safe
5	CHAND	5722.73	1066.53	0	457.45	1523.97	492.15	4164.06	26.63	safe
6	DURGAWATI	5169.35	1288.97	19.395	468.67	1777.04	504.23	3356.75	34.38	safe
7	KUDRA	6481.7	4035.31	16.62	565.11	4617.04	607.98	1821.79	71.23	semi critical
8	MOHANIA	8650.85	4387.96	16.2855	786.93	5191.17	846.63	3399.98	60.01	safe
9	NUAON	7522.58	2629.19	3.6	364.54	2997.33	392.19	4497.6	39.84	safe
10	RAMGARH	6460.65	2304.82	0.06	475.20	2780.08	511.25	3644.52	43.03	safe
11	RAMPUR	4666.34	1566.99	0.6	304.13	1871.72	327.2	2771.55	40.11	safe
DISTRICT TOTAL		**74894.61**	**26800.86**	**61.1055**	**5725.61**	**32587.58**	**6159.97**	**41879.54**	**43.23**	**safe**
KATIHAR										
1	AMDABAD	5553.87	863.73	0	409.54	1273.27	444.52	4245.62	22.93	safe
2	AZAMNAGAR	10859.06	6150.06	81	772.14	7003.19	838.1	3789.91	64.49	safe
3	BALRAMPUR	6235.44	2746.17	1.5	388.93	3136.6	422.16	3065.61	50.30	safe
4	BARARI	10399.85	1585.71	18	997.40	2601.11	1082.61	7713.53	25.01	safe
5	BARSOI	9468.96	5061.33	0	837.79	5899.12	909.37	3498.26	62.30	safe
6	DANDKHORA	3074.96	1867.32	0.12	237.85	2105.29	258.17	1153.42	68.47	safe
7	FALKA	9533.25	3029.67	0	544.04	3573.7	590.52	5913.07	37.49	safe
8	HASANGANJ	2834.42	1368.36	0	195.39	1563.75	212.08	1253.98	55.17	safe
9	KADWA	10299.65	2772.63	2.34	1212.42	3987.38	1315.99	6208.7	38.71	safe
10	KATIHAR	4739.45	691.74	7.827	1725.98	2425.54	1873.43	2166.46	51.18	safe

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			Irrigation	Industrial	Domestic	Total Extraction				
1	2	9	10	11	12	13	14	15	16	17
11	KORHA	16009.73	3477.6	6	988.43	4472.02	1072.87	11453.27	27.93	safe
12	KURSELA	1848.25	425.25	0	223.43	648.68	242.51	1180.49	35.10	safe
13	MANIHARI	7386.95	1338.12	0	735.44	2073.56	798.27	5250.56	28.07	safe
14	MANSAHI	2430.94	1362.69	9	294.48	1666.16	319.63	739.63	68.54	safe
15	PRANPUR	5493.94	3252.69	0	504.32	3757	547.4	1693.86	68.38	safe
16	SAMELI	5066.87	742.77	31.2477	295.28	1069.3	320.5	3972.35	21.10	safe
DISTRICT TOTAL		**111235.59**	**36735.84**	**157.0347**	**10362.84**	**47255.67**	**11248.13**	**63298.72**	**45.32**	**safe**
KHAGARIA										
1	ALAULI	8128.37	3951.12	11	1002.90	4965.02	1096.8	3069.45	61.08	safe
2	BELDAUR	6988.21	4141	0	711.75	4852.75	778.39	2068.82	69.44	safe
3	CHAUTHAM	4812.96	2048.88	0	546.83	2595.71	598.03	2166.05	53.93	safe
4	GOGRI	7583.33	4040.6	5	1221.90	5267.5	1336.3	2201.43	69.46	safe
5	KHAGARIA	7518.32	2983.32	0.978	1270.34	4254.64	1389.27	3144.75	56.59	safe
6	MANSI	2159.34	1050.4	0.81	314.64	1365.84	344.1	764.04	63.25	safe
7	PARBATTA	7263.54	4147.66	0	867.60	5015.26	948.83	2167.05	69.05	safe
DISTRICT TOTAL		**44454.07**	**22362.98**	**17.788**	**5935.95**	**28316.72**	**6491.72**	**15581.59**	**63.26**	**safe**
KISHANGANJ										
1	BAHADURGANJ	8001.69	1053	115.5	998.15	2166.65	1092.99	5740.2	27.08	safe
2	DIGHALBANK	7633.31	2271.75	60	742.73	3074.49	813.31	4488.24	40.28	safe
3	KISHANGANJ	6033.61	1371.3	3	676.42	2050.73	740.7	3918.6	33.99	safe
4	KOCHADHAMAN	9769.99	2515.2	4.5	1041.34	3561.04	1140.3	6109.99	36.45	safe
5	POTHIA	10782.36	3581.4	28.95	935.72	4546.07	1024.64	6147.37	42.16	safe
6	TERHAGACHH	5676.96	1111.5	60	502.77	1674.25	550.54	3954.94	29.49	safe
7	THAKURGANJ	11343.48	2215.2	26.55	1086.45	3328.2	1189.69	7912.04	29.34	safe
DISTRICT TOTAL		**59241.4**	**14119.35**	**298.5**	**5983.58**	**20401.43**	**6552.17**	**38271.38**	**34.11**	**safe**
LAKHISARAI										

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			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
1	BARAHIA	7290.95	366.36	0	509.55	875.91	545.24	6379.35	12.01	safe
2	CHANNAN	2141.05	835.24	0	464.33	1299.57	496.85	808.96	60.70	safe
3	HALSI	5653.34	1245.53	2.31	425.78	1673.61	455.6	3949.91	29.60	safe
4	LAKHISARAI	6329.47	2472.01	0.108	726.25	3198.37	777.12	3080.23	50.53	safe
5	PIPARIA	1618.92	918.06	0	104.71	1022.76	112.04	588.83	63.18	safe
6	RAMGARH CHOWK	4586.71	536.25	57.81	445.11	1039.18	476.28	3516.38	22.66	safe
7	SURAJGARHA	9882.74	907.79	26.07	757.17	1691.02	810.19	8138.7	17.11	safe
DISTRICT TOTAL		**37503.18**	**7281.24**	**86.298**	**3432.89**	**10800.42**	**3673.32**	**26462.36**	**36.54**	**safe**
MADHEPURA										
1	ALAMNAGAR	6329.2	2421.9	10	629.34	3061.24	691.21	3206.09	48.37	safe
2	BIHARIGANJ	6936.16	2295.15	10	486.29	2791.45	534.11	4096.89	40.24	safe
3	CHAUSA	5749.48	2739.75	10	547.86	3297.61	601.73	2398	57.35	safe
4	GAMHARIA	3478.94	1302.6	10	296.09	1608.68	325.2	1841.15	46.24	safe
5	GHELADH	5443.74	1641.9	10	329.44	1981.34	361.83	3430.01	36.40	safe
6	GWALPARA	5999.02	2768.85	10	452.16	3231	496.61	2723.57	53.86	safe
7	KUMARKHAND	14889.97	4311.45	10	874.14	5195.59	960.08	9608.44	34.89	safe
8	MADHEPURA	10470.39	1212.9	4.2	1021.70	2238.8	1122.15	8131.14	21.38	safe
9	MURLIGANJ	12001.88	2273.7	10	842.52	3126.22	925.35	8792.83	26.05	safe
10	PURAINI	4289.31	1645.05	10	374.71	2029.76	411.56	2222.7	47.32	safe
11	SHANKARPUR	6981.68	2068.95	10	381.12	2460.07	418.6	4484.13	35.24	safe
12	SIGHESHWARSTHAN	7295.79	2817.75	31.56	494.94	3344.25	543.6	3902.88	45.84	safe
13	UDA KISHANGANJ	8524.75	3660.75	10	678.70	4349.45	745.43	4108.57	51.02	safe
DISTRICT TOTAL		**98390.31**	**31160.7**	**145.76**	**7409.01**	**38715.46**	**8137.46**	**58946.4**	**41.86**	**safe**
MADHUBANI										

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			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
1	ANDHARATHARI	6081.54	1564.92	0	652.09	2217.02	699.91	3816.7	36.45	safe
2	BABUBARHI	8135.26	2230.2	0	739.36	2969.56	793.58	5111.48	36.50	safe
3	BASOPATTI	5129.72	2007.18	636	590.24	3233.42	633.53	1853.01	63.03	safe
4	BENIPATTI	8940.6	2377.62	1020	1229.48	4627.09	1319.64	4223.35	51.75	safe
5	BISFI	5717.9	1604.61	1164	1091.03	3859.63	1171.04	2262.04	67.50	safe
6	GHOGHARDIHA	5716.71	3165.75	0	701.24	3867	752.67	1798.28	67.64	safe
7	HARLAKHI	5910.51	2010.96	696	667.64	3374.6	716.61	2486.94	57.09	safe
8	JAINAGAR	5060.81	706.86	252	711.90	1670.76	764.1	3337.85	33.01	safe
9	JHANJHARPUR	5331.29	1806.84	348	773.51	2928.35	830.24	2346.21	54.93	safe
10	KALUAHI	3034.54	699.3	504	398.99	1602.3	428.25	1402.98	52.80	safe
11	KHAJAULI	5126.49	960.12	0	488.47	1448.59	524.29	3642.08	28.26	safe
12	KHUTAUNA	8671.52	2233.98	0	721.65	2955.64	774.58	5662.95	34.08	safe
13	LADANIA	5446.61	1767.75	912	597.25	3277.01	641.06	2125.79	60.17	safe
14	LAKHANAUR	4565.22	1268.19	528	570.99	2367.18	612.87	2156.16	51.85	safe
15	LAUKAHI	12470.9	2413.74	696	708.69	3818.43	760.67	8600.48	30.62	safe
16	MADHEPUR	6355.66	1765.26	624	458.26	2847.52	491.87	3474.53	44.80	safe
17	MADHWAPUR	3542.12	1164.66	278.4	910.39	2353.45	977.16	1121.9	66.44	safe
18	PANDAUL	6041.7	1780.38	255	920.72	2956.1	988.24	3018.08	48.93	safe
19	PHULPARAS	6838.99	1449.63	0	564.79	2014.42	606.21	4783.15	29.45	safe
20	RAHIKA	5651.2	644.31	165.6	1302.07	2111.98	1397.56	3443.73	37.37	safe
21	RAJNAGAR	6795.72	2394.63	636	859.65	3890.27	922.7	2842.4	57.25	safe
DISTRICT TOTAL		**130565.01**	**36016.89**	**8715**	**15658.41**	**60390.32**	**16806.78**	**69510.09**	**48.09**	**safe**
MUNGER										
1	ASARGANJ	2106.39	725.8	0	254.52	980.32	267.94	1112.65	46.54	safe
2	BARIYARPUR	3647.05	448.3	708	364.13	1520.43	383.32	2107.43	41.69	safe
3	DHARAHARA	6573.15	823.7	0	425.03	1248.72	447.43	5302.03	19.00	safe

S. No	District / Assessment Unit	Annual Extractable Ground Water Resource (Ham)	ANNUAL GROUND WATER DRAFT (Ham)				Annual GW Allocation for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization (OE/Critical/ Semi-critical/Safe)
			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
4	HAVELI KHARAGPUR	7071.75	1329.3	0.507	915.01	2244.8	963.23	4778.73	31.74	safe
5	JAMALPUR	3937.73	578.2	0.555	757.20	1335.95	797.11	2561.87	33.93	safe
6	MUNGER SADAR	5592.83	1058.8	27	786.45	1872.25	827.9	3679.13	33.48	safe
7	SANGRAMPUR	2669.65	1045.4	0	315.27	1360.67	331.89	1292.36	50.97	safe
8	TARAPURA	3218.29	1336.2	13.215	398.74	1748.16	419.76	1449.11	54.32	safe
9	TETIYABAMBAR	2763.2	937.8	0	246.15	1183.95	259.12	1566.28	42.85	safe
DISTRICT TOTAL		**37580.04**	**8283.5**	**749.277**	**4462.49**	**13495.25**	**4697.7**	**23849.59**	**39.39**	**safe**
MUZAFFARPUR										
1	AURAI	6133.6	3603.07	7	333.21	3943.28	1099.2	2190.32	64.29	safe
2	BANDRA	3370.31	2161.98	9	432.75	2603.73	469.34	729.99	77.25	semi critical
3	BOCHAHAN	5329.39	3693.31	4	856.94	4554.25	929.39	702.69	85.46	semi critical
4	GAIGHAT	5959.18	3005.54	2	905.99	3913.53	982.58	1969.06	65.67	safe
5	KANTI	6813.32	2521.18	120	1048.84	3690.01	1137.51	3034.64	54.16	safe
6	KATRA	5353.26	2442.85	2	854.03	3298.88	926.23	1982.18	61.62	safe
7	KURHANI	10400.72	5870.74	12	1519.79	7402.53	1648.27	2869.71	71.17	semi critical
8	MARWAN	5611.16	2502.05	4	575.08	3081.13	623.7	2481.41	54.91	safe
9	MINAPUR	7256.57	4741.67	5.55	1189.26	5936.48	1289.8	1219.55	81.81	semi critical
10	MOTIPUR	13435.3	5124.72	1083	1490.23	7697.95	1616.22	5611.36	57.30	safe
11	MURAUL (DHOLI)	1925.93	937.25	1	315.66	1253.91	342.35	645.33	65.11	safe
12	MUSHAHARI	4618.39	2256.714	16.8	2192.08	4465.59	2377.39	1542.55	96.69	critical
13	PAROO	12402.32	5205.79	3	1261.60	6470.39	1368.26	5825.27	52.17	safe
14	SAHEBGANJ	7551.95	3520.8	3	900.09	4423.89	976.18	3051.97	58.58	safe
15	SAKRA	5374.63	3756.2	3	1070.34	4829.54	1160.82	454.61	89.86	semi critical
16	SARAIYA	10463.89	5449.09	114.33	1156.91	6720.33	1254.72	3645.75	64.22	safe
DISTRICT TOTAL		**111999.92**	**56792.954**	**1389.68**	**16102.79**	**74285.42**	**18201.96**	**37956.39**	**68.77**	**safe**

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			Irrigation	Industrial	Domestic	Total Extraction				
1	2	9	10	11	12	13	14	15	16	17
NALANDA										
1	ASTHAWAN	4078.5	2806.86	4.1796	534.84	3345.88	565.19	702.27	82.04	semi critical
2	BEN	2455.22	1375.2	48	285.10	1708.3	301.28	730.74	69.58	safe
3	BIHARSHARIF	4107.83	1602.62	112.5	1142.20	2857.32	1207.01	1185.7	69.56	safe
4	BIND	1906.74	1242.06	0	202.22	1444.28	213.7	450.98	75.75	semi critical
5	CHANDI	3090.86	1866.49	200	496.41	2562.89	524.57	499.81	82.92	semi critical
6	EKANGARSARAI	3434.67	2140.66	300	574.13	3014.78	606.71	387.31	87.77	semi critical
7	GIRIYAK	2228.06	1650.16	150	315.95	2116.12	333.88	118.39	94.98	critical
8	HARNAUT	4377.31	3051.83	21	574.65	3647.49	607.26	697.21	83.33	semi critical
9	HILSA	3807.69	2127.15	0.57	762.69	2890.41	805.96	874.01	75.91	semi critical
10	ISLAMPUR	5207.16	2638.71	120.51	841.05	3600.27	888.77	1559.17	69.14	safe
11	KARAI PARSARAI	1638.29	1219.24	0	241.26	1460.5	254.95	164.1	89.15	semi critical
12	KATRISARAI	1242.03	638.7	25.5	136.44	800.64	144.18	433.65	64.46	safe
13	NAGARNAUSA	2011.63	1845.06	500	308.20	2653.25	325.68	41.98	131.90	over_exploited
14	NOORSARAI	2899.33	1427.1	27	562.29	2016.39	594.2	851.03	69.55	safe
15	PARWALPUR	1392.32	533.35	28.11	229.41	790.86	242.42	588.45	56.80	safe
16	RAHUI	2906.3	1831.86	0.42	469.93	2302.21	496.59	577.43	79.21	semi critical
17	RAJGIR	3498.66	2107.59	123	521.63	2752.21	551.23	716.85	78.66	semi critical
18	SARMERA	2954.88	1886.85	100	316.73	2303.58	334.7	633.33	77.96	semi critical
19	SILAO	3284.77	1483.3	240	553.28	2276.58	584.67	976.8	69.31	safe
20	THARTHARI	1480.55	801.7	0	223.13	1024.83	235.79	443.06	69.22	safe
DISTRICT TOTAL		**58002.8**	**34276.49**	**2000.7896**	**9291.52**	**45568.79**	**9818.74**	**12632.27**	**78.86**	**semi critical**
NAWADA										
1	AKBARPUR	5125.05	3185.1	0.18	612.49	3797.77	650.26	1431.89	74.10	semi critical
2	GOVINDPUR	3927.61	1347.6	0.06	256.70	1604.35	272.53	2307.43	40.85	safe
3	HISUA	3356.64	2488.5	0.9	437.70	2927.1	464.7	402.54	87.20	semi critical

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			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
4	KASHICHAK	2237.71	522	0	216.41	738.41	229.76	1485.95	33.00	safe
5	KAWAKOLE	6789.04	885	0	426.99	1311.99	453.32	5450.72	19.33	safe
6	MESKAUR	1438.56	912	0	304.82	1216.81	323.62	202.95	84.59	semi critical
7	NARDIGANJ	2611.18	1633.2	0	320.02	1953.22	339.75	638.23	74.80	semi critical
8	NARHAT	2136.58	1350	7.5	282.67	1640.17	300.1	478.98	76.77	semi critical
9	NAWADA	5137.73	2397	57	718.88	3172.87	763.22	1920.52	61.76	safe
10	PAKARIBARAWAN	5652.25	2130	0.18	492.24	2622.42	522.6	2999.47	46.40	safe
11	RAJAULI	9074.93	2068.5	0	455.15	2523.65	483.22	6523.21	27.81	safe
12	ROH	4044.66	2263.5	0	419.89	2683.39	445.79	1335.37	66.34	safe
13	SIRDALA	6183.27	1628.4	1.8	451.47	2081.67	479.32	4073.75	33.67	safe
14	WARISALIGANJ	4854.43	2355.6	15.975	586.91	2958.48	623.1	1859.75	60.94	safe
DISTRICT TOTAL		**62569.64**	**25166.4**	**83.595**	**5982.32**	**31232.3**	**6351.29**	**31110.76**	**56.25**	**safe**
PATNA										
1	ATHMALGOLA	1173.64	744.9	0	304.02	1048.92	324.08	104.66	89.37	semi critical
2	BAKHTIYARPUR	5047.52	1997.09	0	874.30	2871.39	932	2118.43	56.89	safe
3	BARH	2931.57	1425.56	0	623.29	2048.85	664.43	841.58	69.89	safe
4	BELCHHIA	1882.03	896.5	0	221.14	1117.63	235.73	749.81	59.38	safe
5	BIHTA	7120.74	3688.86	45	1007.39	4741.25	1073.88	2313	66.58	safe
6	BIKRAM	7300.06	2624.3	150.99	620.22	3395.51	661.15	3863.62	46.51	safe
7	DANAPUR	3367.65	1320.3	0	902.79	2223.09	962.37	1084.98	66.01	safe
8	DANIYAWAN	1830.55	992.41	0	250.95	1243.36	267.51	570.63	67.92	safe
9	DHANARUA	5103.41	2836.2	0	706.46	3542.66	753.08	1514.13	69.42	safe
10	DULHIN BAZAR	3746.18	1437.66	0	417.66	1855.32	445.22	1863.3	49.53	safe
11	FATUHA	3476.51	2027.96	0	579.05	2607.01	617.27	831.28	74.99	semi critical
12	GHOSWARI	3451.66	882	0	250.32	1132.33	266.84	2302.81	32.81	safe
13	KHUSRUPUR	1782.44	783.17	0	403.54	1186.71	430.17	569.1	66.58	safe

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			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
14	MANER	4059	581.91	0	994.70	1576.6	1060.34	2416.76	38.84	safe
15	MASAURHI	5833.19	3962.1	0	948.96	4911.06	1011.59	859.5	84.19	semi critical
16	MOKAMA	4824.91	1305.61	0	832.93	2138.54	887.9	2631.4	44.32	safe
17	NAUBATPUR	6573.35	3425.83	294	740.16	4459.99	789.01	2064.51	67.85	safe
18	PALIGANJ	8701.62	1739.21	0.423	877.28	2616.91	935.17	6026.82	30.07	safe
19	PANDARAK	5286.99	2112.4	0	516.75	2629.15	550.85	2623.74	49.73	safe
20	PATNA SADAR	1673.11	868.7	0	278.44	1147.14	296.82	507.59	68.56	safe
21	PATNA URBAN	2514.37	733.5	0	2417.59	3151.1	2577.14	81.39	125.32	over_exploited
22	PHULWARI SHARIF	4506.17	1235.54	943.545	1171.39	3350.49	1248.7	1078.37	74.35	semi critical
23	PUNPUN	4000.37	3026.22	0	461.70	3487.92	492.17	481.98	87.19	semi critical
24	SAMPATCHAK	2032.06	1609.65	0	357.17	1966.81	380.74	96.24	96.79	critical
DISTRICT TOTAL		**98219.1**	**42257.58**	**1433.958**	**16758.189**	**60449.74**	**17864.16**	**37595.63**	**65.96**	**safe**
PURNEA										
1	AMOUR	8335.27	4101.3	2	1015.50	5118.8	1102.25	3129.72	61.41	safe
2	BAISA	5173.86	2373.84	0	674.97	3048.82	732.64	2067.37	58.93	safe
3	BAISI	5128.84	2566.44	0.6	795.83	3362.87	863.82	1697.98	65.57	safe
4	BANMANKHI	20487.33	4059.72	240	1303.92	5603.65	1415.31	14772.29	27.35	safe
5	BARHARA KOTHI	12268.27	2481.57	90	730.45	3302.02	792.85	8903.85	26.92	safe
6	BHAWANIPUR	8337.3	1695.33	90	565.21	2350.54	613.49	5938.48	28.19	safe
7	DAGARUA	7323.8	4322.07	2.7	772.89	5097.66	838.92	2160.11	69.60	safe
8	DHAMDAHA	19366.08	3188.43	45	1006.85	4240.28	1092.86	15039.79	21.90	safe
9	JALALGARH	7367.3	2271.78	42	394.76	2708.55	428.49	4625.02	36.76	safe
10	KASBA	8990.19	1173.6	123	734.19	2030.79	796.92	6896.67	22.59	safe
11	KRITYANANDNAGAR	18911.63	3587.22	222	805.61	4614.83	874.43	14227.98	24.40	safe

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			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
12	PURNEA	11332.33	4183.17	114	1077.27	5374.44	1169.31	5865.85	47.43	safe
13	RUPAULI	10984.63	3793.23	30	820.22	4643.45	890.3	6271.1	42.27	safe
14	SRINAGAR	7478.91	1644.3	30	384.65	2058.95	417.51	5387.1	27.53	safe
DISTRICT TOTAL		**151485.74**	**41442**	**1031.3**	**11082.33**	**53555.65**	**12029.1**	**96983.31**	**40.06**	**safe**
ROHTAS										
1	AKORHIGOLA	3866.91	1407.84	0.39	389.58	1797.81	410.82	2047.86	46.49	safe
2	BIKRAMGANJ	4599.13	1745.1	0.465	642.62	2388.19	677.66	2175.9	51.93	safe
3	CHENARI	5977.35	1062.39	51	454.02	1567.41	478.77	4385.19	26.22	safe
4	DAWATH	4004.27	863.73	0.27	395.42	1259.42	416.99	2723.28	31.45	safe
5	DEHRI	5096.48	3228.45	23.4	675.61	3927.46	712.45	1132.18	77.06	semi critical
6	DINARA	9054.47	515.97	0.285	731.09	1247.34	770.95	7767.27	13.78	safe
7	KARAKAT	5999.54	1927.68	0.48	678.61	2606.78	715.61	3355.76	43.45	safe
8	KARGAHAR	8664.89	760.2	0.24	729.84	1490.28	769.63	7134.82	17.20	safe
9	KOCHAS	7796.77	5040.15	0.15	551.32	5591.61	581.37	2175.11	71.72	semi critical
10	NASRIGANJ	4564.23	360.63	0	505.68	866.31	533.24	3670.36	18.98	safe
11	NAUHATTA	7929.67	490.83	0	305.01	795.84	321.64	7117.2	10.04	safe
12	NOKHA	4213.73	1505.1	3.03	625.26	2133.38	659.35	2046.26	50.63	safe
13	RAJPUR	1958.38	378.12	0.84	243.88	622.84	257.18	1322.24	31.80	safe
14	ROHTAS	6160.75	375.33	0	289.45	664.78	305.23	5480.19	10.79	safe
15	SANJHAULI	2523.03	711.12	2.025	203.05	916.2	214.12	1595.77	36.31	safe
16	SASARAM	7345.25	846.12	60	929.59	1835.71	980.28	5458.85	24.99	safe
17	SHEOSAGAR	11379.32	1296.12	104.7	570.95	1971.77	602.08	9376.42	17.33	safe
18	SURAJPURA	1986.2	379.89	0	186.54	566.44	196.71	1409.61	28.52	safe
19	TILOUTHU	3384.13	1152.06	0	373.38	1525.43	393.73	1838.35	45.08	safe
DISTRICT TOTAL		**106504.5**	**24046.83**	**247.275**	**9480.89**	**33775**	**9997.81**	**72212.62**	**34.41**	**safe**
SAHARSA										

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			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
1	BANMA ITAHRI	2141.88	581.1	0	310.90	891.99	334.35	1226.44	41.65	safe
2	KAHARA	5237.67	1495.65	2.997	759.99	2258.64	817.32	2921.7	43.12	safe
3	MAHISHI	8178.39	2023.35	45	706.88	2775.23	760.2	5349.84	33.93	safe
4	NAUHATTA	4850.13	996.45	0	553.07	1549.52	594.8	3258.88	31.95	safe
5	PATARGHAT	4860.93	462.15	0	438.68	900.83	471.77	3927.01	18.53	safe
6	SALKHUA	5965.99	1132.95	0	454.14	1587.09	488.4	4344.64	26.60	safe
7	SATTAR KATAIYA	8078.04	1961.7	0	516.41	2478.11	555.37	5560.97	30.68	safe
8	SIMRI BAKHTIYARPUR	7336.02	3558.15	0	959.20	4517.34	1031.55	2746.33	61.58	safe
9	SONBARSA	7784.94	1571.7	0	806.24	2377.95	867.07	5346.16	30.55	safe
10	SOUR BAZAR	9218.2	3755.7	18	732.15	4505.85	787.38	4657.12	48.88	safe
DISTRICT TOTAL		**63652.19**	**17538.9**	**65.997**	**6237.65**	**23842.55**	**6708.21**	**39339.09**	**36.75**	**safe**
SAMASTIPUR										
1	BIBHUTIPUR	6550.31	4086	12	1150.38	5248.38	1234.74	1217.57	80.12	semi critical
2	BITHAN	3740.26	1876.5	4	505.41	2385.91	542.48	1317.28	63.79	safe
3	DALSINGSARAI	3094.43	2256	10	768.38	3034.38	824.73	60.05	98.06	critical
4	HASANPUR	4189.1	892.5	78	773.68	1744.19	830.42	2388.17	41.64	safe
5	KALYANPUR	7301.62	3840	16	1069.04	4925.06	1147.45	2298.14	67.45	safe
6	KHANPUR	4142.57	1884	12	665.87	2561.86	714.7	1531.88	61.84	safe
7	MOHANPUR	2436.52	1099.5	4	391.34	1494.85	420.04	912.97	61.35	safe
8	MOHIUDDIN NAGAR	4052.2	2160	9	627.74	2796.74	673.78	1209.42	69.02	safe
9	MORWA	3825.11	1972.5	3	633.02	2608.54	679.45	1170.14	68.20	safe
10	PATORI	3205.99	1470	8	612.21	2090.2	657.11	1070.89	65.20	safe
11	PUSA	2215.86	849	5	452.23	1306.23	485.4	876.46	58.95	safe
12	ROSERA	3093.63	1011	10	758.23	1779.23	813.83	1258.8	57.51	safe

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			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
13	SAMASTIPUR	4195.09	1825.5	32.4	1045.55	2903.45	1122.22	1214.97	69.21	safe
14	SARAIRANJAN	4446.67	2035.5	7	866.94	2909.44	930.52	1473.65	65.43	safe
15	SHIVAJINAGAR	4100.2	1878	10	659.47	2547.47	707.84	1504.36	62.13	safe
16	SINGHIYA	4346.42	1516.5	6	714.54	2237.05	766.94	2056.97	51.47	safe
17	TAJPUR	2283.2	1672.5	9.9	549.85	2232.26	590.17	80.6	97.77	critical
18	UJIYARPUR	5677.41	3951	11	1013.15	4975.15	1087.45	627.96	87.63	semi critical
19	VIDYAPATINAGAR	2727.57	1387.5	10	520.22	1917.73	558.37	771.69	70.31	semi critical
20	WARISNAGAR	4810.09	2725.5	7	753.78	3486.28	809.06	1268.53	72.48	semi critical
DISTRICT TOTAL		**80434.25**	**40389**	**264.3**	**14531.01**	**55184.4**	**15596.7**	**24310.5**	**68.48**	**safe**
SARAN										
1	AMNOUR	5275.66	808.5	0.804	655.78	1465.07	693.73	3772.64	27.77	safe
2	BANIYAPUR	9852.62	3412.5	2.25	859.58	4274.33	909.32	5528.55	43.38	safe
3	CHAPRA SADAR	6098.01	1083	5.4	1108.82	2197.22	1172.98	3836.63	36.03	safe
4	DARIYAPUR	6433.65	1479	7.5	969.18	2455.68	1025.26	3921.89	38.17	safe
5	DIGHWARA	2272.76	1072.5	0	500.49	1572.98	529.44	670.83	69.21	safe
6	EKMA	6129.28	2089.5	0.42	701.76	2791.67	742.36	3297.01	45.55	safe
7	GARKHA	5672.37	979.5	0.003	877.52	1857.02	928.3	3764.58	32.74	safe
8	ISUAPUR	4149.61	1245	0	480.47	1725.47	508.27	2396.34	41.58	safe
9	JALALPUR	5681.59	1416	0	569.92	1985.91	602.89	3662.71	34.95	safe
10	LAHLADPUR	1761.94	874.5	0	261.69	1136.19	276.84	610.59	64.49	safe
11	MAKER	2397.99	888	0.285	277.16	1165.44	293.2	1216.51	48.60	safe
12	MANJHI	8272.13	3205.5	0	877.25	4082.74	928.01	4138.63	49.36	safe
13	MARHAURA	7168.64	1447.5	108	937.57	2493.06	991.82	4621.33	34.78	safe
14	MASHRAKH	6699.04	1366.5	0.24	618.16	1984.9	653.93	4678.37	29.63	safe
15	NAGRA	3071.62	1071	7	405.87	1483.88	429.36	1564.25	48.31	safe
16	PANAPUR	3385.31	919.5	0	398.38	1317.87	421.43	2044.39	38.93	safe

S. No	District / Assessment Unit	Annual Extractable Ground Water Resource (Ham)	ANNUAL GROUND WATER DRAFT (Ham)				Annual GW Allocation for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization (OE/Critical/ Semi-critical/Safe)
			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
17	PARSA	4514.47	1020	0	509.97	1529.97	539.48	2954.99	33.89	safe
18	RIVILGANJ	3475.33	1456.5	0	482.83	1939.32	510.77	1508.07	55.80	safe
19	SONEPUR	4229.02	1879.2	0	972.24	2851.44	1028.49	1321.33	67.43	safe
20	TARAIYA	3725.04	1411.5	42	453.96	1907.45	480.22	1791.33	51.21	safe
DISTRICT TOTAL		**100266.08**	**29125.2**	**173.902**	**12918.60**	**42217.61**	**13666.1**	**57300.97**	**44.59**	**safe**
SHEIKHPURA										
1	ARIYARI	3531.06	1517.4	2.4	364.51	1884.31	384.79	1626.48	53.36	safe
2	BARBIGHA	2393.4	1579.5	0	549.93	2129.43	580.52	233.38	88.97	semi critical
3	CHEWARA	2833.47	1203	0	238.30	1441.31	251.56	1378.9	50.87	safe
4	GHAT KUSUMBA	2152.08	982.2	0	157.24	1139.45	165.99	1003.88	52.95	safe
5	SHEIKHOPUR SARAI	1640.54	618	0	219.48	837.48	231.69	790.85	51.05	safe
6	SHEIKHPURA	3780.71	1538.1	0	547.87	2085.97	578.35	1664.26	55.17	safe
DISTRICT TOTAL		**16331.26**	**7438.2**	**2.4**	**2077.33**	**9517.95**	**2192.9**	**6697.75**	**58.73**	**safe**
SHEOHAR										
1	DUMRI KATSARI	2380.16	751.5	1	322.70	1075.21	348.57	1279.08	45.17	safe
2	PIPRAHI	3010.78	1198.5	1	407.53	1607.03	440.19	1371.09	53.38	safe
3	PURNAHIYA	2366.83	960	1	317.70	1278.71	343.16	1062.65	54.03	safe
4	SHEOHAR	3538.31	1514.7	3	605.82	2123.53	654.38	1366.22	60.02	safe
5	TARIYANI	5415.2	2721	175.002	683.05	3579.06	737.8	1781.39	66.09	safe
DISTRICT TOTAL		**16711.28**	**7145.7**	**181.002**	**2336.8**	**9663.54**	**2524.1**	**6860.43**	**55.74**	**safe**
SITAMARHI										
1	BAIRGANIA	1739.77	371.28	0	565.18	936.45	611.71	756.79	53.83	safe
2	BAJPATTI	3952.24	677.04	0	748.18	1425.23	809.78	2465.41	36.06	safe
3	BATHNAHA	4521.03	1048.92	0	911.42	1960.35	986.46	2485.64	43.36	safe
4	BELSAND	2352.14	667.94	0	470.75	1138.69	509.51	1174.69	48.41	safe

S. No	District / Assessment Unit	Annual Extractable Ground Water Resource (Ham)	ANNUAL GROUND WATER DRAFT (Ham)				Annual GW Allocation for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization (OE/Critical/ Semi-critical/Safe)
			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
5	BOKHRA	2683.2	1092	0	454.40	1546.4	491.81	1099.39	57.63	safe
6	CHORAUT	2214.28	709.8	0	275.34	985.14	298.01	1206.47	44.49	safe
7	DUMRA	5906.77	1838.2	0	1332.75	3170.94	1442.47	2626.11	53.68	safe
8	MAJORGANJ	2010.6	724.36	0	356.84	1081.2	386.22	900.02	53.77	safe
9	NANPUR	2699.64	519.3	0	633.35	1152.64	685.49	1494.86	42.70	safe
10	PARIHAR	6175.83	1865.5	0	1174.22	3039.71	1270.89	3039.45	49.22	safe
11	PARSAUNI	1787.94	573.3	0	298.63	871.93	323.21	891.43	48.77	safe
12	PUPRI	2957.15	942.76	0	633.27	1576.03	685.41	1328.98	53.30	safe
13	RIGA	4019.12	1461.46	88	718.58	2268.03	777.74	1691.93	56.43	safe
14	RUNNI SAIDPUR	7752.25	1483.9	0	1293.49	2777.4	1399.99	4868.35	35.83	safe
15	SONBARSA	5091.33	2011.1	0	872.27	2883.36	944.08	2136.16	56.63	safe
16	SUPPI	2188.32	637	0	424.38	1061.38	459.32	1092	48.50	safe
17	SURSAND	3746.24	604.84	0	728.87	1333.71	788.88	2352.52	35.60	safe
DISTRICT TOTAL		**61797.85**	**17228.7**	**88**	**11891.92**	**29208.59**	**12870.98**	**31610.2**	**48.13**	**safe**
SIWAN										
1	ANDAR	4561.29	2086.91	0	364.08	2450.99	386.67	2087.71	53.73	safe
2	BARHARIA	7900.94	3944.34	0	1063.15	5007.49	1129.13	2827.47	63.38	safe
3	BASANTPUR	2754.43	1362.74	0.36	348.20	1711.29	369.81	1021.53	62.13	safe
4	BHAGWANPUR	6062.21	3453.97	0	730.13	4184.1	775.44	1832.81	69.02	safe
5	DARAULI	9260.22	4115.75	1.2	576.94	4693.89	612.75	4530.52	50.69	safe
6	DARAUNDHA	6280.13	3280.9	0.36	573.11	3854.36	608.68	2390.2	61.37	safe
7	GORIAKOTHI	5557.14	1234.51	0	740.25	1974.76	786.19	3536.44	35.54	safe
8	GUTHANI	4711.14	2335.79	15	424.06	2774.86	450.38	1909.96	58.90	safe
9	HASANPURA	3298.83	1552.7	0	494.96	2047.65	525.68	1220.46	62.07	safe
10	HUSSAINGANJ	4201.74	2061.52	2.25	604.86	2668.63	642.4	1495.57	63.51	safe
11	LAKRI NABIGANJ	3743.52	1729.43	0	426.52	2155.96	453	1561.08	57.59	safe

S. No	District / Assessment Unit	Annual Extractable Ground Water Resource (Ham)	ANNUAL GROUND WATER DRAFT (Ham)				Annual GW Allocation for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization (OE/Critical/ Semi-critical/Safe)
			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
12	MAHARAJGANJ	4343.77	1687.05	12	686.82	2385.86	729.45	1915.29	54.93	safe
13	MAIRWA	3985.36	1256.73	0	431.26	1688	458.03	2270.59	42.36	safe
14	NAUTAN	3333.86	1882.65	0	300.17	2182.83	318.8	1132.4	65.47	safe
15	PACHRUKHI	4521.49	1709.87	4.8	667.62	2382.29	709.05	2097.77	52.69	safe
16	RAGHUNATHPUR	6821.2	3354.54	0	521.81	3876.34	554.19	2912.48	56.83	safe
17	SISWAN	4088.78	1142.63	0	509.43	1652.06	541.05	2405.1	40.40	safe
18	SIWAN SADAR	6080.52	3140.15	175.19364	911.23	4226.57	967.78	1797.4	69.51	safe
19	ZIRADEI	6240.28	2641.54	7.65	541.85	3191.04	575.48	3015.61	51.14	safe
DISTRICT TOTAL		**97746.85**	**43973.72**	**218.81364**	**10916.45**	**55108.97**	**11593.96**	**41960.39**	**56.38**	**safe**
SUPAUL										
1	BASANTPUR	9282.85	3730.35	7	757.92	4495.27	823.69	4721.81	48.43	safe
2	CHHATAPUR	16164.98	4233.45	5	1004.01	5242.47	1091.14	10835.38	32.43	safe
3	KISHANPUR	5861.15	2250.3	6	587.67	2843.97	638.67	2966.18	48.52	safe
4	MARAUNA	3114.72	945	5	508.70	1458.69	552.83	1611.9	46.83	safe
5	NIRMALI	2439.45	803.4	5	395.55	1203.95	429.88	1201.17	49.35	safe
6	PIPRA	11297.01	4130.1	6	705.89	4841.99	767.15	6393.76	42.86	safe
7	PRATAPGANJ	5786.3	1092.45	6	374.62	1473.07	407.13	4280.72	25.46	safe
8	RAGHOPUR	9840.03	2256.15	10	755.82	3021.97	821.4	6752.48	30.71	safe
9	SARAIGARH-BHAPTIYAHI	6805.95	1023.75	8	430.31	1462.06	467.65	5306.55	21.48	safe
10	SUPAUL	11127.59	2293.2	3.3	1151.07	3447.58	1250.96	7580.12	30.98	safe
11	TRIVENGANJ	15759.44	1277.25	10	1130.27	2417.51	1228.34	13243.86	15.34	safe
DISTRICT TOTAL		**97479.47**	**24035.4**	**71.3**	**7801.83**	**31908.53**	**8478.84**	**64893.93**	**35.67**	**safe**
VAISHALI										
1	BHAGWANPUR	6521.98	2593.33	131.7	239.18	2964.21	790.31	3006.64	45.45	safe
2	BIDUPUR	3896.9	2526.5	0	941.41	3467.91	1022.68	347.72	88.99	semi critical

S. No	District / Assessment Unit	Annual Extractable Ground Water Resource (Ham)	ANNUAL GROUND WATER DRAFT (Ham)				Annual GW Allocation for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization (OE/Critical/ Semi-critical/Safe)
			Irrigation	Industrial	Domestic	Total Extraction				
1	**2**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
3	CHEHRA KALAN	2768.52	1217.61	0	458.73	1676.33	498.33	1052.59	60.55	safe
4	DESRI	2280.88	1092.1	129	335.00	1556.1	363.91	695.87	68.22	safe
5	GORAUL	3332	1737.58	213	306.76	2257.34	333.25	1048.17	67.75	safe
6	HAJIPUR	4016.79	2971.49	157.59	621.84	3750.92	675.52	359.34	93.38	critical
7	JANDAHA	5016.12	3242.07	252	1303.45	4797.52	1415.97	1541.71	95.64	critical
8	LALGANJ	5108.66	2388.55	195	967.21	3550.76	1050.7	1474.41	69.50	safe
9	MAHNAR	2793.46	1059.5	420	1022.06	2501.56	1110.29	203.67	89.55	semi critical
10	MAHUA	8585.97	2535.42	159	752.27	3446.69	817.21	5074.34	40.14	safe
11	PATEHRI BELSAR	7090.88	1605.55	195	1296.24	3096.79	1408.14	3882.19	43.67	safe
12	PATEPUR	5667.4	4580.3	6	996.30	5582.6	1082.31	966.15	98.50	critical
13	RAGHOPUR	5869.72	1096.99	75	815.56	1987.55	885.96	3811.77	33.86	safe
14	RAJA PAKAR	2452.58	1717.5	75	553.71	2346.21	601.51	106.37	95.66	critical
15	SAHDAI	2592.81	1142.63	0	446.09	1588.72	484.6	965.58	61.27	safe
16	VAISHALI	5089.83	1864.72	255	656.51	2776.23	713.18	2256.93	54.54	safe
DISTRICT TOTAL		**73084.5**	**33371.84**	**2263.29**	**11712.32**	**47347.44**	**13253.87**	**26793.45**	**69.17**	**safe**
WEST CHAMPARAN										
1	BAGAHA 1	20528.72	3392.03	645	1210.06	5247.09	1318.35	15173.34	25.56	safe
2	BAGAHA 2	18500.58	1401.8	540	999.94	2941.74	1089.43	15469.35	15.90	safe
3	BAIRIYA	9785.07	960.07	83	1092.27	2135.34	1190.01	7551.99	21.82	safe
4	BETTIAH	2193.49	366.75	360	743.75	1470.5	810.31	656.43	67.04	safe
5	BHITAHA	3339.15	880.2	40	1164.56	2084.76	1268.77	1150.18	62.43	safe
6	CHANPATIA	11719.12	1101.88	105	233.36	1440.24	254.24	10258	12.29	safe
7	GAUNAHA	6416.83	781.28	83	1117.74	1982.03	1217.77	4334.77	30.89	safe
8	LAURIYA	9167.84	2682.98	360	858.37	3901.34	935.18	5189.69	42.55	safe
9	MADHUBANI	3923.42	900.36	38	811.29	1749.66	883.89	2101.16	44.60	safe
10	MAINATAND	10050.24	2214.65	71	315.86	2601.5	344.12	7420.48	25.88	safe

S. No	District / Assessment Unit	Annual Extractable Ground Water Resource (Ham)	ANNUAL GROUND WATER DRAFT (Ham)				Annual GW Allocation for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization (OE/Critical/ Semi-critical/Safe)
			Irrigation	Industrial	Domestic	Total Extraction				
1	2	9	10	11	12	13	14	15	16	17
11	MAJHAULIA	11102.02	2305.83	450	672.35	3428.18	732.52	7613.67	30.88	safe
12	NARKATIAGANJ	13111.06	2829.25	540	1160.91	4530.16	1264.79	8477.02	34.55	safe
13	NAUTAN	9770.96	1977.19	240	1456.49	3673.69	1586.83	5966.93	37.60	safe
14	PIPRASI	3129.16	283.62	28	823.32	1134.94	897	1920.54	36.27	safe
15	RAMNAGAR	8828.54	2594.53	651	136.03	3381.56	148.2	5434.81	38.30	safe
16	SIKTA	8416.16	935.62	74	667.95	1677.57	727.72	6678.82	19.93	safe
17	THAKARAHA	2889.48	456.4	26	185.99	668.4	202.64	2204.43	23.13	safe
18	YOGAPATTI	11241.49	2373.28	62	733.77	3169.05	799.43	8006.78	28.19	safe
DISTRICT TOTAL		**164113.33**	**28437.72**	**4396**	**14384.01**	**47217.75**	**15671.2**	**115608.39**	**33.21**	**safe**
STATE TOTAL (HAM)		**3095450.98**	**1021130.19**	**40141.63**	**348300.04**	**1409571.69**	**375965.02**	**1670343.33**	**51.15**	**safe**
STATE TOTAL (MCM)		**30954.5**	**10211.30**	**401.41**	**3483**	**14095.71**	**3759.65**	**16703.43**	**51.15**	**Safe**
STATE TOTAL (BCM)		**30.95**	**10.21**	**0.4**	**3.48**	**14.09**	**3.75**	**16.7**	**44.76**	**Safe**

Annexure VII
Minutes of the Meeting of the SLC Committee
GWRA 2024

Minutes of 2nd State Level Committee meeting held in the Chamber of Secretary, Minor Water Resources Department, Government of Bihar on 18.09.2024 regarding approval of Dynamic Ground Water Resources Assessment (GWRA) 2024 of Bihar

2nd Meeting of State Level Committee (SLC) was convened for approval of GWRA 2024 in the chamber of Secretary, Minor Water Resources Department; Govt. of Bihar on 18.09.2024.The meeting was conducted under the chairmanship of Dr. Sandeep Kumar R. Pudakalkatti, IAS, Secretary, Minor Water Resources Department, Govt. of Bihar and Chairman of SLC. The meeting was attended by the committee members along with officers from CGWB, MER, Patna. The list of the participants is attached as Annexure-I.

The meeting commenced with the permission of Dr. Sandeep Kumar R. Pudakalkatti, IAS, Secretary, Minor Water Resources Department, Govt. of Bihar and Chairman of SLC. Shri Rajeev Ranjan Shukla, Regional Director, CGWB, MER, Patna & Member Secretary (SLC), welcomed all the committee members and gave a brief about Dynamic Ground Water Resources of Bihar.

A detailed presentation was made by Shri Alok Kumar Sinha, Scientist-D, CGWB, MER, Patna on Dynamic Ground Water Resources Assessment of Bihar, 2024. The discussions were held on the results of Ground Water Resources Assessment, 2024 of Bihar. The results of the GWRA-2024 are as follows.

No. of Assessment Units	535 (534 Blocks+ Patna Urban)
Descriptions	**In bcm**
• Total Annual Ground Water Recharge	34.15
• Natural Discharges	3.19
• Annual Extractable Ground Water Resource	30.95
• Ground Water Draft for Irrigational Uses	10.21
• Ground Water Draft for Domestic Uses	3.48
• Ground Water Draft for Industrial Uses	0.4
• Total Extraction	14.10
• Net Annual Ground Water Availability for 'Future Uses'	16.7
• Stage of Ground Water Extraction (%)	45.54%
No. of assessment units Categorised Under	
o Safe	473
o Semi-critical	49
o Critical	9
o Over exploited	4

District wise summary of the OCS blocks presented during the meeting are given below.

Table-1: District-wise number of blocks categorized as OCS (*Over Exploited/ Critical/ Semi Critical*) other than *'Safe'* in Bihar.

S. No	Name of District	Total no. of blocks	Semi Critical	Critical	Over Exploited	Total
1	Begusarai	18	4	0	0	4
2	Bhojpur	14	3	0	0	3
3	Gaya	24	4	0	0	4
4	Jehanabad	7	3	0	2	5
5	Kaimur	11	1	0	0	1
6	Muzaffarpur	16	5	1	0	6
7	Nalanda	20	10	1	1	12
8	Nawada	14	5	0	0	5
9	Patna	24	5	1	1	7
10	Rohtas	19	2	0	0	2
11	Samastipur	20	4	2	0	6
12	Sheikhpura	6	1	0	0	1
13	Vaishali	16	2	4	0	6
State Total			**49**	**9**	**4**	**62**

The results of the assessment and categorisation of blocks were agreed upon and approved by the Committee.

List of Participants

S. No.	Name of participants	Designation/ Organisation	Email ID
1	Dr. S.K. Jain	Prof.& Head IDE Dr. R.P.C.A.U., Pusa	skjain@rpcau.ac.in
2	Sh. Daya Shankar Prasad	C.E.(South Bihar),PHED, Patna	dayaprasad06@gmail.com
3	Sh. Sunil Kumar	C.E. MWRD, Patna	ce.pmg@nic.in
4	Sh. Rajeev Ranjan Shukla	Regional Director, CGWB, MER, Patna	rdmer-cgwb@gov.in
5	Sh. Madhav Kumar Pandit	S.E.(monitoring), MWRD, Patna	madhavpandit@gmail.com
6	Sh. Mukesh Kumar	AGM , NABARD	mukeshkumar@nabard.org
7	Sh. Abhishek Ranjan	Executive Engineer, P.R.D.	abhishek94707@gmail.com
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